

# KIC 004445630

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|---------|------|-----------------------------|-----------------|------------------------|------------------------|
| 004445630-01 | OBS      | 6414.01 | 2.813965      | 133.104812   | 451840.4    | 4.500            | 39571.6 | -1.0 | 1.11                        | 6280            | 51.73                  | 1107.88                |
| 004445630-02 | OBS      | No      | 5.627760      | 133.731441   | 20244.2     | 7.500            | 1542.6  | -1.0 | 1.11                        | 6280            | 15.92                  | 439.68                 |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments                                |
|--------------|----------|------|-------|---|---|---|---|---|
| 004445630-01 | OBS      | FP   | 0.00  | 0 | 1 | 0 | 0 | MOD_ODDEVEN_ALT—HAS_SEC_TCE—CENT_NOFITS |
| 004445630-02 | 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.

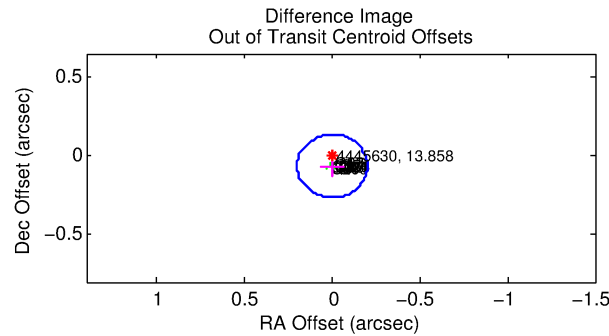
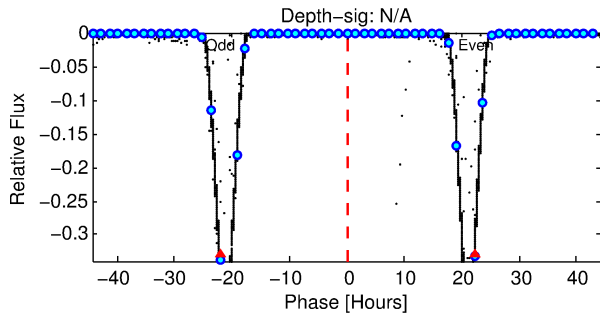
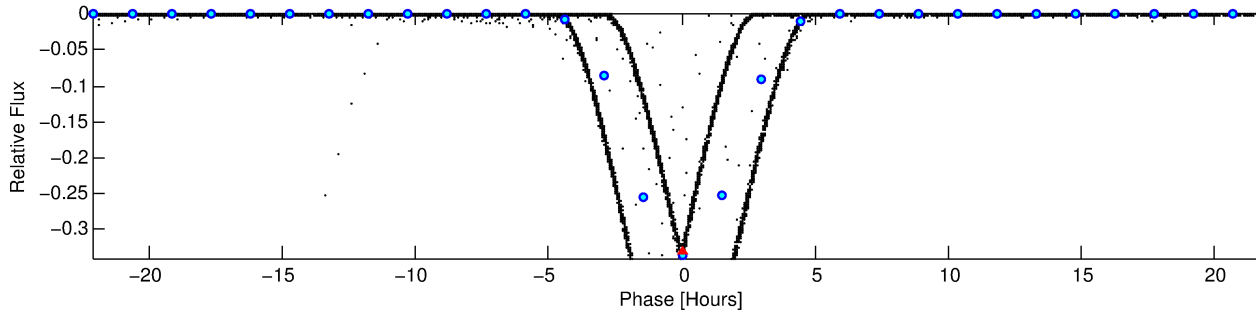
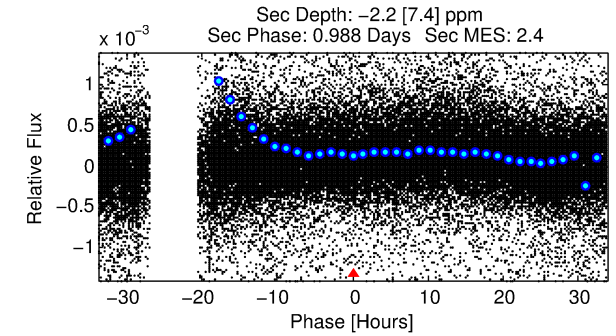
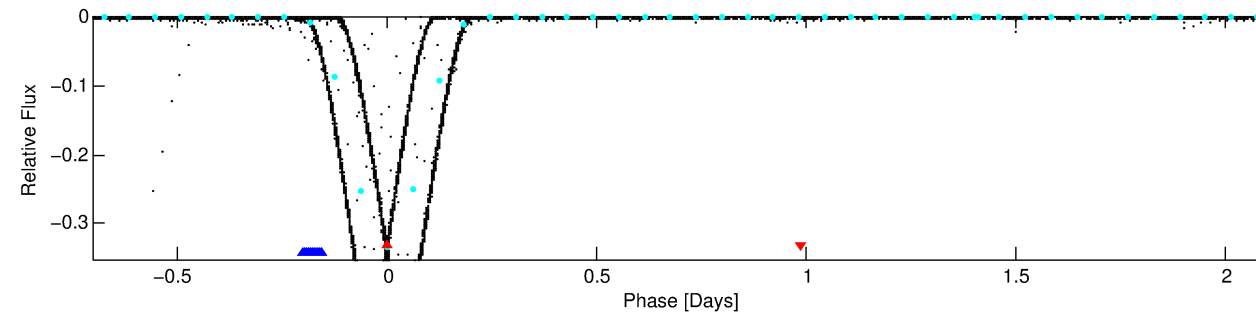
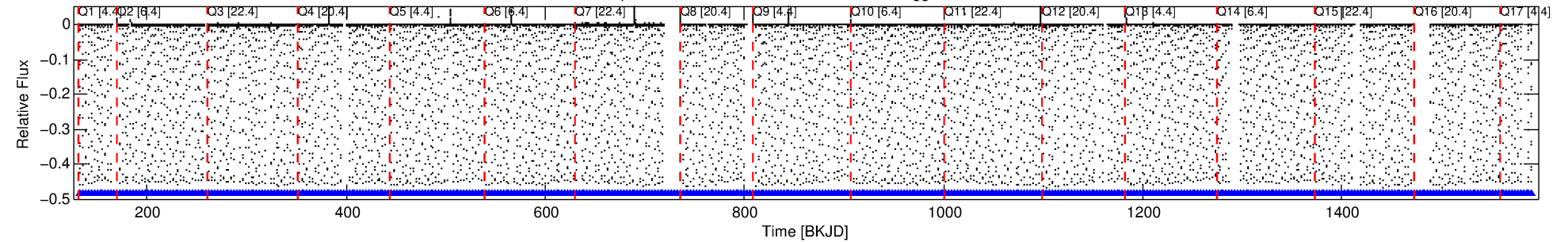
## Ephemeris Match Information For 004445630-01

No Significant Match Found

# DV One-Page Summary

KIC: 4445630 Candidate: 1 of 2 Period: 2.814 d  
KOI: K06414 Corr: No Ephemeris Match

Kp: 13.86 R\*: 1.11 Rs Teff: 6280.0 K Logg: 4.36 Fe/H: -0.180



## TPS TCE Results:

Period = 2.81396 d  
Epoch = 133.1048 BKJD

DV fit results are unavailable

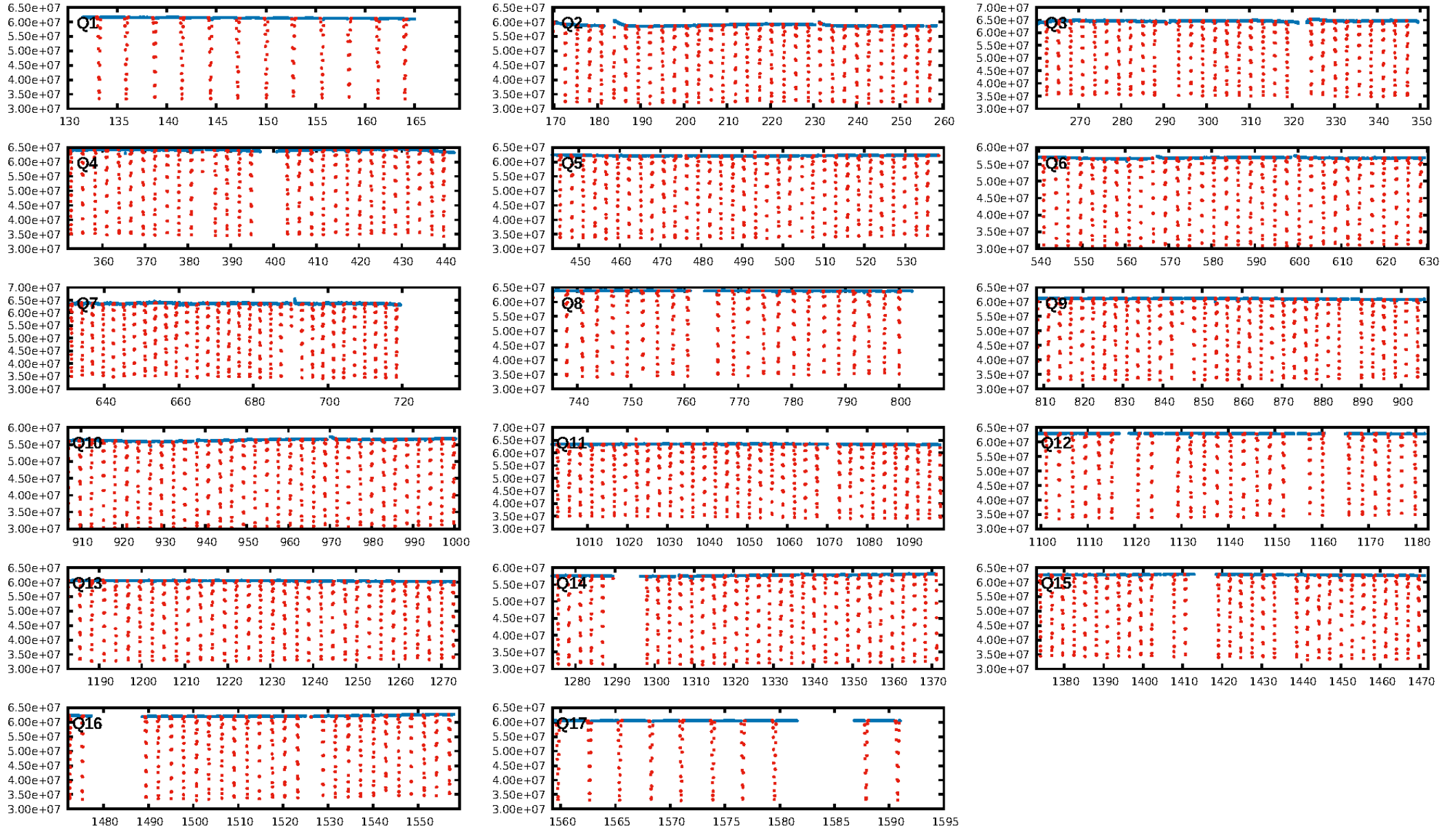
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [7.72s]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [461/461]  
GhostDiagnostic-chr: 1.562  
Centroid-sig: N/A  
Centroid-so: 0.391 arcsec [1102.40s]  
OotOffset-rm: 0.064 arcsec [0.96s]  
KicOffset-rm: 0.134 arcsec [1.93s]  
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]

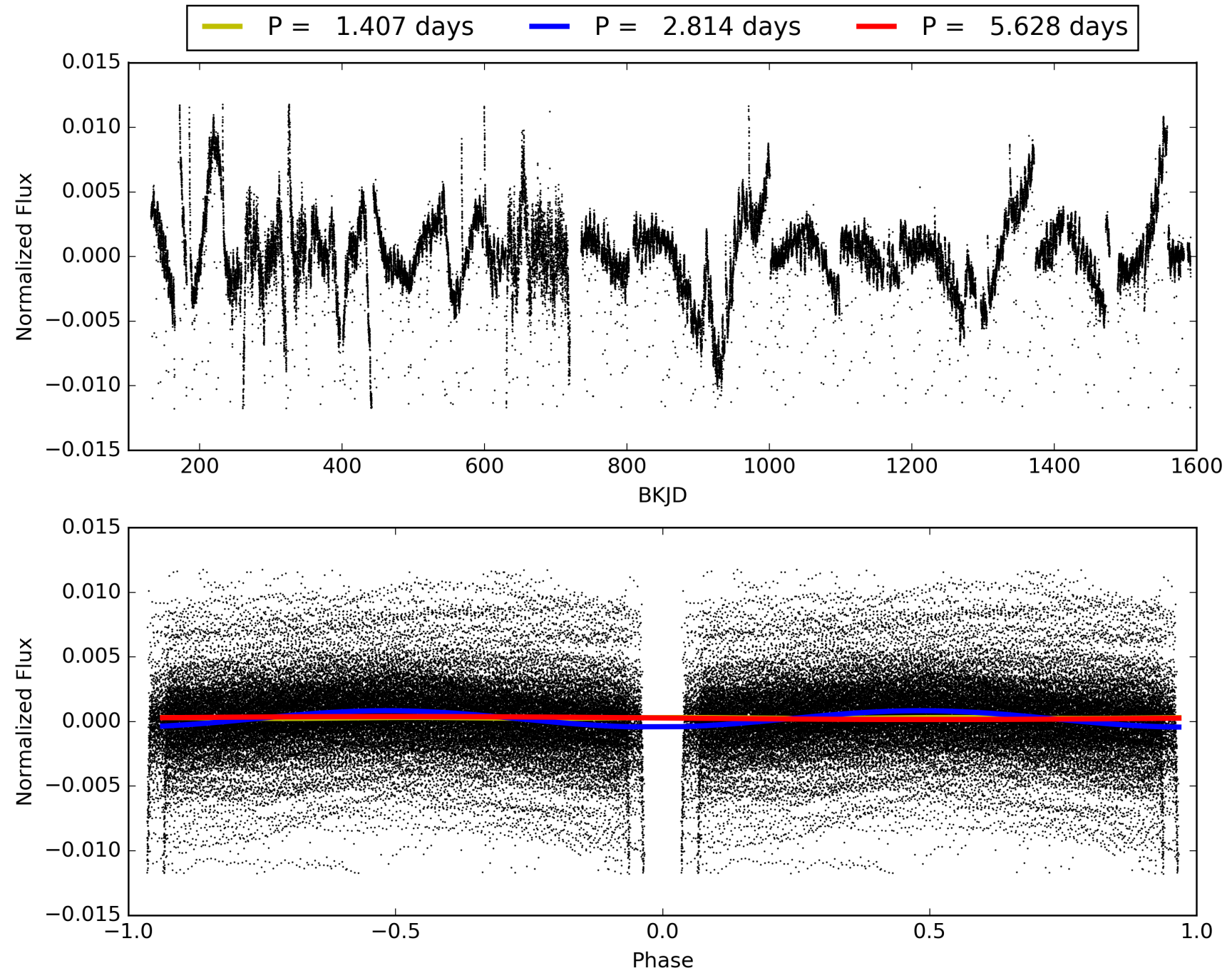
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 09:30:58 Z

