

KIC 009031209

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 009031209-01 | OBS | 3316.01 | 47.057090 | 161.056089 | 1554.4 | 5.524 | 24.1 | 26.3 | 0.74 | 5288 | 3.25 | 6.73 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|--------------|
| 009031209-01 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | CENT_KIC_POS |

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 009031209-01

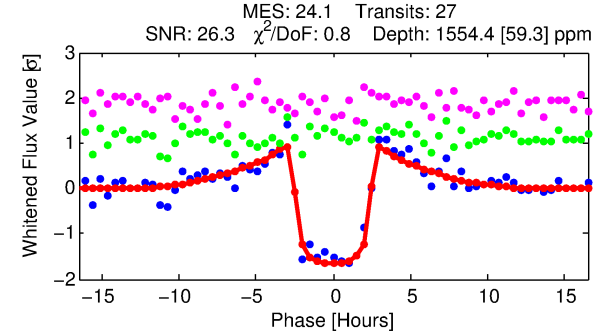
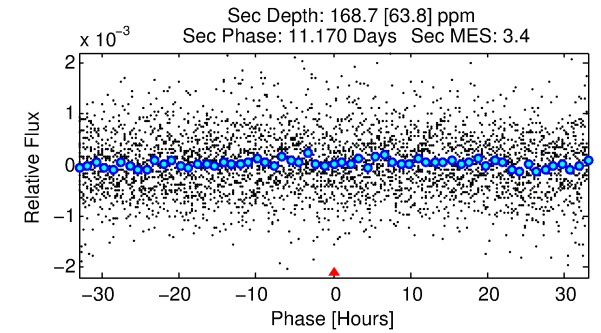
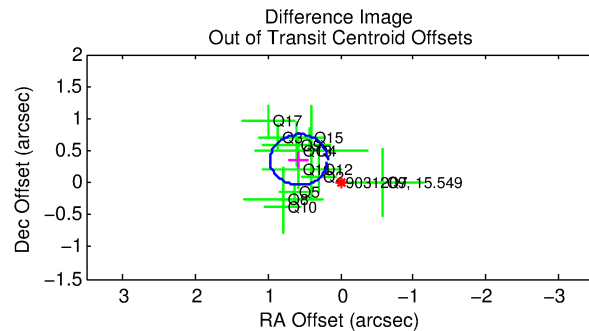
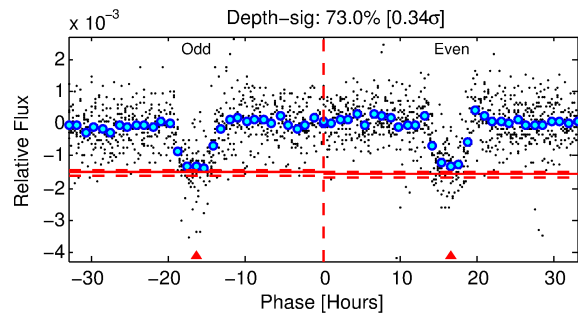
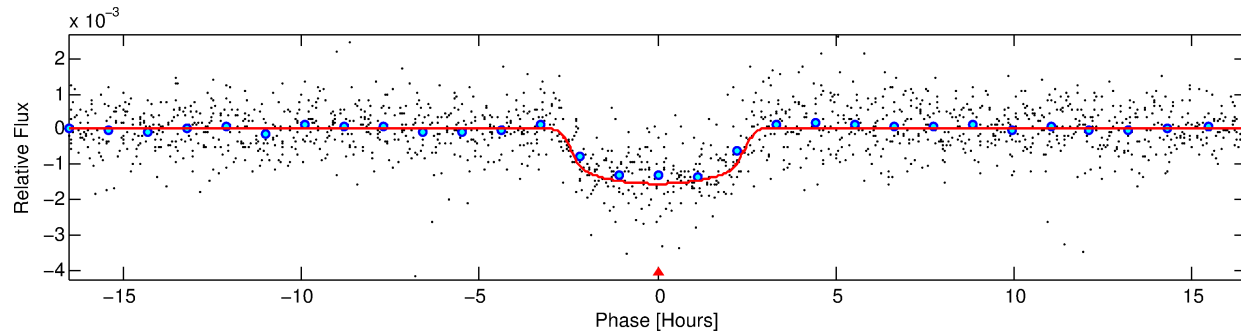
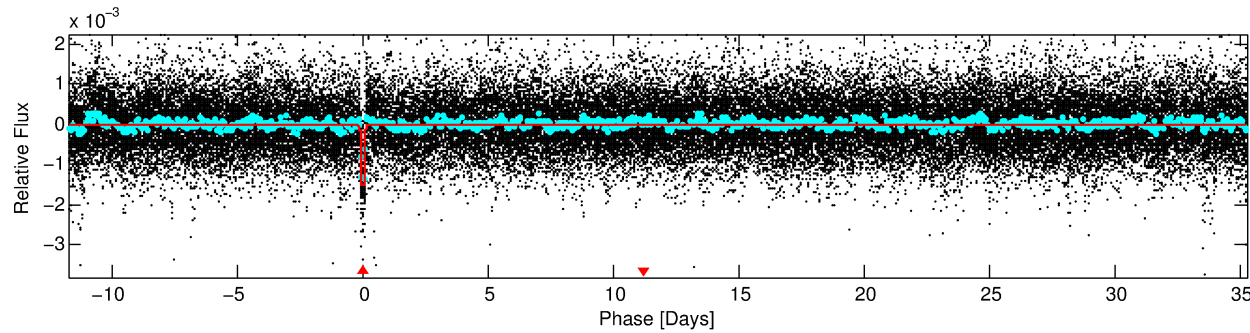
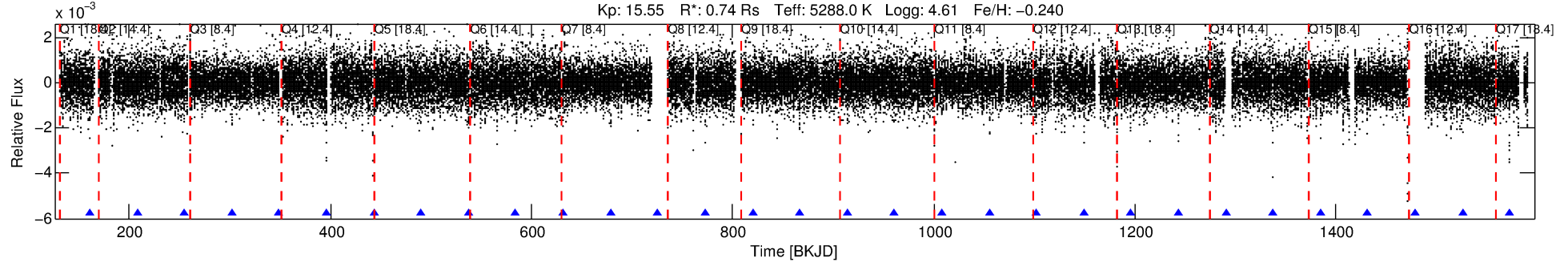
No Significant Match Found

DV One-Page Summary

KIC: 9031209 Candidate: 1 of 1 Period: 47.057 d

KOI: K03316.01 Corr: 0.978

Kp: 15.55 R*: 0.74 Rs Teff: 5288.0 K Logg: 4.61 Fe/H: -0.240



DV Fit Results:

Period = 47.05709 [0.00017] d
Epoch = 161.0561 [0.0031] BKJD
Rp/R* = 0.0403 [0.0032]
a/R* = 43.20 [12.39]
b = 0.80 [0.13]
Seff = 6.73 [1.49]
Teq = 411 [23] K
Rp = 3.25 [0.59] Re
a = 0.2387 [0.0317] AU
Ag = 499.32 [224.36] [2.22σ]
Teff = 3002 [320] K [8.0%σ]

