

KIC 006222898

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 006222898-01 | OBS | 3896.01 | 7.780839 | 132.824201 | 377.1 | 5.238 | 17.7 | 19.0 | 0.90 | 5646 | 3.32 | 140.83 |
| 006222898-02 | OBS | No | 3.890454 | 132.686085 | 374.2 | 5.214 | 17.3 | 18.9 | 0.90 | 5646 | 3.49 | 354.87 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|---------------------------------------------------------|
| 006222898-01 | OBS | FP | 0.00 | 0 | 1 | 1 | 0 | MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—CENT_RESOLVED_OFFSET |
| 006222898-02 | OBS | FP | 0.00 | 1 | 1 | 1 | 0 | IS_SEC_TCE—CENT_RESOLVED_OFFSET |

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.

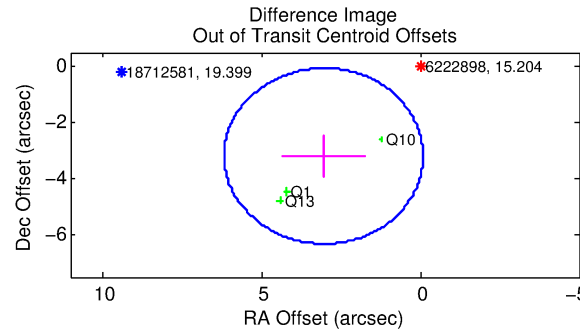
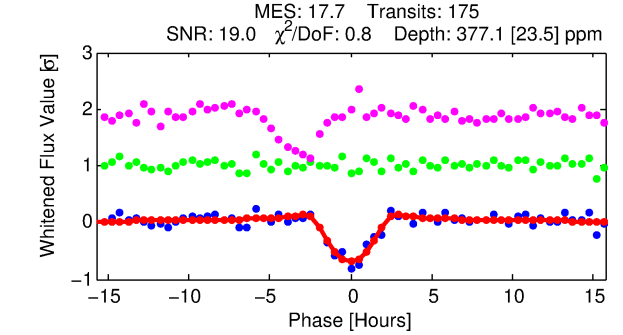
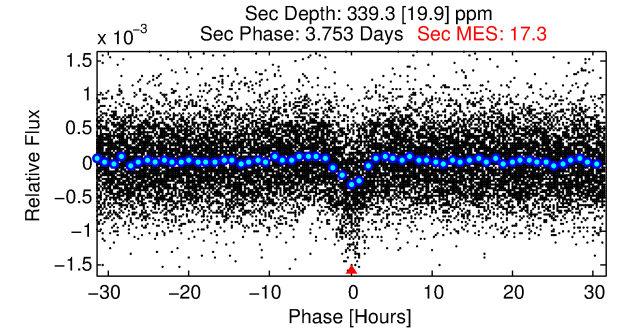
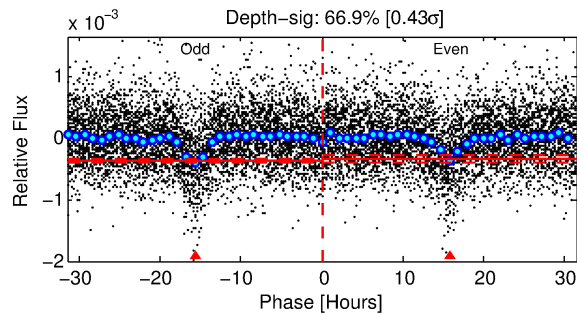
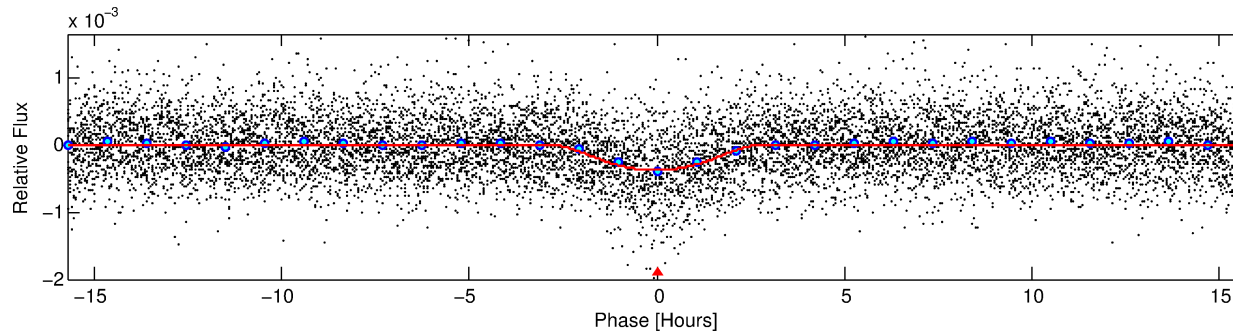
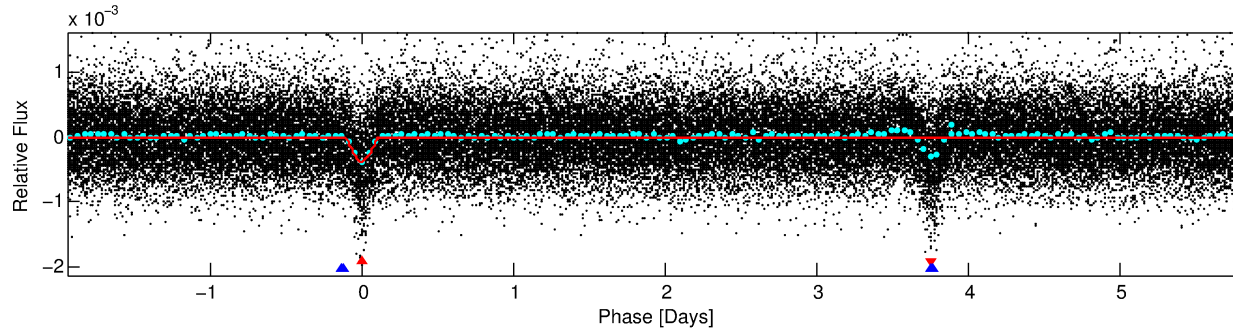
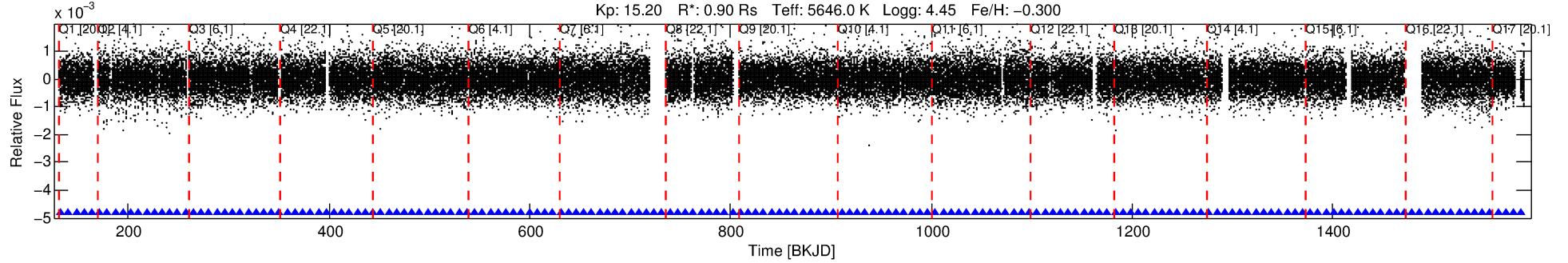
Ephemeris Match Information For 006222898-01

No Significant Match Found

DV One-Page Summary

KIC: 6222898 Candidate: 1 of 2 Period: 7.781 d
KOI: K03896 Corr: No Ephemeris Match

Kp: 15.20 R*: 0.90 Rs Teff: 5646.0 K Logg: 4.45 Fe/H: -0.300



DV Fit Results:

Period = 7.78084 [0.00005] d
Epoch = 132.8242 [0.0054] BKJD
Rp/R* = 0.0340 [0.0447]
a/R* = 3.26 [1.06]
b = 1.00 [0.07]
Seff = 140.83 [46.79]
Teq = 878 [73] K
Rp = 3.32 [4.45] Re
a = 0.0720 [0.0155] AU
Ag = 87.82 [232.84] [0.37σ]
Teff = 4158 [2740] K [1.20σ]

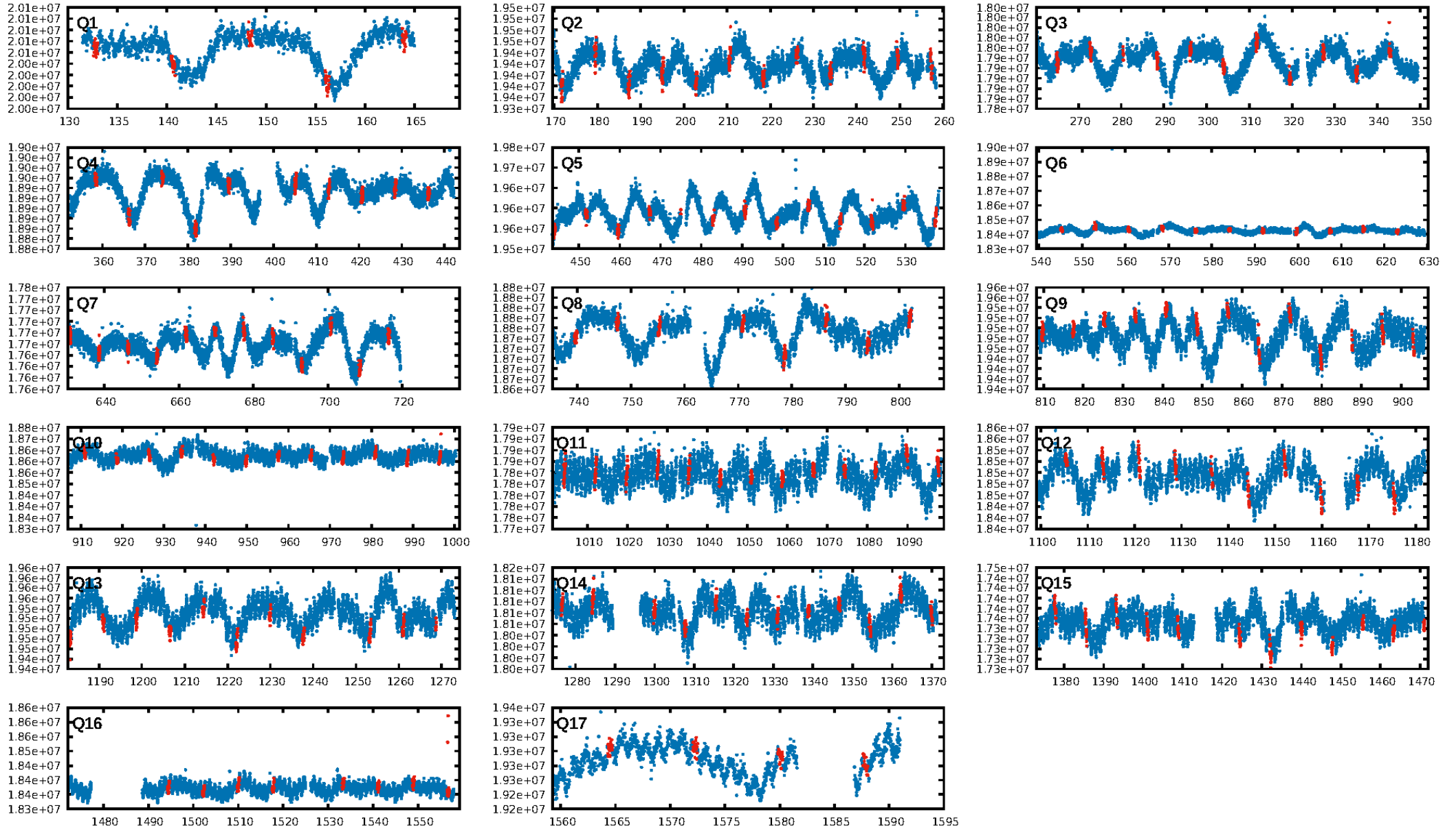
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [12.63σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 5.4%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 1.18e-64
RollingBand-fgt: 1.00 [166/166]
GhostDiagnostic-chr: -0.2934
Centroid-sig: 0.0%
Centroid-so: 31.826 arcsec [52.49σ]
OotOffset-rm: 4.407 arcsec [4.23σ]
KicOffset-rm: 4.357 arcsec [3.88σ]
OotOffset-st: 1/0/0/2 [3]
KicOffset-st: 1/0/0/2 [3]
DiffImageQuality-fgm: 1.00 [3/3]
DiffImageOverlap-fno: 0.00 [0/17]

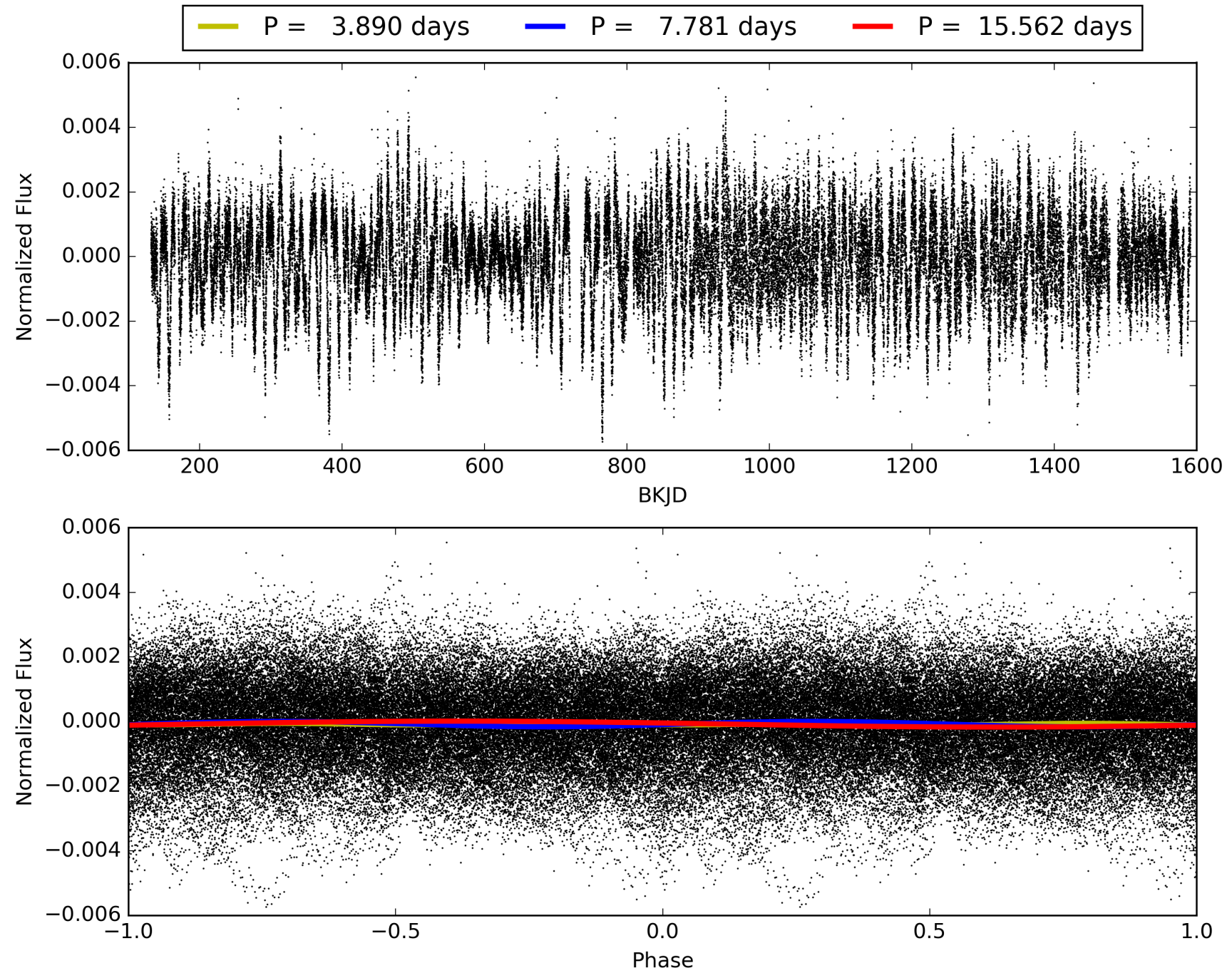
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 23:52:11 Z

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

TCE 006222898-01, PDC Light Curves

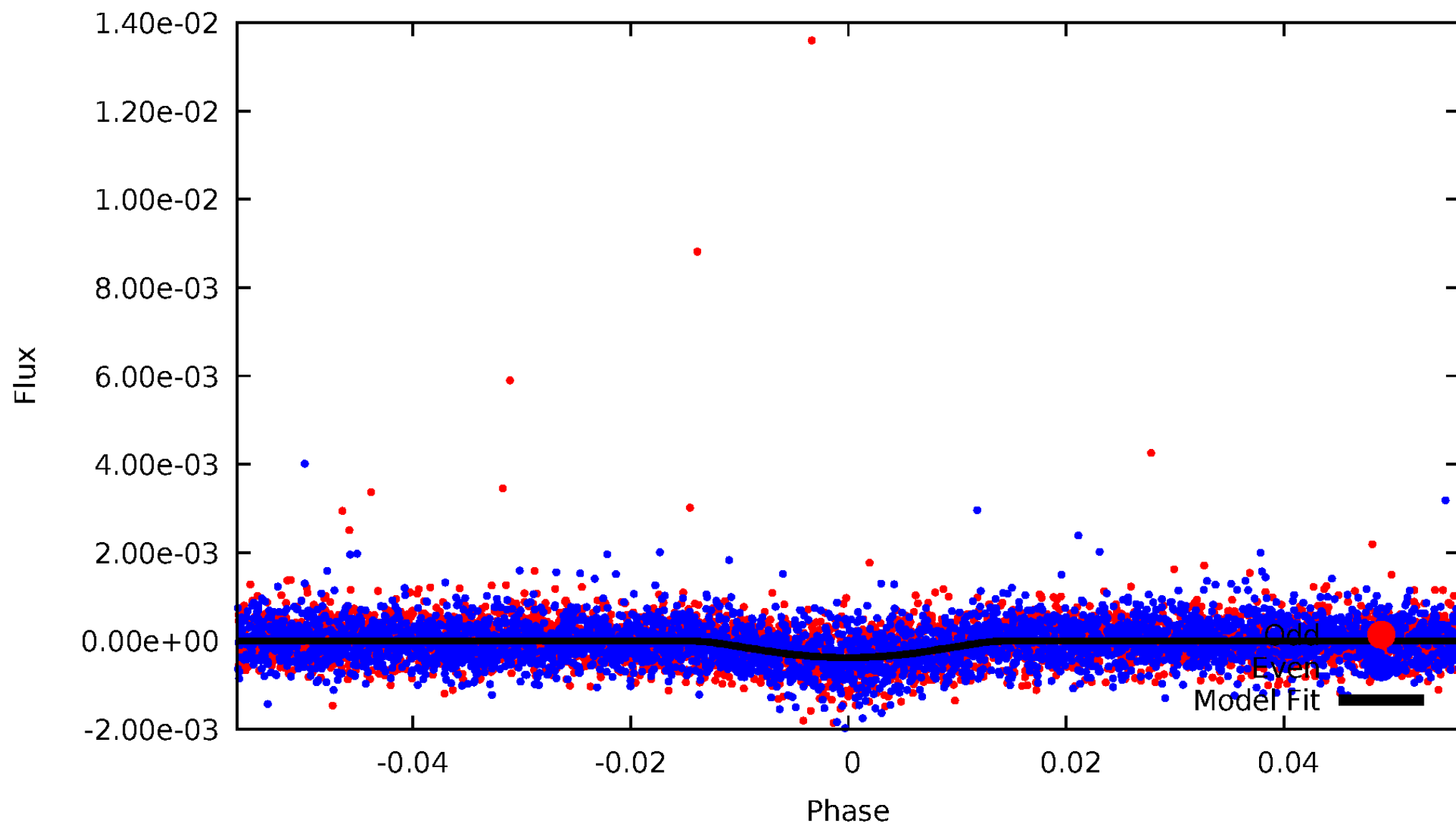


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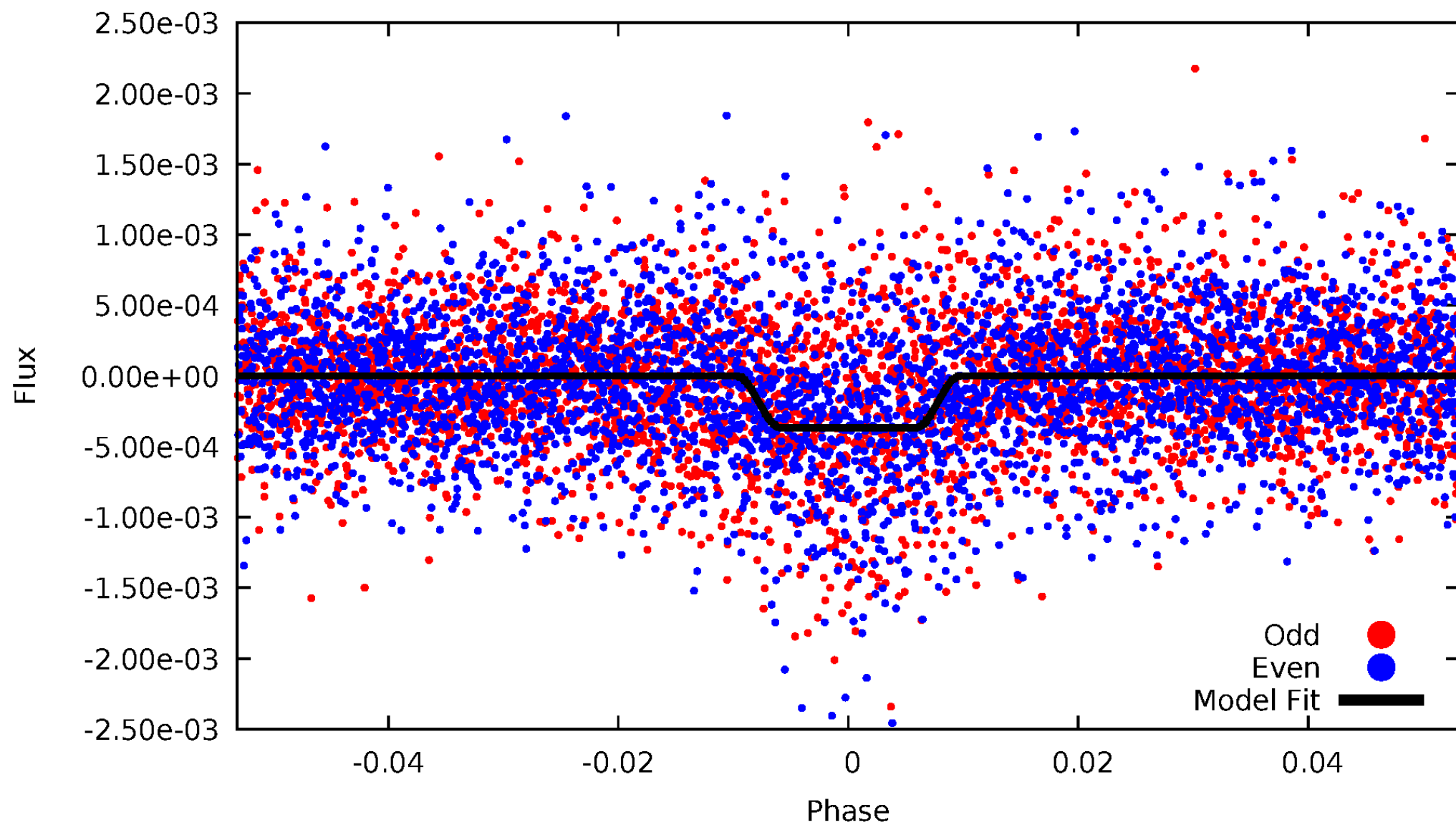
DV Odd/Even

