

# KIC 008578780

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 008578780-01 | OBS      | 2023.01 | 13.590544     | 133.070445   | 603.6       | 4.088            | 22.1 | 23.2 | 0.97                        | 5442            | 2.91                   | 64.96                  |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments   |
|--------------|----------|------|-------|---|---|---|---|------------|
| 008578780-01 | 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](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008578780-01

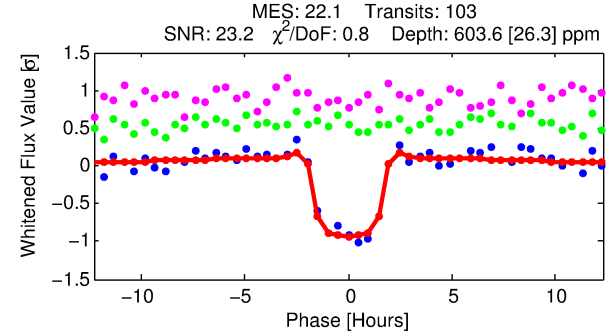
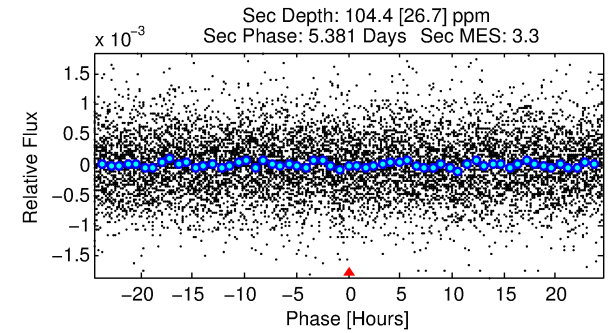
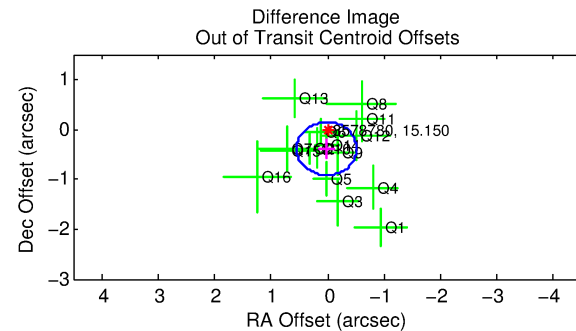
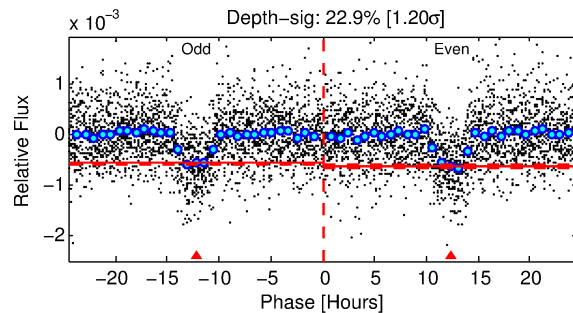
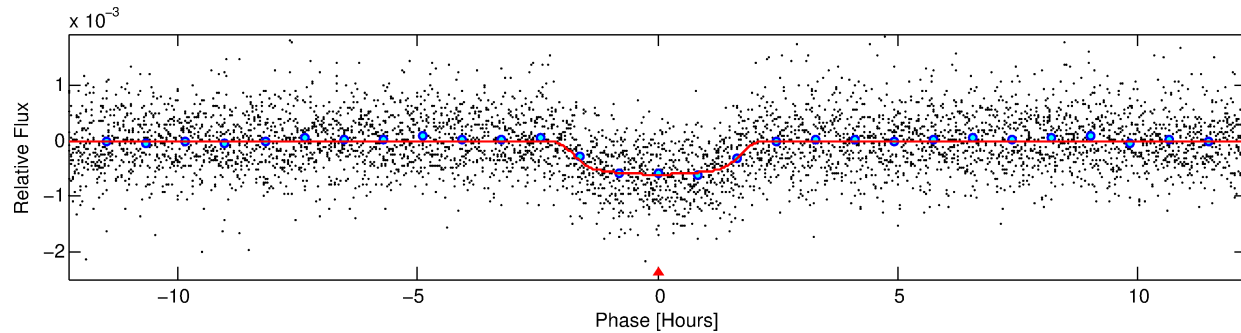
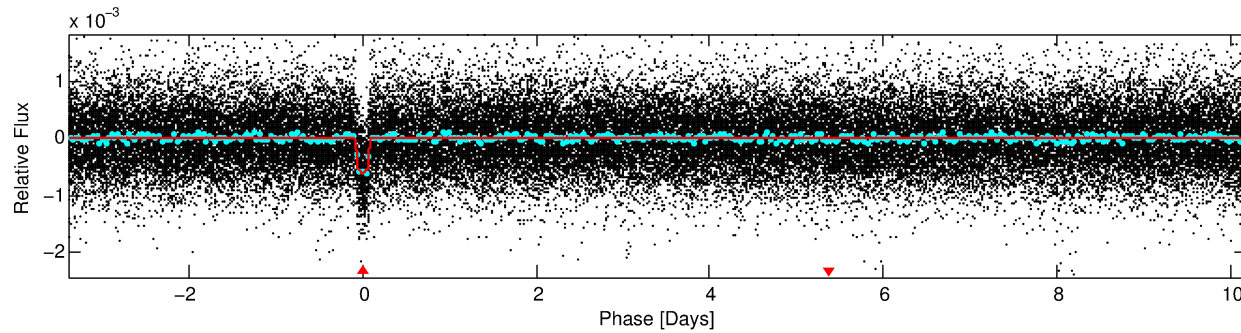
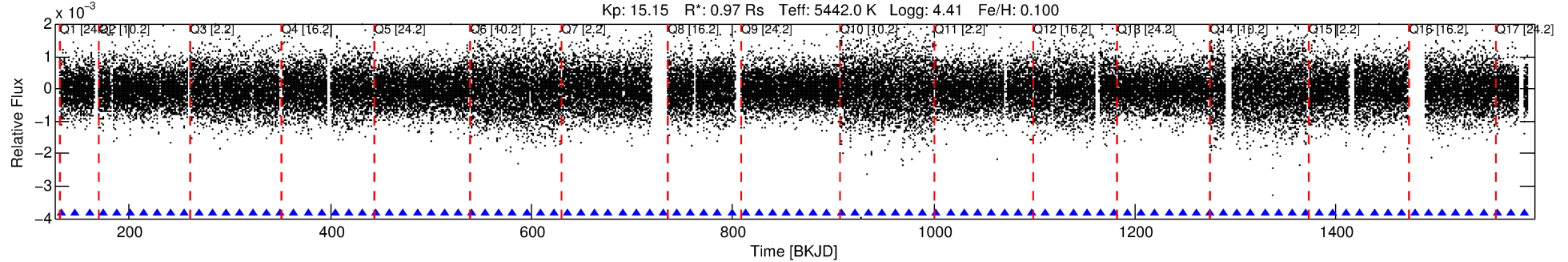
No Significant Match Found

# DV One-Page Summary

KIC: 8578780 Candidate: 1 of 1 Period: 13.591 d

KOI: K02023.01 Corr: 0.963

Kp: 15.15 R\*: 0.97 Rs Teff: 5442.0 K Logg: 4.41 Fe/H: 0.100



## DV Fit Results:

Period = 13.59054 [0.00005] d  
Epoch = 133.0704 [0.0031] BKJD  
Rp/R\* = 0.0274 [0.0020]  
a/R\* = 12.18 [3.37]  
b = 0.91 [0.05]  
Seff = 64.96 [22.47]  
Teq = 724 [63] K  
Rp = 2.91 [0.77] Re  
a = 0.1071 [0.0234] AU  
Ag = 77.90 [34.04] [2.26σ]  
Teffp = 3325 [263] K [9.61σ]