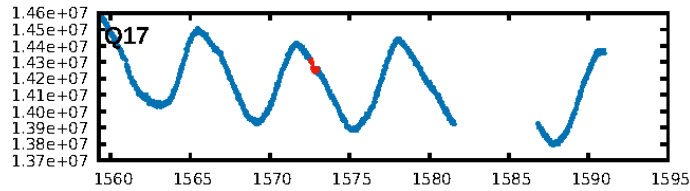
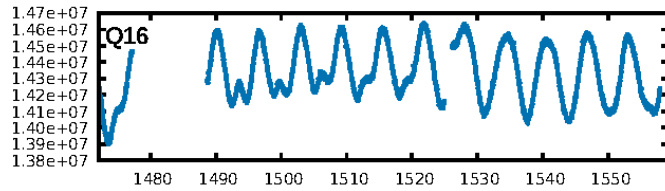
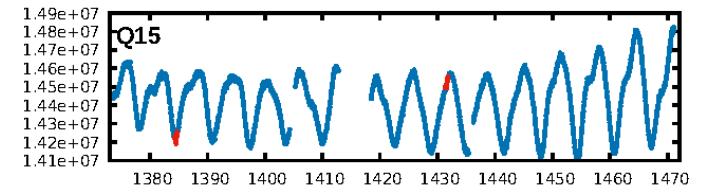
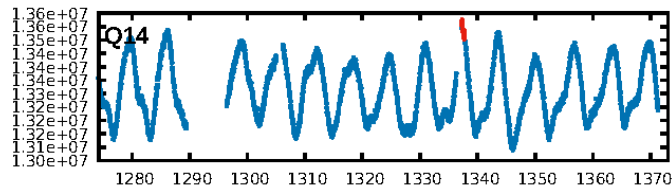
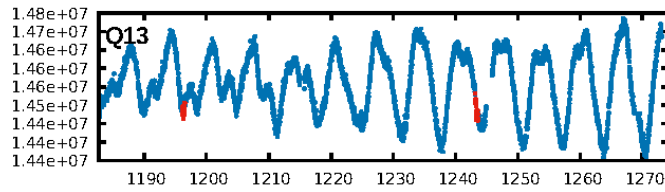
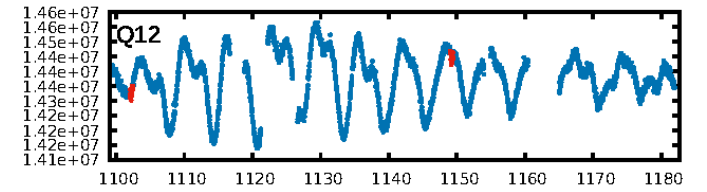
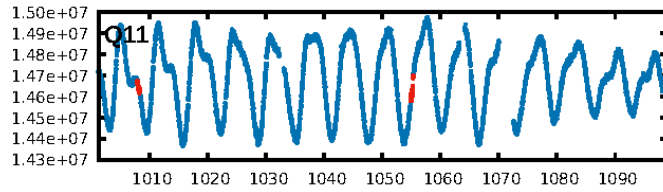
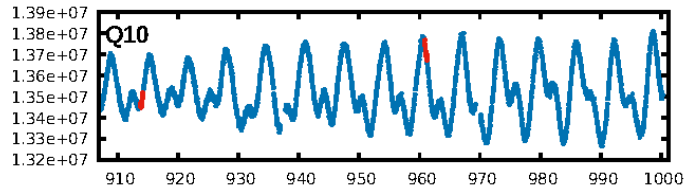
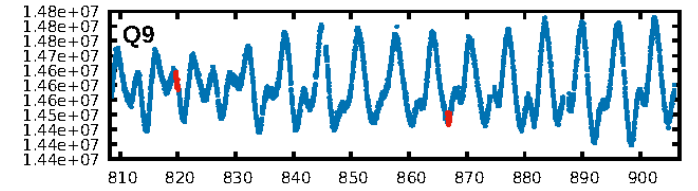
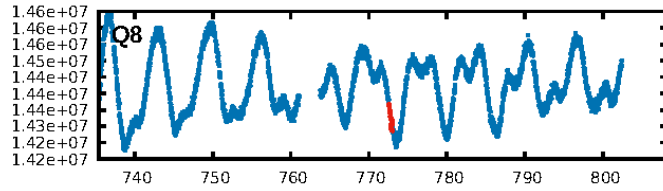
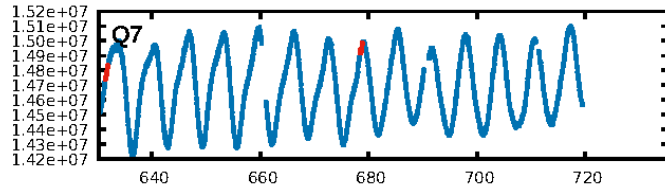
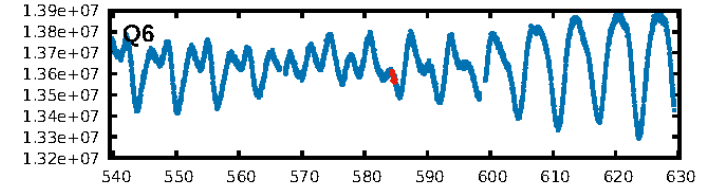
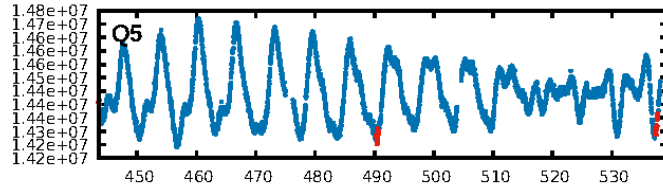
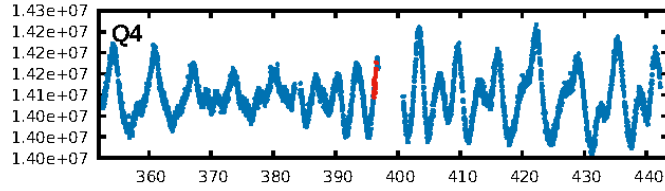
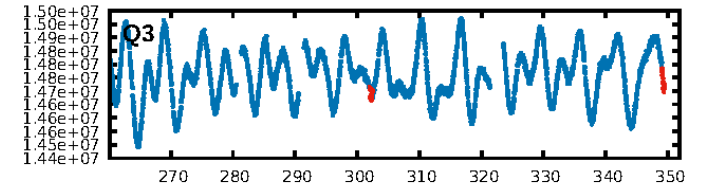
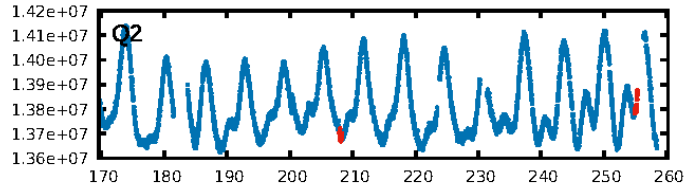
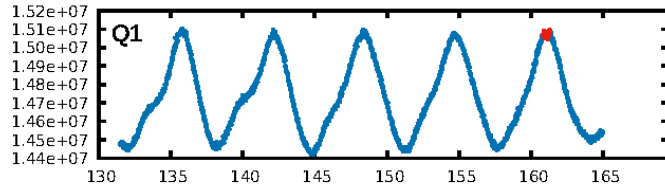
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: N/A
ModelChiSquare2-sig: 92.3%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 1.06e-116
RollingBand-fgt: 1.00 [25/25]
GhostDiagnostic-chr: 2.052
Centroid-sig: 0.0%
Centroid-so: 0.536 arcsec [1.80σ]
OotOffset-rm: 0.675 arcsec [5.13σ]
KicOffset-rm: 0.205 arcsec [1.59σ]
OotOffset-st: 2/4/3/4 [13]
KicOffset-st: 2/4/3/4 [13]
DiffImageQuality-fgm: 1.00 [13/13]
DiffImageOverlap-fno: 1.00 [15/15]

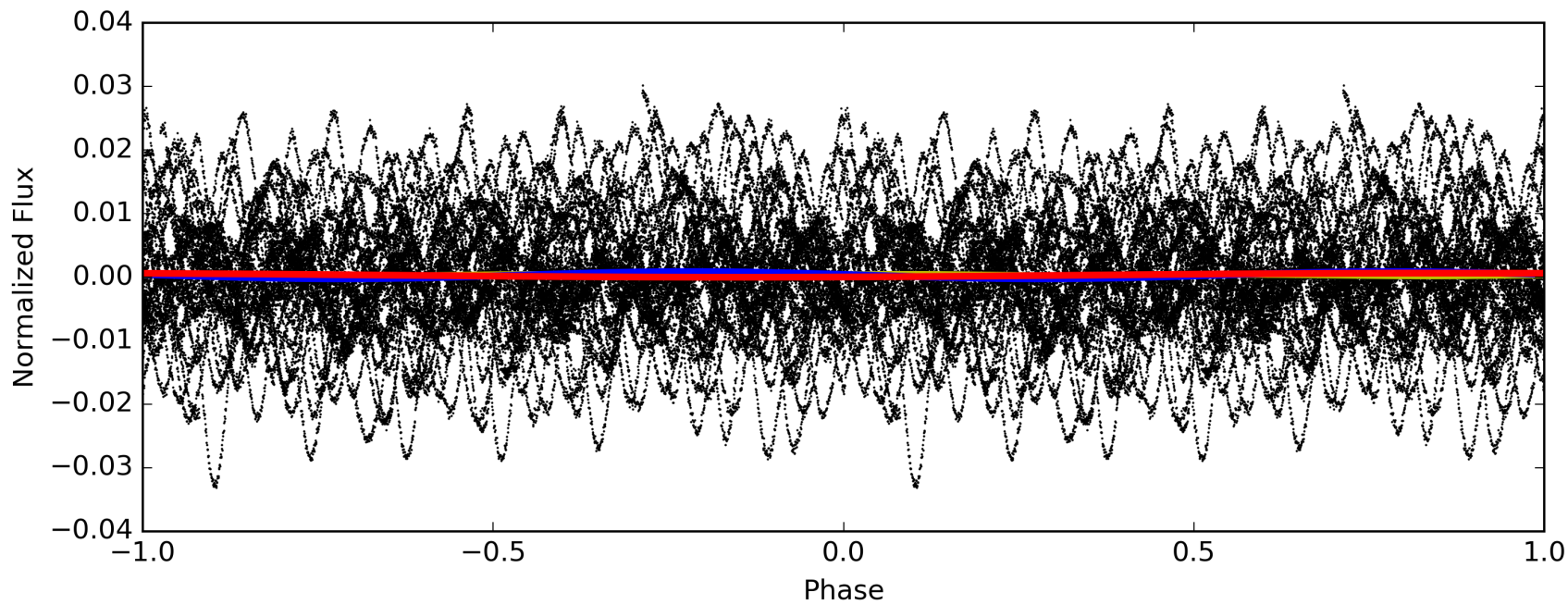
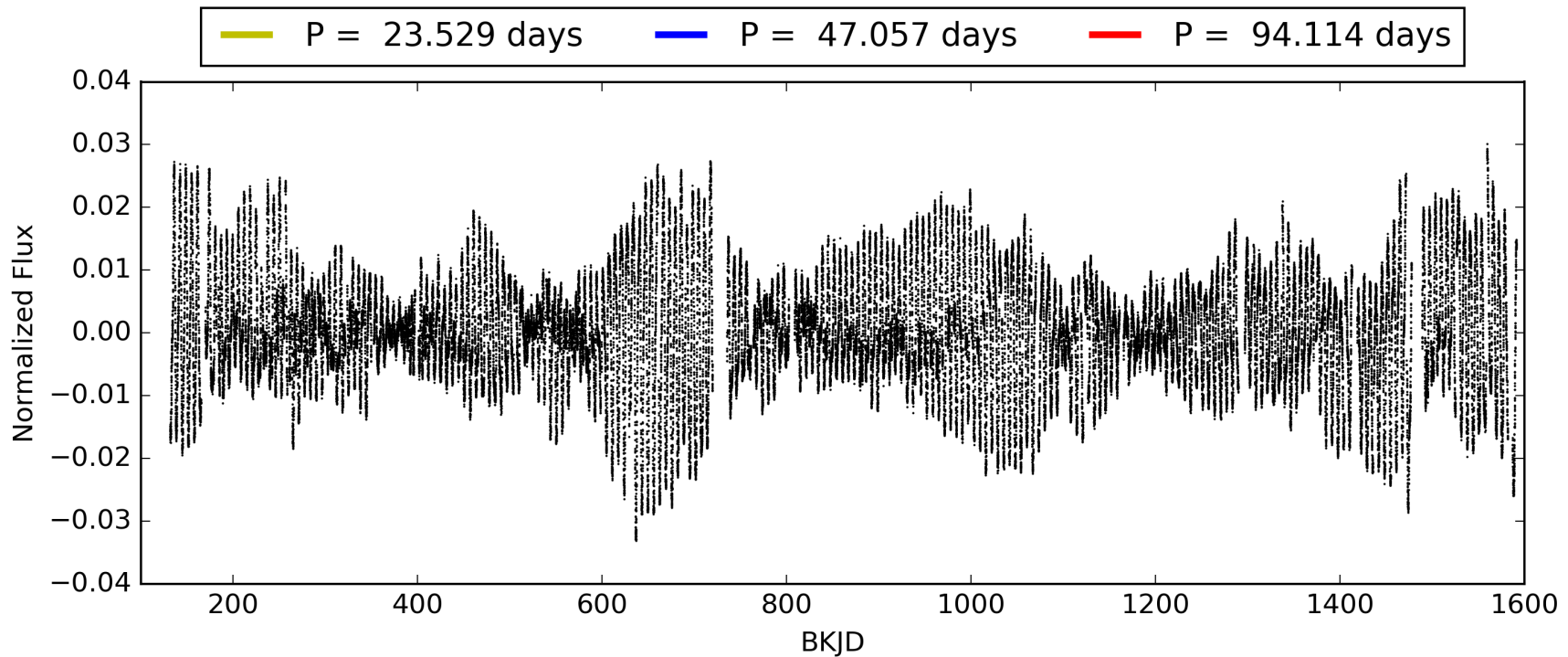
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 01:11:55 Z

