

# KIC 008374905

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|------|---------------|--------------|-------------|------------------|-----|-----|-----------------------------|-----------------|------------------------|------------------------|
| 008374905-01 | OBS      | No   | 368.490898    | 233.981284   | 1125.9      | 11.956           | 8.8 | 8.9 | 0.74                        | 5733            | 3.70                   | 0.60                   |
| 008374905-03 | OBS      | No   | 367.489251    | 186.323182   | 1713.7      | 13.734           | 7.9 | 9.3 | 0.74                        | 5733            | 5.79                   | 0.60                   |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 008374905-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—CENT_FEW_DIFFS |
| 008374905-03 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_SKYE—ALL_TRANS_CHASES—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.

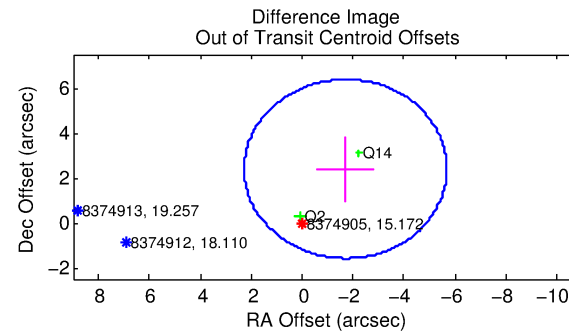
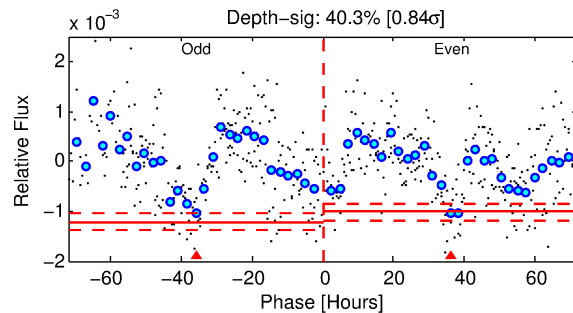
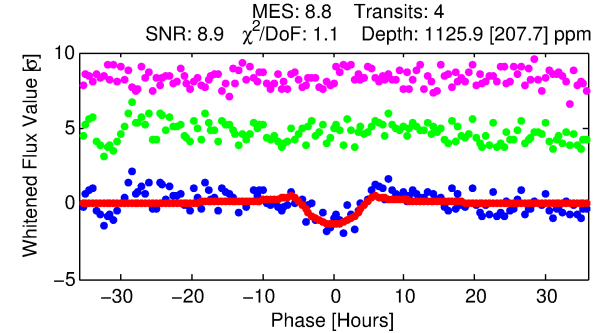
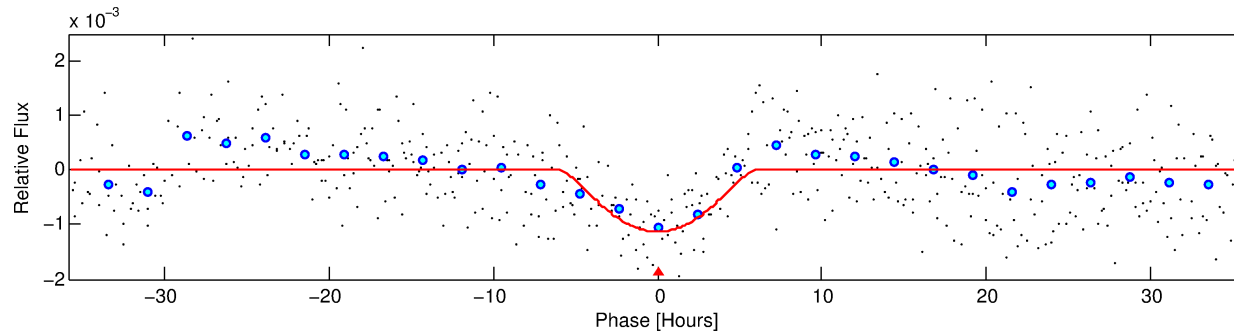
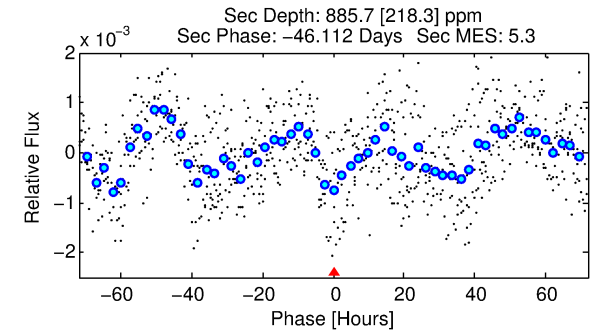
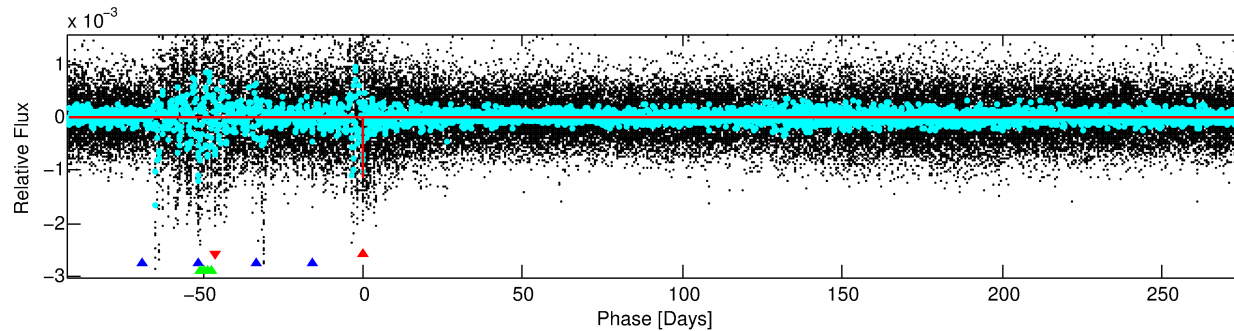
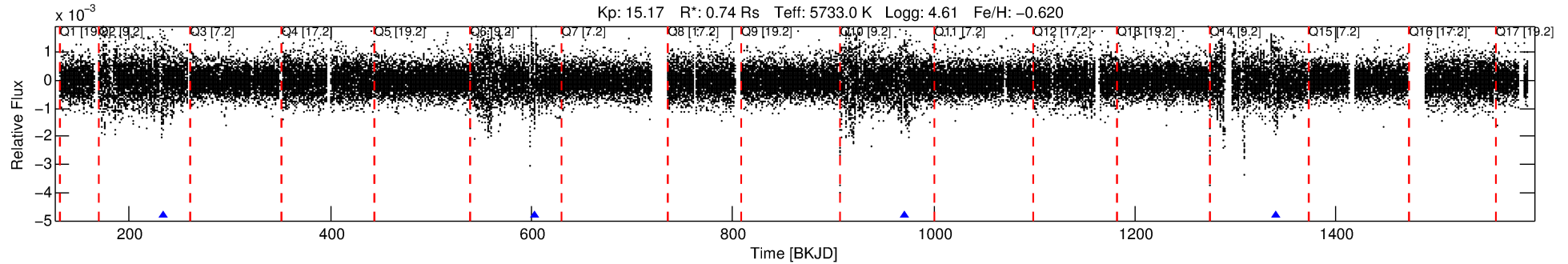
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008374905-01

No Significant Match Found

# DV One-Page Summary

KIC: 8374905 Candidate: 1 of 3 Period: 368.491 d



## DV Fit Results:

Period = 368.49090 [0.01361] d  
Epoch = 233.9813 [0.0258] BKJD  
Rp/R\* = 0.0459 [0.0453]  
a/R\* = 87.29 [34.34]  
b = 0.98 [0.09]  
Seff = 0.60 [0.16]  
Teq = 224 [15] K  
Rp = 3.70 [3.72] Re  
a = 0.9399 [0.1560] AU  
Ag = 31431.93 [62945.31] [0.50σ]  
Teffp = 4617 [2297] K [1.91σ]

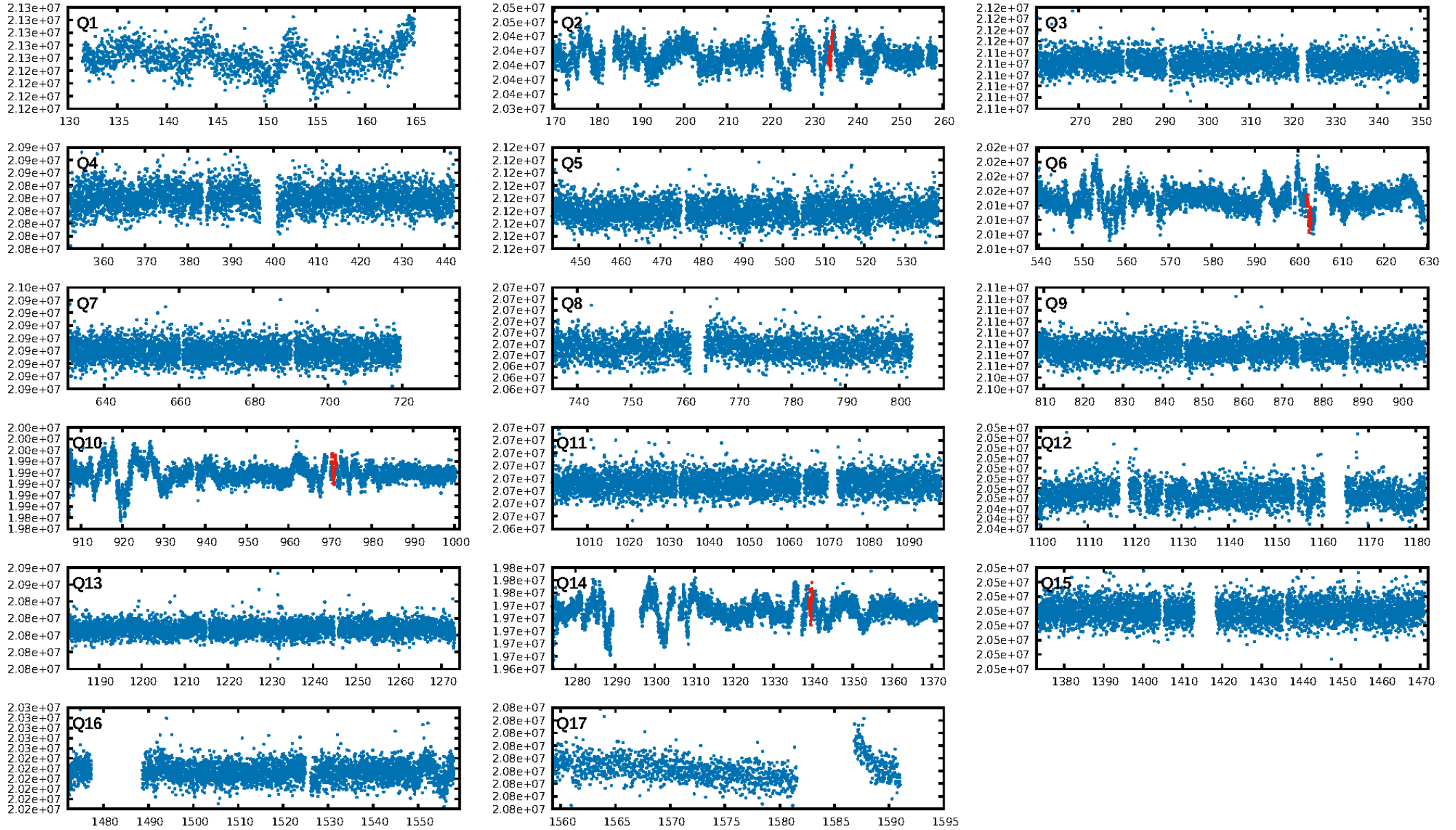
## DV Diagnostic Results:

ShortPeriod-sig: 81.3% [1.32σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 44.2%  
ModelChiSquareGof-sig: 99.5%  
**Bootstrap-pfa: 1.33e-10**  
RollingBand-fgt: 1.00 [4/4]  
**GhostDiagnostic-chr: 0.5814**  
Centroid-sig: 34.7%  
Centroid-so: 1.969 arcsec [1.00σ]  
OotOffset-rm: 2.942 arcsec [2.22σ]  
OotOffset-st: 2/0/0/0 [2]  
KicOffset-rm: 2.927 arcsec [1.98σ]  
KicOffset-st: 2/0/0/0 [2]  
DiffImageQuality-fgm: 0.00 [0/2]  
DiffImageOverlap-fno: 1.00 [3/3]

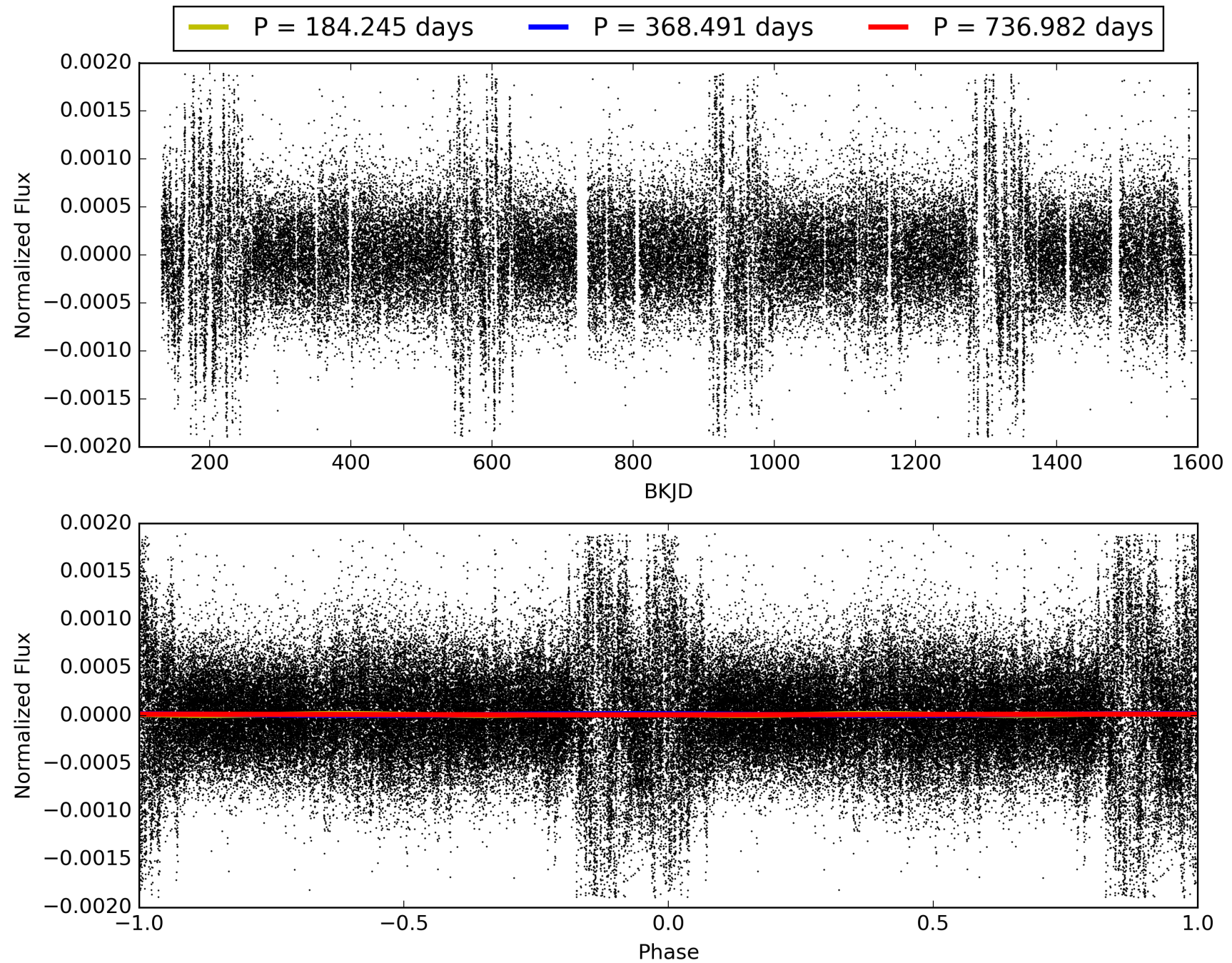
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 10:49:02 Z

