

KIC 007870390

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 007870390-01 | OBS | 0898.01 | 9.770441 | 136.632273 | 1862.0 | 2.572 | 46.7 | 50.8 | 0.51 | 3906 | 2.37 | 10.61 |
| 007870390-02 | OBS | 0898.02 | 5.169804 | 136.443641 | 1024.4 | 2.408 | 34.1 | 38.5 | 0.51 | 3906 | 1.88 | 24.79 |
| 007870390-03 | OBS | 0898.03 | 20.090187 | 147.976064 | 1458.0 | 3.971 | 29.2 | 31.9 | 0.51 | 3906 | 2.20 | 4.06 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|------------|
| 007870390-01 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |
| 007870390-02 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |
| 007870390-03 | 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.

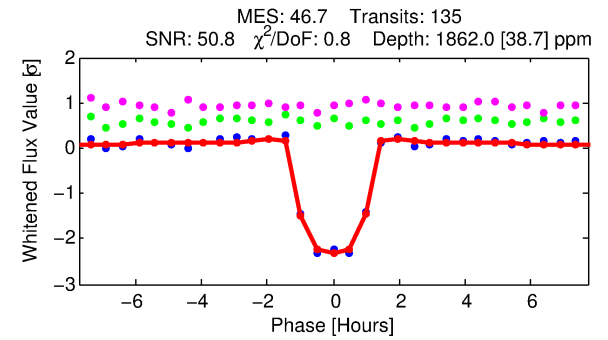
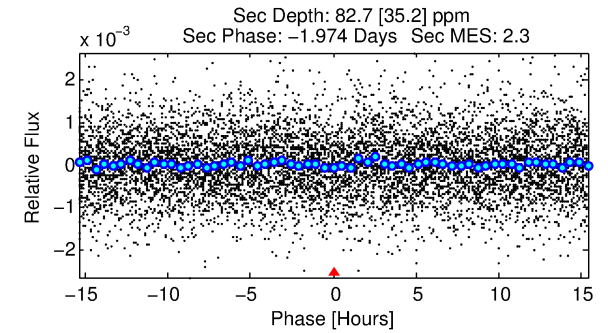
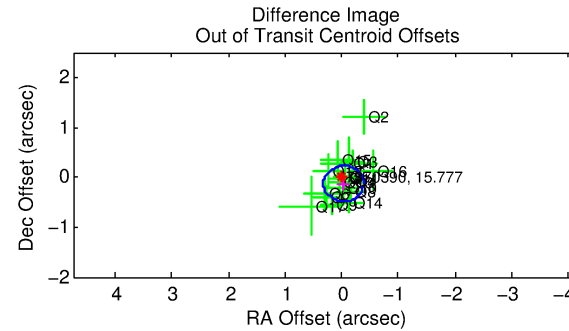
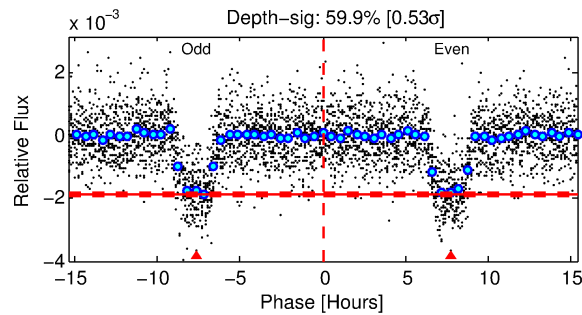
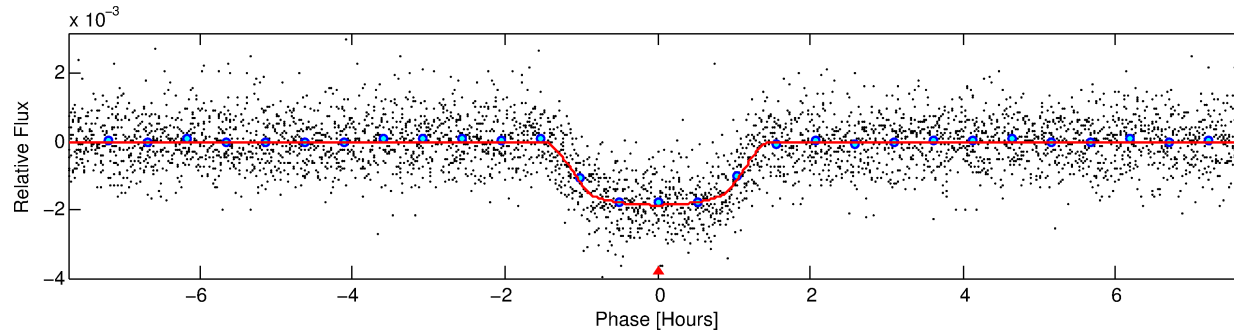
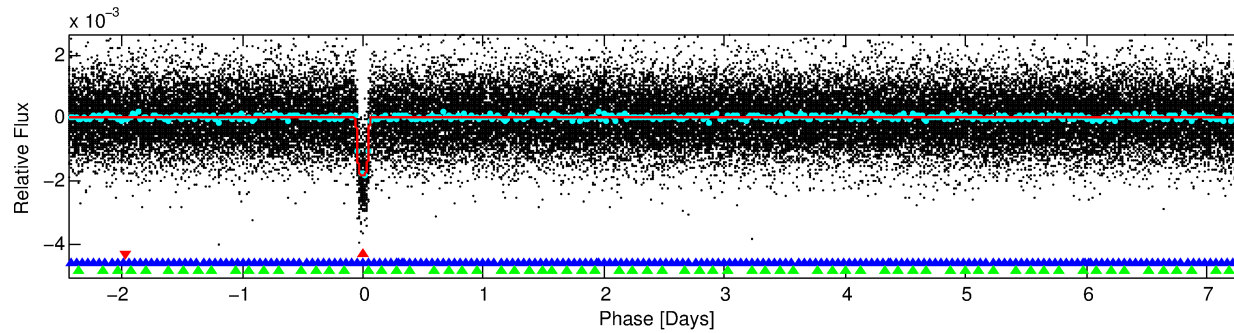
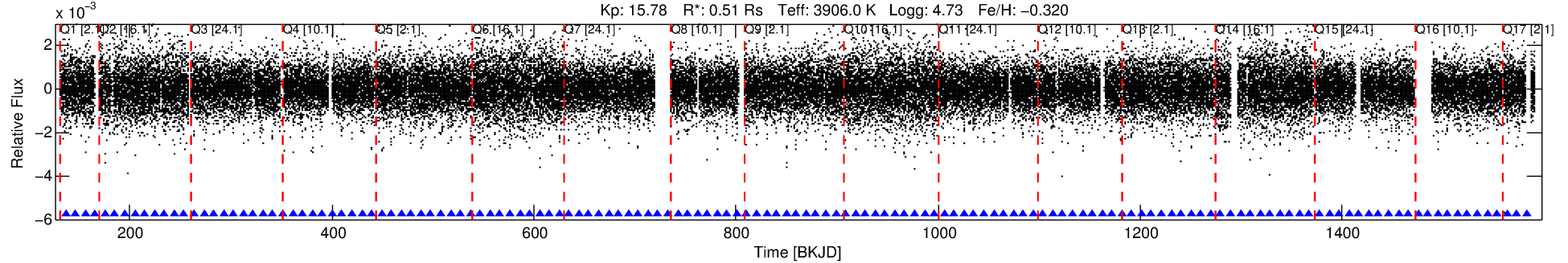
Ephemeris Match Information For 007870390-01

No Significant Match Found

DV One-Page Summary

KIC: 7870390 Candidate: 1 of 3 Period: 9.770 d
KOI: K00898.01 Name: Kepler-83b Corr: 0.981

Kp: 15.78 R*: 0.51 Rs Teff: 3906.0 K Logg: 4.73 Fe/H: -0.320



DV Fit Results:

Period = 9.77044 [0.00001] d
Epoch = 136.6323 [0.0011] BKJD
Rp/R* = 0.0427 [0.0045]
a/R* = 21.52 [10.60]
b = 0.73 [0.31]
Seff = 10.61 [1.41]
Teq = 460 [15] K
Rp = 2.37 [0.33] Re
a = 0.0714 [0.0052] AU
Ag = 41.17 [19.99] [2.01σ]
Teffp = 1802 [218] K [6.15σ]

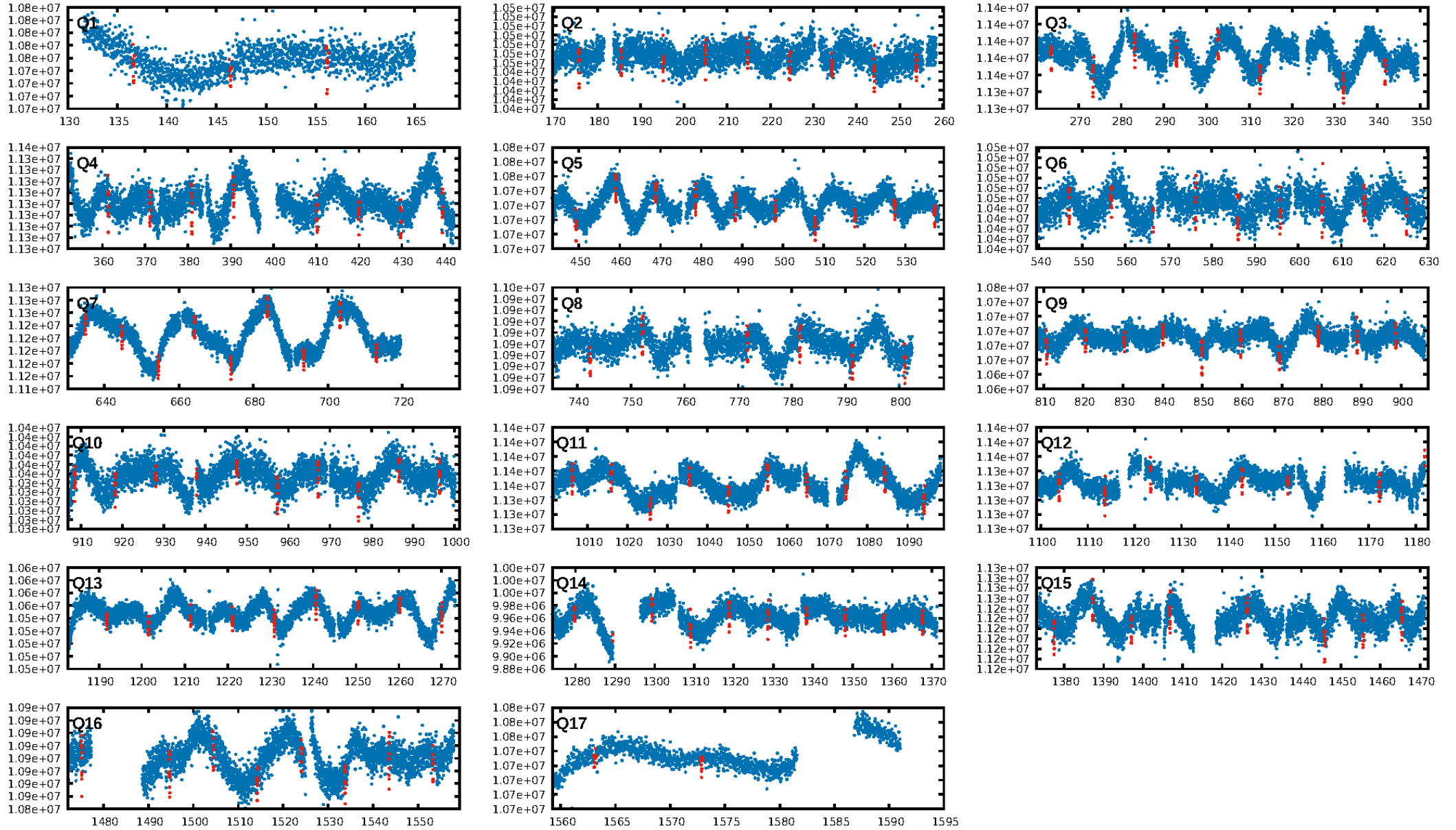
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [31.34σ]
LongPeriod-sig: 100.0% [52.35σ]
ModelChiSquare2-sig: 100.0%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 0.00e+00
RollingBand-fgt: 1.00 [130/130]
GhostDiagnostic-chr: 2.56
Centroid-sig: 13.4%
Centroid-so: 0.416 arcsec [1.70σ]
OotOffset-rm: 0.134 arcsec [1.14σ]
KicOffset-rm: 0.081 arcsec [0.56σ]
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]

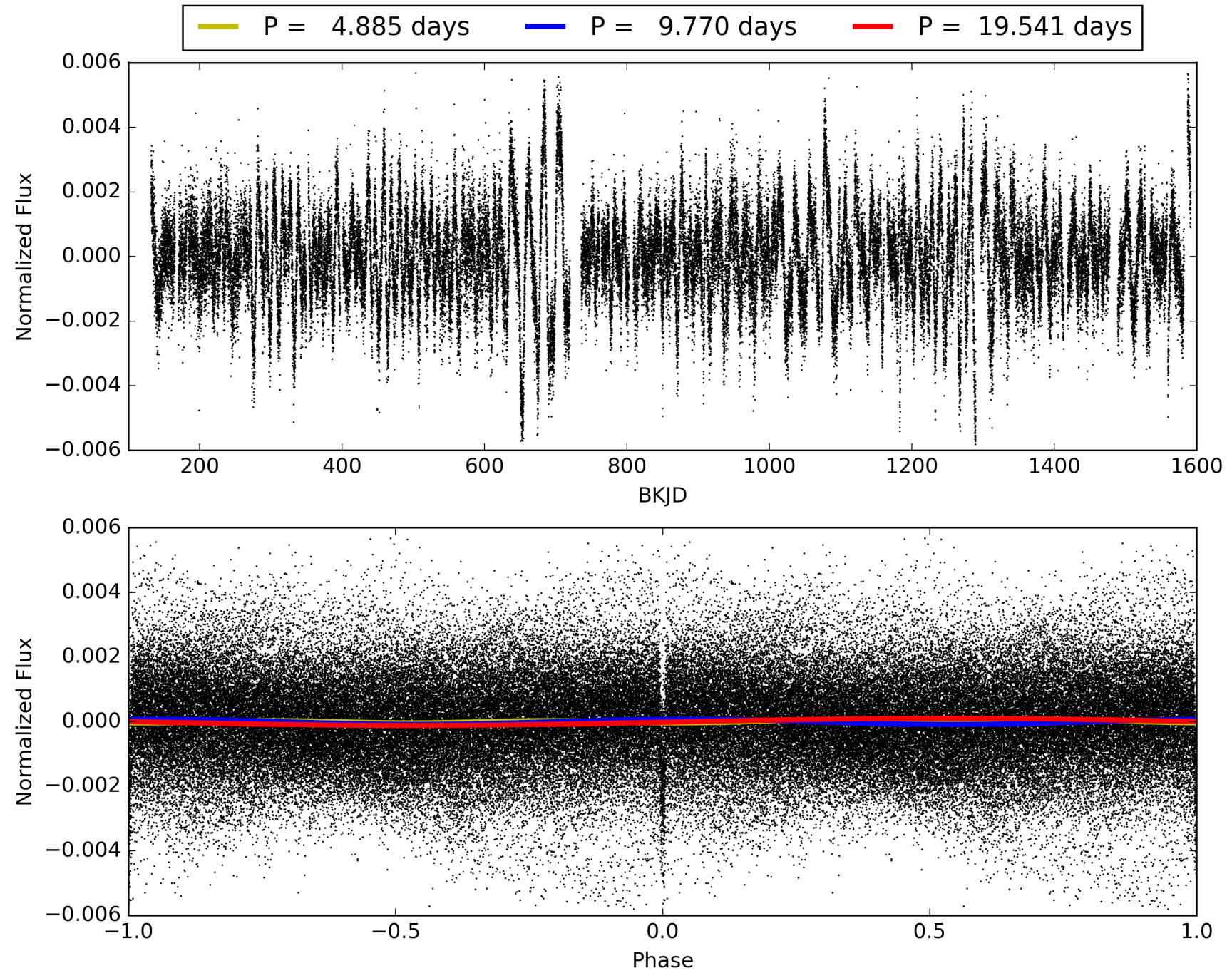
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 09:33:14 Z

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

TCE 007870390-01, PDC Light Curves

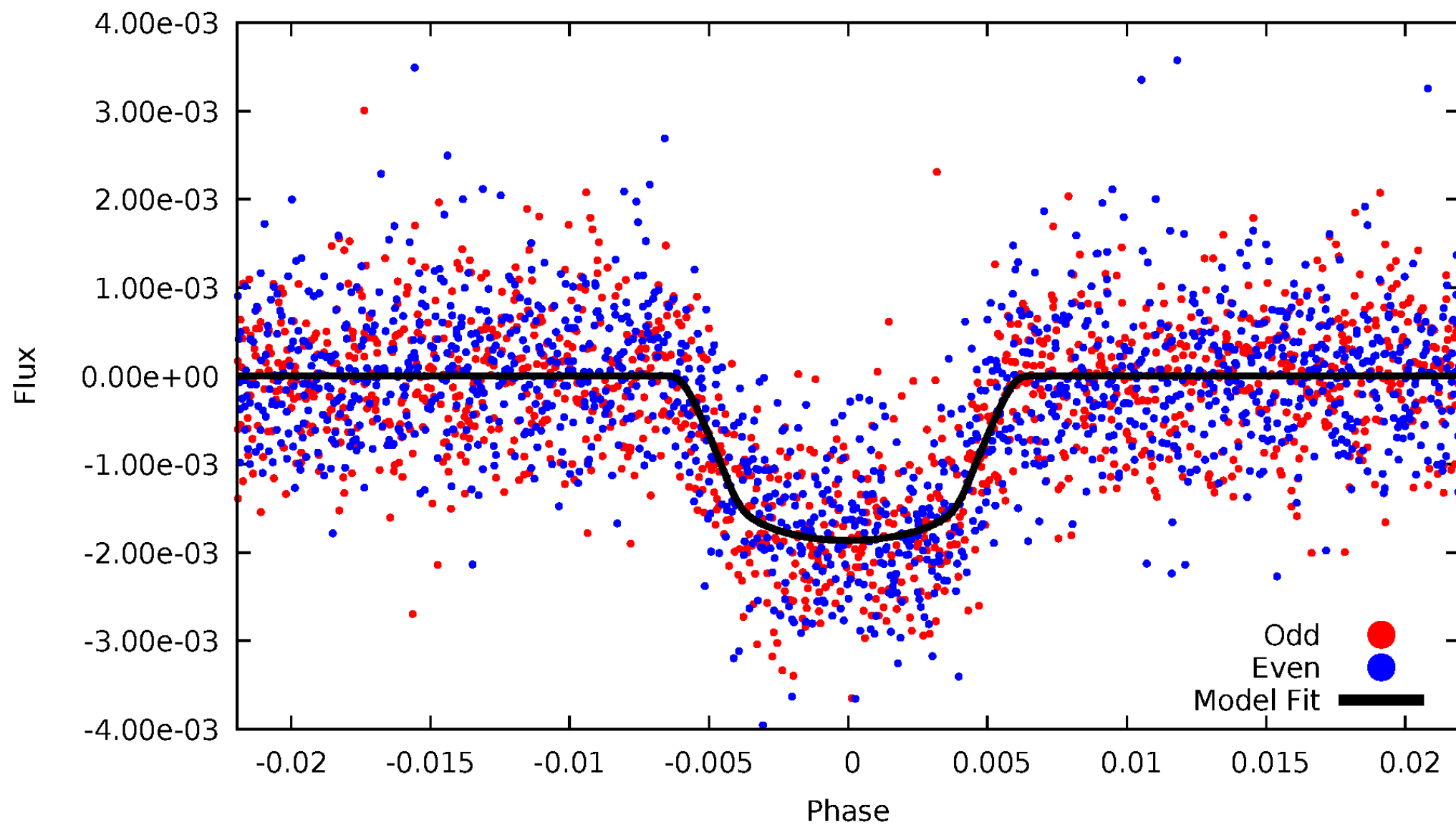


TCE 007870390-01



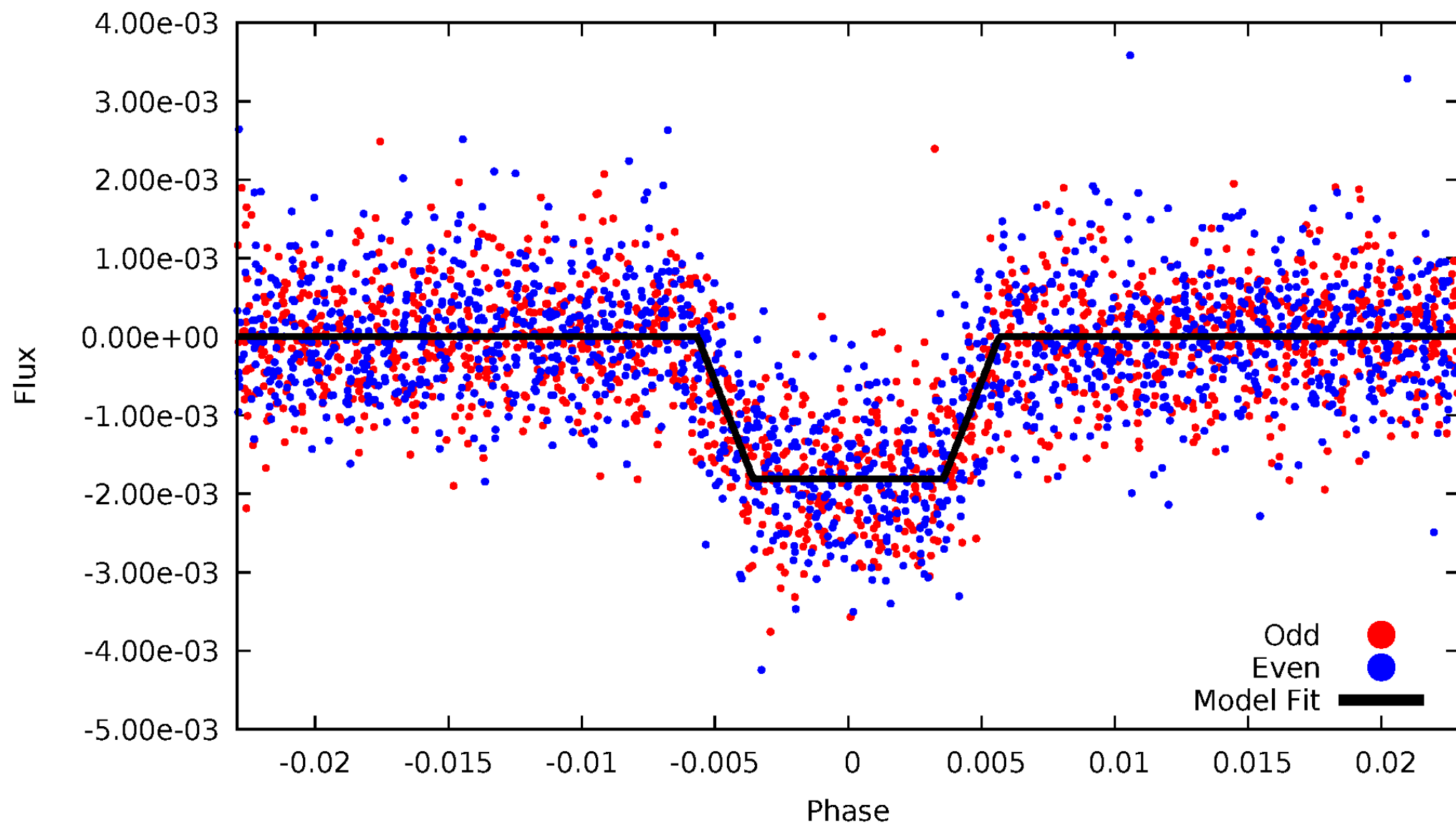
DV Odd/Even

TCE 007870390-01



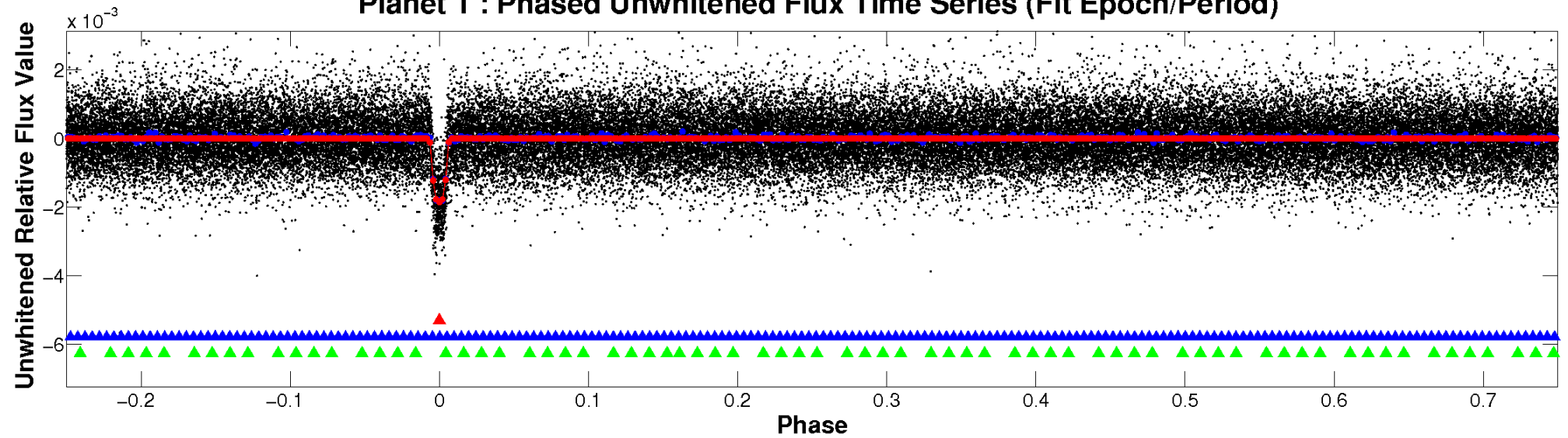
ALT Odd/Even

TCE 007870390-01

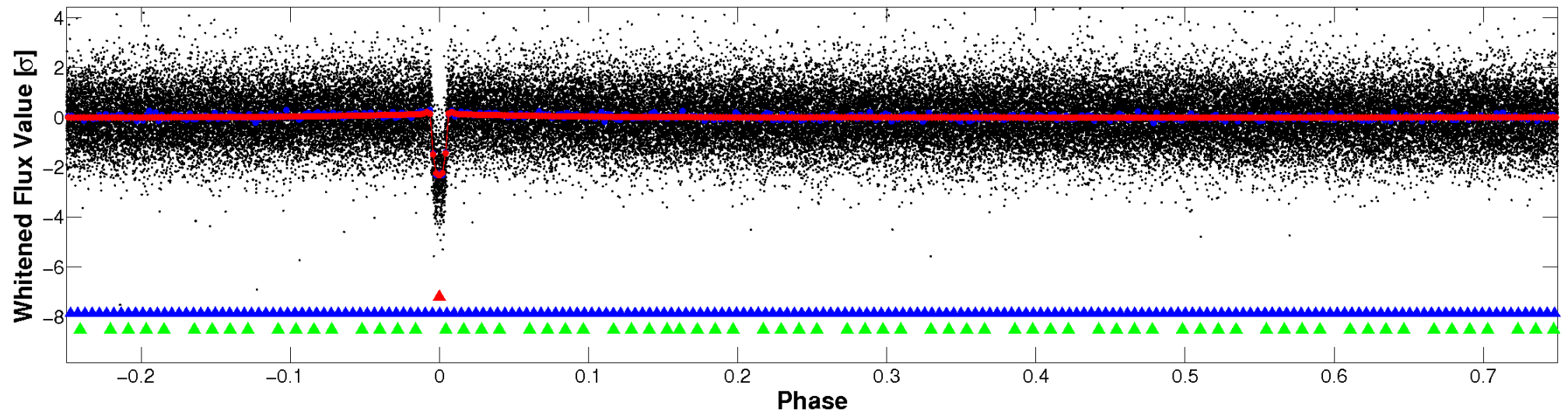


Non-Whitened Vs. Whitened Light Curve

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

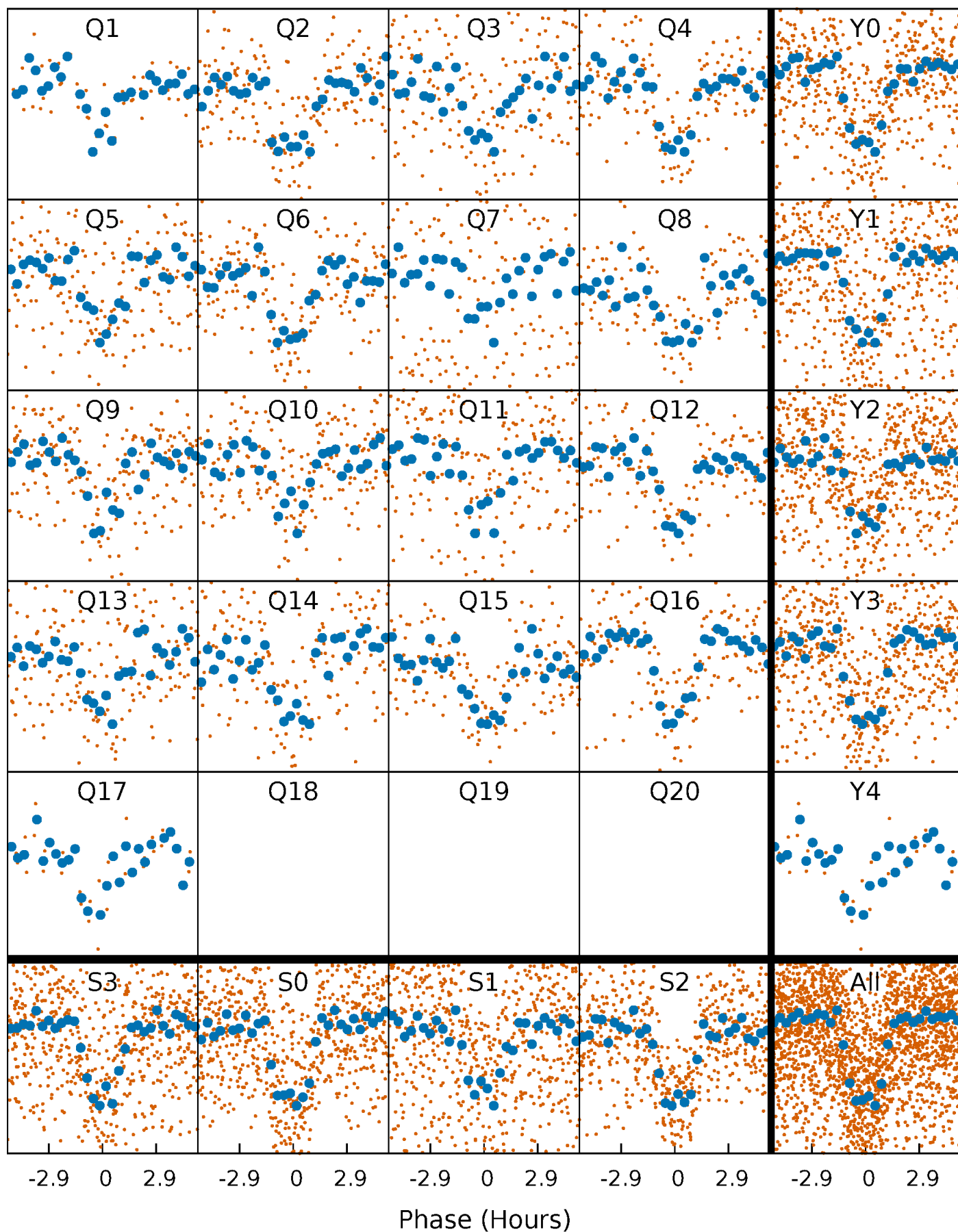


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



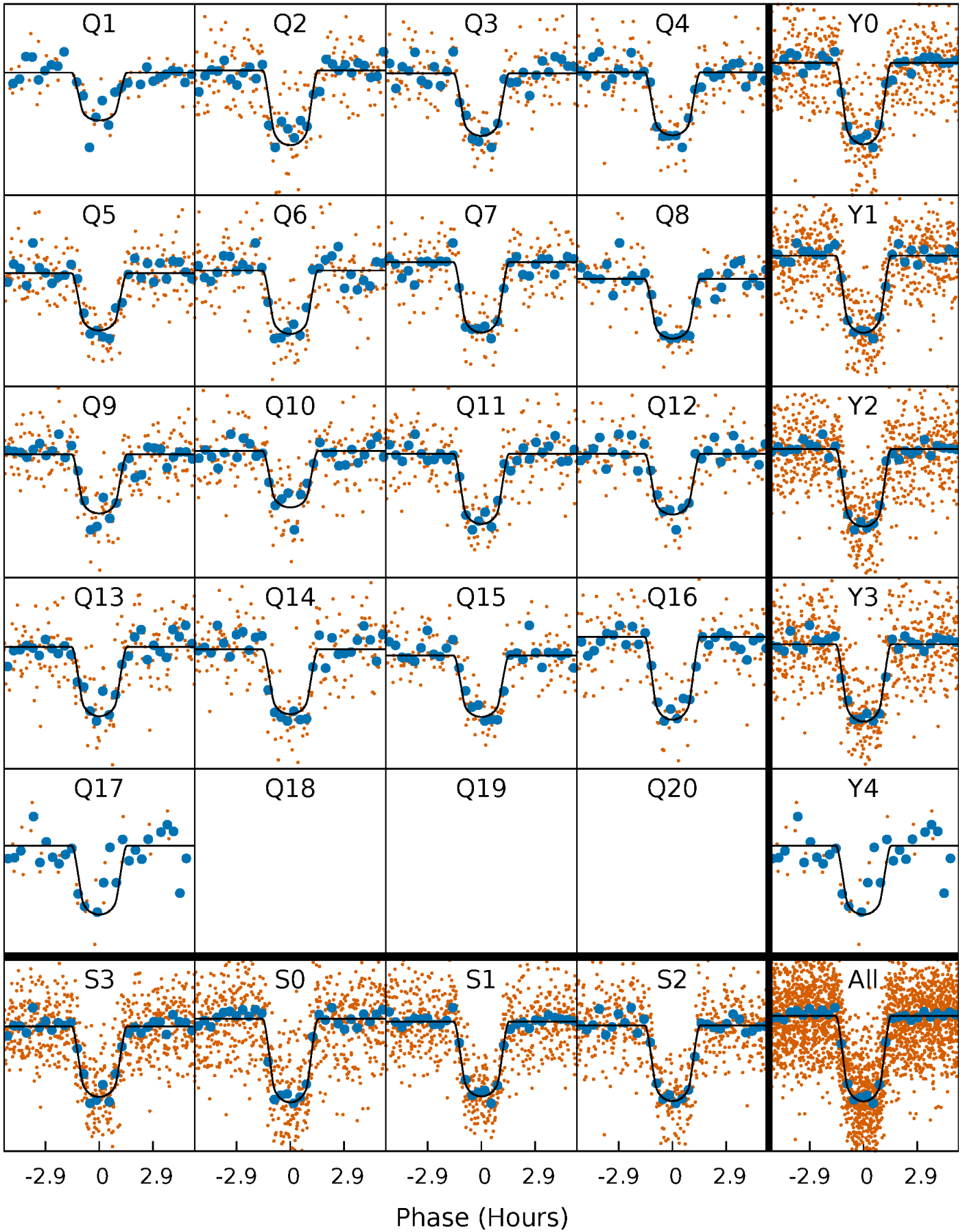
PDC Quarter-Phased Transit Curves

TCE 007870390-01 P= 9.770441 Days $T_0=136.632273$ (BKJD)