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

TCE 009031209-01, PDC Light Curves

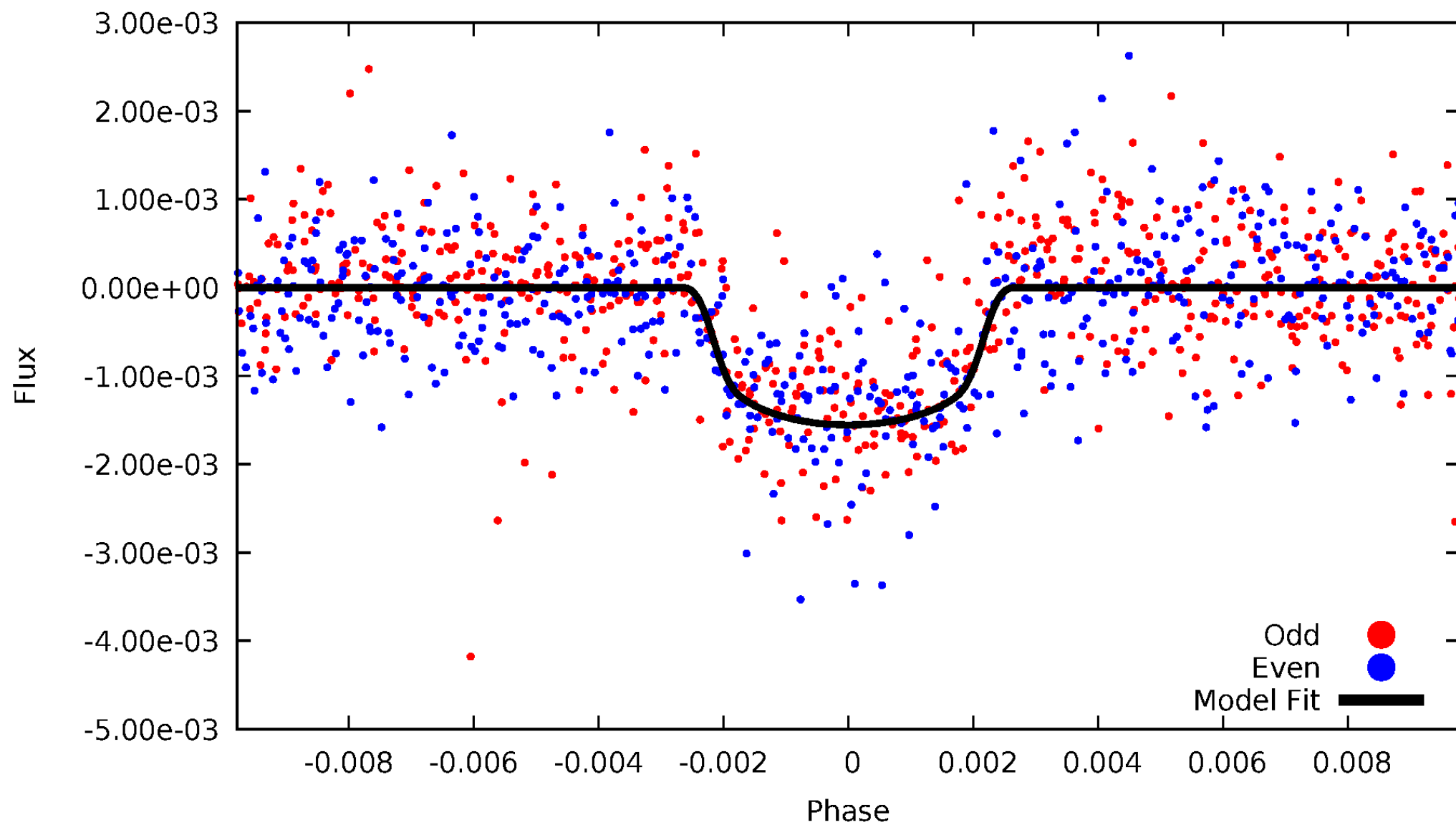


TCE 009031209-01



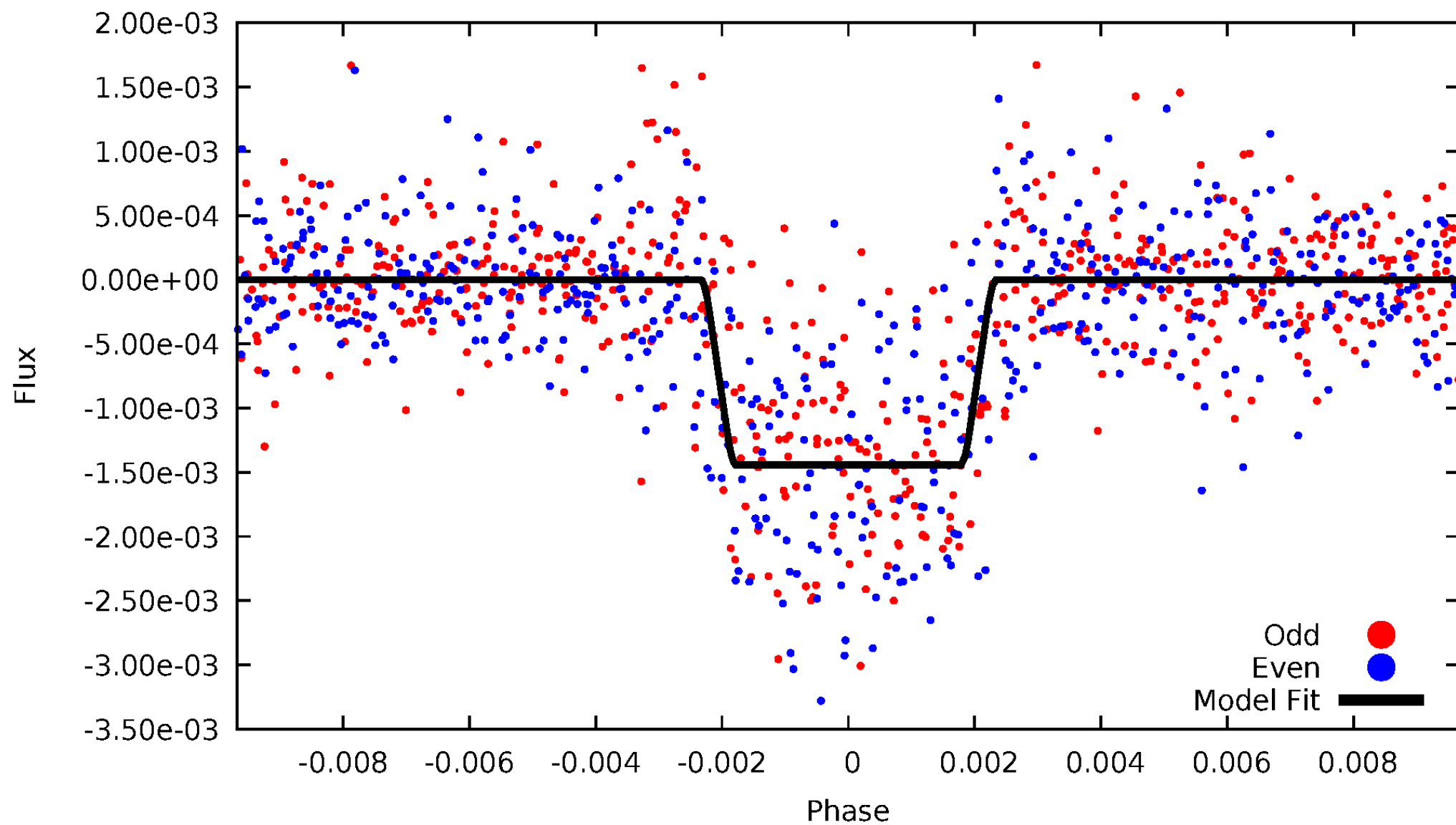
DV Odd/Even

TCE 009031209-01



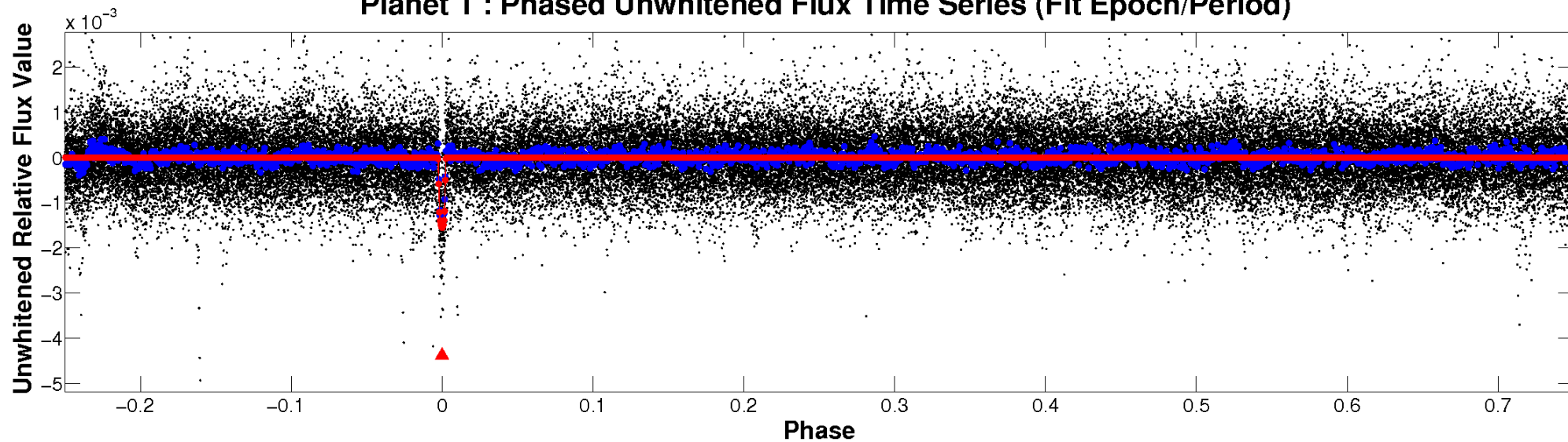
ALT Odd/Even

TCE 009031209-01

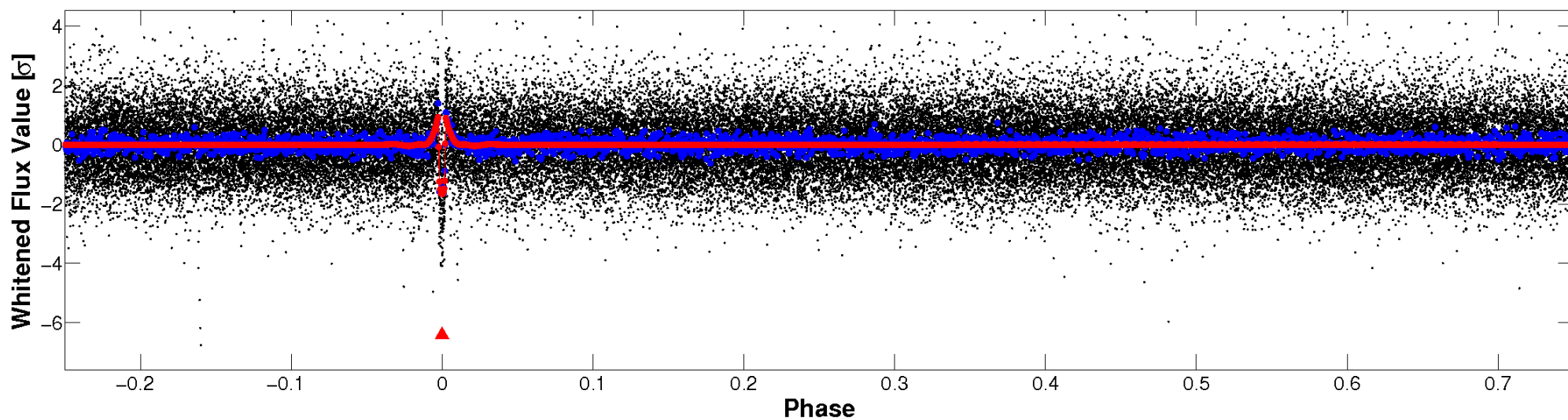


