

# KIC 004070376

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|-------|-------|-----------------------------|-----------------|------------------------|------------------------|
| 004070376-01 | OBS      | 1318.01 | 1.634612      | 132.335411   | 16873.5     | 2.694            | 826.9 | 804.5 | 0.97                        | 6121            | 16.00                  | 1595.19                |
| 004070376-02 | OBS      | No      | 1.634577      | 131.525985   | 394.8       | 1.742            | 22.9  | 21.1  | 0.97                        | 6121            | 2.28                   | 1595.23                |
| 004070376-03 | OBS      | No      | 0.544866      | 131.788277   | 1024.4      | 2.000            | 10.0  | -1.0  | 0.97                        | 6121            | 3.11                   | 6902.06                |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 004070376-01 | OBS      | FP   | 0.00  | 0 | 1 | 0 | 0 | SWEET_EB—DEEP_V_SHAPED—HAS_SEC_TCE                      |
| 004070376-02 | OBS      | FP   | 0.00  | 1 | 1 | 0 | 0 | IS_SEC_TCE  |
| 004070376-03 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—RESIDUAL_TCE—CENT_NOFITS |

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

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

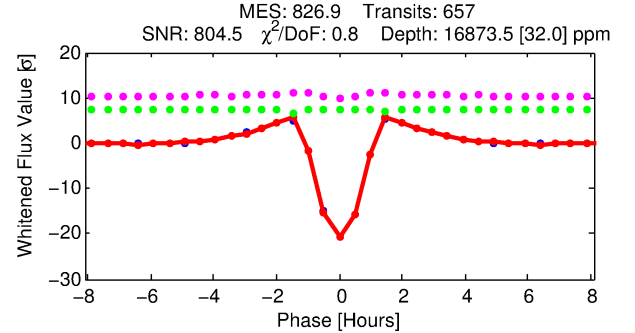
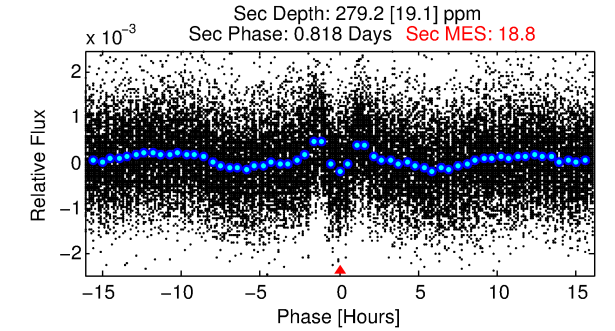
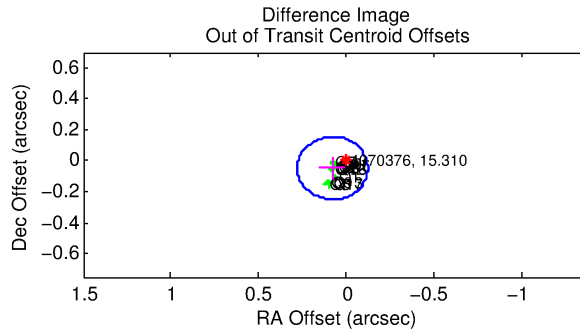
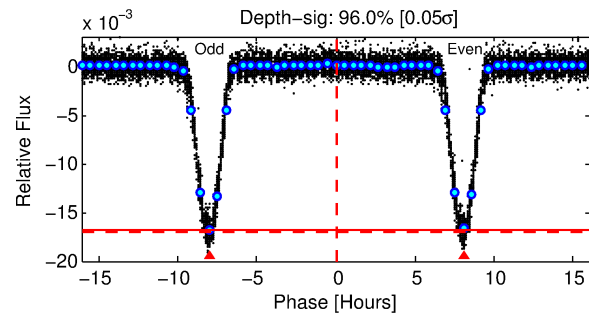
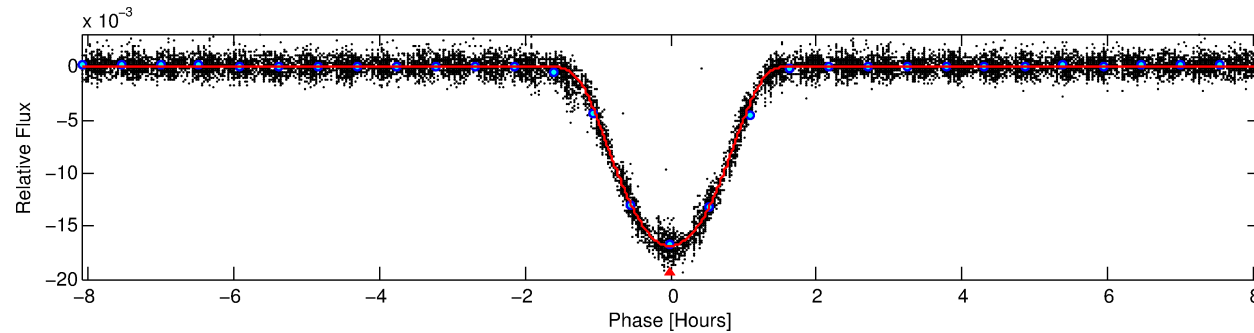
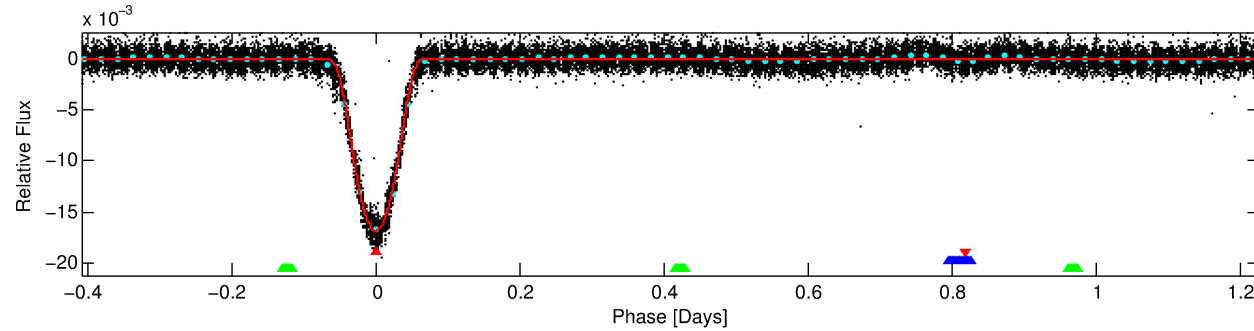
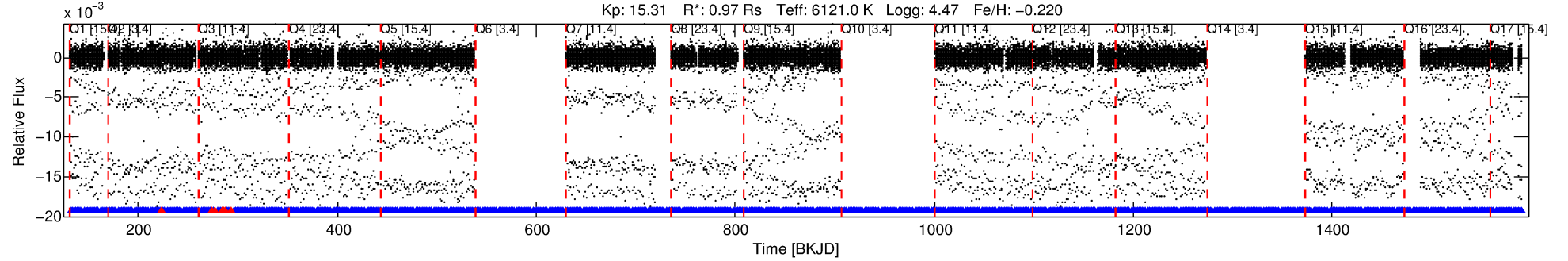
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004070376-01

No Significant Match Found

# DV One-Page Summary

KIC: 4070376 Candidate: 1 of 3 Period: 1.635 d  
KOI: K01318.01 Corr: 0.995



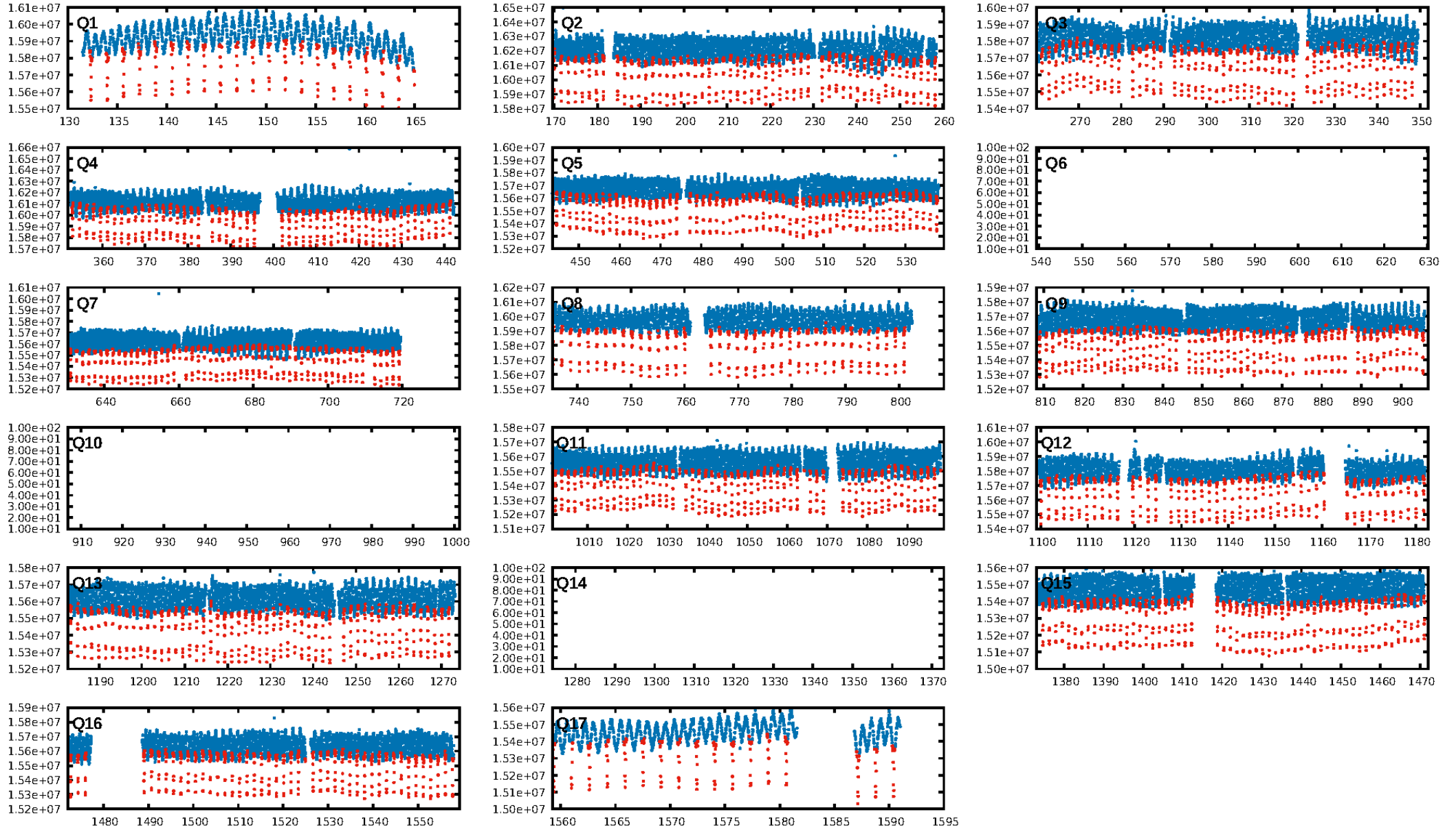
## DV Fit Results:

Period = 1.63461 [0.00000] d  
Epoch = 132.3354 [0.0000] BKJD  
Rp/R\* = 0.1512 [0.0016]  
a/R\* = 3.47 [0.01]  
b = 0.90 [0.00]  
Seff = 1595.19 [669.79]  
Teq = 1611 [169] K  
Rp = 16.00 [5.22] Re  
a = 0.0272 [0.0074] AU  
Ag = 0.45 [0.18] [-3.10 $\sigma$ ]  
Teffp = 2035 [79] K [2.27 $\sigma$ ]

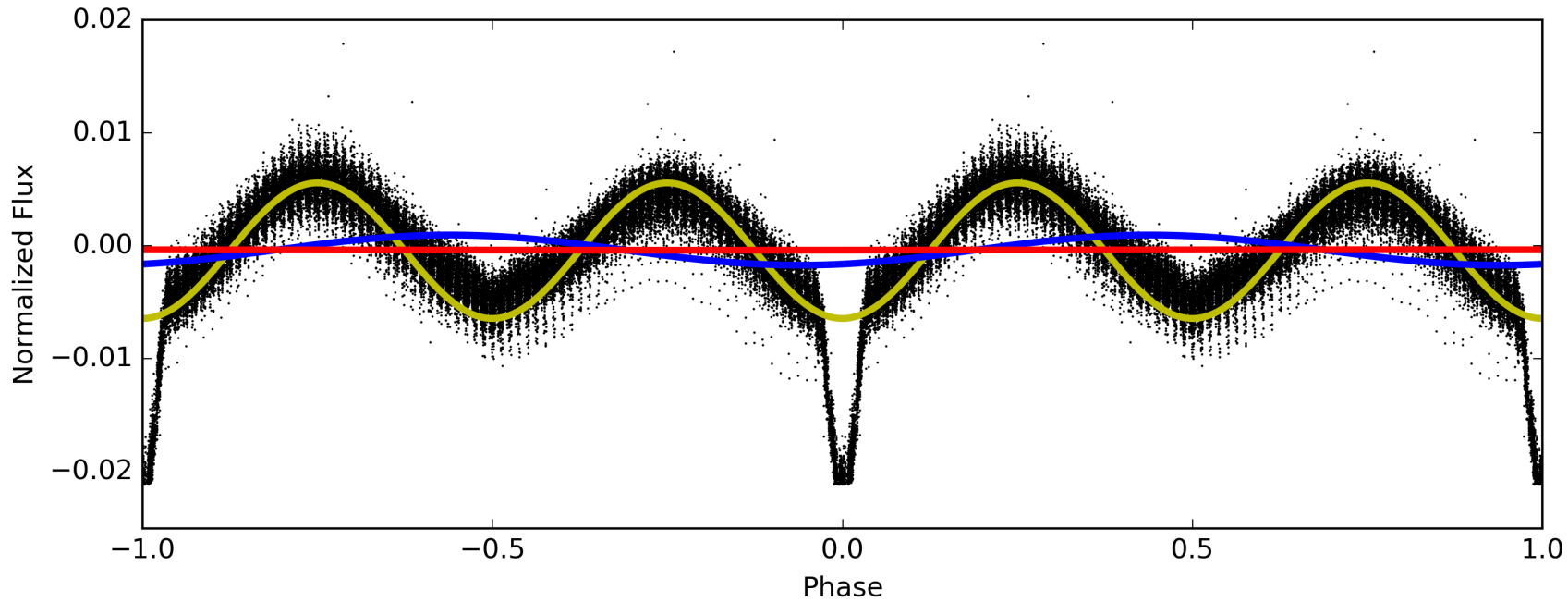
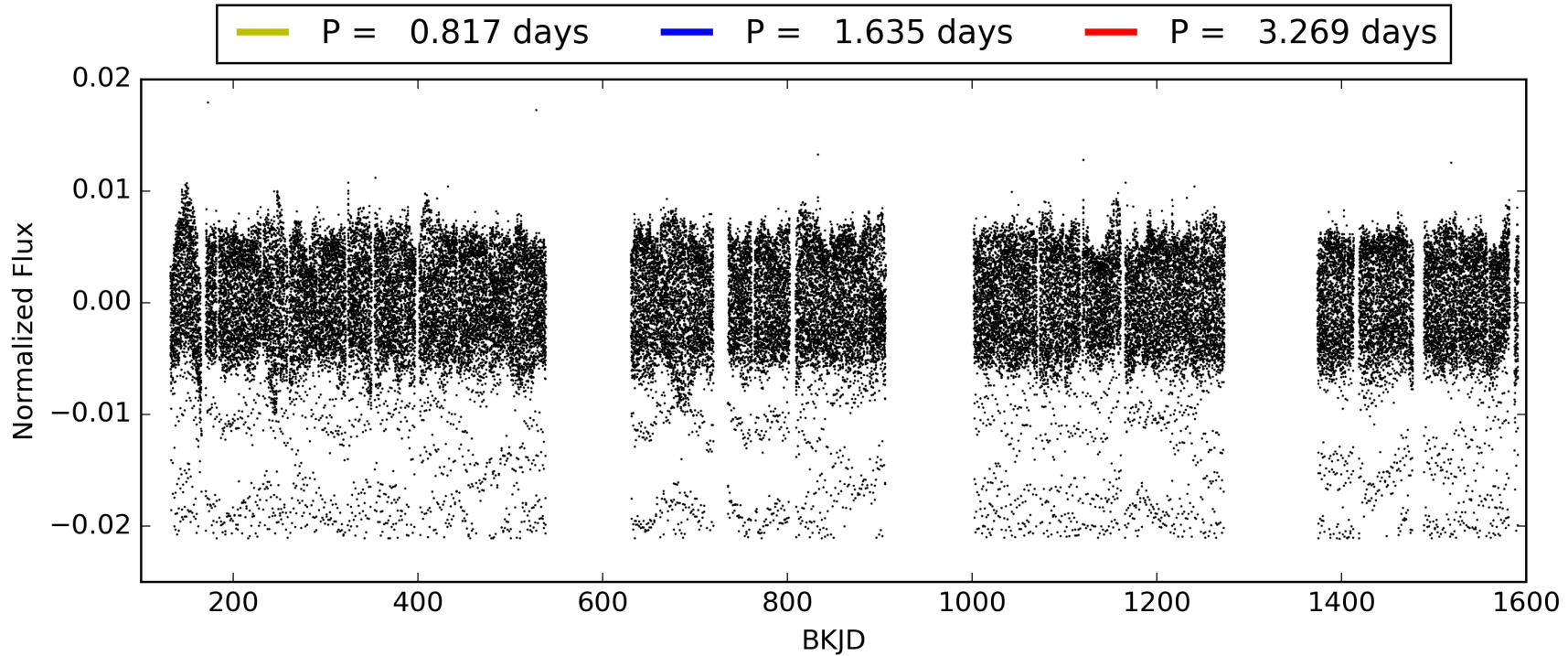
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 0.99 [612/619]  
GhostDiagnostic-chr: 4.061  
Centroid-sig: 0.0%  
Centroid-so: 0.123 arcsec [9.26 $\sigma$ ]  
OotOffset-rm: 0.093 arcsec [1.38 $\sigma$ ]  
KicOffset-rm: 0.077 arcsec [1.15 $\sigma$ ]  
OotOffset-st: 1/4/4/5 [14]  
KicOffset-st: 1/4/4/5 [14]  
DiffImageQuality-fgm: 1.00 [14/14]  
DiffImageOverlap-fno: 0.00 [0/14]

# TCE 004070376-01, PDC Light Curves

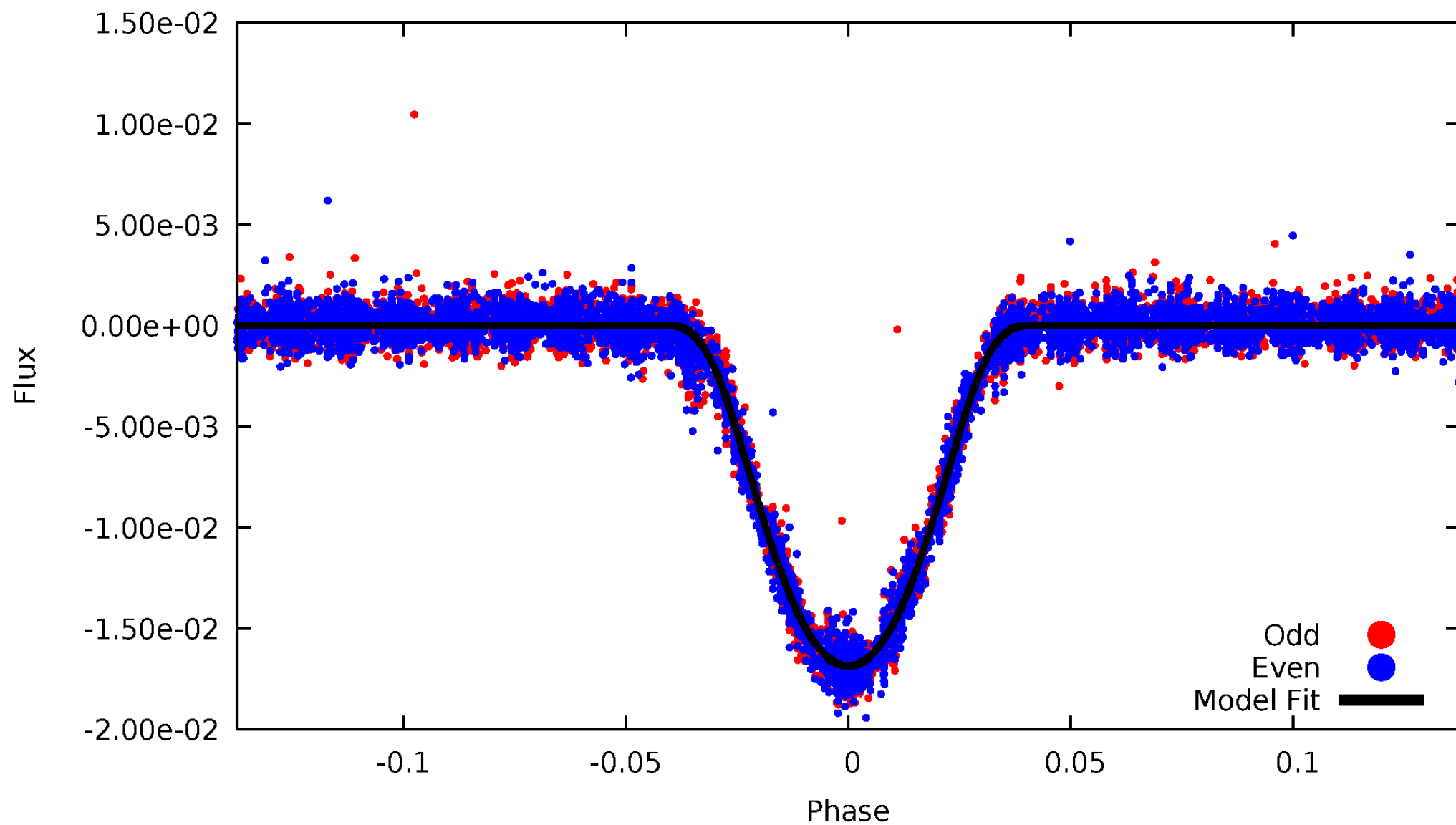


TCE 004070376-01



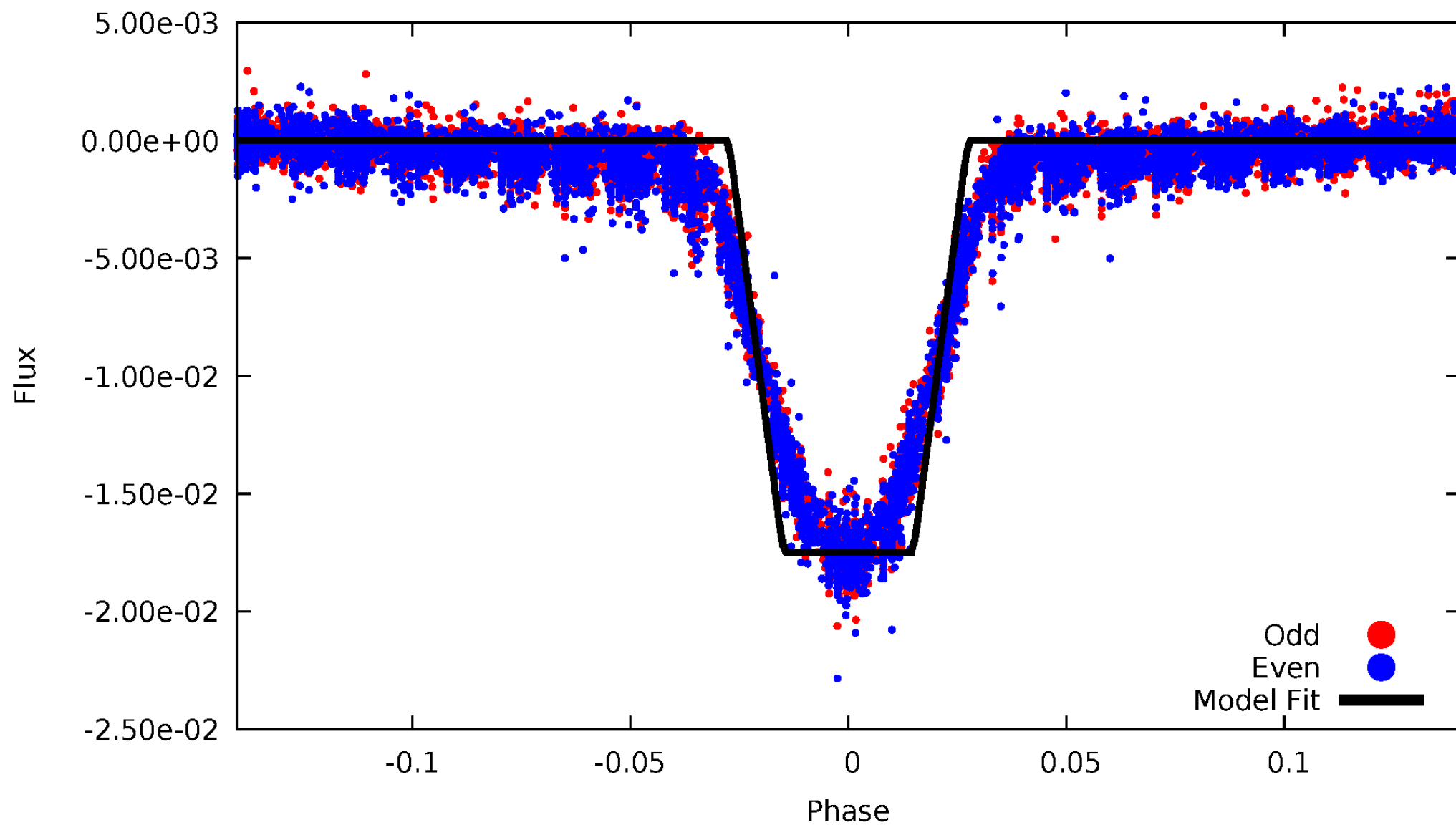
# DV Odd/Even

TCE 004070376-01



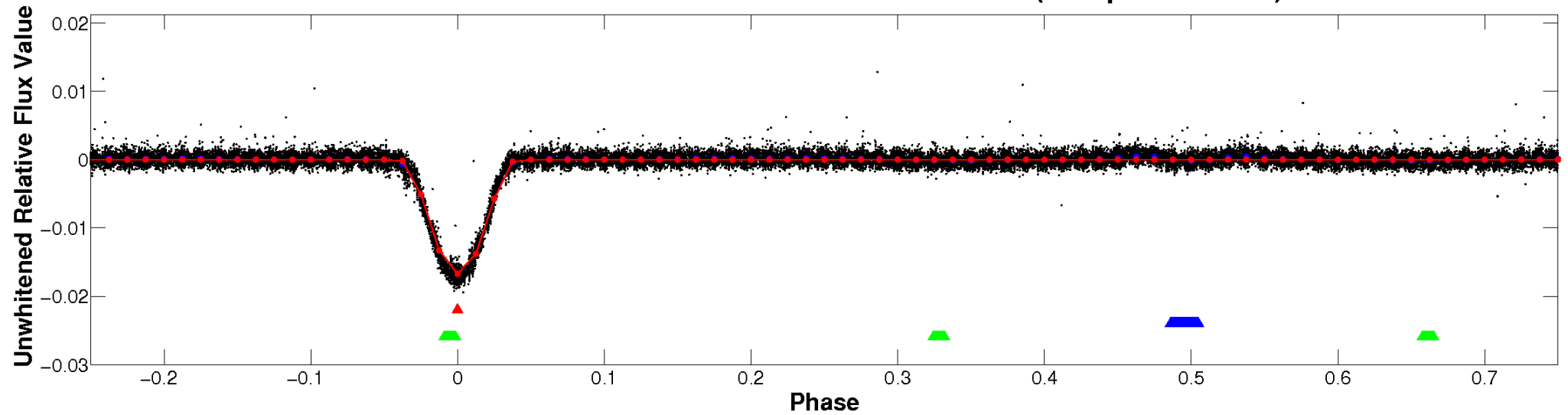
# ALT Odd/Even

TCE 004070376-01

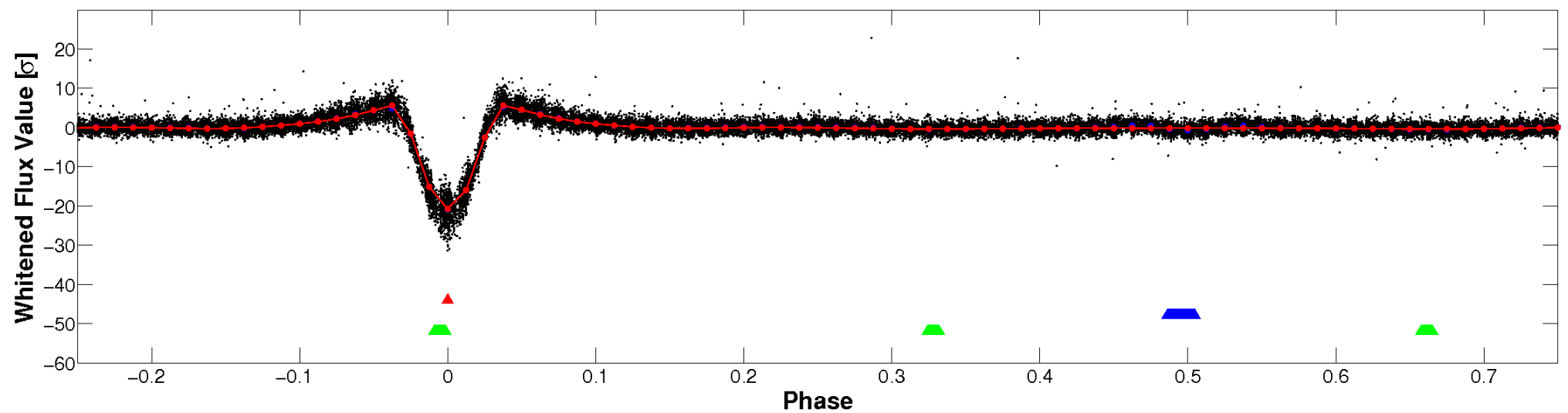


# Non-Whitened Vs. Whitened Light Curve

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

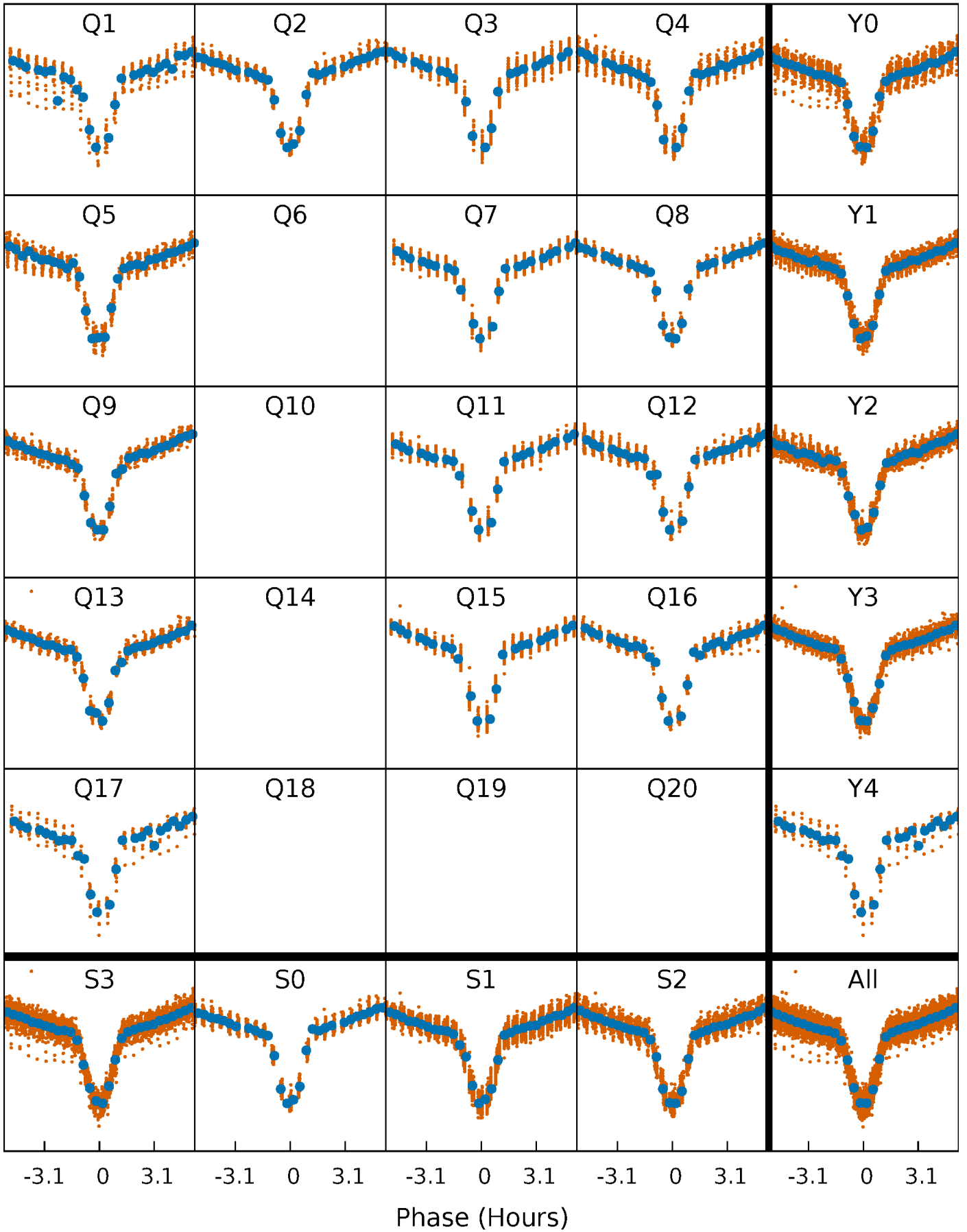


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

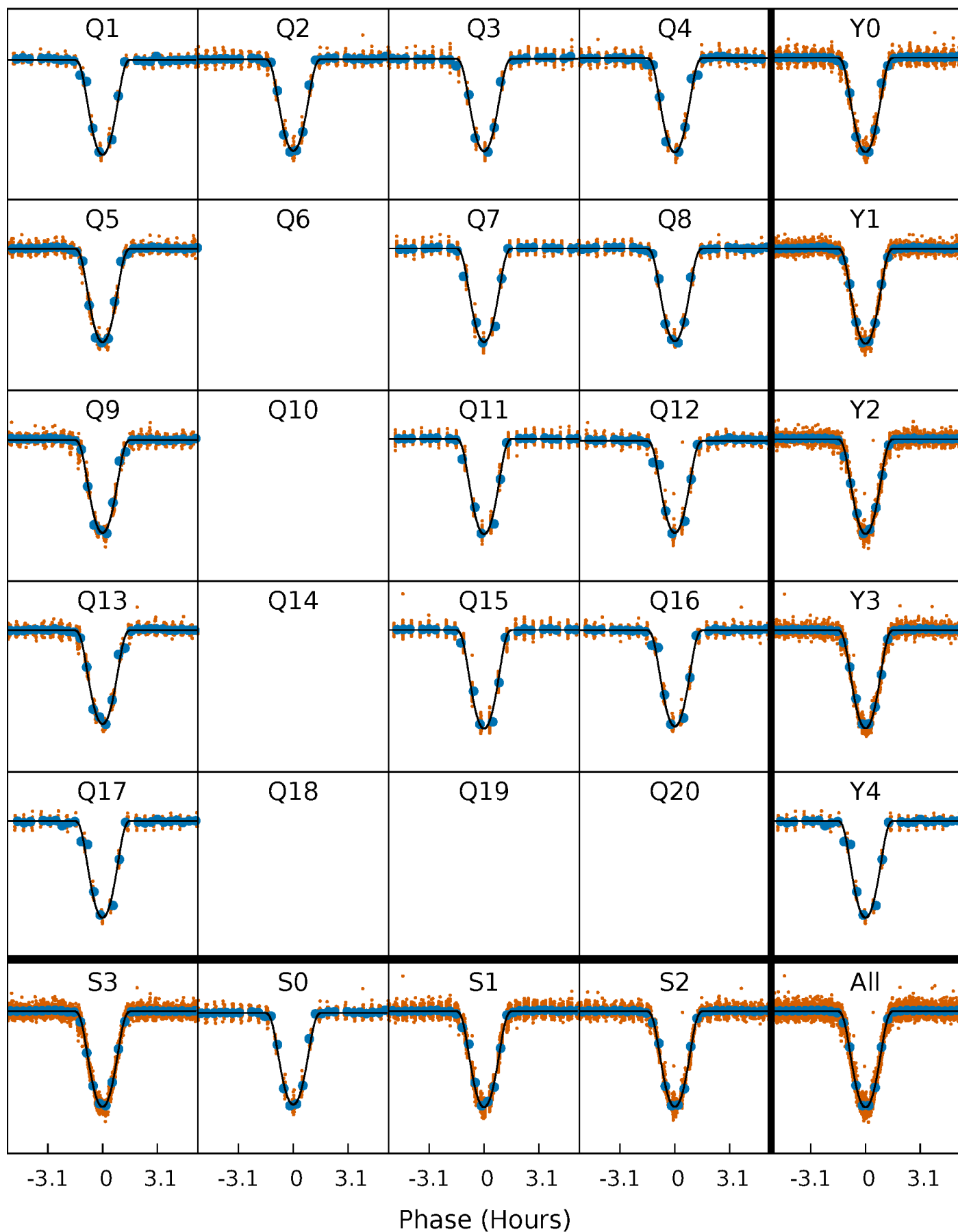
TCE 004070376-01 P= 1.634612 Days  $T_0=132.335411$  (BKJD)