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

# TCE 004445630-01, PDC Light Curves

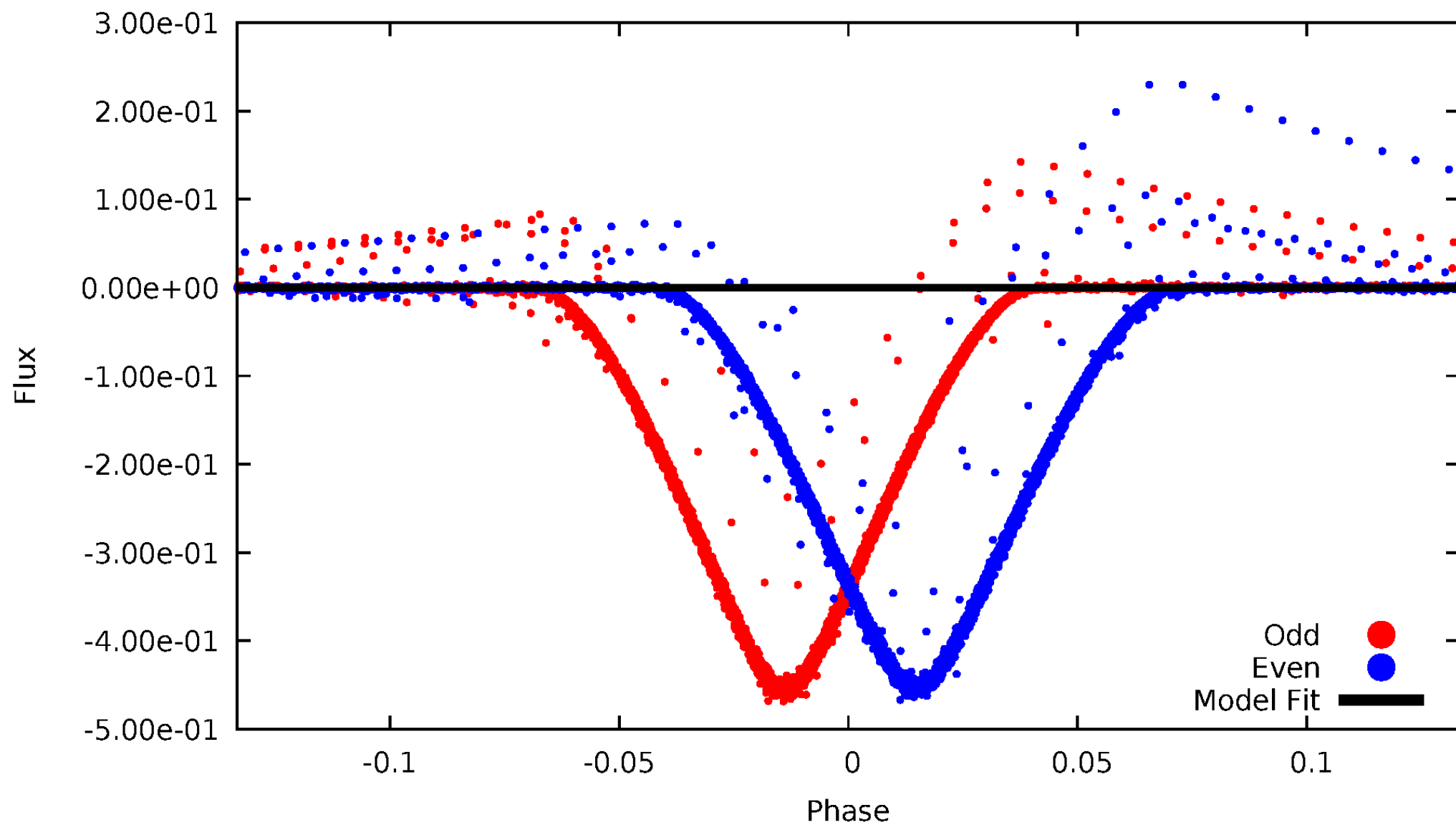


TCE 004445630-01



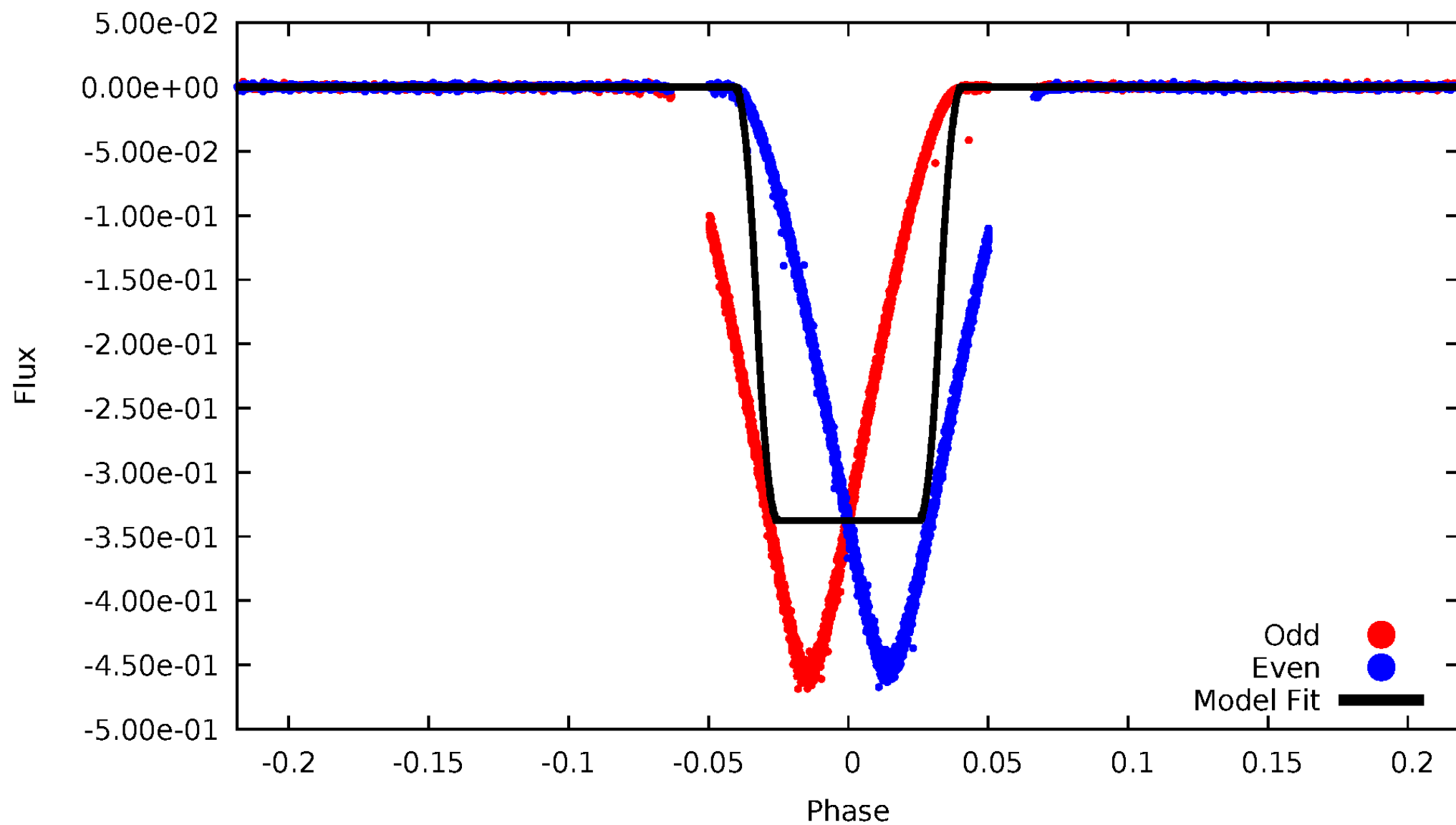
# DV Odd/Even

TCE 004445630-01



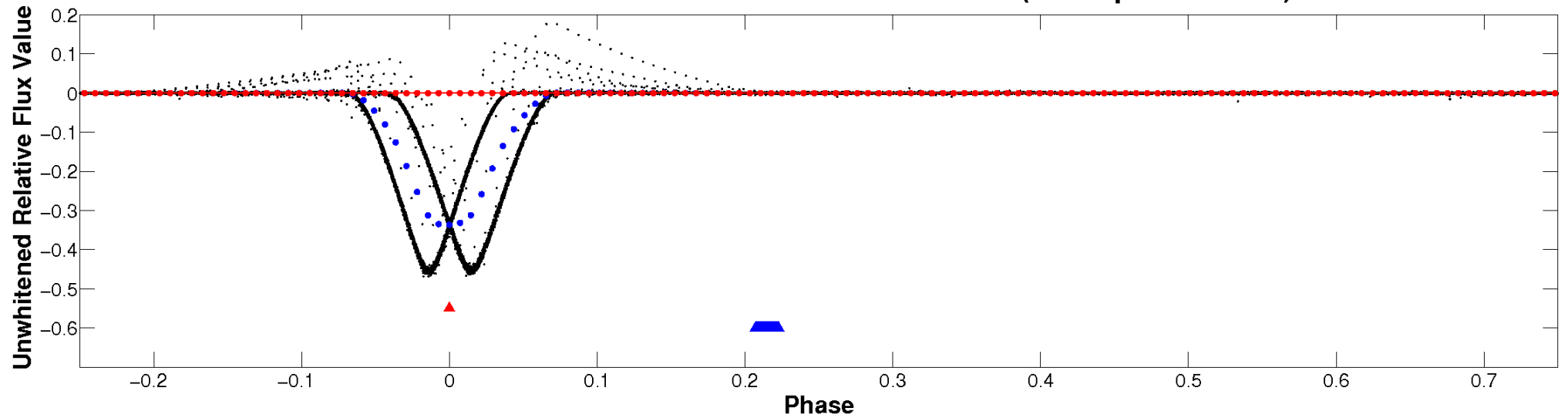
# ALT Odd/Even

TCE 004445630-01



# Non-Whitened Vs. Whitened Light Curve

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

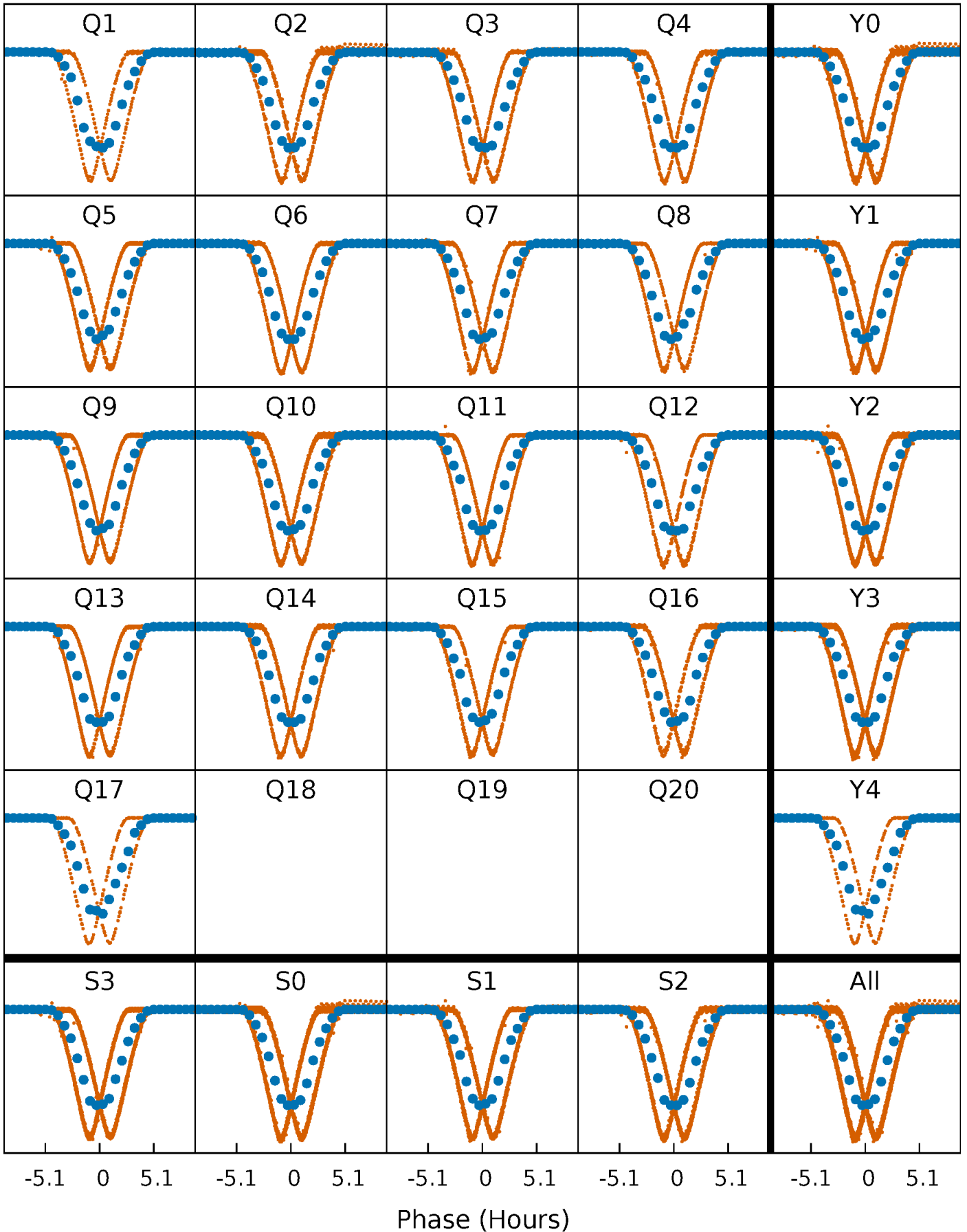


**Planet 1 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



# PDC Quarter-Phased Transit Curves

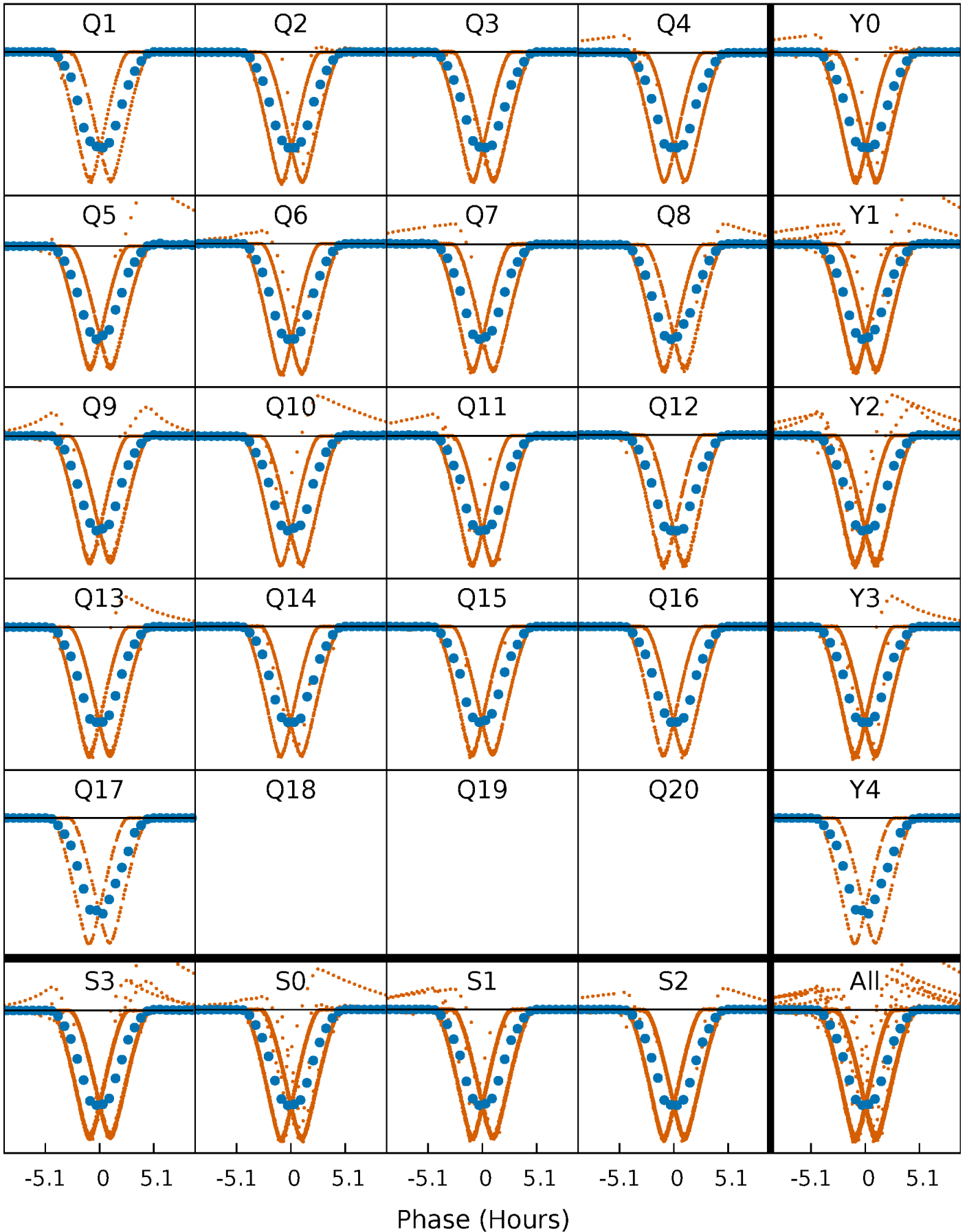
TCE 004445630-01 P= 2.813965 Days  $T_0=133.104812$  (BKJD)





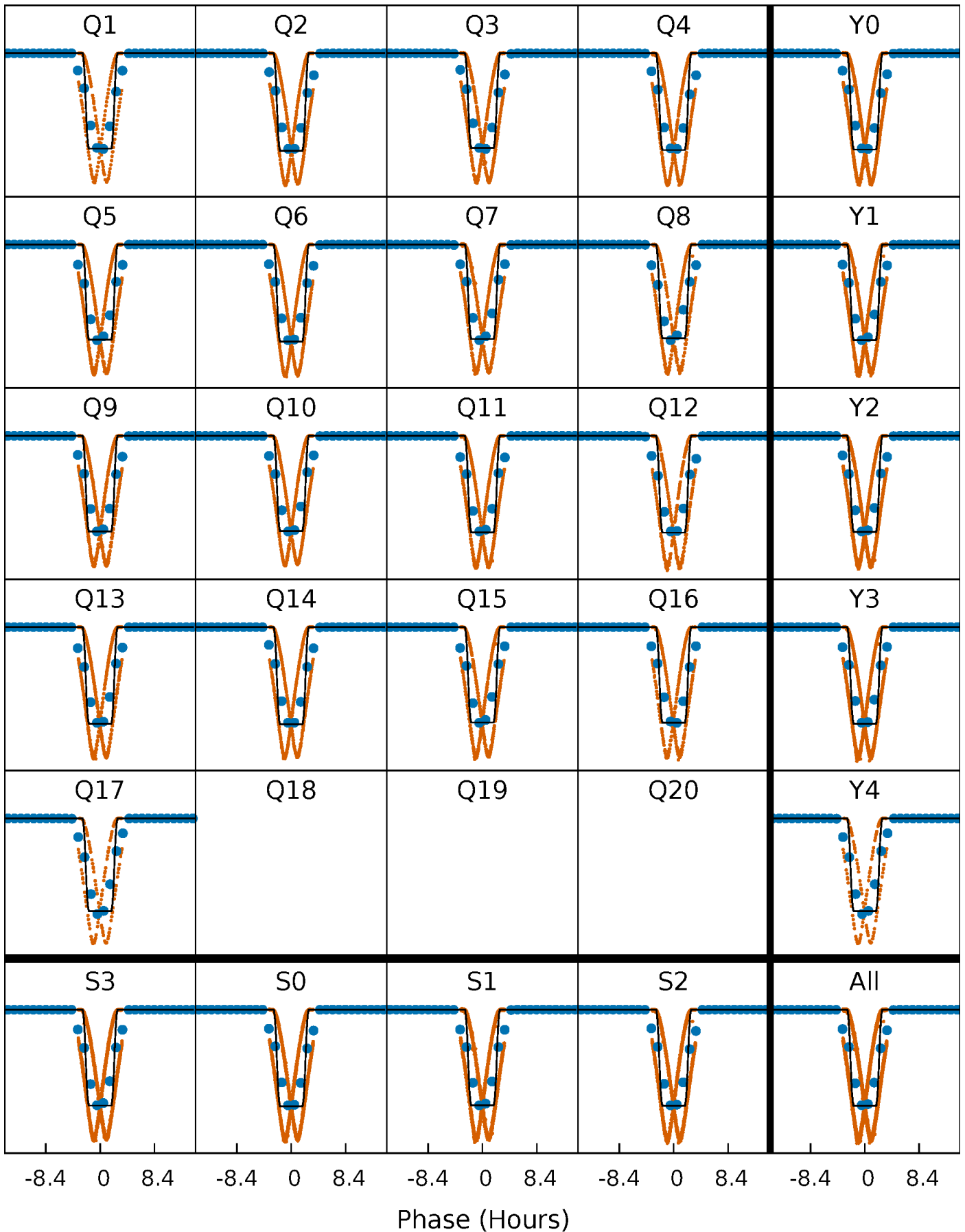
# DV Quarter-Phased Transit Curves

TCE 004445630-01 P= 2.813965 Days  $T_0=133.104812$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

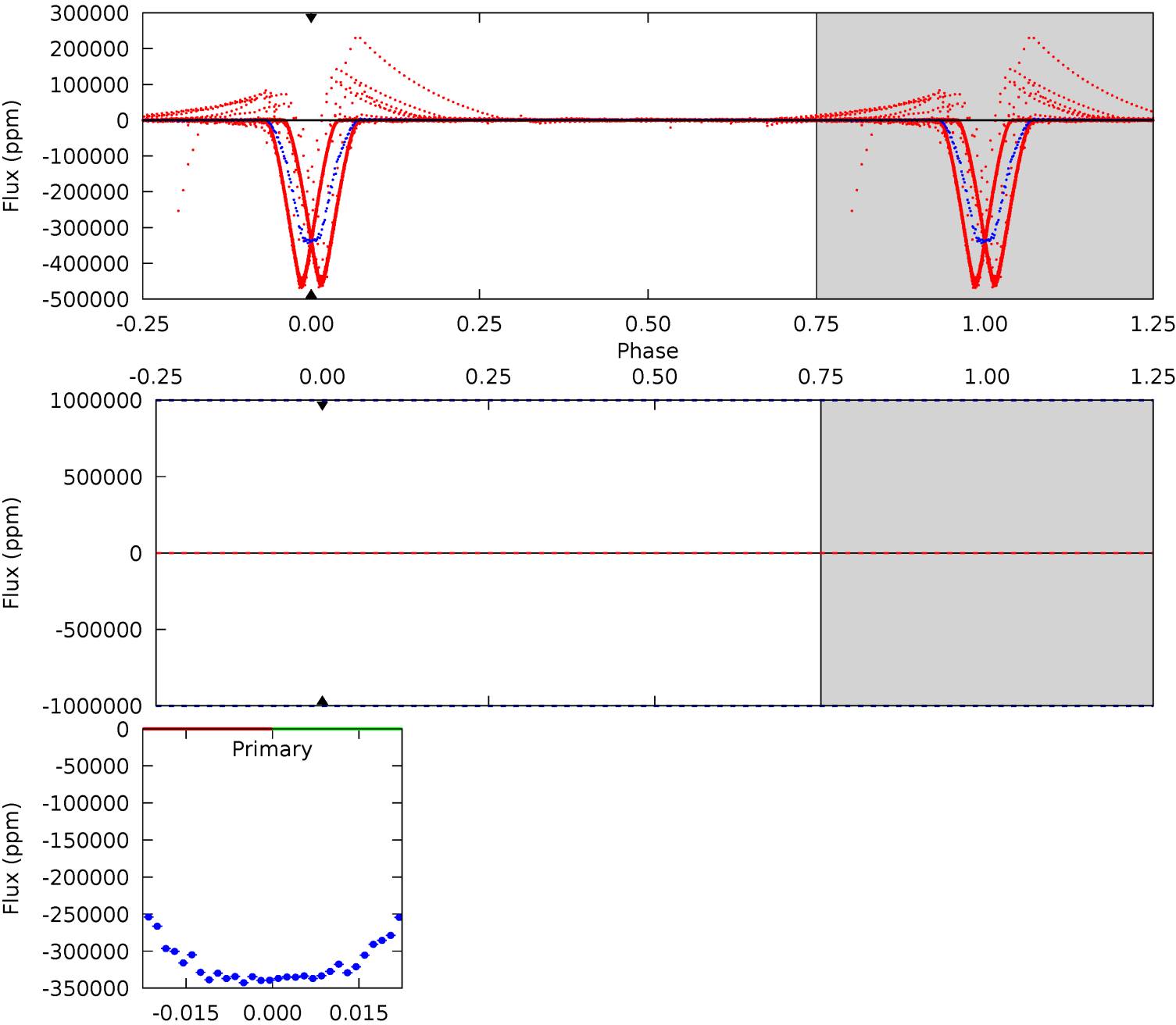
TCE 004445630-01 P= 2.813965 Days  $T_0=133.106043$  (BKJD)



DV Model-Shift Uniqueness Test

004445630-01, P = 2.813965 Days, E = 130.290847 Days

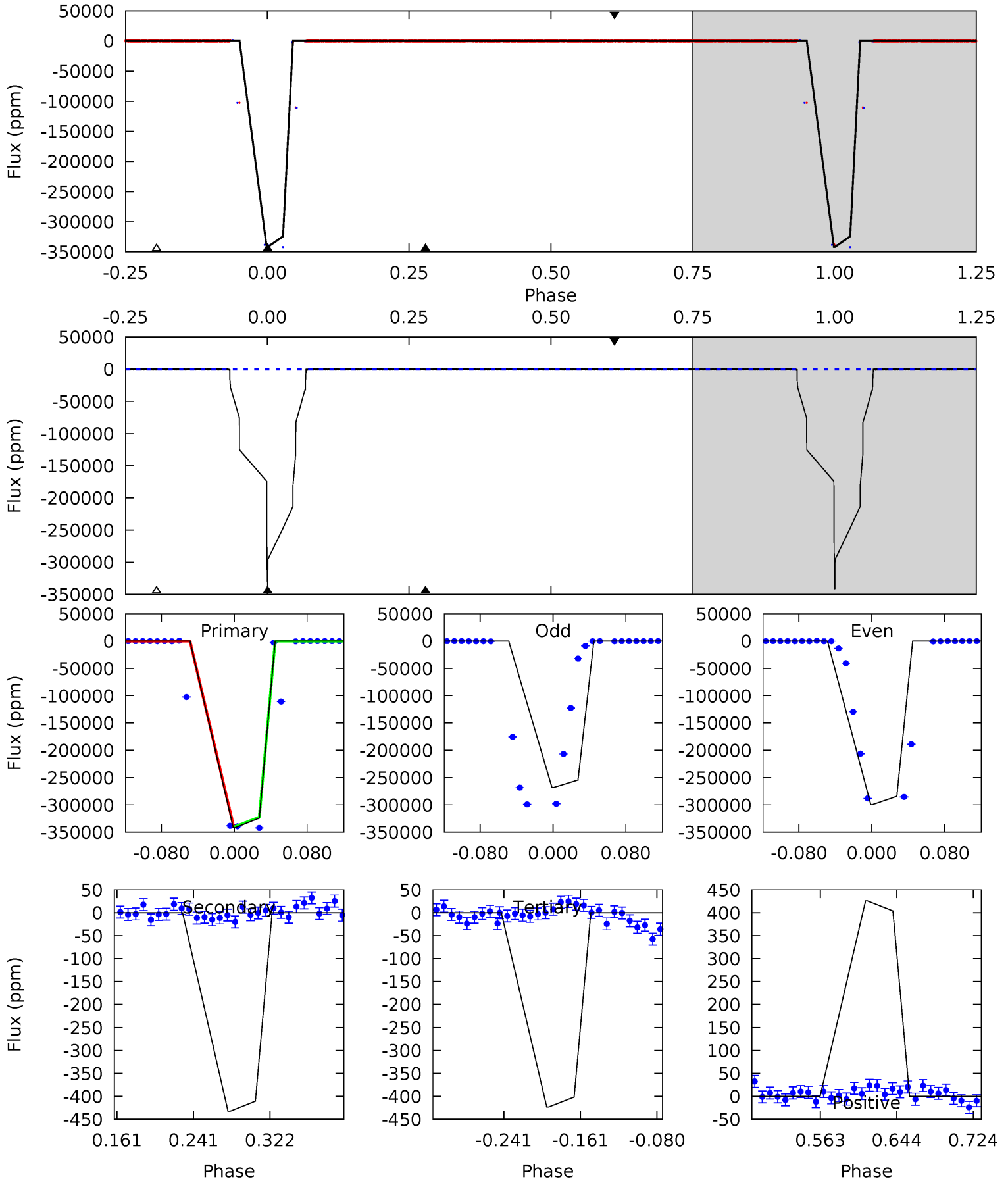
| Pri | Sec | Ter | Pos | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|-----|-----|-----|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|-----|-------|-----|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



# Alt Model-Shift Uniqueness Test

004445630-01, P = 2.813965 Days, E = 130.292078 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 |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|-----|
| 3306 | 4.19 | 4.10 | 4.12 | 4.61            | 1.75            | 1.00             | 3302    | 3302    | 0.09    | 0.07    | 1605    | 1.00 | 0.00  | 0   |