Non-Whitened Vs. Whitened Light Curve

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

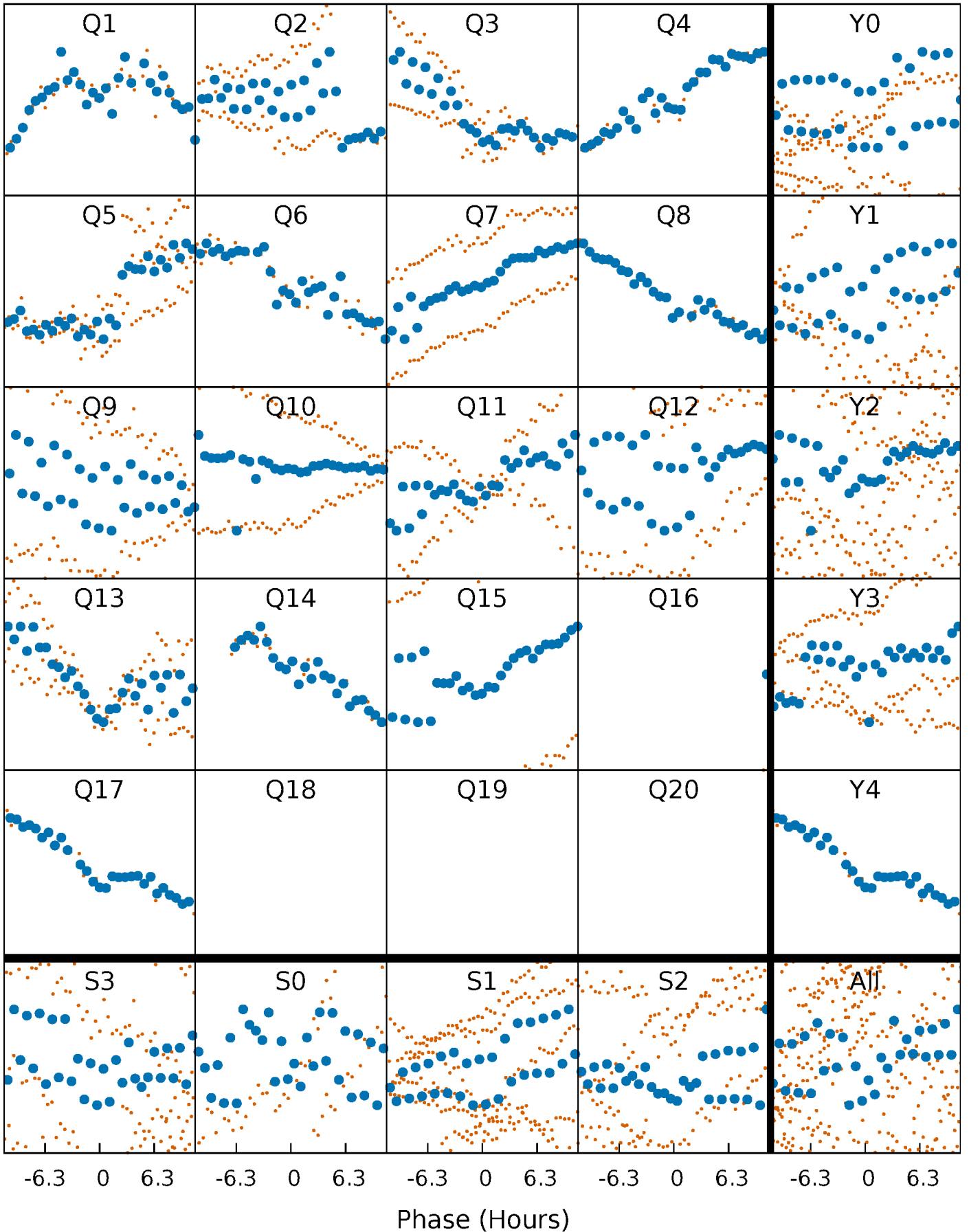


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



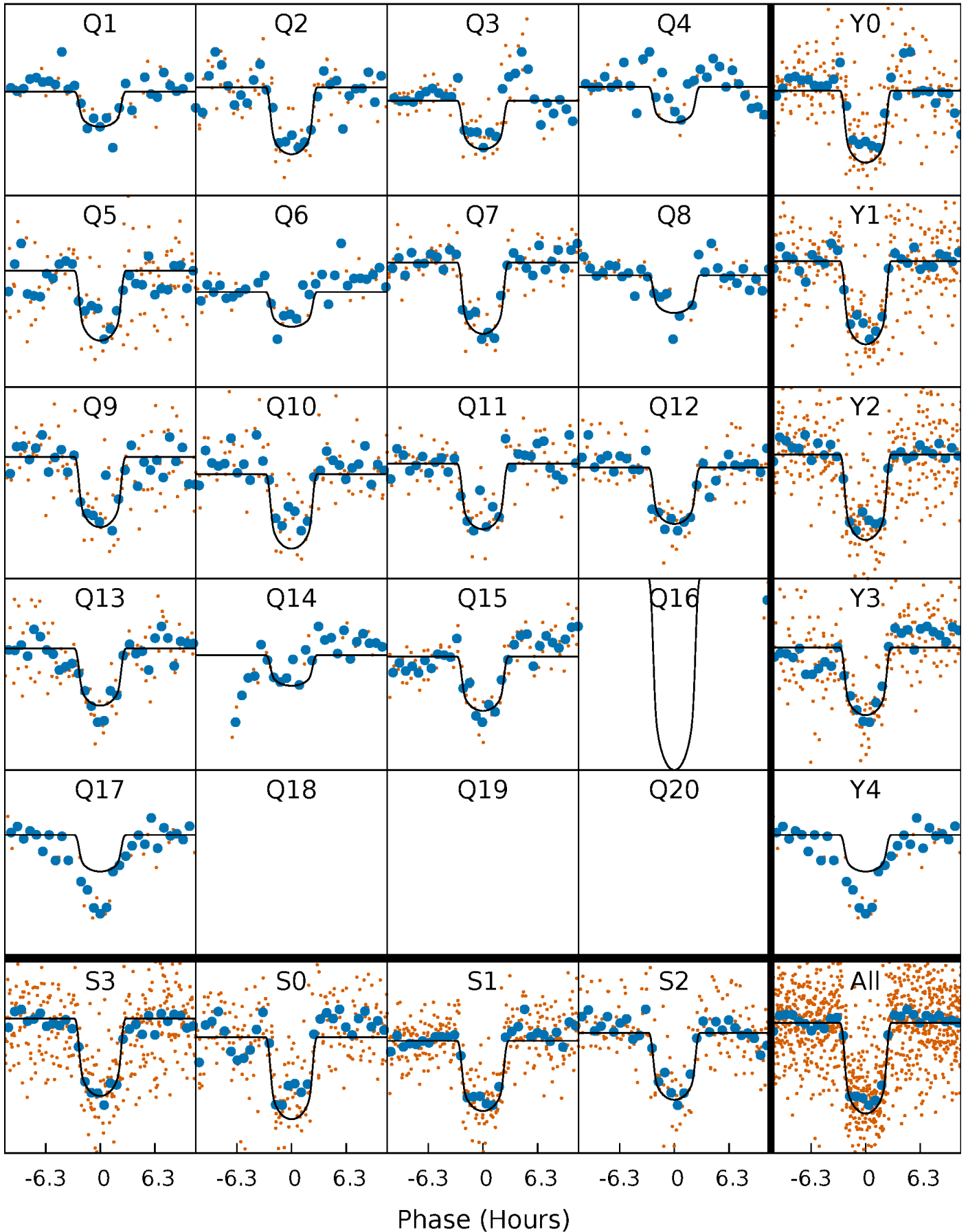
PDC Quarter-Phased Transit Curves

TCE 009031209-01 P= 47.057090 Days $T_0=161.056089$ (BKJD)