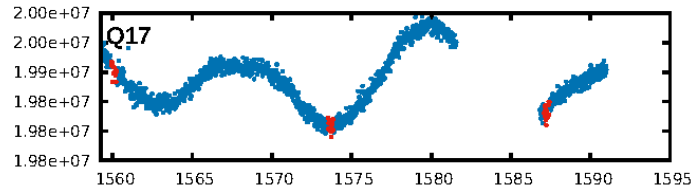
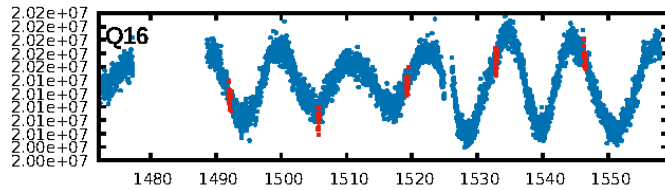
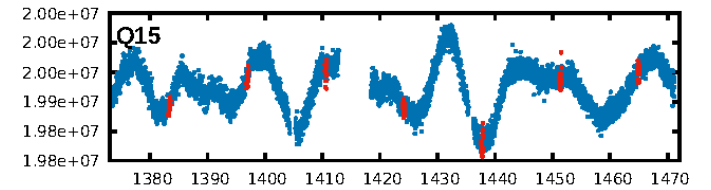
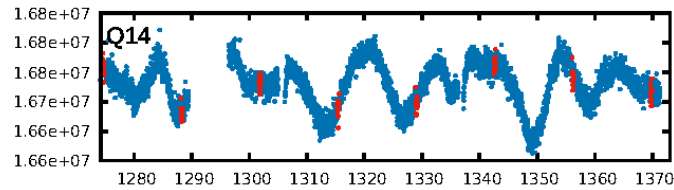
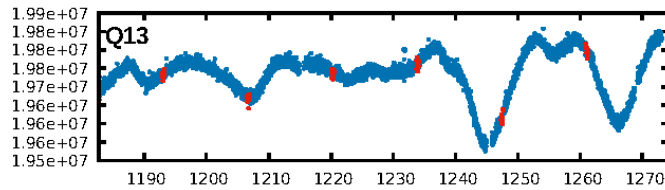
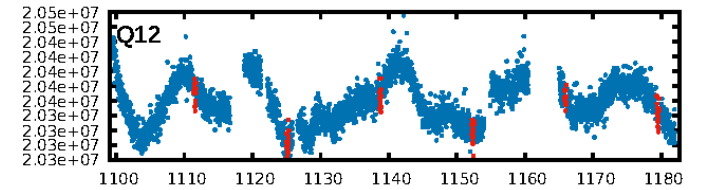
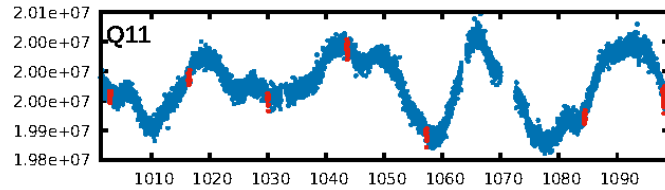
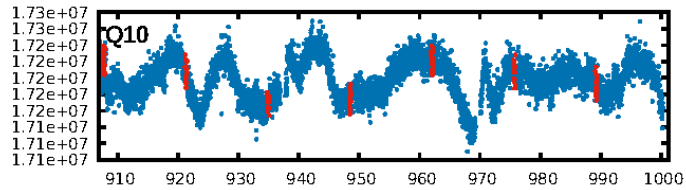
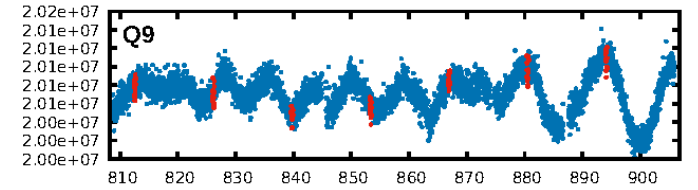
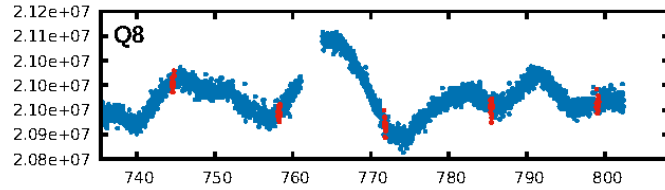
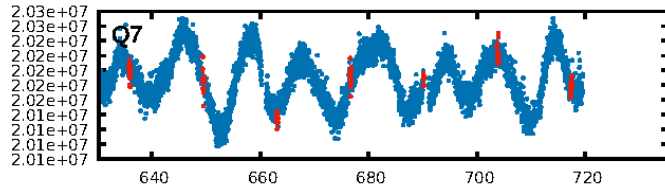
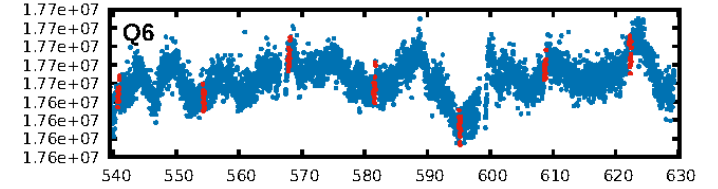
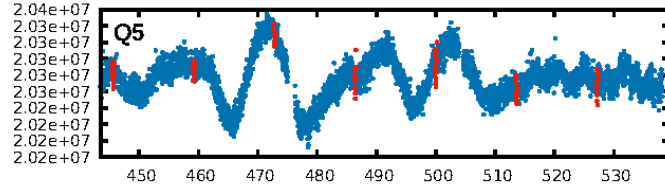
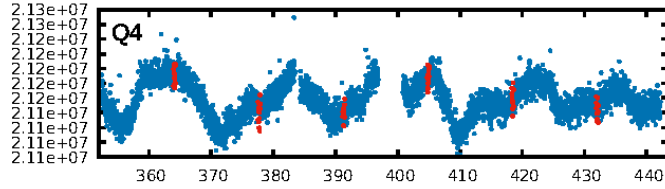
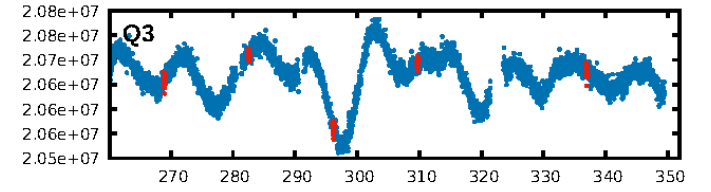
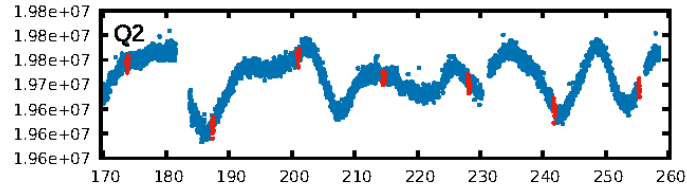
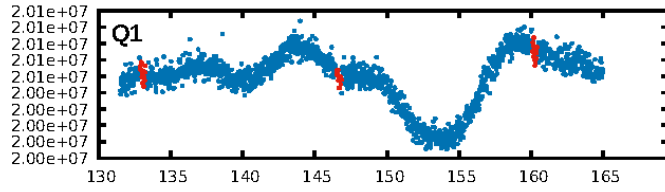
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 98.6%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 2.80e-102  
RollingBand-fgt: 1.00 [97/97]  
GhostDiagnostic-chr: 2.123  
Centroid-sig: 0.3%  
Centroid-so: 0.584 arcsec [1.45σ]  
OotOffset-rm: 0.392 arcsec [2.22σ]  
KicOffset-rm: 0.368 arcsec [1.85σ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 1.00 [16/16]  
DiffImageOverlap-fno: 1.00 [17/17]

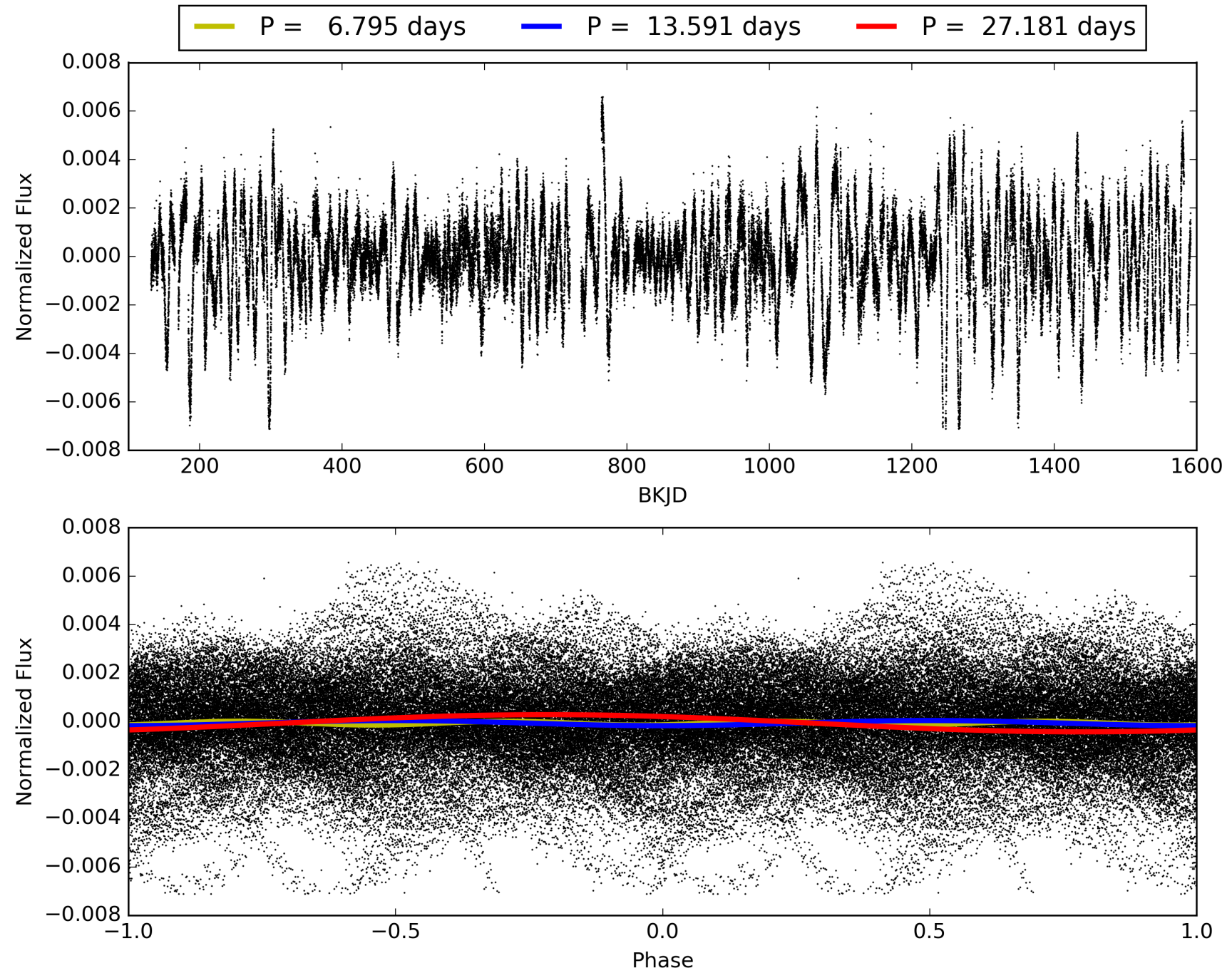
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 15:09:13 Z