TCE 006222898-01



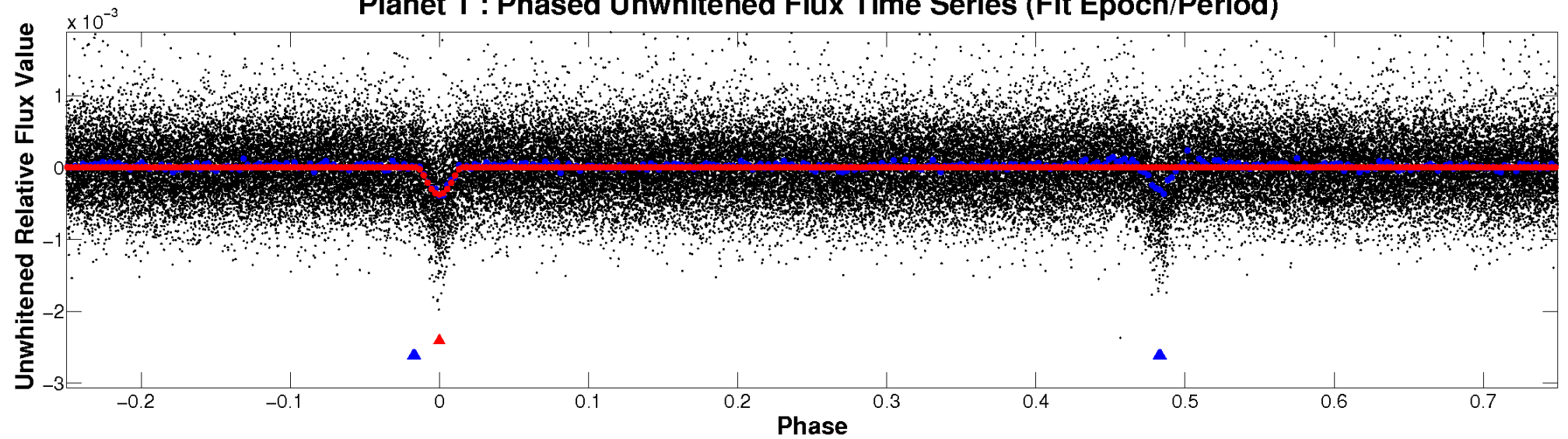
ALT Odd/Even

TCE 006222898-01

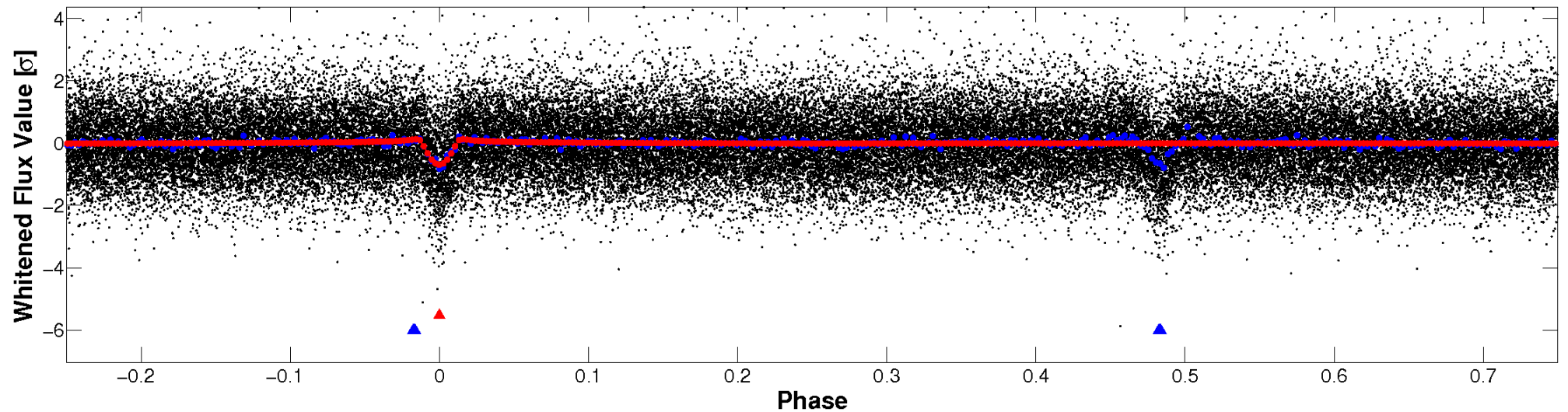


Non-Whitened Vs. Whitened Light Curve

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

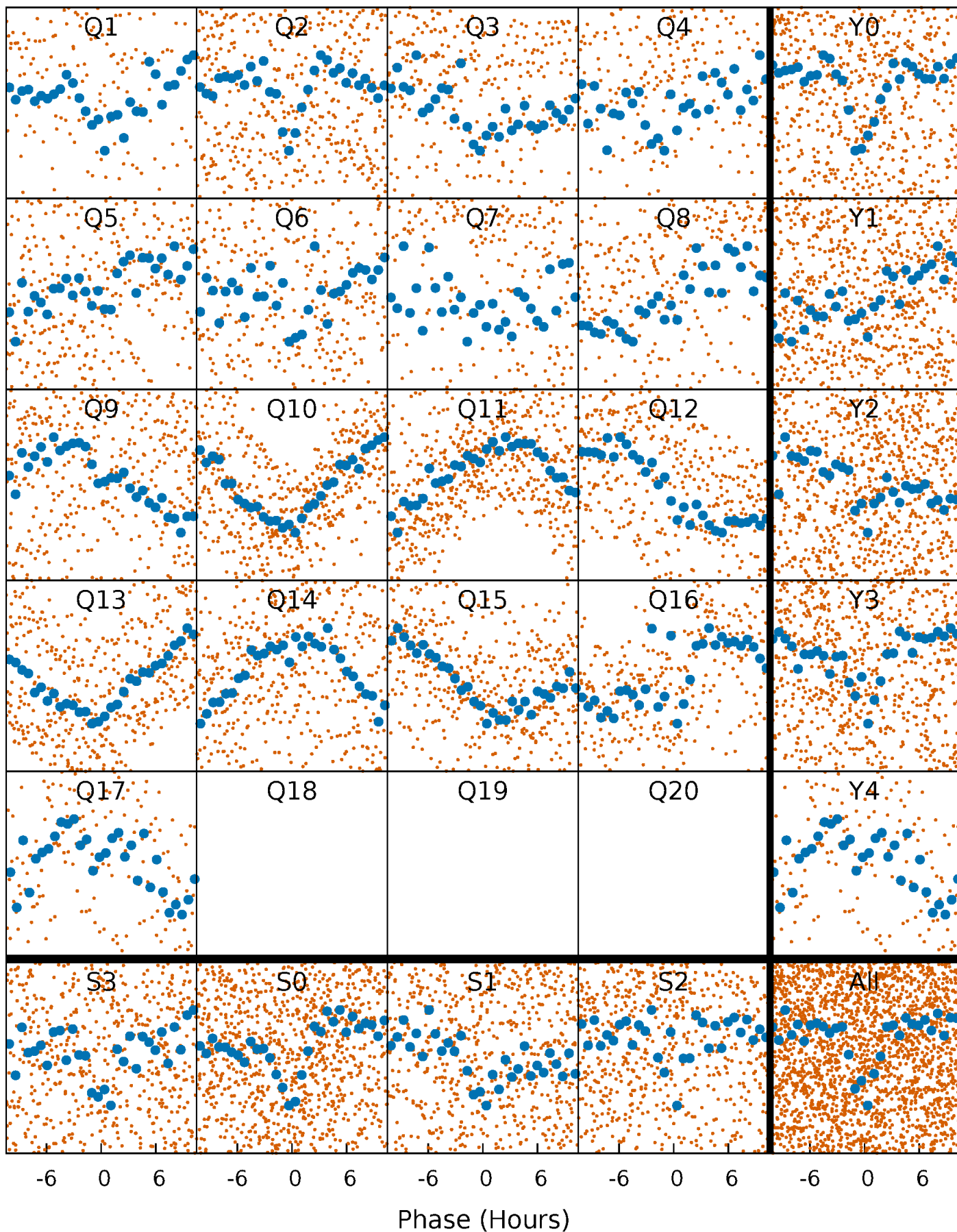


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



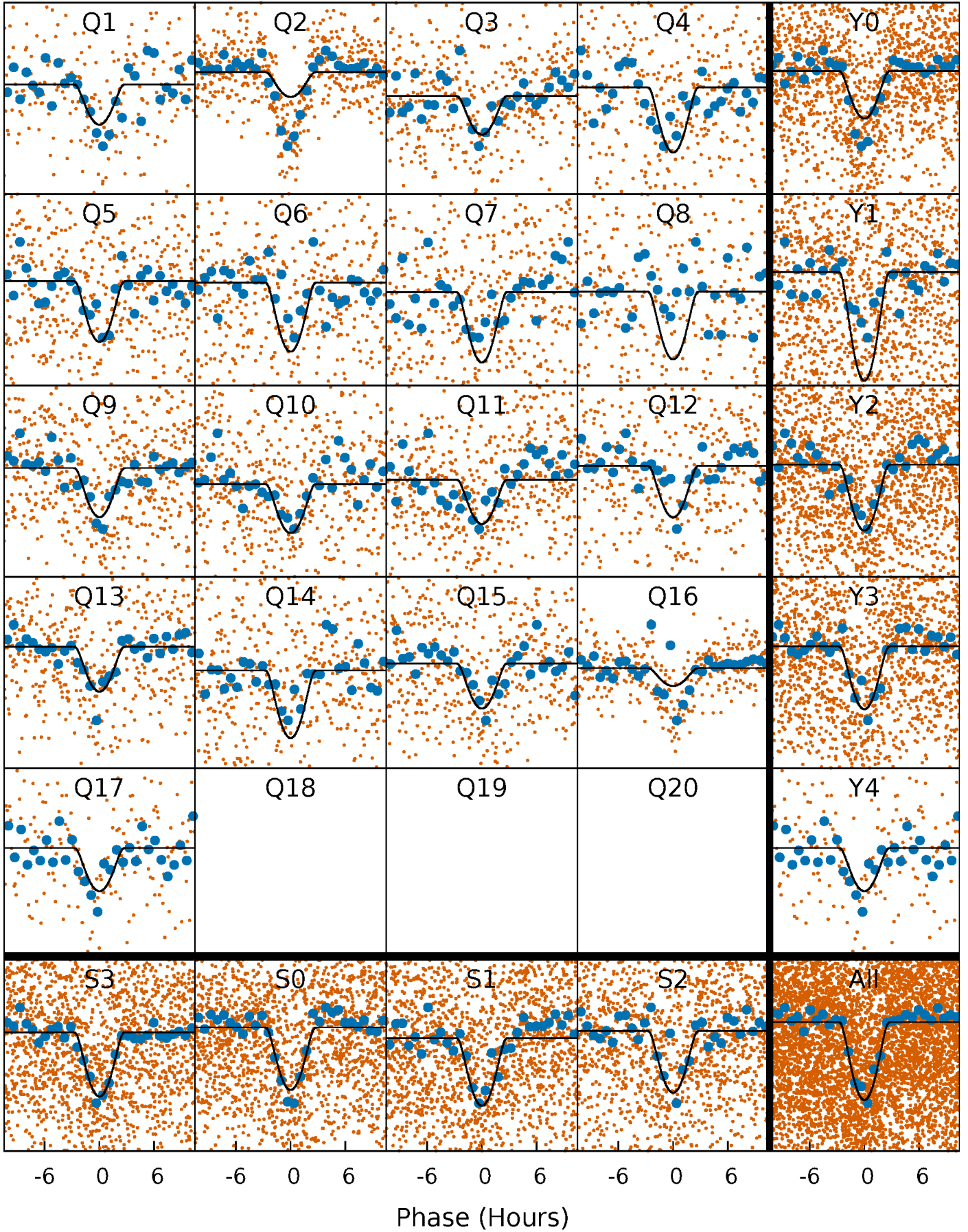
PDC Quarter-Phased Transit Curves

TCE 006222898-01 P= 7.780839 Days $T_0=132.824201$ (BKJD)



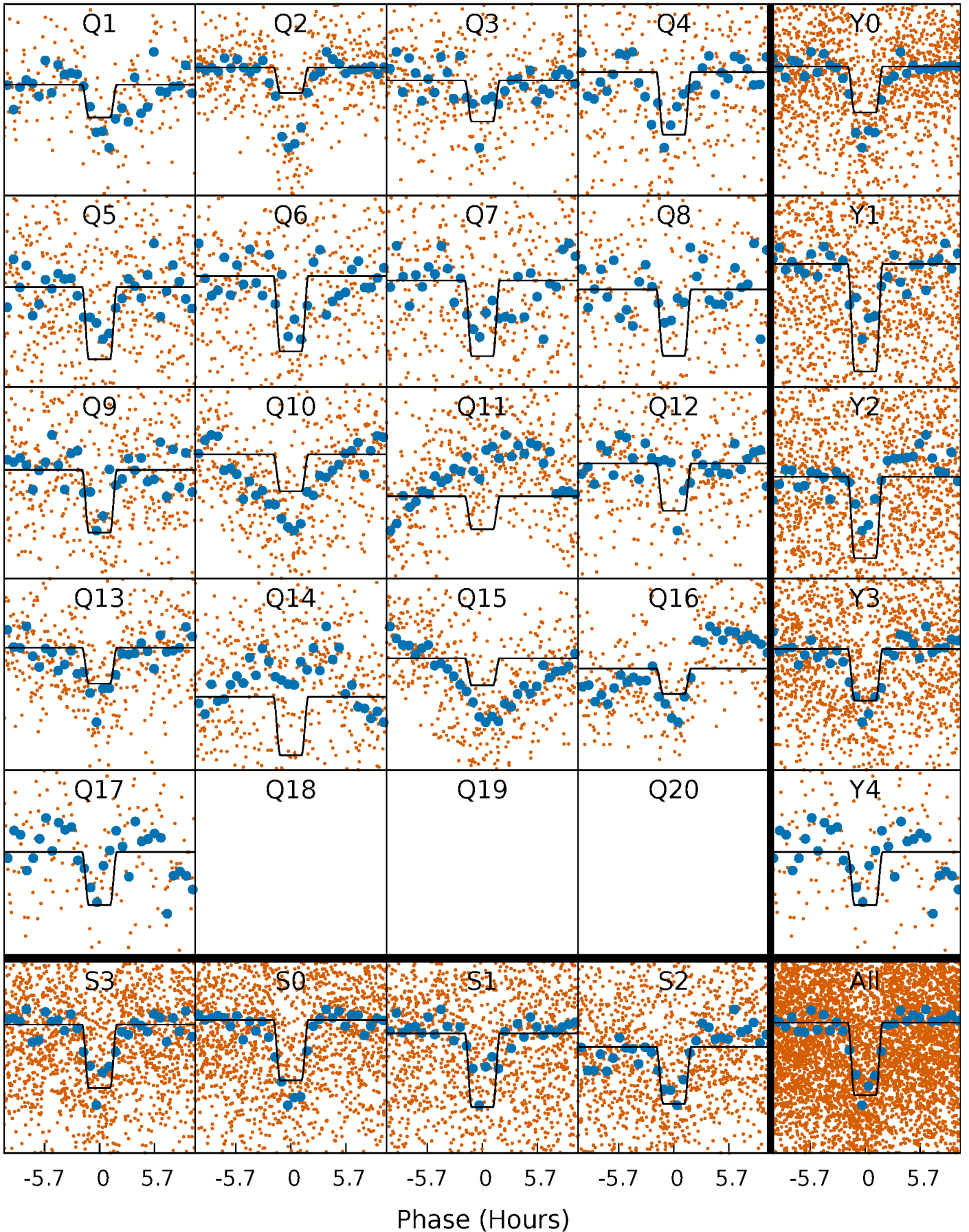
DV Quarter-Phased Transit Curves

TCE 006222898-01 P= 7.780839 Days $T_0=132.824201$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

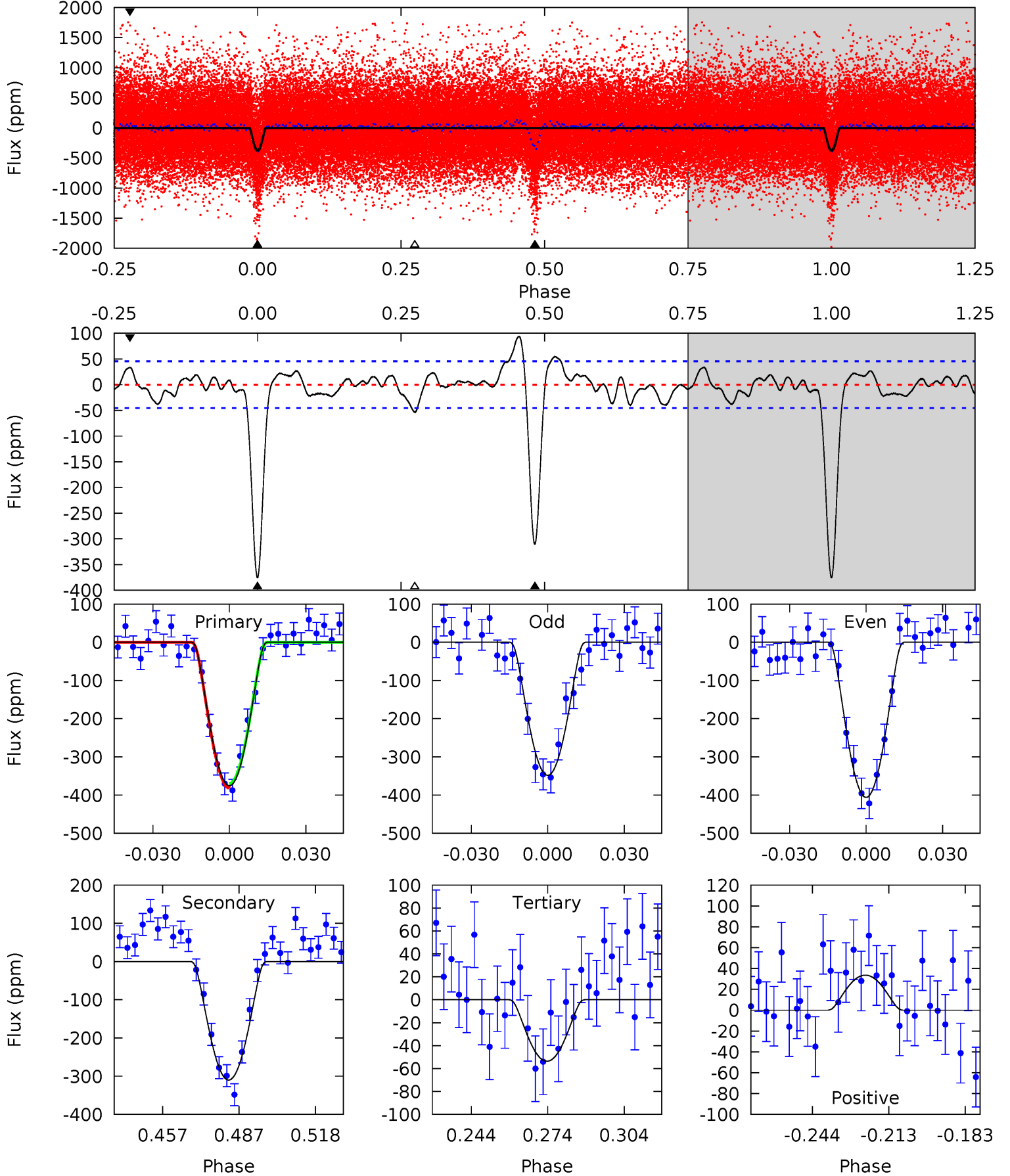
TCE 006222898-01 P= 7.780877 Days $T_0=132.817892$ (BKJD)



DV Model-Shift Uniqueness Test

006222898-01, P = 7.780839 Days, E = 125.043362 Days

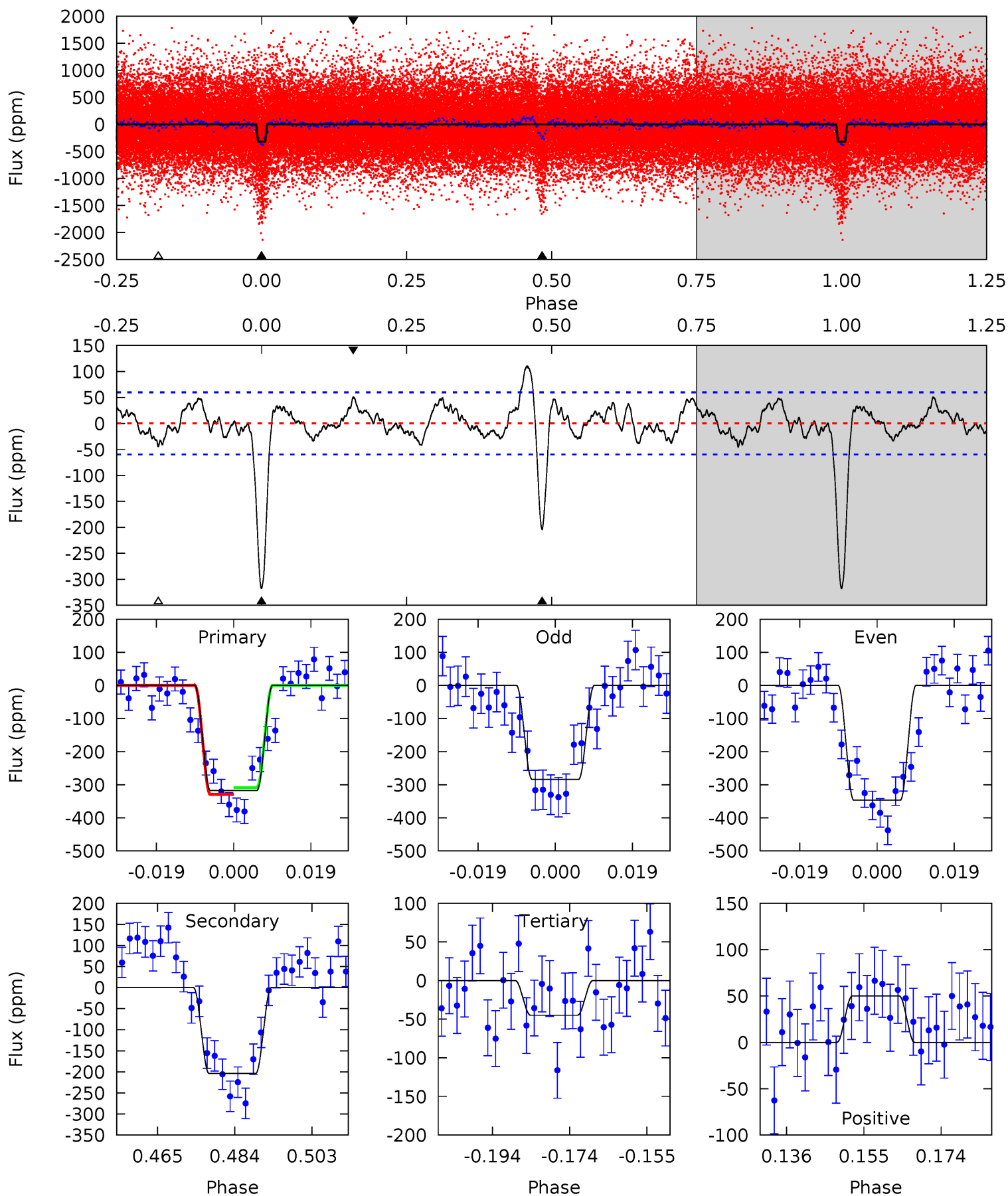
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 39.8 | 32.8 | 5.68 | 3.56 | 4.81 | 2.16 | 2.21 | 34.1 | 36.2 | 27.2 | 29.3 | 3.06 | 1.00 | 0.20 | 0.59 |