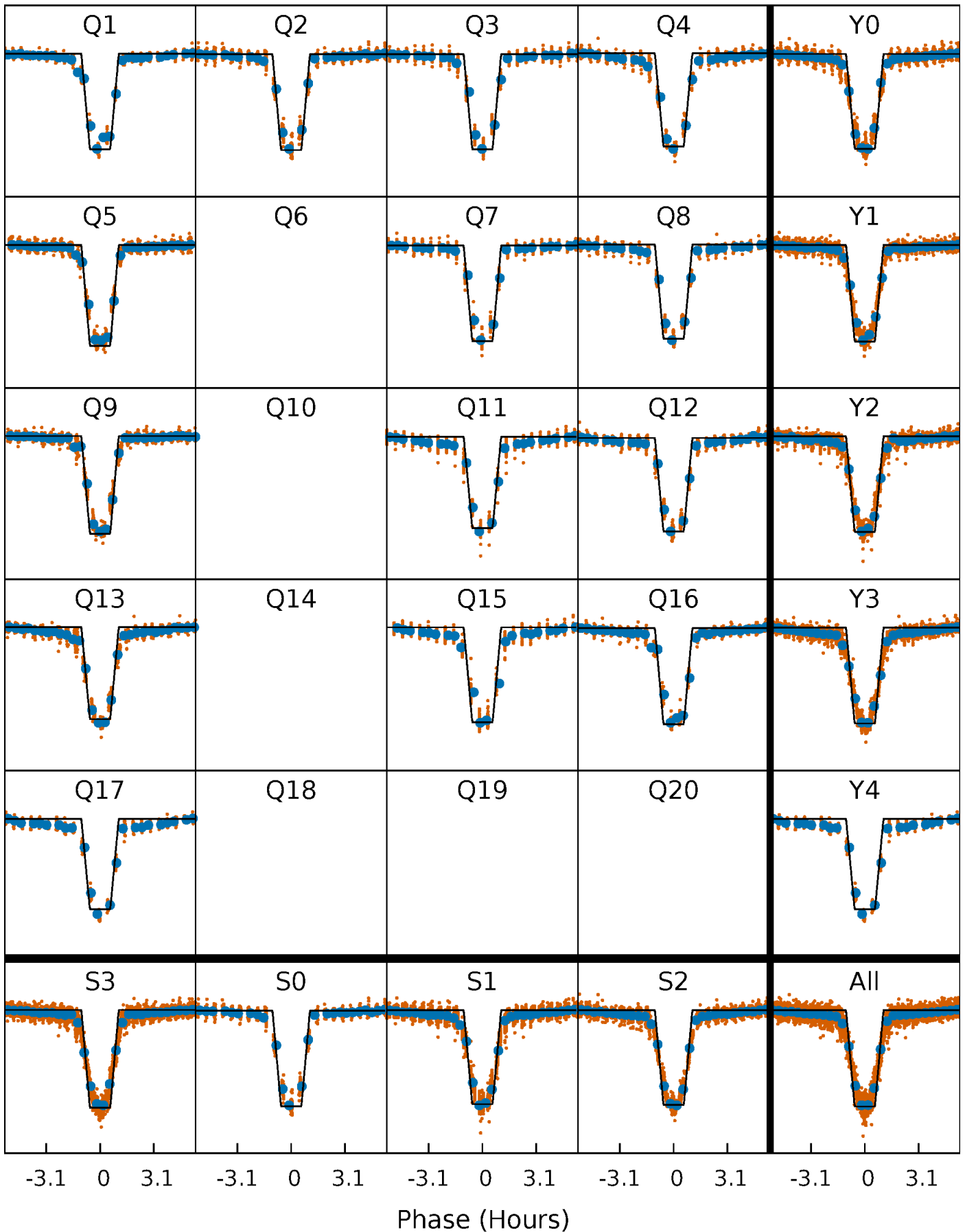
# DV Quarter-Phased Transit Curves

TCE 004070376-01 P= 1.634612 Days  $T_0=132.335411$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

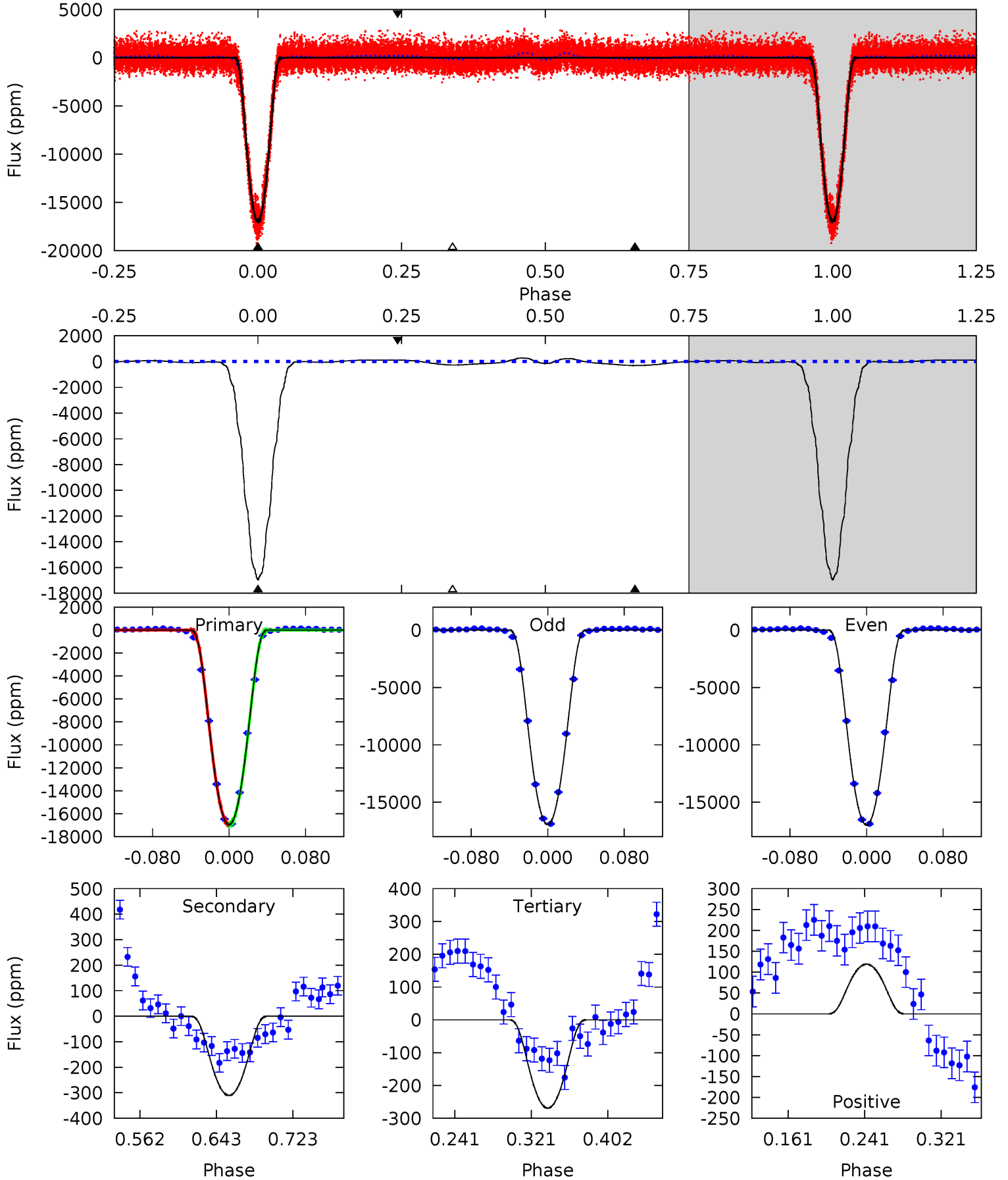
TCE 004070376-01 P= 1.634612 Days  $T_0=132.334982$  (BKJD)



# DV Model-Shift Uniqueness Test

004070376-01, P = 1.634612 Days, E = 130.700799 Days

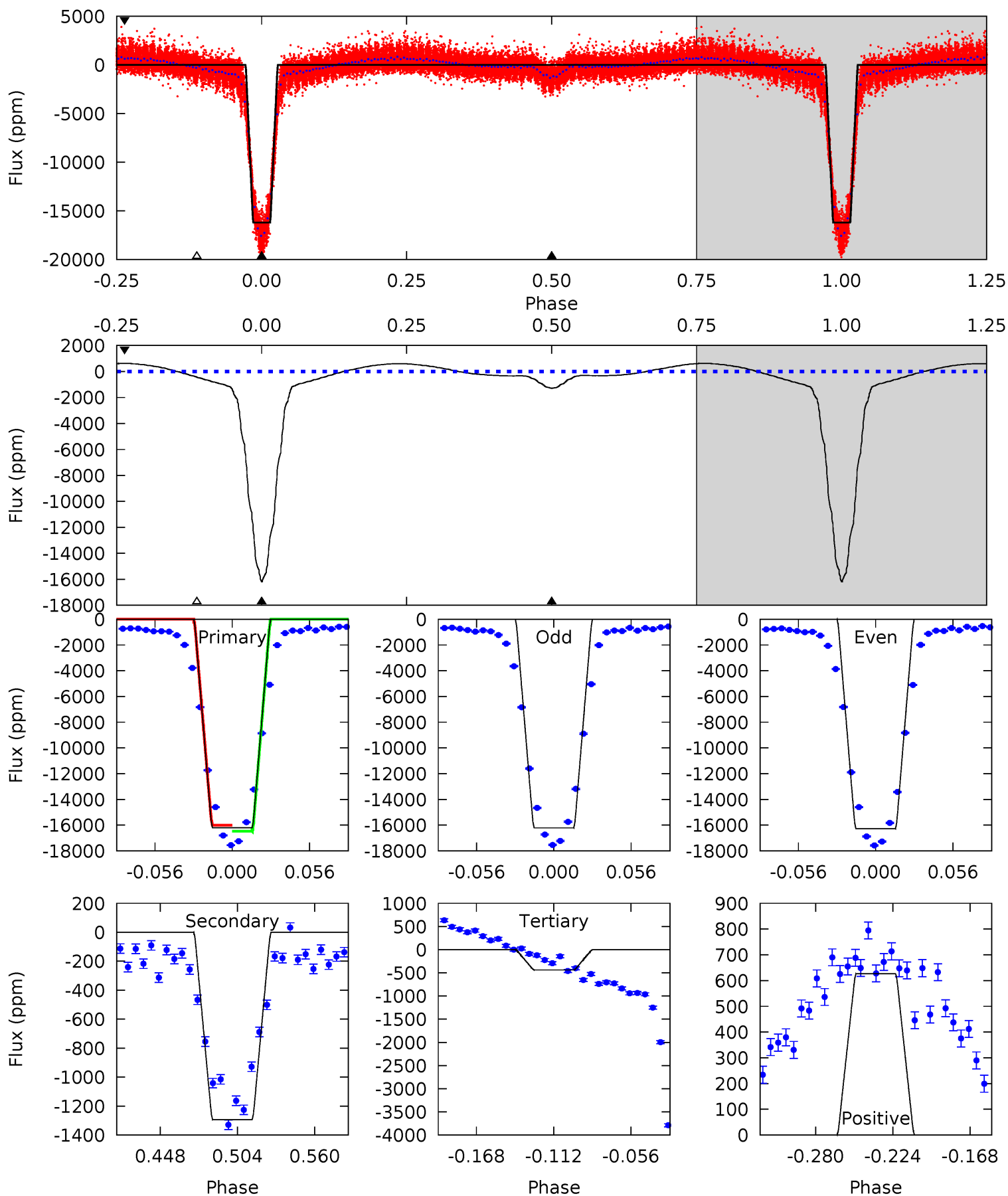
| Pri  | Sec  | Ter  | Pos  | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 1650 | 30.2 | 26.2 | 11.6 | 4.61            | 1.75            | 12.3             | 1624    | 1639    | 4.05    | 18.7    | 1.87    | 1.00 | 0.02  | 2.64 |



# Alt Model-Shift Uniqueness Test

004070376-01, P = 1.634612 Days, E = 130.700370 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  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 1175 | 93.7 | 31.7 | 45.4 | 4.69            | 1.91            | 32.7             | 1143    | 1129    | 62.0    | 48.3    | 2.41    | 1.00 | 0.04  | 16.5 |



### Stellar Parameters For KIC 004070376

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R (R_{\odot})$           | $M(M_{\odot})$            | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $6121^{+191}_{-212}$ | $4.468^{+0.054}_{-0.216}$ | $-0.220^{+0.300}_{-0.300}$ | $0.970^{+0.316}_{-0.105}$ | $1.001^{+0.142}_{-0.129}$ | $1.547^{+0.449}_{-0.830}$                 |
|        | +3%/-3%              | +1%/-5%                   | +136%/-136%                | +33%/-11%                 | +14%/-13%                 | +29%/-54%                                 |
| 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 004070376-01 / KOI 1318.01

| Detrend | Depth (ppm)    | $R_p (R_{\oplus})$      | $T_{max} (K)$        | $T_{obs} (K)$       | $A_{obs}$                 |
|---------|----------------|-------------------------|----------------------|---------------------|---------------------------|
| DV      | $-311 \pm 10$  | $16.39^{+3.04}_{-1.20}$ | $2306^{+169}_{-108}$ | $2458^{+99}_{-277}$ | $0.457^{+0.074}_{-0.115}$ |
| Alt.    | $-1293 \pm 14$ | $14.36^{+2.50}_{-1.11}$ | $2309^{+165}_{-120}$ | $3549^{+81}_{-74}$  | $2.493^{+0.388}_{-0.639}$ |

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

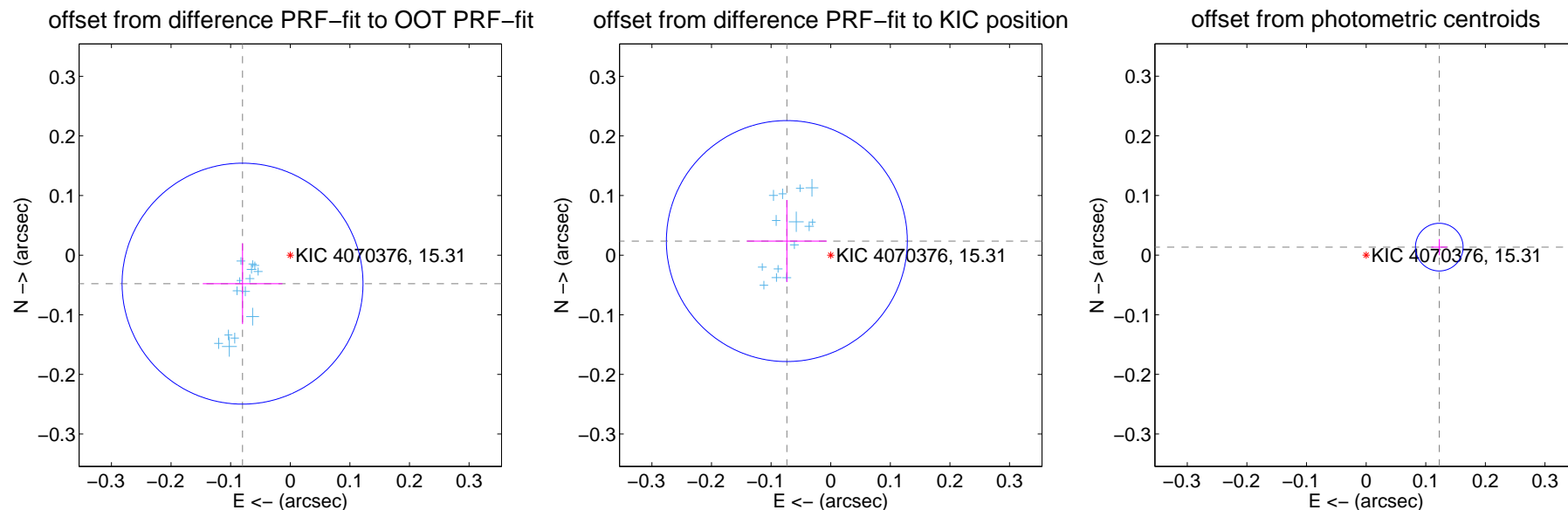
## DV Centroid Data

Supplemental centroid analysis for 004070376-01. Kepler magnitude: 15.31. Transit SNR 804.54

There are 14 quarters with good PRF difference image offsets

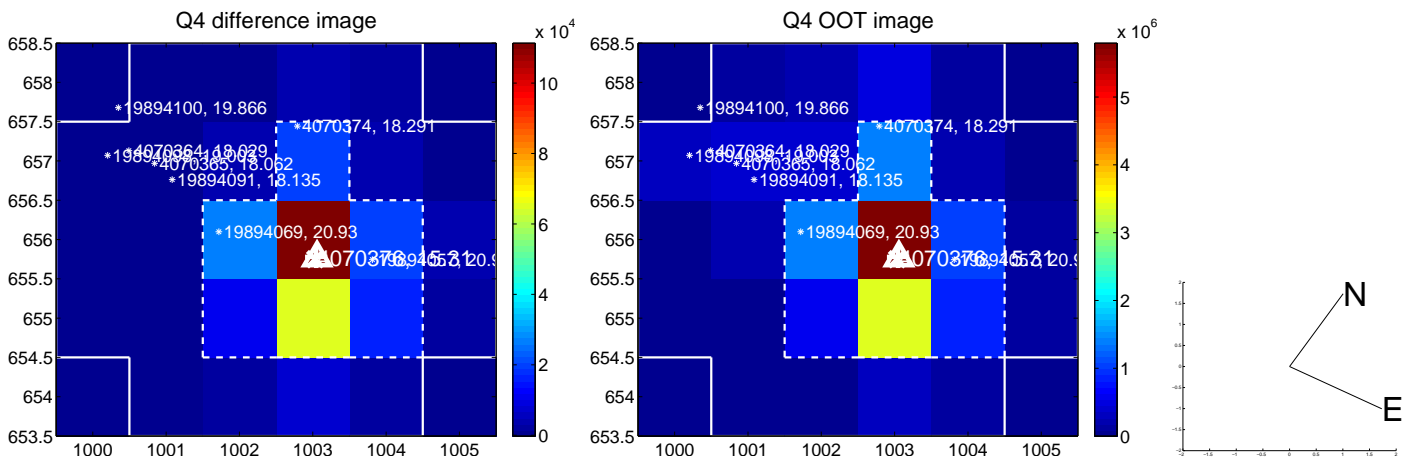
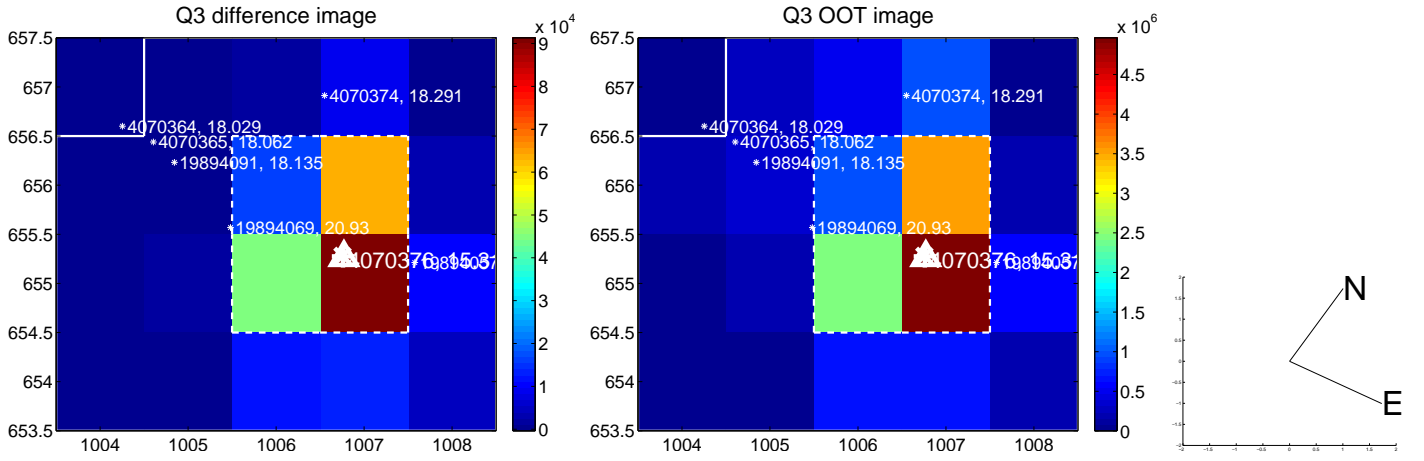
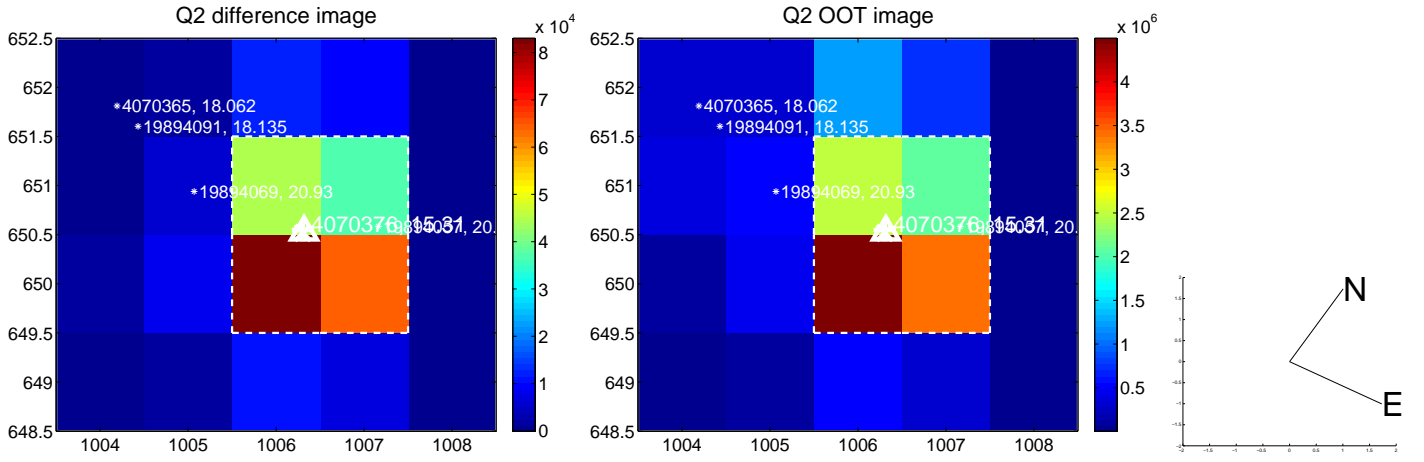
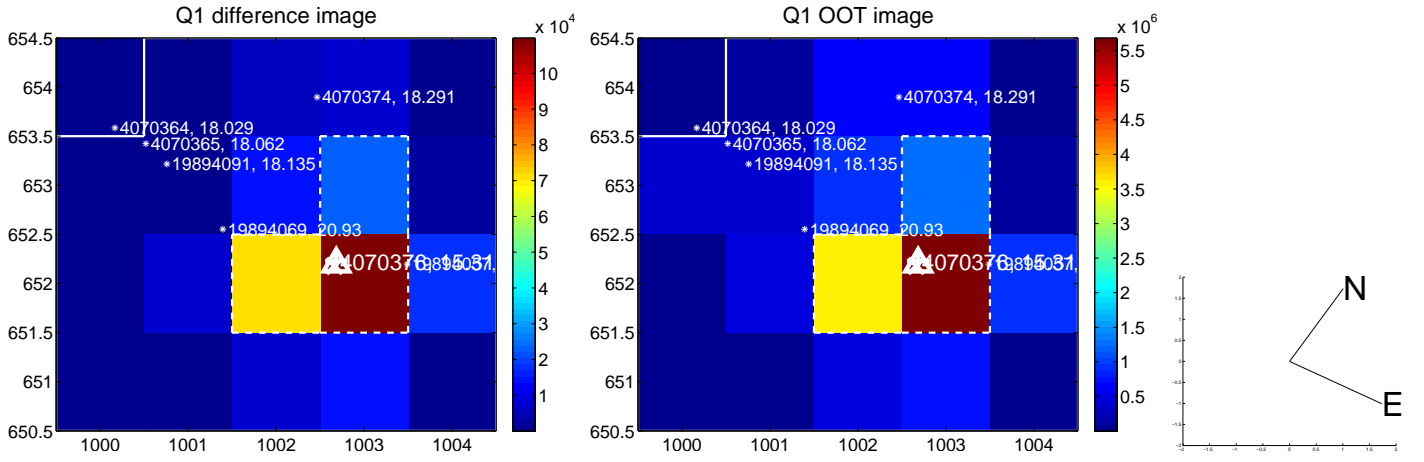
The direct PRF centroid is offset from the target star catalog position by about 0.21 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA       | $\Delta$ Dec       |
|---|--------------------|---------------------|-------------------|--------------------|
| PRF-fit source offset from OOT          | $0.093 \pm 0.067$  | 1.38                | $0.080 \pm 0.067$ | $-0.048 \pm 0.068$ |
| PRF-fit source offset from KIC position | $0.077 \pm 0.067$  | 1.15                | $0.074 \pm 0.067$ | $0.024 \pm 0.069$  |
| photometric centroid source offset      | $0.12 \pm 0.01$    | 9.26                | $-0.12 \pm 0.01$  | $0.01 \pm 0.01$    |

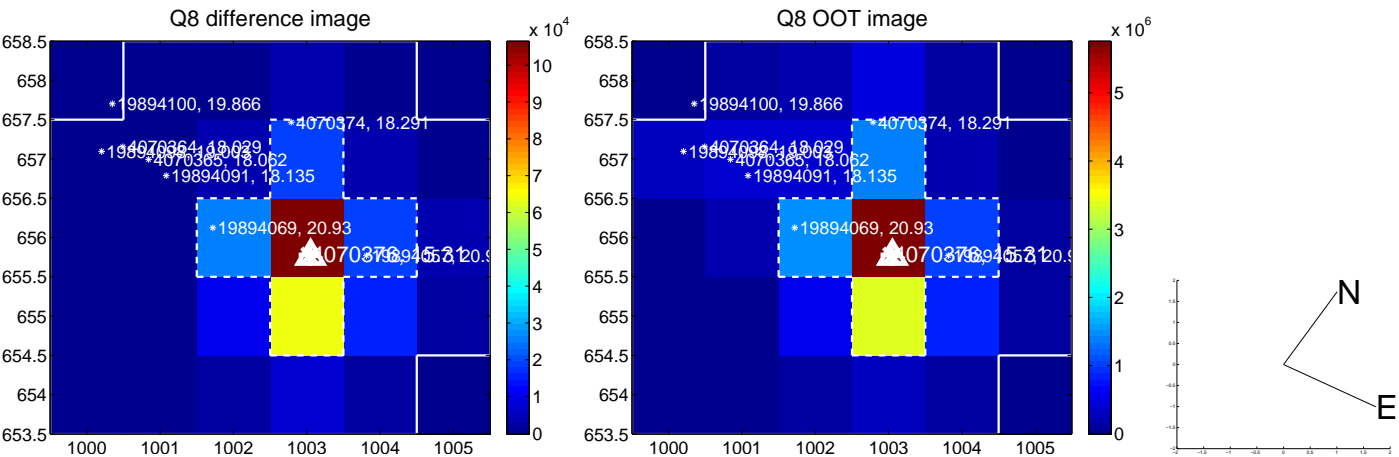
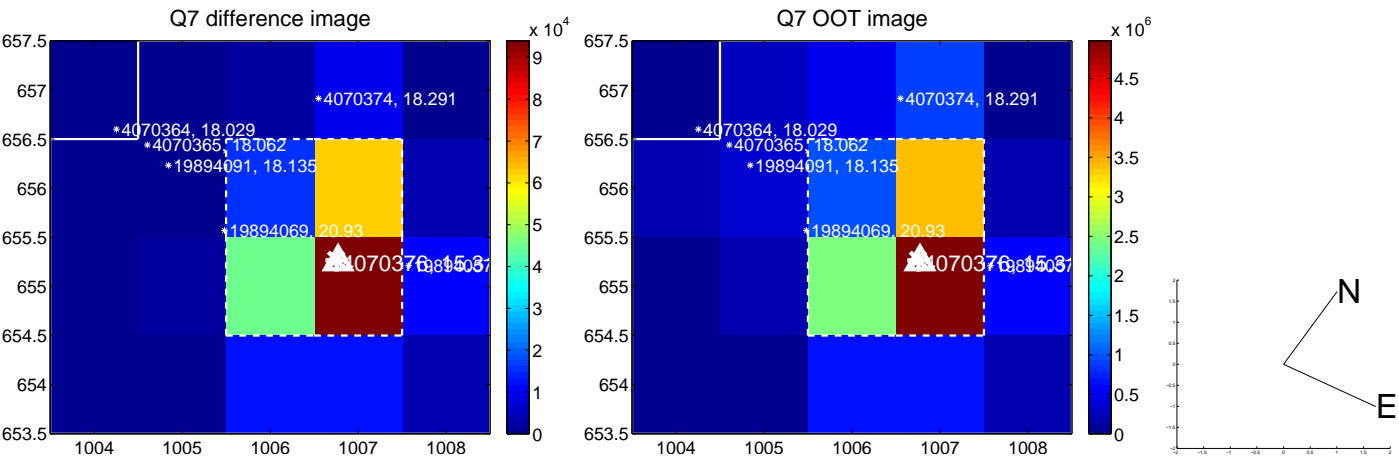
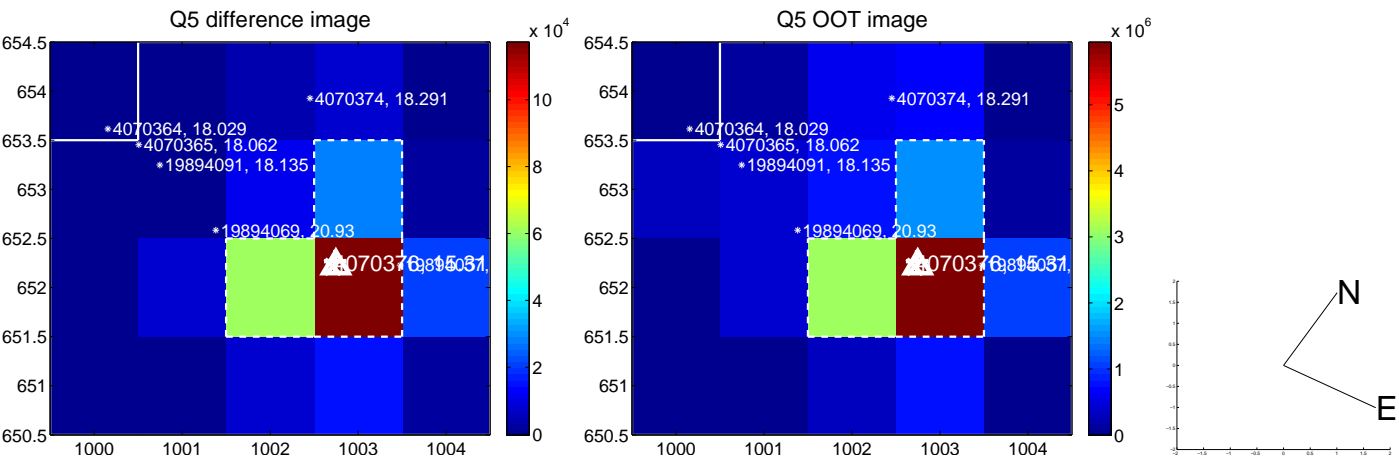


