

# KIC 009777724

## Q1-17 DR25 TCE Parameters

| TCE          | Run Type | KOI?    | Period (Days) | Epoch (BKJD) | Depth (ppm) | Duration (Hours) | MES  | SNR  | R <sub>★</sub> (R <sub>☉</sub> ) | T <sub>★</sub> (K) | R <sub>p</sub> (R <sub>⊕</sub> ) | S <sub>p</sub> (S <sub>⊕</sub> ) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|----------------------------------|--------------------|----------------------------------|----------------------------------|
| 009777724-01 | OBS      | 4197.01 | 1.332567      | 132.043569   | 112.6       | 2.894            | 10.2 | 11.5 | 1.09                             | 6384               | 1.32                             | 2881.16                          |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments                   |
|--------------|----------|------|-------|---|---|---|---|----------------------------|
| 009777724-01 | OBS      | FP   | 0.00  | 0 | 0 | 0 | 1 | CENT_FEW_DIFFS—EPHEM_MATCH |

**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.

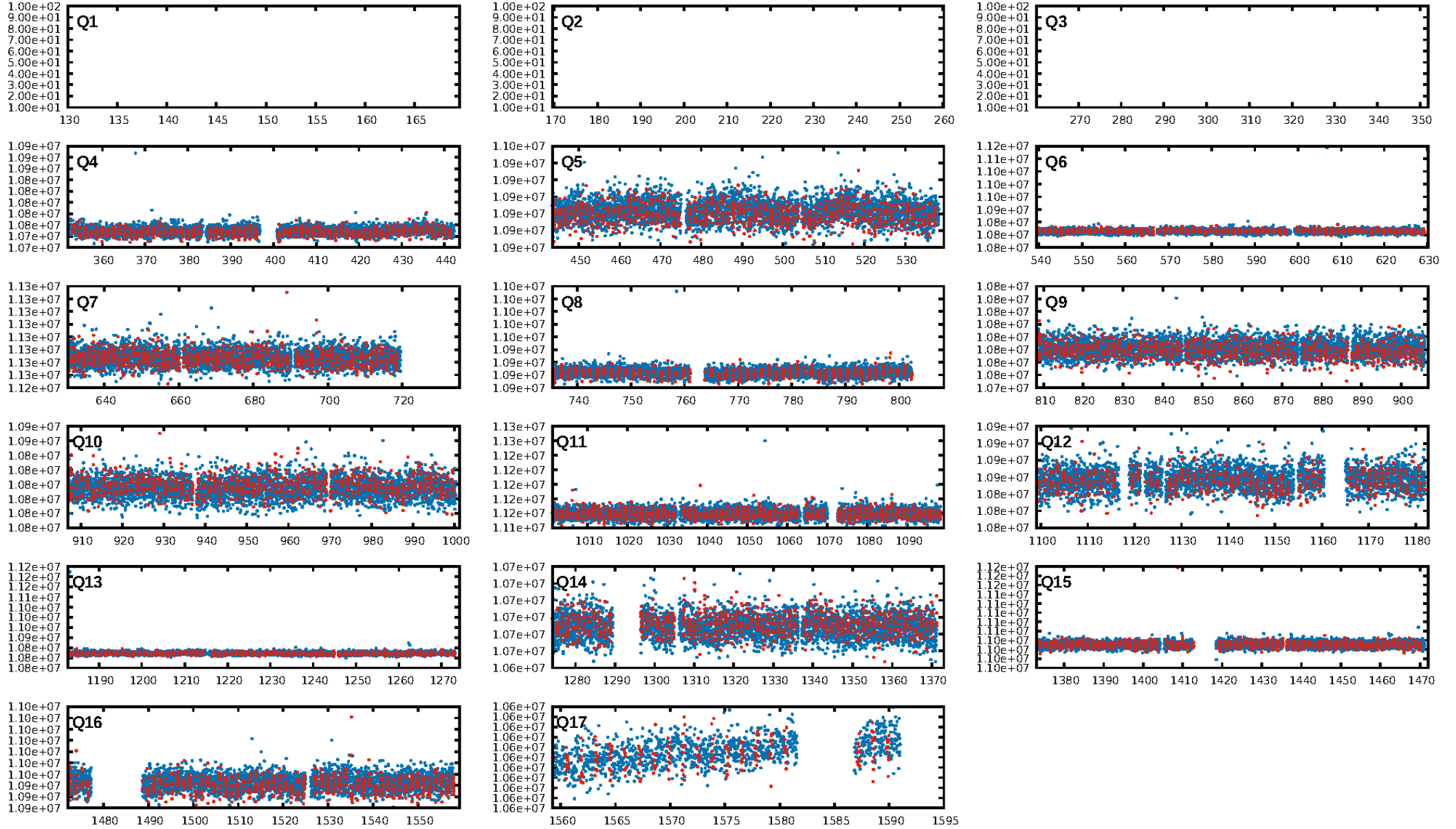
## Ephemeris Match Information For 009777724-01

| TCE (1)      | KIC     | Parent (2) | Parent KIC | P <sub>1</sub> :P <sub>2</sub> | Dist (″) | ΔRow | ΔCol | m <sub>2</sub> | m <sub>1</sub> | D <sub>2</sub> /D <sub>1</sub> | Mechanism   | Flag | σ <sub>P</sub> | σ <sub>T</sub> |
|--------------|---------|------------|------------|--------------------------------|----------|------|------|----------------|----------------|--------------------------------|-------------|------|----------------|----------------|
| 009777724-01 | 9777724 | BR-Cyg-pri | 9899416    | 1:1                            | 1509.7   | 379  | 3    | 10.03          | 15.87          | 5919.20                        | Col-Anomaly | 0    | 0.19           | 0.41           |

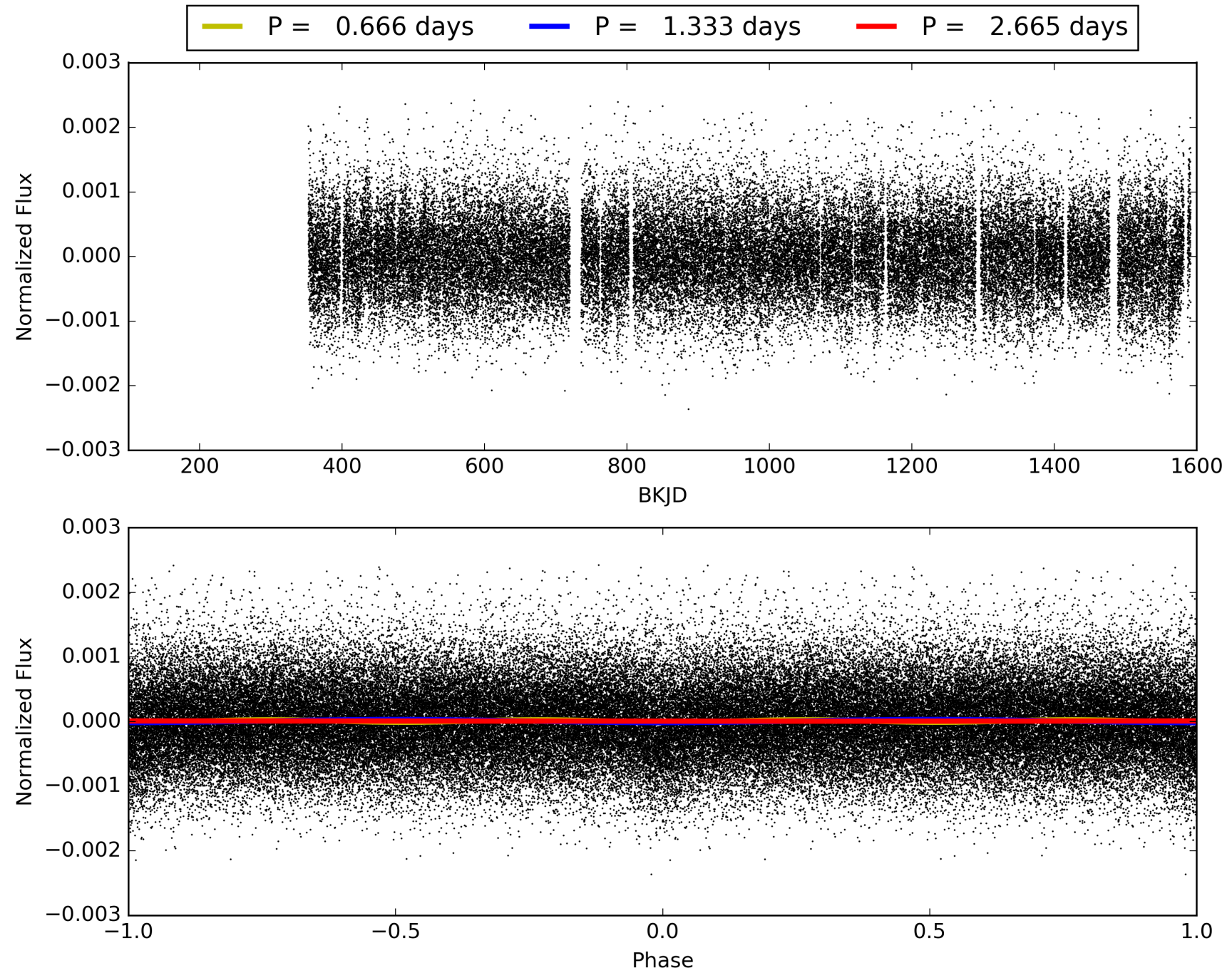
**Notes:** P<sub>1</sub>:P<sub>2</sub> is the period ratio. Dist is the distance in arcseconds. ΔRow and ΔCol are the number of pixels apart in row and column. m<sub>2</sub> and m<sub>1</sub> are the magnitudes of the parent and child. D<sub>2</sub>/D<sub>1</sub> is the parent's transit depth divided by the child's. σ<sub>P</sub> and σ<sub>T</sub> are the significance of the match in period and epoch. For a match to be considered significant σ<sub>P</sub> < 5.0 and σ<sub>T</sub> < 5.0. Matches which have σ<sub>P</sub> and σ<sub>T</sub> very close to this cutoff should receive extra scrutiny, especially if the period ratio is very large.