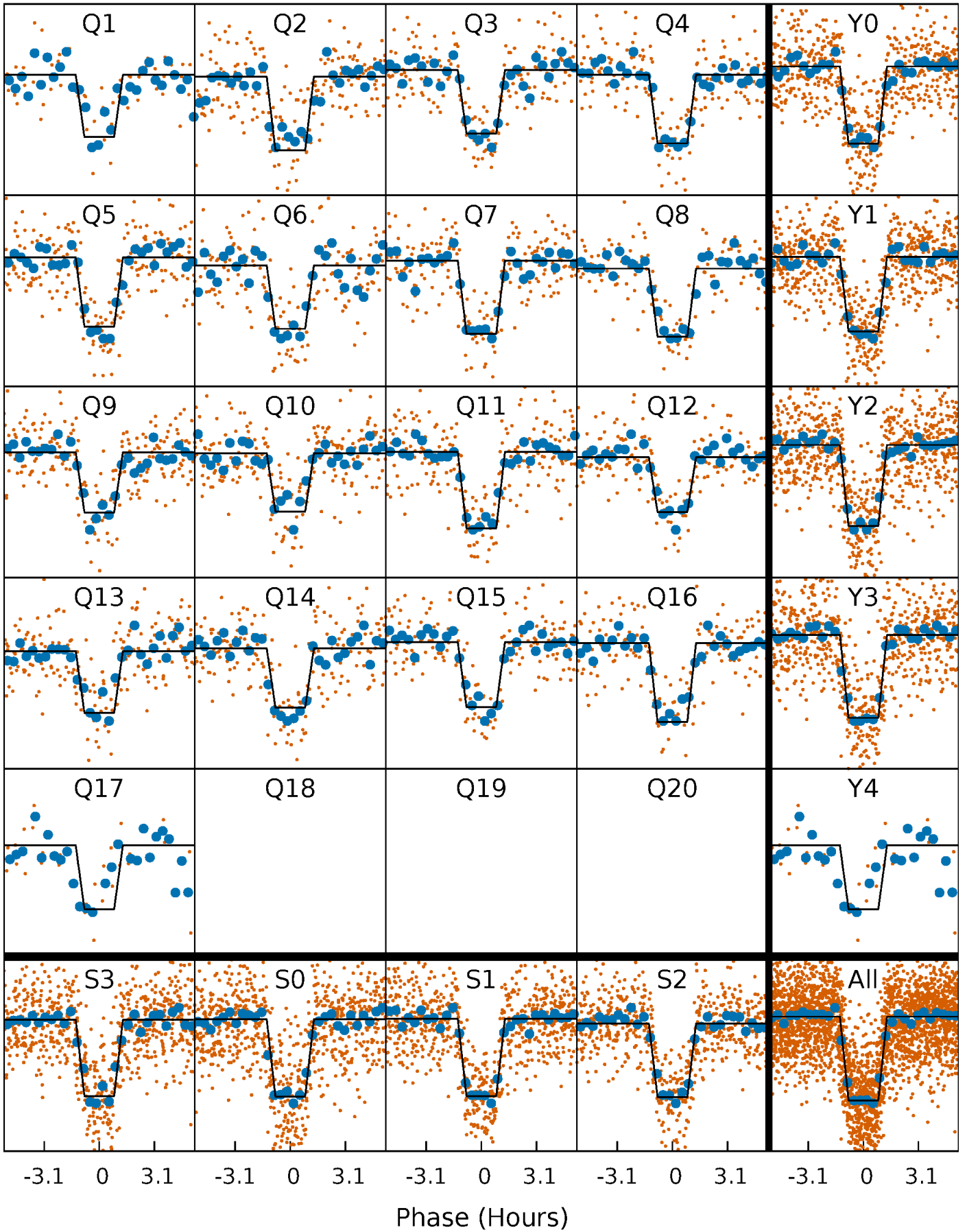
DV Quarter-Phased Transit Curves

TCE 007870390-01 P= 9.770441 Days $T_0=136.632273$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

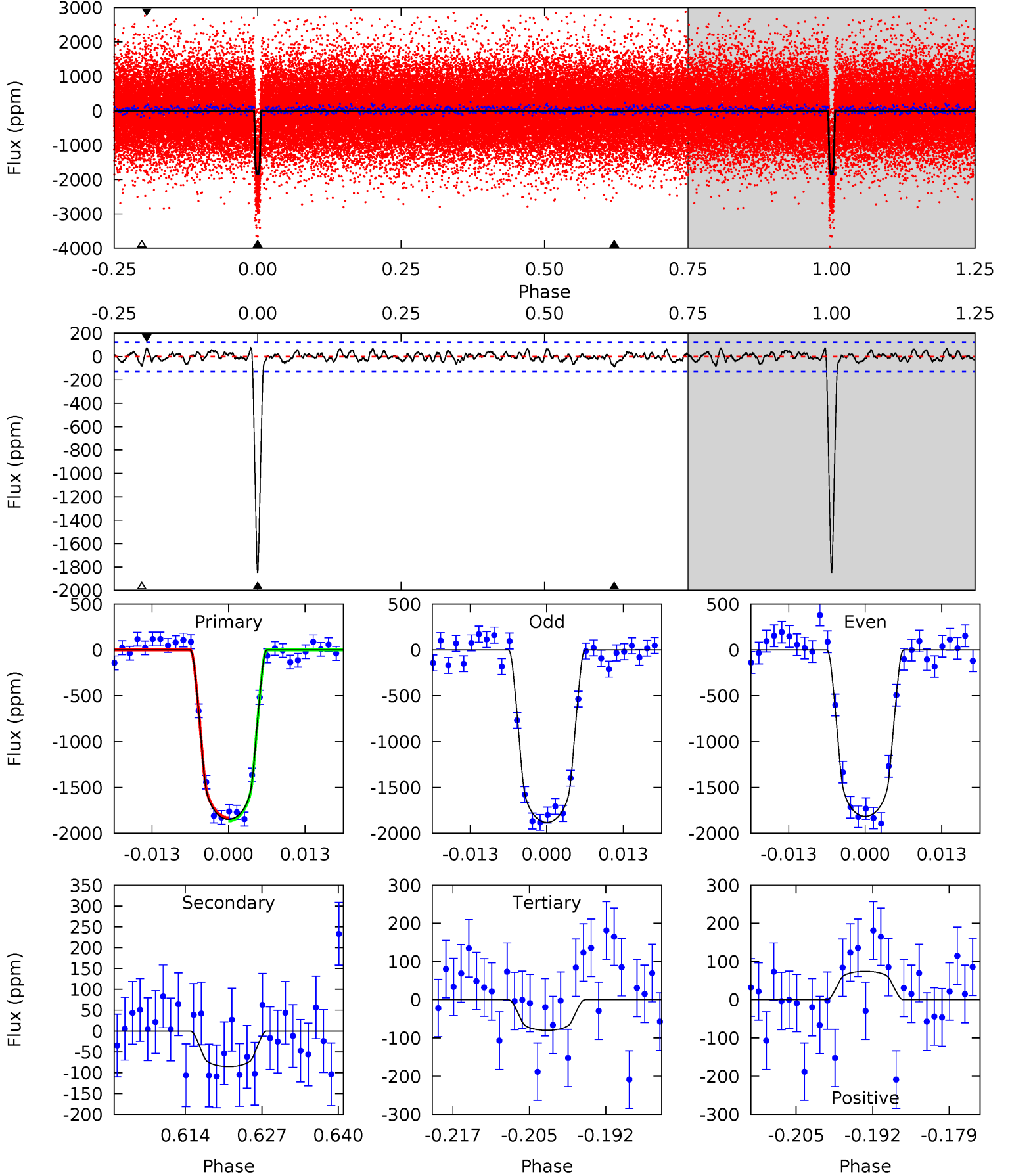
TCE 007870390-01 P= 9.770472 Days $T_0=136.630267$ (BKJD)



DV Model-Shift Uniqueness Test

007870390-01, P = 9.770441 Days, E = 126.861832 Days

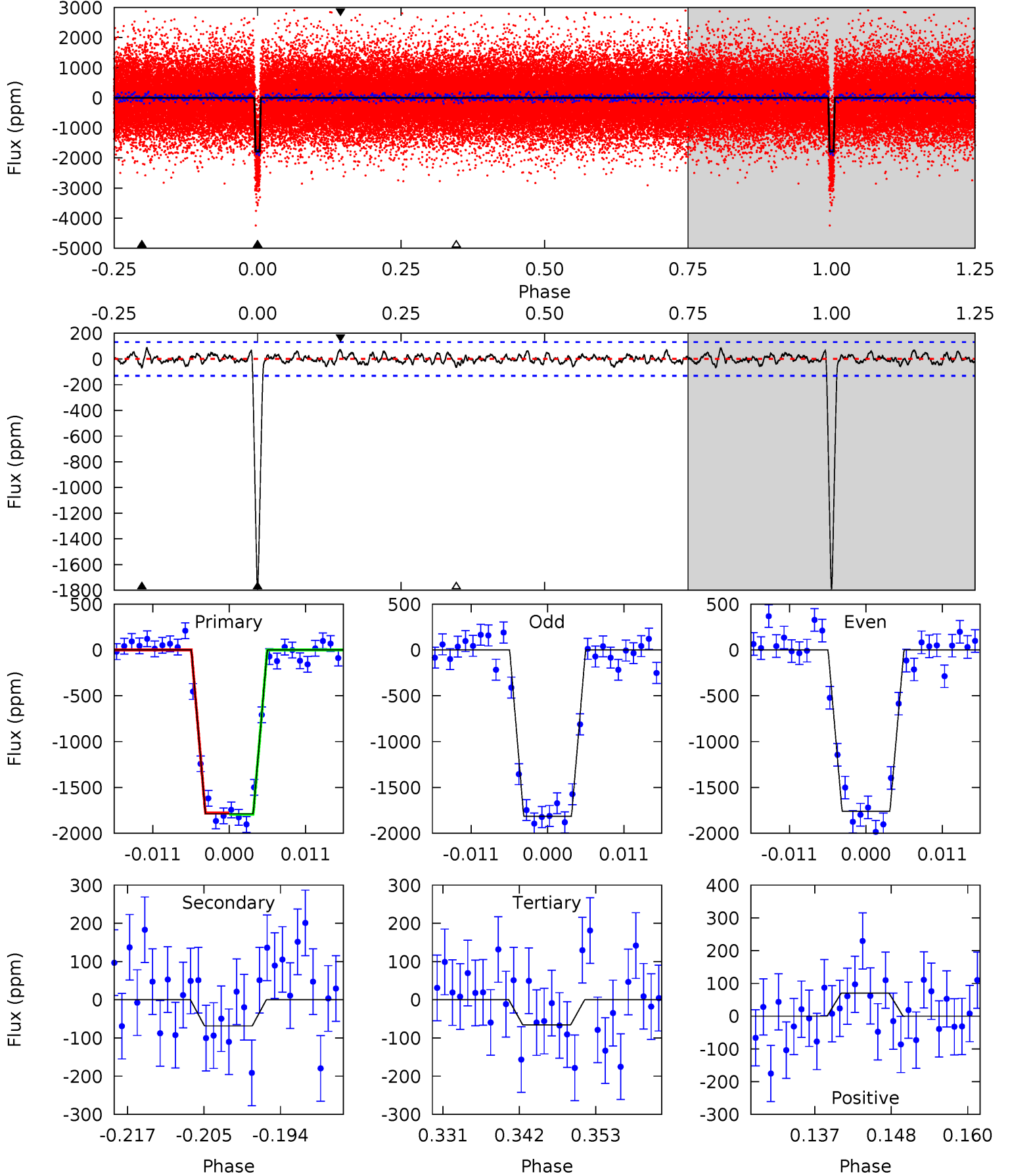
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 73.6 | 3.40 | 3.19 | 2.96 | 4.98 | 2.49 | 1.08 | 70.4 | 70.7 | 0.22 | 0.44 | 1.31 | 1.01 | 0.04 | 0.65 |



Alt Model-Shift Uniqueness Test

007870390-01, P = 9.770472 Days, E = 126.859795 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 68.2 | 2.61 | 2.52 | 2.68 | 5.00 | 2.53 | 0.95 | 65.7 | 65.6 | 0.09 | -0.07 | 1.03 | 1.01 | 0.05 | 0.29 |



Stellar Parameters For KIC 007870390

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | R (R_{\odot}) | $M(M_{\odot})$ | p_{\star} ($\text{g}\cdot\text{cm}^{-3}$) |
|--------|---------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 3906^{+78}_{-86} | $4.730^{+0.052}_{-0.024}$ | $-0.320^{+0.150}_{-0.150}$ | $0.509^{+0.032}_{-0.046}$ | $0.508^{+0.037}_{-0.033}$ | $5.425^{+1.273}_{-0.583}$ |
| | +2%/-2% | +1%/-1% | +47%/-47% | +6%/-9% | +7%/-6% | +23%/-11% |
| Source | SPE70 | SPE60 | SPE70 | DSEP | | |

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

Secondary Eclipse Parameters for KIC 007870390-01 / KOI 0898.01

| Detrend | Depth (ppm) | R_p (R_{\oplus}) | T_{max} (K) | T_{obs} (K) | A_{obs} |
|---------|--------------|------------------------|-------------------|----------------------|------------------|
| DV | -85 ± 25 | $2.37^{+0.28}_{-0.27}$ | 640^{+16}_{-17} | 2502^{+123}_{-120} | 44^{+18}_{-15} |
| Alt. | -68 ± 26 | $2.34^{+0.29}_{-0.26}$ | 639^{+16}_{-16} | 2437^{+132}_{-161} | 35^{+19}_{-15} |

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 $A_{obs} \gg 1.0$

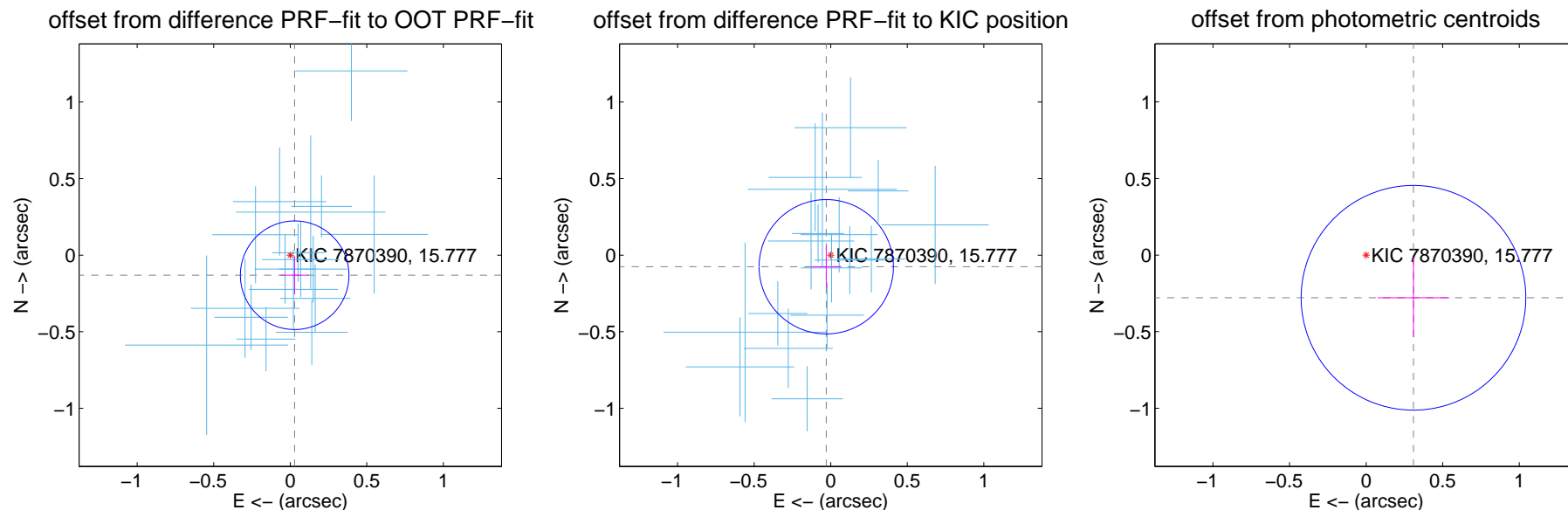
DV Centroid Data

Supplemental centroid analysis for 007870390-01. Kepler magnitude: 15.78. Transit SNR 50.83

There are 17 quarters with good PRF difference image offsets

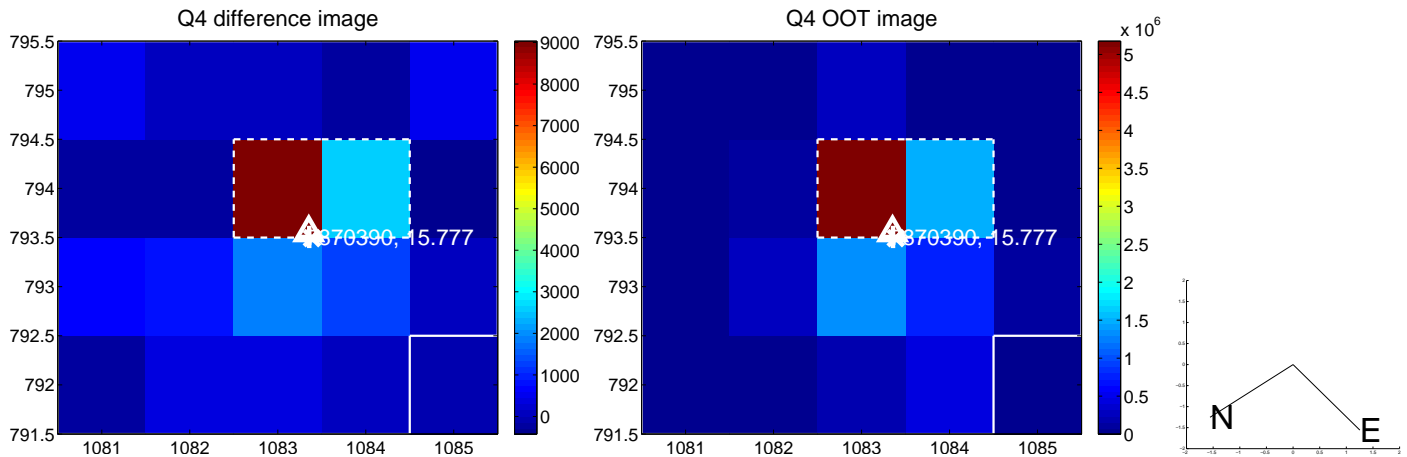
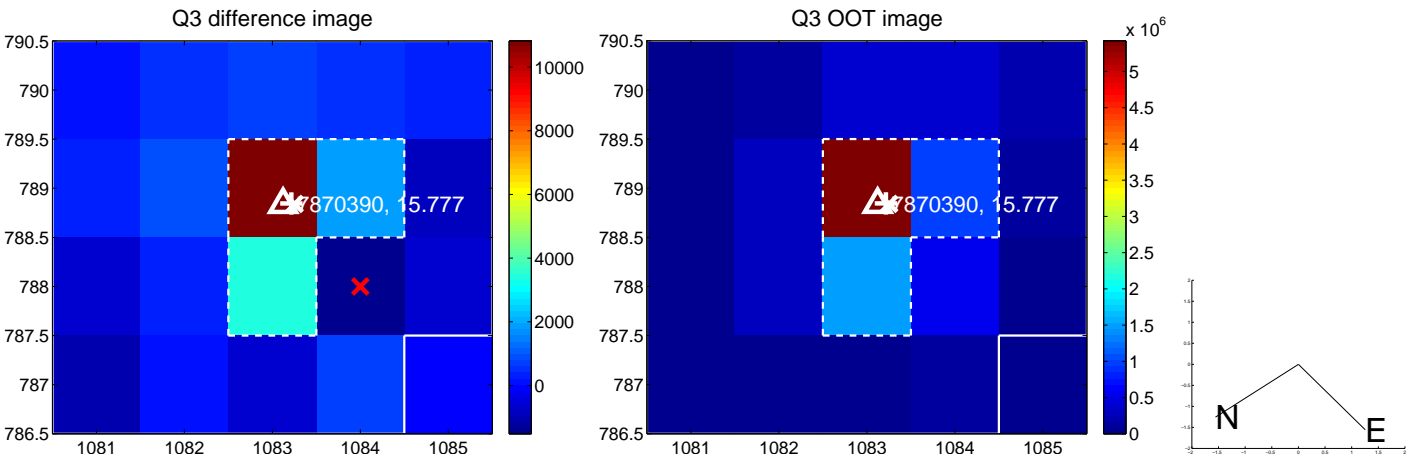
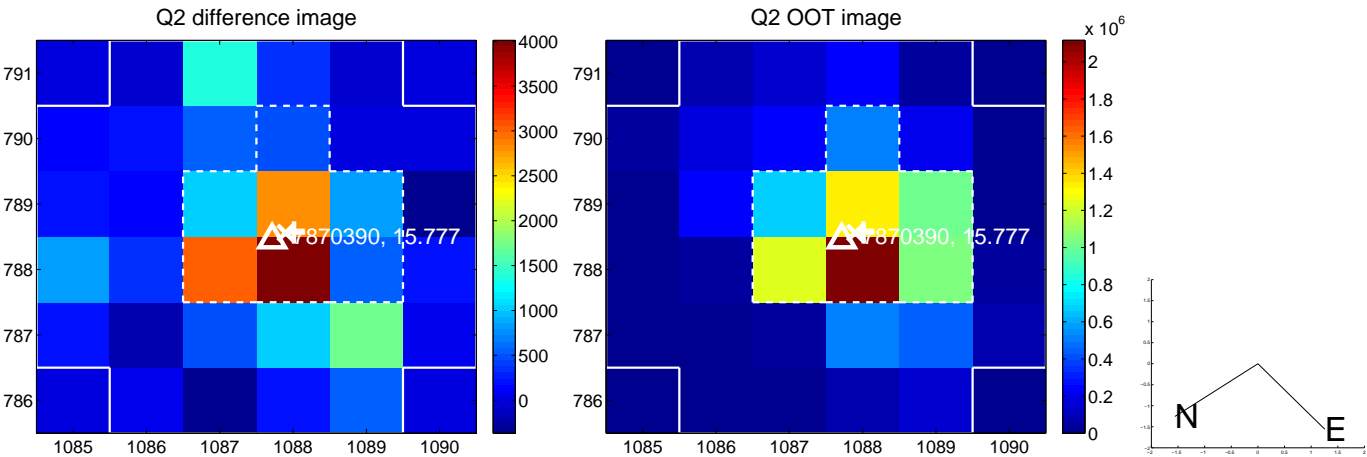
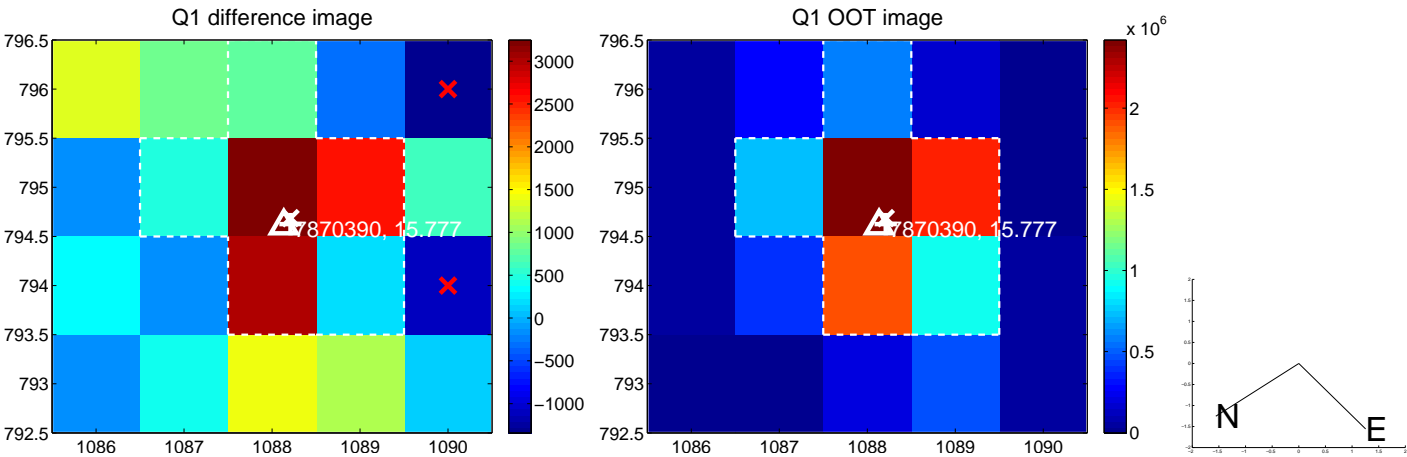
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT | 0.134 ± 0.118 | 1.14 | -0.029 ± 0.091 | -0.131 ± 0.126 |
| PRF-fit source offset from KIC position | 0.081 ± 0.146 | 0.56 | 0.029 ± 0.100 | -0.076 ± 0.138 |
| photometric centroid source offset | 0.42 ± 0.24 | 1.70 | -0.31 ± 0.23 | -0.28 ± 0.26 |

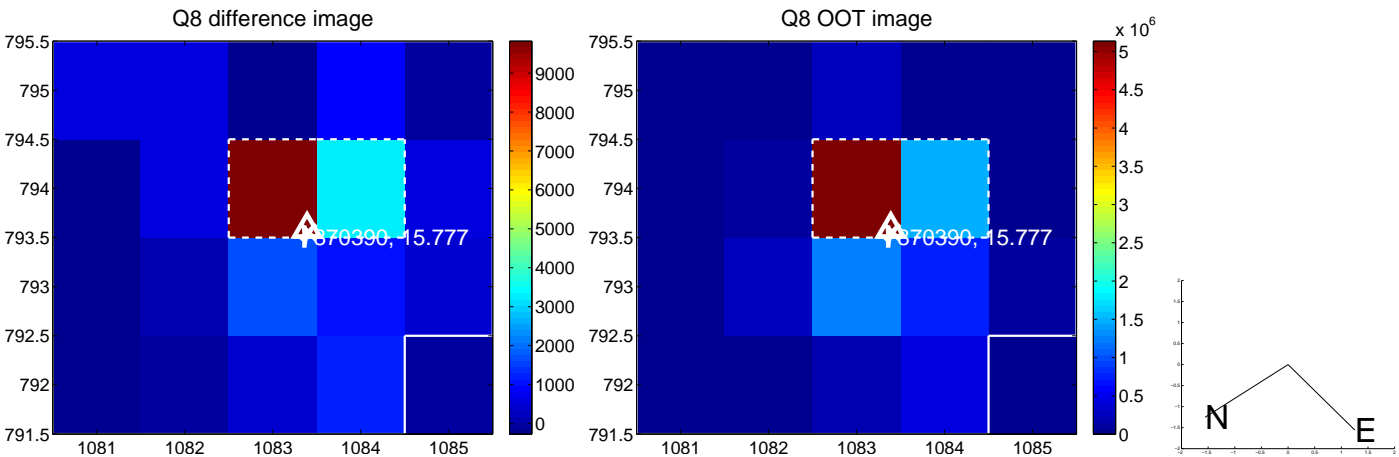
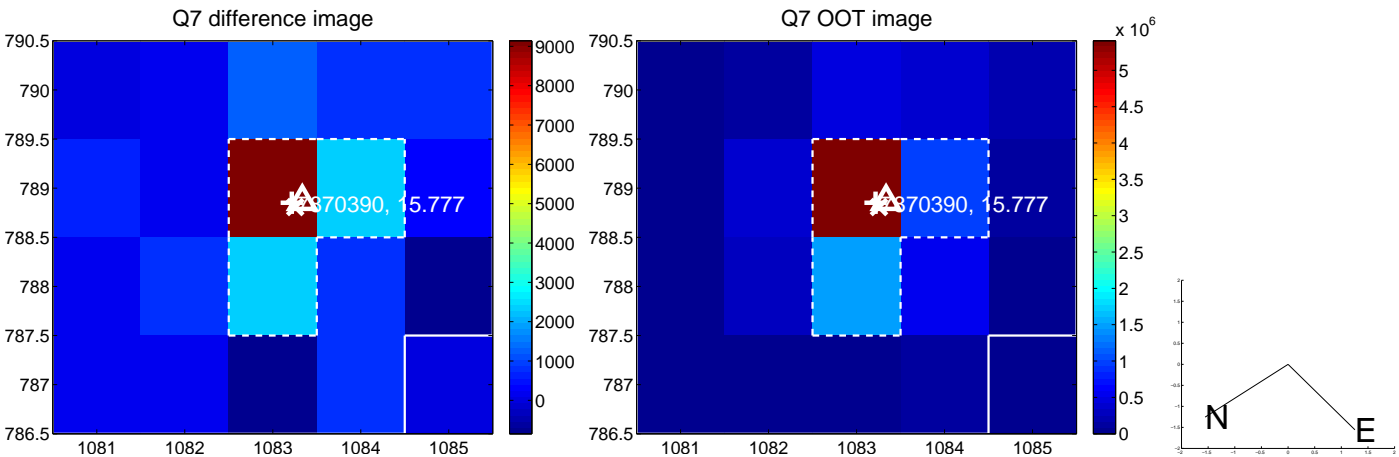
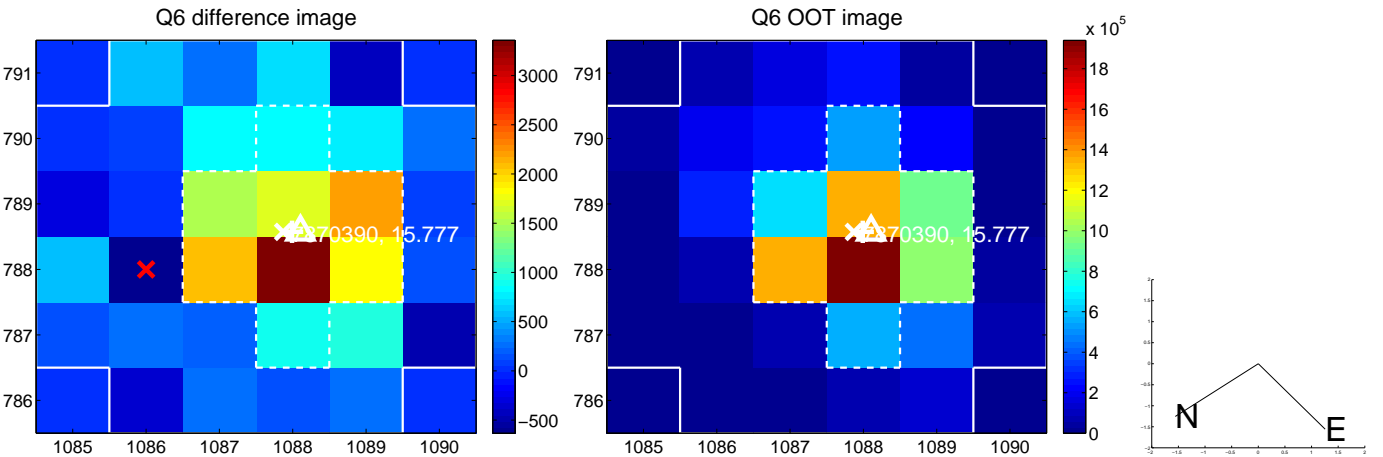
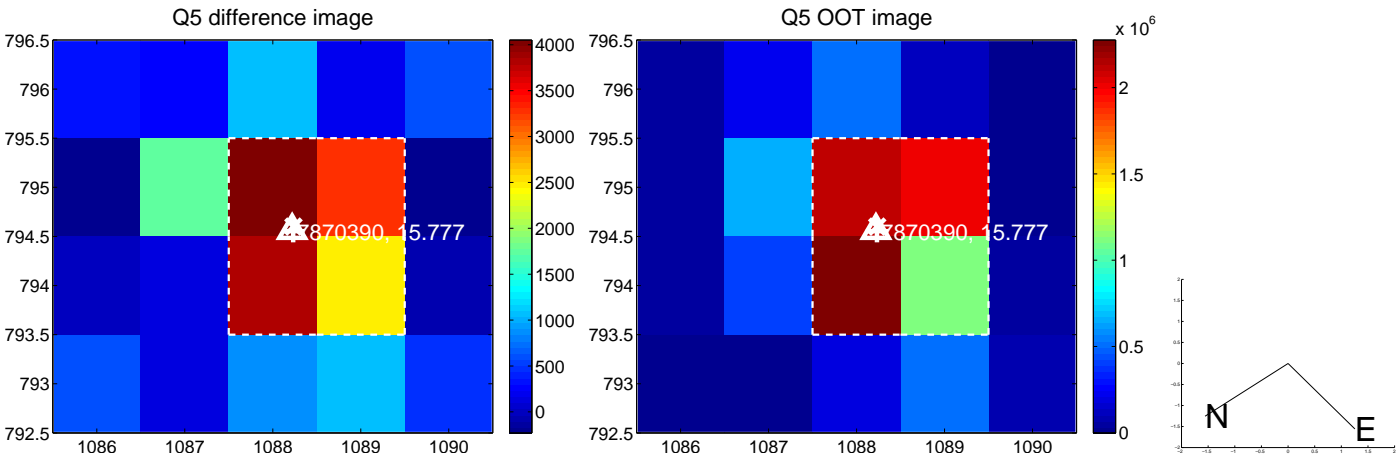