Alt Model-Shift Uniqueness Test

006222898-01, P = 7.780877 Days, E = 125.037015 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 26.1 | 16.7 | 3.70 | 4.12 | 4.90 | 2.34 | 2.10 | 22.4 | 22.0 | 13.0 | 12.6 | 2.59 | 1.05 | 0.26 | 0.85 |



Stellar Parameters For KIC 006222898

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|-------------------------------------------|
| | 5646^{+169}_{-169} | $4.449^{+0.112}_{-0.168}$ | $-0.300^{+0.300}_{-0.300}$ | $0.896^{+0.231}_{-0.124}$ | $0.825^{+0.117}_{-0.068}$ | $1.616^{+0.821}_{-0.740}$ |
| | +3%/-3% | +3%/-4% | +100%/-100% | +26%/-14% | +14%/-8% | +51%/-46% |
| Source | PHO1 | KIC0 | KIC0 | DSEP | | |

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

Secondary Eclipse Parameters for KIC 006222898-01 / KOI 3896.01

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{max} (K)$ | $T_{obs} (K)$ | A_{obs} |
|---------|---------------|------------------------|--------------------|-----------------------|-------------------|
| DV | -310 ± 9 | $4.69^{+4.20}_{-2.99}$ | 1239^{+81}_{-66} | 3832^{+1928}_{-693} | 42^{+270}_{-30} |
| Alt. | -204 ± 12 | $3.91^{+3.88}_{-2.56}$ | 1238^{+75}_{-68} | 3804^{+2009}_{-752} | 39^{+285}_{-29} |

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 $A_{obs} \gg 1.0$

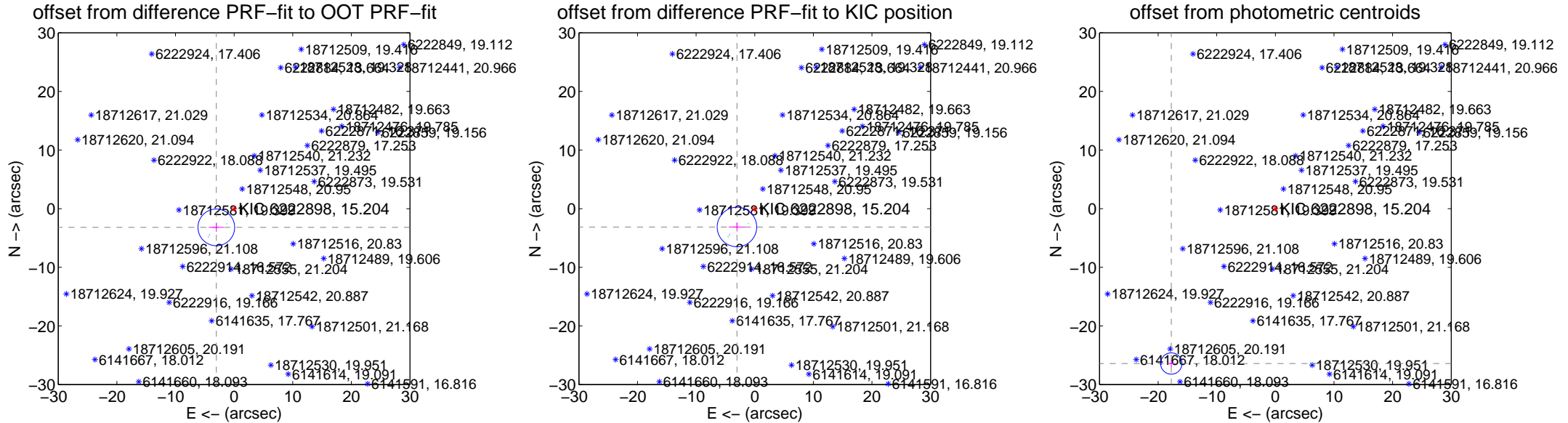
DV Centroid Data

Supplemental centroid analysis for 006222898-01. Kepler magnitude: 15.20. Transit SNR 19.04

There are 3 quarters with good PRF difference image offsets

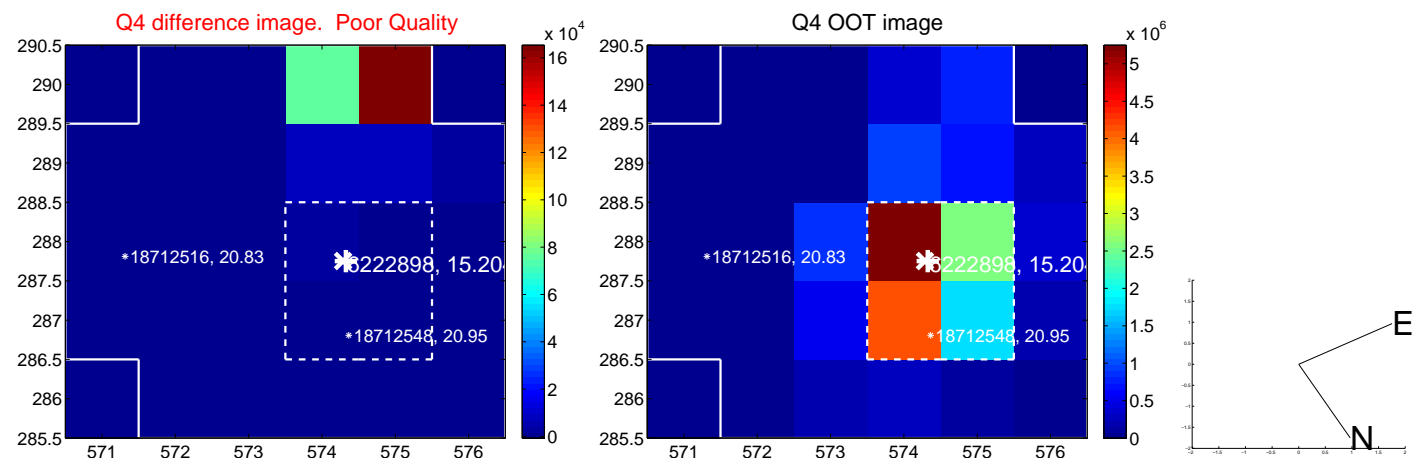
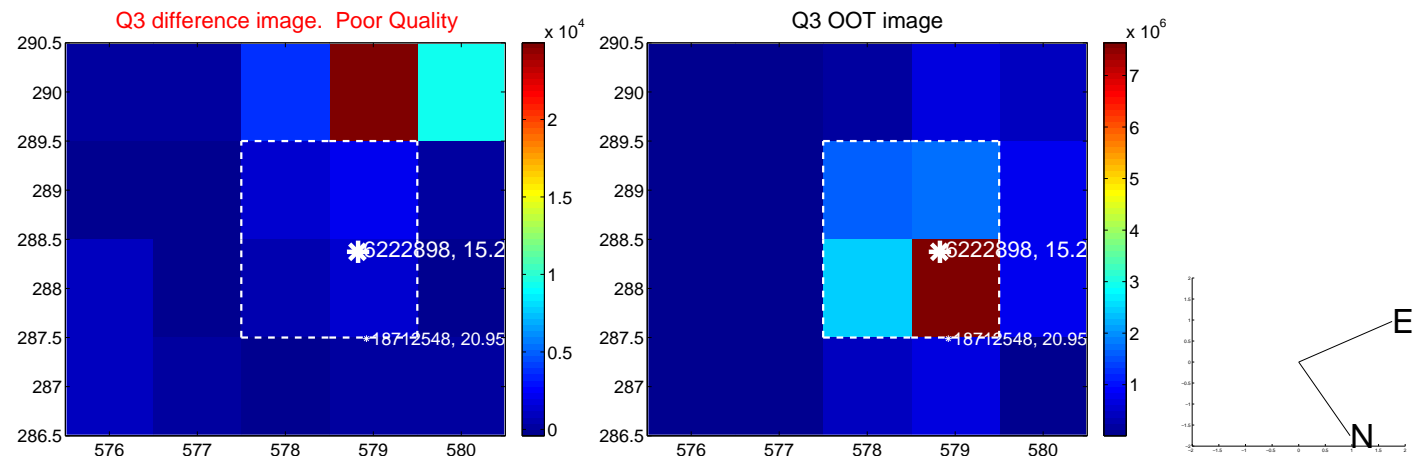
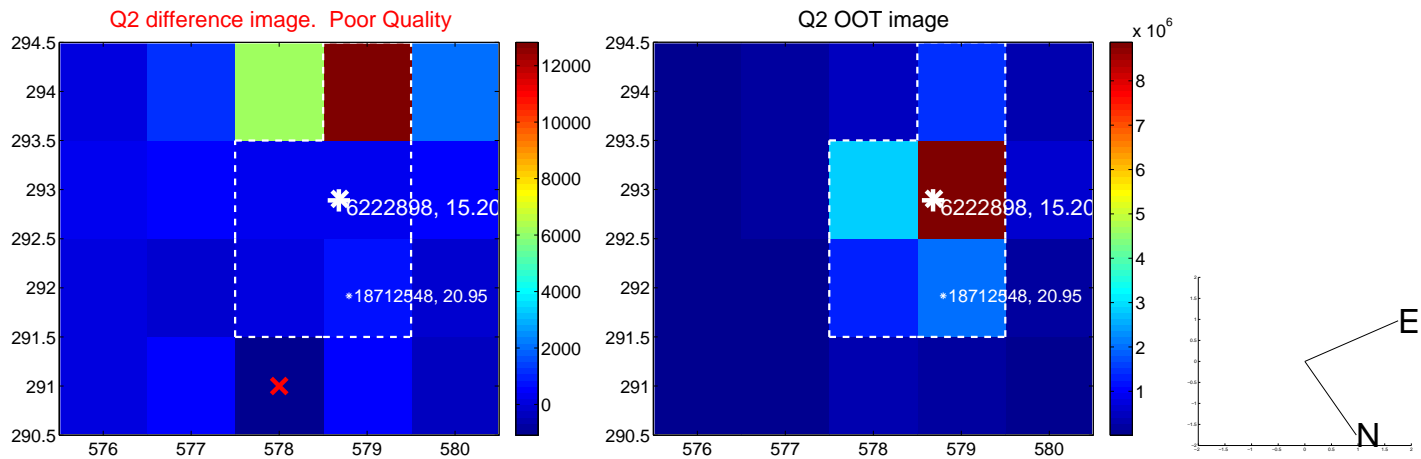
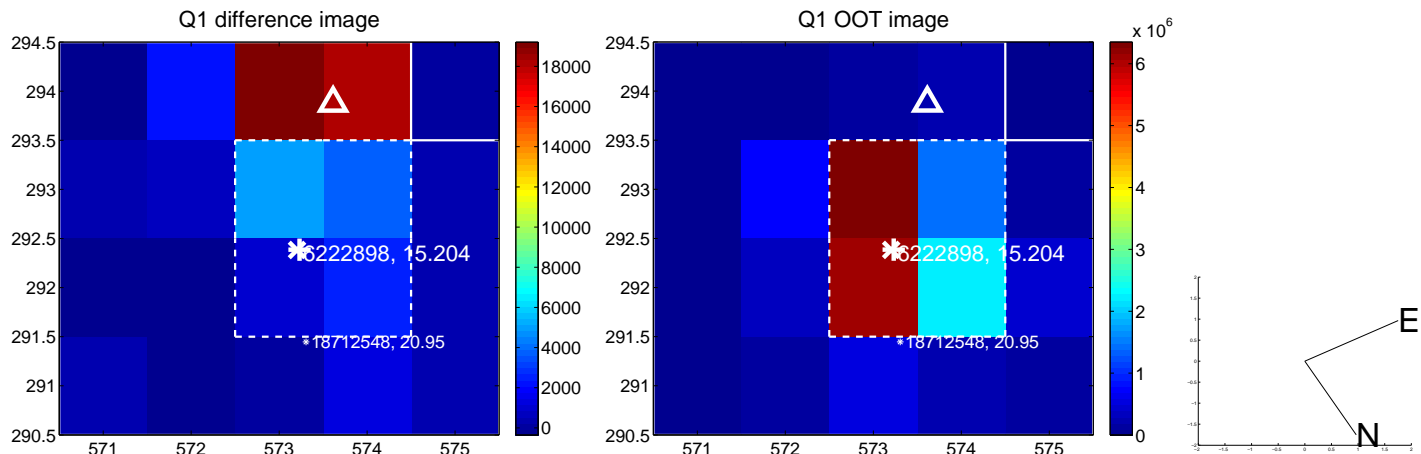
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|-----------------------------------------|--------------------|---------------------|-------------------|--------------------|
| PRF-fit source offset from OOT | 4.407 \pm 1.043 | 4.23 | 3.037 \pm 1.286 | -3.193 \pm 0.758 |
| PRF-fit source offset from KIC position | 4.357 \pm 1.124 | 3.88 | 3.036 \pm 1.401 | -3.125 \pm 0.776 |
| photometric centroid source offset | 31.83 \pm 0.61 | 52.49 | 17.76 \pm 0.60 | -26.41 \pm 0.61 |

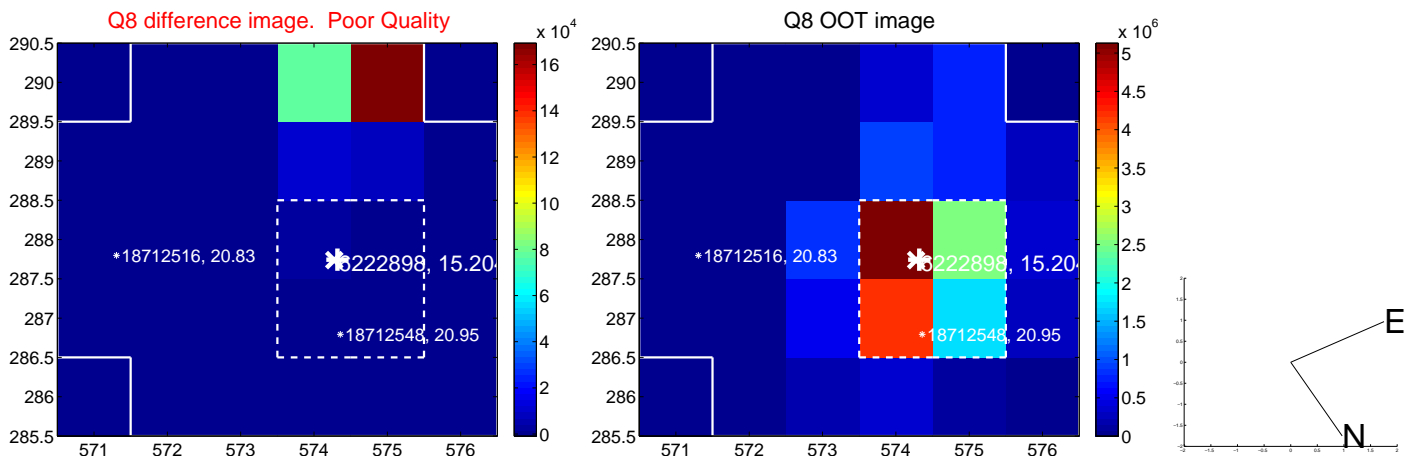
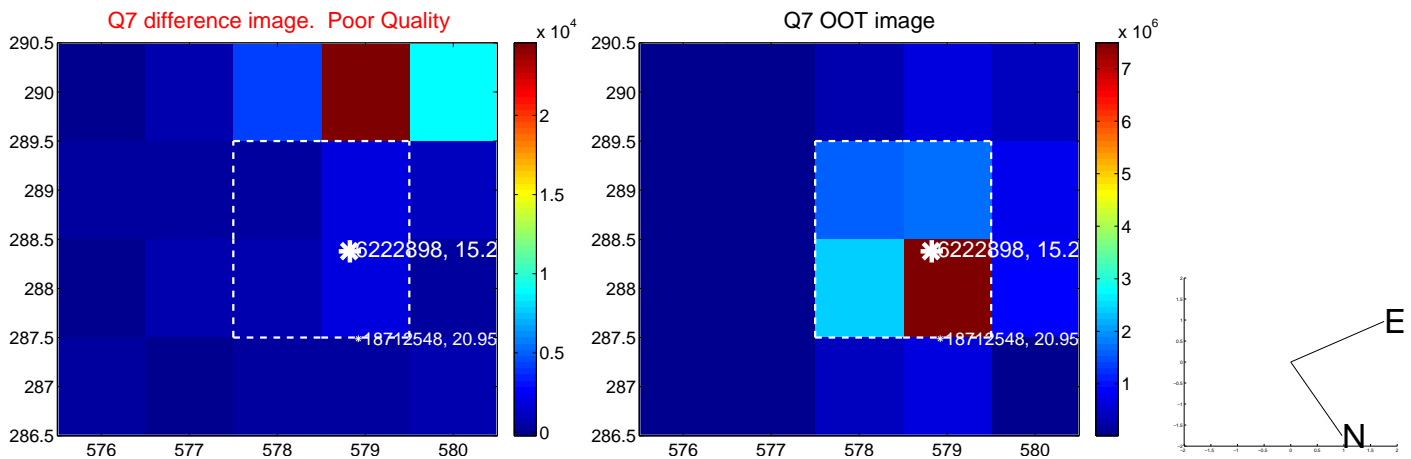
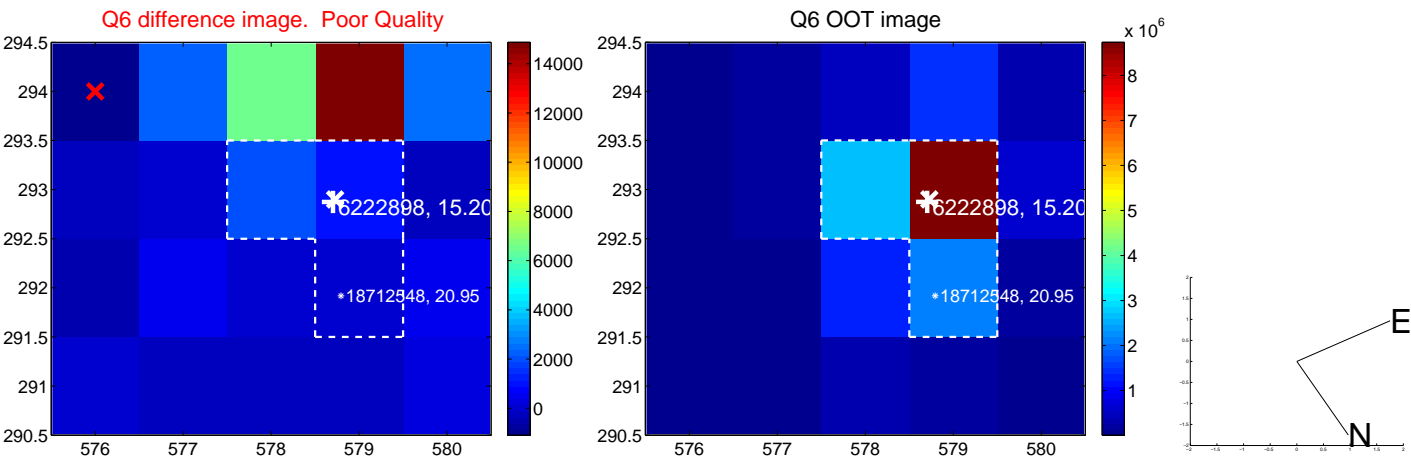
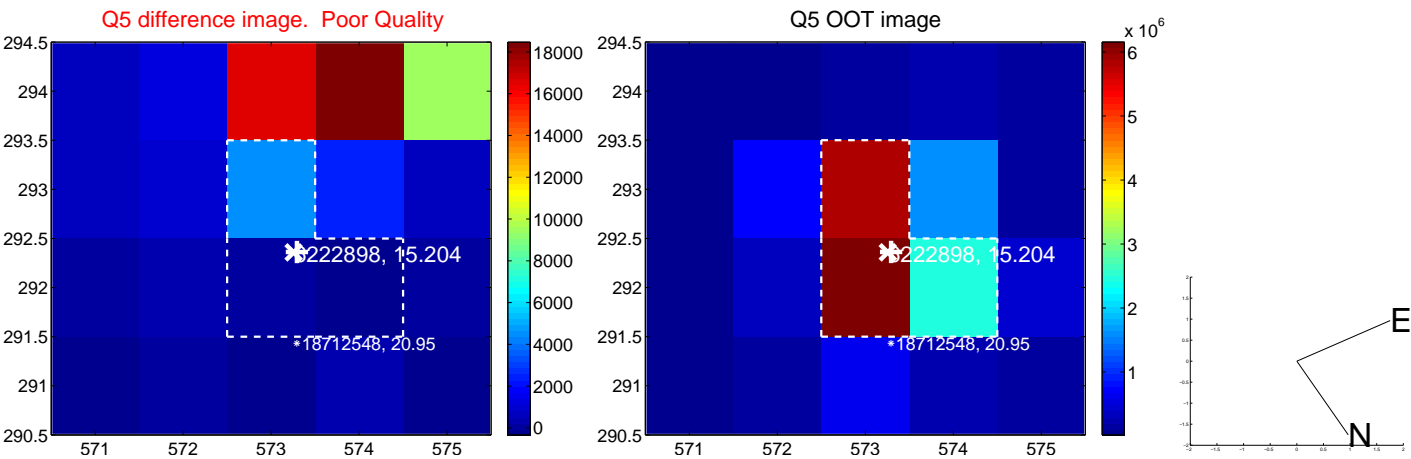