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

# TCE 008374905-01, PDC Light Curves

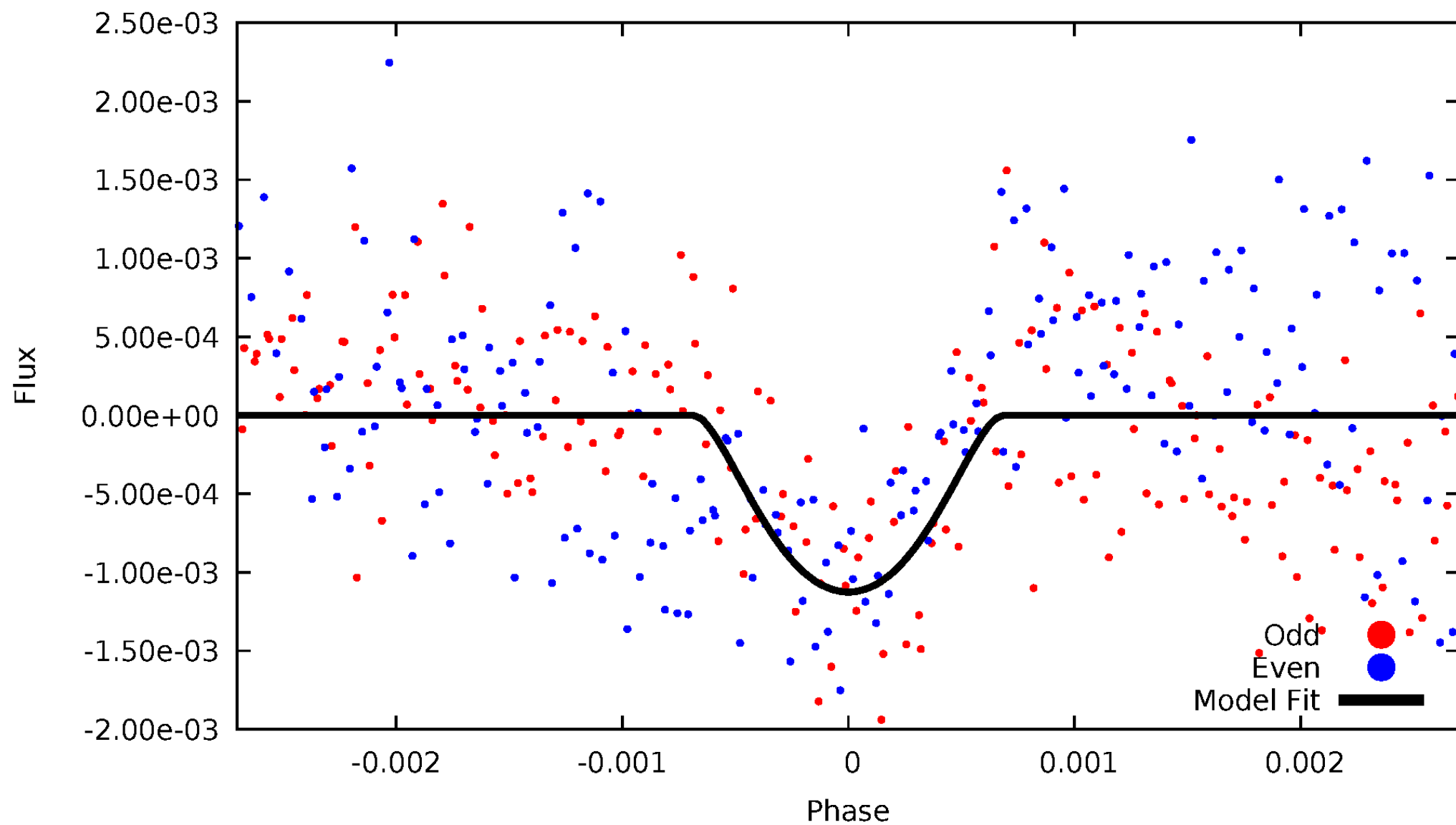


TCE 008374905-01



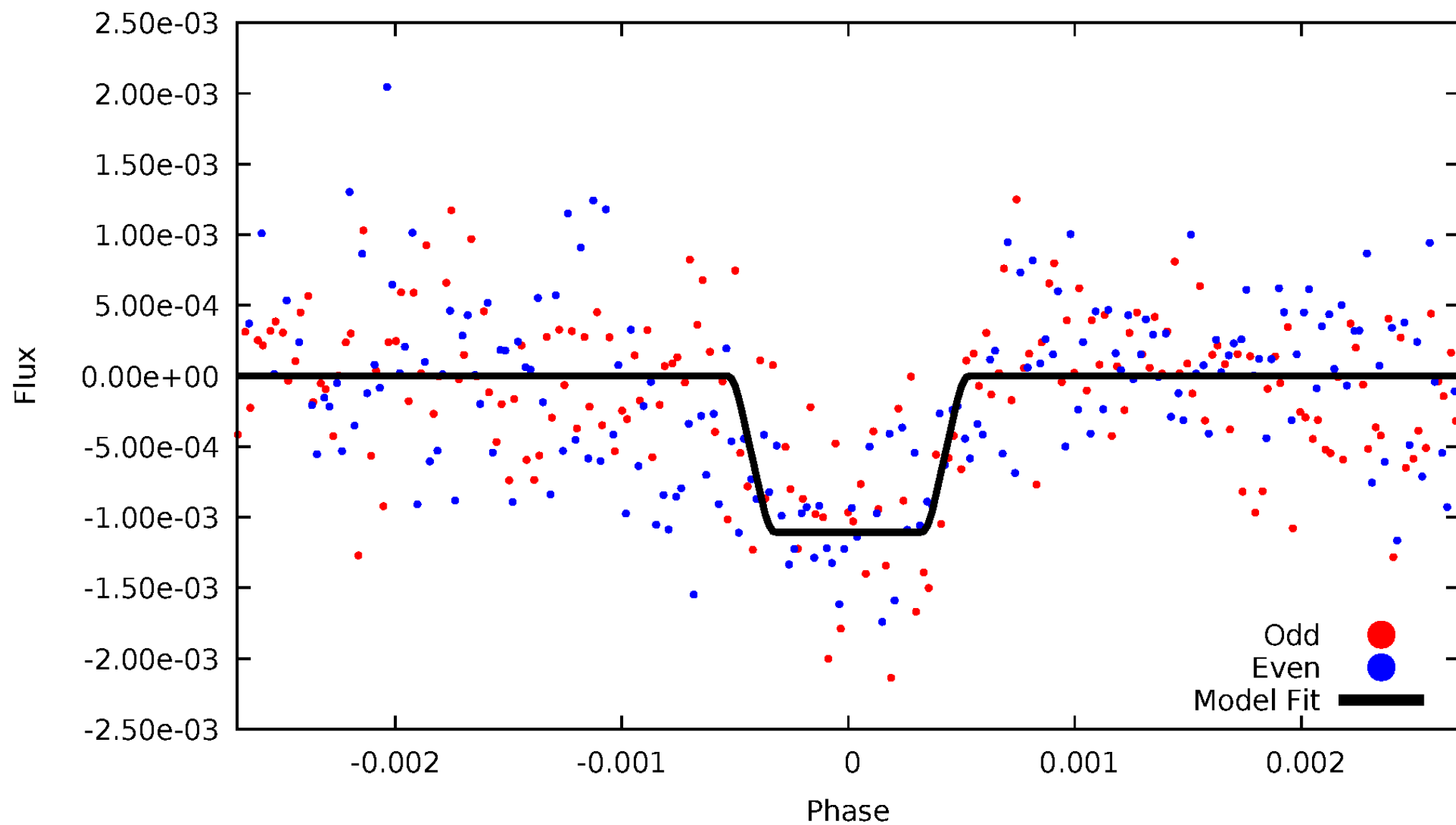
# DV Odd/Even

TCE 008374905-01



# ALT Odd/Even

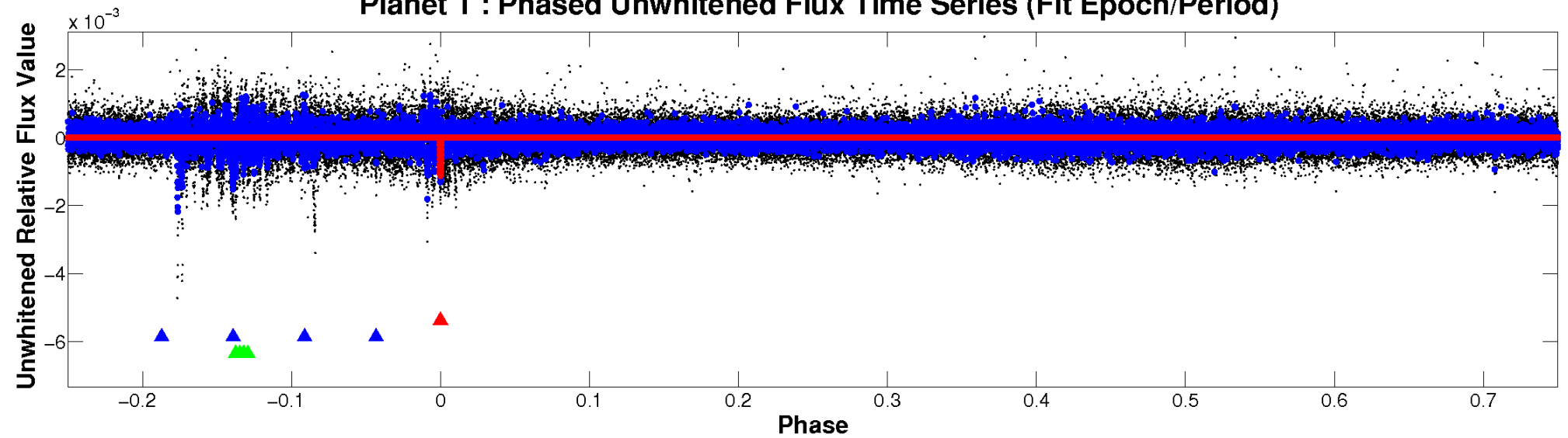
TCE 008374905-01



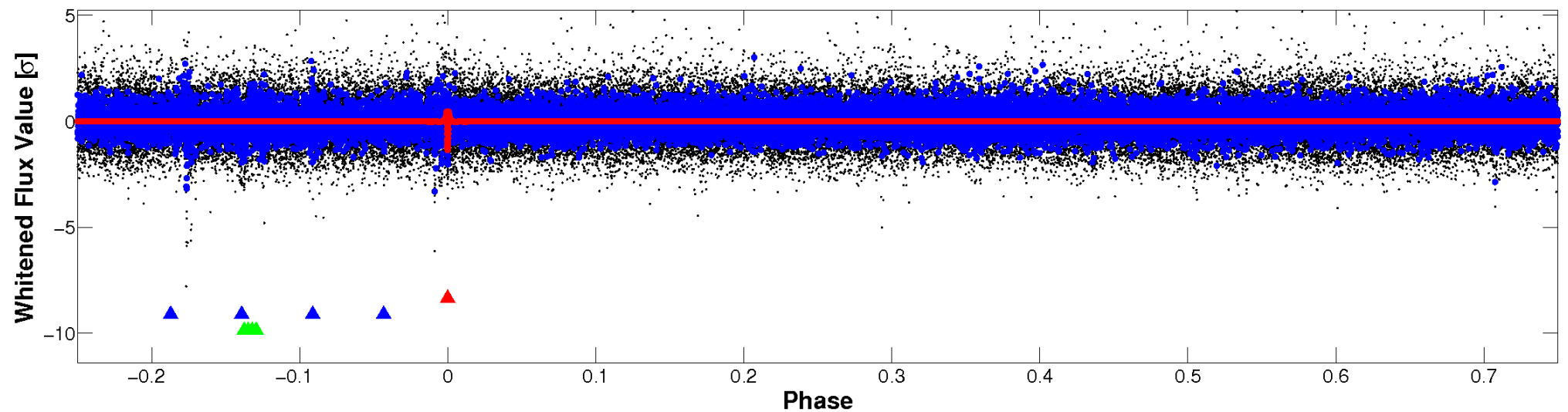


# Non-Whitened Vs. Whitened Light Curve

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

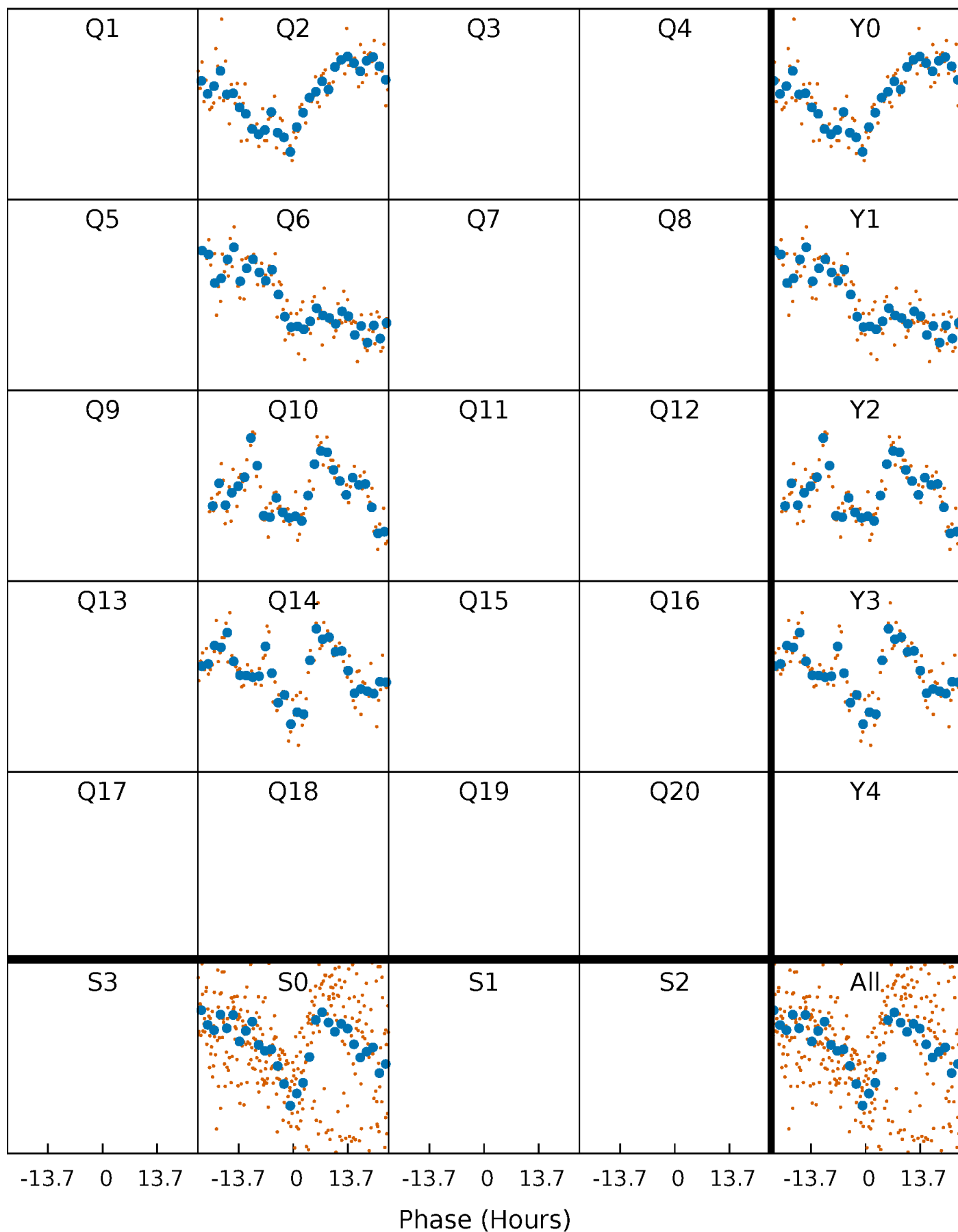


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

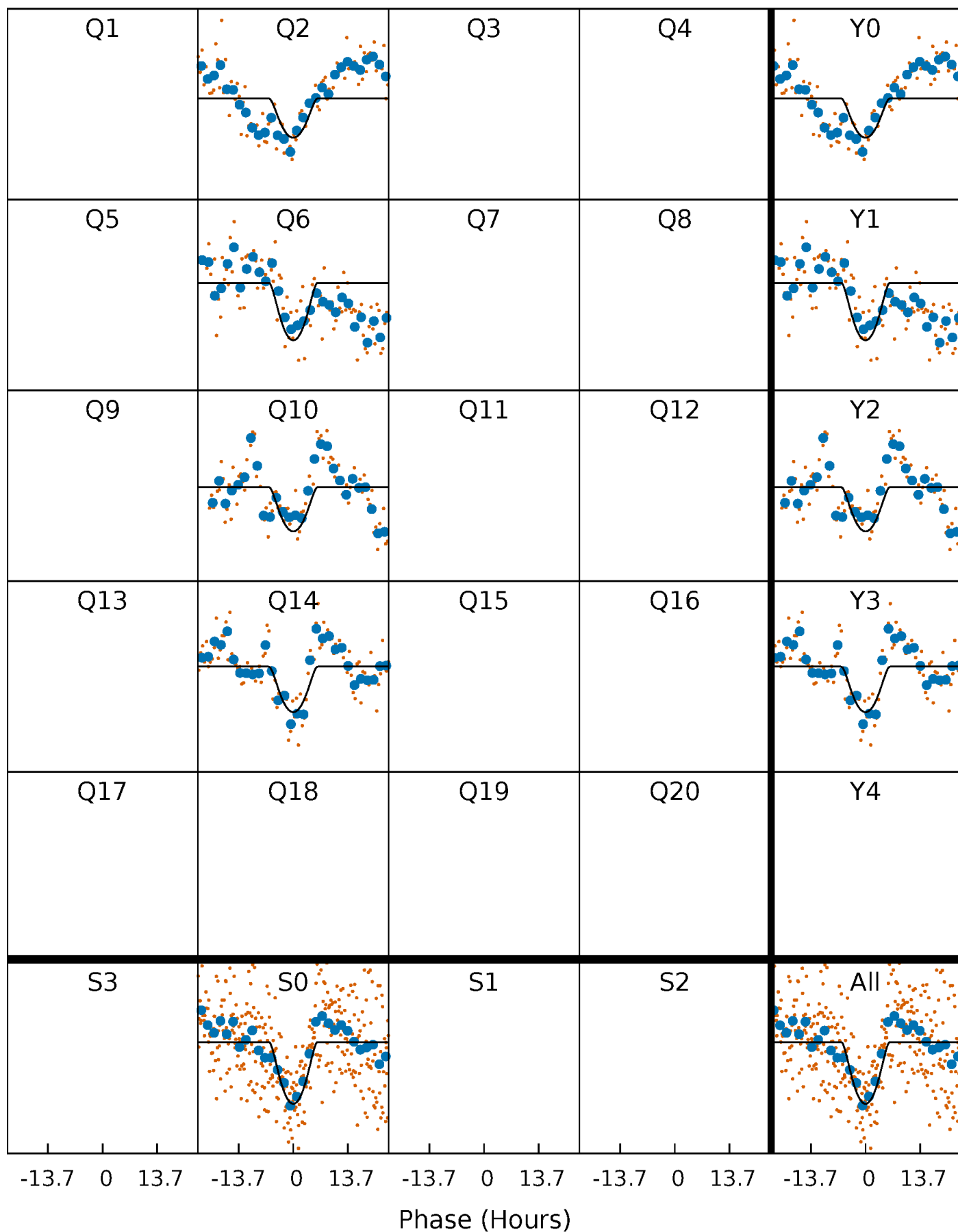
TCE 008374905-01 P=368.490898 Days  $T_0=233.981284$  (BKJD)





