

# KIC 009972067

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|------|---------------|--------------|-------------|------------------|-----|-----|-----------------------------|-----------------|------------------------|------------------------|
| 009972067-01 | OBS      | No   | 374.398235    | 482.989671   | 688.6       | 3.374            | 7.2 | 7.1 | 0.66                        | 5125            | 1.83                   | 0.35                   |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments   |
|--------------|----------|------|-------|---|---|---|---|--|
| 009972067-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS |

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

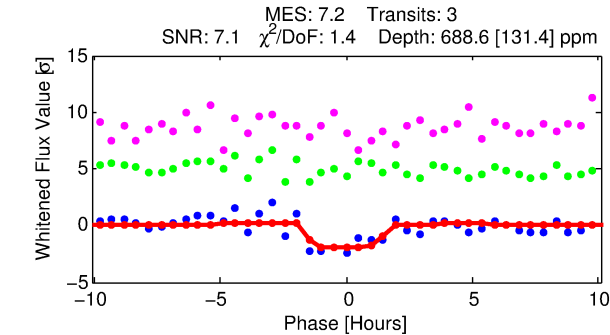
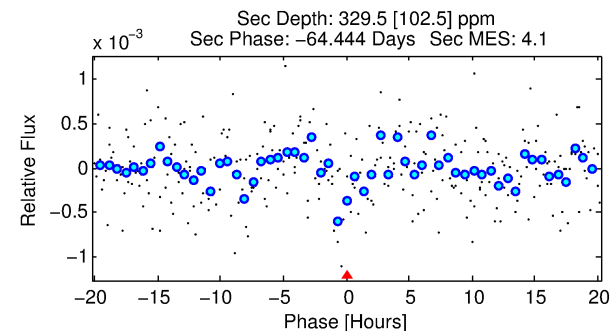
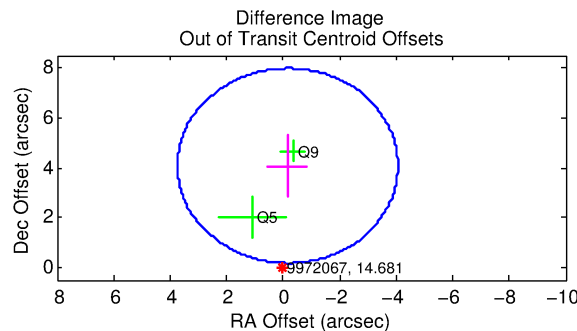
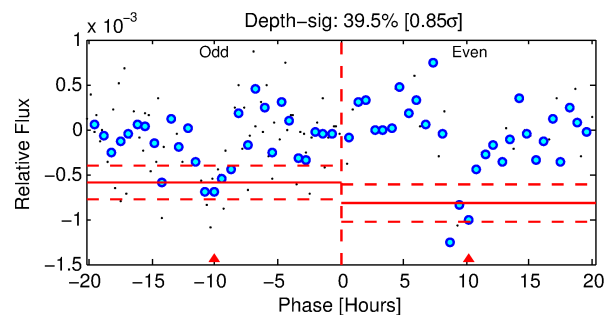
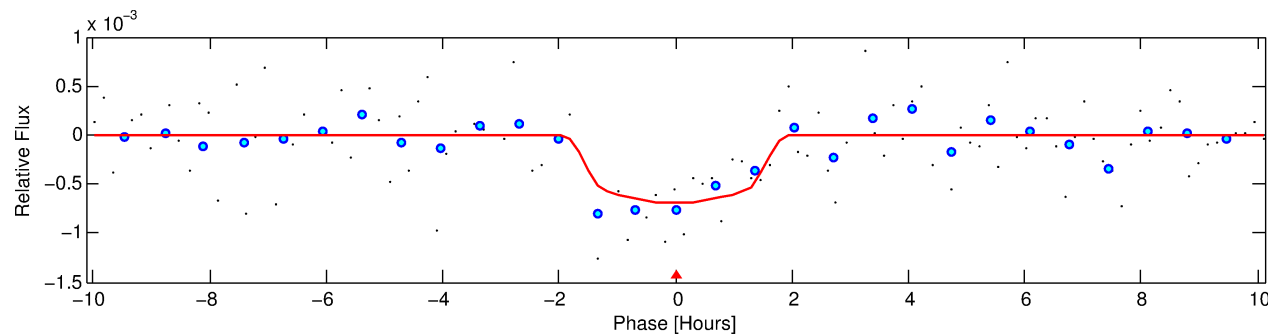
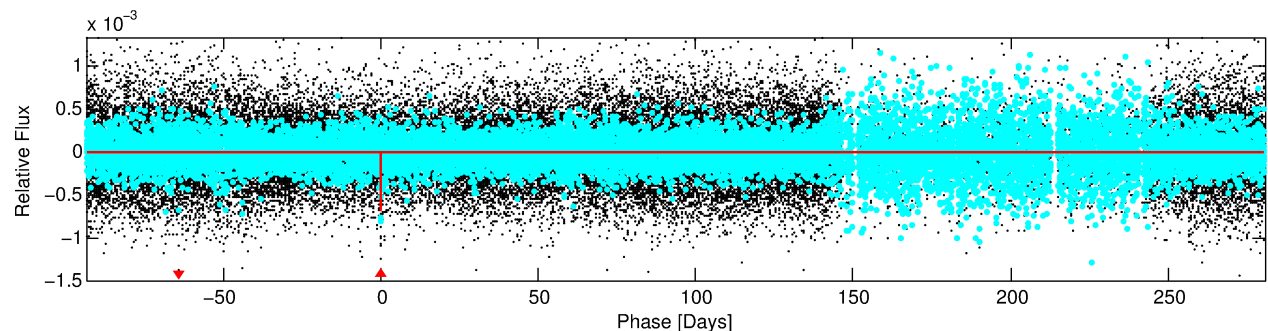
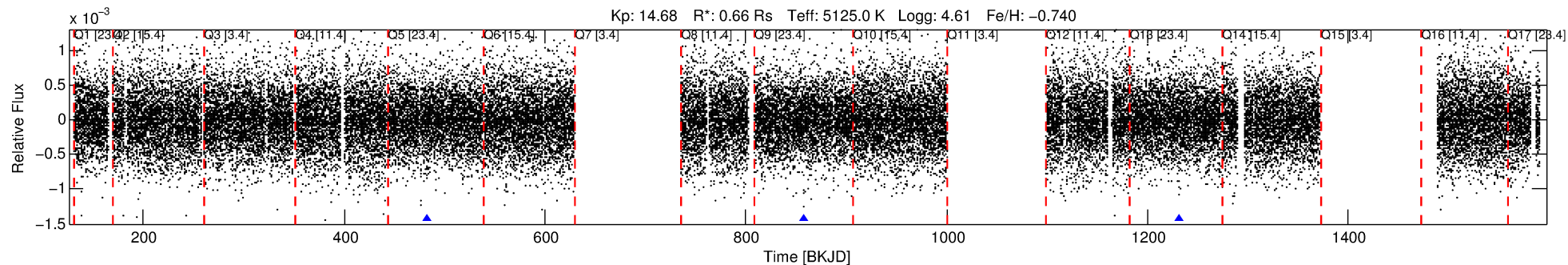
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009972067-01

