

# KIC 004245701

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 004245701-01 | OBS      | No   | 0.897843      | 132.180675   | 12.4        | 6.163            | 9.1  | 8.1  | 2.41                        | 7164            | 0.87                   | 31869.90               |
| 004245701-02 | OBS      | No   | 55.714468     | 141.964464   | 209.6       | 6.163            | 7.2  | 8.3  | 2.41                        | 7164            | 3.94                   | 129.72                 |
| 004245701-03 | OBS      | No   | 41.857491     | 147.545112   | 252.1       | 1.312            | 7.9  | 9.9  | 2.41                        | 7164            | 4.30                   | 189.94                 |
| 004245701-04 | OBS      | No   | 30.455228     | 158.307676   | 206.1       | 2.005            | 11.3 | 7.0  | 2.41                        | 7164            | 4.00                   | 290.25                 |
| 004245701-05 | OBS      | No   | 28.418026     | 132.694838   | 149.5       | 3.266            | 9.3  | 9.9  | 2.41                        | 7164            | 3.31                   | 318.31                 |
| 004245701-06 | OBS      | No   | 191.277248    | 181.918761   | 270.0       | 2.551            | 10.1 | 10.5 | 2.41                        | 7164            | 4.68                   | 25.05                  |
| 004245701-07 | OBS      | No   | 22.543458     | 150.815074   | 101.3       | 3.423            | 10.6 | 6.9  | 2.41                        | 7164            | 2.75                   | 433.46                 |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 004245701-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | LPP_DV—CENT_SATURATED   |
| 004245701-02 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED                  |
| 004245701-03 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—CENT_SATURATED   |
| 004245701-04 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED  |
| 004245701-05 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED  |
| 004245701-06 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED |
| 004245701-07 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—CENT_SATURATED  |

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

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

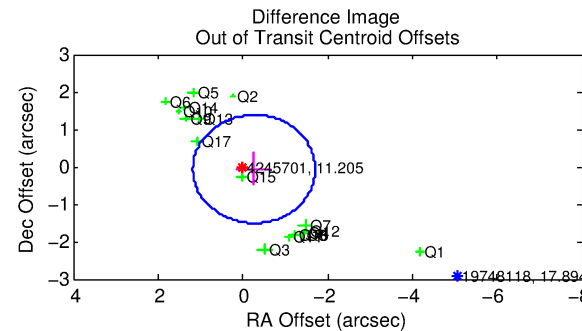
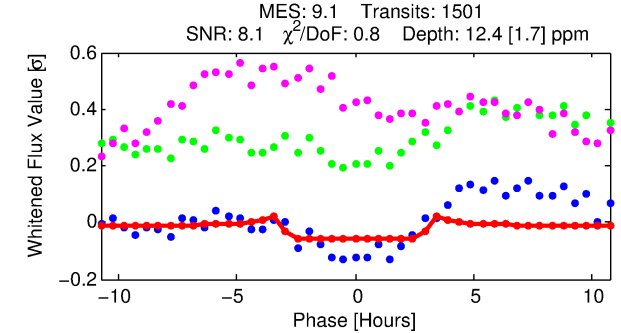
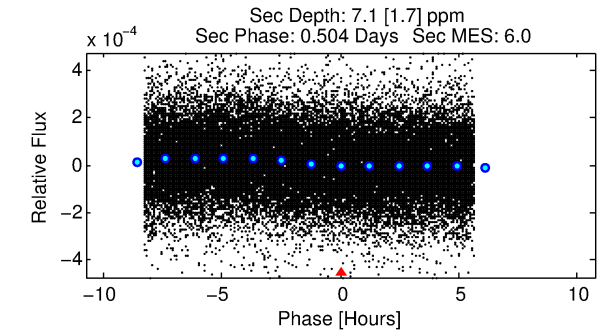
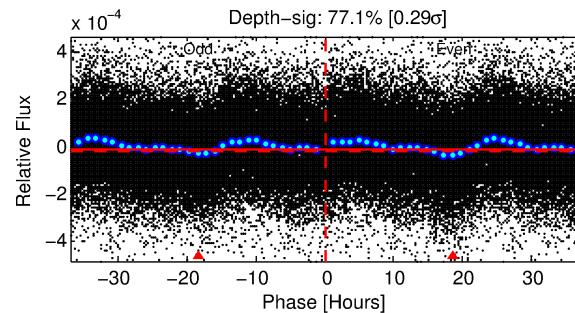
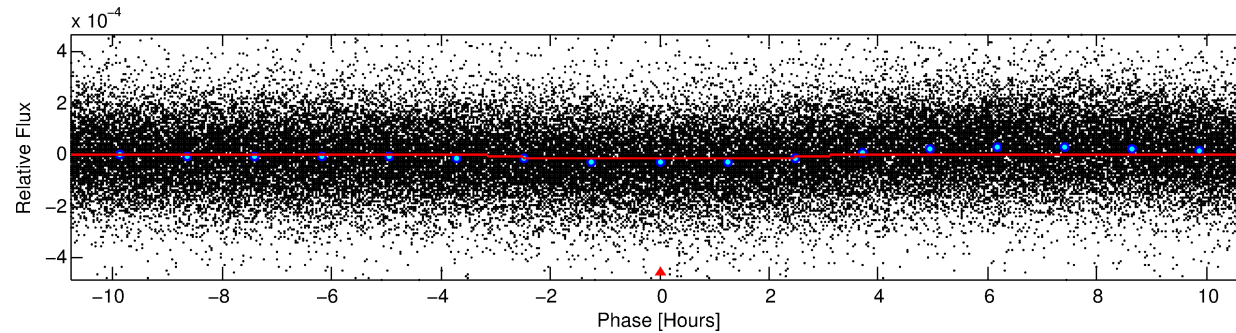
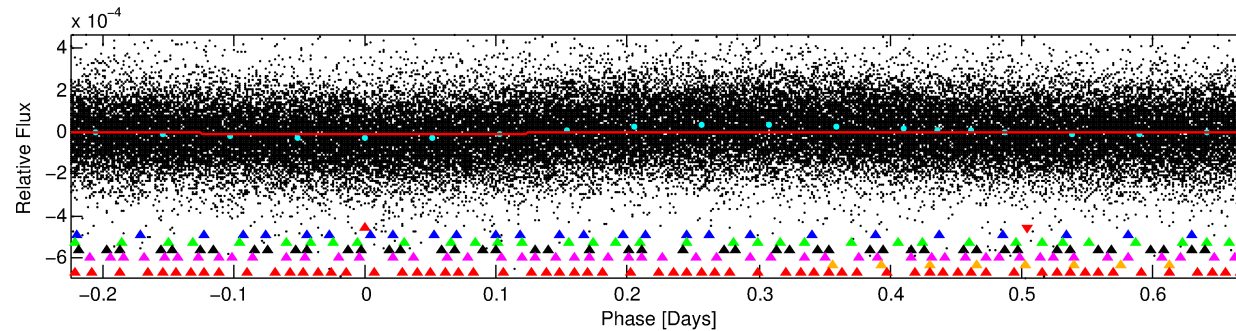
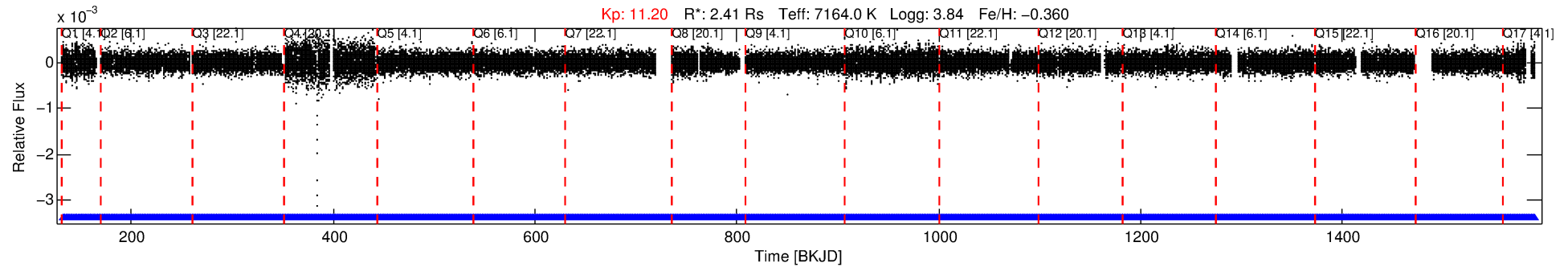
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004245701-01

No Significant Match Found

# DV One-Page Summary

KIC: 4245701 Candidate: 1 of 7 Period: 0.898 d



## DV Fit Results:

Period = 0.89784 [0.00002] d  
Epoch = 132.1807 [0.0046] BKJD  
Rp/R\* = 0.0033 [0.0019]  
a/R\* = 1.25 [1.42]  
b = 0.38 [7.38]  
Seff = 31869.90 [22581.83]  
Teff = 3407 [604] K  
Rp = 0.87 [0.63] Re  
a = 0.0207 [0.0090] AU  
Ag = 2.24 [3.05] [0.40 $\sigma$ ]  
Teffp = 6442 [1908] K [1.52 $\sigma$ ]

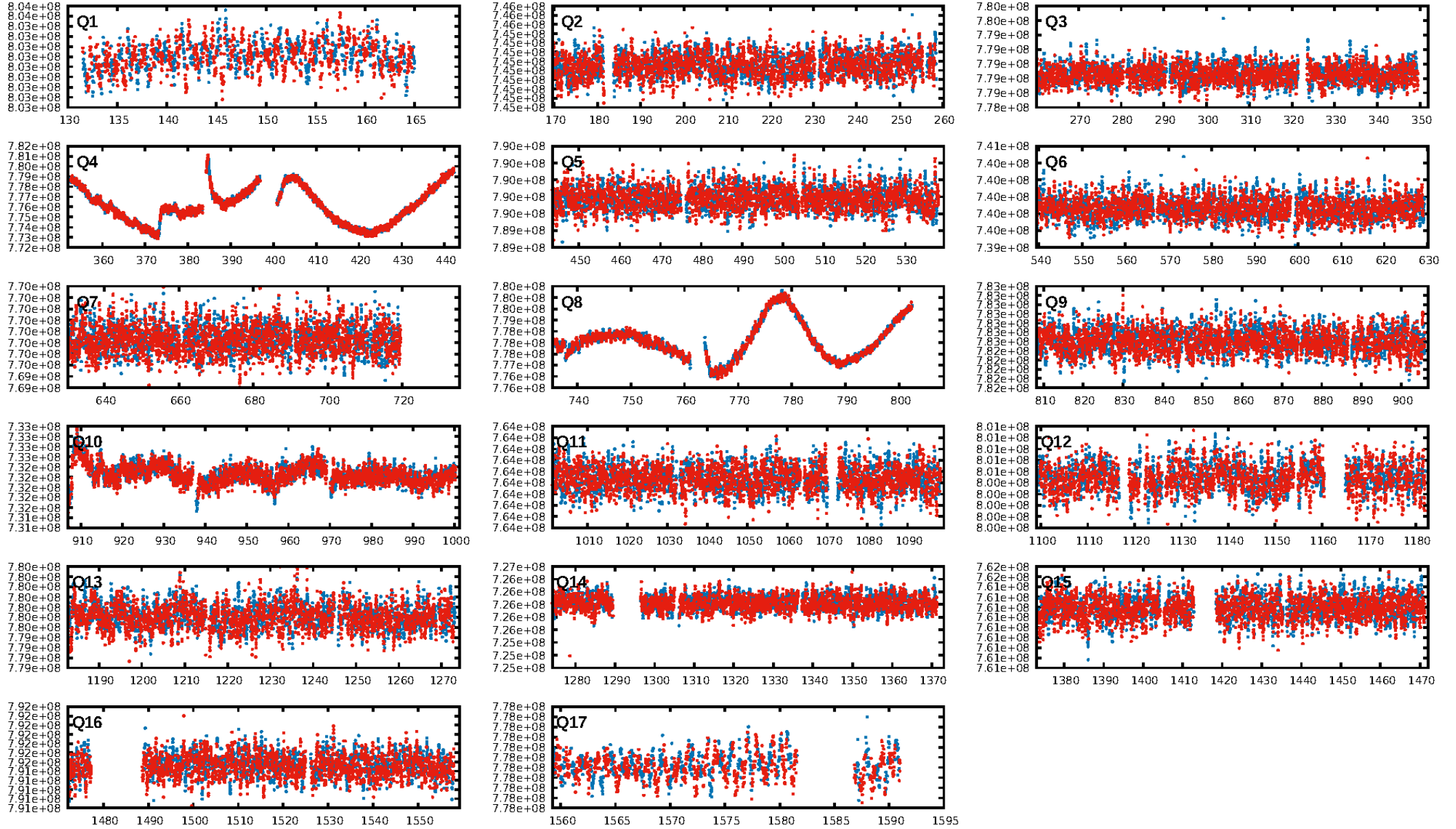
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [73.69 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.90e-13  
RollingBand-fgt: 1.00 [1435/1435]  
GhostDiagnostic-chr: 2.544  
Centroid-sig: 0.0%  
Centroid-so: 1.997 arcsec [2.76 $\sigma$ ]  
OotOffset-rm: 0.274 arcsec [0.57 $\sigma$ ]  
KicOffset-rm: 0.178 arcsec [0.42 $\sigma$ ]  
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: 02-Feb-2016 08:19:59 Z

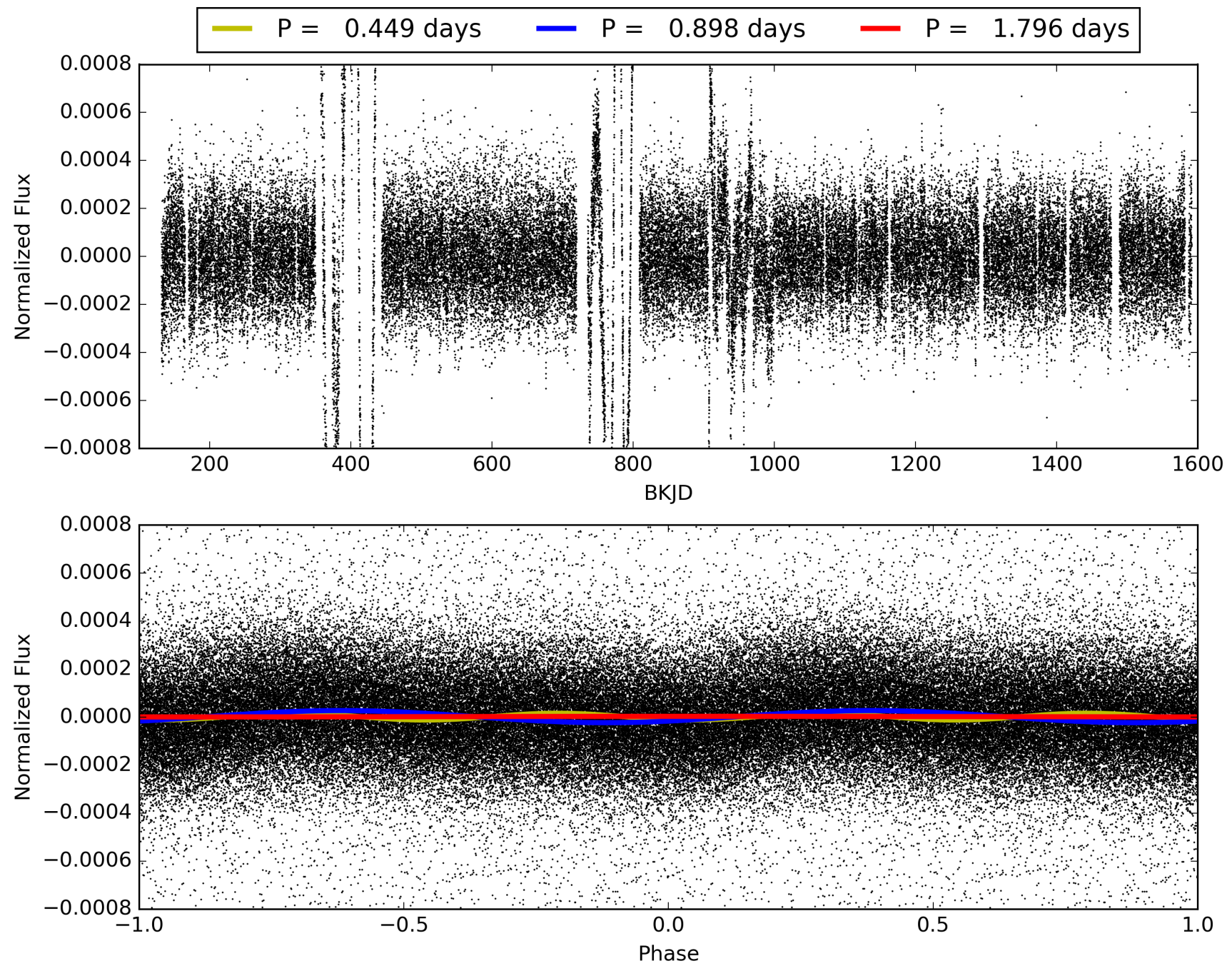
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004245701-01, PDC Light Curves