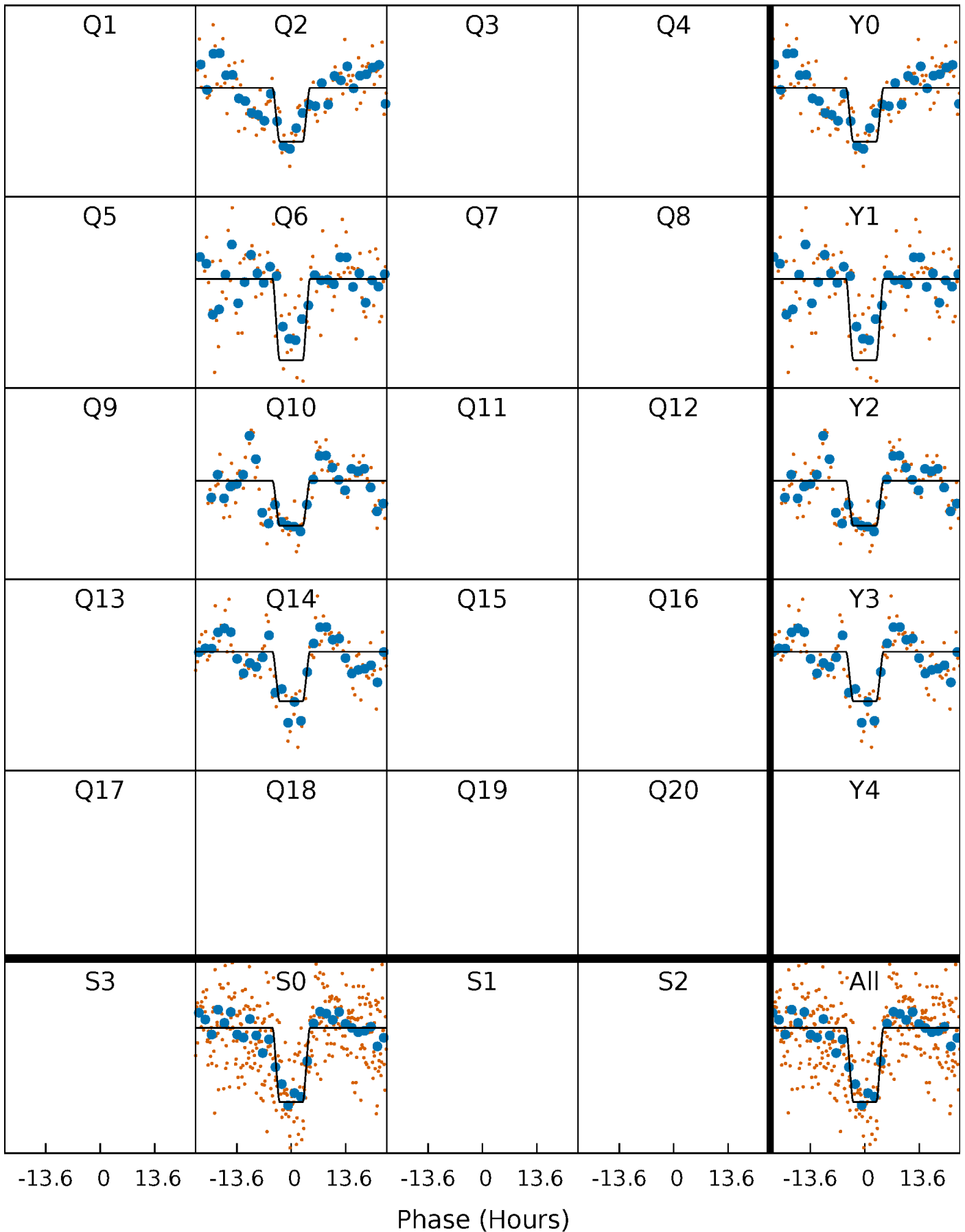
# DV Quarter-Phased Transit Curves

TCE 008374905-01     $P=368.490898$  Days     $T_0=233.981284$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

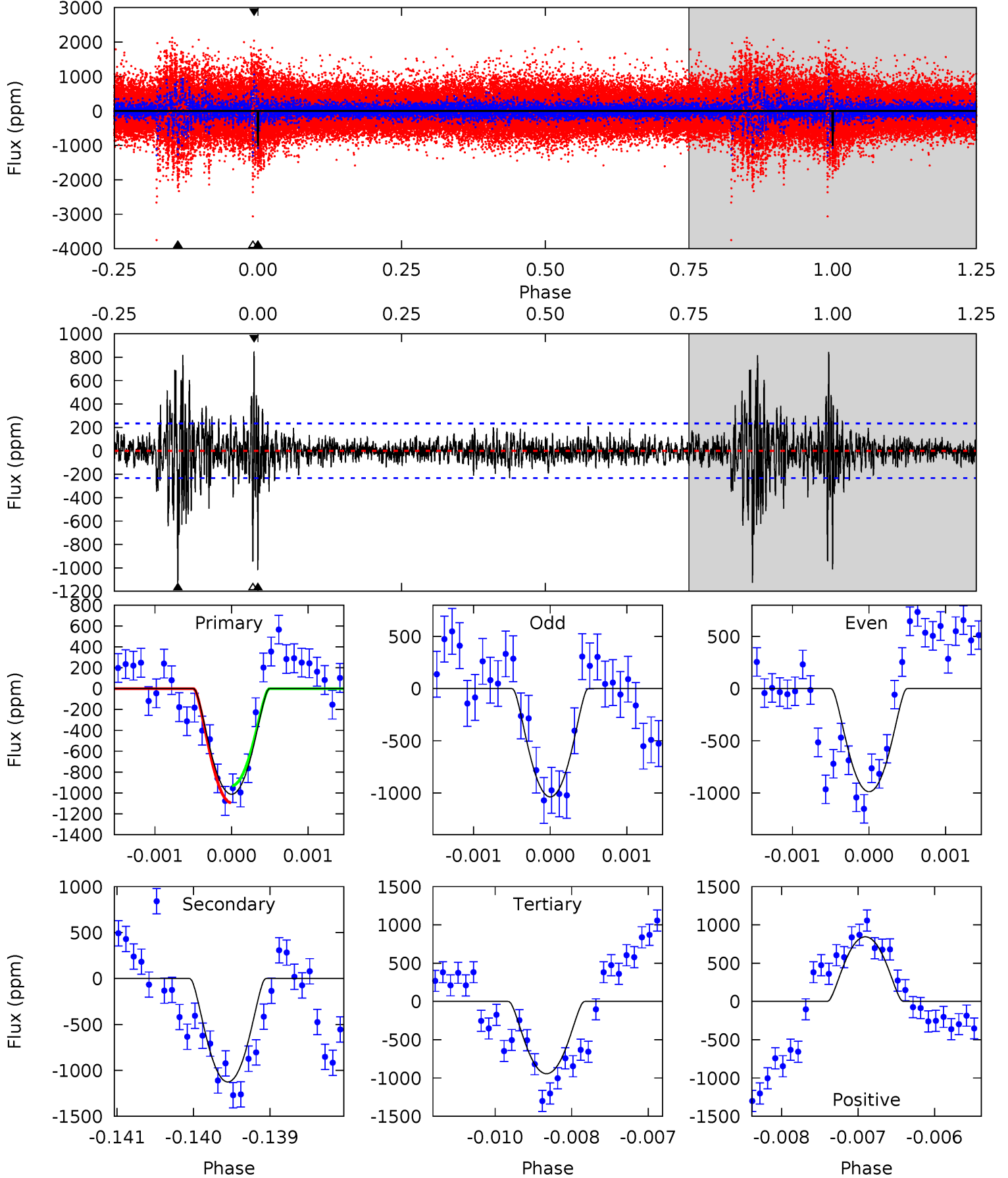
TCE 008374905-01 P=368.485199 Days  $T_0=233.982954$  (BKJD)



# DV Model-Shift Uniqueness Test

008374905-01, P = 368.490898 Days, E = 233.981284 Days

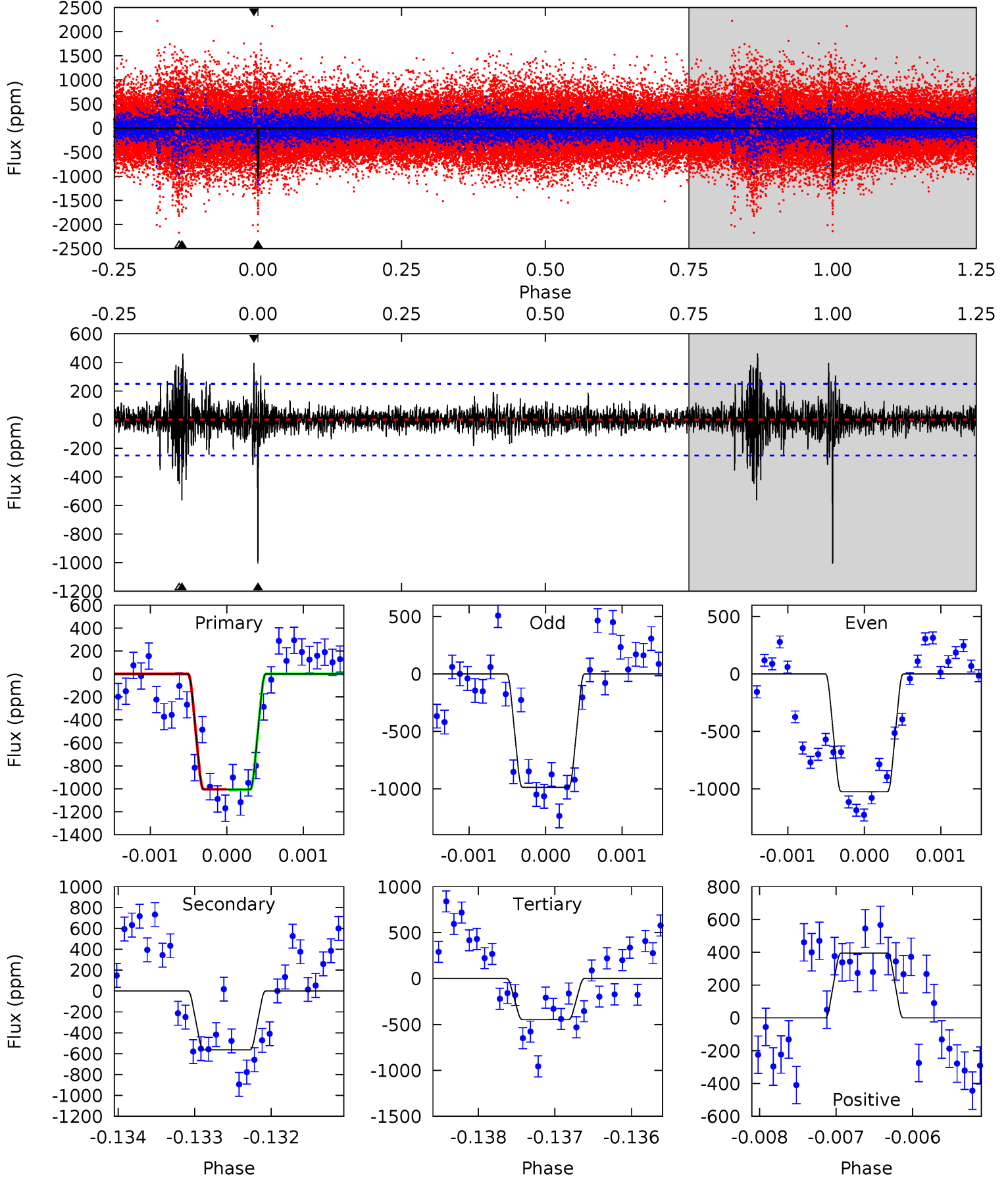
| Pri  | Sec  | Ter  | Pos  | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 23.4 | 26.0 | 21.8 | 19.5 | 5.39            | 3.20            | 2.77             | 1.59    | 3.89    | 4.22    | 6.52    | 0.57    | 0.99 | 0.43  | 1.88 |



# Alt Model-Shift Uniqueness Test

008374905-01, P = 368.485199 Days, E = 233.982954 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  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 21.9 | 12.2 | 9.73 | 8.58 | 5.44            | 3.28            | 1.39             | 12.1    | 13.3    | 2.51    | 3.66    | 0.42    | 0.99 | 0.31  | 0.04 |



### Stellar Parameters For KIC 008374905

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R$ ( $R_{\odot}$ )       | $M(M_{\odot})$            | $p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ ) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $5733^{+157}_{-157}$ | $4.612^{+0.034}_{-0.136}$ | $-0.620^{+0.300}_{-0.300}$ | $0.739^{+0.143}_{-0.051}$ | $0.823^{+0.077}_{-0.085}$ | $2.875^{+0.484}_{-1.128}$                     |
|        | +3%/-3%              | +1%/-3%                   | +48%/-48%                  | +19%/-7%                  | +9%/-10%                  | +17%/-39%                                     |
| 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 008374905-01 / KOI

| Detrend | Depth (ppm)    | $R_p$ ( $R_{\oplus}$ ) | $T_{max}$ (K)     | $T_{obs}$ (K)         | $A_{obs}$                  |
|---------|----------------|------------------------|-------------------|-----------------------|----------------------------|
| DV      | $-1126 \pm 43$ | $4.38^{+3.40}_{-2.78}$ | $319^{+15}_{-12}$ | $4743^{+2954}_{-965}$ | $28722^{+178680}_{-19986}$ |
| Alt.    | $-563 \pm 46$  | $3.99^{+3.36}_{-2.64}$ | $320^{+14}_{-13}$ | $4267^{+2717}_{-769}$ | $16712^{+141104}_{-11610}$ |

$T_{max}$  = 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

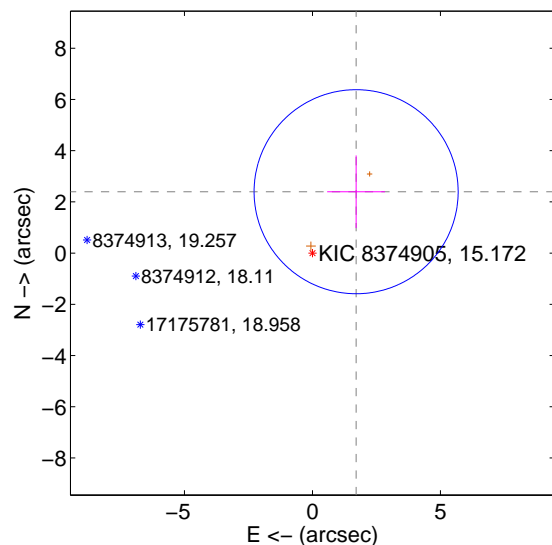
Supplemental centroid analysis for 008374905-01. Kepler magnitude: 15.17. Transit SNR 8.91

There are 0 quarters with good PRF difference image offsets

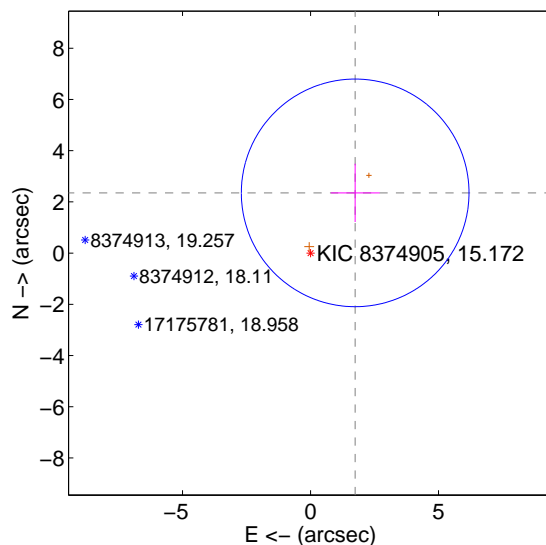
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA        | $\Delta$ Dec      |
|---|--------------------|---------------------|--------------------|-------------------|
| PRF-fit source offset from OOT          | $2.942 \pm 1.328$  | 2.22                | $-1.706 \pm 1.130$ | $2.397 \pm 1.418$ |
| PRF-fit source offset from KIC position | $2.927 \pm 1.482$  | 1.98                | $-1.743 \pm 0.955$ | $2.351 \pm 1.139$ |
| photometric centroid source offset      | $1.97 \pm 1.97$    | 1.00                | $-1.67 \pm 1.88$   | $1.04 \pm 2.19$   |

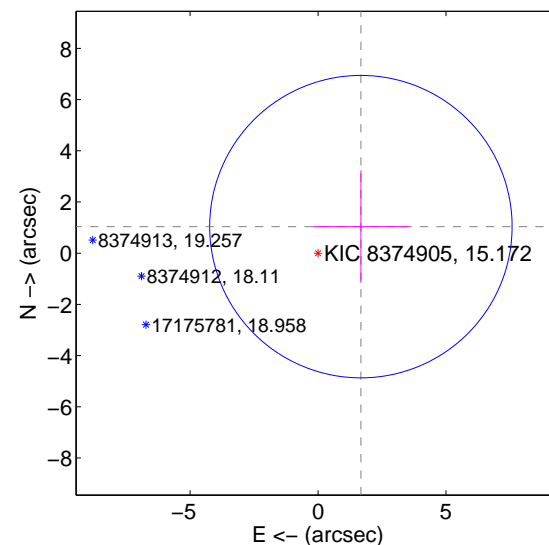
offset from difference PRF-fit to OOT PRF-fit



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.

