

# KIC 010385682

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|---------|------|-----------------------------|-----------------|------------------------|------------------------|
| 010385682-01 | OBS      | 6223.01 | 3.103691      | 132.880042   | 375322.3    | 4.500            | 18498.5 | -1.0 | 1.09                        | 6075            | 53.89                  | 764.05                 |
| 010385682-02 | OBS      | No      | 3.103810      | 133.901720   | 4404.7      | 10.500           | 442.4   | -1.0 | 1.09                        | 6075            | 7.21                   | 764.02                 |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 010385682-01 | OBS      | FP   | 0.00  | 0 | 1 | 0 | 0 | DEPTH_ODDEVEN_ALT—MOD_ODDEVEN_ALT—HAS_SEC_TCE—CENT_NOFITS |
| 010385682-02 | OBS      | FP   | 0.00  | 1 | 1 | 0 | 0 | IS_SEC_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.

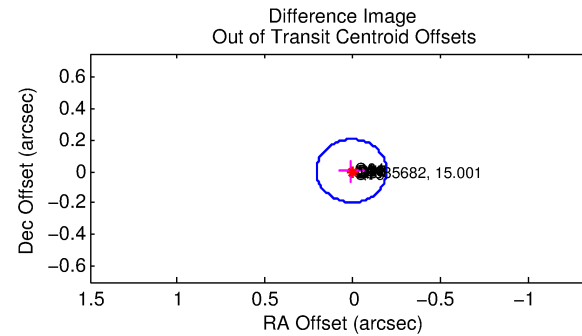
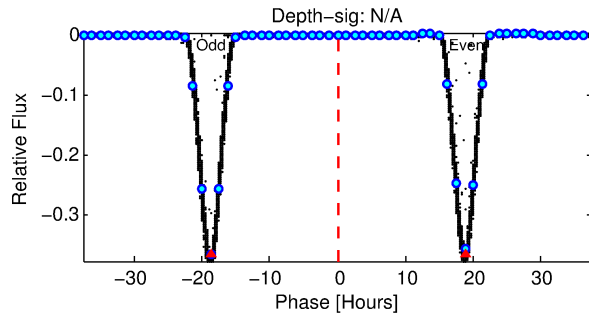
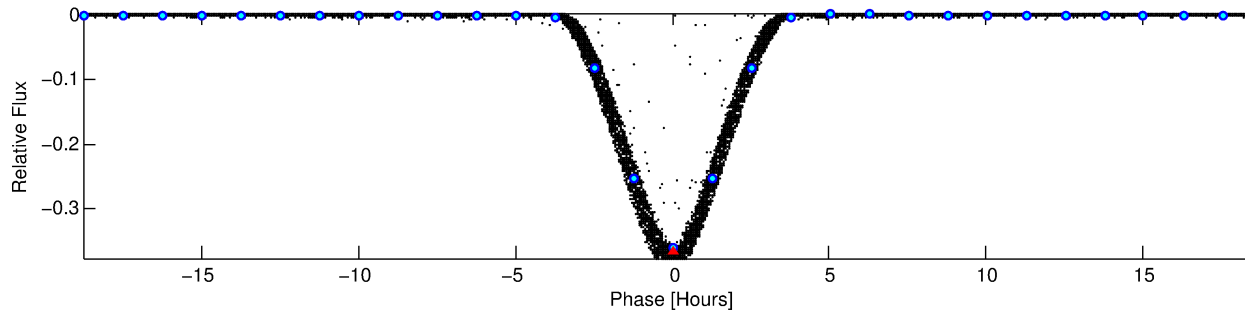
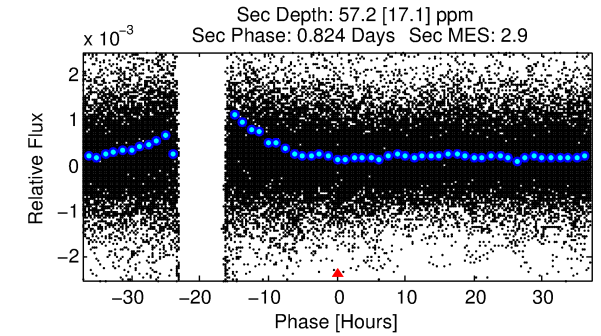
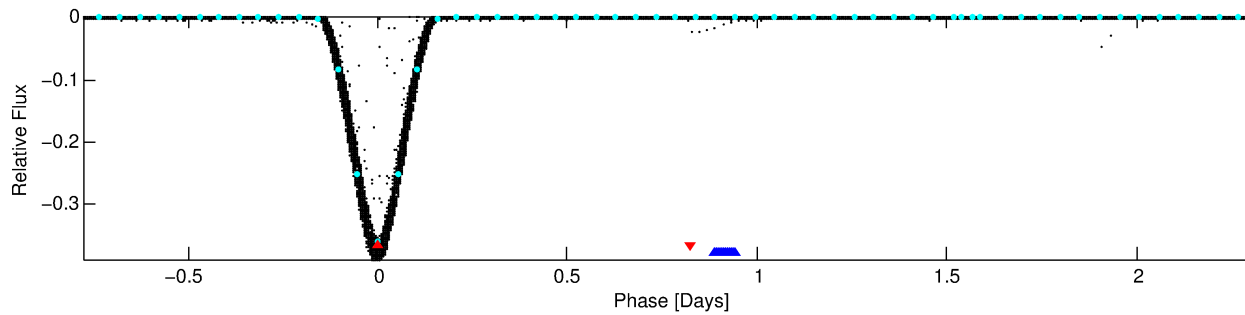
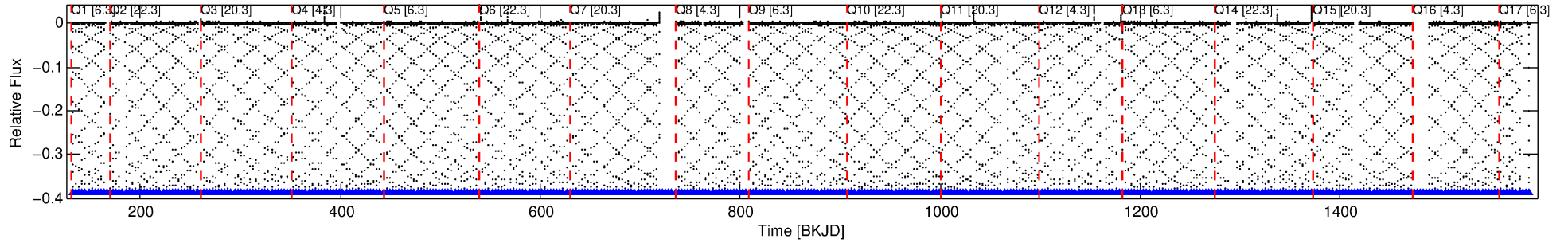
## Ephemeris Match Information For 010385682-01

No Significant Match Found

# DV One-Page Summary

KIC: 10385682 Candidate: 1 of 2 Period: 3.104 d  
KOI: K06223.01 Corr: 0.807

Kp: 15.00 R\*: 1.09 Rs Teff: 6075.0 K Logg: 4.42 Fe/H: 0.160



## TPS TCE Results:

Period = 3.10369 d  
Epoch = 132.8800 BKJD

DV fit results are unavailable

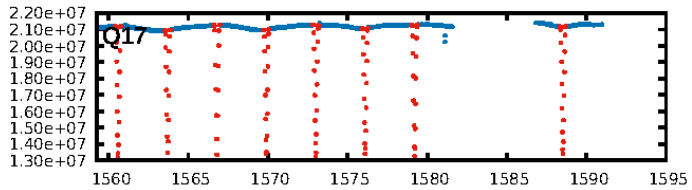
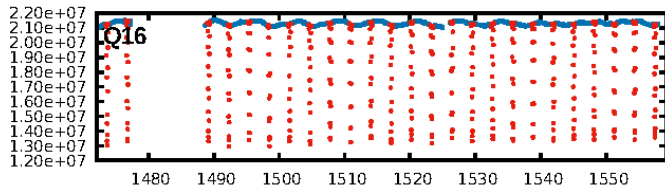
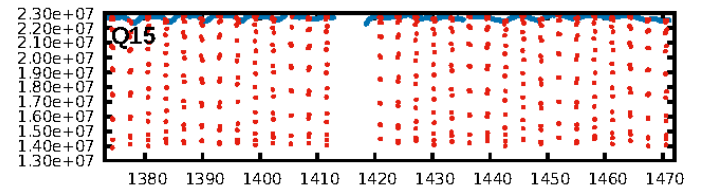
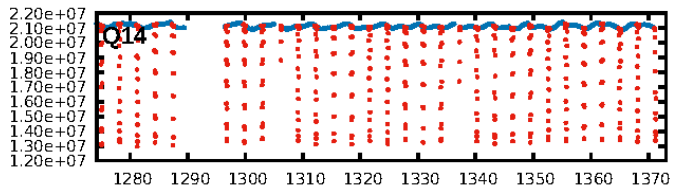
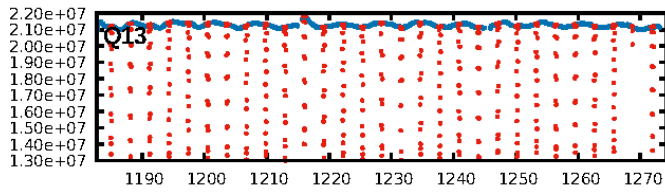
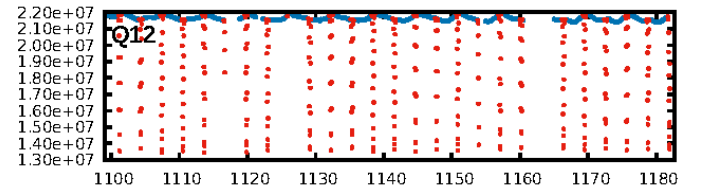
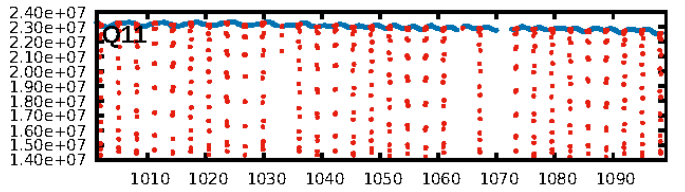
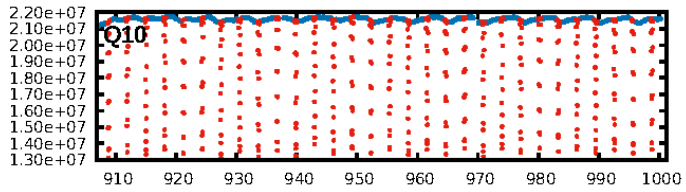
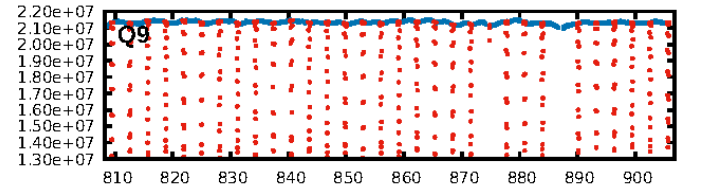
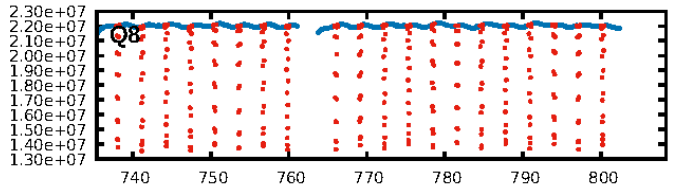
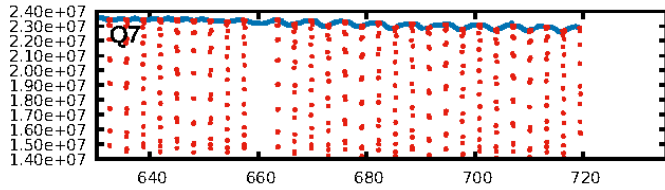
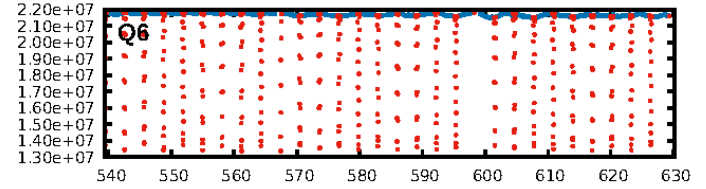
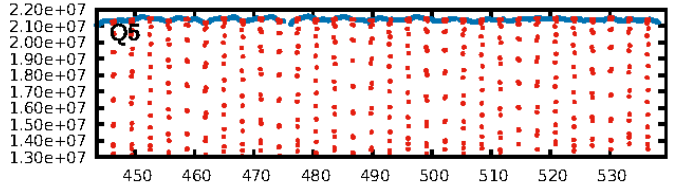
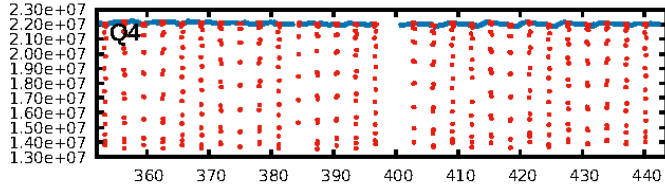
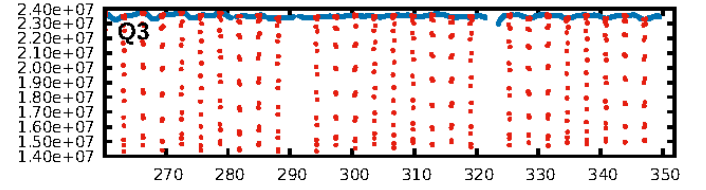
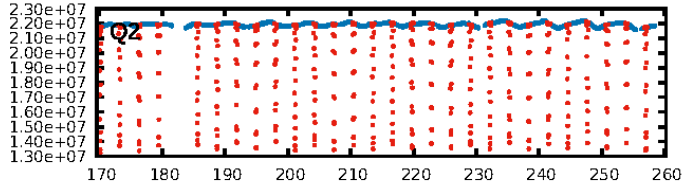
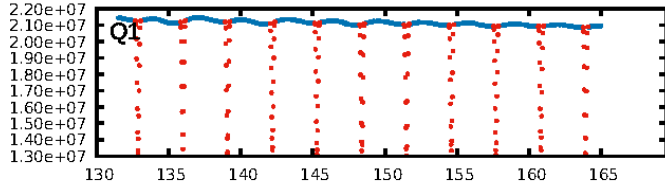
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [417/417]  
GhostDiagnostic-chr: 1.579  
Centroid-sig: 0.0%  
Centroid-so: 0.525 arcsec [957.81 $\sigma$ ]  
OotOffset-rm: 0.011 arcsec [0.16 $\sigma$ ]  
KicOffset-rm: 0.108 arcsec [1.54 $\sigma$ ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 1.00 [17/17]

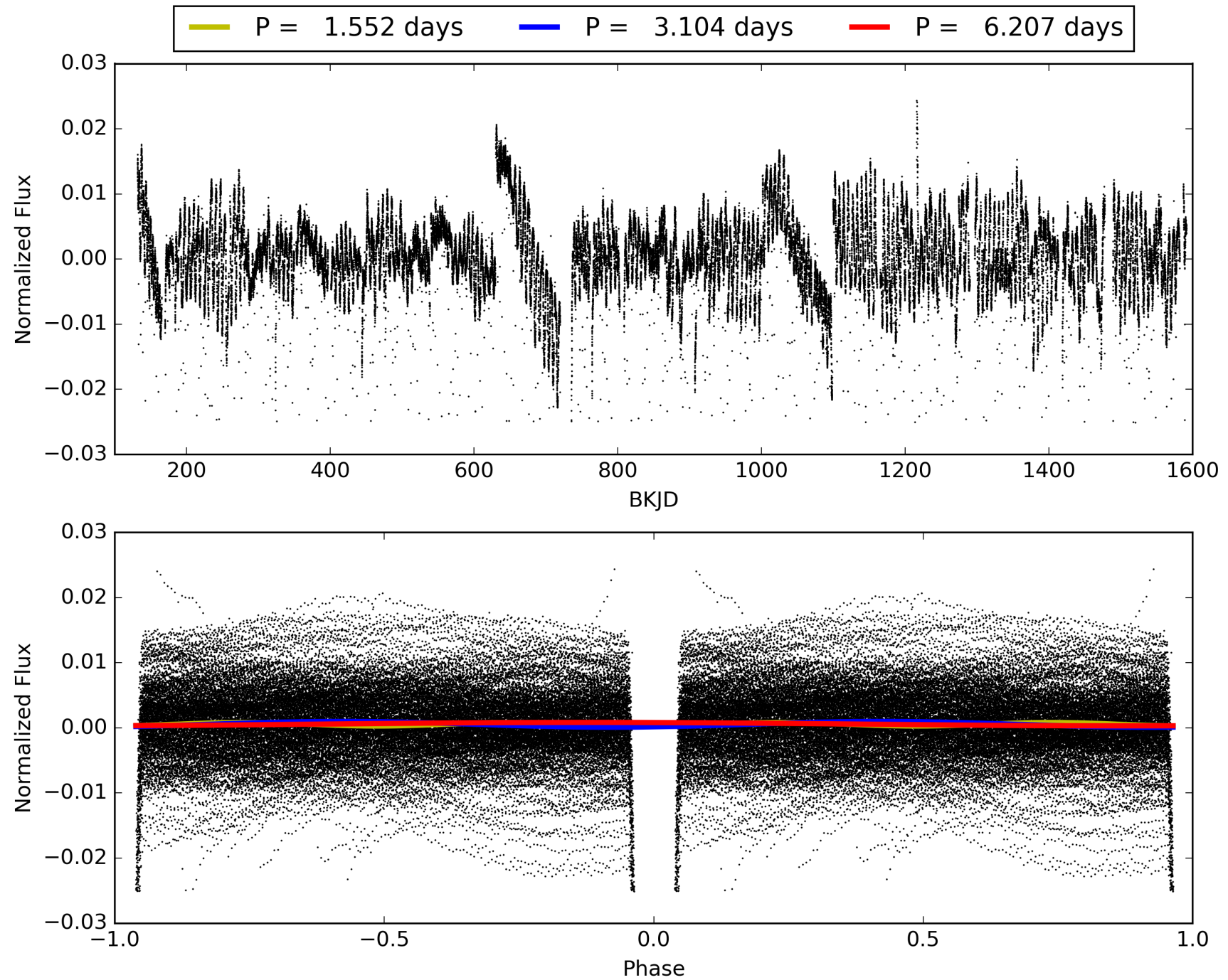
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 01:18:06 Z