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

# TCE 008578780-01, PDC Light Curves

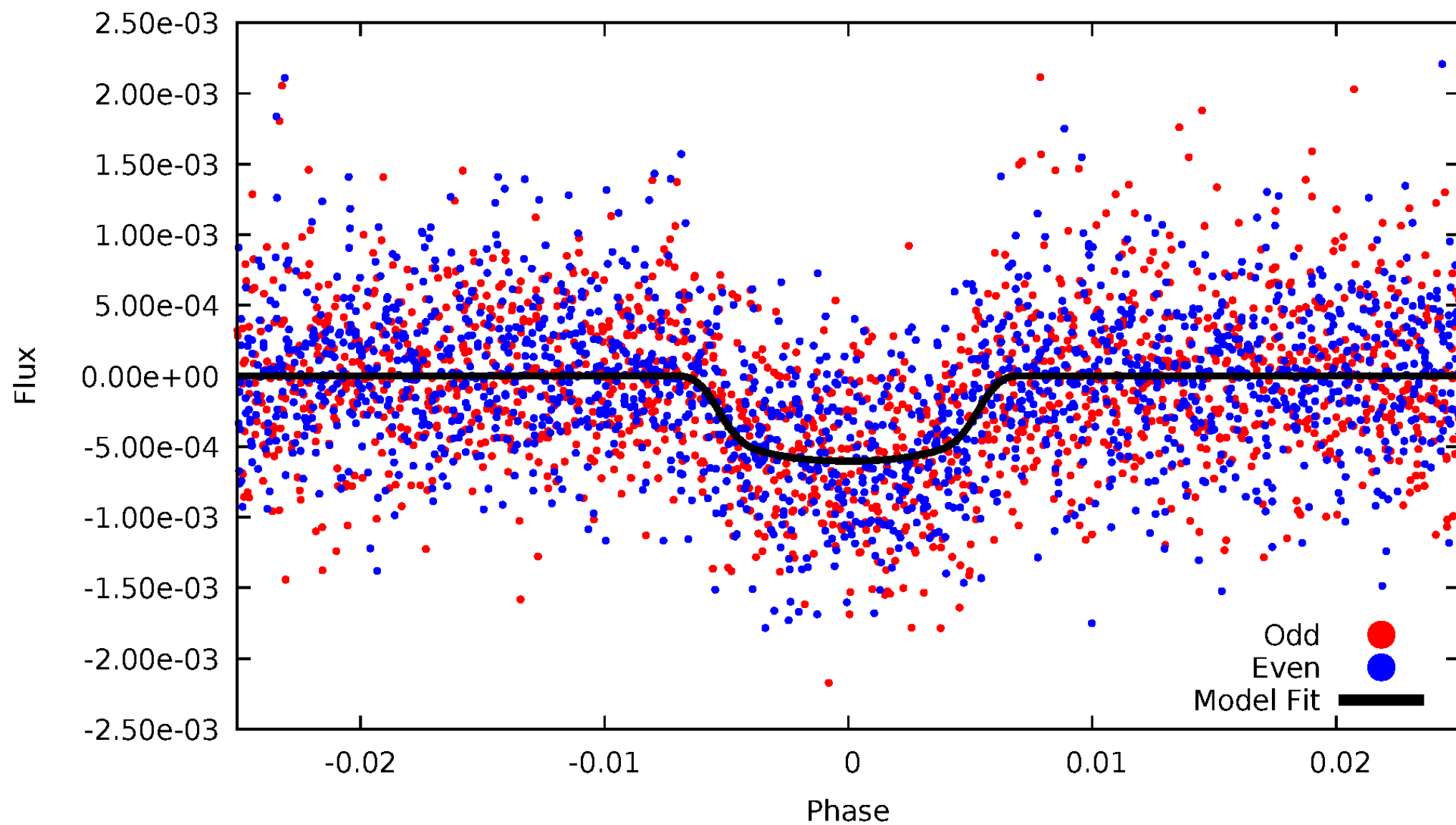


TCE 008578780-01



# DV Odd/Even

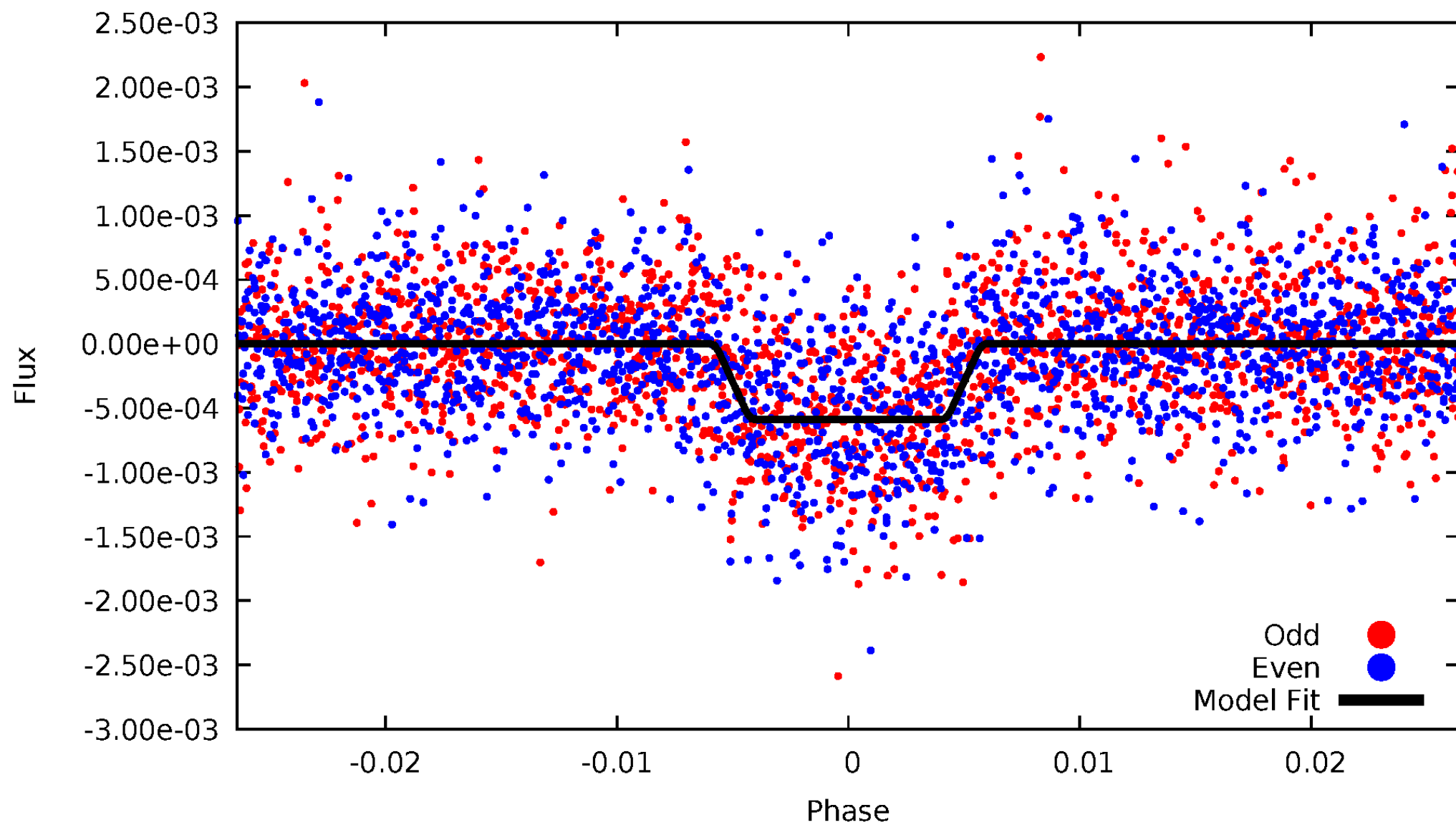
TCE 008578780-01





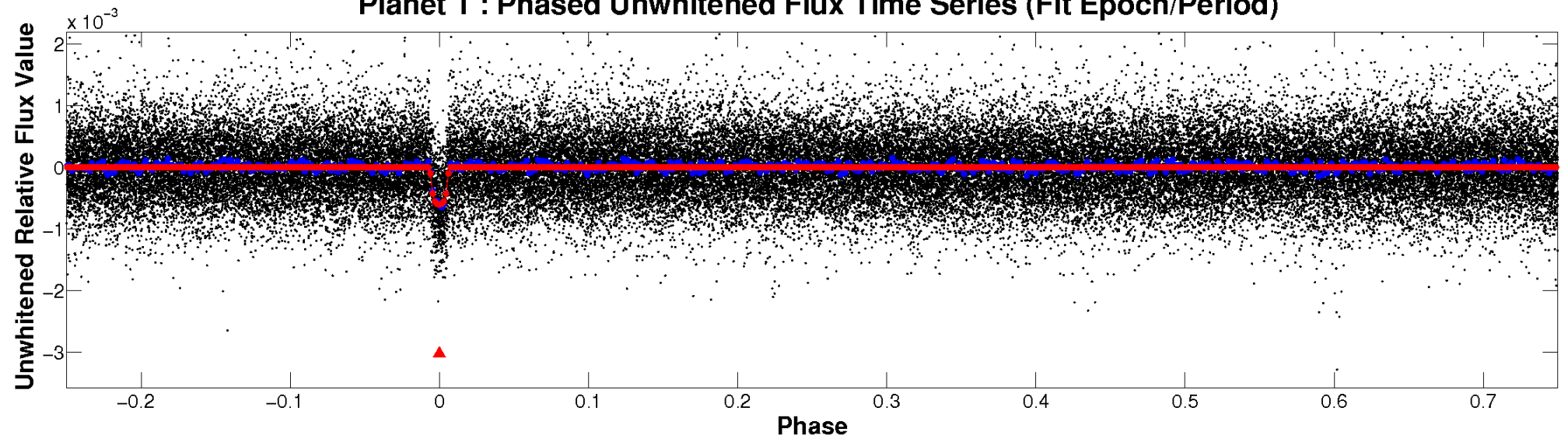
# ALT Odd/Even

TCE 008578780-01

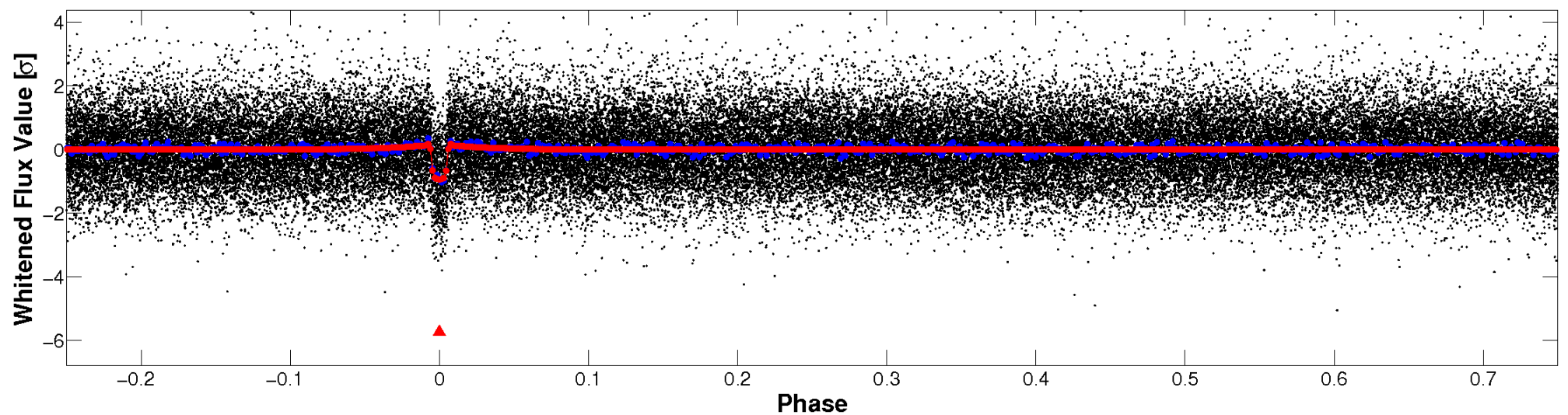


# Non-Whitened Vs. Whitened Light Curve

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