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

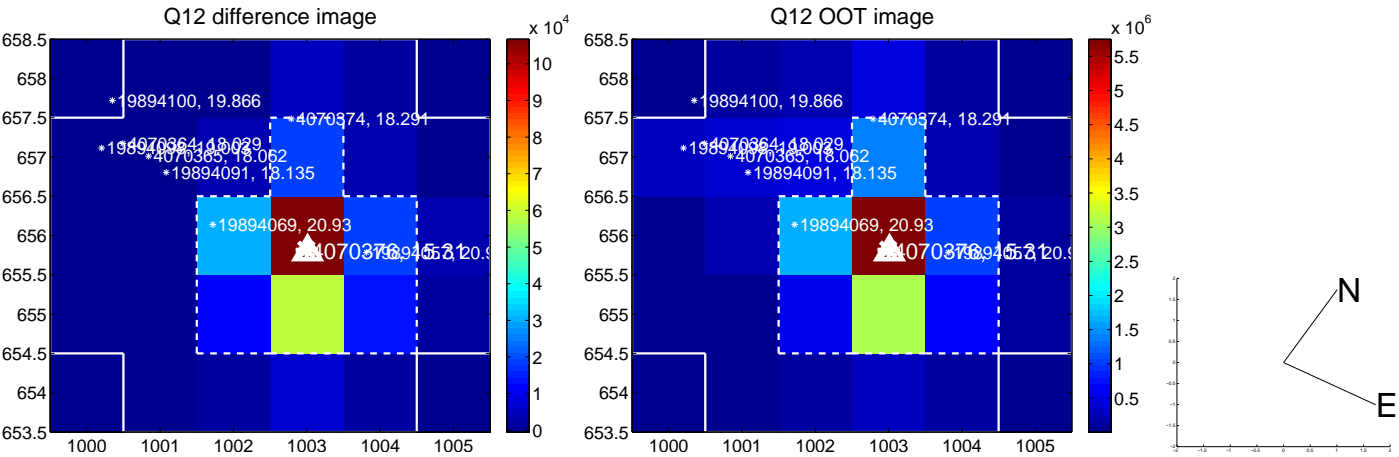
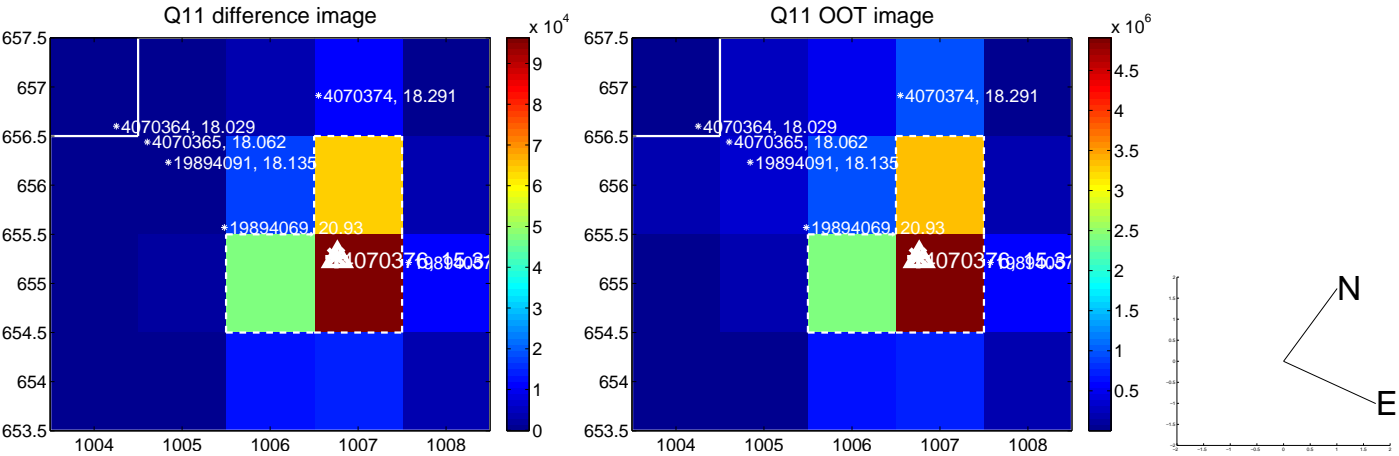
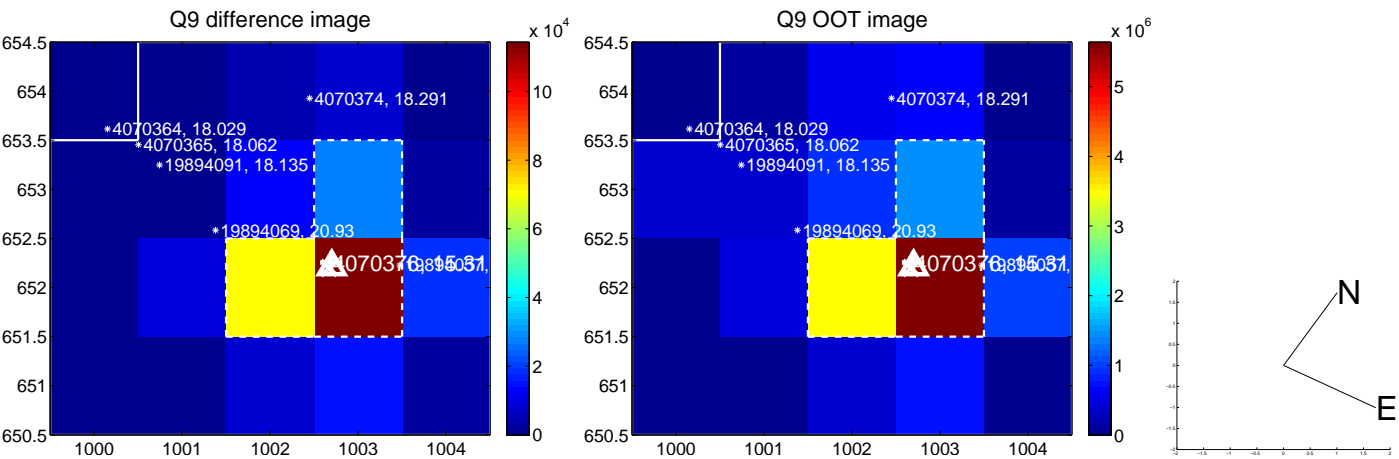


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

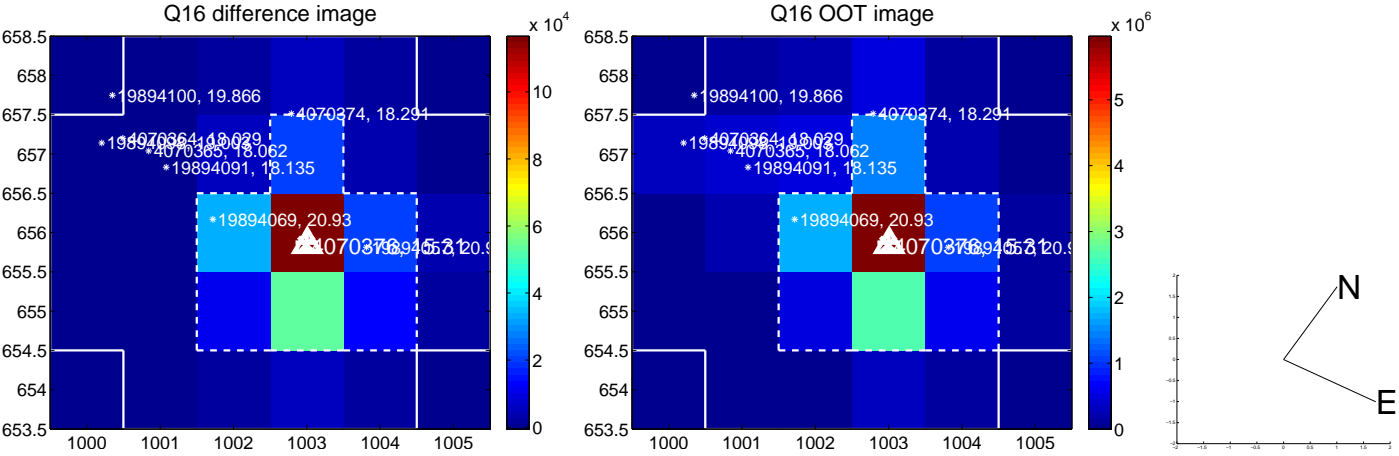
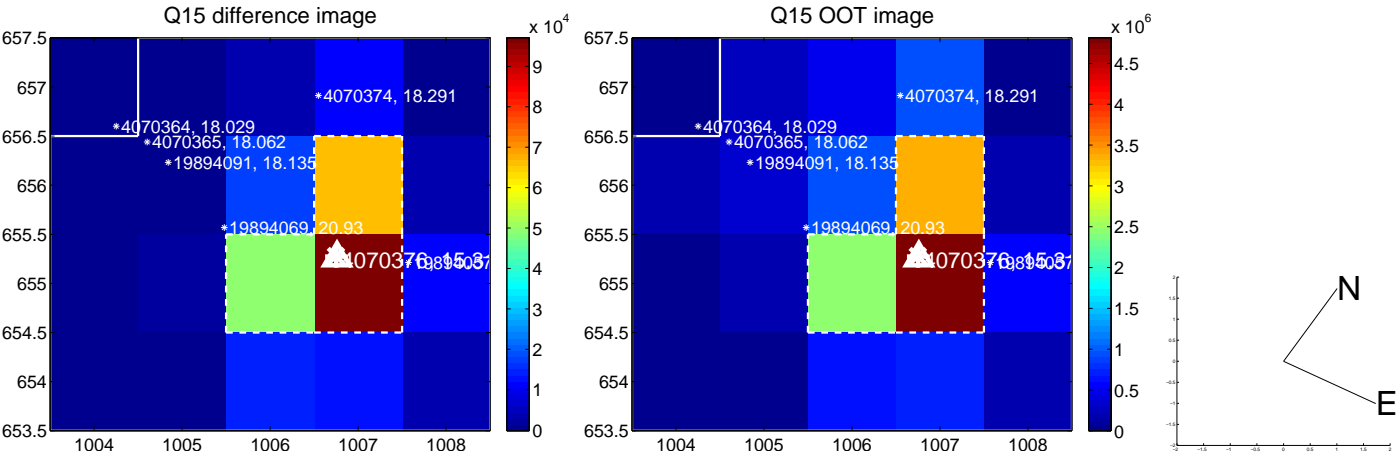
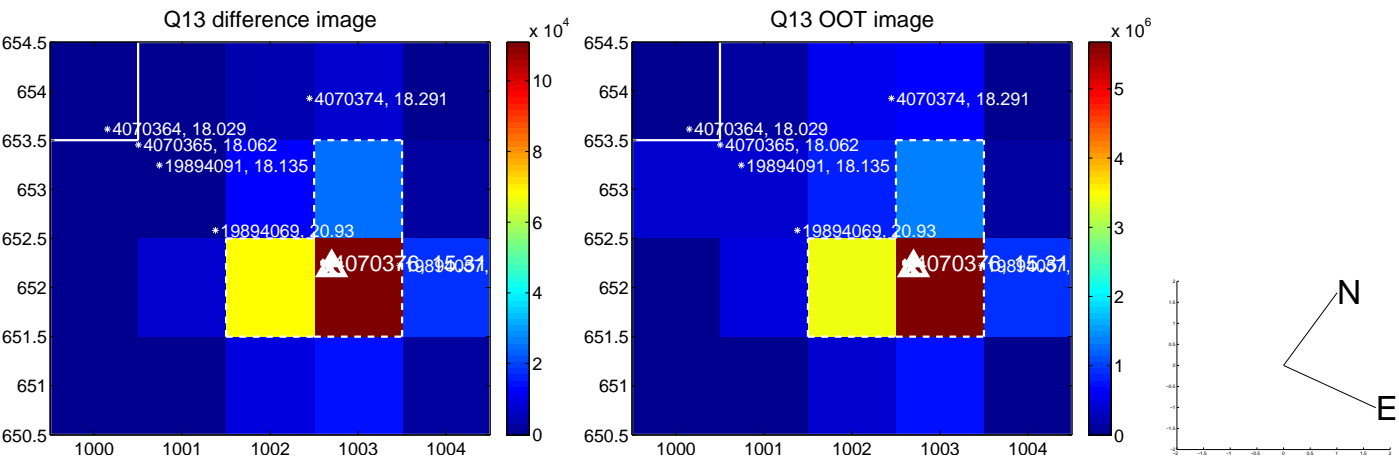




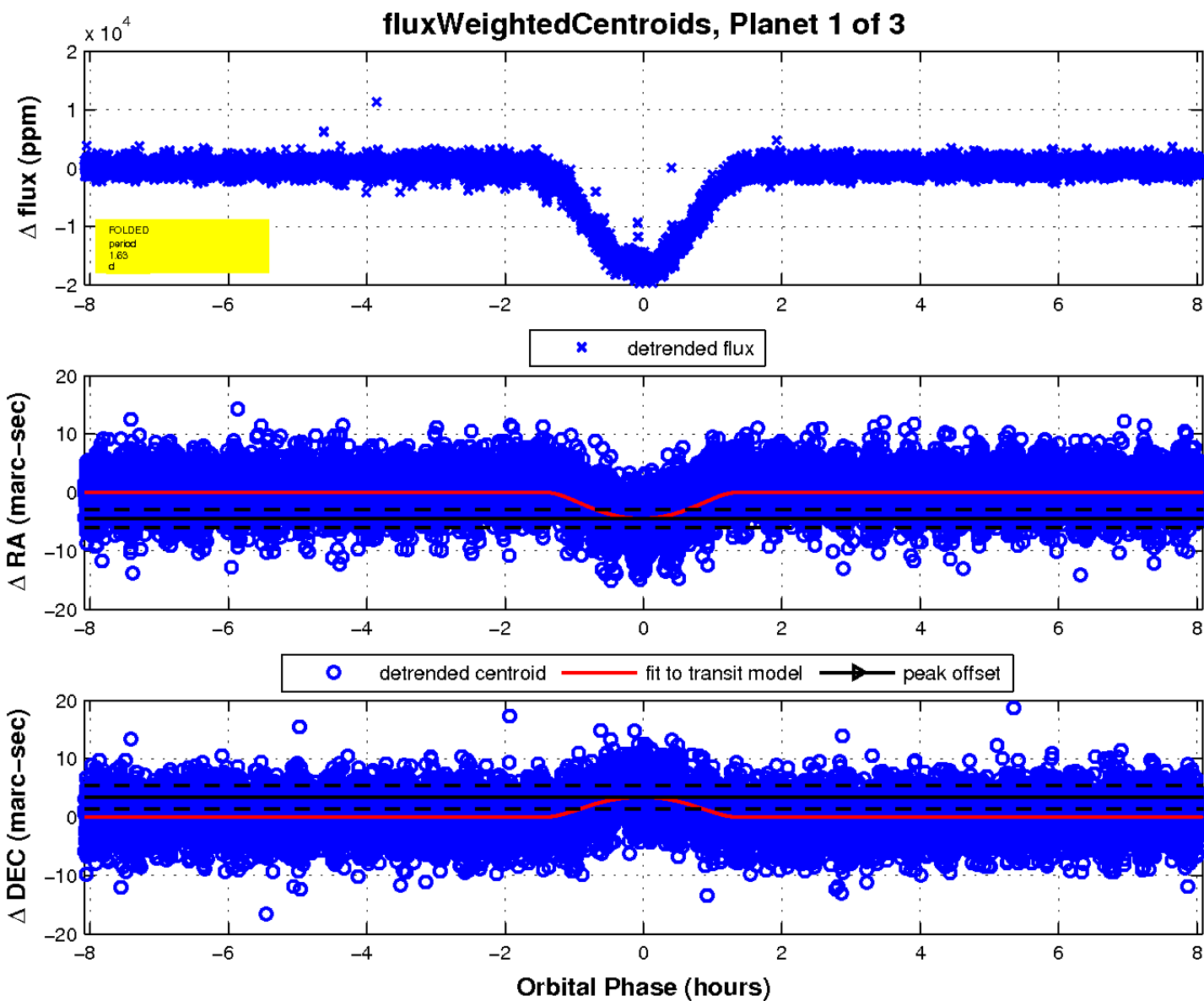
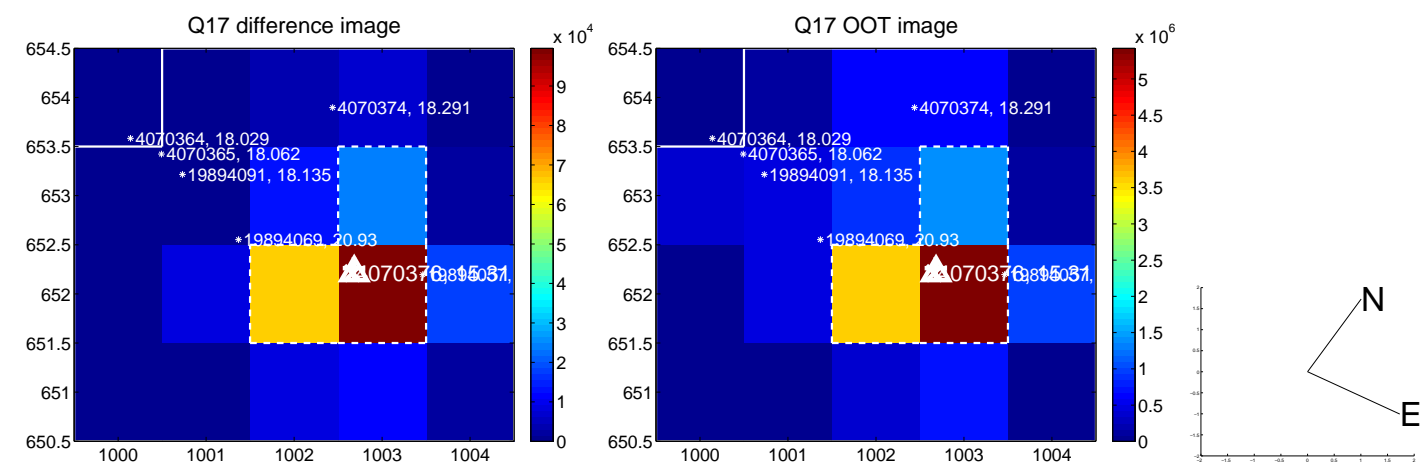
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

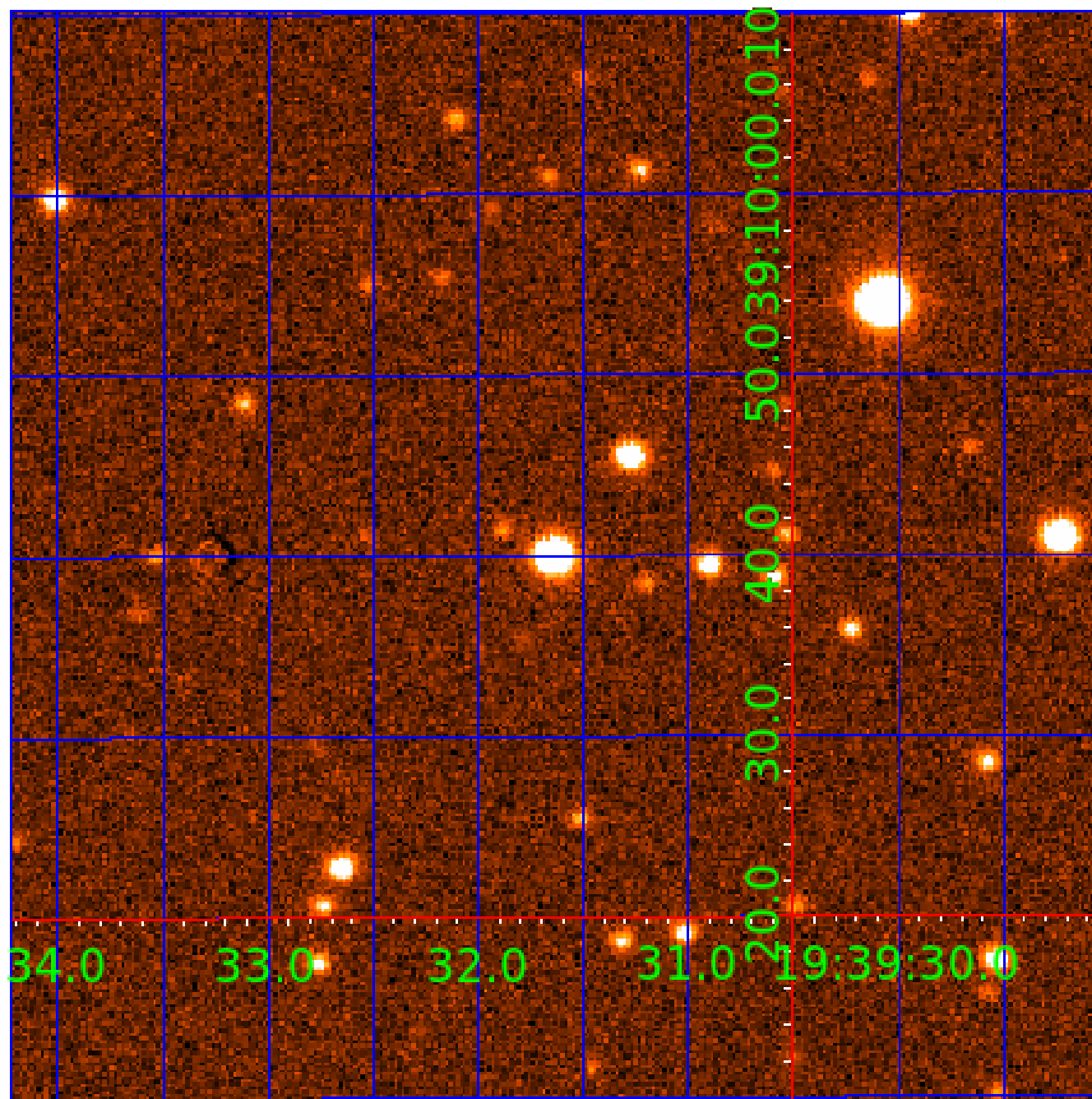


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 004070376

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|-------|-------|-----------------------------|-----------------|------------------------|------------------------|
| 004070376-01 | OBS      | 1318.01 | 1.634612      | 132.335411   | 16873.5     | 2.694            | 826.9 | 804.5 | 0.97                        | 6121            | 16.00                  | 1595.19                |
| 004070376-02 | OBS      | No      | 1.634577      | 131.525985   | 394.8       | 1.742            | 22.9  | 21.1  | 0.97                        | 6121            | 2.28                   | 1595.23                |
| 004070376-03 | OBS      | No      | 0.544866      | 131.788277   | 1024.4      | 2.000            | 10.0  | -1.0  | 0.97                        | 6121            | 3.11                   | 6902.06                |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 004070376-01 | OBS      | FP   | 0.00  | 0 | 1 | 0 | 0 | SWEET_EB—DEEP_V_SHAPED—HAS_SEC_TCE                      |
| 004070376-02 | OBS      | FP   | 0.00  | 1 | 1 | 0 | 0 | IS_SEC_TCE  |
| 004070376-03 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—RESIDUAL_TCE—CENT_NOFITS |

**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 004070376-02

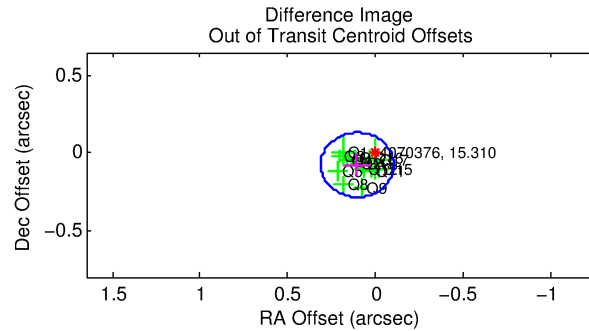
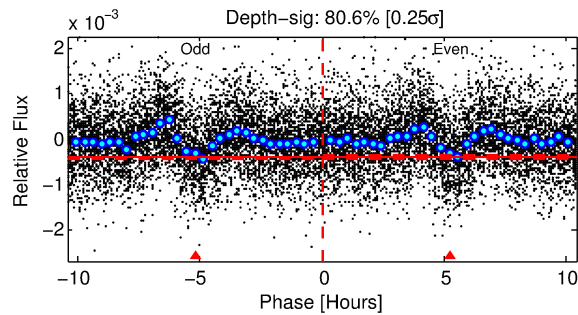
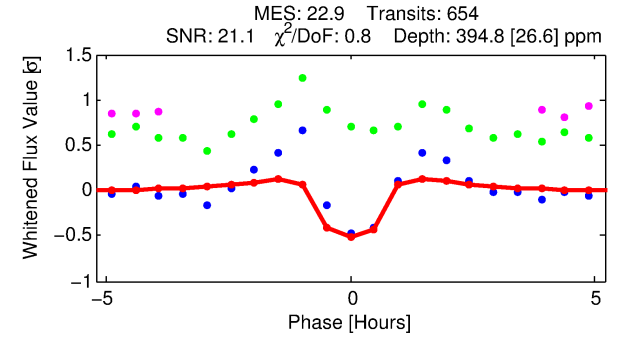
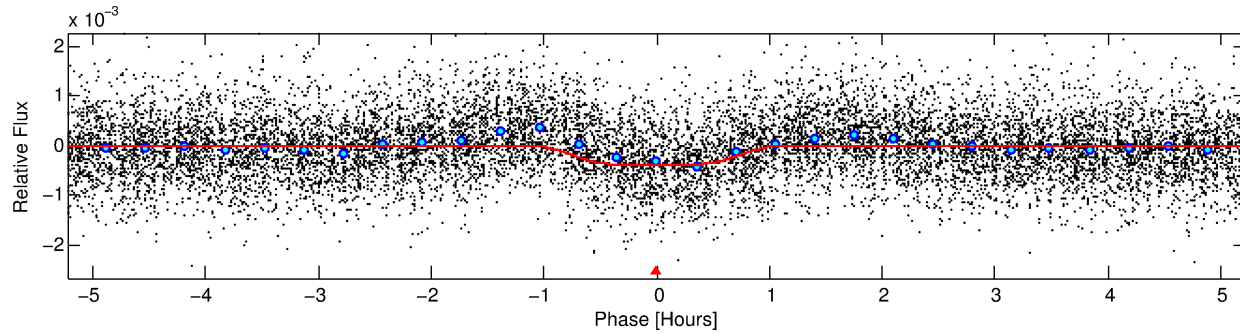
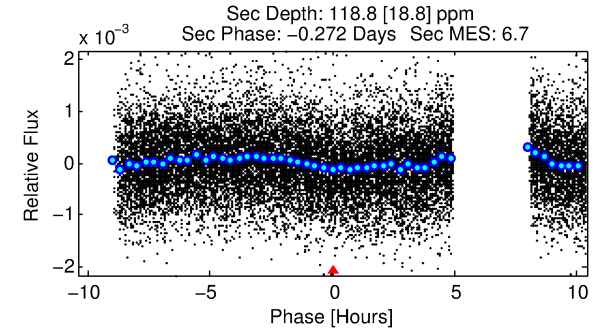
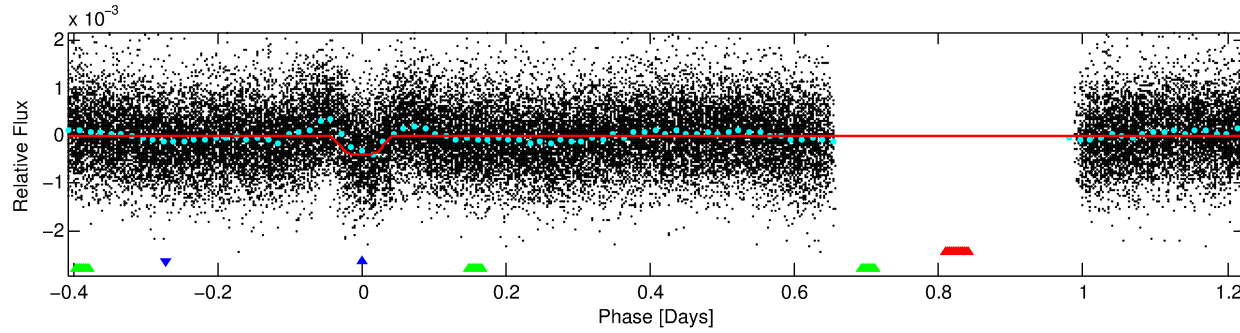
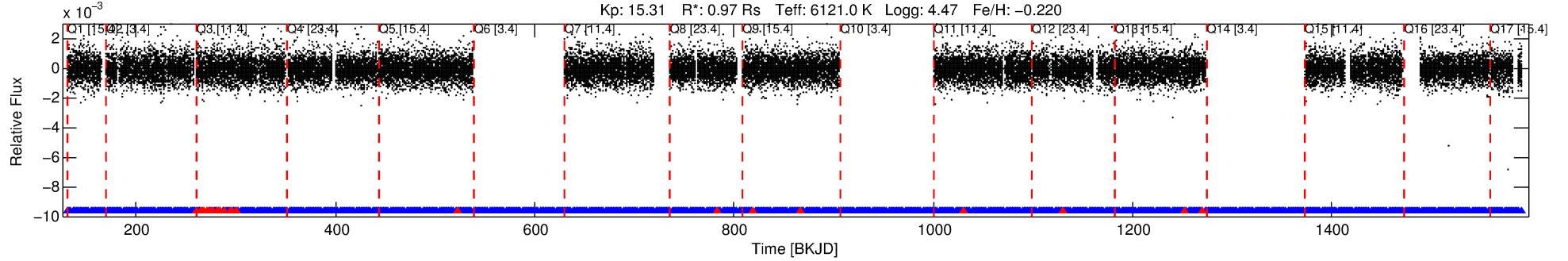
No Significant Match Found

# DV One-Page Summary

KIC: 4070376 Candidate: 2 of 3 Period: 1.635 d

KOI: K01318 Corr: No Ephemeris Match

Kp: 15.31 R\*: 0.97 Rs Teff: 6121.0 K Logg: 4.47 Fe/H: -0.220



## DV Fit Results:

Period = 1.63458 [0.00001] d  
Epoch = 131.5260 [0.0010] BKJD  
Rp/R\* = 0.0215 [0.0043]  
a/R\* = 3.55 [3.30]  
b = 0.90 [0.21]  
Seff = 1595.23 [669.81]  
Teq = 1612 [169] K  
Rp = 2.28 [0.87] Re  
a = 0.0272 [0.0074] AU  
Ag = 9.33 [5.43] [1.53σ]  
Teffp = 4355 [488] K [5.31σ]