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

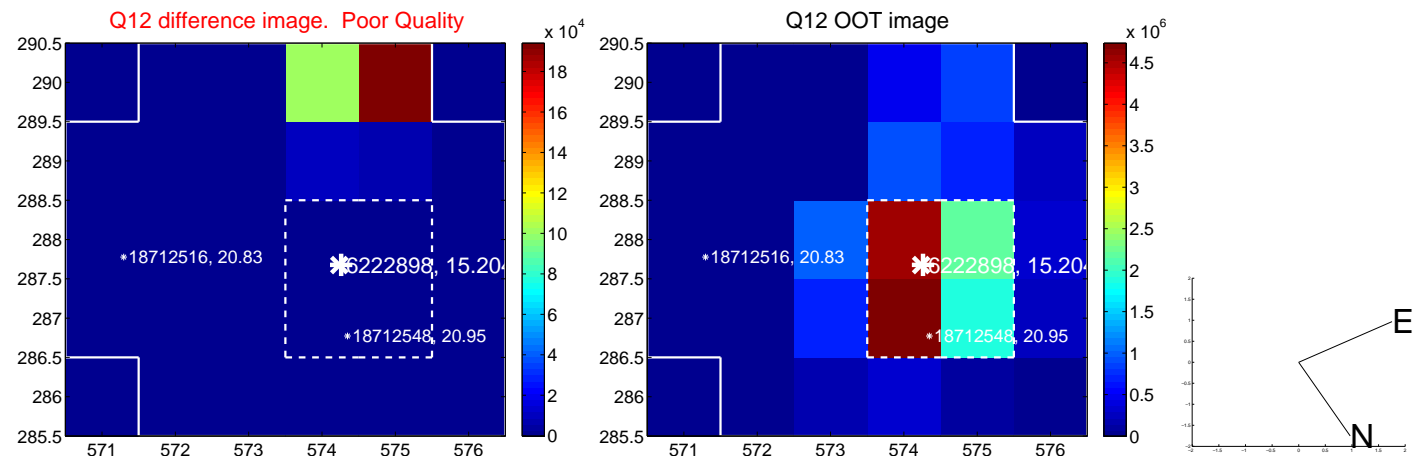
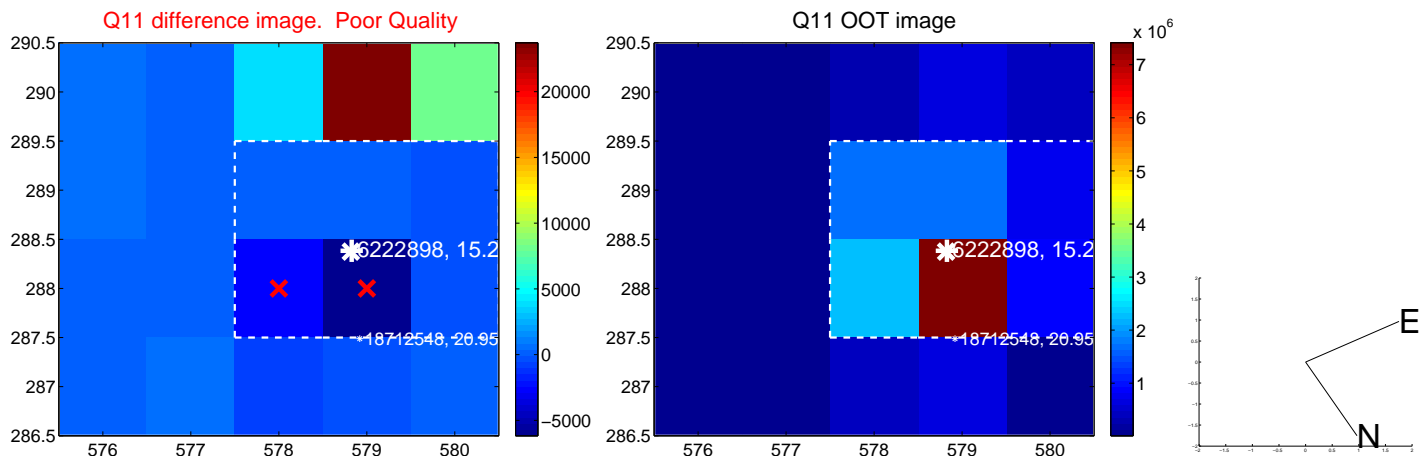
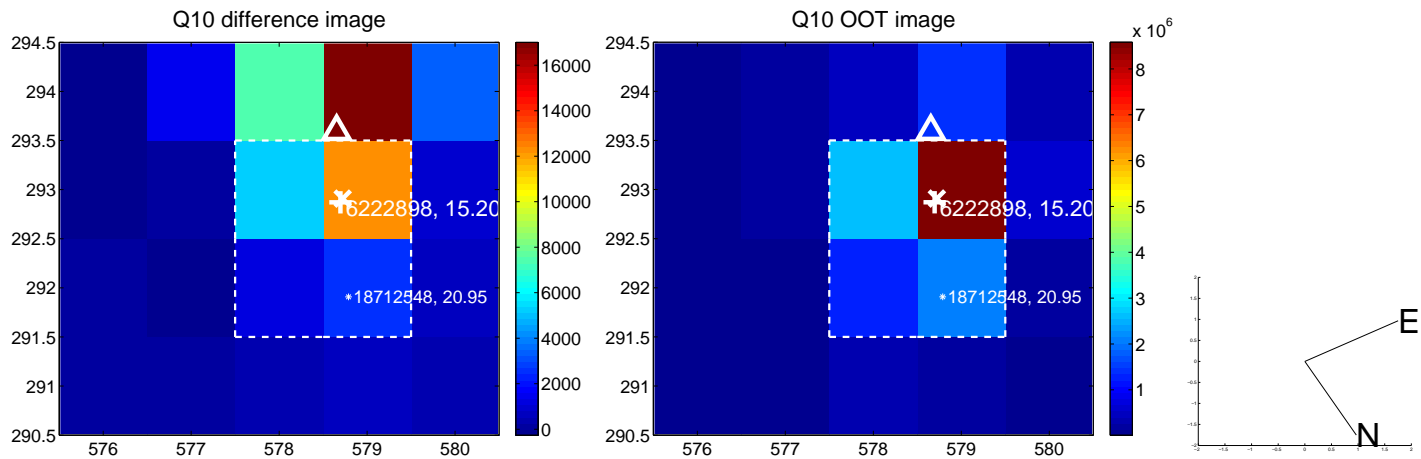
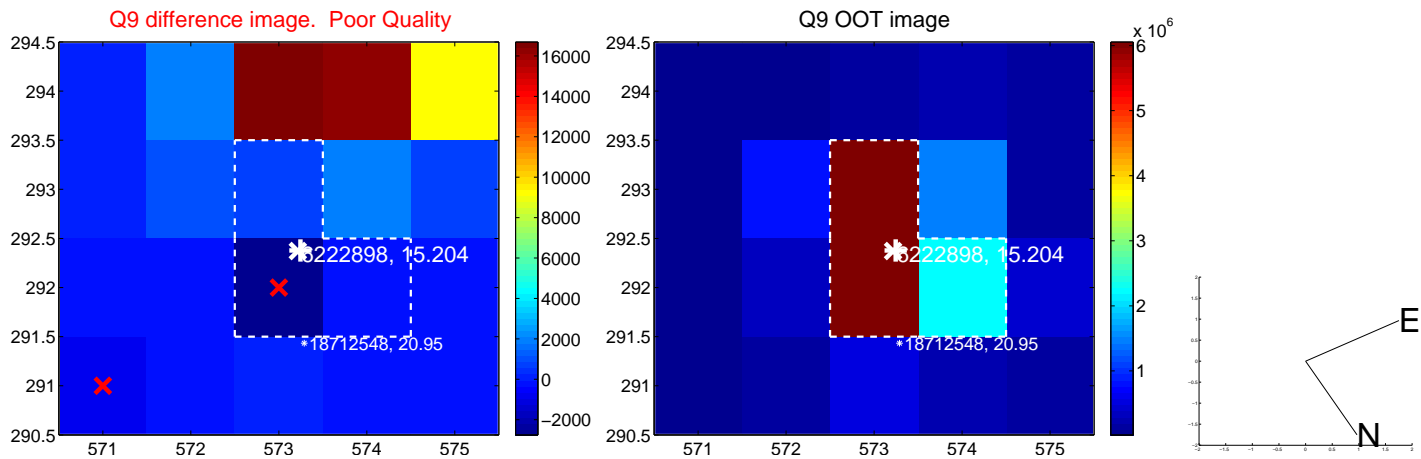
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



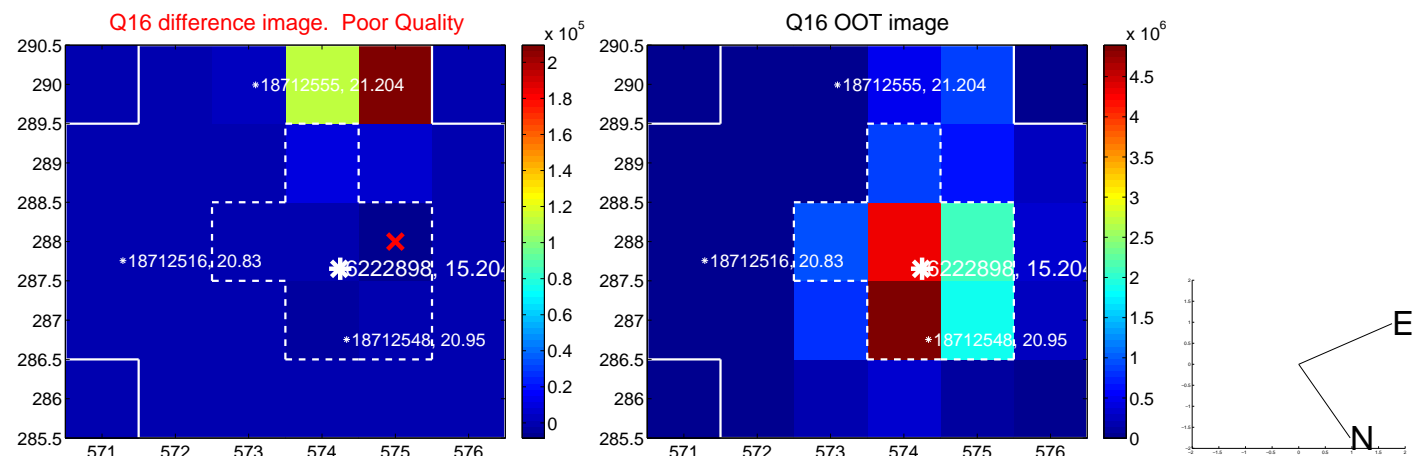
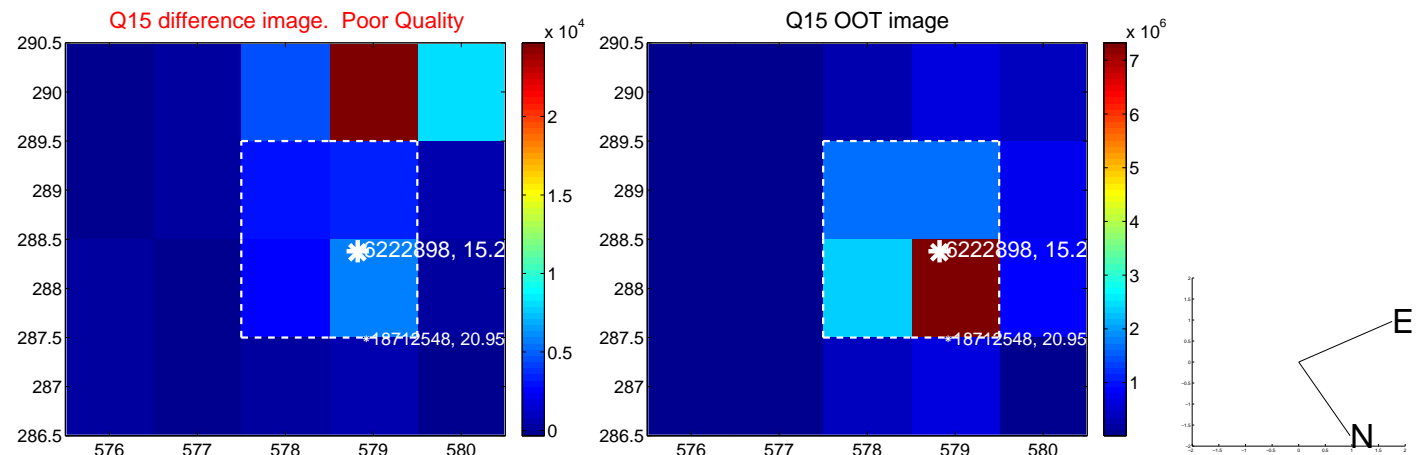
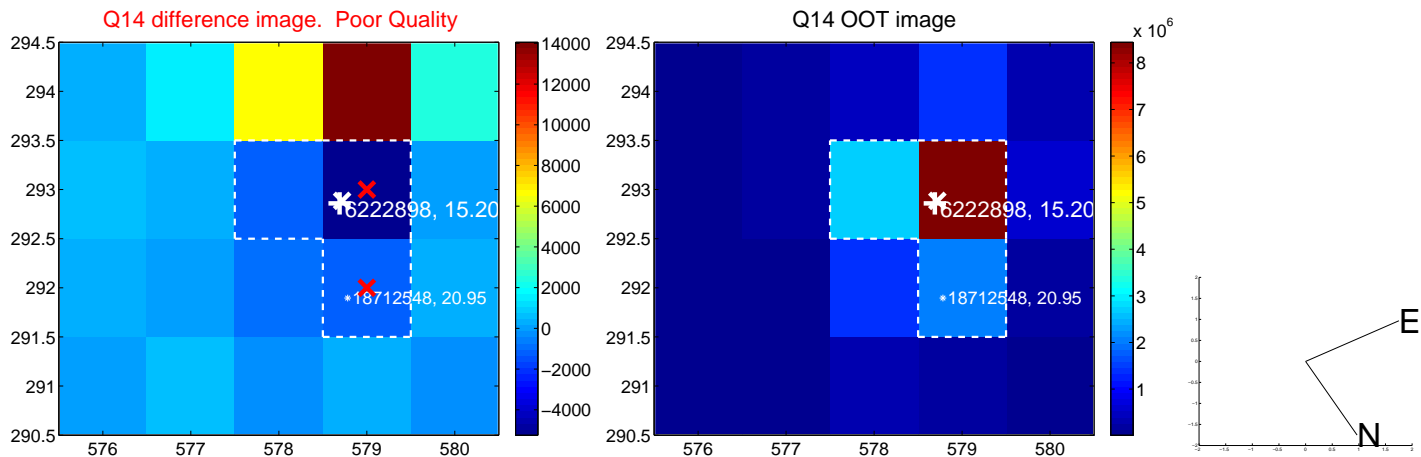
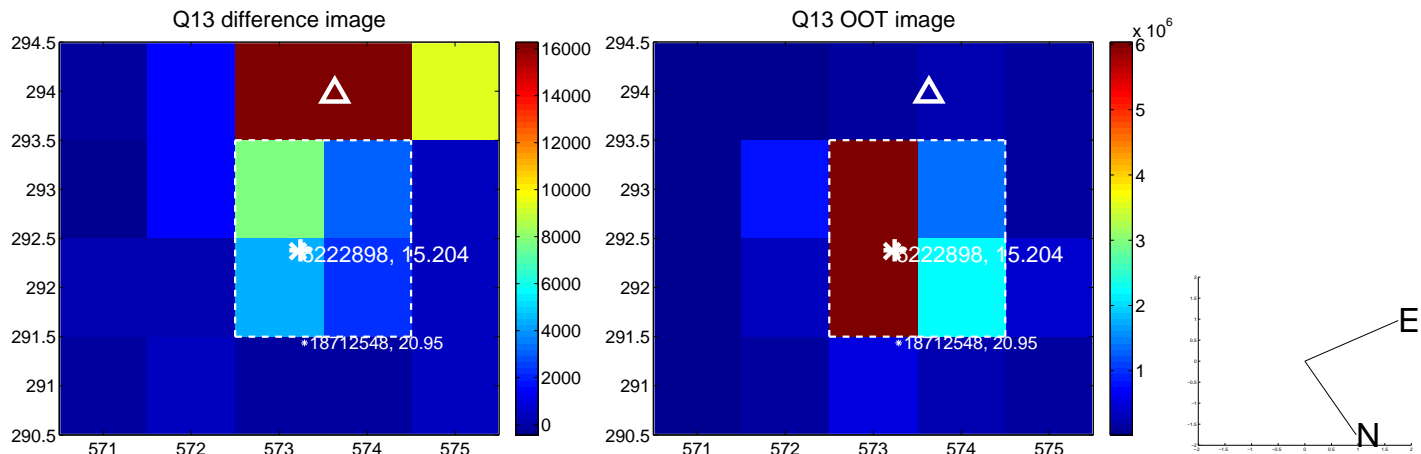
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



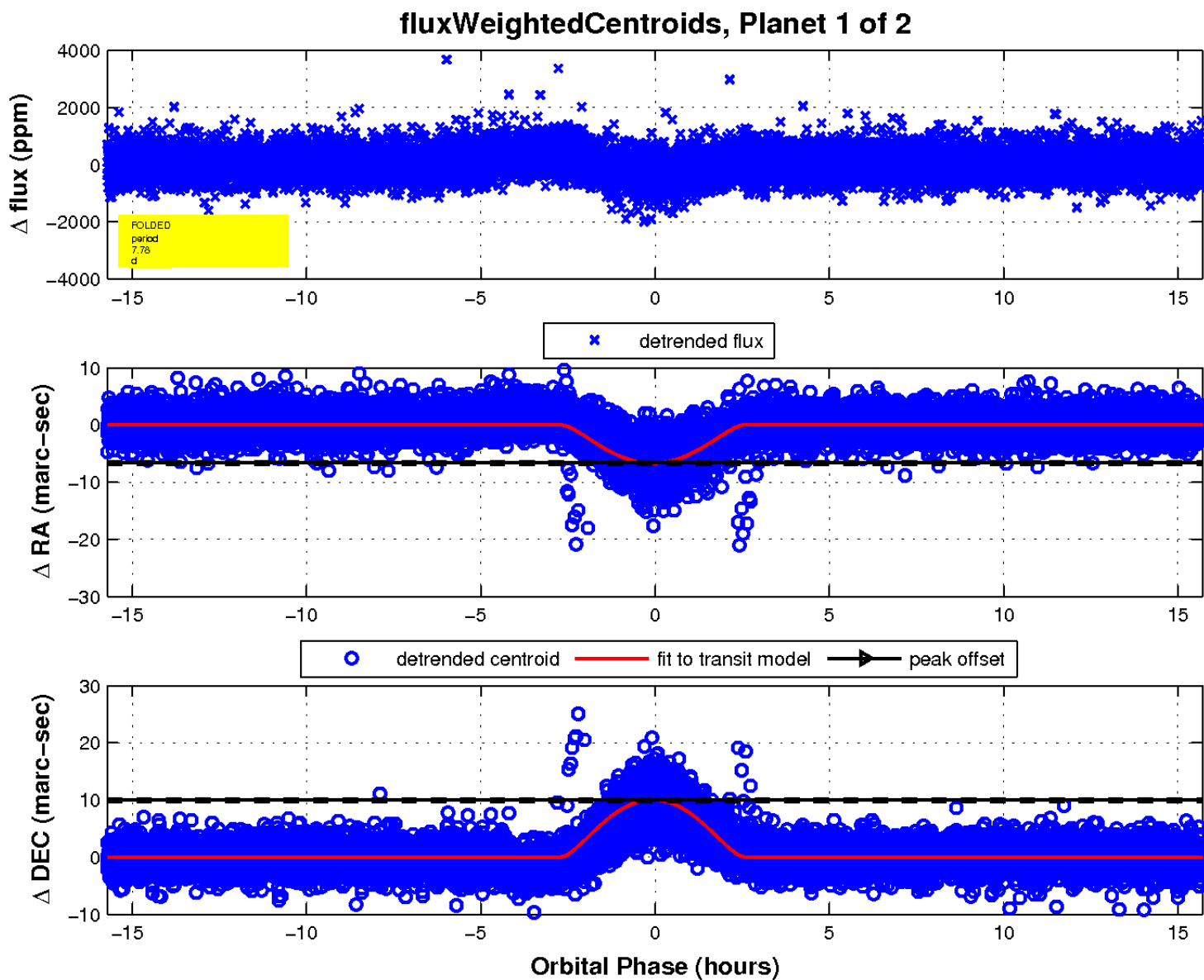
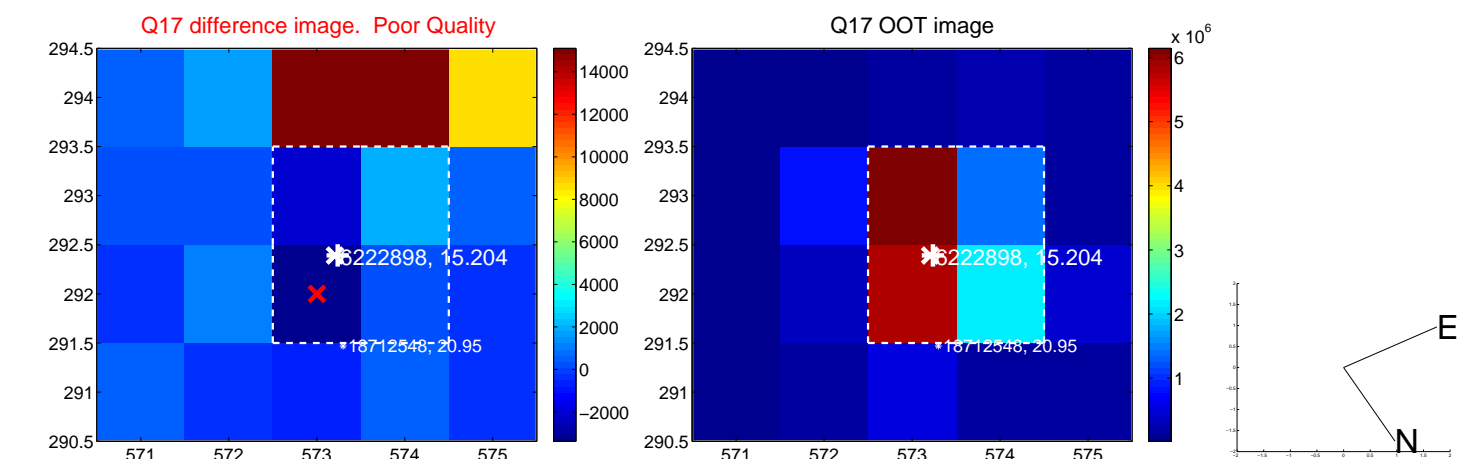
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

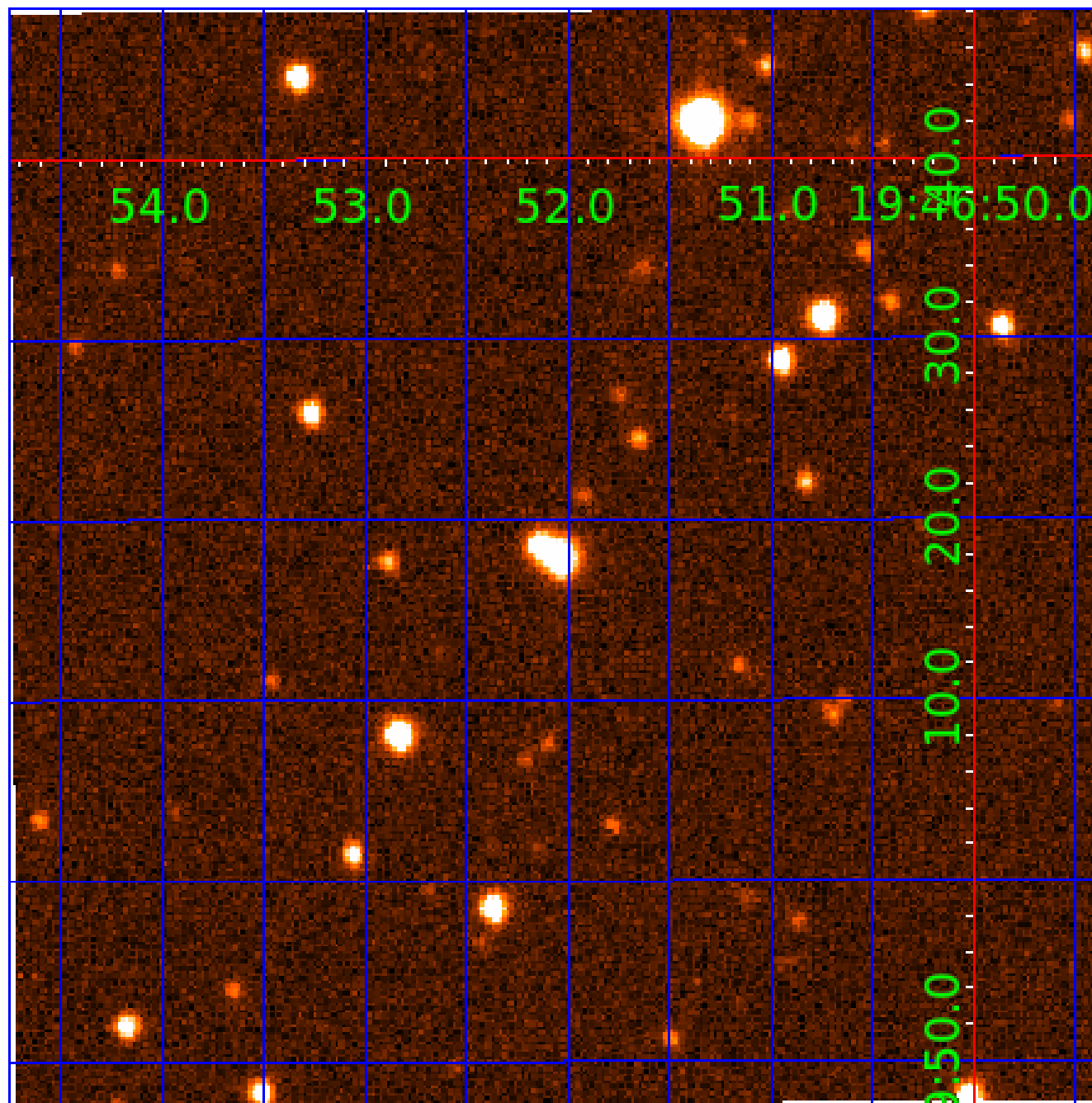


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 006222898

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 006222898-01 | OBS | 3896.01 | 7.780839 | 132.824201 | 377.1 | 5.238 | 17.7 | 19.0 | 0.90 | 5646 | 3.32 | 140.83 |
| 006222898-02 | OBS | No | 3.890454 | 132.686085 | 374.2 | 5.214 | 17.3 | 18.9 | 0.90 | 5646 | 3.49 | 354.87 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|---------------------------------------------------------|
| 006222898-01 | OBS | FP | 0.00 | 0 | 1 | 1 | 0 | MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—CENT_RESOLVED_OFFSET |
| 006222898-02 | OBS | FP | 0.00 | 1 | 1 | 1 | 0 | IS_SEC_TCE—CENT_RESOLVED_OFFSET |

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.