No Significant Match Found

# DV One-Page Summary

KIC: 9972067 Candidate: 1 of 1 Period: 374.398 d



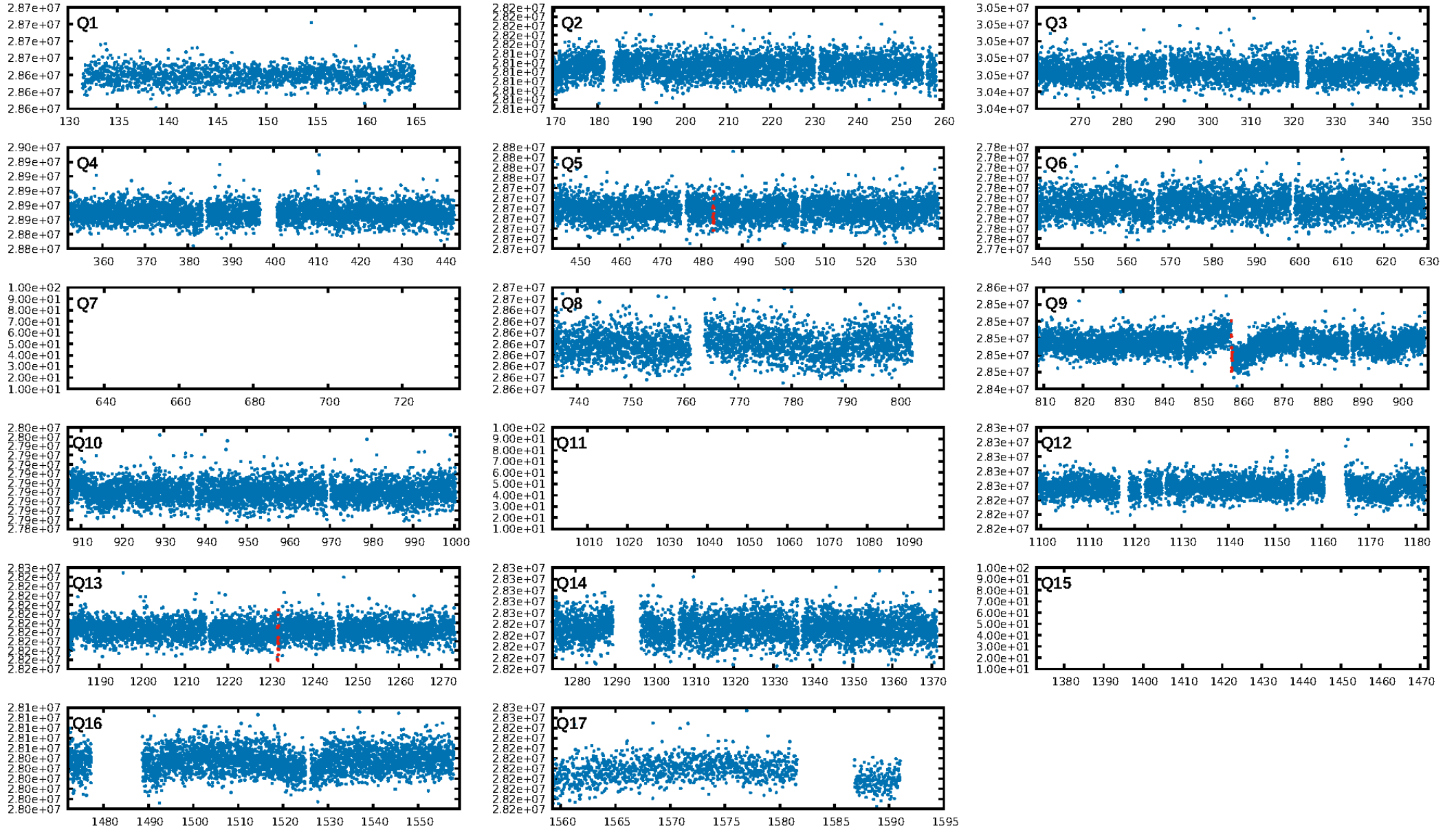
## DV Fit Results:

Period = 374.39823 [0.01233] d  
Epoch = 482.9897 [0.0096] BKJD  
Rp/R\* = 0.0255 [0.0773]  
a/R\* = 648.80 [7820.47]  
b = 0.68 [9.62]  
Seff = 0.35 [0.06]  
Teq = 196 [9] K  
Rp = 1.83 [5.53] Re  
a = 0.8760 [0.0741] AU  
Ag = 41698.24 [252972.03] [0.16 $\sigma$ ]  
Teffp = 4323 [6556] K [0.63 $\sigma$ ]

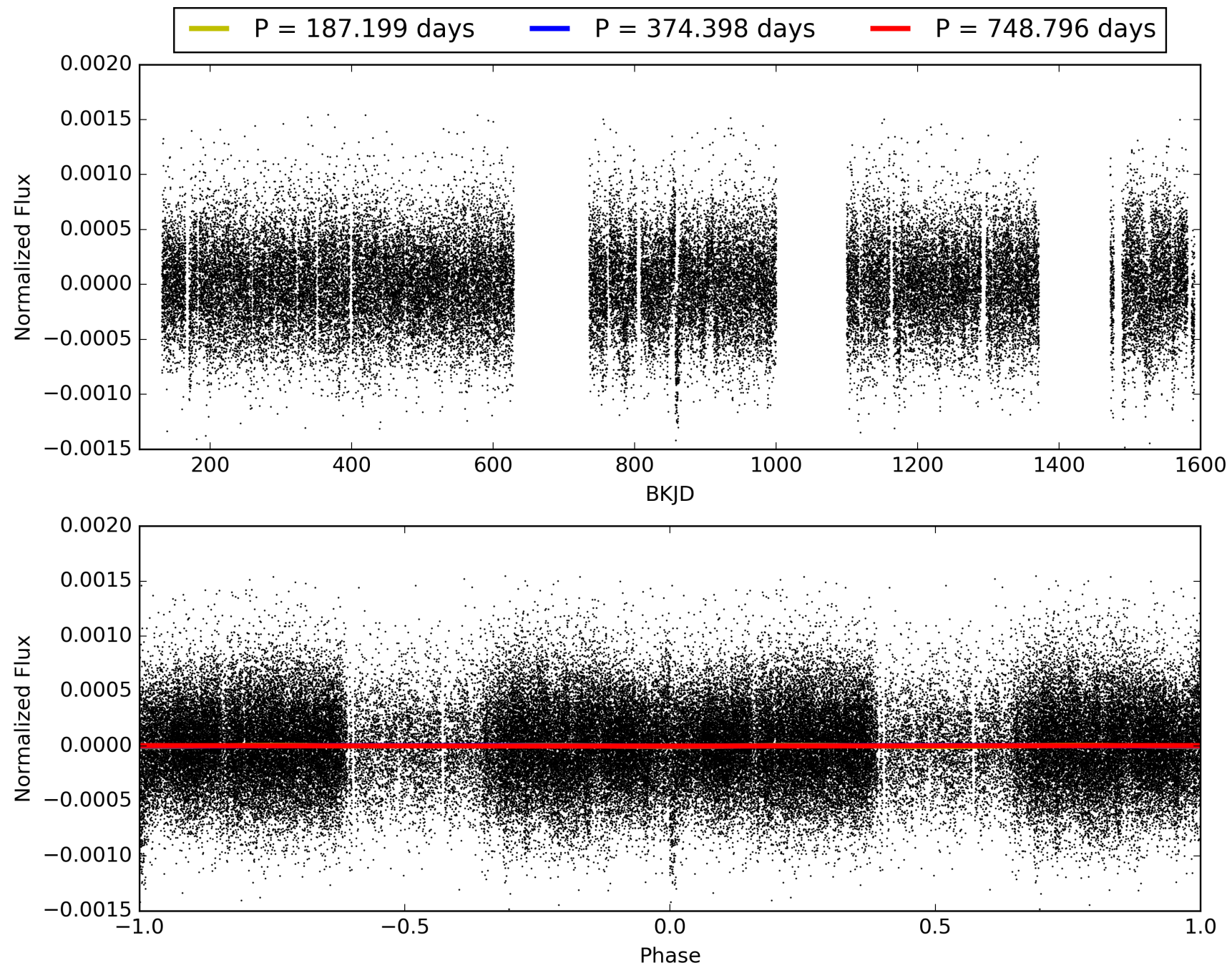
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 25.8%  
ModelChiSquareGof-sig: 94.5%  
**Bootstrap-pfa: 3.83e-12**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 3.016  
Centroid-sig: 13.6%  
Centroid-so: 2.276 arcsec [1.17 $\sigma$ ]  
**OotOffset-rm: 4.078 arcsec [3.14 $\sigma$ ]**  
**KicOffset-rm: 3.877 arcsec [3.03 $\sigma$ ]**  
OotOffset-st: 0/0/0/2 [2]  
KicOffset-st: 0/0/0/2 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 1.00 [2/2]