### Stellar Parameters For KIC 004445630

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R$ ( $R_{\odot}$ )       | $M(M_{\odot})$            | $p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ ) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $6280^{+172}_{-203}$ | $4.361^{+0.101}_{-0.203}$ | $-0.180^{+0.250}_{-0.300}$ | $1.115^{+0.367}_{-0.157}$ | $1.036^{+0.173}_{-0.115}$ | $1.054^{+0.499}_{-0.542}$                     |
|        | +3%/-3%              | +2%/-5%                   | +139%/-167%                | +33%/-14%                 | +17%/-11%                 | +47%/-51%                                     |
| 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 004445630-01 / KOI 6414.01

| Detrend | Depth (ppm)     | $R_p$ ( $R_{\oplus}$ )    | $T_{\text{max}}$ (K) | $T_{\text{obs}}$ (K)   | $A_{\text{obs}}$            |
|---------|-----------------|---------------------------|----------------------|------------------------|-----------------------------|
| DV      | $0 \pm 1000000$ | $53.13^{+15.82}_{-12.86}$ | $2067^{+161}_{-113}$ | $2397^{+3285}_{-7932}$ | $0.484^{+36.171}_{-34.199}$ |
| Alt.    | $-433 \pm 103$  | $72.46^{+16.89}_{-13.76}$ | $2081^{+151}_{-128}$ | $-2455^{+105}_{-117}$  | $0.070^{+0.041}_{-0.026}$   |

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

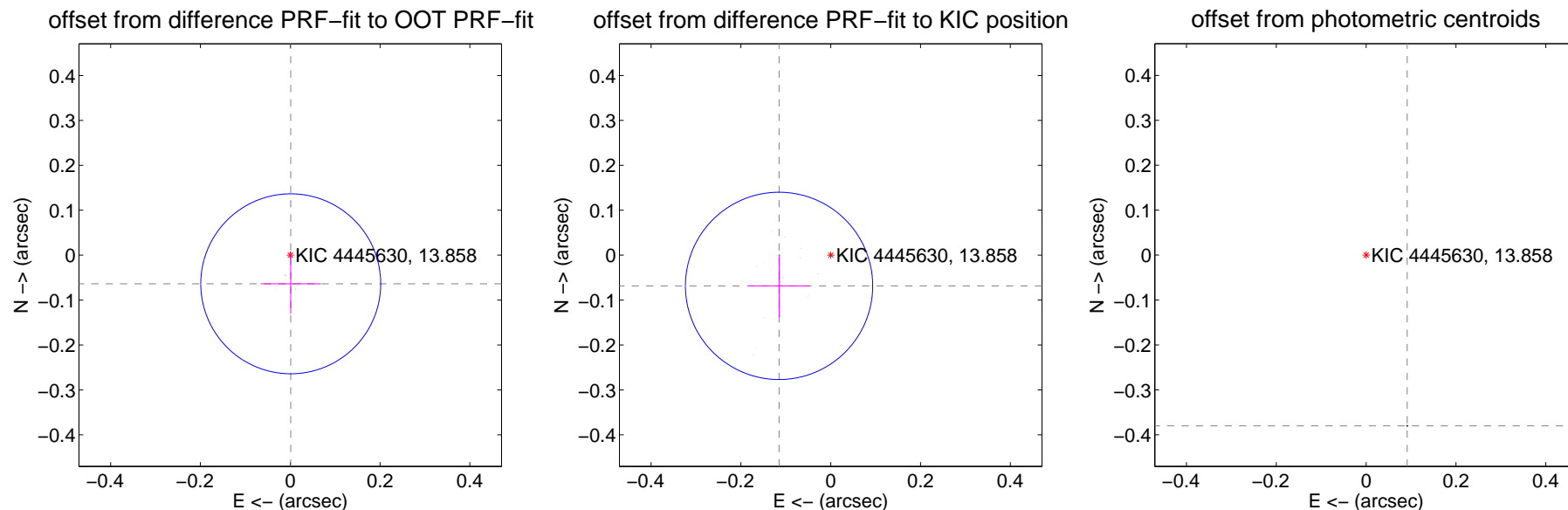
## DV Centroid Data

Supplemental centroid analysis for 004445630-01. Kepler magnitude: 13.86. Transit SNR -1.00

There are 17 quarters with good PRF difference image offsets

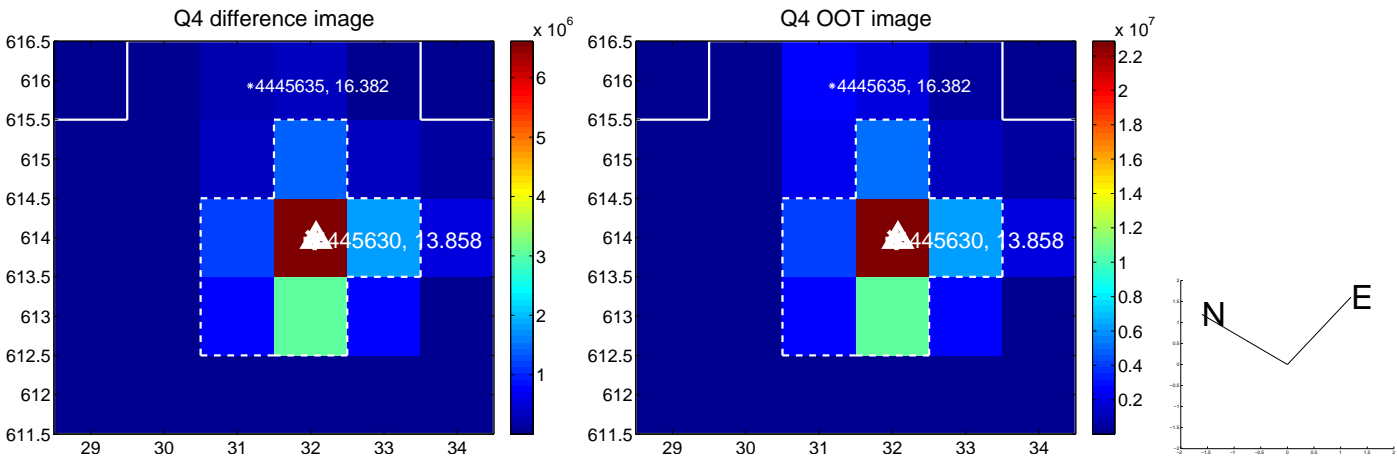
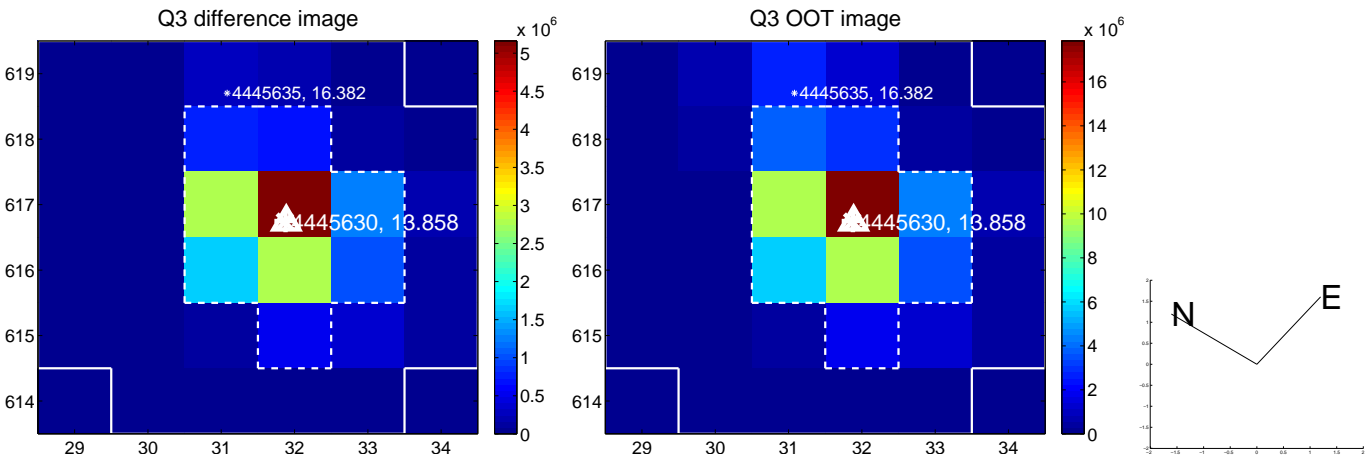
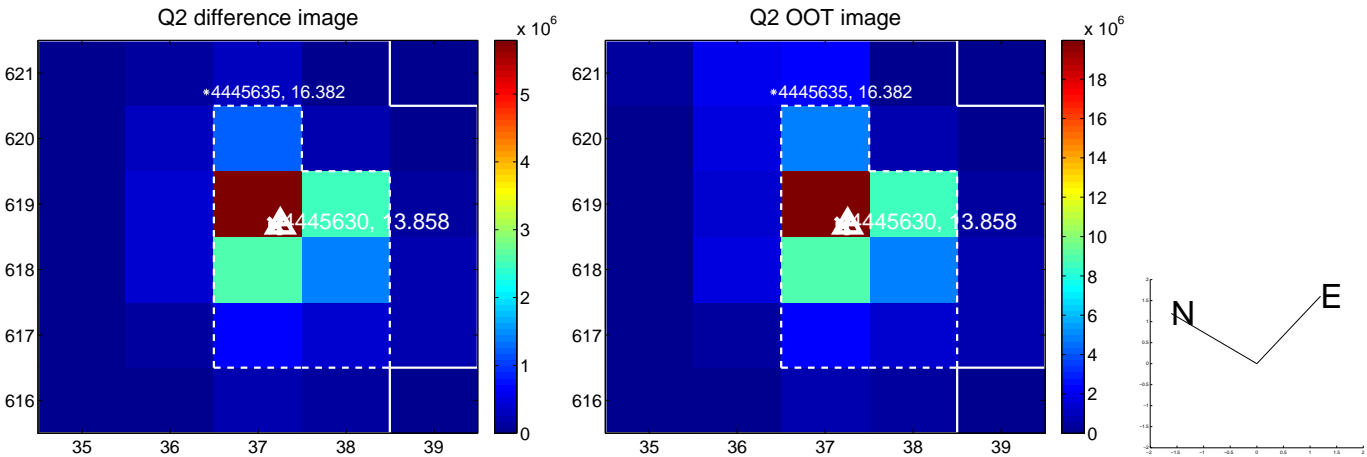
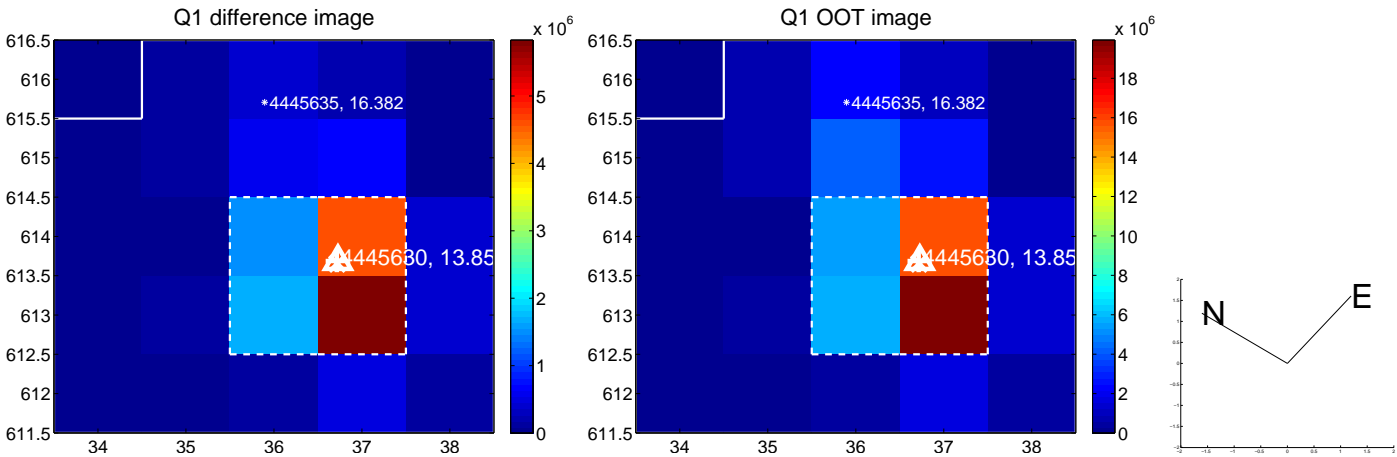
The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA        | $\Delta$ Dec       |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT          | $0.064 \pm 0.067$  | 0.96                | $-0.001 \pm 0.067$ | $-0.064 \pm 0.067$ |
| PRF-fit source offset from KIC position | $0.134 \pm 0.070$  | 1.93                | $0.115 \pm 0.068$  | $-0.068 \pm 0.070$ |
| photometric centroid source offset      | $0.39 \pm 0.00$    | 1102.40             | $-0.09 \pm 0.00$   | $-0.38 \pm 0.00$   |

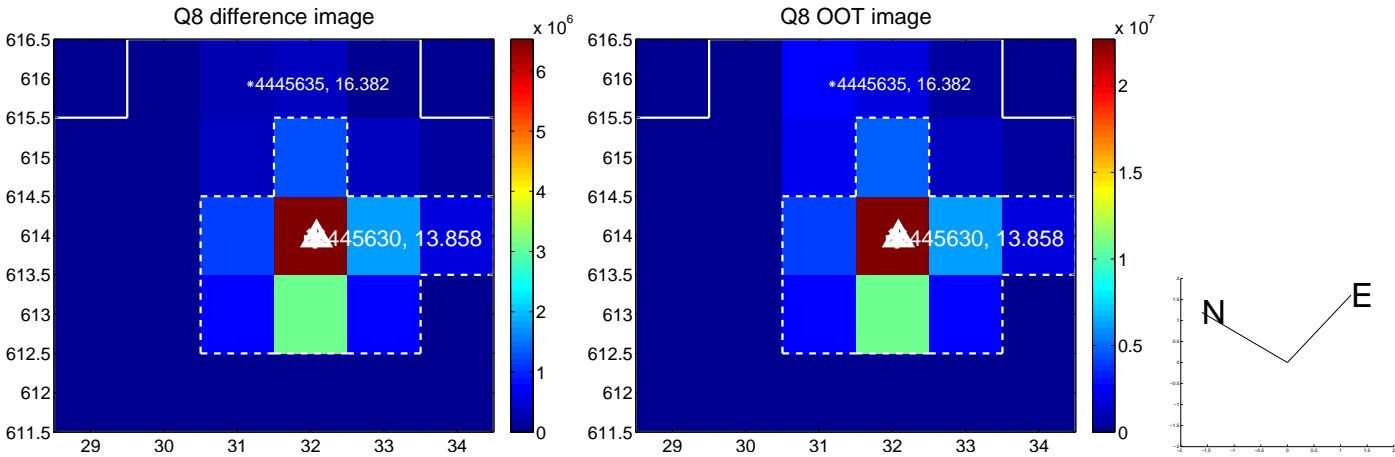
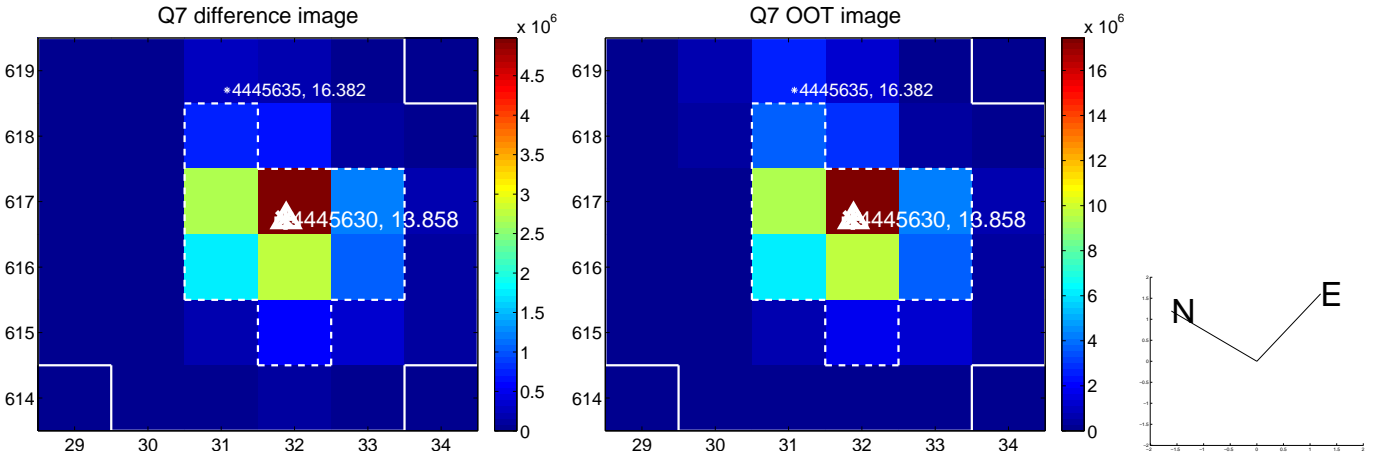
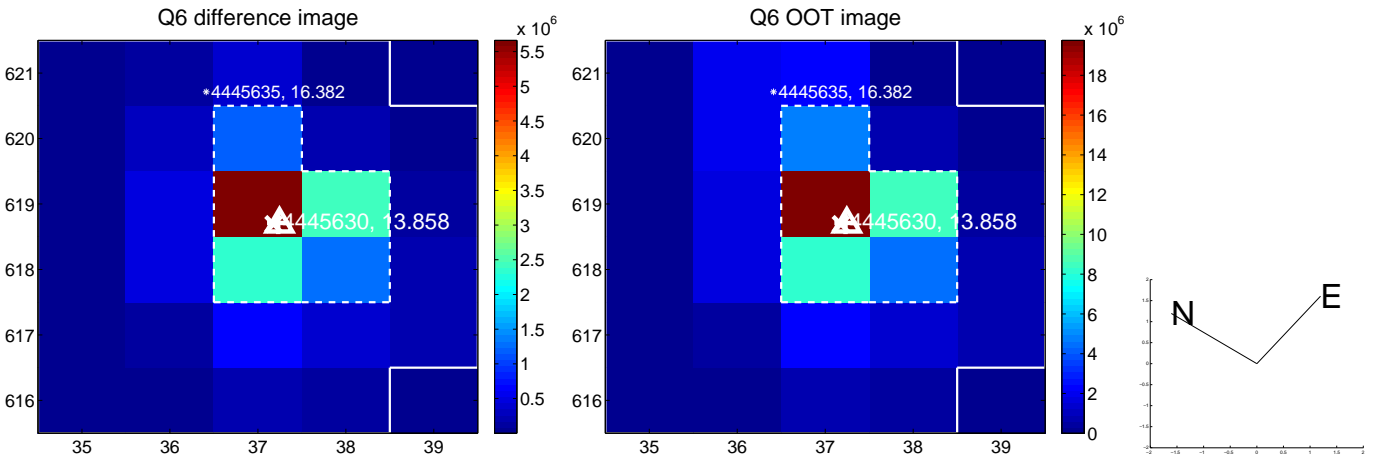
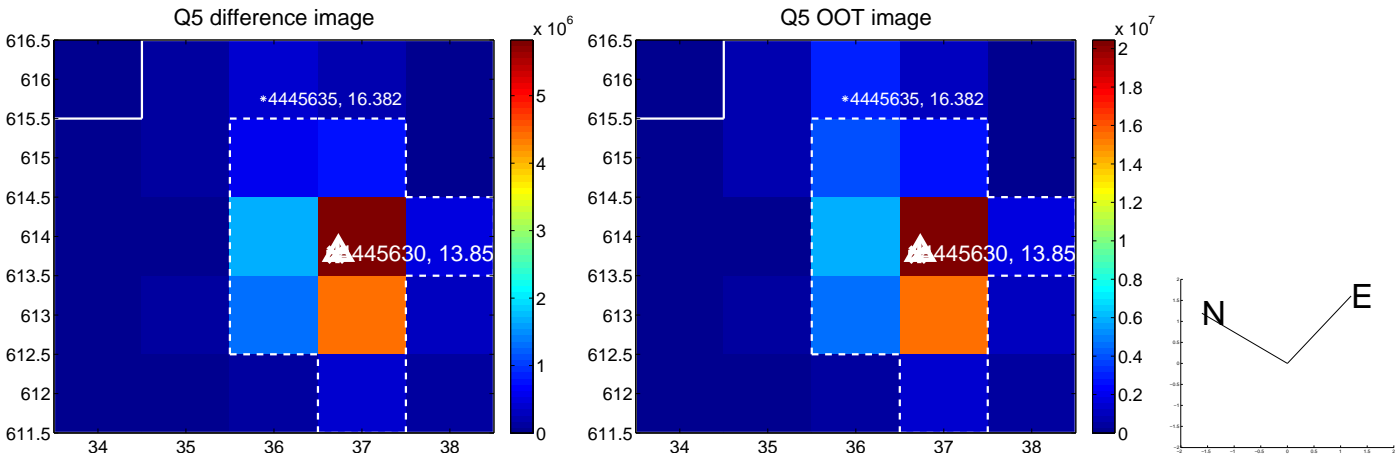