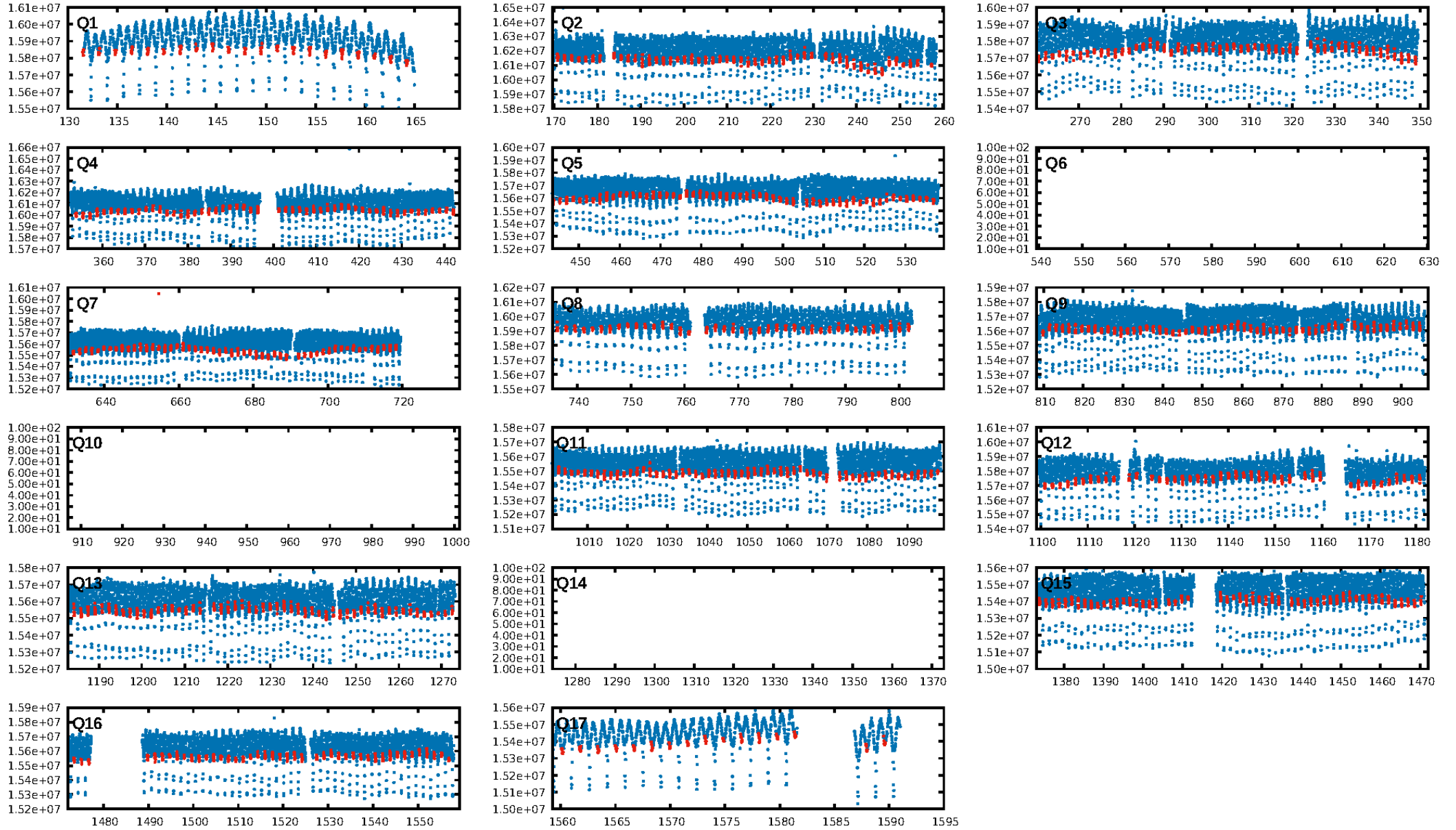
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [9.86σ]  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.20e-111  
RollingBand-fgt: 0.96 [594/617]  
GhostDiagnostic-chr: 21.4  
Centroid-sig: 0.1%  
Centroid-so: 1.810 arcsec [3.19σ]  
OotOffset-rm: 0.131 arcsec [1.89σ]  
KicOffset-rm: 0.090 arcsec [1.28σ]  
OotOffset-st: 1/4/4/5 [14]  
KicOffset-st: 1/4/4/5 [14]  
DiffImageQuality-fgm: 1.00 [14/14]  
DiffImageOverlap-fno: 0.00 [0/14]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 09:51:30 Z

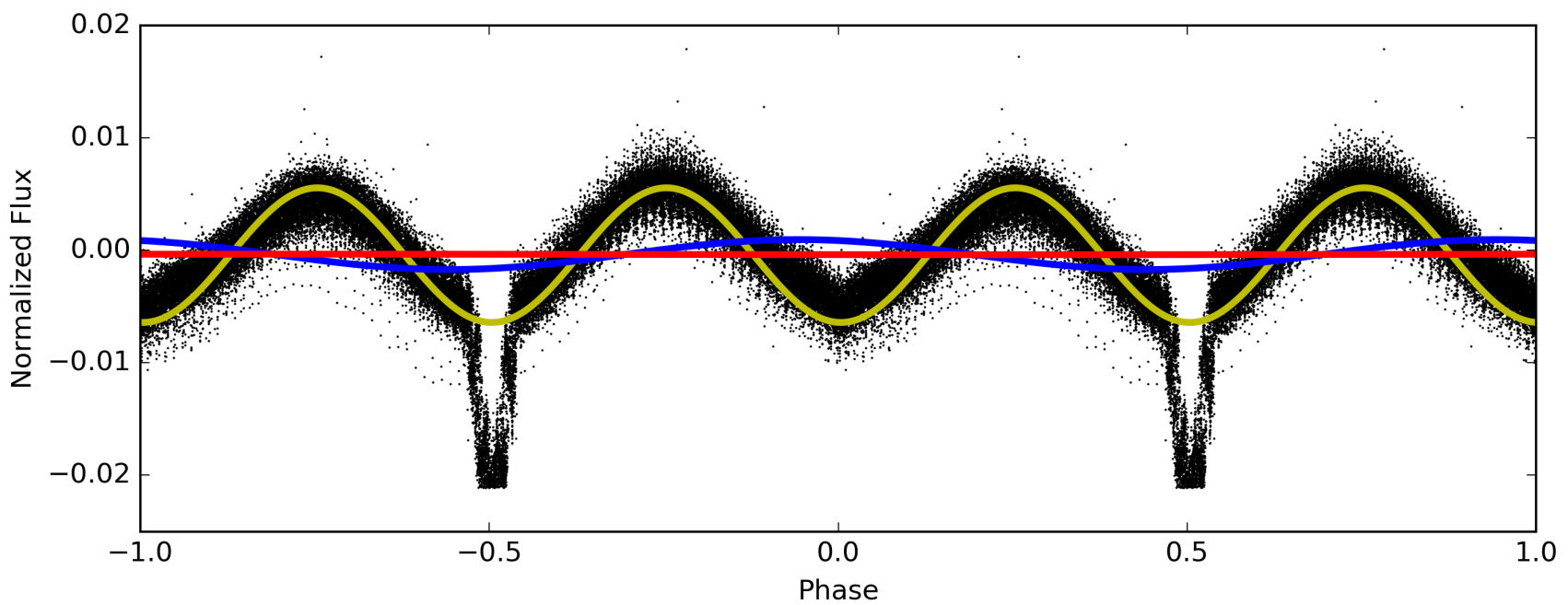
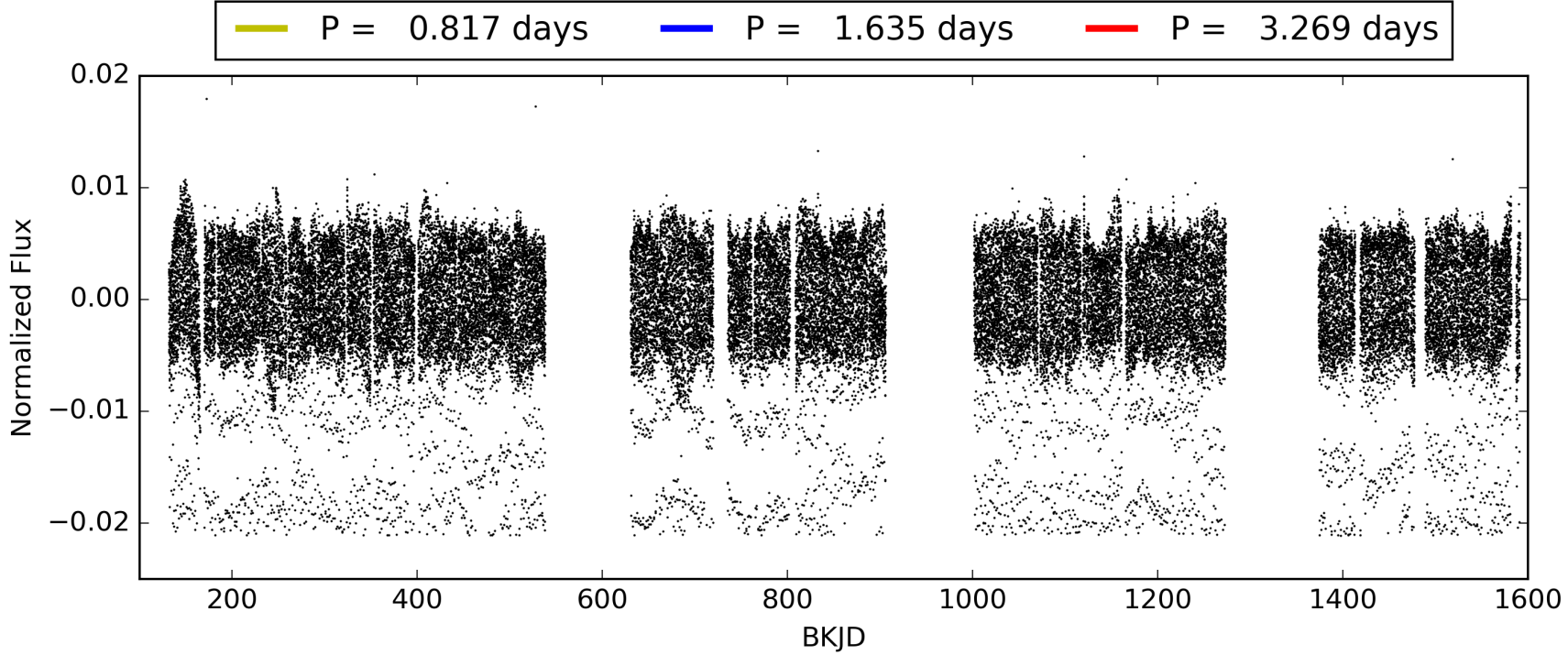
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004070376-02, PDC Light Curves





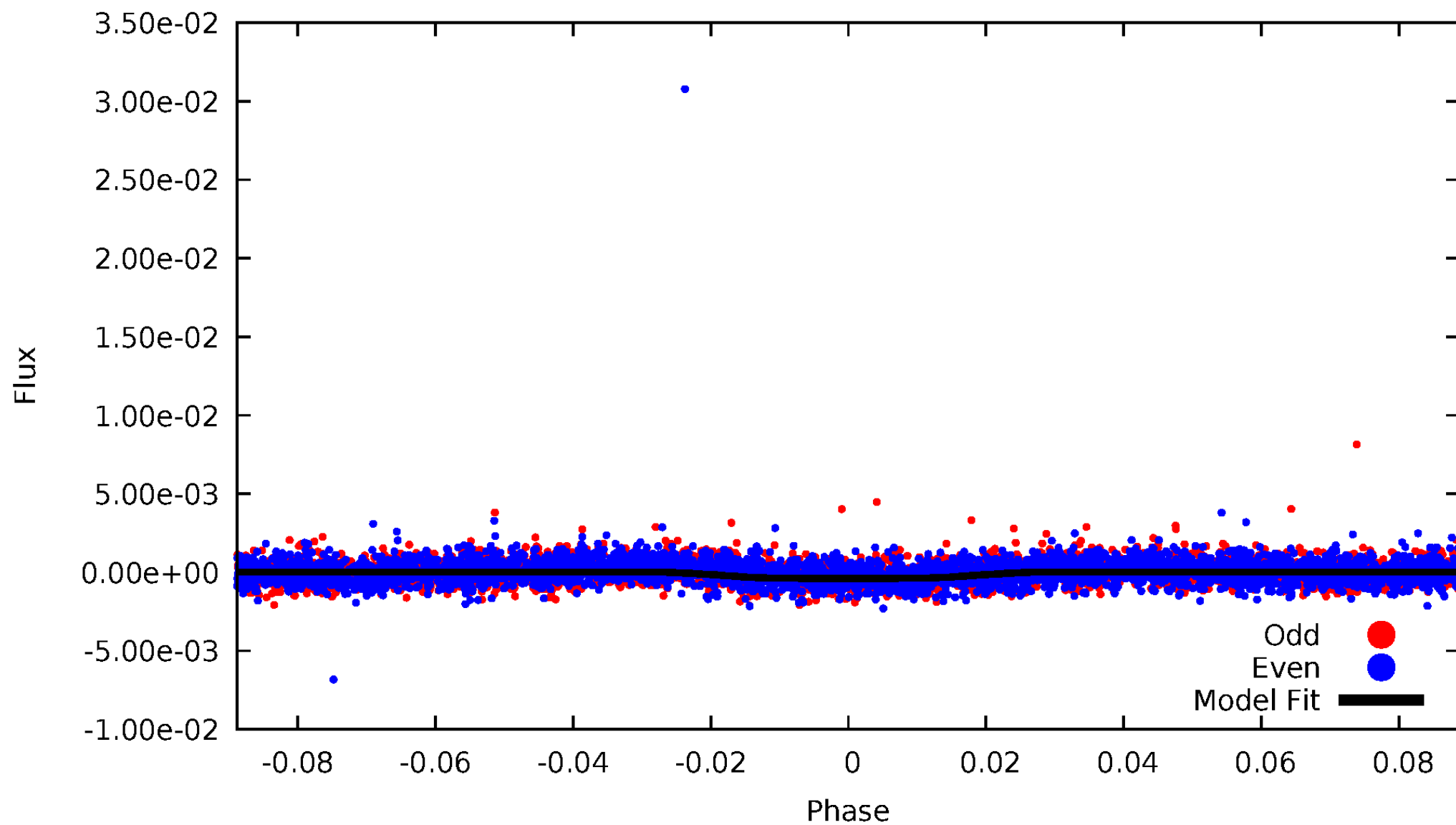
TCE 004070376-02





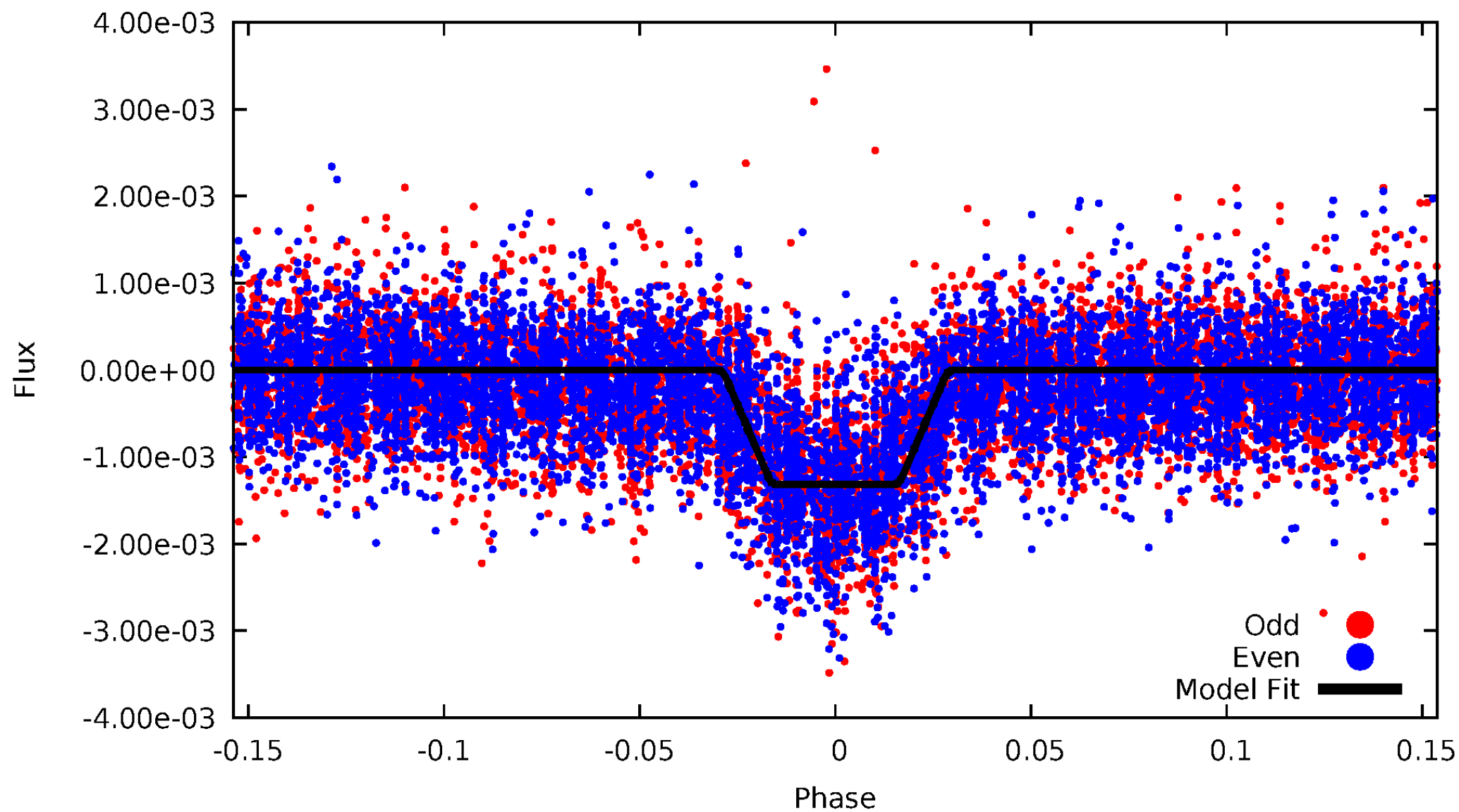
# DV Odd/Even

TCE 004070376-02



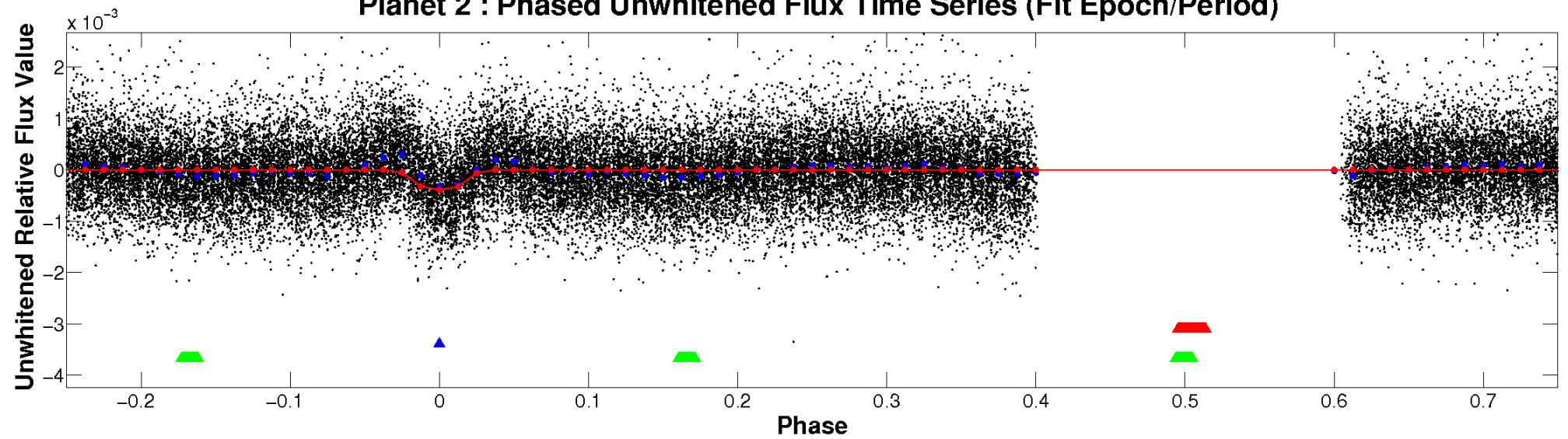
# ALT Odd/Even

TCE 004070376-02

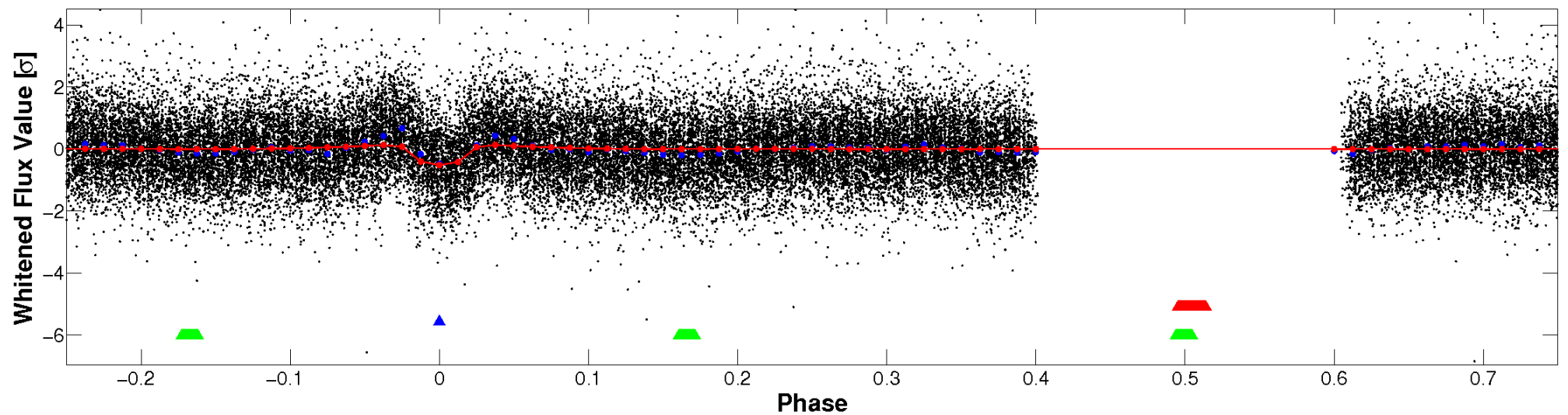


# Non-Whitened Vs. Whitened Light Curve

## Planet 2 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

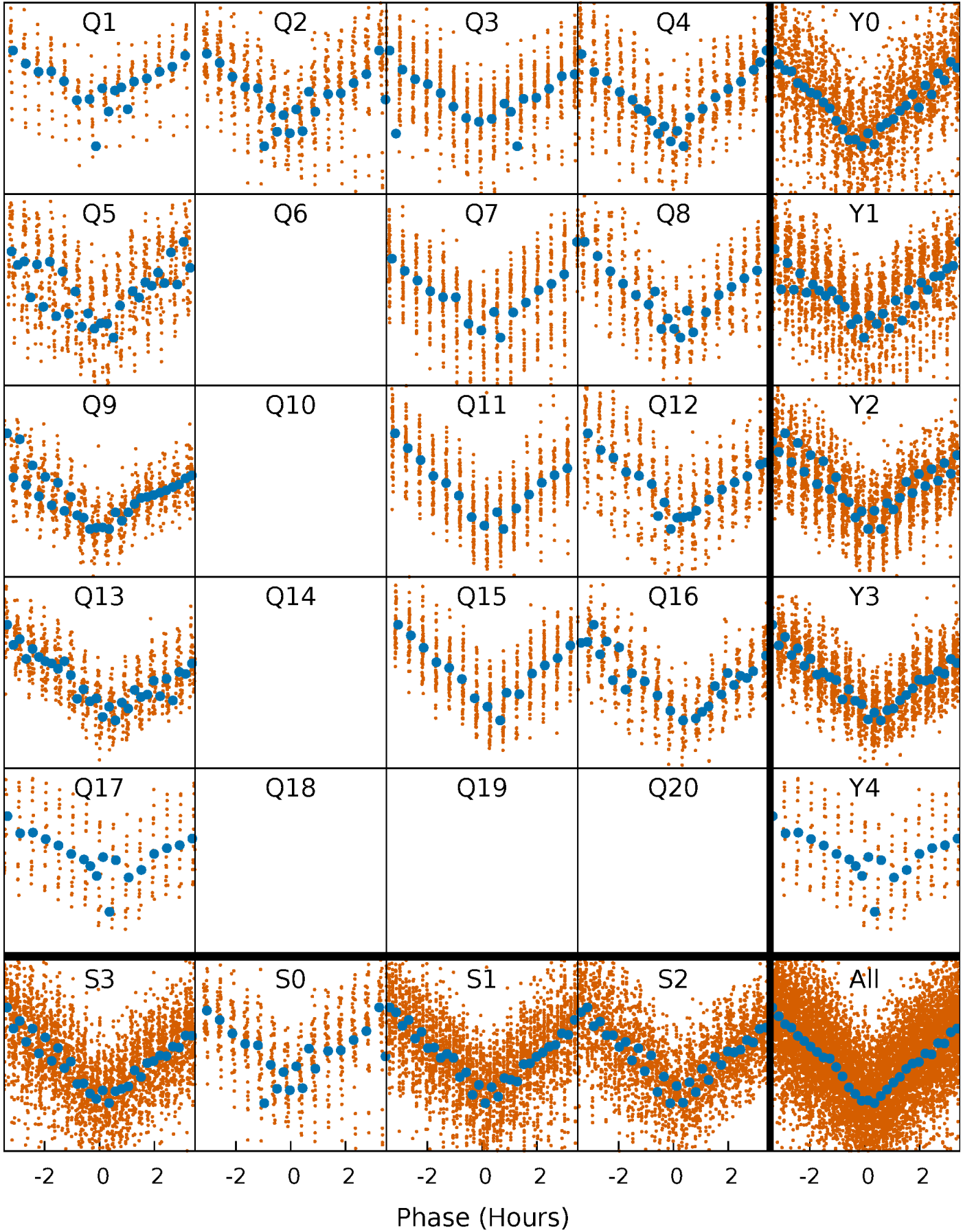


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



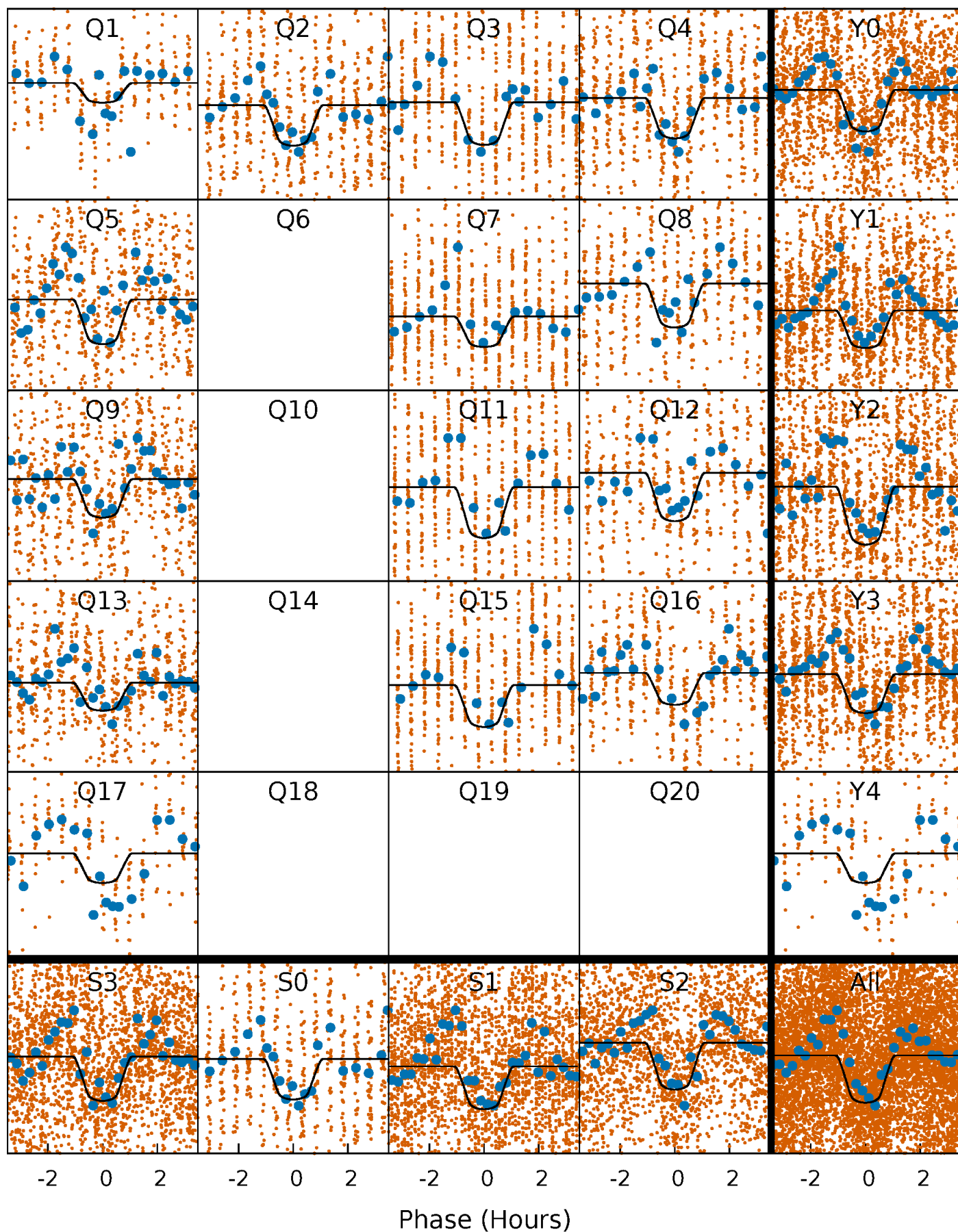
# PDC Quarter-Phased Transit Curves

TCE 004070376-02     $P = 1.634577$  Days     $T_0 = 131.525985$  (BKJD)



# DV Quarter-Phased Transit Curves

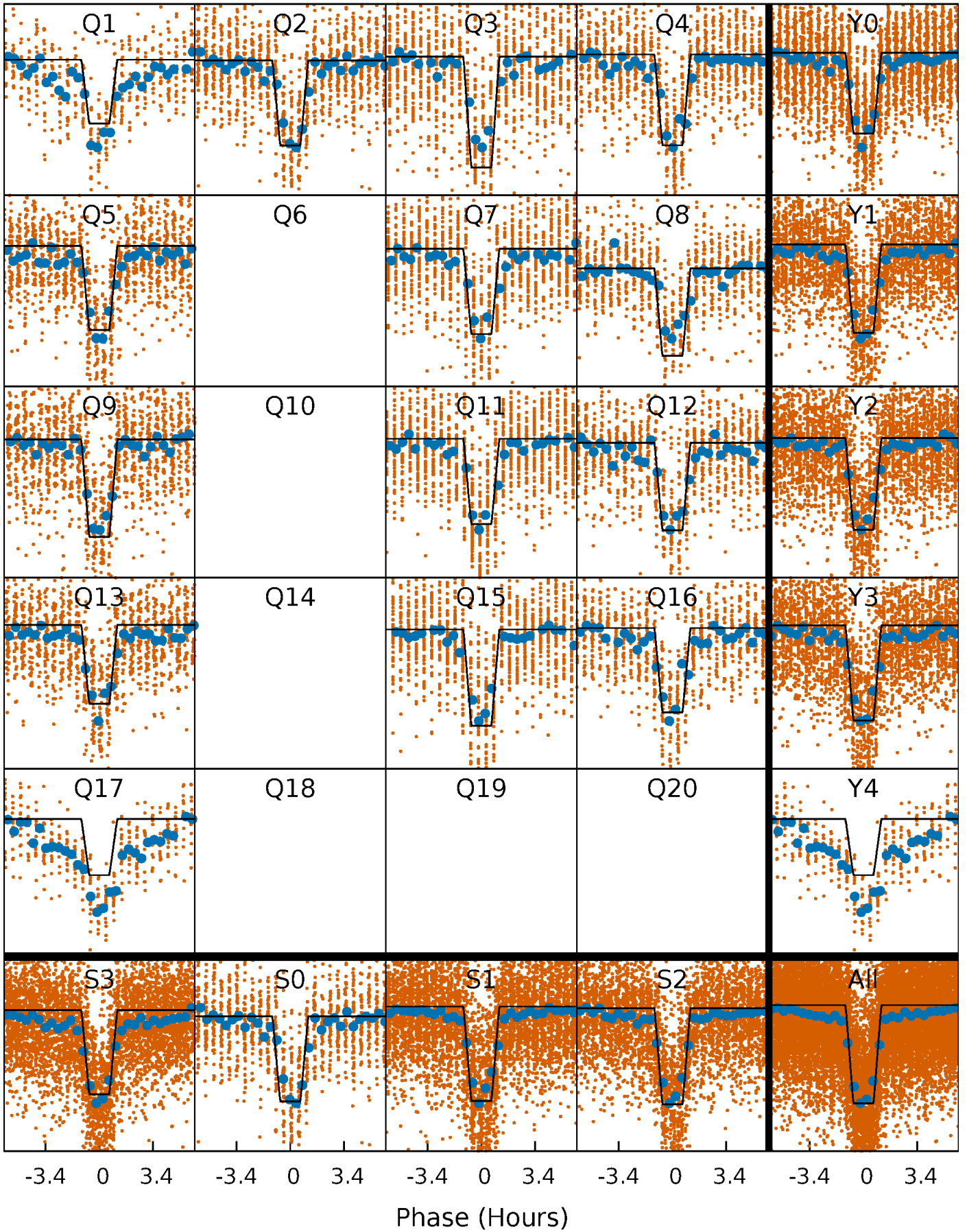
TCE 004070376-02     $P = 1.634577$  Days     $T_0 = 131.525985$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