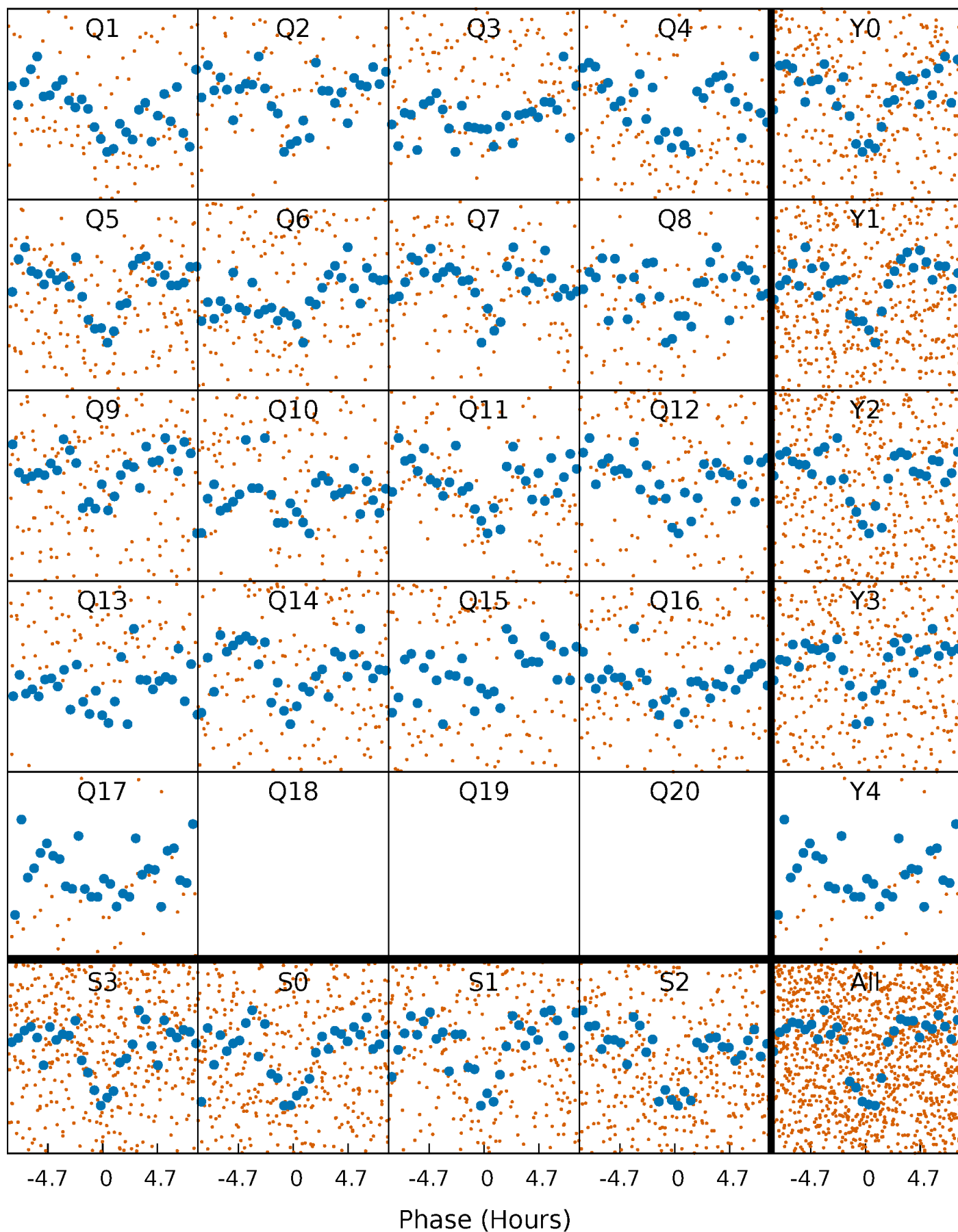


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

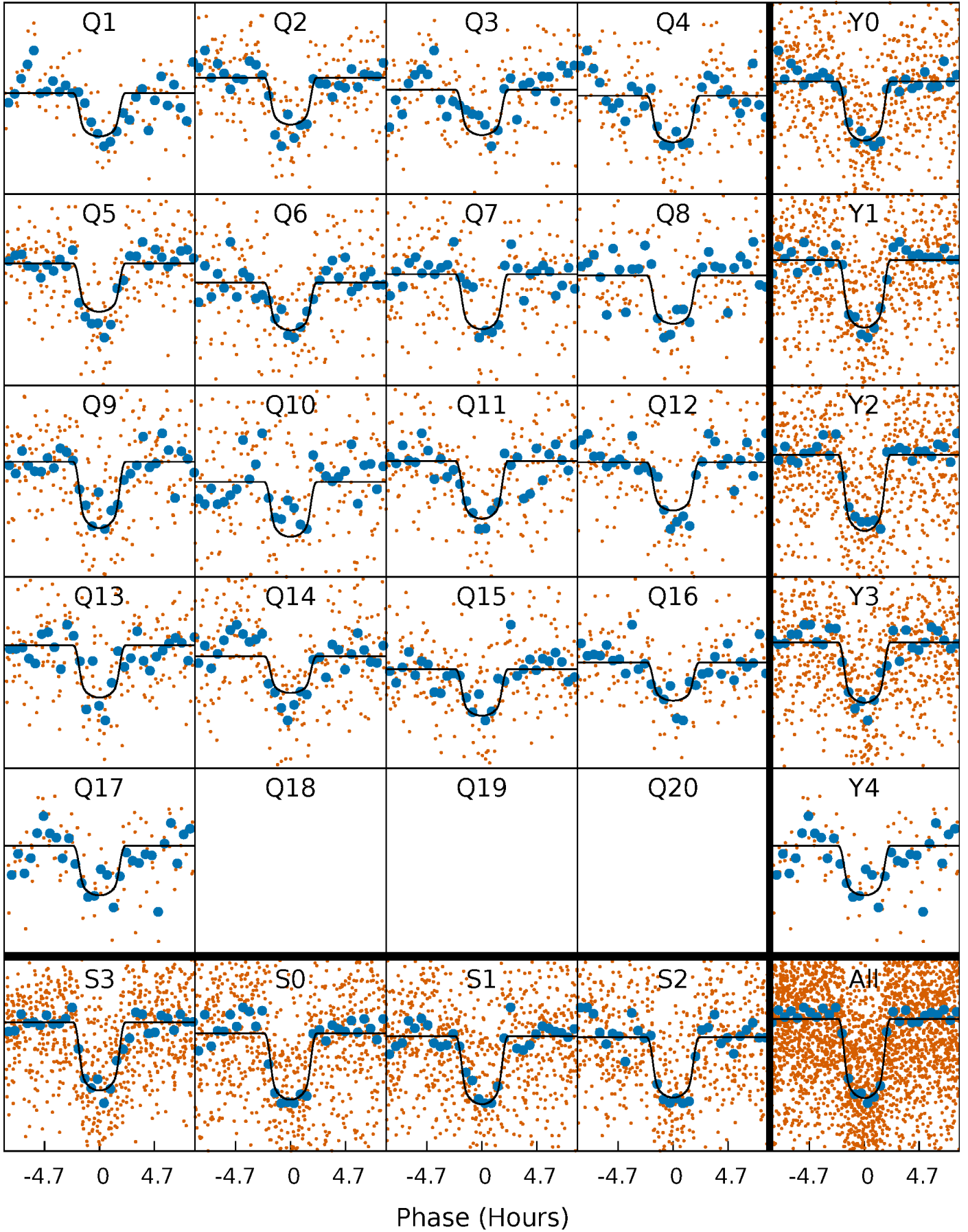
TCE 008578780-01 P= 13.590544 Days  $T_0=133.070445$  (BKJD)





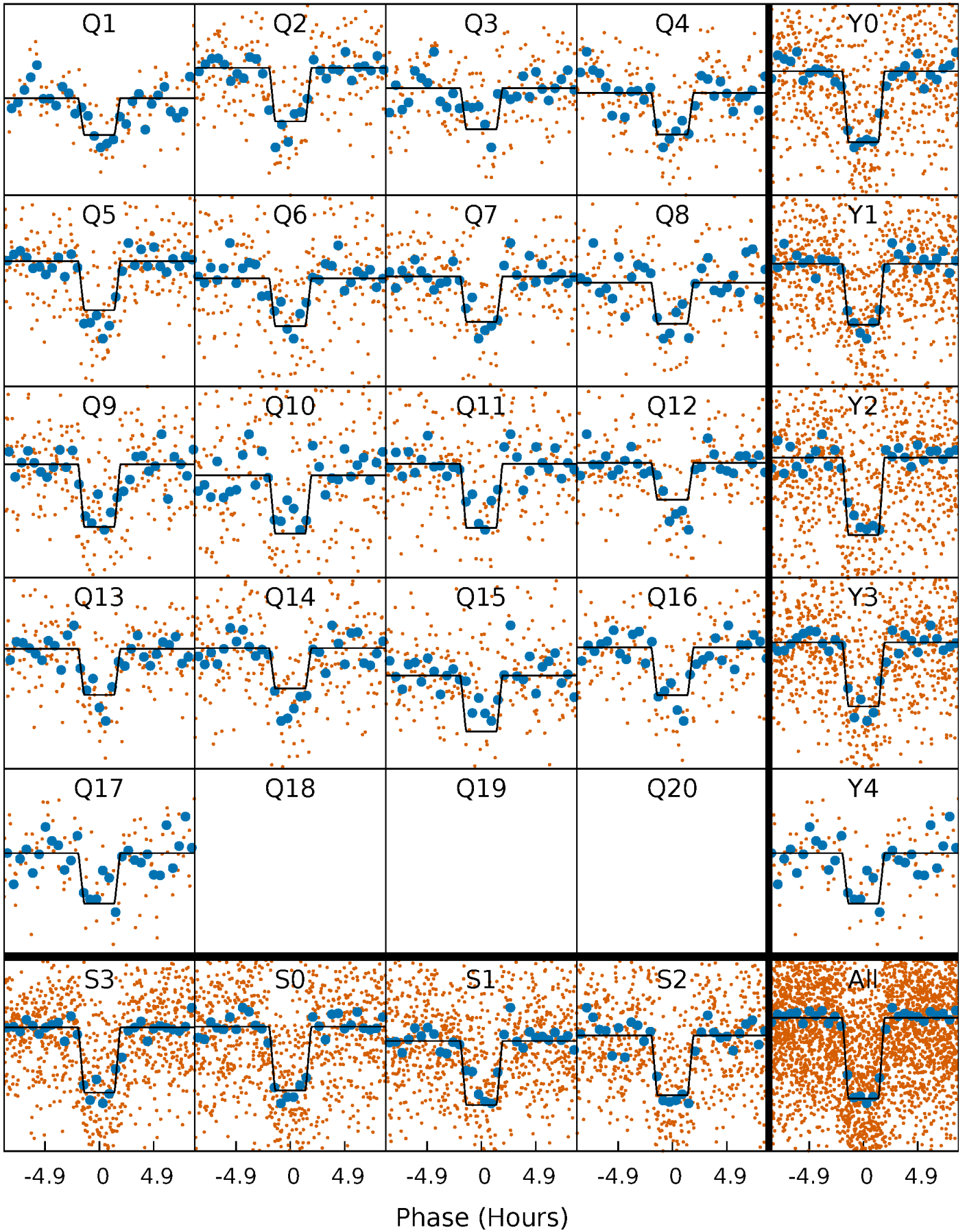
# DV Quarter-Phased Transit Curves

TCE 008578780-01 P= 13.590544 Days  $T_0=133.070445$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