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

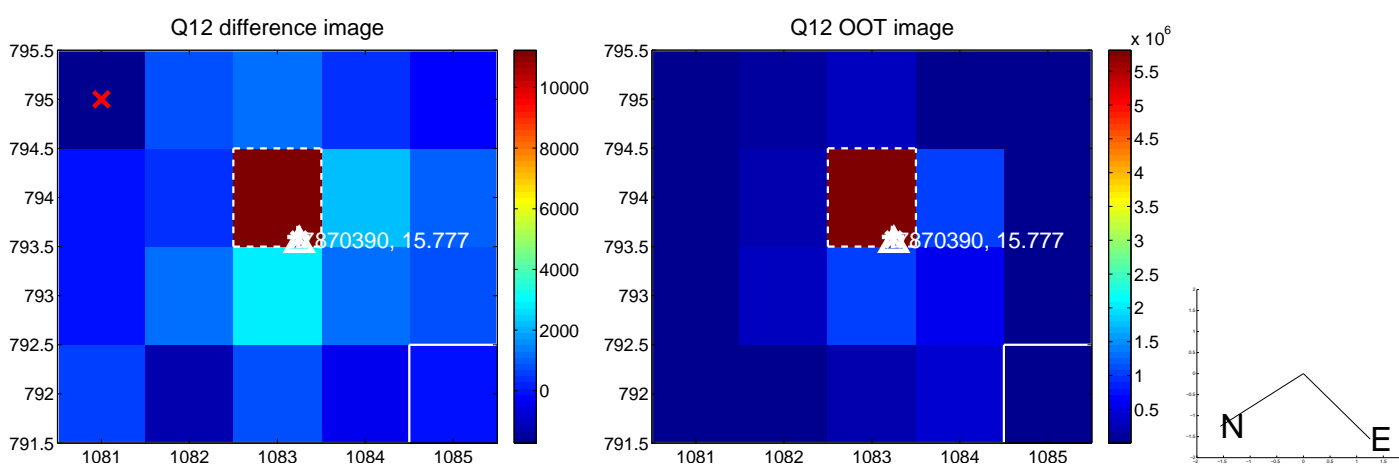
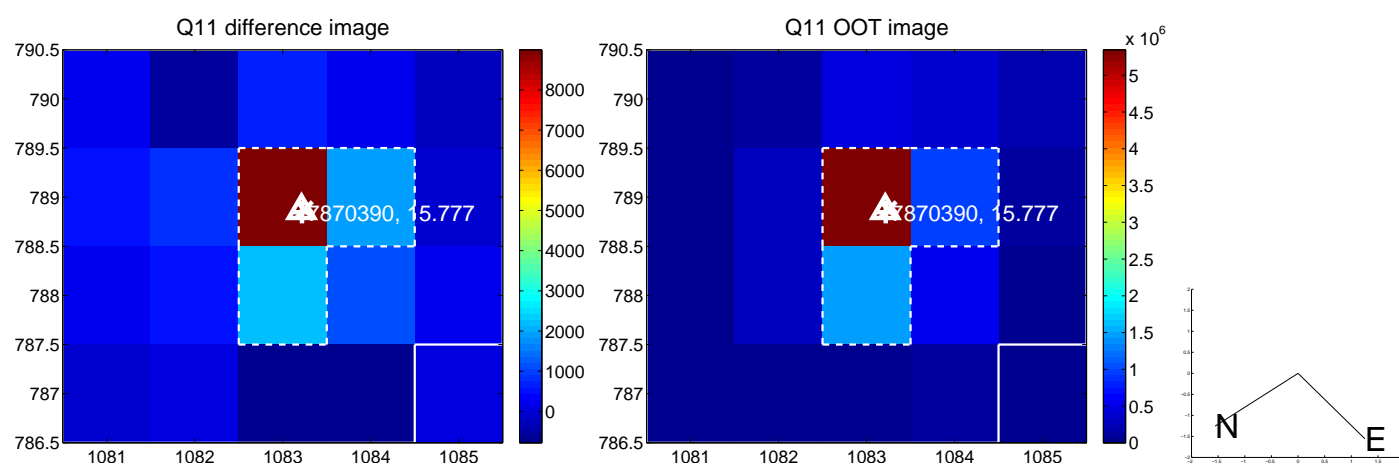
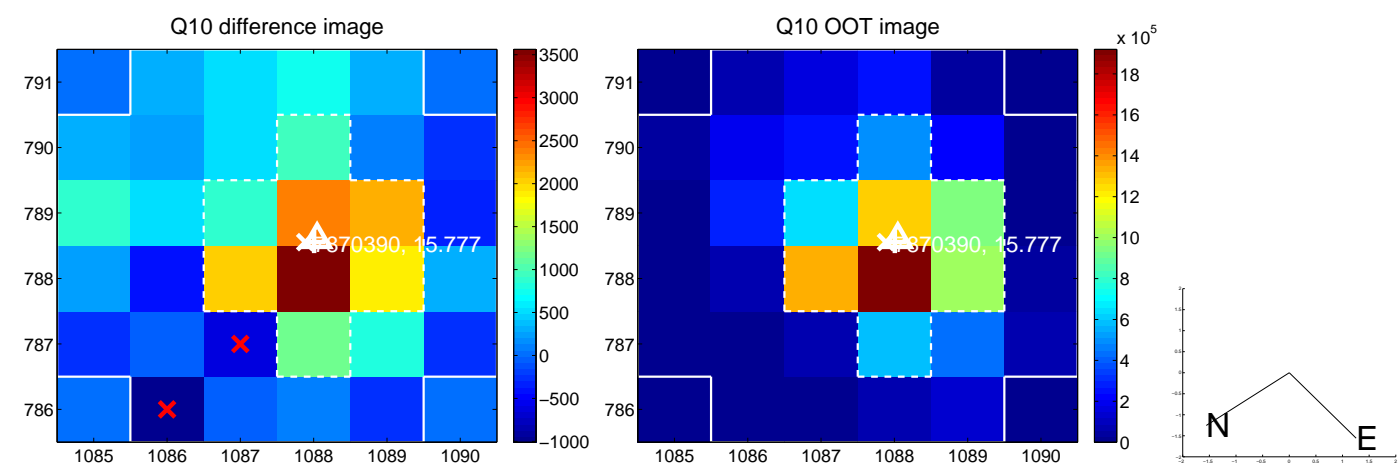
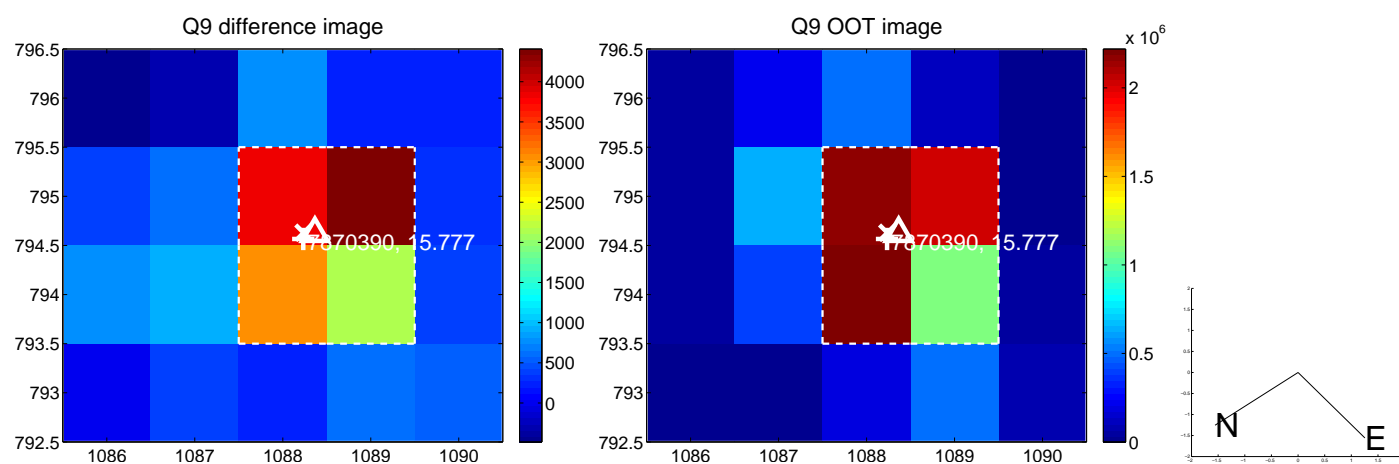
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



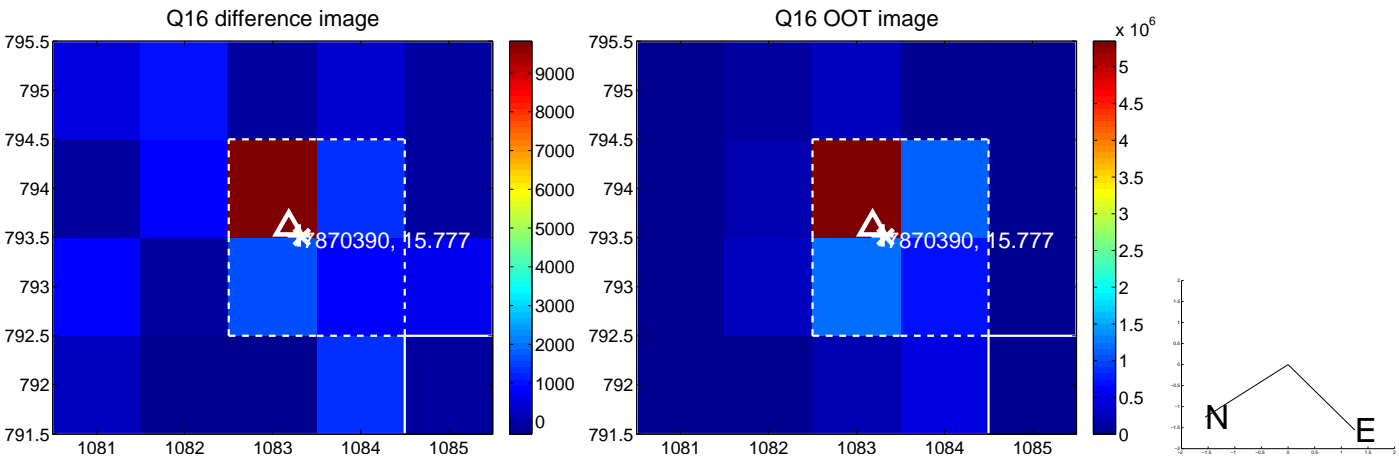
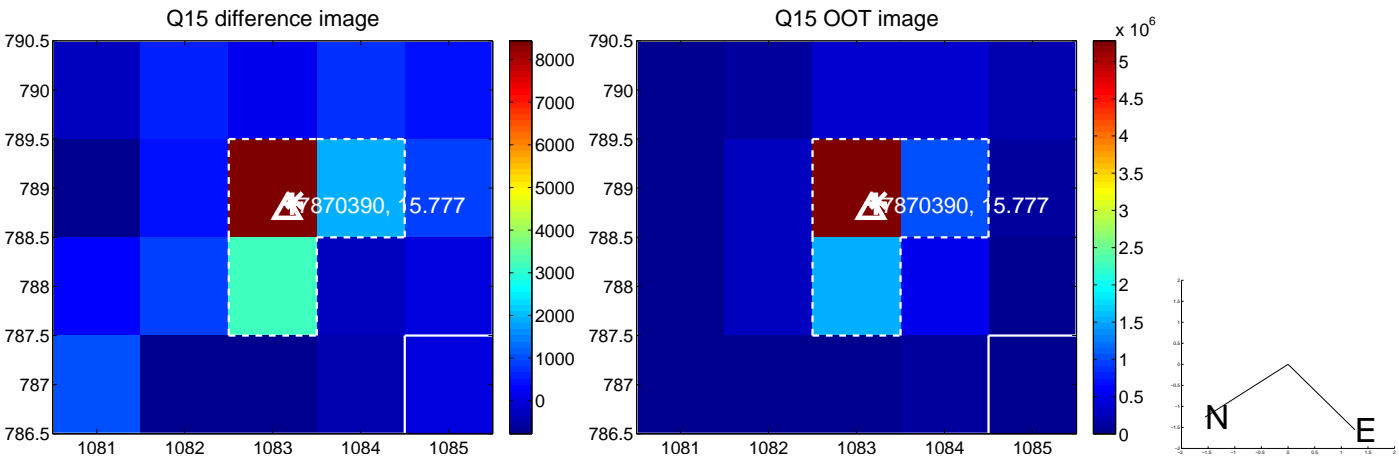
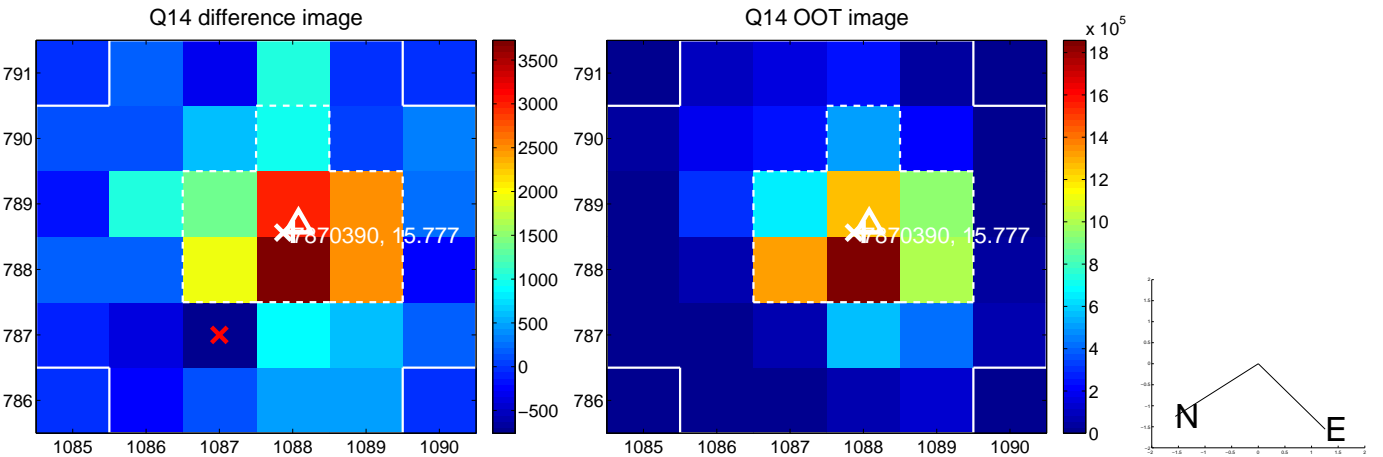
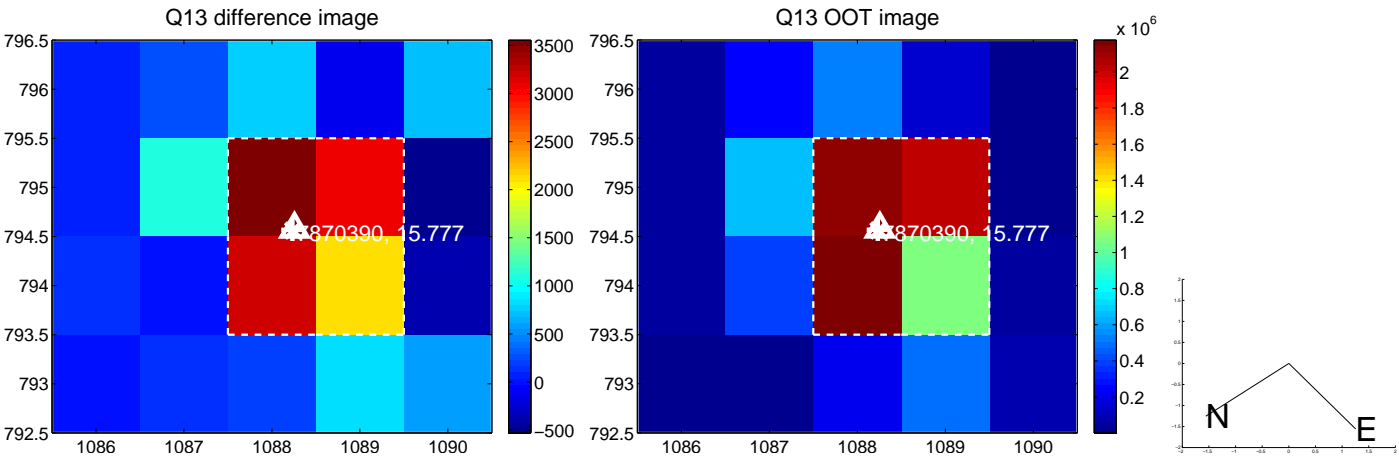
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



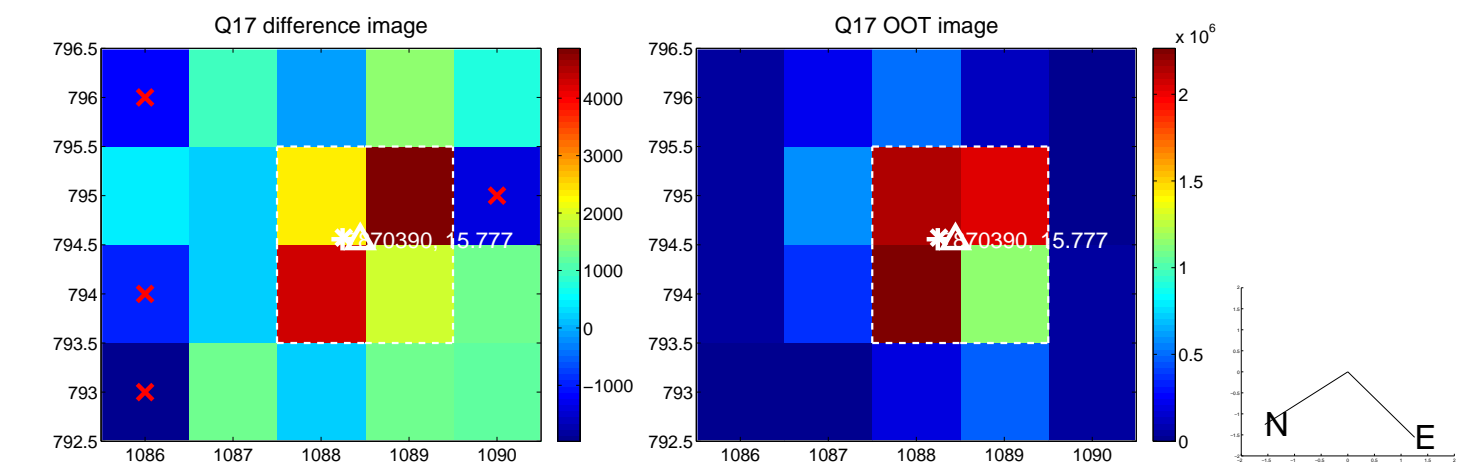
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value



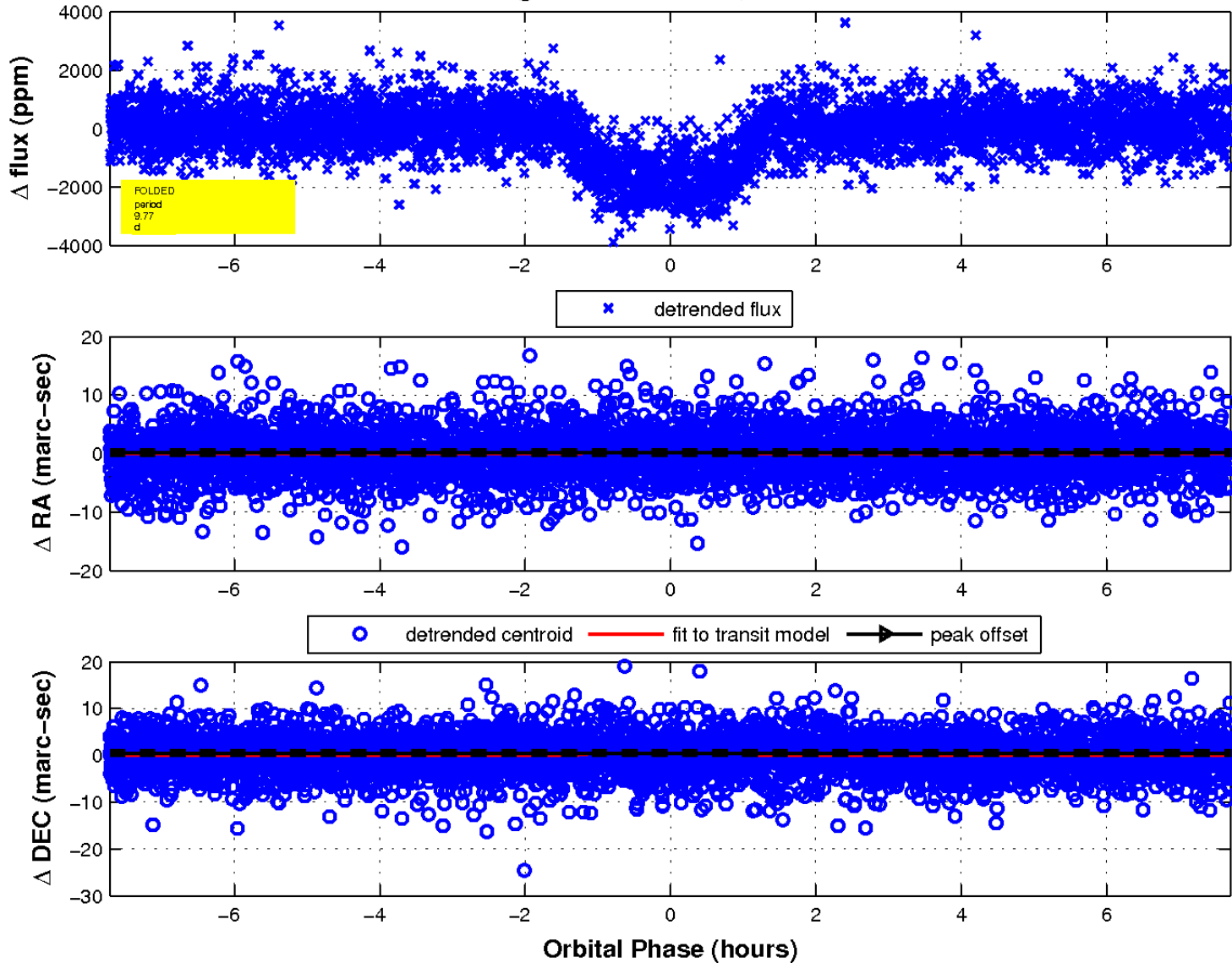
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

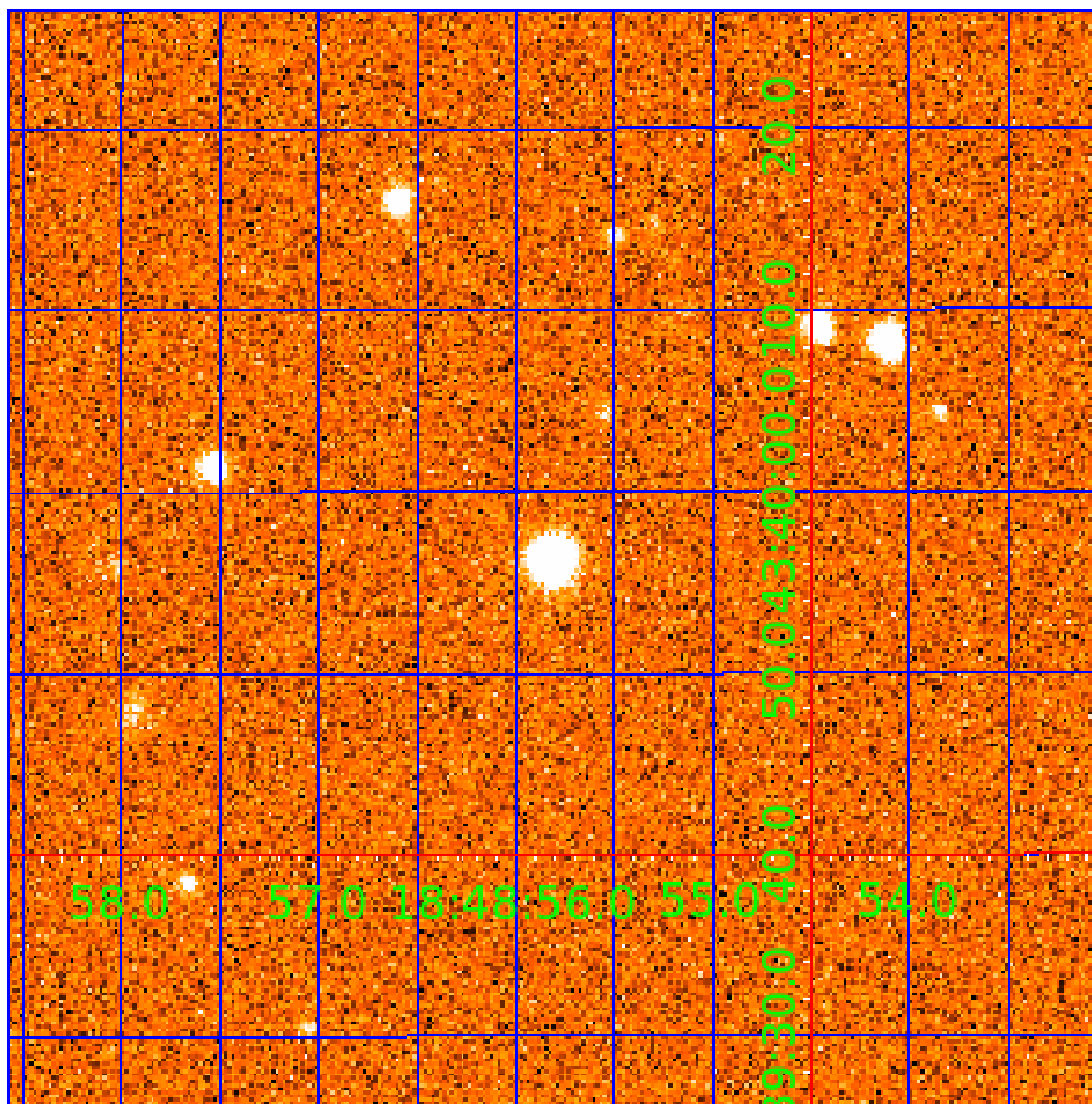


fluxWeightedCentroids, Planet 1 of 3



UKIRT Image

Declination



KIC 007870390

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 007870390-01 | OBS | 0898.01 | 9.770441 | 136.632273 | 1862.0 | 2.572 | 46.7 | 50.8 | 0.51 | 3906 | 2.37 | 10.61 |
| 007870390-02 | OBS | 0898.02 | 5.169804 | 136.443641 | 1024.4 | 2.408 | 34.1 | 38.5 | 0.51 | 3906 | 1.88 | 24.79 |
| 007870390-03 | OBS | 0898.03 | 20.090187 | 147.976064 | 1458.0 | 3.971 | 29.2 | 31.9 | 0.51 | 3906 | 2.20 | 4.06 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|------------|
| 007870390-01 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |
| 007870390-02 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |
| 007870390-03 | 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.

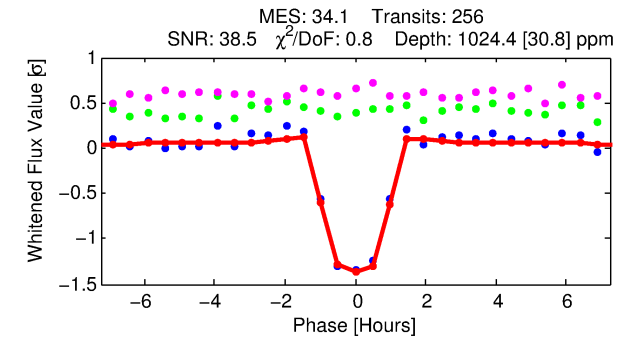
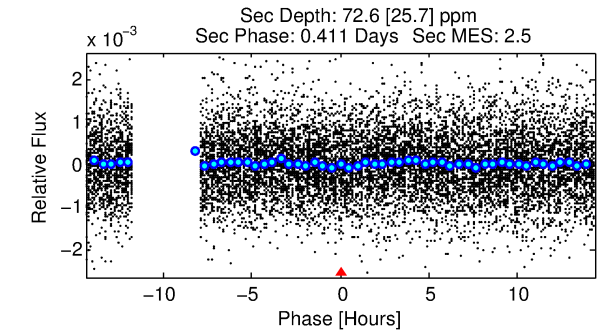
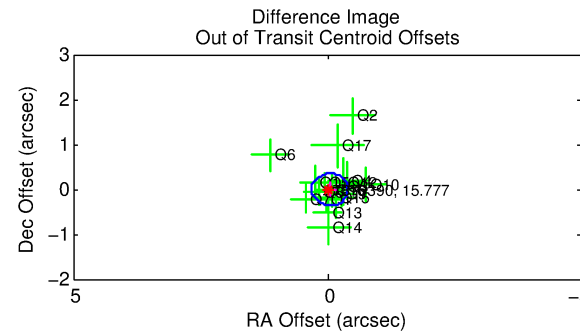
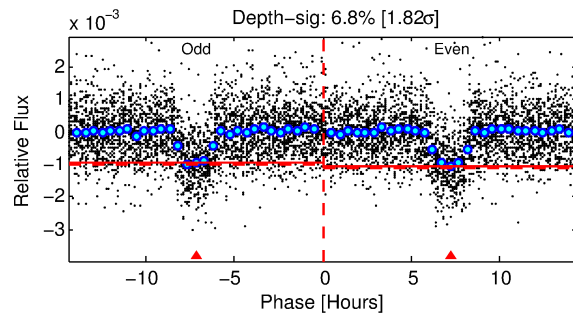
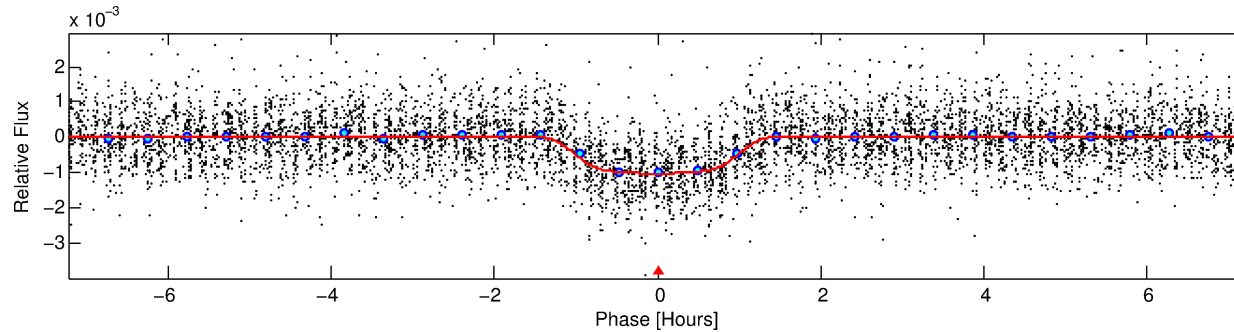
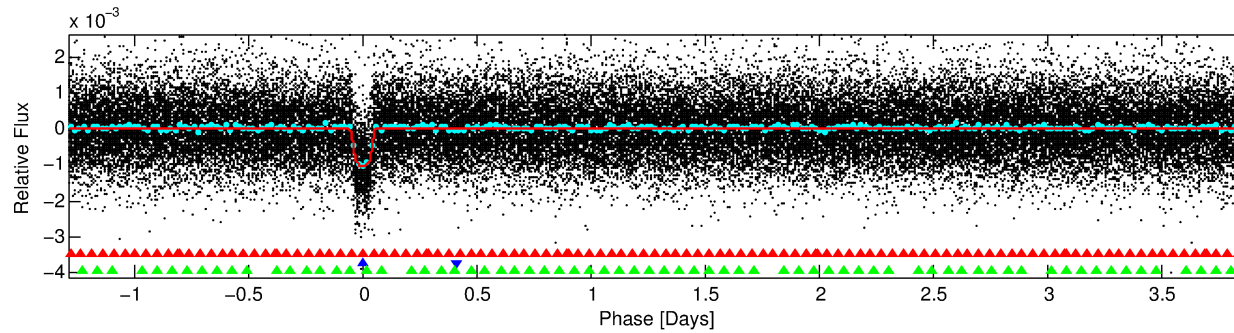
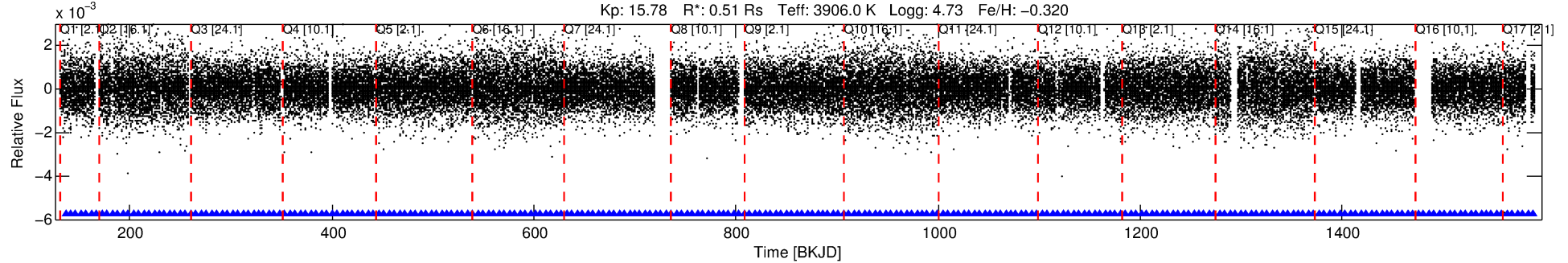
Ephemeris Match Information For 007870390-02