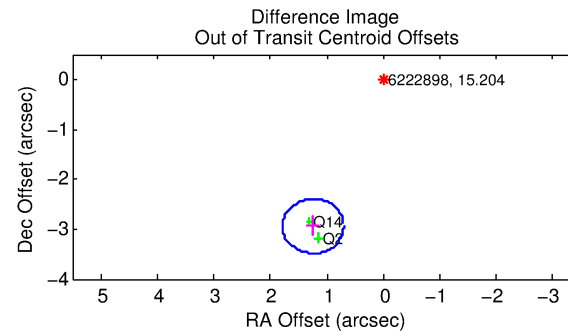
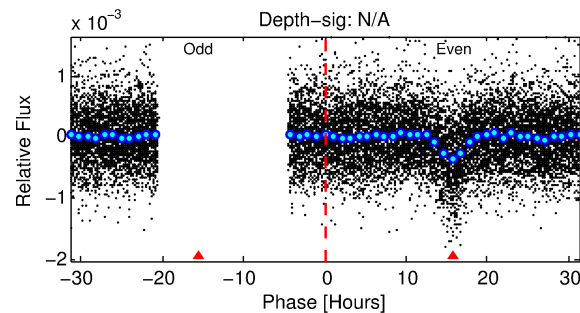
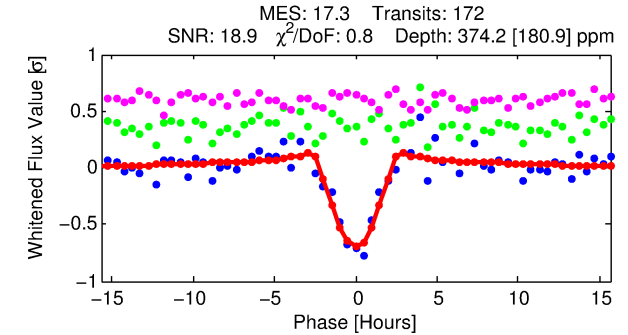
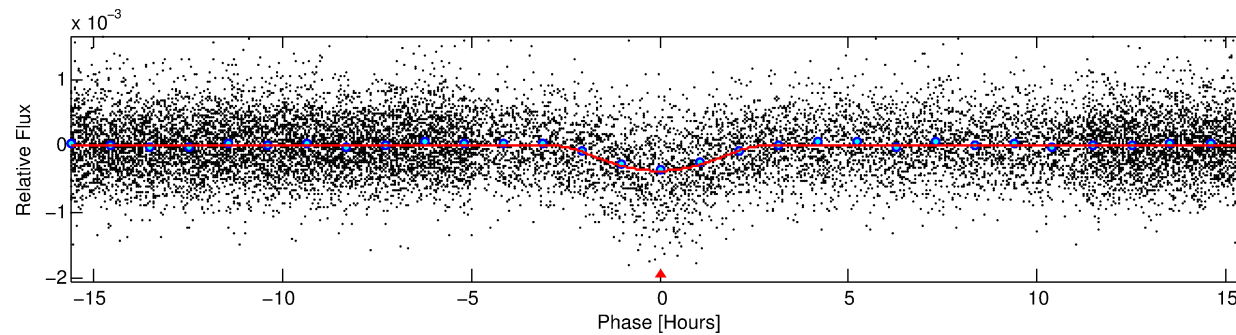
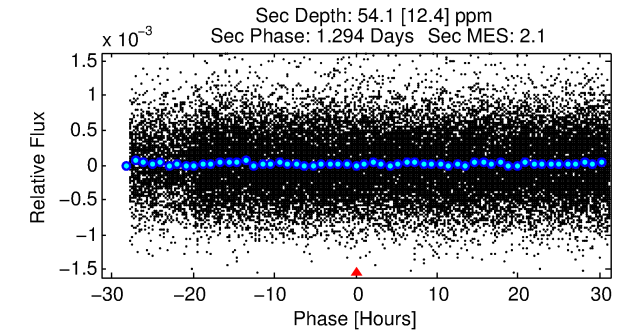
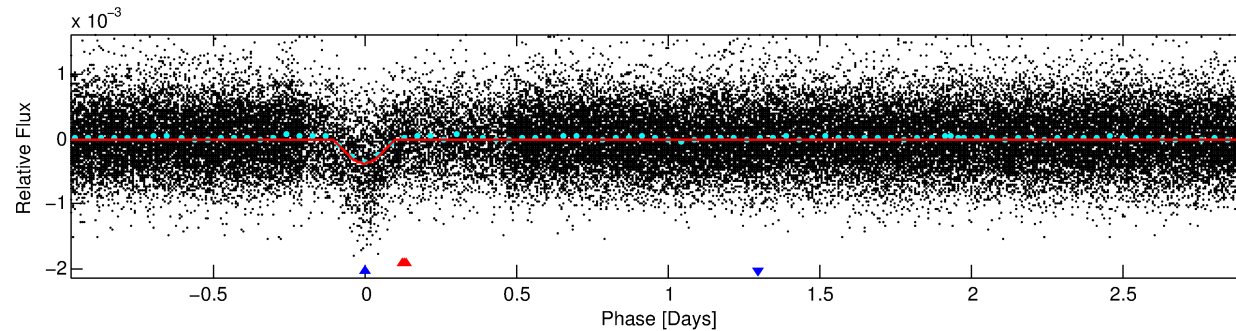
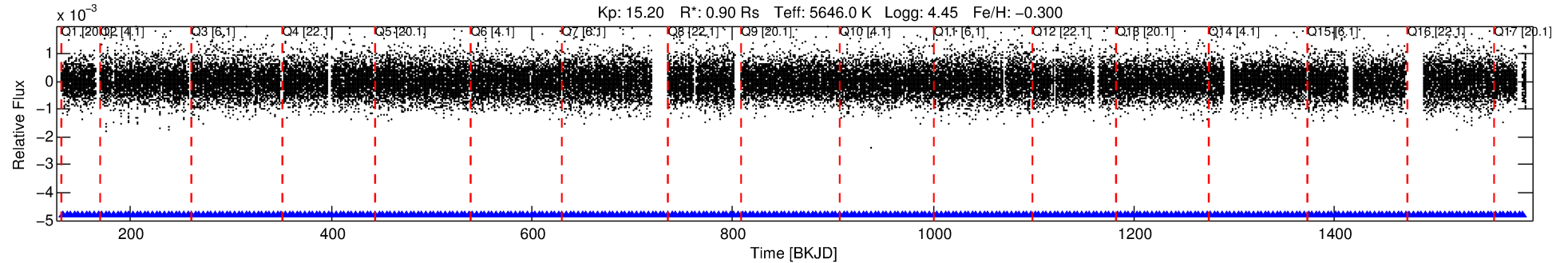
Ephemeris Match Information For 006222898-02

No Significant Match Found

DV One-Page Summary

KIC: 6222898 Candidate: 2 of 2 Period: 3.890 d
KOI: K03896.01 Corr: 0.768

Kp: 15.20 R*: 0.90 Rs Teff: 5646.0 K Logg: 4.45 Fe/H: -0.300



DV Fit Results:

Period = 3.89045 [0.00003] d
Epoch = 132.6861 [0.0052] BKJD
Rp/R* = 0.0357 [0.0610]
a/R* = 1.84 [0.52]
b = 1.00 [0.10]
Seff = 354.86 [117.90]
Teq = 1107 [92] K
Rp = 3.49 [6.03] Re
a = 0.0454 [0.0098] AU
Ag = 5.02 [17.26] [0.23σ]
Teff = 2562 [2193] K [0.66σ]

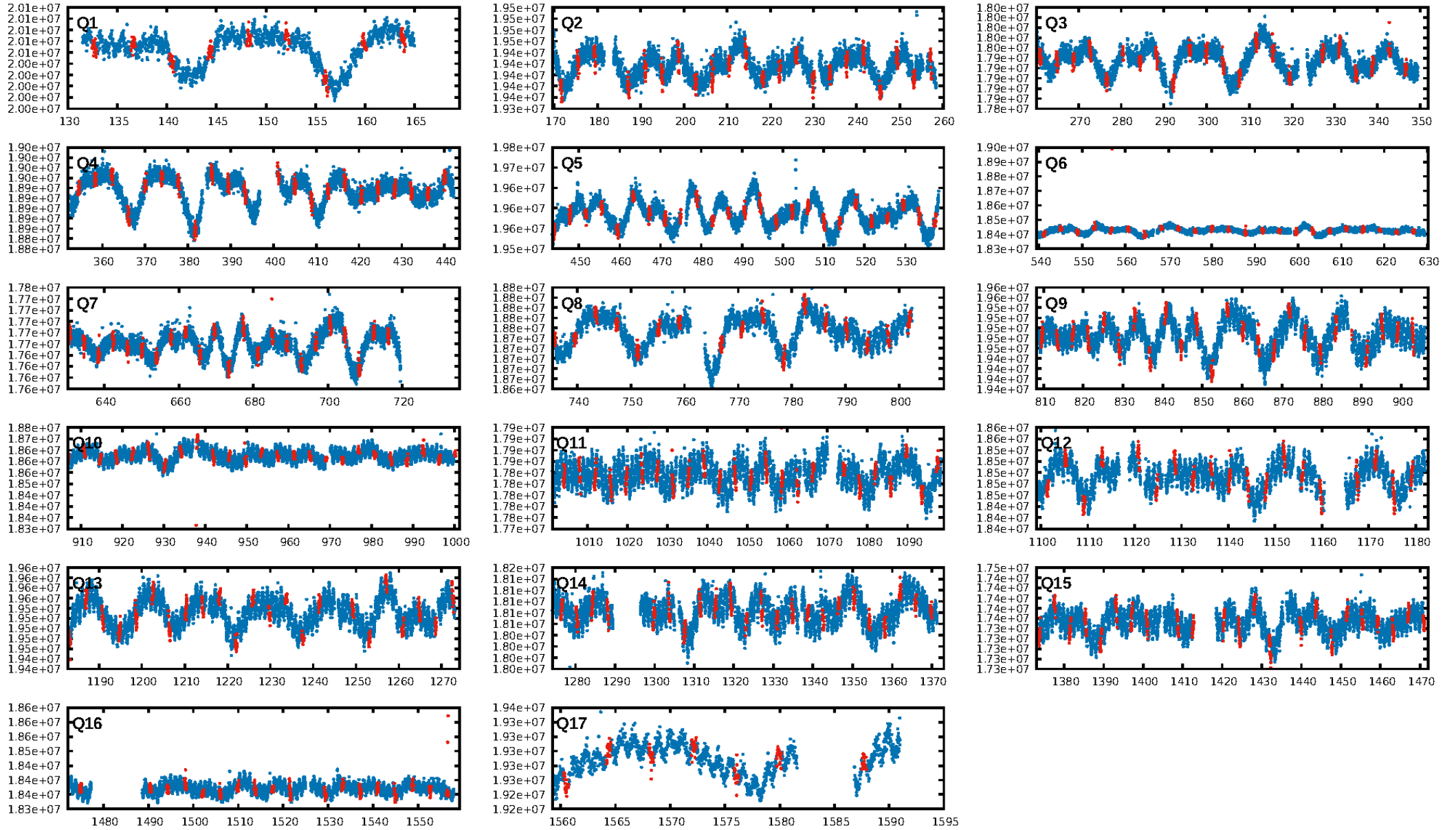
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [12.63σ]
ModelChiSquare2-sig: 0.1%
ModelChiSquareGoF-sig: 100.0%
Bootstrap-pfa: 1.67e-61
RollingBand-fgt: 1.00 [165/165]
GhostDiagnostic-chr: -0.3138
Centroid-sig: 0.0%
Centroid-so: 5.928 arcsec [13.80σ]
OotOffset-rm: 3.195 arcsec [17.61σ]
KicOffset-rm: 3.112 arcsec [18.10σ]
OotOffset-st: 2/0/0/0 [2]
KicOffset-st: 2/0/0/0 [2]
DiffImageQuality-fgm: 1.00 [2/2]
DiffImageOverlap-fno: 1.00 [17/17]

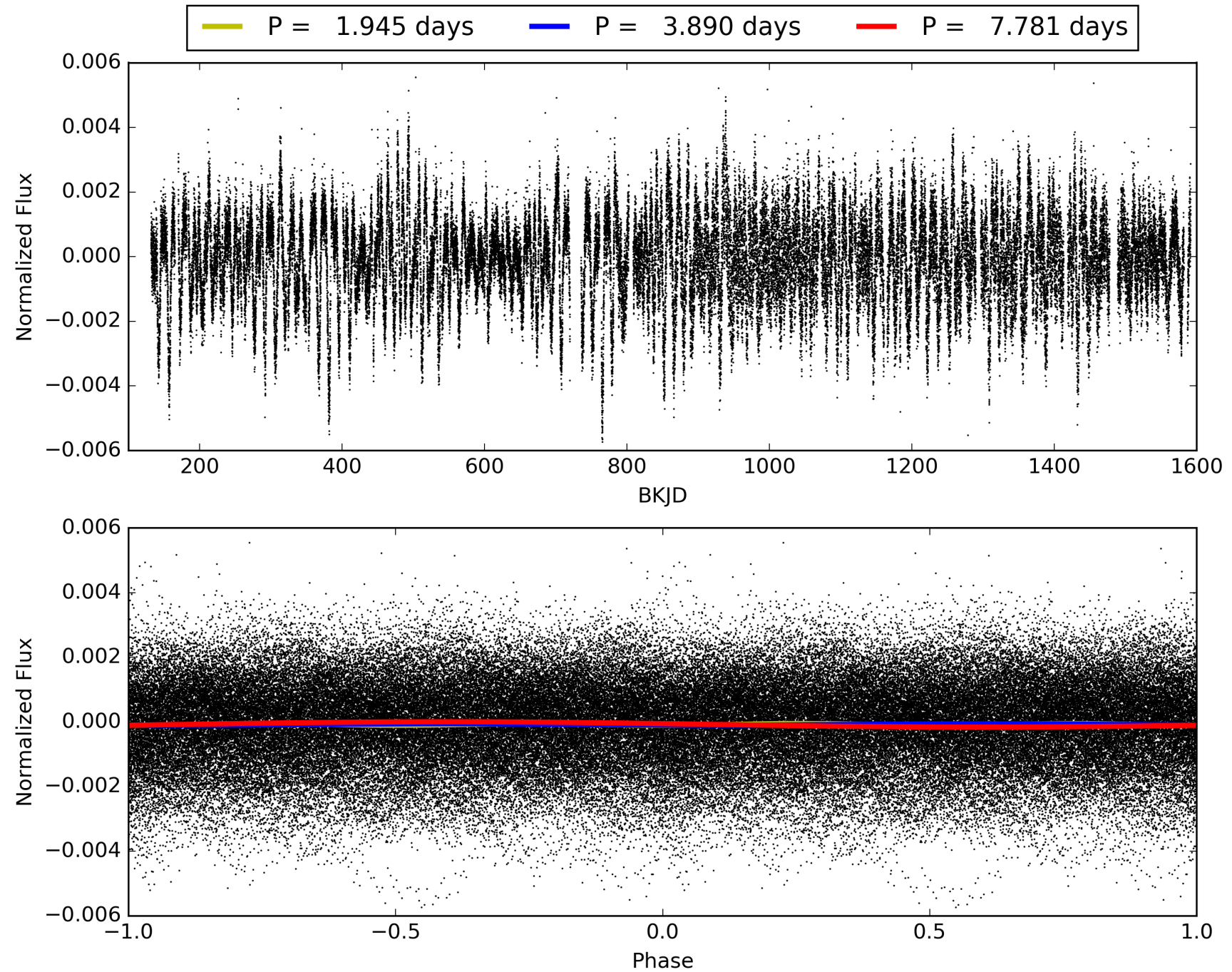
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 23:52:18 Z