# TCE 009972067-01, PDC Light Curves

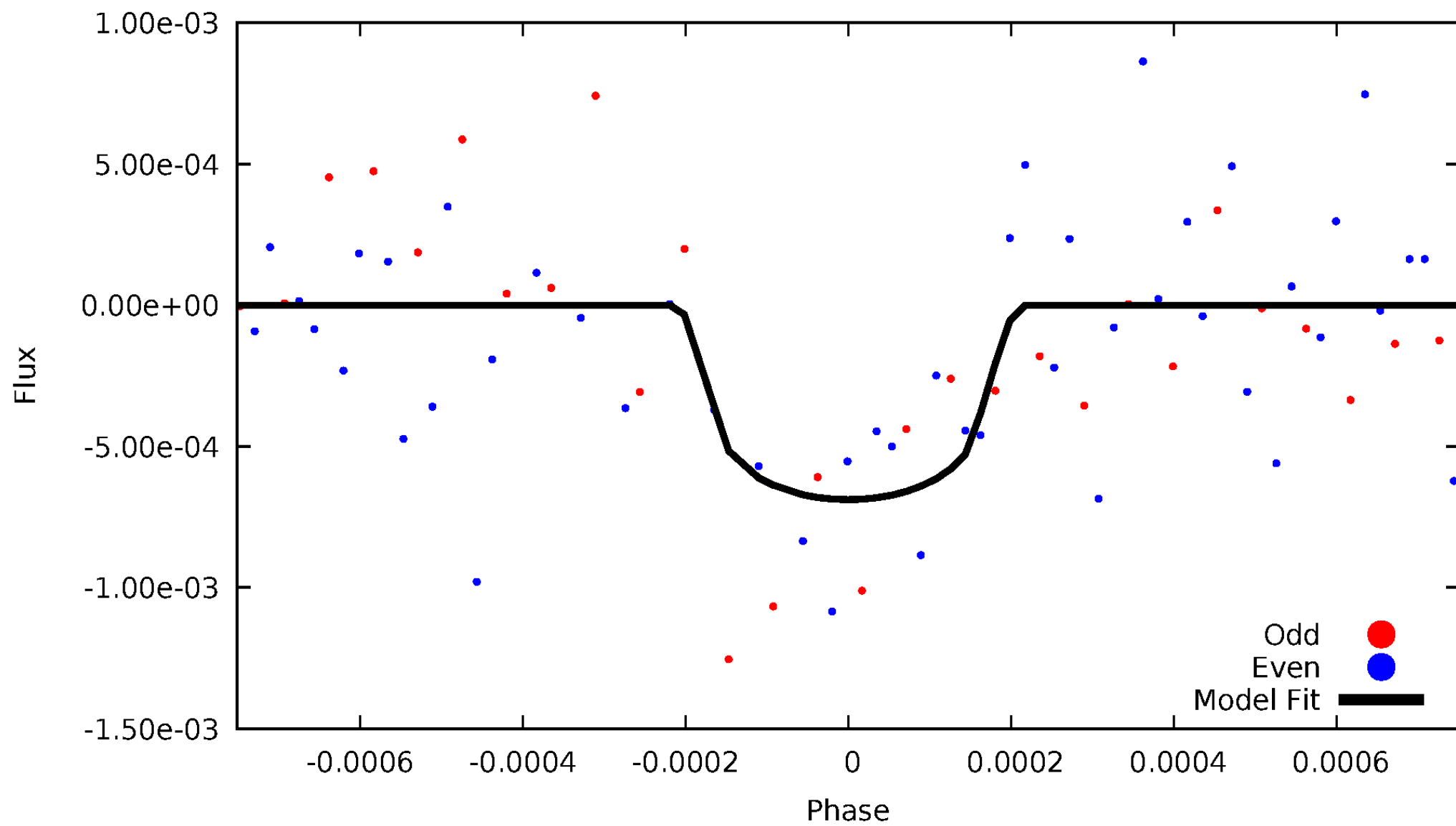


TCE 009972067-01



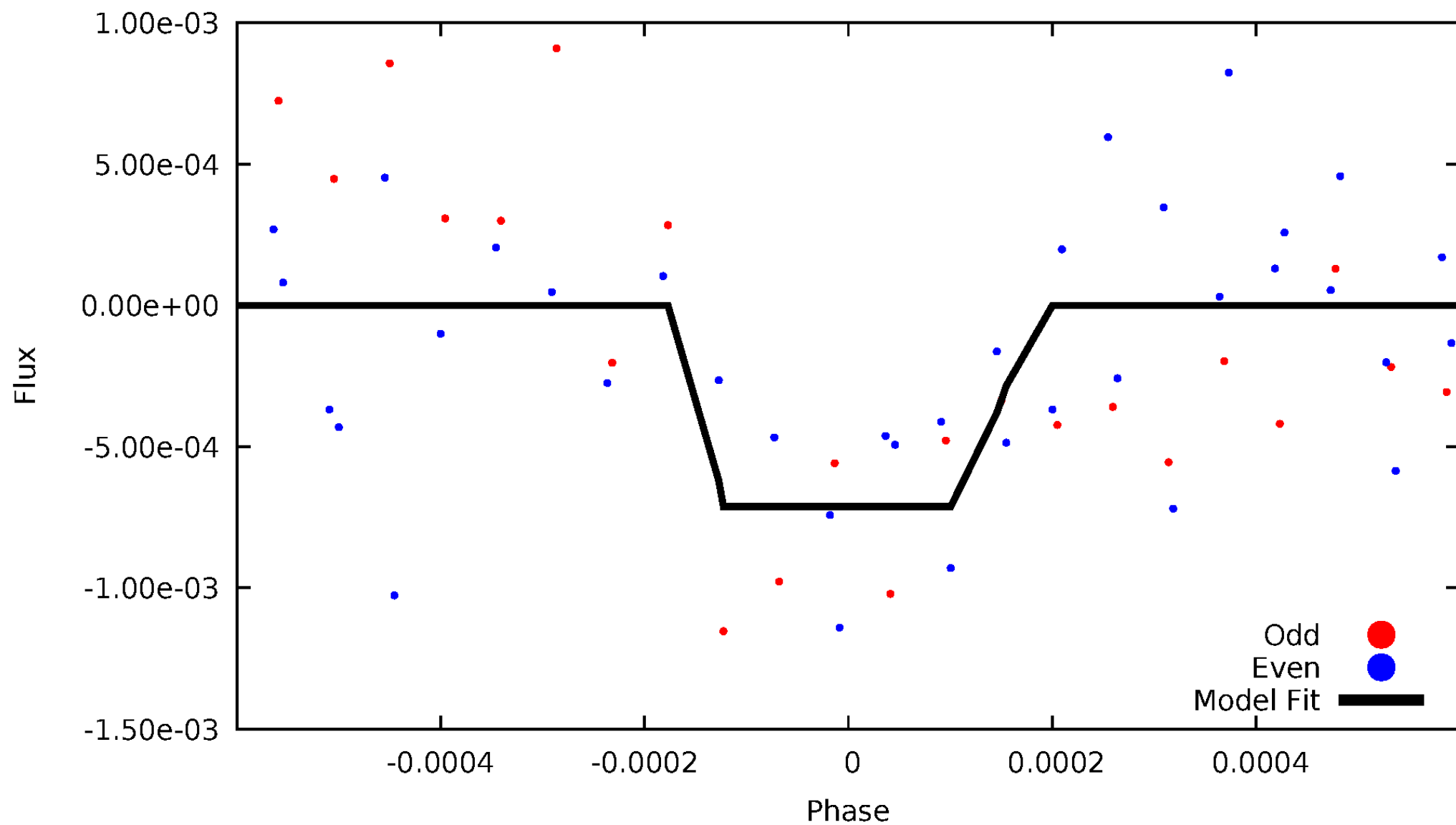
# DV Odd/Even

TCE 009972067-01



# ALT Odd/Even

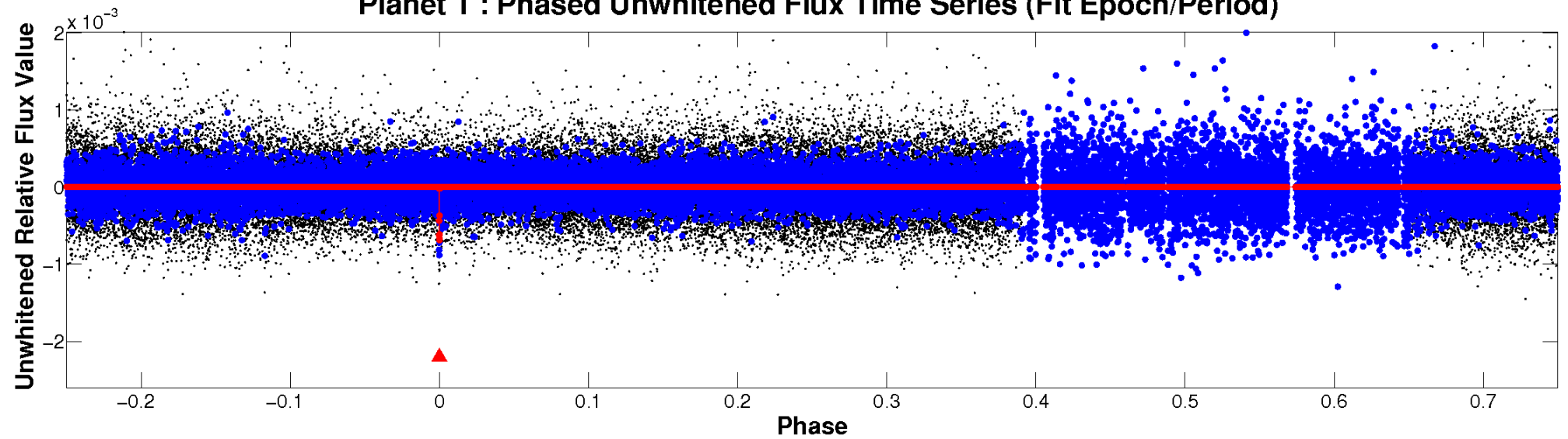
TCE 009972067-01