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

## TCE 010385682-01, PDC Light Curves

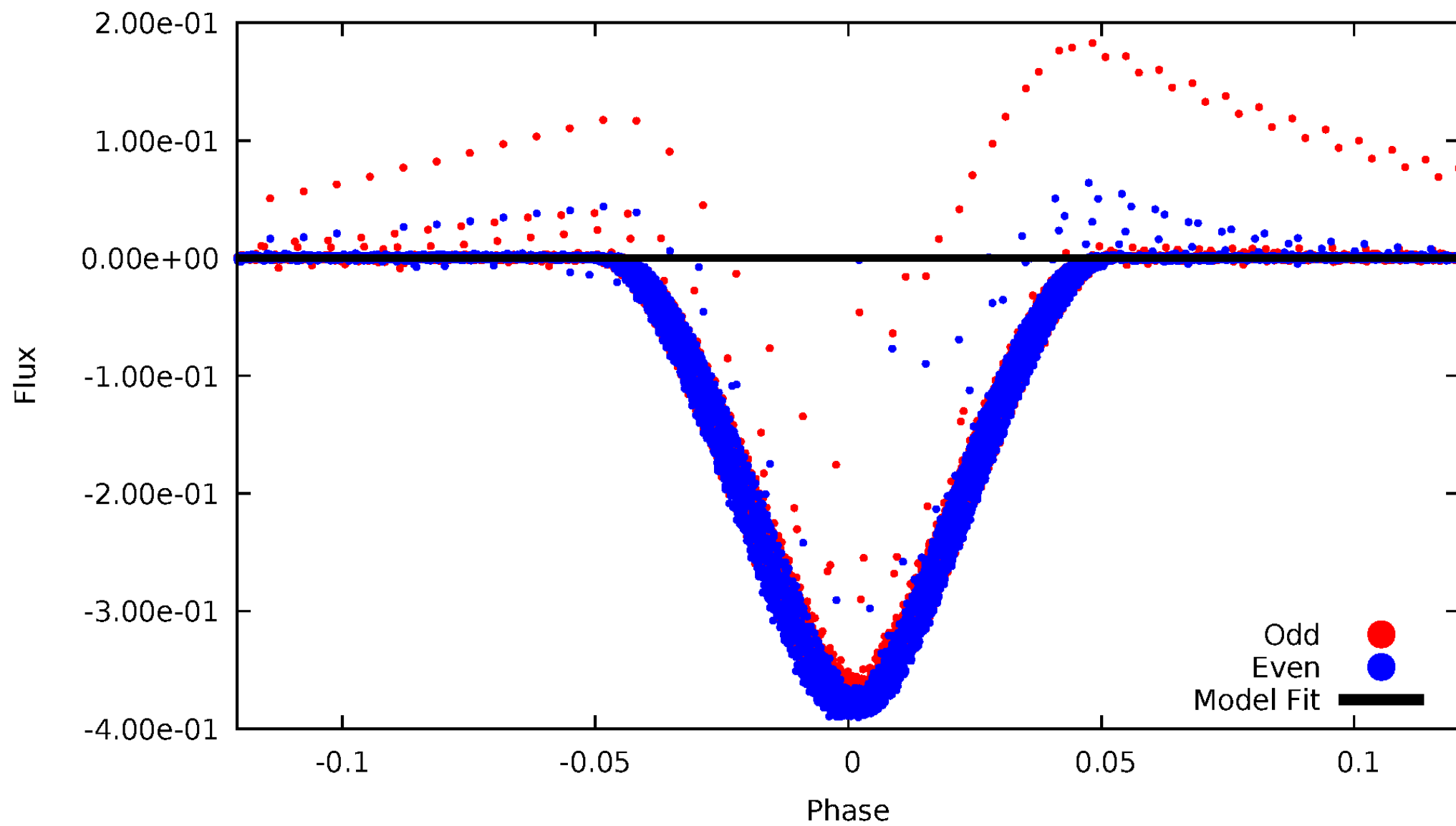


TCE 010385682-01



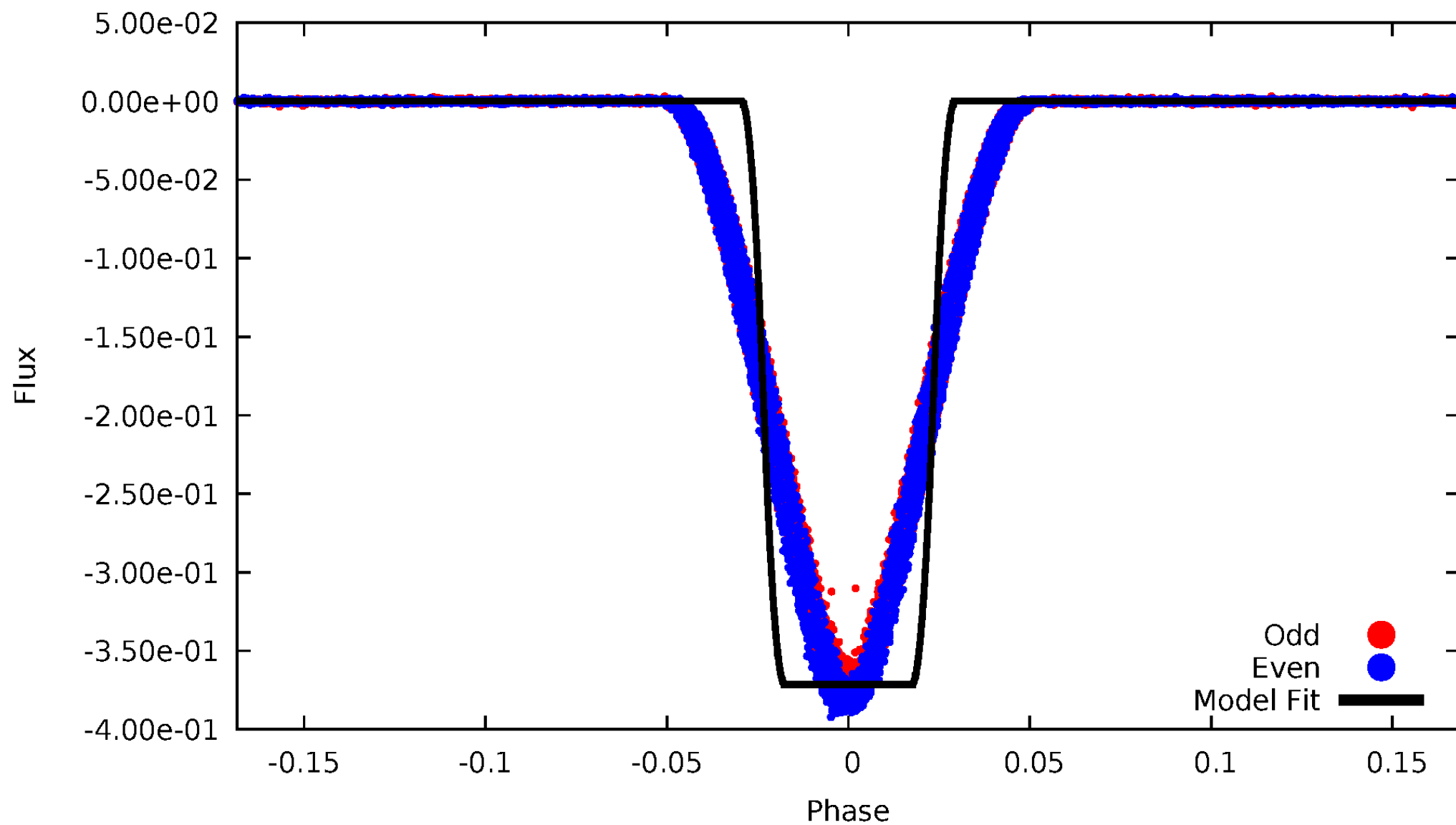
# DV Odd/Even

TCE 010385682-01



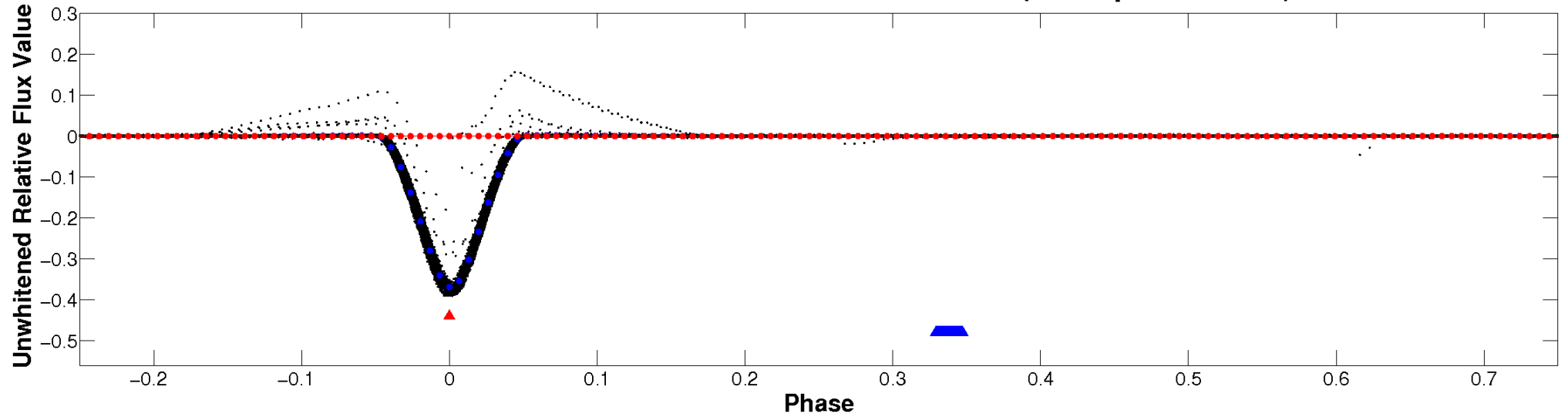
# ALT Odd/Even

TCE 010385682-01



# Non-Whitened Vs. Whitened Light Curve

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

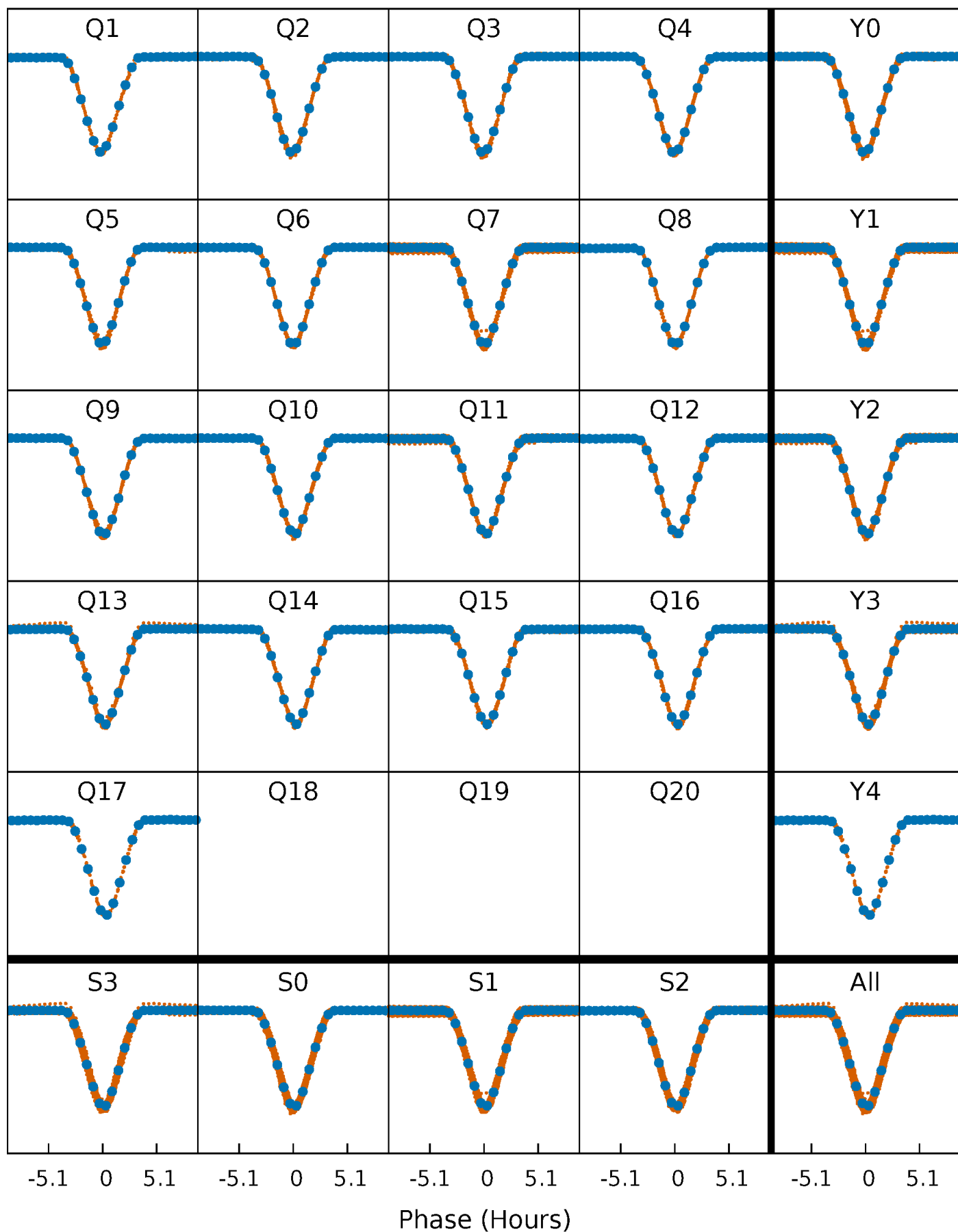


**Planet 1 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



# PDC Quarter-Phased Transit Curves

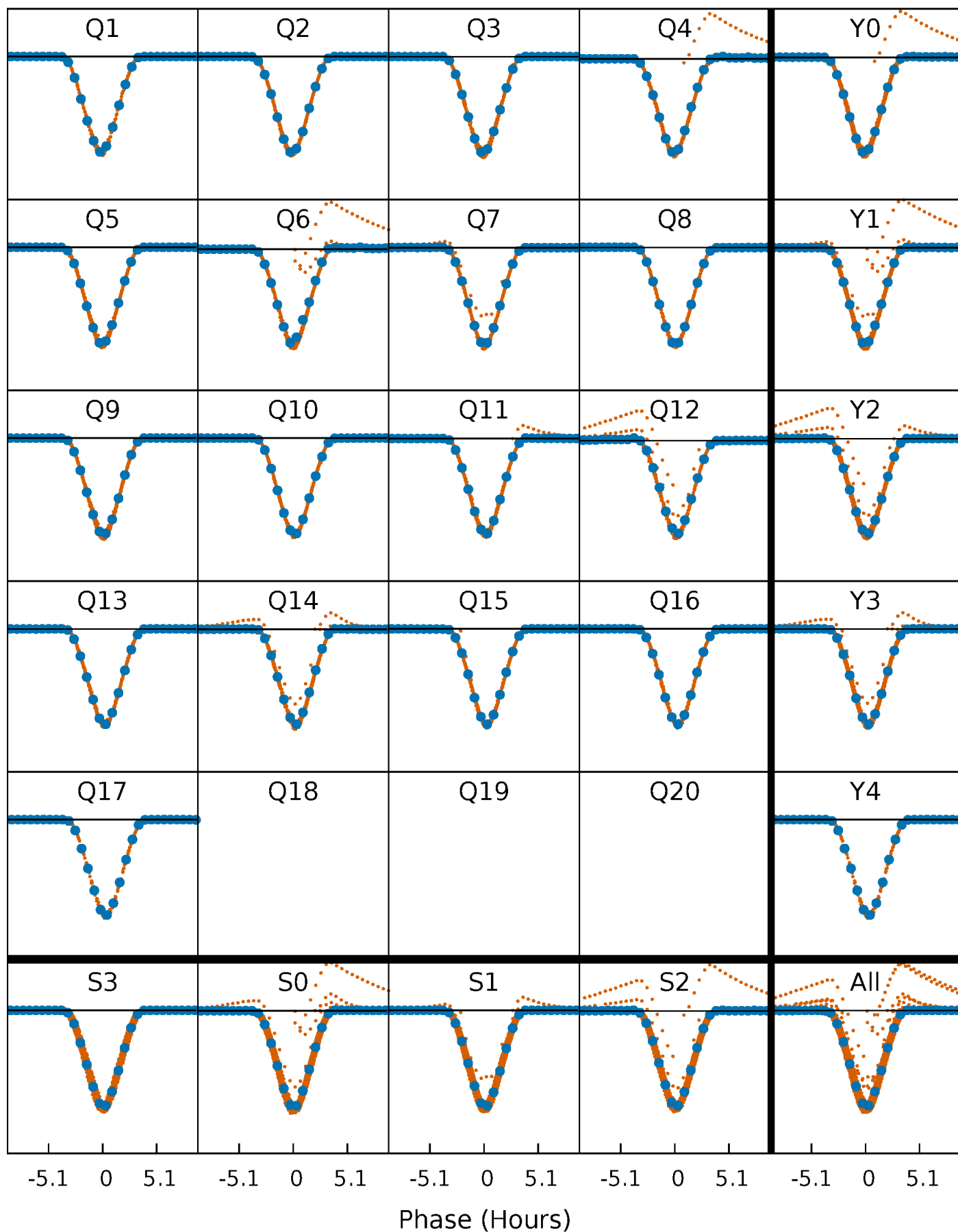
TCE 010385682-01   P= 3.103691 Days    $T_0=132.880042$  (BKJD)





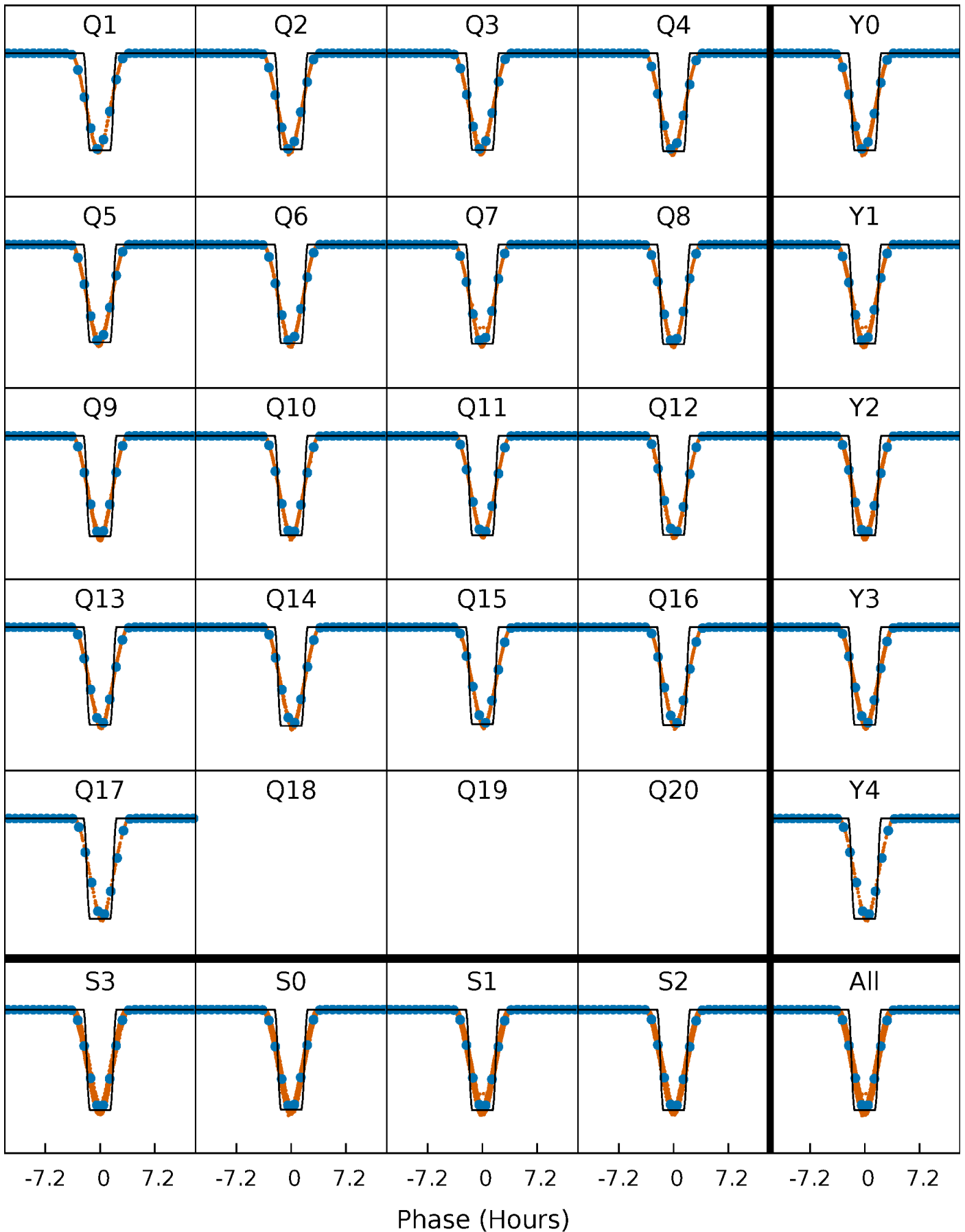
# DV Quarter-Phased Transit Curves

TCE 010385682-01 P= 3.103691 Days  $T_0=132.880042$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

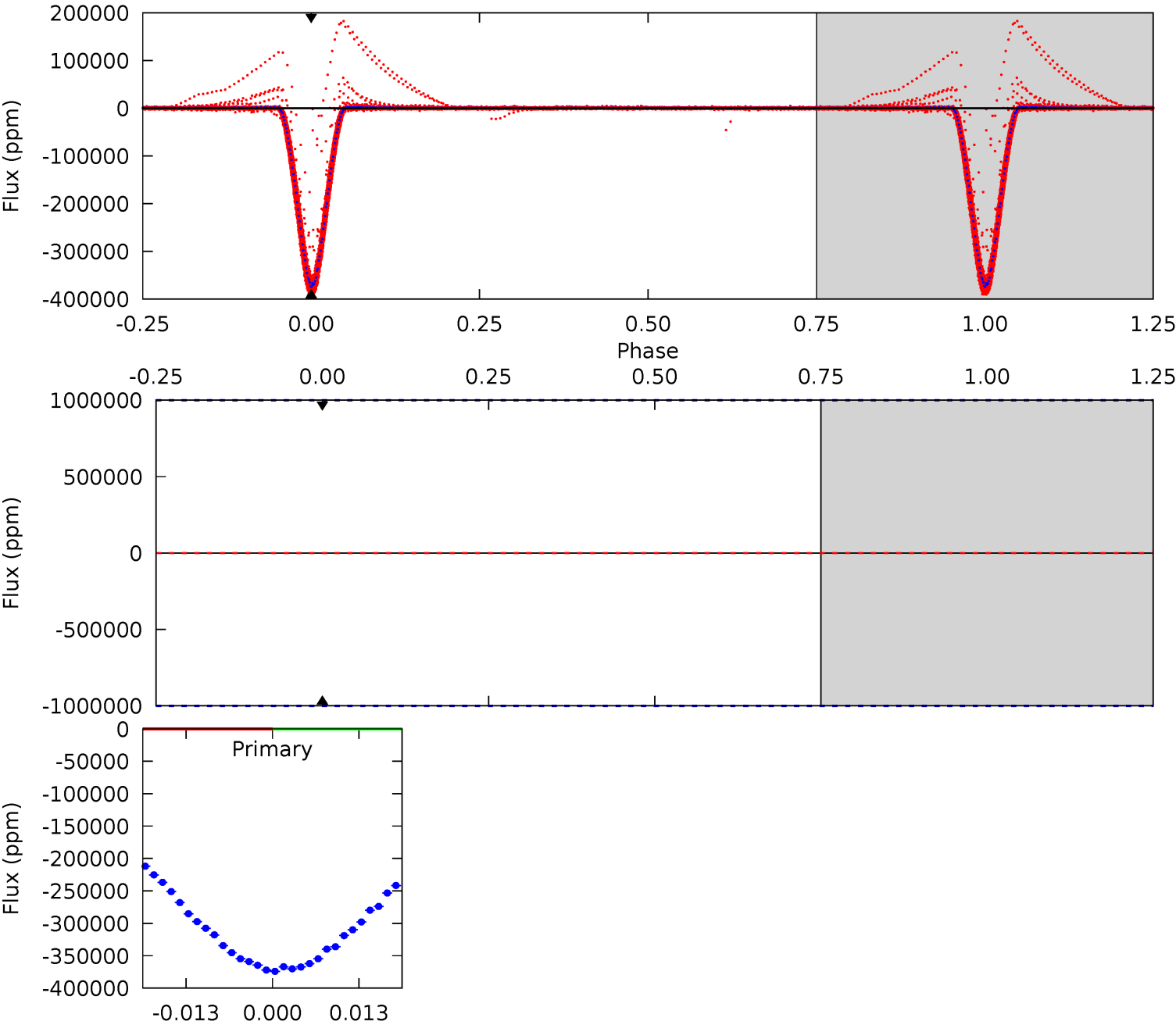
TCE 010385682-01     $P = 3.103691$  Days     $T_0 = 132.883299$  (BKJD)



# DV Model-Shift Uniqueness Test

010385682-01, P = 3.103691 Days, E = 129.776351 Days

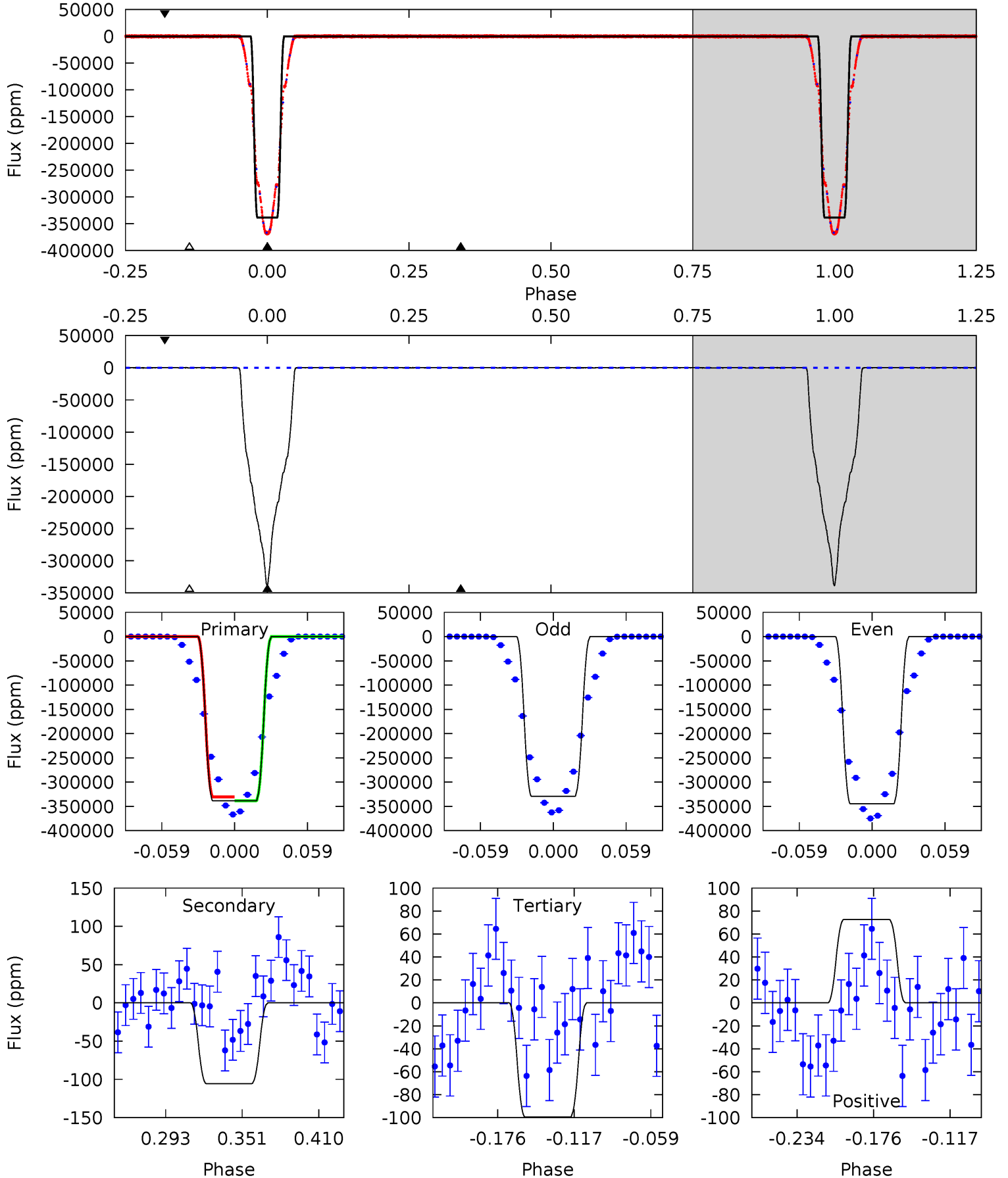
| Pri | Sec | Ter | Pos | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|-----|-----|-----|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|-----|-------|-----|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