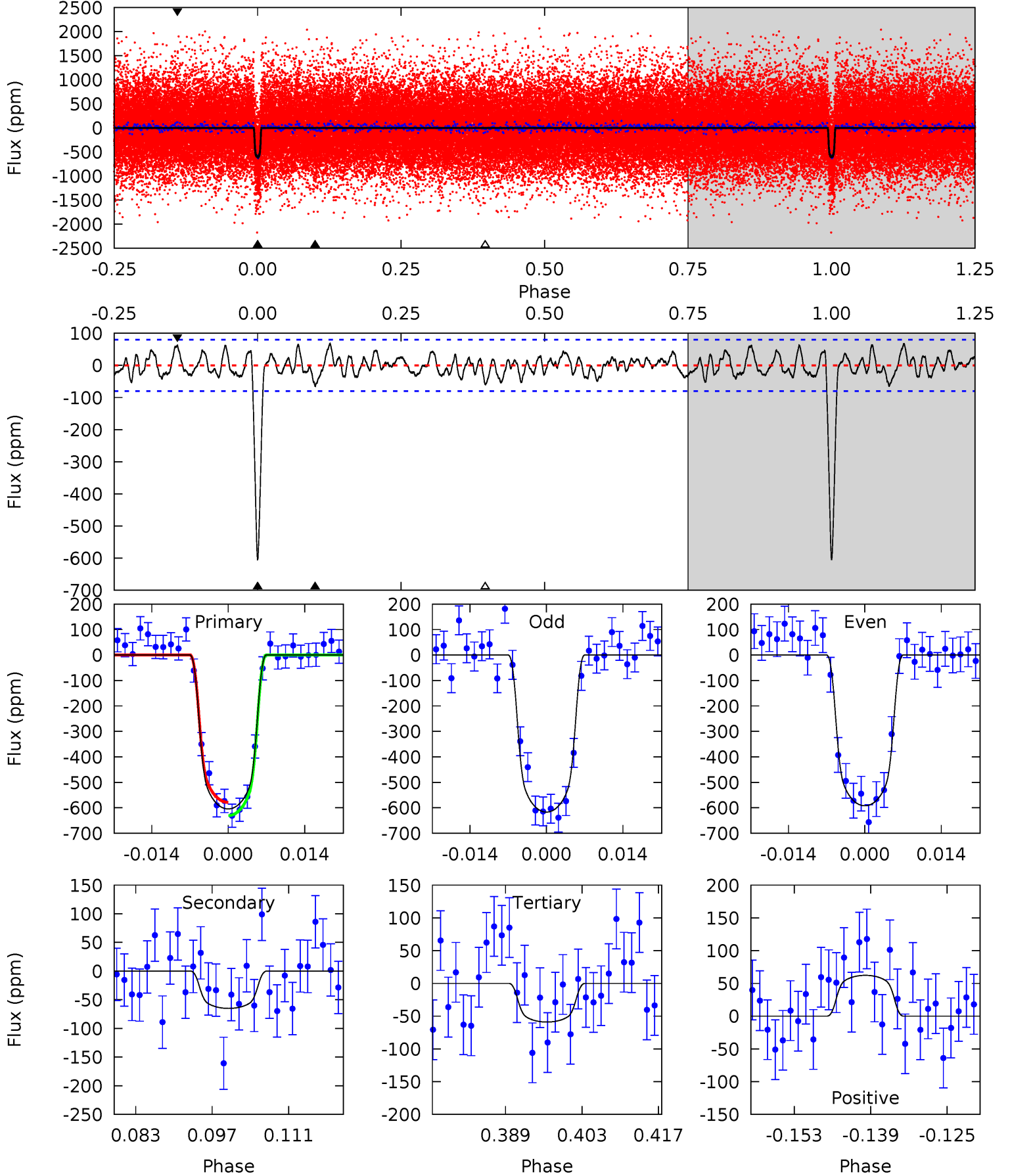
TCE 008578780-01 P= 13.590418 Days  $T_0=133.076561$  (BKJD)



# DV Model-Shift Uniqueness Test

008578780-01, P = 13.590544 Days, E = 119.479901 Days

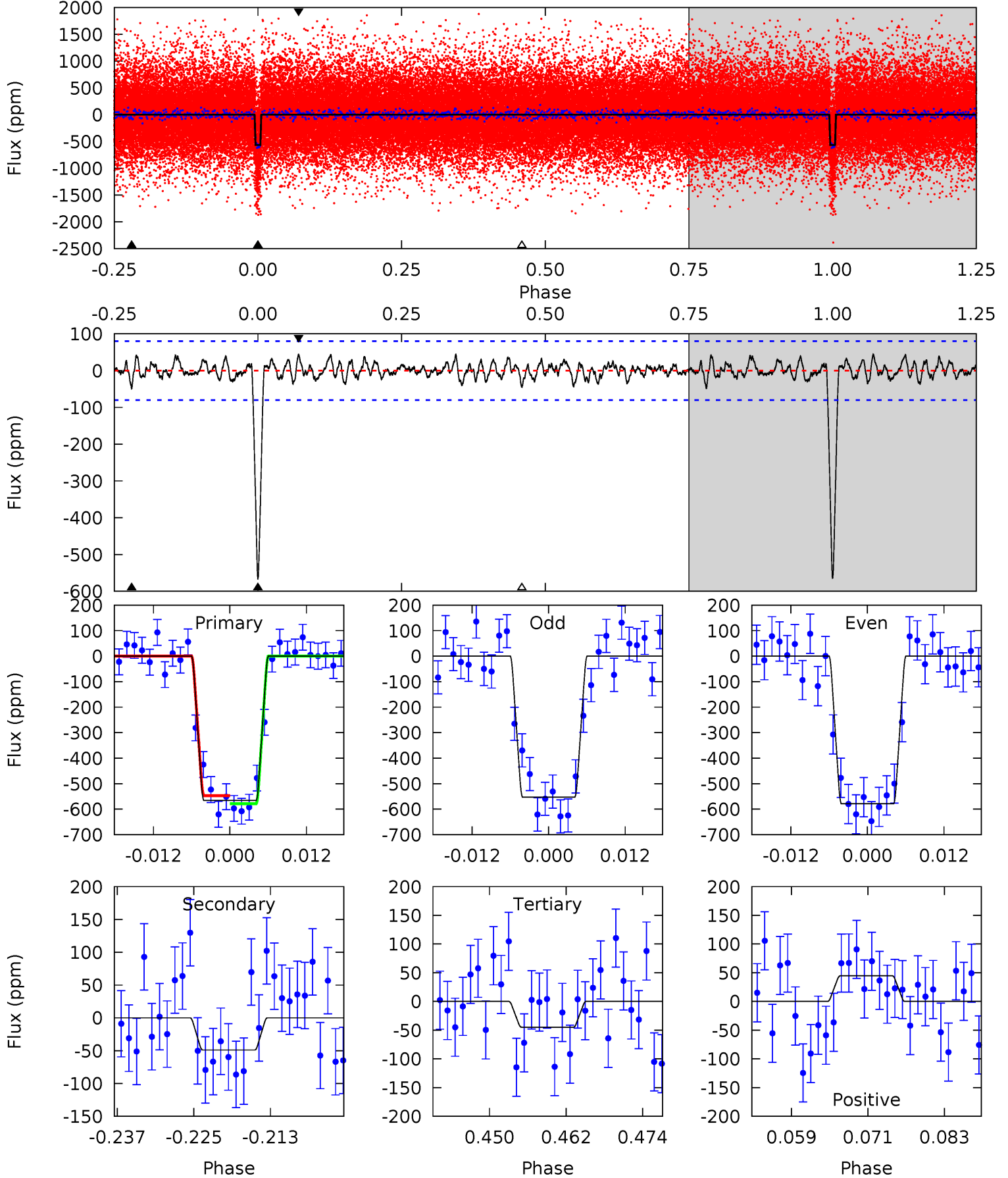
| Pri  | Sec  | Ter  | Pos  | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 37.5 | 4.03 | 3.66 | 3.86 | 4.96            | 2.46            | 1.53             | 33.8    | 33.6    | 0.37    | 0.17    | 0.77    | 1.02 | 0.10  | 1.62 |



# Alt Model-Shift Uniqueness Test

008578780-01, P = 13.590418 Days, E = 119.486143 Days

| Pri  | Sec  | Ter  | Pos  | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 35.3 | 3.06 | 2.80 | 2.78 | 4.99            | 2.52            | 1.00             | 32.5    | 32.5    | 0.26    | 0.27    | 0.82    | 0.98 | 0.07  | 0.97 |



### Stellar Parameters For KIC 008578780

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                    | $R (R_{\odot})$           | $M(M_{\odot})$            | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|---------------------------|---------------------------|---------------------------|---|
|        | $5442^{+164}_{-164}$ | $4.409^{+0.135}_{-0.180}$ | $0.100^{+0.250}_{-0.300}$ | $0.974^{+0.248}_{-0.133}$ | $0.887^{+0.101}_{-0.074}$ | $1.352^{+0.736}_{-0.649}$                 |
|        | +3%/-3%              | +3%/-4%                   | +250%/-300%               | +25%/-14%                 | +11%/-8%                  | +54%/-48%                                 |
| 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 008578780-01 / KOI 2023.01

| Detrend | Depth (ppm)  | $R_p (R_{\oplus})$     | $T_{max} (K)$      | $T_{obs} (K)$        | $A_{obs}$        |
|---------|--------------|------------------------|--------------------|----------------------|------------------|
| DV      | $-65 \pm 16$ | $2.91^{+0.45}_{-0.34}$ | $1015^{+70}_{-60}$ | $3431^{+176}_{-178}$ | $47^{+20}_{-15}$ |
| Alt.    | $-49 \pm 16$ | $2.58^{+0.42}_{-0.32}$ | $1013^{+70}_{-53}$ | $3417^{+193}_{-205}$ | $45^{+23}_{-16}$ |

$T_{max}$  = 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  $A_{obs} \gg 1.0$