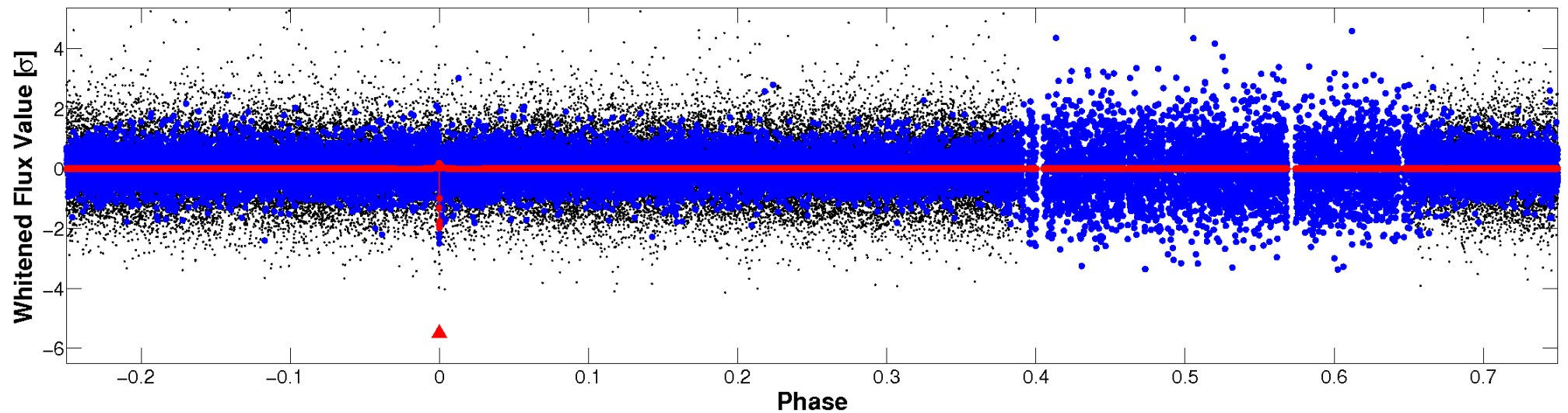


# Non-Whitened Vs. Whitened Light Curve

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

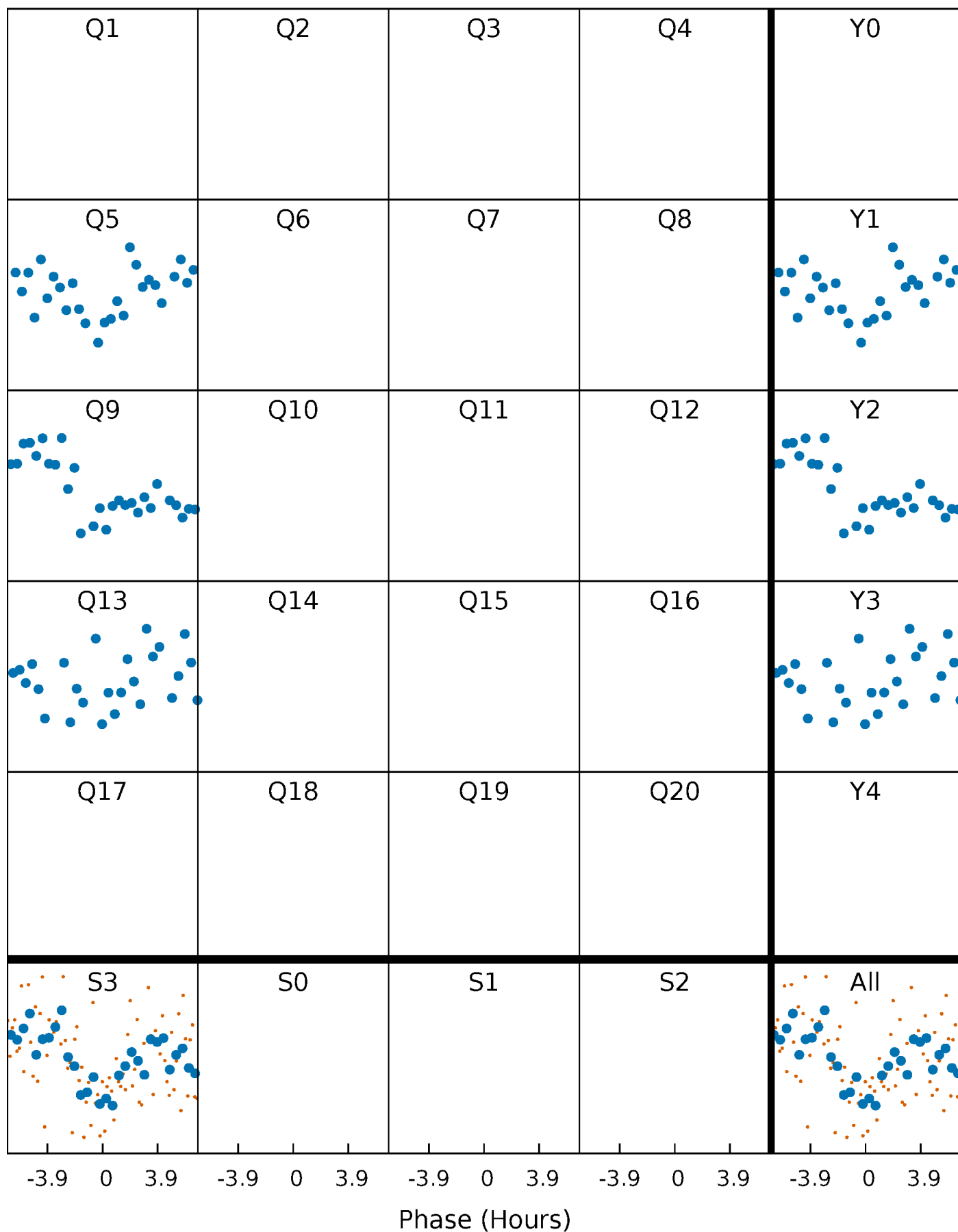


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

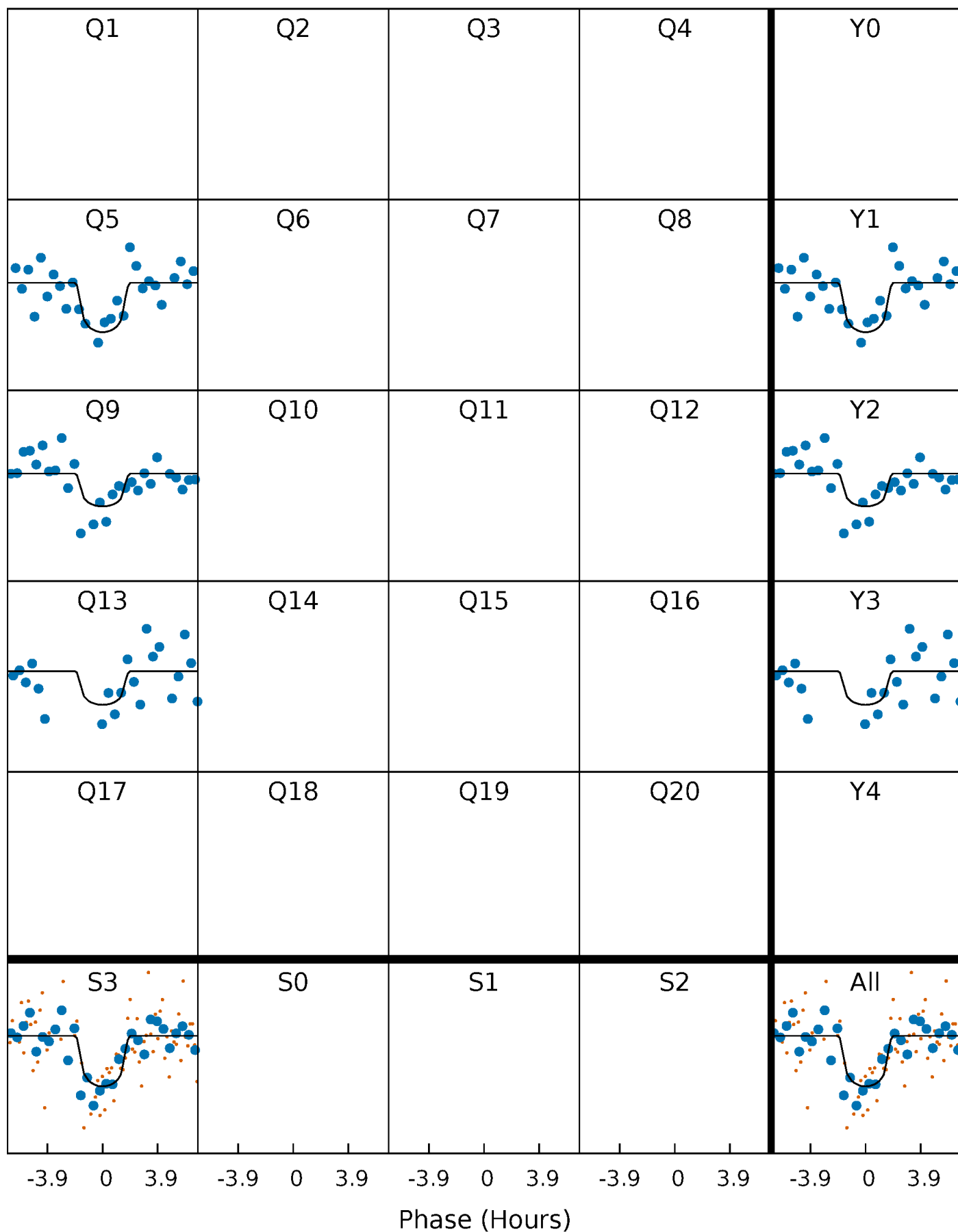