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

# TCE 009777724-01, PDC Light Curves

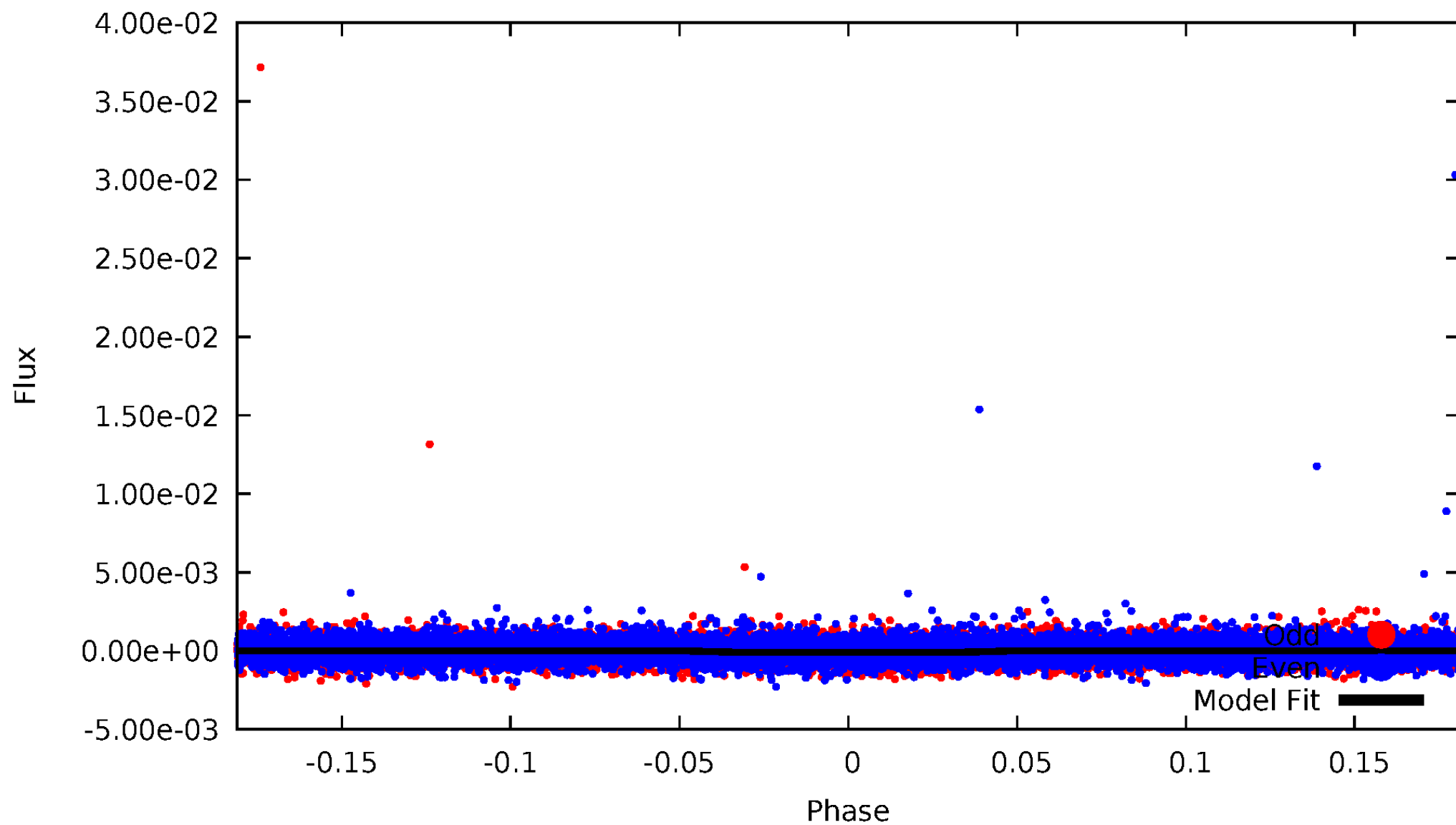


TCE 009777724-01



# DV Odd/Even

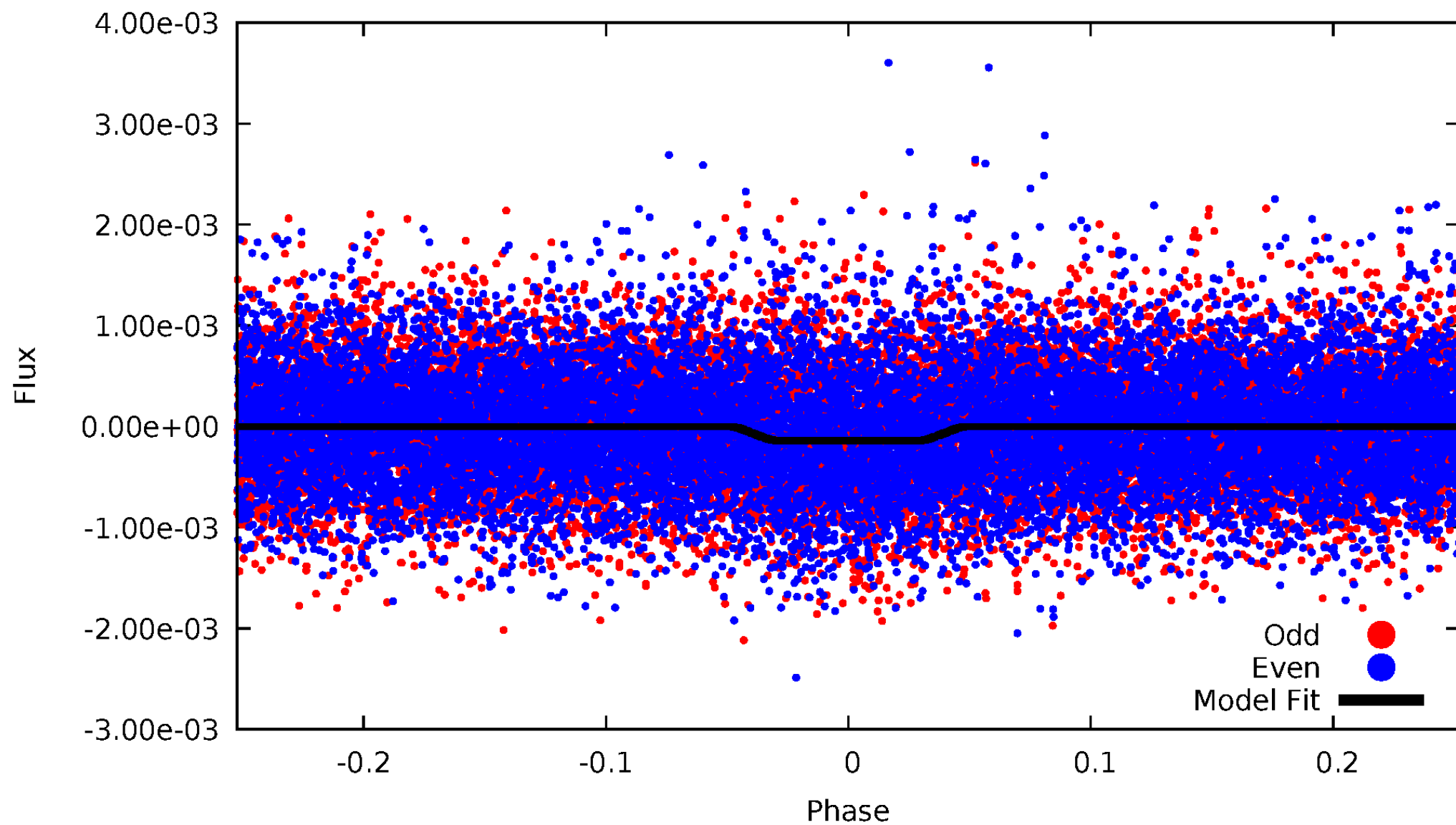
TCE 009777724-01



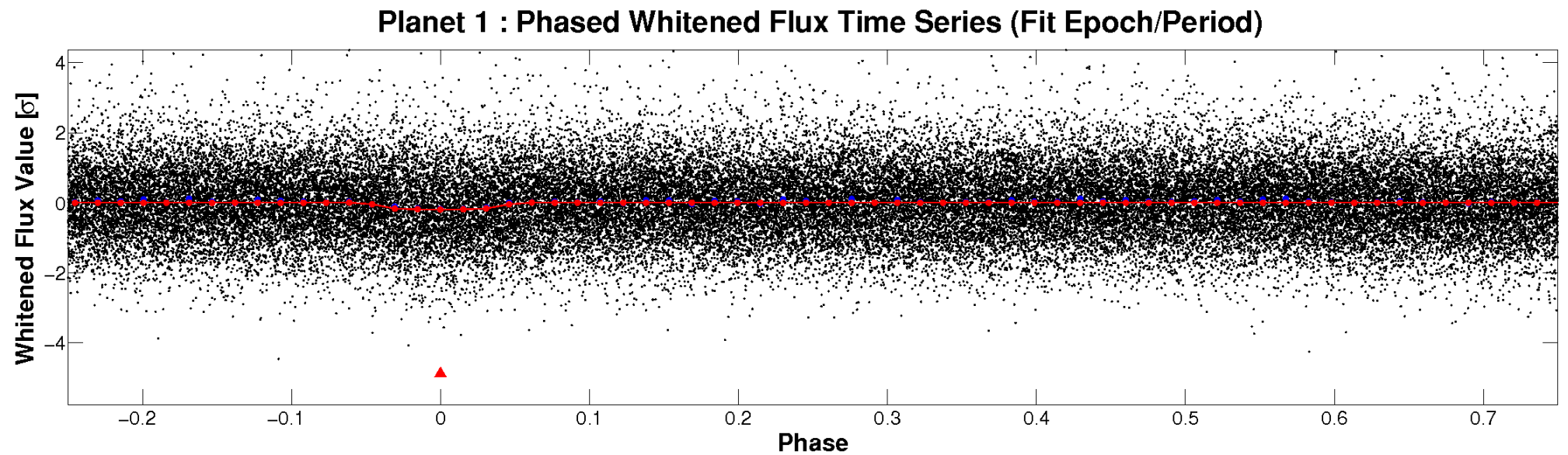
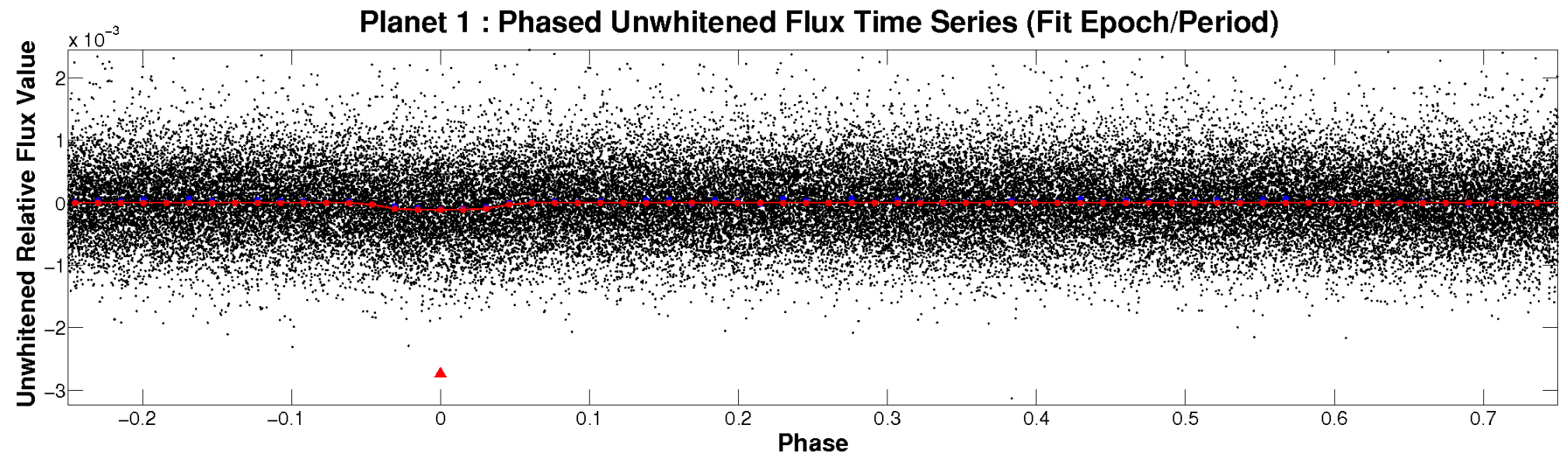