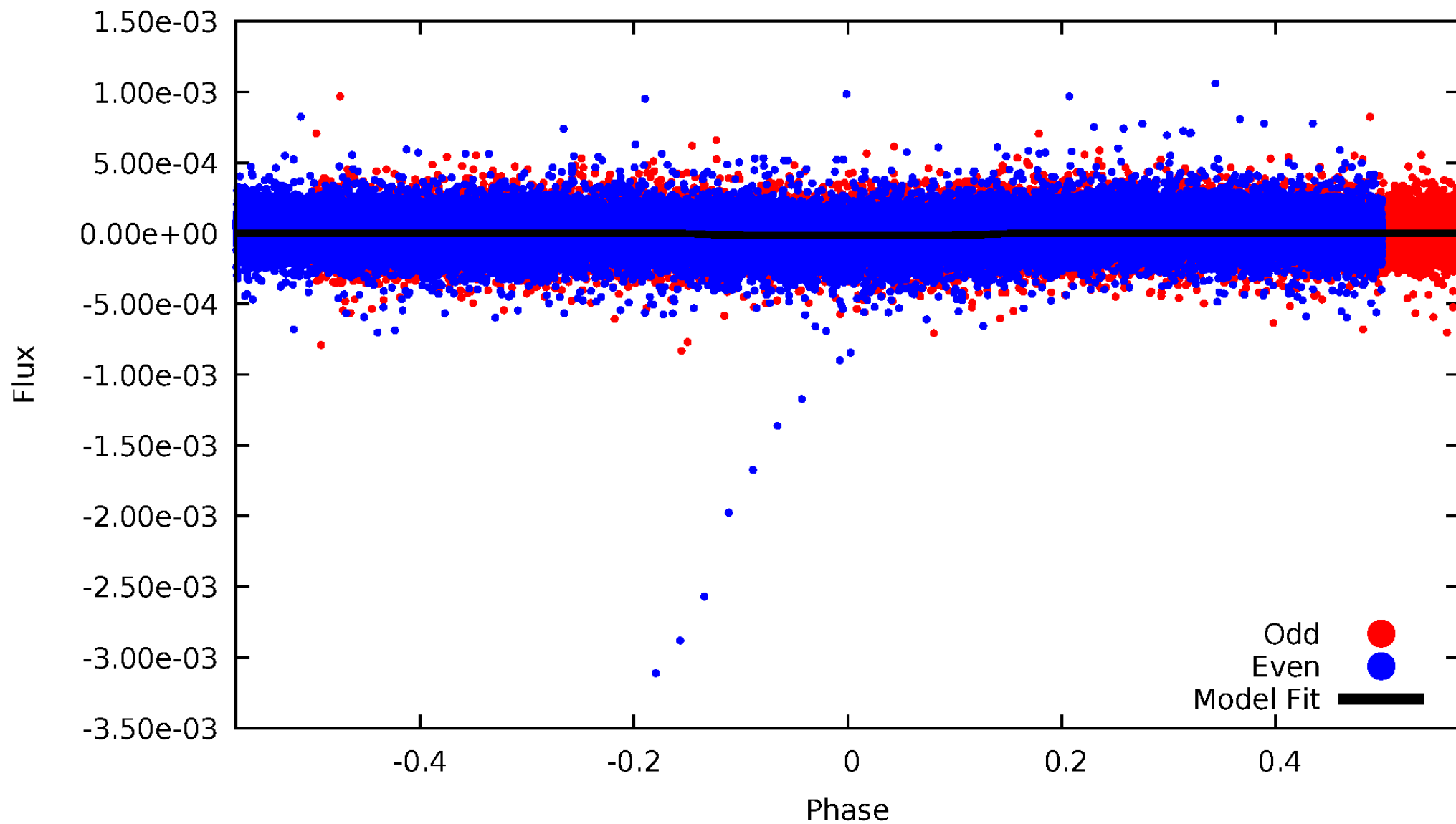
TCE 004245701-01





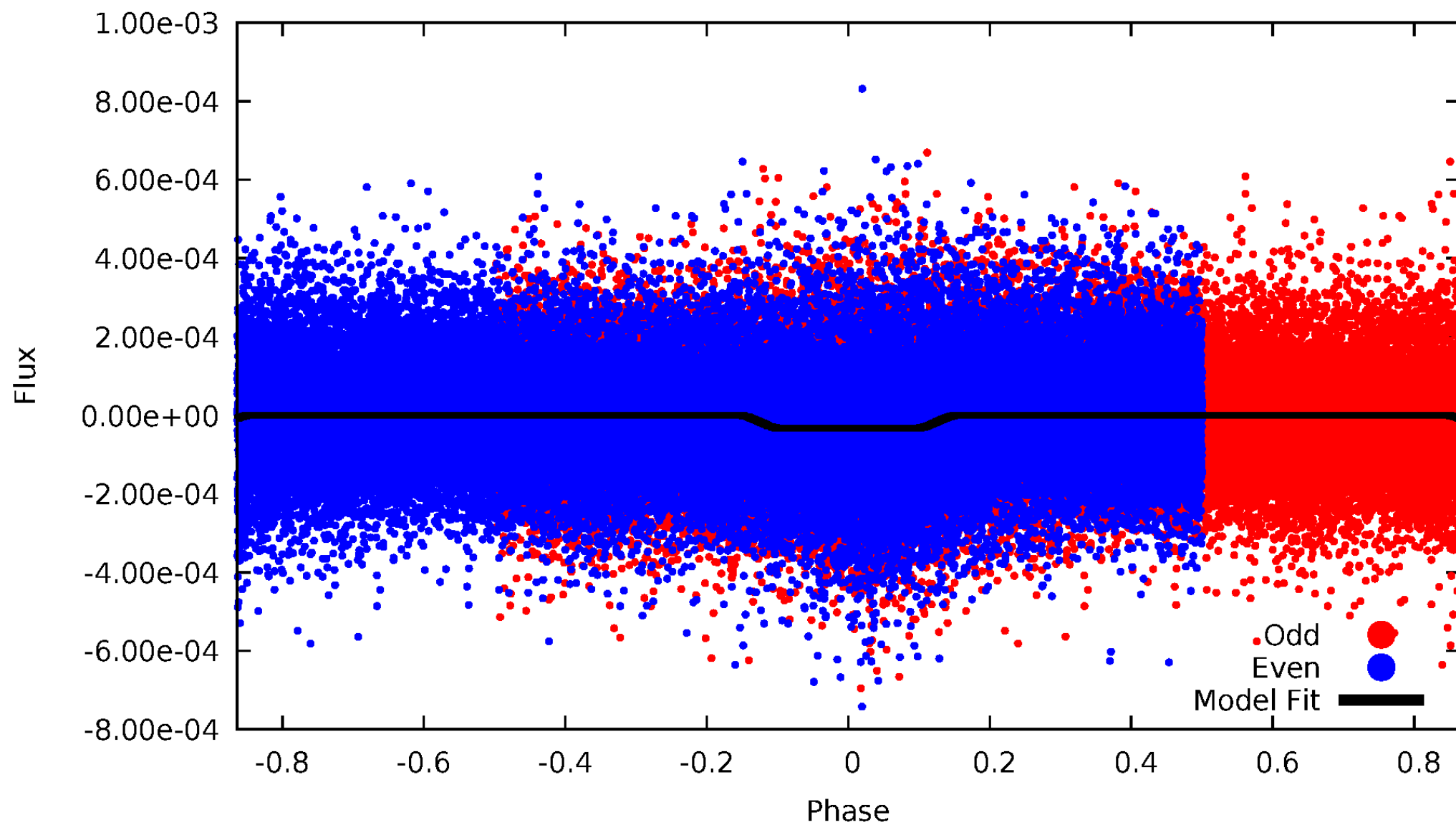
# DV Odd/Even

TCE 004245701-01



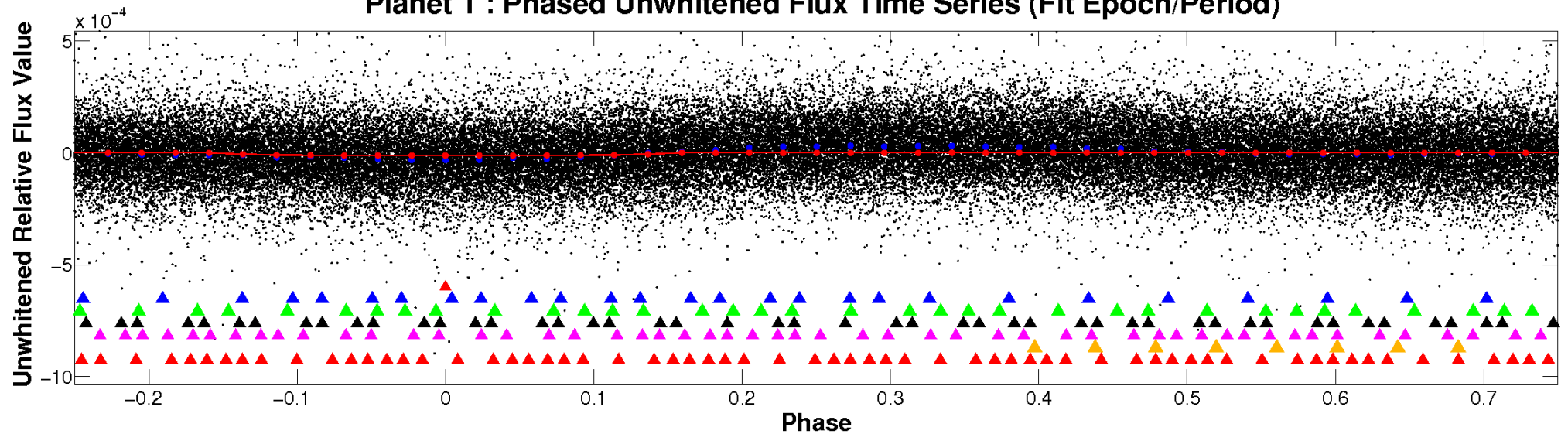
# ALT Odd/Even

TCE 004245701-01

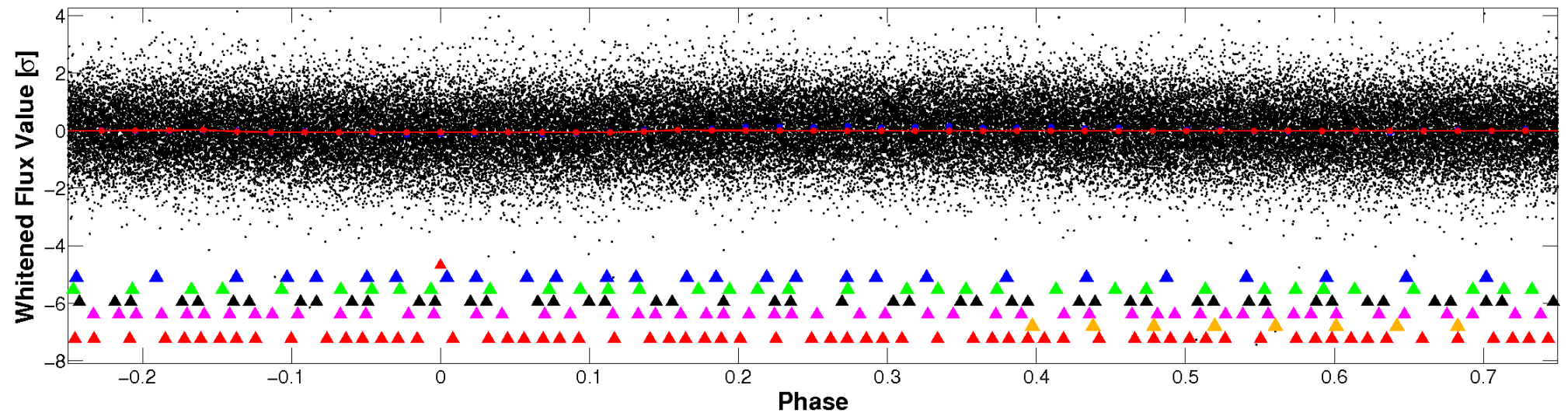


# Non-Whitened Vs. Whitened Light Curve

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



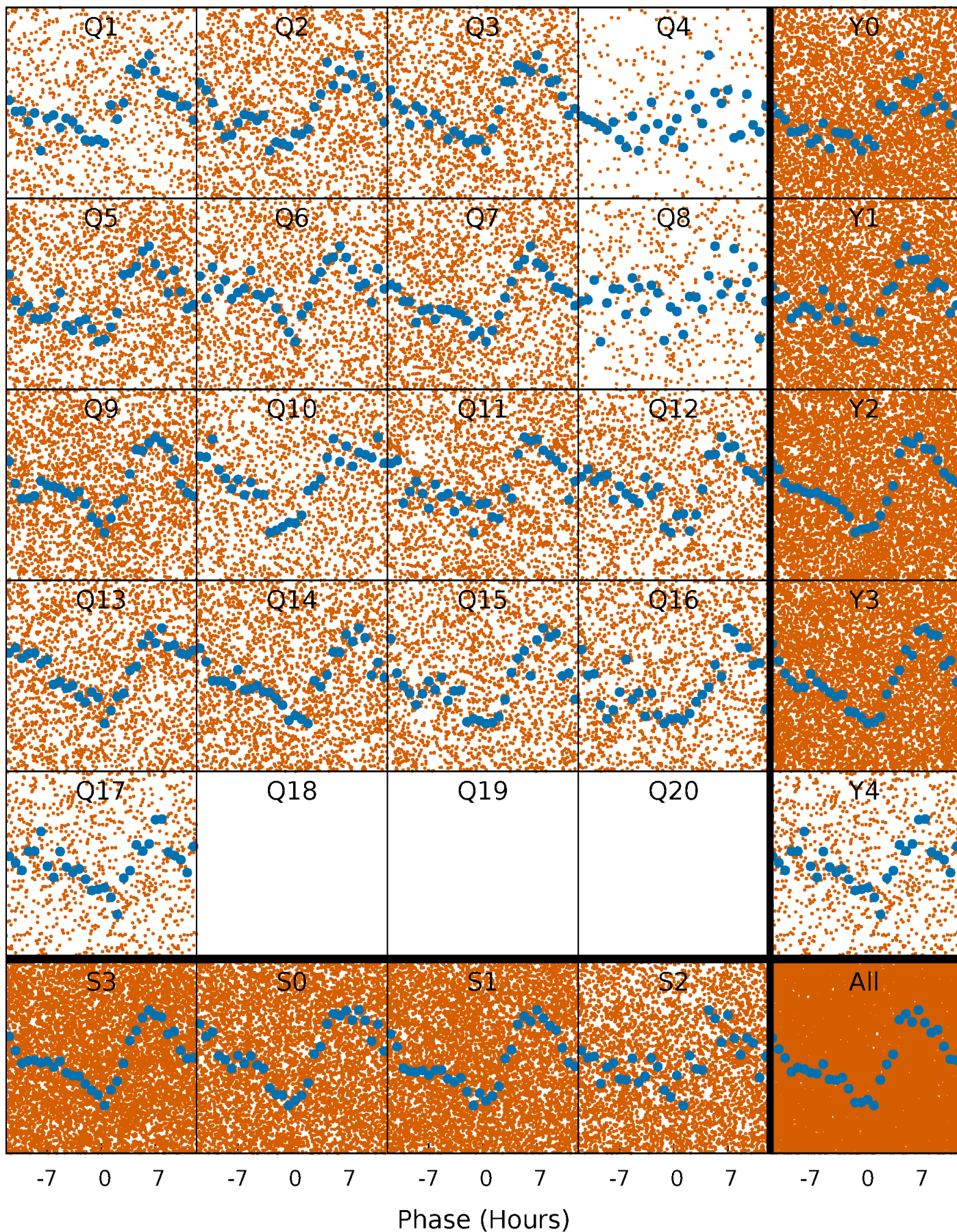
Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

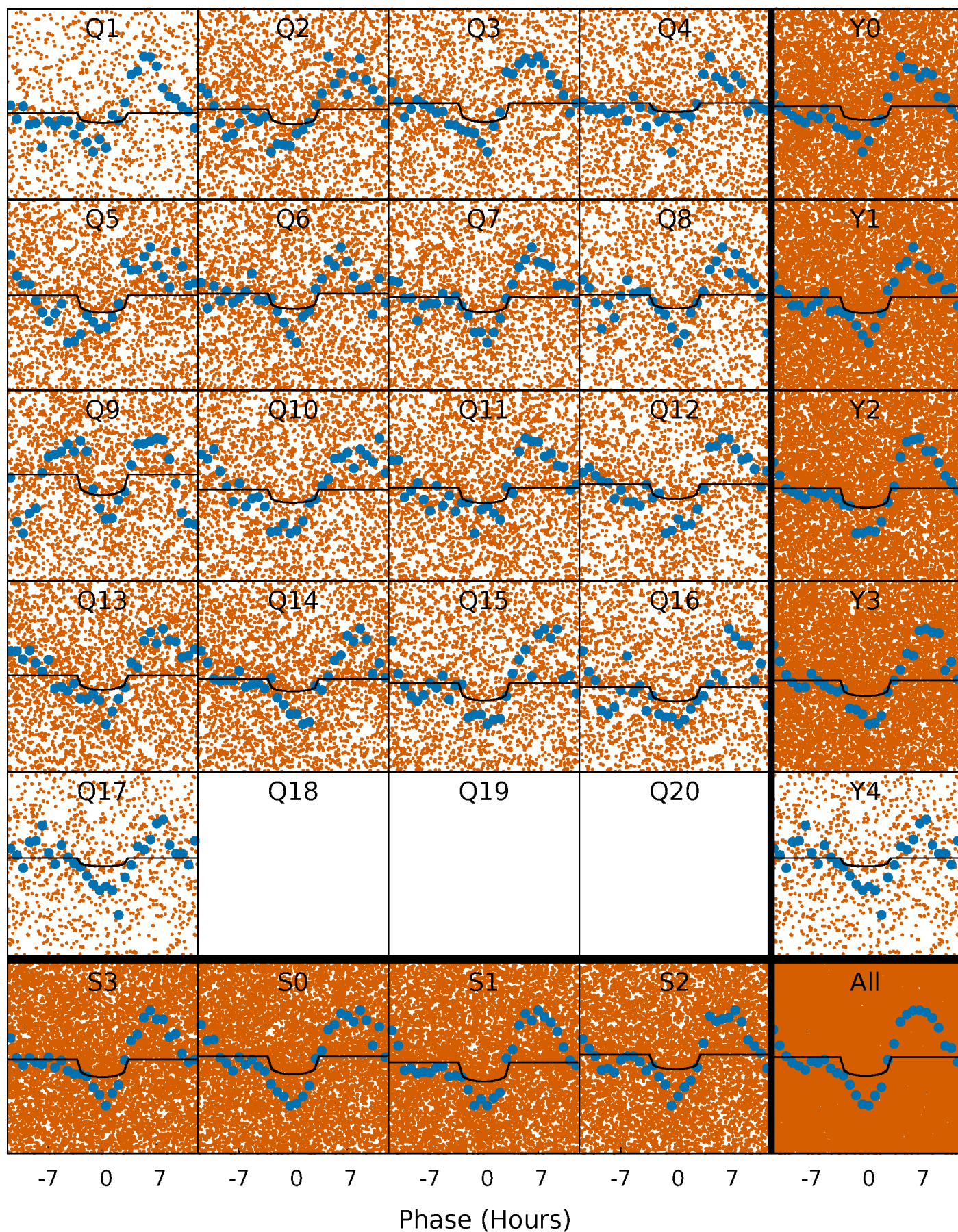
TCE 004245701-01 P= 0.897843 Days  $T_0=132.180675$  (BKJD)





# DV Quarter-Phased Transit Curves

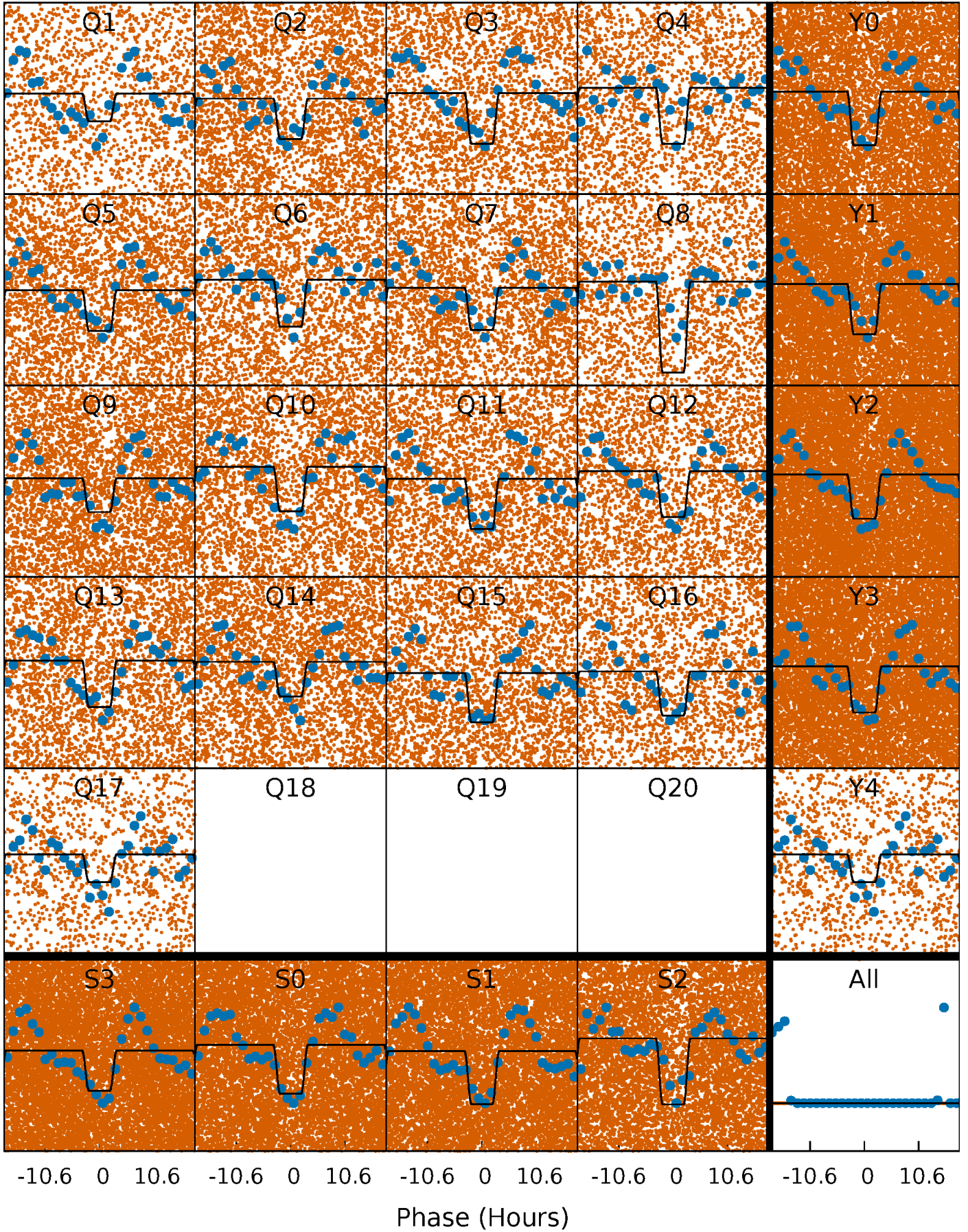
TCE 004245701-01   P= 0.897843 Days    $T_0=132.180675$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 004245701-01 P= 0.897857 Days  $T_0=132.154734$  (BKJD)

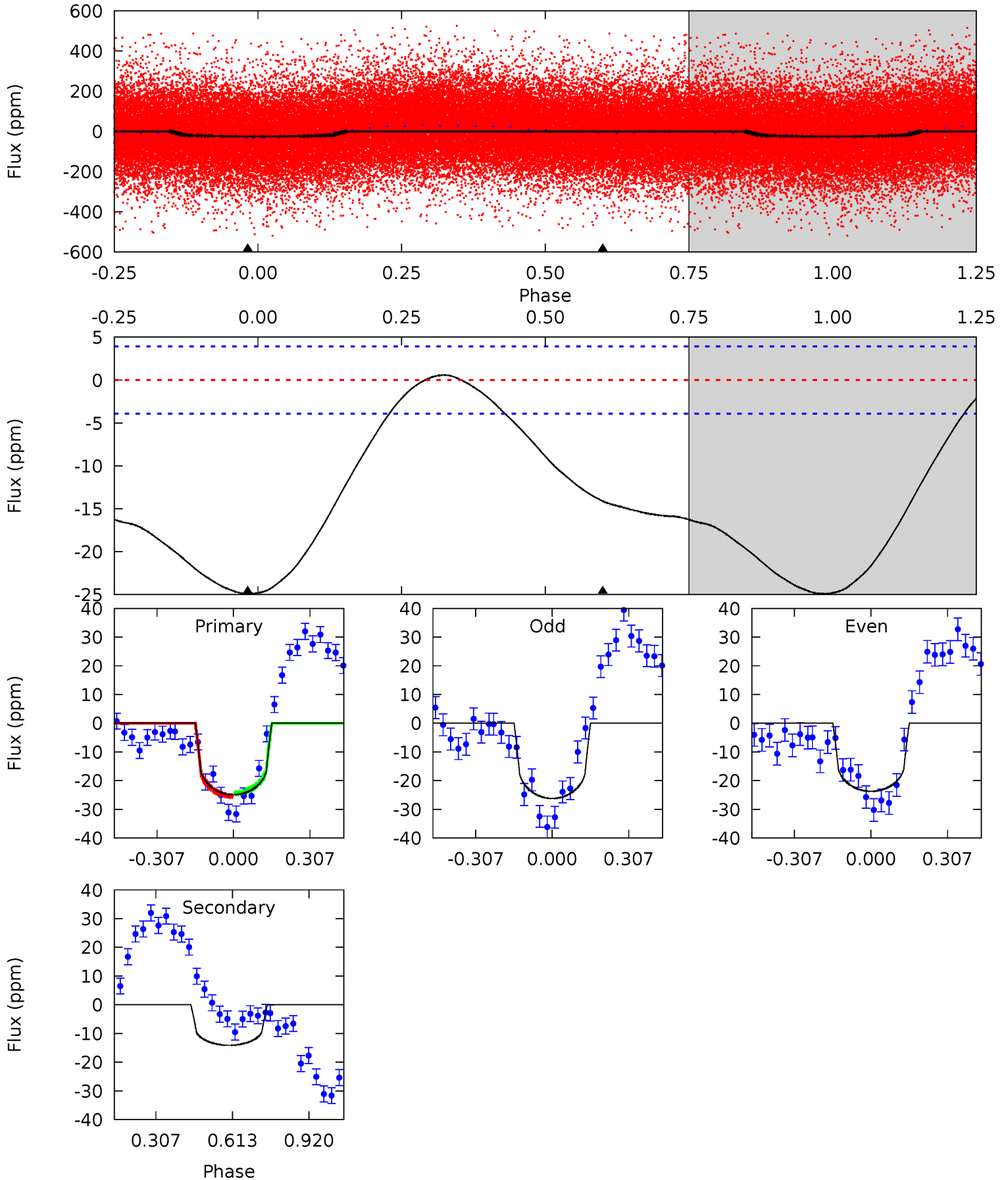




# DV Model-Shift Uniqueness Test

004245701-01, P = 0.897843 Days, E = 131.282832 Days

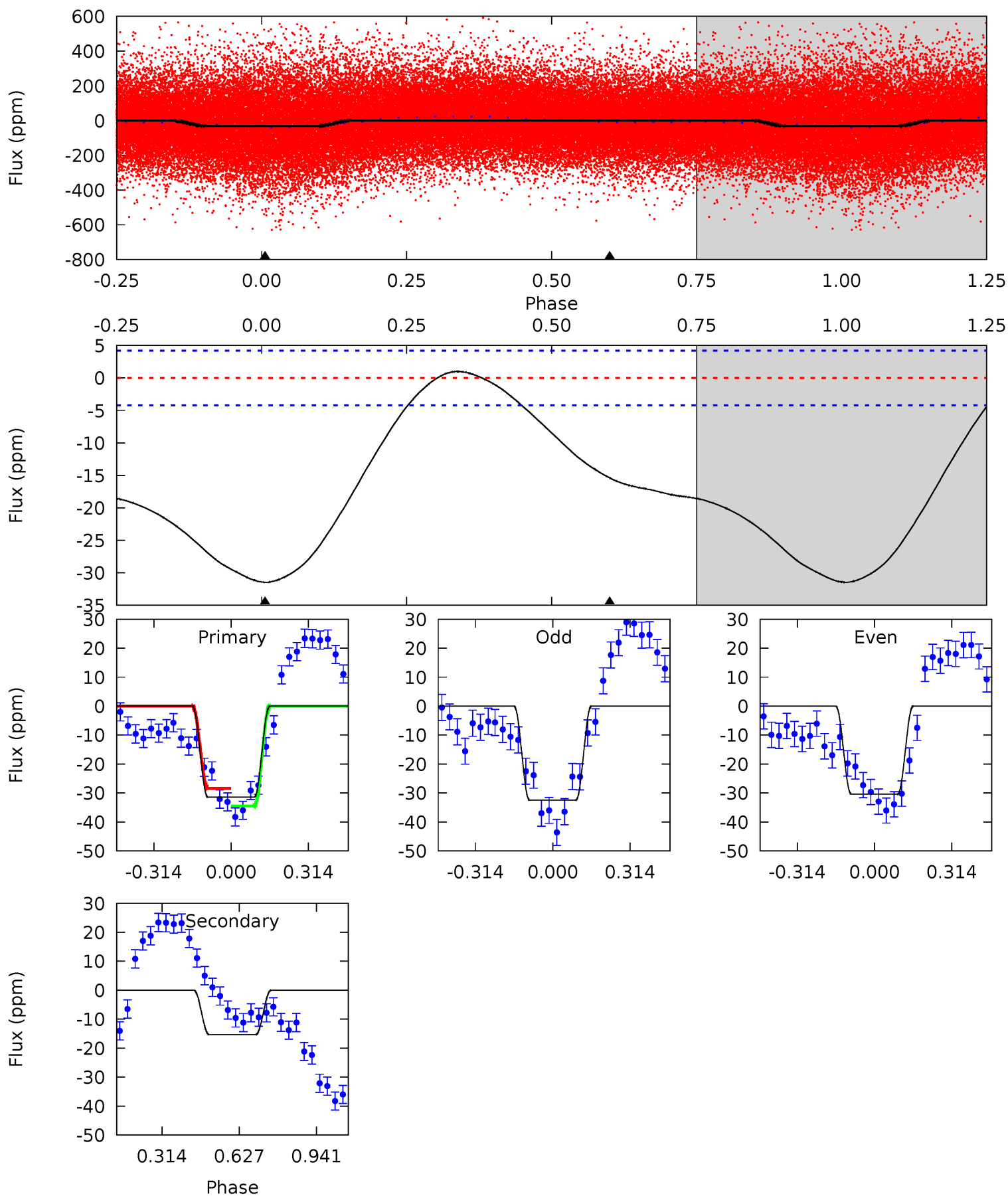
| Pri  | Sec  | Ter | Pos | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|-----|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 27.6 | 15.6 | 0   | 0   | 4.32            | 1.02            | 1.15             | 27.6    | 27.6    | 15.6    | 15.6    | 1.37    | 1.07 | 0.02  | 0.56 |