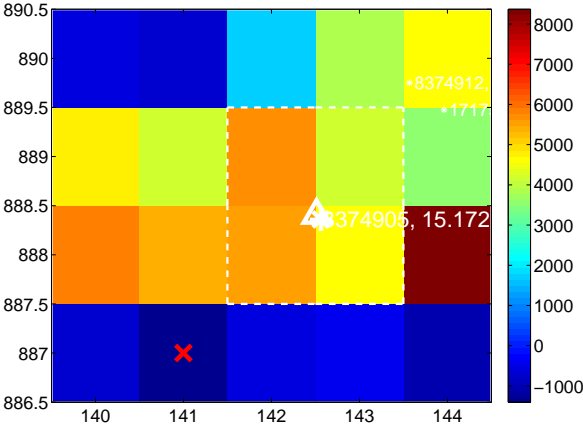
Q1 no difference image



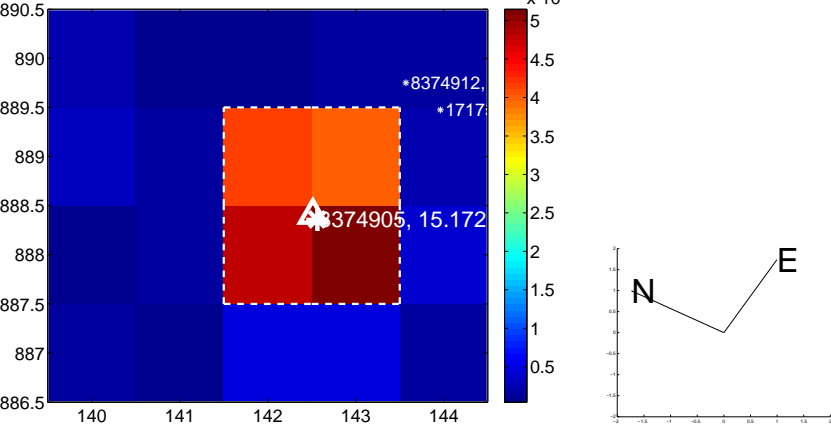
Q1 no OOT image



Q2 difference image. Poor Quality



Q2 OOT image



Q3 no difference image



Q3 no OOT image



Q4 no difference image



Q4 no OOT image





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

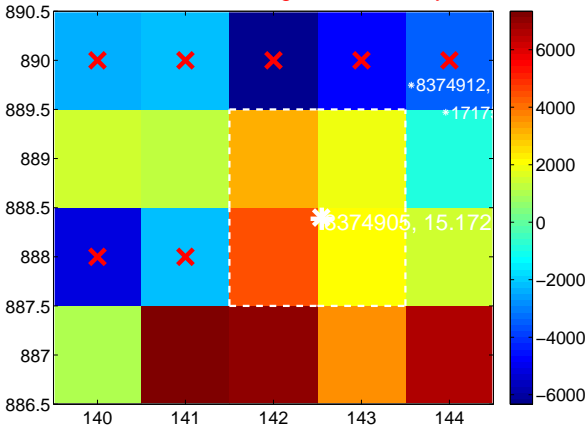
Q5 no difference image



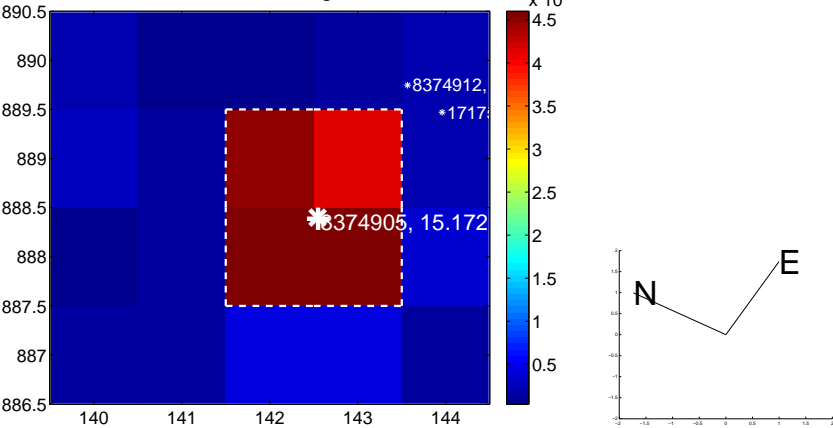
Q5 no OOT image



Q6 difference image. Poor Quality



Q6 OOT image



Q7 no difference image



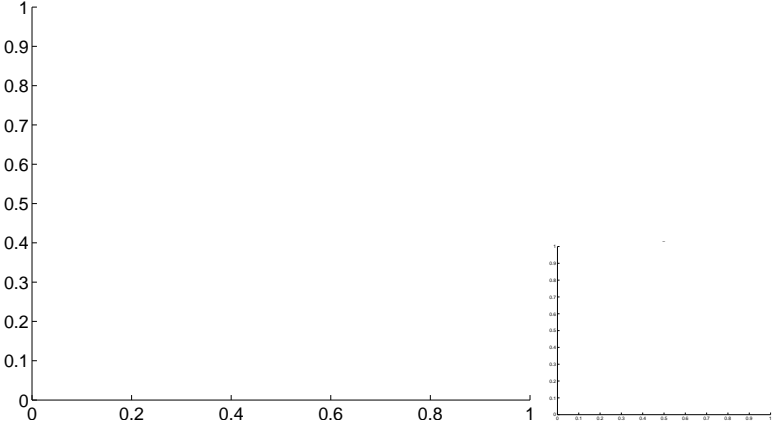
Q7 no OOT image



Q8 no difference image



Q8 no OOT image



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.

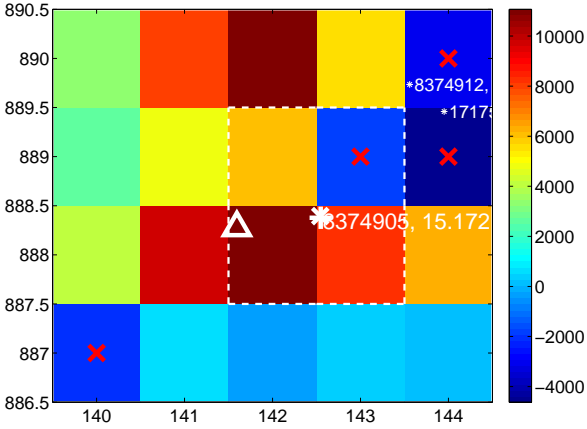
Q13 no difference image



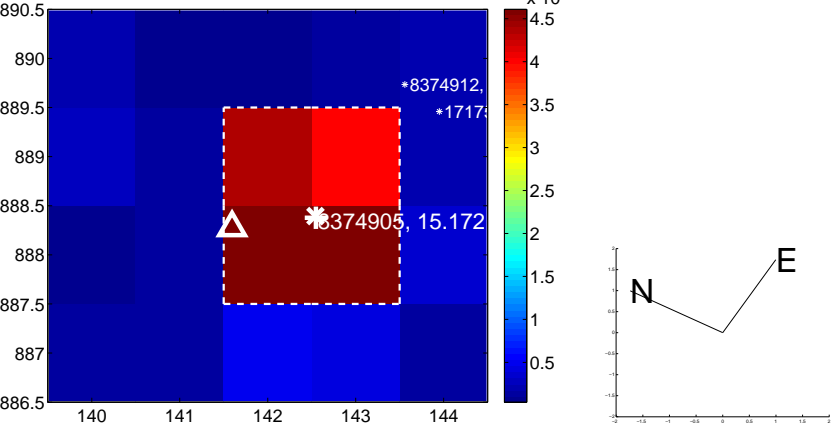
Q13 no OOT image



Q14 difference image. Poor Quality



Q14 OOT image



Q15 no difference image



Q15 no OOT image



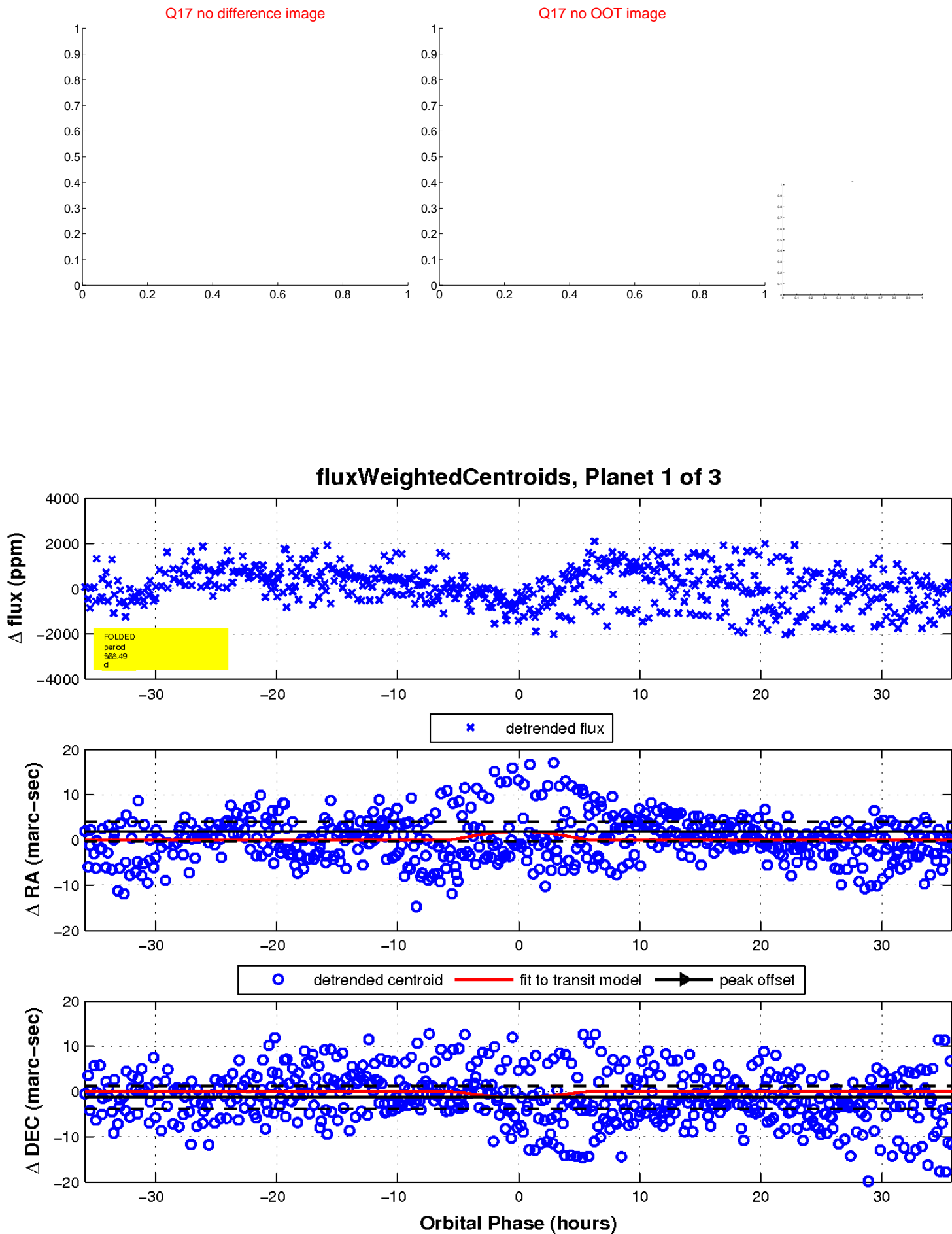
Q16 no difference image



Q16 no OOT image

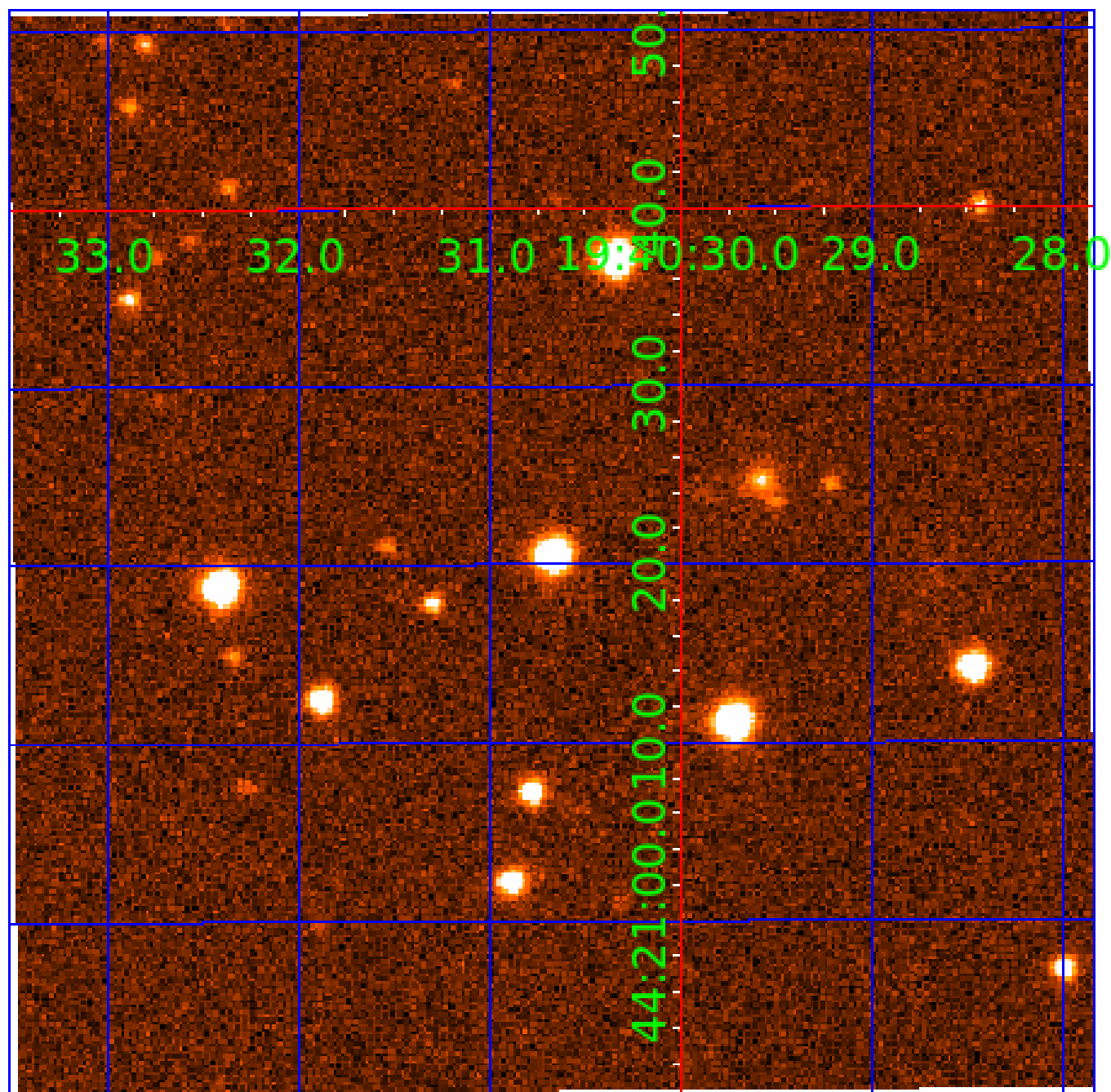


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 008374905

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|------|---------------|--------------|-------------|------------------|-----|-----|-----------------------------|-----------------|------------------------|------------------------|
| 008374905-01 | OBS      | No   | 368.490898    | 233.981284   | 1125.9      | 11.956           | 8.8 | 8.9 | 0.74                        | 5733            | 3.70                   | 0.60                   |
| 008374905-03 | OBS      | No   | 367.489251    | 186.323182   | 1713.7      | 13.734           | 7.9 | 9.3 | 0.74                        | 5733            | 5.79                   | 0.60                   |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 008374905-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—CENT_FEW_DIFFS |
| 008374905-03 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_SKYE—ALL_TRANS_CHASES—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.

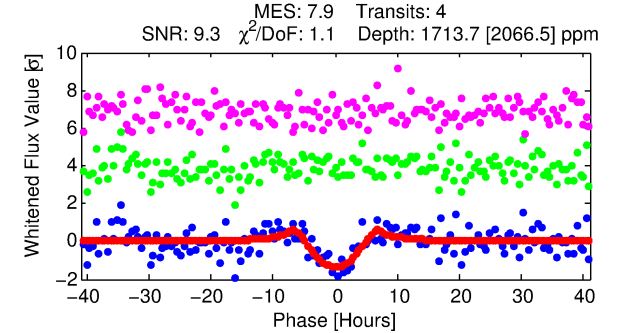
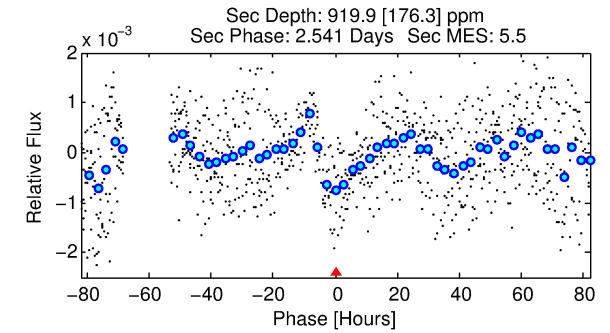
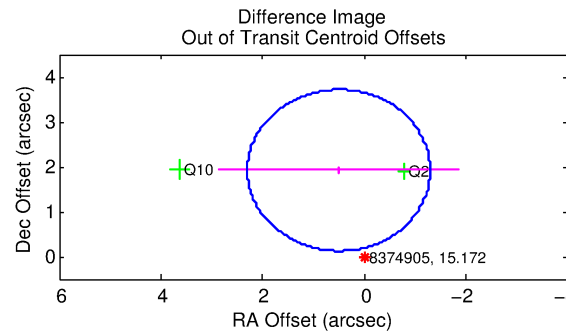
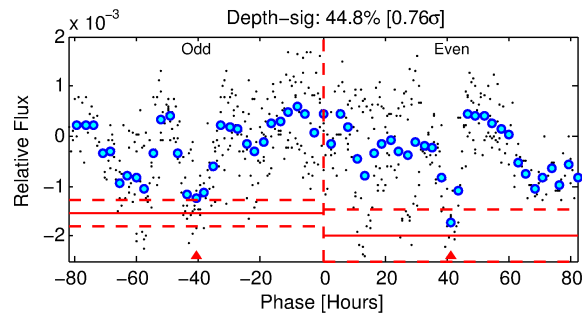
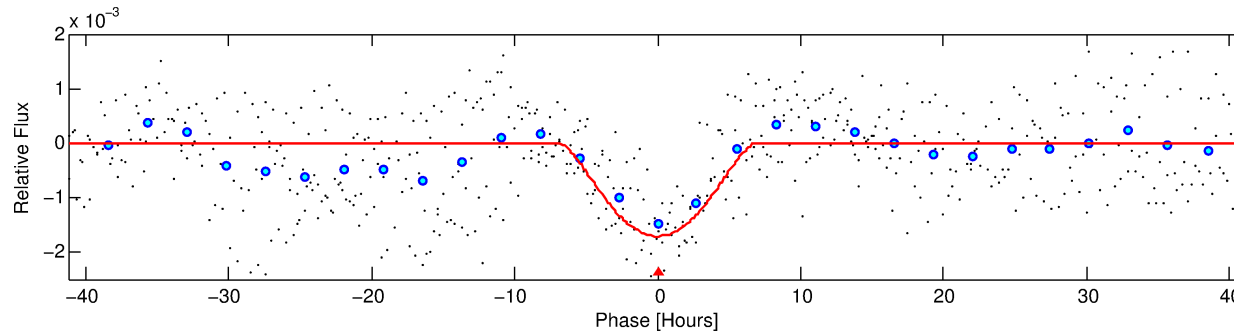
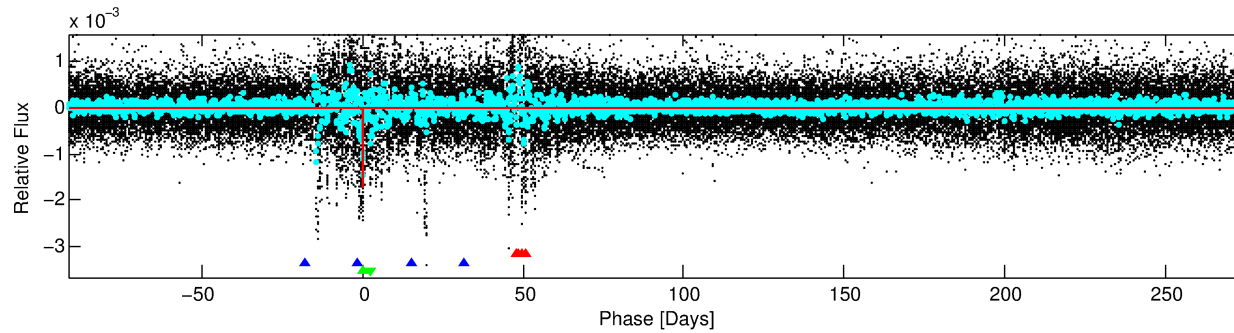
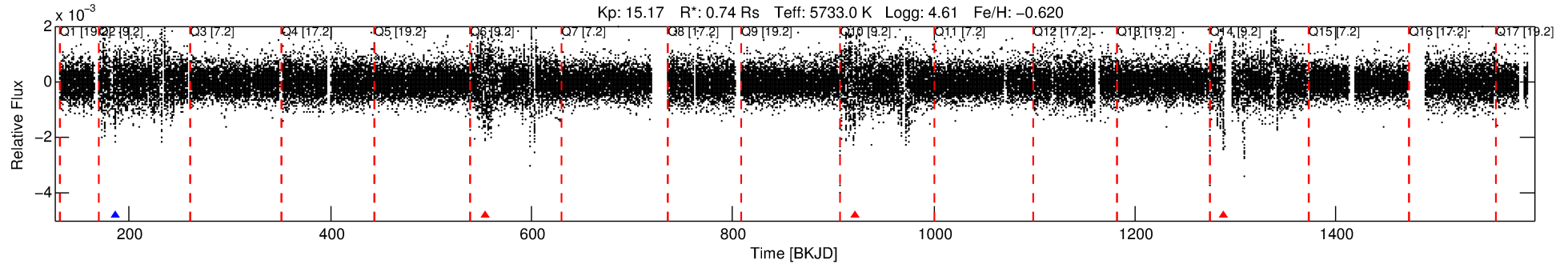
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008374905-03