# Alt Model-Shift Uniqueness Test

010385682-01, P = 3.103691 Days, E = 129.779608 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 |
|-------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|-----|
| 11691 | 3.64 | 3.43 | 2.51 | 4.68            | 1.89            | 1.20             | 11688   | 11689   | 0.21    | 1.14    | 241.1   | 1.00 | 0.00  | 0   |



### Stellar Parameters For KIC 010385682

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                    | $R (R_{\odot})$           | $M(M_{\odot})$            | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|---------------------------|---------------------------|---------------------------|---|
|        | $6075^{+169}_{-211}$ | $4.422^{+0.070}_{-0.224}$ | $0.160^{+0.200}_{-0.300}$ | $1.091^{+0.350}_{-0.125}$ | $1.149^{+0.151}_{-0.151}$ | $1.247^{+0.368}_{-0.673}$                 |
|        | +3%/-3%              | +2%/-5%                   | +125%/-188%               | +32%/-11%                 | +13%/-13%                 | +30%/-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 010385682-01 / KOI 6223.01

| Detrend | Depth (ppm)     | $R_p (R_{\oplus})$        | $T_{max} (K)$        | $T_{obs} (K)$          | $A_{obs}$                   |
|---------|-----------------|---------------------------|----------------------|------------------------|-----------------------------|
| DV      | $0 \pm 1000000$ | $55.88^{+15.63}_{-12.71}$ | $1907^{+157}_{-96}$  | $2427^{+2852}_{-7456}$ | $0.542^{+36.022}_{-30.720}$ |
| Alt.    | $-105 \pm 29$   | $76.08^{+15.38}_{-14.89}$ | $1912^{+147}_{-101}$ | $-2419^{+65}_{-97}$    | $0.019^{+0.012}_{-0.007}$   |

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

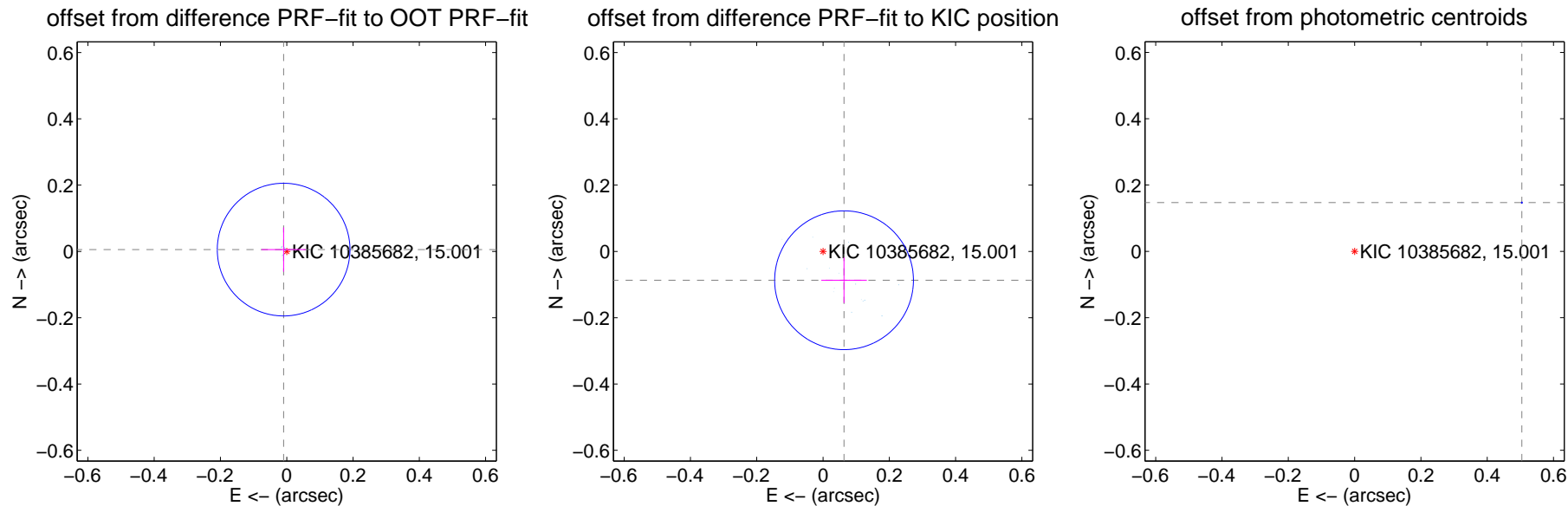
## DV Centroid Data

Supplemental centroid analysis for 010385682-01. Kepler magnitude: 15.00. Transit SNR -1.00

There are 17 quarters with good PRF difference image offsets

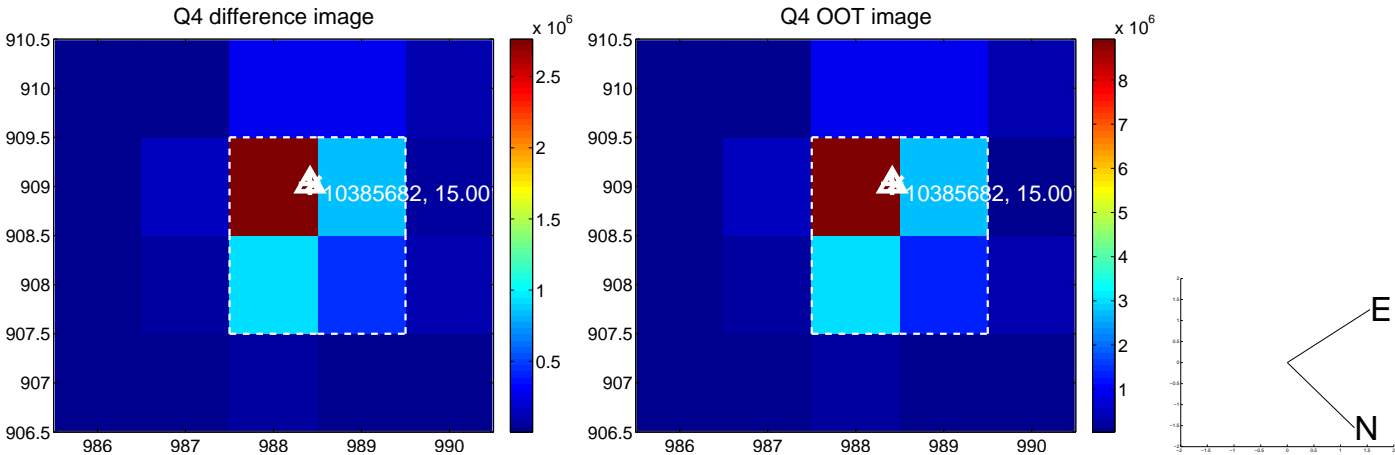
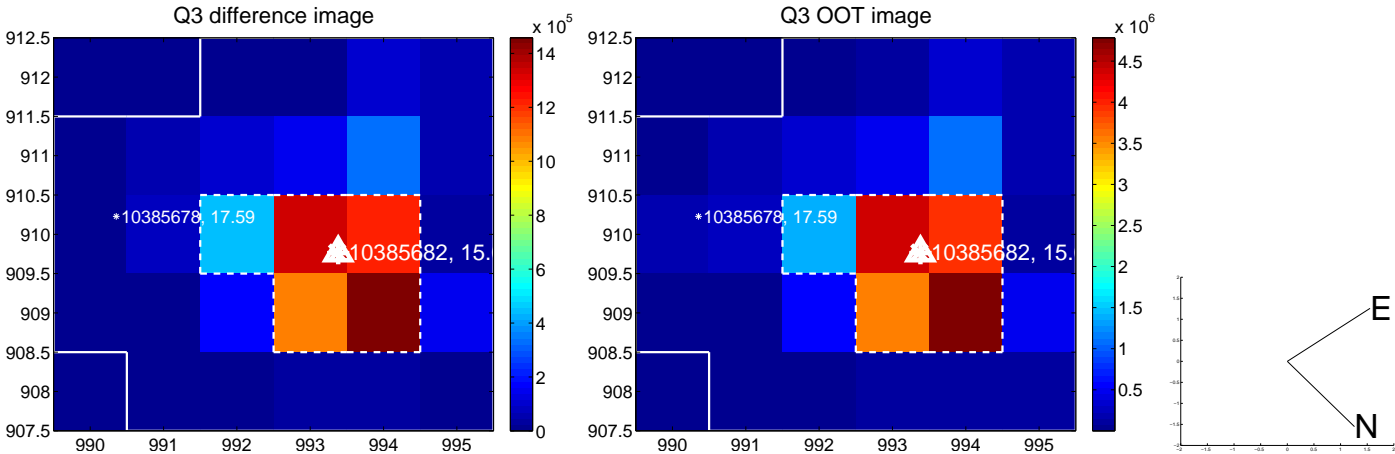
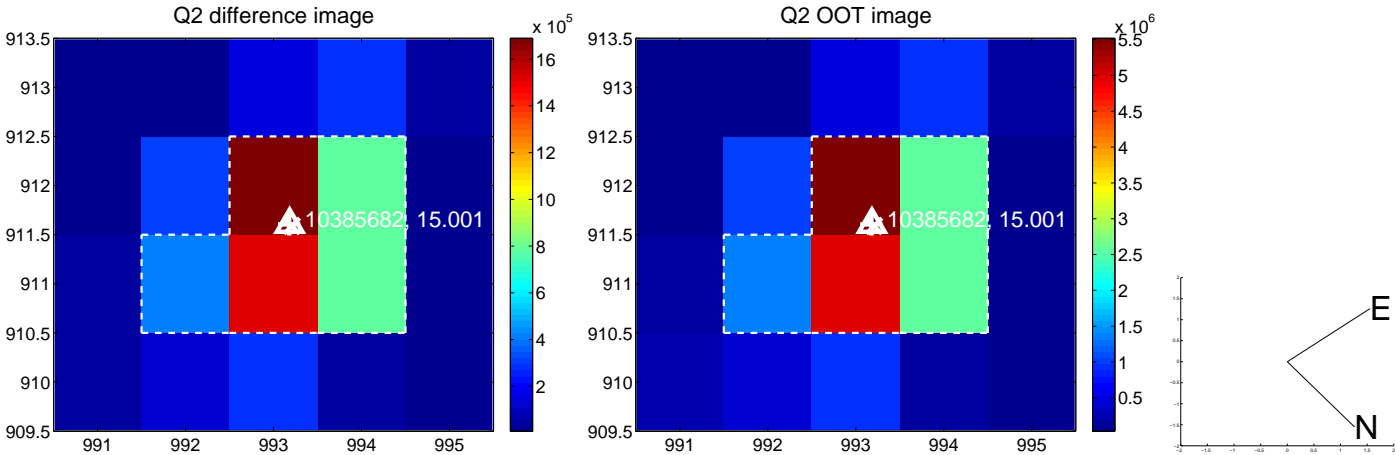
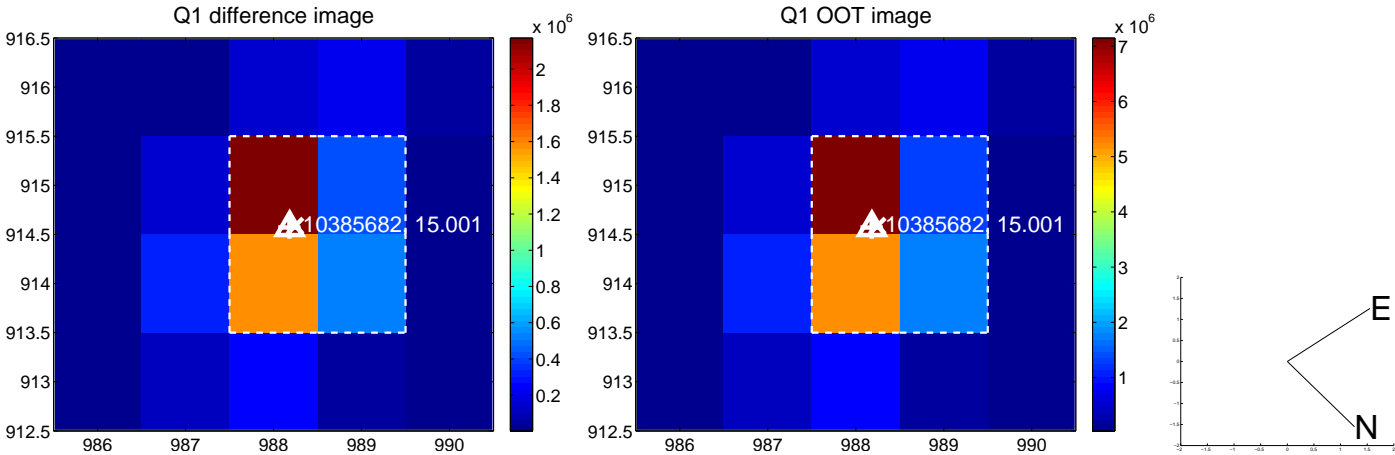
The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA        | $\Delta$ Dec       |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT          | $0.011 \pm 0.067$  | 0.16                | $0.009 \pm 0.067$  | $0.005 \pm 0.067$  |
| PRF-fit source offset from KIC position | $0.108 \pm 0.070$  | 1.54                | $-0.063 \pm 0.069$ | $-0.087 \pm 0.068$ |
| photometric centroid source offset      | $0.53 \pm 0.00$    | 957.81              | $-0.50 \pm 0.00$   | $0.15 \pm 0.00$    |

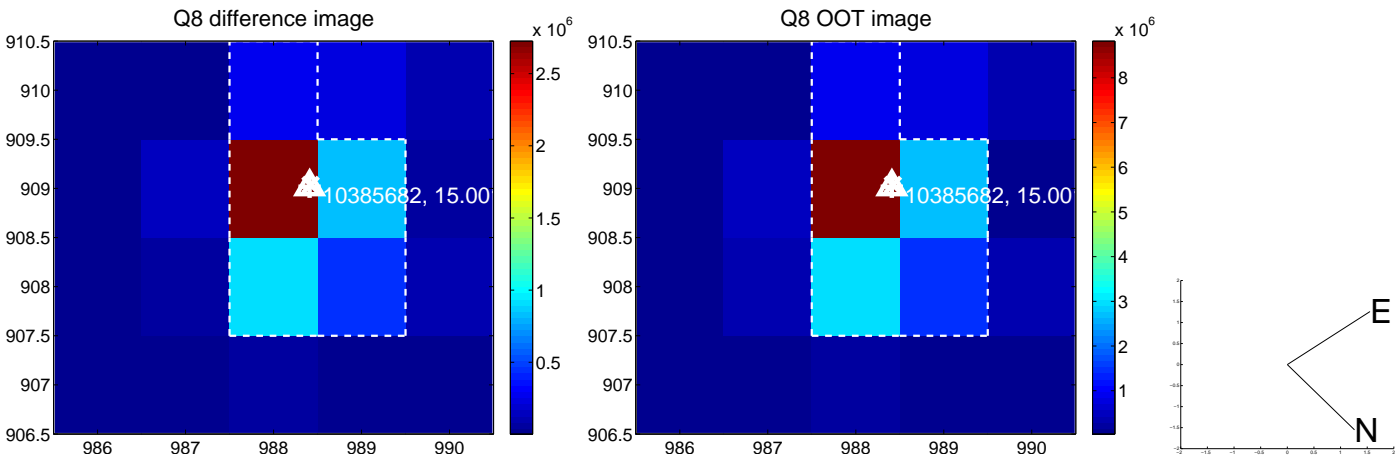
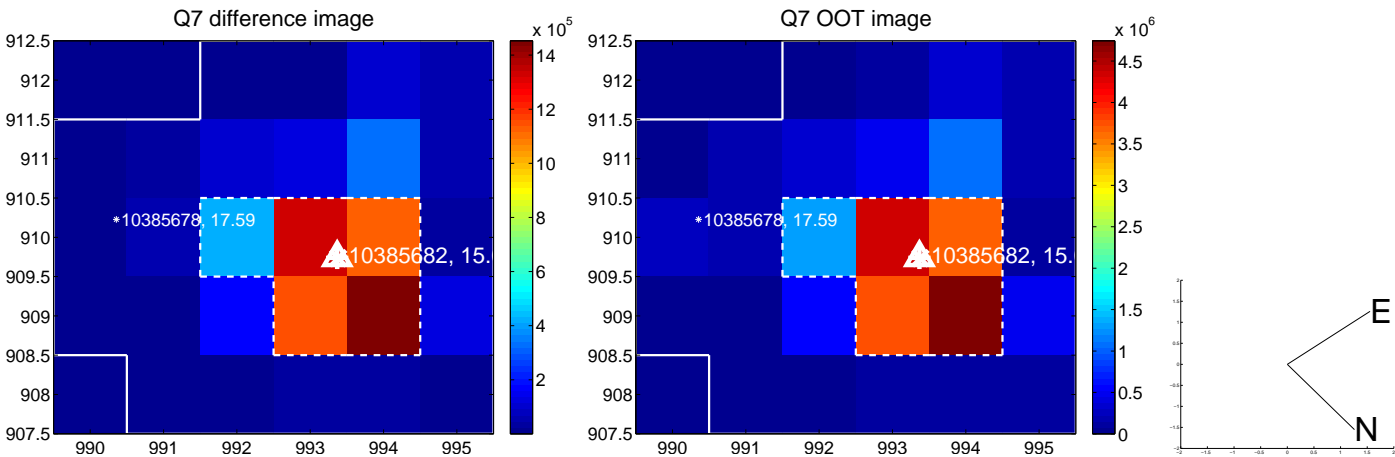
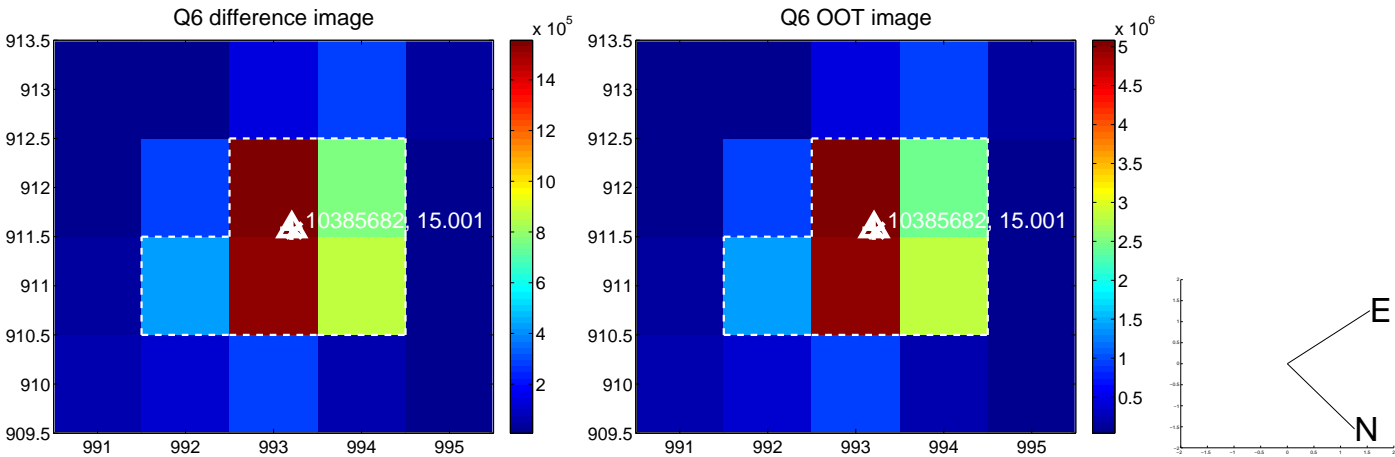
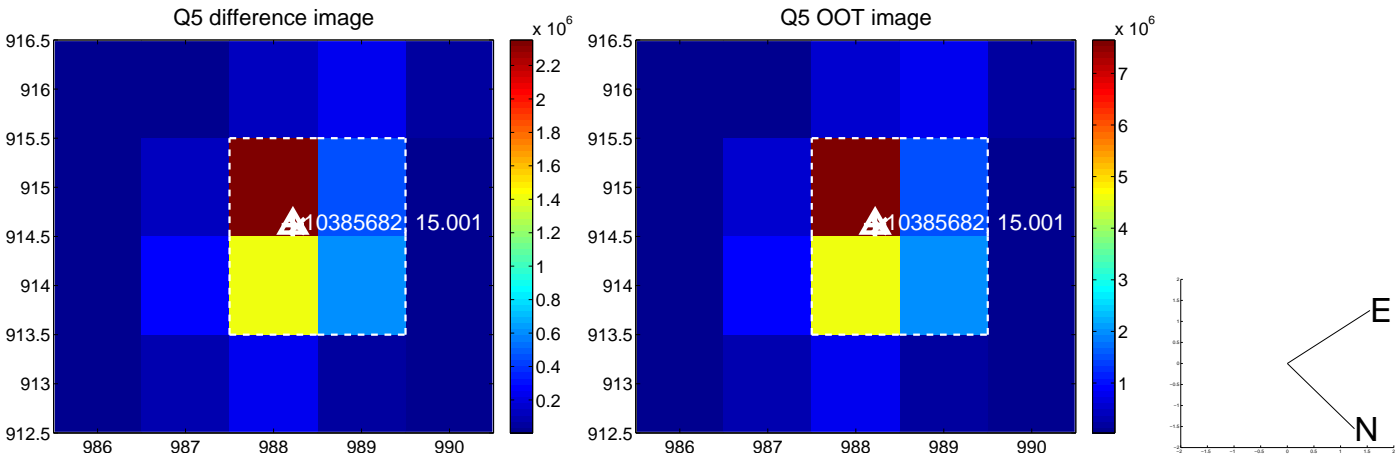