# Alt Model-Shift Uniqueness Test

004245701-01, P = 0.897857 Days, E = 131.256877 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  |
|------|------|-----|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 32.3 | 15.8 | 0   | 0   | 4.32            | 1.01            | 1.63             | 32.3    | 32.3    | 15.8    | 15.8    | 1.06    | 0.92 | 0.03  | 2.71 |



### Stellar Parameters For KIC 004245701

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R$ ( $R_{\odot}$ )       | $M$ ( $M_{\odot}$ )       | $p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ ) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $7164^{+176}_{-252}$ | $3.843^{+0.408}_{-0.102}$ | $-0.360^{+0.300}_{-0.300}$ | $2.411^{+0.465}_{-1.085}$ | $1.478^{+0.206}_{-0.308}$ | $0.148^{+0.471}_{-0.056}$                     |
|        | +2%/-4%              | +11%/-3%                  | +83%/-83%                  | +19%/-45%                 | +14%/-21%                 | +317%/-38%                                    |
| 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 004245701-01 / KOI

| Detrend | Depth (ppm) | $R_p$ ( $R_{\oplus}$ ) | $T_{max}$ (K)        | $T_{obs}$ (K)          | $A_{obs}$                  |
|---------|-------------|------------------------|----------------------|------------------------|----------------------------|
| DV      | $-14 \pm 1$ | $0.85^{+0.45}_{-0.44}$ | $4625^{+331}_{-526}$ | $7218^{+4621}_{-1474}$ | $4.694^{+15.480}_{-2.706}$ |
| Alt.    | $-15 \pm 1$ | $1.39^{+0.55}_{-0.48}$ | $4639^{+301}_{-492}$ | $5601^{+1321}_{-833}$  | $1.857^{+2.562}_{-0.888}$  |

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



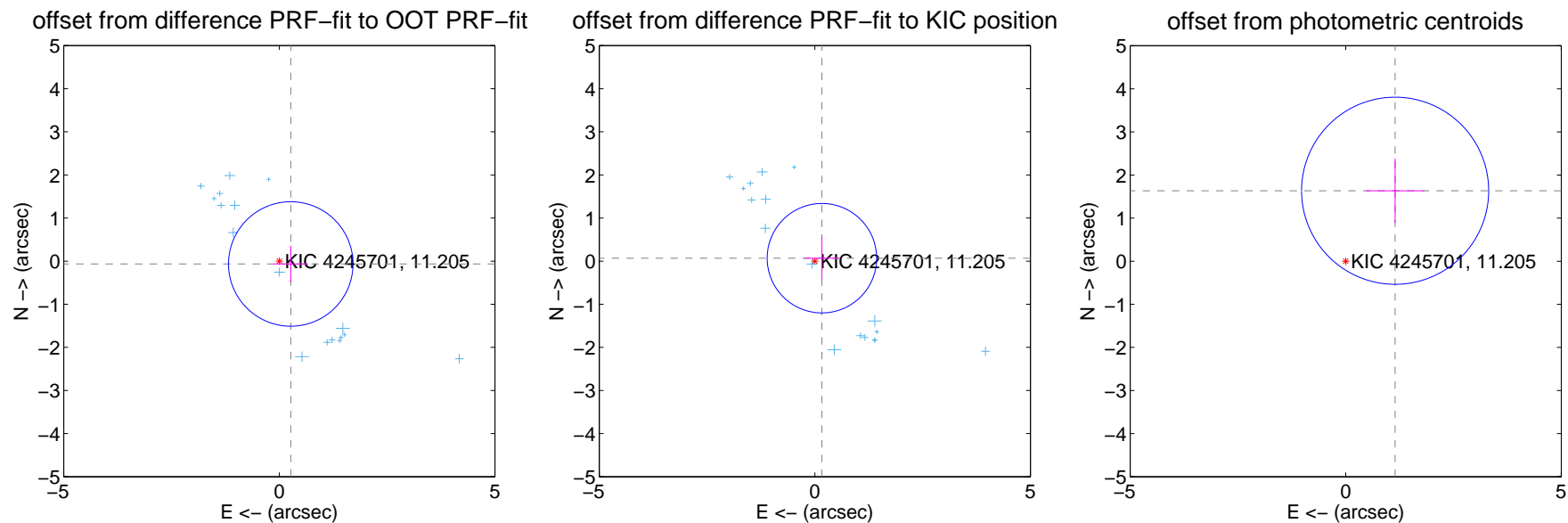
## DV Centroid Data

Supplemental centroid analysis for 004245701-01. **Kepler magnitude: 11.21.** Transit SNR 8.08

There are 17 quarters with good PRF difference image offsets

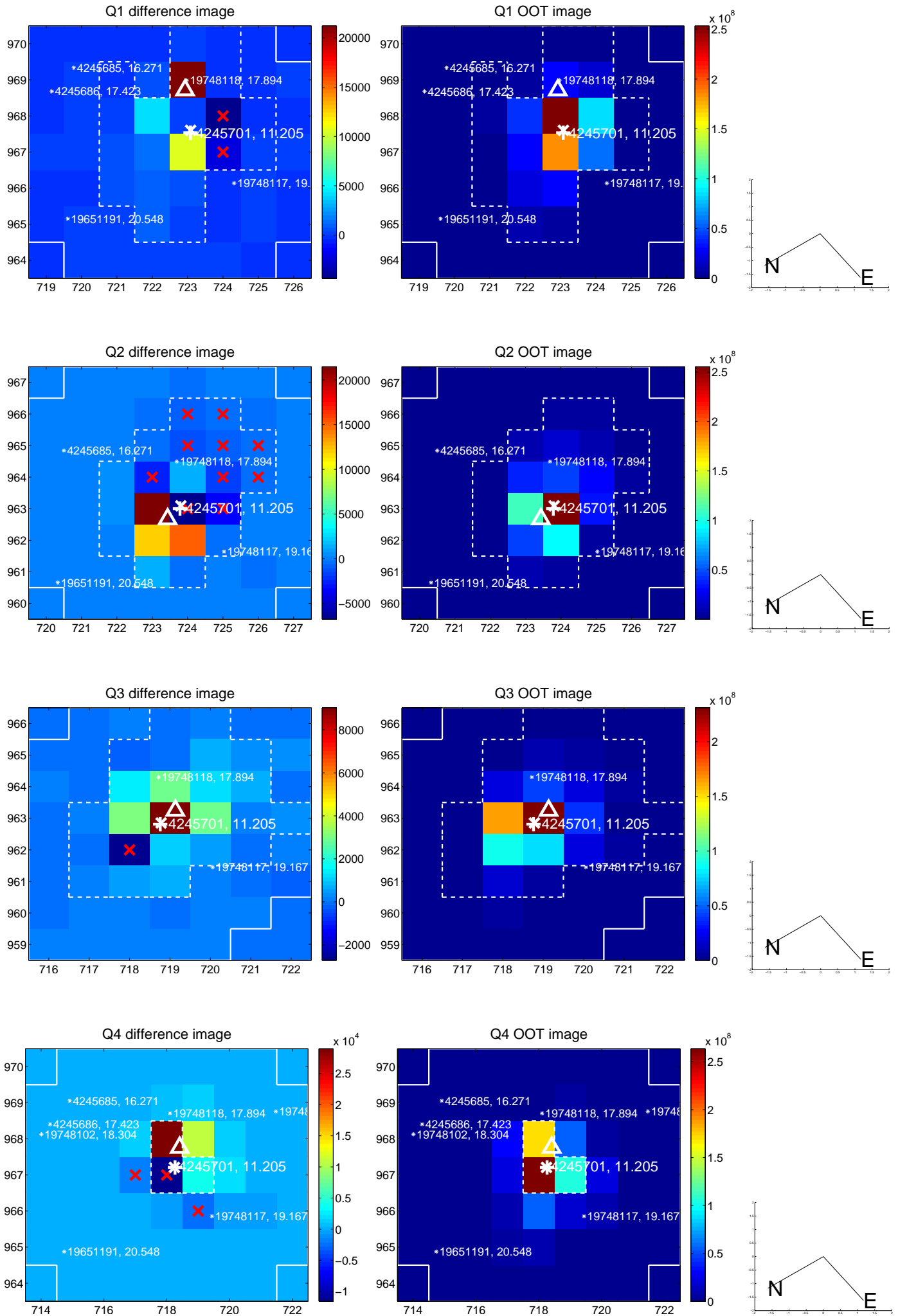
The direct PRF centroid is offset from the target star catalog position by about 0.13 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA        | $\Delta$ Dec       |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT          | $0.274 \pm 0.481$  | 0.57                | $-0.266 \pm 0.404$ | $-0.065 \pm 0.425$ |
| PRF-fit source offset from KIC position | $0.178 \pm 0.423$  | 0.42                | $-0.165 \pm 0.411$ | $0.068 \pm 0.486$  |
| photometric centroid source offset      | $2.00 \pm 0.72$    | 2.76                | $-1.15 \pm 0.68$   | $1.63 \pm 0.75$    |

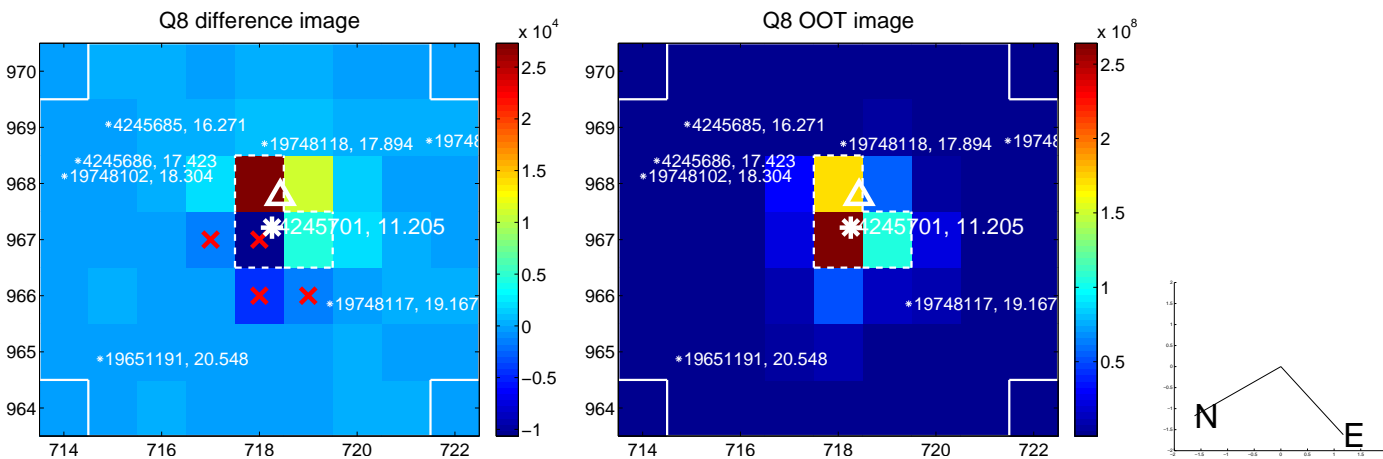
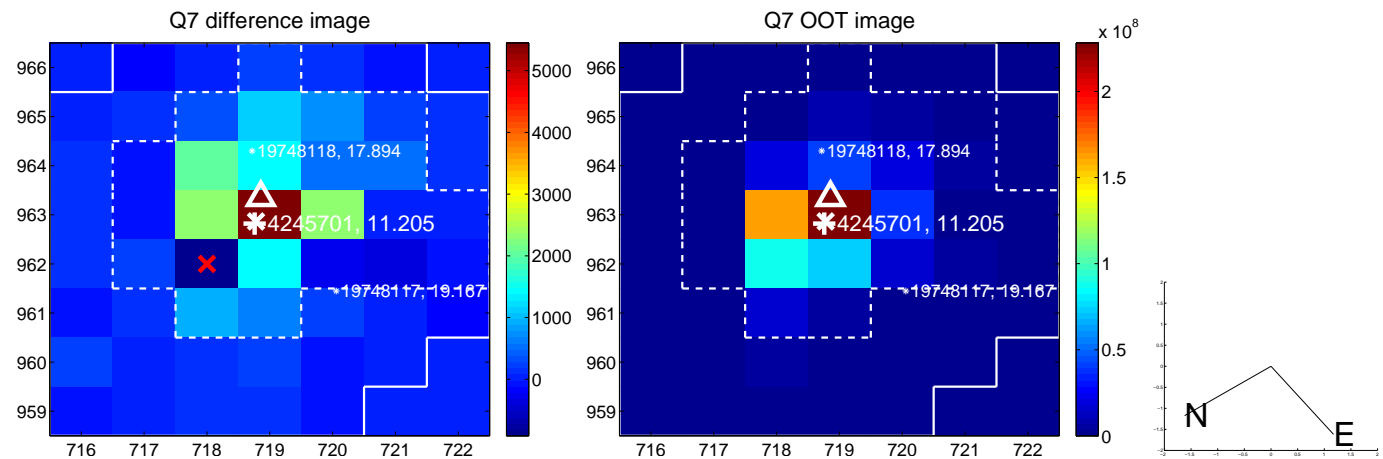
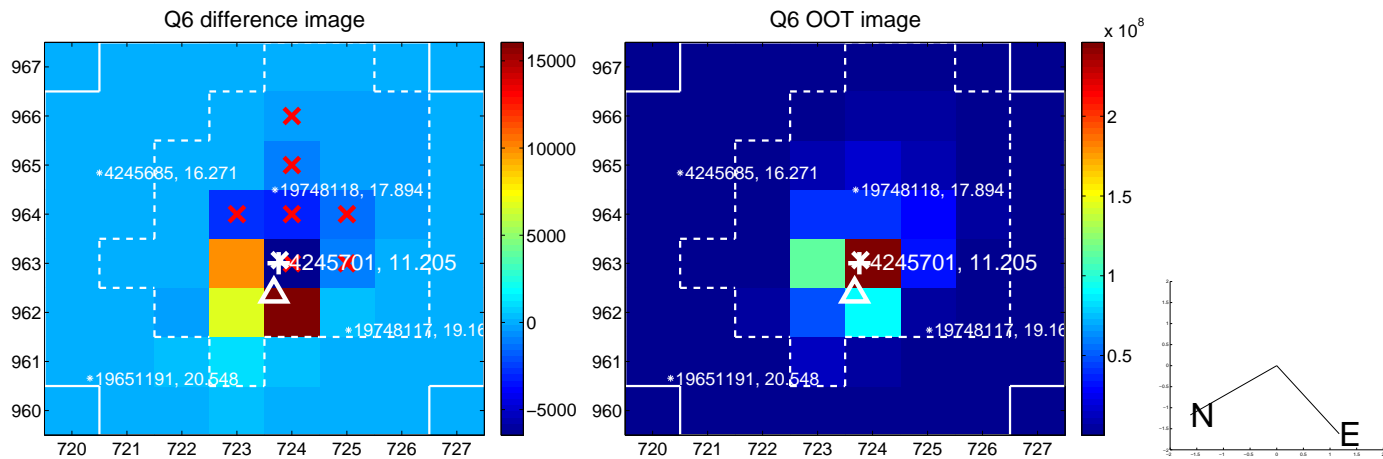
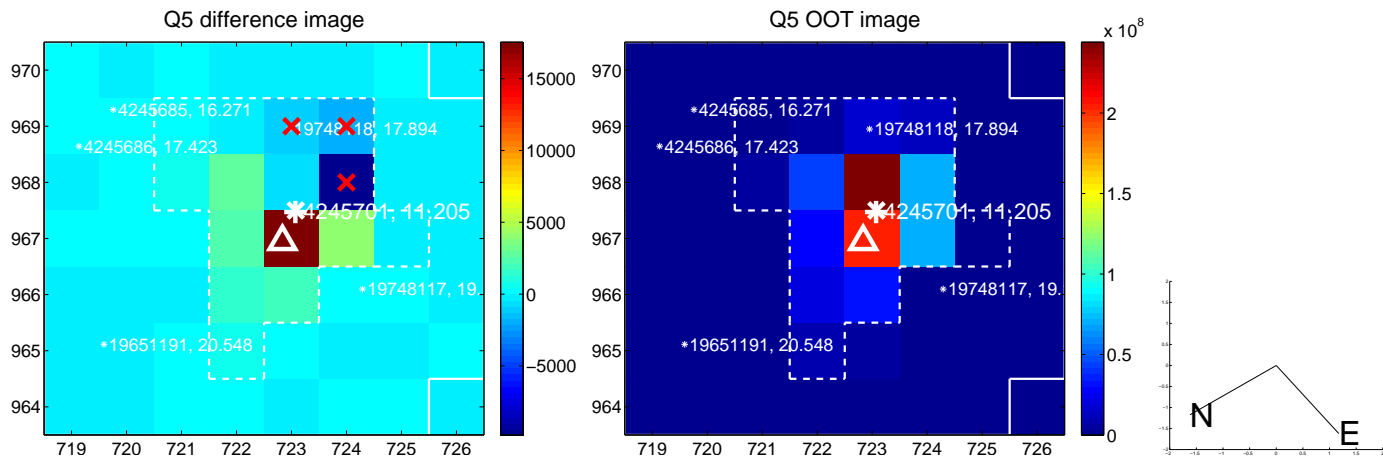