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

TCE 006222898-02, PDC Light Curves

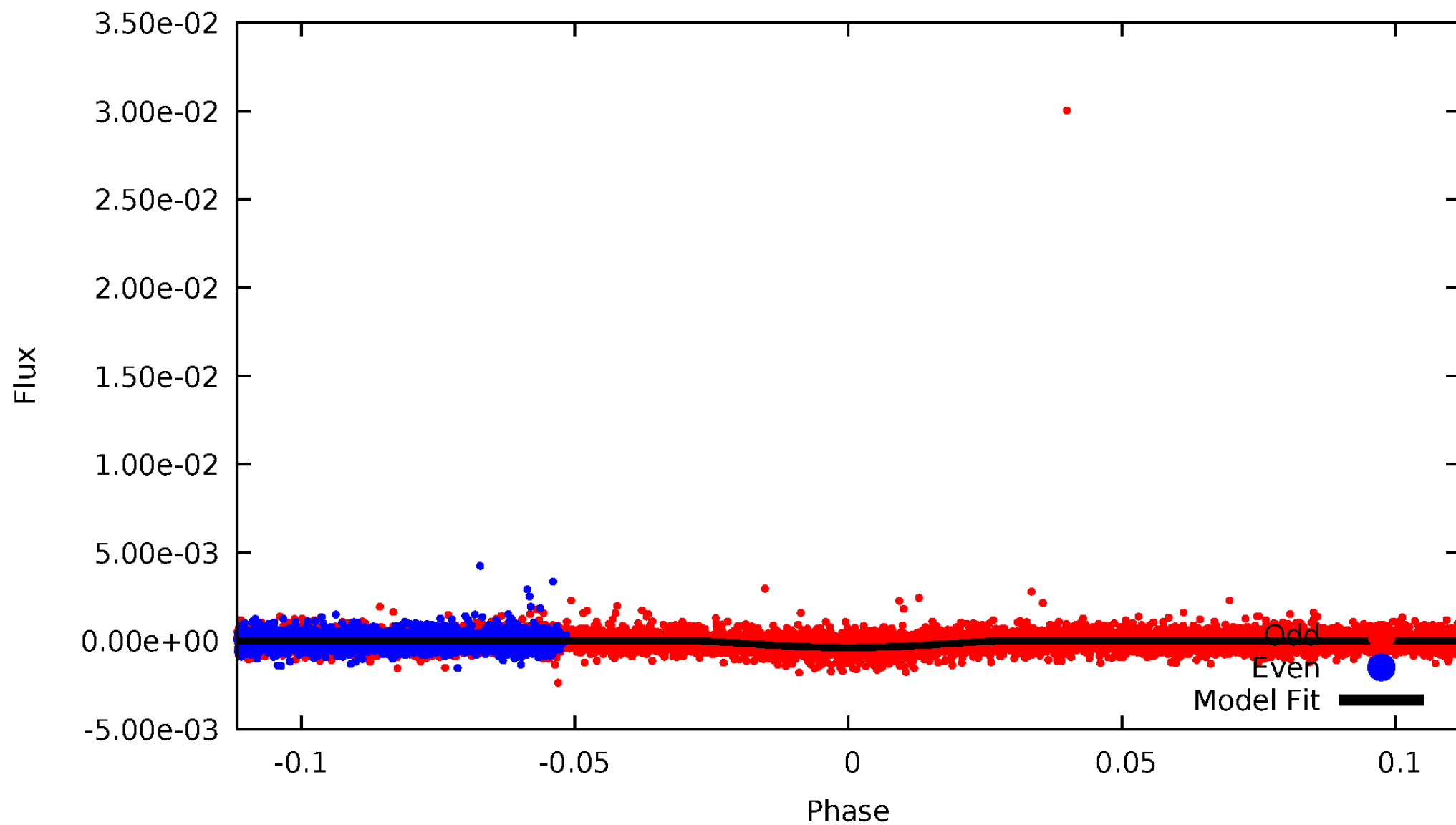


TCE 006222898-02



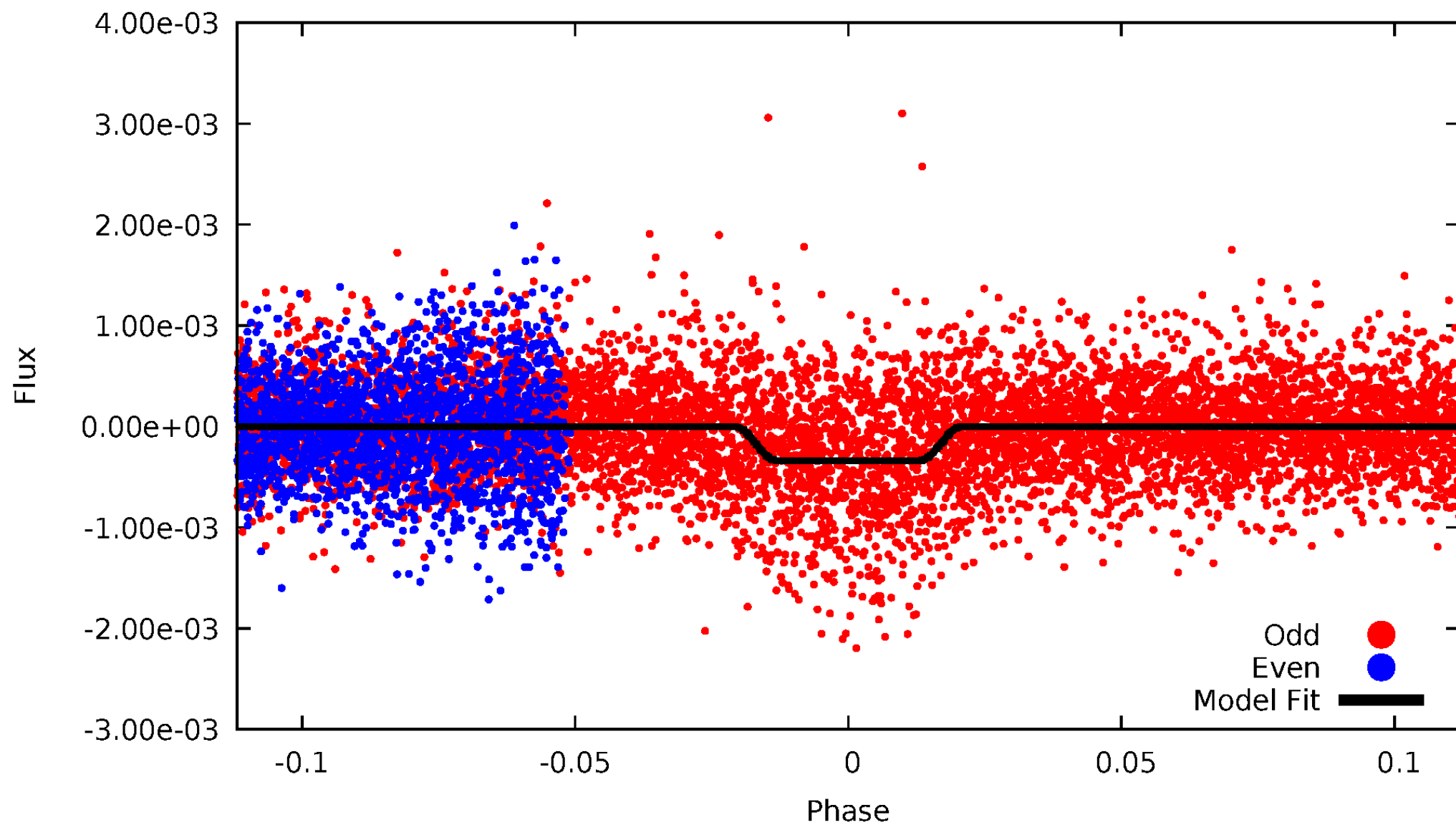
DV Odd/Even

TCE 006222898-02



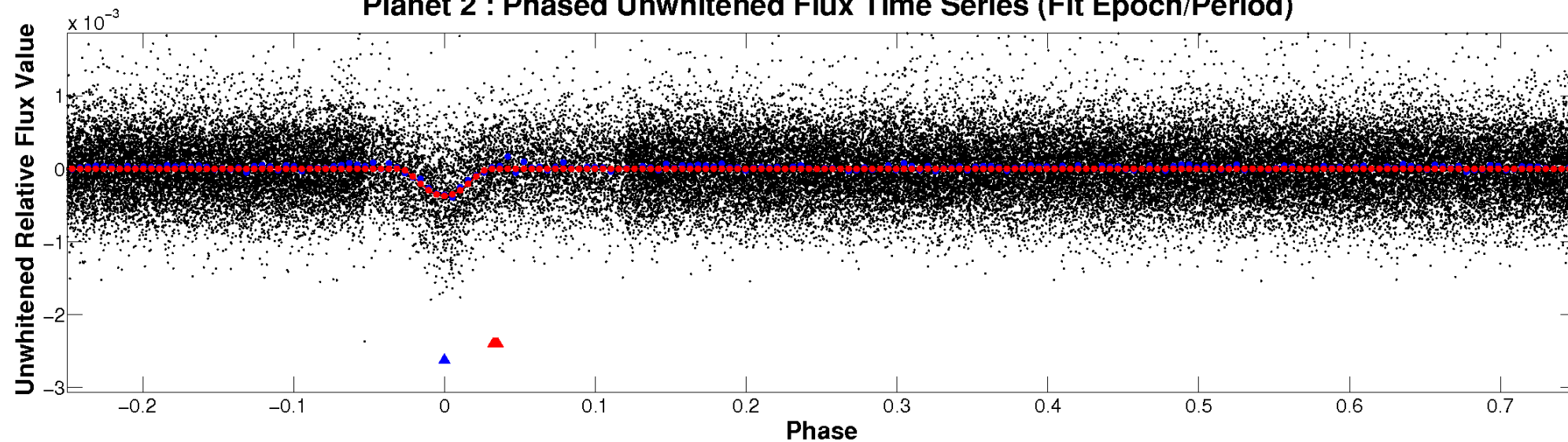
ALT Odd/Even

TCE 006222898-02

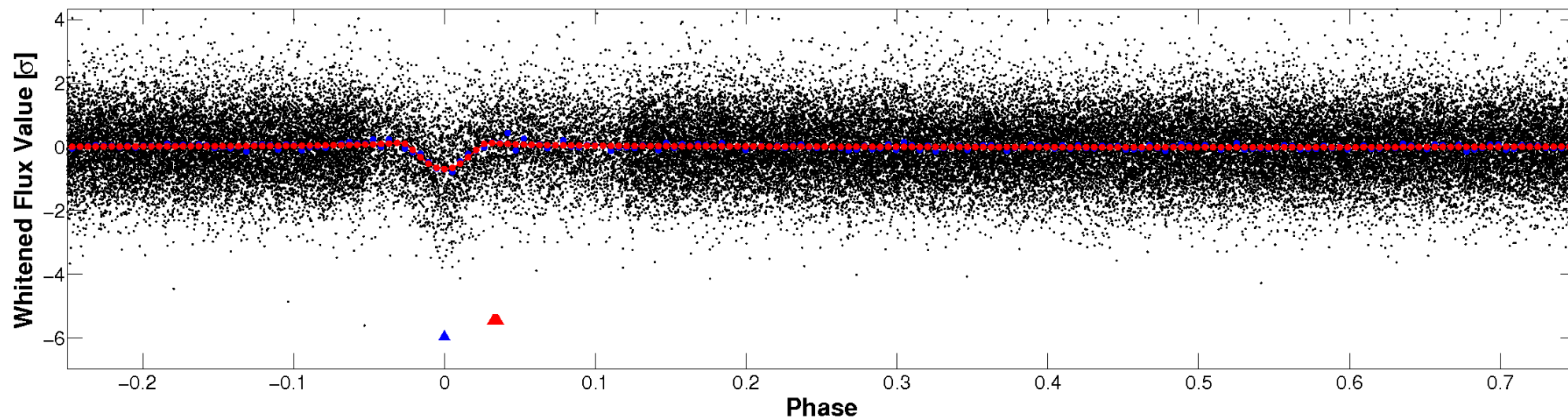


Non-Whitened Vs. Whitened Light Curve

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

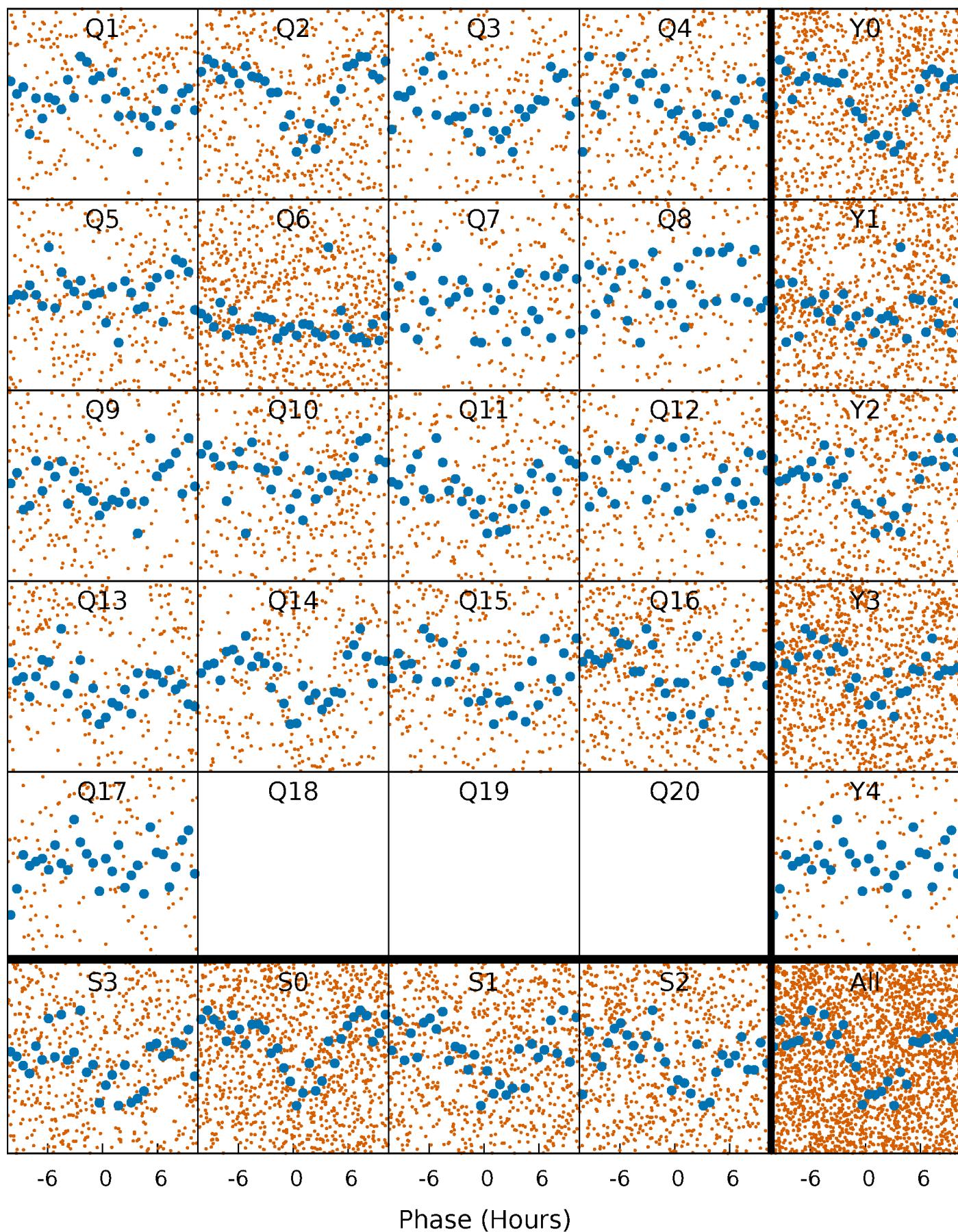


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



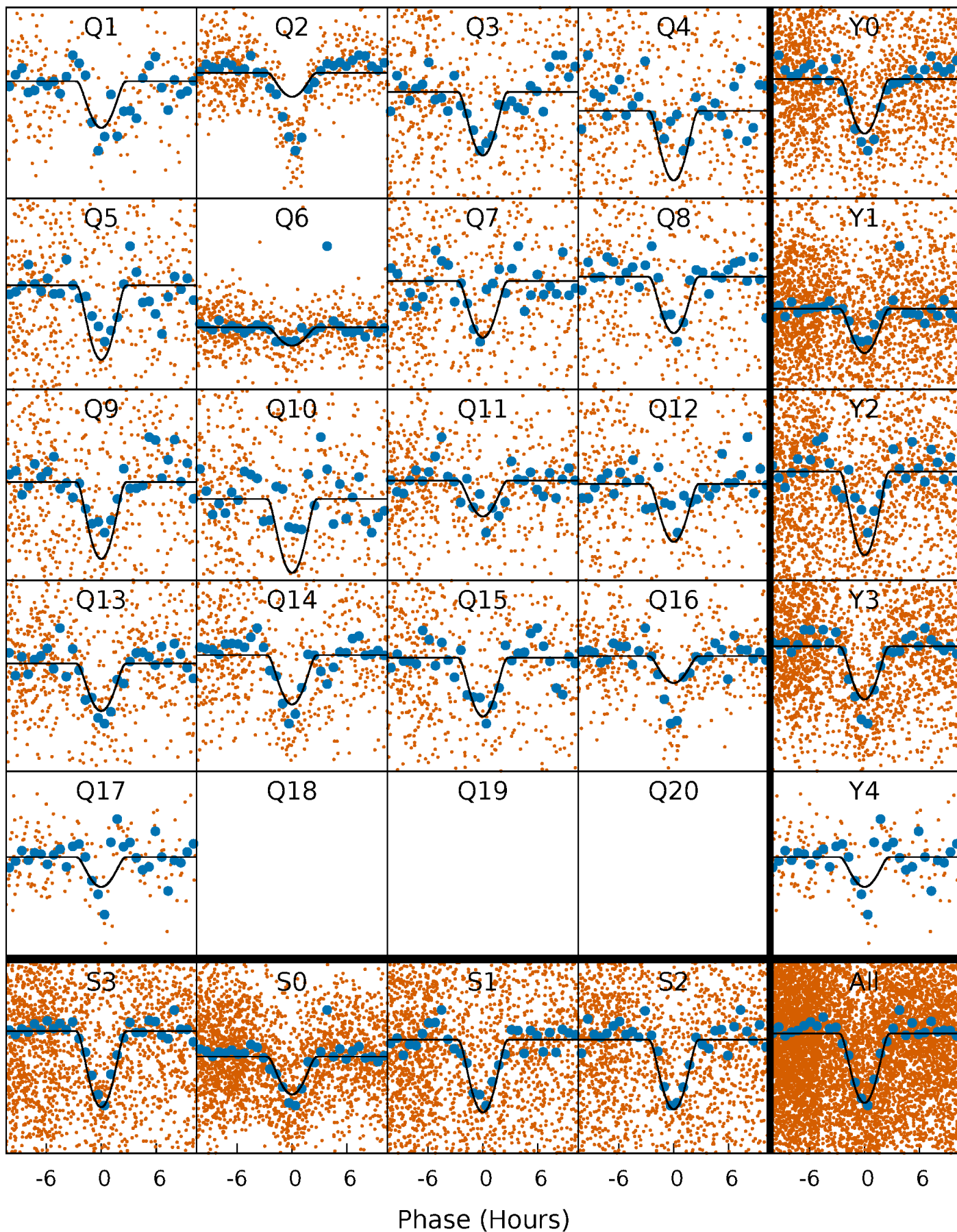
PDC Quarter-Phased Transit Curves

TCE 006222898-02 $P = 3.890454$ Days $T_0 = 132.686085$ (BKJD)



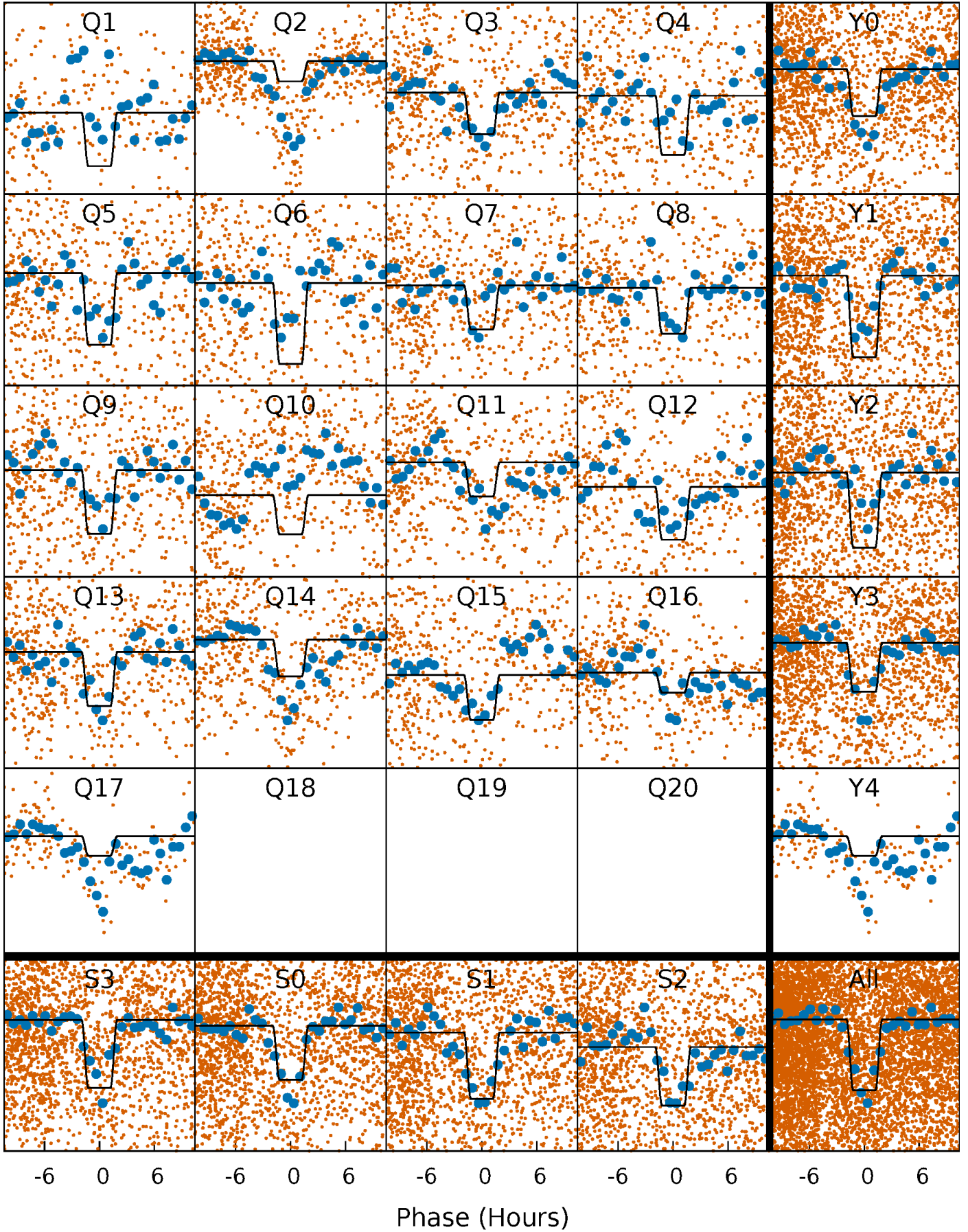
DV Quarter-Phased Transit Curves

TCE 006222898-02 $P = 3.890454$ Days $T_0 = 132.686085$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

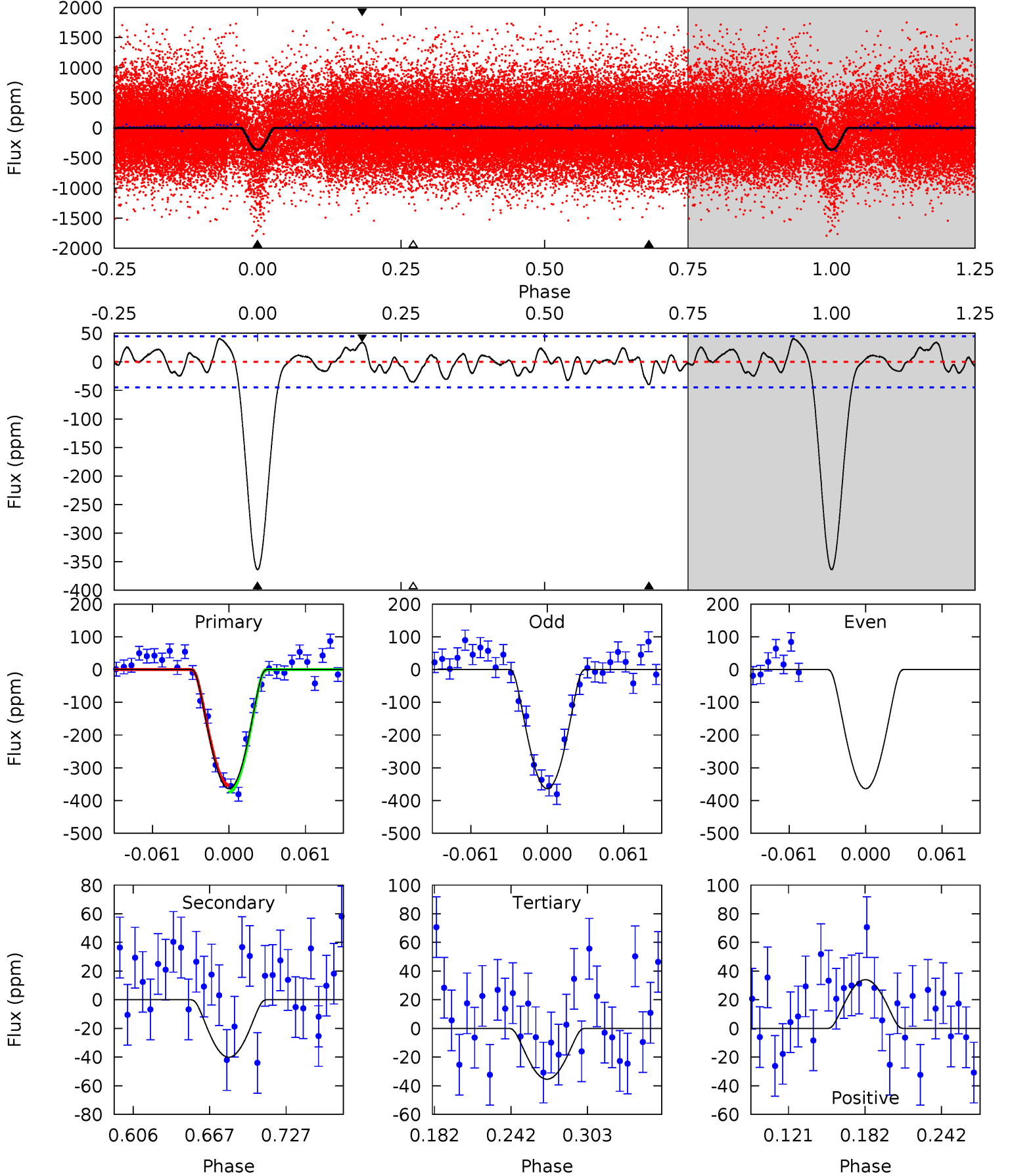
TCE 006222898-02 P= 3.890455 Days $T_0=132.683679$ (BKJD)