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

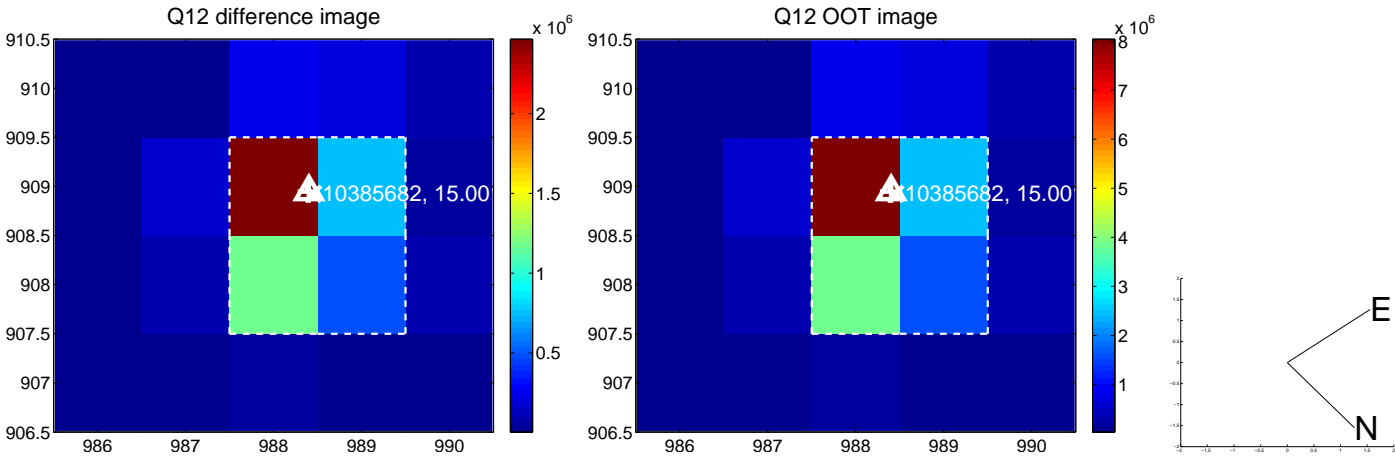
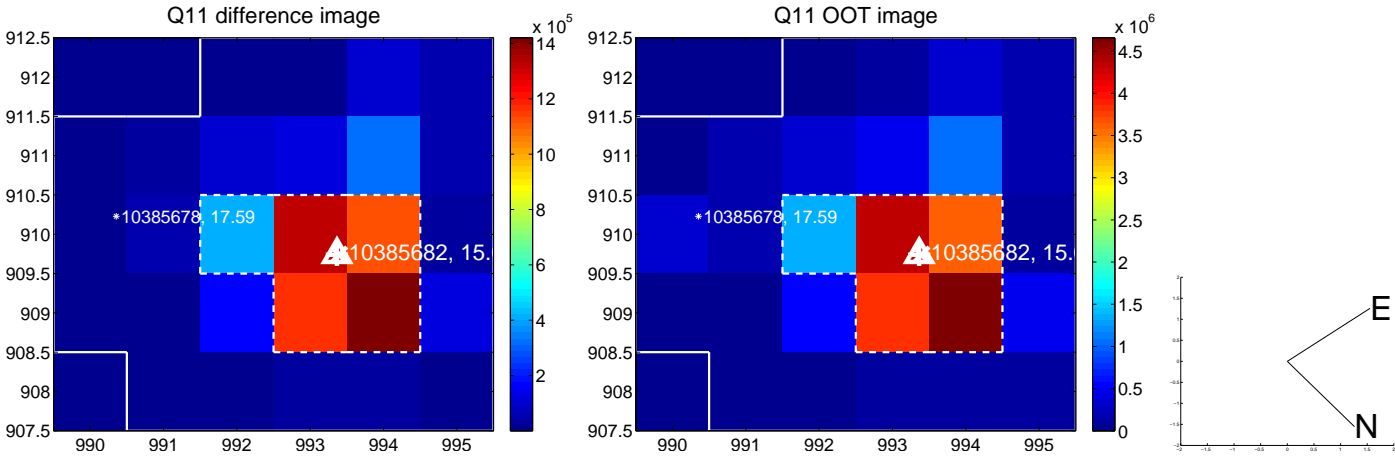
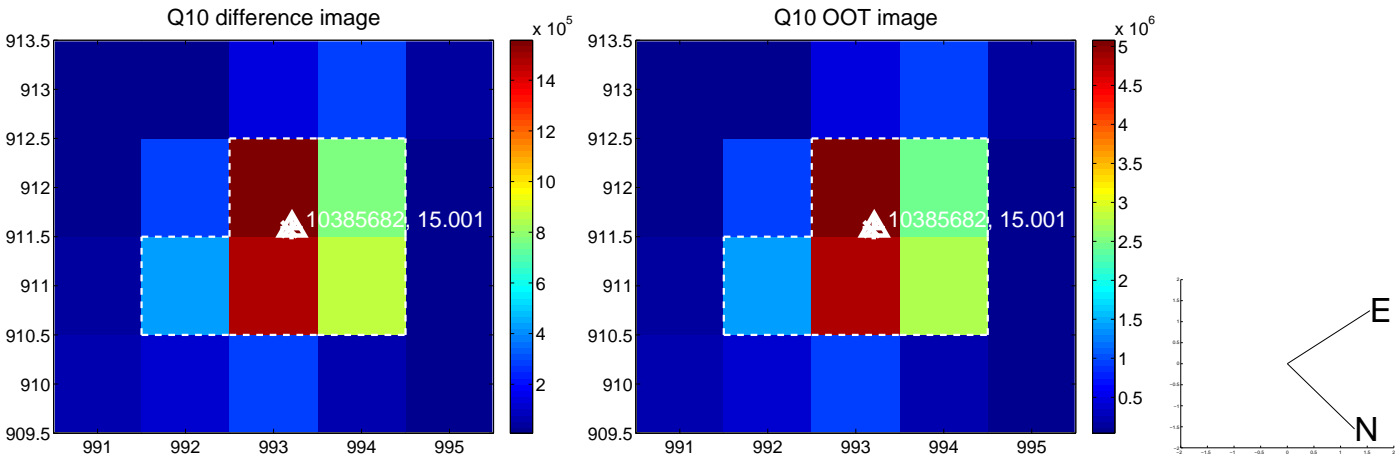
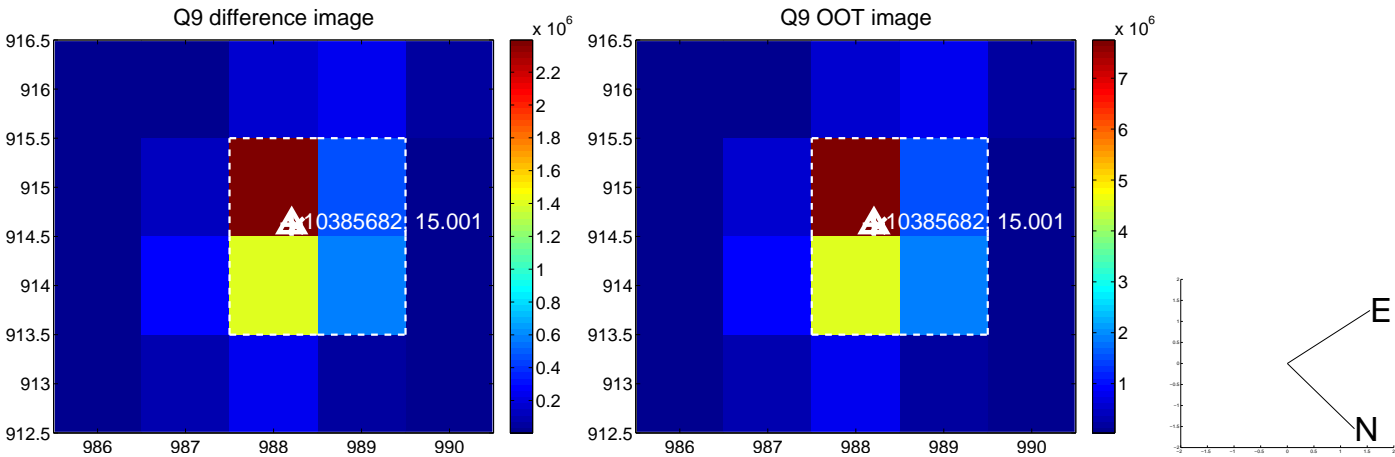


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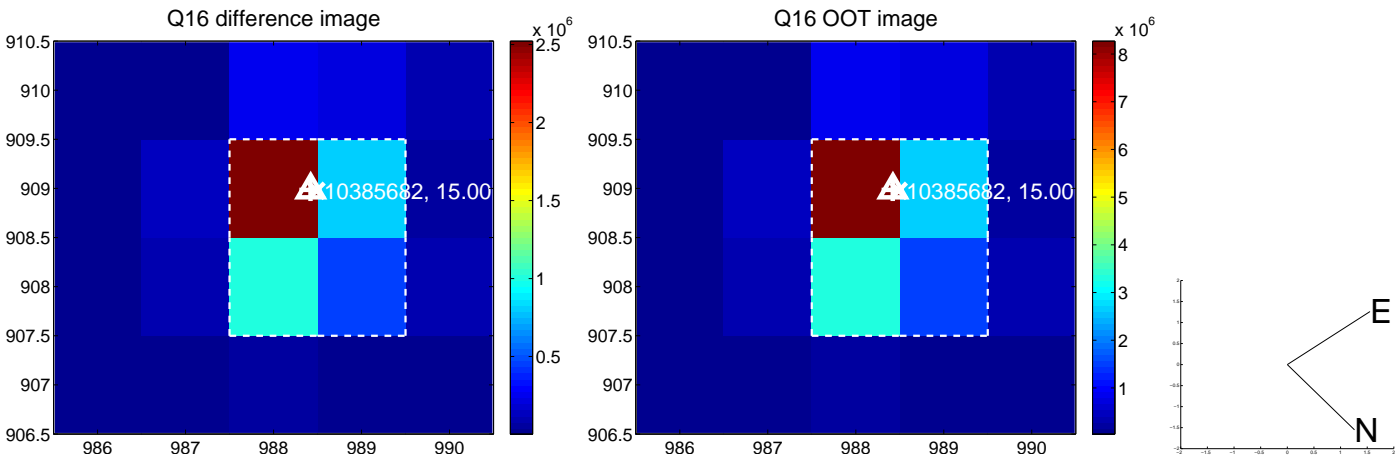
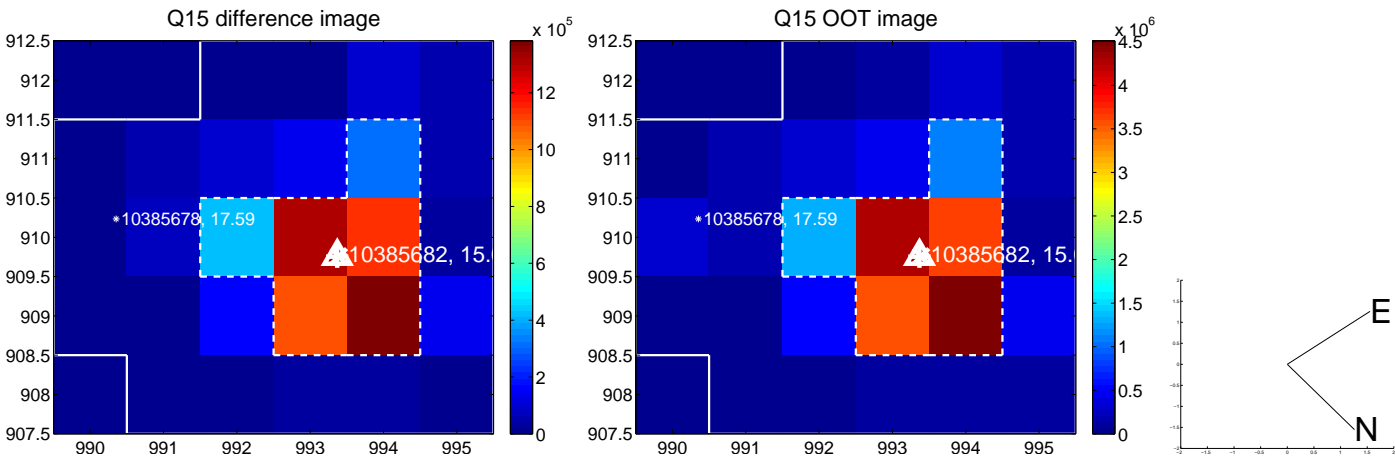
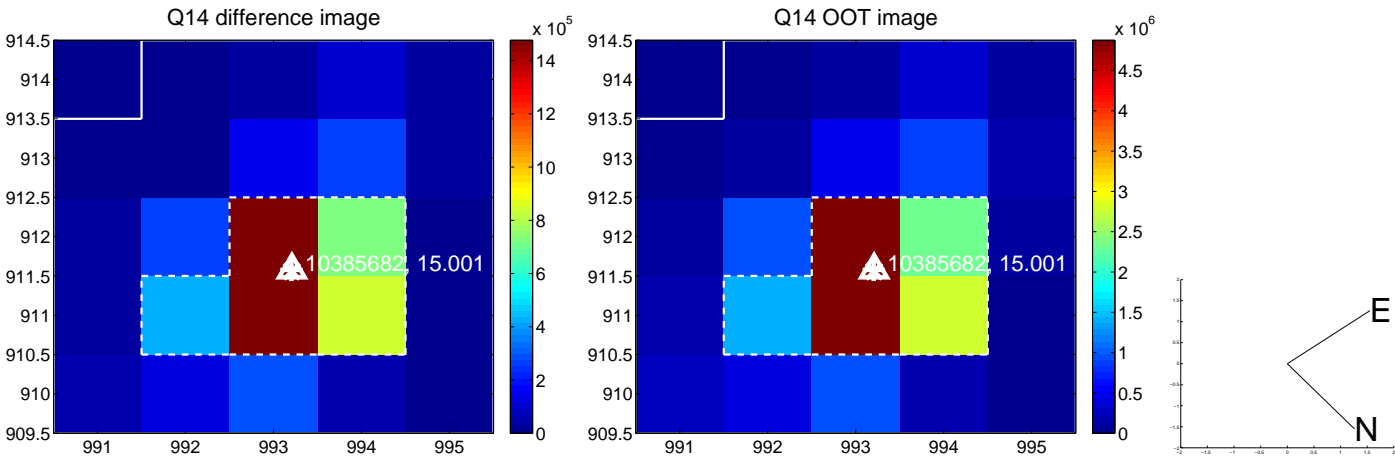
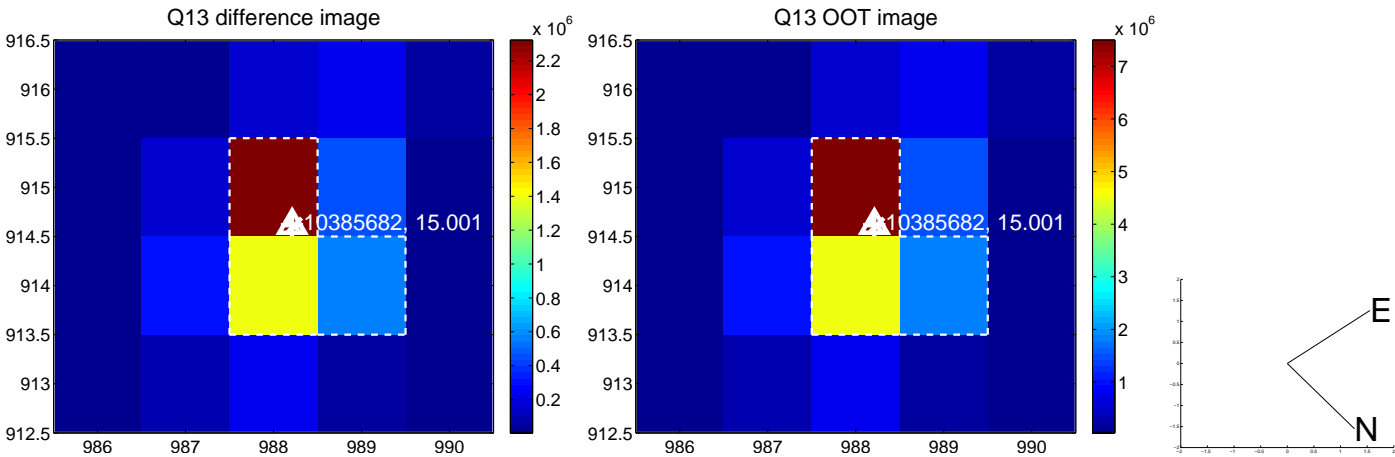




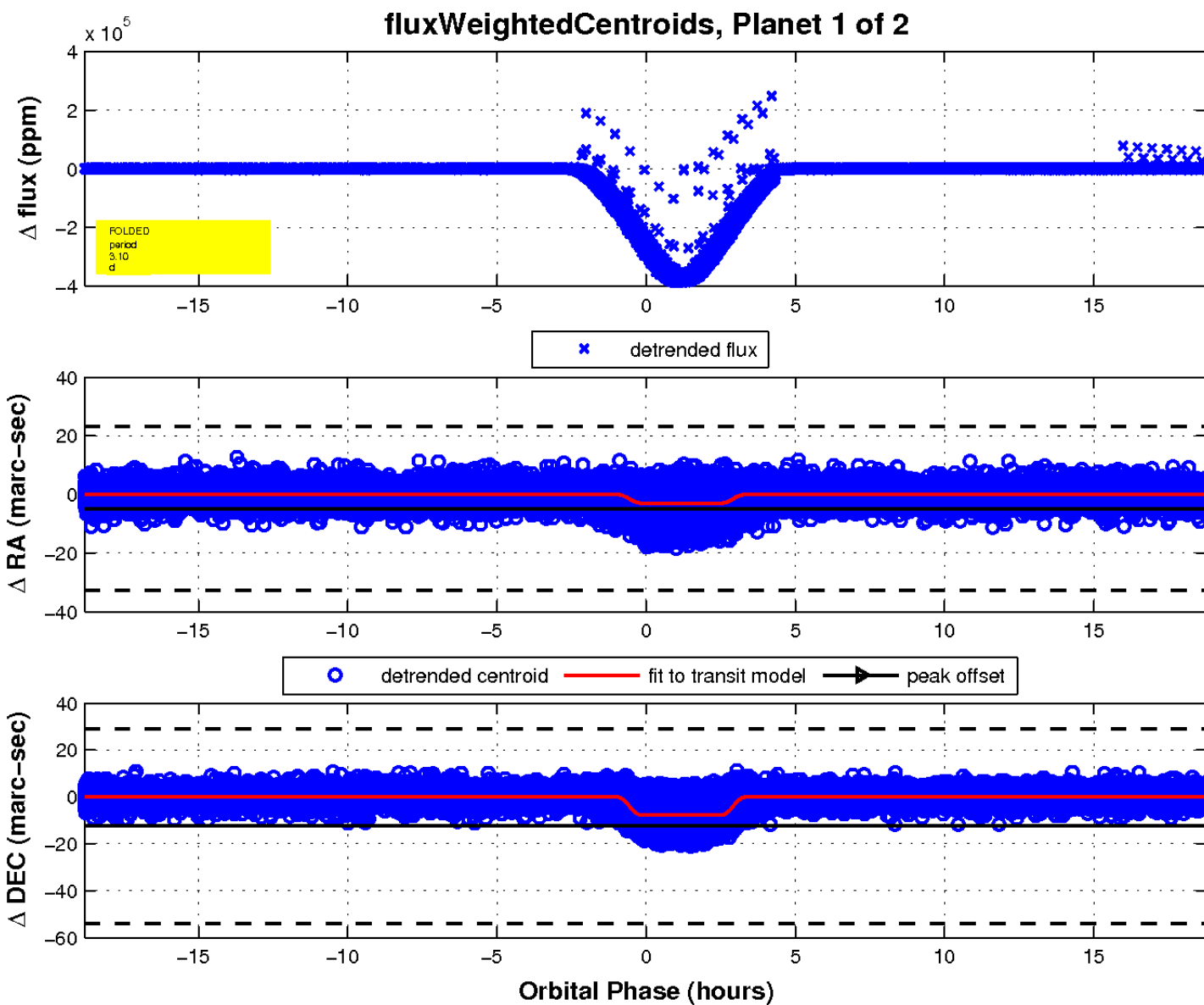
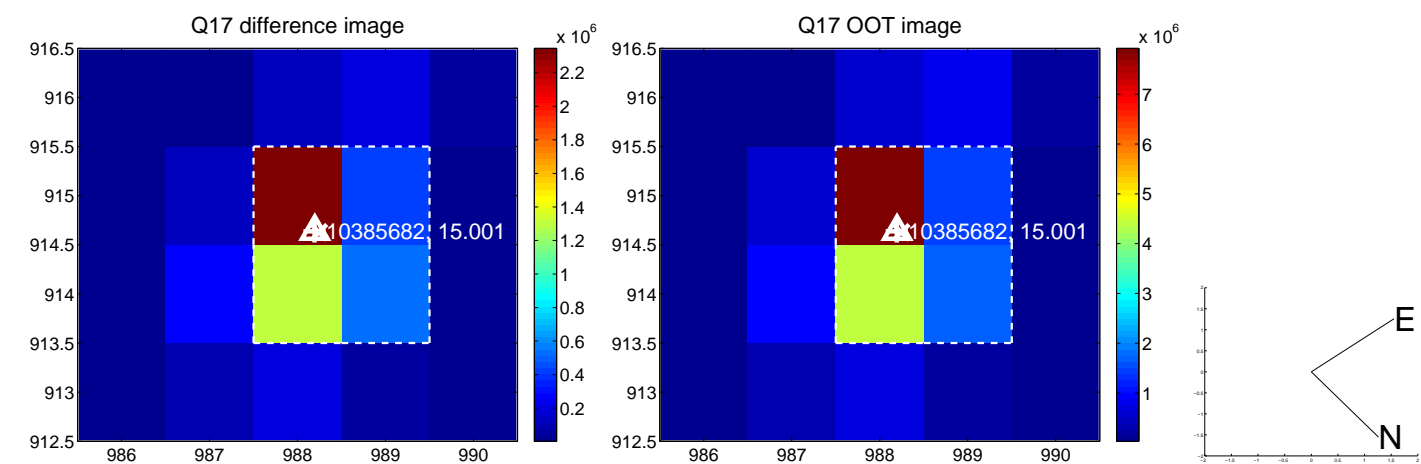
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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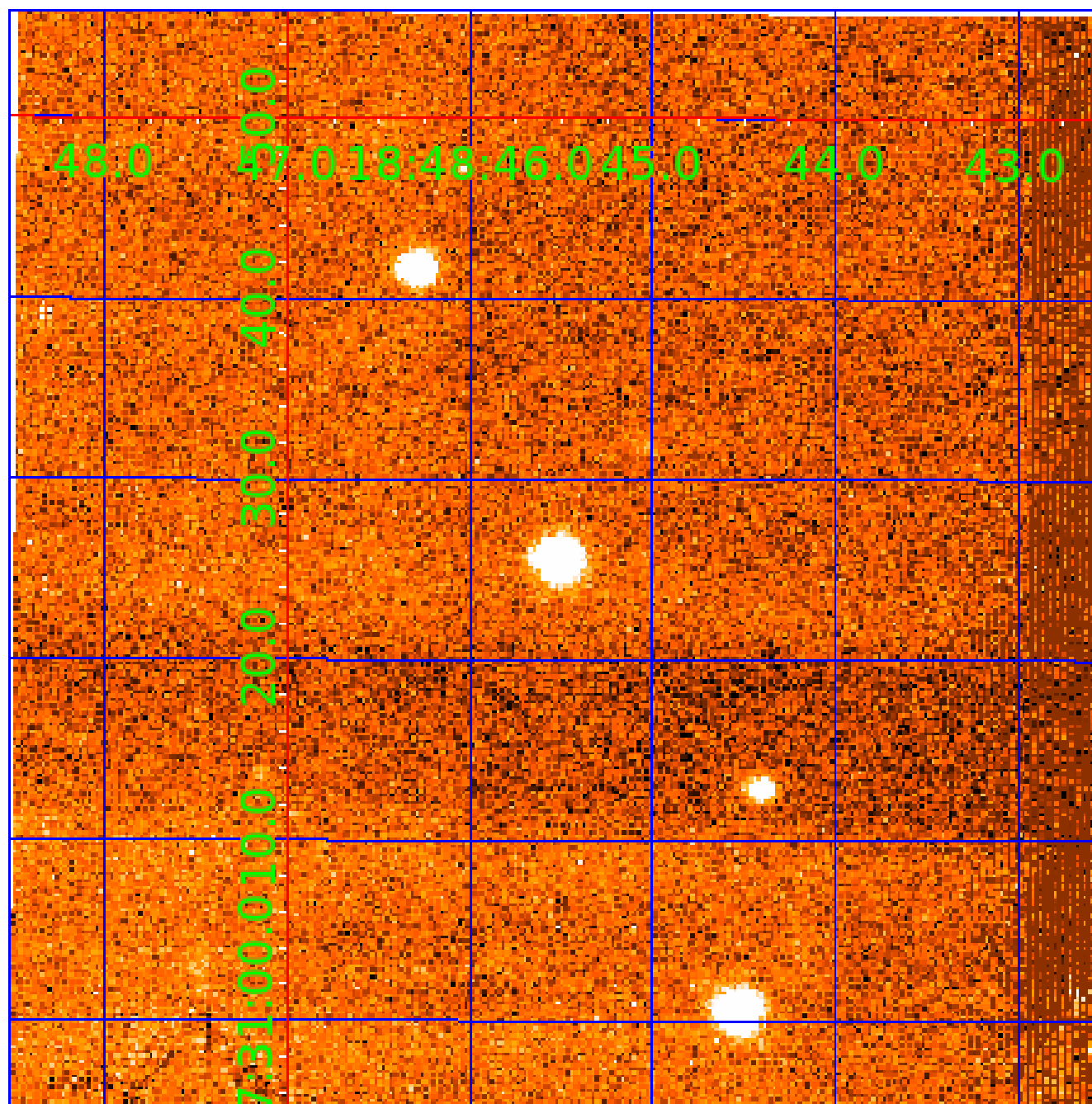


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



# UKIRT Image

Declination



# KIC 010385682

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|---------|------|-----------------------------|-----------------|------------------------|------------------------|
| 010385682-01 | OBS      | 6223.01 | 3.103691      | 132.880042   | 375322.3    | 4.500            | 18498.5 | -1.0 | 1.09                        | 6075            | 53.89                  | 764.05                 |
| 010385682-02 | OBS      | No      | 3.103810      | 133.901720   | 4404.7      | 10.500           | 442.4   | -1.0 | 1.09                        | 6075            | 7.21                   | 764.02                 |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 010385682-01 | OBS      | FP   | 0.00  | 0 | 1 | 0 | 0 | DEPTH_ODDEVEN_ALT—MOD_ODDEVEN_ALT—HAS_SEC_TCE—CENT_NOFITS |
| 010385682-02 | OBS      | FP   | 0.00  | 1 | 1 | 0 | 0 | IS_SEC_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.