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

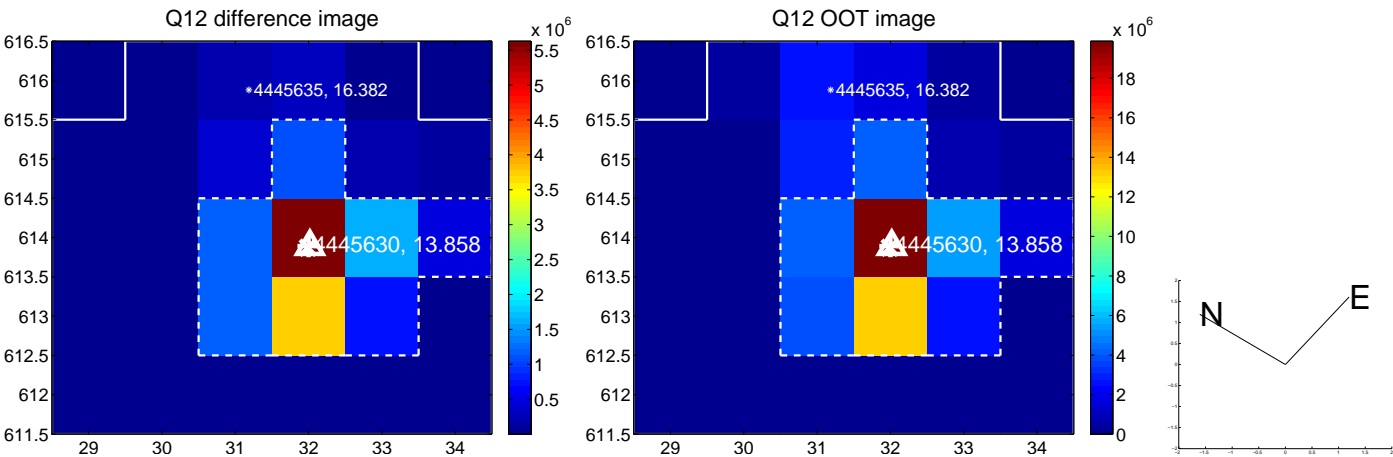
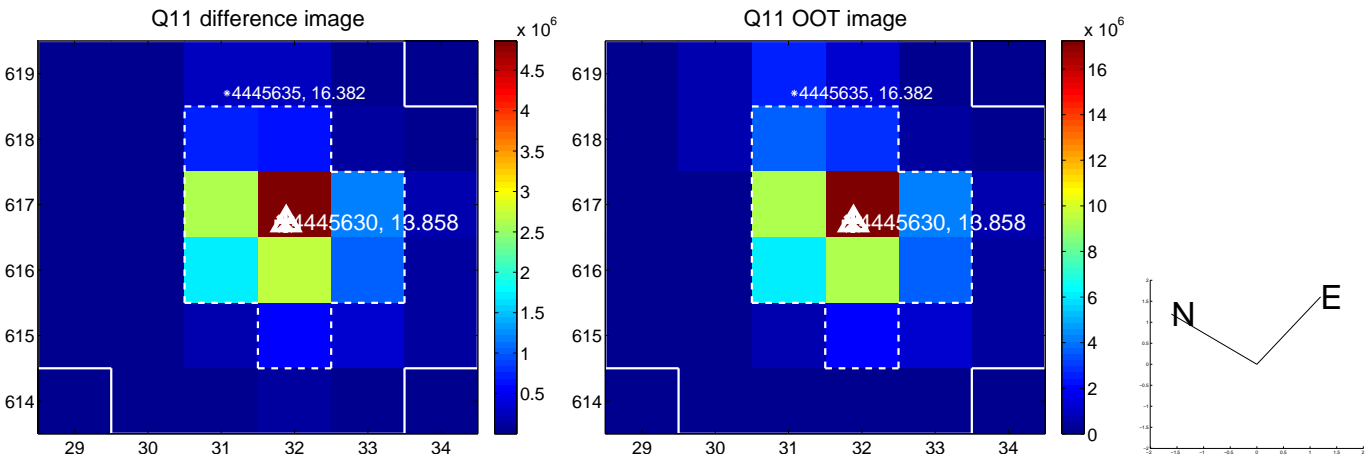
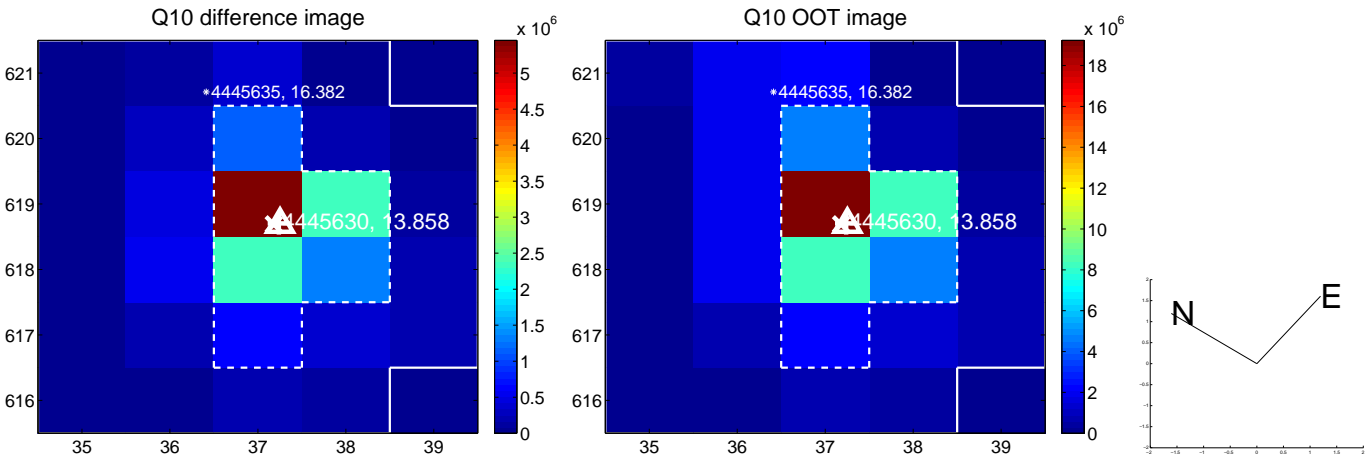
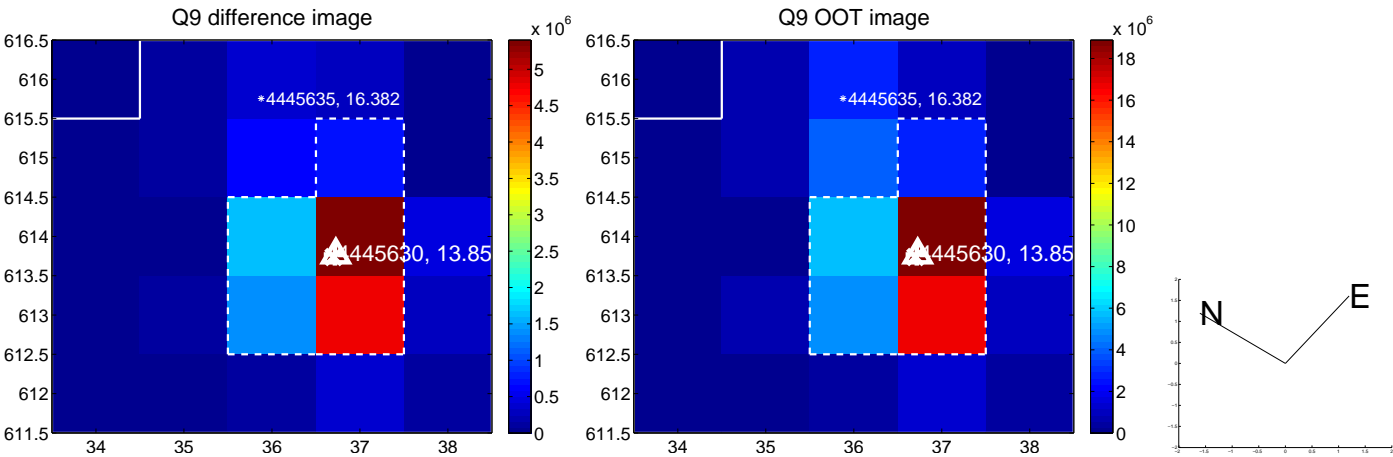


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

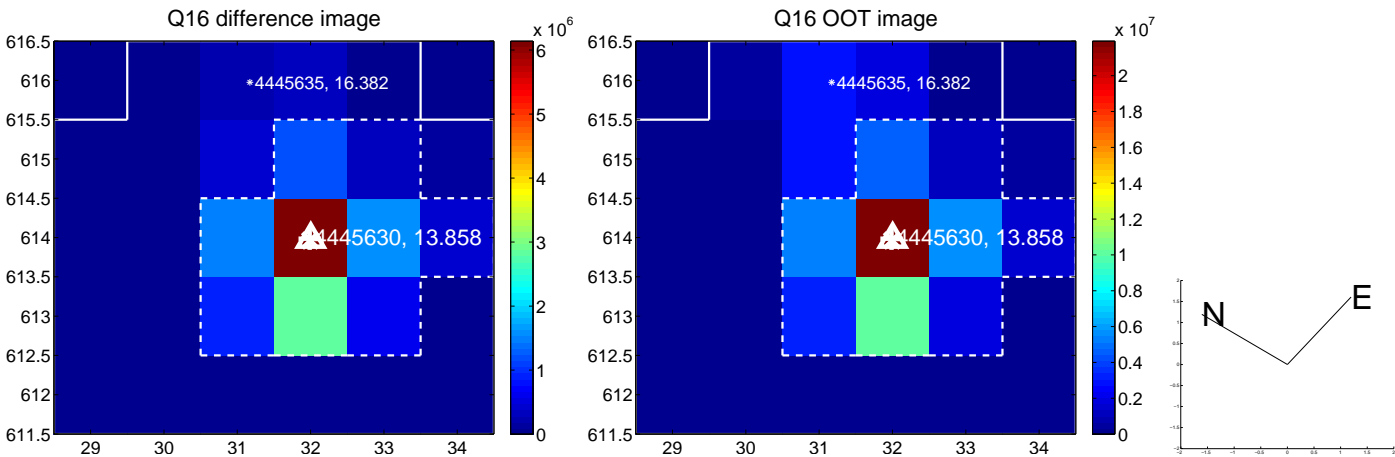
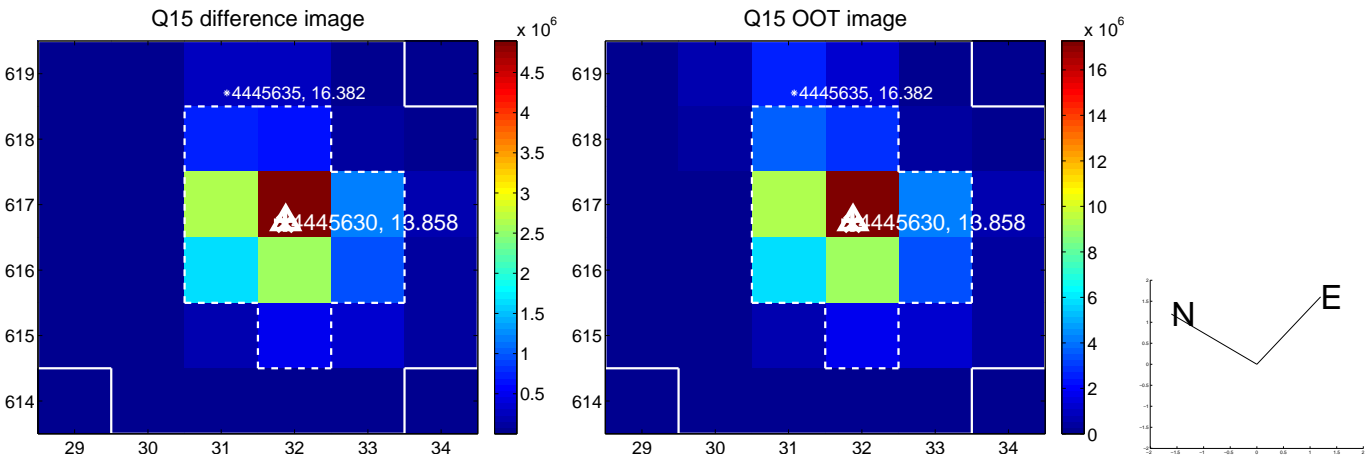
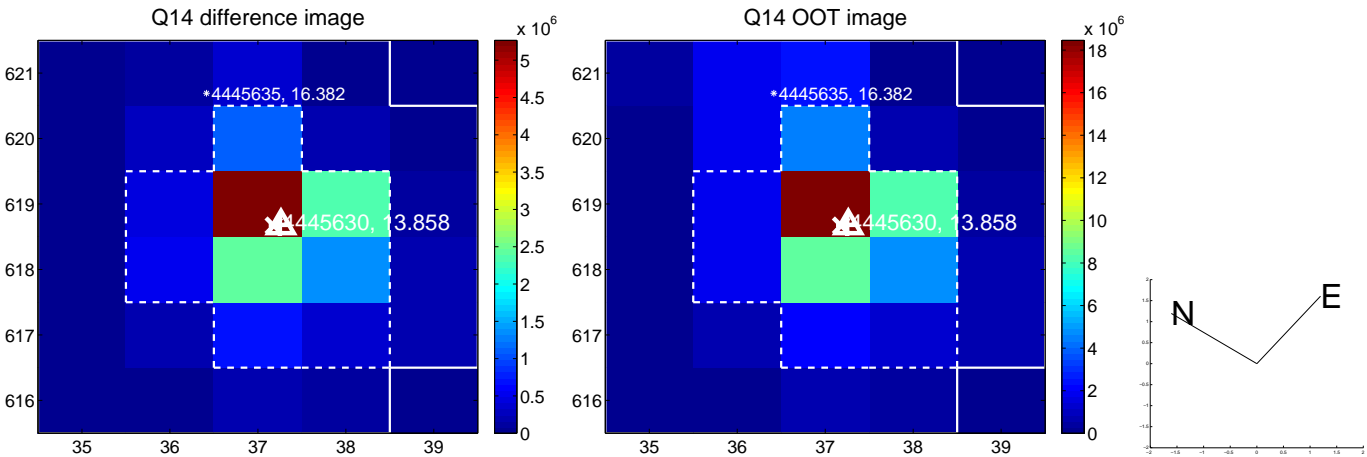
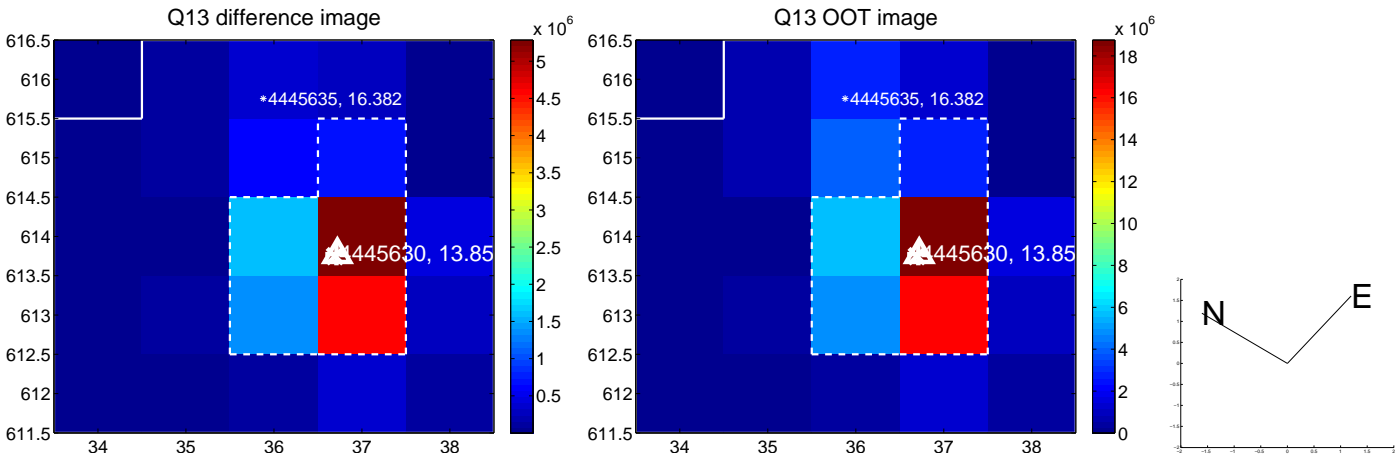




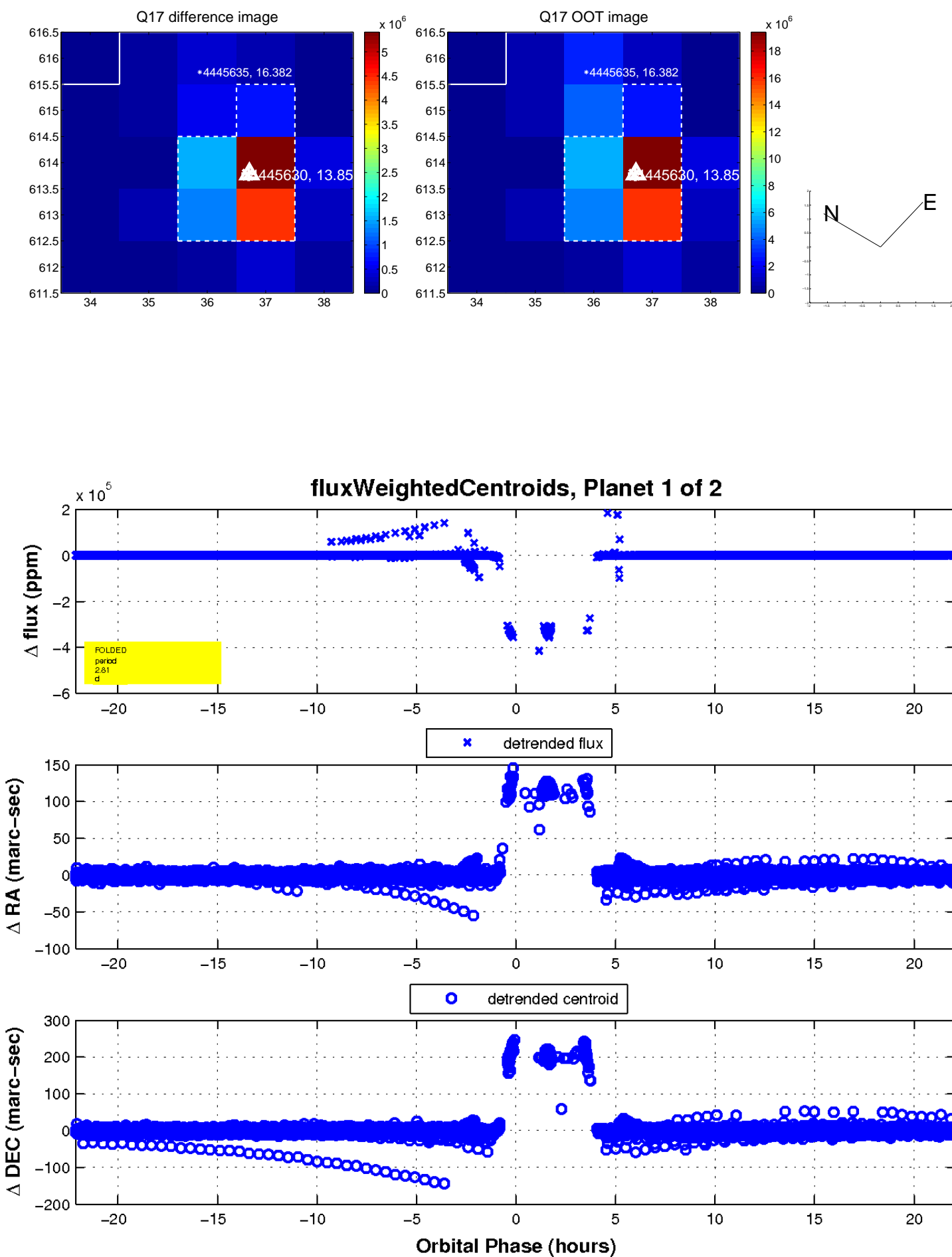
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

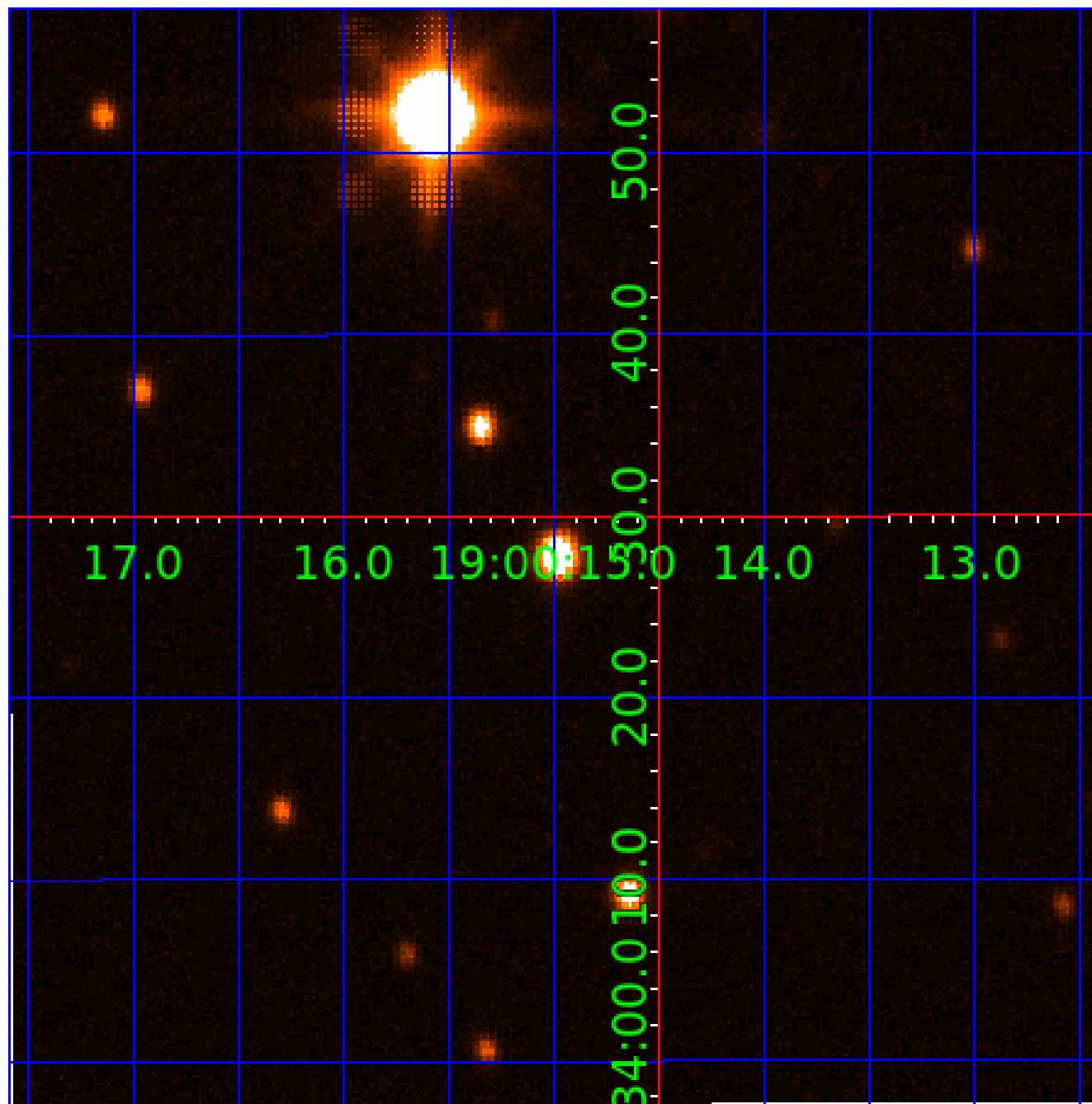


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 004445630

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|---------|------|-----------------------------|-----------------|------------------------|------------------------|
| 004445630-01 | OBS      | 6414.01 | 2.813965      | 133.104812   | 451840.4    | 4.500            | 39571.6 | -1.0 | 1.11                        | 6280            | 51.73                  | 1107.88                |
| 004445630-02 | OBS      | No      | 5.627760      | 133.731441   | 20244.2     | 7.500            | 1542.6  | -1.0 | 1.11                        | 6280            | 15.92                  | 439.68                 |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments                                |
|--------------|----------|------|-------|---|---|---|---|---|
| 004445630-01 | OBS      | FP   | 0.00  | 0 | 1 | 0 | 0 | MOD_ODDEVEN_ALT—HAS_SEC_TCE—CENT_NOFITS |
| 004445630-02 | 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.