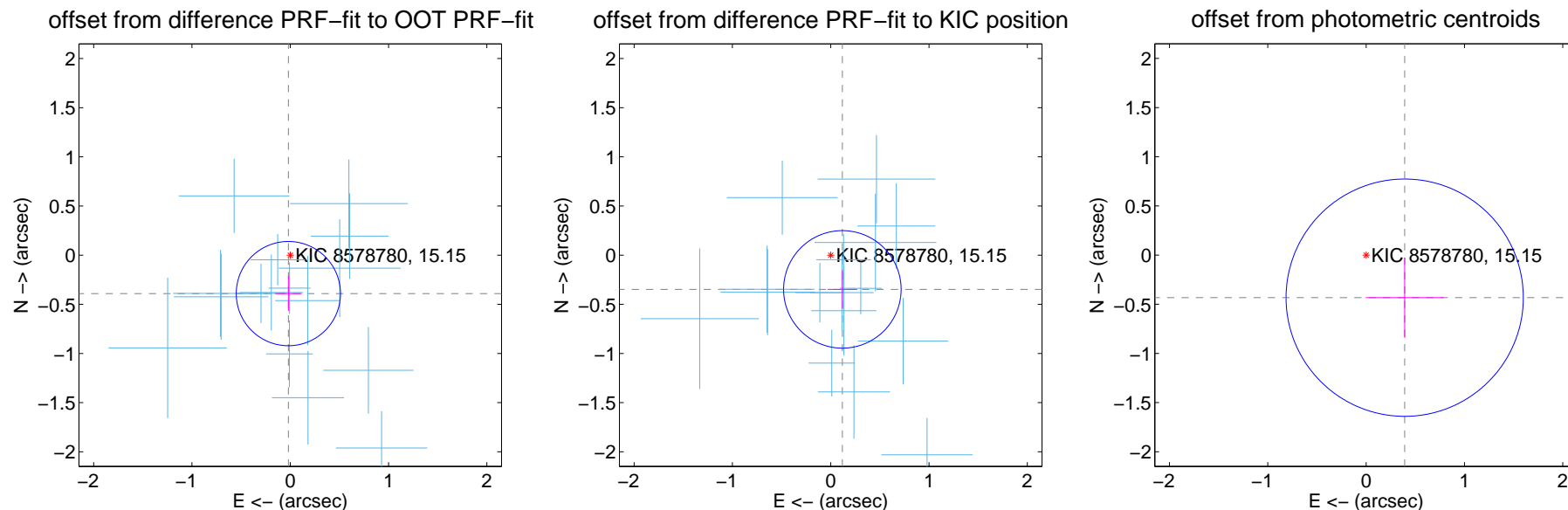
## DV Centroid Data

Supplemental centroid analysis for 008578780-01. Kepler magnitude: 15.15. Transit SNR 23.22

There are 16 quarters with good PRF difference image offsets

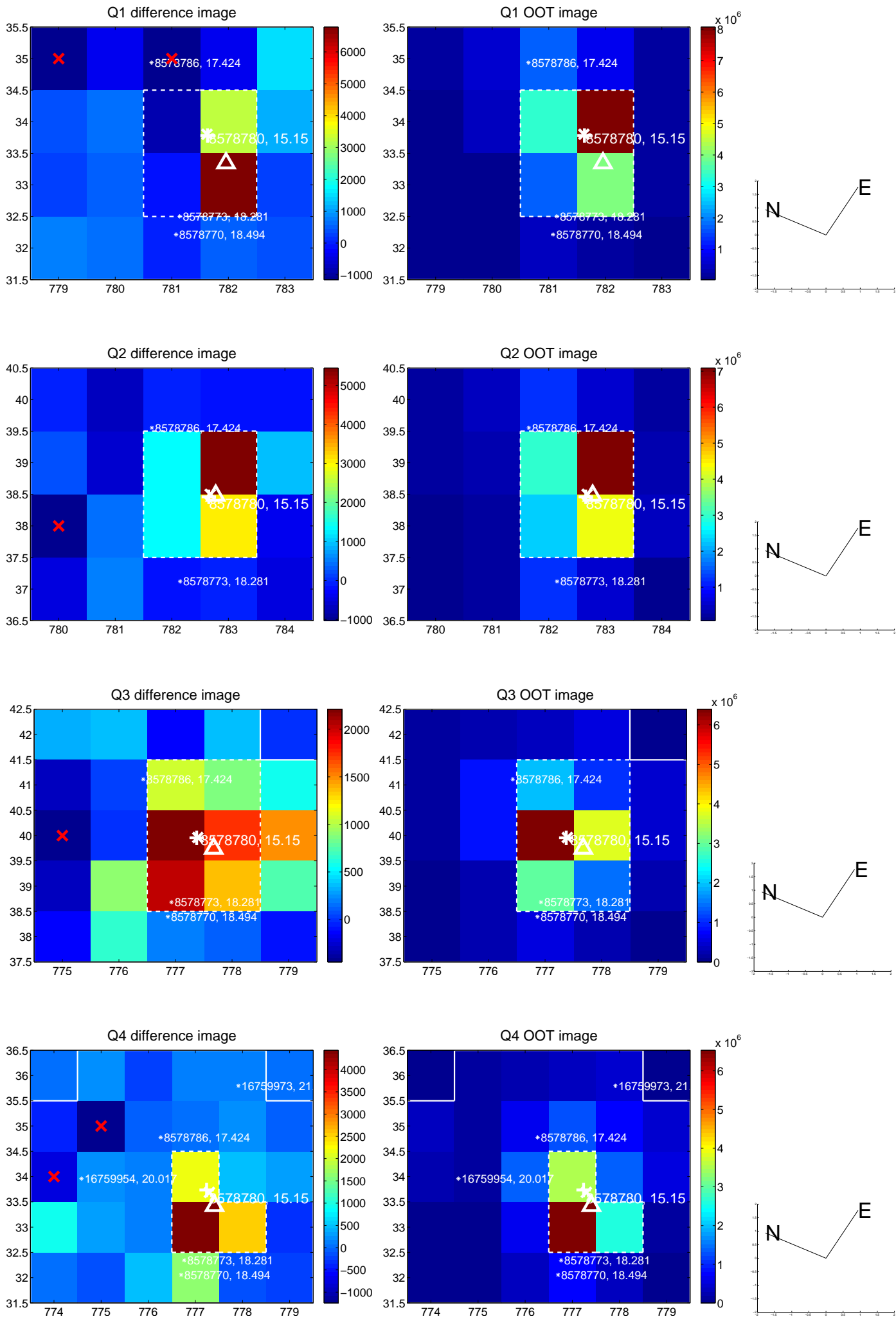
The direct PRF centroid is offset from the target star catalog position by about 0.31 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA        | $\Delta$ Dec       |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT          | $0.392 \pm 0.177$  | 2.22                | $0.019 \pm 0.136$  | $-0.391 \pm 0.177$ |
| PRF-fit source offset from KIC position | $0.368 \pm 0.199$  | 1.85                | $-0.118 \pm 0.152$ | $-0.348 \pm 0.198$ |
| photometric centroid source offset      | $0.58 \pm 0.40$    | 1.45                | $-0.39 \pm 0.40$   | $-0.43 \pm 0.41$   |

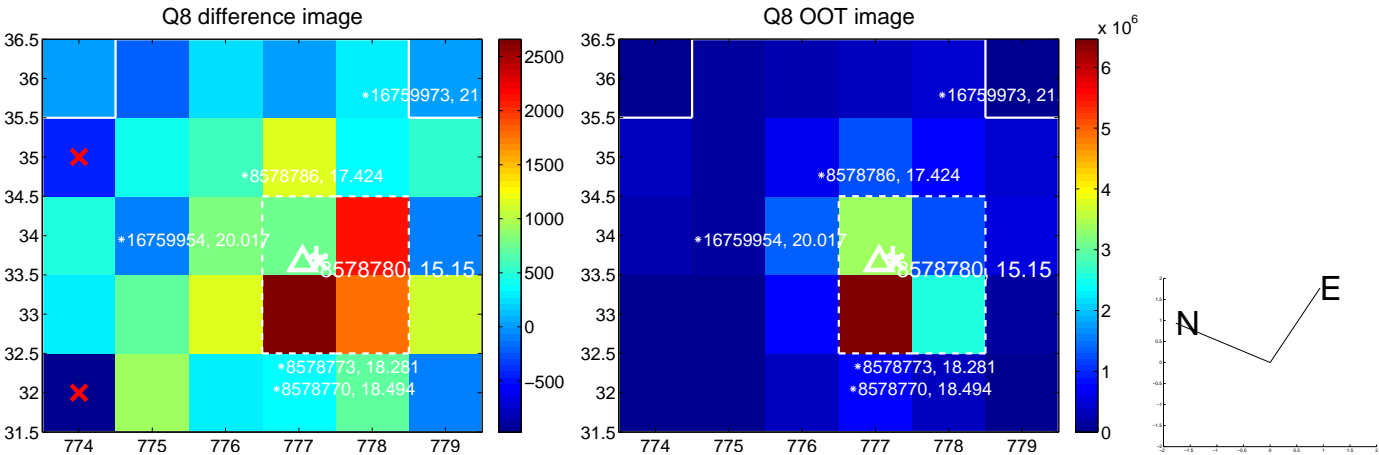
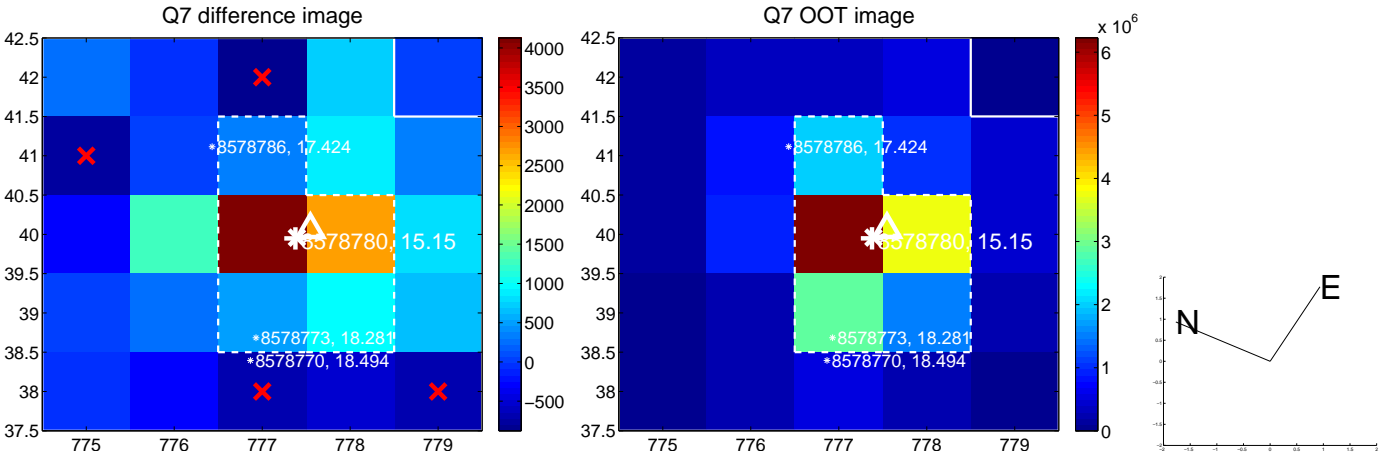
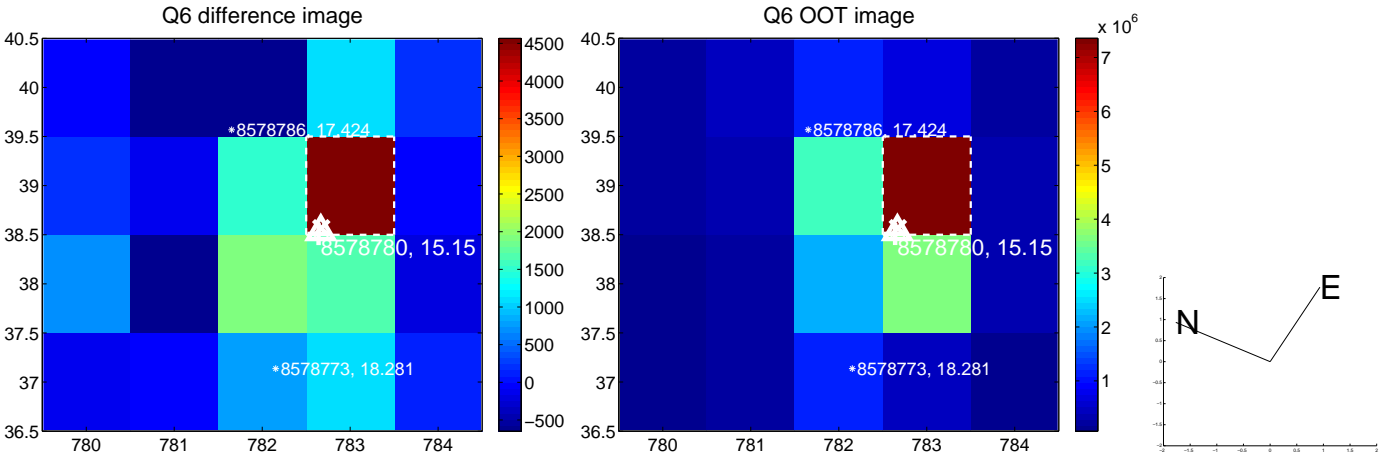
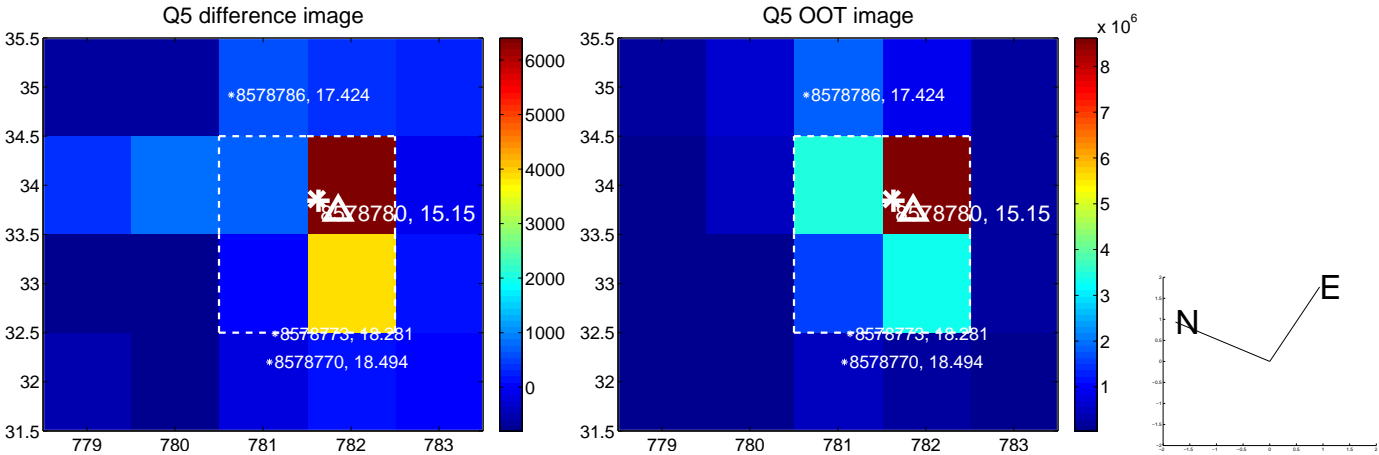