# ALT Odd/Even

TCE 009777724-01

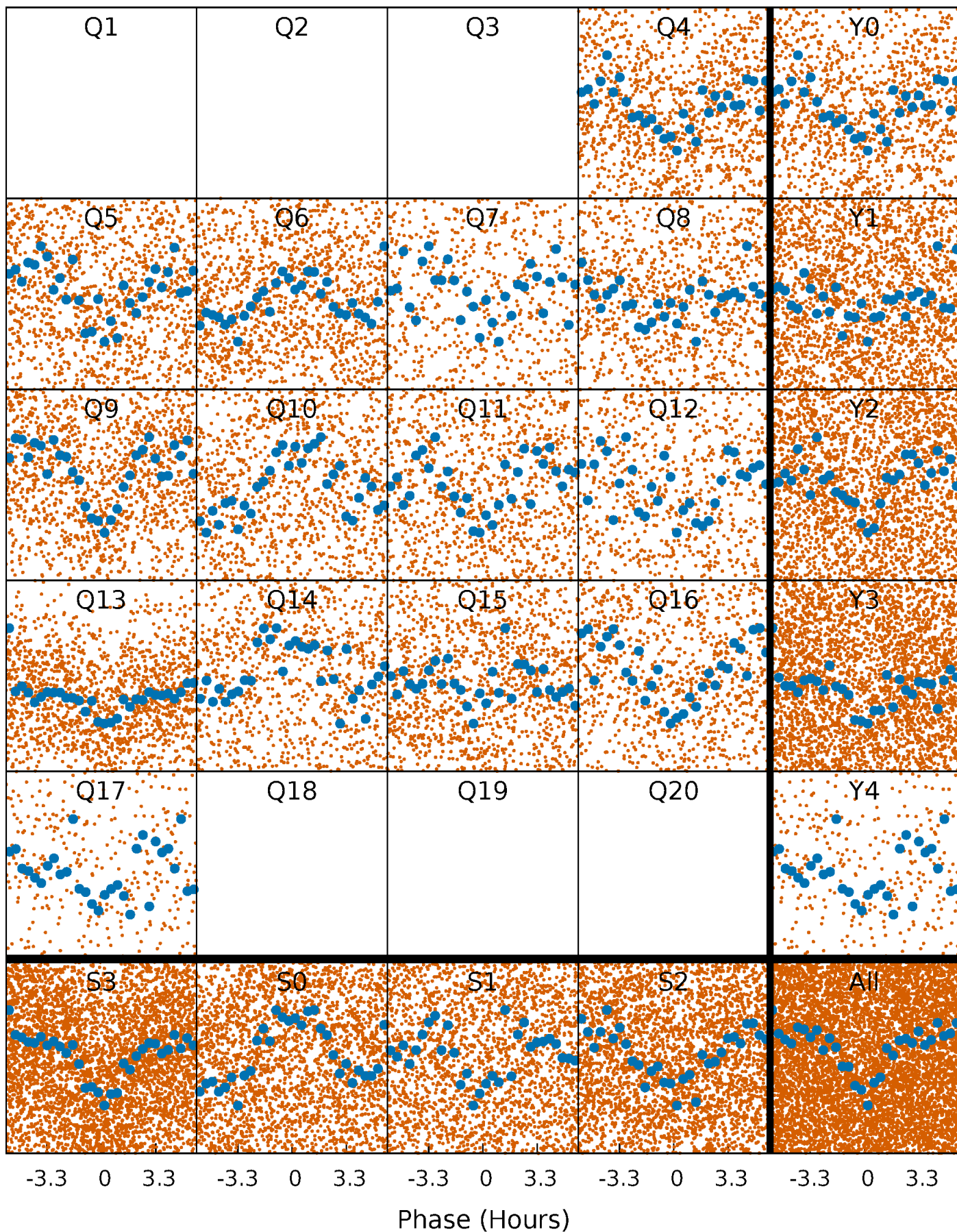


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

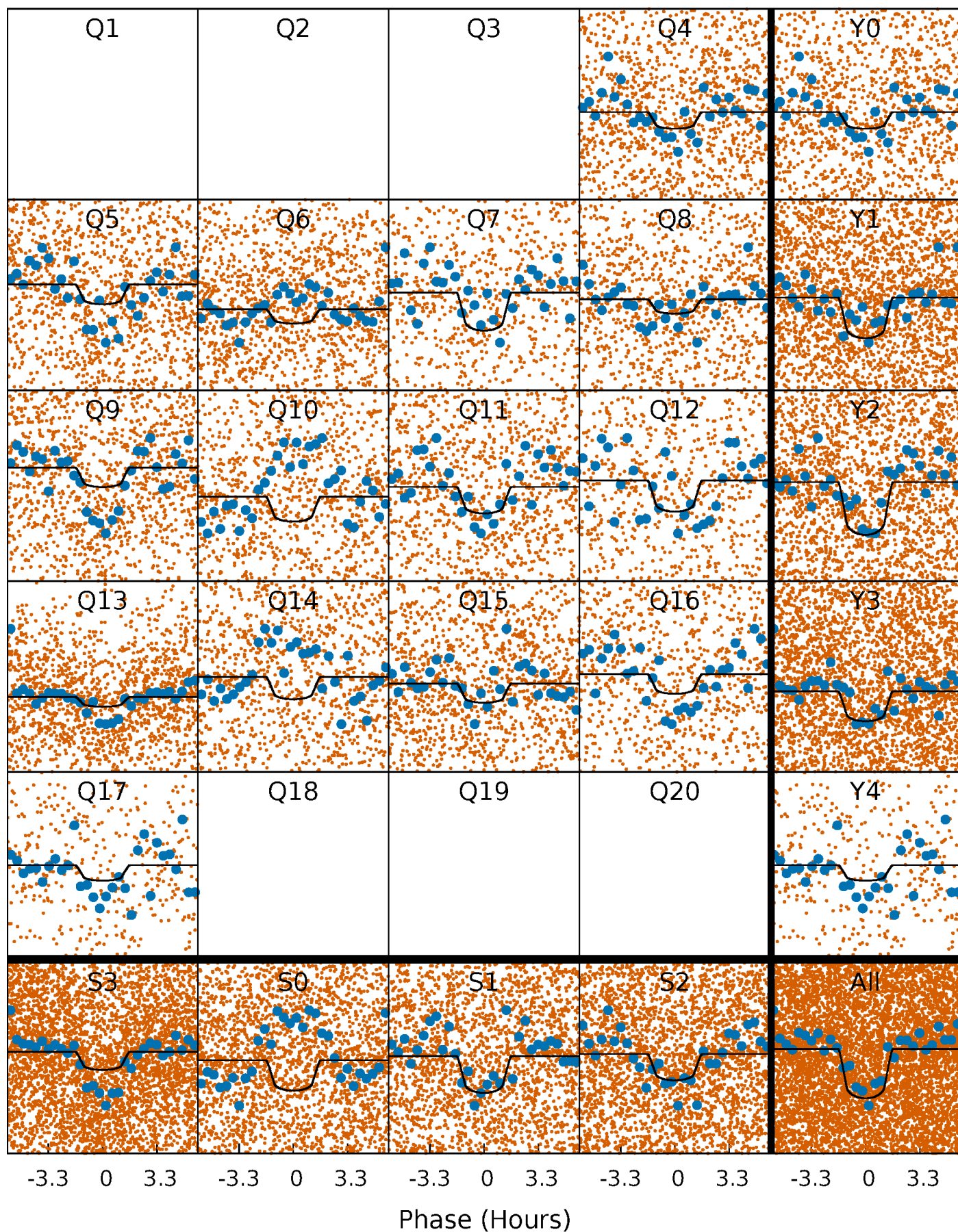
TCE 009777724-01 P= 1.332567 Days  $T_0=132.043569$  (BKJD)