No Significant Match Found

# DV One-Page Summary

KIC: 8374905 Candidate: 3 of 3 Period: 367.489 d



## DV Fit Results:

Period = 367.48925 [0.01279] d  
Epoch = 186.3232 [0.0226] BKJD  
Rp/R\* = 0.0718 [0.1691]  
a/R\* = 78.82 [40.92]  
b = 1.00 [0.30]  
Seff = 0.60 [0.16]  
Teq = 224 [15] K  
Rp = 5.79 [13.68] Re  
a = 0.9382 [0.1557] AU  
Ag = 13302.86 [62825.64] [0.21 $\sigma$ ]  
Teffp = 3727 [4396] K [0.80 $\sigma$ ]

## DV Diagnostic Results:

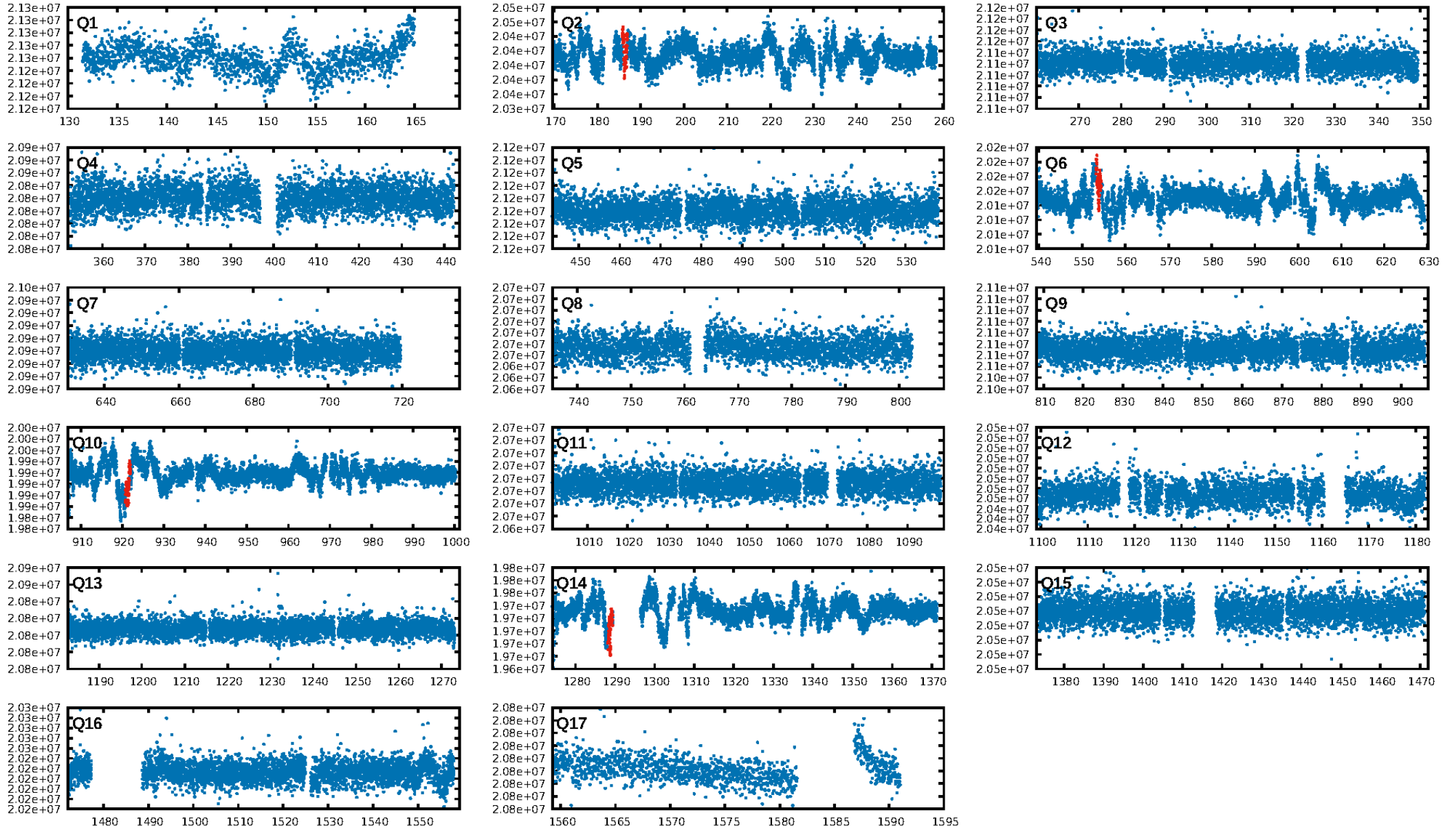
ShortPeriod-sig: 100.0% [26.13 $\sigma$ ]  
LongPeriod-sig: 81.3% [1.32 $\sigma$ ]  
ModelChiSquare2-sig: 5.5%  
ModelChiSquareGof-sig: 84.4%  
Bootstrap-pfa: 1.60e-09  
RollingBand-fgt: 0.25 [1/4]  
GhostDiagnostic-chr: 14.98  
Centroid-sig: 6.6%  
Centroid-so: 3.059 arcsec [1.66 $\sigma$ ]  
OotOffset-rm: 1.984 arcsec [3.31 $\sigma$ ]  
KicOffset-rm: 1.941 arcsec [3.24 $\sigma$ ]  
OotOffset-st: 2/0/0/0 [2]  
KicOffset-st: 2/0/0/0 [2]  
DiffImageQuality-fgm: 0.00 [0/2]  
DiffImageOverlap-fno: 1.00 [3/3]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 10:49:22 Z

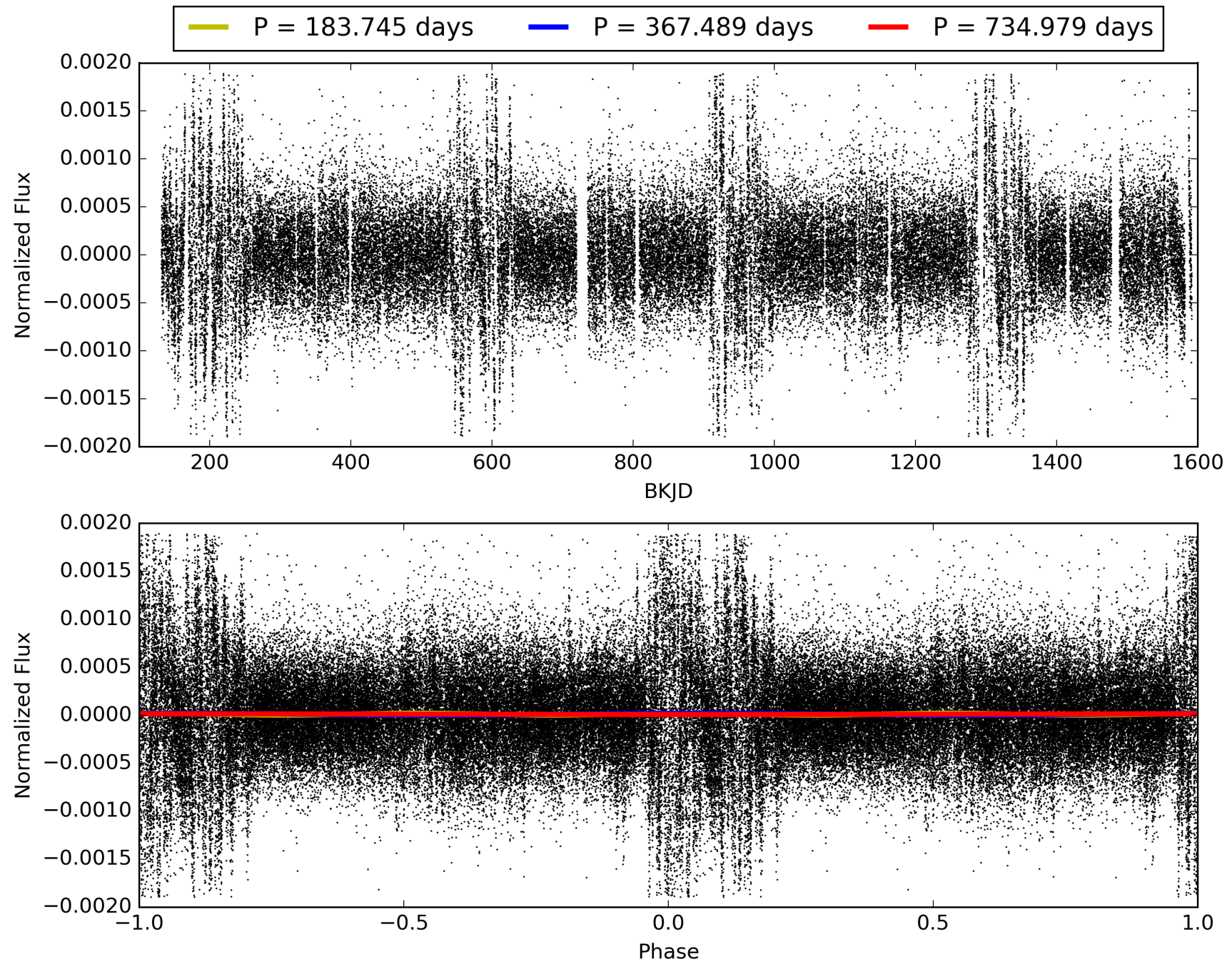
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 008374905-03, PDC Light Curves