No Significant Match Found

DV One-Page Summary

KIC: 7870390 Candidate: 2 of 3 Period: 5.170 d
KOI: K00898.02 Name: Kepler-83d Corr: 0.950

Kp: 15.78 R*: 0.51 Rs Teff: 3906.0 K Logg: 4.73 Fe/H: -0.320



DV Fit Results:

Period = 5.16980 [0.00001] d
Epoch = 136.4436 [0.0012] BKJD
Rp/R* = 0.0339 [0.0027]
a/R* = 9.12 [3.31]
b = 0.87 [0.10]
Seff = 24.79 [3.30]
Teq = 569 [19] K
Rp = 1.88 [0.23] Re
a = 0.0467 [0.0034] AU
Ag = 24.51 [9.84] [2.39σ]
Teffp = 1958 [195] K [7.08σ]

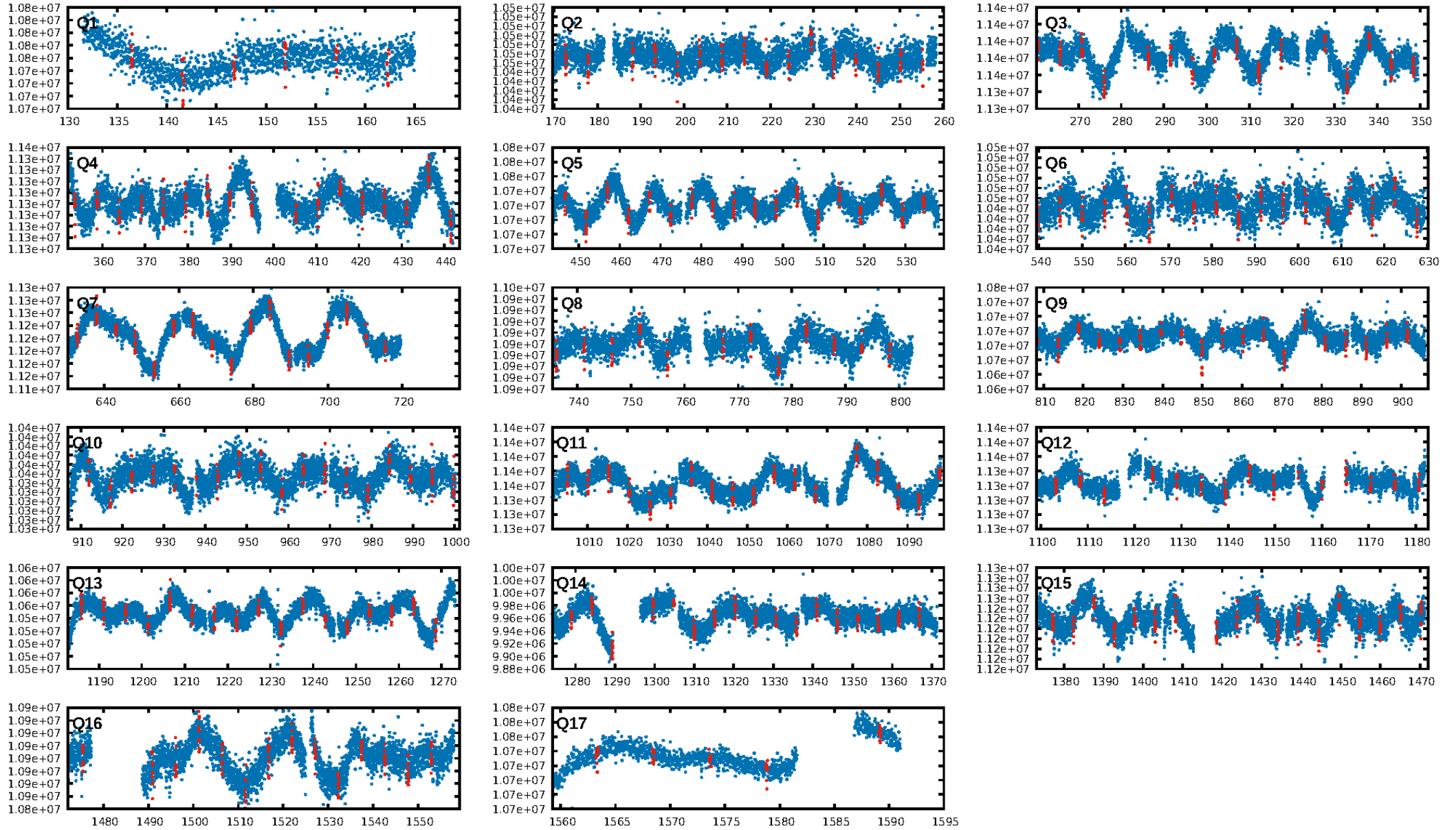
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [31.34σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 2.02e-244
RollingBand-fgt: 1.00 [245/245]
GhostDiagnostic-chr: 3.828
Centroid-sig: 0.3%
Centroid-so: 0.595 arcsec [1.72σ]
OotOffset-rm: 0.048 arcsec [0.40σ]
KicOffset-rm: 0.118 arcsec [0.80σ]
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]

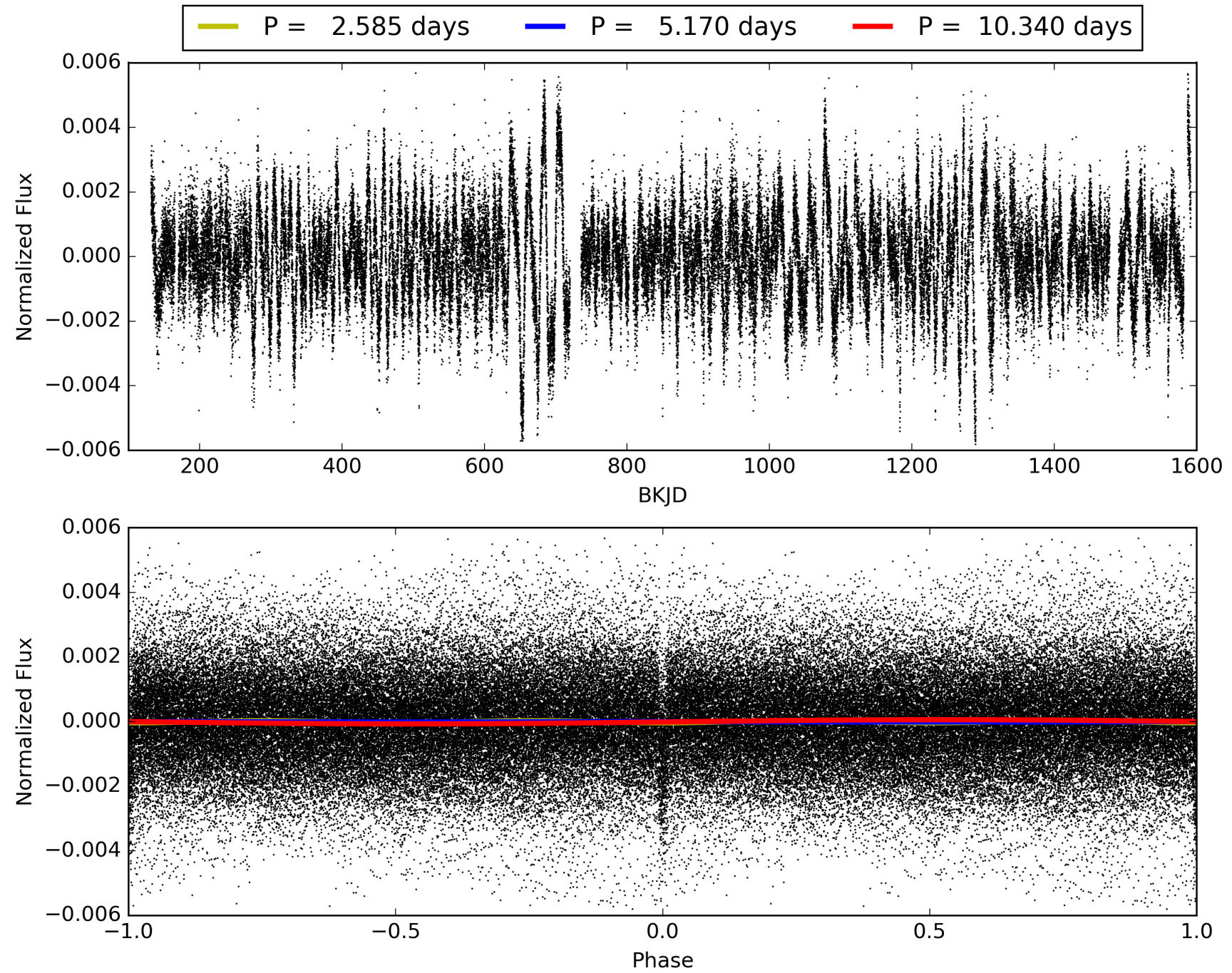
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 09:33:20 Z

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

TCE 007870390-02, PDC Light Curves

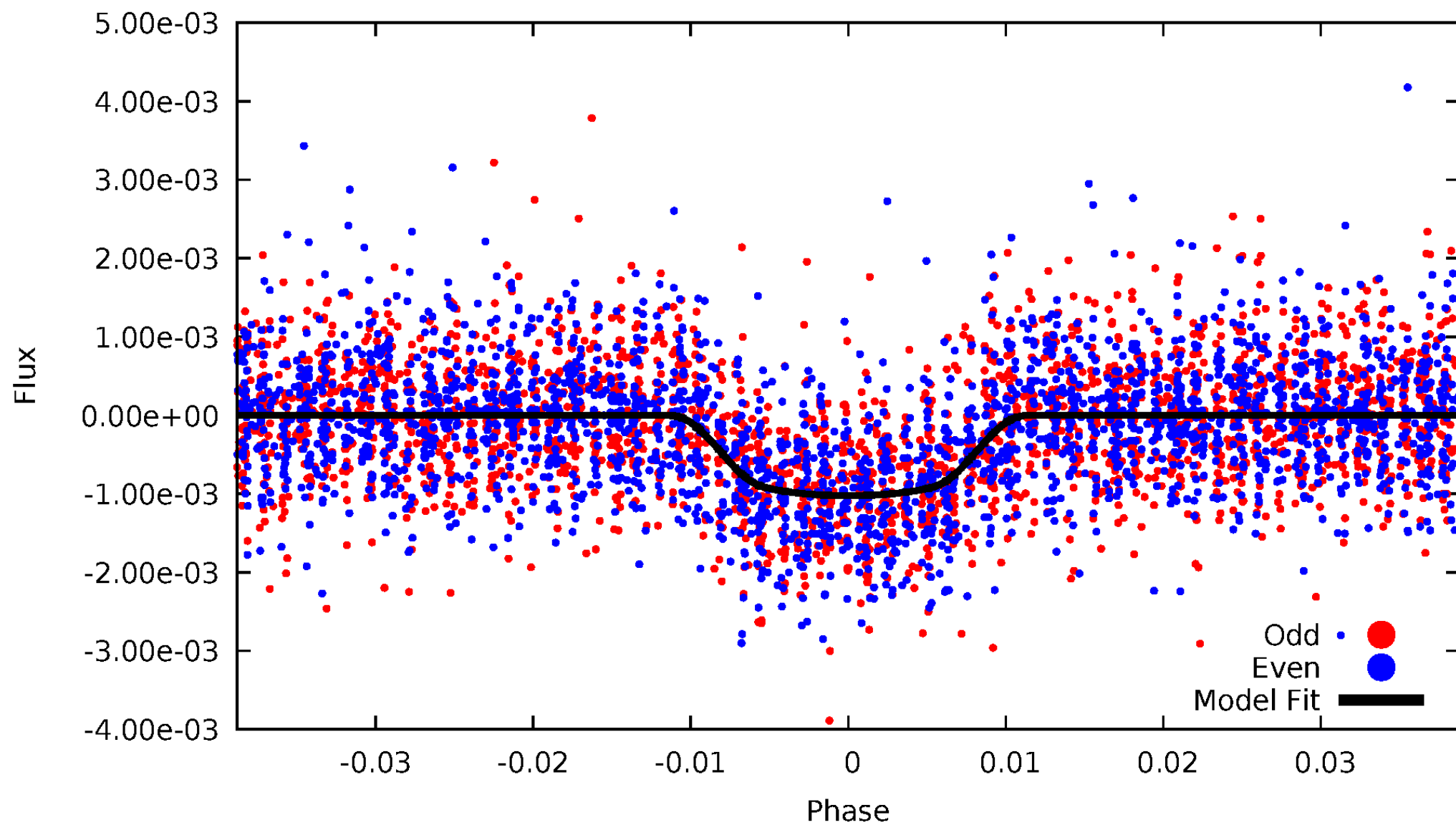


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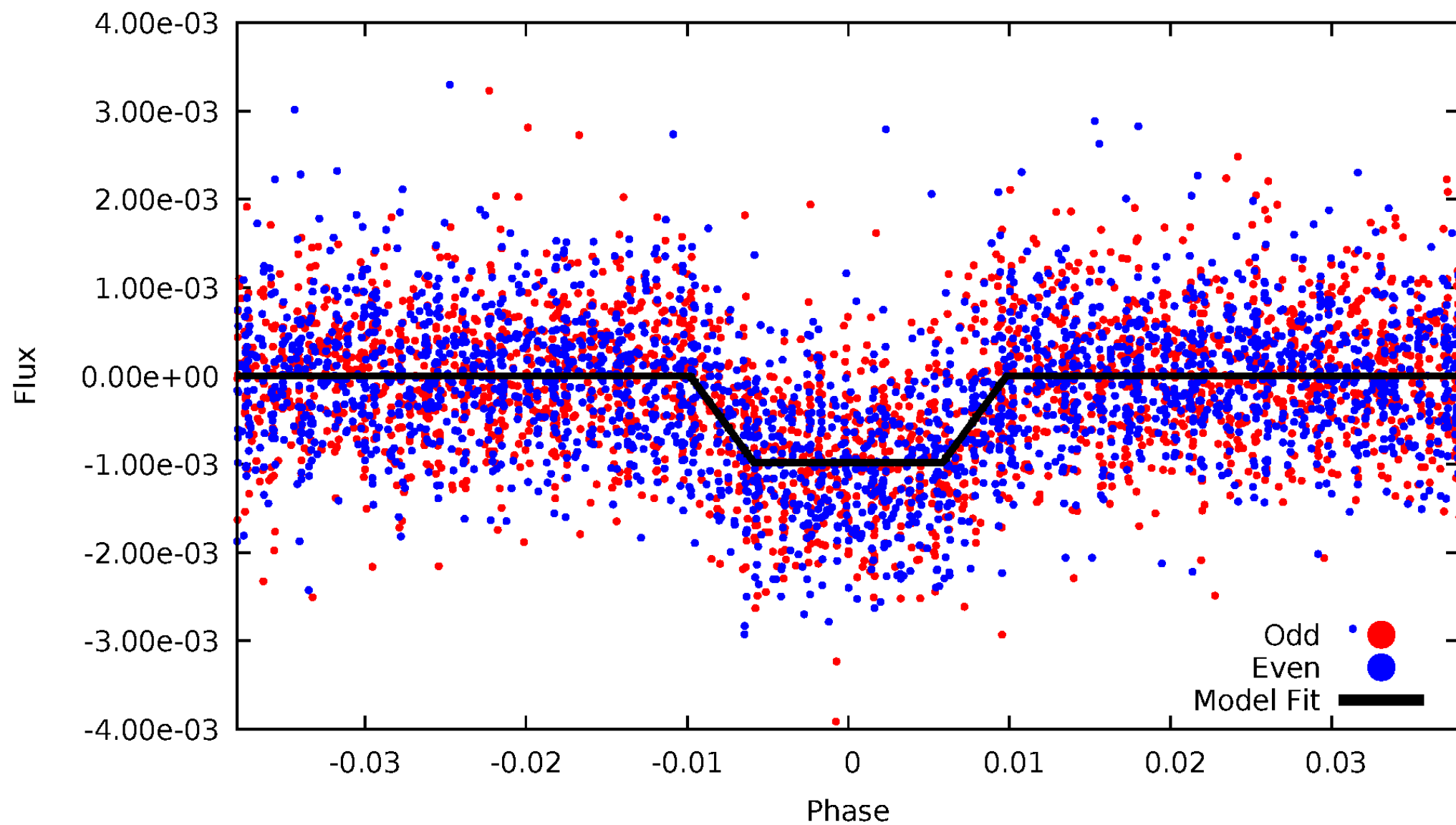
DV Odd/Even

TCE 007870390-02



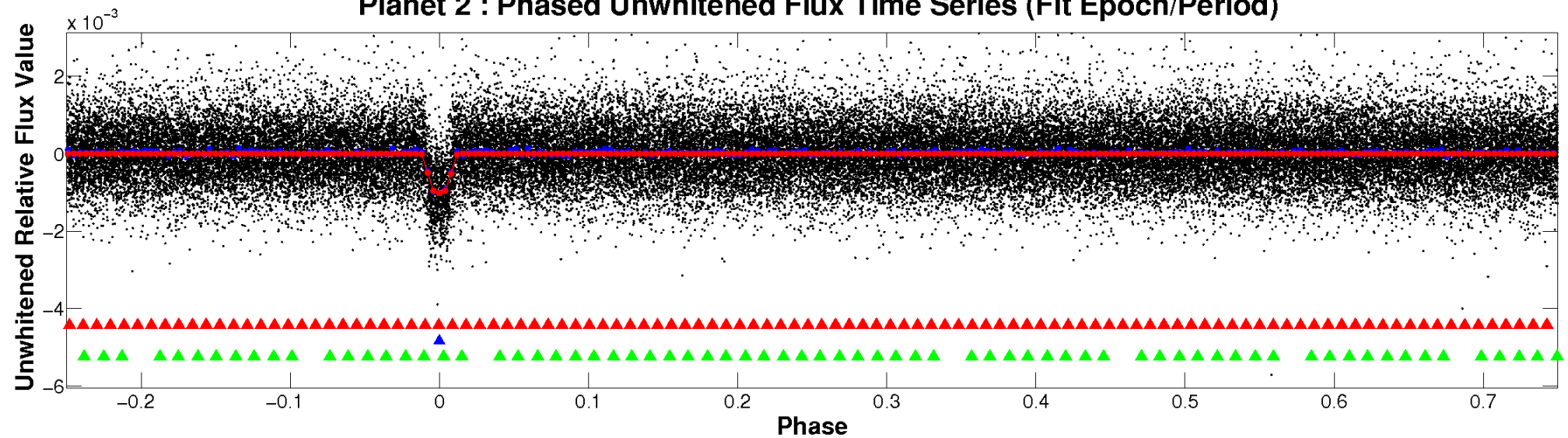
ALT Odd/Even

TCE 007870390-02

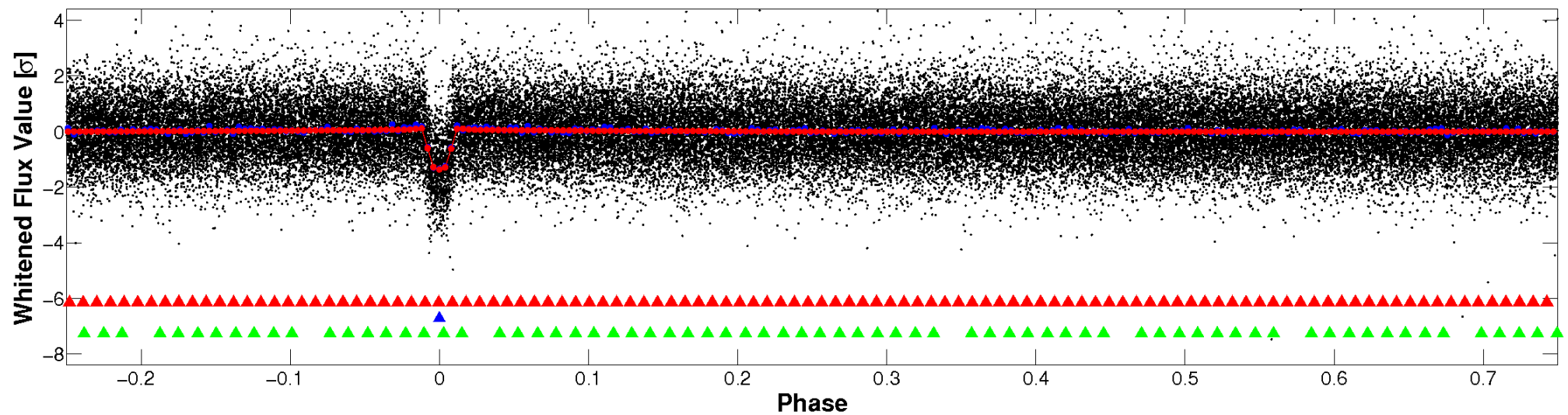


Non-Whitened Vs. Whitened Light Curve

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

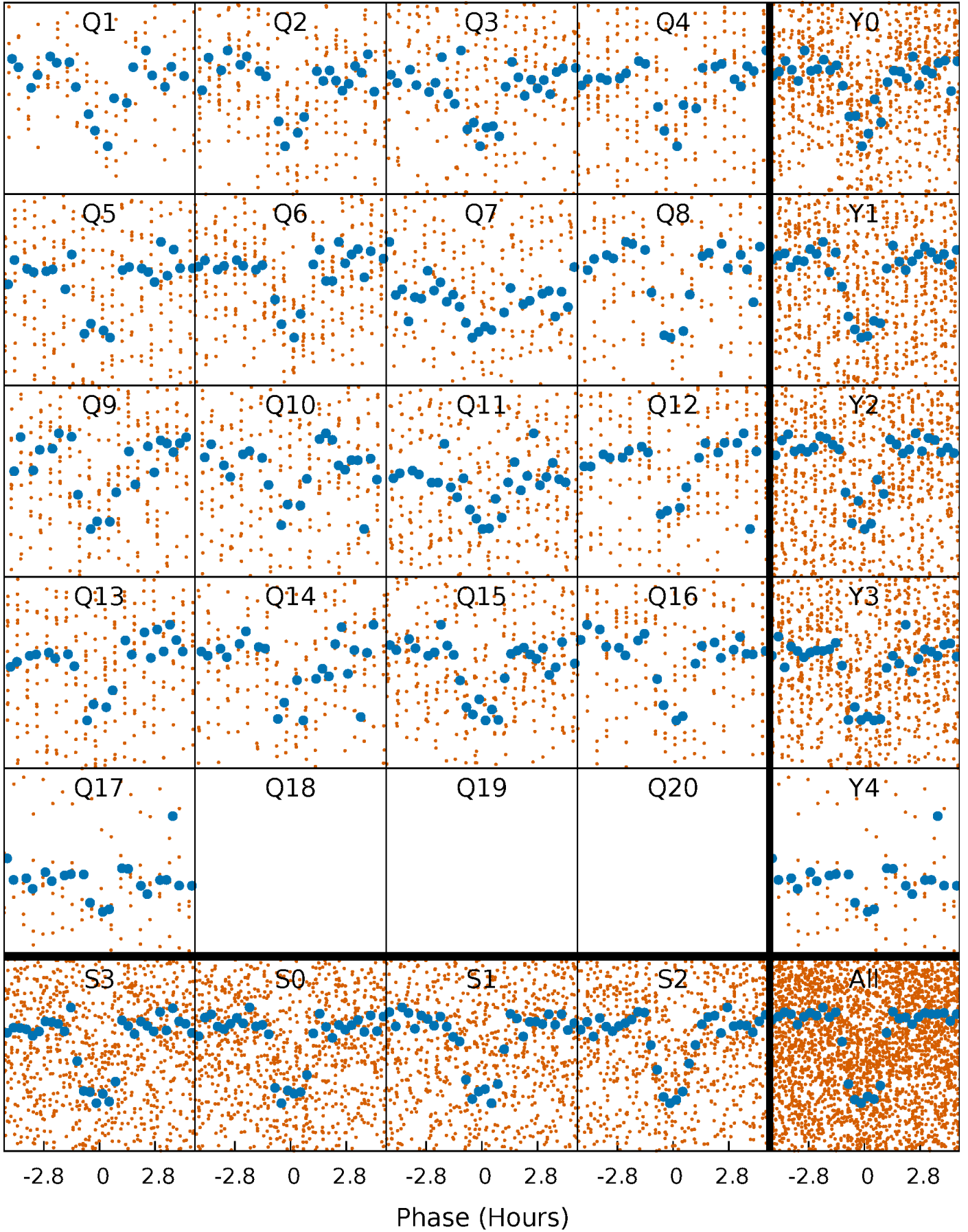


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



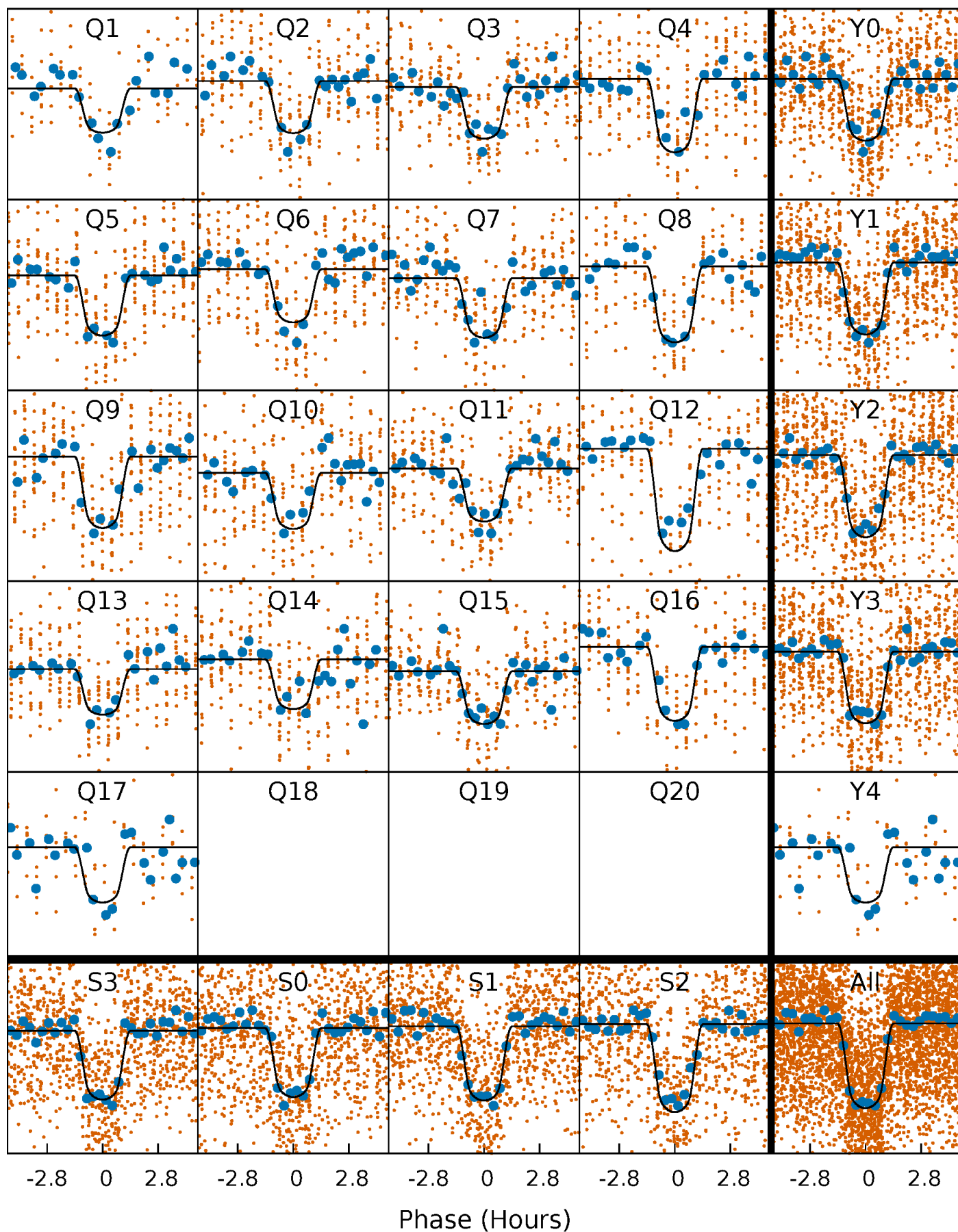
PDC Quarter-Phased Transit Curves

TCE 007870390-02 P= 5.169804 Days $T_0=136.443641$ (BKJD)



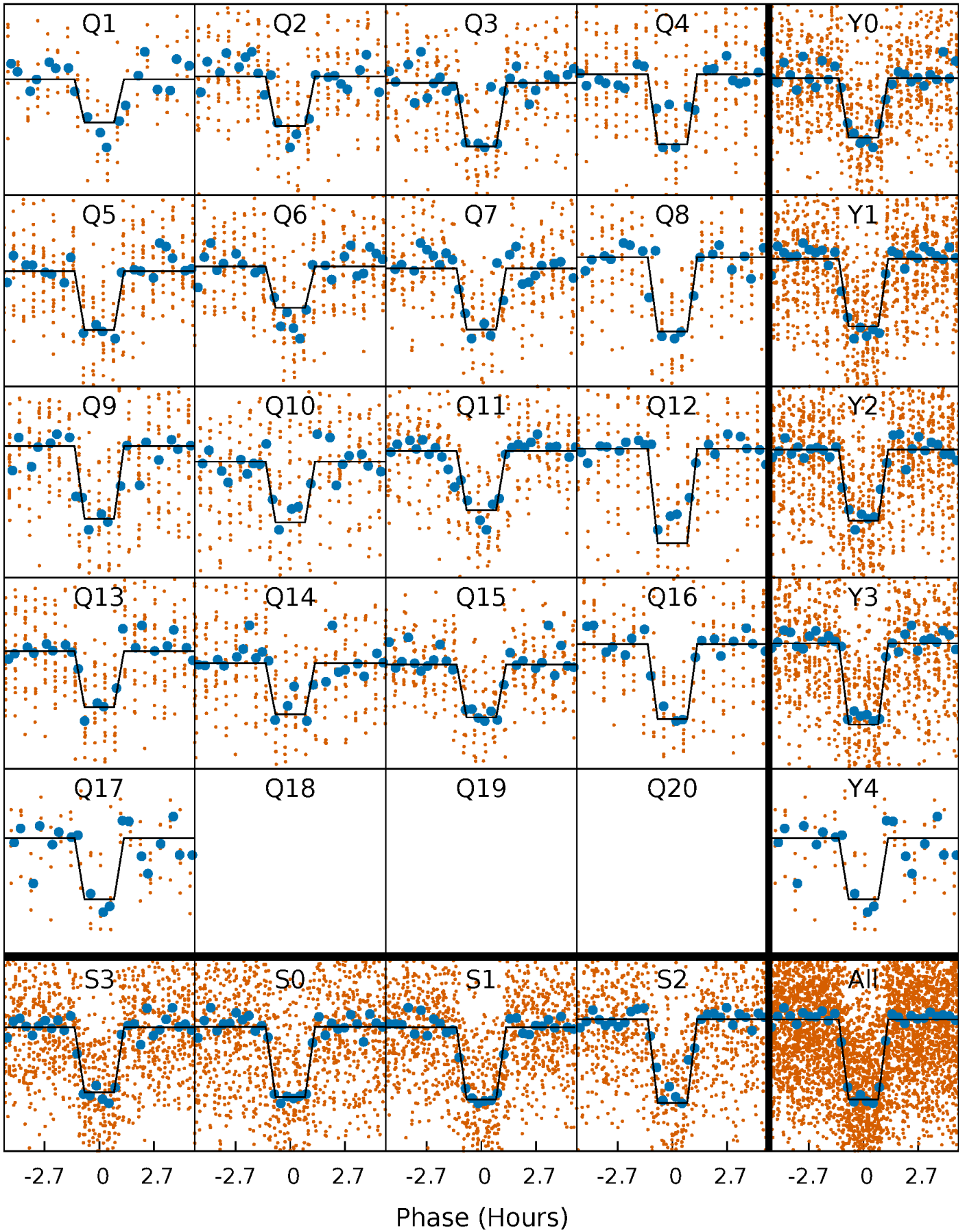
DV Quarter-Phased Transit Curves

TCE 007870390-02 P= 5.169804 Days $T_0=136.443641$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

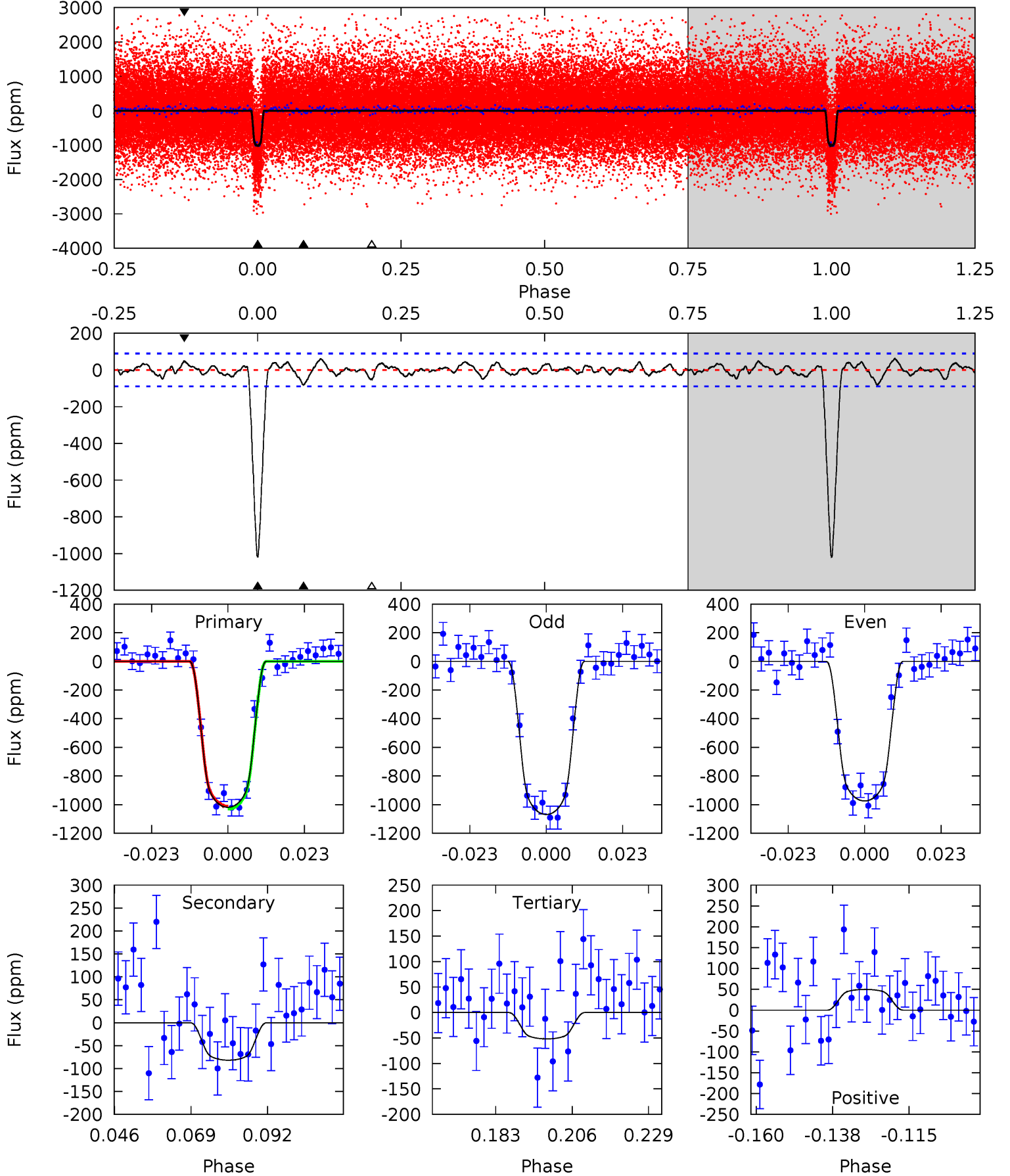
TCE 007870390-02 $P = 5.169817$ Days $T_0 = 136.441236$ (BKJD)