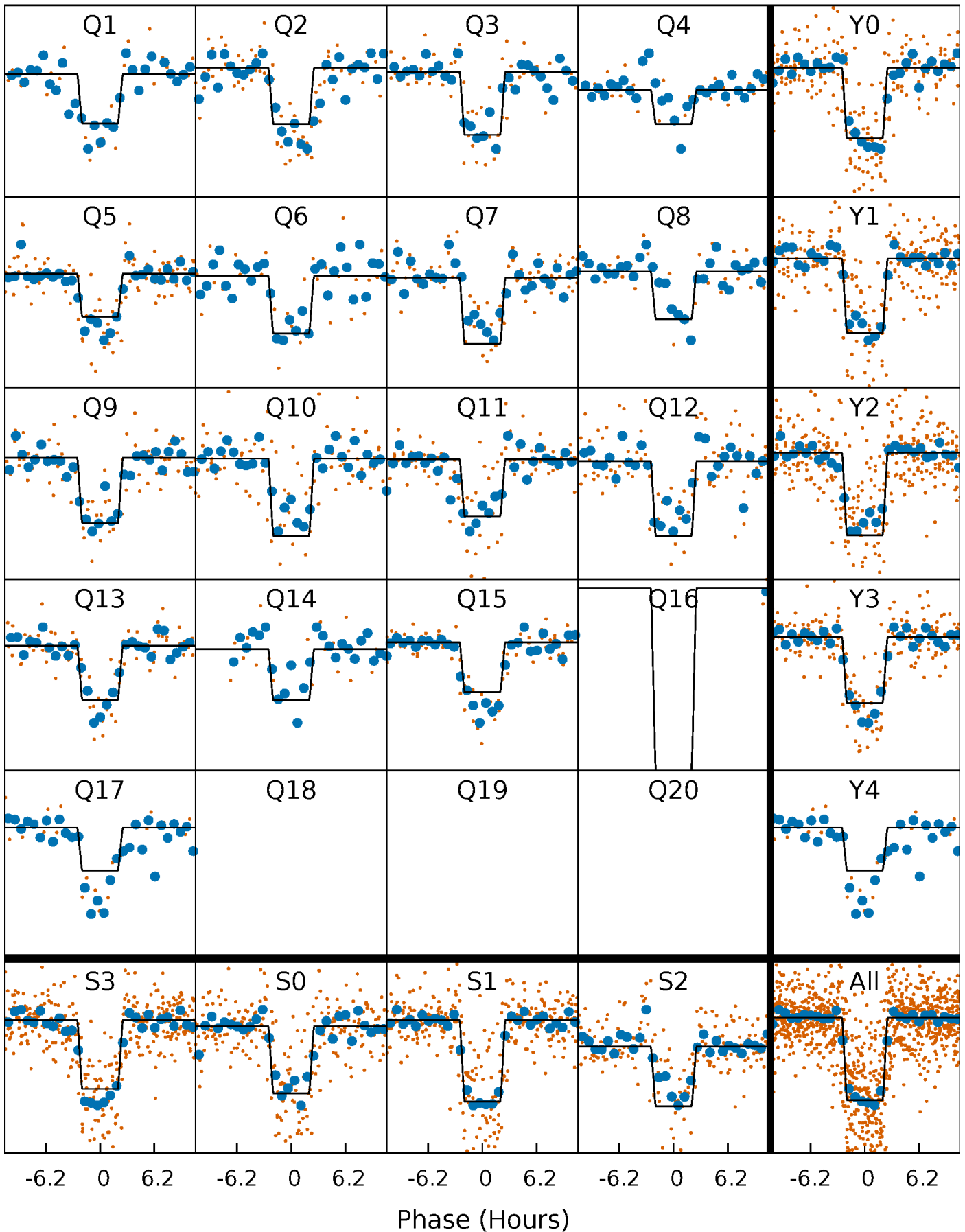
DV Quarter-Phased Transit Curves

TCE 009031209-01 P= 47.057090 Days $T_0=161.056089$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

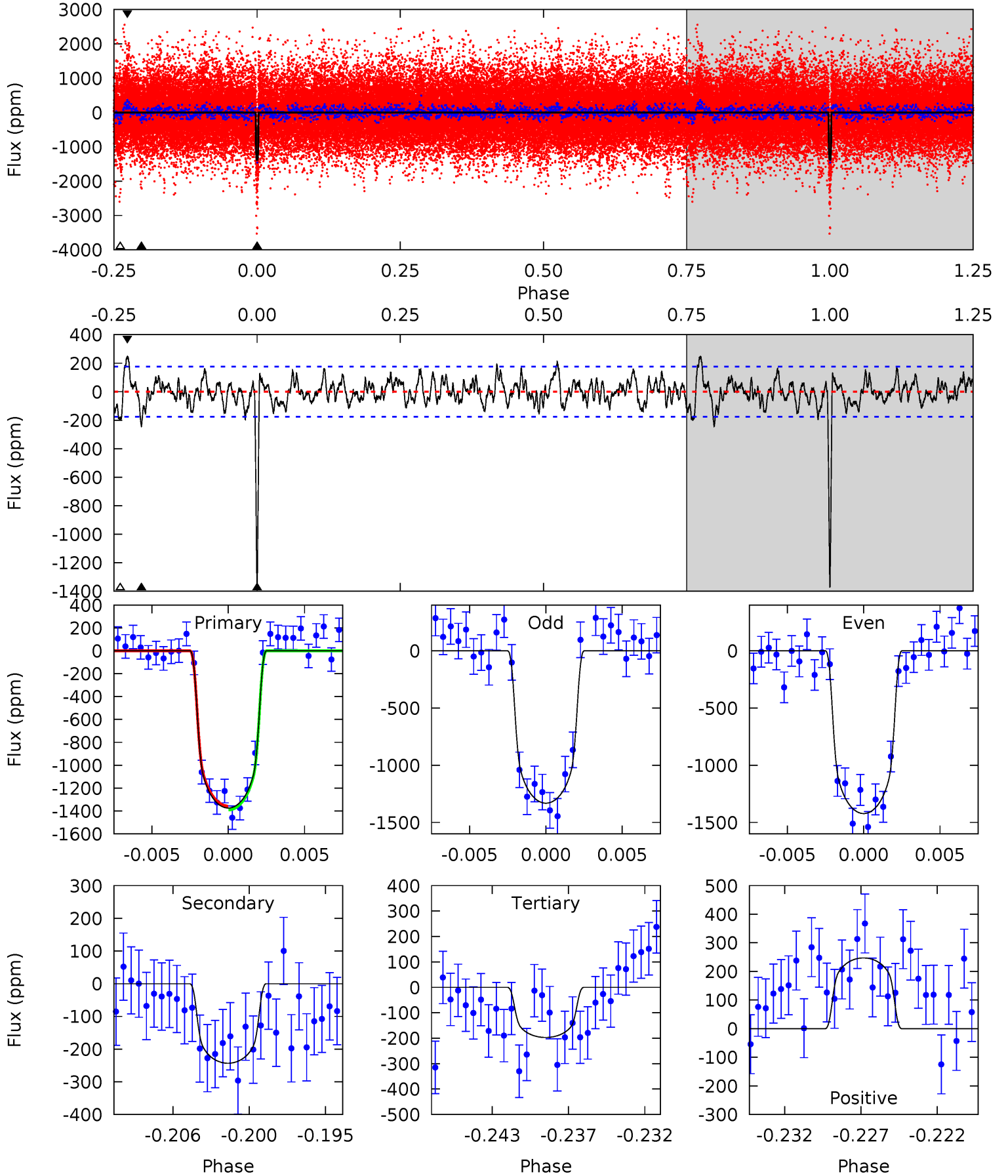
TCE 009031209-01 P= 47.057611 Days $T_0=161.047611$ (BKJD)



DV Model-Shift Uniqueness Test

009031209-01, $P = 47.057090$ Days, $E = 113.998999$ Days

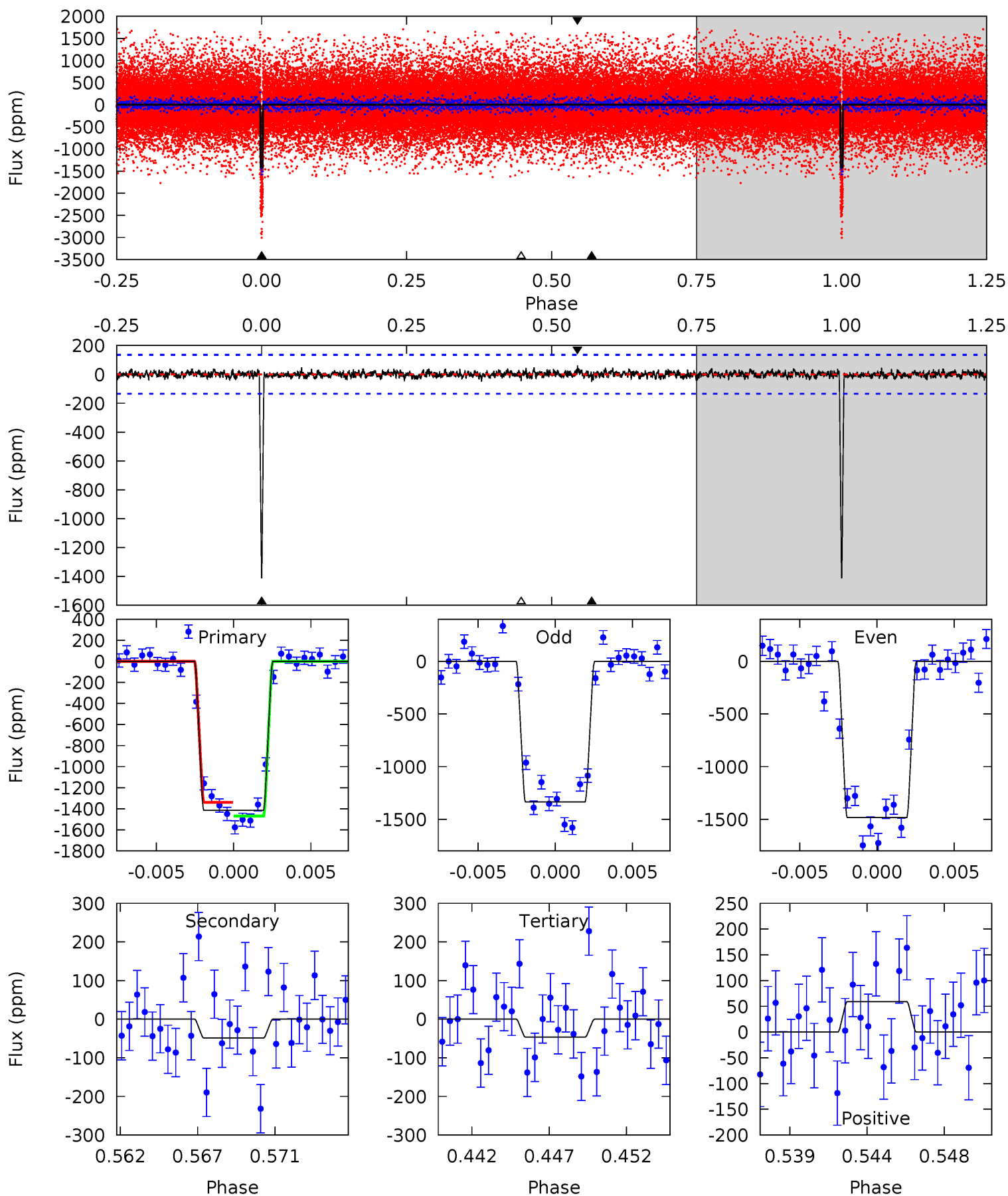
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 40.3 | 7.14 | 5.78 | 7.25 | 5.15 | 2.79 | 2.10 | 34.5 | 33.1 | 1.35 | -0.12 | 1.33 | 1.00 | 0.15 | 0.50 |



Alt Model-Shift Uniqueness Test

009031209-01, P = 47.057611 Days, E = 113.990000 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 54.2 | 1.87 | 1.78 | 2.26 | 5.17 | 2.83 | 0.54 | 52.4 | 52.0 | 0.09 | -0.39 | 2.83 | 1.04 | 0.04 | 2.48 |



Stellar Parameters For KIC 009031209

| | $T_{\text{eff}} (K)$ | $\log(g)$ | $[\text{Fe}/\text{H}]$ | $R (R_{\odot})$ | $M (M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 5288^{+159}_{-159} | $4.613^{+0.032}_{-0.097}$ | $-0.240^{+0.300}_{-0.300}$ | $0.740^{+0.122}_{-0.057}$ | $0.828^{+0.071}_{-0.094}$ | $2.883^{+0.492}_{-0.885}$ |
| | +3%/-3% | +1%/-2% | +125%/-125% | +16%/-8% | +9%/-11% | +17%/-31% |
| 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 009031209-01 / KOI 3316.01