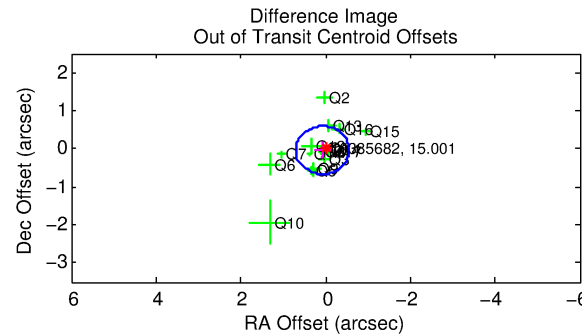
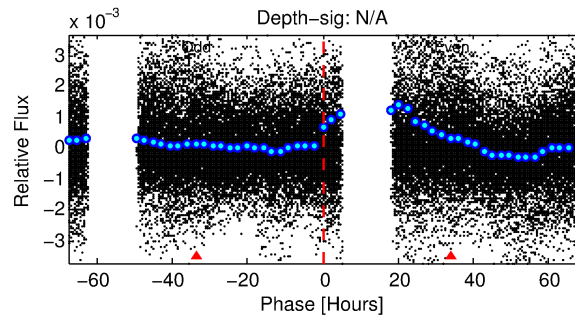
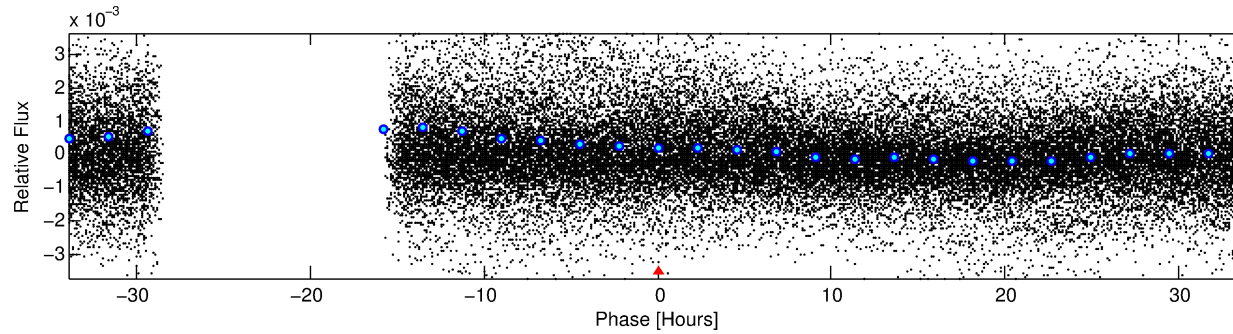
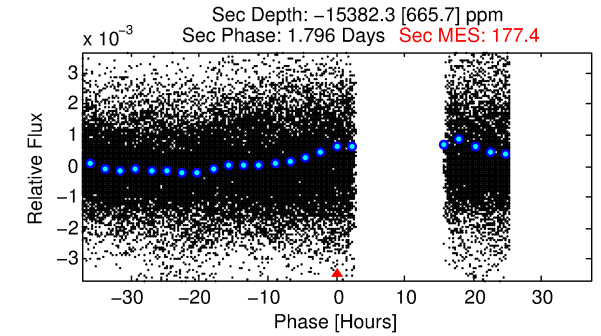
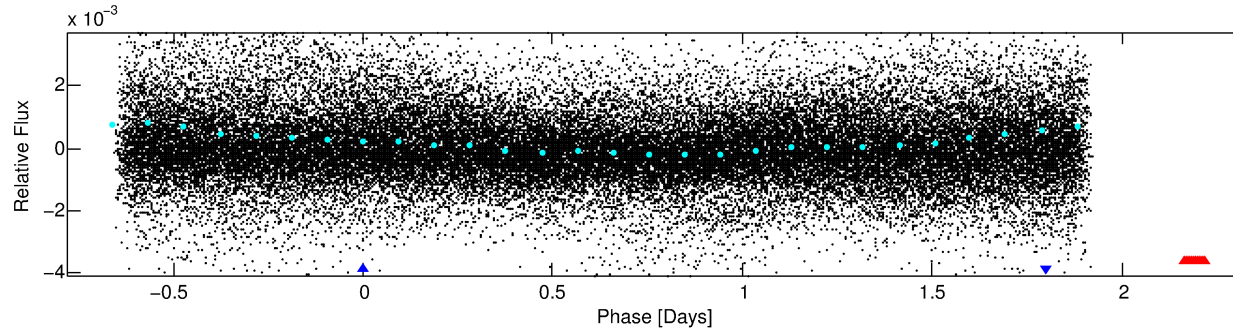
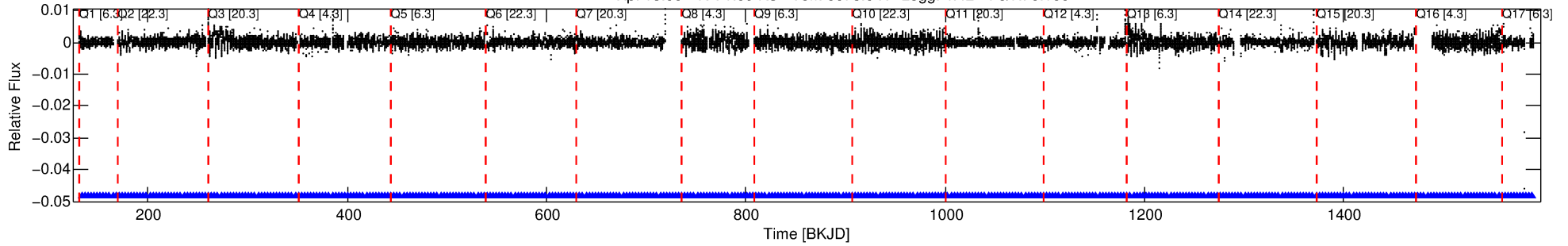
## Ephemeris Match Information For 010385682-02

No Significant Match Found

# DV One-Page Summary

KIC: 10385682 Candidate: 2 of 2 Period: 3.104 d  
KOI: K06223 Corr: No Ephemeris Match

Kp: 15.00 R\*: 1.09 Rs Teff: 6075.0 K Logg: 4.42 Fe/H: 0.160



## TPS TCE Results:

Period = 3.10381 d  
Epoch = 133.9017 BKJD

DV fit results are unavailable

## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]

LongPeriod-sig: N/A

ModelChiSquare2-sig: N/A

ModelChiSquareGof-sig: N/A

Bootstrap-pfa: N/A

RollingBand-fgt: 1.00 [420/420]

GhostDiagnostic-chr: 1.726

Centroid-sig: 2.1%

Centroid-so: 2.661 arcsec [1.84σ]

OotOffset-rm: 0.083 arcsec [0.40σ]

KicOffset-rm: 0.121 arcsec [0.61σ]

OotOffset-st: 4/4/3/5 [16]

KicOffset-st: 4/4/3/5 [16]

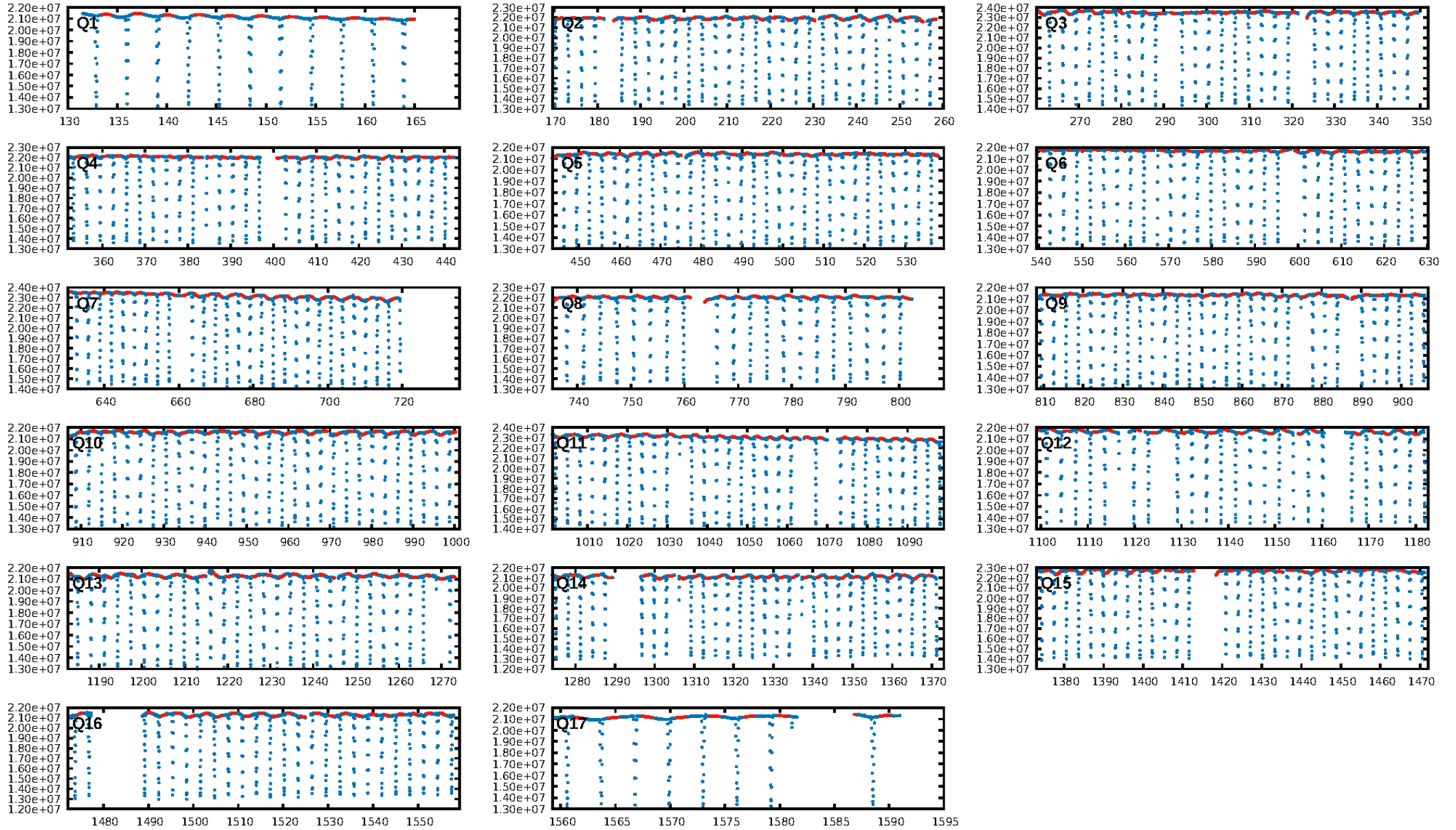
DiffImageQuality-fgm: 0.25 [4/16]

DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 01:18:14 Z

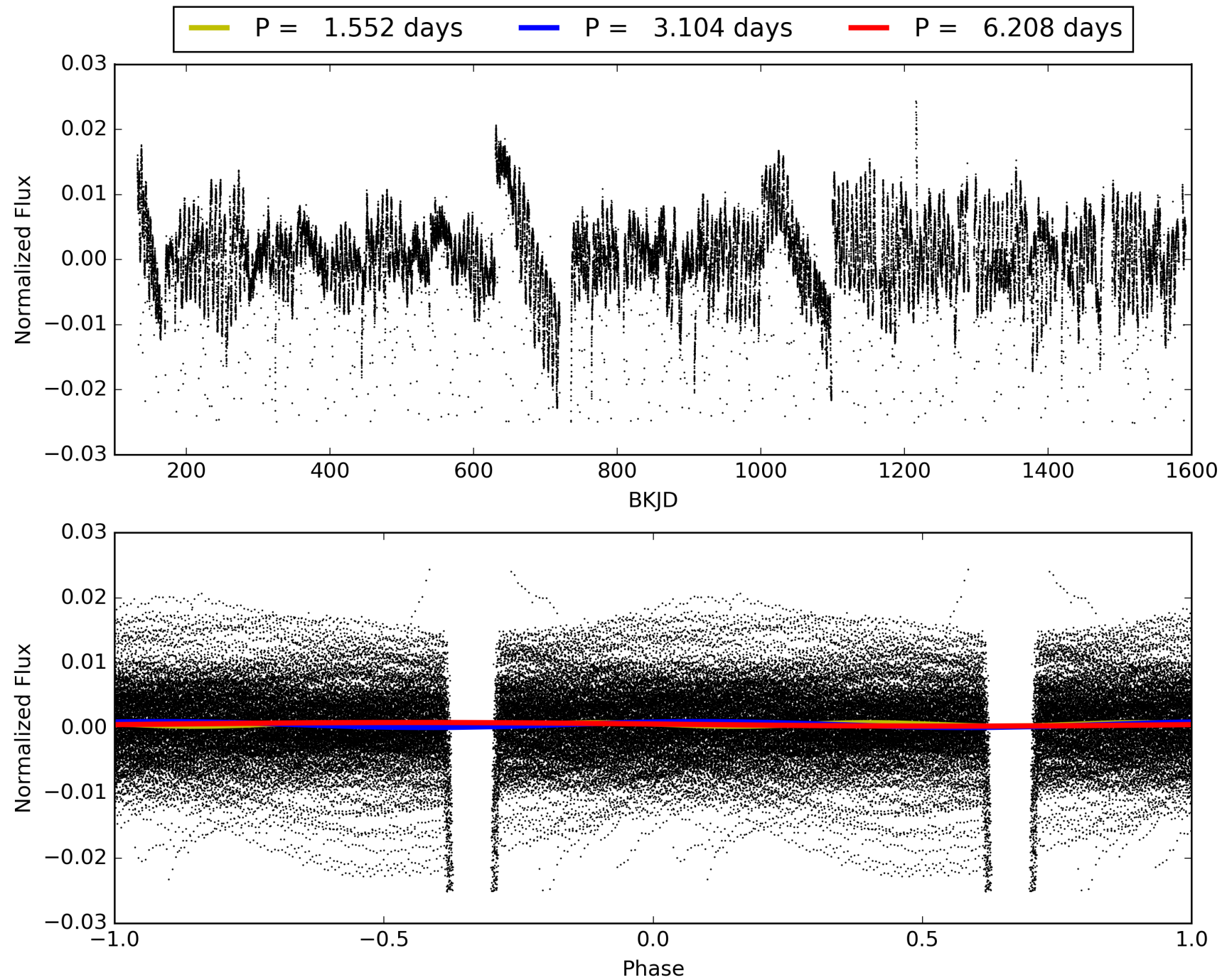
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010385682-02, PDC Light Curves