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

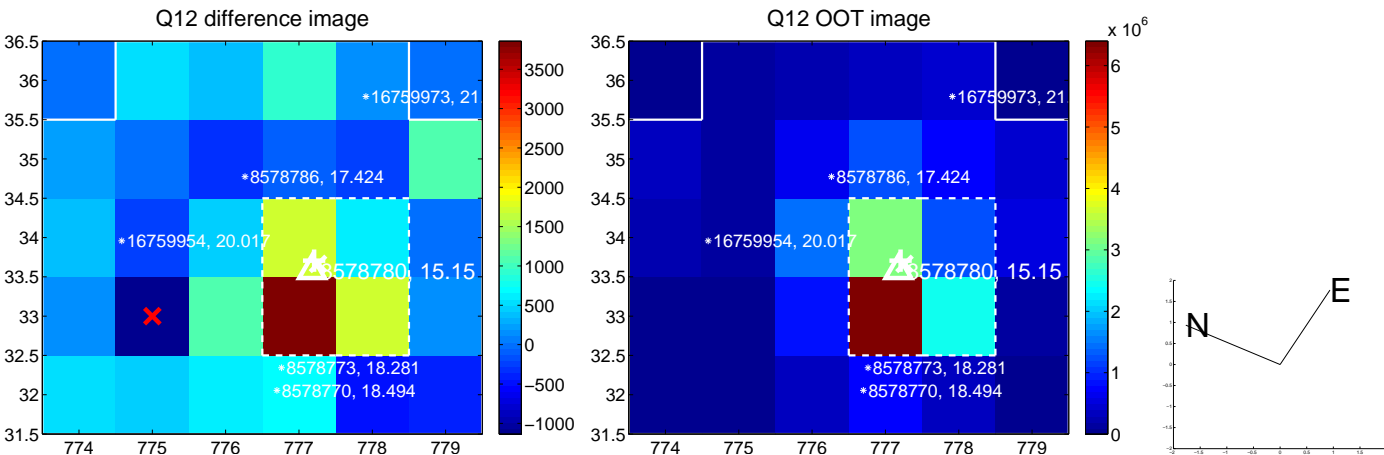
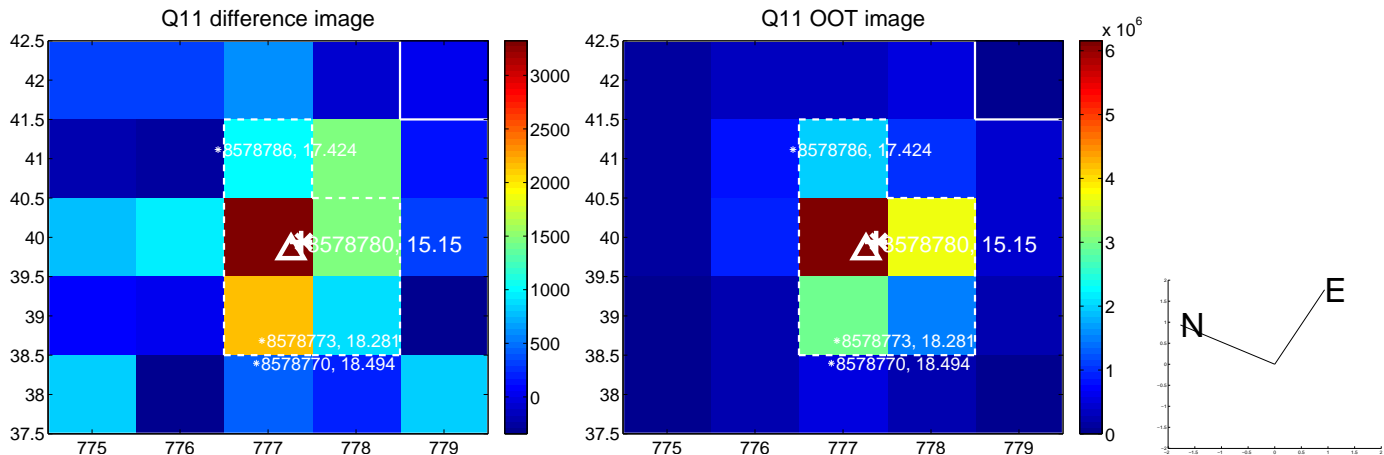
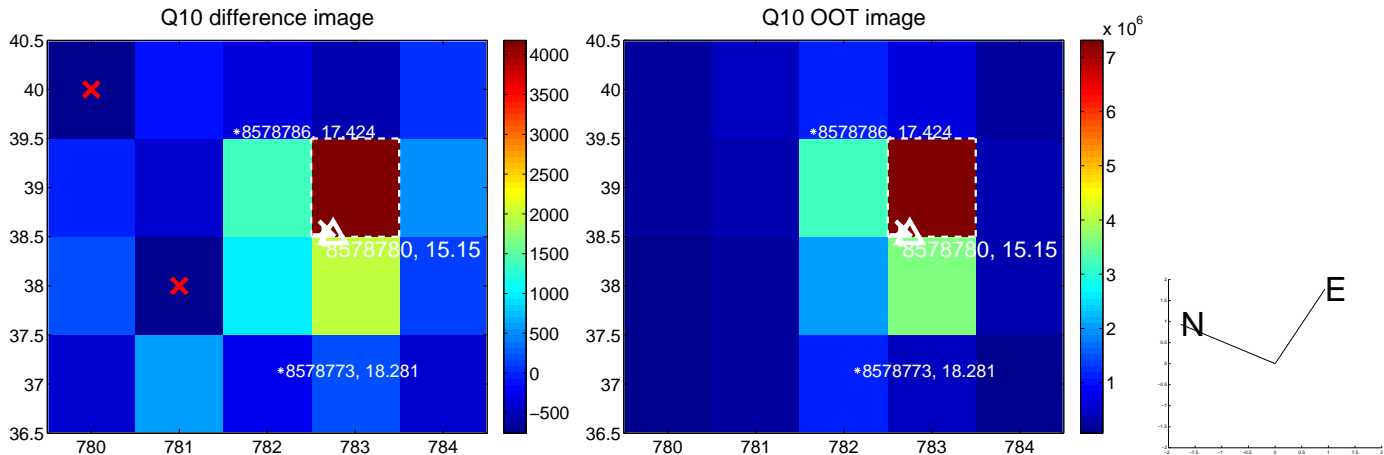
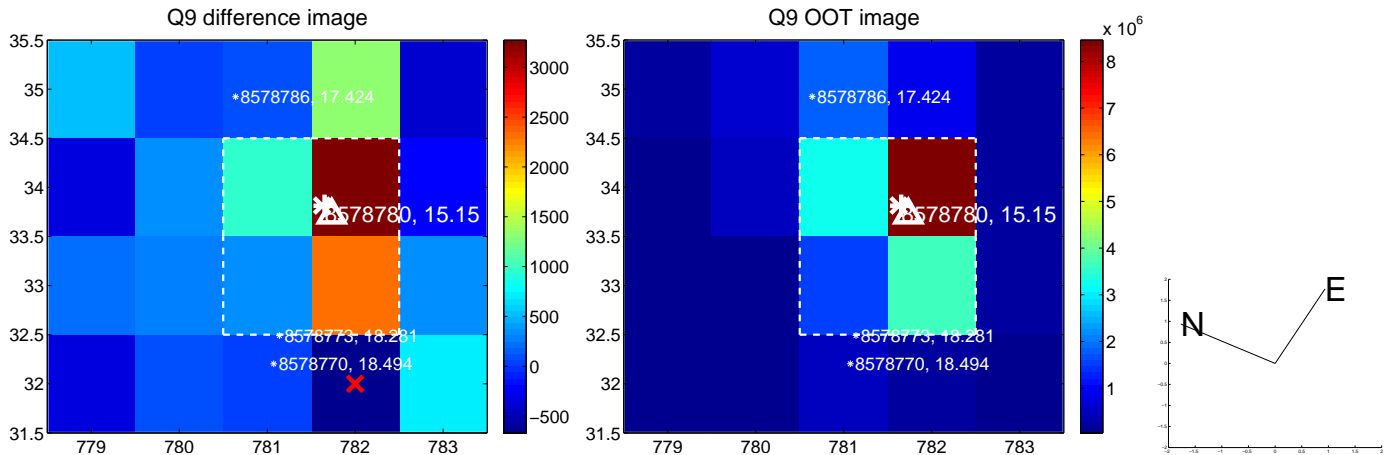
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