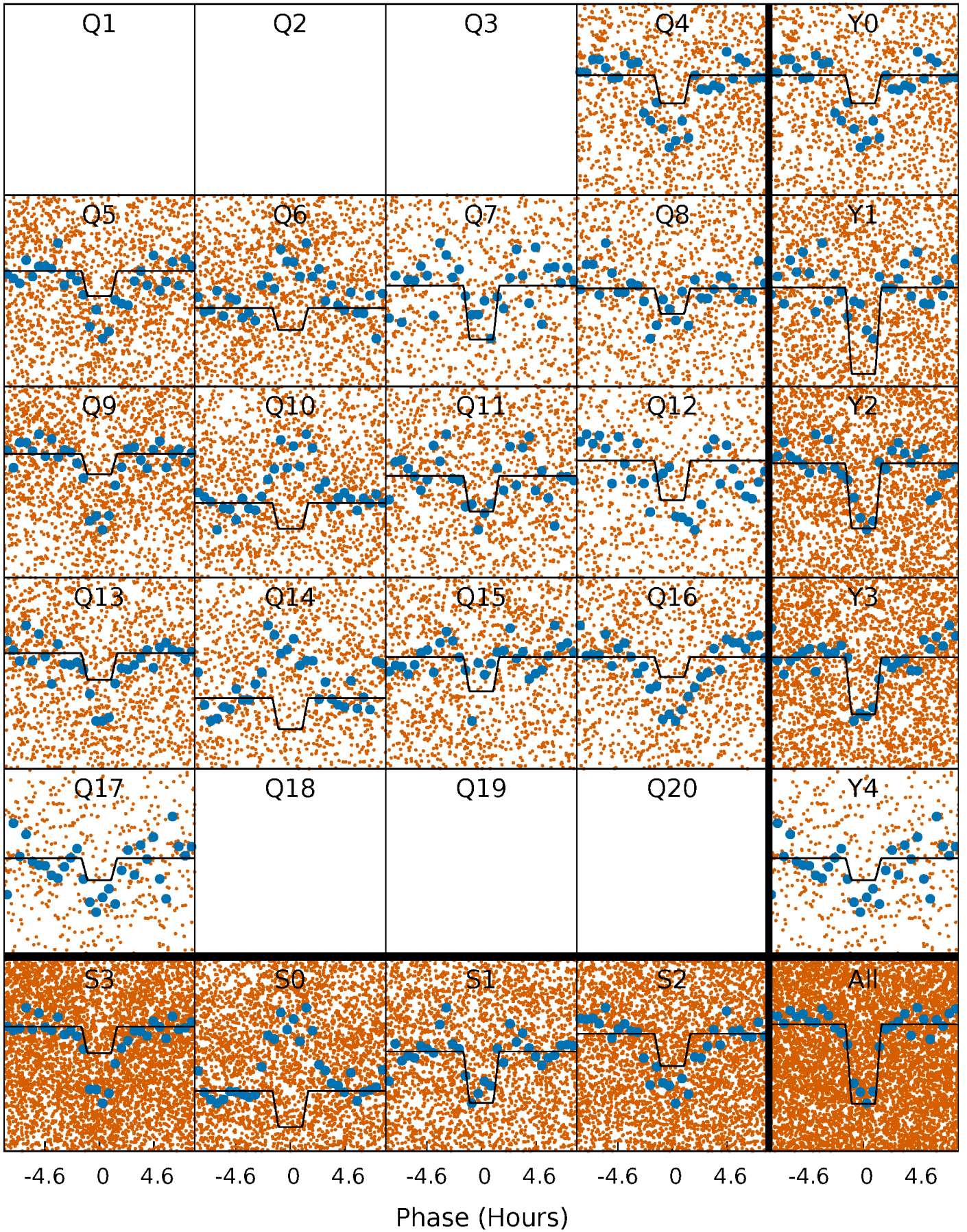
# DV Quarter-Phased Transit Curves

TCE 009777724-01 P= 1.332567 Days  $T_0=132.043569$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 009777724-01 P= 1.332579 Days  $T_0=132.036521$  (BKJD)

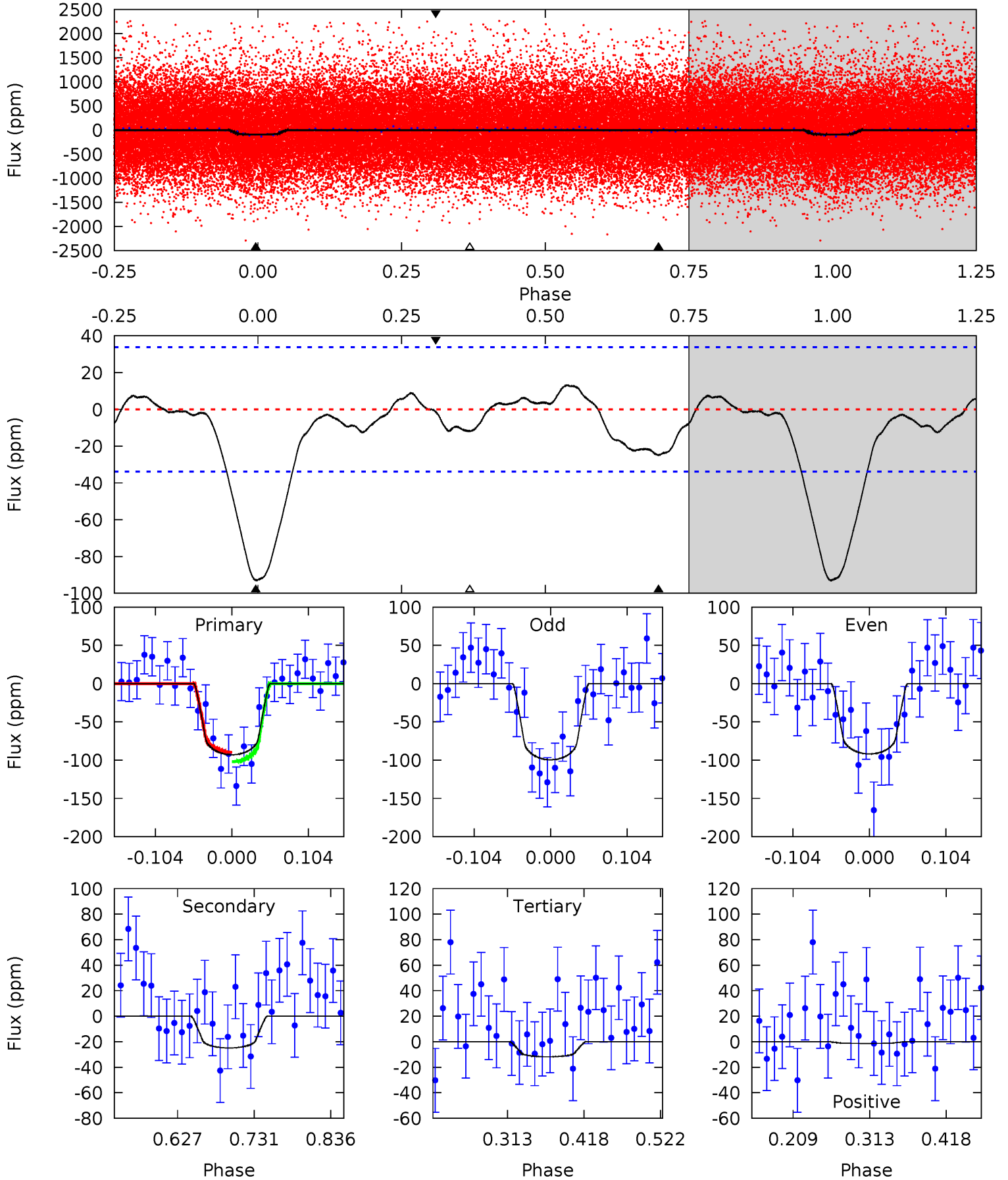




# DV Model-Shift Uniqueness Test

009777724-01, P = 1.332567 Days, E = 132.043569 Days

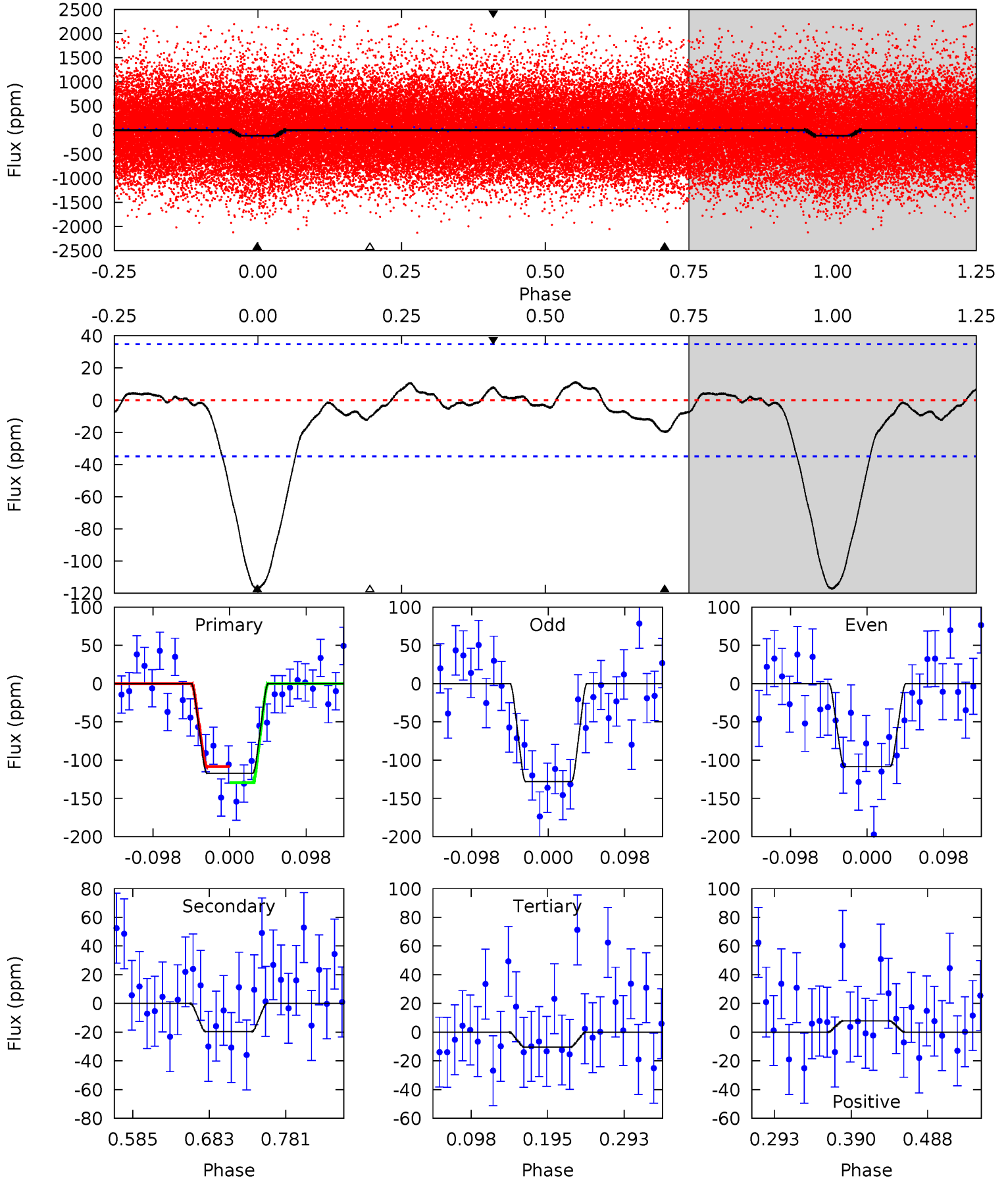
| Pri  | Sec  | Ter  | Pos   | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|-------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 12.5 | 3.35 | 1.59 | -0.18 | 4.56            | 1.62            | 0.89             | 10.9    | 12.7    | 1.76    | 3.53    | 0.52    | 0.86 | 0.12  | 0.83 |