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

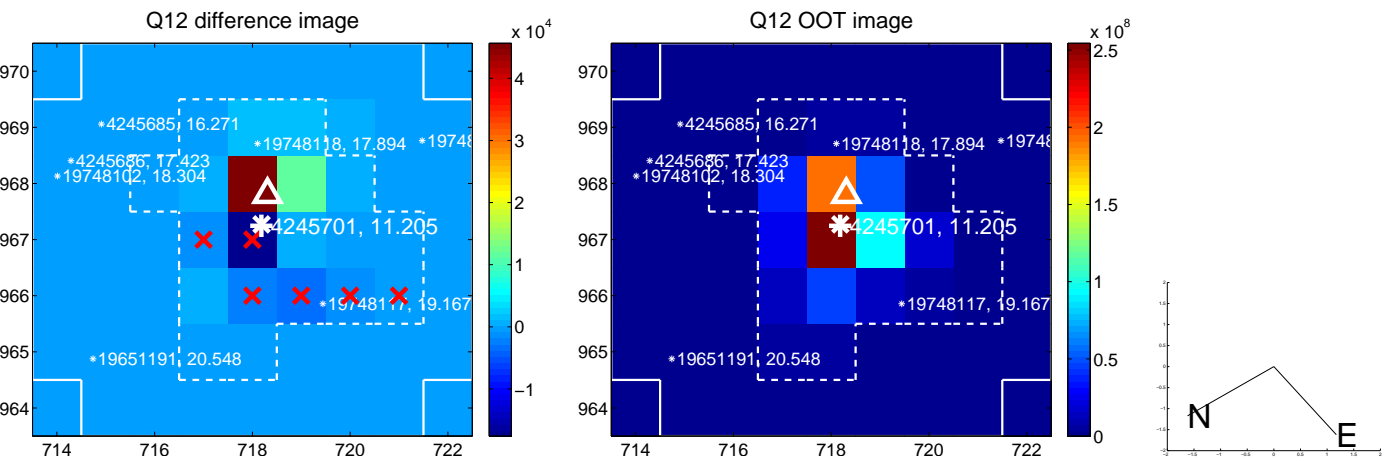
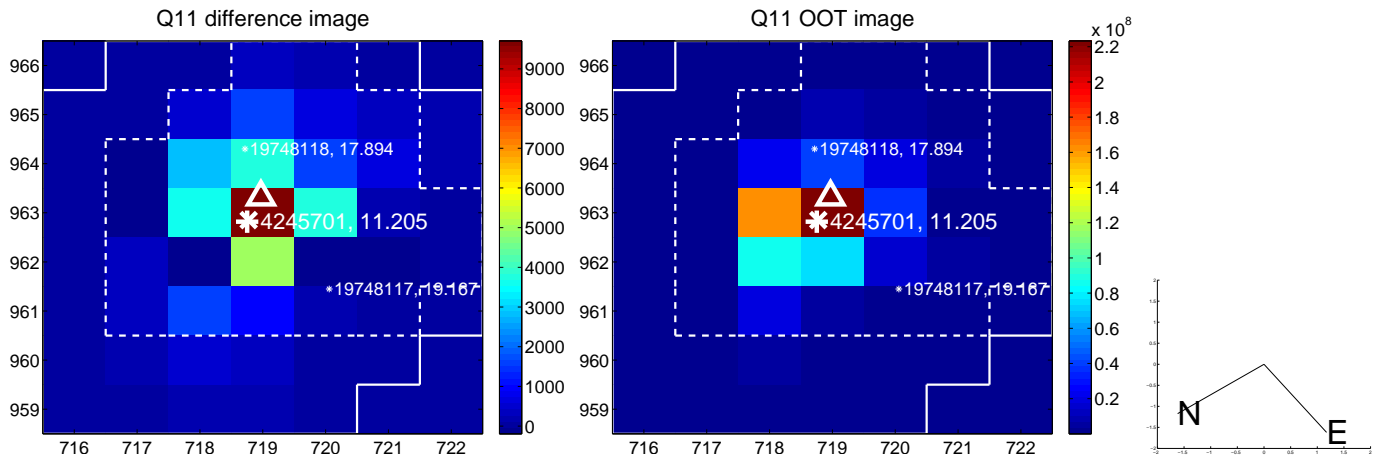
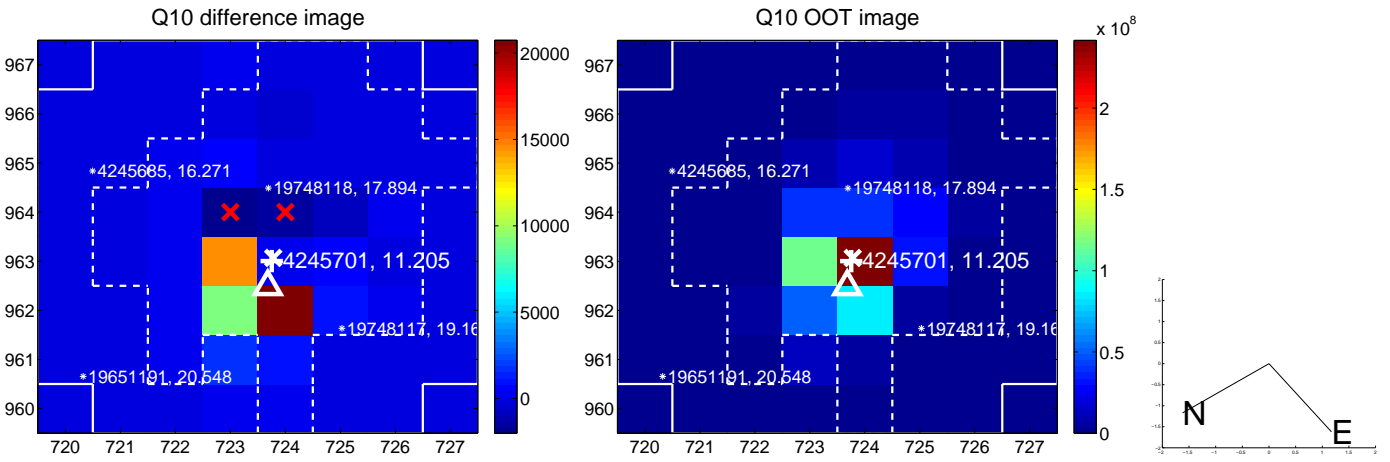
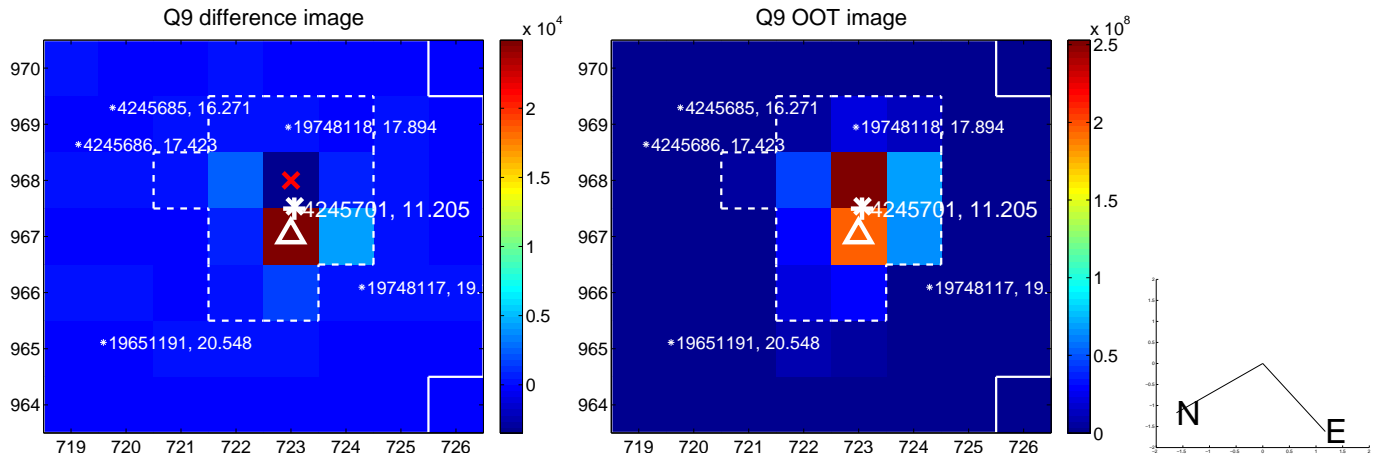


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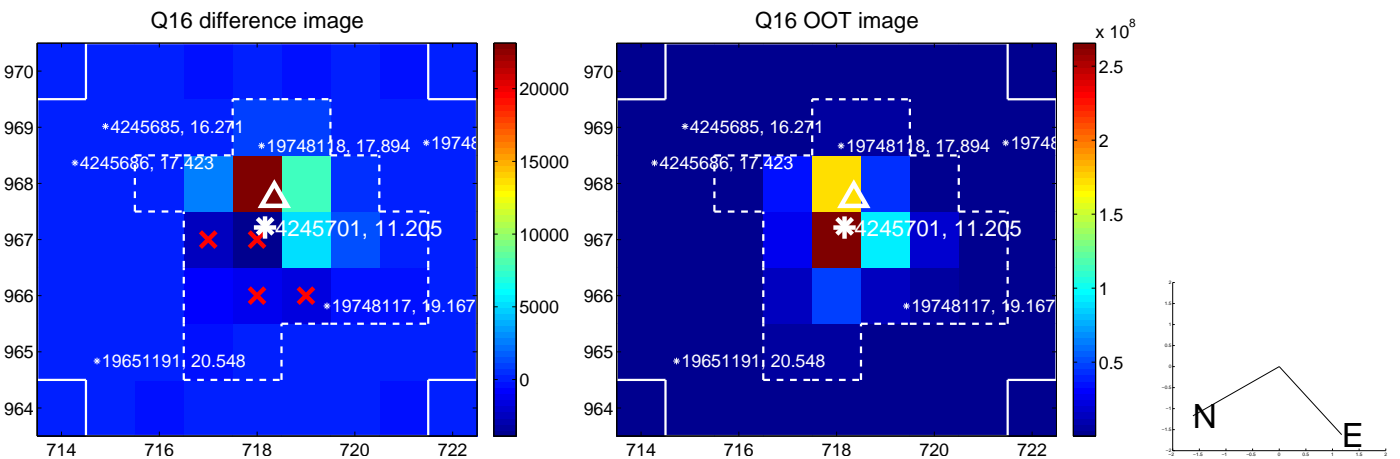
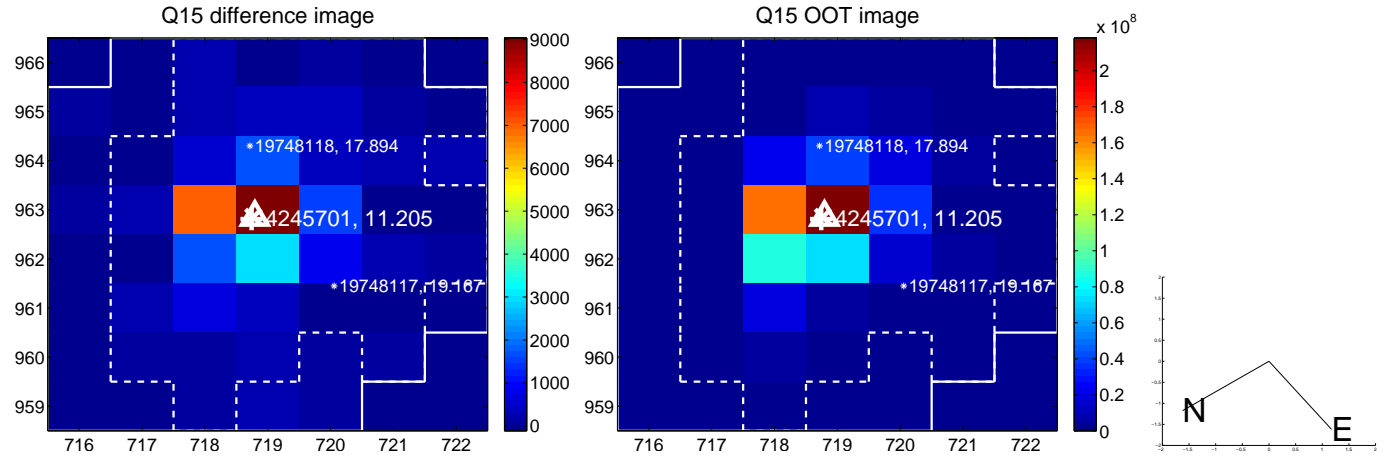
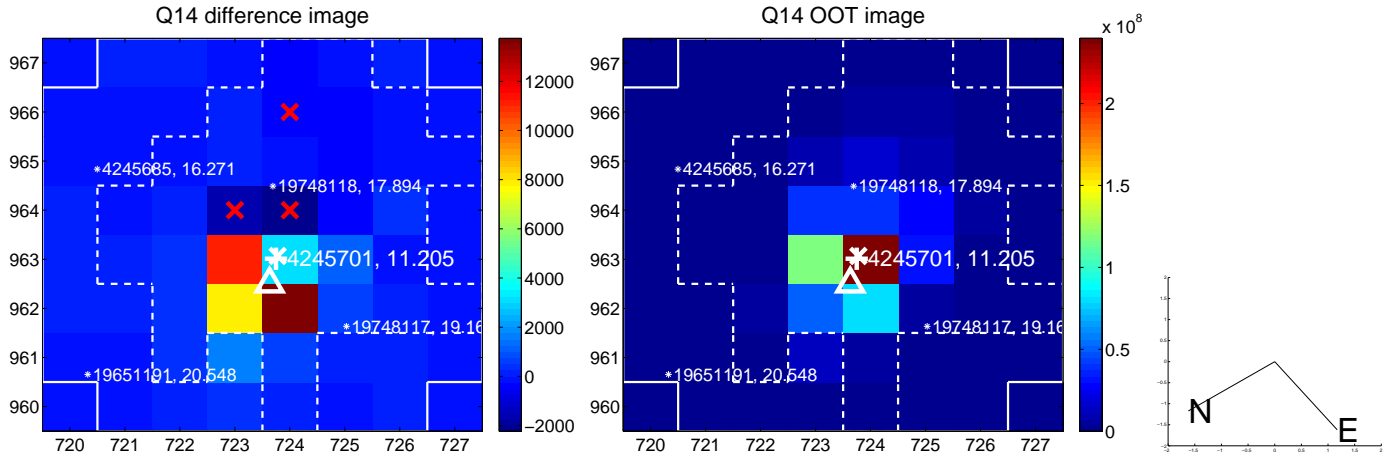
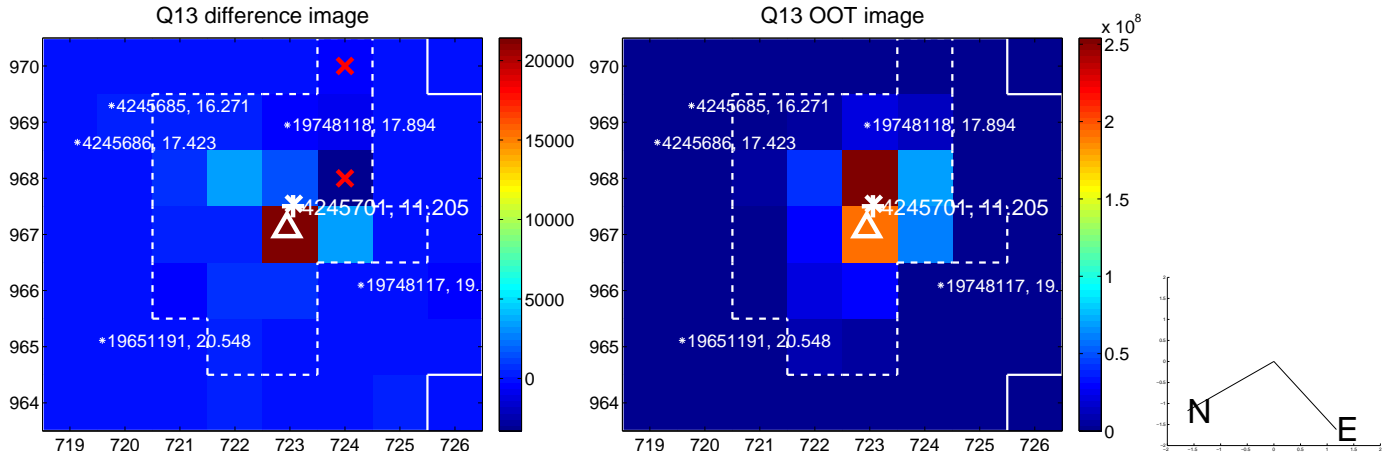




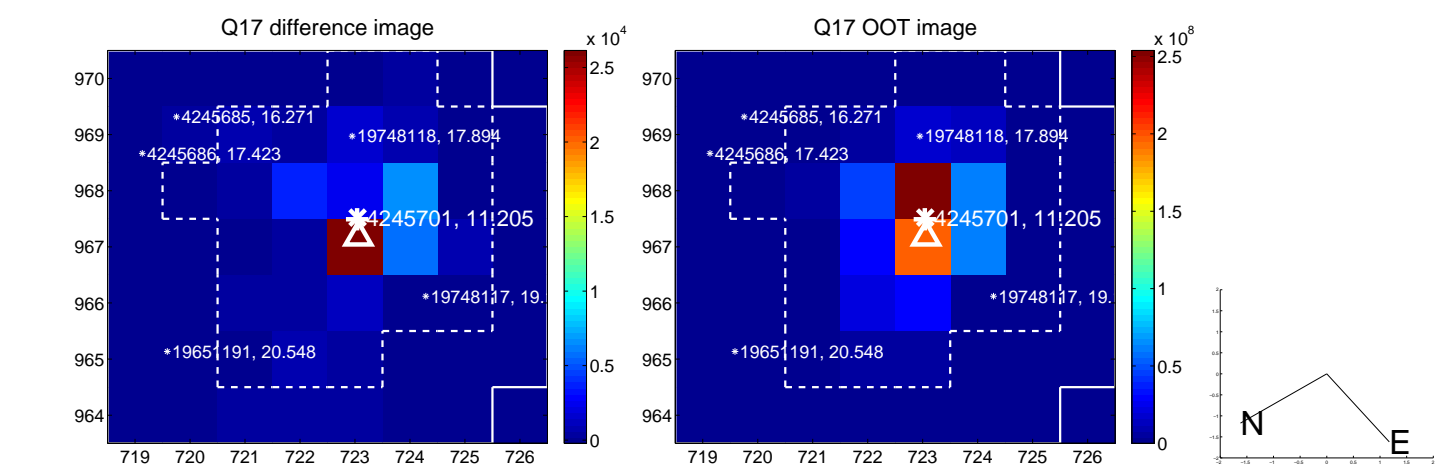
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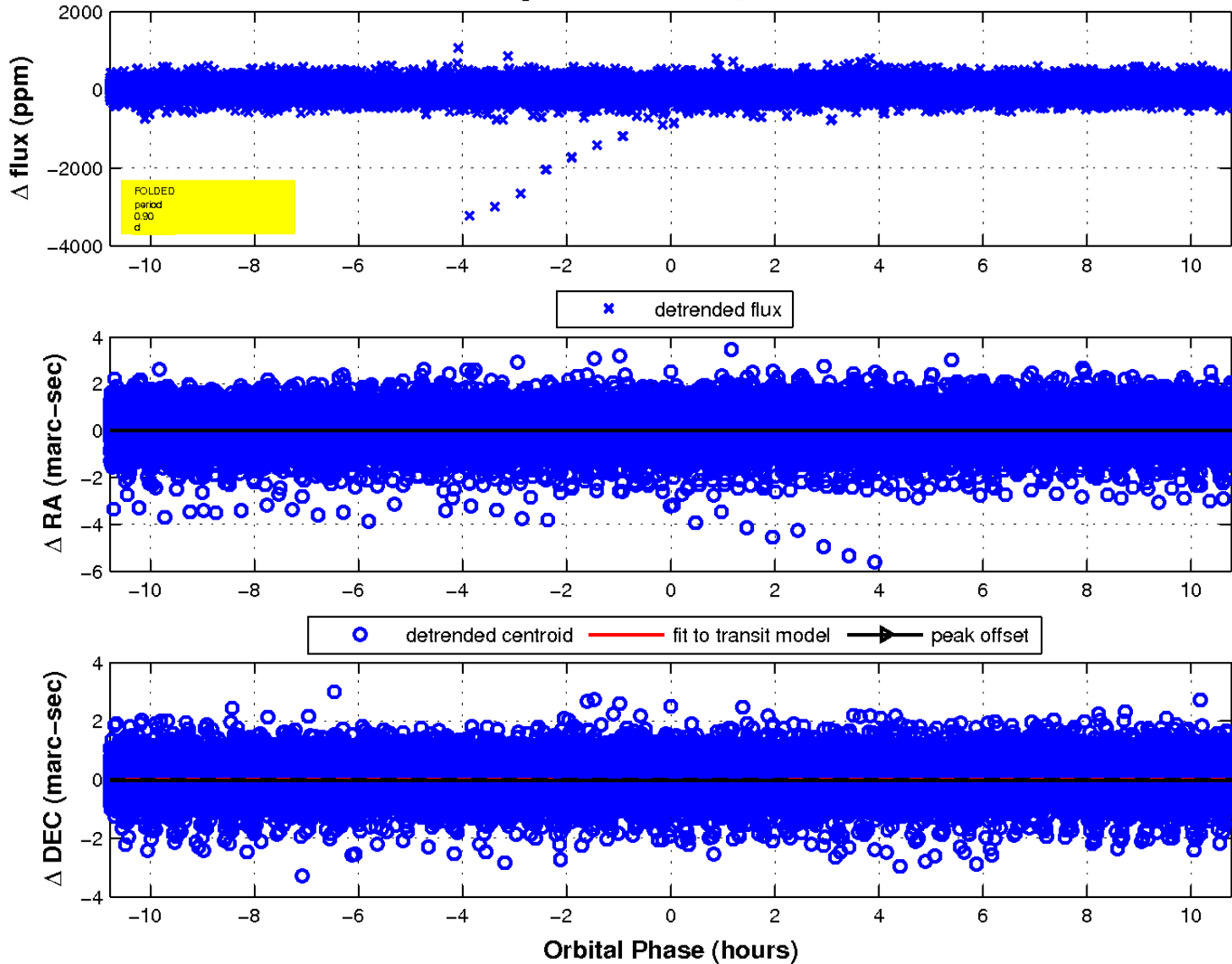
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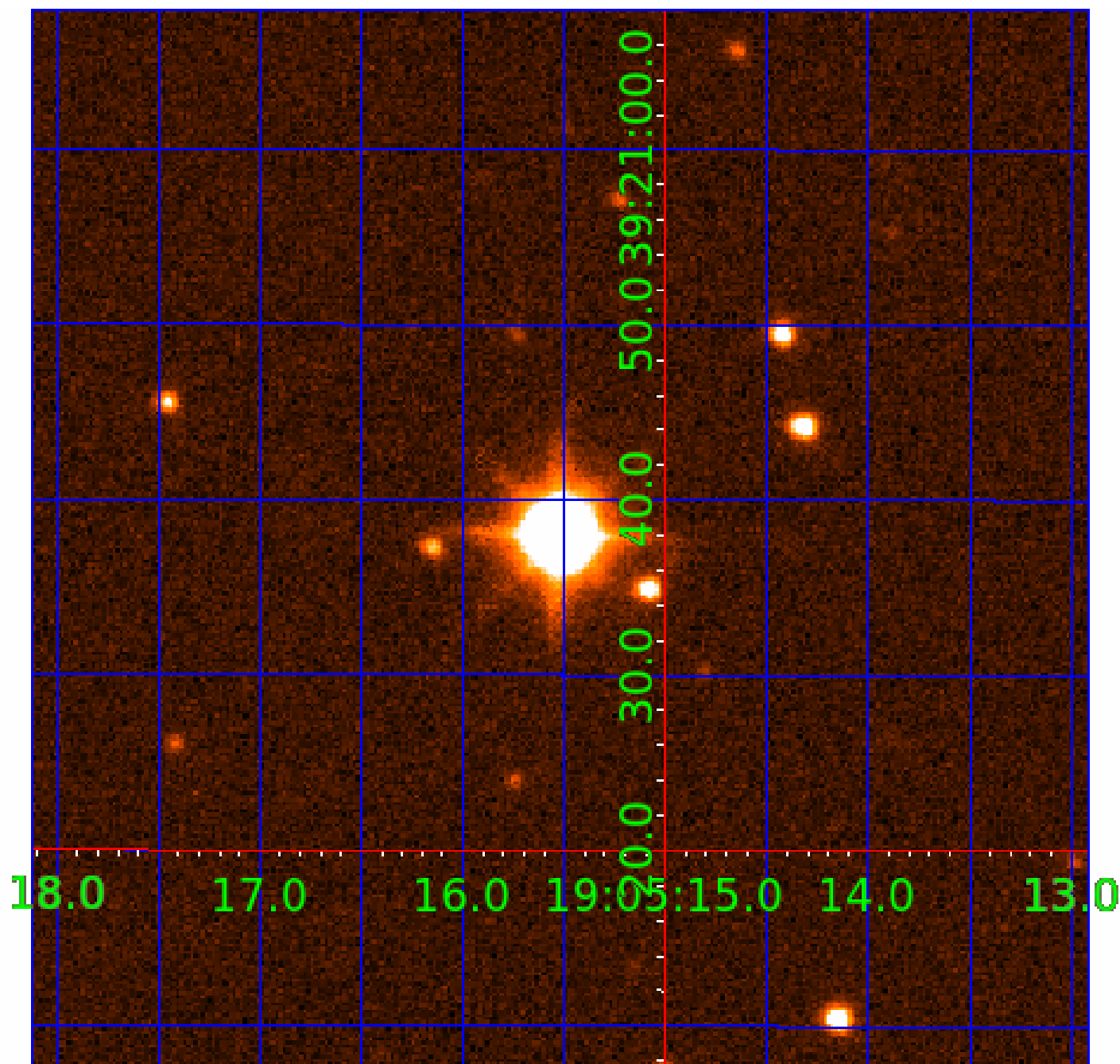


fluxWeightedCentroids, Planet 1 of 7



UKIRT Image

Declination





# KIC 004245701

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
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## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 004245701-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | LPP_DV—CENT_SATURATED   |
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| 004245701-06 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED |
| 004245701-07 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—CENT_SATURATED  |