DV Model-Shift Uniqueness Test

007870390-02, P = 5.169804 Days, E = 131.273837 Days

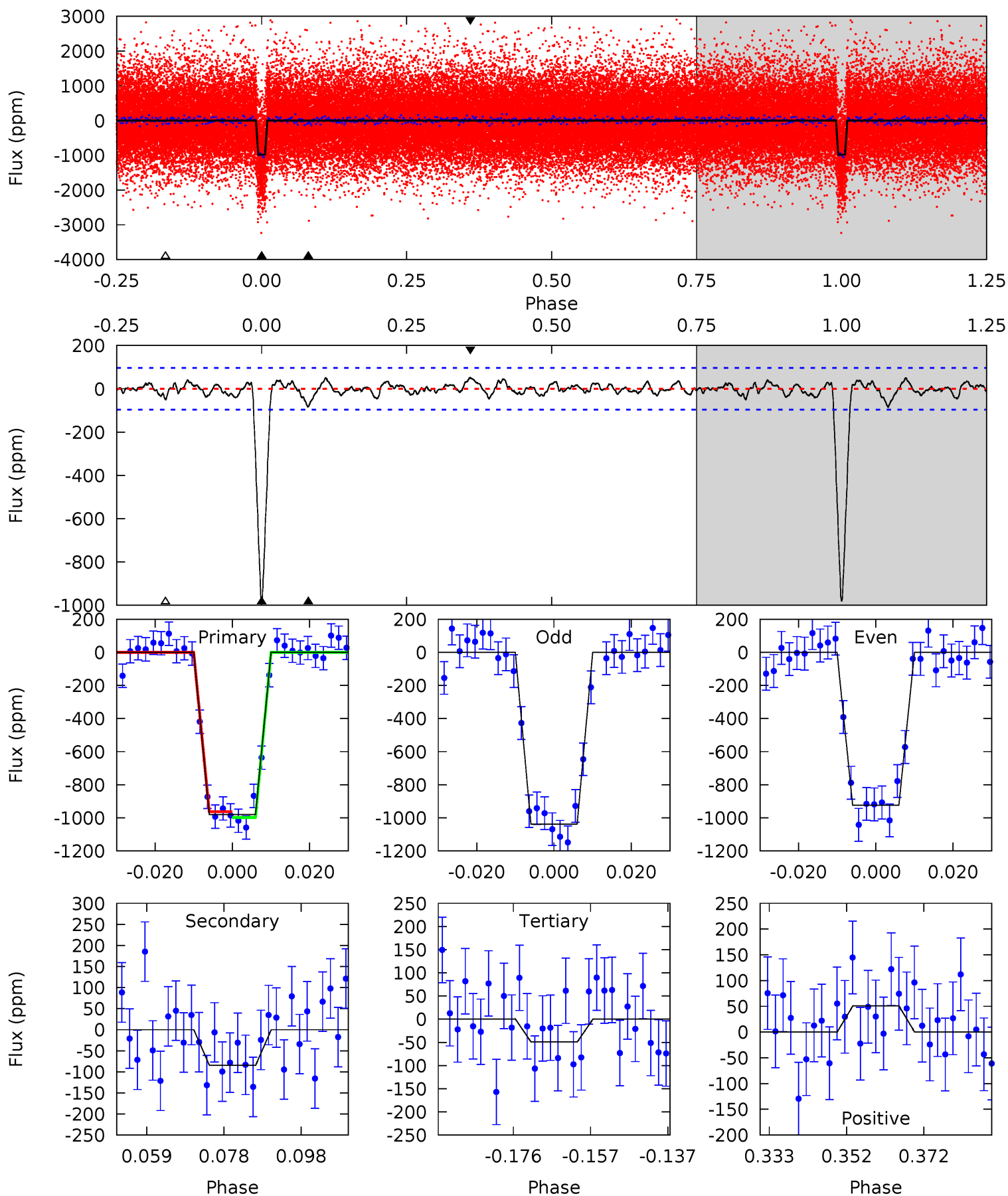
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 55.4 | 4.45 | 2.81 | 2.71 | 4.86 | 2.27 | 1.13 | 52.6 | 52.7 | 1.64 | 1.74 | 2.57 | 0.98 | 0.06 | 0.53 |



Alt Model-Shift Uniqueness Test

007870390-02, P = 5.169817 Days, E = 131.271419 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 49.8 | 4.30 | 2.50 | 2.58 | 4.90 | 2.33 | 1.00 | 47.3 | 47.3 | 1.80 | 1.72 | 2.90 | 1.00 | 0.05 | 0.91 |



Stellar Parameters For KIC 007870390

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | R (R_{\odot}) | $M(M_{\odot})$ | p_{\star} ($\text{g}\cdot\text{cm}^{-3}$) |
|--------|---------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 3906^{+78}_{-86} | $4.730^{+0.052}_{-0.024}$ | $-0.320^{+0.150}_{-0.150}$ | $0.509^{+0.032}_{-0.046}$ | $0.508^{+0.037}_{-0.033}$ | $5.425^{+1.273}_{-0.583}$ |
| | +2%/-2% | +1%/-1% | +47%/-47% | +6%/-9% | +7%/-6% | +23%/-11% |
| Source | SPE70 | SPE60 | SPE70 | DSEP | | |

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

Secondary Eclipse Parameters for KIC 007870390-02 / KOI 0898.02

| Detrend | Depth (ppm) | R_p (R_{\oplus}) | T_{max} (K) | T_{obs} (K) | A_{obs} |
|---------|--------------|------------------------|----------------------|----------------------|------------------|
| DV | -82 ± 18 | $1.86^{+0.16}_{-0.17}$ | 791^{+21}_{-21} | 2633^{+103}_{-101} | 28^{+9}_{-7} |
| Alt. | -85 ± 20 | $1.74^{+0.17}_{-0.17}$ | 790^{+21}_{-21} | 2690^{+114}_{-108} | 34^{+10}_{-10} |

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

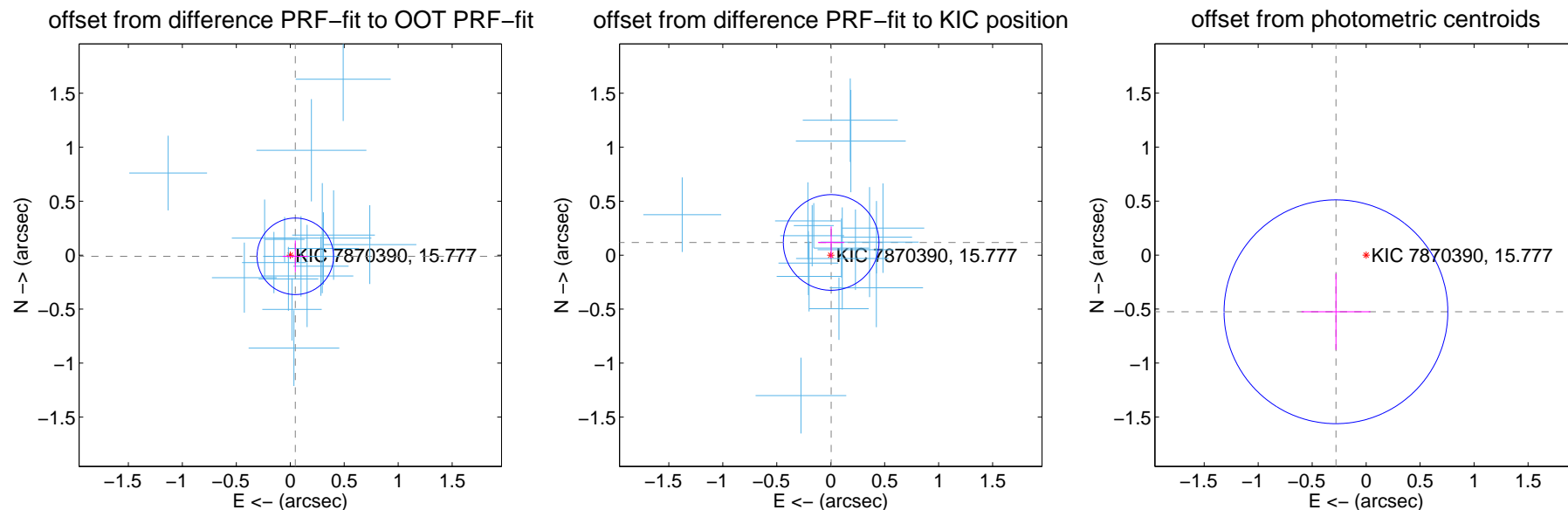
DV Centroid Data

Supplemental centroid analysis for 007870390-02. Kepler magnitude: 15.78. Transit SNR 38.48

There are 17 quarters with good PRF difference image offsets

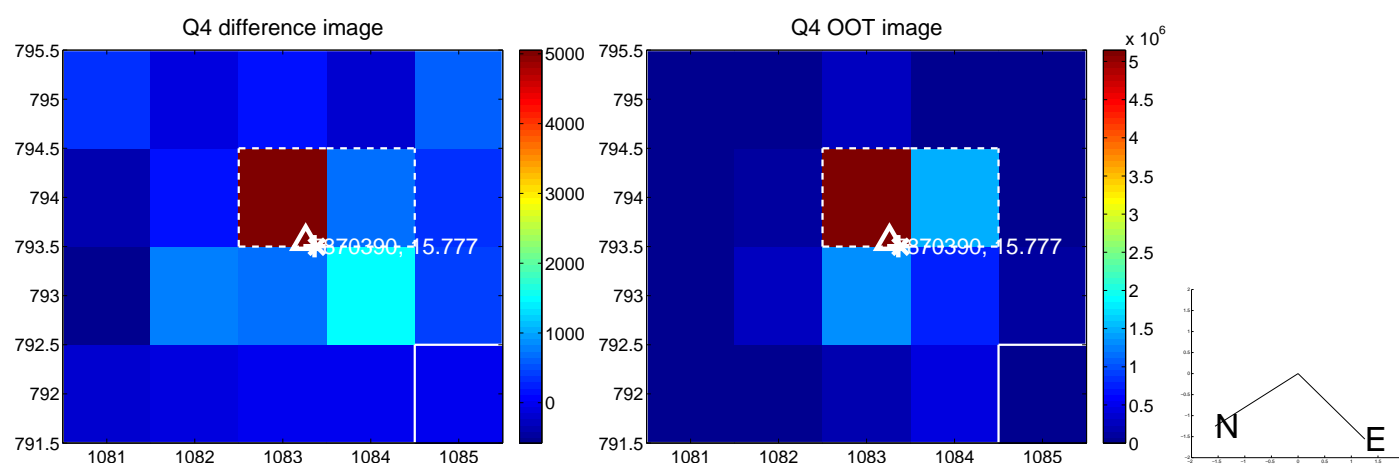
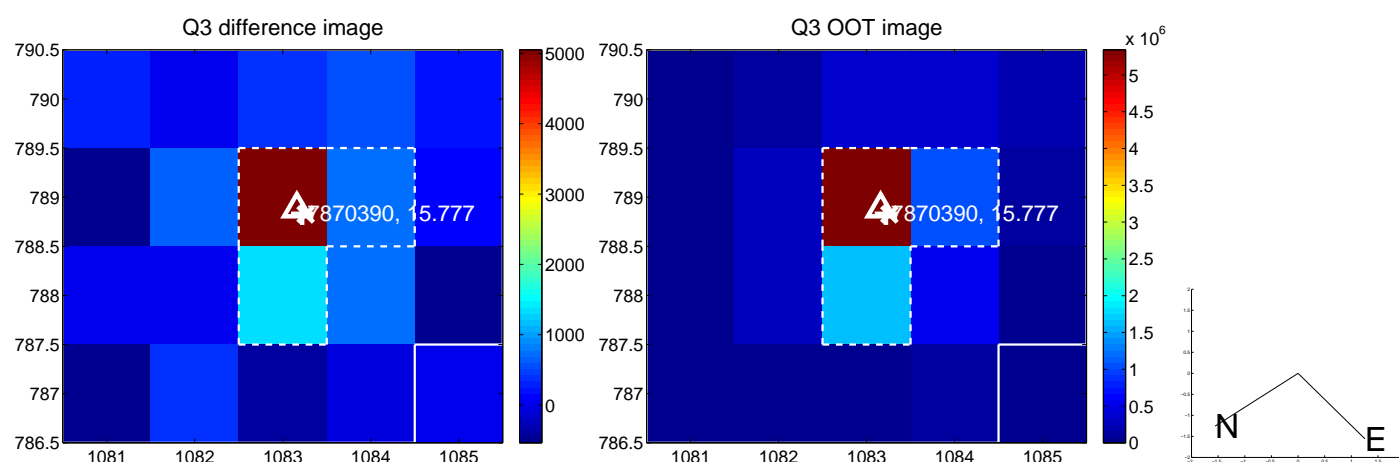
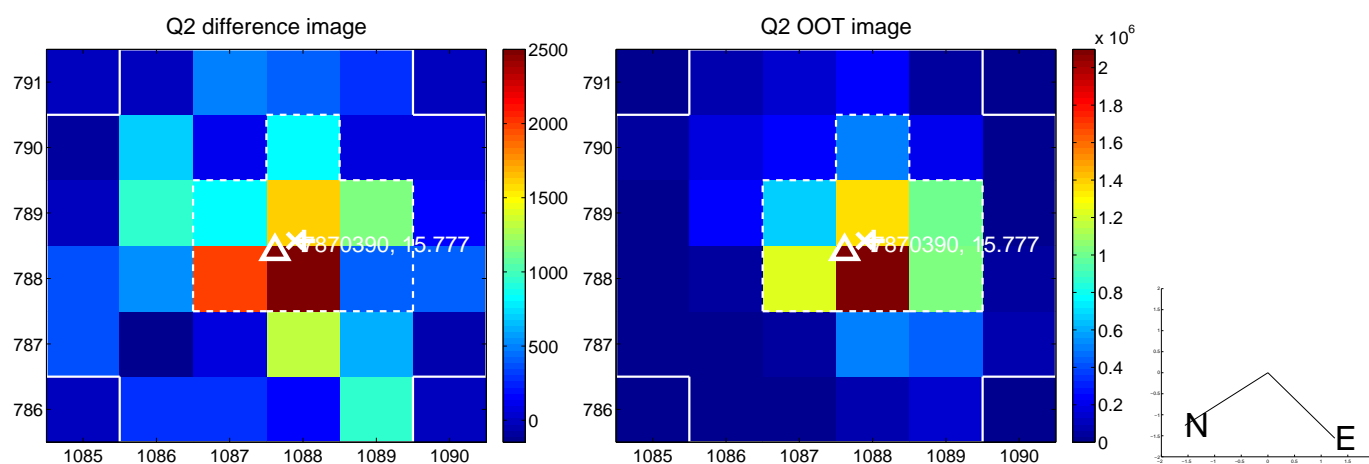
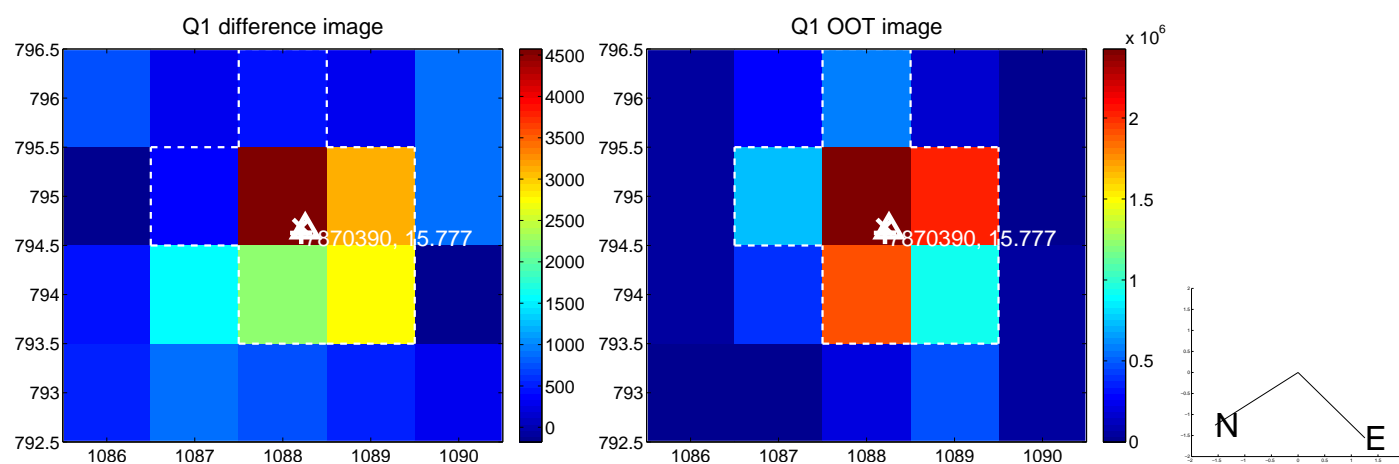
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT | 0.048 ± 0.118 | 0.40 | -0.047 ± 0.118 | -0.011 ± 0.146 |
| PRF-fit source offset from KIC position | 0.118 ± 0.148 | 0.80 | -0.004 ± 0.122 | 0.118 ± 0.147 |
| photometric centroid source offset | 0.59 ± 0.35 | 1.72 | 0.28 ± 0.32 | -0.52 ± 0.35 |

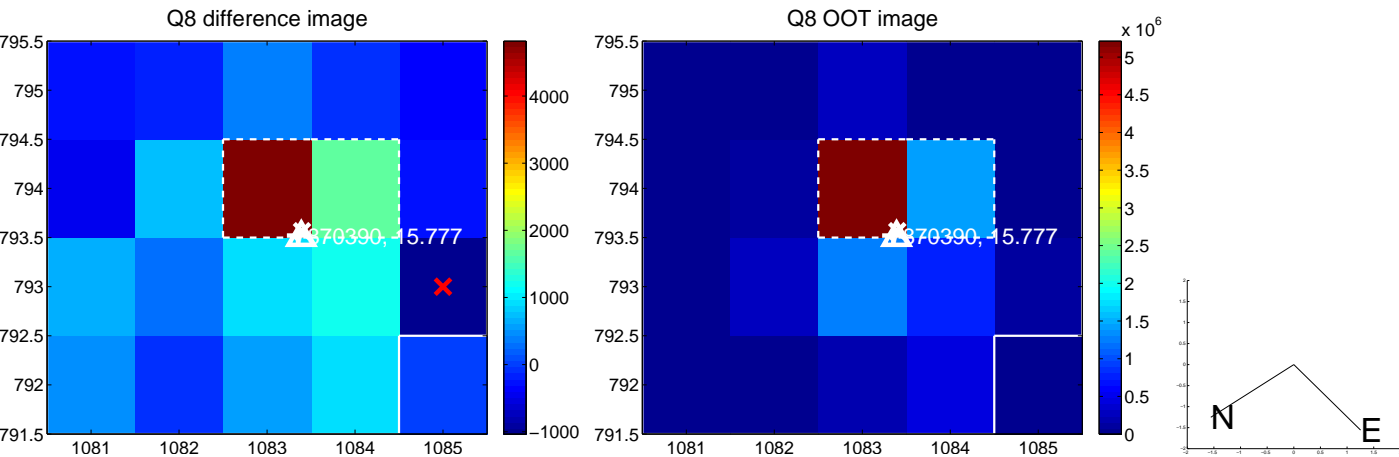
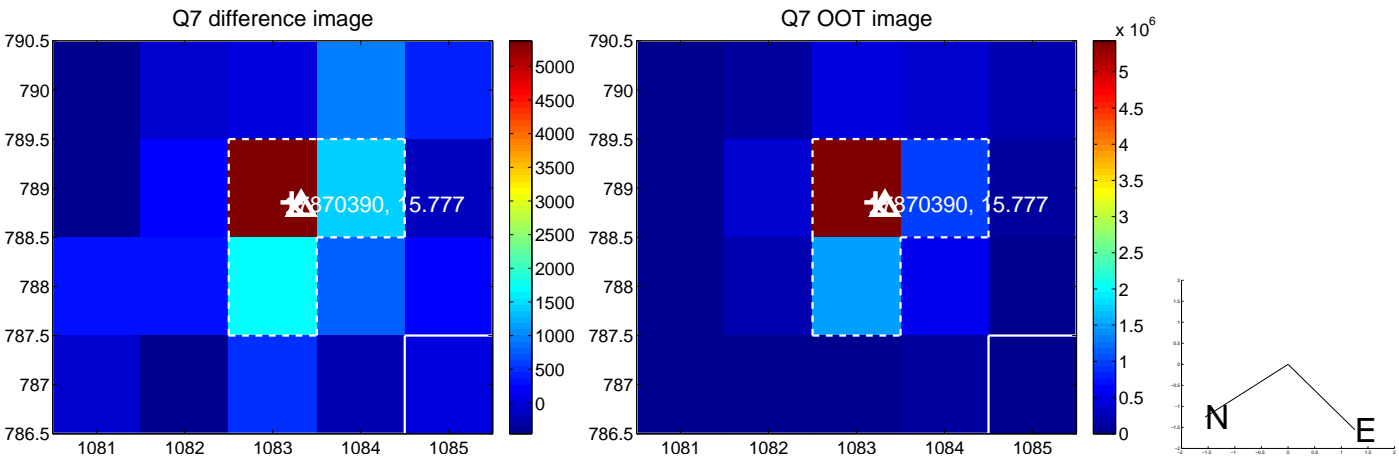
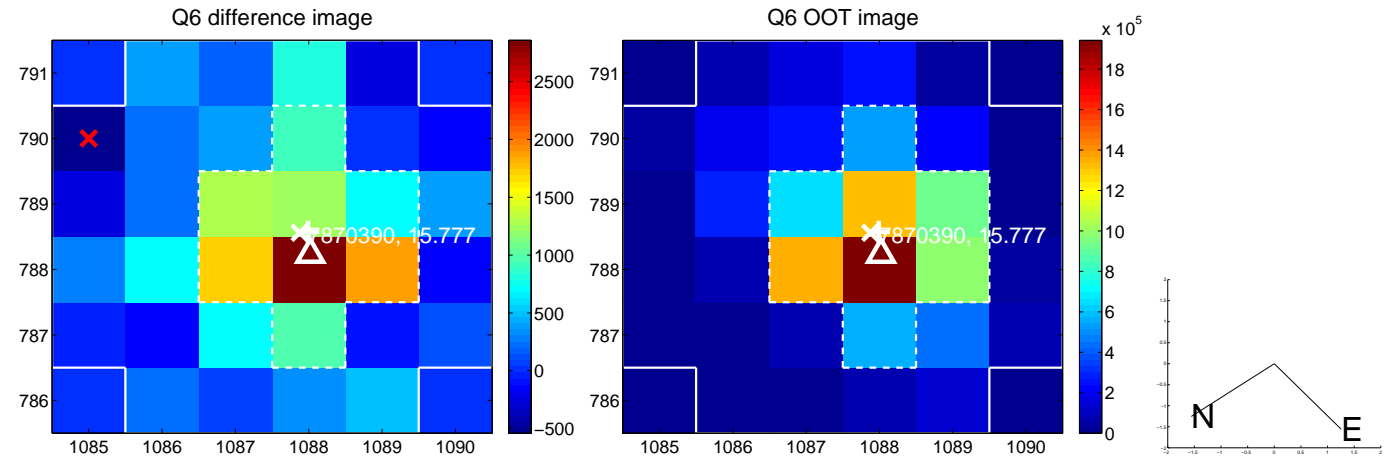
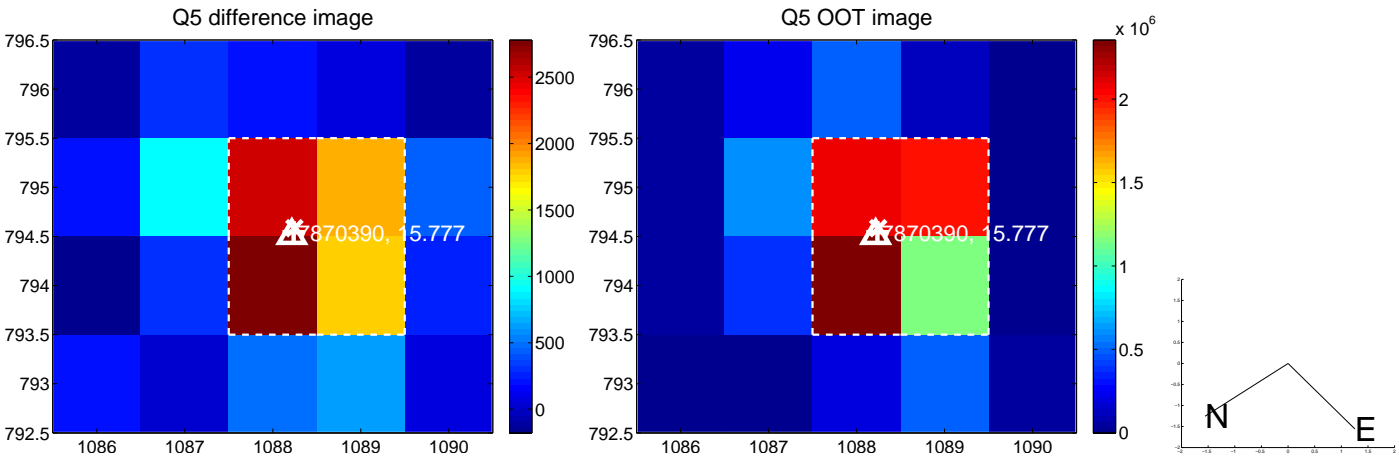


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

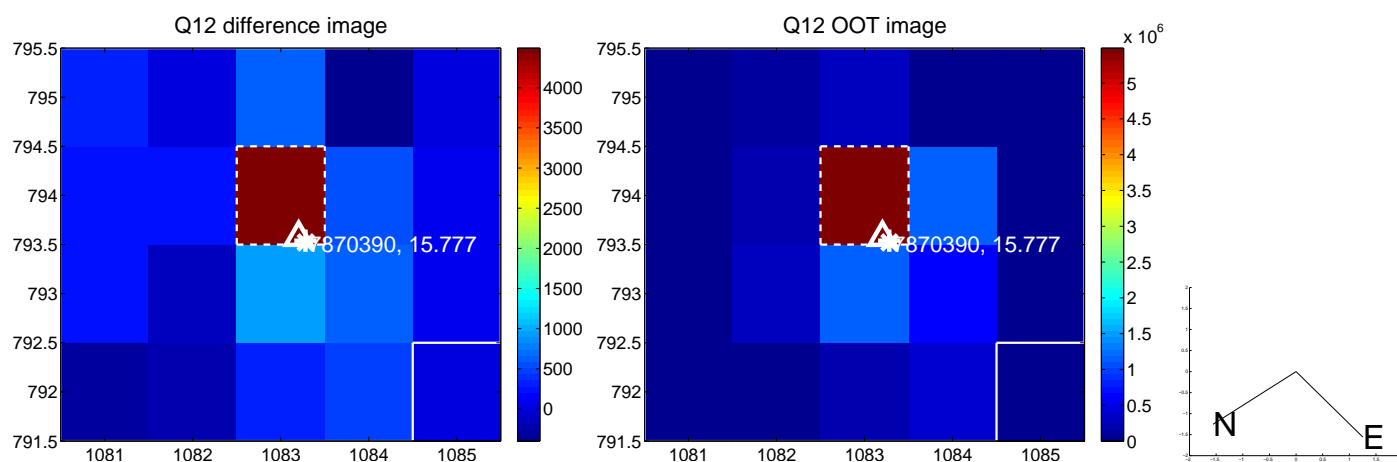
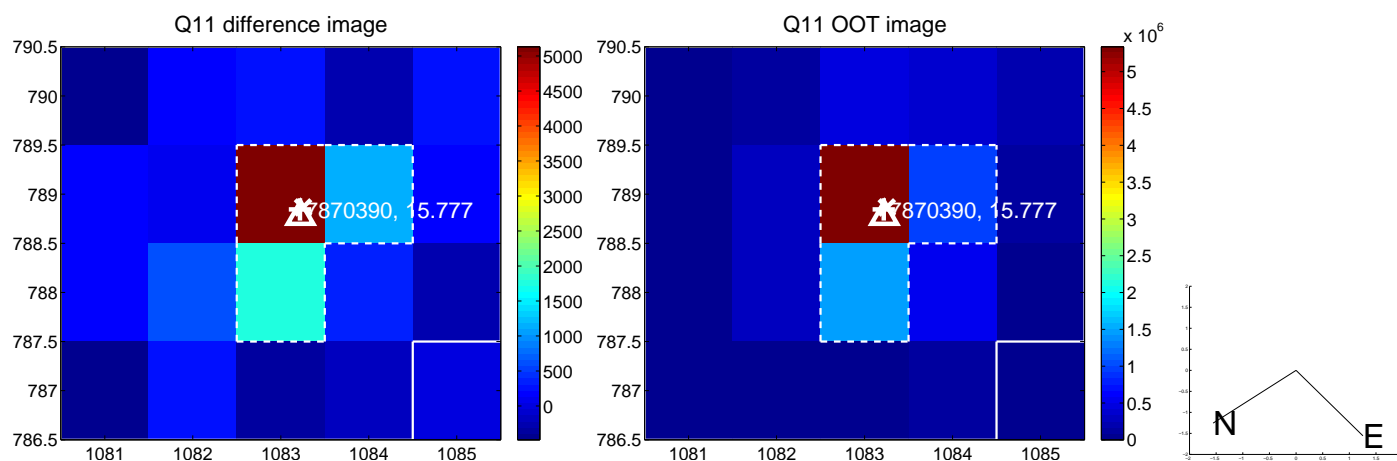
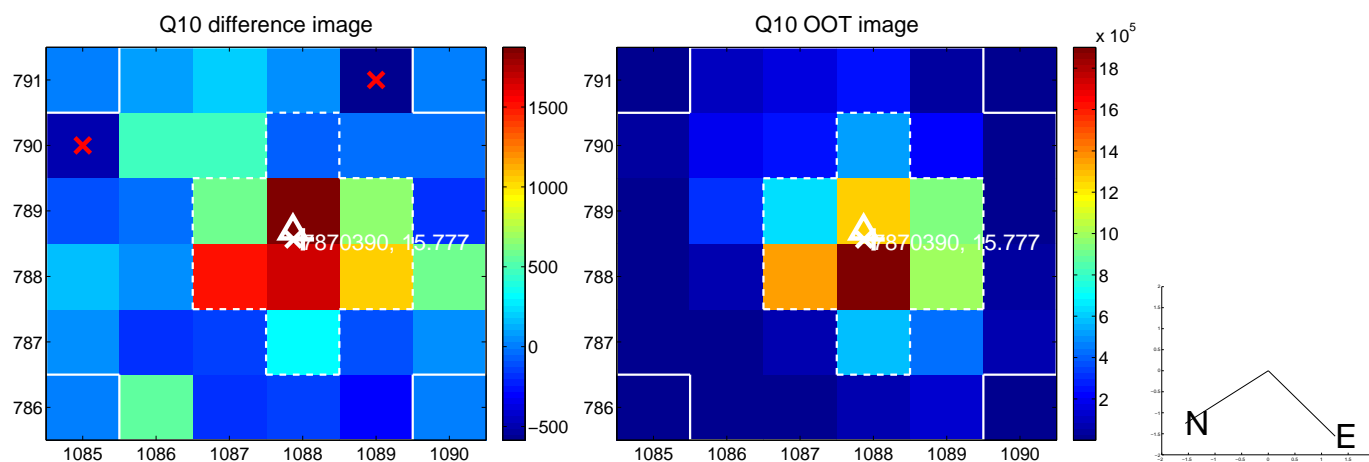
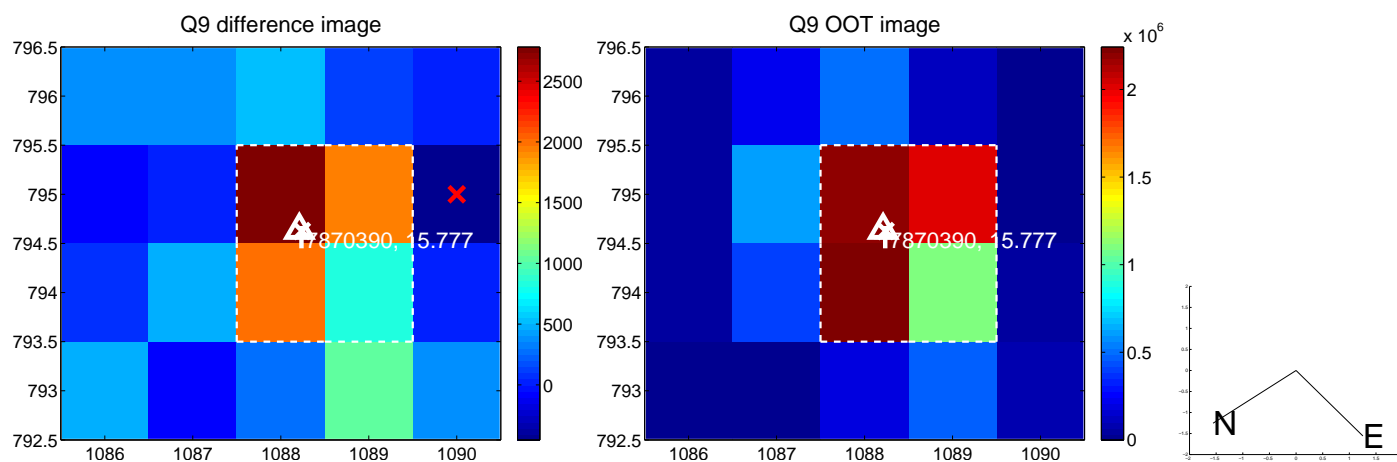
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value