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{\text{max}} (K)$ | $T_{\text{obs}} (K)$ | A_{obs} |
|---------|---------------|------------------------|----------------------|----------------------|---------------------|
| DV | -243 ± 34 | $3.33^{+0.34}_{-0.32}$ | 583^{+26}_{-23} | 3692^{+157}_{-159} | 676^{+176}_{-138} |
| Alt. | -49 ± 26 | $3.12^{+0.36}_{-0.32}$ | 581^{+25}_{-22} | 2939^{+206}_{-305} | 153^{+92}_{-84} |

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

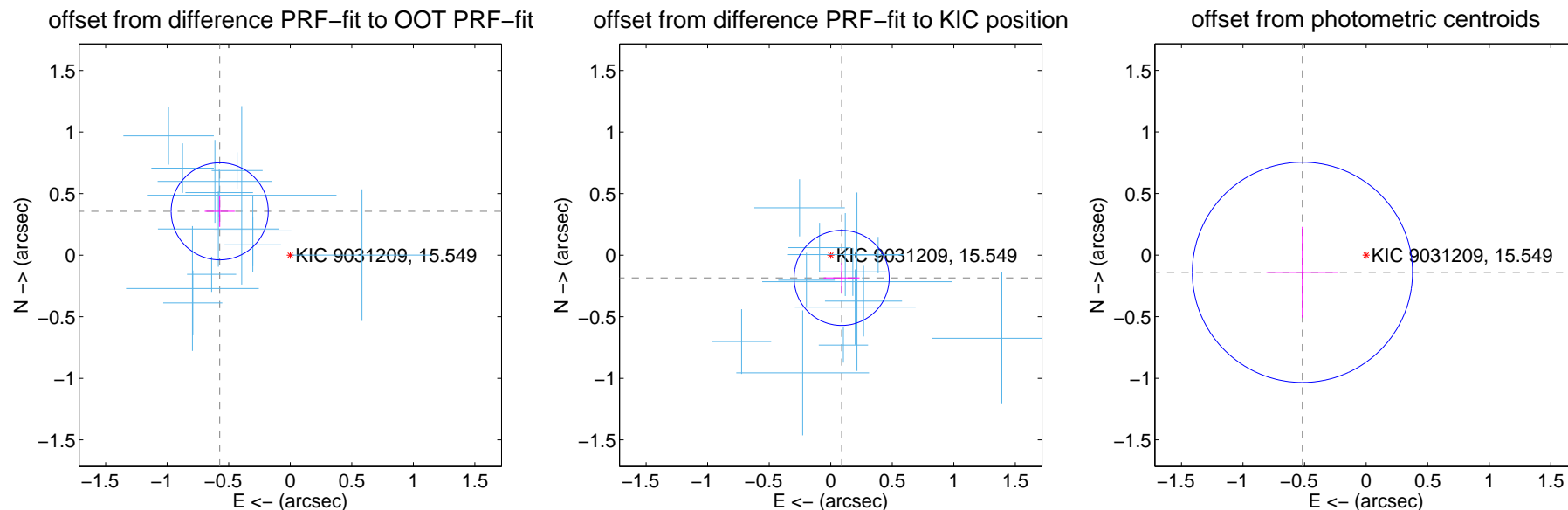
DV Centroid Data

Supplemental centroid analysis for 009031209-01. Kepler magnitude: 15.55. Transit SNR 26.28

There are 13 quarters with good PRF difference image offsets

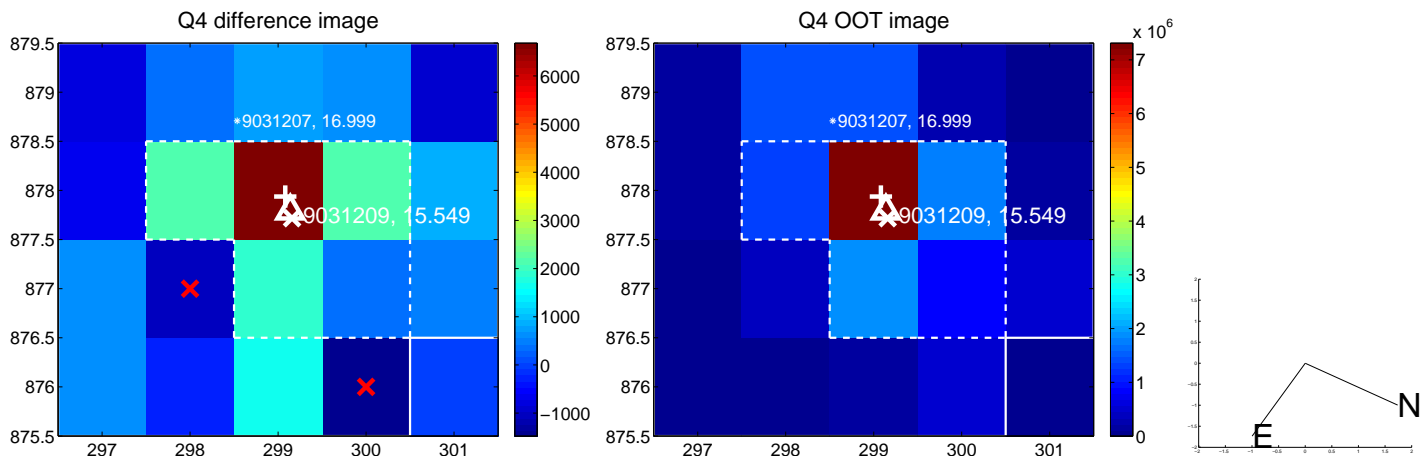
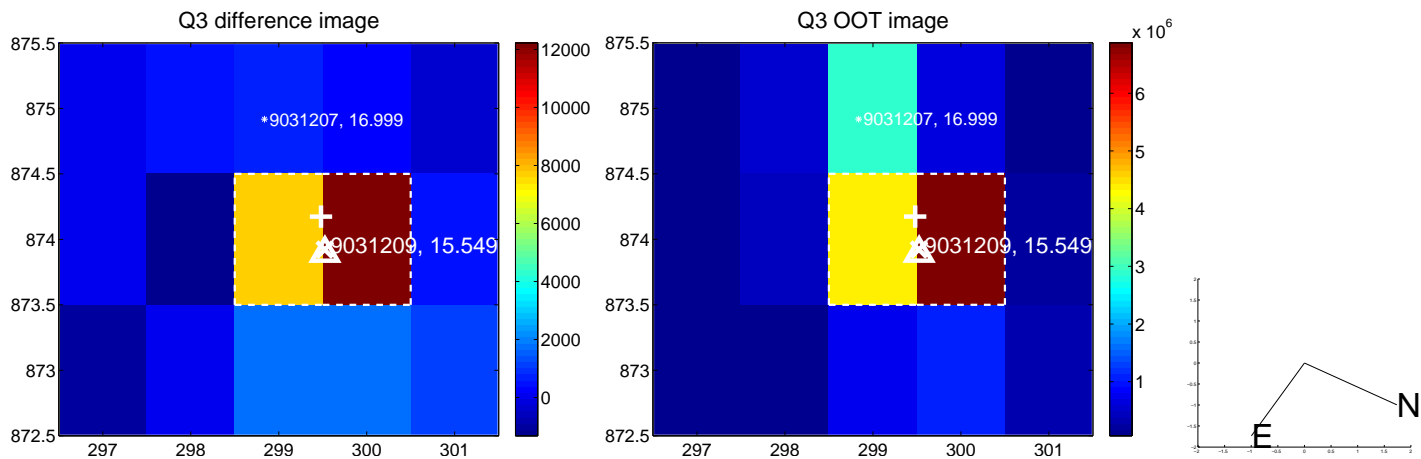
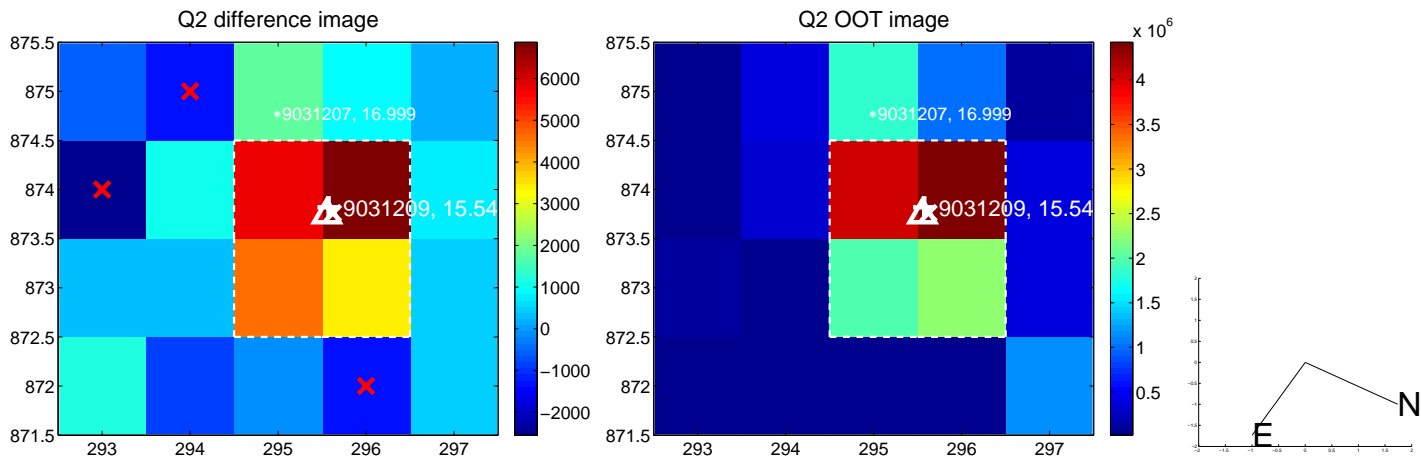
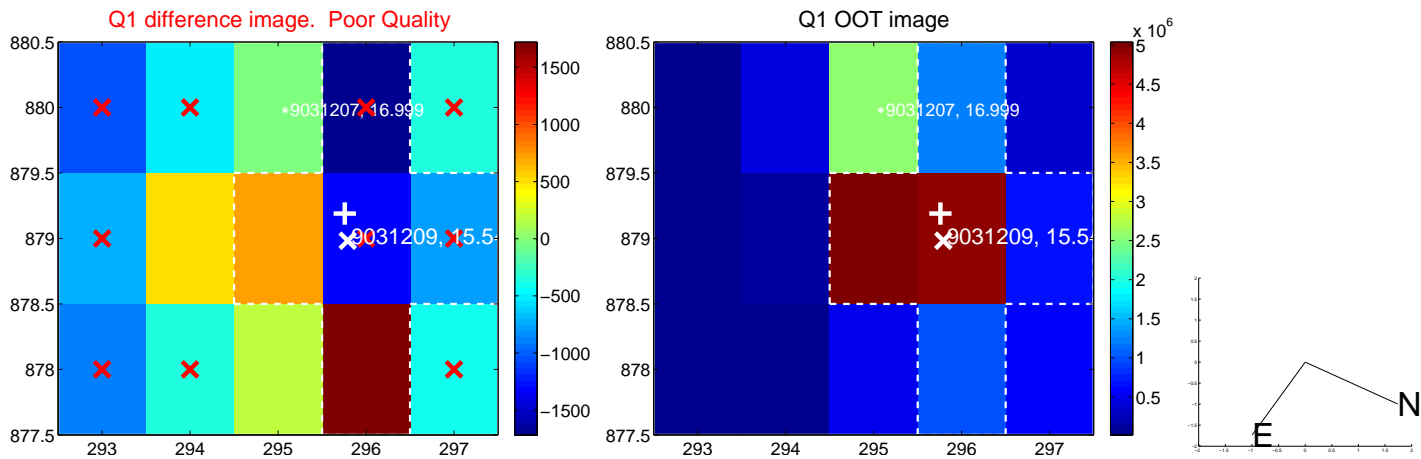
The direct PRF centroid is offset from the target star catalog position by about 0.94 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|-------------------------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT | 0.675 ± 0.131 | 5.13 | 0.573 ± 0.122 | 0.356 ± 0.127 |
| PRF-fit source offset from KIC position | 0.205 ± 0.129 | 1.59 | -0.089 ± 0.146 | -0.185 ± 0.122 |
| photometric centroid source offset | 0.54 ± 0.30 | 1.80 | 0.52 ± 0.29 | -0.14 ± 0.37 |