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

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

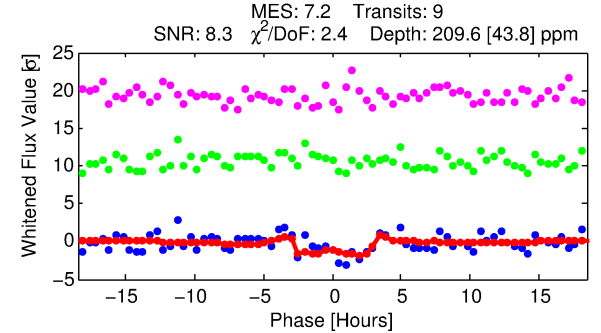
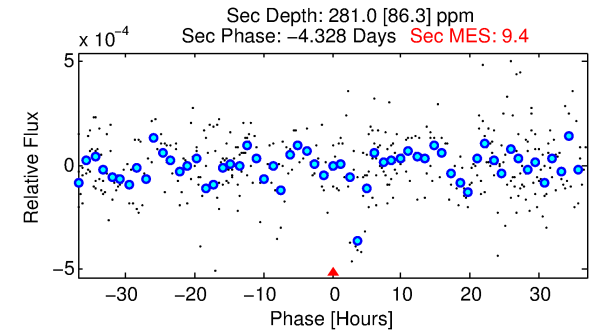
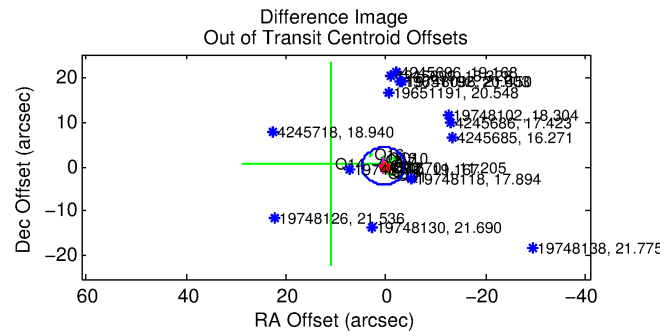
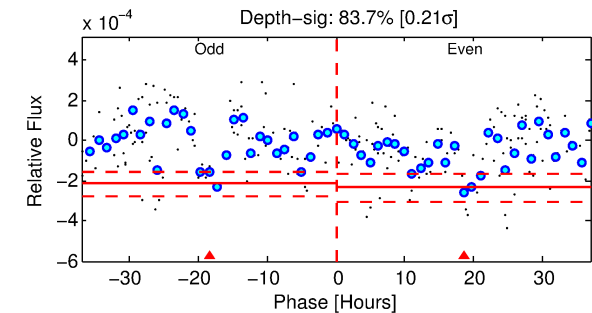
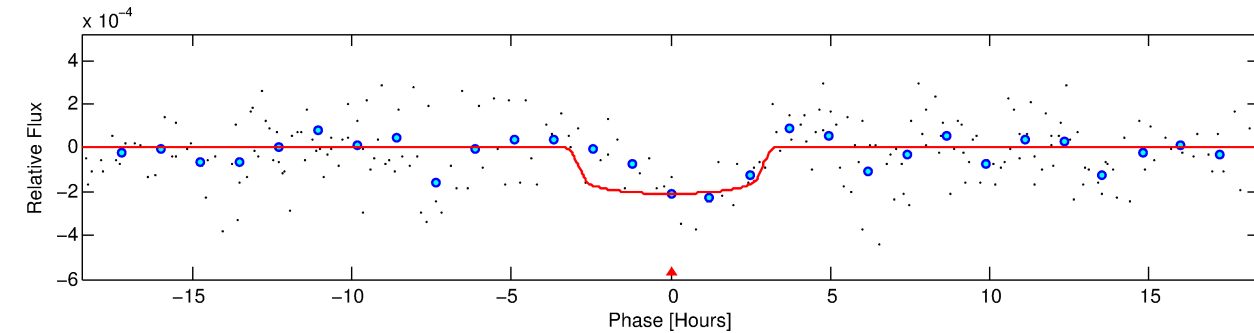
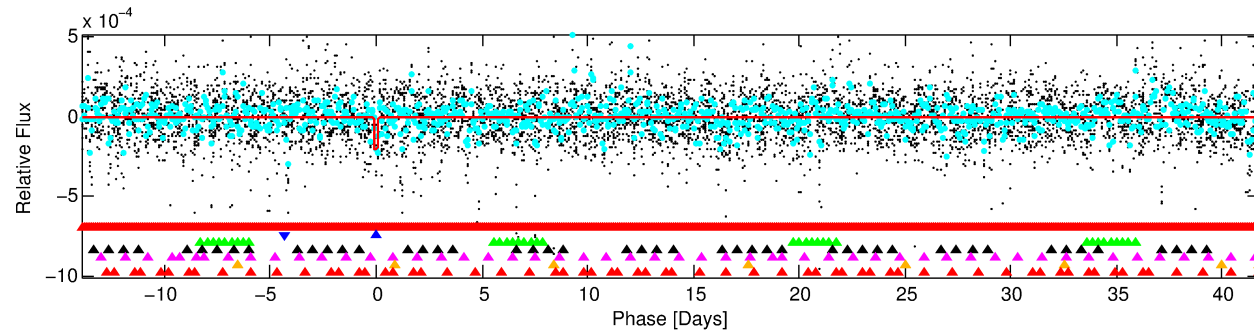
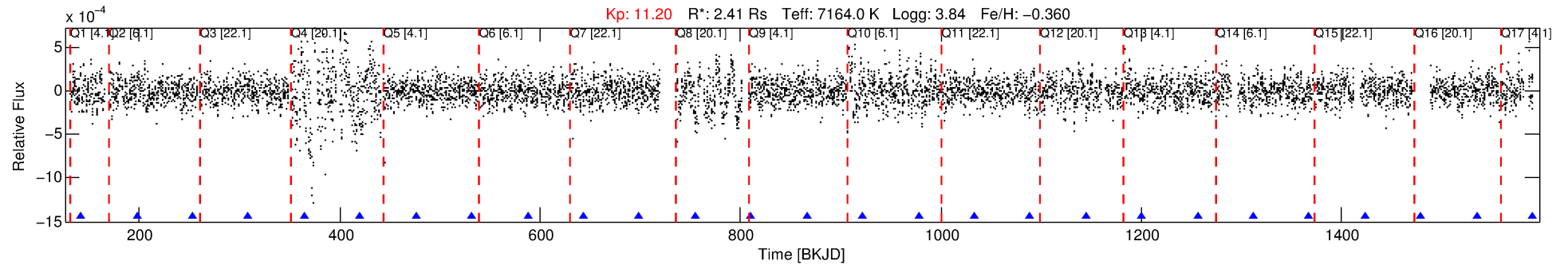
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004245701-02

No Significant Match Found

# DV One-Page Summary

KIC: 4245701 Candidate: 2 of 7 Period: 55.714 d



## DV Fit Results:

Period = 55.71447 [0.00305] d  
Epoch = 141.9645 [0.0360] BKJD  
 $R_p/R^*$  = 0.0150 [0.0064]  
 $a/R^*$  = 38.57 [91.24]  
 $b$  = 0.85 [0.79]  
 $\text{Seff}$  = 129.73 [91.92]  
 $T_{\text{eq}}$  = 861 [152] K  
 $R_p$  = 3.94 [2.44]  $R_e$   
 $a$  = 0.3252 [0.1410] AU  
 $A_g$  = 1054.77 [1206.60] [0.87 $\sigma$ ]  
 **$T_{\text{eff}}$  = 7582 [1744] K [3.84 $\sigma$ ]**

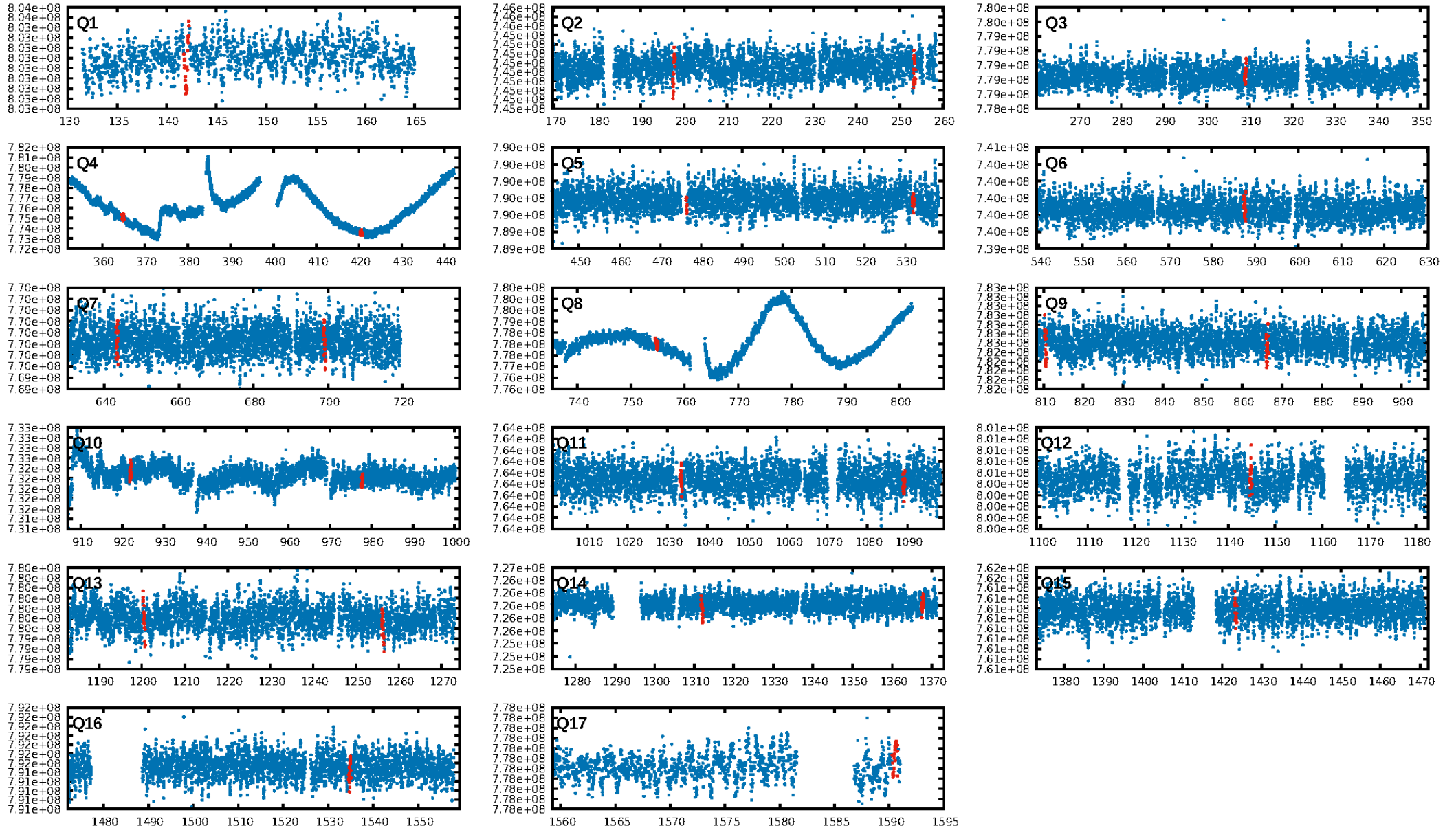
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [52.78 $\sigma$ ]  
LongPeriod-sig: 100.0% [487.78 $\sigma$ ]  
ModelChiSquare2-sig: 49.7%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 6.73e-06**  
RollingBand-fgt: 1.00 [8/8]  
GhostDiagnostic-chr: 1.806  
Centroid-sig: 2.1%  
Centroid-so: 0.443 arcsec [1.29 $\sigma$ ]  
OotOffset-rm: 0.469 arcsec [0.33 $\sigma$ ]  
KicOffset-rm: 0.583 arcsec [0.40 $\sigma$ ]  
OotOffset-st: 3/2/4/4 [13]  
KicOffset-st: 3/2/4/4 [13]  
DiffImageQuality-fgm: 0.38 [5/13]  
DiffImageOverlap-fno: 0.00 [0/17]

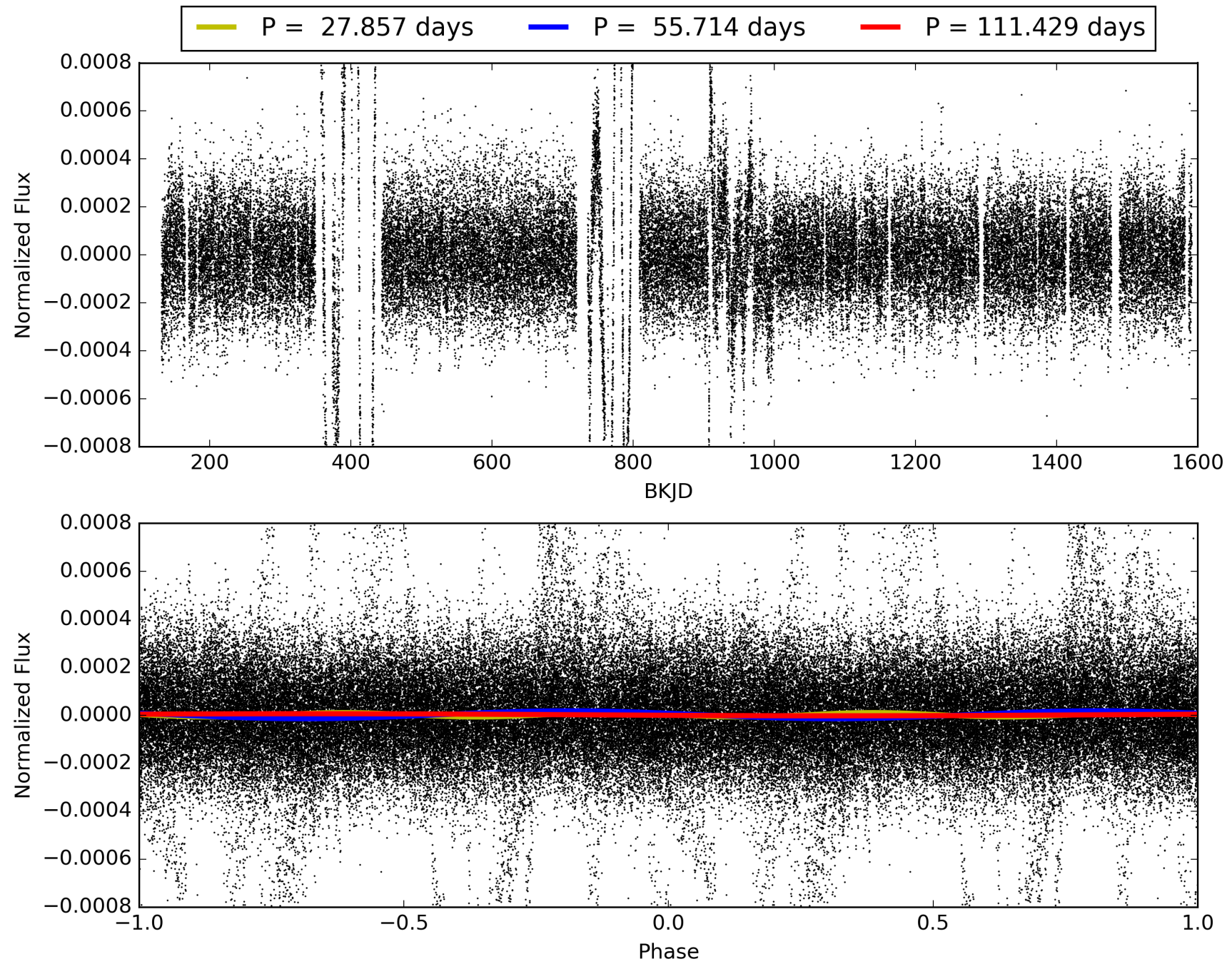
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 08:20:10 Z