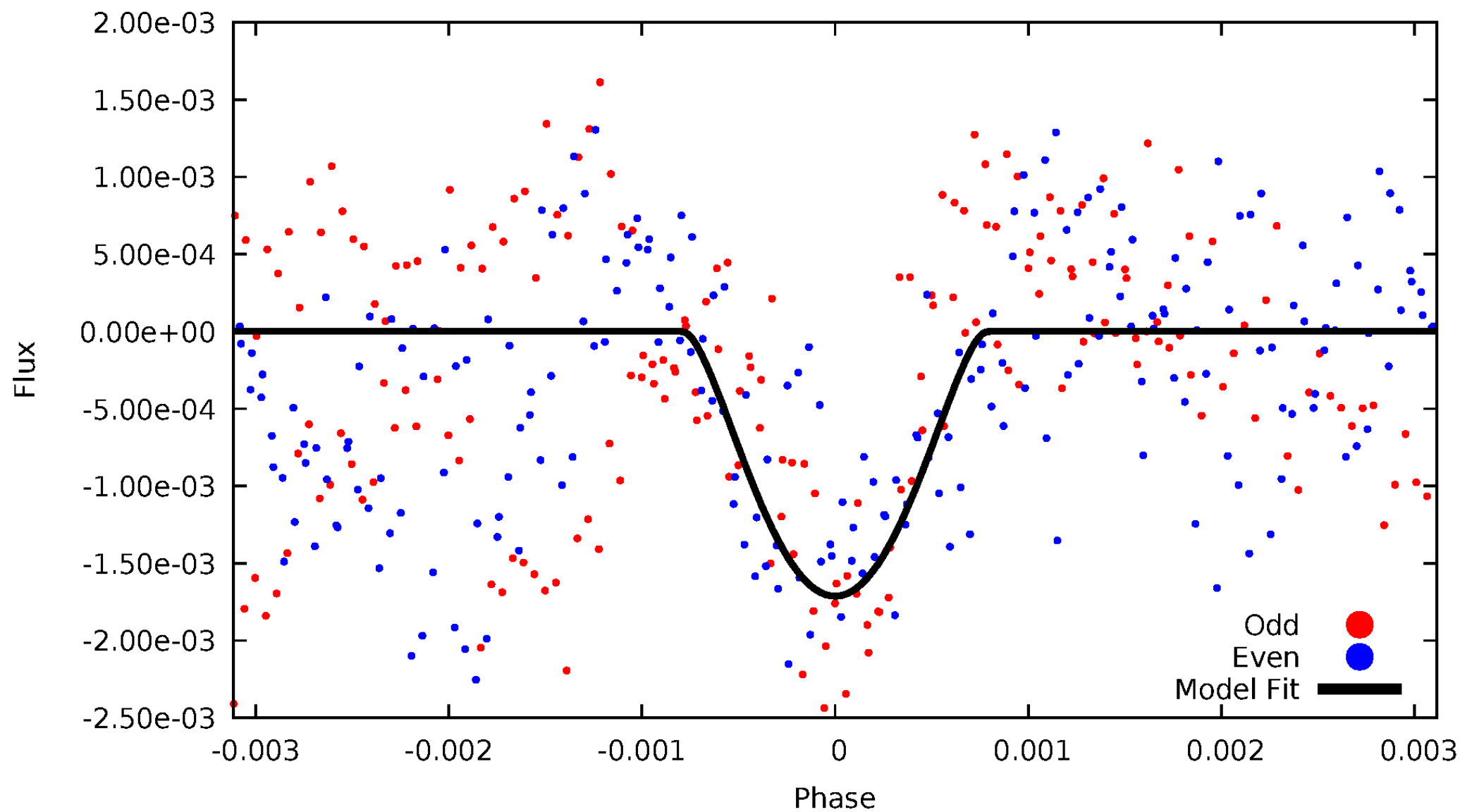


TCE 008374905-03



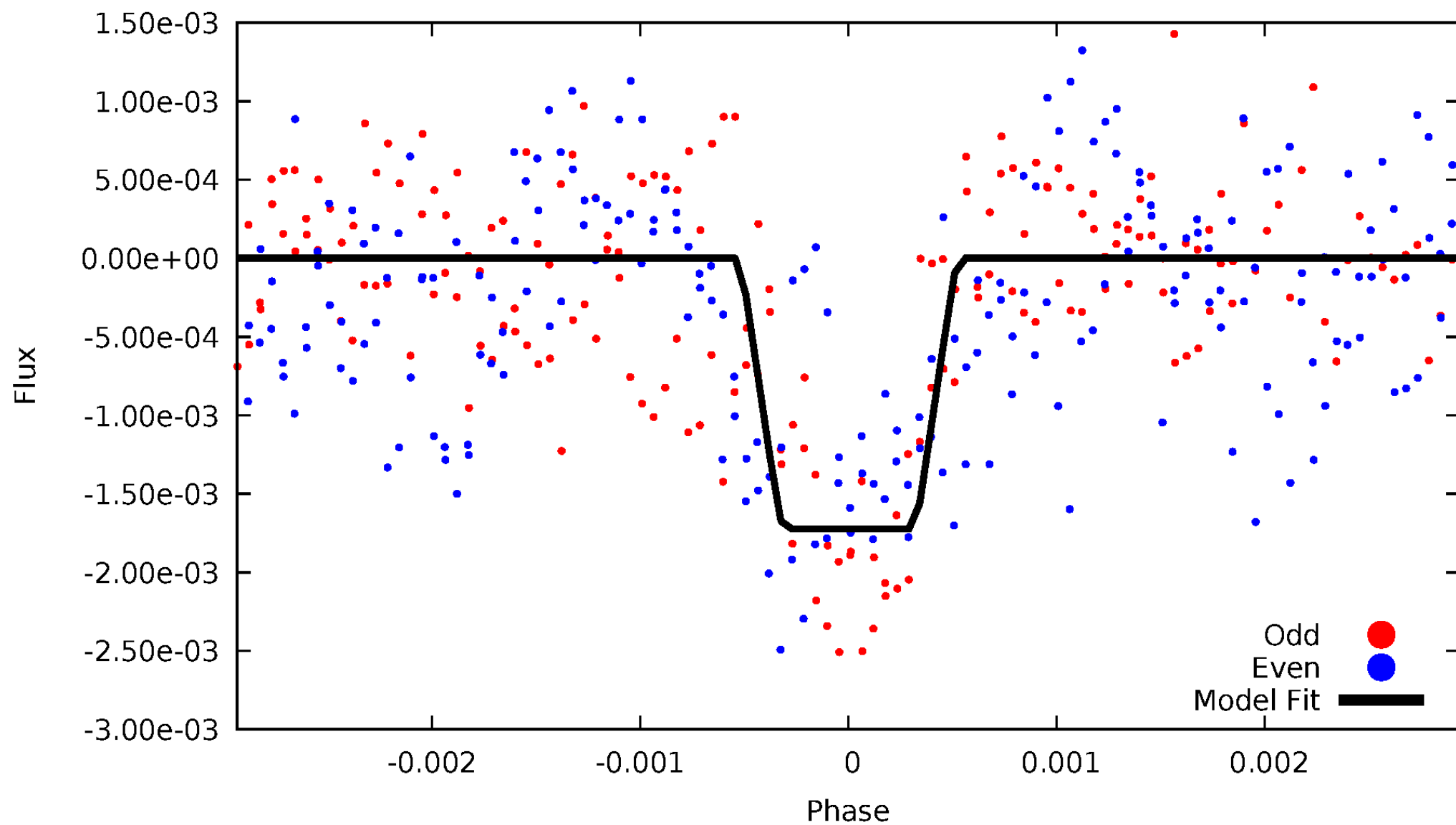
# DV Odd/Even

TCE 008374905-03



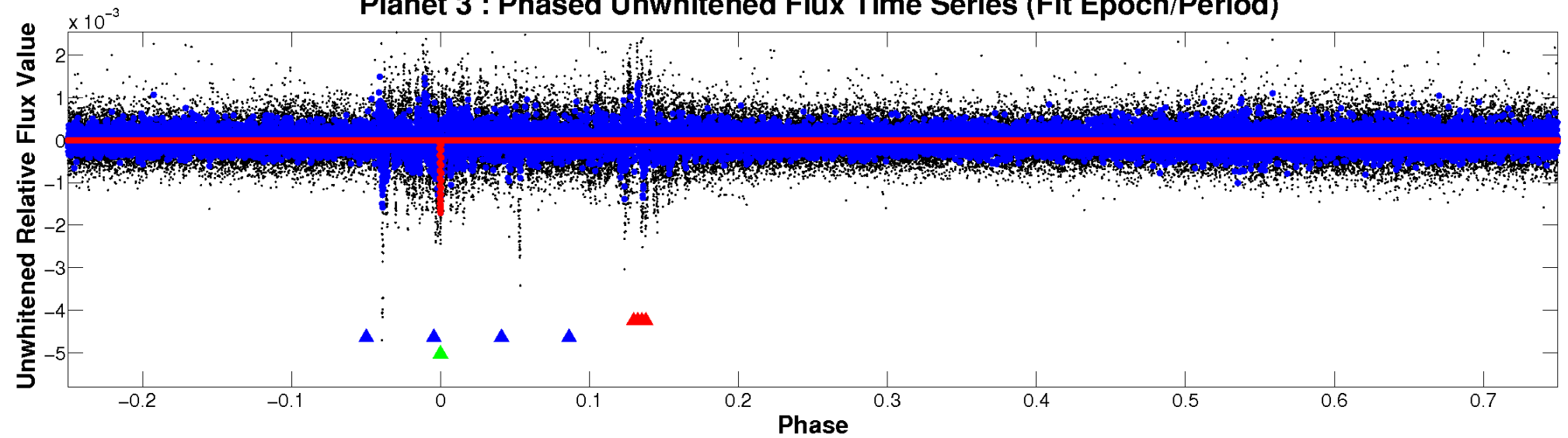
# ALT Odd/Even

TCE 008374905-03

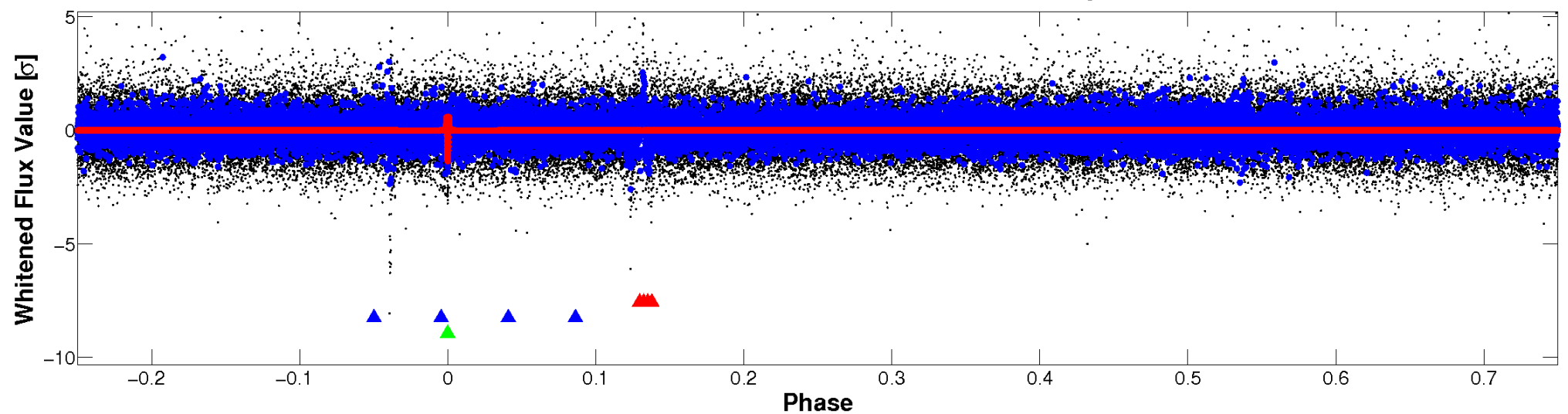


# Non-Whitened Vs. Whitened Light Curve

Planet 3 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

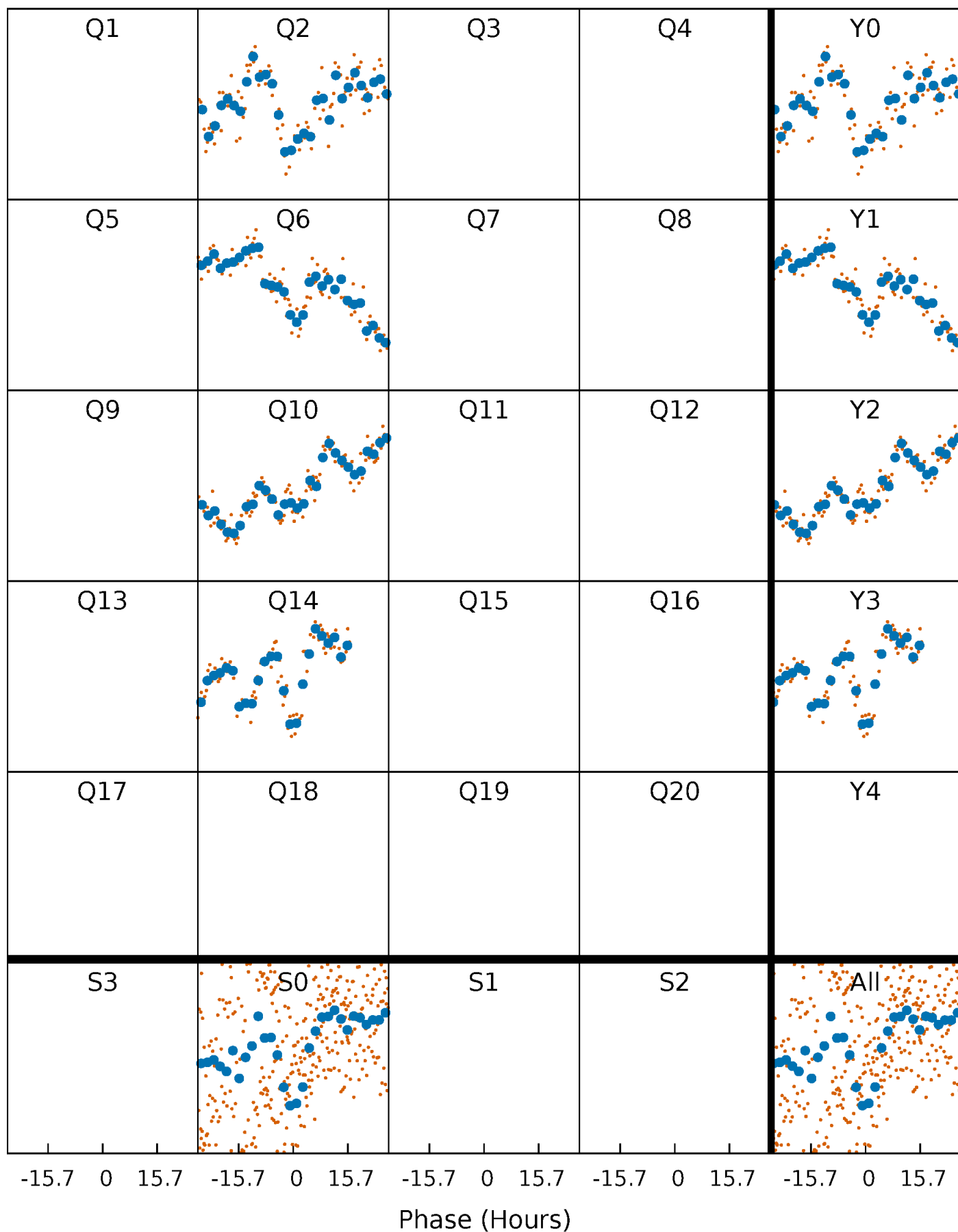


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



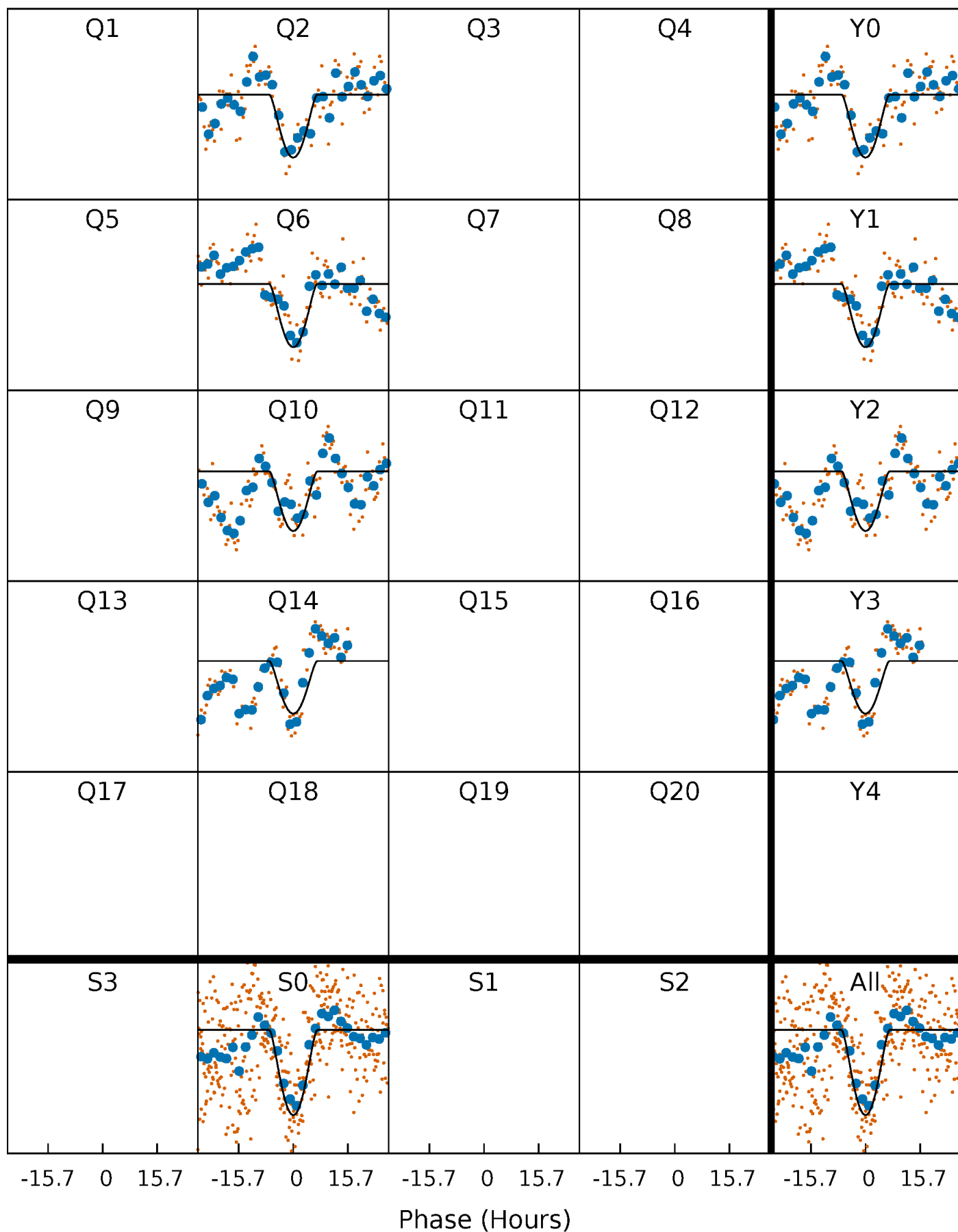
# PDC Quarter-Phased Transit Curves

TCE 008374905-03     $P=367.489251$  Days     $T_0=186.323182$  (BKJD)



# DV Quarter-Phased Transit Curves

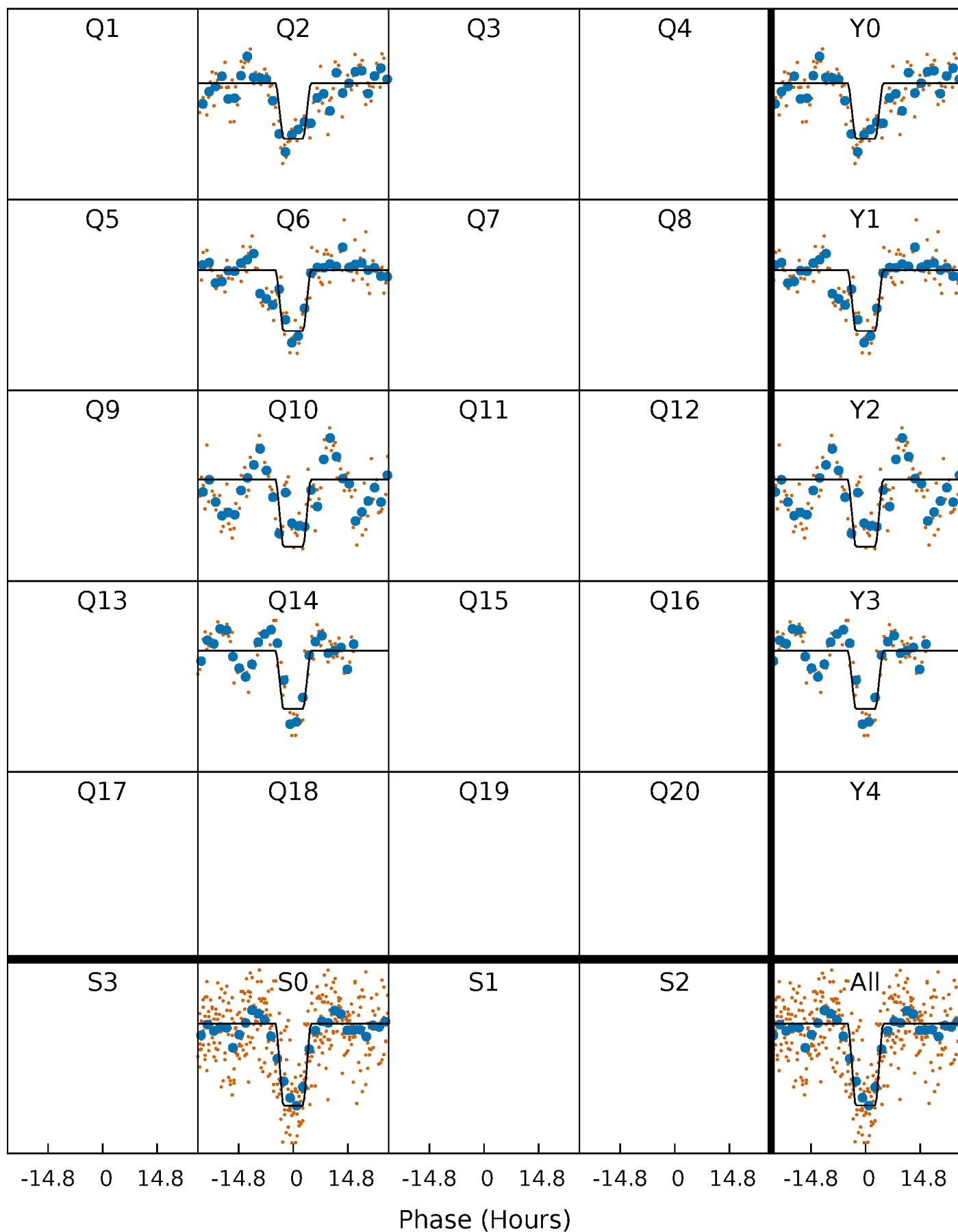
TCE 008374905-03     $P=367.489251$  Days     $T_0=186.323182$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