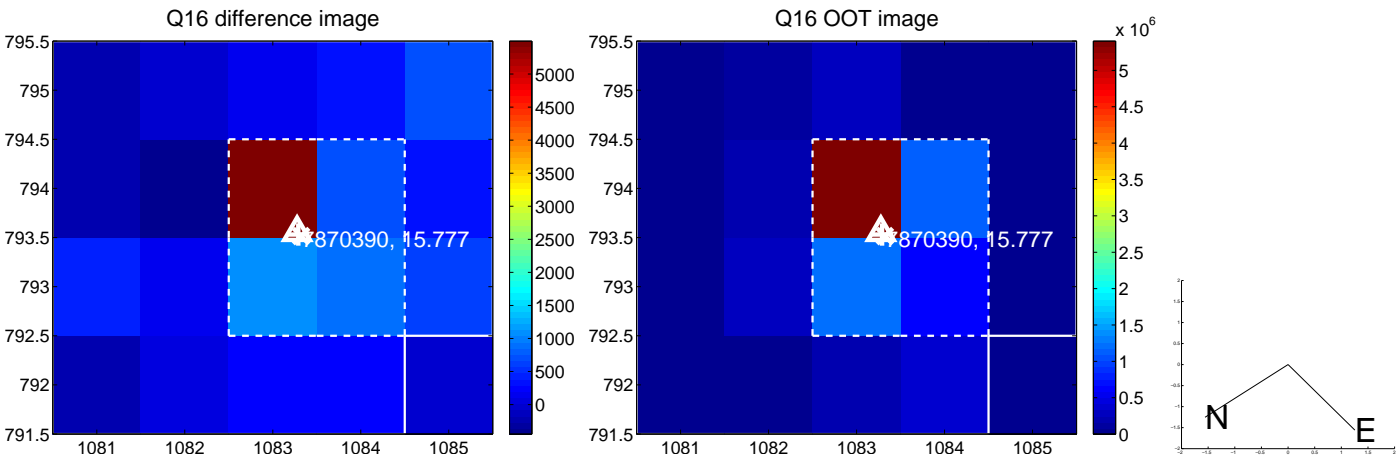
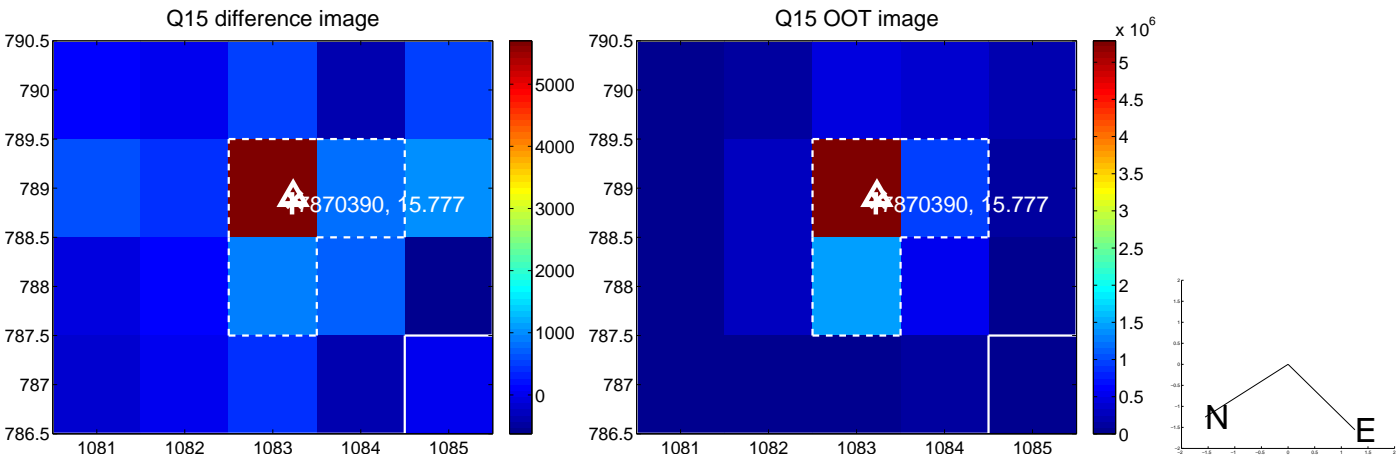
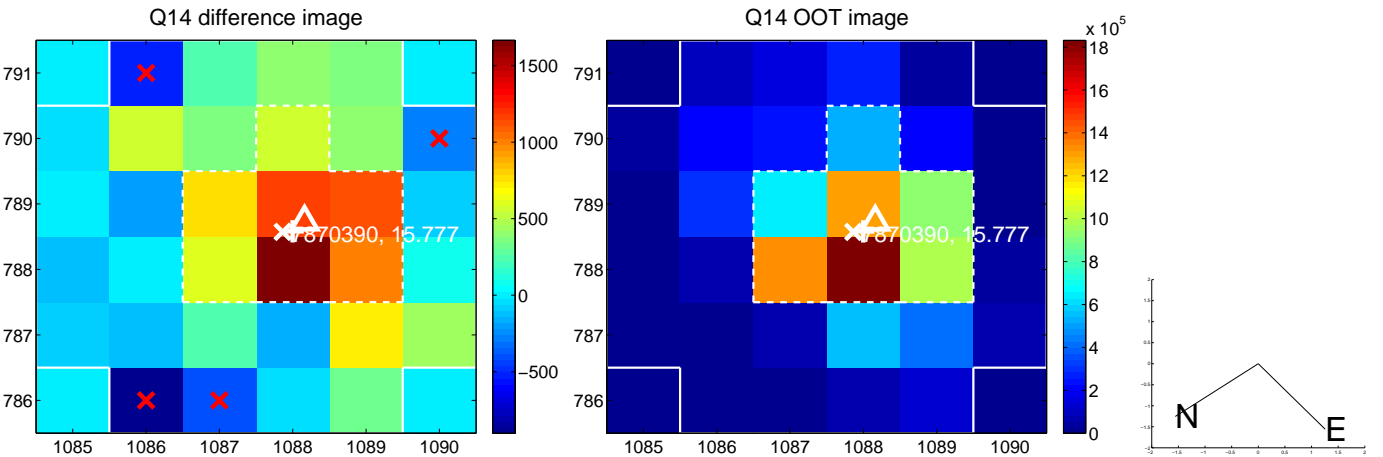
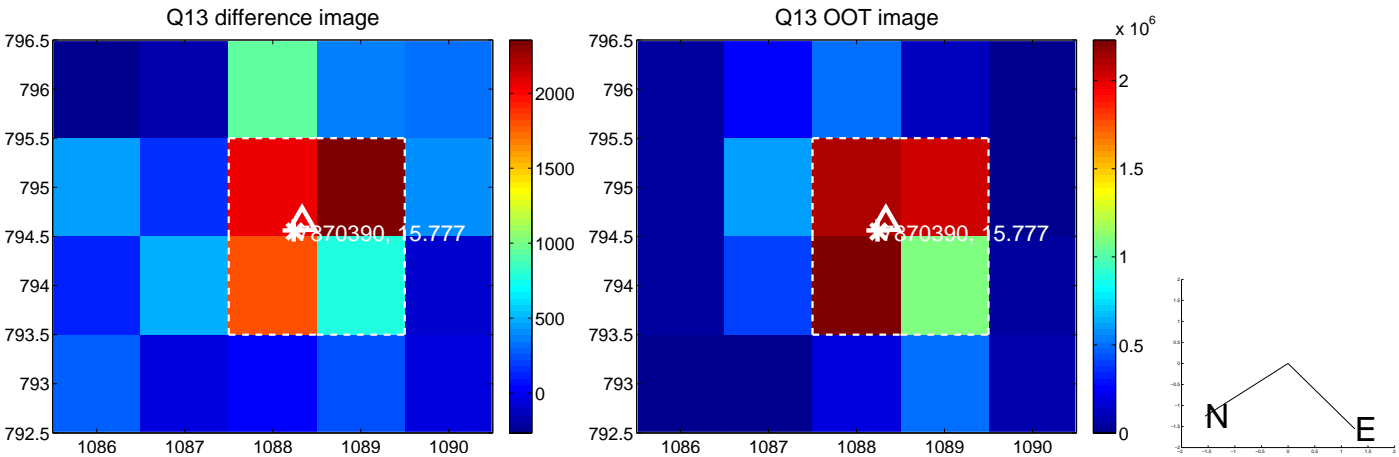
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



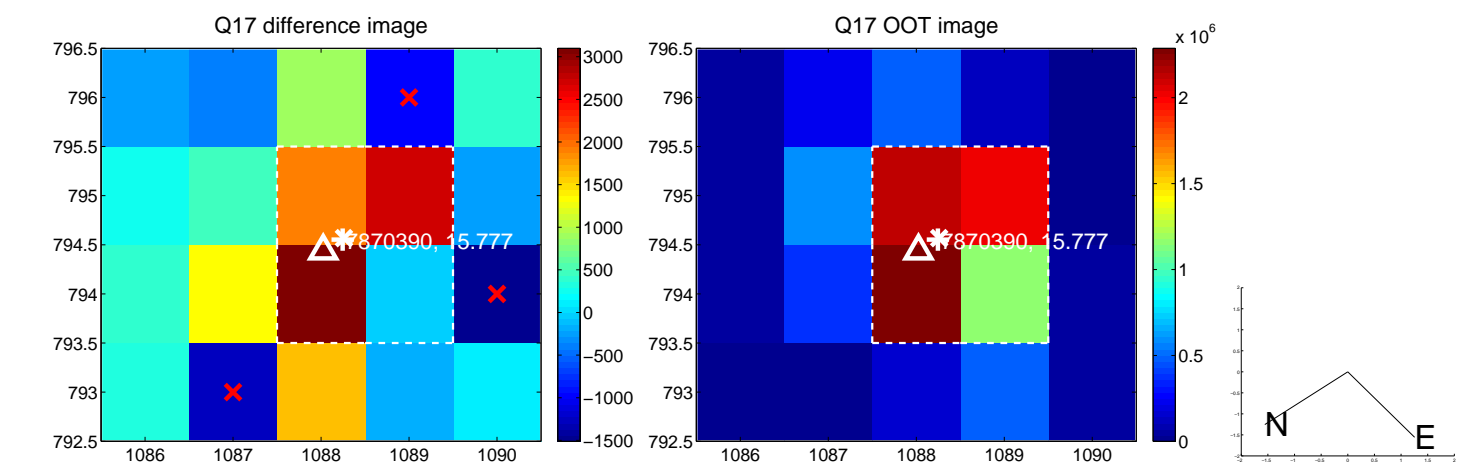
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value



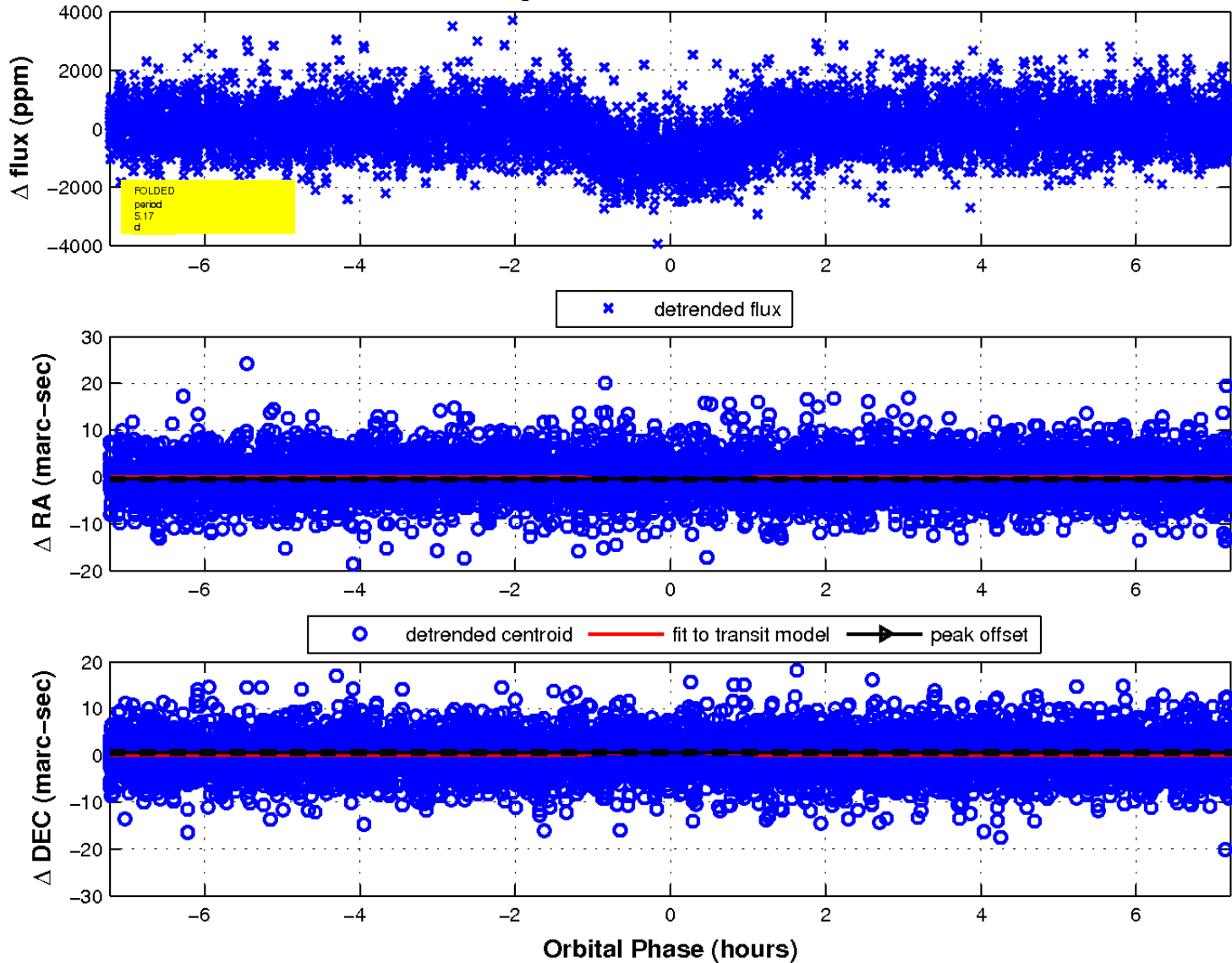
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

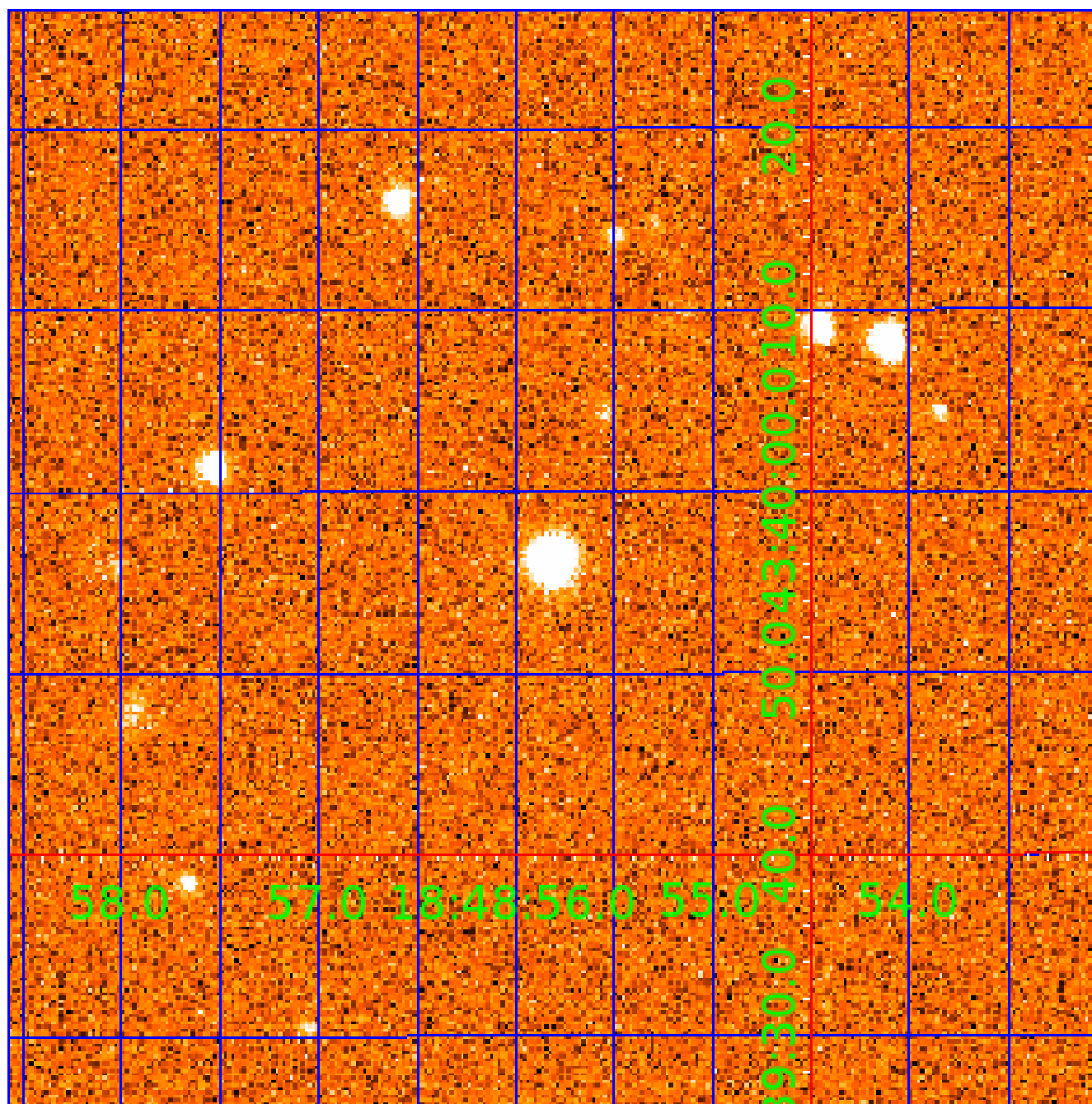


fluxWeightedCentroids, Planet 2 of 3



UKIRT Image

Declination



KIC 007870390

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 007870390-01 | OBS | 0898.01 | 9.770441 | 136.632273 | 1862.0 | 2.572 | 46.7 | 50.8 | 0.51 | 3906 | 2.37 | 10.61 |
| 007870390-02 | OBS | 0898.02 | 5.169804 | 136.443641 | 1024.4 | 2.408 | 34.1 | 38.5 | 0.51 | 3906 | 1.88 | 24.79 |
| 007870390-03 | OBS | 0898.03 | 20.090187 | 147.976064 | 1458.0 | 3.971 | 29.2 | 31.9 | 0.51 | 3906 | 2.20 | 4.06 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|------------|
| 007870390-01 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |
| 007870390-02 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |
| 007870390-03 | 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.

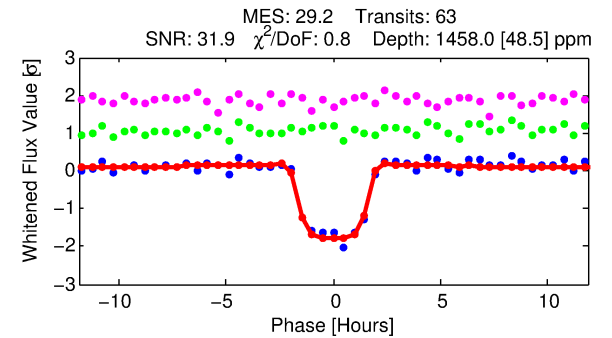
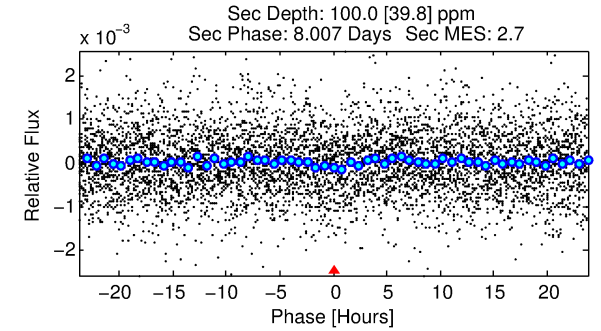
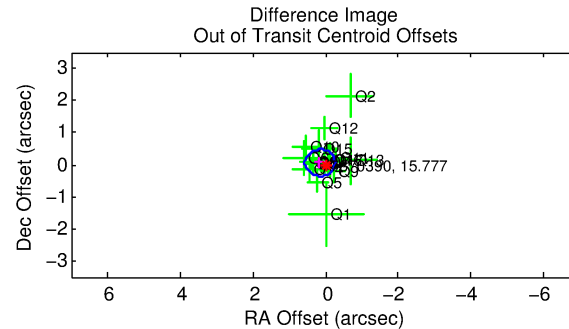
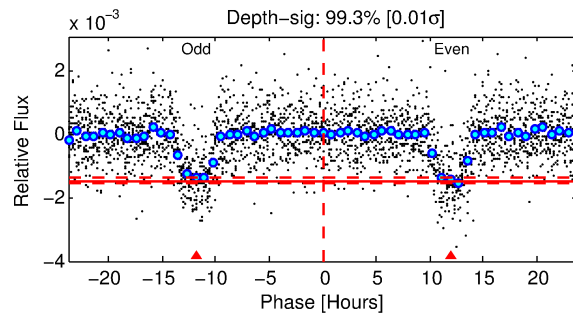
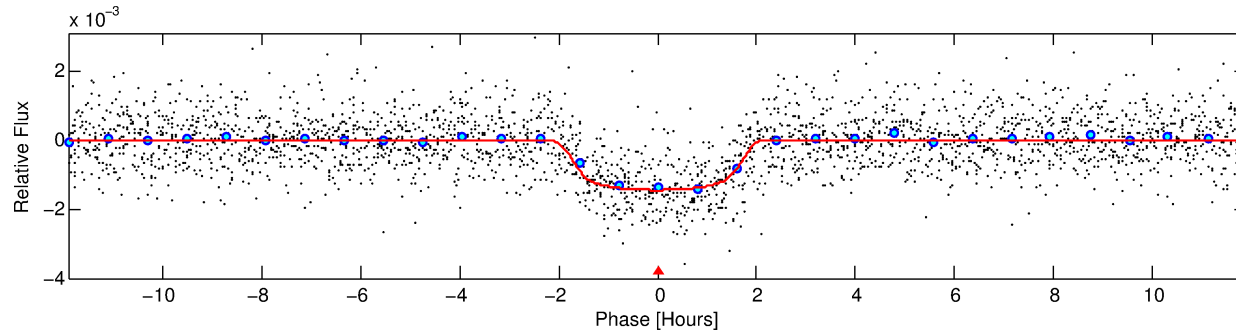
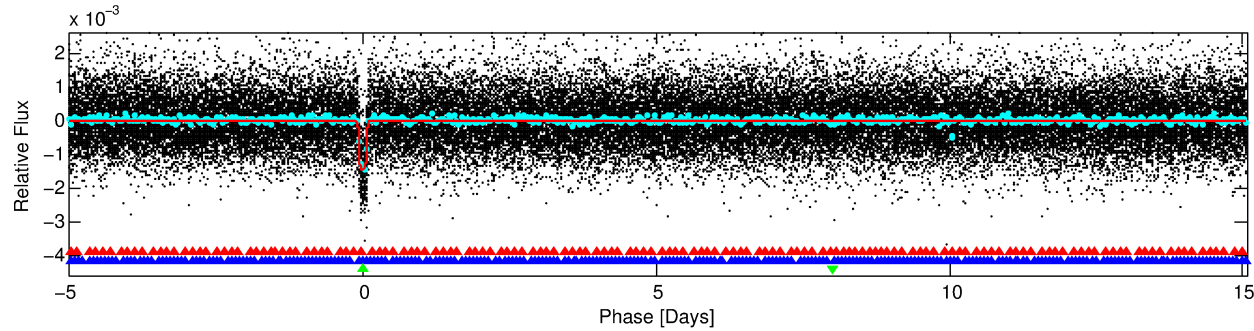
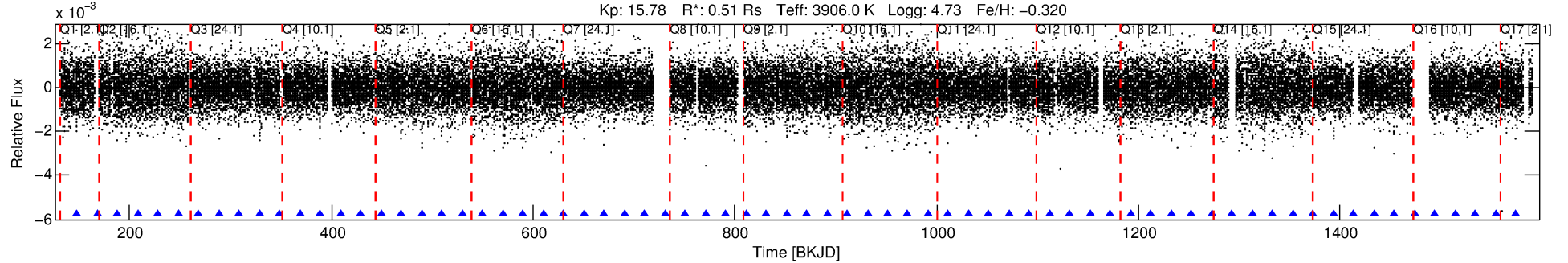
Ephemeris Match Information For 007870390-03

No Significant Match Found

DV One-Page Summary

KIC: 7870390 Candidate: 3 of 3 Period: 20.090 d
KOI: K00898.03 Name: Kepler-83c Corr: 0.950

Kp: 15.78 R*: 0.51 Rs Teff: 3906.0 K Logg: 4.73 Fe/H: -0.320



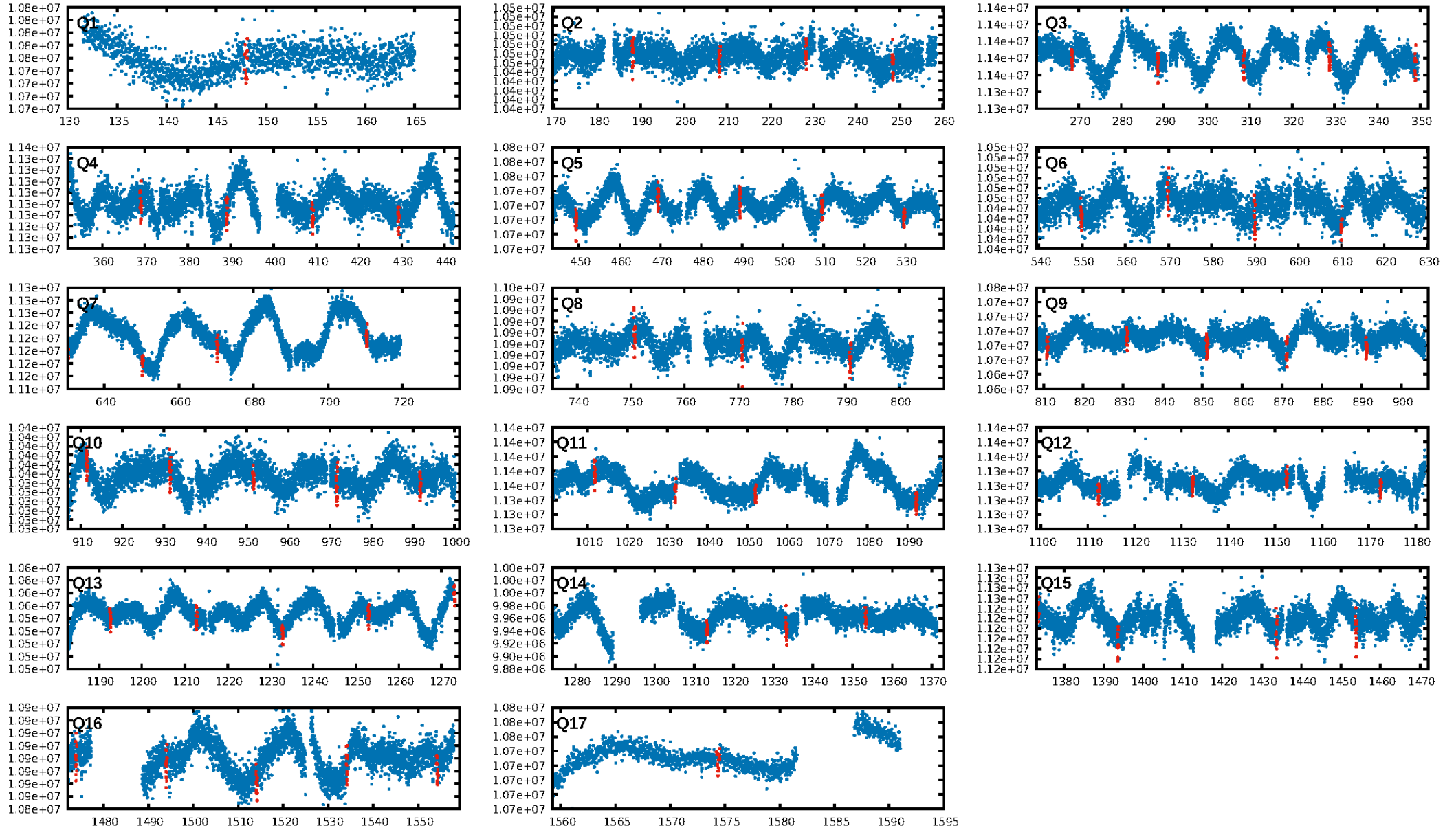
DV Fit Results:

Period = 20.09019 [0.00006] d
Epoch = 147.9761 [0.0025] BKJD
Rp/R* = 0.0396 [0.0026]
a/R* = 23.58 [6.84]
b = 0.84 [0.10]
Seff = 4.06 [0.54]
Teq = 362 [12] K
Rp = 2.20 [0.25] Re
a = 0.1154 [0.0083] AU
Ag = 151.52 [65.29] [2.31σ]
Teffp = 1963 [210] K [7.61σ]

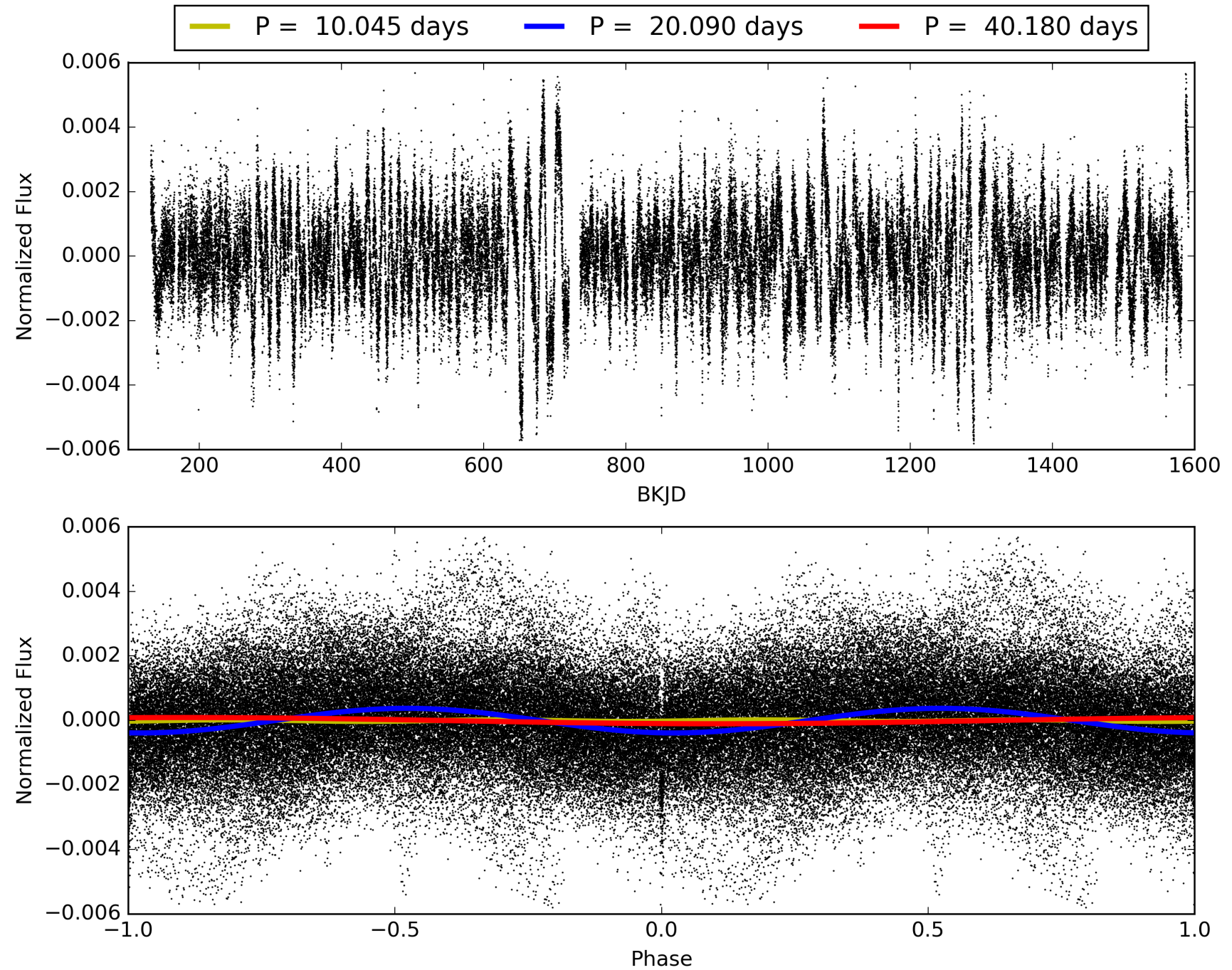
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [52.35σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 69.0%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 2.37e-177
RollingBand-fgt: 1.00 [61/61]
GhostDiagnostic-chr: 3.421
Centroid-sig: 53.8%
Centroid-so: 0.480 arcsec [1.36σ]
OotOffset-rm: 0.166 arcsec [1.20σ]
KicOffset-rm: 0.187 arcsec [1.35σ]
OotOffset-st: 4/4/4/5 [17]
KicOffset-st: 4/4/4/5 [17]
DiffImageQuality-fgm: 0.94 [16/17]
DiffImageOverlap-fno: 1.00 [17/17]