# Alt Model-Shift Uniqueness Test

009777724-01, P = 1.332579 Days, E = 132.036521 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  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 15.3 | 2.57 | 1.37 | 1.03 | 4.57            | 1.66            | 0.71             | 14.0    | 14.3    | 1.20    | 1.54    | 1.29    | 0.87 | 0.09  | 1.37 |





### Stellar Parameters For KIC 009777724

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R (R_{\odot})$           | $M(M_{\odot})$            | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $6384^{+175}_{-263}$ | $4.419^{+0.068}_{-0.189}$ | $-0.160^{+0.250}_{-0.300}$ | $1.086^{+0.326}_{-0.140}$ | $1.129^{+0.154}_{-0.154}$ | $1.240^{+0.433}_{-0.625}$                 |
|        | +3%/-4%              | +2%/-4%                   | +156%/-188%                | +30%/-13%                 | +14%/-14%                 | +35%/-50%                                 |
| Source | KIC0                 | 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 009777724-01 / KOI 4197.01

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$     | $T_{\text{max}} (K)$ | $T_{\text{obs}} (K)$  | $A_{\text{obs}}$           |
|---------|-------------|------------------------|----------------------|-----------------------|----------------------------|
| DV      | $-25 \pm 7$ | $1.36^{+0.75}_{-0.65}$ | $2637^{+181}_{-144}$ | $4392^{+1537}_{-752}$ | $4.191^{+11.318}_{-2.481}$ |
| Alt.    | $-20 \pm 8$ | $1.47^{+0.71}_{-0.66}$ | $2644^{+174}_{-145}$ | $4066^{+1176}_{-732}$ | $2.998^{+7.457}_{-1.878}$  |

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature

$T_{\text{obs}}$  = Observed Planetary Temperature (Assuming A=0.3)

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

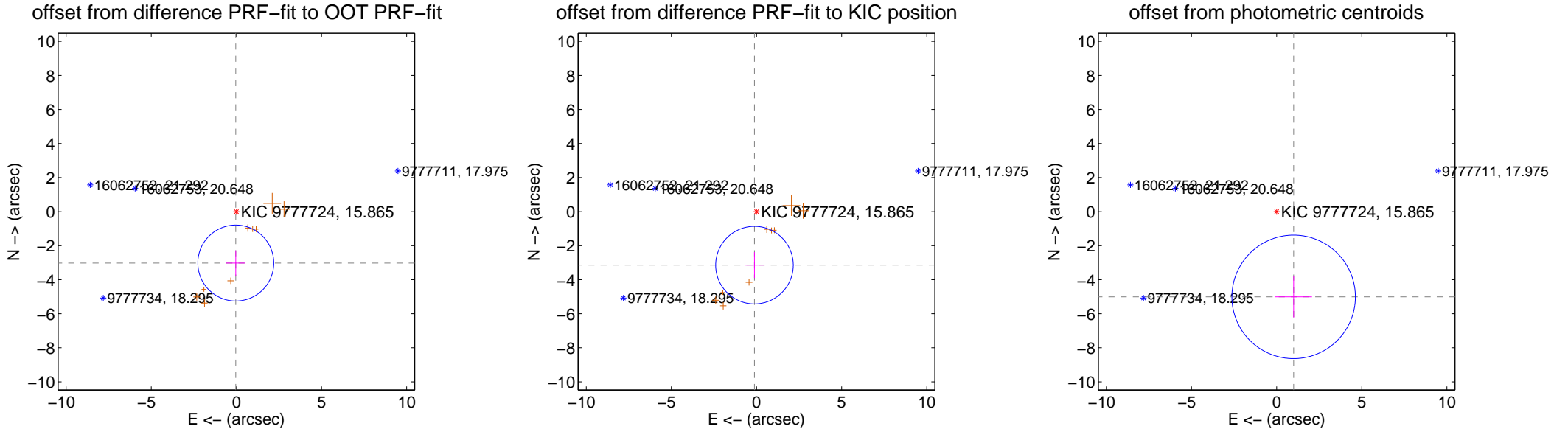
## DV Centroid Data

Supplemental centroid analysis for 009777724-01. Kepler magnitude: 15.87. Transit SNR 11.50

There are 0 quarters with good PRF difference image offsets

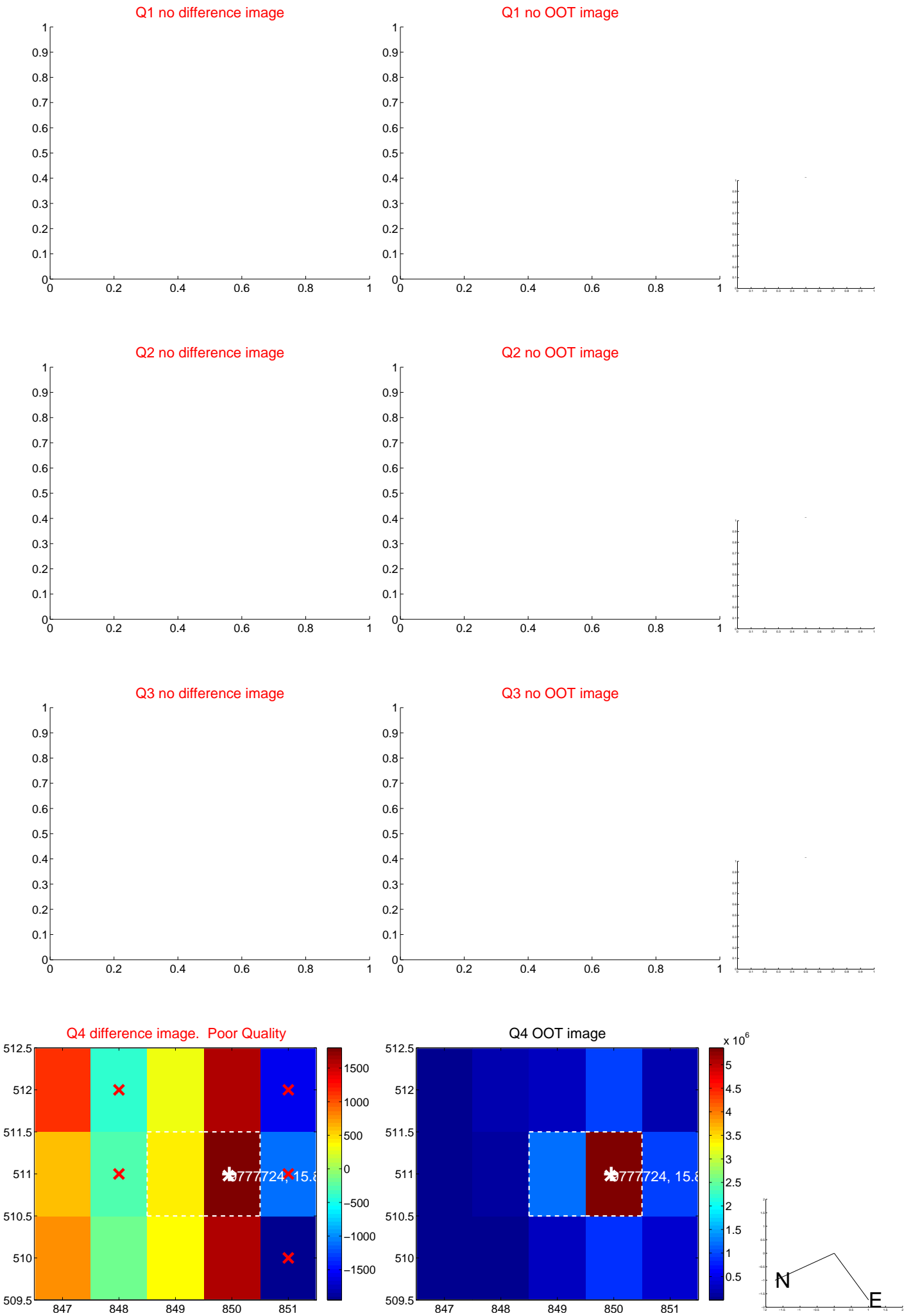
The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA       | $\Delta$ Dec       |
|---|--------------------|---------------------|-------------------|--------------------|
| PRF-fit source offset from OOT          | $3.022 \pm 0.744$  | 4.06                | $0.035 \pm 0.571$ | $-3.021 \pm 0.744$ |
| PRF-fit source offset from KIC position | $3.146 \pm 0.760$  | 4.14                | $0.121 \pm 0.568$ | $-3.144 \pm 0.760$ |
| photometric centroid source offset      | $5.11 \pm 1.21$    | 4.22                | $-1.00 \pm 1.08$  | $-5.01 \pm 1.21$   |