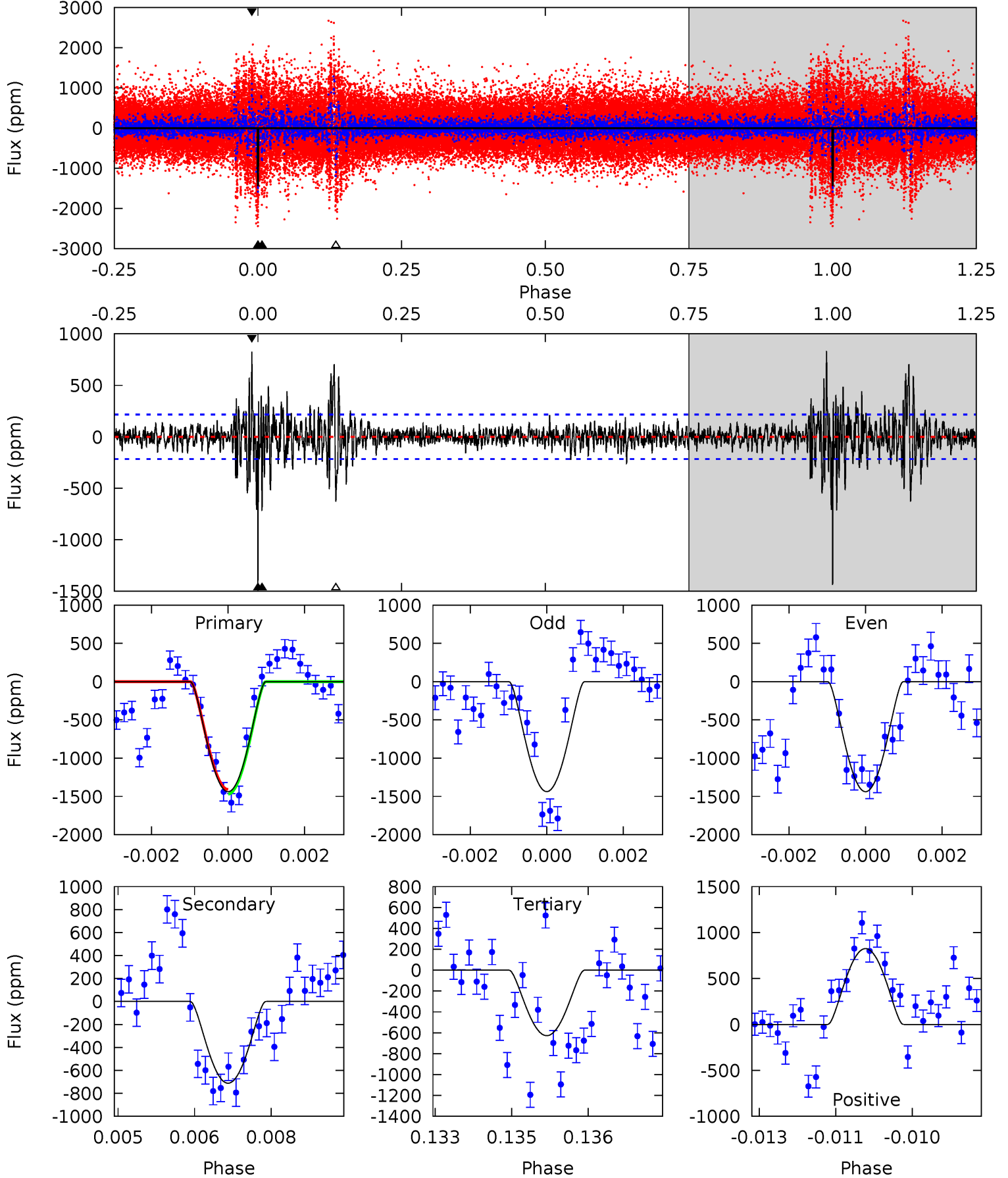
TCE 008374905-03     $P=367.477143$  Days     $T_0=186.354913$  (BKJD)



# DV Model-Shift Uniqueness Test

008374905-03, P = 367.489251 Days, E = 186.323182 Days

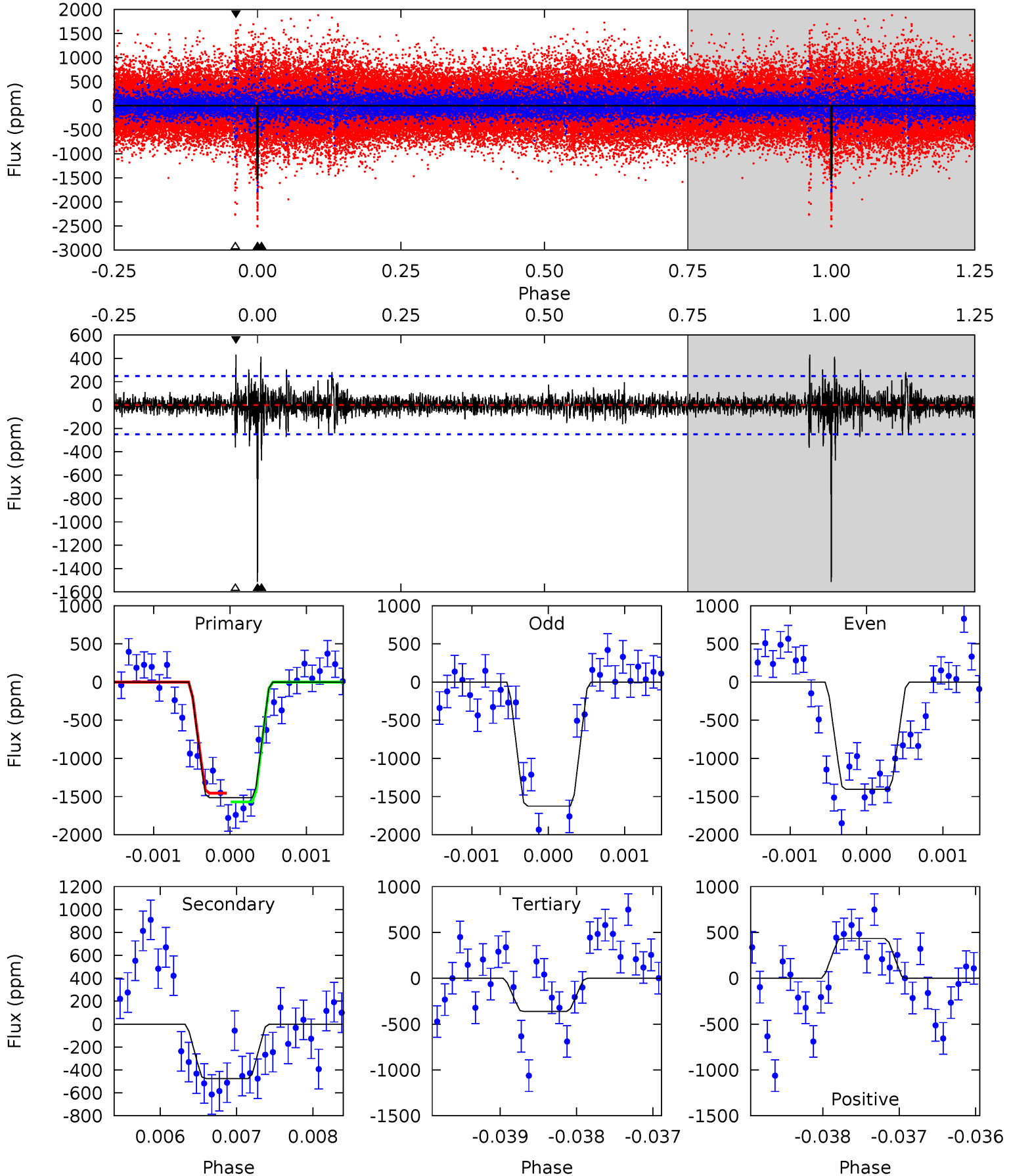
| Pri  | Sec  | Ter  | Pos  | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 35.6 | 17.6 | 15.6 | 20.5 | 5.37            | 3.15            | 2.85             | 20.1    | 15.2    | 2.09    | -2.82   | 0.01    | 1.00 | 0.36  | 0.75 |



# Alt Model-Shift Uniqueness Test

008374905-03, P = 367.477143 Days, E = 186.354913 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  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 33.1 | 10.4 | 7.94 | 9.47 | 5.45            | 3.29            | 1.24             | 25.2    | 23.7    | 2.45    | 0.92    | 2.38    | 0.93 | 0.22  | 1.24 |



### Stellar Parameters For KIC 008374905

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R$ ( $R_{\odot}$ )       | $M(M_{\odot})$            | $p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ ) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $5733^{+157}_{-157}$ | $4.612^{+0.034}_{-0.136}$ | $-0.620^{+0.300}_{-0.300}$ | $0.739^{+0.143}_{-0.051}$ | $0.823^{+0.077}_{-0.085}$ | $2.875^{+0.484}_{-1.128}$                     |
|        | +3%/-3%              | +1%/-3%                   | +48%/-48%                  | +19%/-7%                  | +9%/-10%                  | +17%/-39%                                     |
| 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 008374905-03 / KOI

| Detrend | Depth (ppm)   | $R_p$ ( $R_{\oplus}$ )   | $T_{max}$ (K)     | $T_{obs}$ (K)         | $A_{obs}$               |
|---------|---------------|--------------------------|-------------------|-----------------------|-------------------------|
| DV      | $-712 \pm 40$ | $11.40^{+12.81}_{-7.98}$ | $319^{+17}_{-13}$ | $3151^{+1652}_{-585}$ | $2653^{+27065}_{-2081}$ |
| Alt.    | $-475 \pm 46$ | $10.84^{+11.88}_{-7.41}$ | $319^{+16}_{-12}$ | $3015^{+1354}_{-524}$ | $1928^{+17085}_{-1494}$ |

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

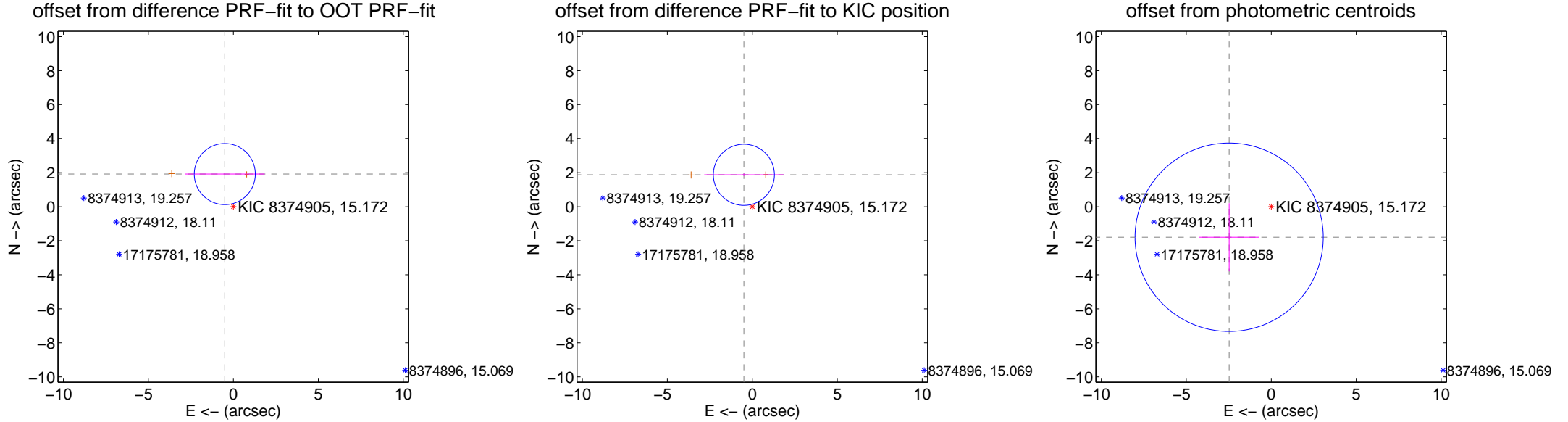
## DV Centroid Data

Supplemental centroid analysis for 008374905-03. Kepler magnitude: 15.17. Transit SNR 9.26

There are 0 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

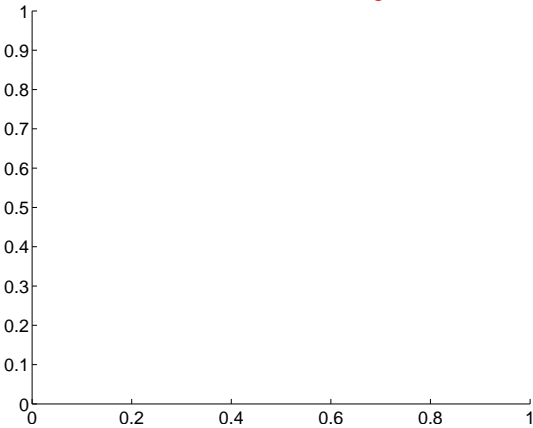
|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA       | $\Delta$ Dec      |
|---|--------------------|---------------------|-------------------|-------------------|
| PRF-fit source offset from OOT          | $1.984 \pm 0.599$  | 3.31                | $0.503 \pm 2.344$ | $1.919 \pm 0.072$ |
| PRF-fit source offset from KIC position | $1.941 \pm 0.599$  | 3.24                | $0.495 \pm 2.333$ | $1.877 \pm 0.068$ |
| photometric centroid source offset      | $3.06 \pm 1.85$    | 1.66                | $2.48 \pm 1.76$   | $-1.79 \pm 2.00$  |



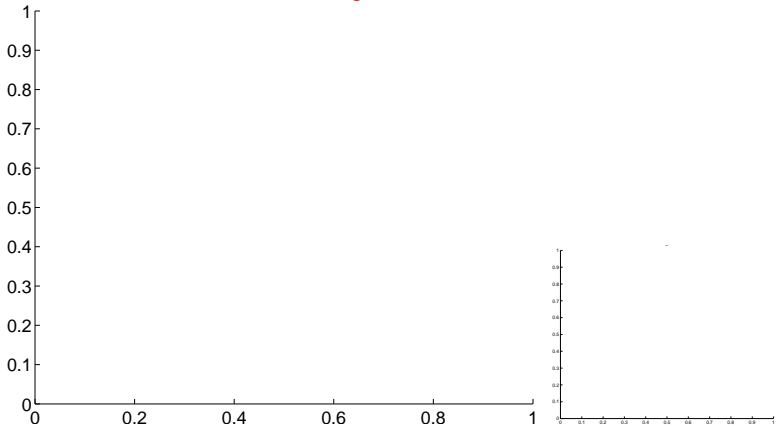
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

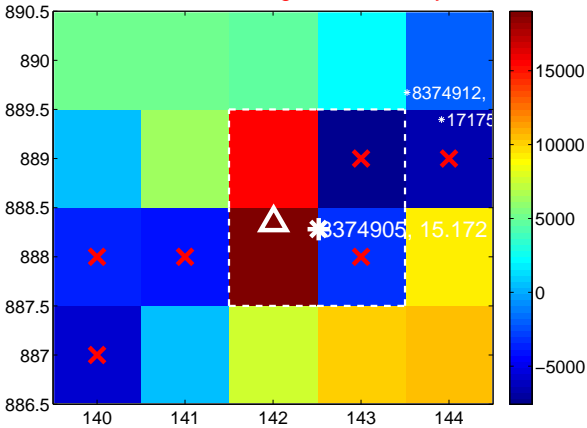
Q1 no difference image



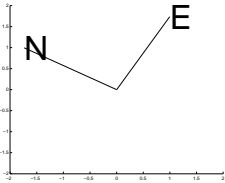
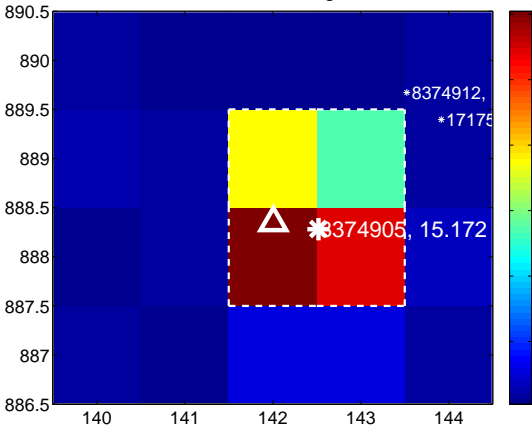
Q1 no OOT image