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

# TCE 004245701-02, PDC Light Curves

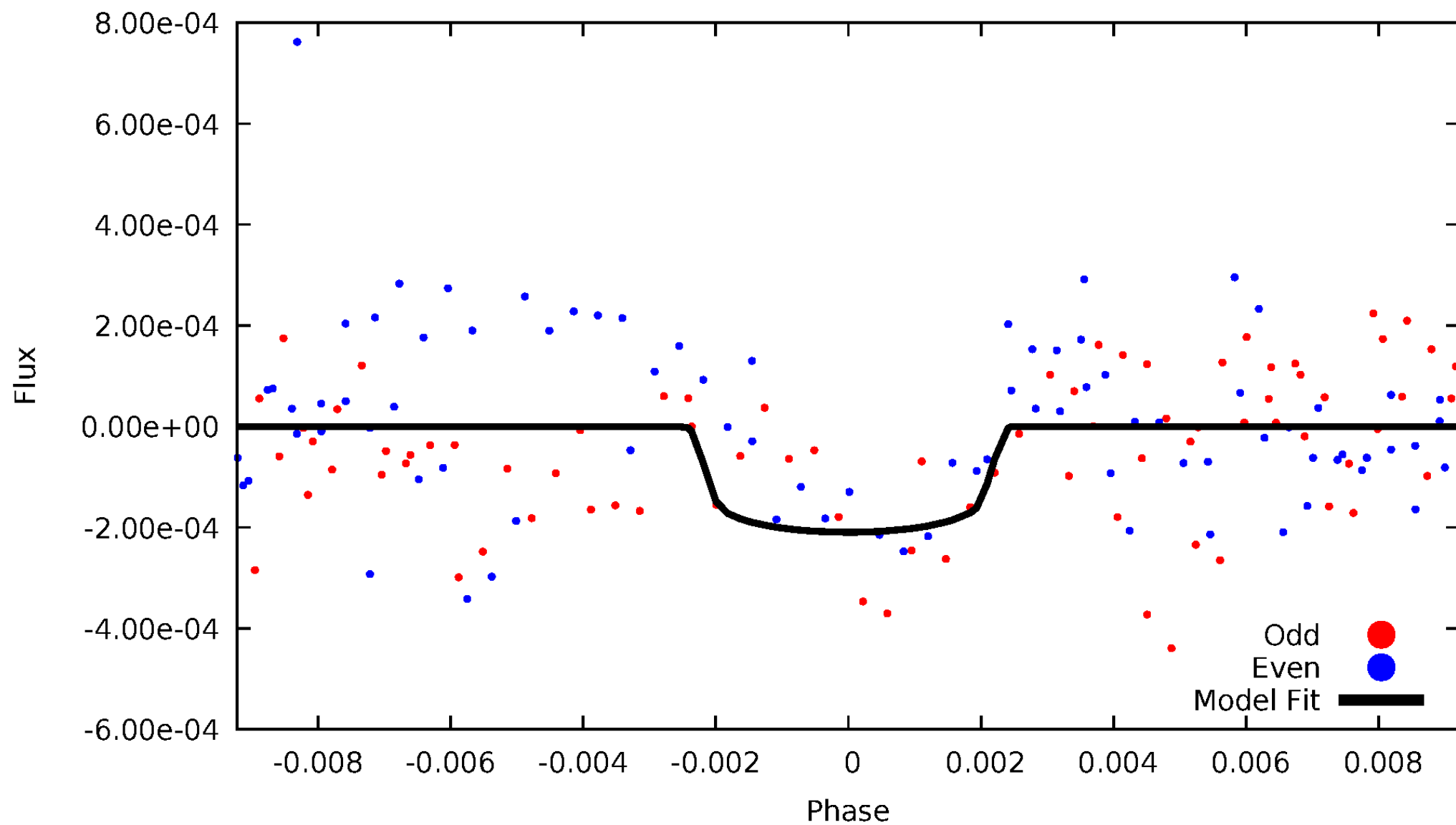


TCE 004245701-02



# DV Odd/Even

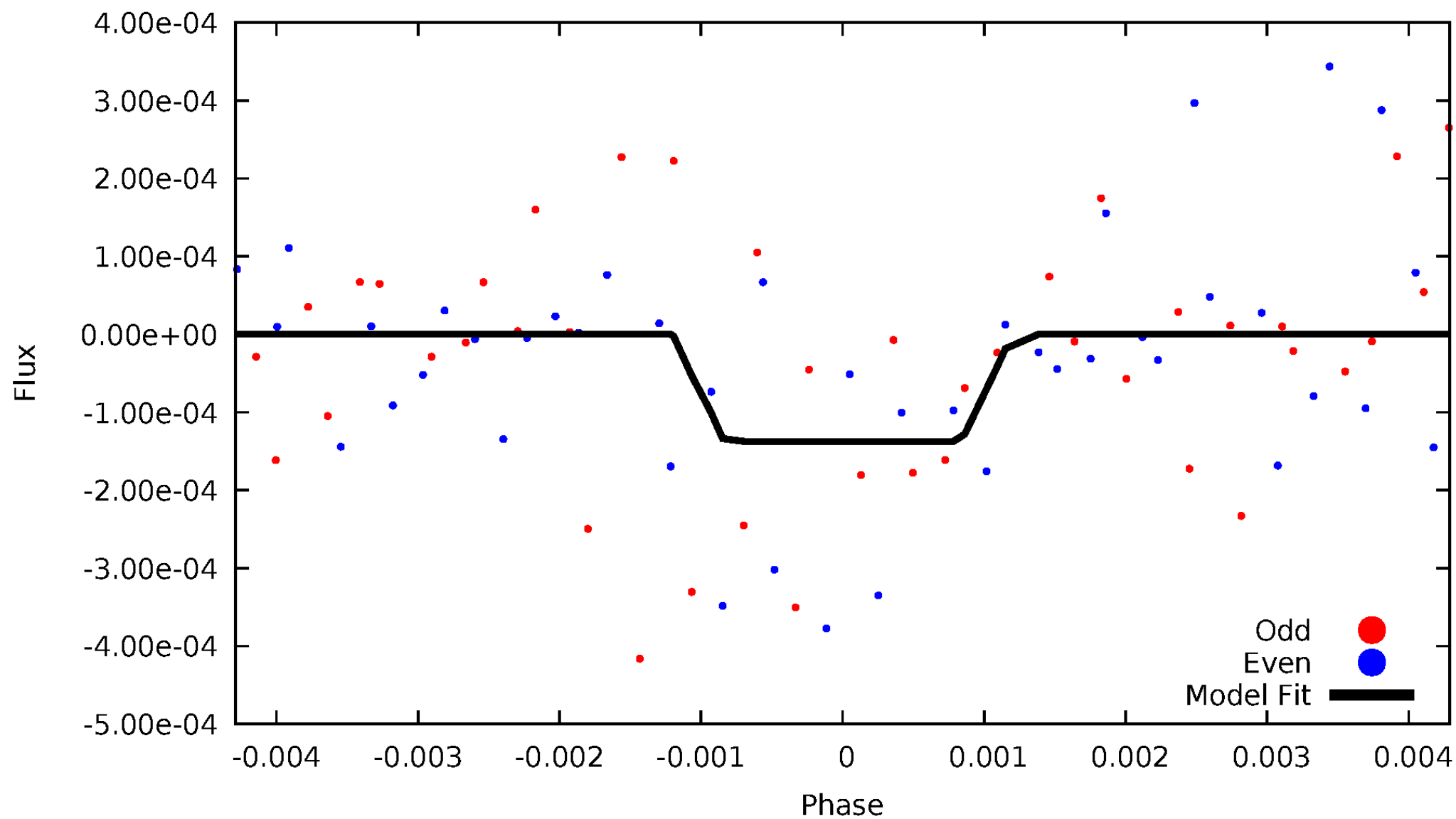
TCE 004245701-02





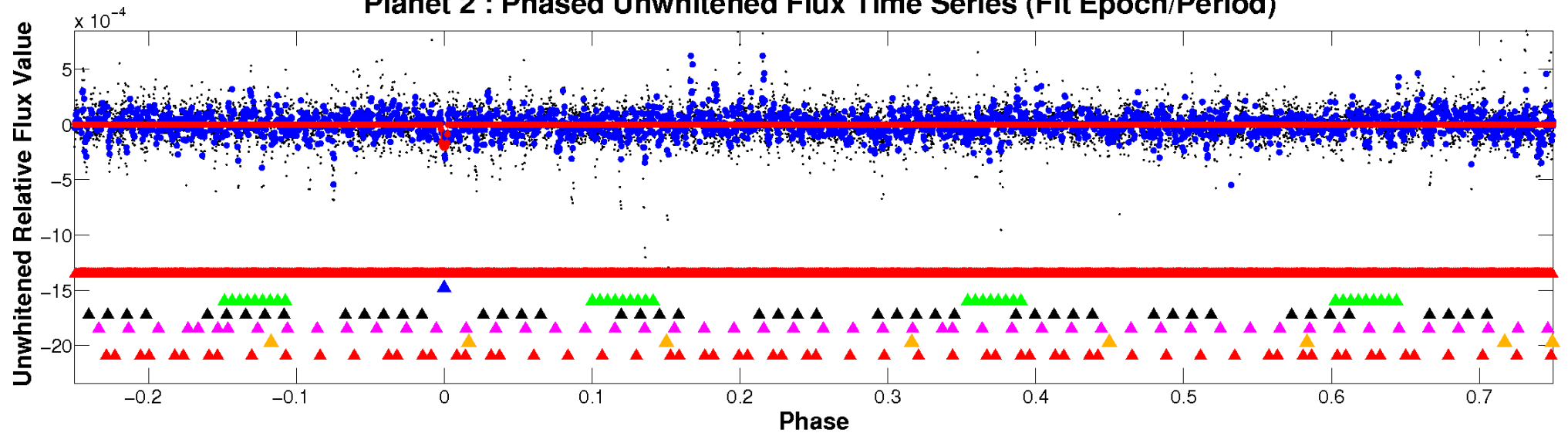
# ALT Odd/Even

TCE 004245701-02

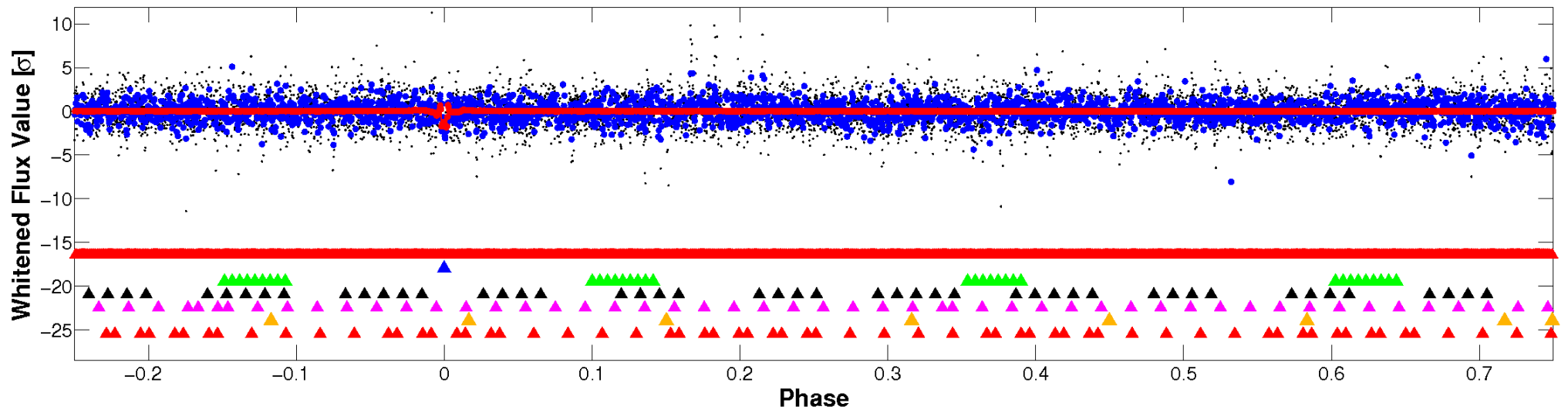


# Non-Whitened Vs. Whitened Light Curve

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

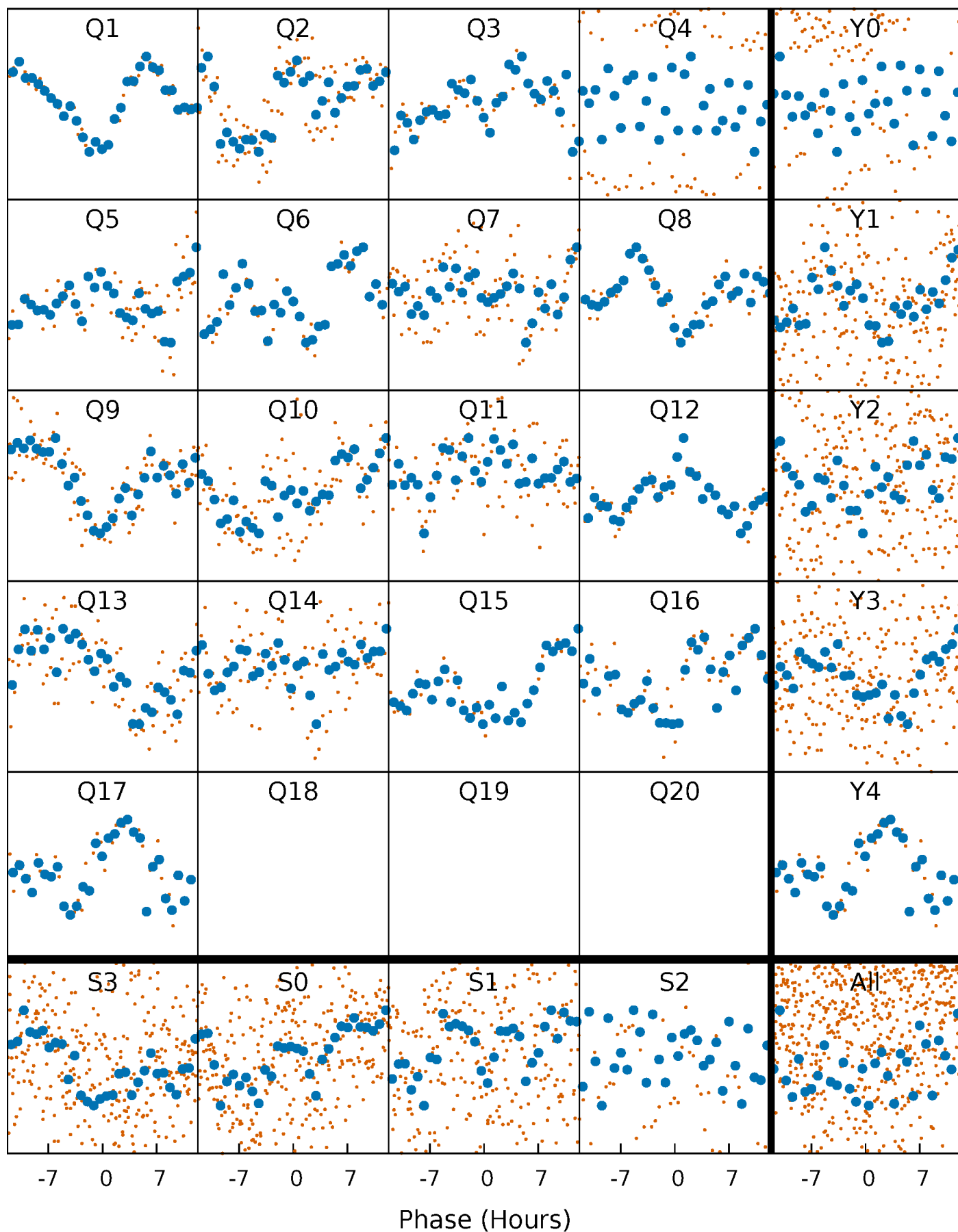


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



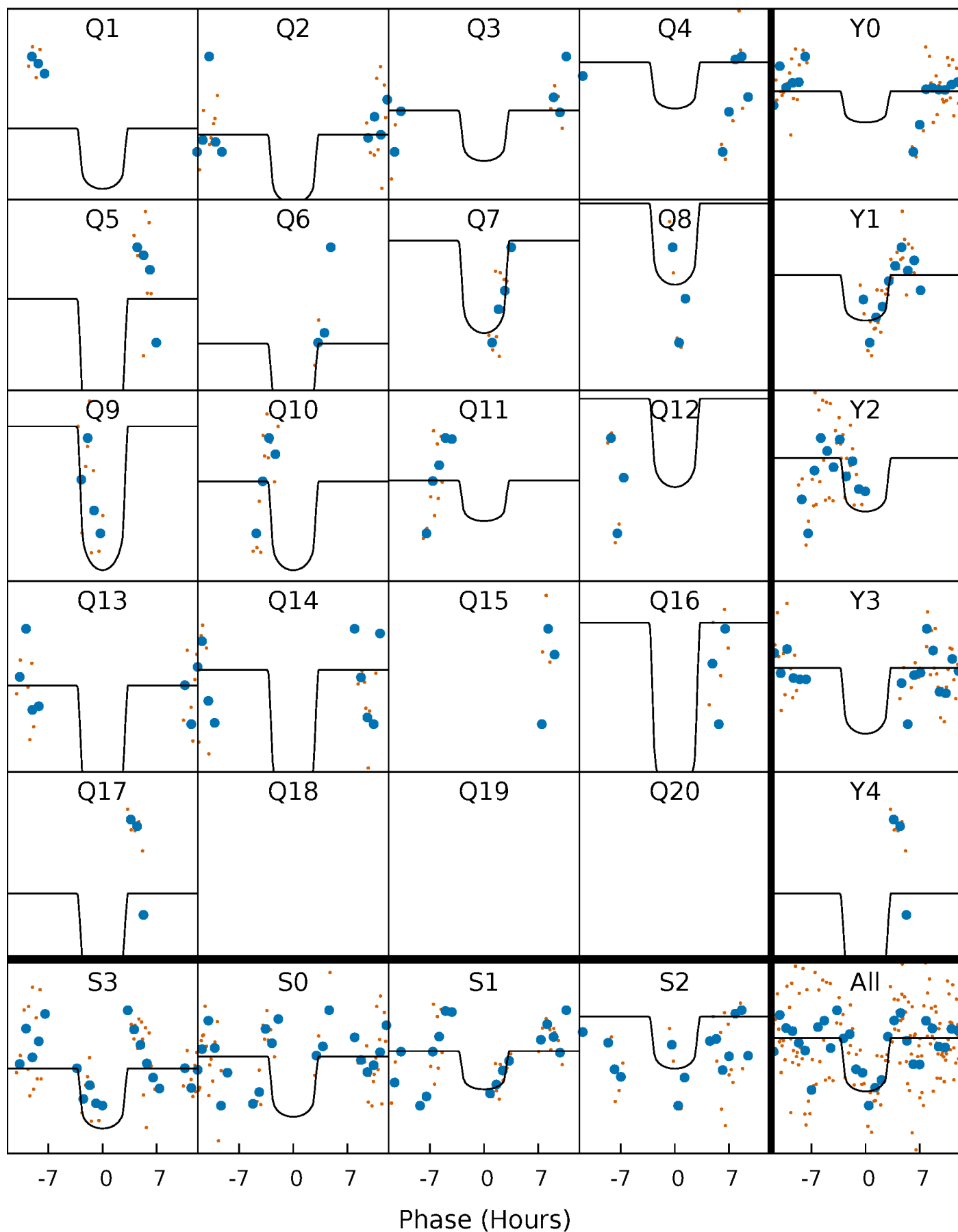
# PDC Quarter-Phased Transit Curves

TCE 004245701-02     $P = 55.714468$  Days     $T_0 = 141.964464$  (BKJD)



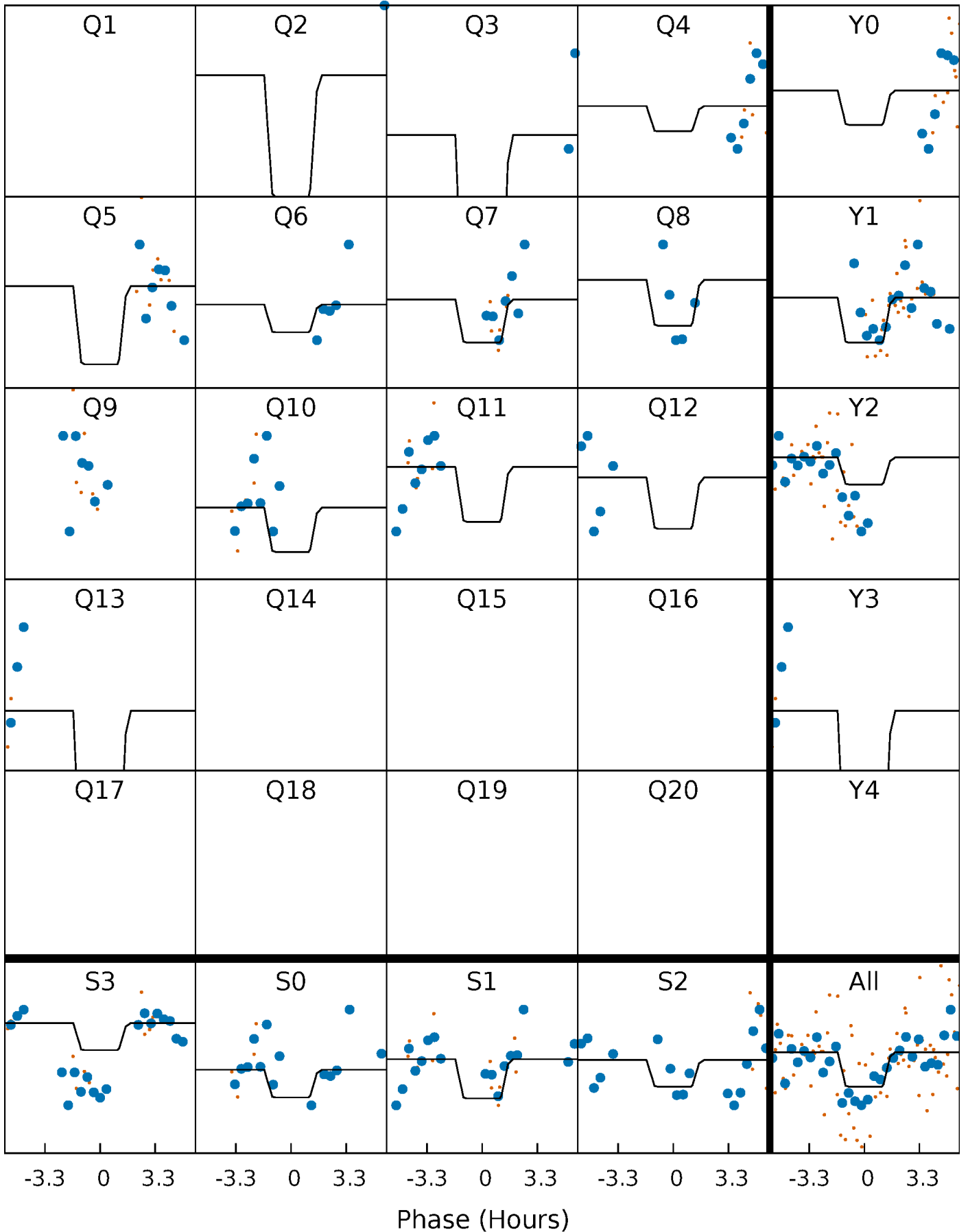
# DV Quarter-Phased Transit Curves

TCE 004245701-02     $P = 55.714468$  Days     $T_0 = 141.964464$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

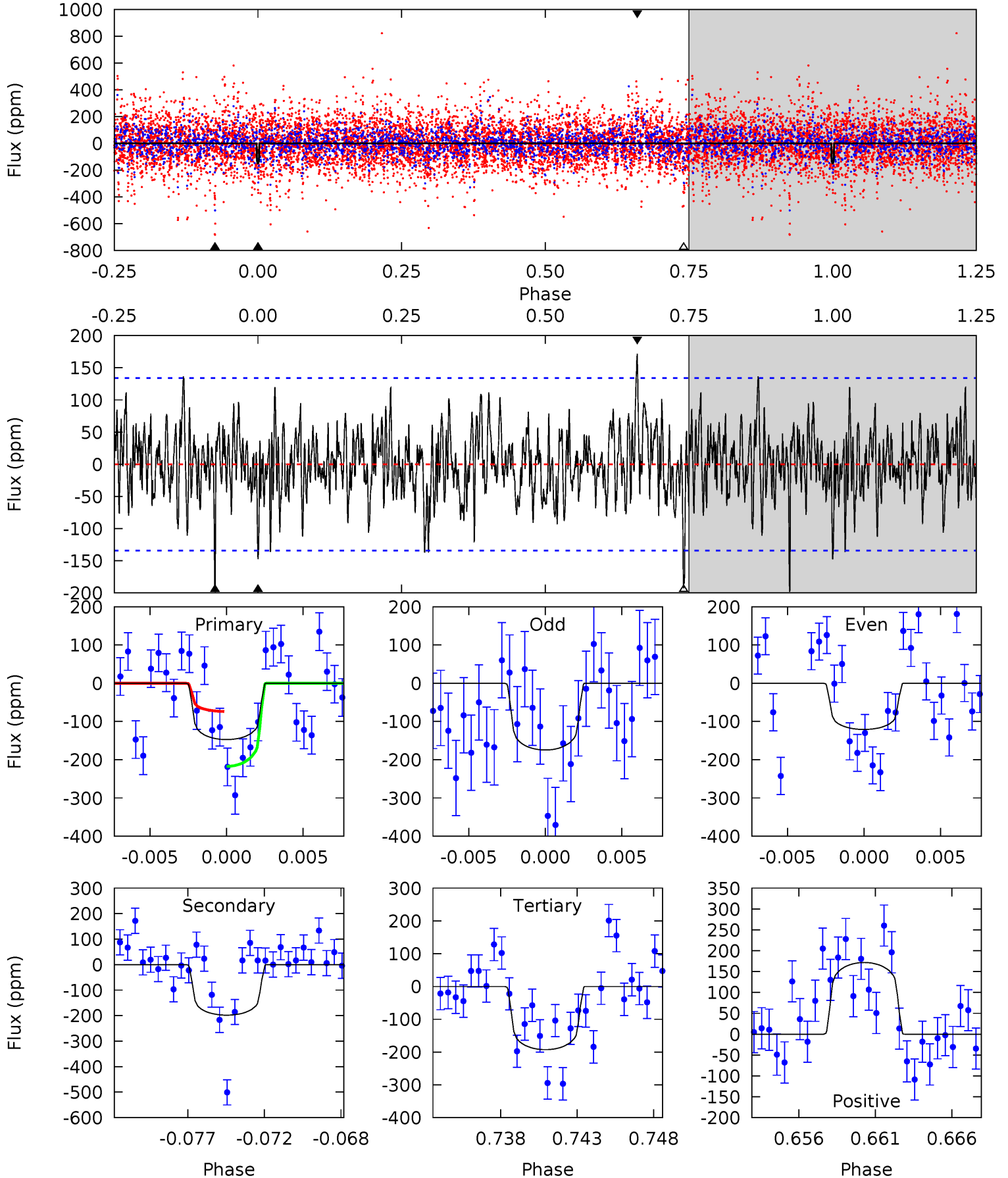
TCE 004245701-02 P= 55.696202 Days  $T_0=142.170471$  (BKJD)



# DV Model-Shift Uniqueness Test

004245701-02, P = 55.714468 Days, E = 86.249996 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  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 5.68 | 7.64 | 7.42 | 6.61 | 5.16            | 2.82            | 1.69             | -1.74   | -0.94   | 0.22    | 1.03    | 0.96    | 0.89 | 0.46  | 2.79 |

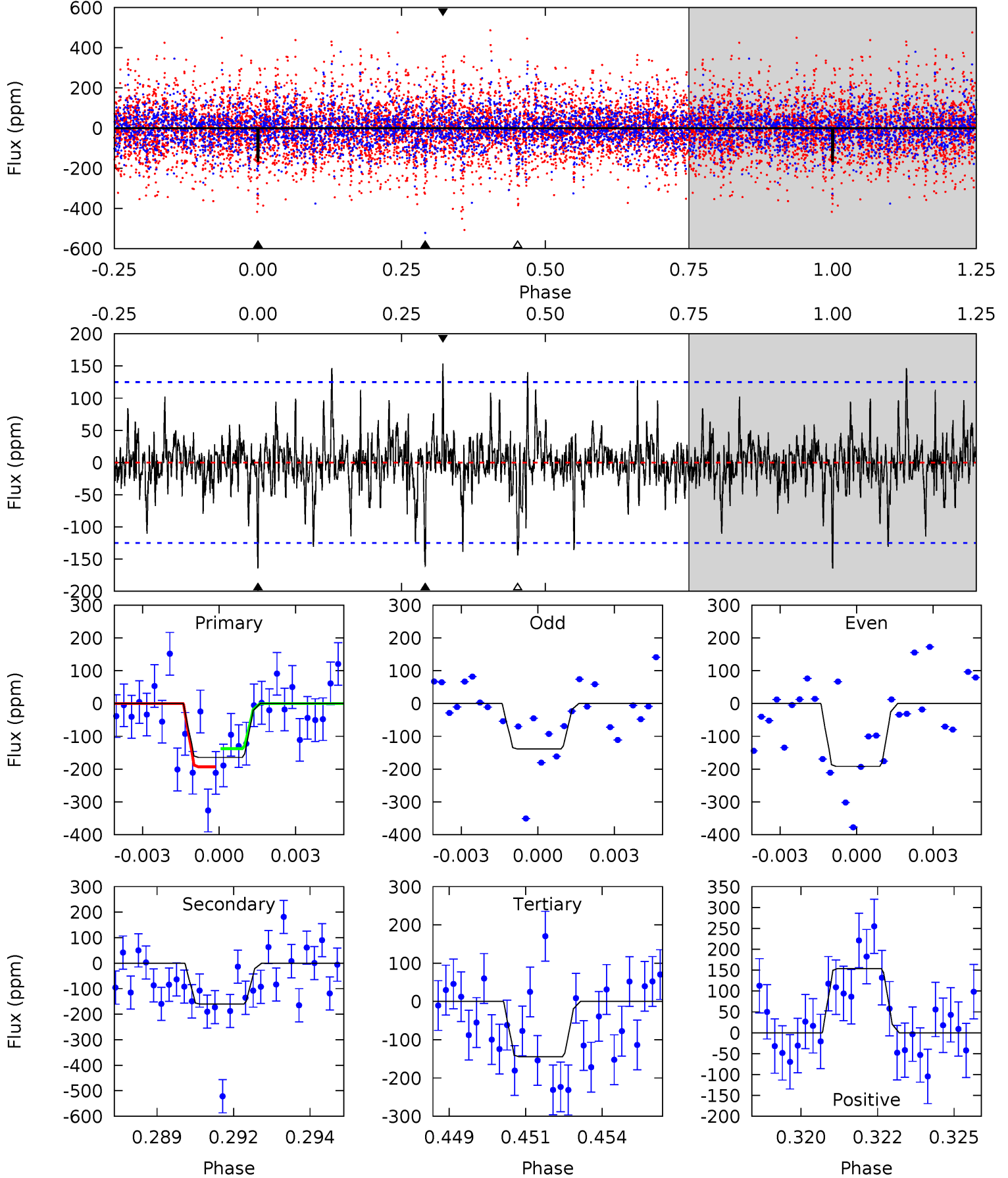




# Alt Model-Shift Uniqueness Test

004245701-02, P = 55.696202 Days, E = 86.474269 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  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 6.94 | 6.78 | 6.09 | 6.49 | 5.28            | 3.01            | 1.45             | 0.85    | 0.45    | 0.69    | 0.29    | 1.06    | 1.83 | 0.48  | 1.18 |