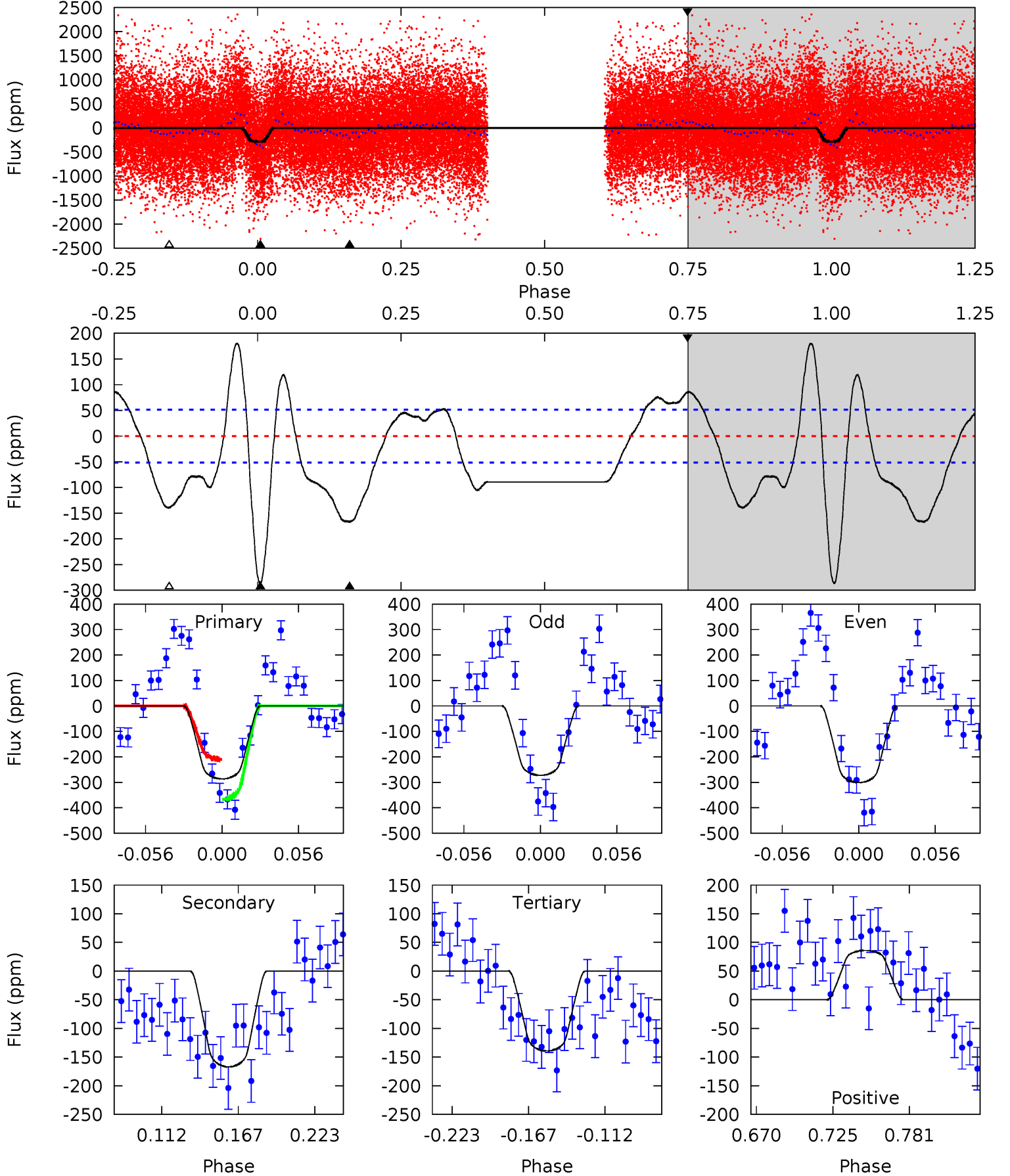
TCE 004070376-02 P= 1.634616 Days  $T_0=131.515345$  (BKJD)



# DV Model-Shift Uniqueness Test

004070376-02, P = 1.634577 Days, E = 129.891408 Days

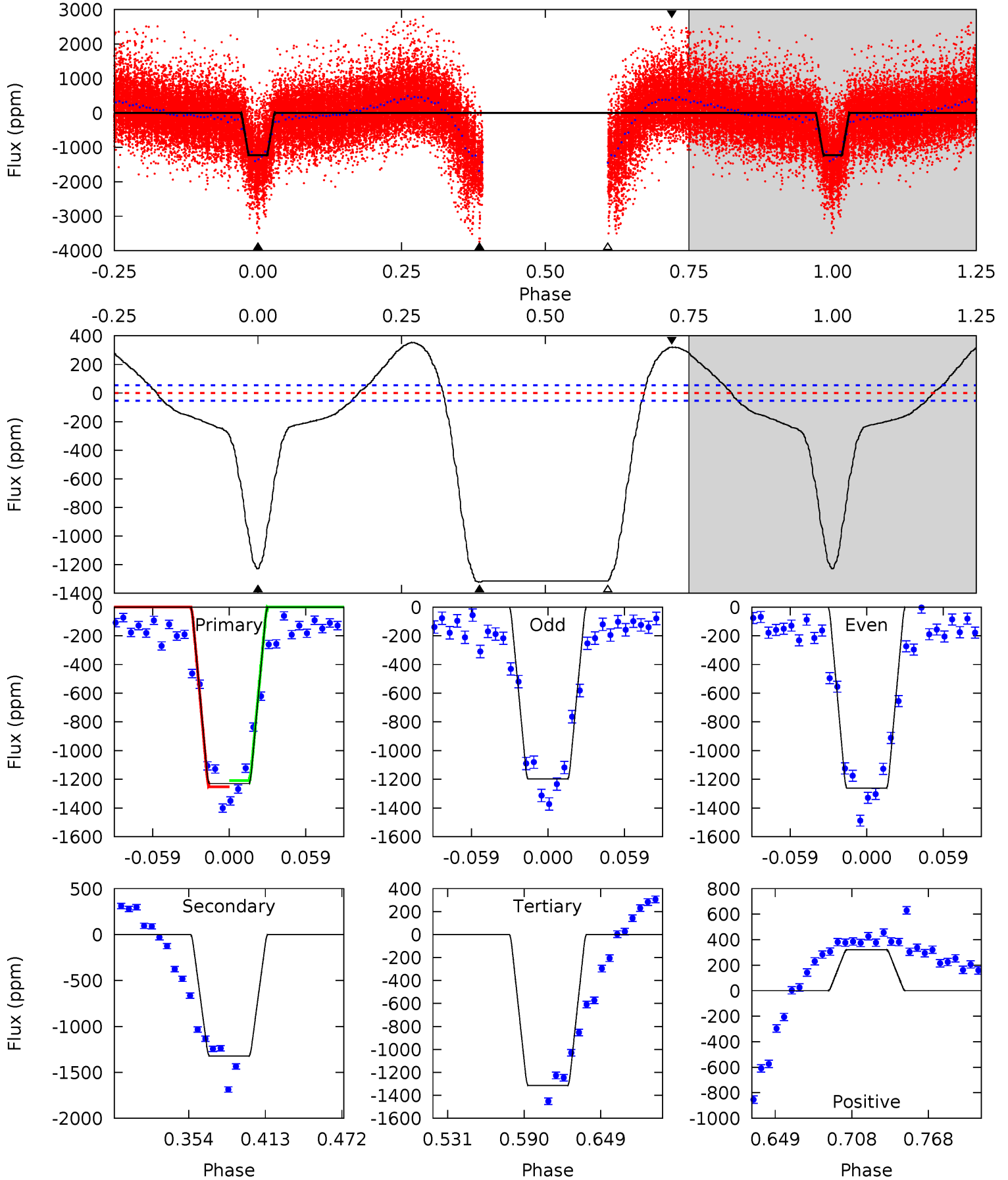
| Pri  | Sec  | Ter  | Pos  | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 26.1 | 15.2 | 12.7 | 7.84 | 4.69            | 1.91            | 6.13             | 13.4    | 18.3    | 2.53    | 7.38    | 1.30    | 0.91 | 0.39  | 7.21 |



# Alt Model-Shift Uniqueness Test

004070376-02, P = 1.634616 Days, E = 129.880729 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  |
|-------|-------|-------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 105.6 | 113.5 | 112.8 | 27.5 | 4.67            | 1.89            | 27.2             | -7.22   | 78.1    | 0.66    | 86.0    | 2.73    | 1.01 | 0.21  | 2.10 |





### Stellar Parameters For KIC 004070376

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R (R_{\odot})$           | $M(M_{\odot})$            | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $6121^{+191}_{-212}$ | $4.468^{+0.054}_{-0.216}$ | $-0.220^{+0.300}_{-0.300}$ | $0.970^{+0.316}_{-0.105}$ | $1.001^{+0.142}_{-0.129}$ | $1.547^{+0.449}_{-0.830}$                 |
|        | +3%/-3%              | +1%/-5%                   | +136%/-136%                | +33%/-11%                 | +14%/-13%                 | +29%/-54%                                 |
| 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 004070376-02 / KOI

| Detrend | Depth (ppm)    | $R_p (R_{\oplus})$     | $T_{max} (K)$        | $T_{obs} (K)$        | $A_{obs}$        |
|---------|----------------|------------------------|----------------------|----------------------|------------------|
| DV      | $-167 \pm 11$  | $2.38^{+0.60}_{-0.50}$ | $2305^{+163}_{-111}$ | $4821^{+497}_{-366}$ | $12^{+7}_{-4}$   |
| Alt.    | $-1321 \pm 12$ | $4.02^{+0.84}_{-0.63}$ | $2310^{+174}_{-117}$ | $6140^{+435}_{-390}$ | $33^{+12}_{-10}$ |

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

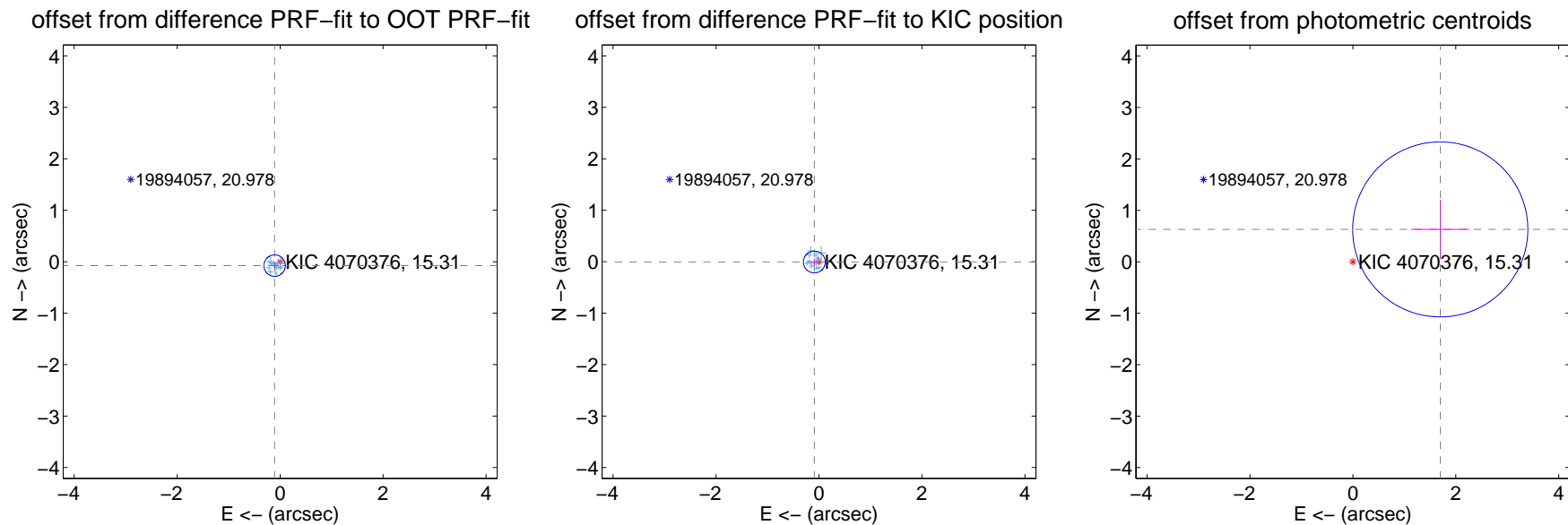
## DV Centroid Data

Supplemental centroid analysis for 004070376-02. Kepler magnitude: 15.31. Transit SNR 21.15

There are 14 quarters with good PRF difference image offsets

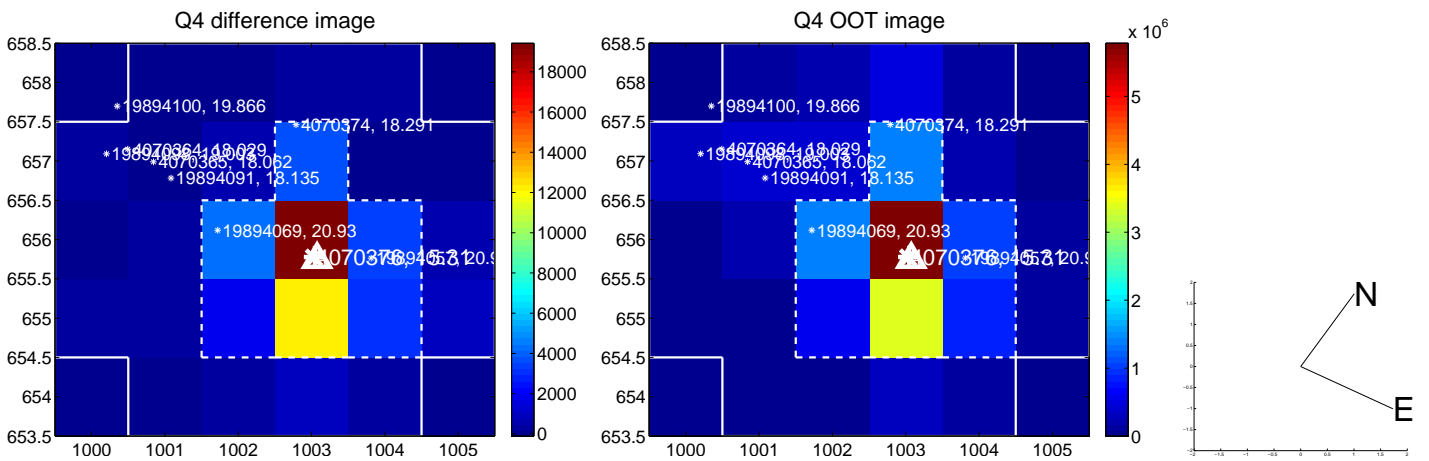
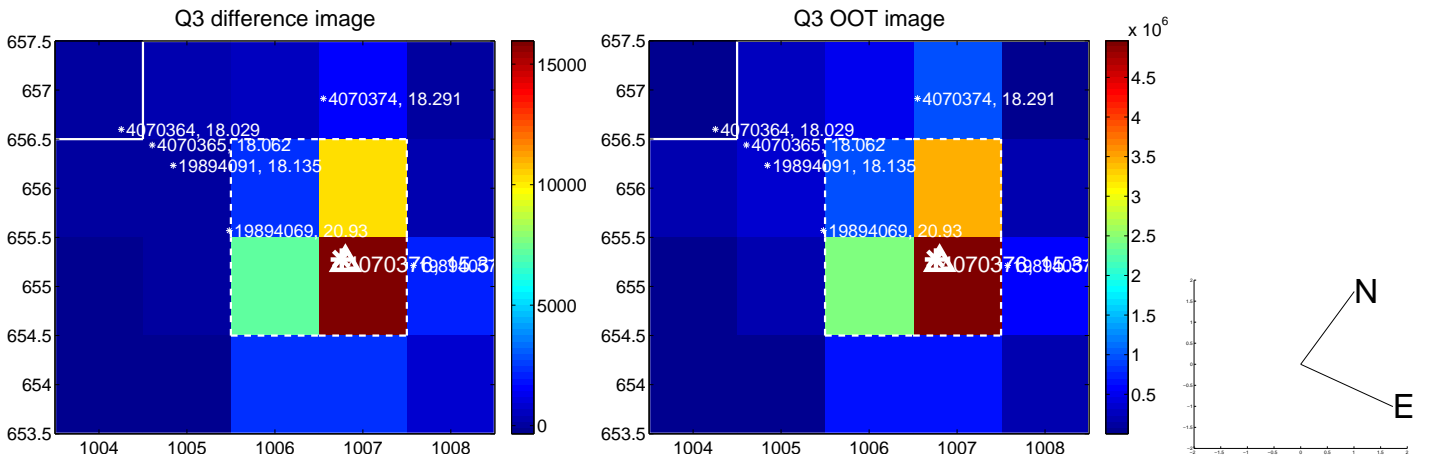
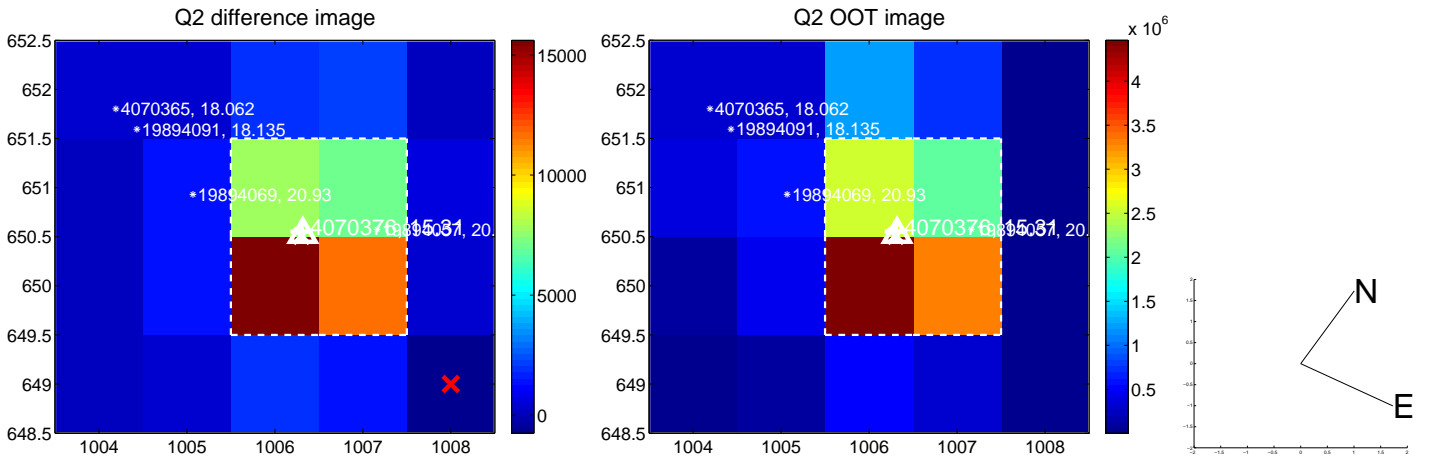
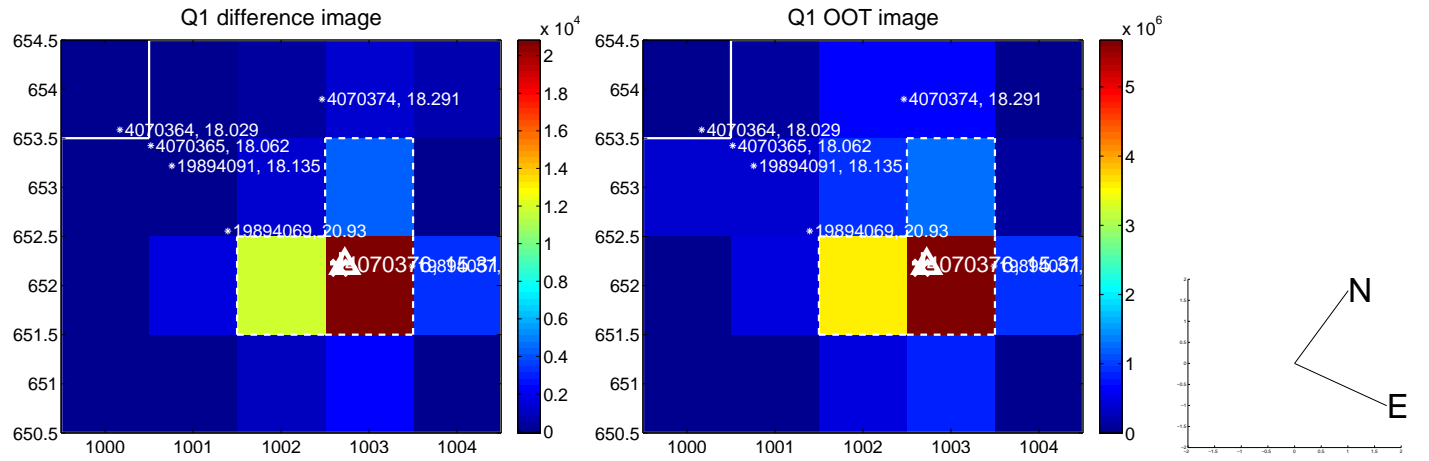
The direct PRF centroid is offset from the target star catalog position by about 0.21 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA       | $\Delta$ Dec       |
|---|--------------------|---------------------|-------------------|--------------------|
| PRF-fit source offset from OOT          | $0.131 \pm 0.069$  | 1.89                | $0.106 \pm 0.070$ | $-0.077 \pm 0.069$ |
| PRF-fit source offset from KIC position | $0.090 \pm 0.071$  | 1.28                | $0.090 \pm 0.071$ | $-0.006 \pm 0.071$ |
| photometric centroid source offset      | $1.81 \pm 0.57$    | 3.19                | $-1.70 \pm 0.57$  | $0.63 \pm 0.58$    |

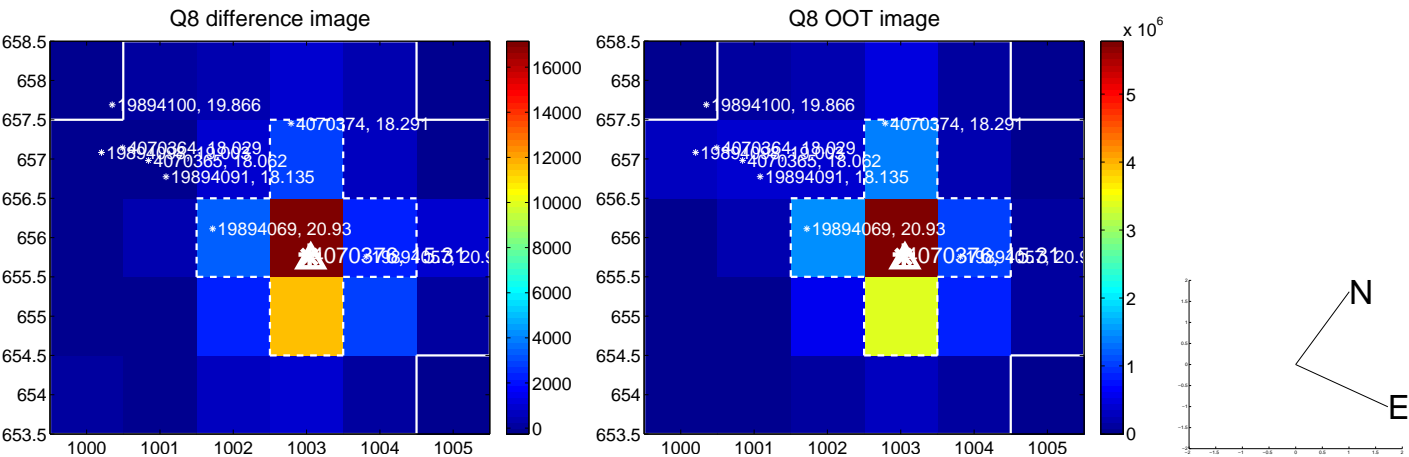
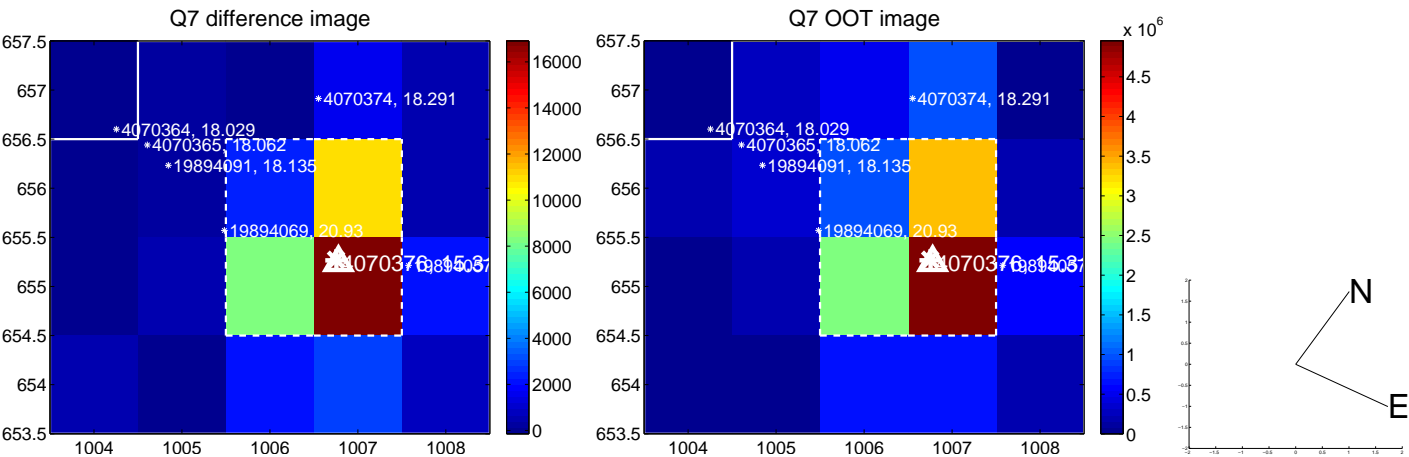
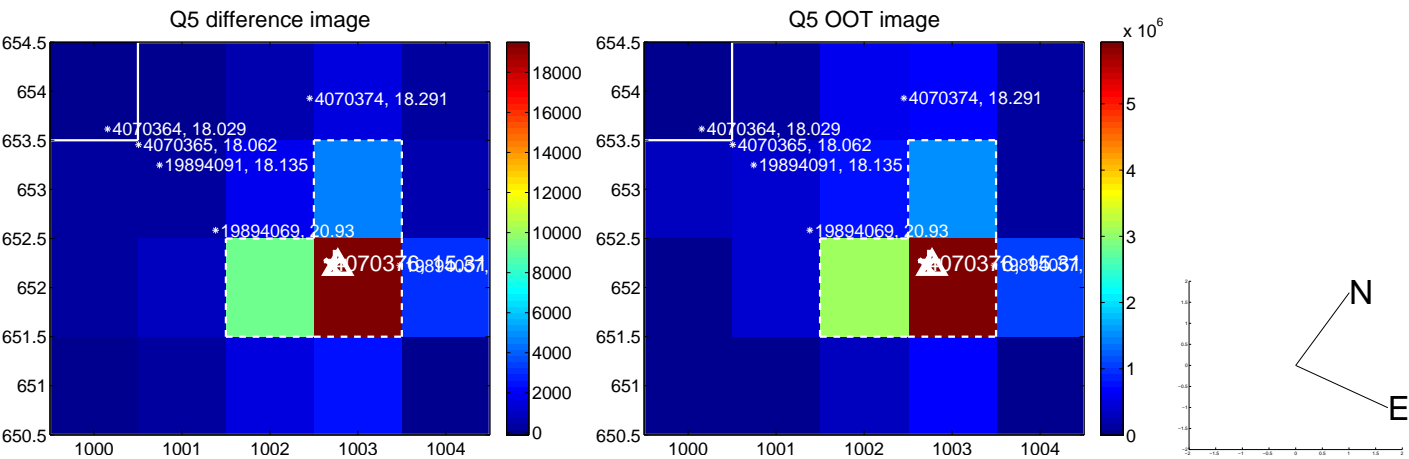


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

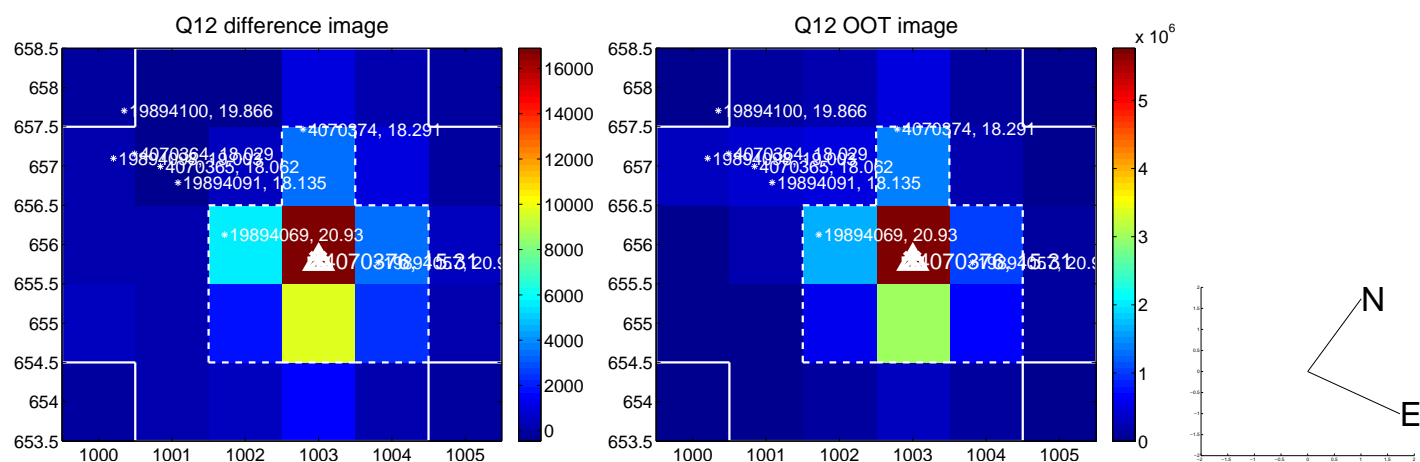
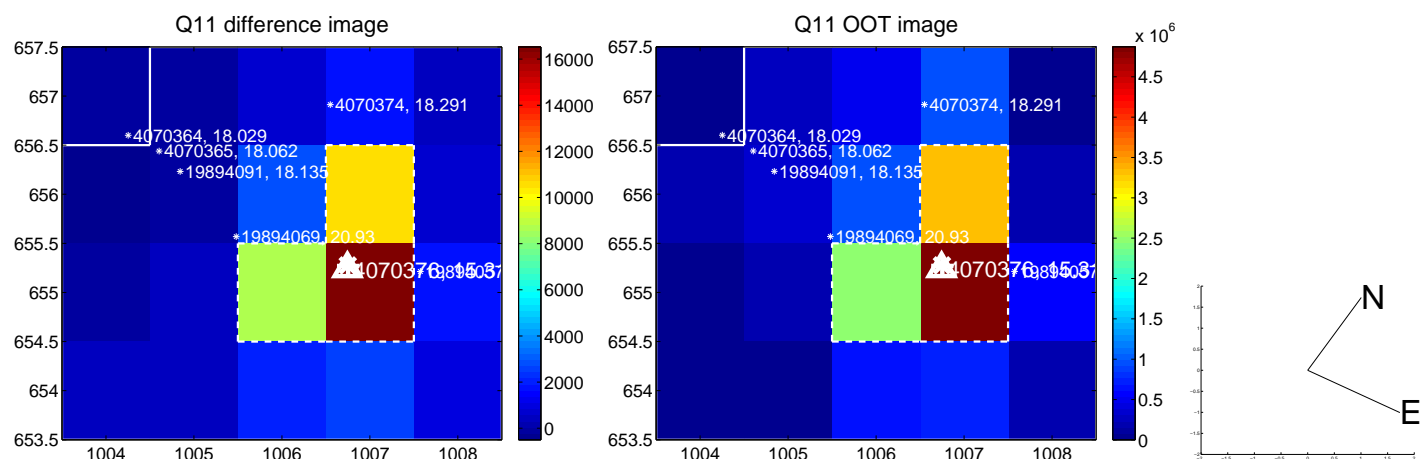
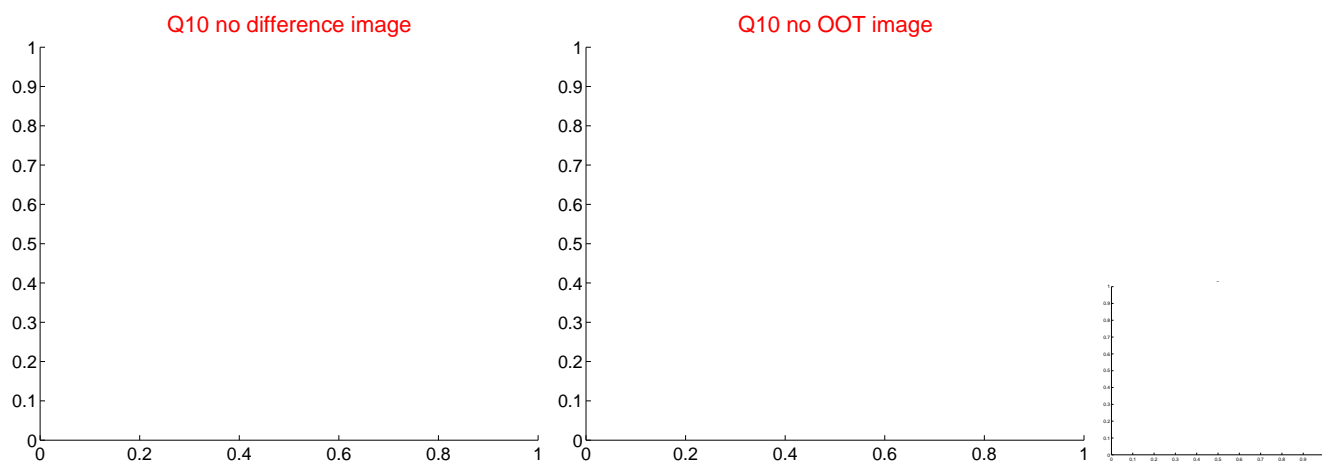
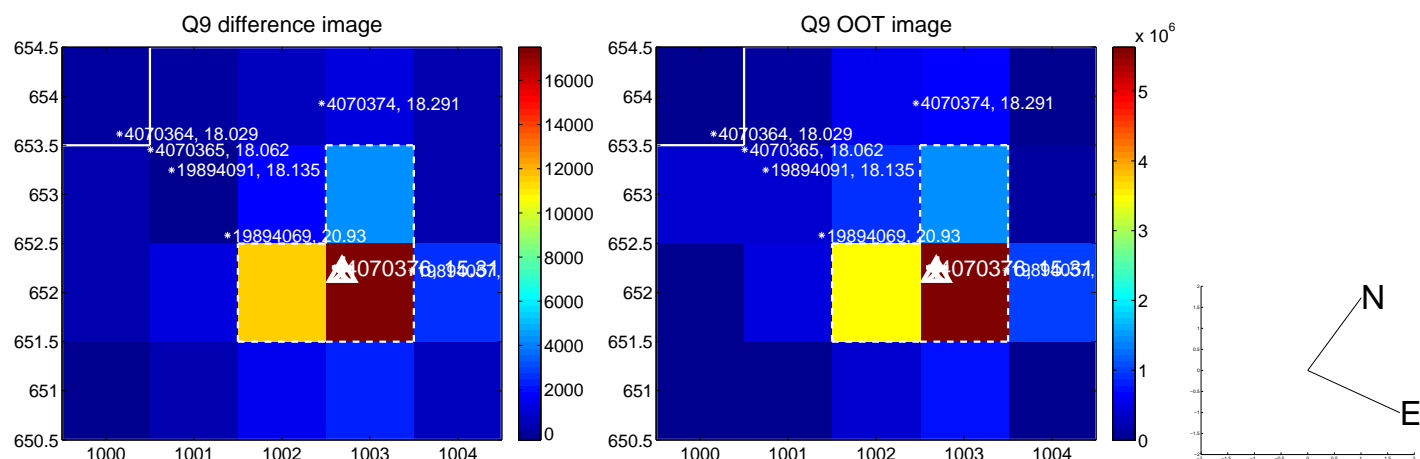
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