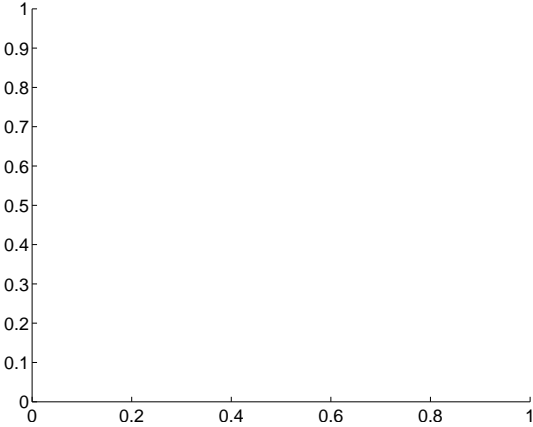
Q2 difference image. Poor Quality



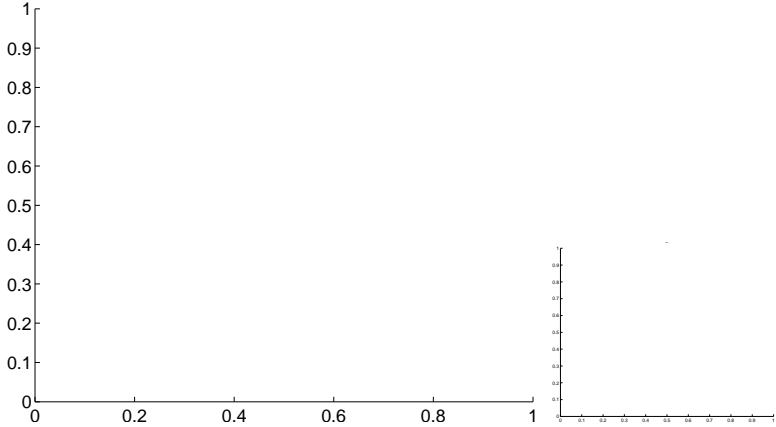
Q2 OOT image



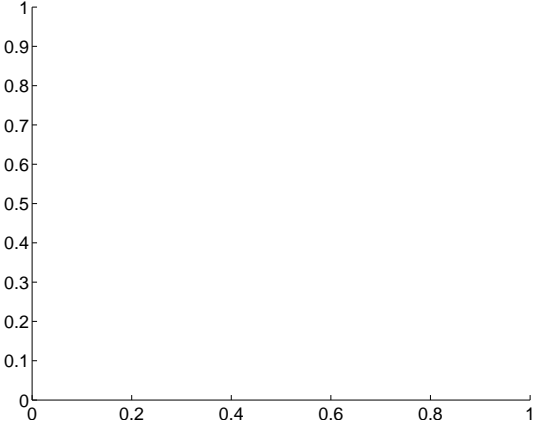
Q3 no difference image



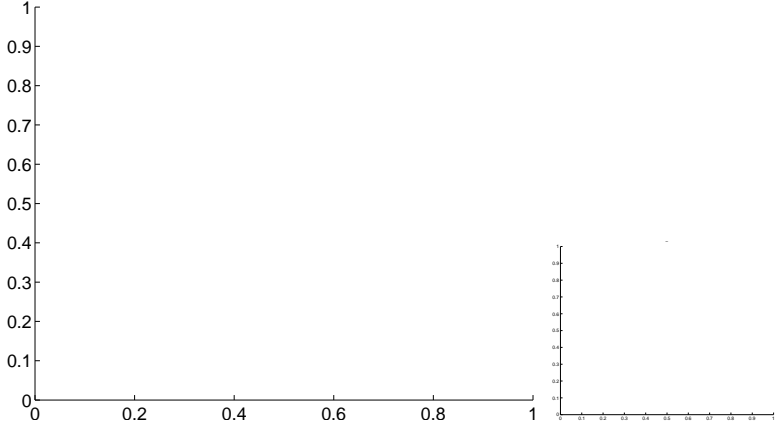
Q3 no OOT image



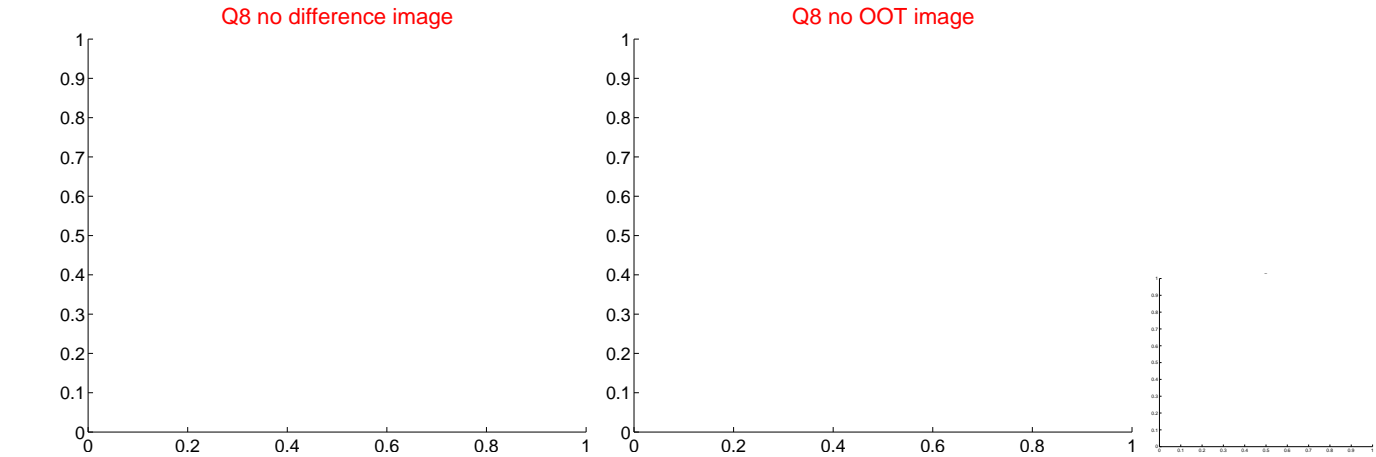
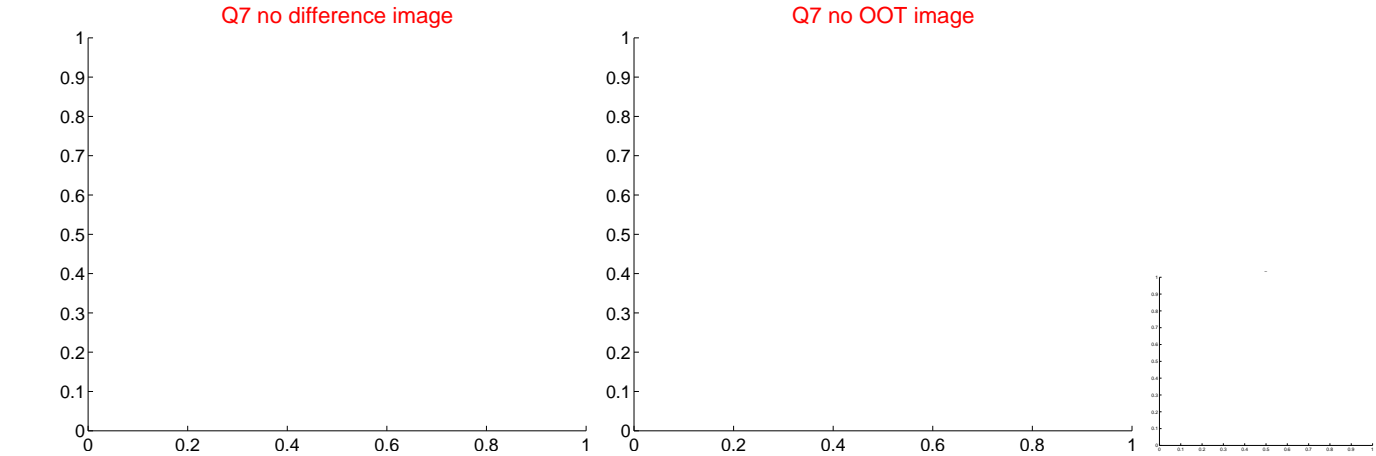
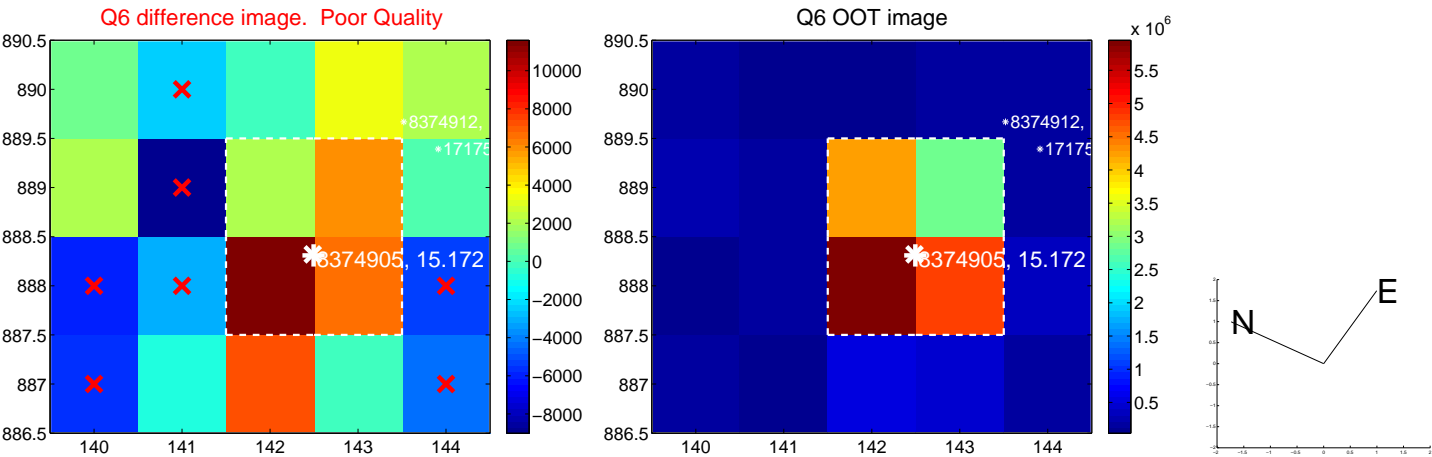
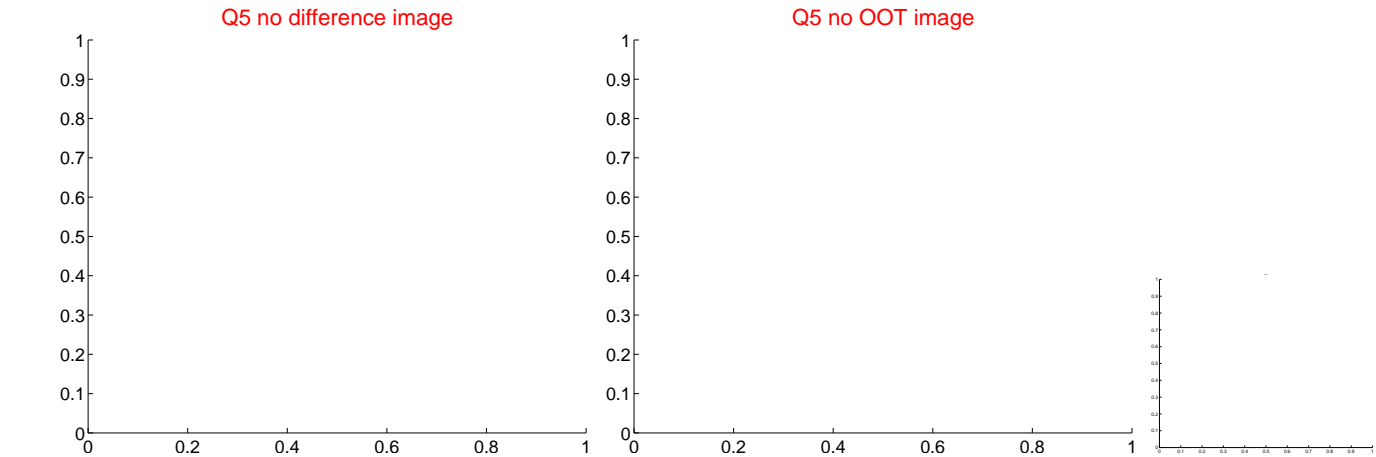
Q4 no difference image



Q4 no OOT image



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.

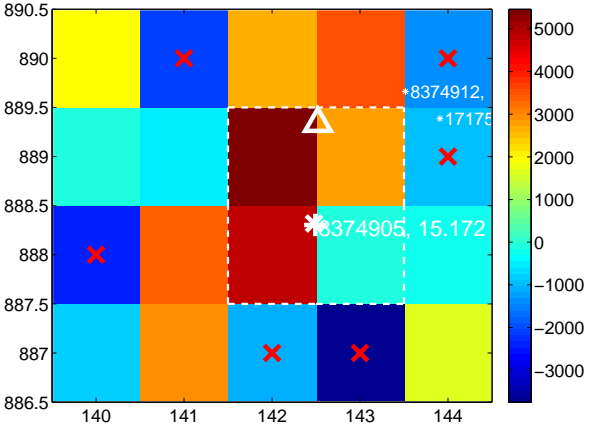
Q9 no difference image



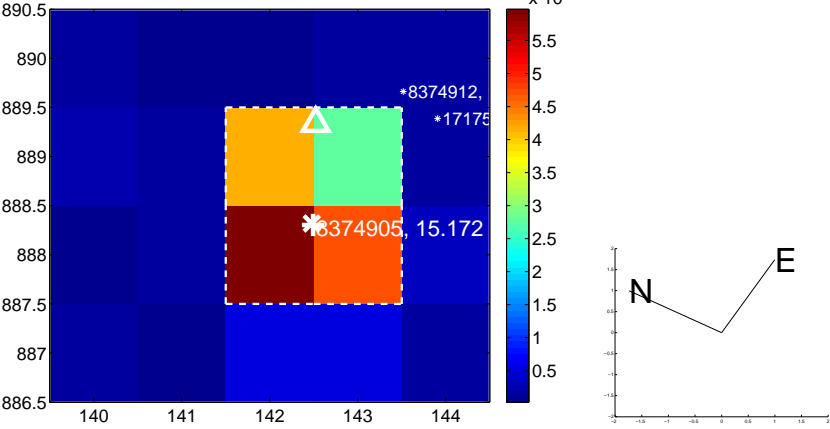
Q9 no OOT image



Q10 difference image. Poor Quality



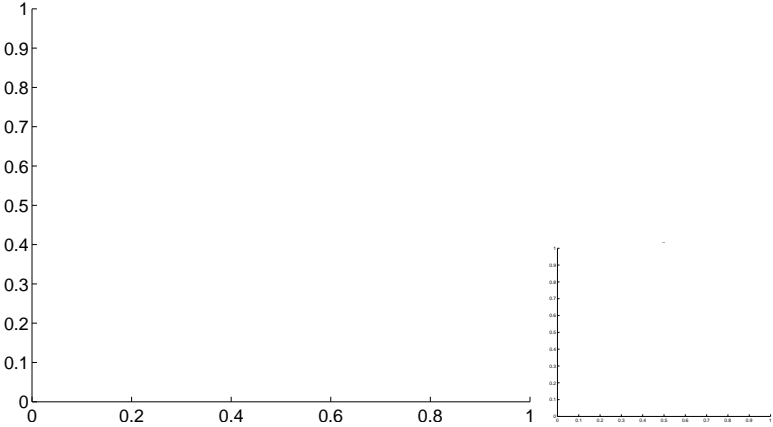
Q10 OOT image



Q11 no difference image



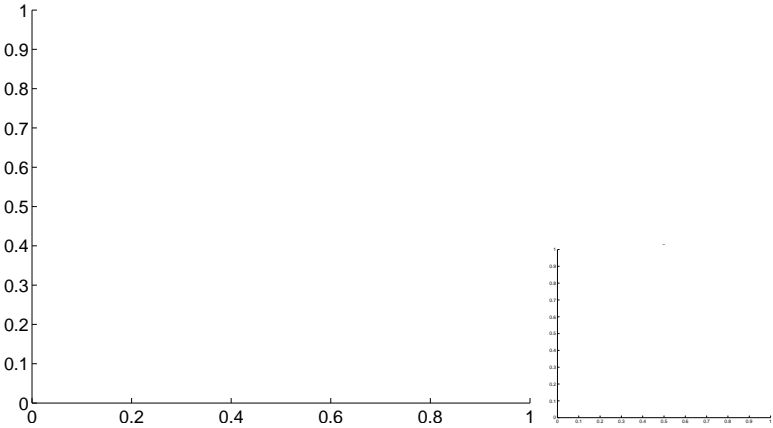
Q11 no OOT image



Q12 no difference image



Q12 no OOT image

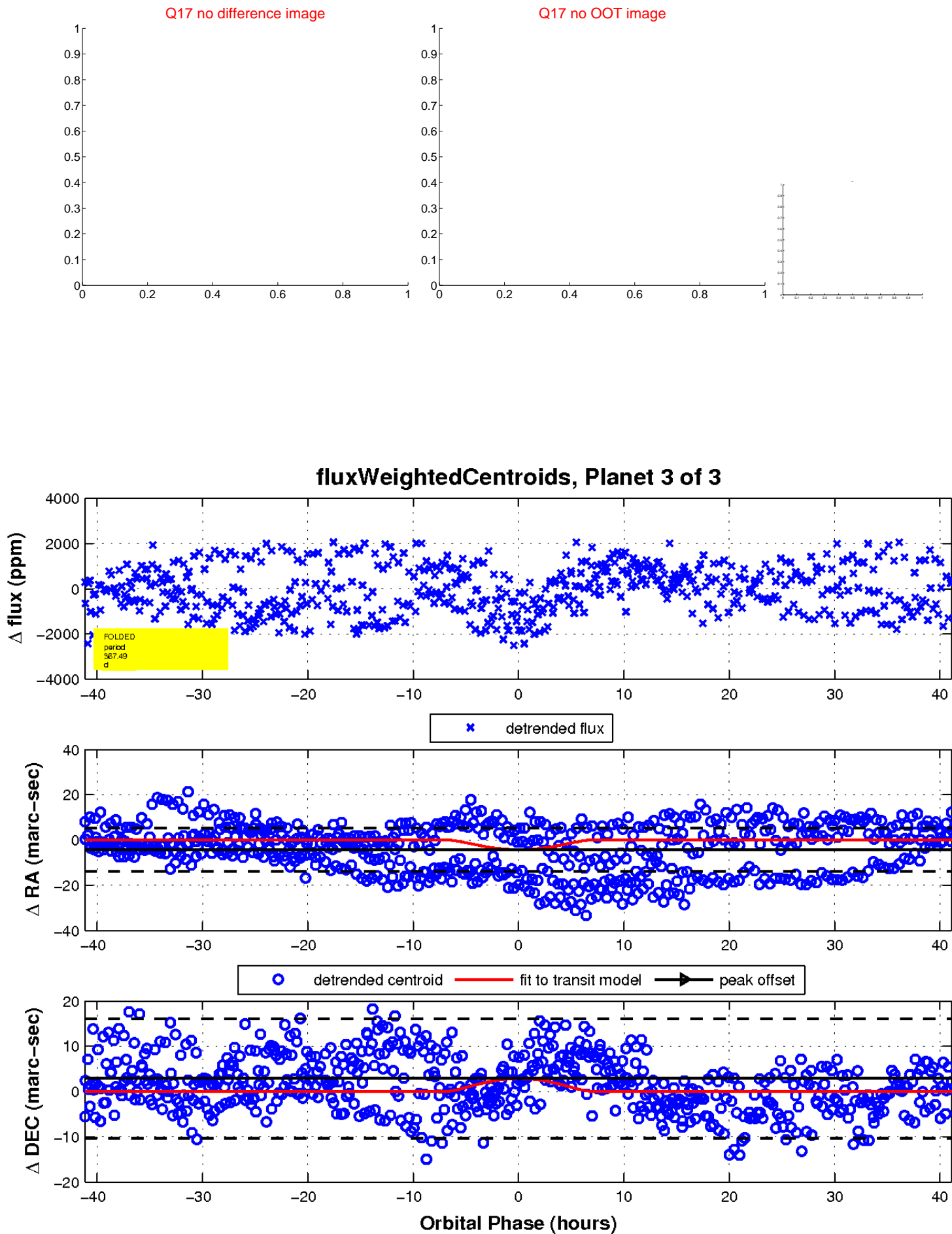




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image

Declination