### Stellar Parameters For KIC 004245701

|        | $T_{\text{eff}} (K)$ | $\log(g)$                 | [Fe/H]                     | $R (R_{\odot})$           | $M (M_{\odot})$           | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $7164^{+176}_{-252}$ | $3.843^{+0.408}_{-0.102}$ | $-0.360^{+0.300}_{-0.300}$ | $2.411^{+0.465}_{-1.085}$ | $1.478^{+0.206}_{-0.308}$ | $0.148^{+0.471}_{-0.056}$                 |
|        | +2%/-4%              | +11%/-3%                  | +83%/-83%                  | +19%/-45%                 | +14%/-21%                 | +317%/-38%                                |
| 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 004245701-02 / KOI

| Detrend | Depth (ppm)   | $R_p (R_{\oplus})$     | $T_{max} (K)$       | $T_{obs} (K)$          | $A_{obs}$             |
|---------|---------------|------------------------|---------------------|------------------------|-----------------------|
| DV      | $-198 \pm 26$ | $3.59^{+1.71}_{-1.57}$ | $1173^{+83}_{-138}$ | $6963^{+2614}_{-1258}$ | $906^{+1929}_{-497}$  |
| Alt.    | $-161 \pm 24$ | $2.84^{+1.88}_{-1.45}$ | $1168^{+84}_{-124}$ | $7370^{+4529}_{-1545}$ | $1142^{+3609}_{-718}$ |

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

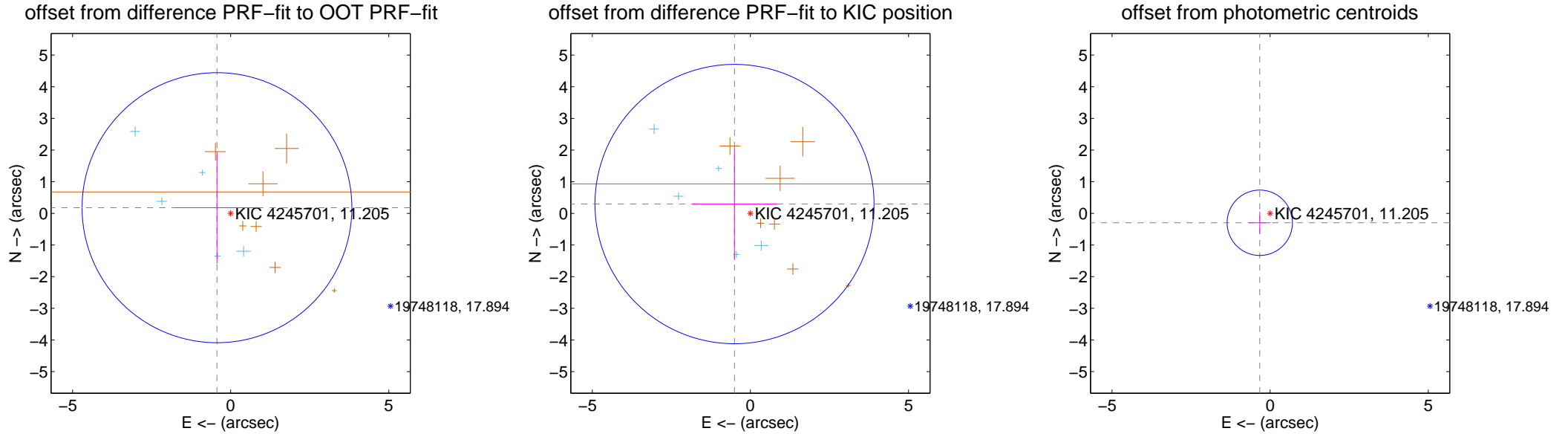
## DV Centroid Data

Supplemental centroid analysis for 004245701-02. **Kepler magnitude: 11.21.** Transit SNR 8.26

There are 5 quarters with good PRF difference image offsets

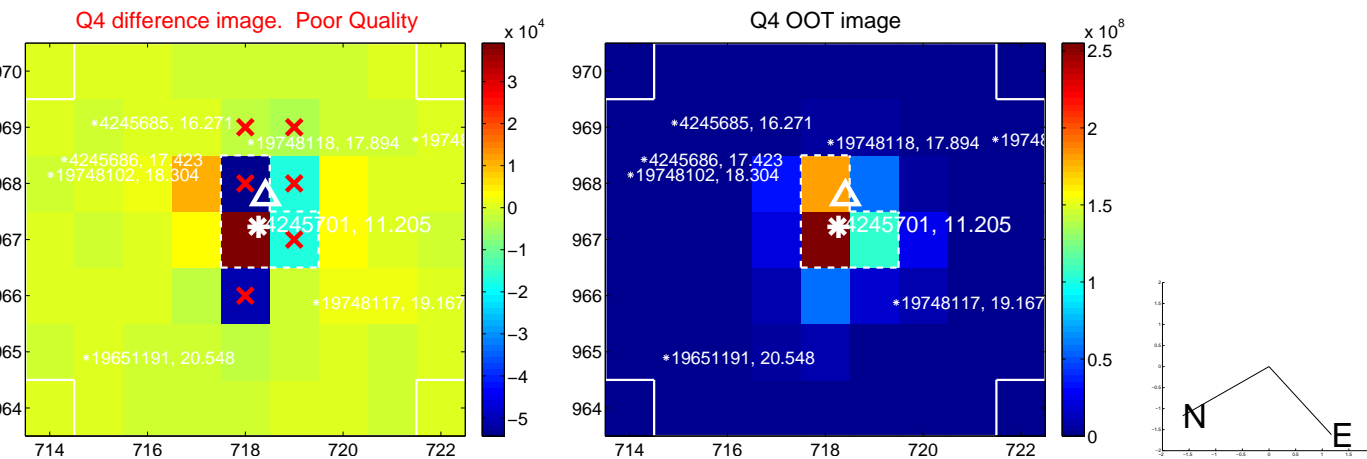
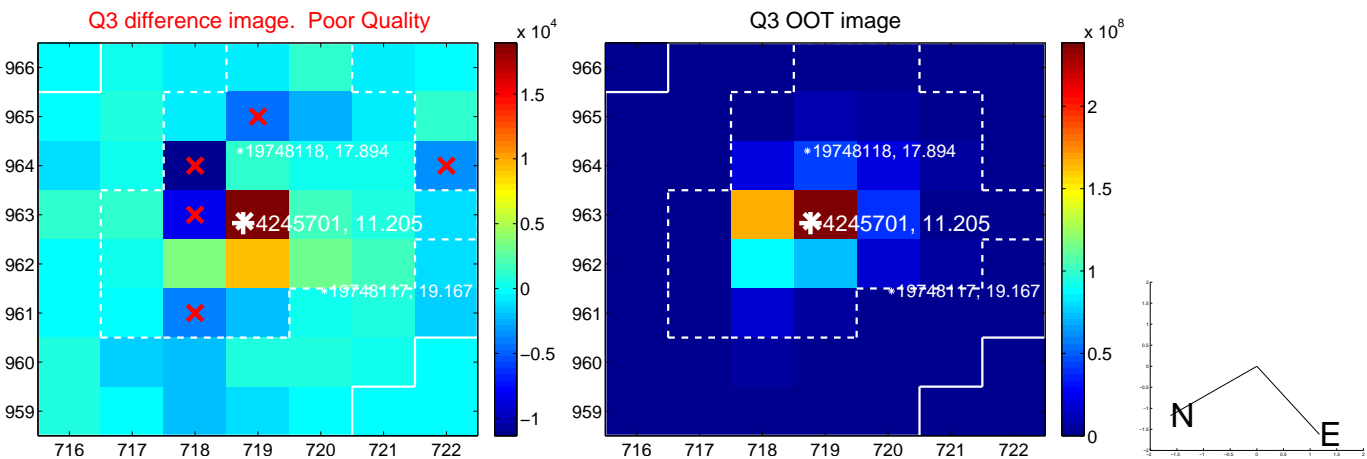
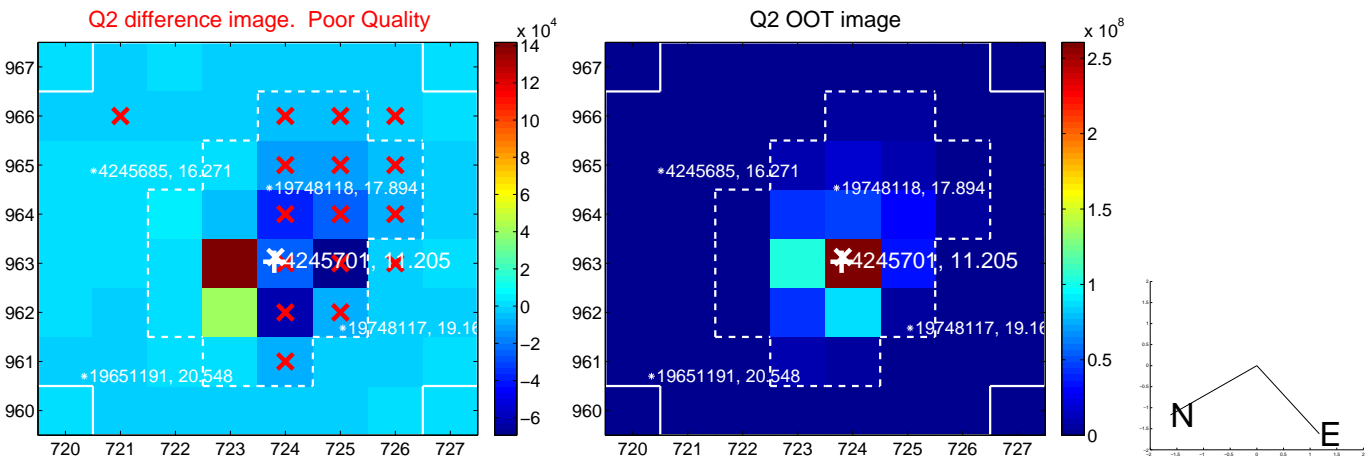
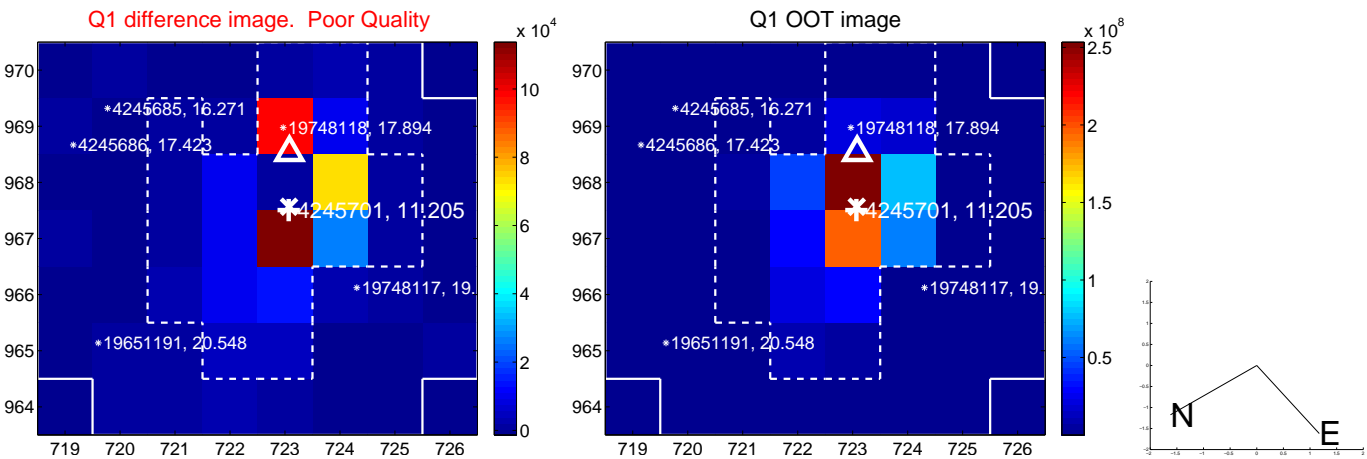
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA       | $\Delta$ Dec      |
|---|--------------------|---------------------|-------------------|-------------------|
| PRF-fit source offset from OOT          | $0.469 \pm 1.422$  | 0.33                | $0.434 \pm 1.353$ | $0.179 \pm 1.770$ |
| PRF-fit source offset from KIC position | $0.583 \pm 1.471$  | 0.40                | $0.504 \pm 1.353$ | $0.294 \pm 1.770$ |
| photometric centroid source offset      | $0.44 \pm 0.34$    | 1.29                | $0.33 \pm 0.34$   | $-0.30 \pm 0.35$  |



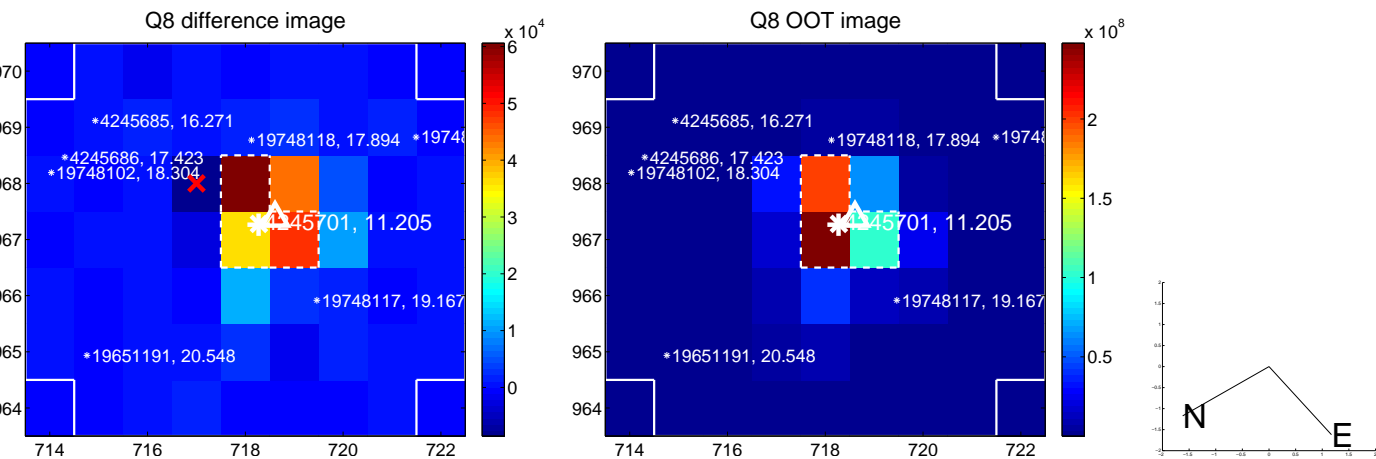
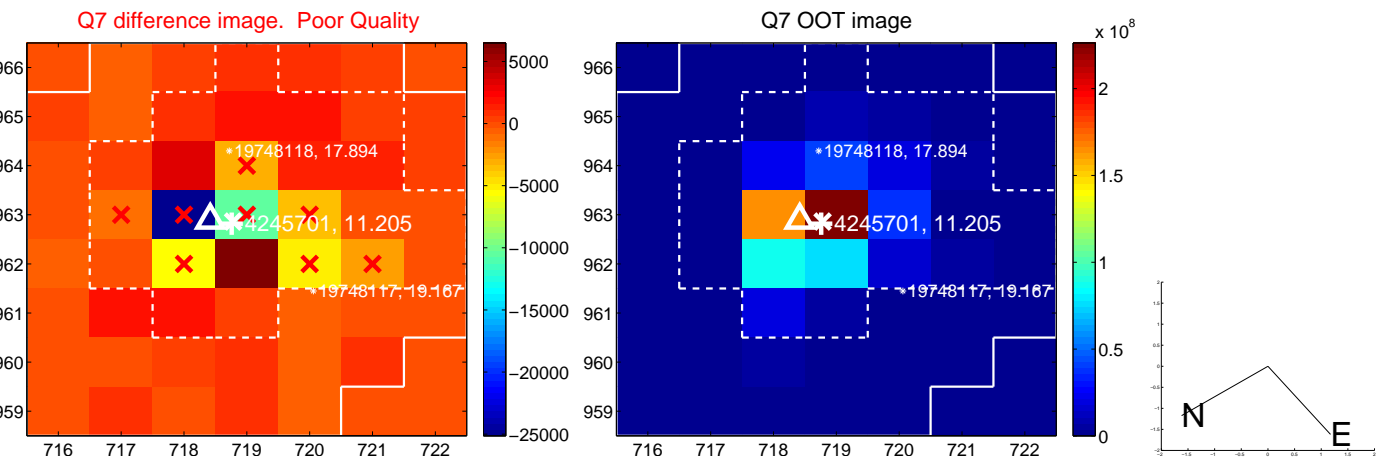
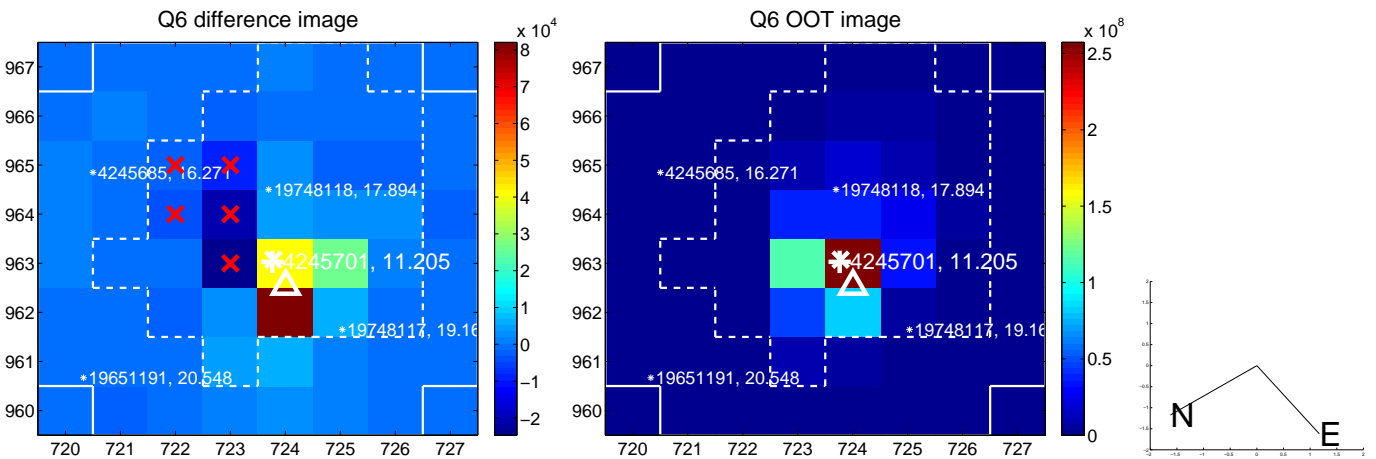
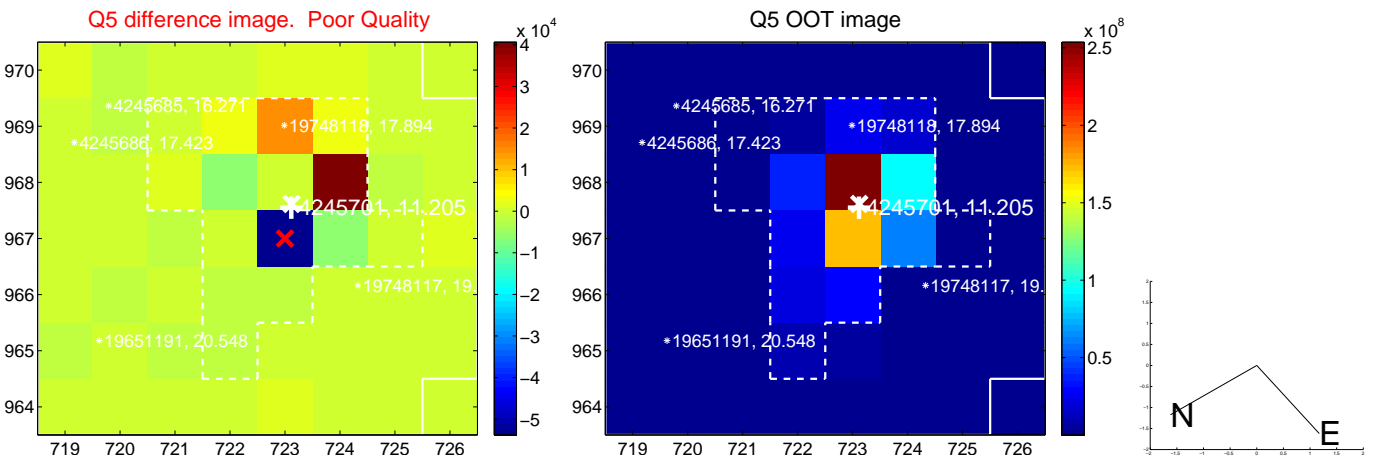
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