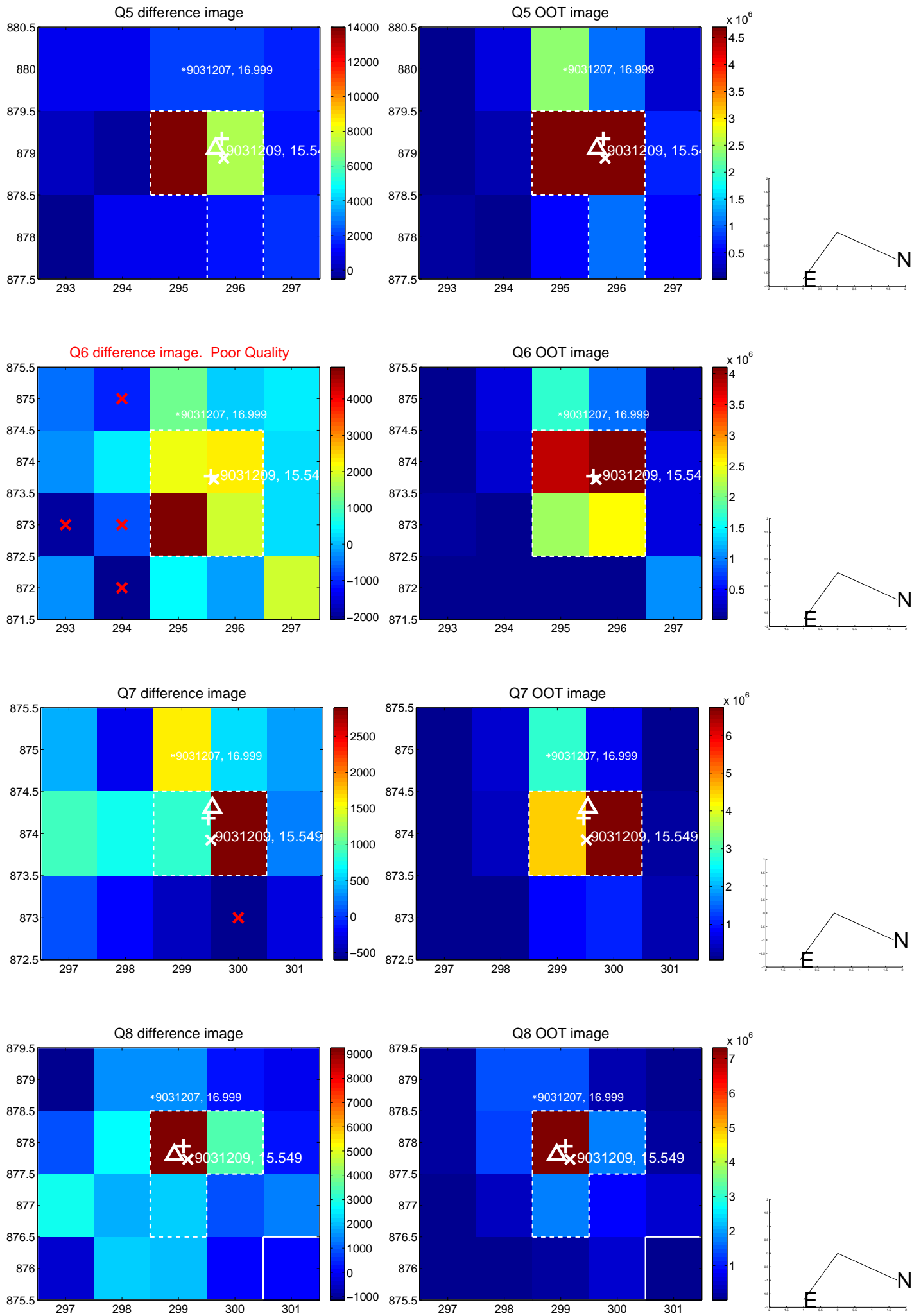


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

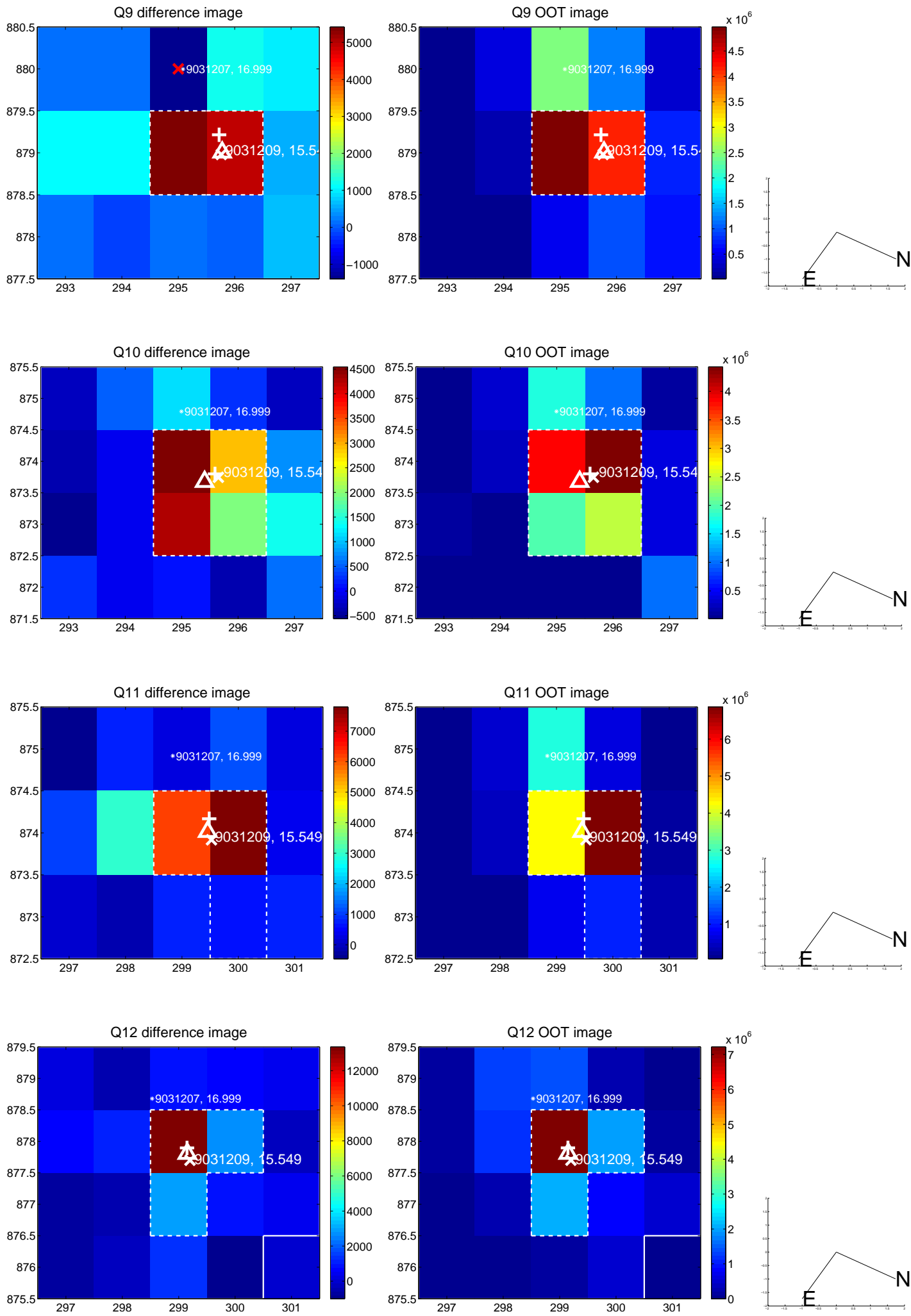
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