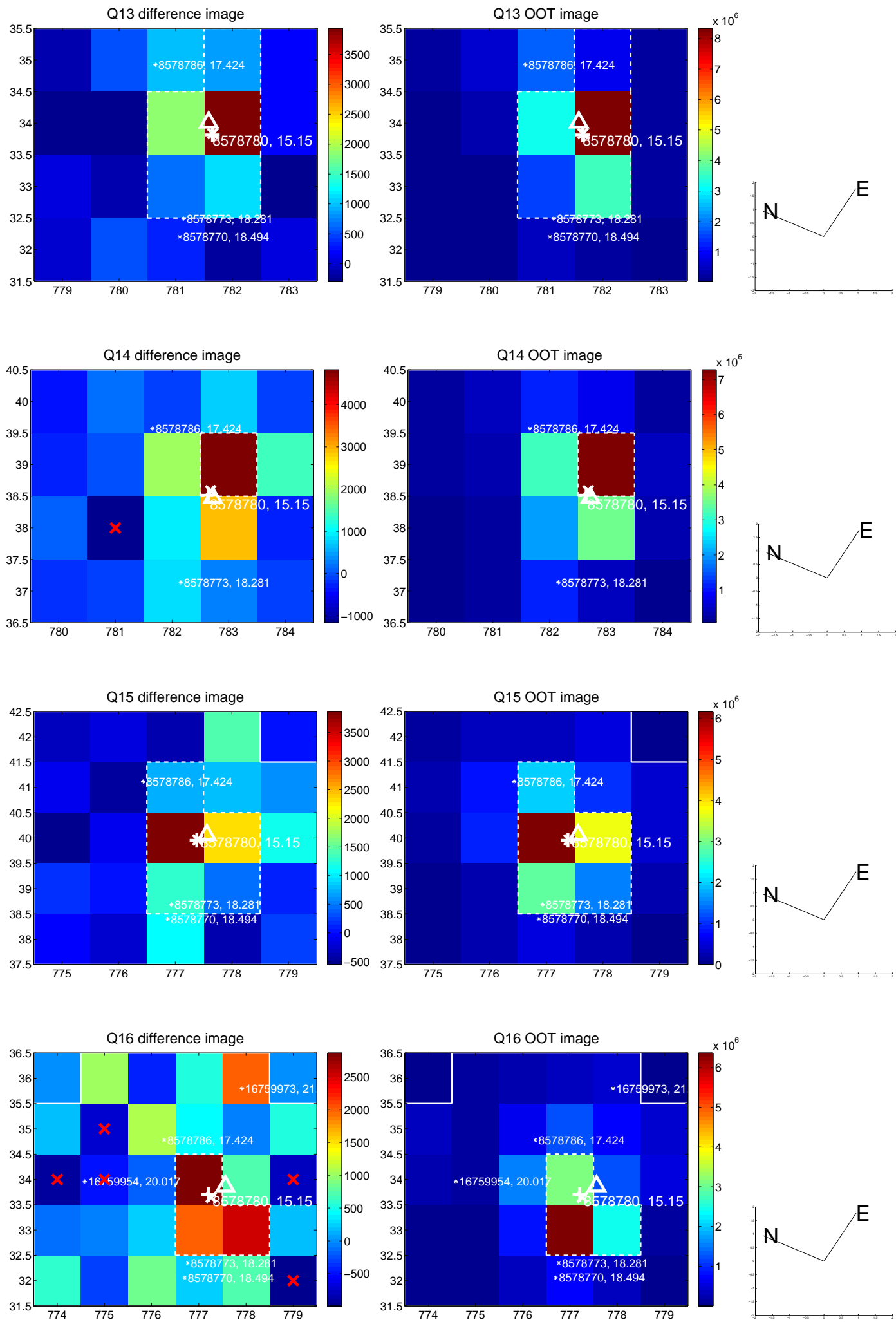
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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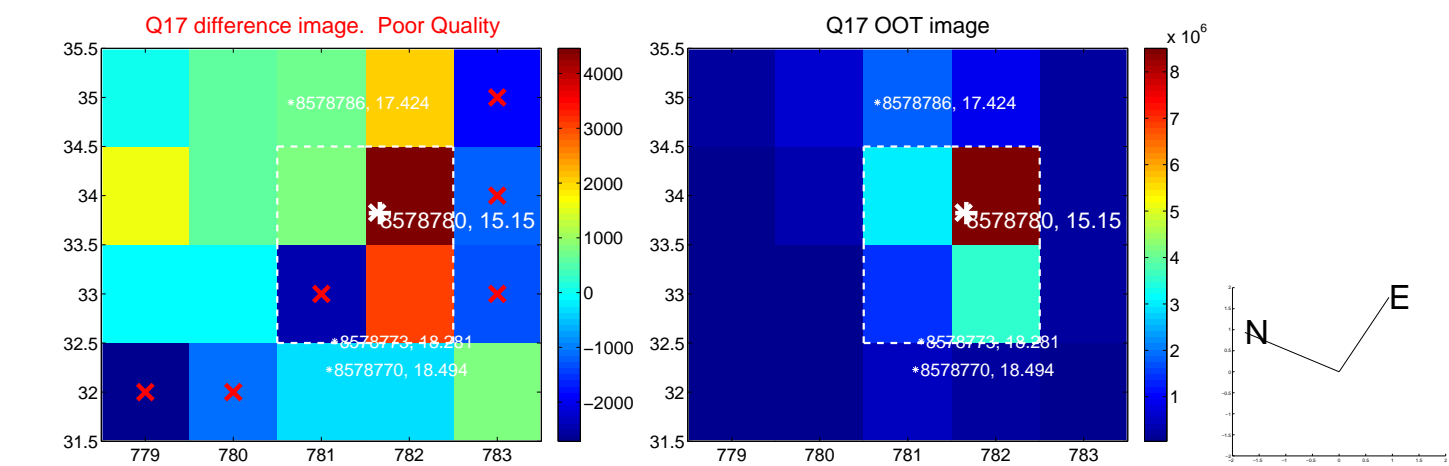


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

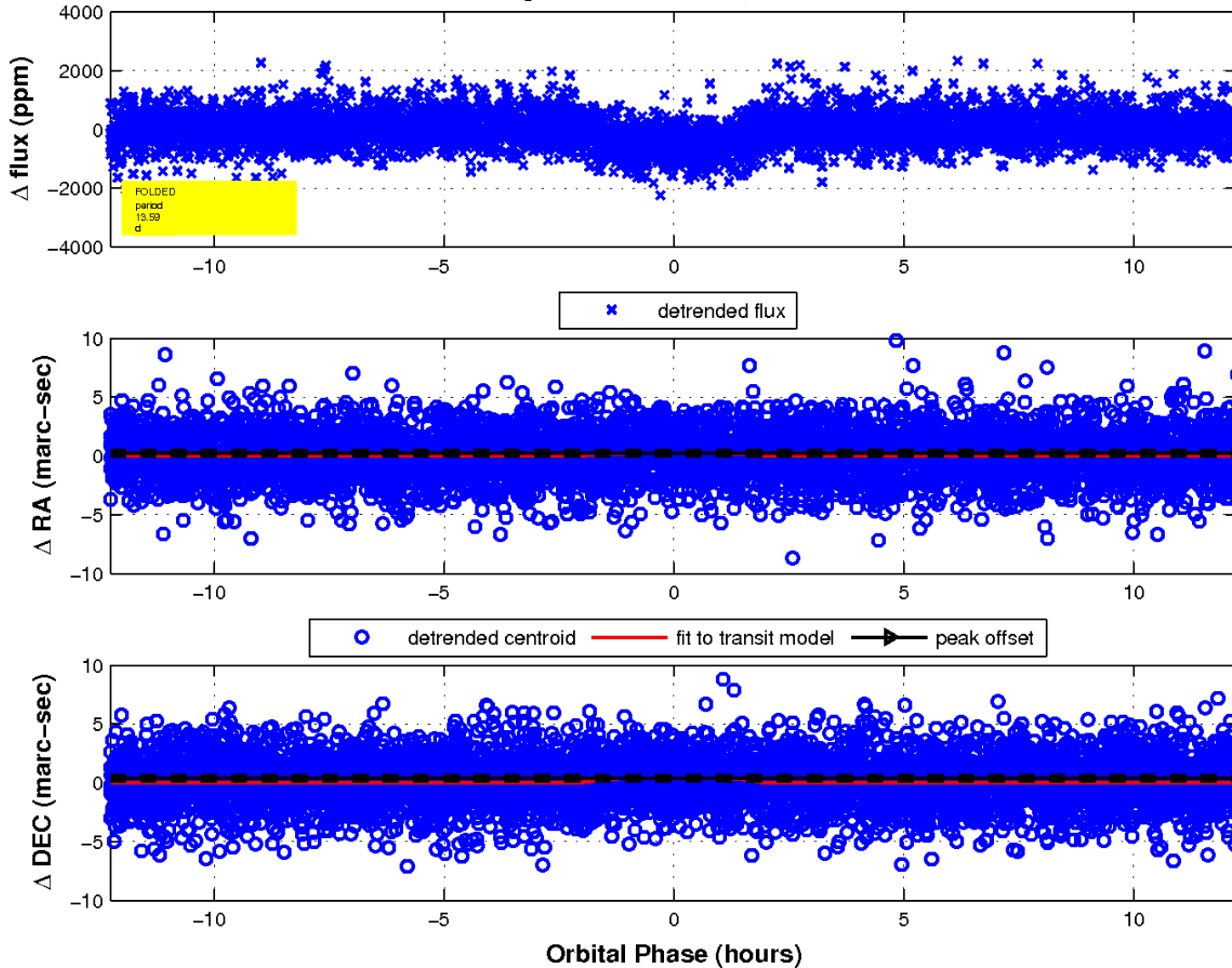




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 1 of 1



UKIRT Image