TCE 009972067-01     $P=374.398235$  Days     $T_0=482.989671$  (BKJD)





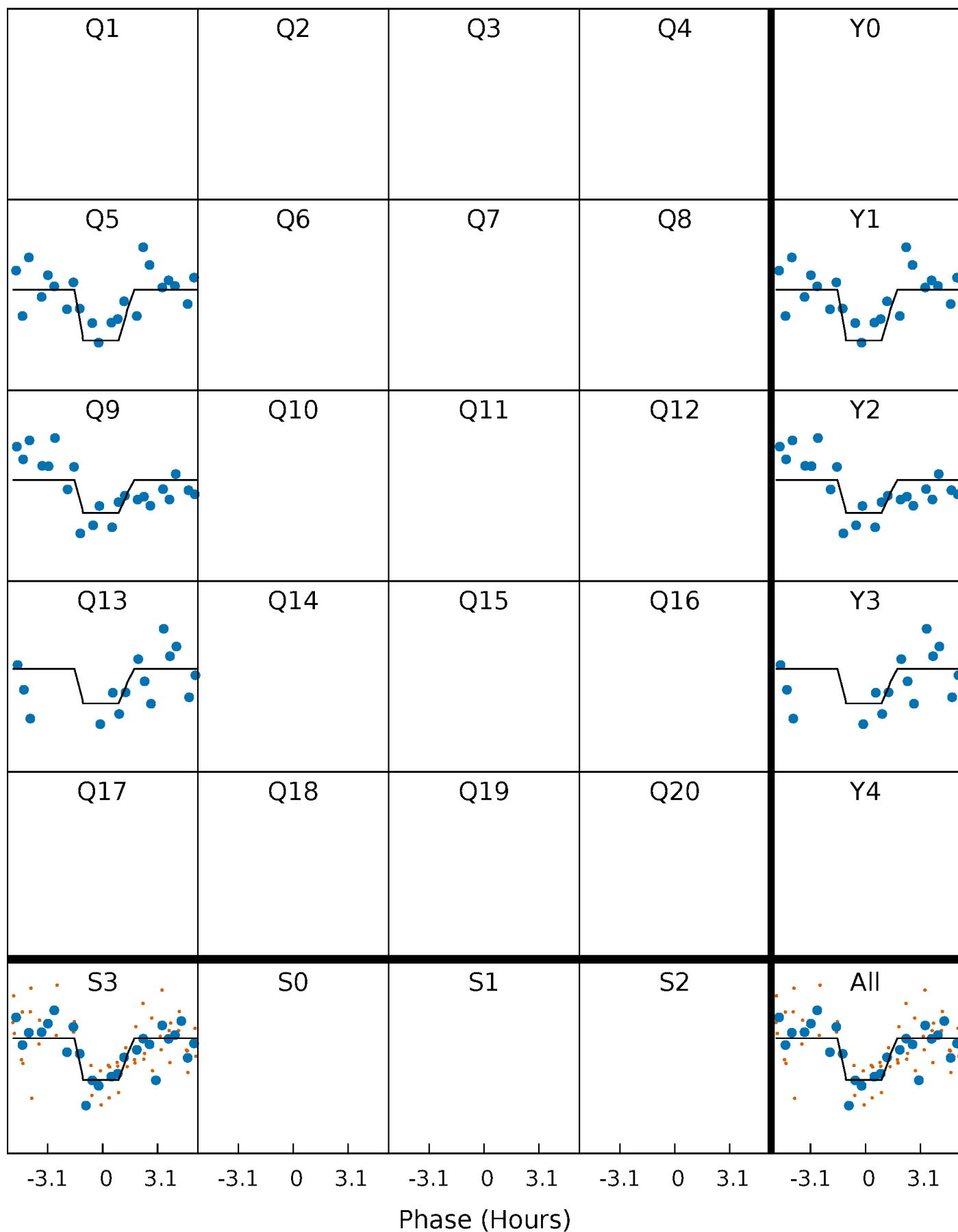
# DV Quarter-Phased Transit Curves

TCE 009972067-01   P=374.398235 Days    $T_0=482.989671$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