DV Model-Shift Uniqueness Test

006222898-02, P = 3.890454 Days, E = 128.795631 Days

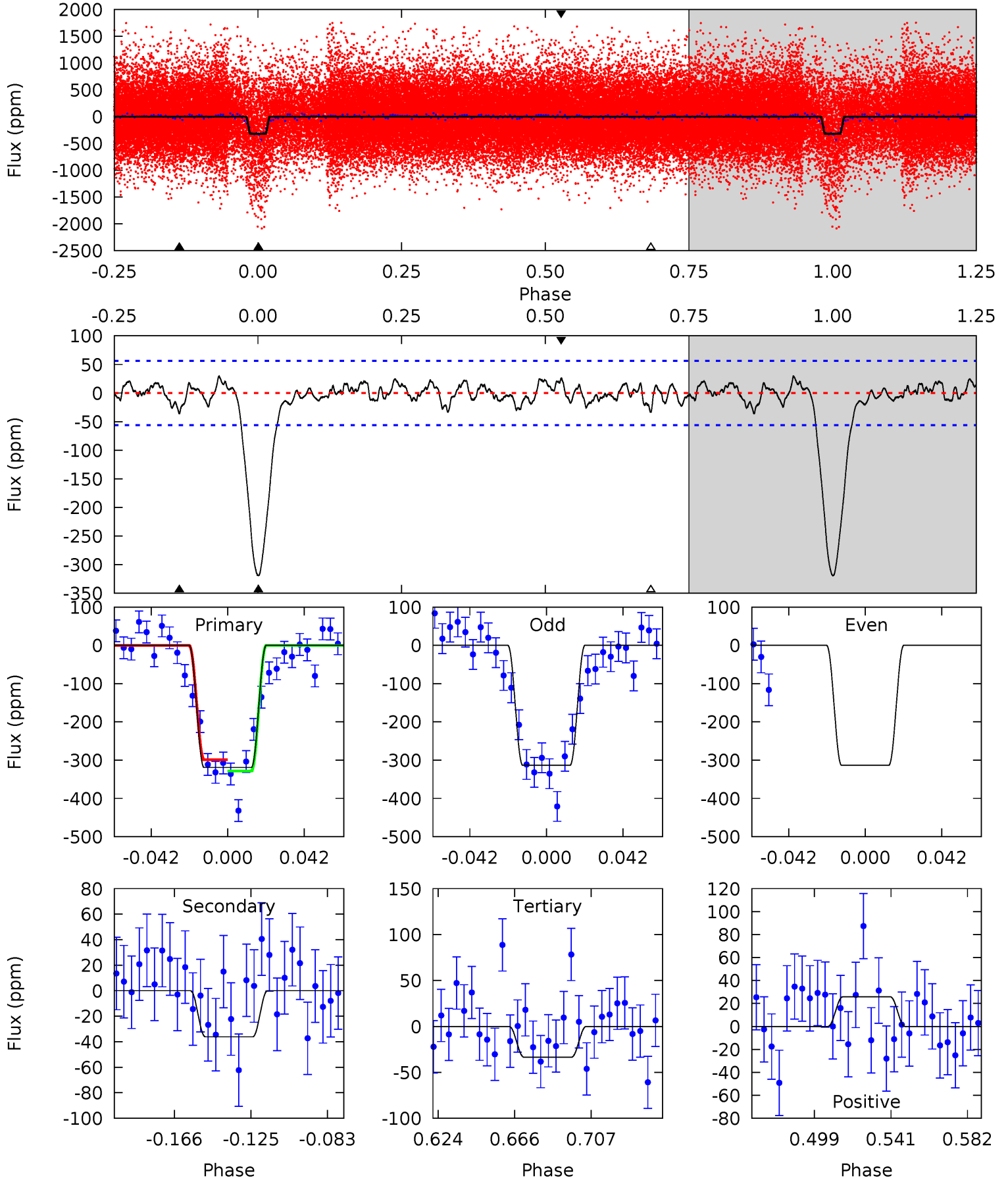
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 38.0 | 4.19 | 3.71 | 3.56 | 4.67 | 1.88 | 1.62 | 34.3 | 34.5 | 0.49 | 0.64 | 0 | 1.08 | 0.10 | 1.10 |



Alt Model-Shift Uniqueness Test

006222898-02, P = 3.890455 Days, E = 128.793224 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 26.9 | 3.05 | 2.83 | 2.18 | 4.75 | 2.04 | 1.09 | 24.1 | 24.7 | 0.22 | 0.87 | 0 | 1.06 | 0.08 | 1.26 |



Stellar Parameters For KIC 006222898

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|-------------------------------------------|
| | 5646^{+169}_{-169} | $4.449^{+0.112}_{-0.168}$ | $-0.300^{+0.300}_{-0.300}$ | $0.896^{+0.231}_{-0.124}$ | $0.825^{+0.117}_{-0.068}$ | $1.616^{+0.821}_{-0.740}$ |
| | +3%/-3% | +3%/-4% | +100%/-100% | +26%/-14% | +14%/-8% | +51%/-46% |
| Source | PHO1 | KIC0 | KIC0 | DSEP | | |

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

Secondary Eclipse Parameters for KIC 006222898-02 / KOI

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{\text{max}} (K)$ | $T_{\text{obs}} (K)$ | A_{obs} |
|---------|--------------|------------------------|----------------------|-----------------------|----------------------------|
| DV | -40 ± 10 | $5.75^{+5.05}_{-4.01}$ | 1556^{+101}_{-87} | 2590^{+1084}_{-727} | $1.389^{+12.325}_{-1.021}$ |
| Alt. | -36 ± 12 | $4.91^{+5.10}_{-3.37}$ | 1557^{+102}_{-87} | 2675^{+1134}_{-825} | $1.709^{+15.024}_{-1.356}$ |

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

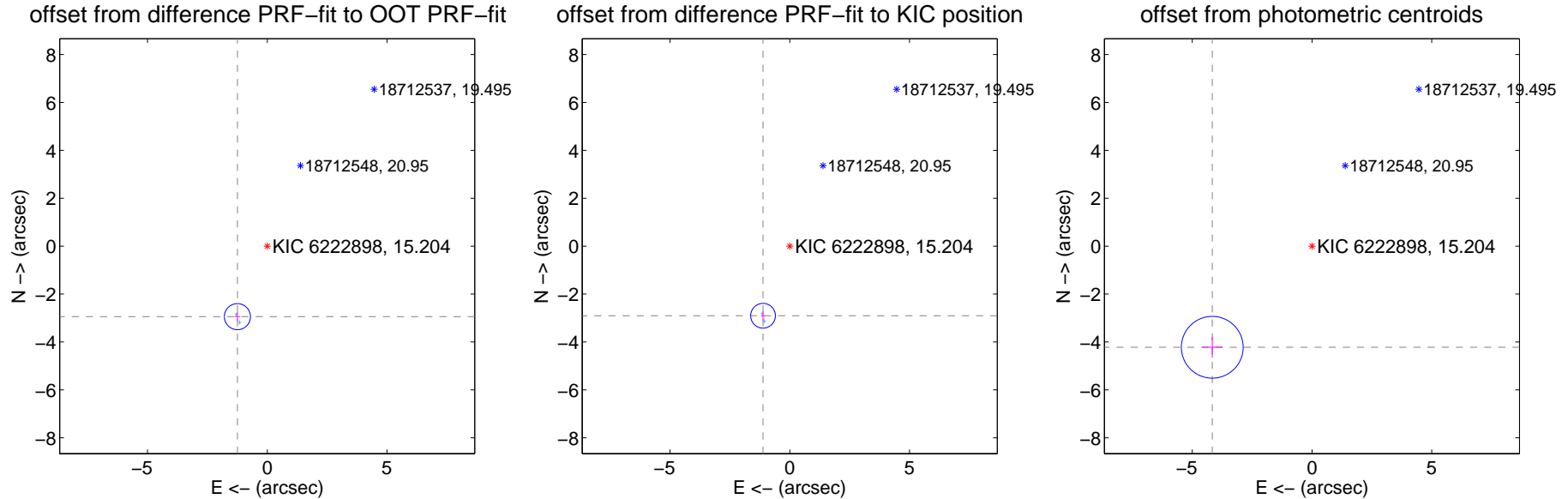
DV Centroid Data

Supplemental centroid analysis for 006222898-02. Kepler magnitude: 15.20. Transit SNR 18.93

There are 2 quarters with good PRF difference image offsets

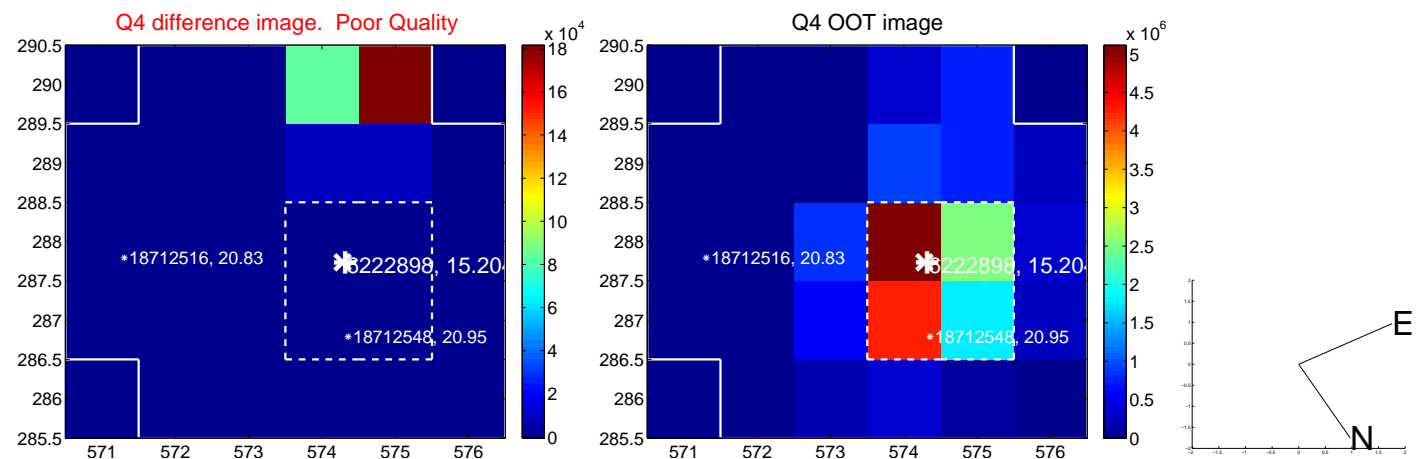
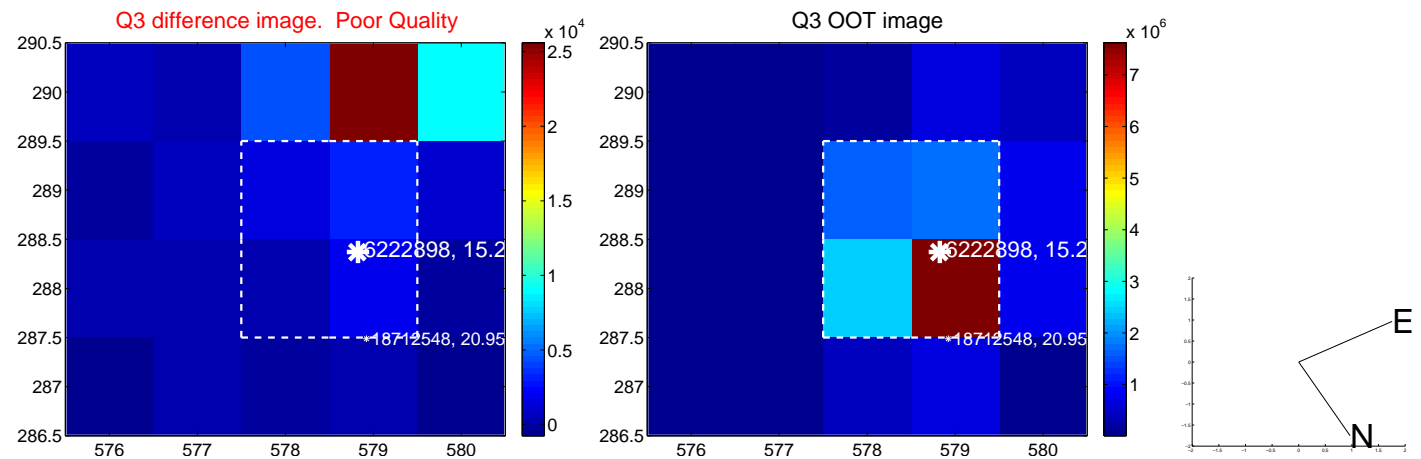
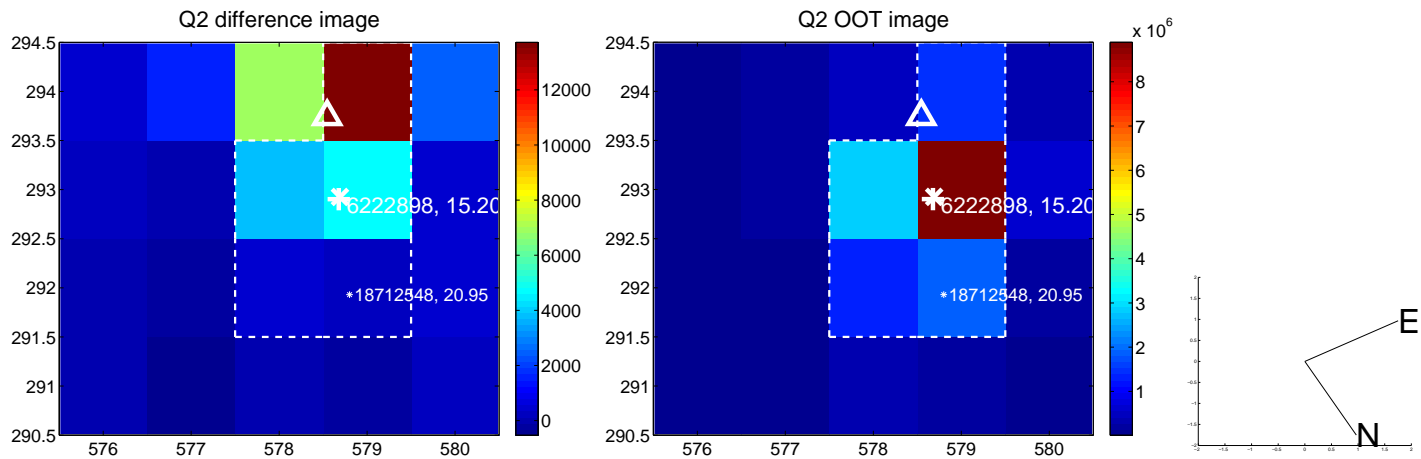
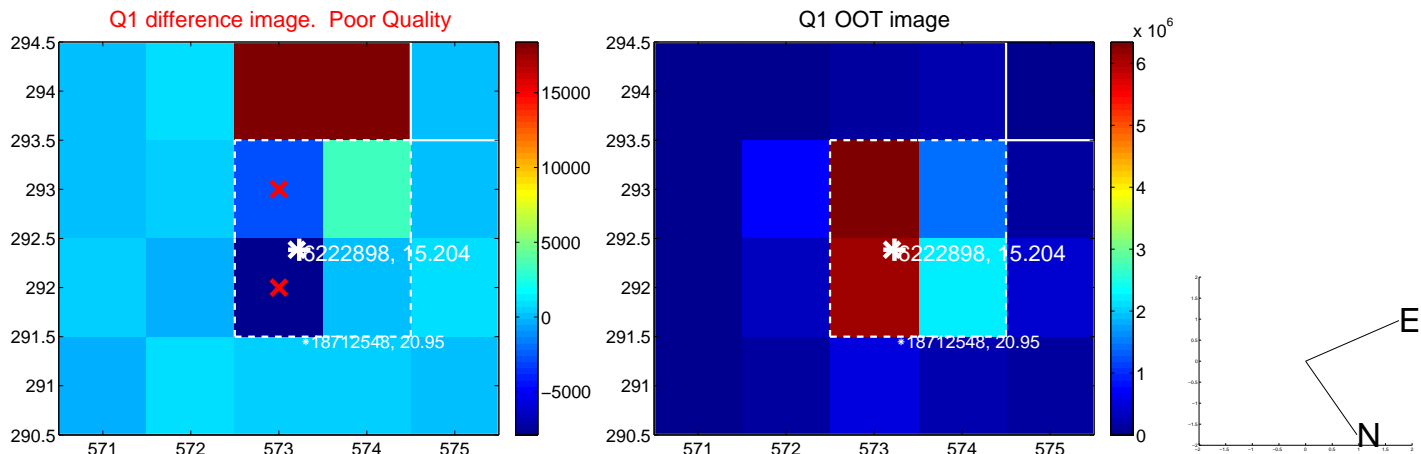
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|-----------------------------------------|--------------------|---------------------|-------------------|--------------------|
| PRF-fit source offset from OOT | 3.195 ± 0.181 | 17.61 | 1.245 ± 0.106 | -2.943 ± 0.192 |
| PRF-fit source offset from KIC position | 3.112 ± 0.172 | 18.10 | 1.116 ± 0.082 | -2.905 ± 0.181 |
| photometric centroid source offset | 5.93 ± 0.43 | 13.80 | 4.16 ± 0.43 | -4.22 ± 0.43 |

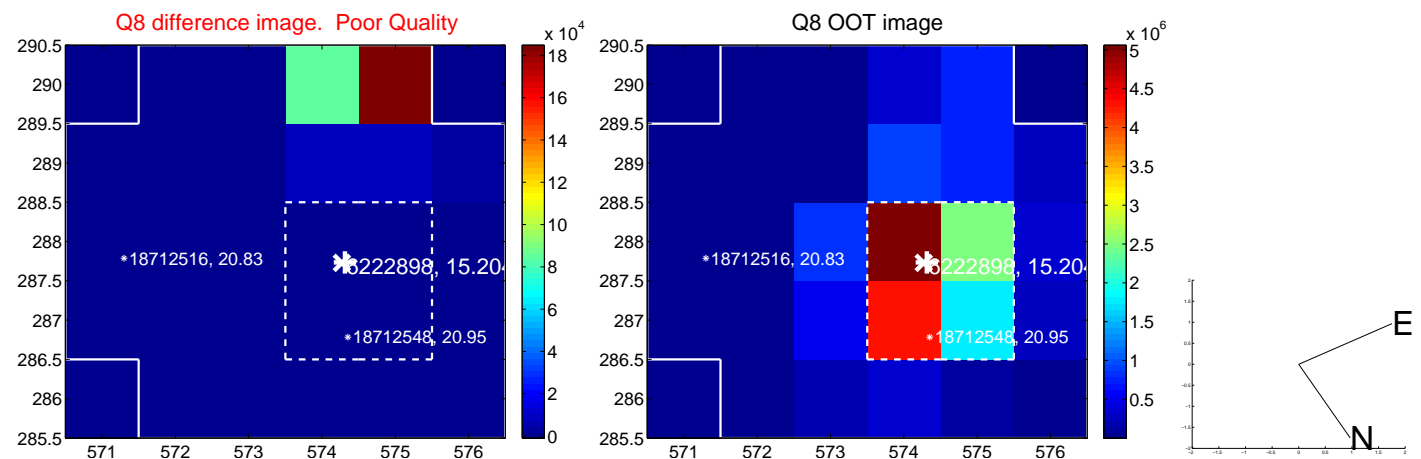
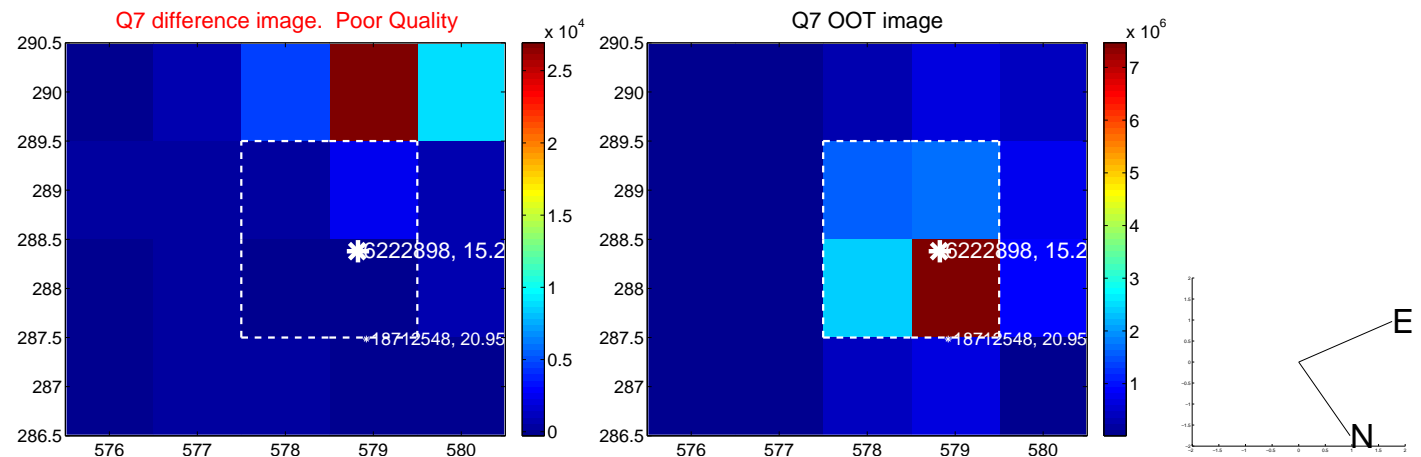
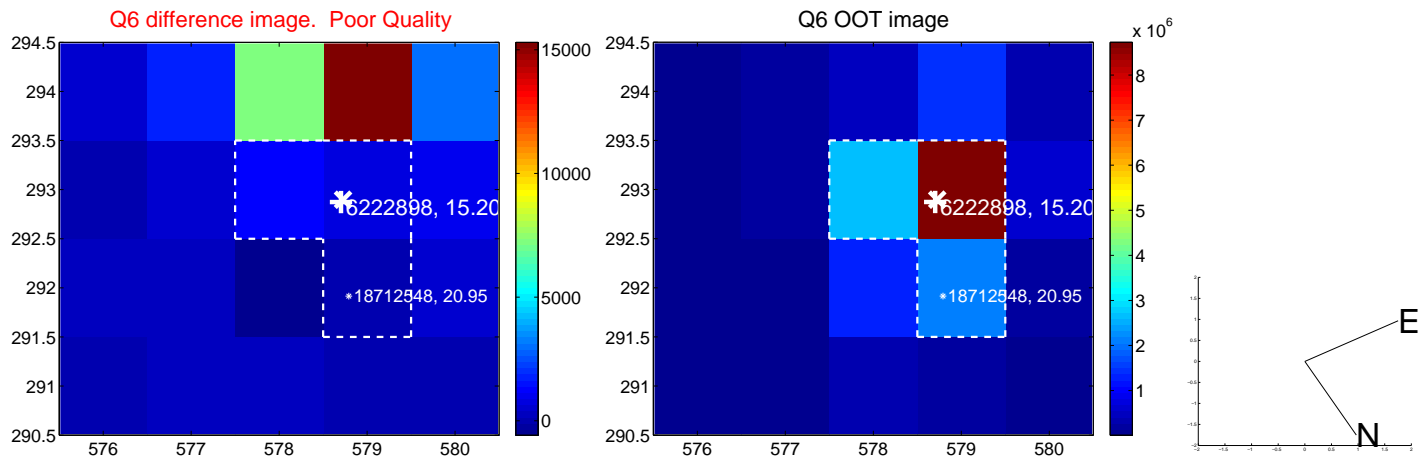
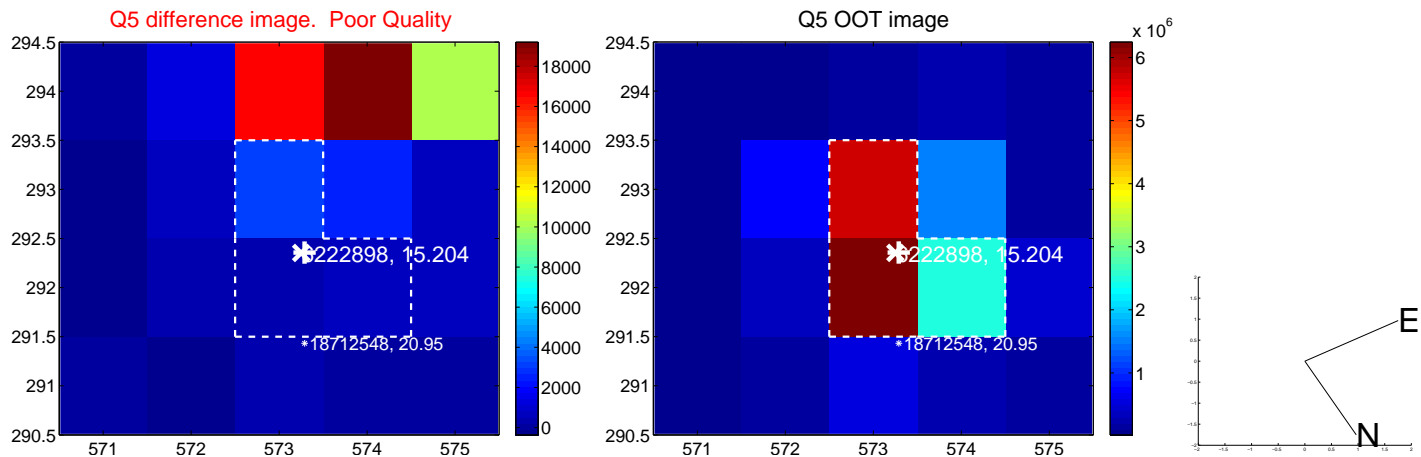