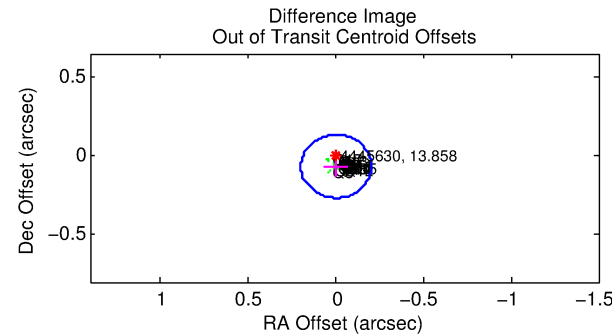
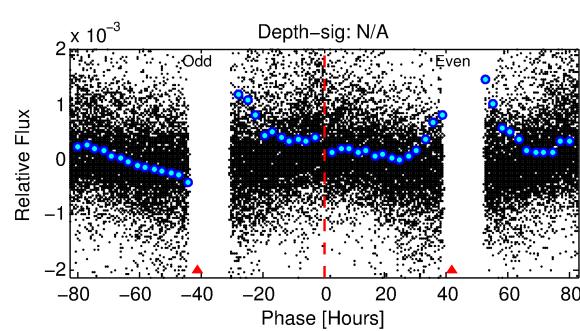
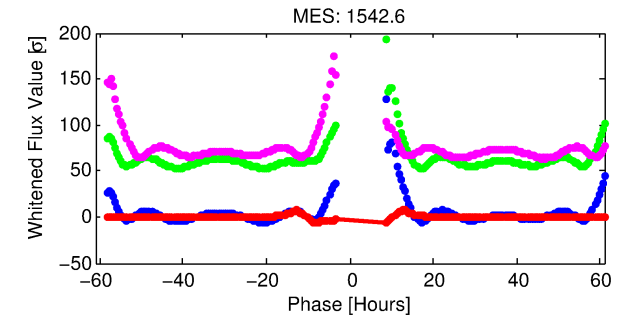
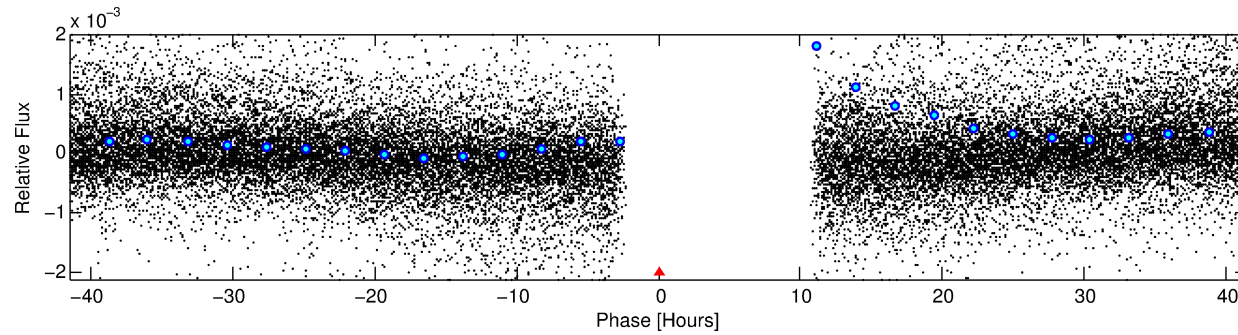
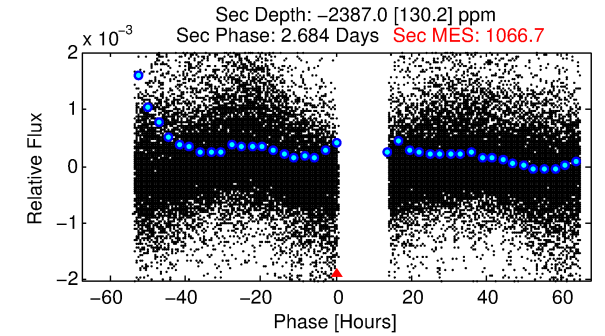
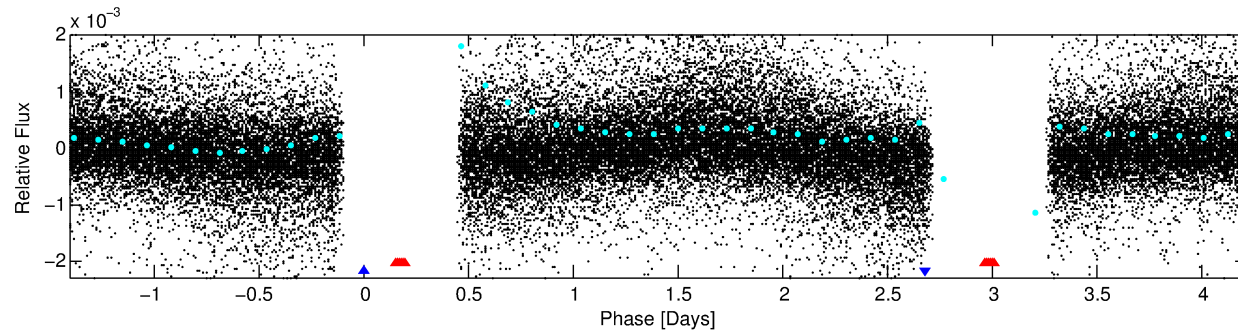
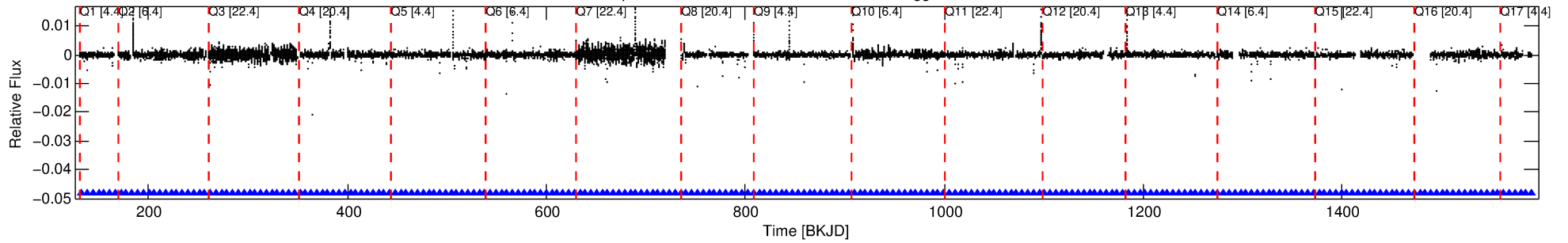
## Ephemeris Match Information For 004445630-02

No Significant Match Found

# DV One-Page Summary

KIC: 4445630 Candidate: 2 of 2 Period: 5.628 d  
KOI: K06414 Corr: No Ephemeris Match

Kp: 13.86 R\*: 1.11 Rs Teff: 6280.0 K Logg: 4.36 Fe/H: -0.180



TPS TCE Results:

Period = 5.62776 d  
Epoch = 133.7314 BKJD

DV fit results are unavailable

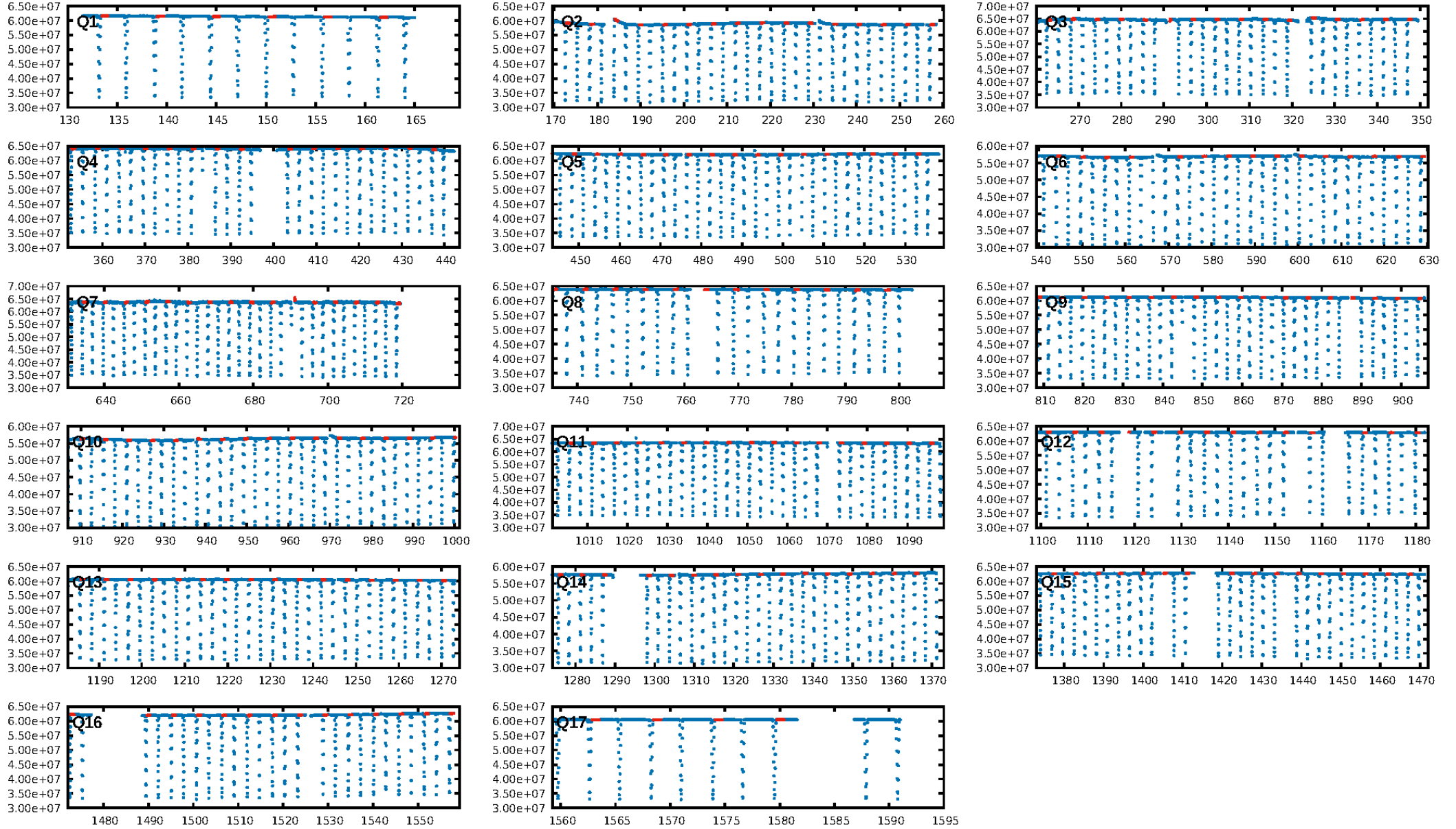
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [7.72σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [225/225]  
GhostDiagnostic-chr: -17.59  
Centroid-sig: N/A  
Centroid-so: 10.018 arcsec [11.44σ]  
OotOffset-rm: 0.065 arcsec [0.98σ]  
KicOffset-rm: 0.135 arcsec [1.96σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 09:31:04 Z

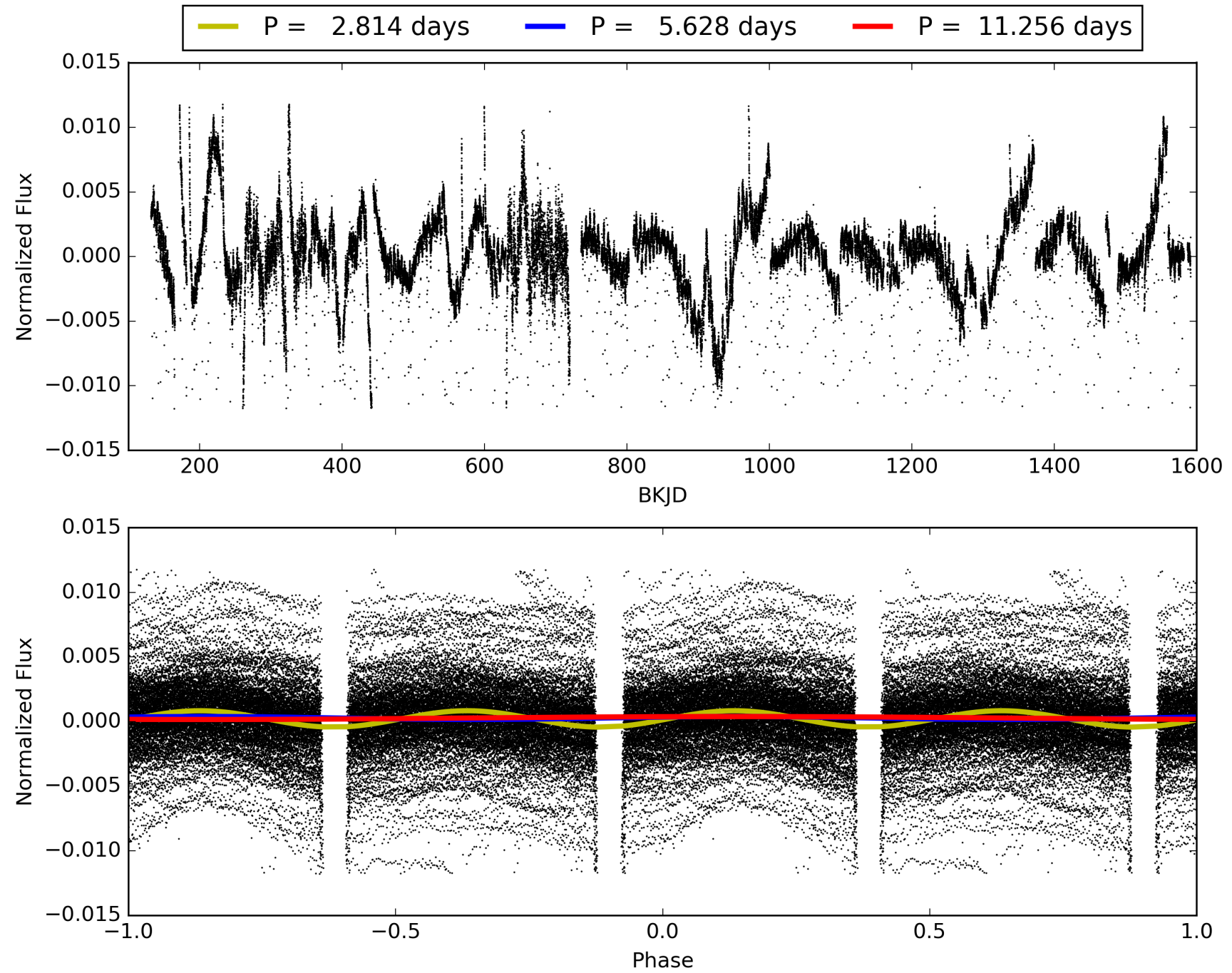
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004445630-02, PDC Light Curves