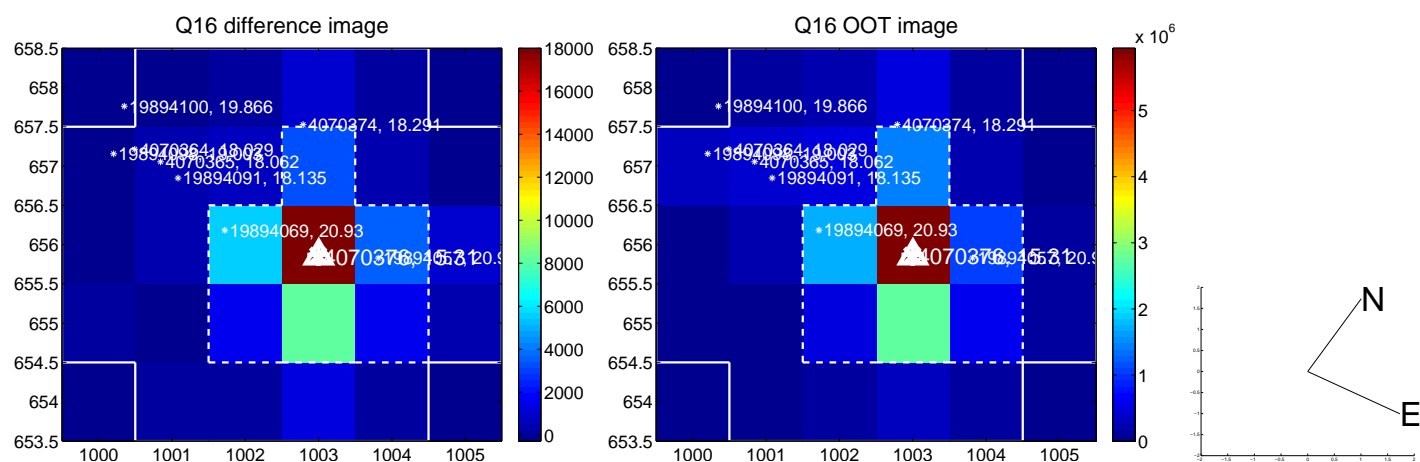
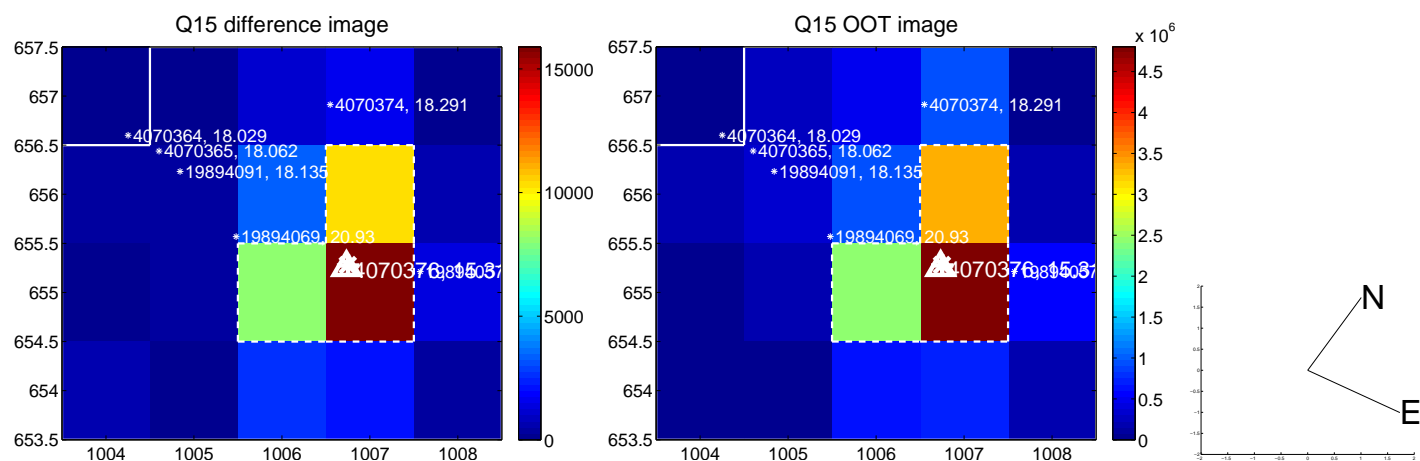
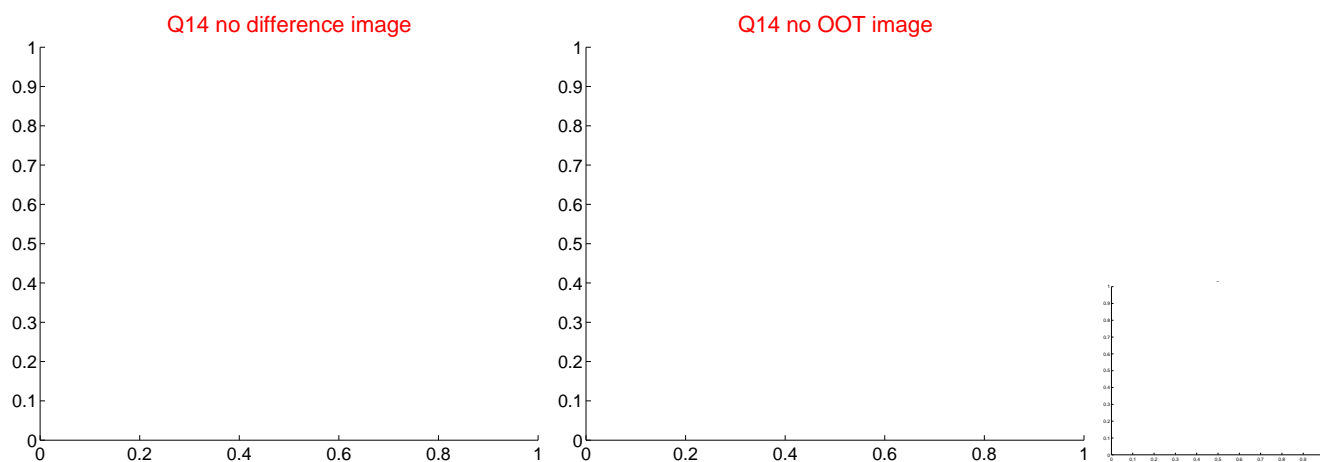
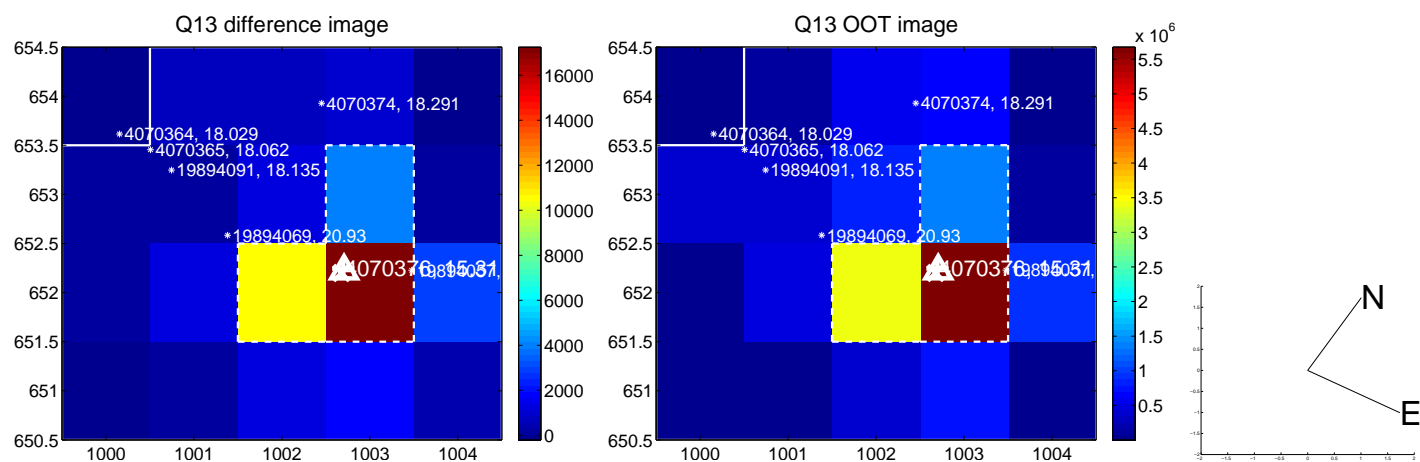
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



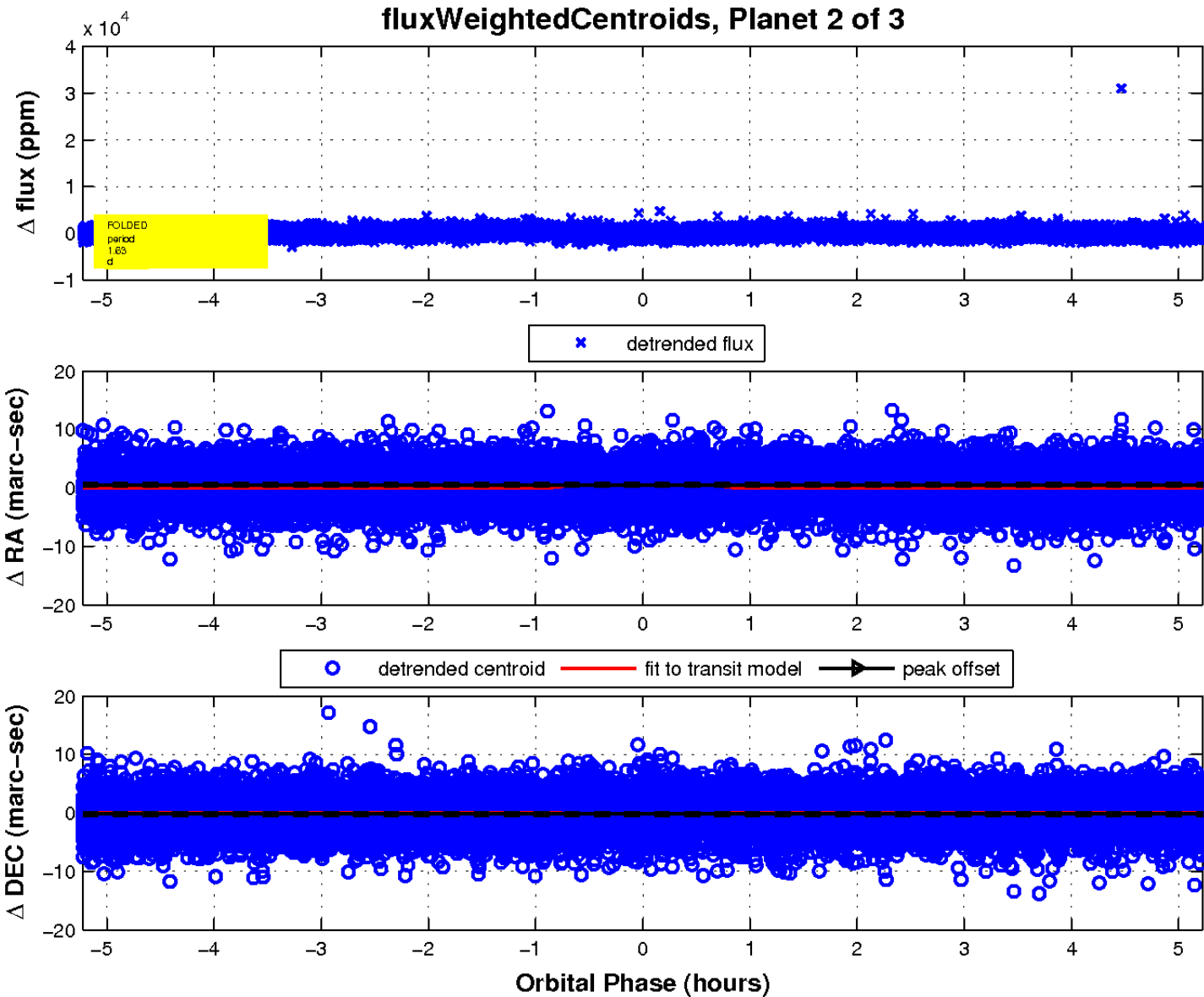
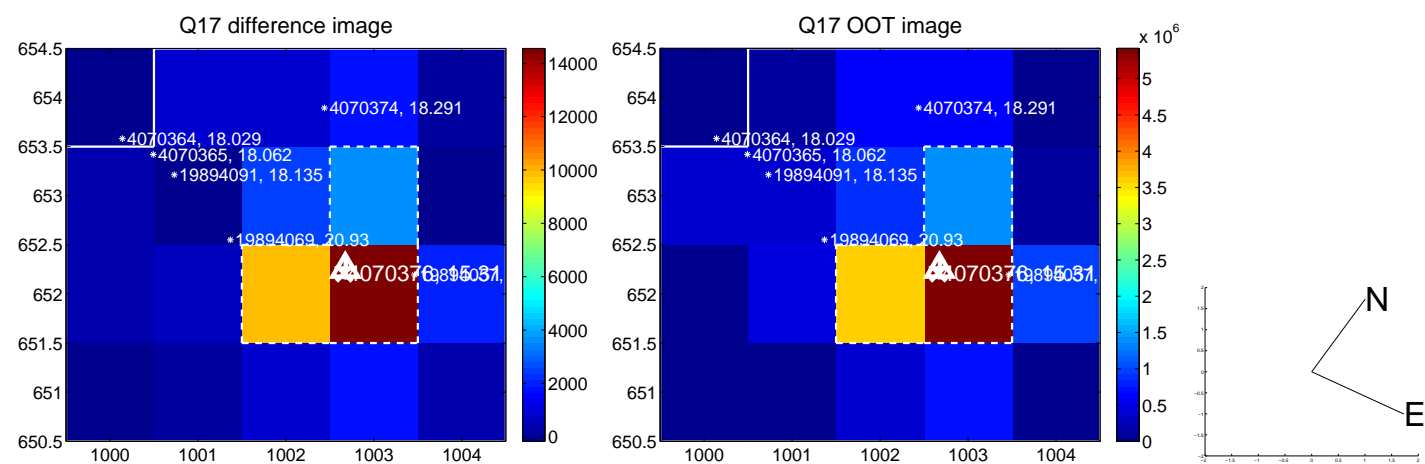
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

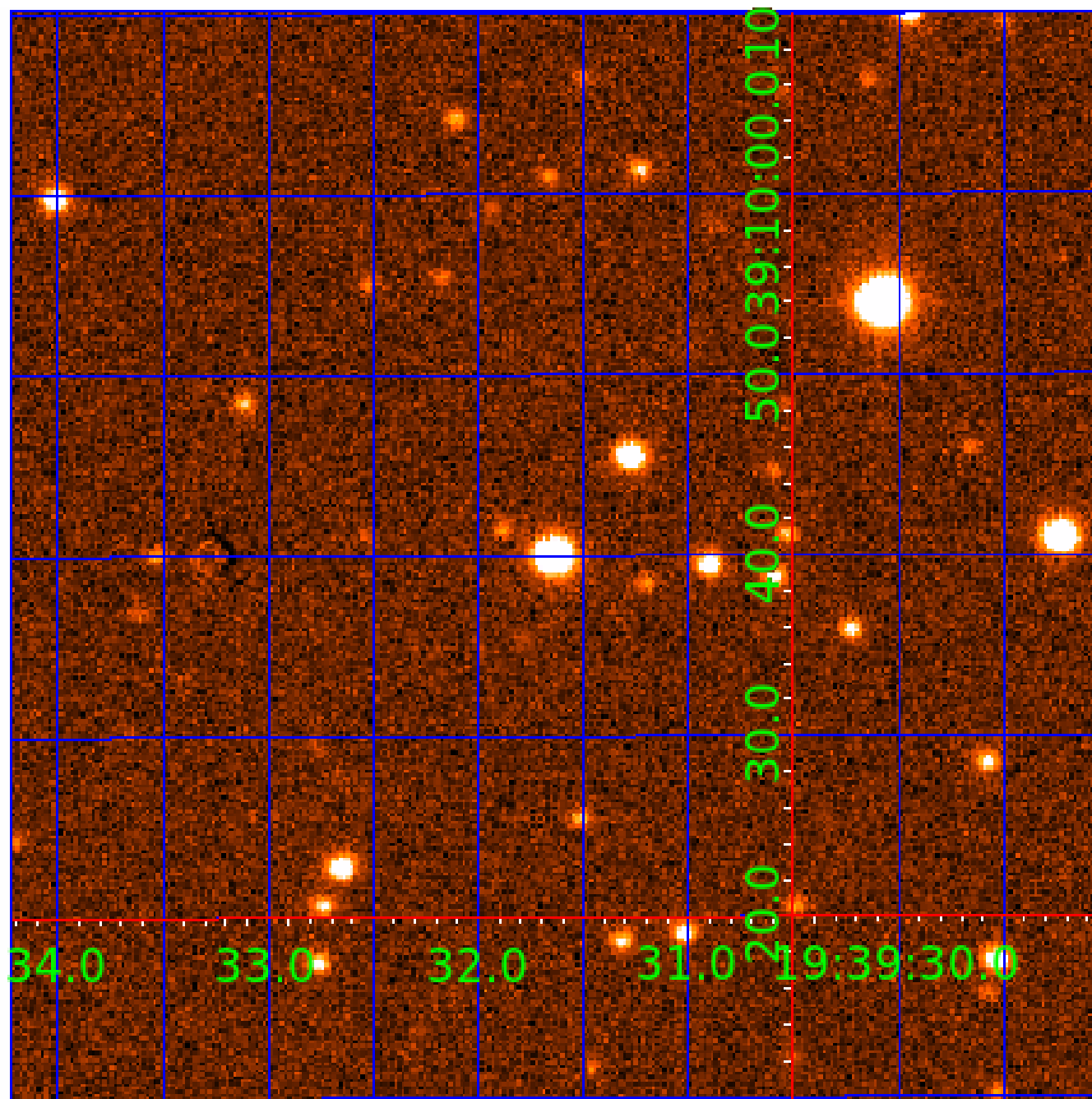


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 004070376

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|-------|-------|-----------------------------|-----------------|------------------------|------------------------|
| 004070376-01 | OBS      | 1318.01 | 1.634612      | 132.335411   | 16873.5     | 2.694            | 826.9 | 804.5 | 0.97                        | 6121            | 16.00                  | 1595.19                |
| 004070376-02 | OBS      | No      | 1.634577      | 131.525985   | 394.8       | 1.742            | 22.9  | 21.1  | 0.97                        | 6121            | 2.28                   | 1595.23                |
| 004070376-03 | OBS      | No      | 0.544866      | 131.788277   | 1024.4      | 2.000            | 10.0  | -1.0  | 0.97                        | 6121            | 3.11                   | 6902.06                |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 004070376-01 | OBS      | FP   | 0.00  | 0 | 1 | 0 | 0 | SWEET_EB—DEEP_V_SHAPED—HAS_SEC_TCE                      |
| 004070376-02 | OBS      | FP   | 0.00  | 1 | 1 | 0 | 0 | IS_SEC_TCE  |
| 004070376-03 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—RESIDUAL_TCE—CENT_NOFITS |

**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 004070376-03

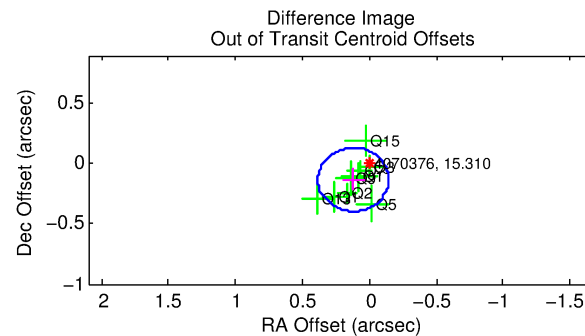
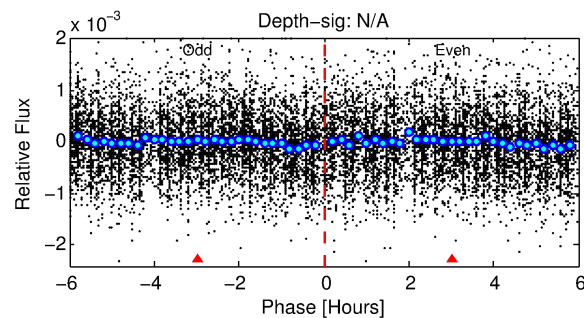
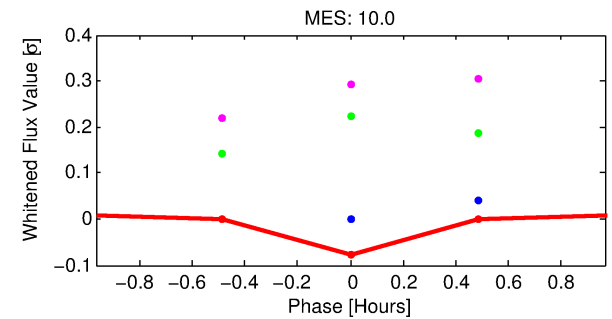
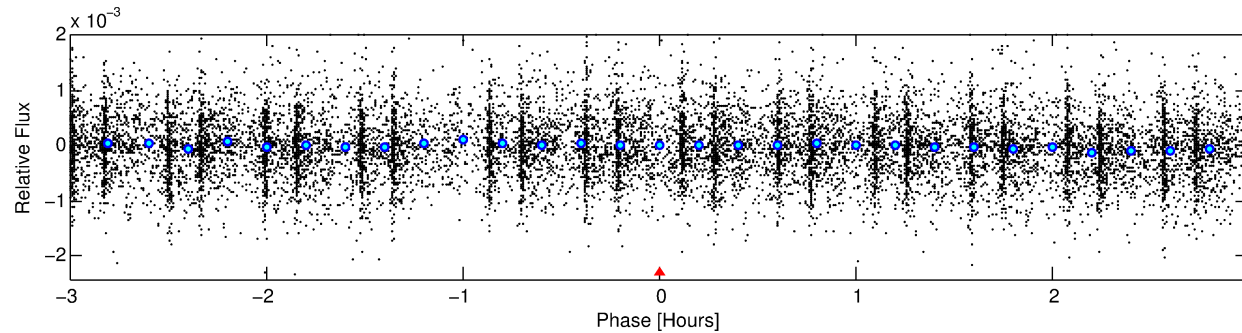
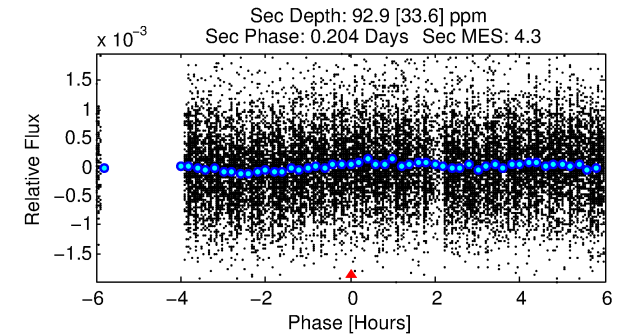
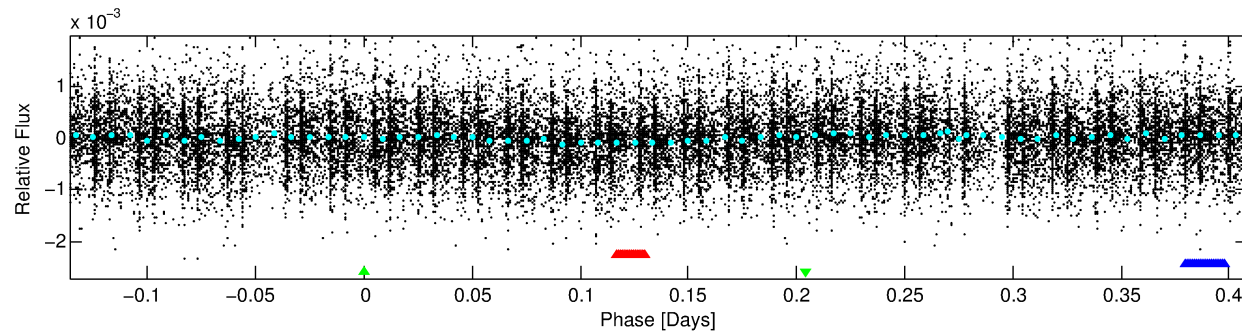
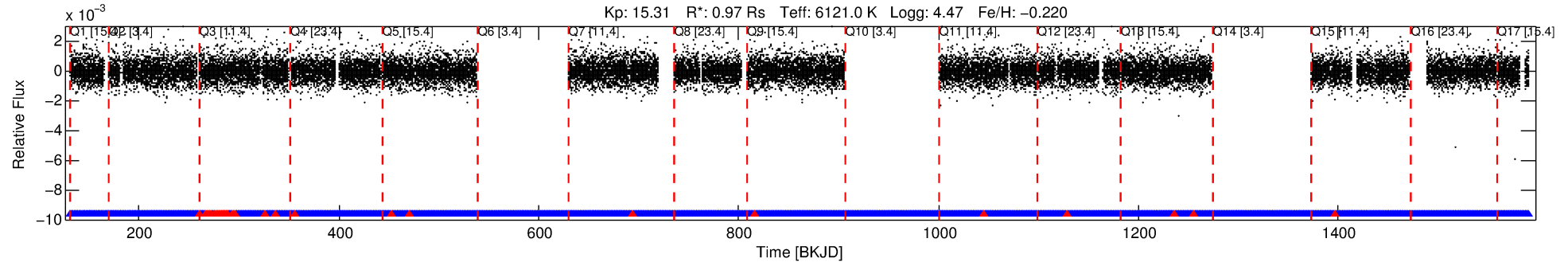
No Significant Match Found

# DV One-Page Summary

KIC: 4070376 Candidate: 3 of 3 Period: 0.545 d

KOI: K01318 Corr: No Ephemeris Match

Kp: 15.31 R\*: 0.97 Rs Teff: 6121.0 K Logg: 4.47 Fe/H: -0.220



## TPS TCE Results:

Period = 0.54487 d  
Epoch = 131.7883 BKJD

DV fit results are unavailable

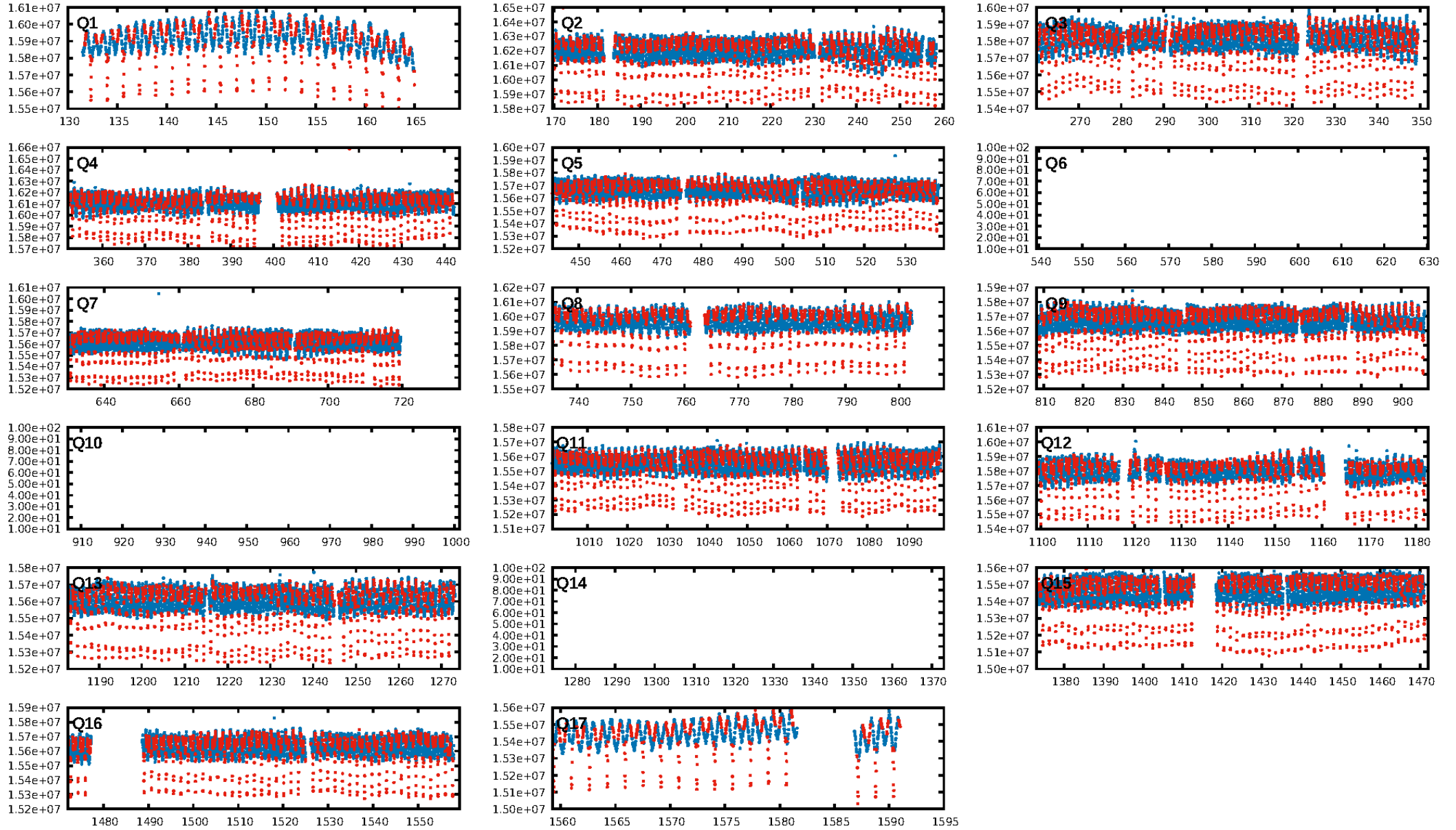
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [9.86σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.90e-25  
RollingBand-fgt: 0.97 [1193/1232]  
GhostDiagnostic-chr: -0.7353  
Centroid-sig: 35.3%  
Centroid-so: 0.731 arcsec [1.21σ]  
OotOffset-rm: 0.179 arcsec [2.03σ]  
KicOffset-rm: 0.131 arcsec [1.65σ]  
OotOffset-st: 1/4/0/4 [9]  
KicOffset-st: 1/4/0/4 [9]  
DiffImageQuality-fgm: 0.00 [0/9]  
DiffImageOverlap-fno: 1.00 [9/9]