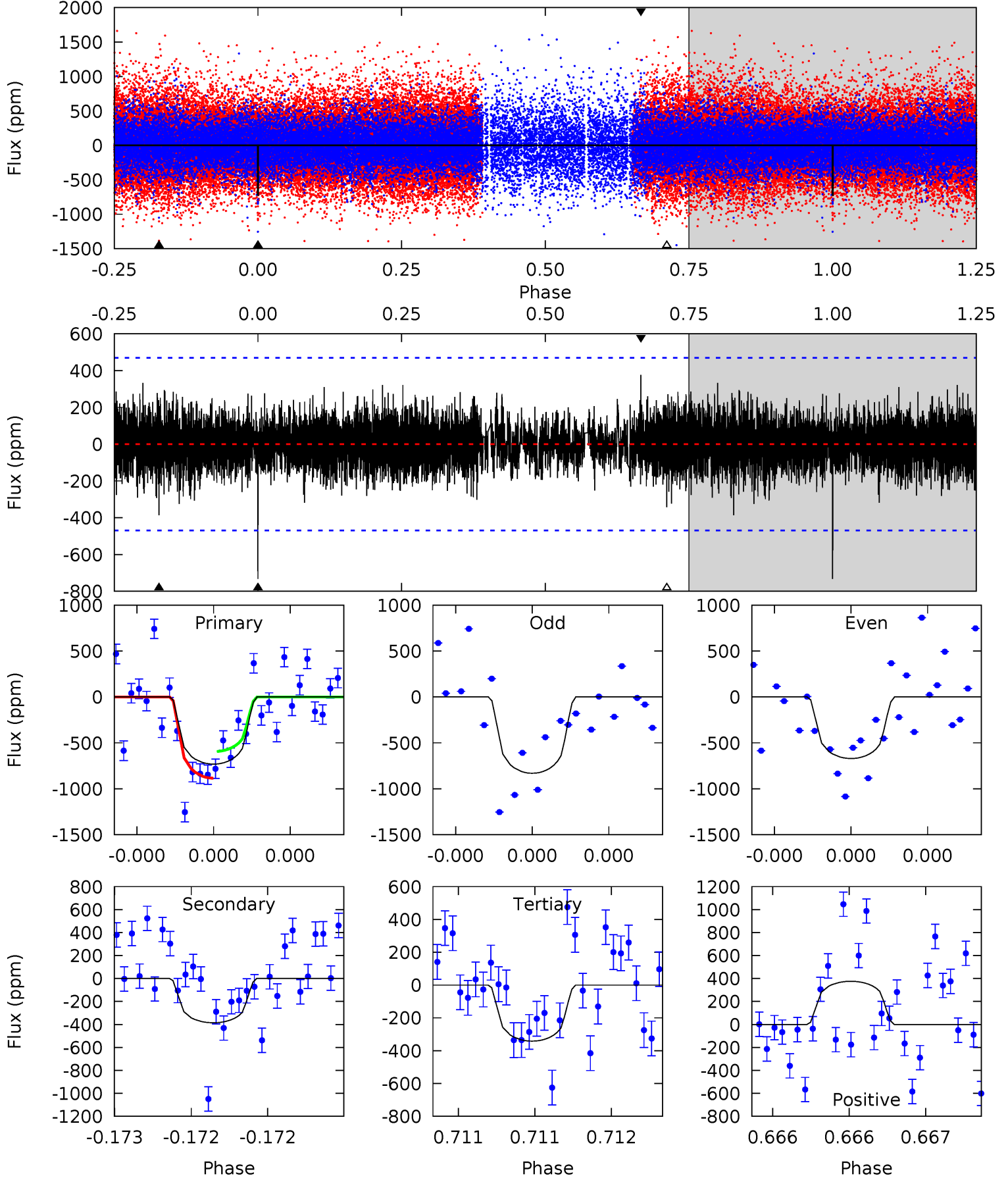
TCE 009972067-01 P=374.403189 Days  $T_0=482.975569$  (BKJD)



# DV Model-Shift Uniqueness Test

009972067-01,  $P = 374.398235$  Days,  $E = 108.591436$  Days

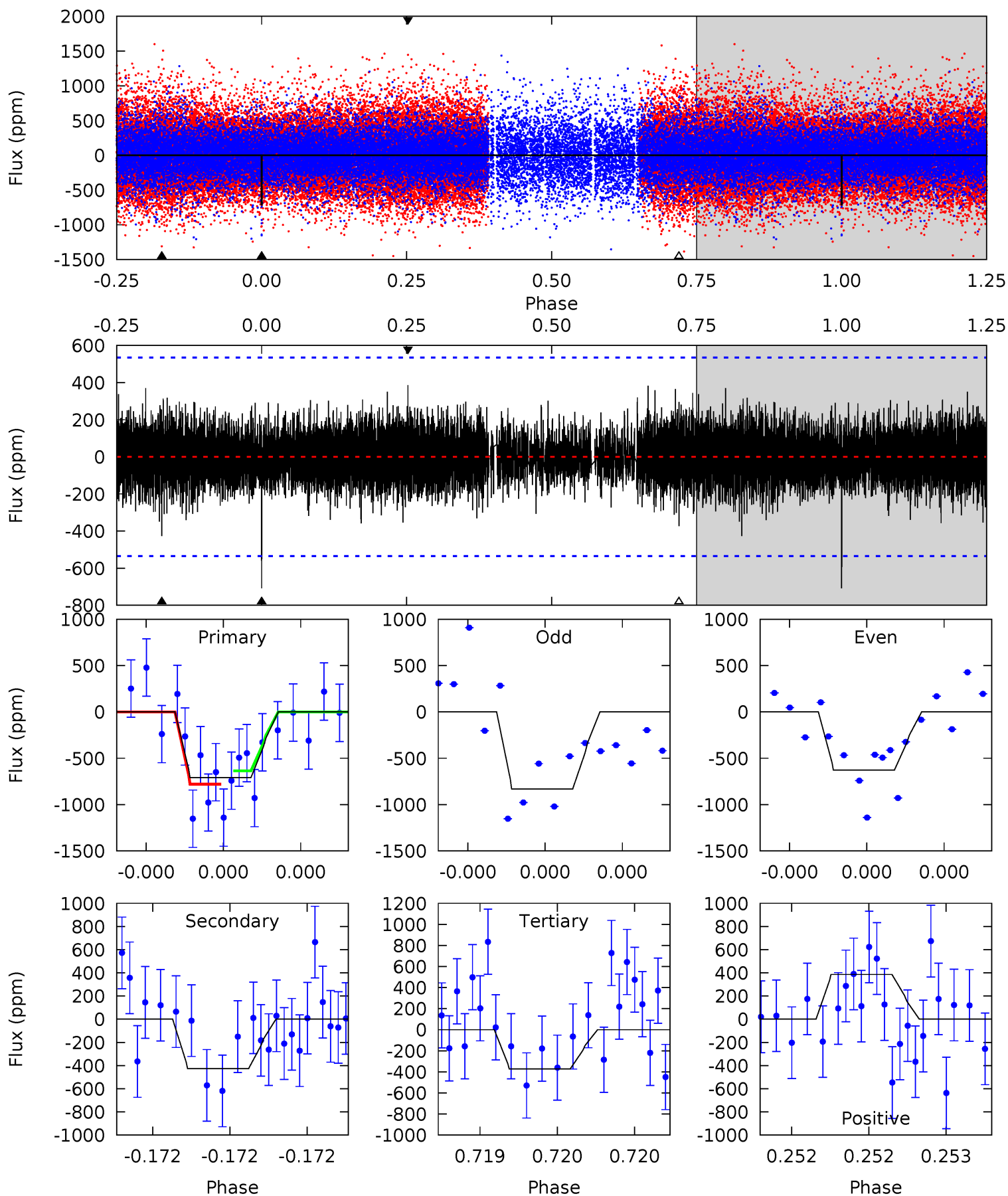
| Pri  | Sec  | Ter  | Pos  | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 8.76 | 4.62 | 4.09 | 4.50 | 5.62            | 3.55            | 1.09             | 4.67    | 4.26    | 0.53    | 0.12    | 0.97    | 0.95 | 0.34  | 1.69 |