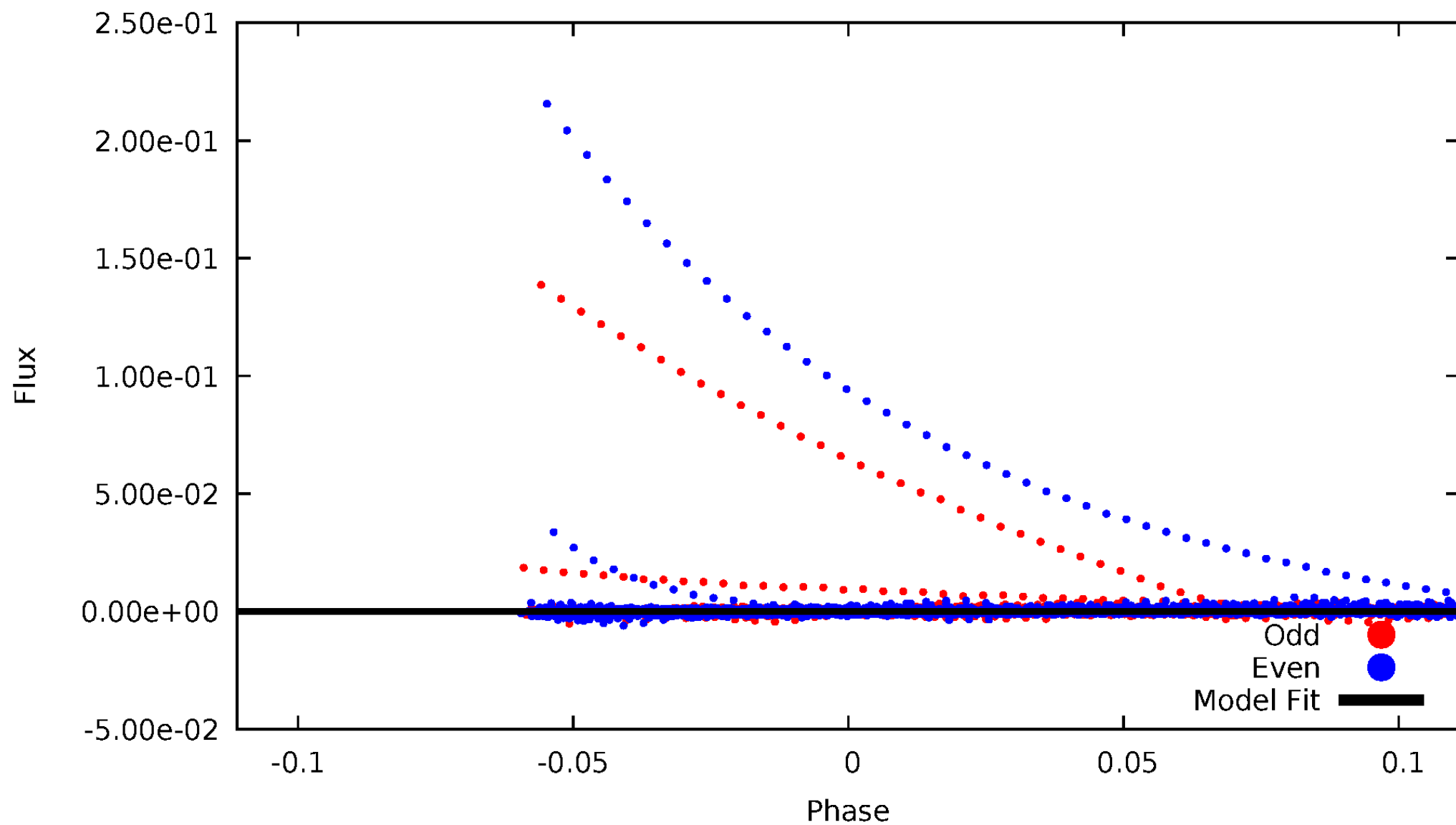
TCE 004445630-02





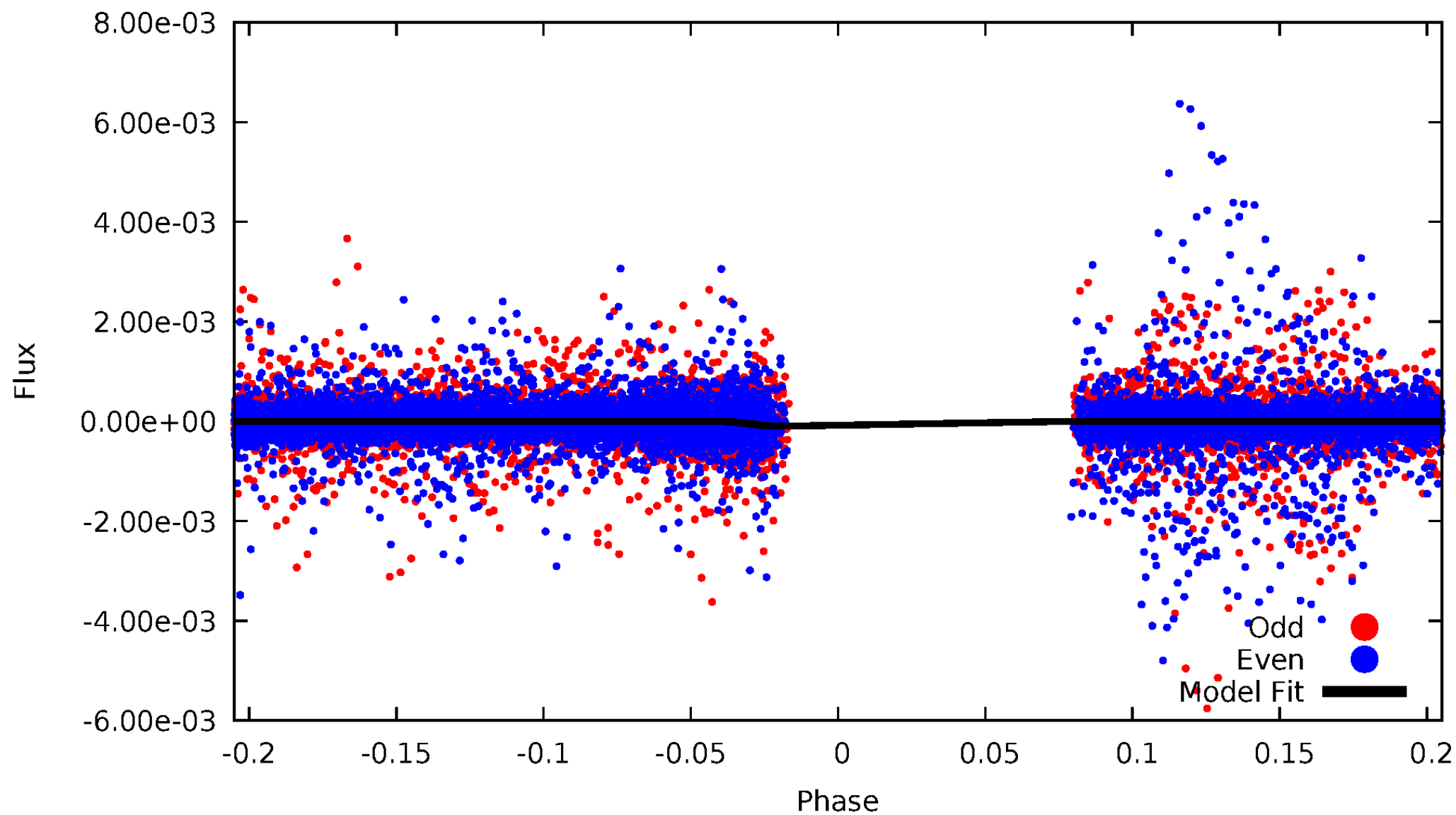
# DV Odd/Even

TCE 004445630-02



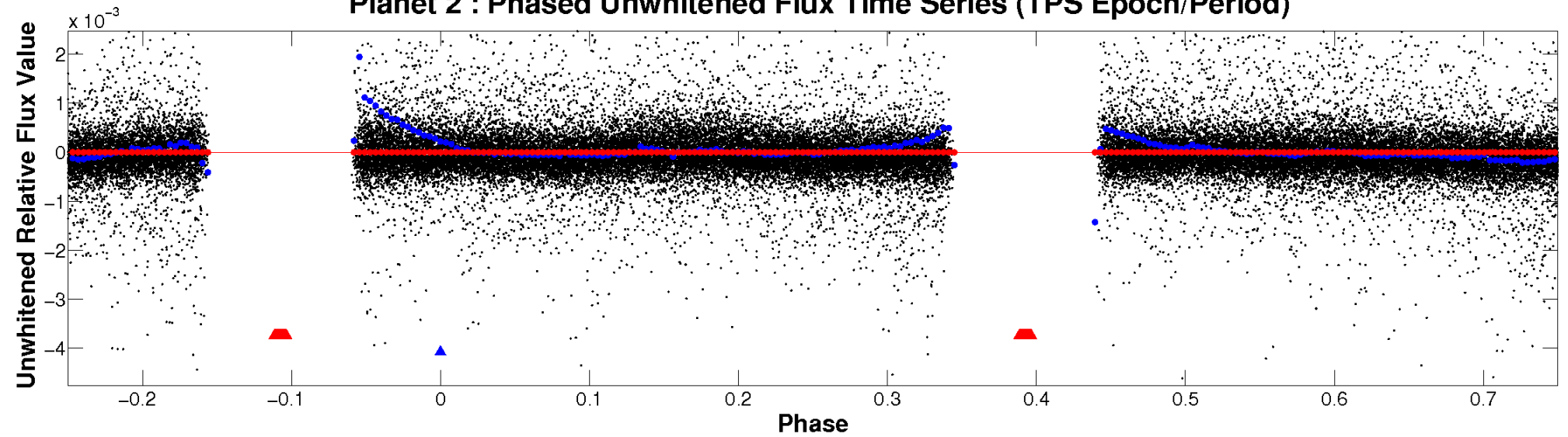
# ALT Odd/Even

TCE 004445630-02



# Non-Whitened Vs. Whitened Light Curve

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

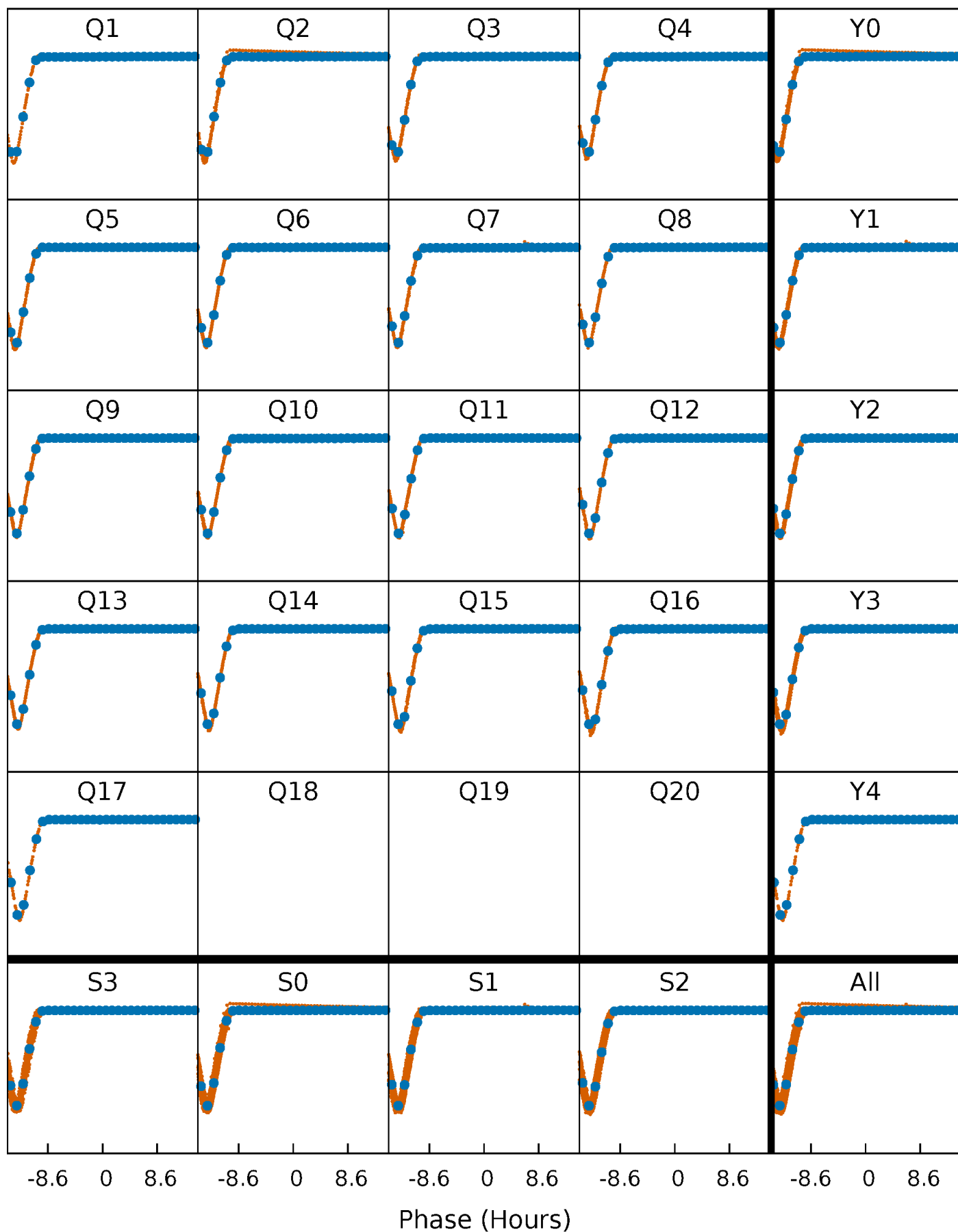


**Planet 2 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



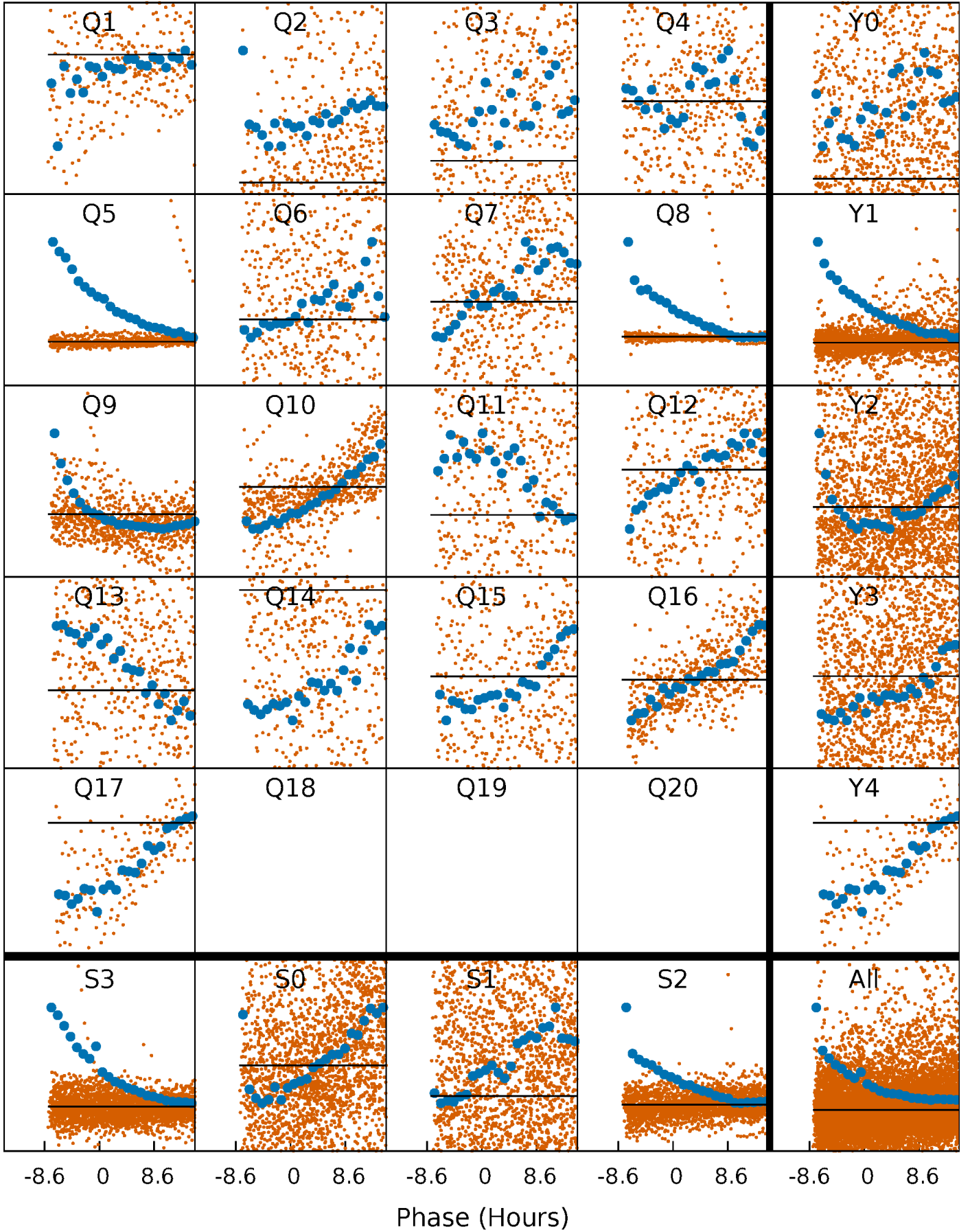
# PDC Quarter-Phased Transit Curves

TCE 004445630-02   P= 5.627760 Days    $T_0=133.731441$  (BKJD)



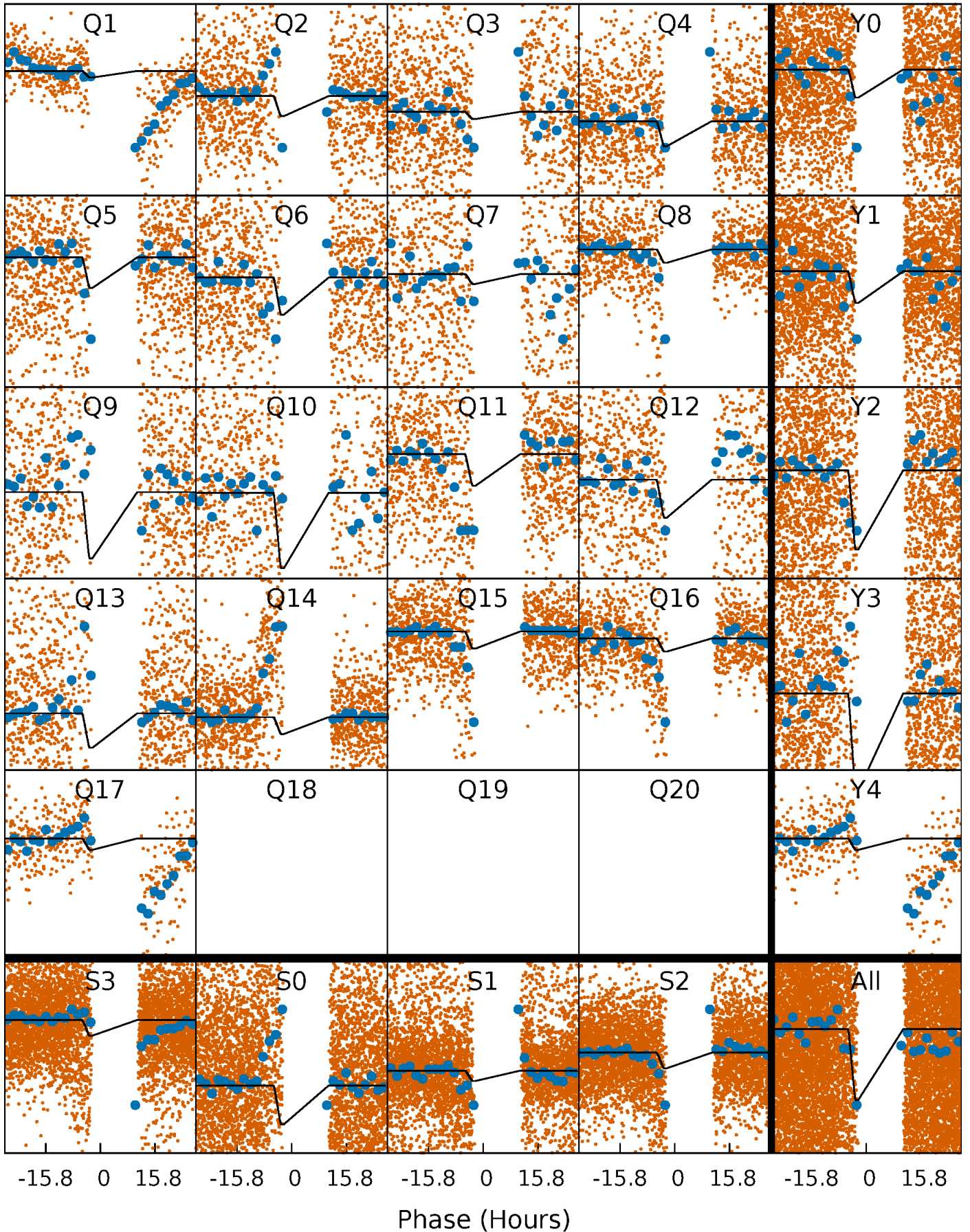
# DV Quarter-Phased Transit Curves

TCE 004445630-02     $P = 5.627760$  Days     $T_0 = 133.731441$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

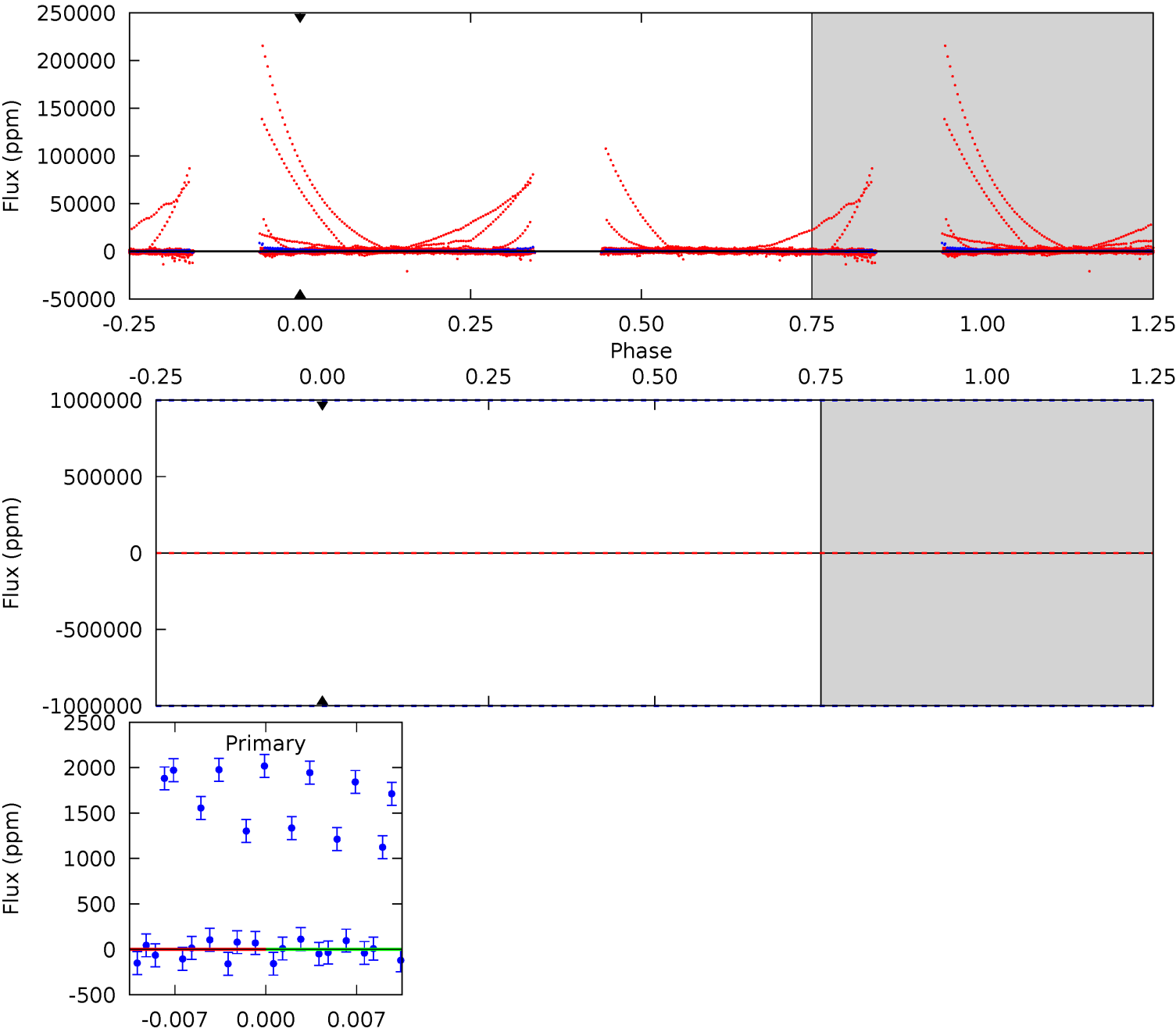
TCE 004445630-02 P= 5.627760 Days  $T_0=132.950954$  (BKJD)



# DV Model-Shift Uniqueness Test

004445630-02, P = 5.627760 Days, E = 128.103681 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   |

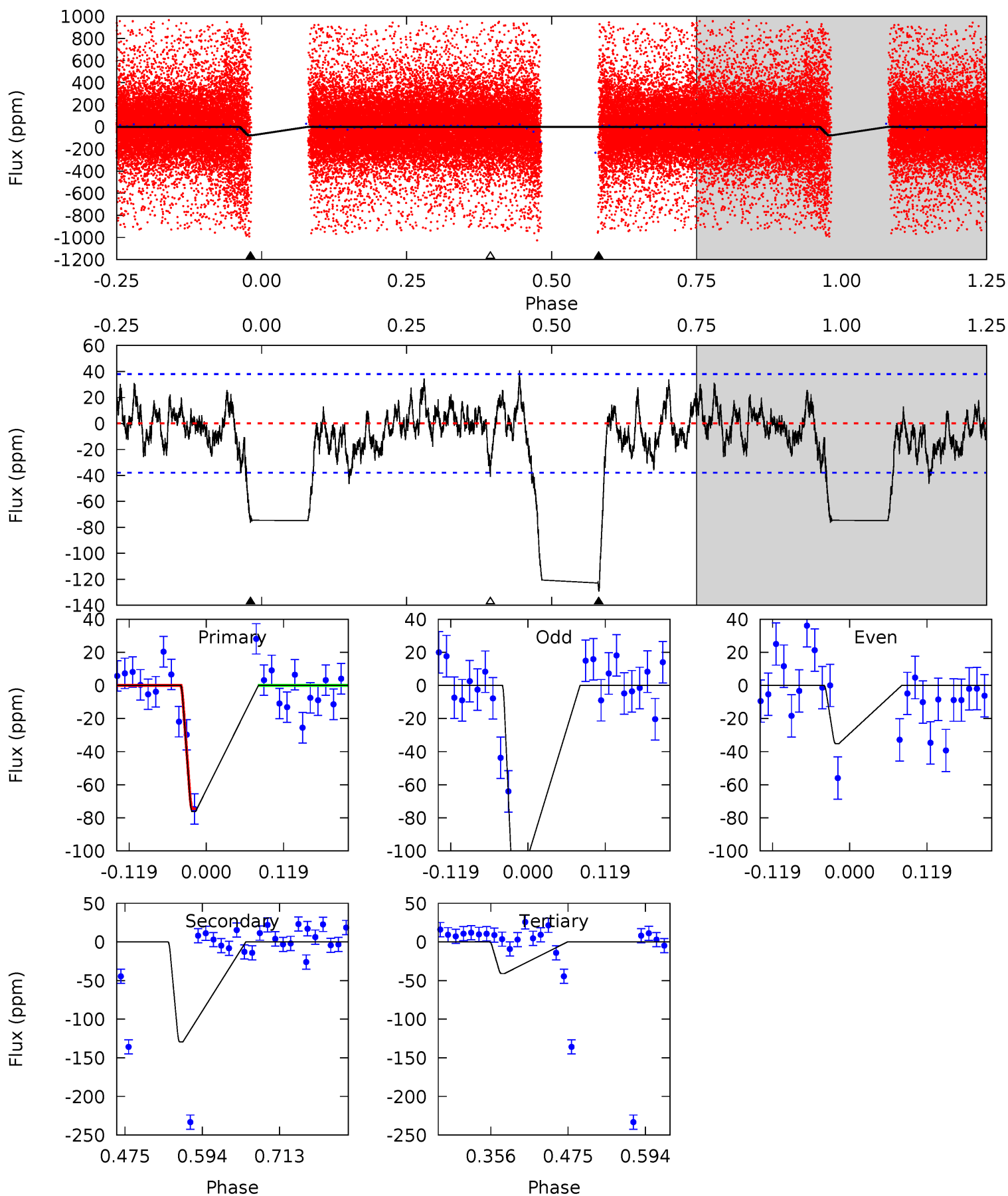




# Alt Model-Shift Uniqueness Test

004445630-02, P = 5.627760 Days, E = 127.323194 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 |
|------|------|------|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|-----|-------|-----|
| 9.09 | 15.4 | 4.88 | 0   | 4.53            | 1.56            | 2.01             | 4.21    | 9.09    | 10.5    | 15.4    | 5.24    | 0   | 0.24  | 0   |