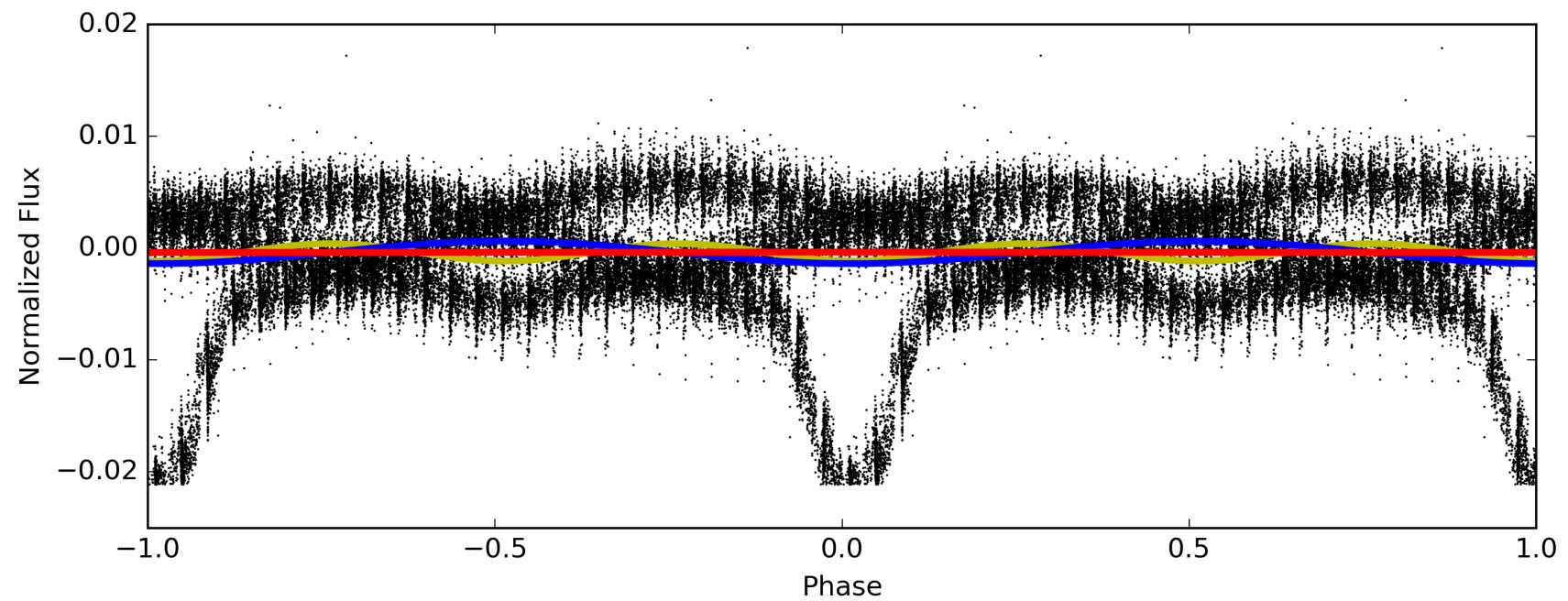
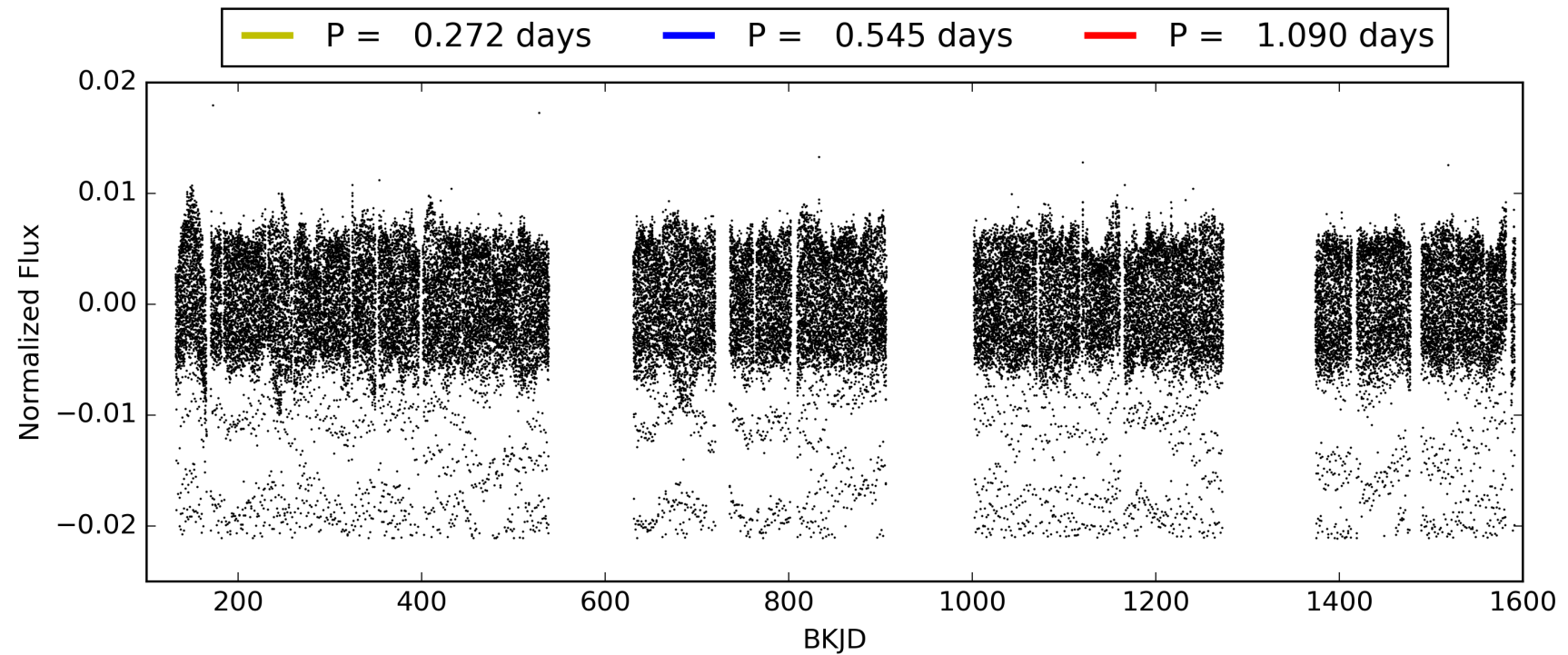
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 09:51:37 Z

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

# TCE 004070376-03, PDC Light Curves

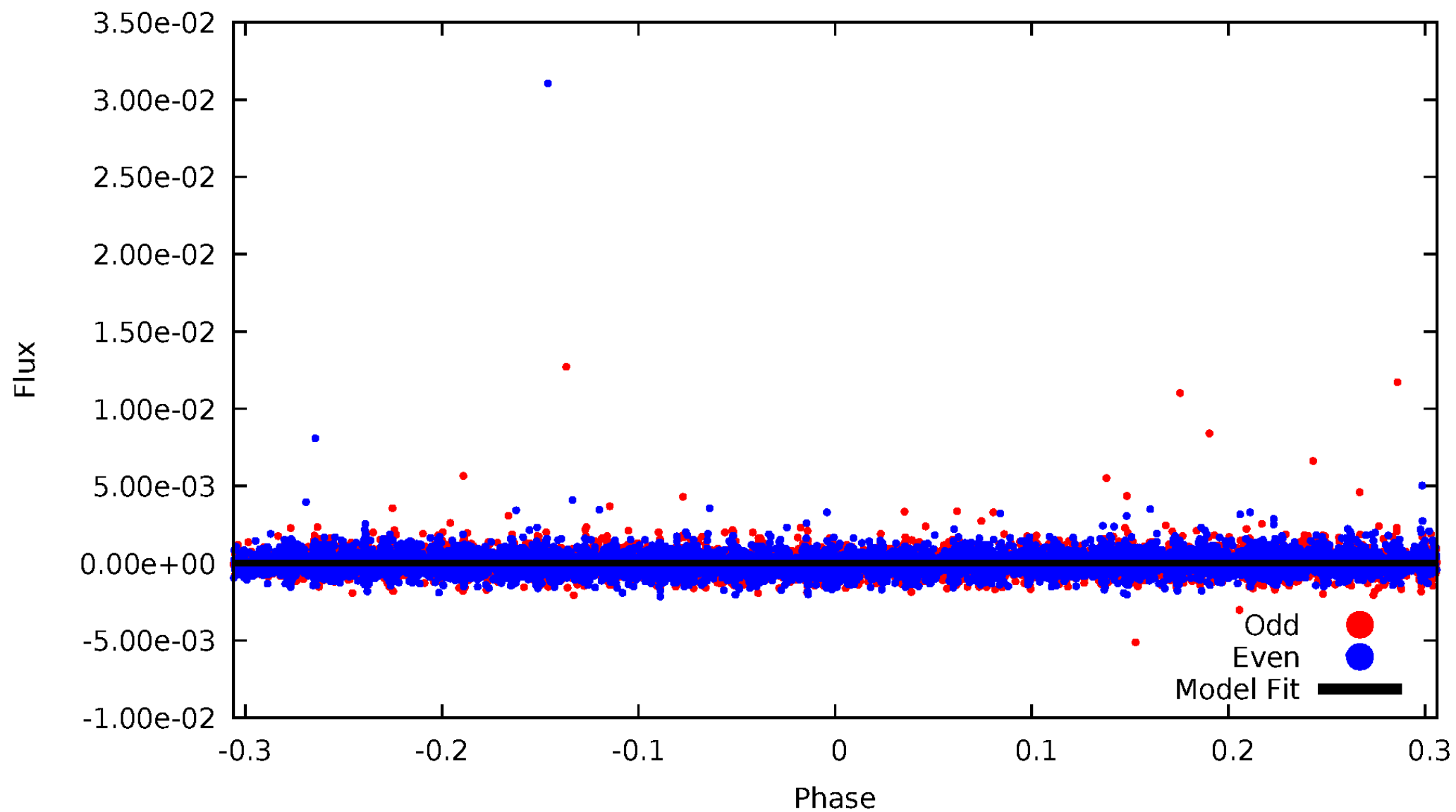


TCE 004070376-03



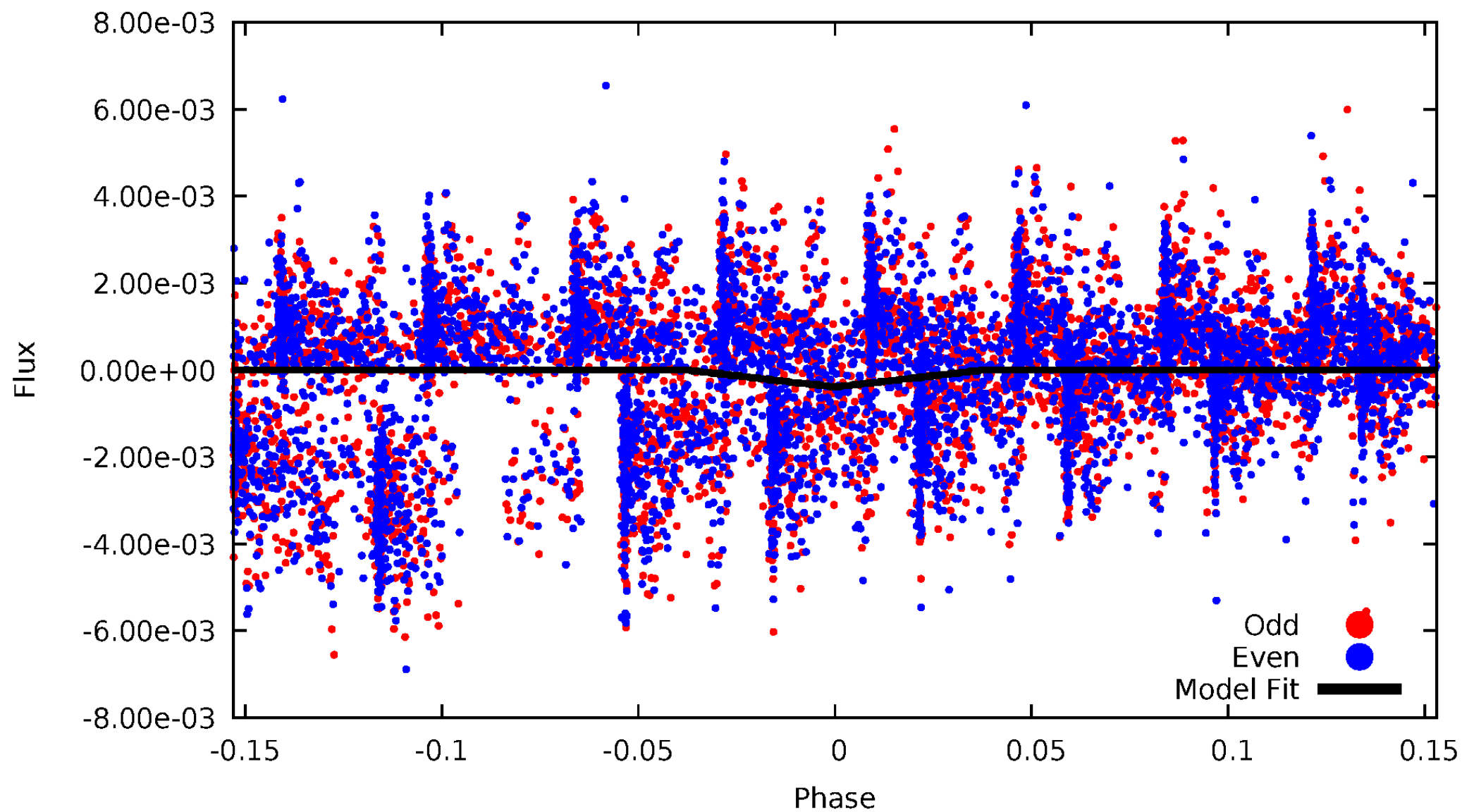
DV Odd/Even

TCE 004070376-03



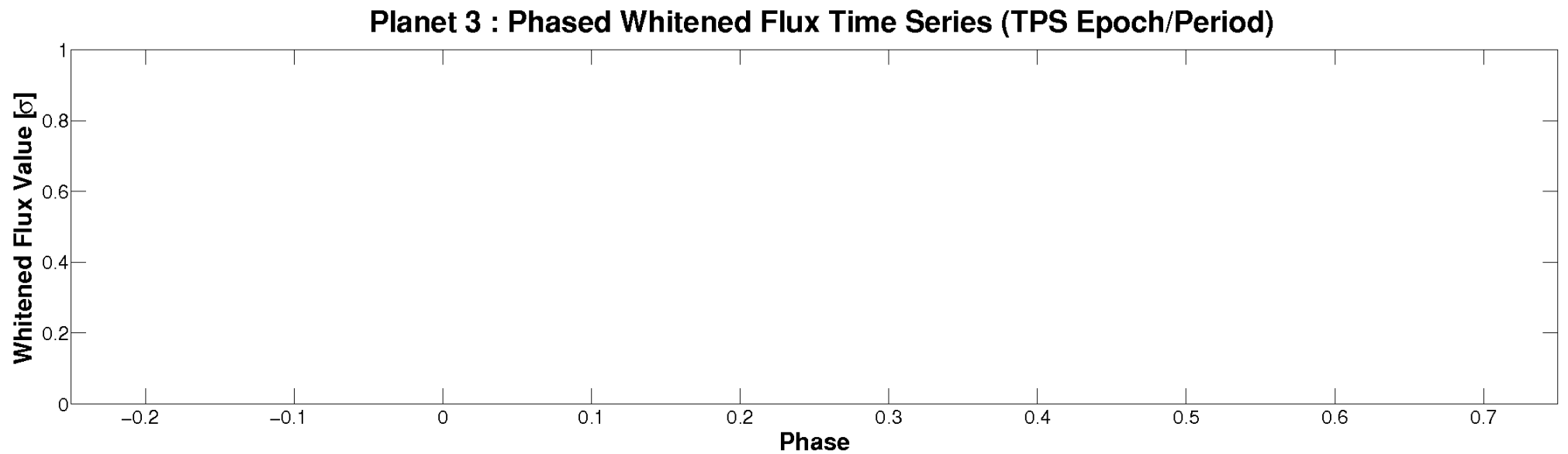
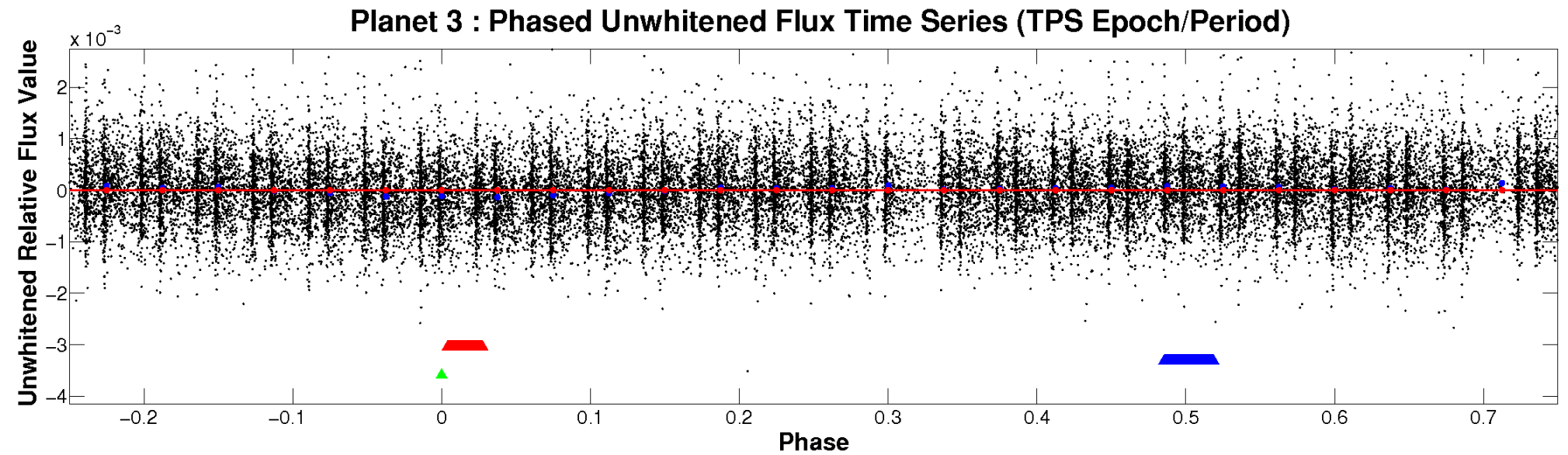
# ALT Odd/Even

TCE 004070376-03



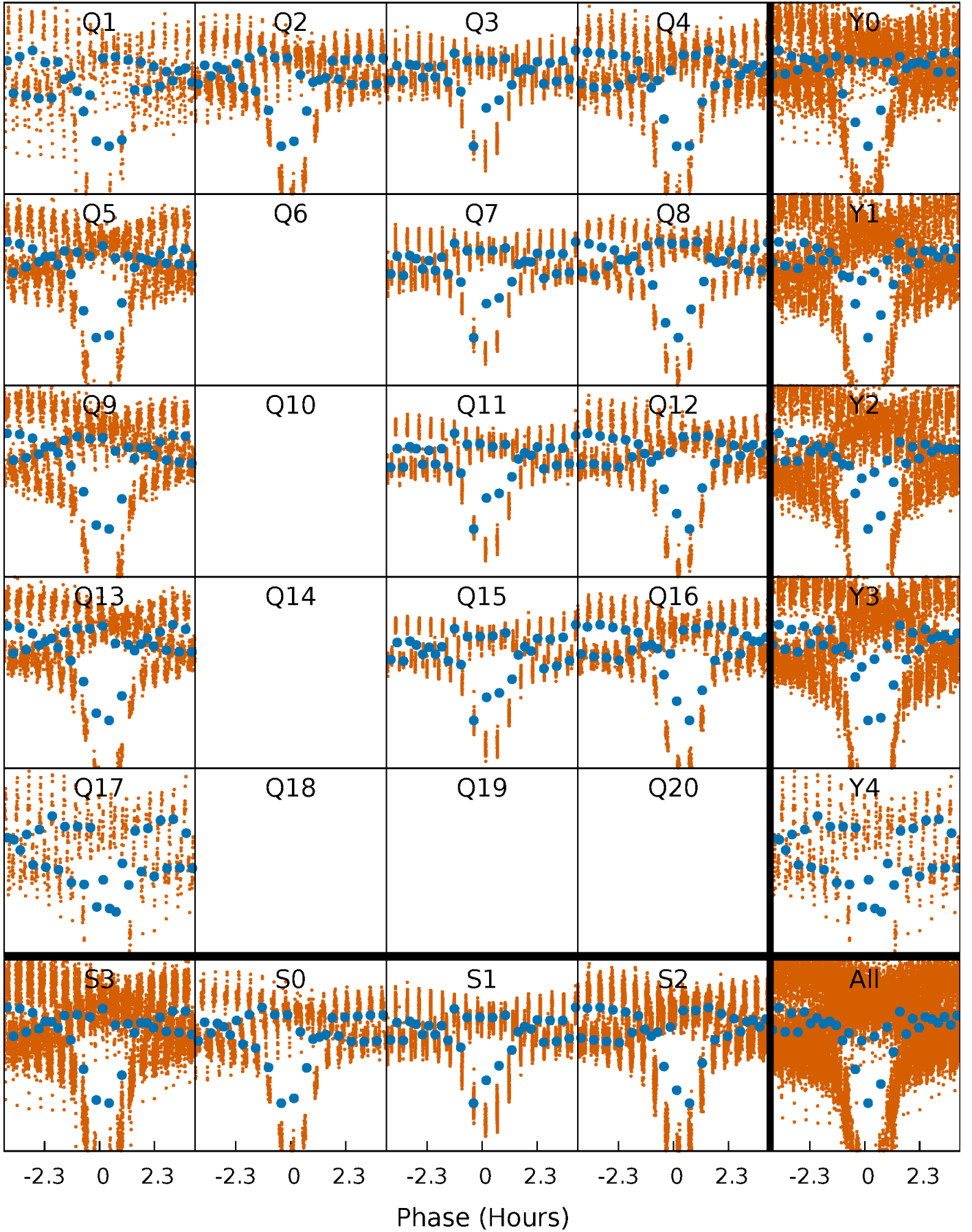


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

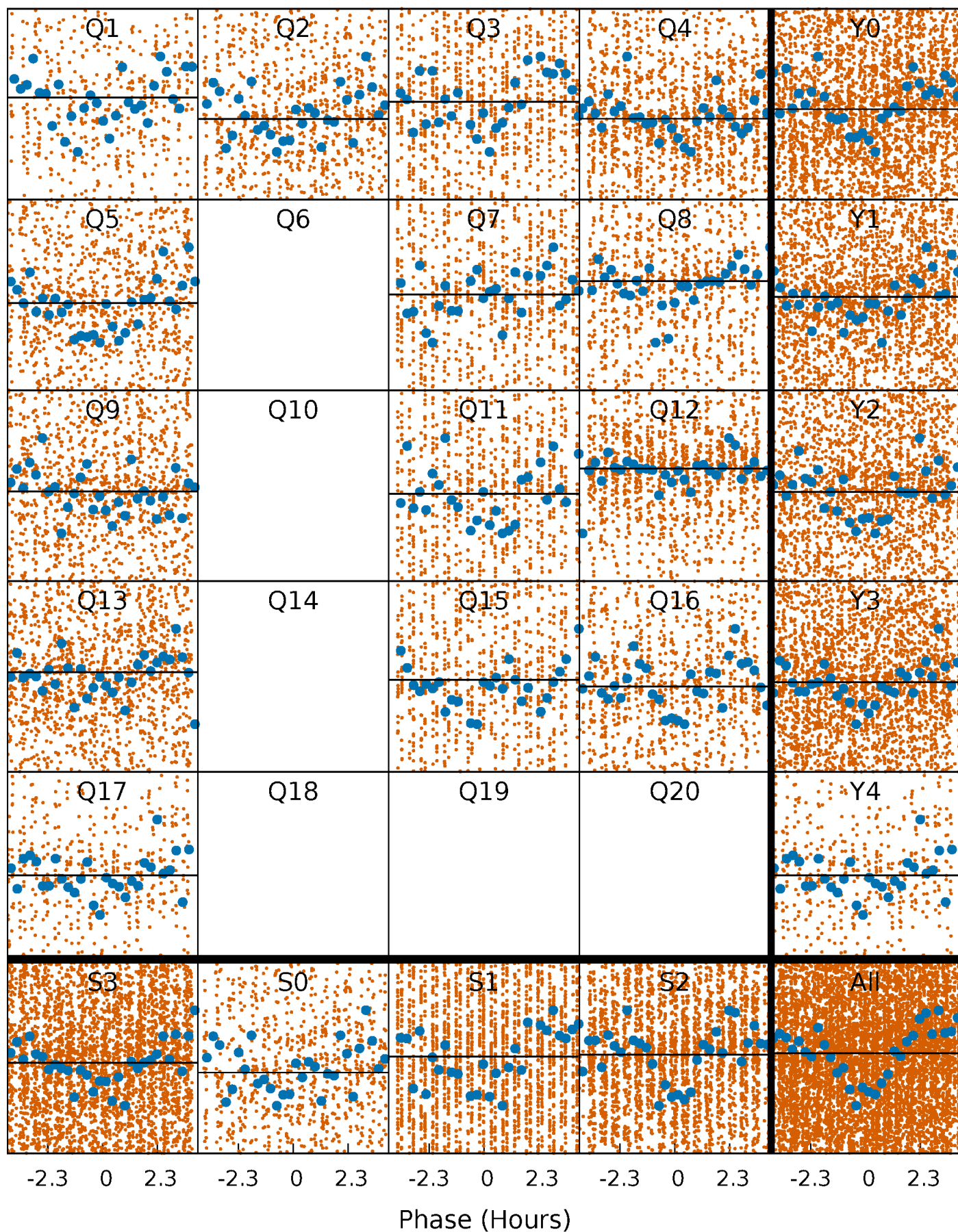
TCE 004070376-03   P= 0.544866 Days    $T_0=131.788277$  (BKJD)





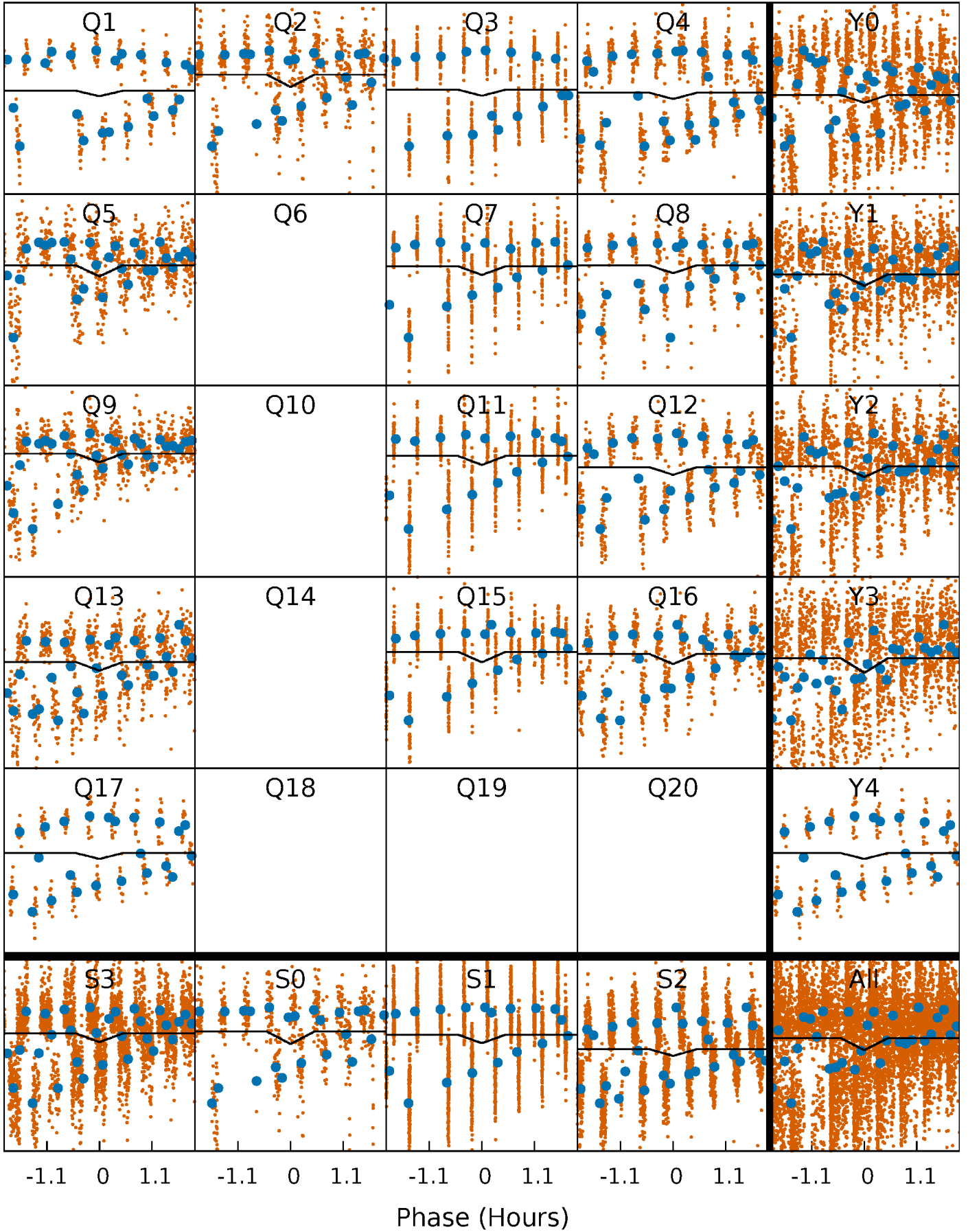
# DV Quarter-Phased Transit Curves

TCE 004070376-03 P= 0.544866 Days  $T_0=131.788277$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

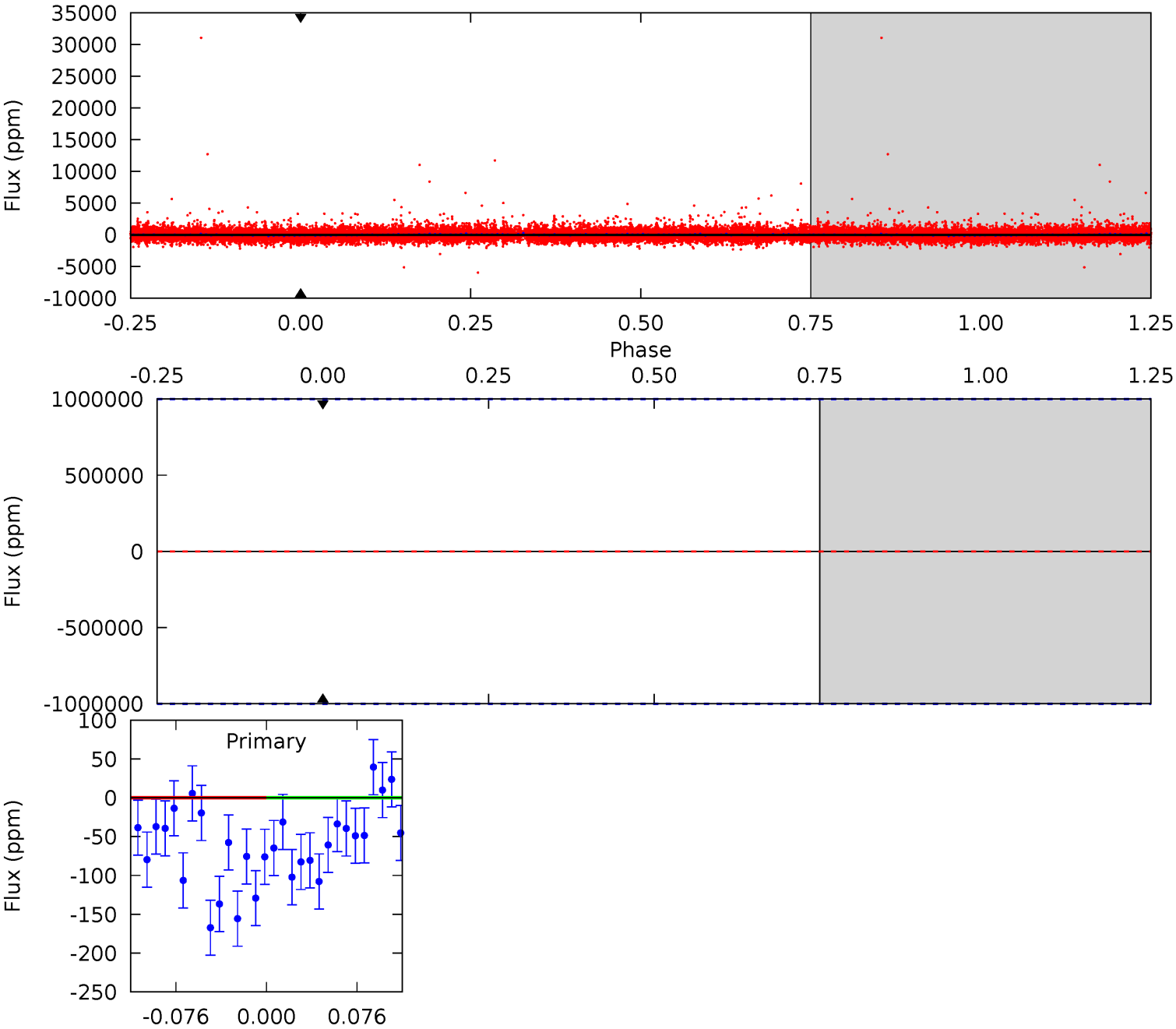
TCE 004070376-03     $P = 0.544866$  Days     $T_0 = 131.673410$  (BKJD)