TCE 007870390-03, PDC Light Curves

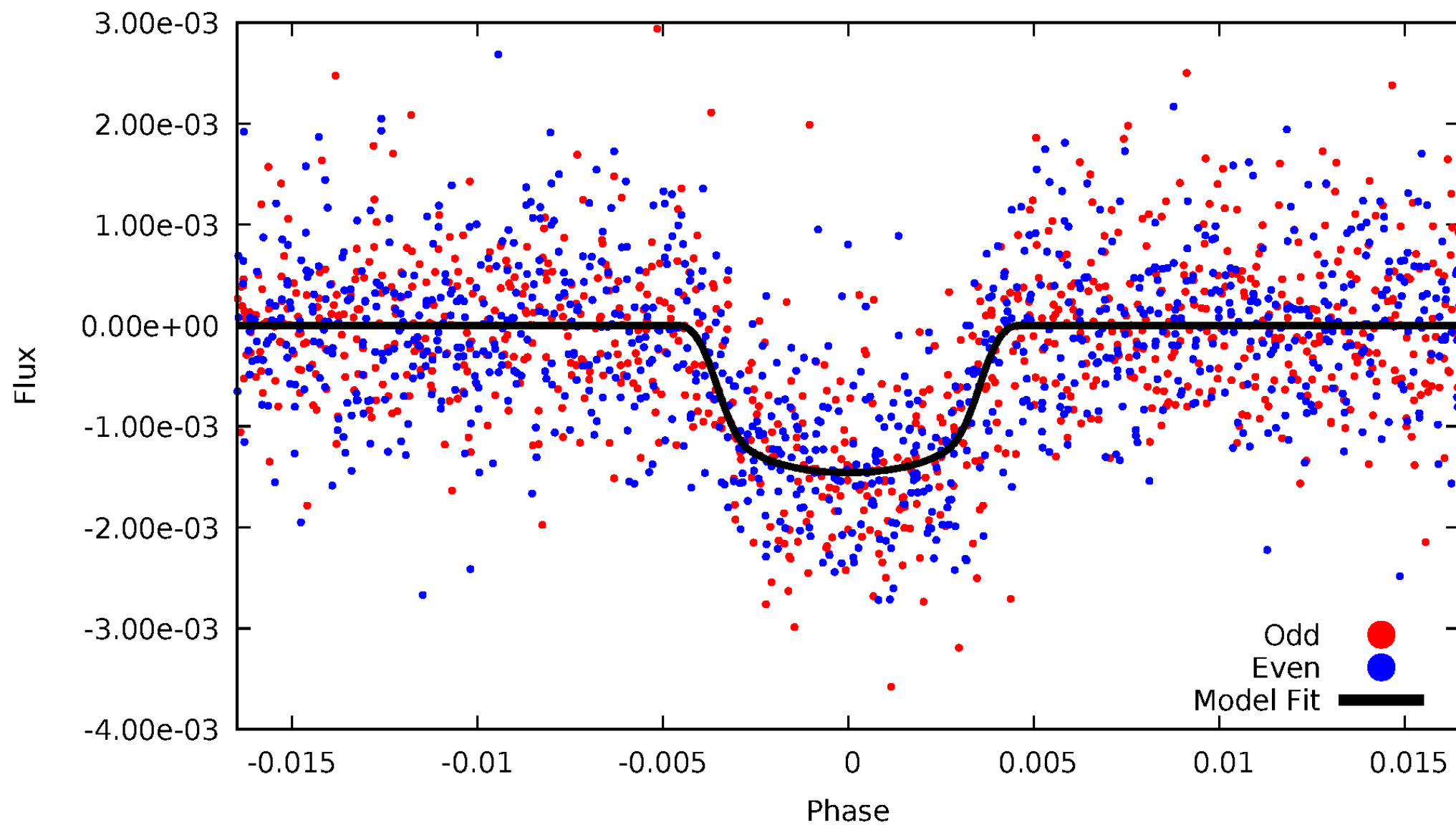


TCE 007870390-03



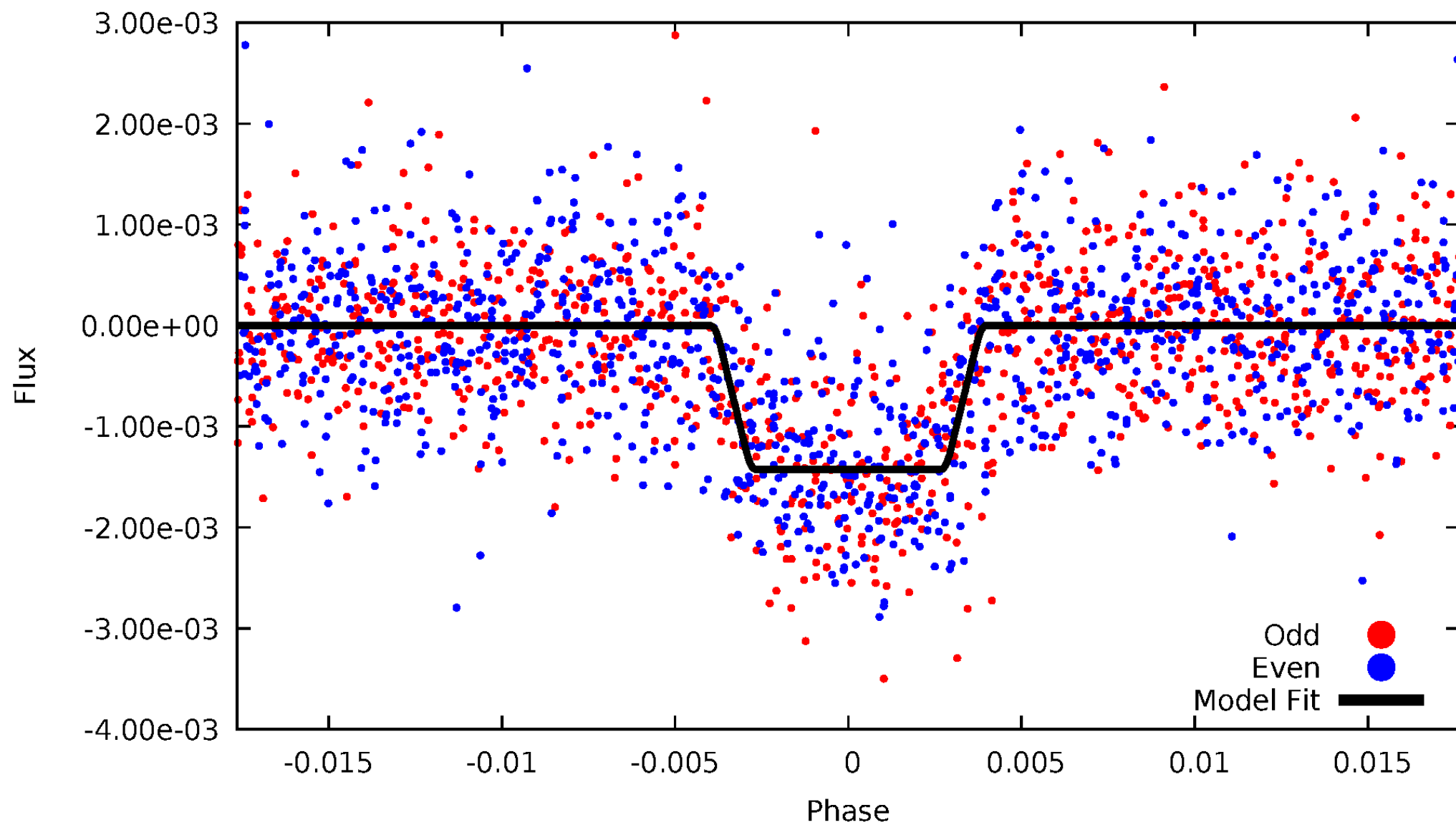
DV Odd/Even

TCE 007870390-03



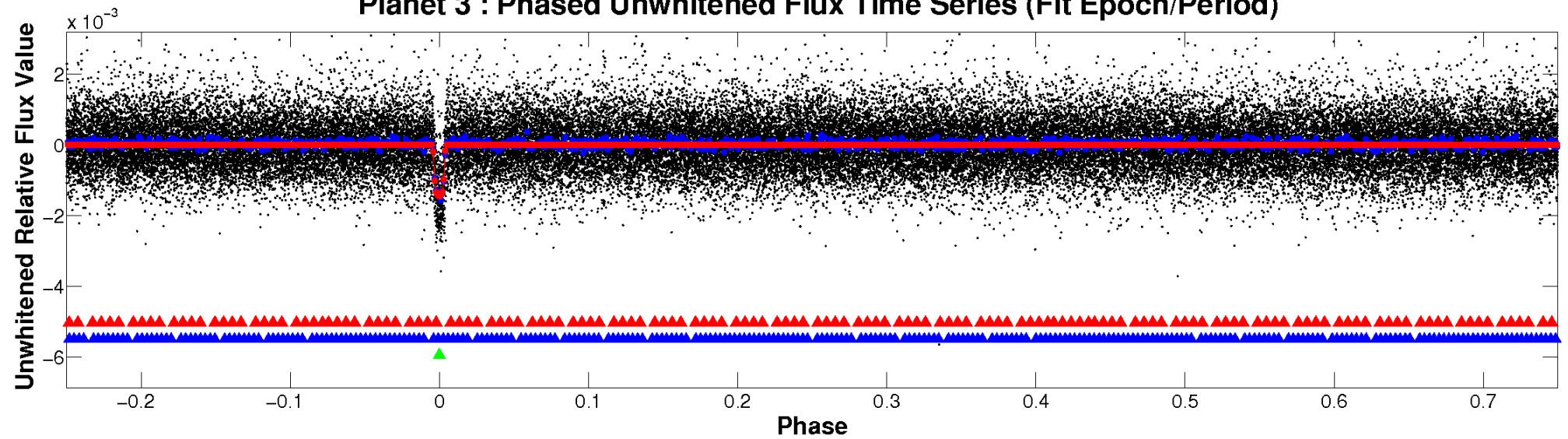
ALT Odd/Even

TCE 007870390-03

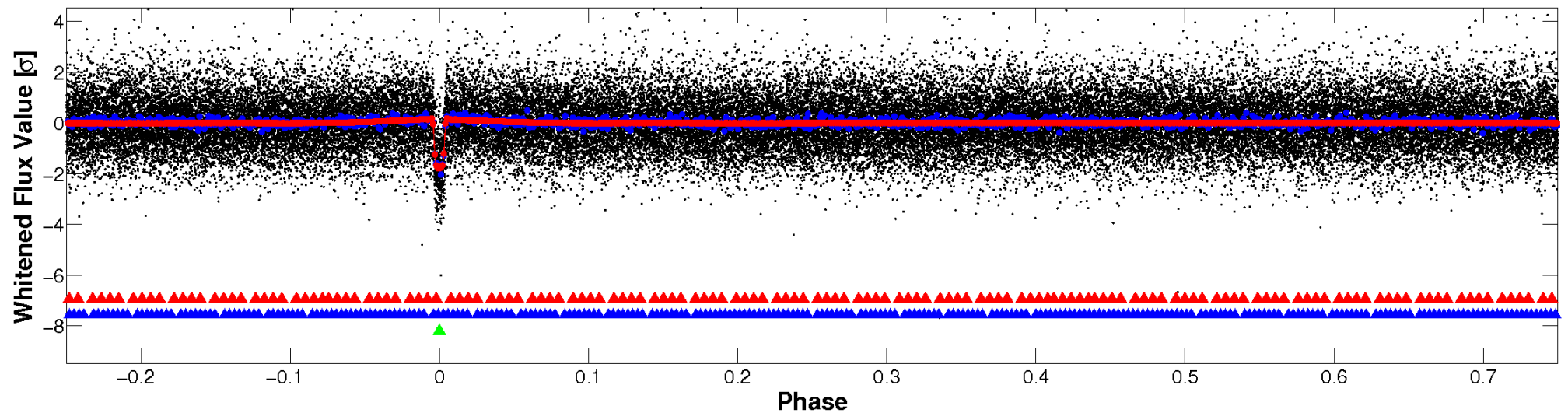


Non-Whitened Vs. Whitened Light Curve

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

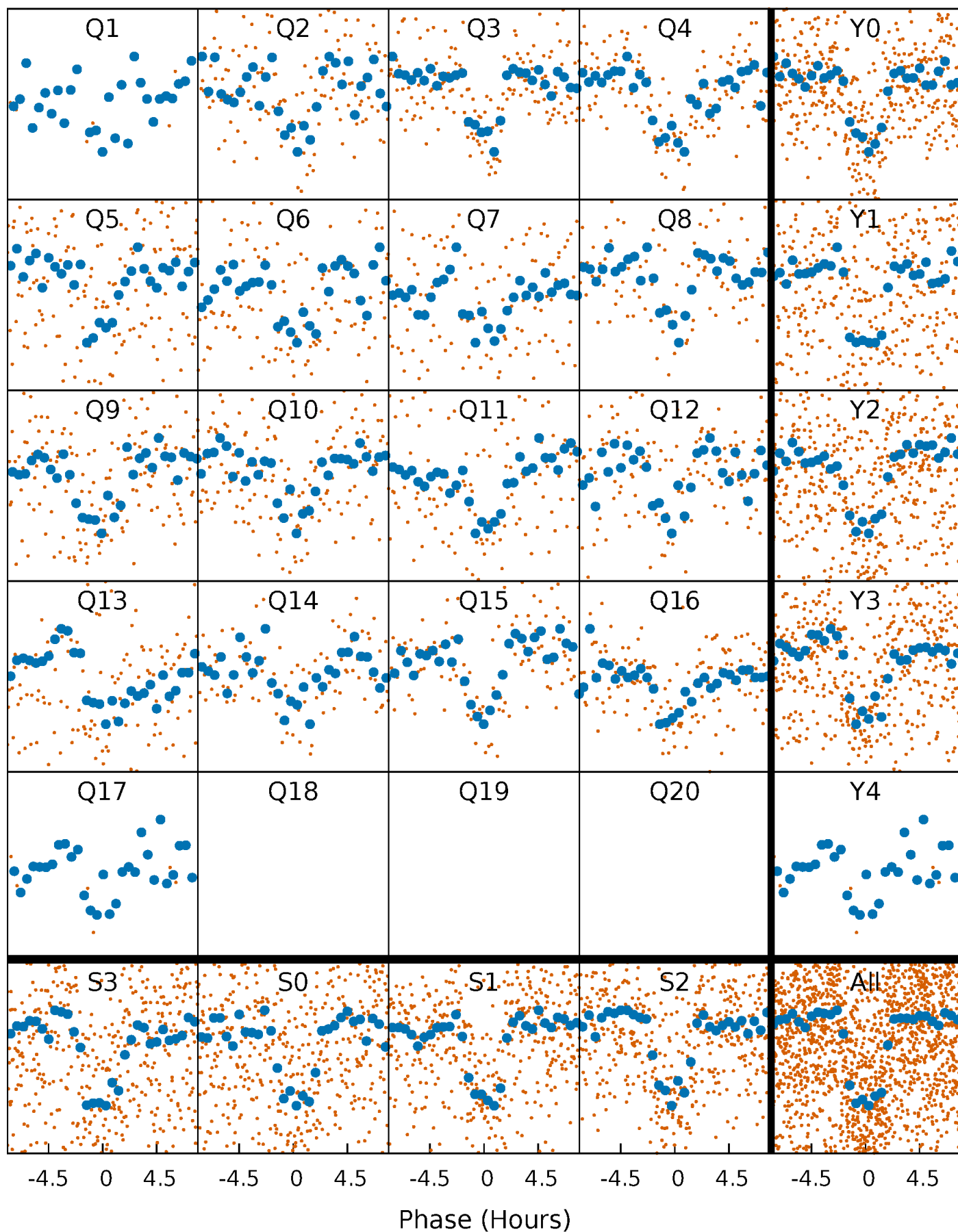


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



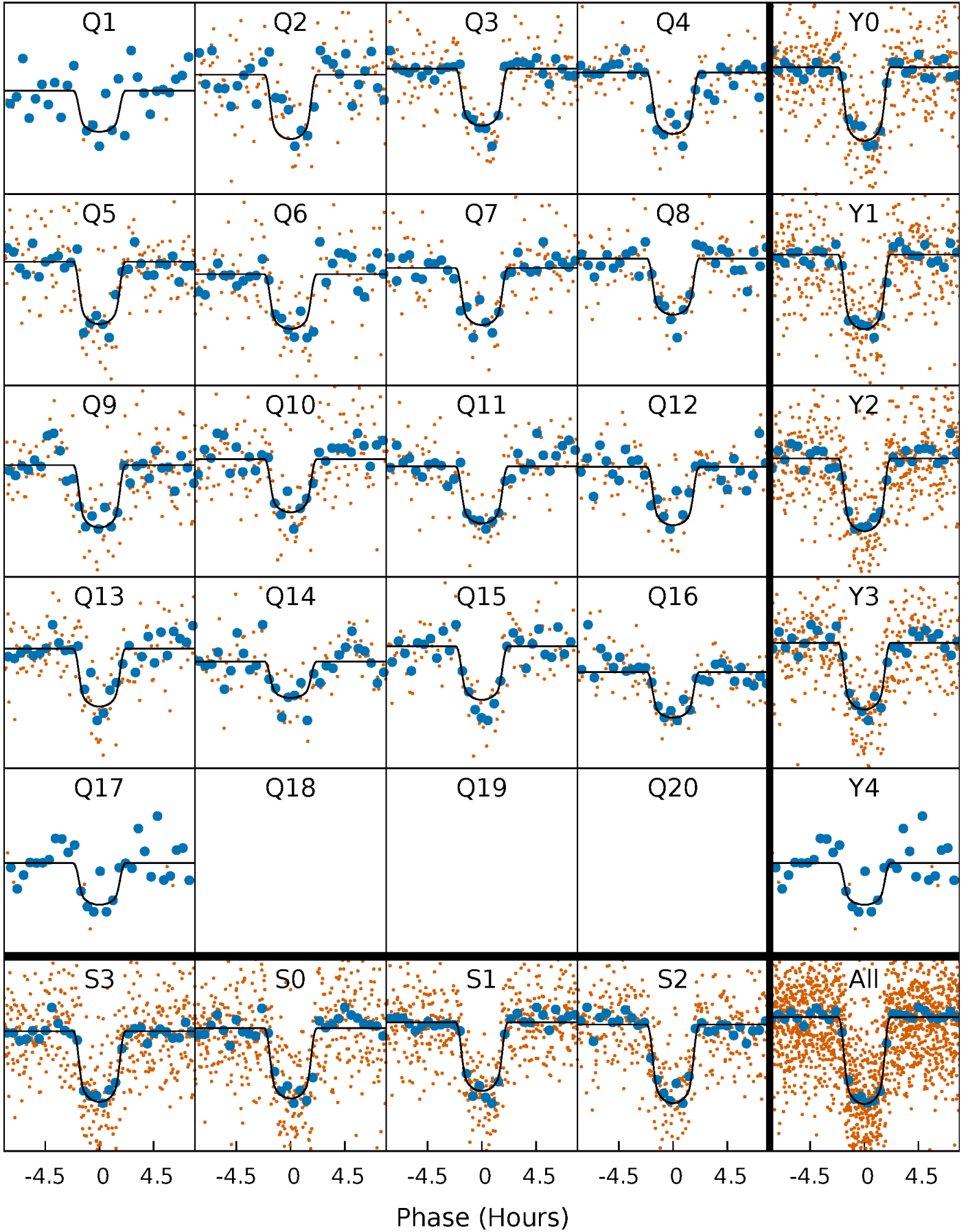
PDC Quarter-Phased Transit Curves

TCE 007870390-03 P= 20.090187 Days $T_0=147.976064$ (BKJD)



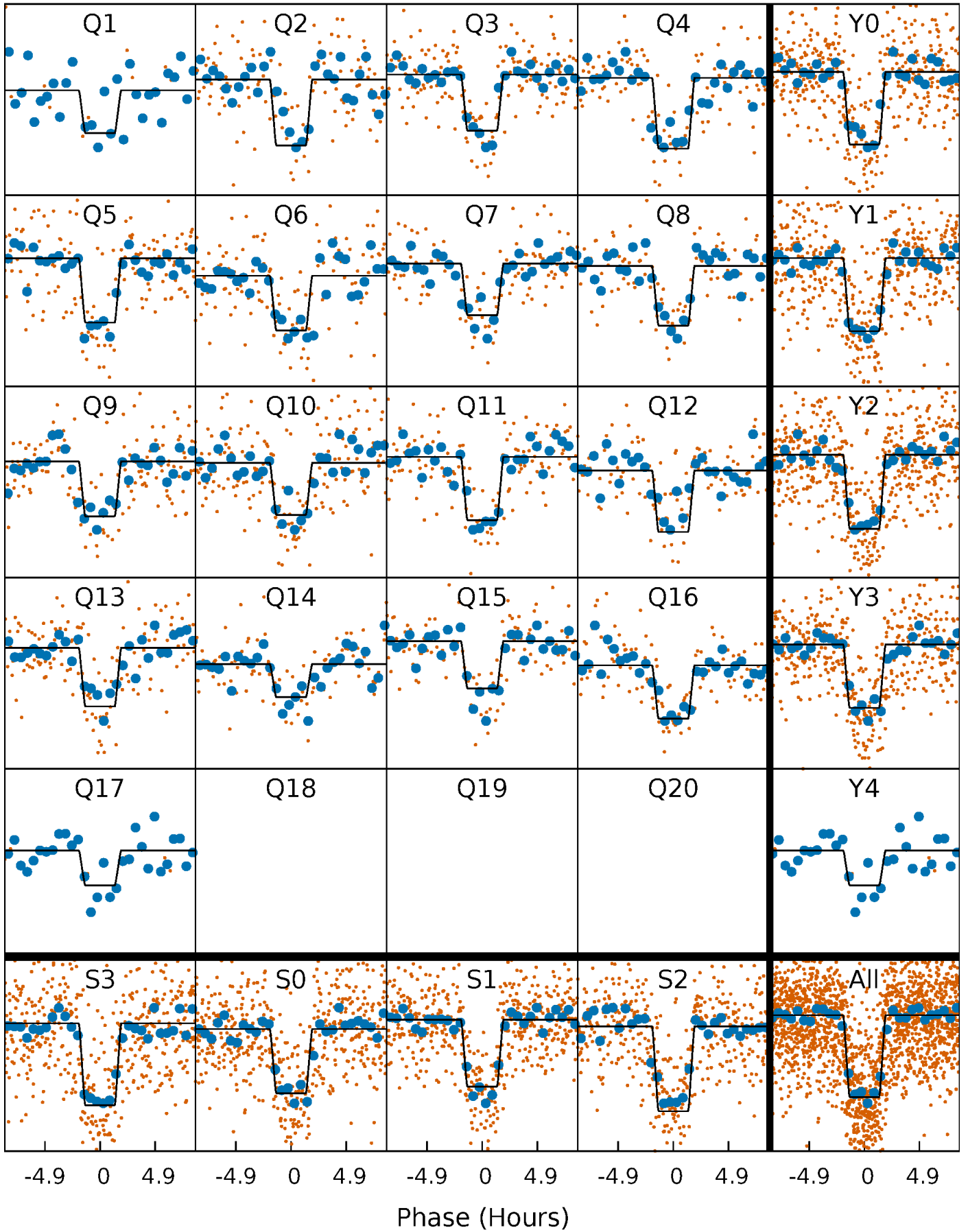
DV Quarter-Phased Transit Curves

TCE 007870390-03 P= 20.090187 Days $T_0=147.976064$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

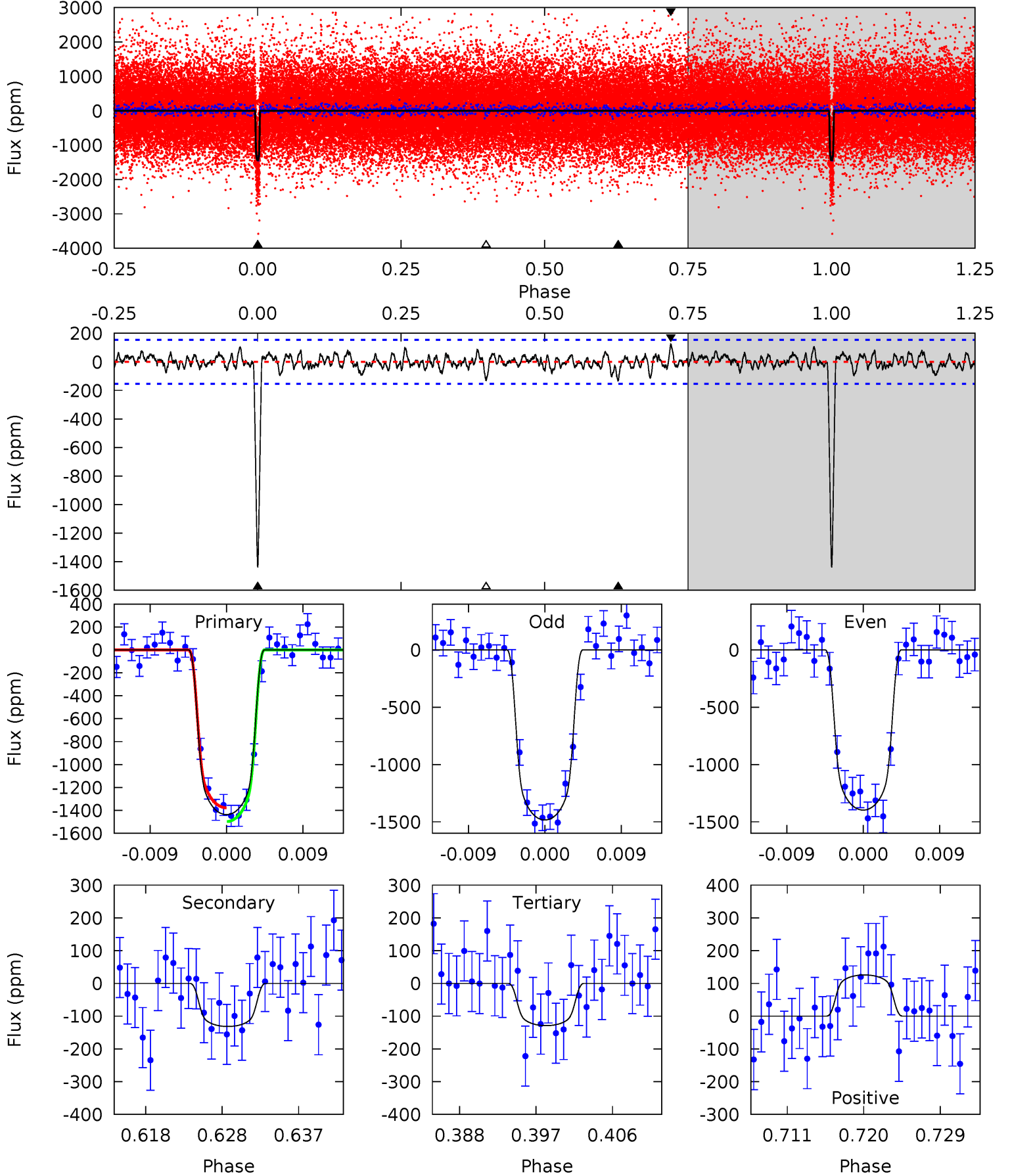
TCE 007870390-03 P= 20.089980 Days $T_0=147.985139$ (BKJD)



DV Model-Shift Uniqueness Test

007870390-03, P = 20.090187 Days, E = 127.885877 Days

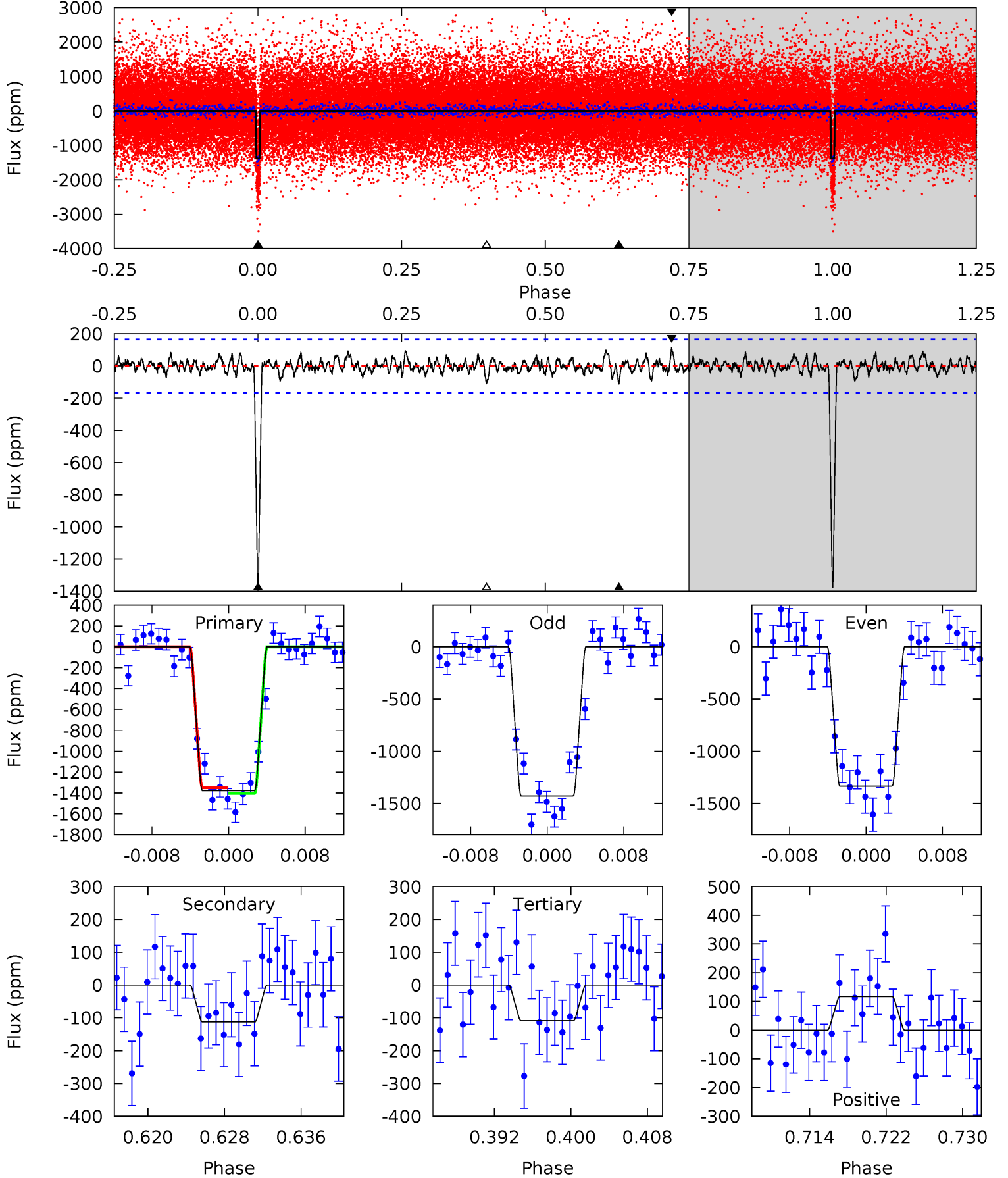
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 46.9 | 4.30 | 4.21 | 4.11 | 5.04 | 2.60 | 1.20 | 42.7 | 42.8 | 0.09 | 0.19 | 1.41 | 1.05 | 0.08 | 1.97 |



Alt Model-Shift Uniqueness Test

007870390-03, $P = 20.089980$ Days, $E = 127.895159$ Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 42.2 | 3.44 | 3.33 | 3.59 | 5.07 | 2.66 | 1.00 | 38.9 | 38.6 | 0.12 | -0.15 | 1.43 | 0.96 | 0.08 | 0.83 |



Stellar Parameters For KIC 007870390

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | R (R_{\odot}) | $M(M_{\odot})$ | p_{\star} ($\text{g}\cdot\text{cm}^{-3}$) |
|--------|---------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 3906^{+78}_{-86} | $4.730^{+0.052}_{-0.024}$ | $-0.320^{+0.150}_{-0.150}$ | $0.509^{+0.032}_{-0.046}$ | $0.508^{+0.037}_{-0.033}$ | $5.425^{+1.273}_{-0.583}$ |
| | +2%/-2% | +1%/-1% | +47%/-47% | +6%/-9% | +7%/-6% | +23%/-11% |
| Source | SPE70 | SPE60 | SPE70 | DSEP | | |

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

Secondary Eclipse Parameters for KIC 007870390-03 / KOI 0898.03

| Detrend | Depth (ppm) | R_p (R_{\oplus}) | T_{max} (K) | T_{obs} (K) | A_{obs} |
|---------|---------------|------------------------|----------------------|----------------------|-------------------|
| DV | -132 ± 31 | $2.17^{+0.19}_{-0.17}$ | 503^{+13}_{-14} | 2691^{+109}_{-112} | 202^{+62}_{-56} |
| Alt. | -112 ± 33 | $2.10^{+0.17}_{-0.19}$ | 502^{+13}_{-13} | 2662^{+114}_{-132} | 185^{+63}_{-58} |