### Stellar Parameters For KIC 004445630

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R (R_{\odot})$           | $M(M_{\odot})$            | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $6280^{+172}_{-203}$ | $4.361^{+0.101}_{-0.203}$ | $-0.180^{+0.250}_{-0.300}$ | $1.115^{+0.367}_{-0.157}$ | $1.036^{+0.173}_{-0.115}$ | $1.054^{+0.499}_{-0.542}$                 |
|        | +3%/-3%              | +2%/-5%                   | +139%/-167%                | +33%/-14%                 | +17%/-11%                 | +47%/-51%                                 |
| 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 004445630-02 / KOI

| Detrend | Depth (ppm)     | $R_p (R_{\oplus})$        | $T_{max} (K)$       | $T_{obs} (K)$            | $A_{obs}$                      |
|---------|-----------------|---------------------------|---------------------|--------------------------|--------------------------------|
| DV      | $0 \pm 1000000$ | $17.82^{+12.65}_{-10.41}$ | $1647^{+128}_{-82}$ | $2228^{+10468}_{-13542}$ | $0.521^{+1199.158}_{-932.868}$ |
| Alt.    | $-129 \pm 8$    | $8.45^{+10.17}_{-5.97}$   | $1646^{+132}_{-85}$ | $3111^{+1751}_{-683}$    | $4.008^{+44.081}_{-3.216}$     |

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

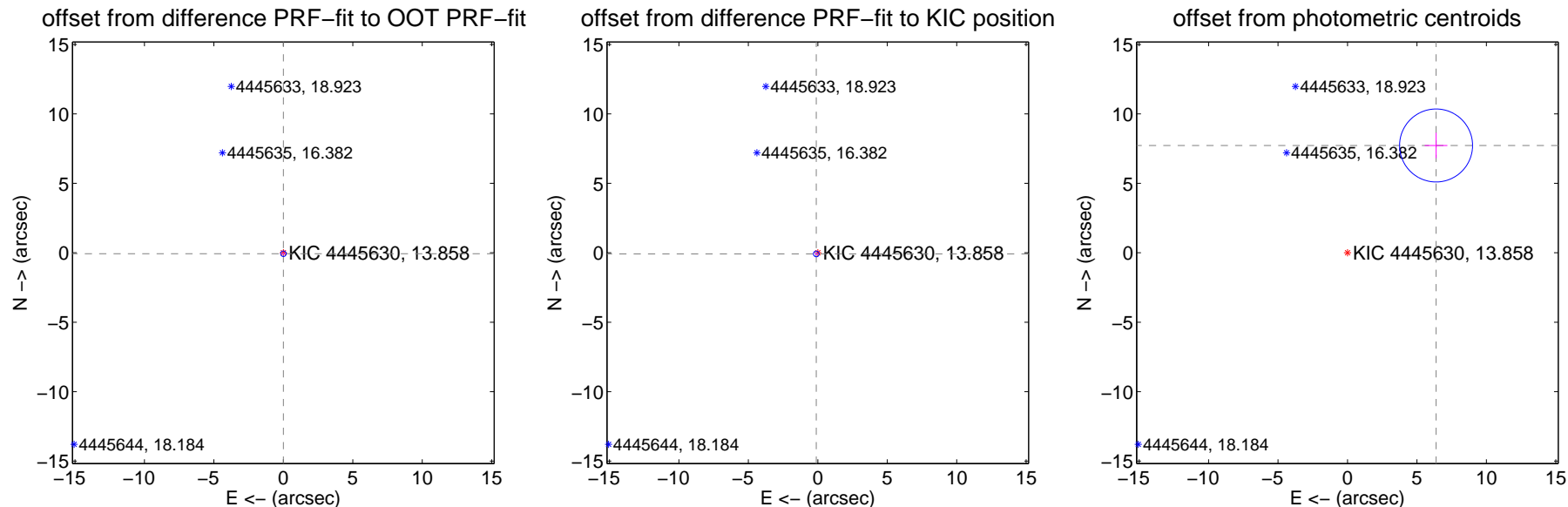
## DV Centroid Data

Supplemental centroid analysis for 004445630-02. Kepler magnitude: 13.86. Transit SNR -1.00

There are 17 quarters with good PRF difference image offsets

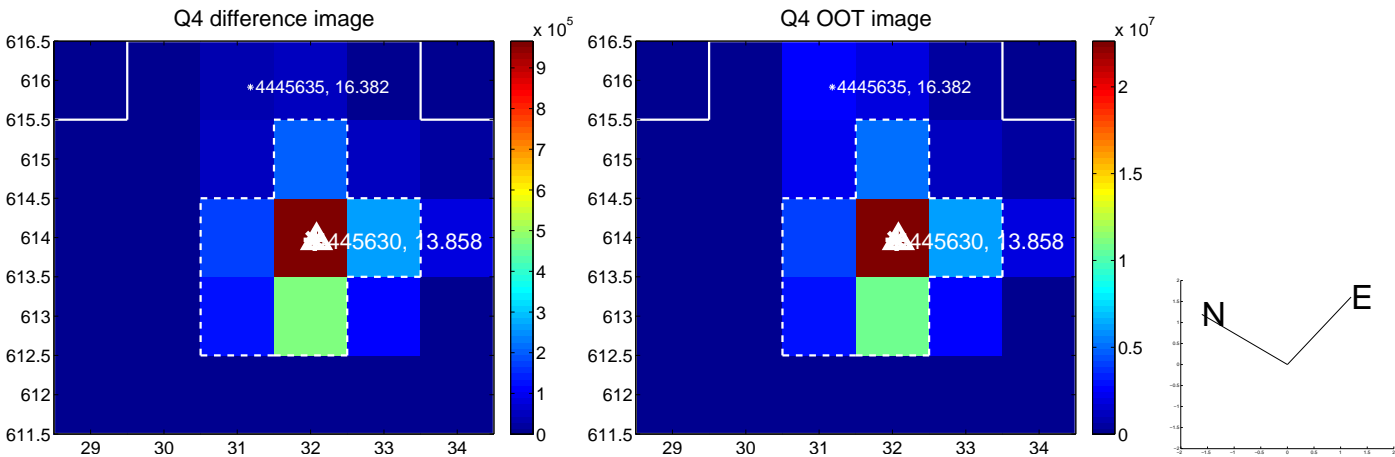
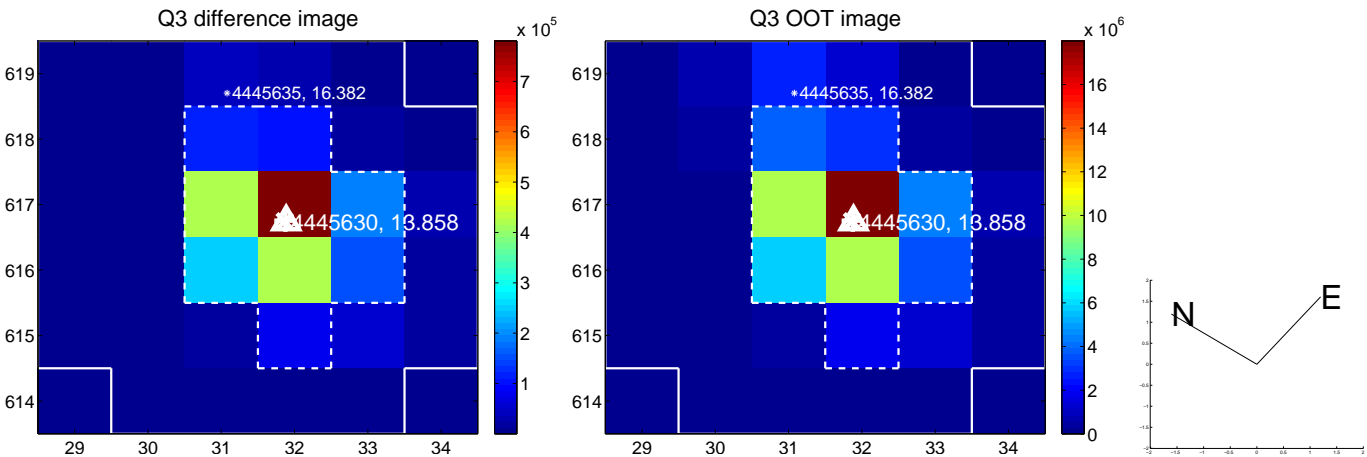
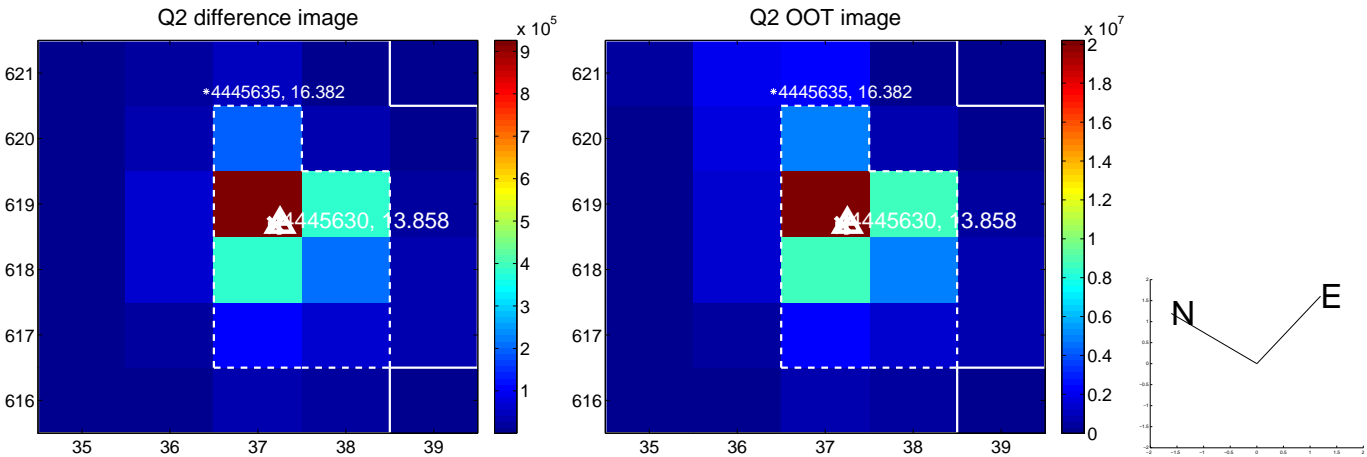
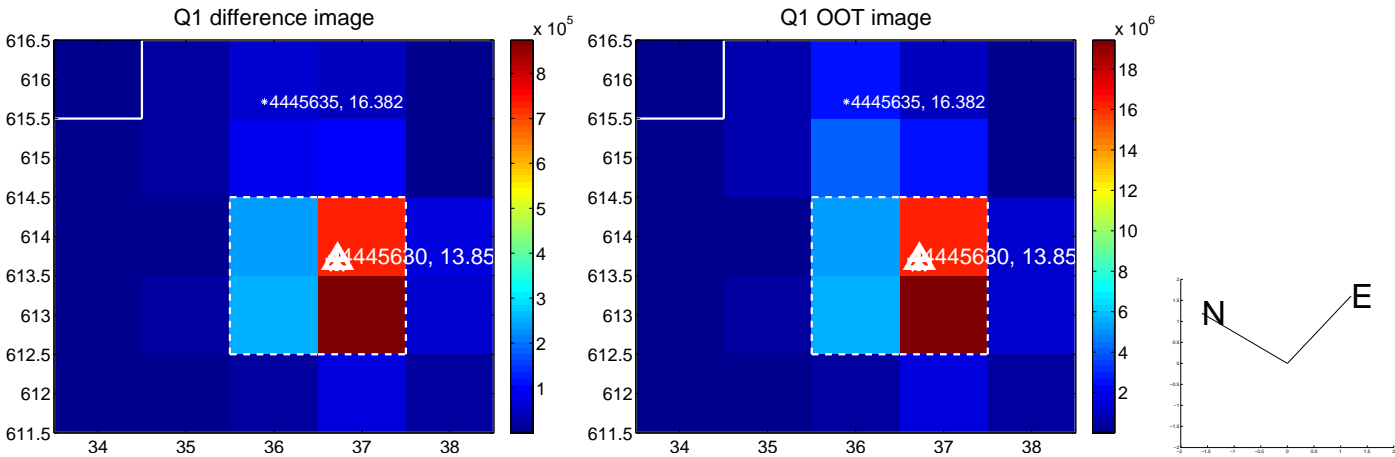
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA        | $\Delta$ Dec       |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT          | $0.065 \pm 0.067$  | 0.98                | $-0.003 \pm 0.067$ | $-0.065 \pm 0.067$ |
| PRF-fit source offset from KIC position | $0.135 \pm 0.069$  | 1.96                | $0.108 \pm 0.068$  | $-0.080 \pm 0.069$ |
| photometric centroid source offset      | $10.02 \pm 0.88$   | 11.44               | $-6.38 \pm 0.81$   | $7.73 \pm 0.92$    |

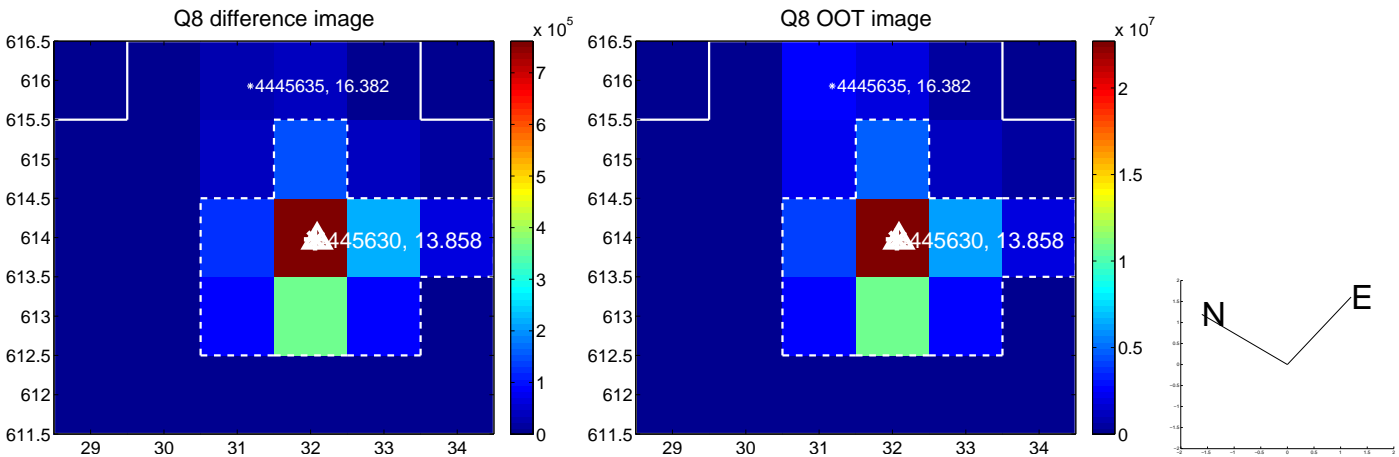
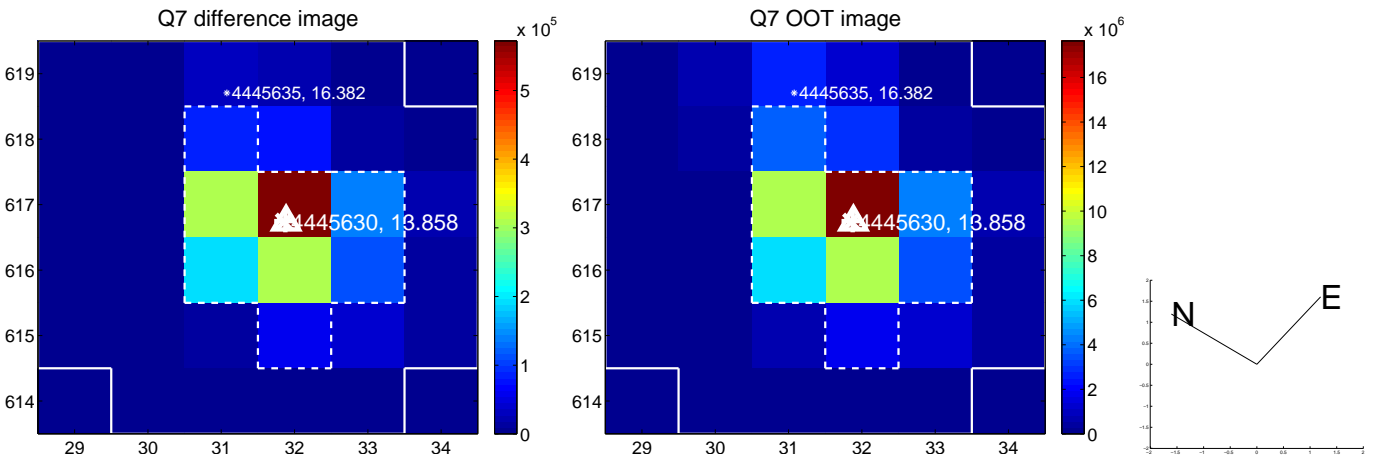
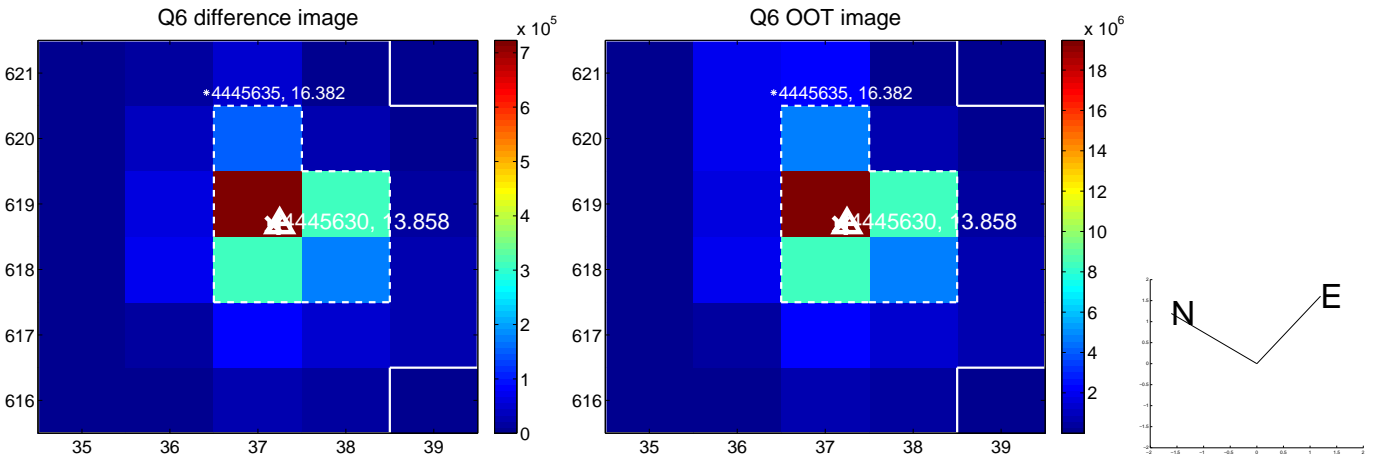
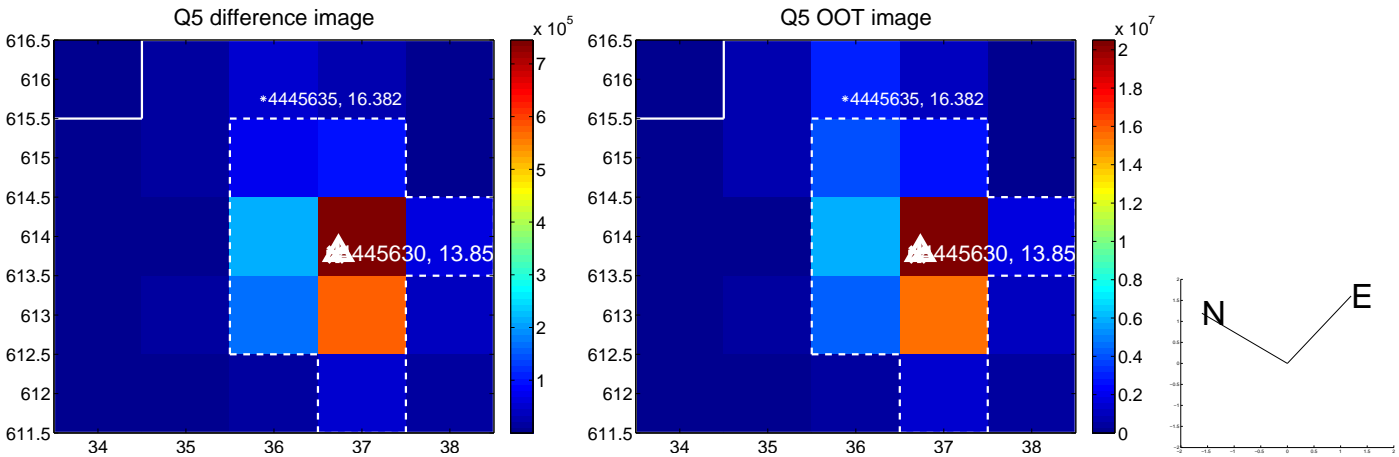