# DV Model-Shift Uniqueness Test

004070376-03, P = 0.544866 Days, E = 131.243411 Days

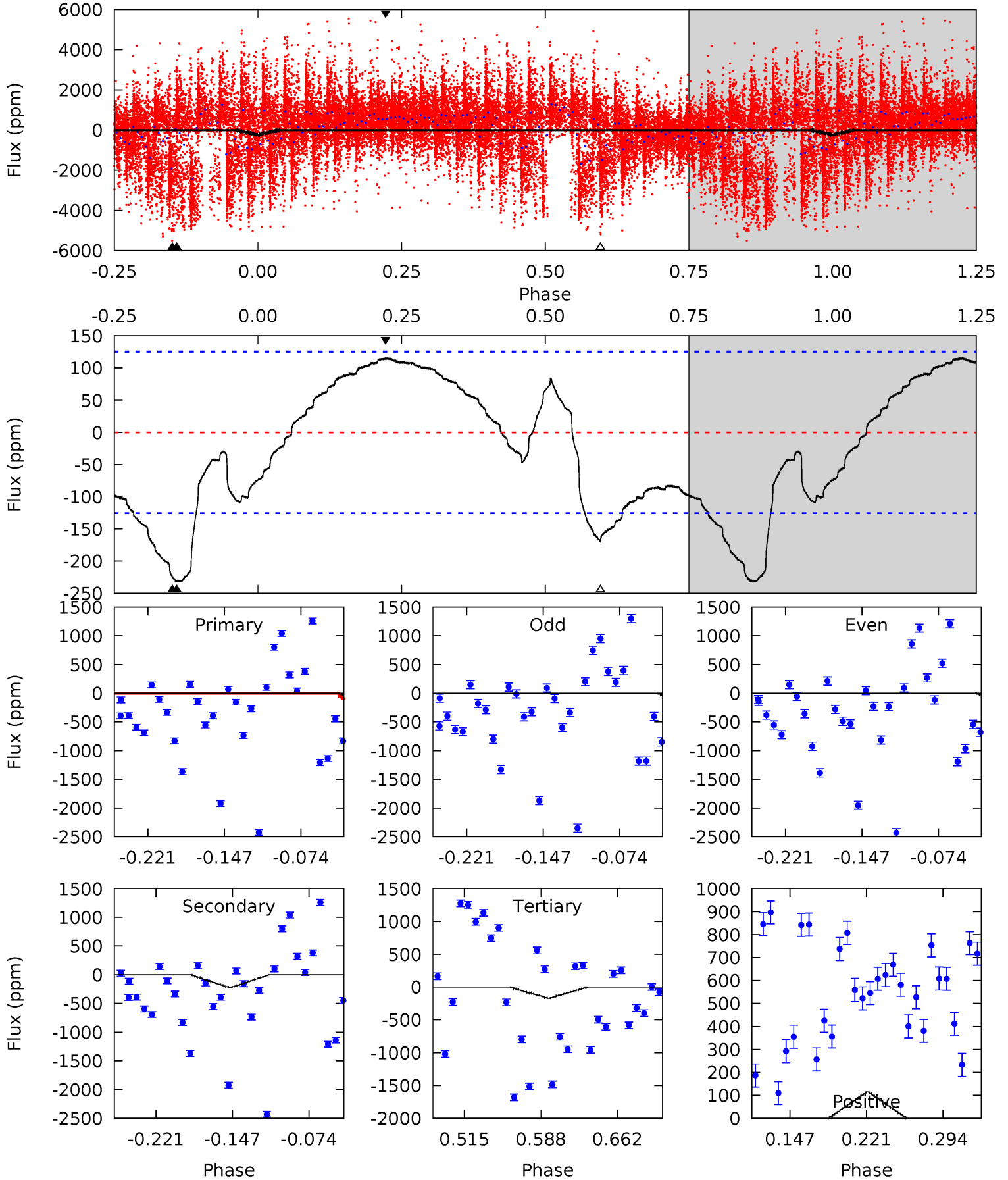
| Pri | Sec | Ter | Pos | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|-----|-----|-----|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|-----|-------|-----|
| 0   | 0   | 0   | 0   | 1.00            | 1.00            | 1.00             | 0       | 0       | 0       | 0       | 0       | 0   | 0     | 0   |



# Alt Model-Shift Uniqueness Test

004070376-03, P = 0.544866 Days, E = 131.128544 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  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|-------|-------|------|
| 8.57 | 8.29 | 6.28 | 4.24 | 4.63            | 1.79            | 3.18             | 2.30    | 4.34    | 2.01    | 4.05    | 0.44    | -9.09 | 0.33  | 8.63 |



### Stellar Parameters For KIC 004070376

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R$ ( $R_{\odot}$ )       | $M$ ( $M_{\odot}$ )       | $p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ ) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $6121^{+191}_{-212}$ | $4.468^{+0.054}_{-0.216}$ | $-0.220^{+0.300}_{-0.300}$ | $0.970^{+0.316}_{-0.105}$ | $1.001^{+0.142}_{-0.129}$ | $1.547^{+0.449}_{-0.830}$                     |
|        | +3%/-3%              | +1%/-5%                   | +136%/-136%                | +33%/-11%                 | +14%/-13%                 | +29%/-54%                                     |
| 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 004070376-03 / KOI

| Detrend | Depth (ppm)     | $R_p$ ( $R_{\oplus}$ ) | $T_{\text{max}}$ (K) | $T_{\text{obs}}$ (K)     | $A_{\text{obs}}$              |
|---------|-----------------|------------------------|----------------------|--------------------------|-------------------------------|
| DV      | $0 \pm 1000000$ | $8.83^{+8.82}_{-6.24}$ | $3321^{+251}_{-181}$ | $4127^{+20065}_{-21655}$ | $1.657^{+237.535}_{-137.963}$ |
| Alt.    | $-225 \pm 27$   | $8.73^{+8.59}_{-5.74}$ | $3318^{+207}_{-163}$ | $-2412^{+7061}_{-754}$   | $0.270^{+2.159}_{-0.201}$     |

$T_{\text{max}}$  = 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

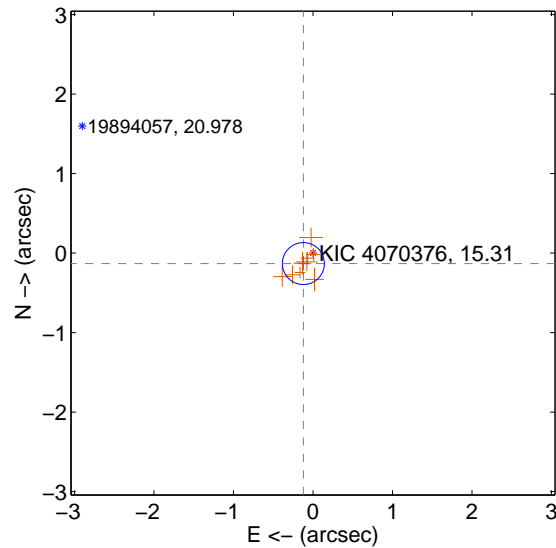
Supplemental centroid analysis for 004070376-03. Kepler magnitude: 15.31. Transit SNR -1.00

There are 0 quarters with good PRF difference image offsets

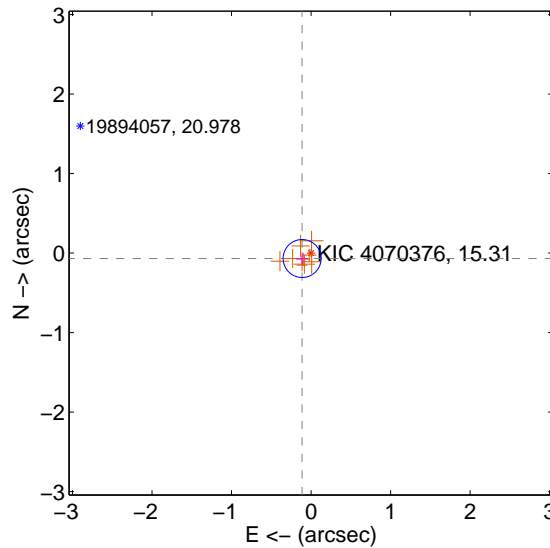
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA       | $\Delta$ Dec       |
|---|--------------------|---------------------|-------------------|--------------------|
| PRF-fit source offset from OOT          | $0.179 \pm 0.088$  | 2.03                | $0.121 \pm 0.076$ | $-0.132 \pm 0.086$ |
| PRF-fit source offset from KIC position | $0.131 \pm 0.080$  | 1.65                | $0.112 \pm 0.076$ | $-0.068 \pm 0.078$ |
| photometric centroid source offset      | $0.73 \pm 0.60$    | 1.21                | $-0.71 \pm 0.60$  | $-0.18 \pm 0.63$   |

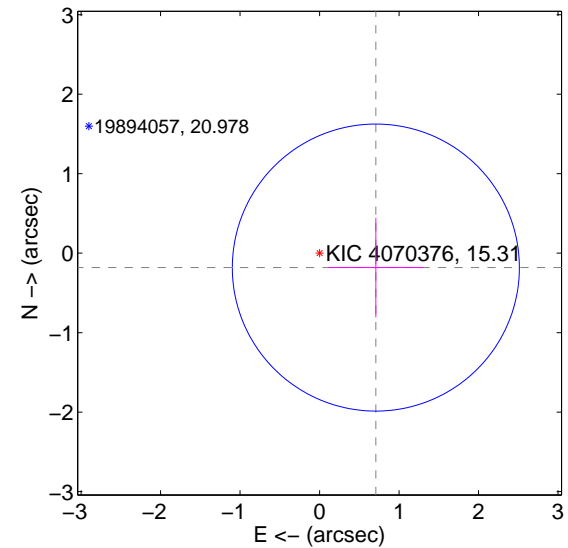
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



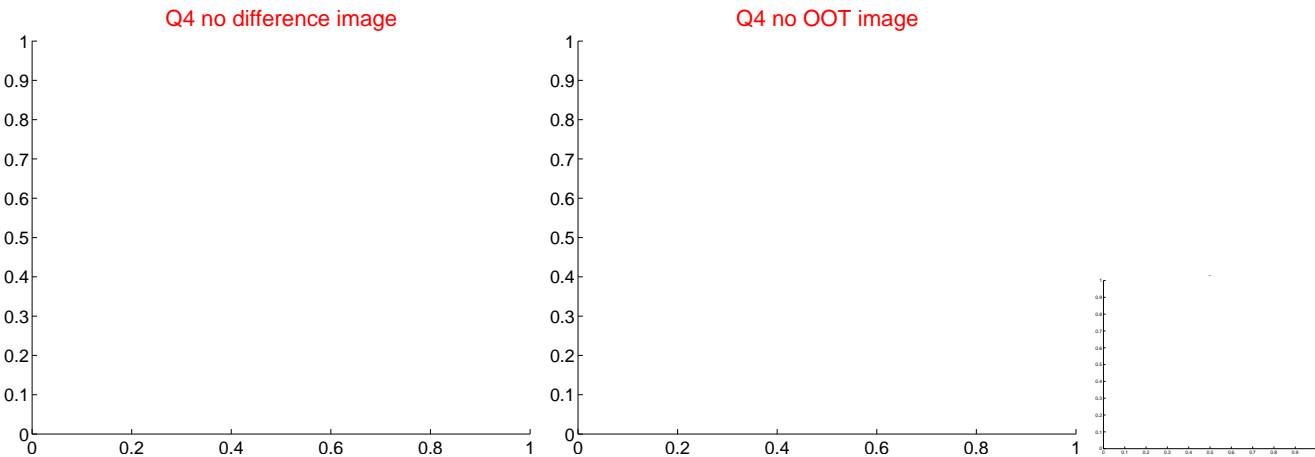
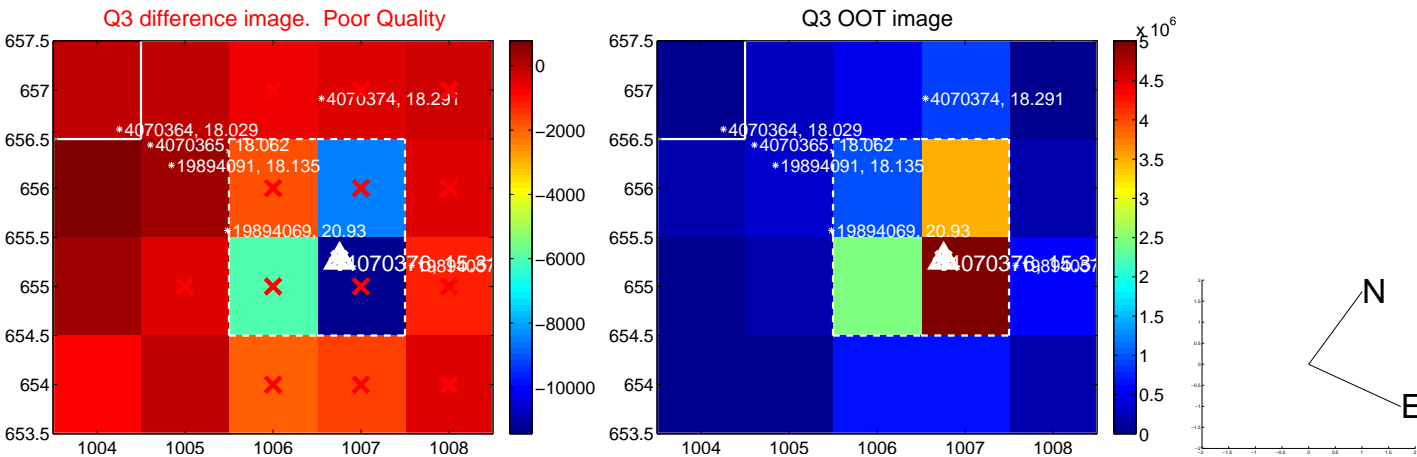
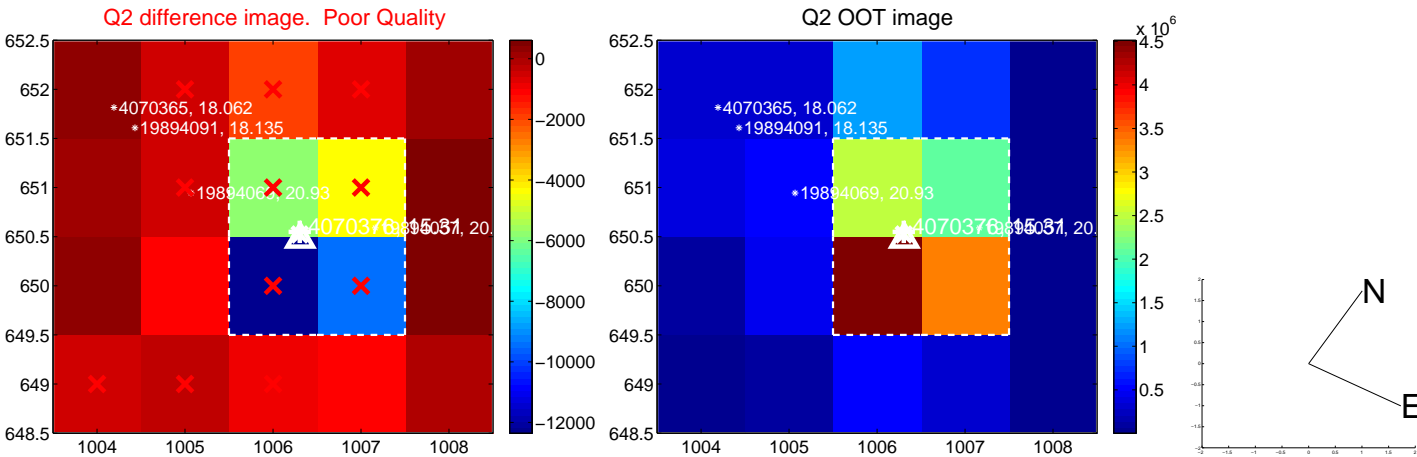
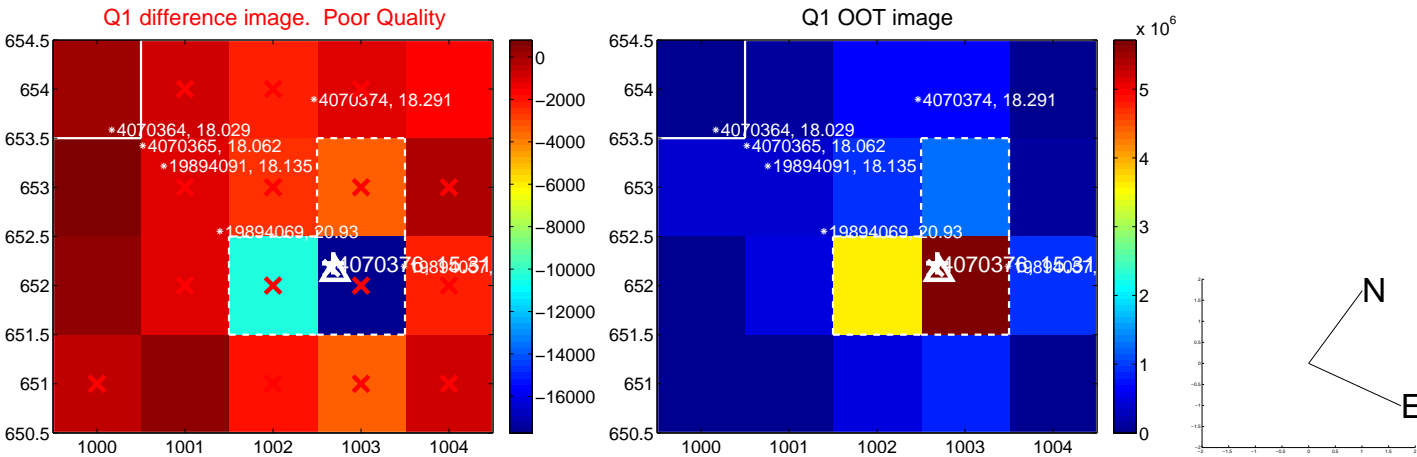
offset from photometric centroids



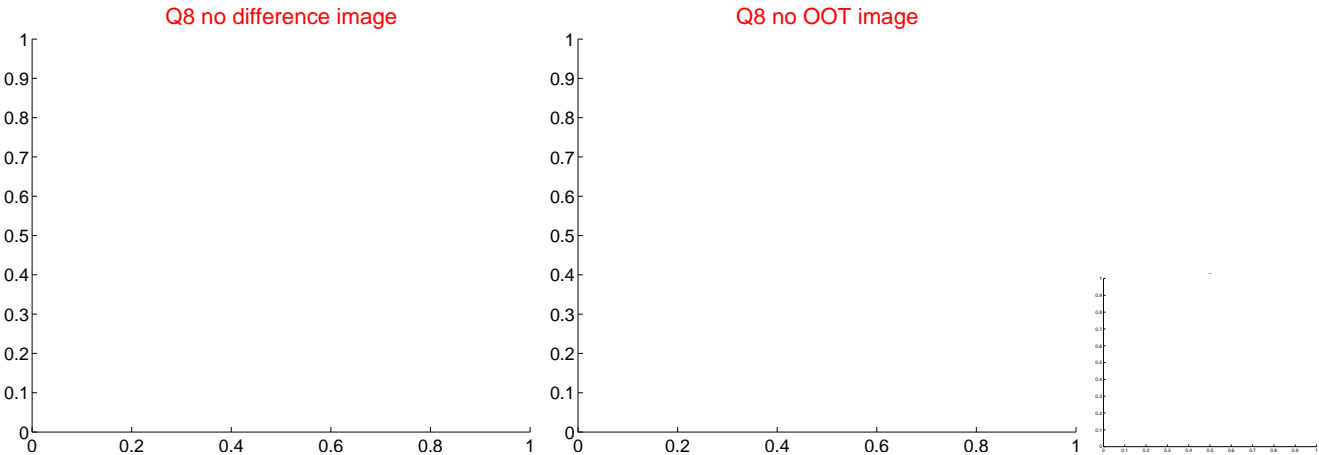
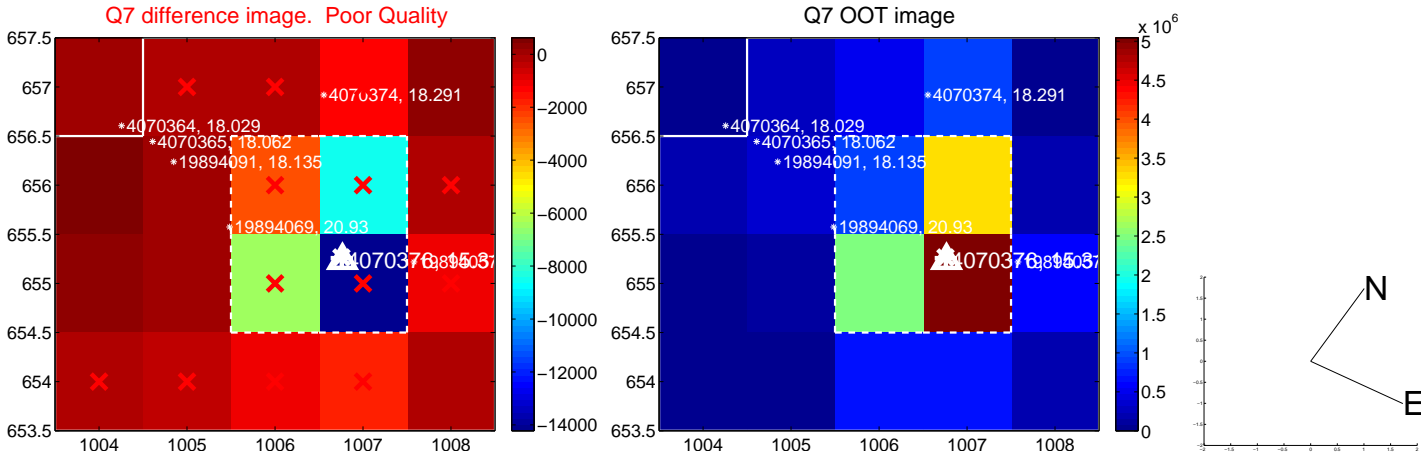
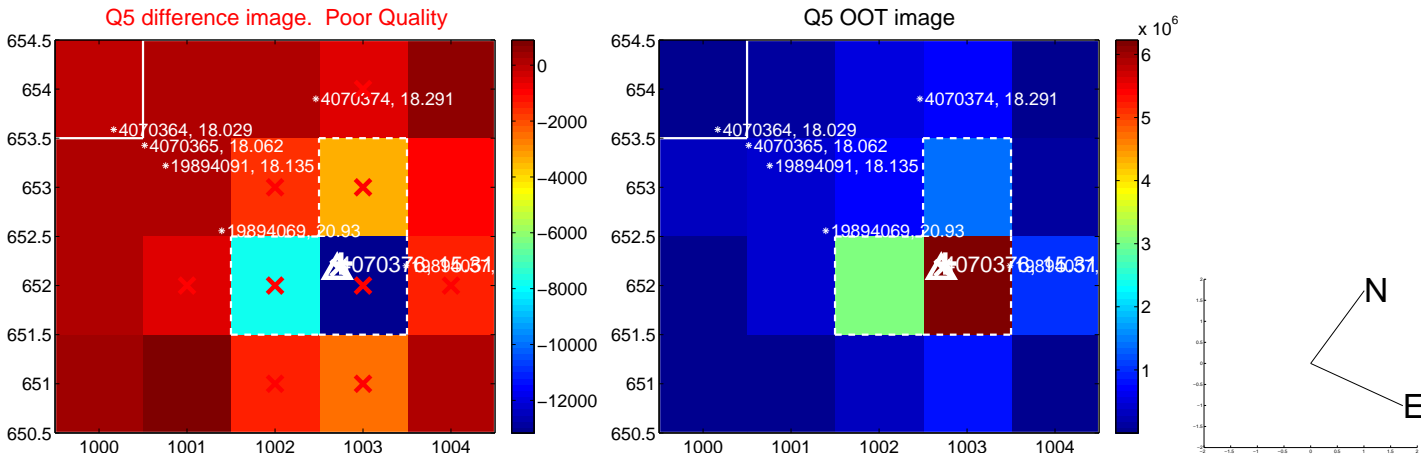
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

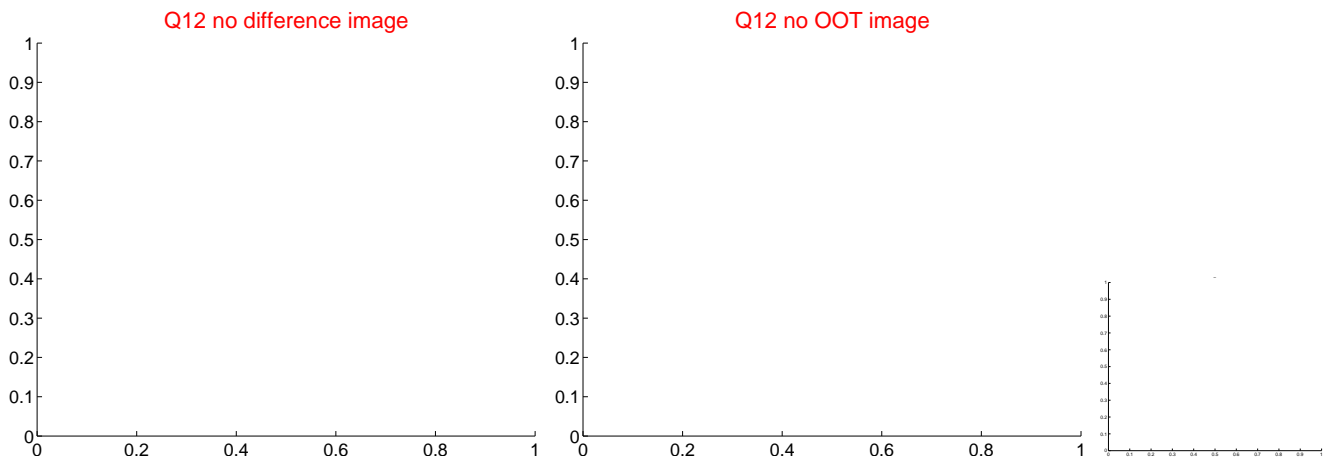
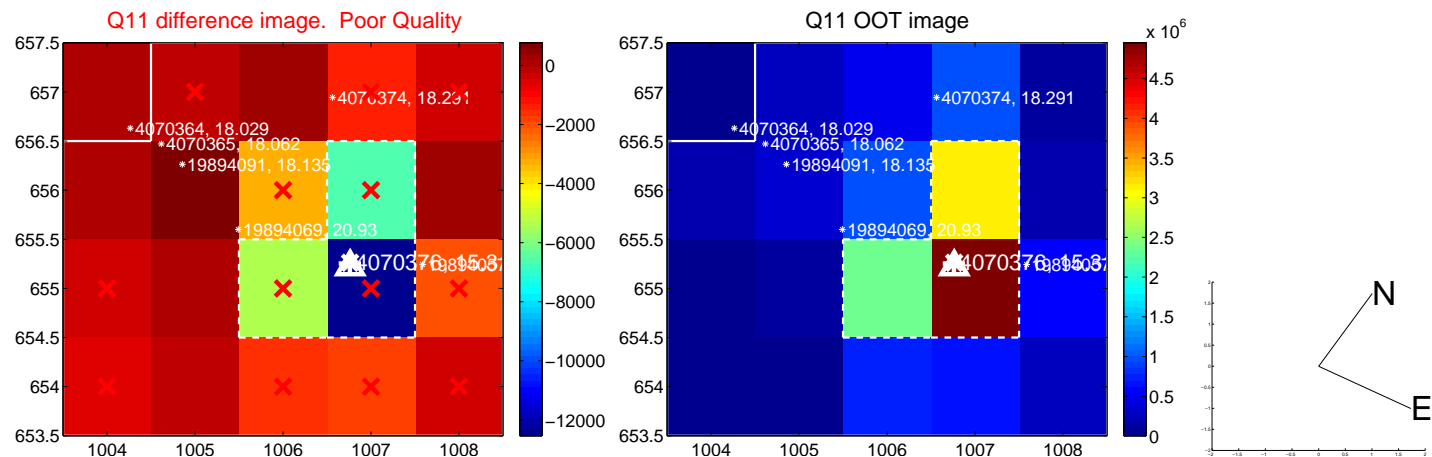
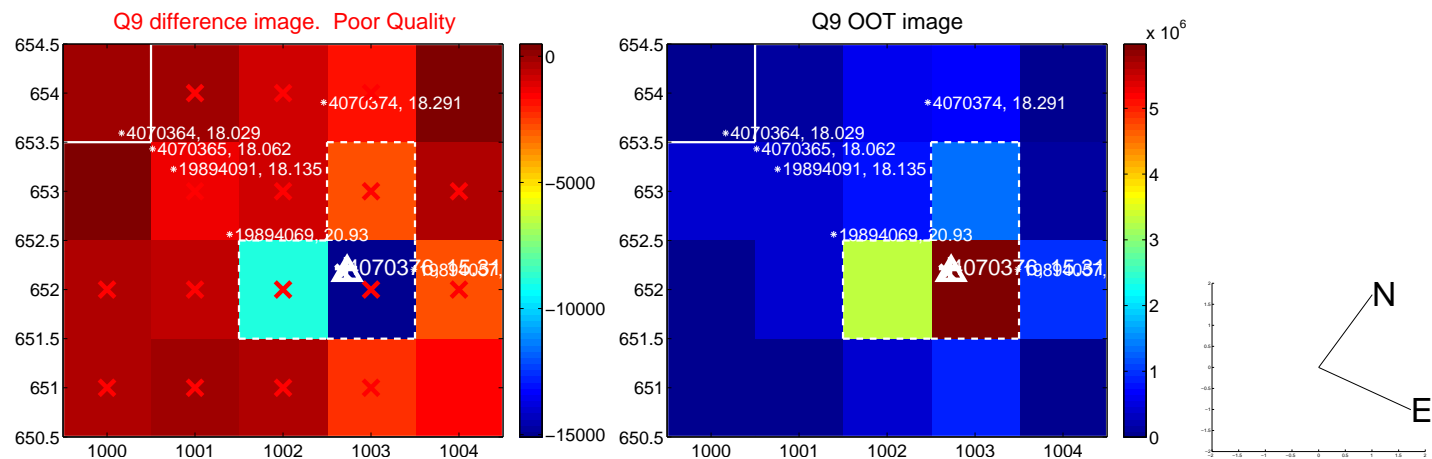


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



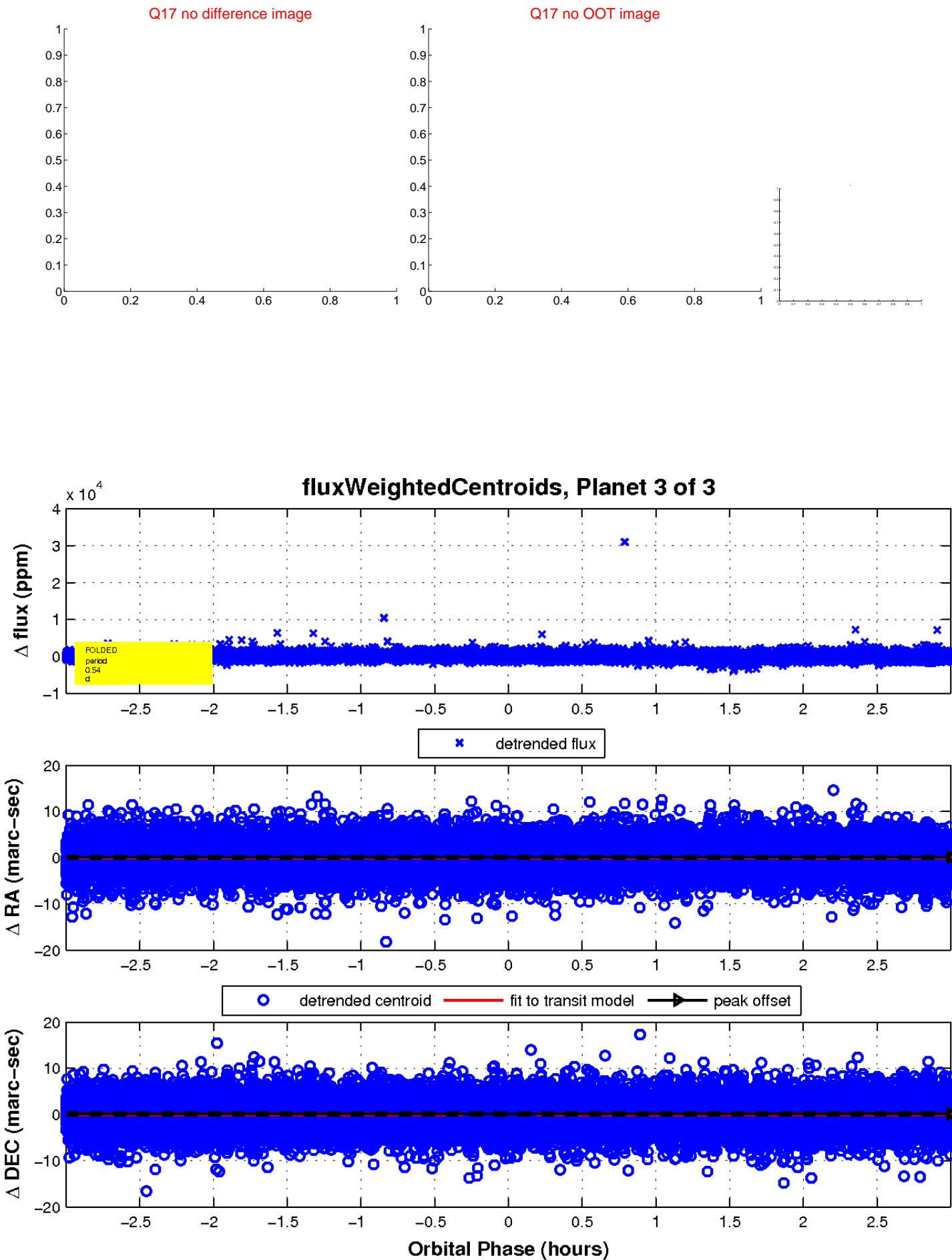


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





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



UKIRT Image

Declination