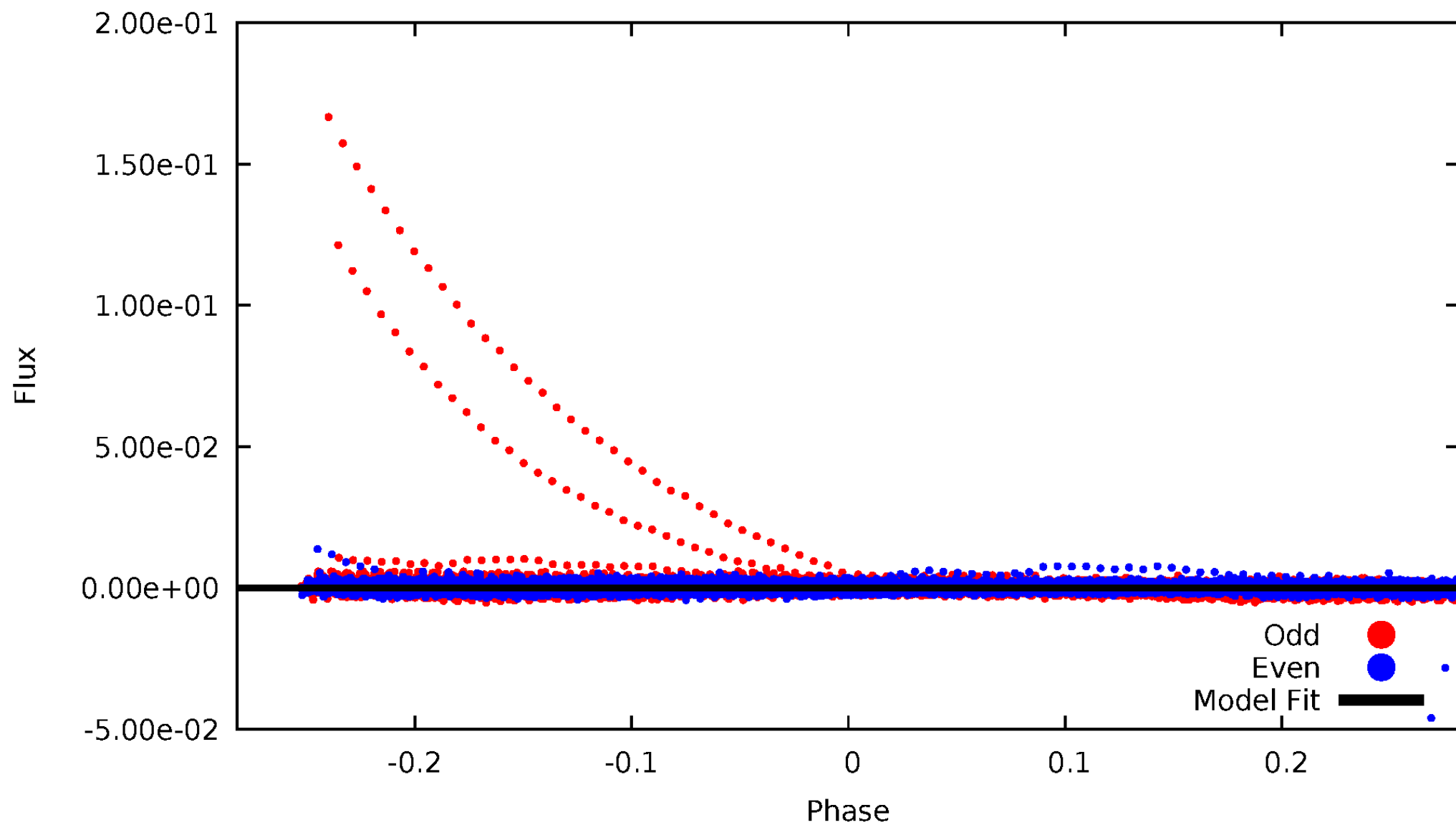
TCE 010385682-02





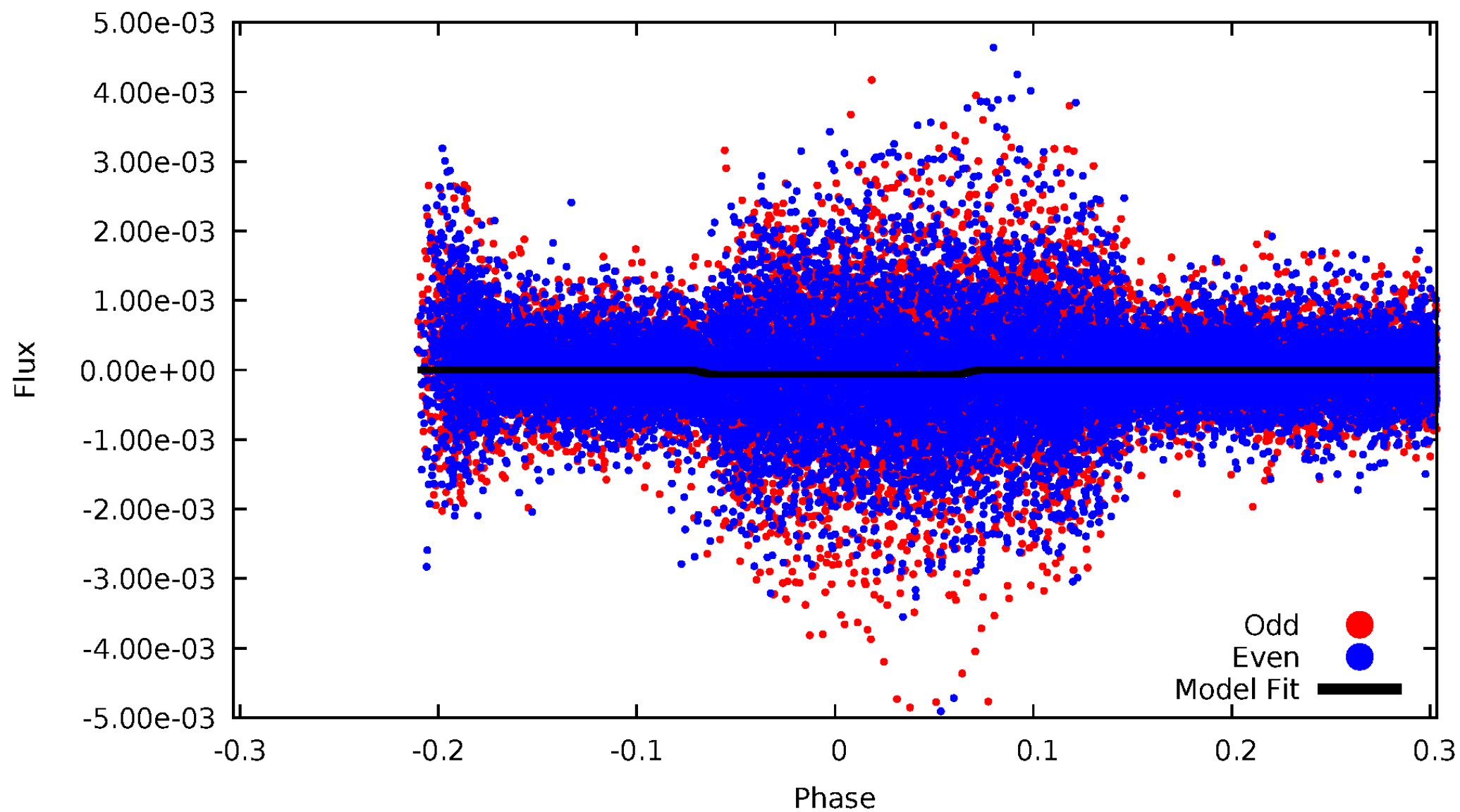
# DV Odd/Even

TCE 010385682-02



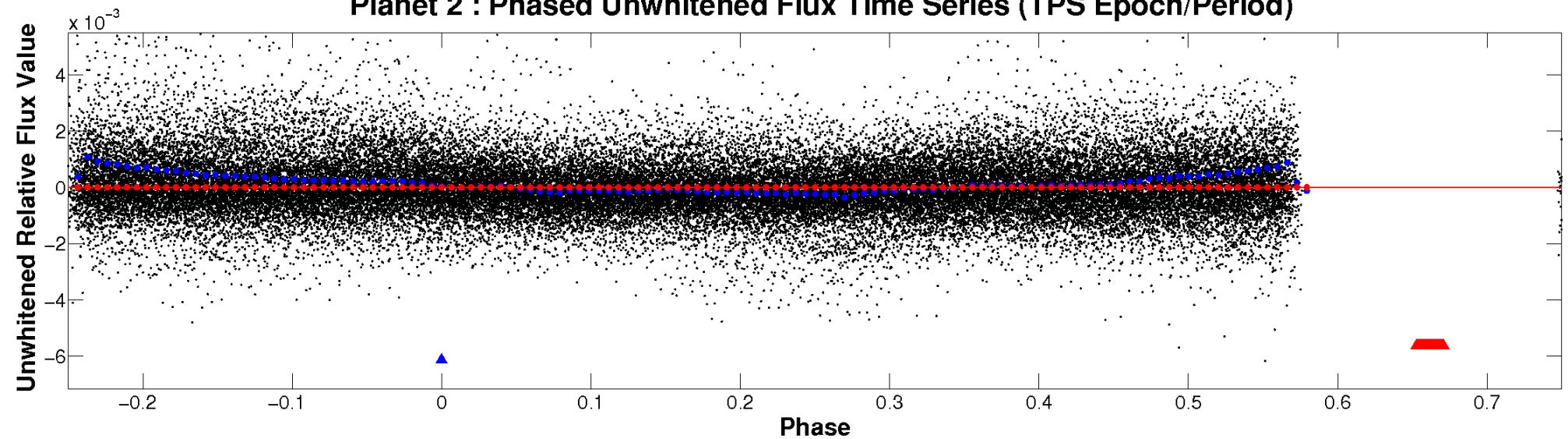
# ALT Odd/Even

TCE 010385682-02

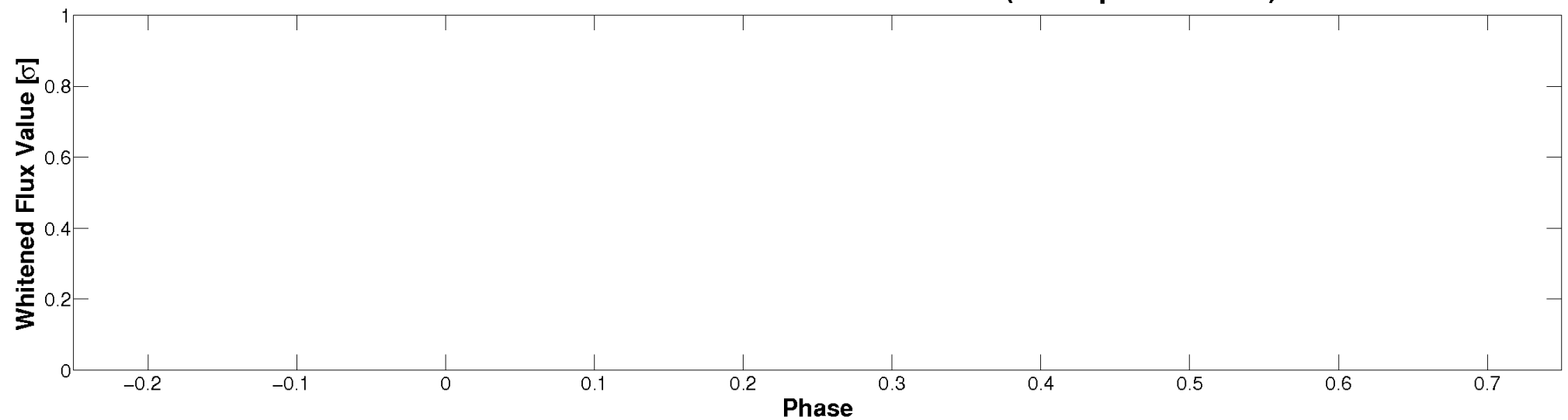


# Non-Whitened Vs. Whitened Light Curve

**Planet 2 : Phased Unwhitened Flux Time Series (TPS Epoch/Period)**

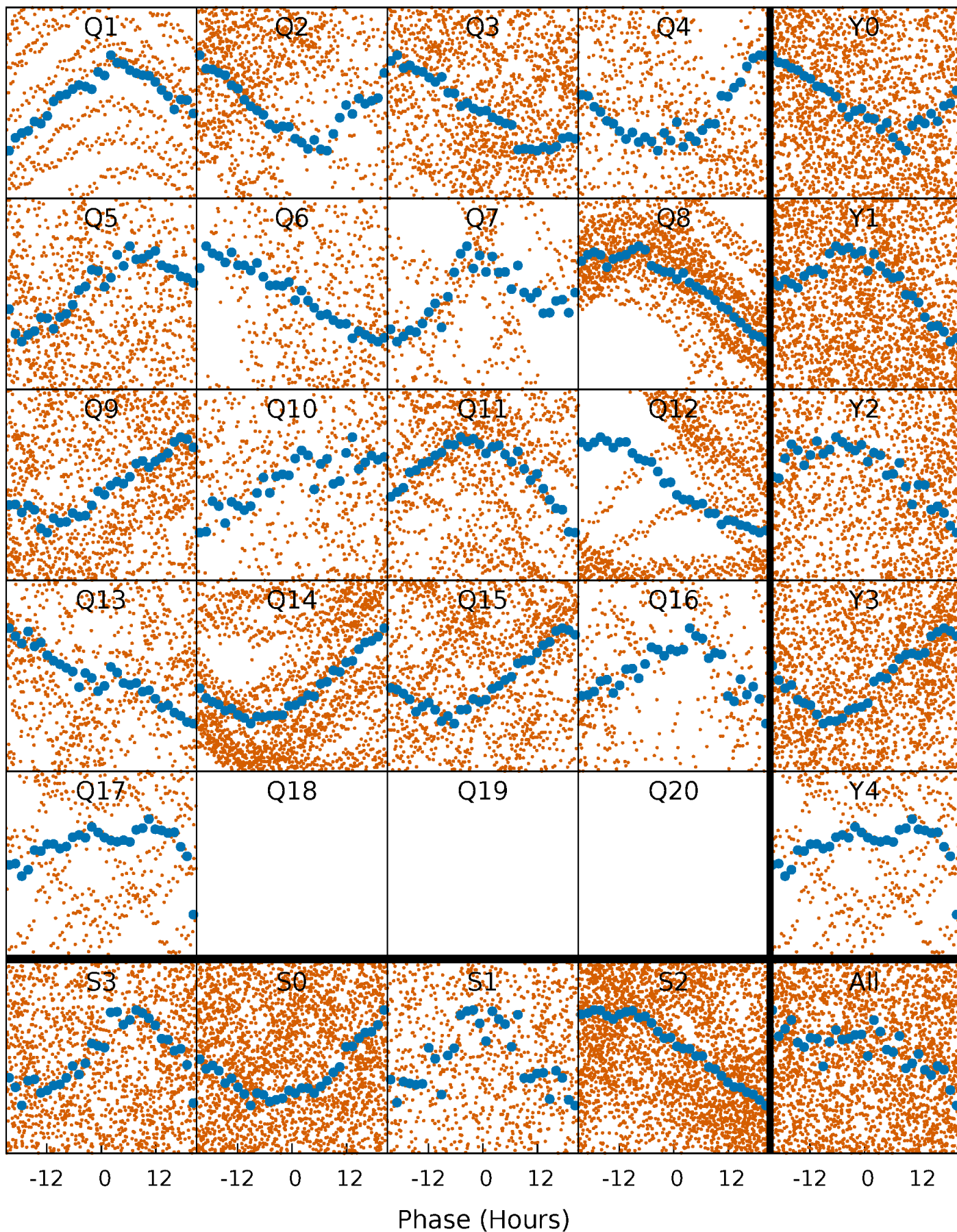


**Planet 2 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



# PDC Quarter-Phased Transit Curves

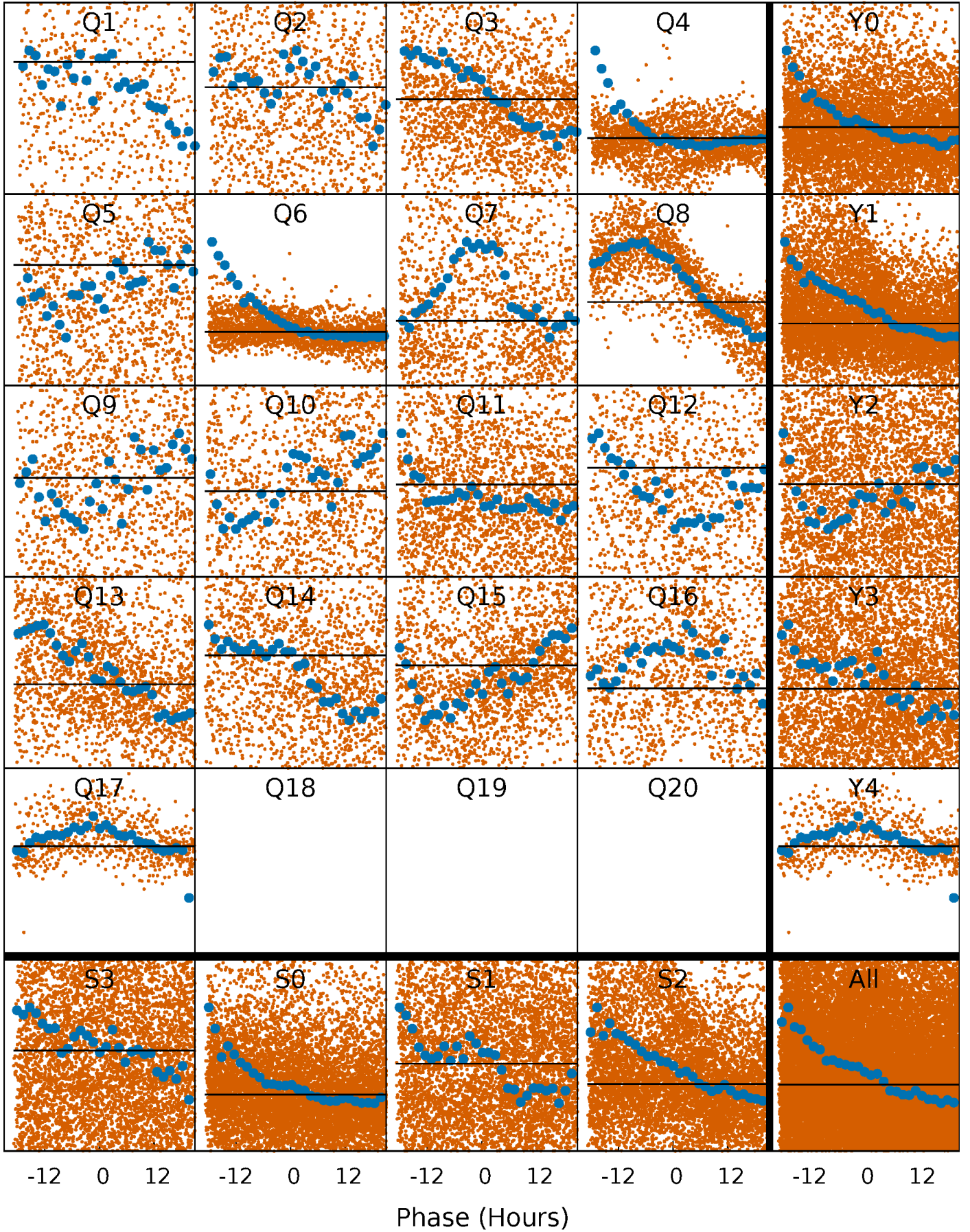
TCE 010385682-02     $P = 3.103810$  Days     $T_0 = 133.901720$  (BKJD)





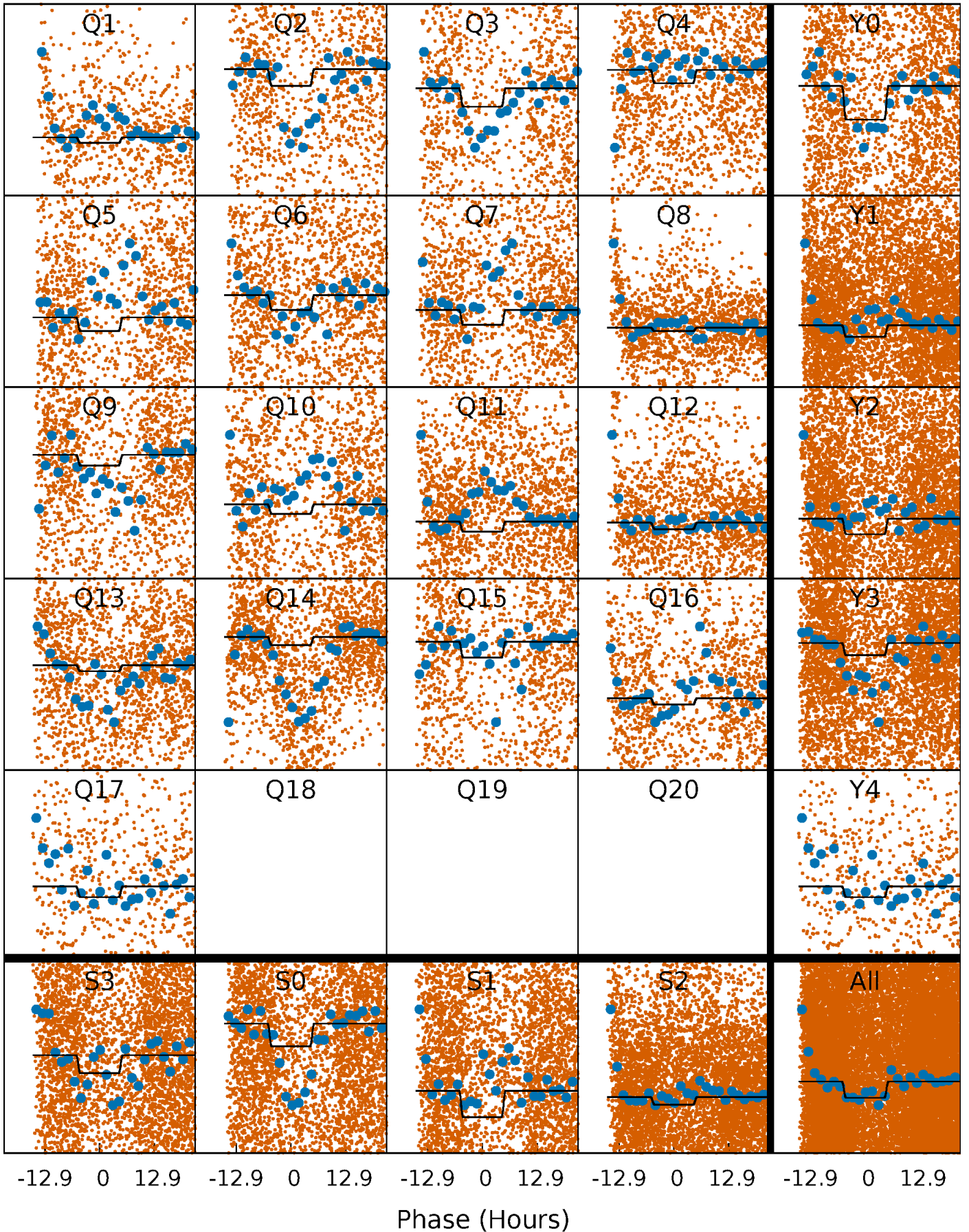
# DV Quarter-Phased Transit Curves

TCE 010385682-02     $P = 3.103810$  Days     $T_0 = 133.901720$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

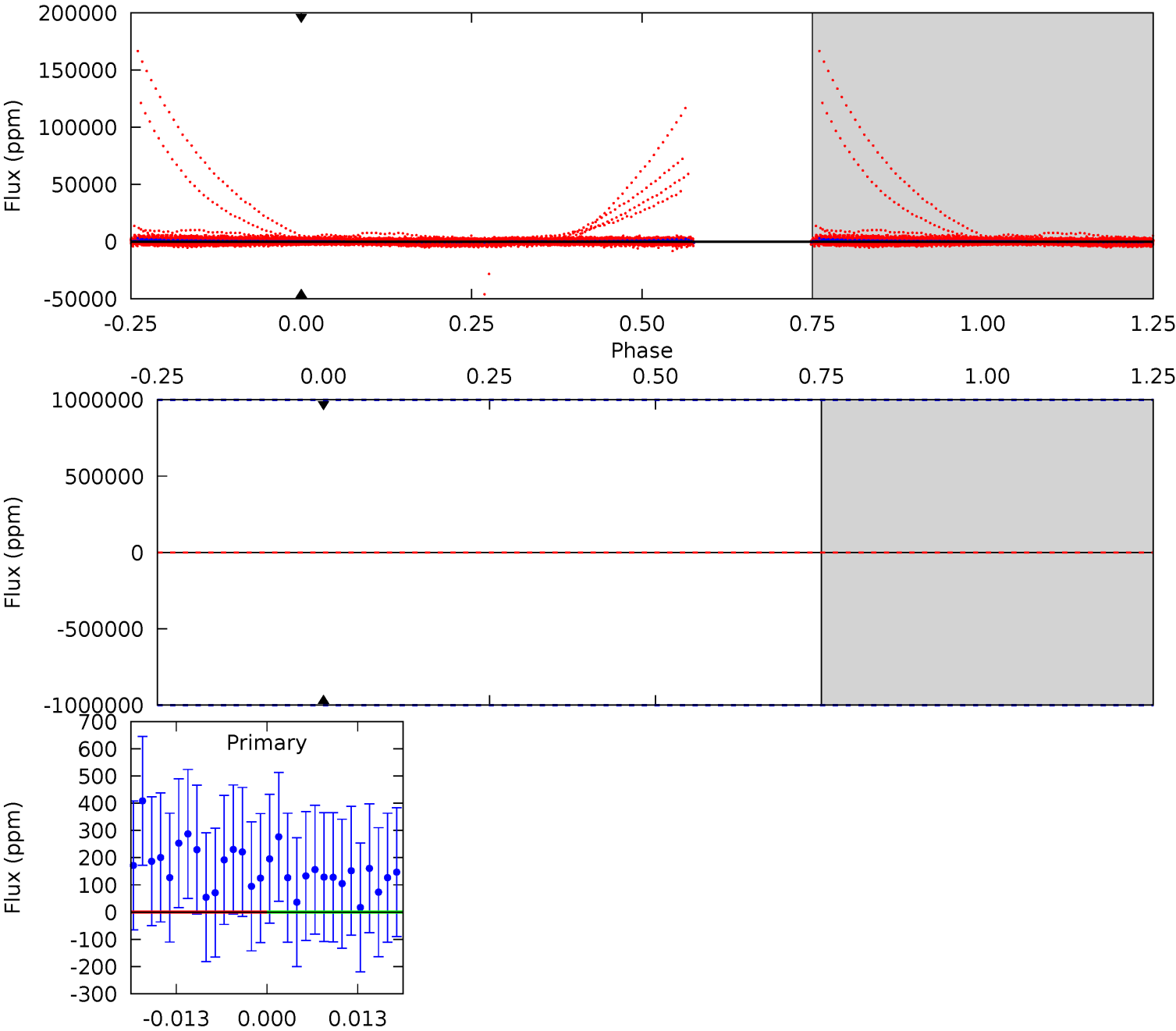
TCE 010385682-02     $P = 3.103810$  Days     $T_0 = 133.770390$  (BKJD)



# DV Model-Shift Uniqueness Test

010385682-02, P = 3.103810 Days, E = 130.797910 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   |

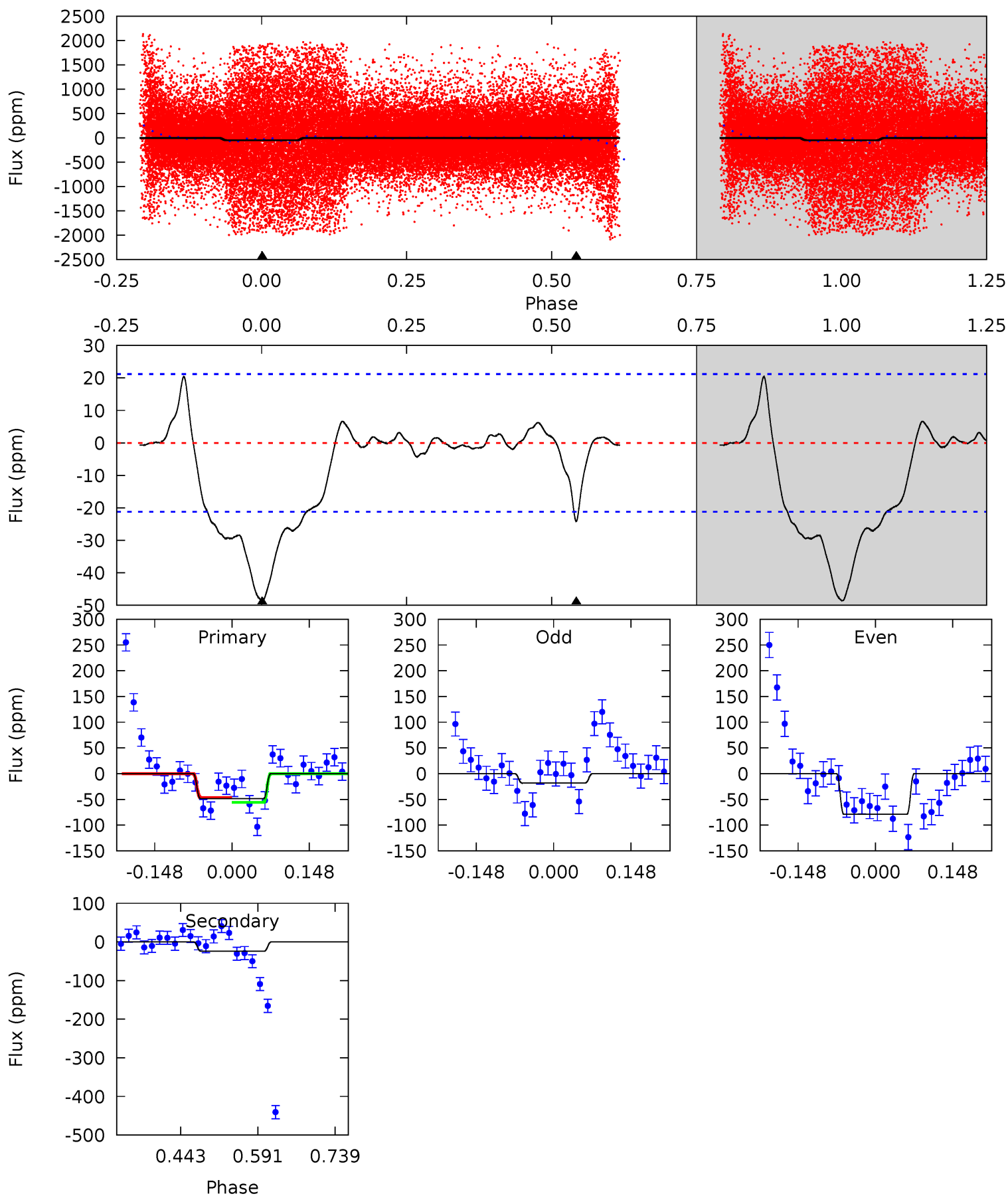




# Alt Model-Shift Uniqueness Test

010385682-02, P = 3.103810 Days, E = 130.666580 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 |
|------|------|-----|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|-----|
| 10.3 | 5.11 | 0   | 0   | 4.48            | 1.45            | 0.47             | 10.3    | 10.3    | 5.11    | 5.11    | 6.35    | 1.76 | 0.30  | 0   |