# Alt Model-Shift Uniqueness Test

009972067-01, P = 374.403189 Days, E = 108.572380 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  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 7.51 | 4.53 | 3.95 | 4.09 | 5.67            | 3.63            | 1.01             | 3.56    | 3.42    | 0.58    | 0.44    | 1.10    | 0.87 | 0.35  | 0.75 |



### Stellar Parameters For KIC 009972067

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R$ ( $R_{\odot}$ )       | $M$ ( $M_{\odot}$ )       | $p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ ) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $5125^{+153}_{-138}$ | $4.610^{+0.072}_{-0.044}$ | $-0.740^{+0.300}_{-0.300}$ | $0.656^{+0.063}_{-0.057}$ | $0.639^{+0.073}_{-0.028}$ | $3.188^{+0.897}_{-0.541}$                     |
|        | +3%/-3%              | +2%/-1%                   | +41%/-41%                  | +10%/-9%                  | +11%/-4%                  | +28%/-17%                                     |
| 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 009972067-01 / KOI

| Detrend | Depth (ppm)   | $R_p$ ( $R_{\oplus}$ ) | $T_{max}$ (K)     | $T_{obs}$ (K)         | $A_{obs}$               |
|---------|---------------|------------------------|-------------------|-----------------------|-------------------------|
| DV      | $-386 \pm 84$ | $4.49^{+4.12}_{-3.07}$ | $272^{+10}_{-10}$ | $3355^{+1733}_{-595}$ | $8416^{+73835}_{-6362}$ |
| Alt.    | $-427 \pm 94$ | $4.57^{+4.59}_{-3.07}$ | $273^{+10}_{-9}$  | $3373^{+1707}_{-621}$ | $8142^{+71752}_{-6117}$ |

$T_{max}$  = 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

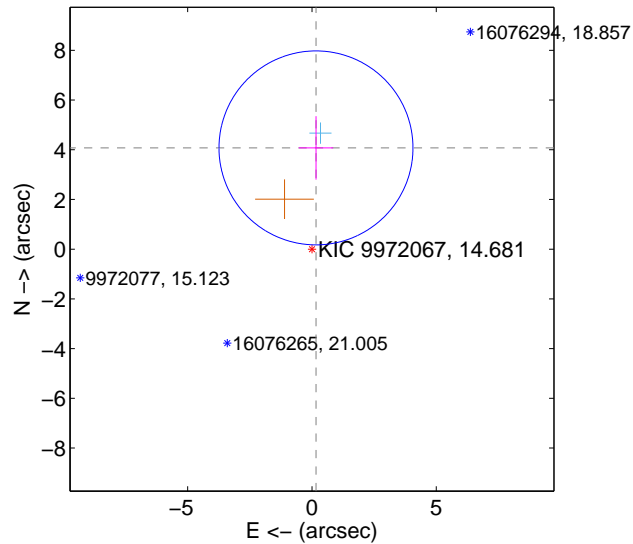
Supplemental centroid analysis for 009972067-01. Kepler magnitude: 14.68. Transit SNR 7.12

There are 1 quarters with good PRF difference image offsets

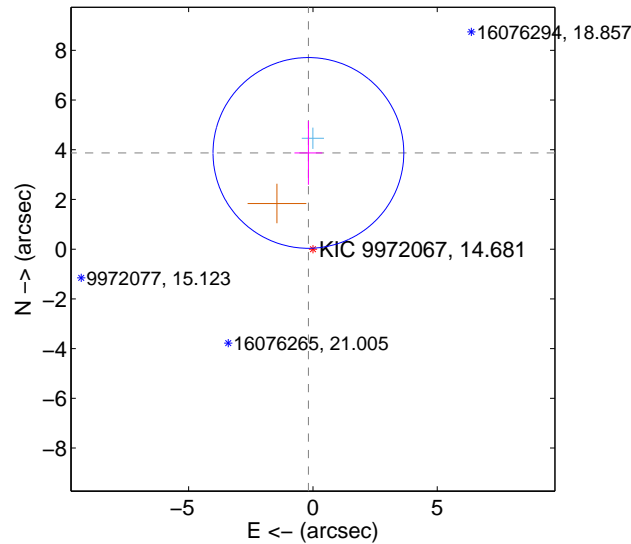
The direct PRF centroid is offset from the target star catalog position by about 0.40 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA        | $\Delta$ Dec      |
|---|--------------------|---------------------|--------------------|-------------------|
| PRF-fit source offset from OOT          | $4.078 \pm 1.301$  | 3.14                | $-0.161 \pm 0.695$ | $4.075 \pm 1.274$ |
| PRF-fit source offset from KIC position | $3.877 \pm 1.279$  | 3.03                | $0.182 \pm 0.562$  | $3.872 \pm 1.280$ |
| photometric centroid source offset      | $2.28 \pm 1.95$    | 1.17                | $0.33 \pm 2.65$    | $2.25 \pm 1.93$   |

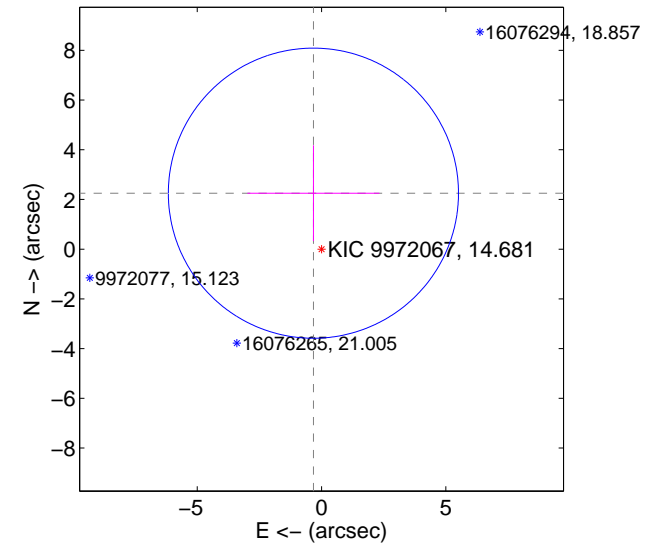
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids



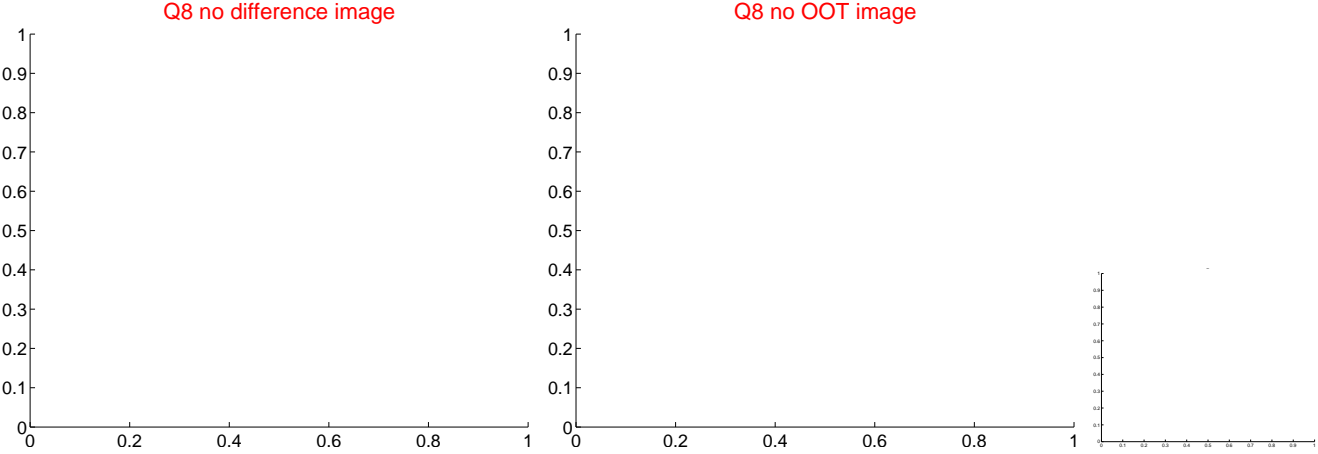
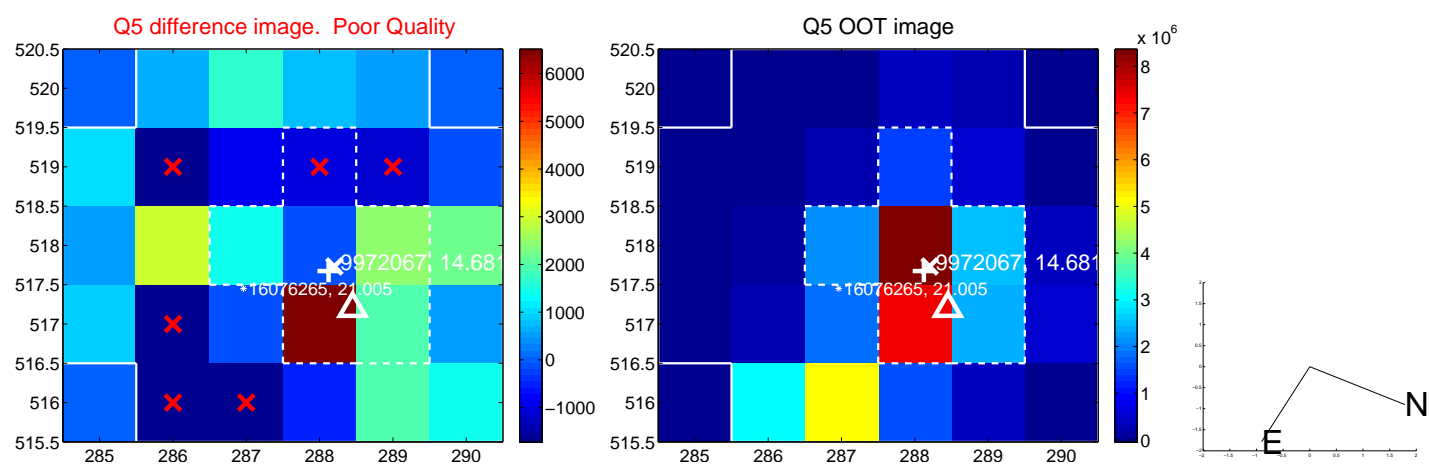
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