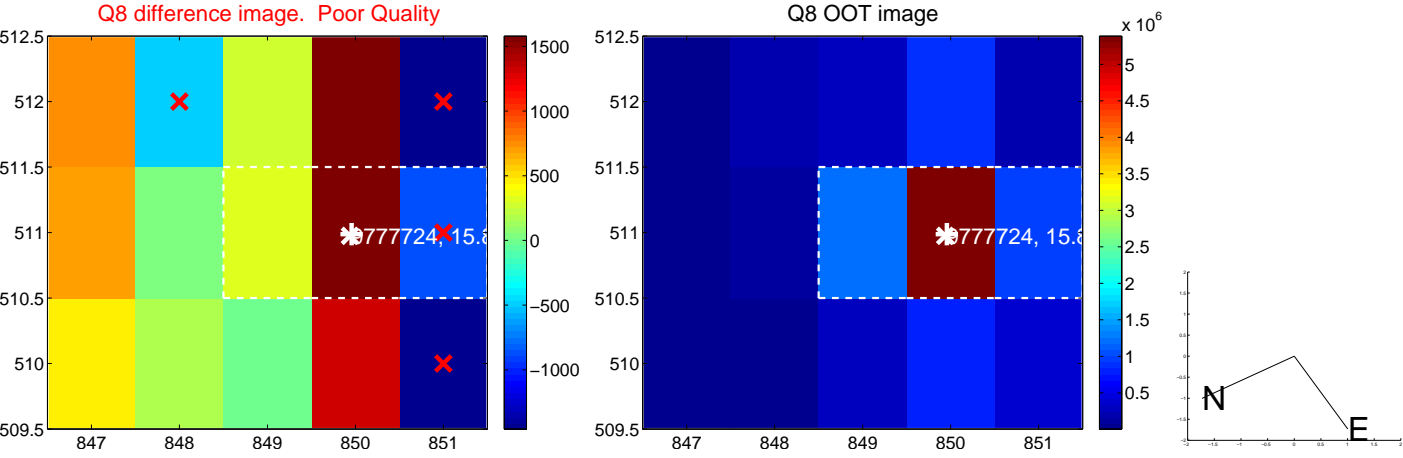
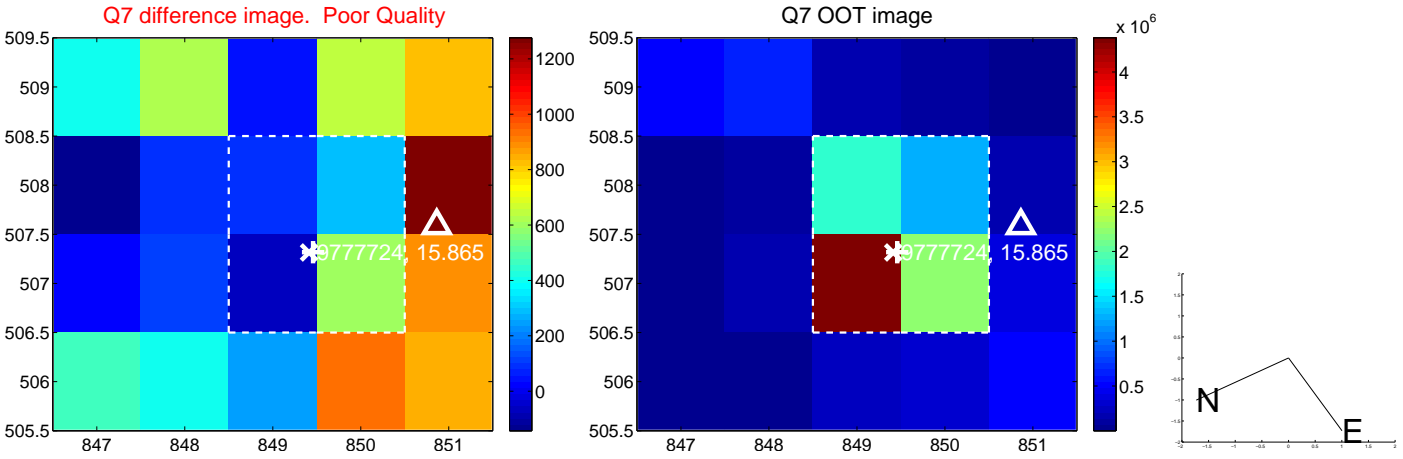
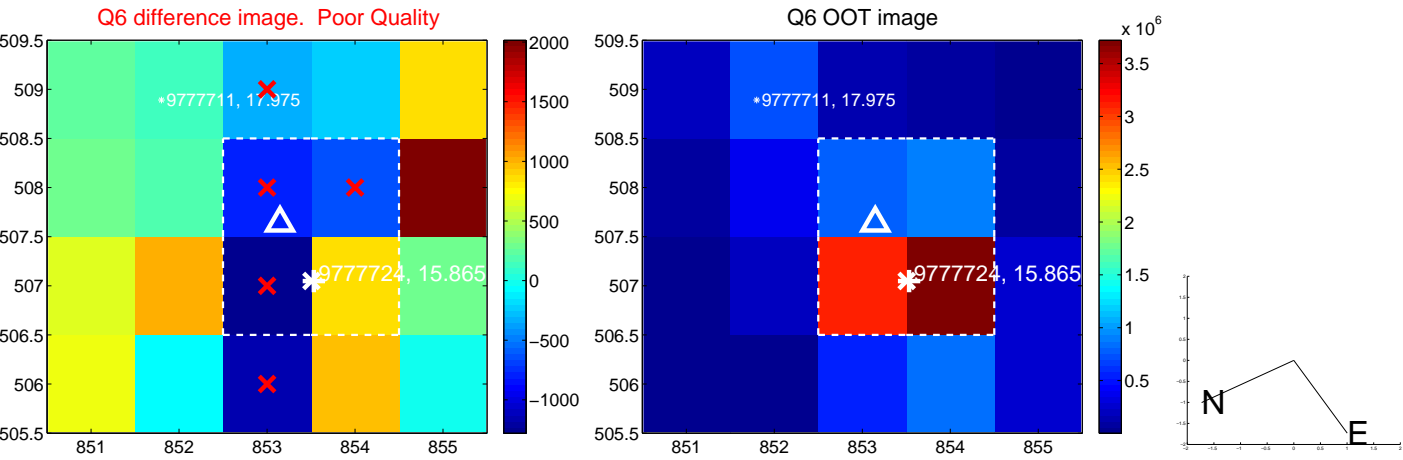
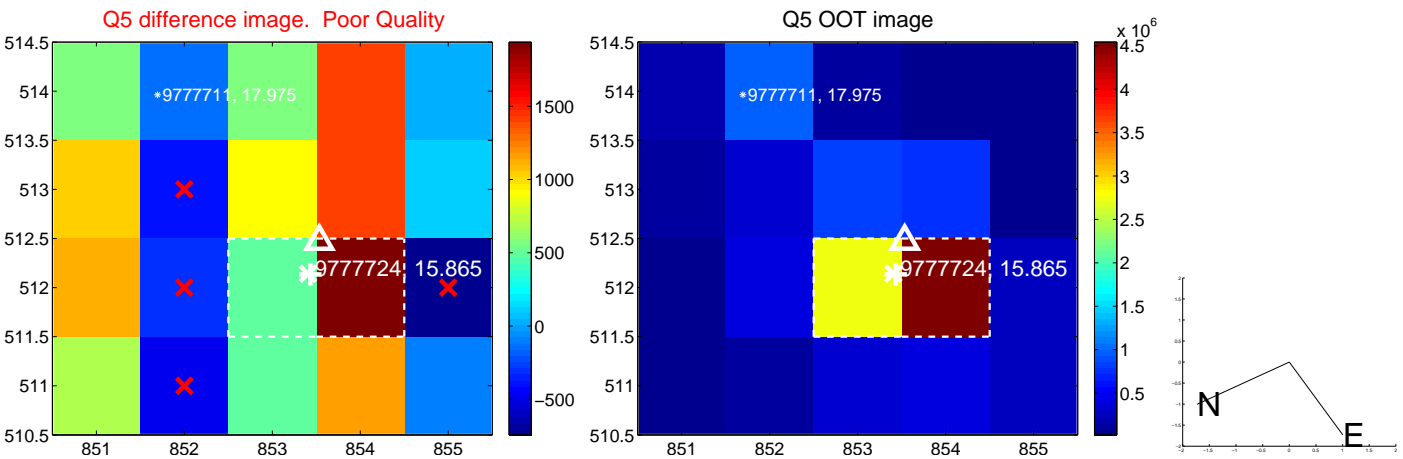


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . 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 ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.