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

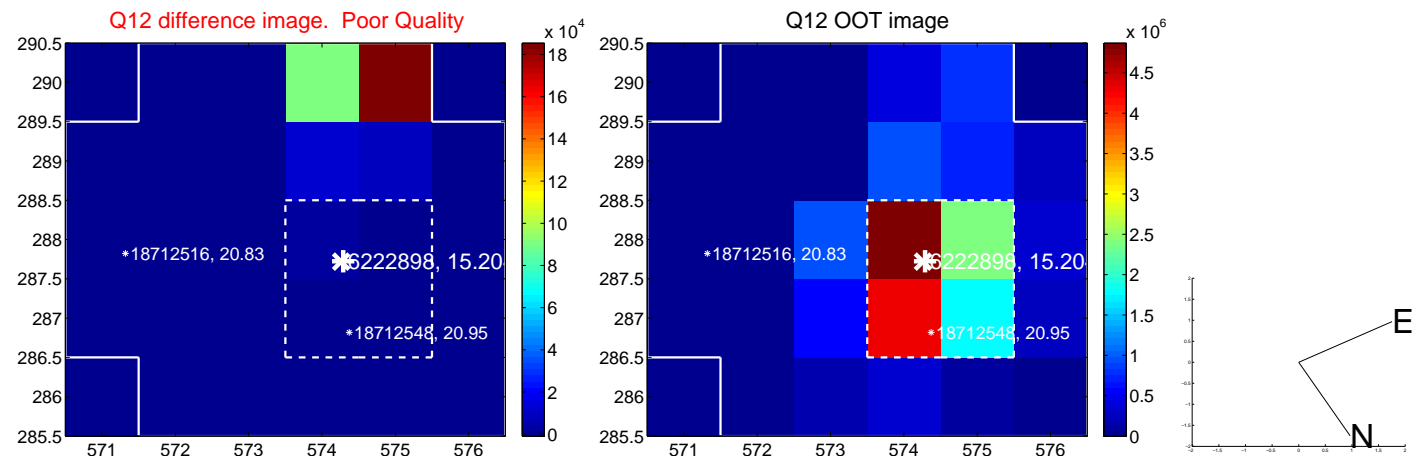
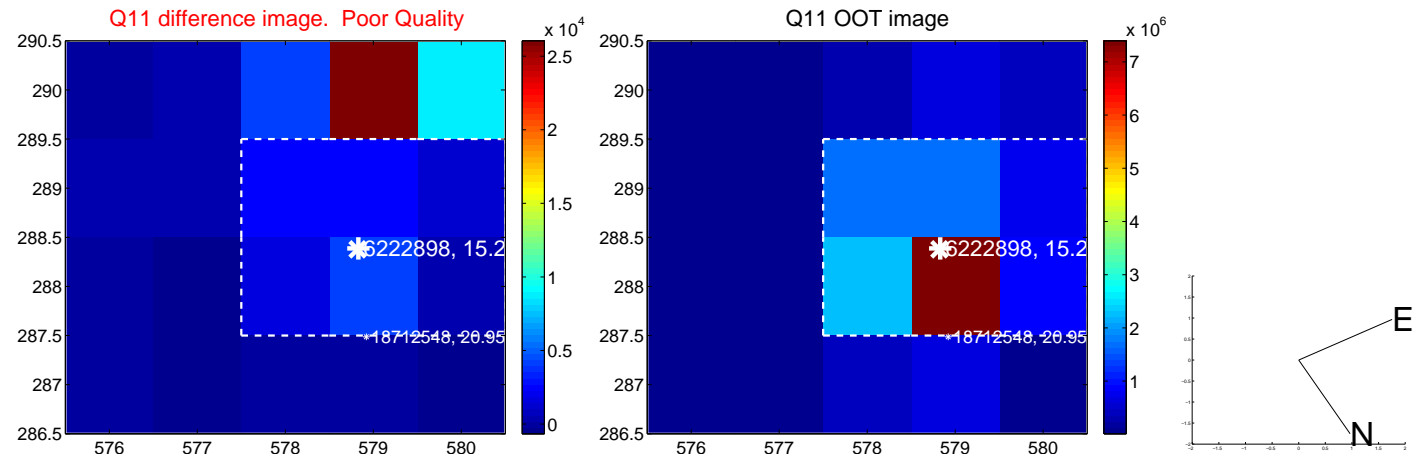
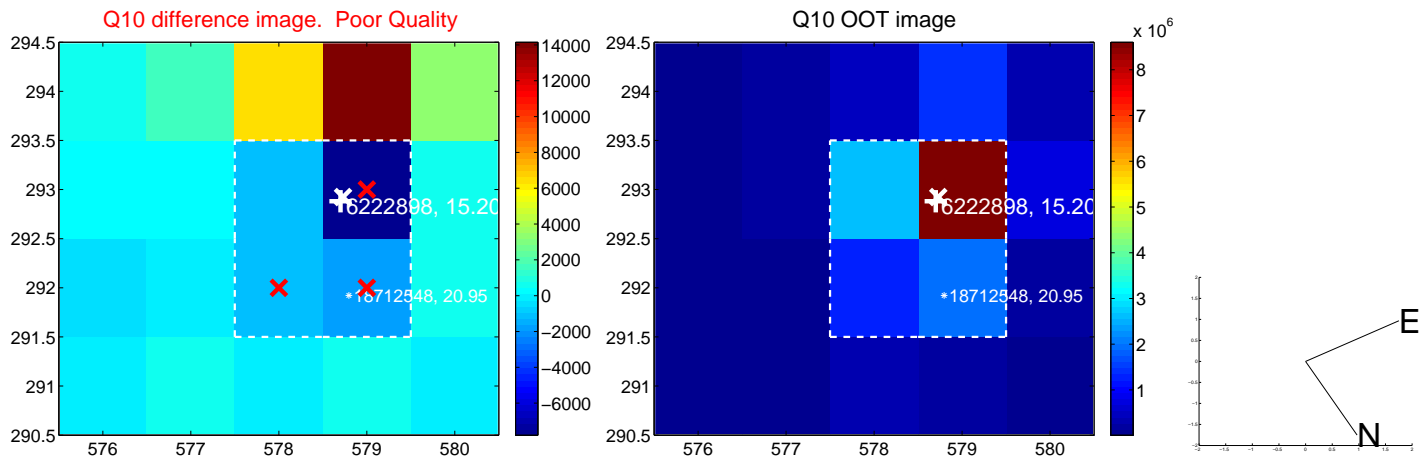
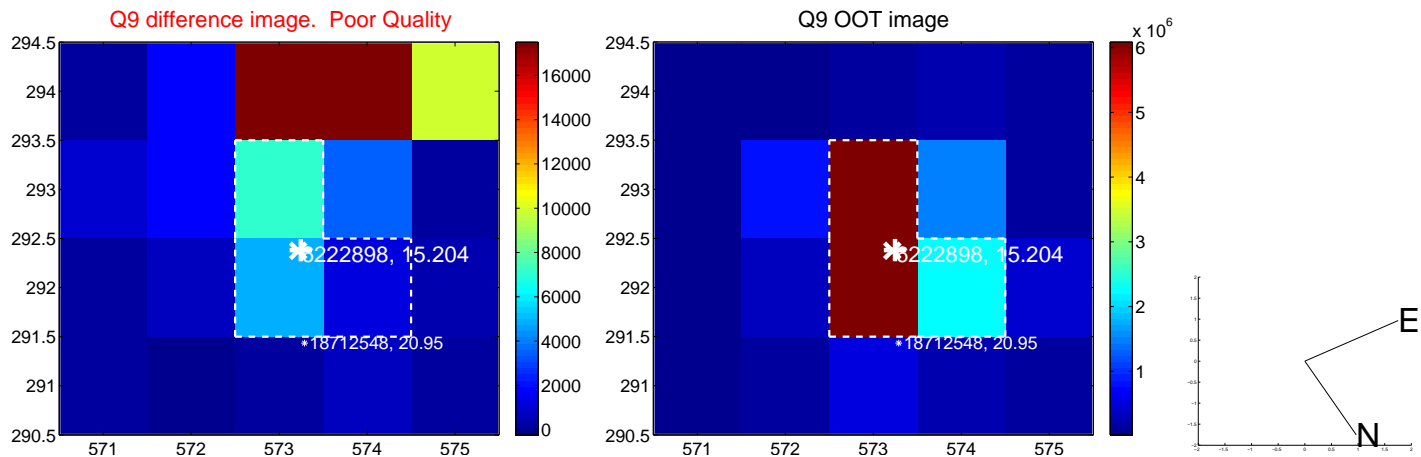
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



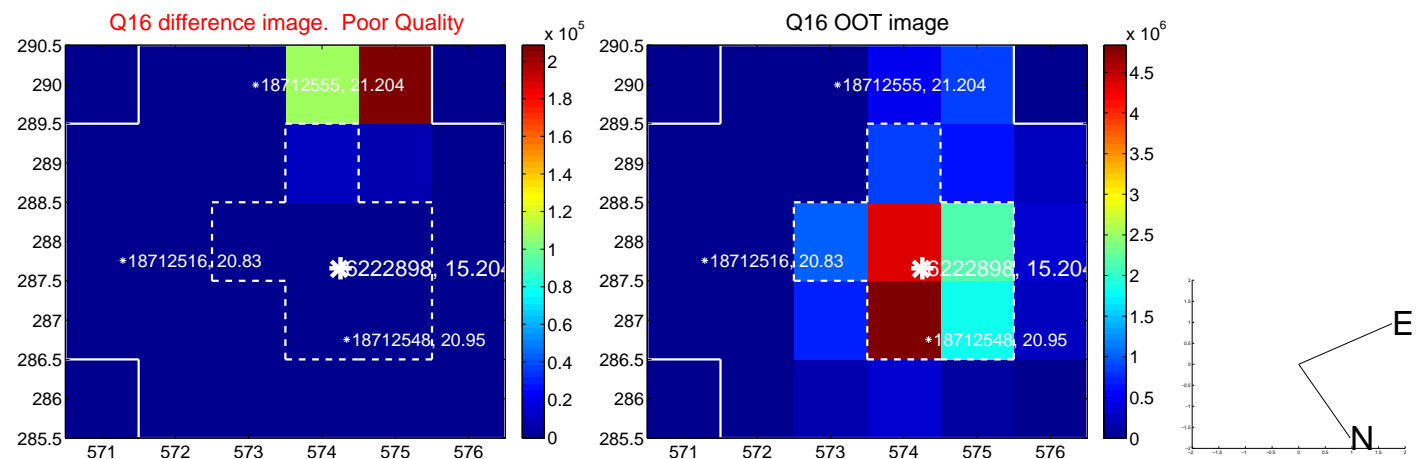
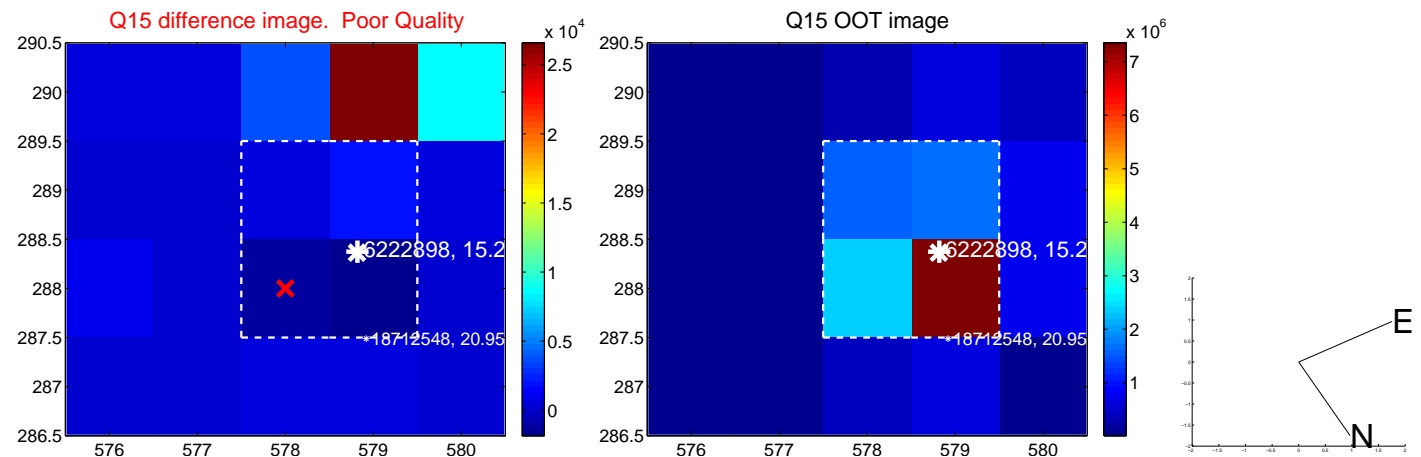
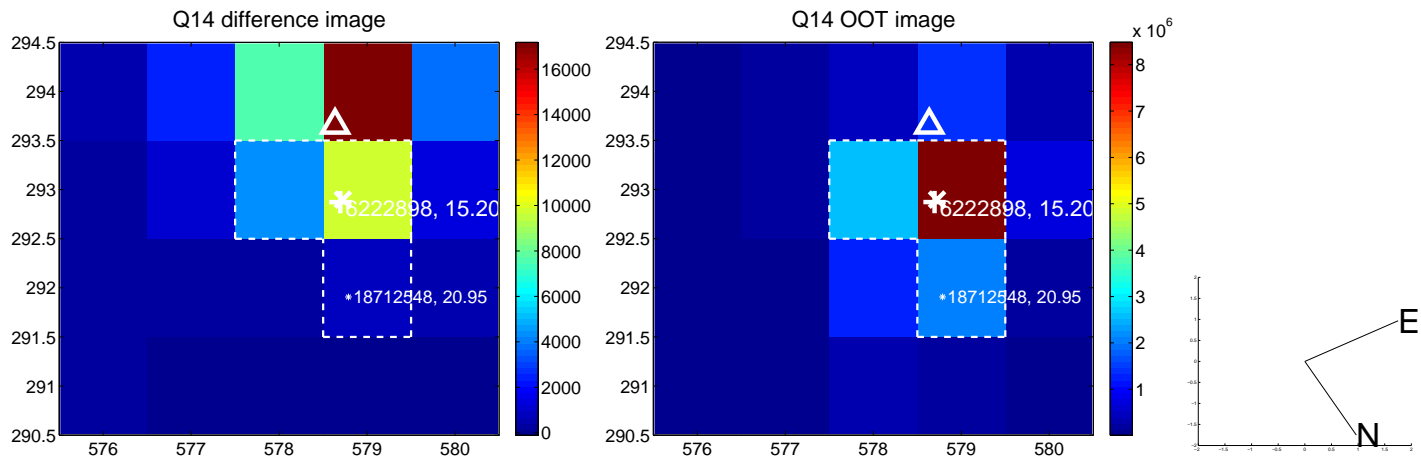
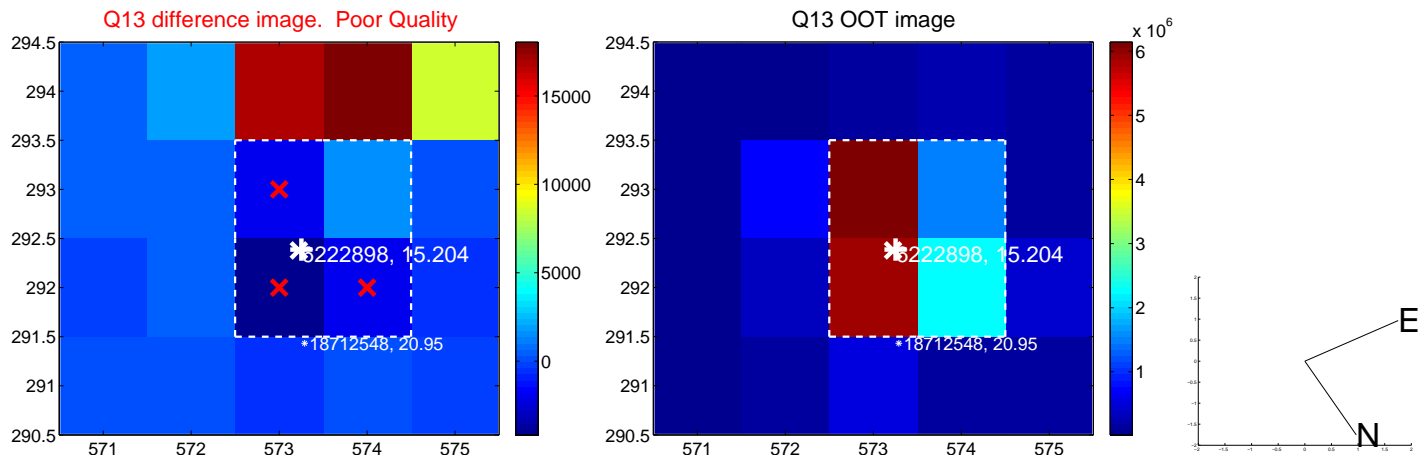
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



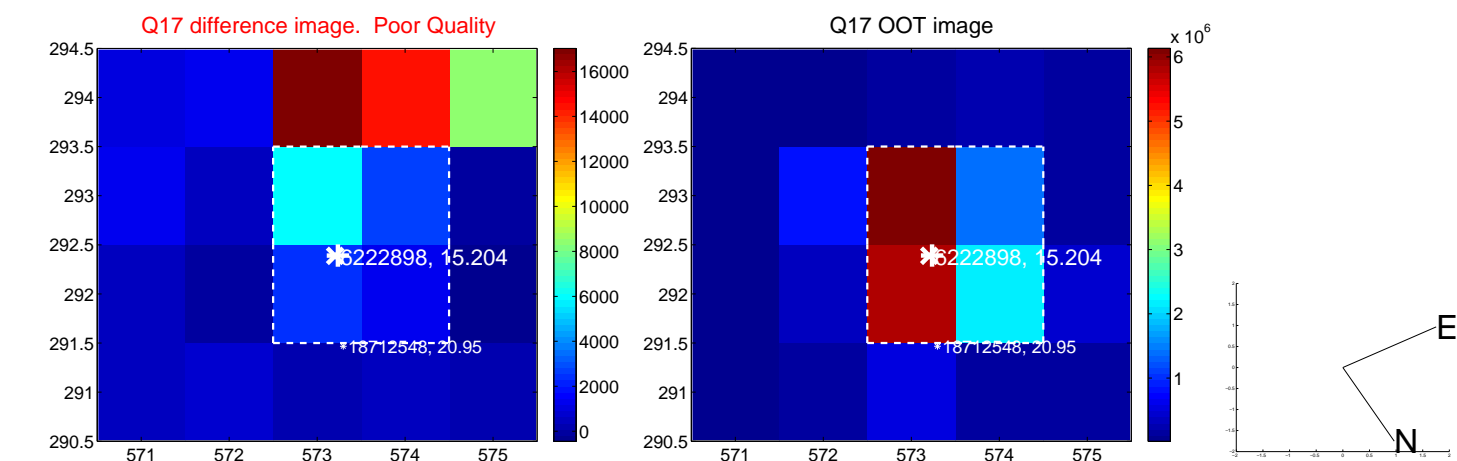
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



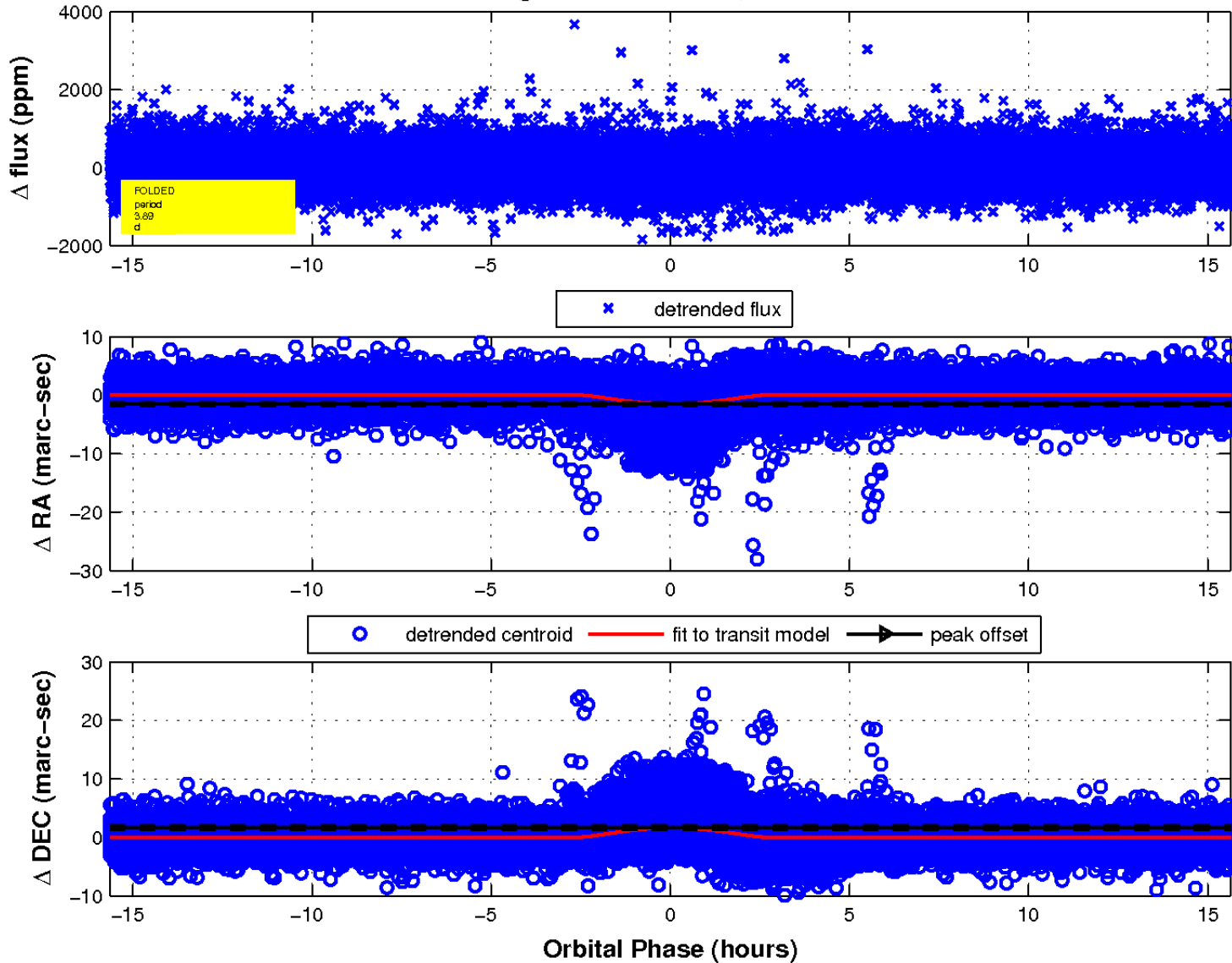
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