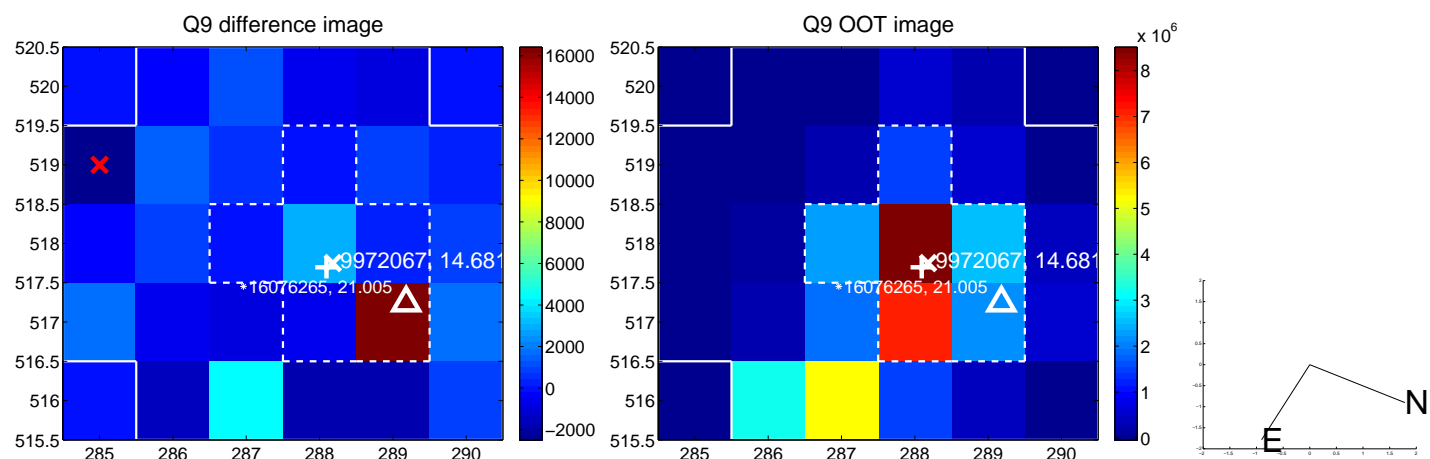




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



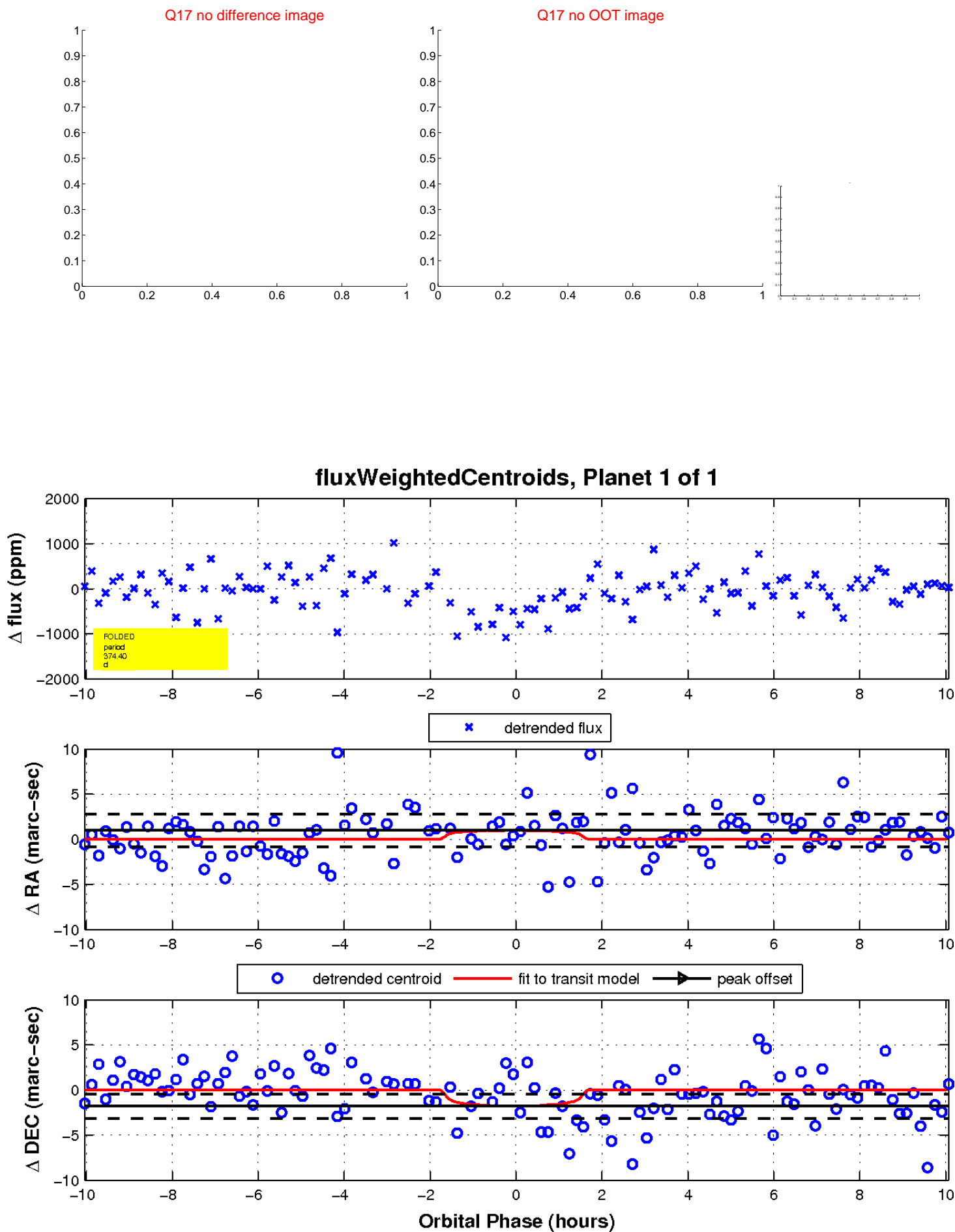
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