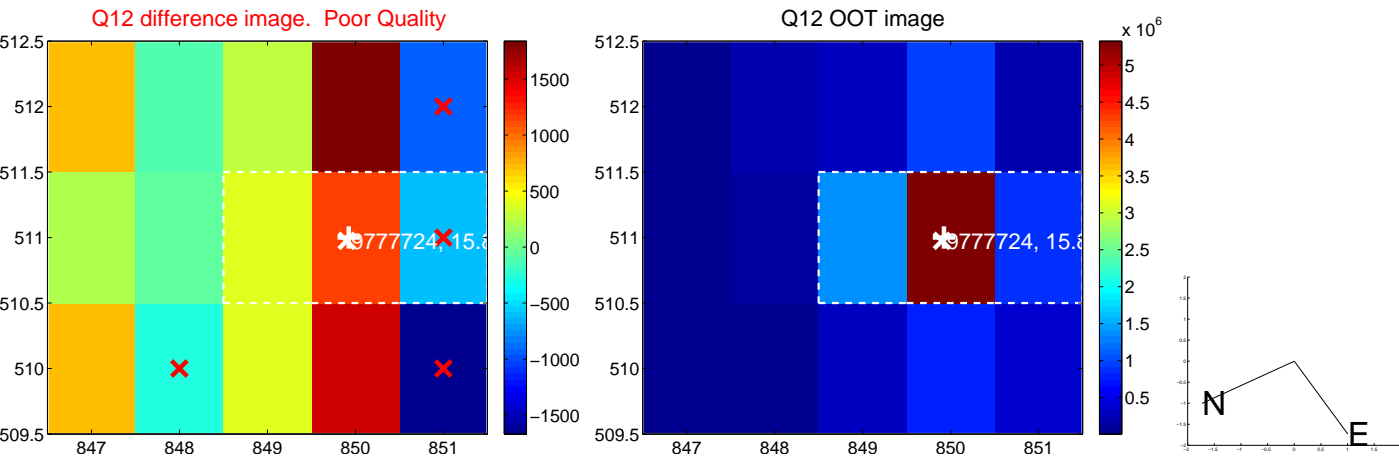
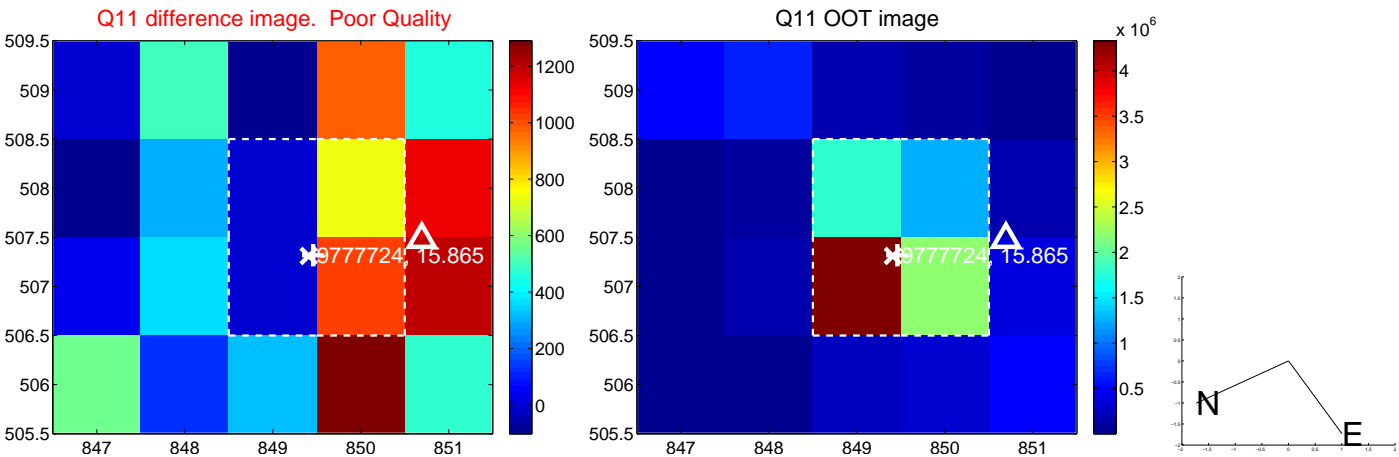
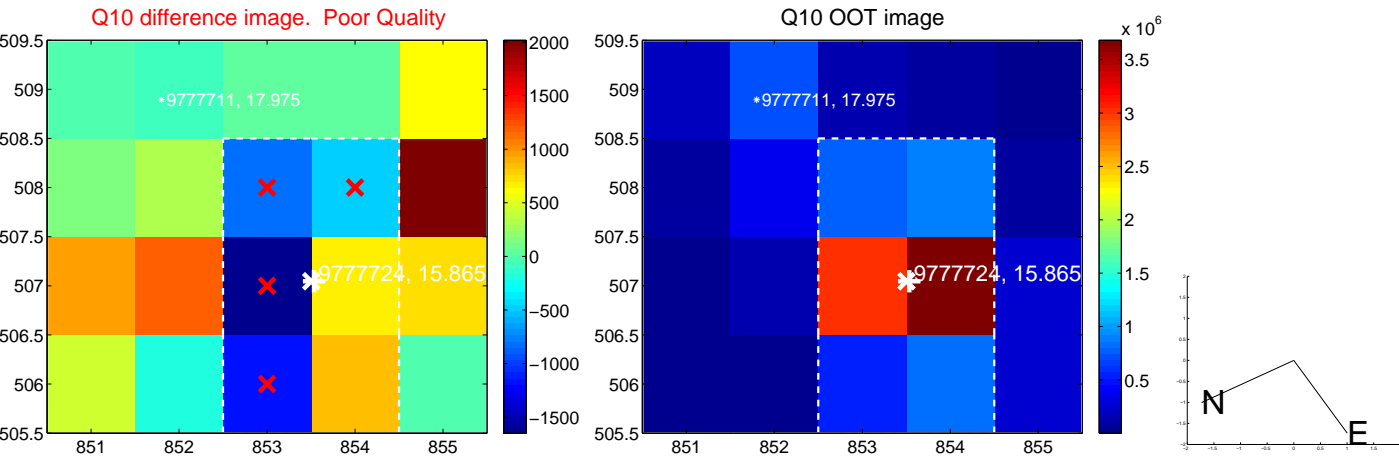
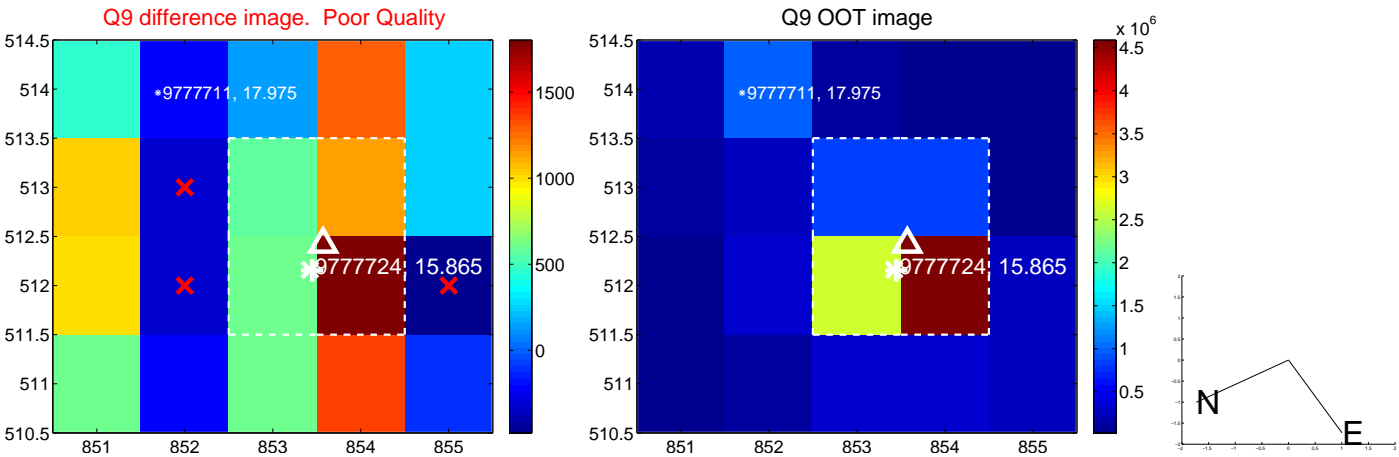