### Stellar Parameters For KIC 010385682

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                    | $R$ ( $R_{\odot}$ )       | $M(M_{\odot})$            | $p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ ) |
|--------|----------------------|---------------------------|---------------------------|---------------------------|---------------------------|---|
|        | $6075^{+169}_{-211}$ | $4.422^{+0.070}_{-0.224}$ | $0.160^{+0.200}_{-0.300}$ | $1.091^{+0.350}_{-0.125}$ | $1.149^{+0.151}_{-0.151}$ | $1.247^{+0.368}_{-0.673}$                     |
|        | +3%/-3%              | +2%/-5%                   | +125%/-188%               | +32%/-11%                 | +13%/-13%                 | +30%/-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 010385682-02 / KOI

| Detrend | Depth (ppm)     | $R_p$ ( $R_{\oplus}$ )   | $T_{\text{max}}$ (K) | $T_{\text{obs}}$ (K)      | $A_{\text{obs}}$                  |
|---------|-----------------|--------------------------|----------------------|---------------------------|-----------------------------------|
| DV      | $0 \pm 1000000$ | $12.44^{+10.62}_{-8.71}$ | $1904^{+146}_{-105}$ | $-4106^{+20228}_{-11863}$ | $-10.984^{+1058.815}_{-1021.848}$ |
| Alt.    | $-24 \pm 5$     | $8.60^{+9.54}_{-6.17}$   | $1902^{+145}_{-96}$  | $1955^{+1440}_{-4326}$    | $0.341^{+3.460}_{-0.268}$         |

$T_{\text{max}}$  = 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

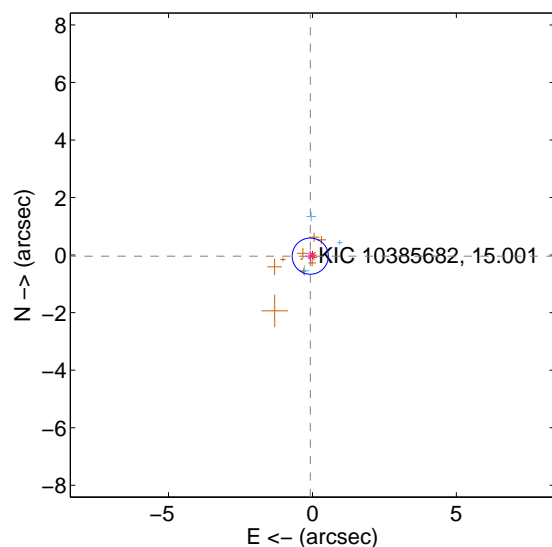
Supplemental centroid analysis for 010385682-02. Kepler magnitude: 15.00. Transit SNR -1.00

There are 4 quarters with good PRF difference image offsets

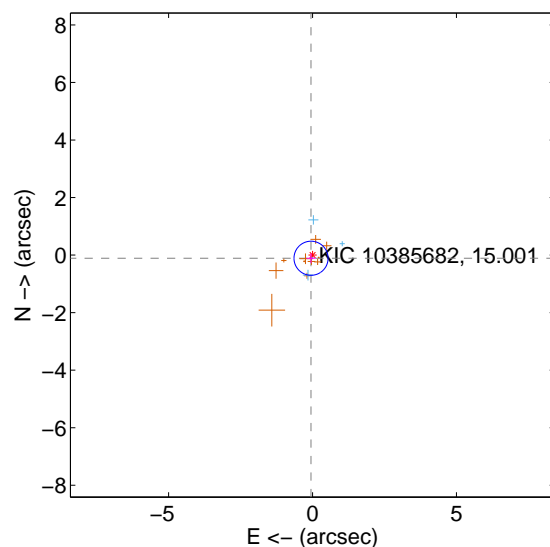
The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA       | $\Delta$ Dec       |
|---|--------------------|---------------------|-------------------|--------------------|
| PRF-fit source offset from OOT          | $0.083 \pm 0.209$  | 0.40                | $0.075 \pm 0.171$ | $-0.037 \pm 0.181$ |
| PRF-fit source offset from KIC position | $0.121 \pm 0.198$  | 0.61                | $0.052 \pm 0.158$ | $-0.109 \pm 0.171$ |
| photometric centroid source offset      | $2.66 \pm 1.45$    | 1.84                | $-1.27 \pm 1.36$  | $2.34 \pm 1.48$    |

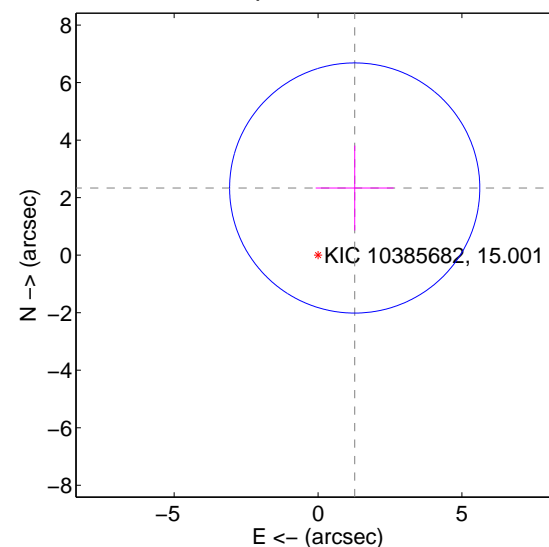
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

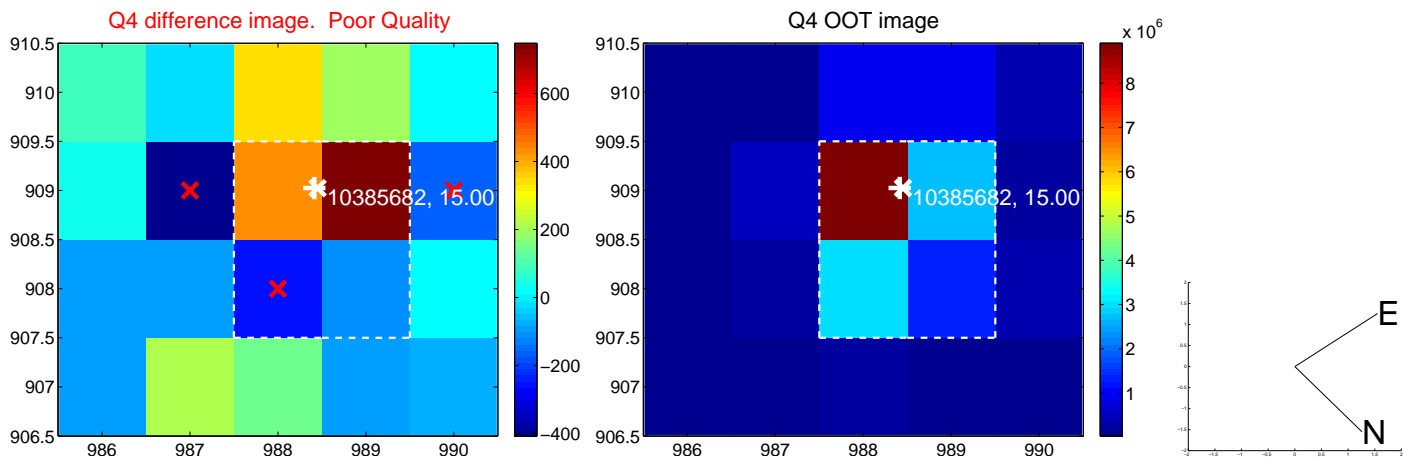
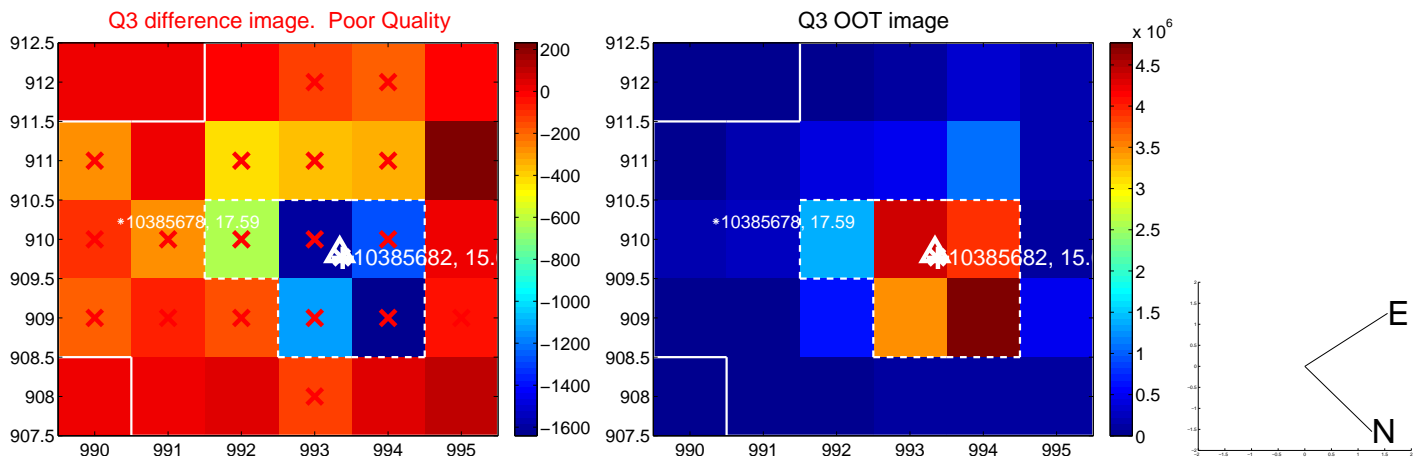
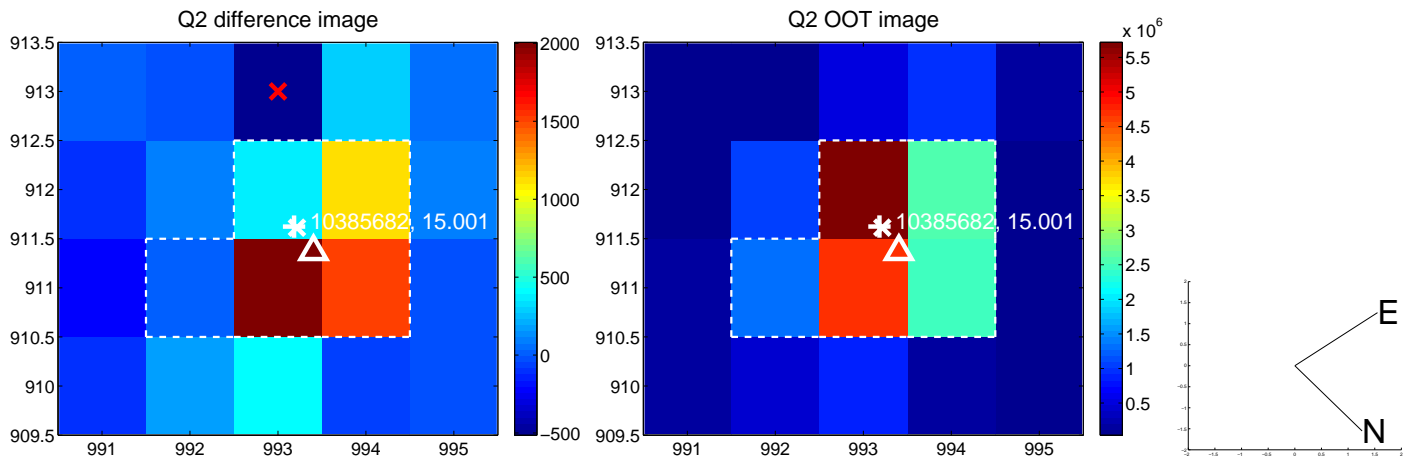
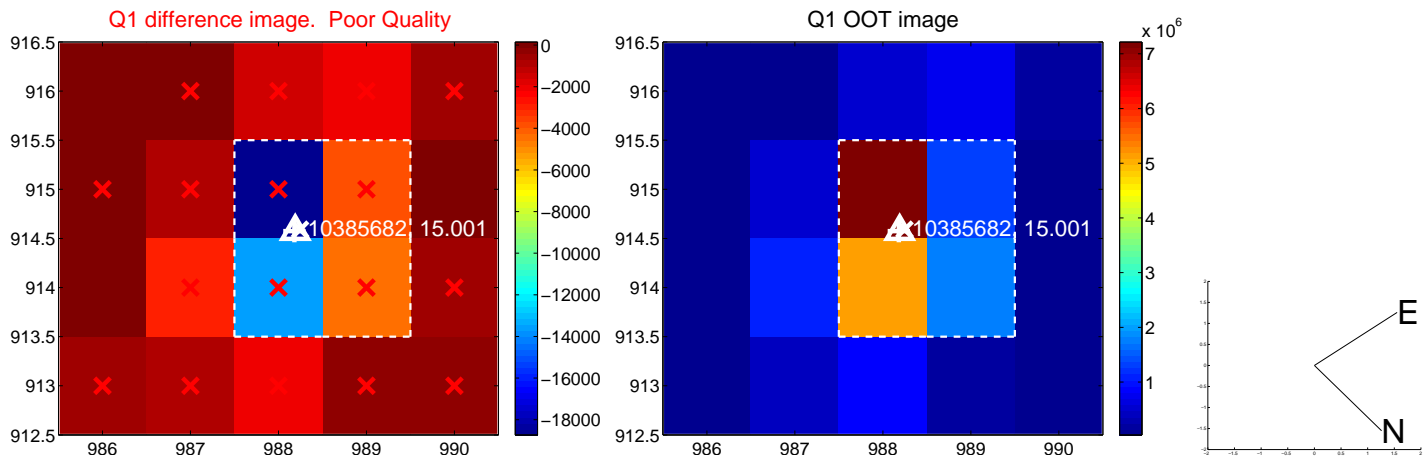


offset from photometric centroids

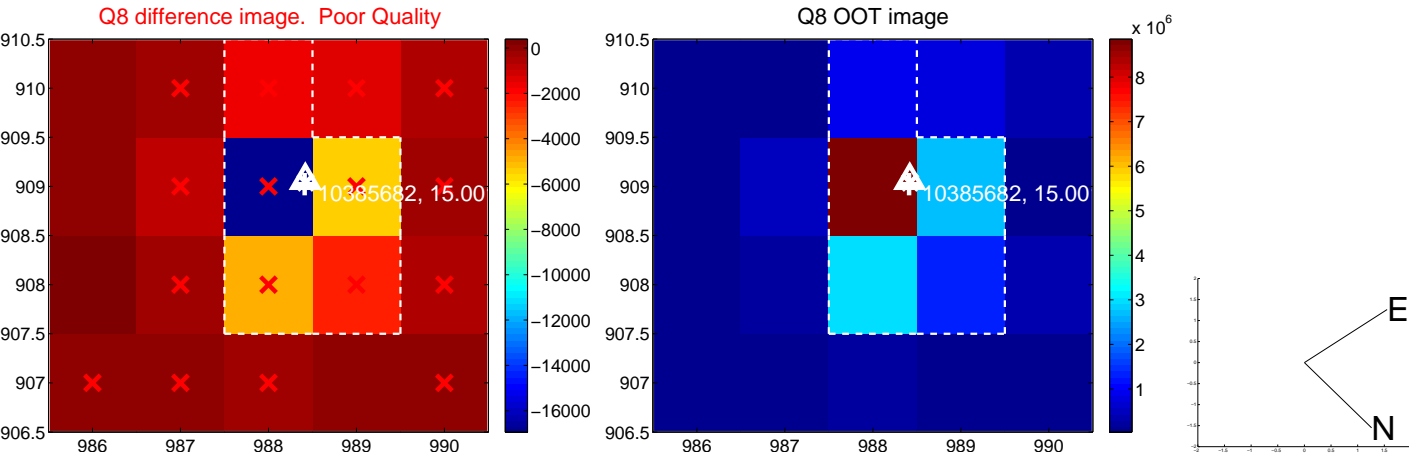
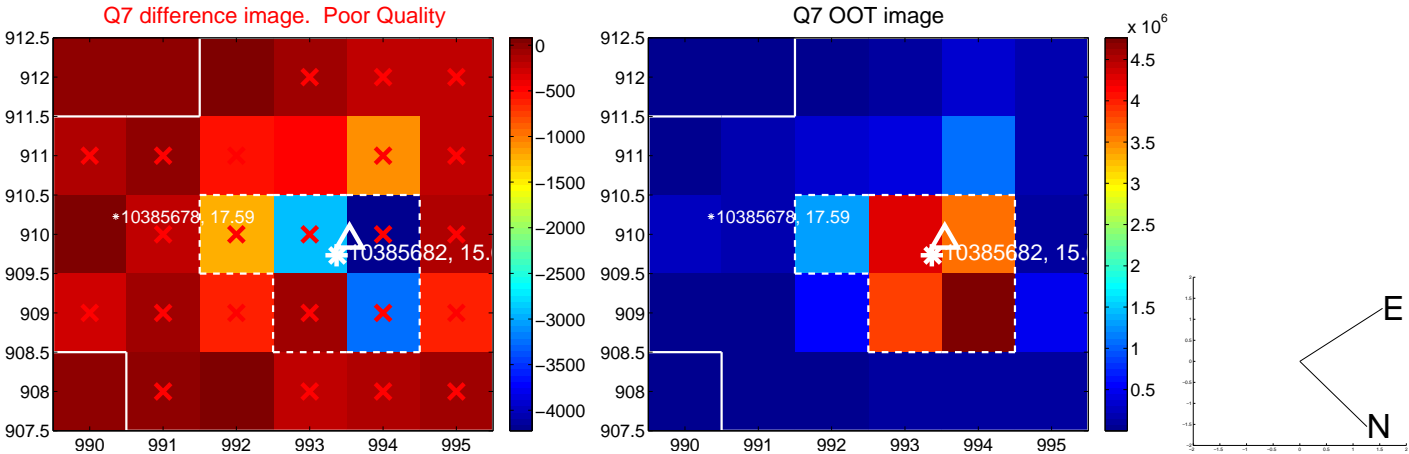
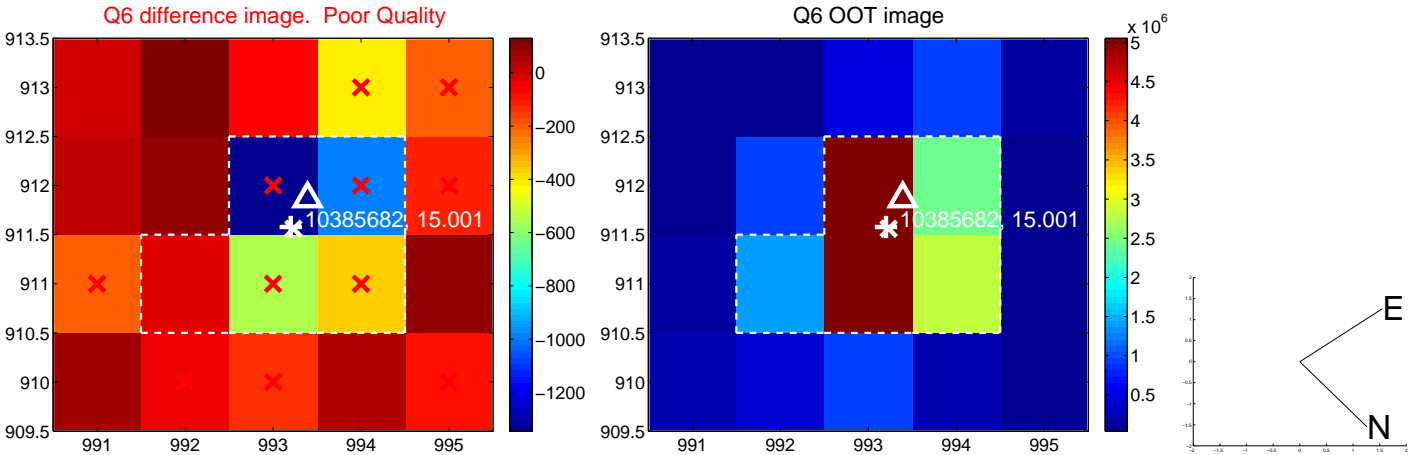
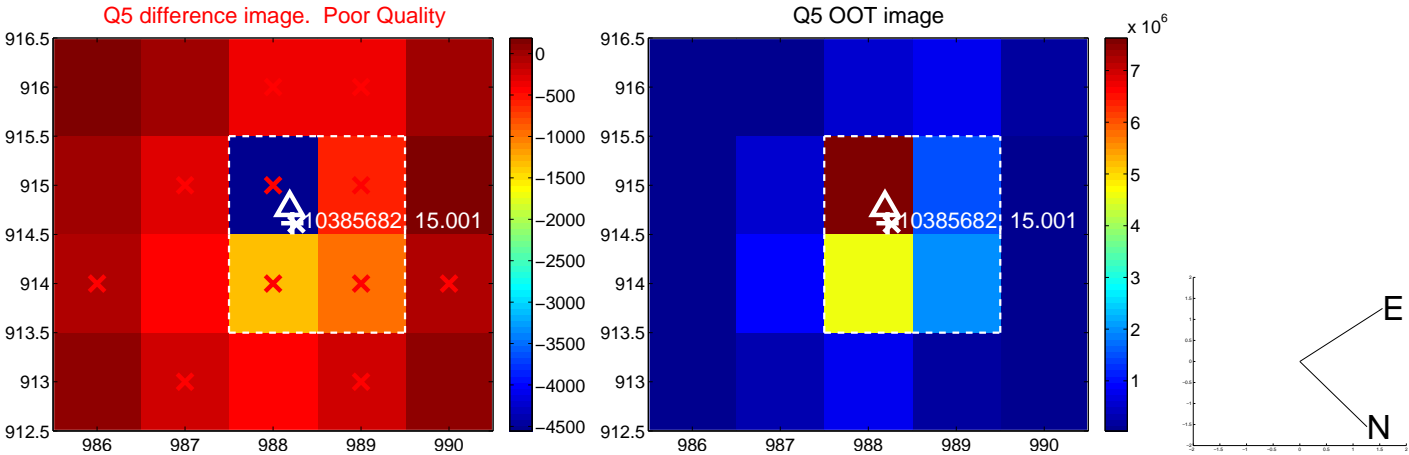