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

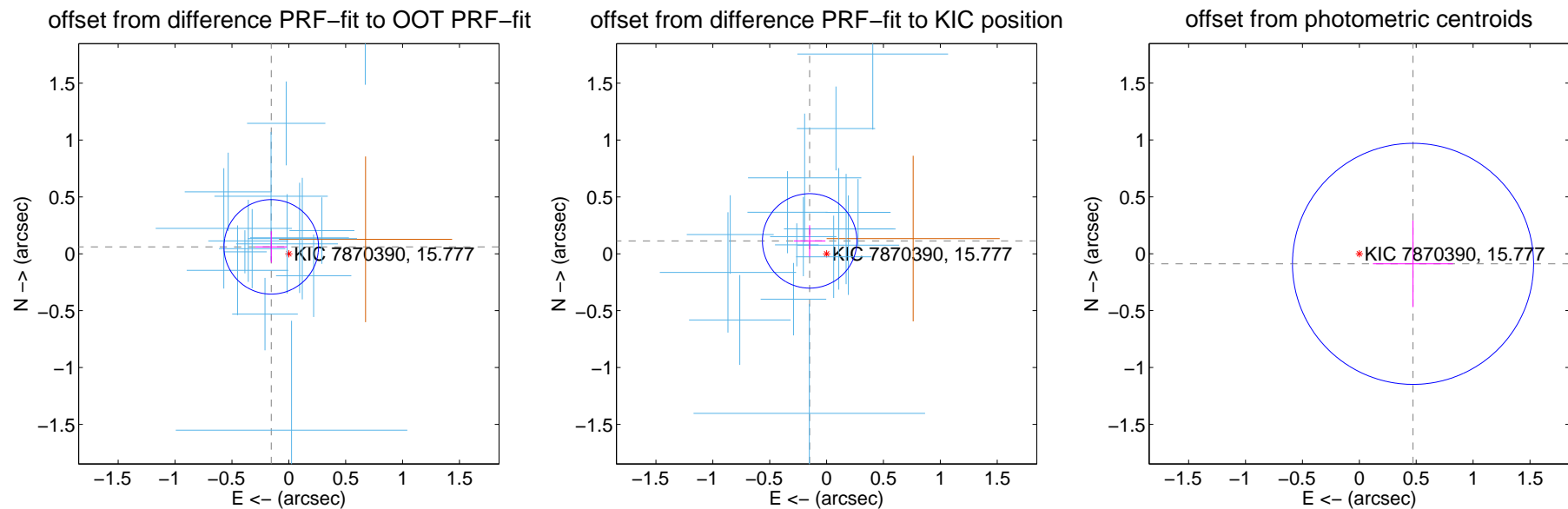
DV Centroid Data

Supplemental centroid analysis for 007870390-03. Kepler magnitude: 15.78. Transit SNR 31.91

There are 16 quarters with good PRF difference image offsets

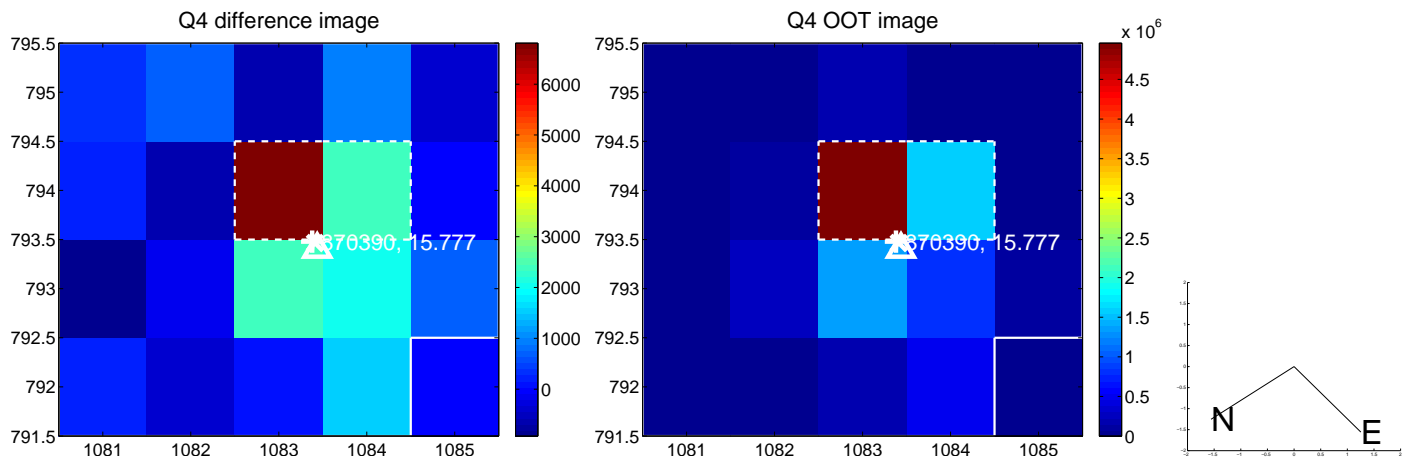
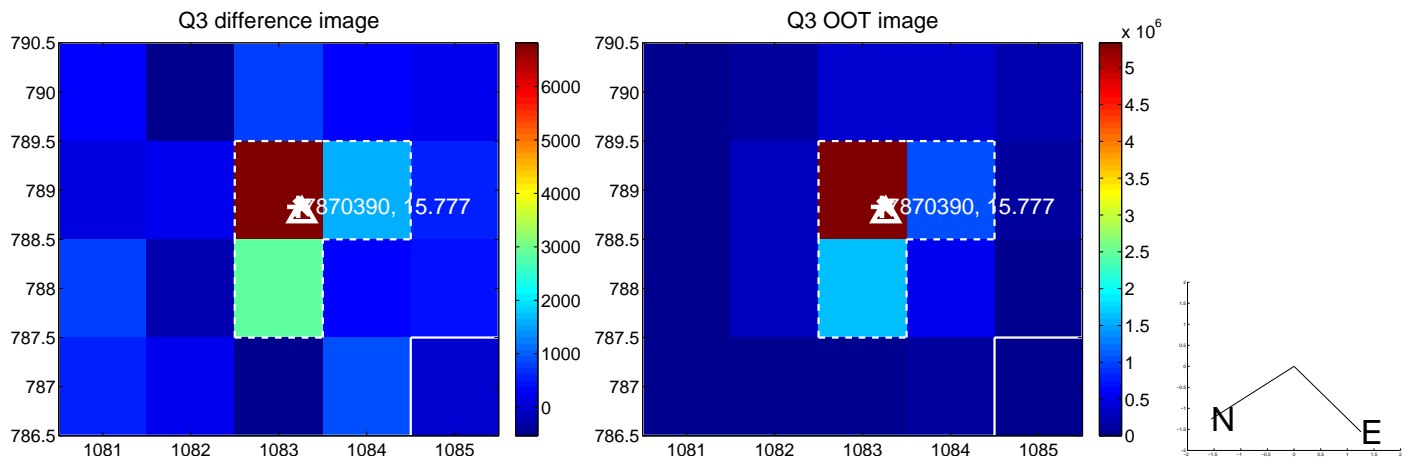
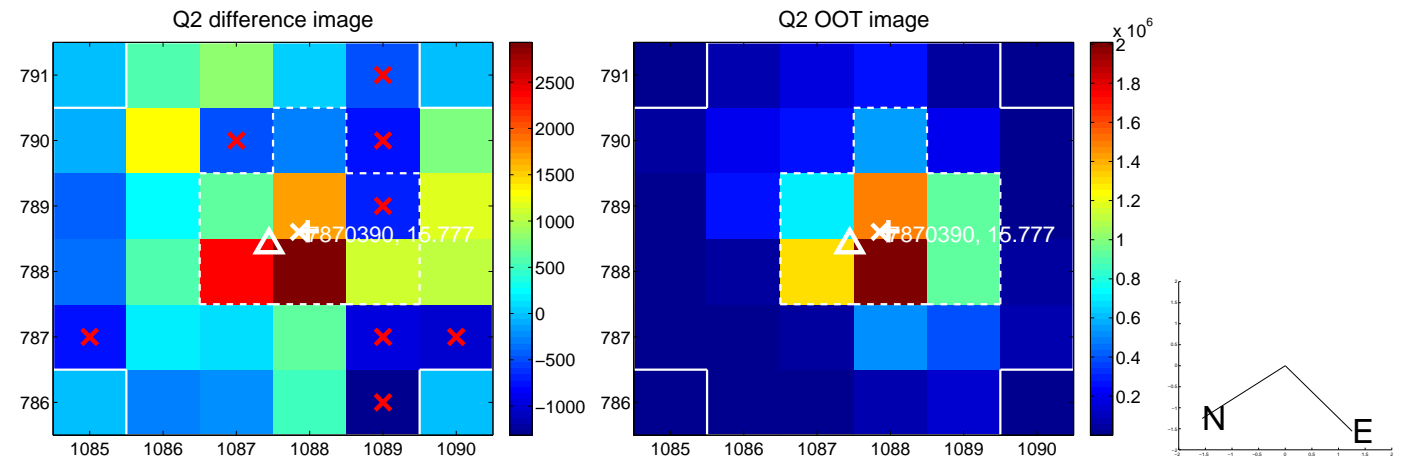
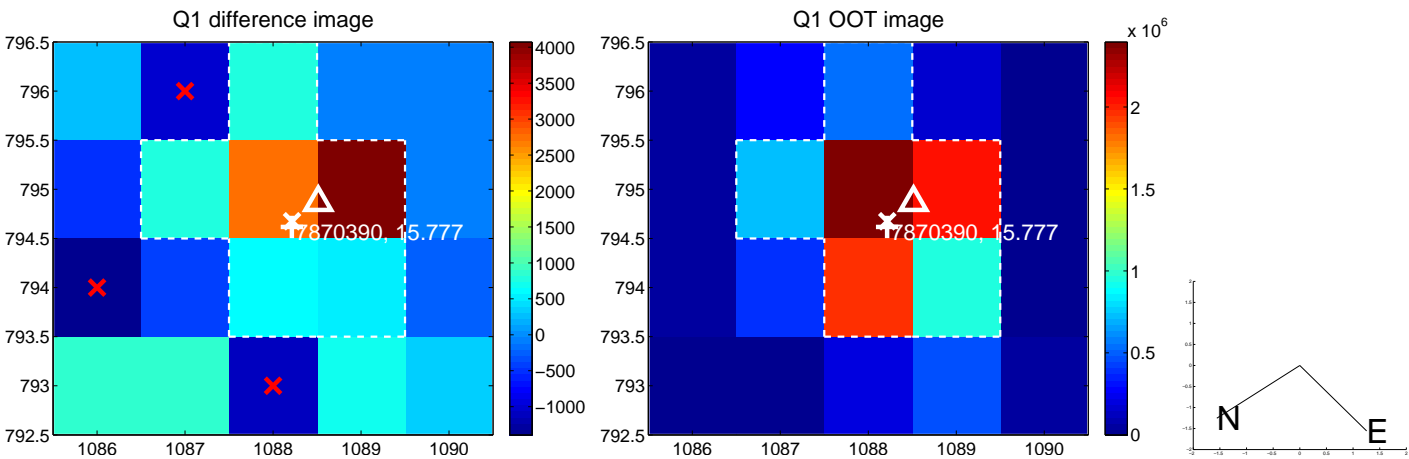
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|-------------------|-------------------|
| PRF-fit source offset from OOT | 0.166 ± 0.138 | 1.20 | 0.154 ± 0.139 | 0.061 ± 0.138 |
| PRF-fit source offset from KIC position | 0.187 ± 0.138 | 1.35 | 0.149 ± 0.139 | 0.113 ± 0.138 |
| photometric centroid source offset | 0.48 ± 0.35 | 1.36 | -0.47 ± 0.35 | -0.09 ± 0.38 |

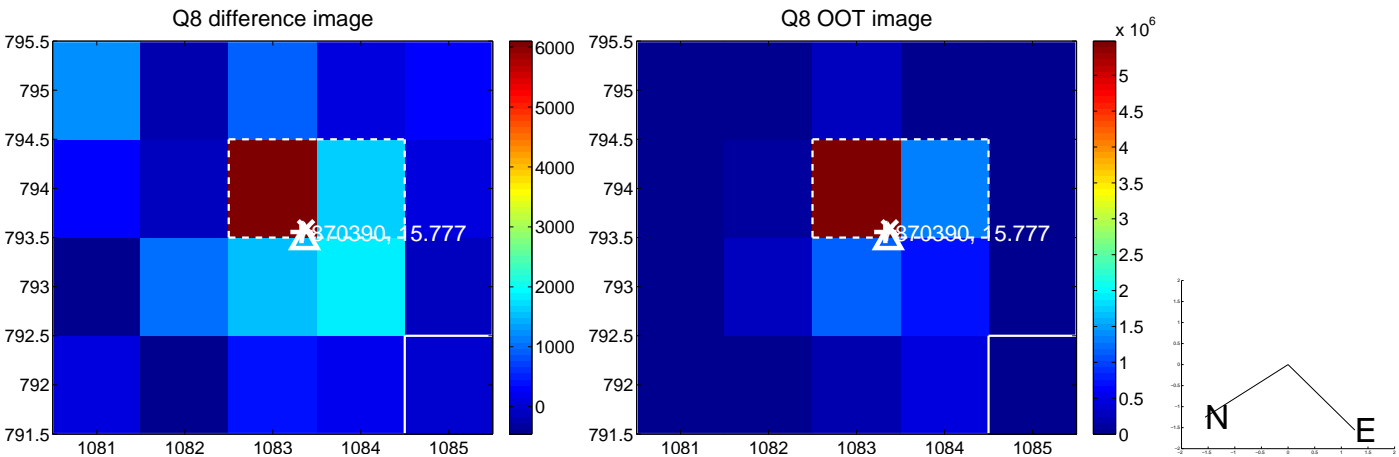
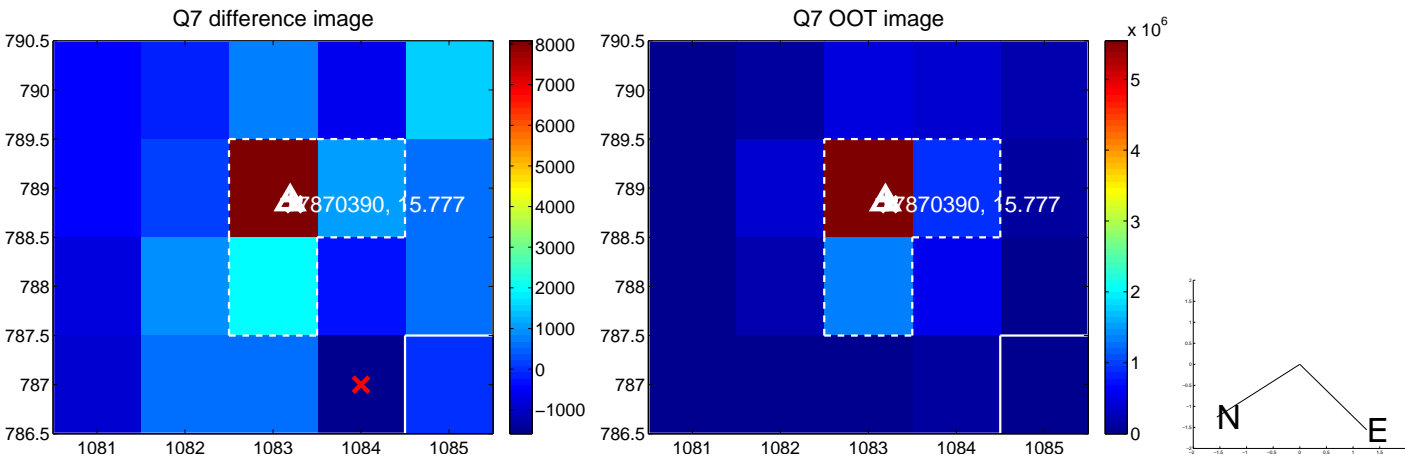
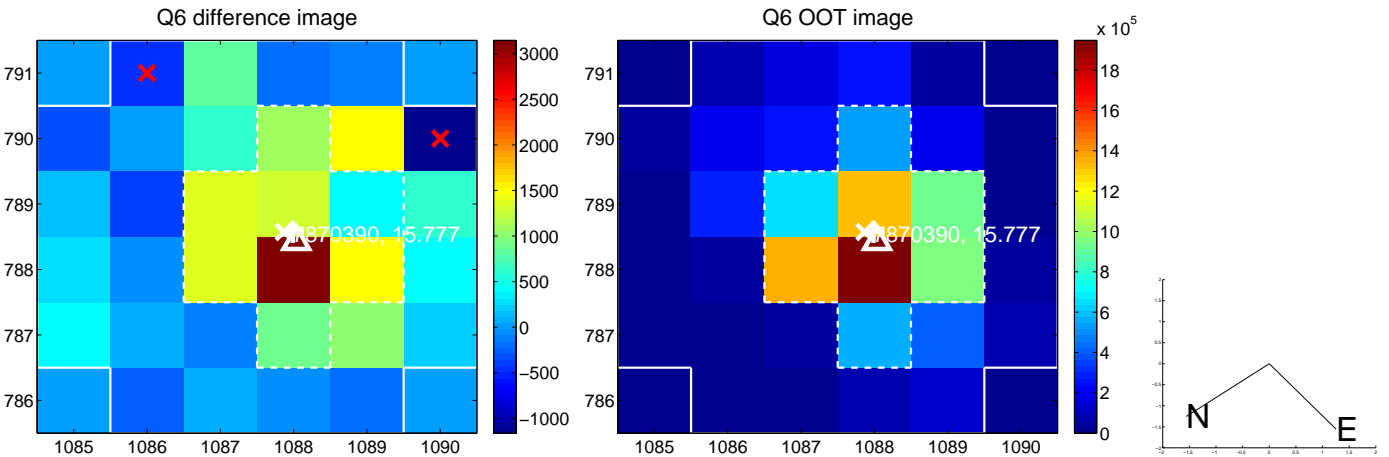
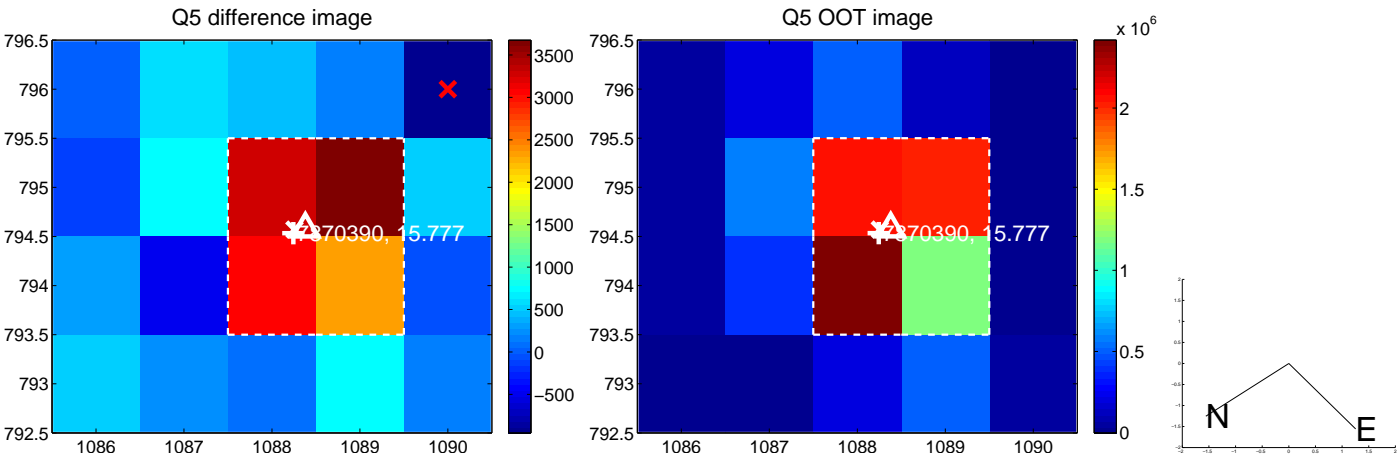


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

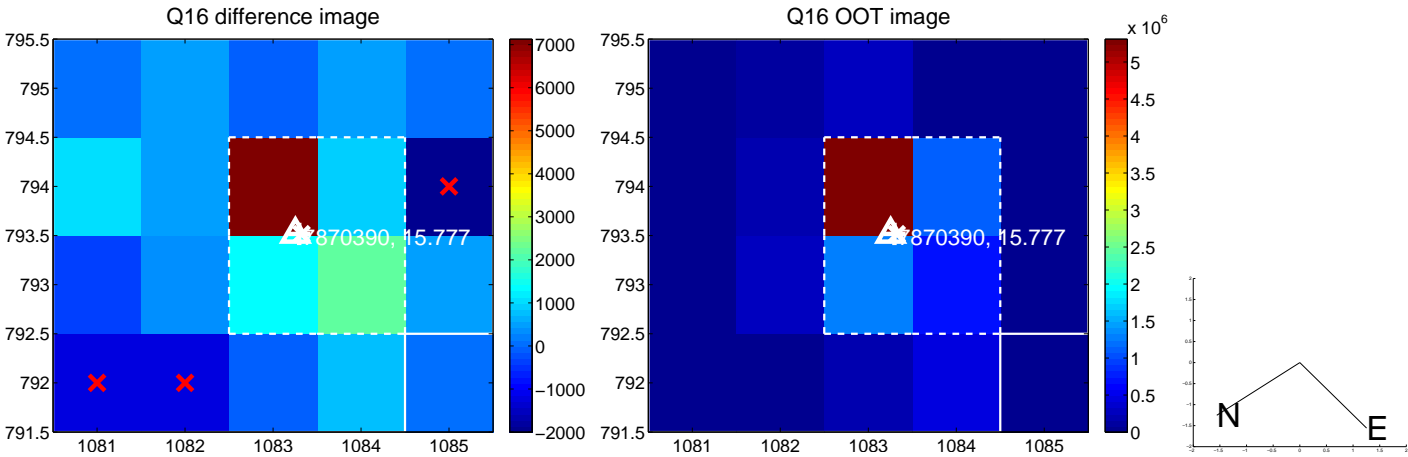
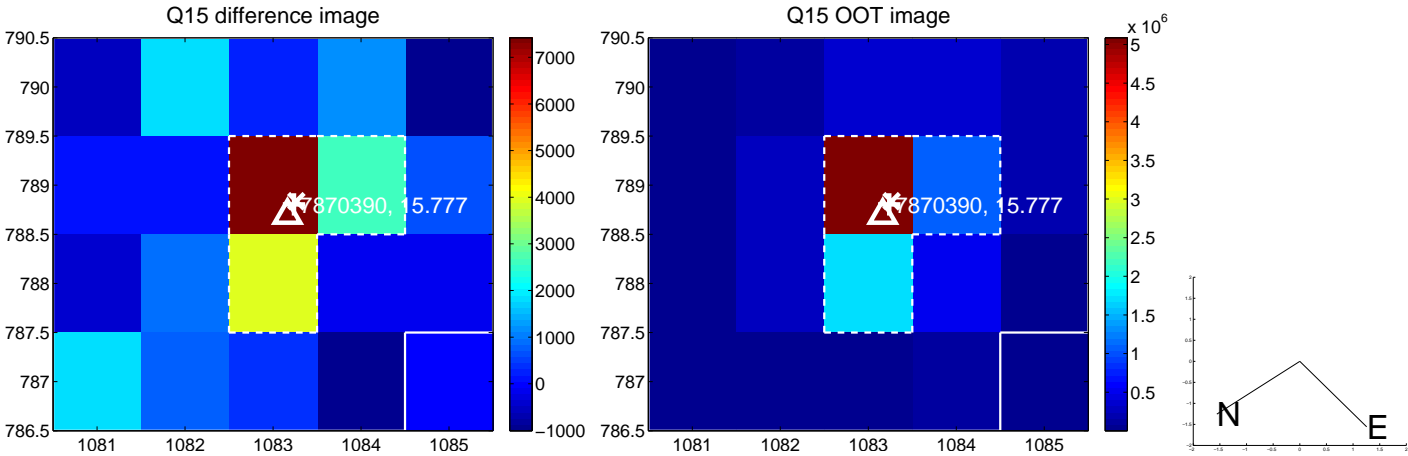
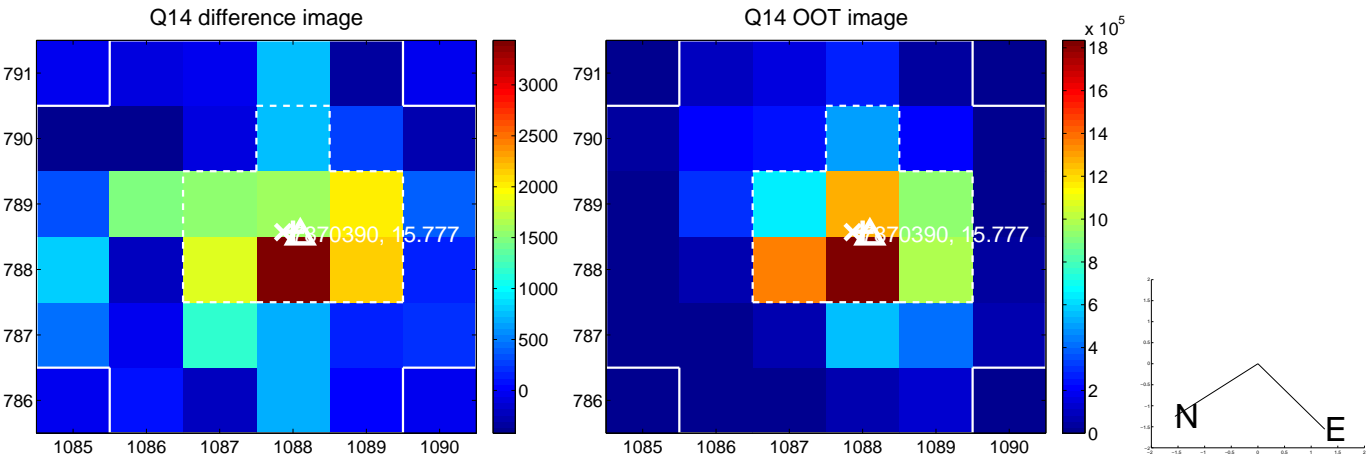
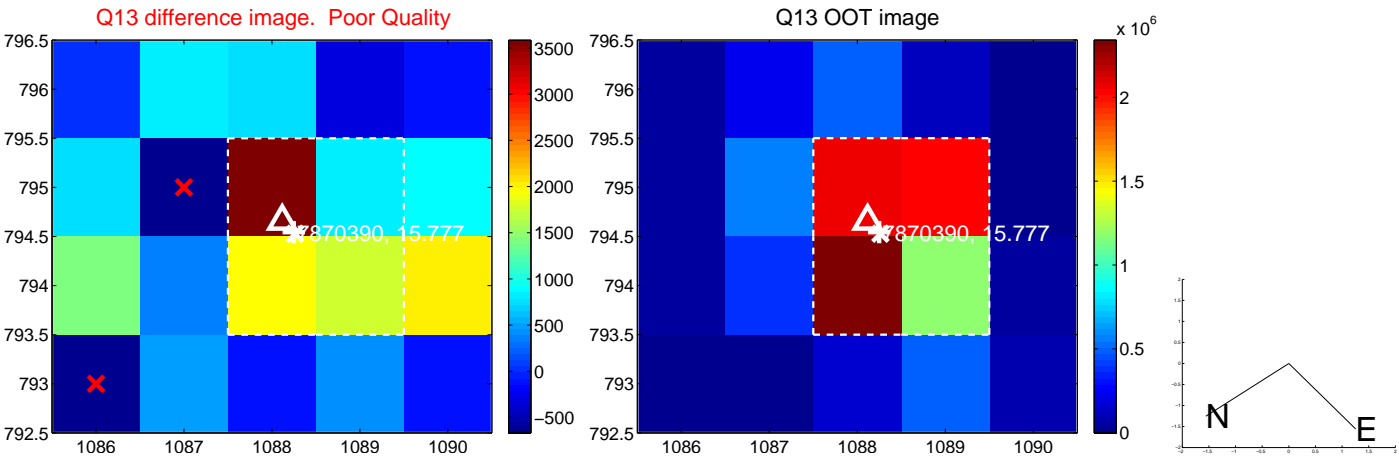
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



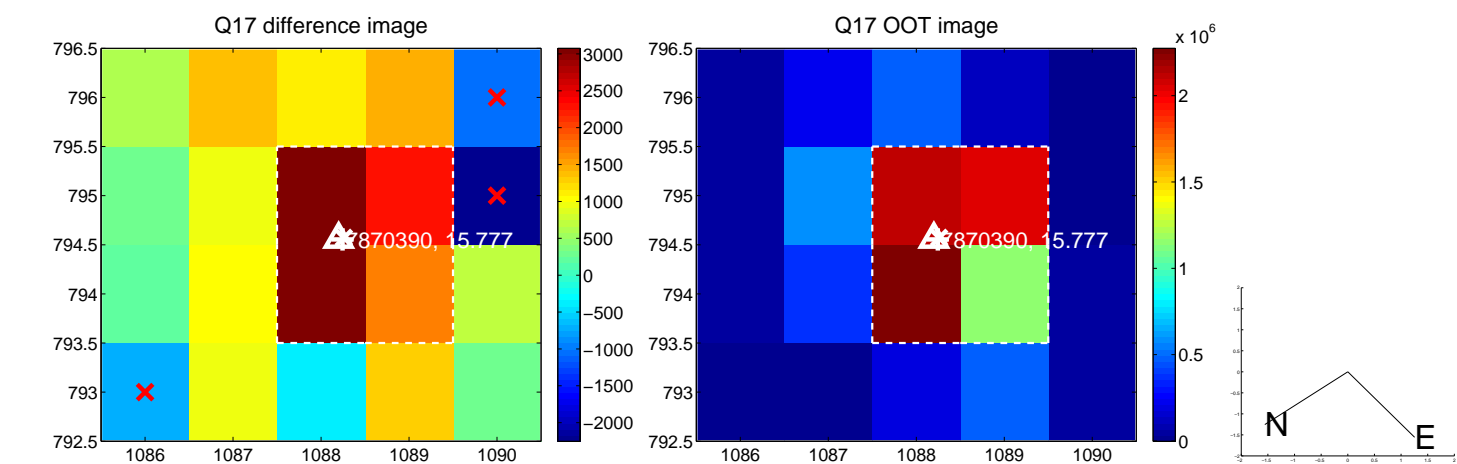
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



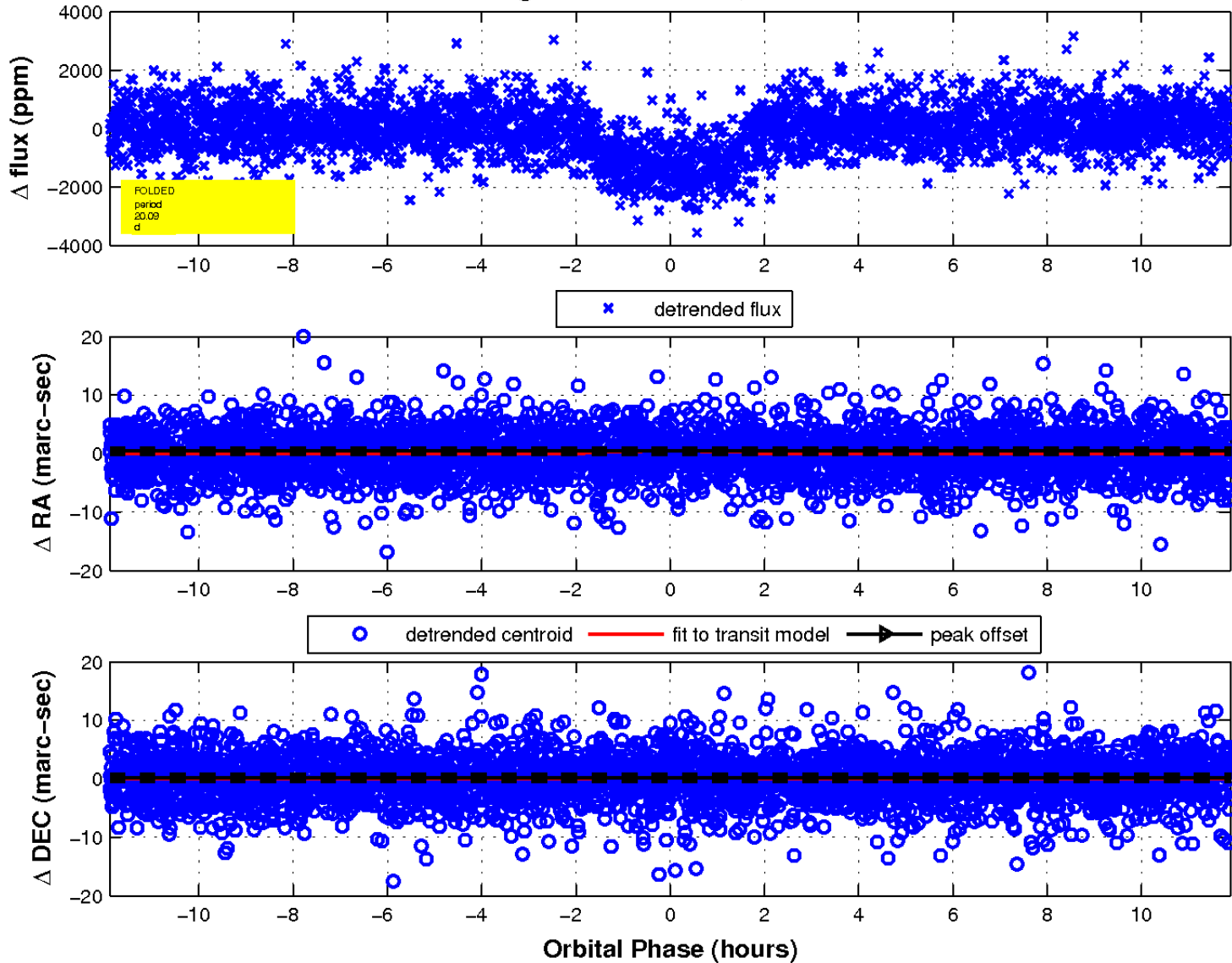
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



fluxWeightedCentroids, Planet 3 of 3



UKIRT Image

Declination