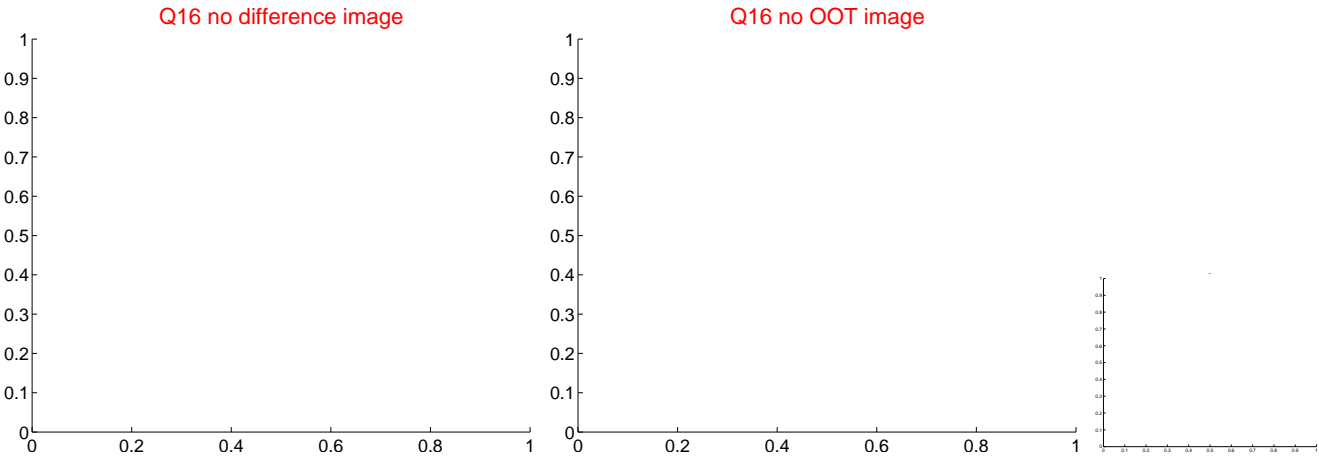
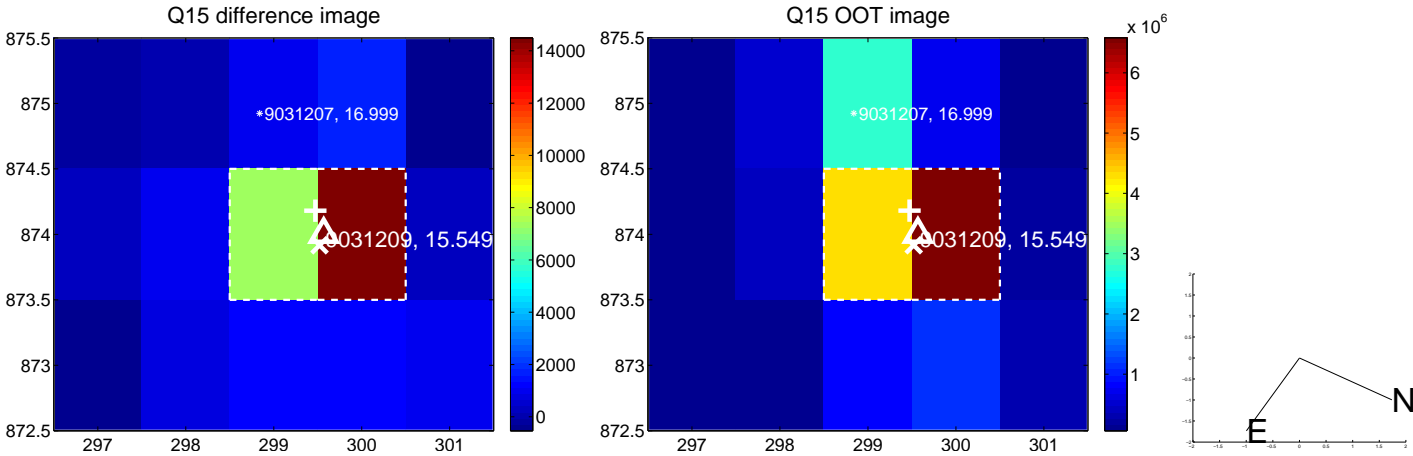
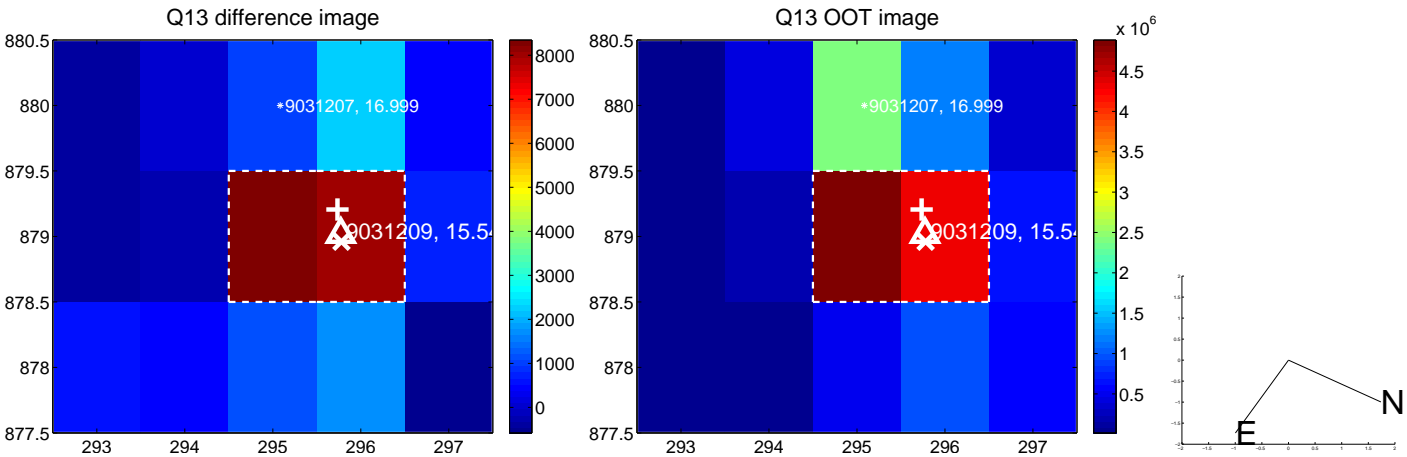
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



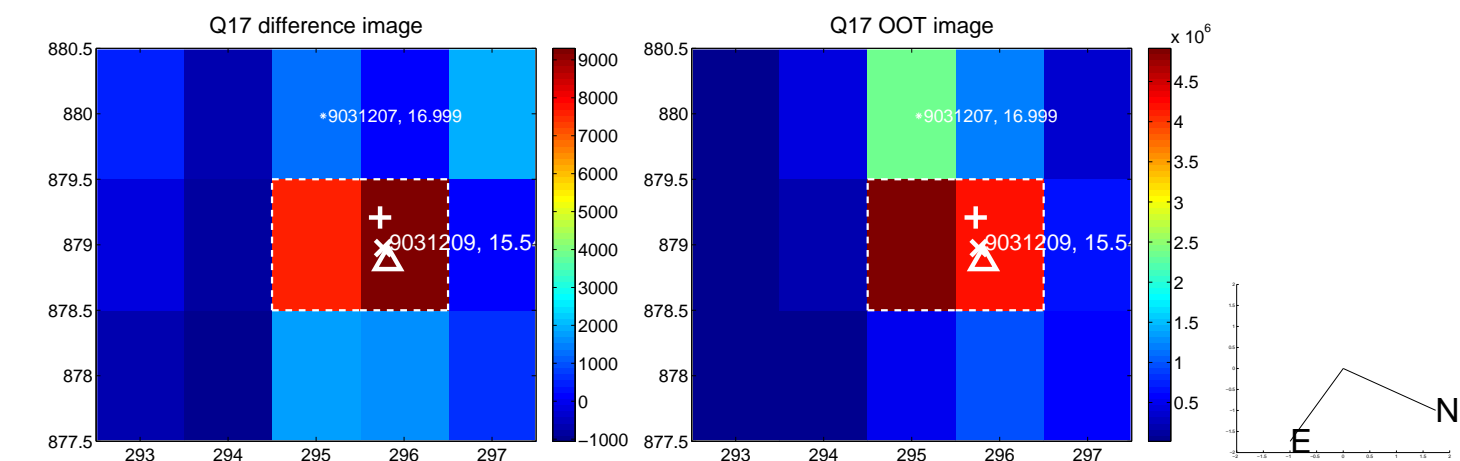
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



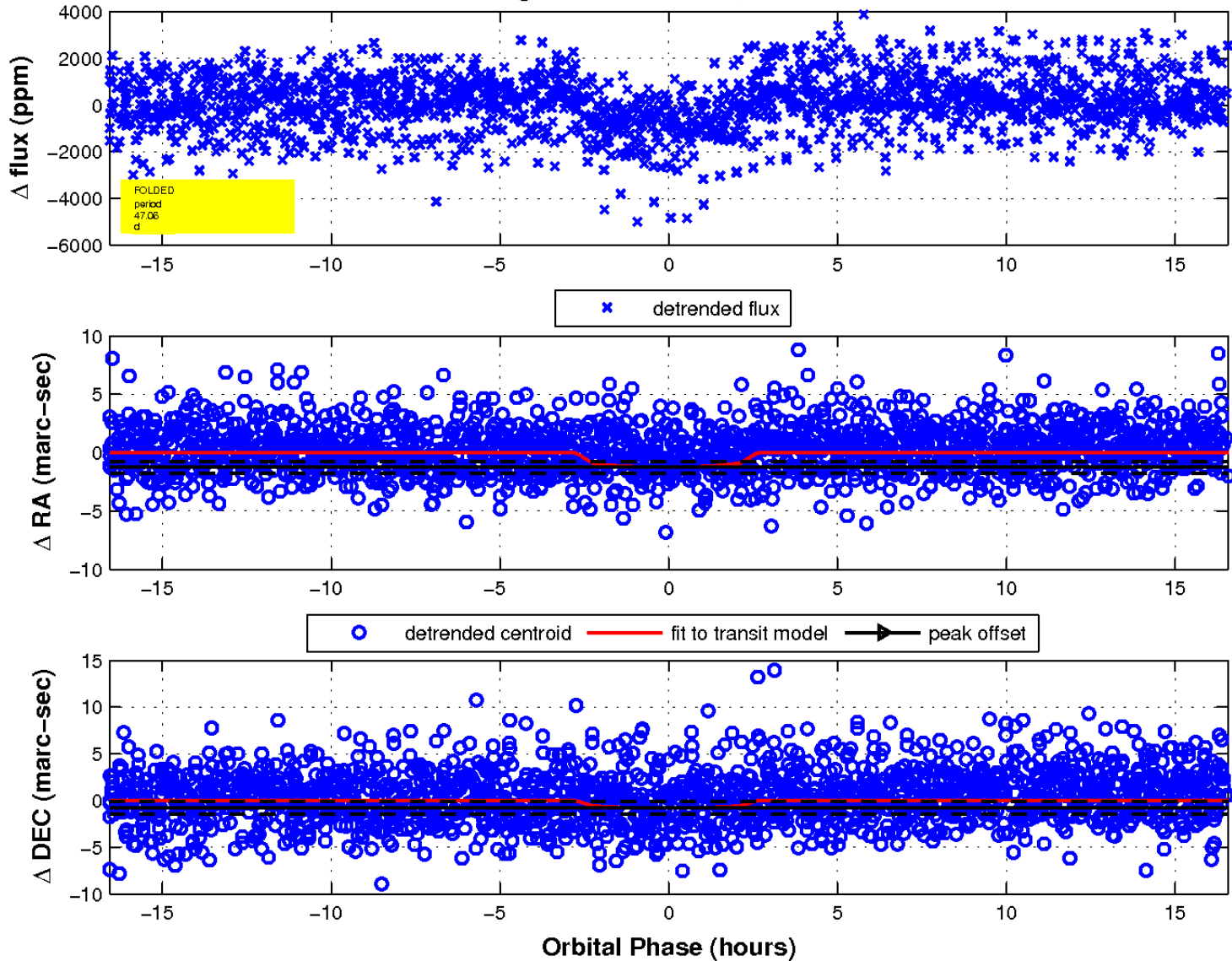
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



fluxWeightedCentroids, Planet 1 of 1



UKIRT Image

Declination