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

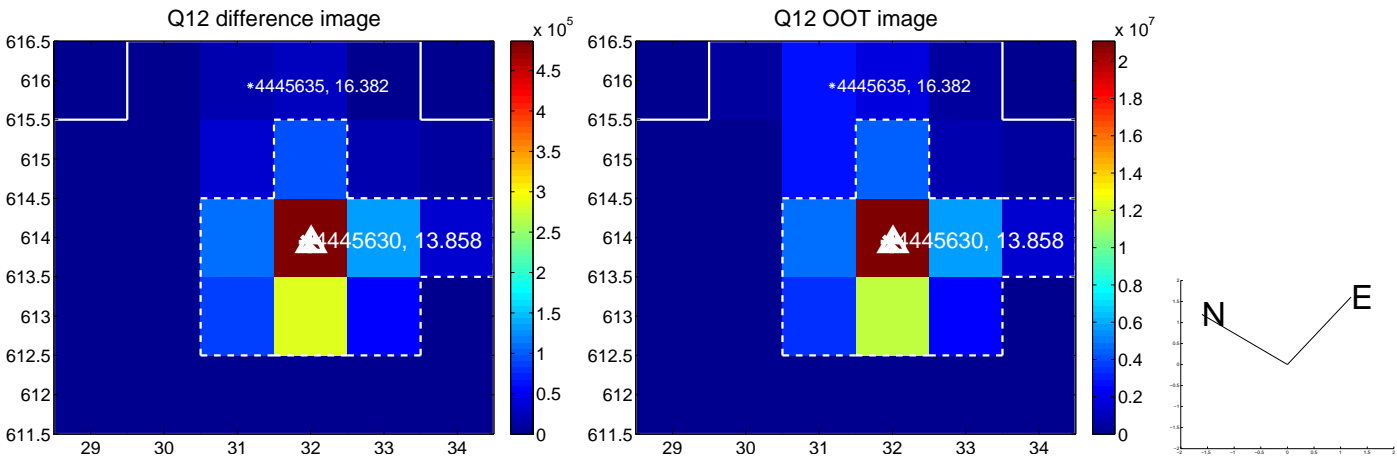
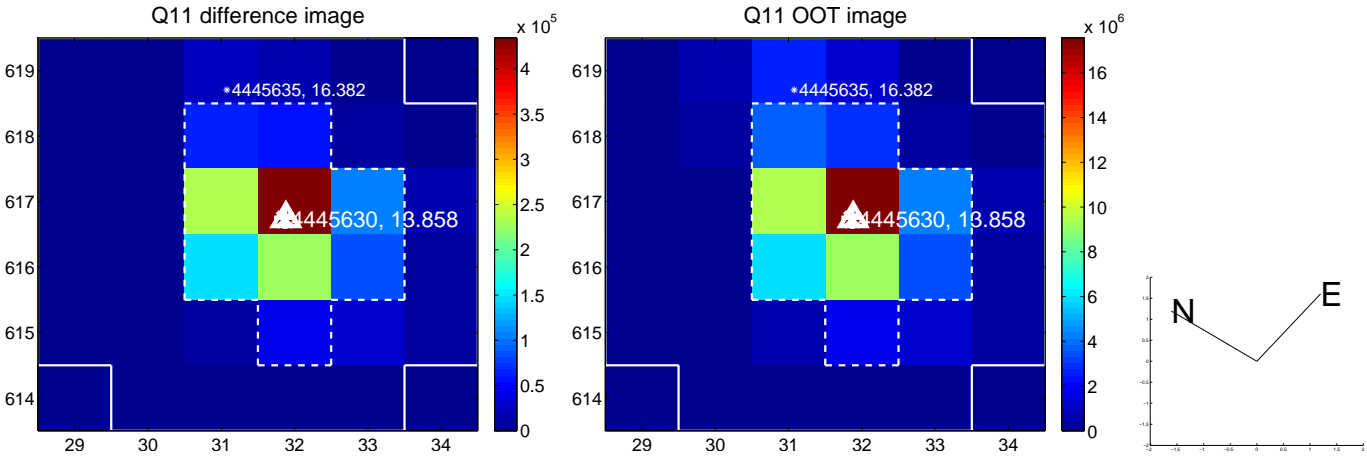
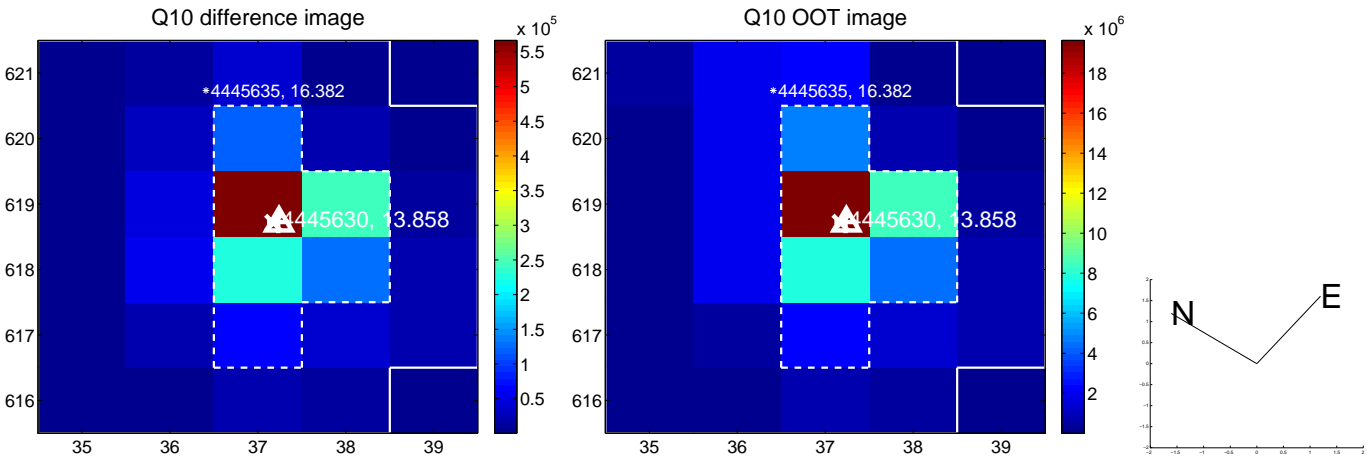
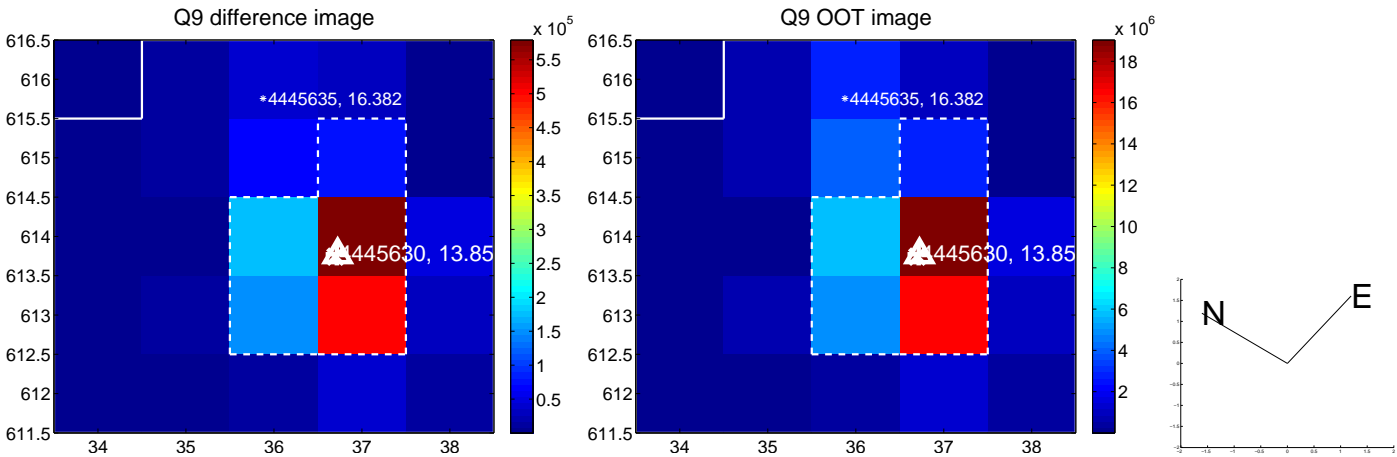
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



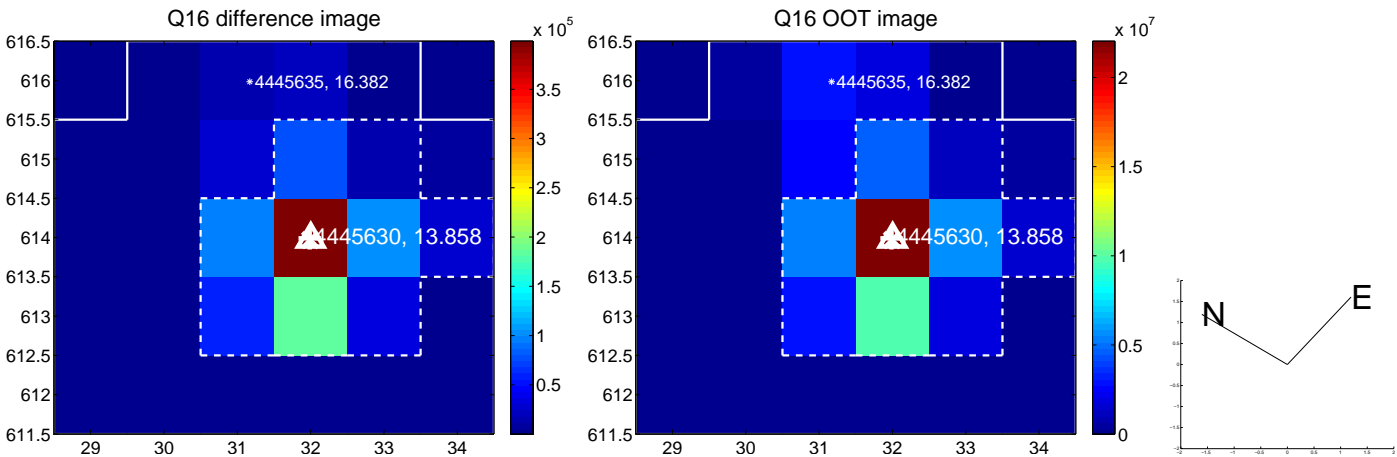
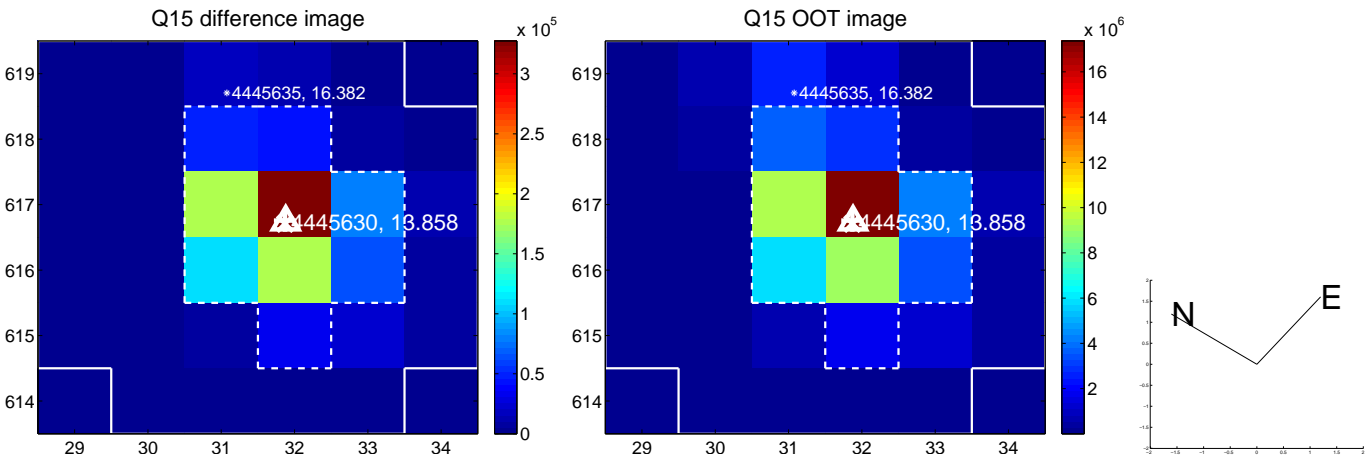
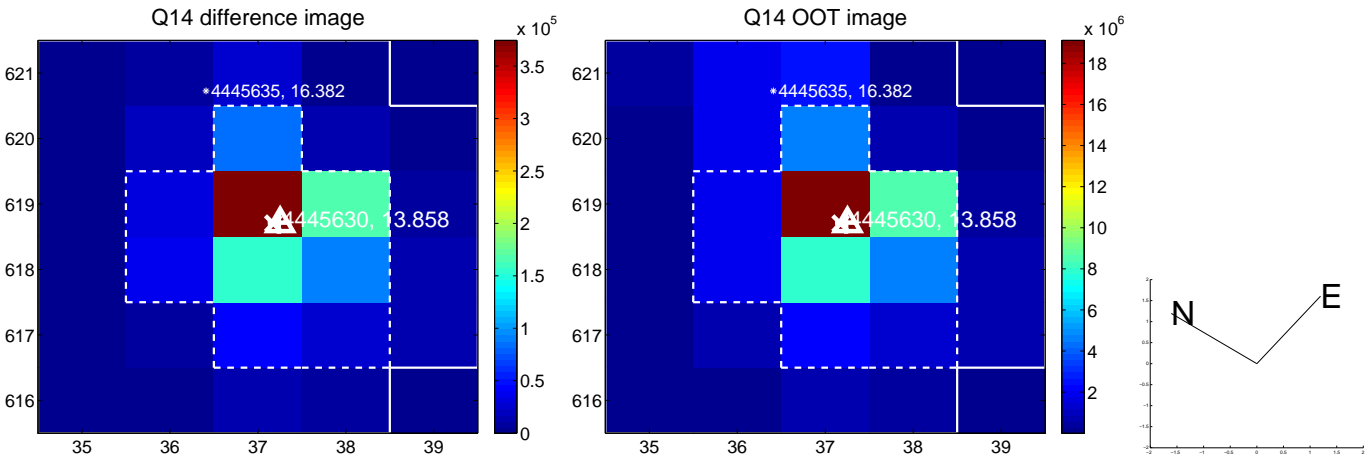
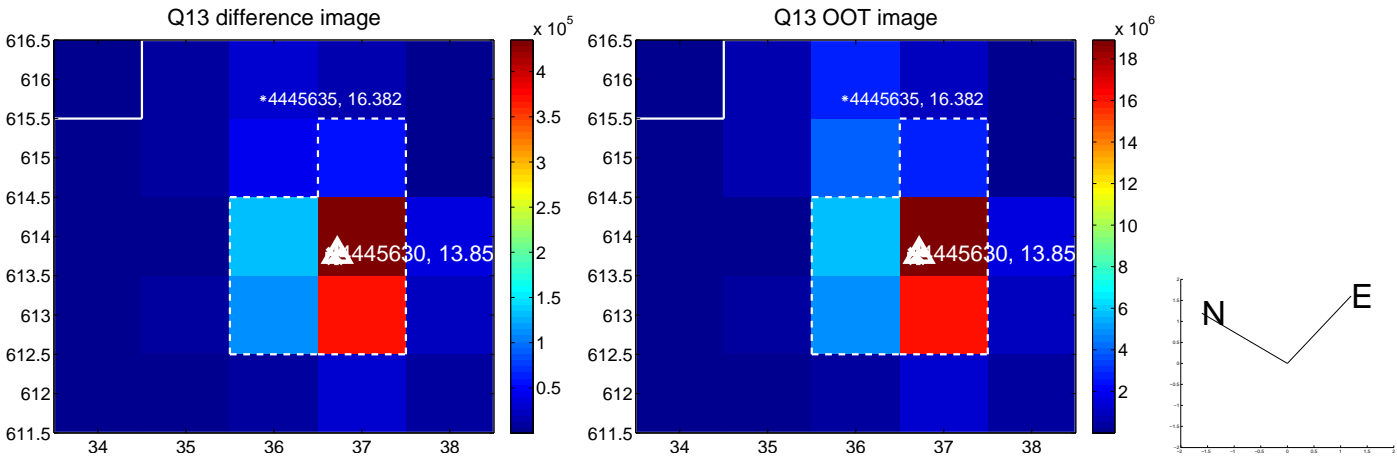
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



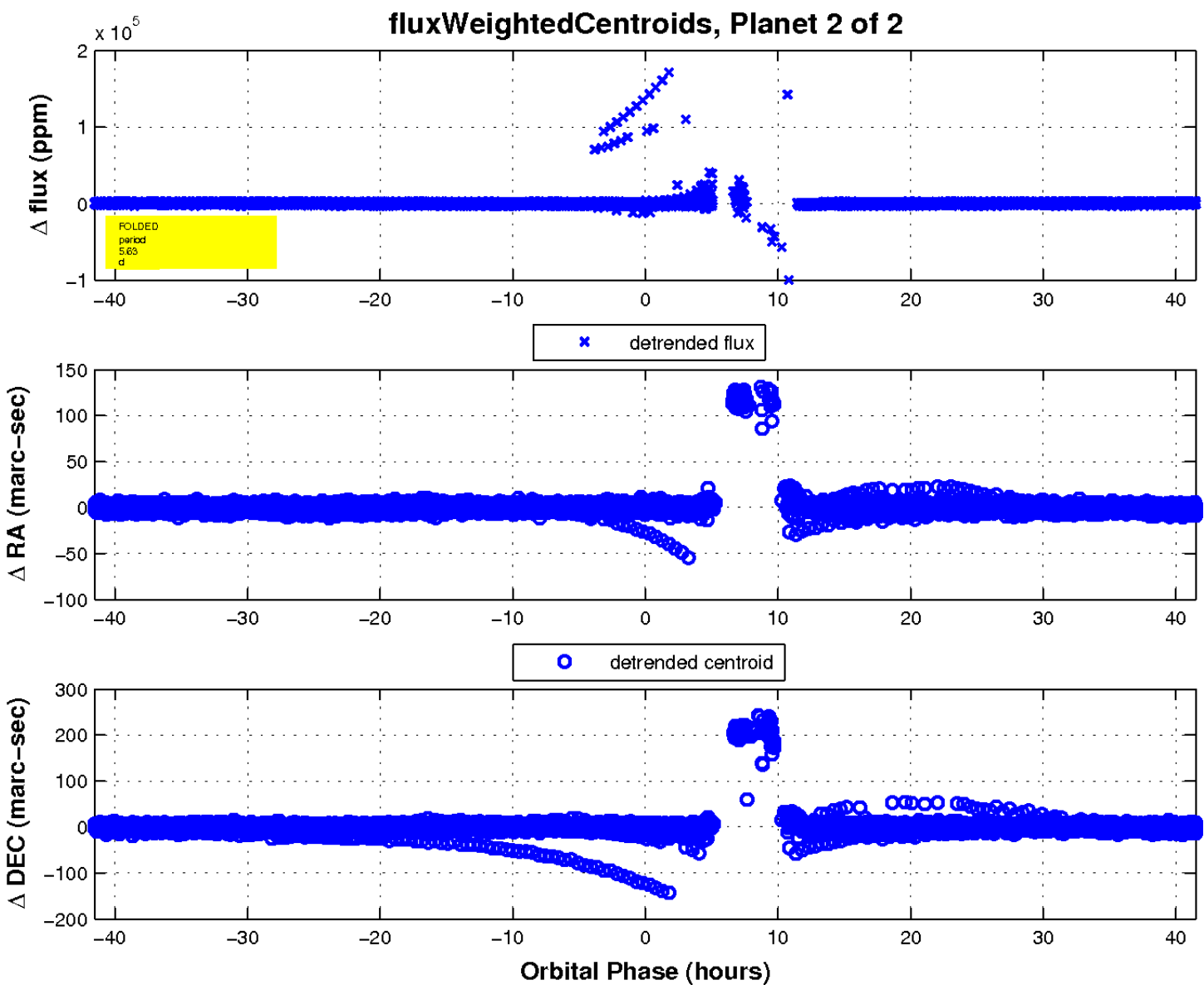
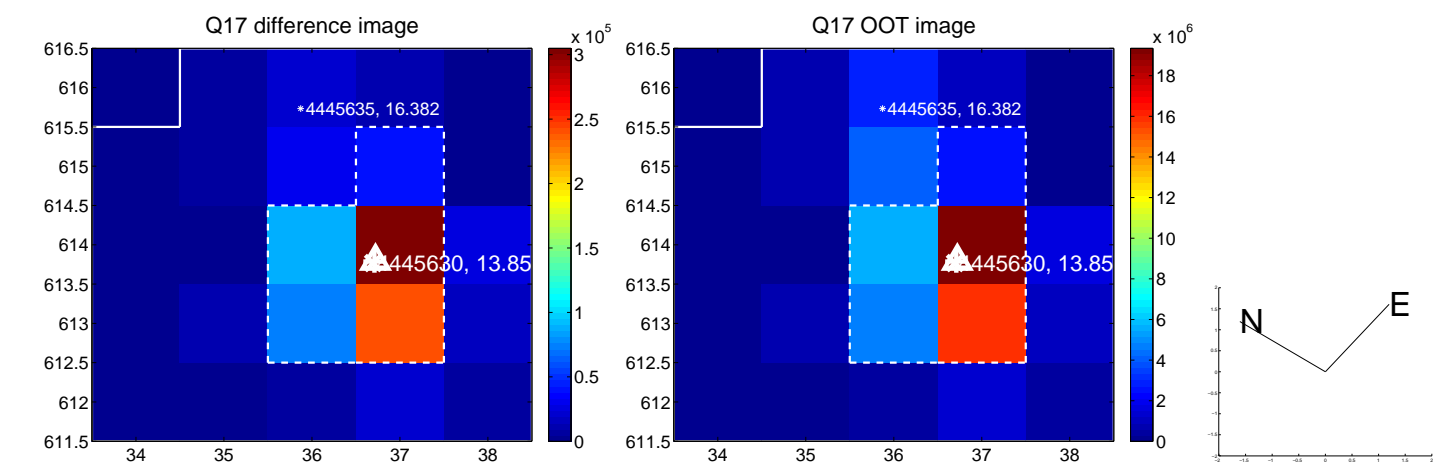
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image

Declination