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

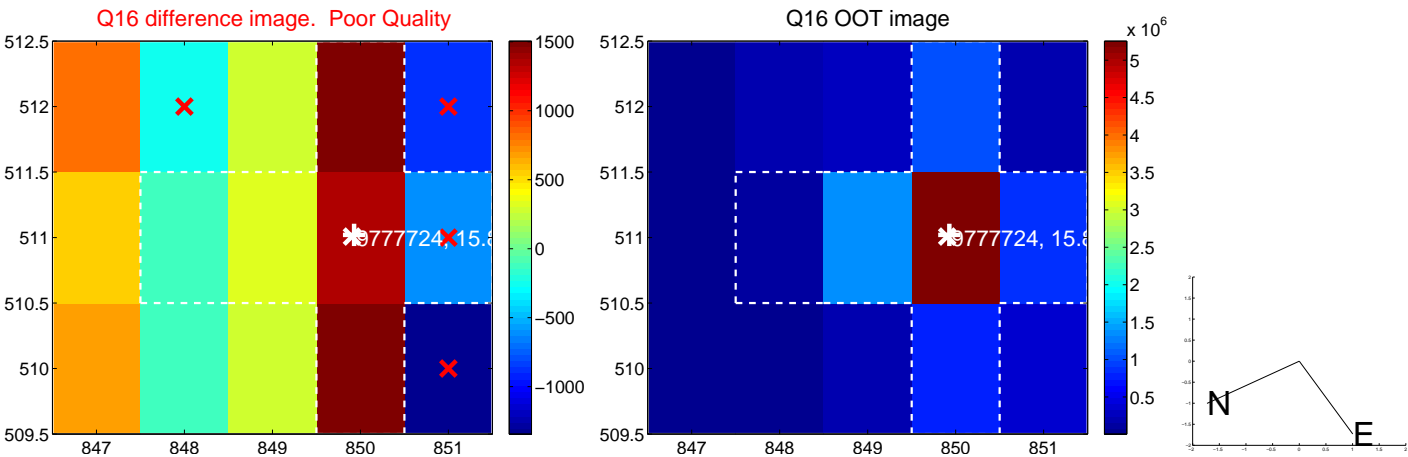
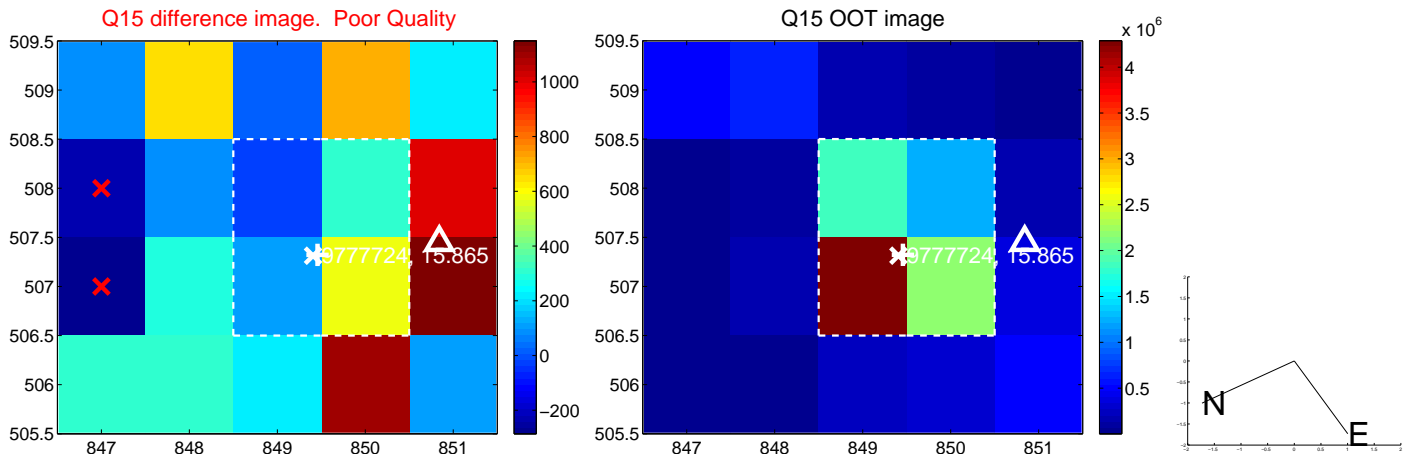
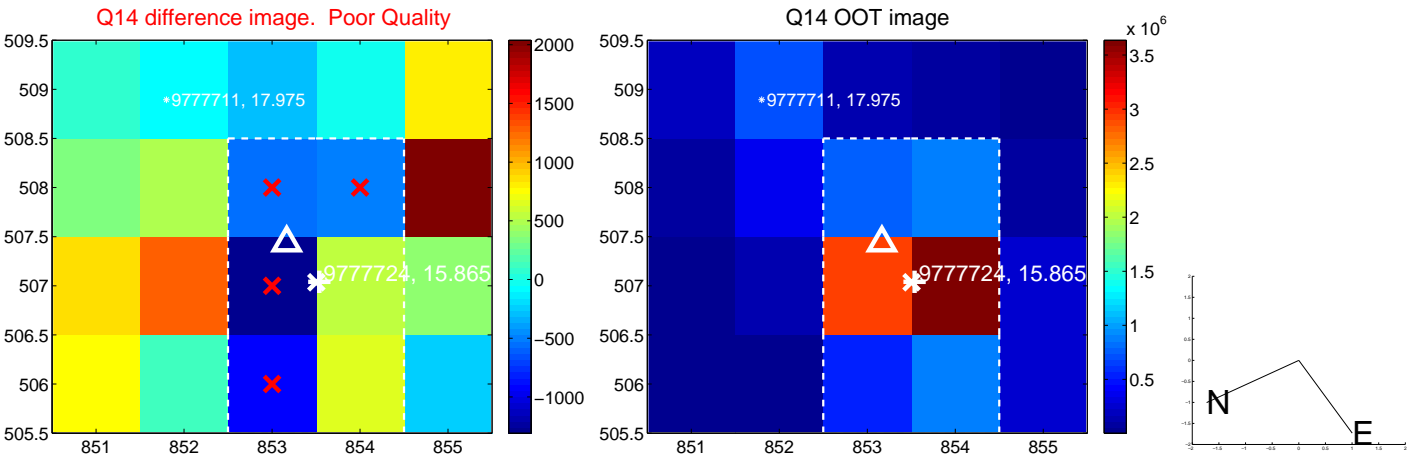
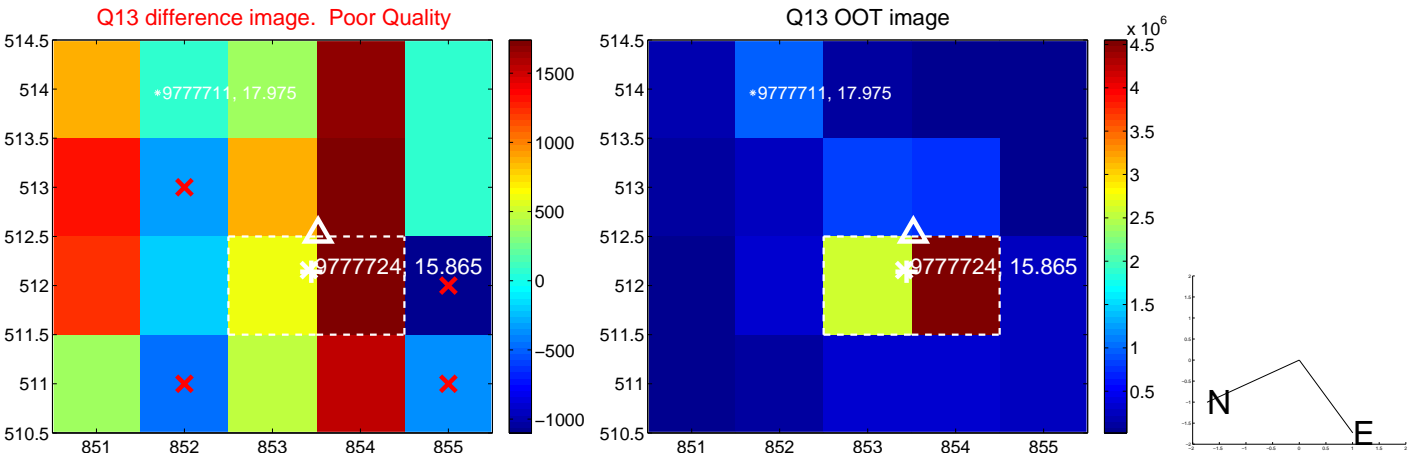




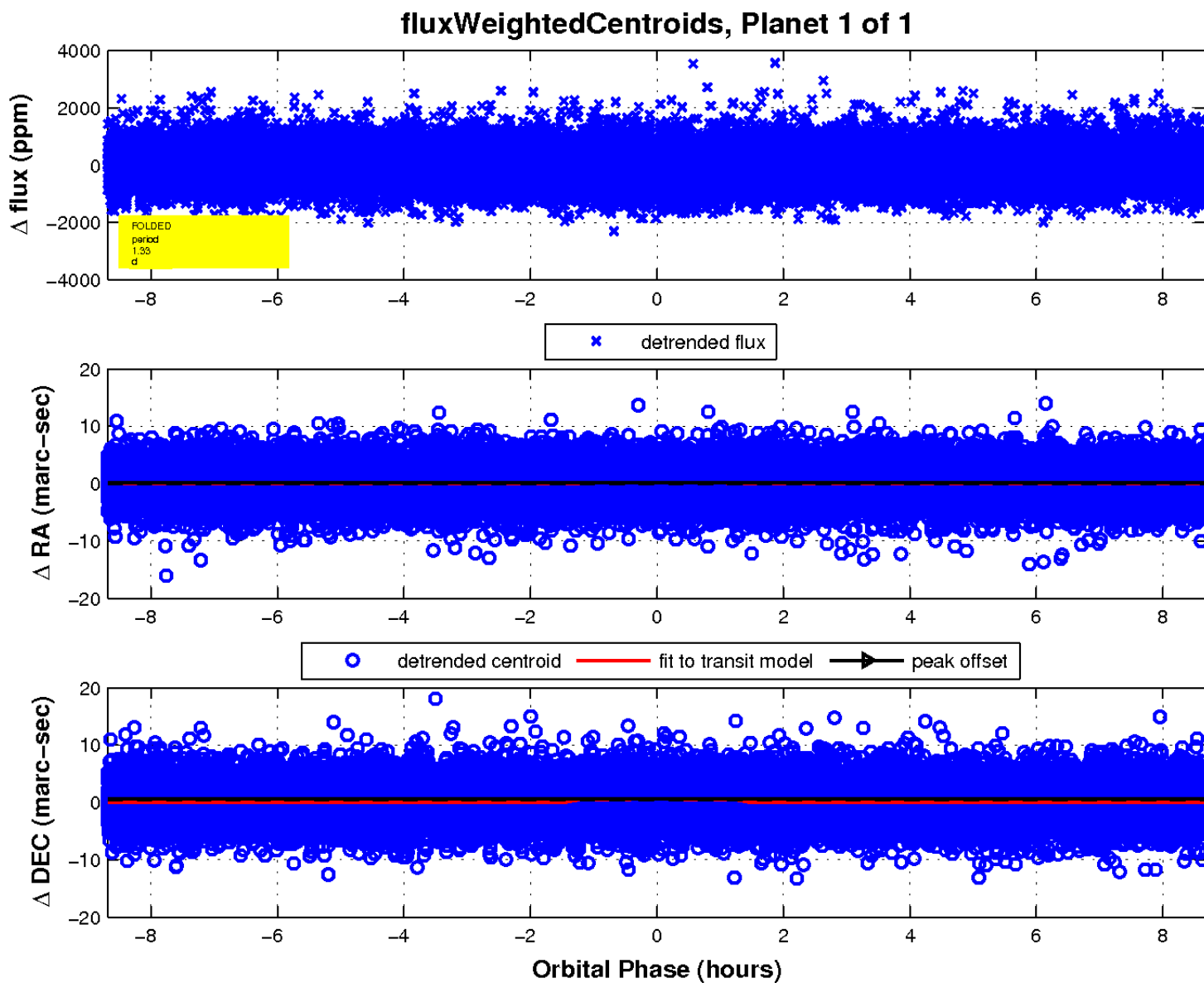
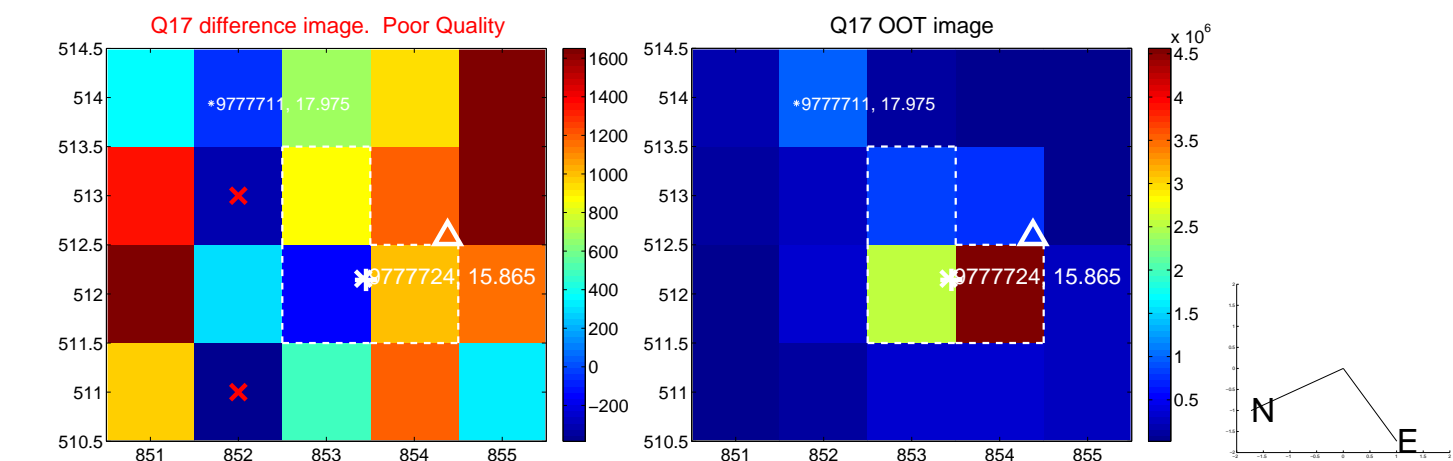
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image