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

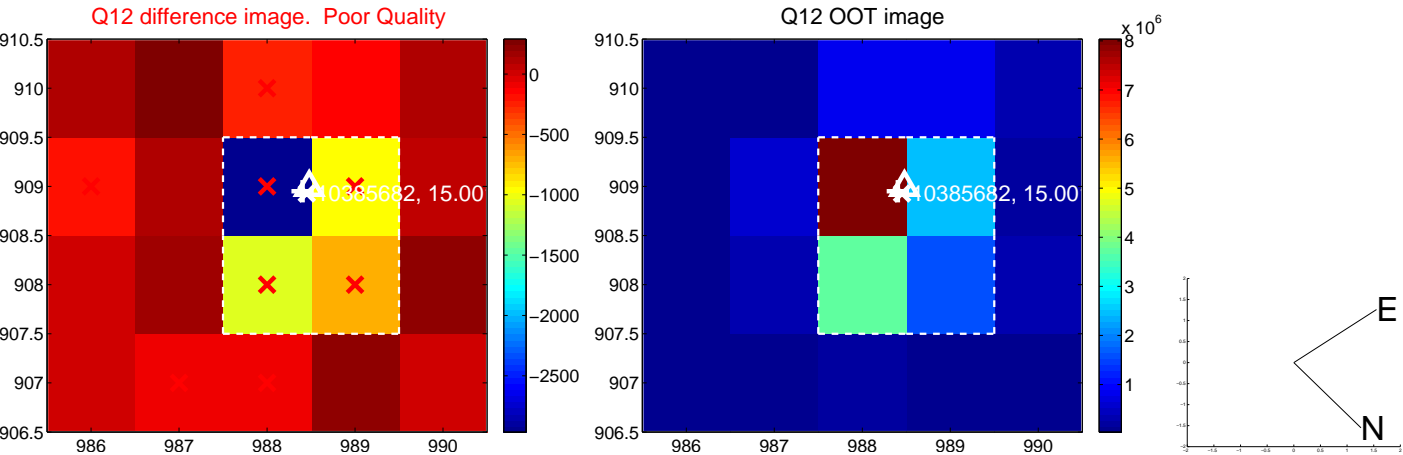
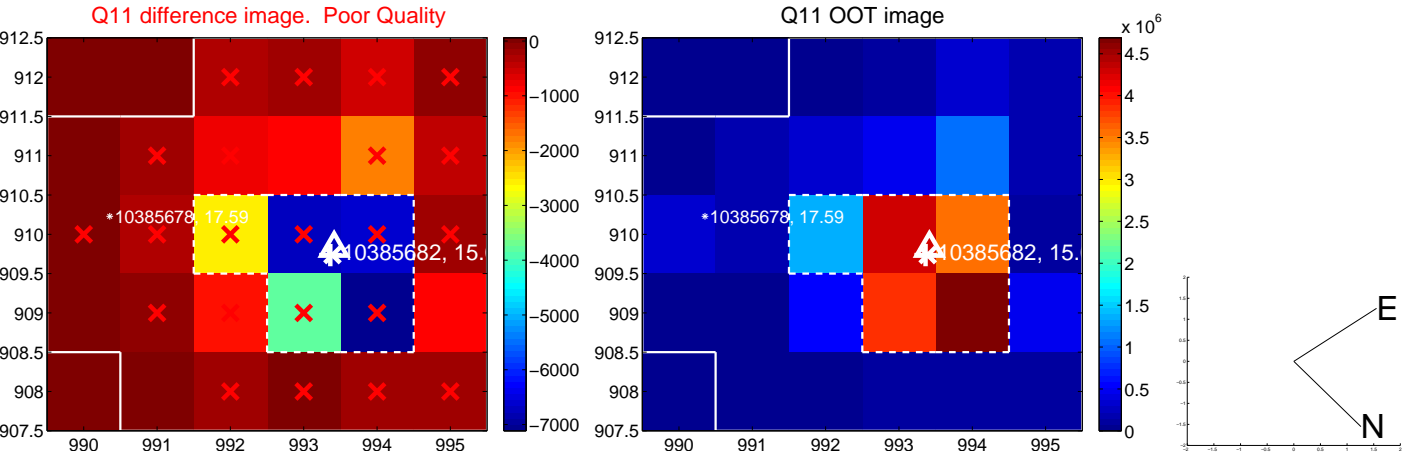
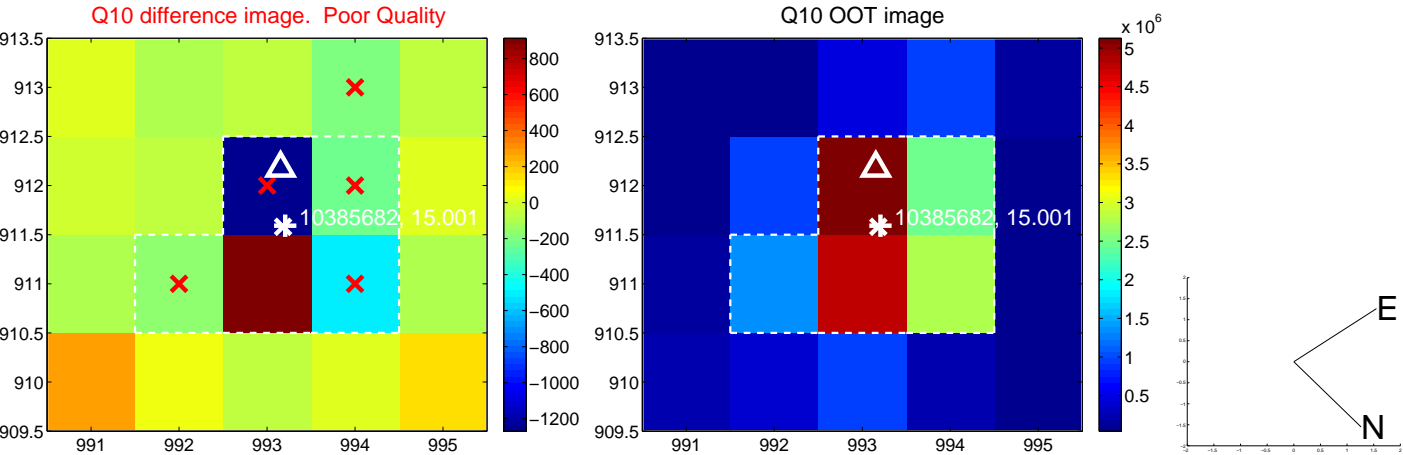
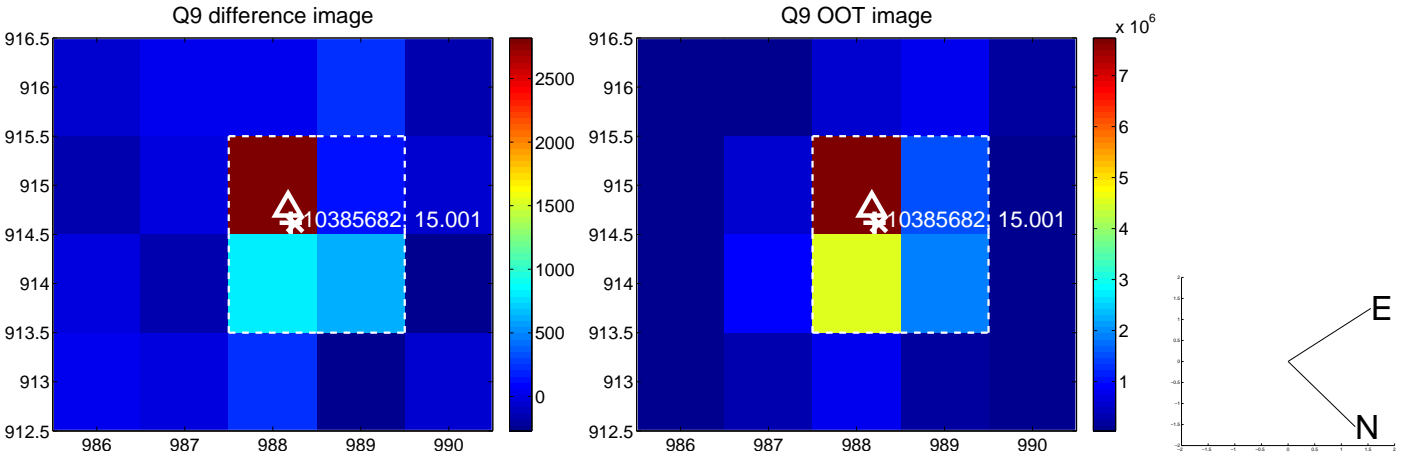
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



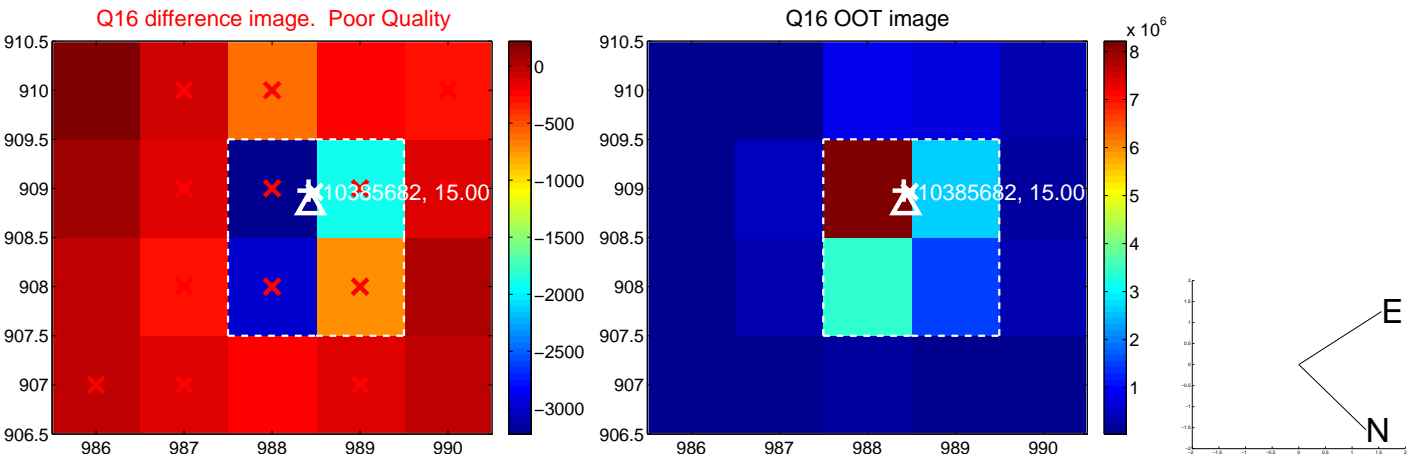
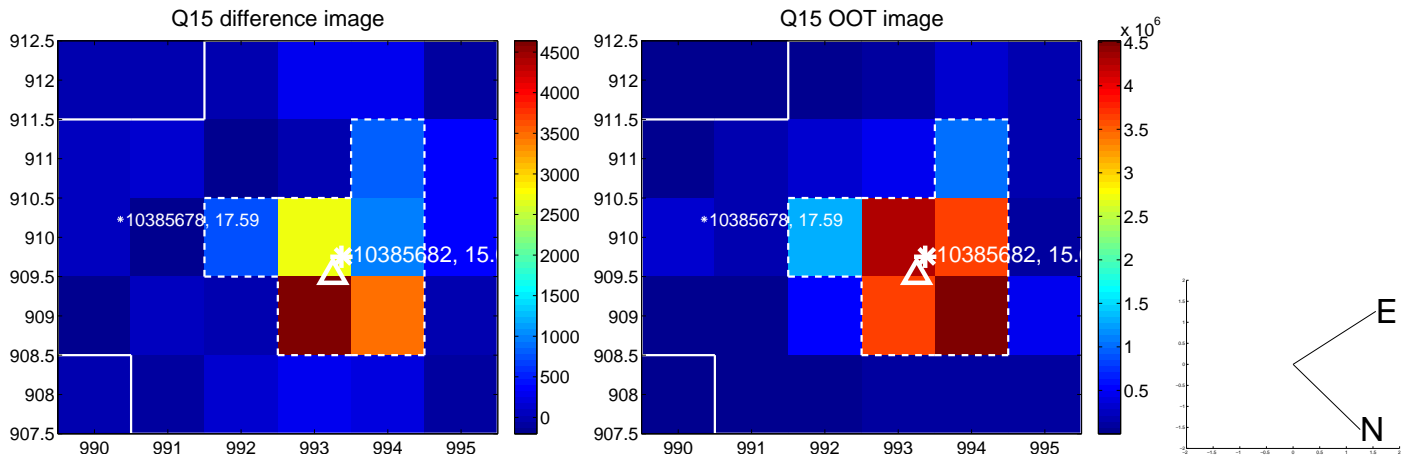
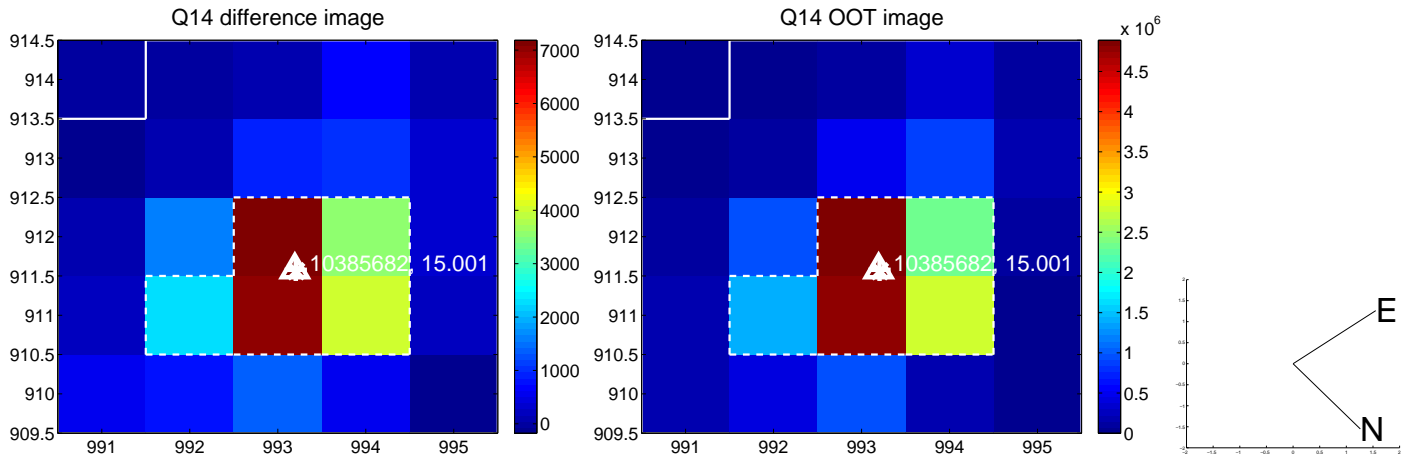
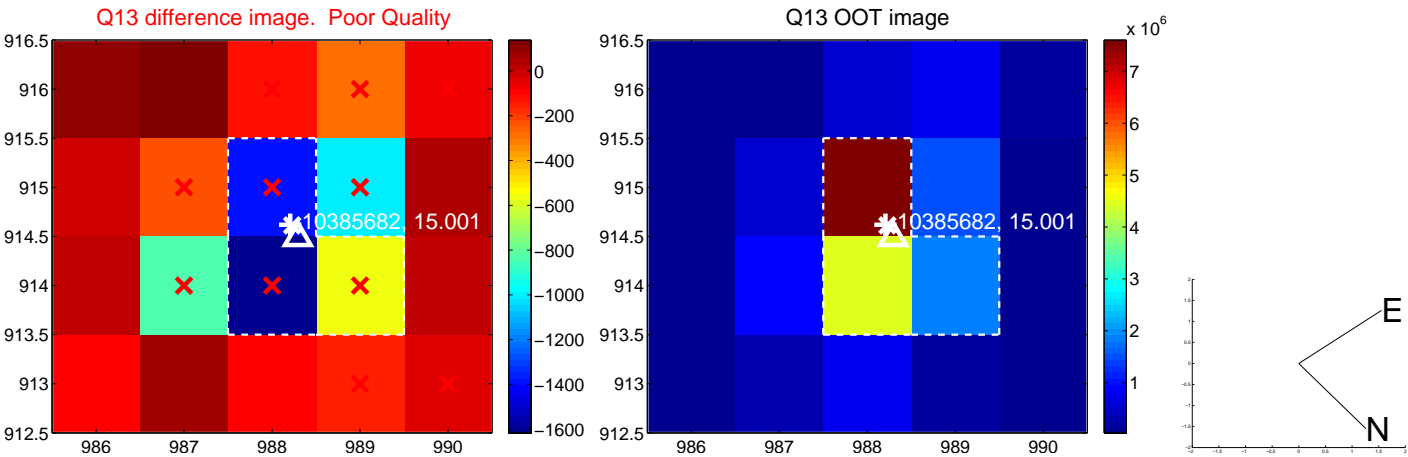
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



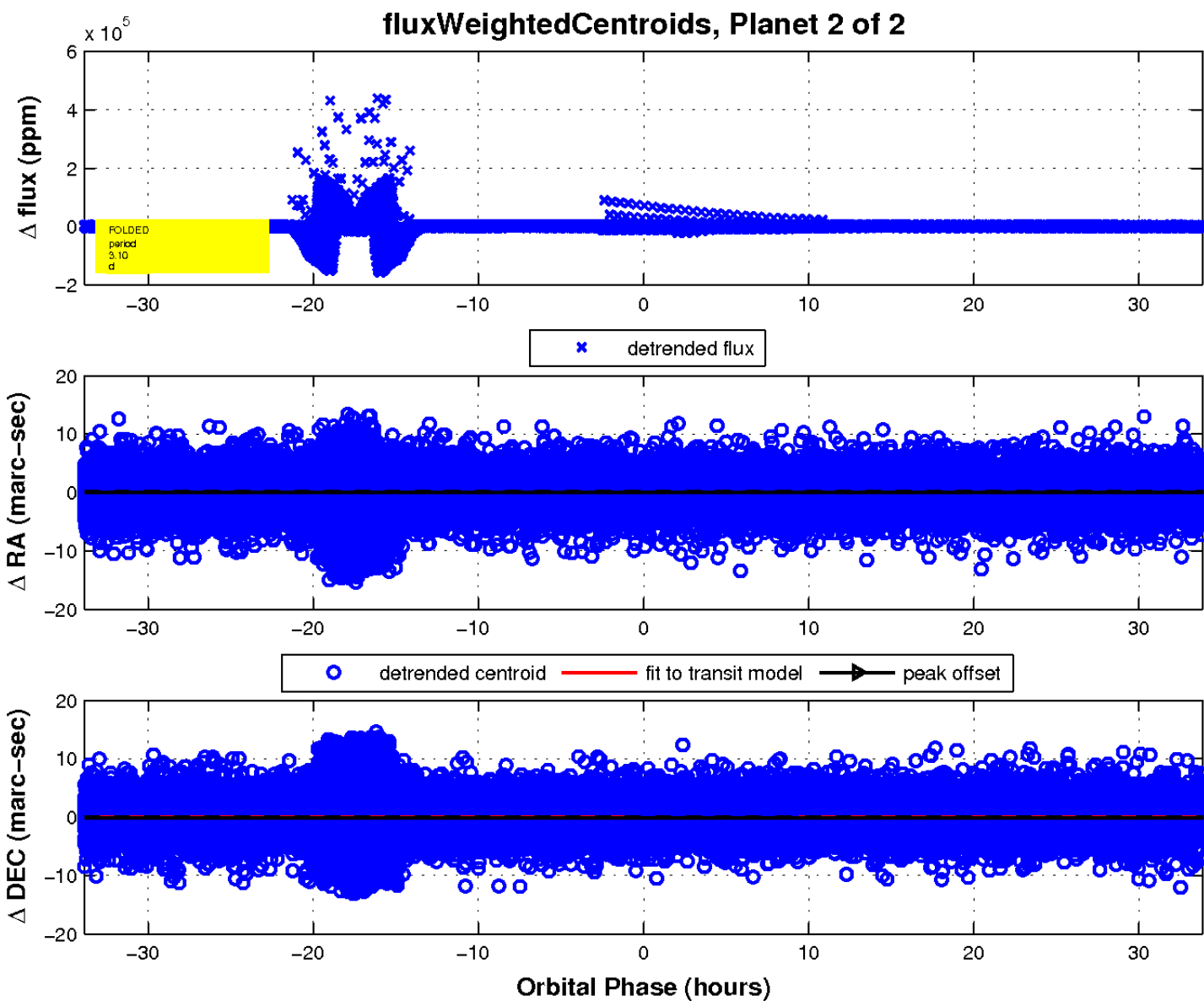
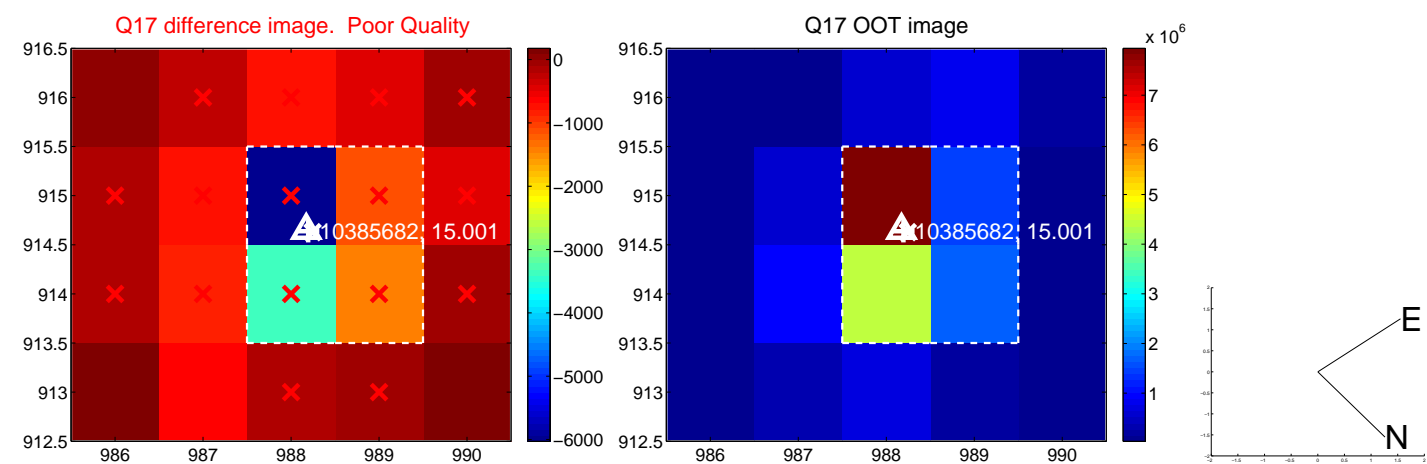
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