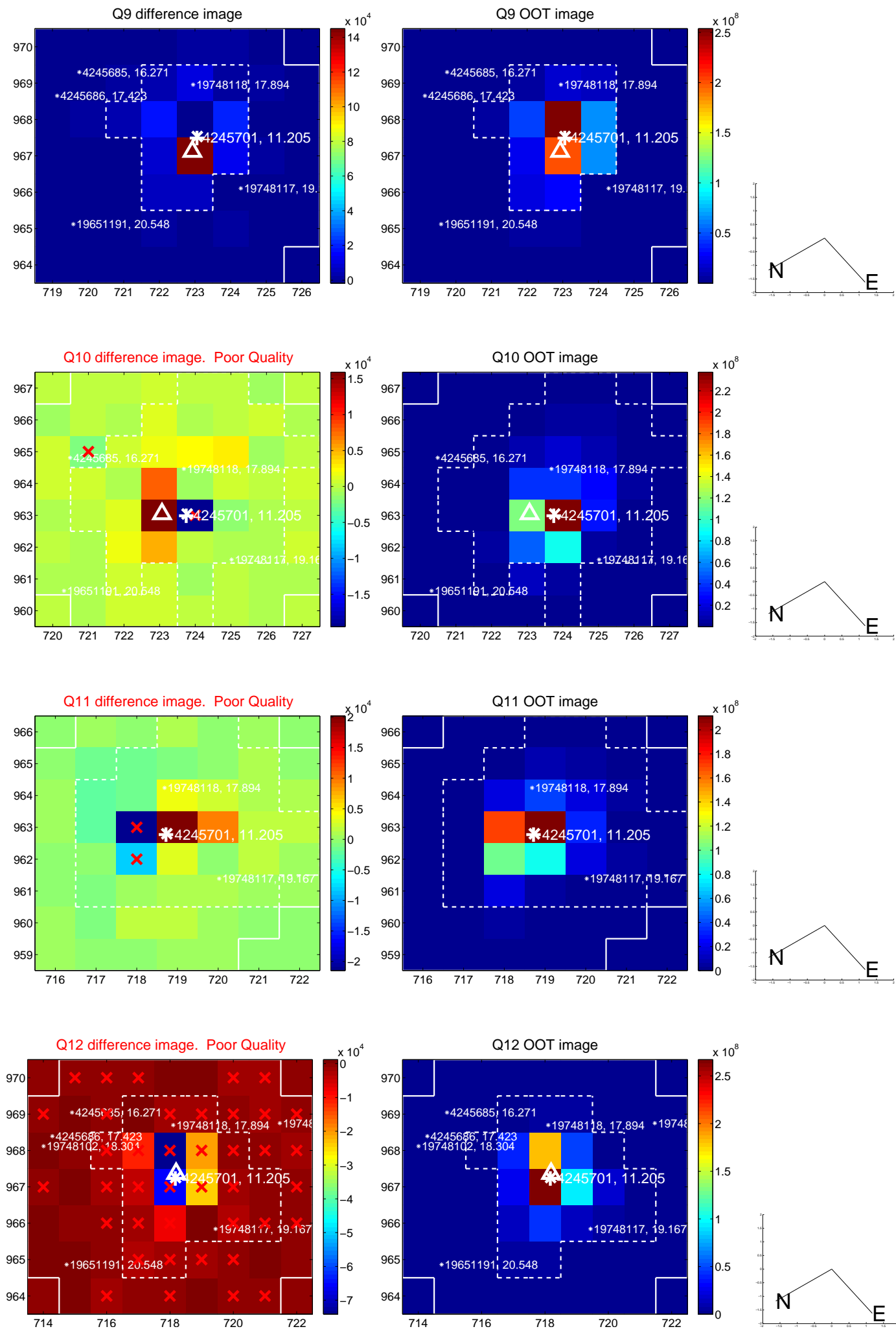




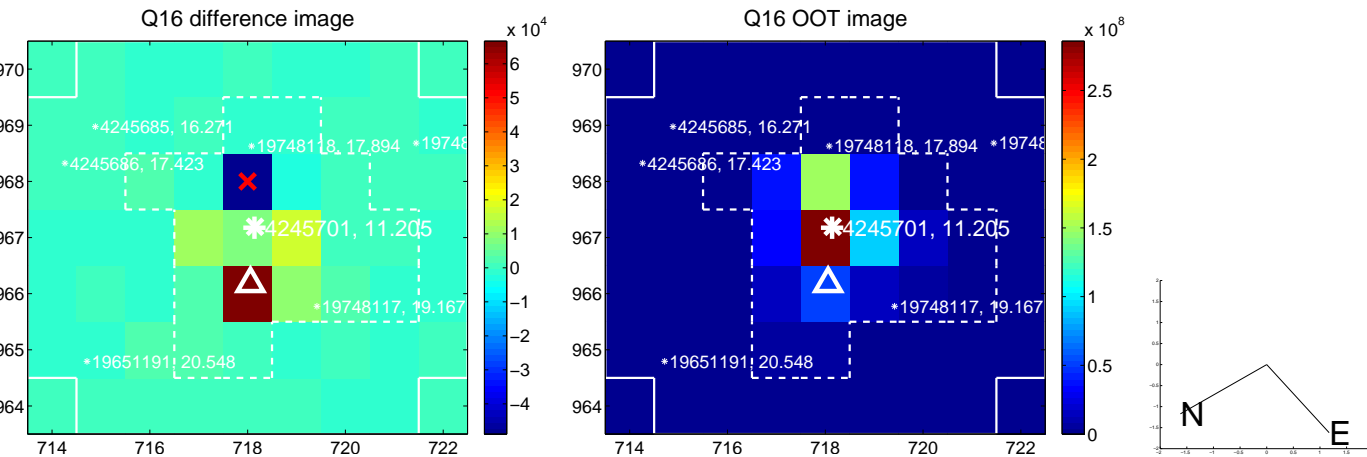
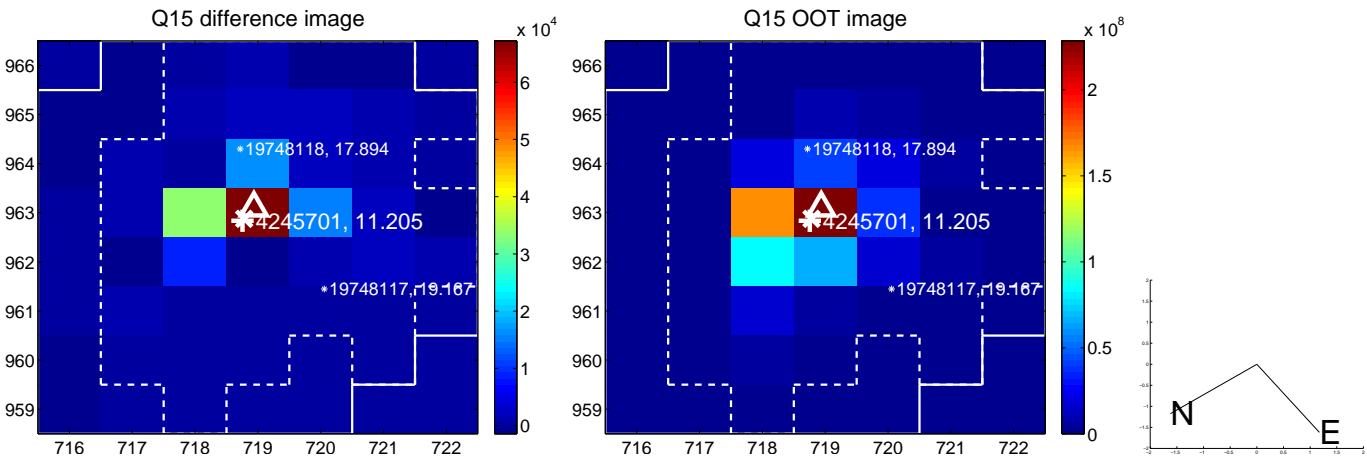
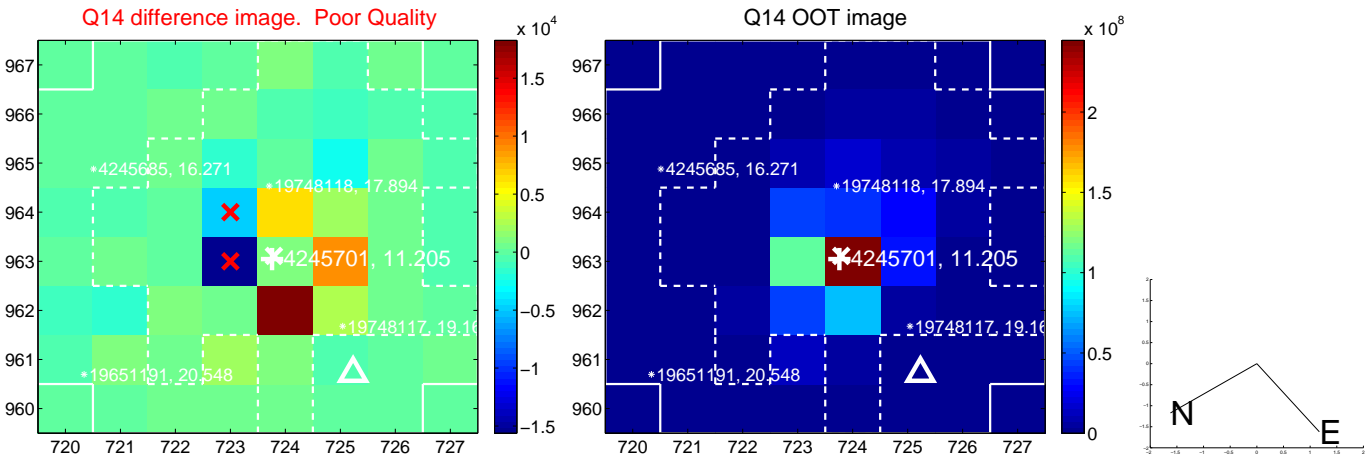
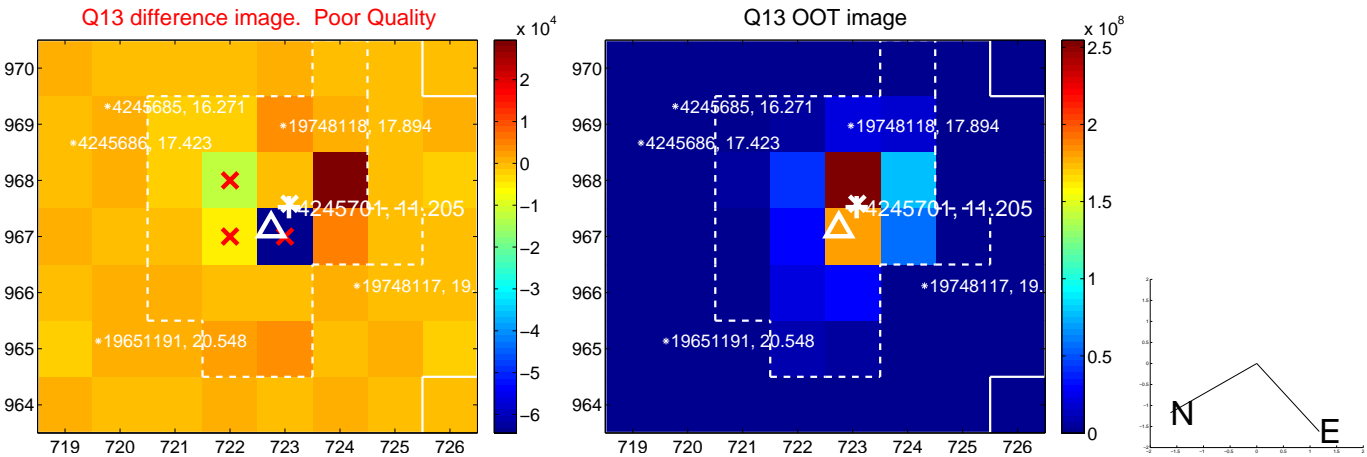
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



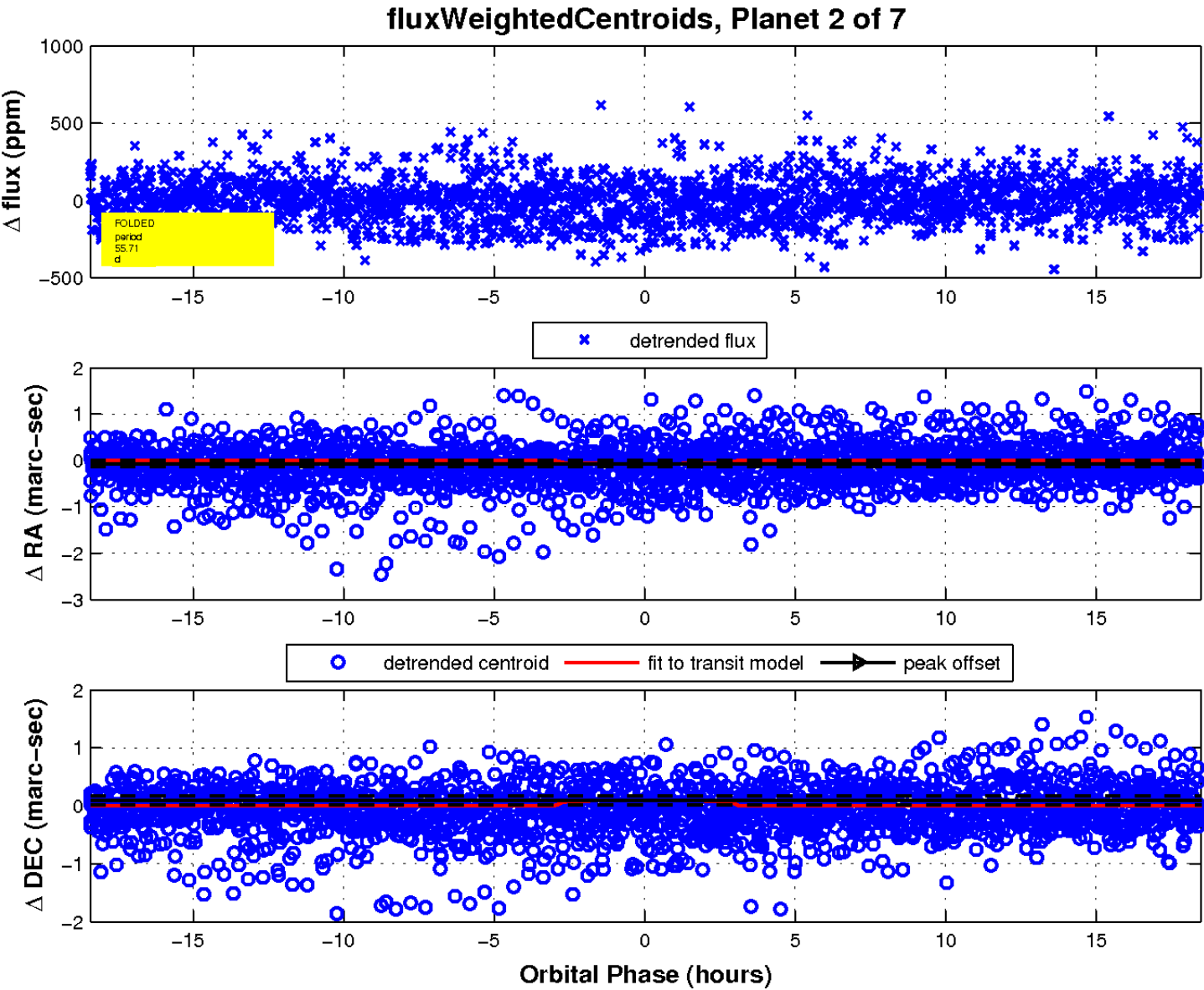
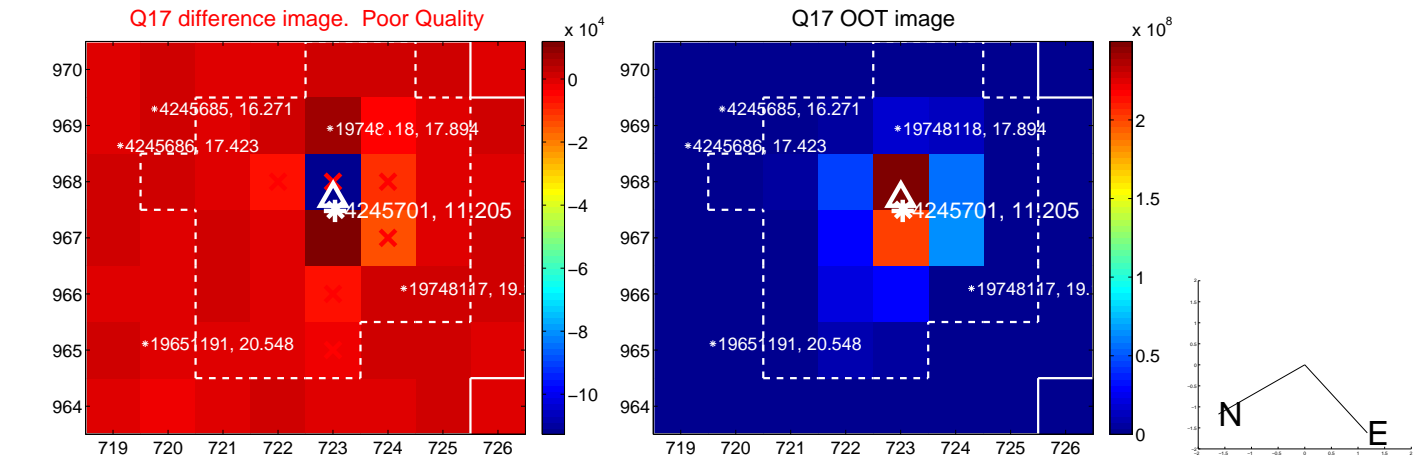
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

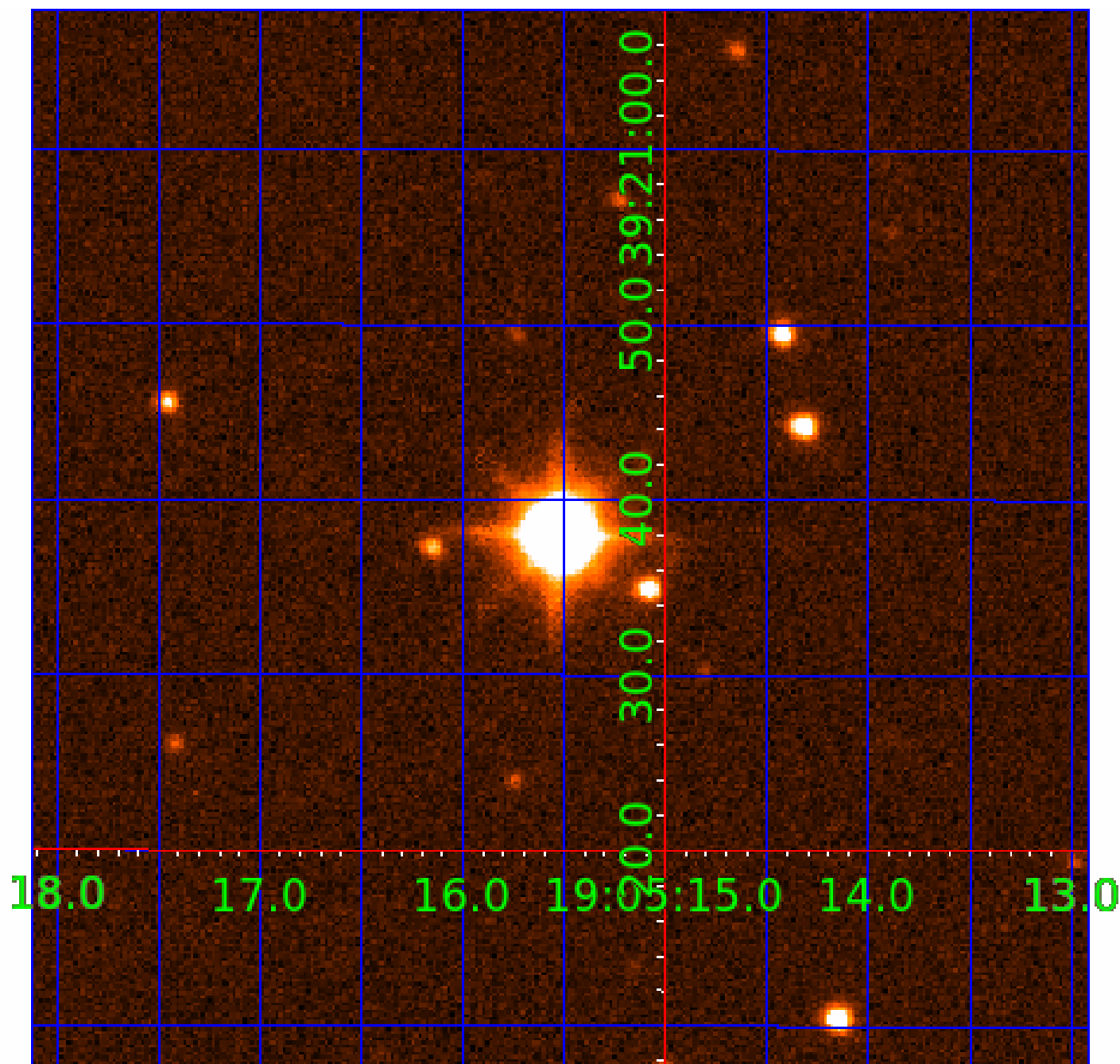


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 004245701

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 004245701-01 | OBS      | No   | 0.897843      | 132.180675   | 12.4        | 6.163            | 9.1  | 8.1  | 2.41                        | 7164            | 0.87                   | 31869.90               |
| 004245701-02 | OBS      | No   | 55.714468     | 141.964464   | 209.6       | 6.163            | 7.2  | 8.3  | 2.41                        | 7164            | 3.94                   | 129.72                 |
| 004245701-03 | OBS      | No   | 41.857491     | 147.545112   | 252.1       | 1.312            | 7.9  | 9.9  | 2.41                        | 7164            | 4.30                   | 189.94                 |
| 004245701-04 | OBS      | No   | 30.455228     | 158.307676   | 206.1       | 2.005            | 11.3 | 7.0  | 2.41                        | 7164            | 4.00                   | 290.25                 |
| 004245701-05 | OBS      | No   | 28.418026     | 132.694838   | 149.5       | 3.266            | 9.3  | 9.9  | 2.41                        | 7164            | 3.31                   | 318.31                 |
| 004245701-06 | OBS      | No   | 191.277248    | 181.918761   | 270.0       | 2.551            | 10.1 | 10.5 | 2.41                        | 7164            | 4.68                   | 25.05                  |
| 004245701-07 | OBS      | No   | 22.543458     | 150.815074   | 101.3       | 3.423            | 10.6 | 6.9  | 2.41                        | 7164            | 2.75                   | 433.46                 |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 004245701-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | LPP_DV—CENT_SATURATED   |
| 004245701-02 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED                  |
| 004245701-03 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—CENT_SATURATED   |
| 004245701-04 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED  |
| 004245701-05 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED  |
| 004245701-06 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED |
| 004245701-07 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—CENT_SATURATED  |

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

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

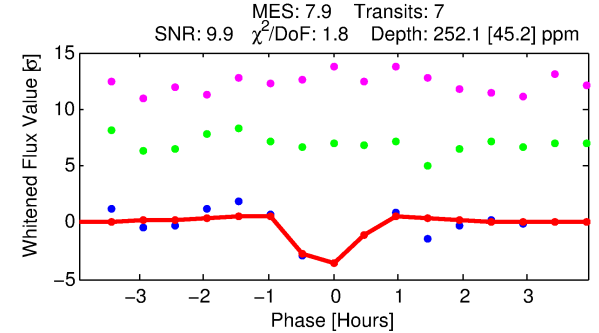
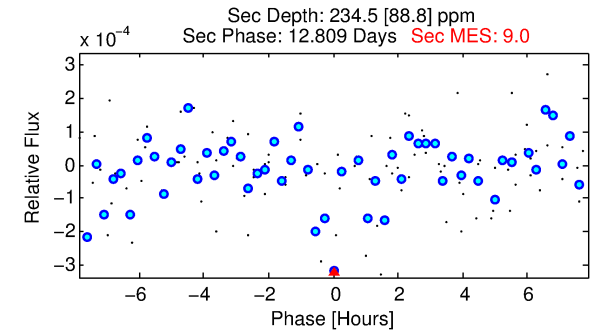
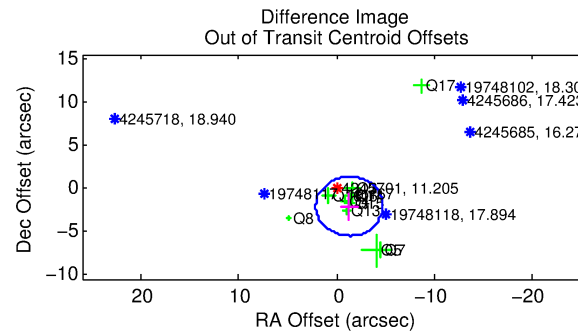
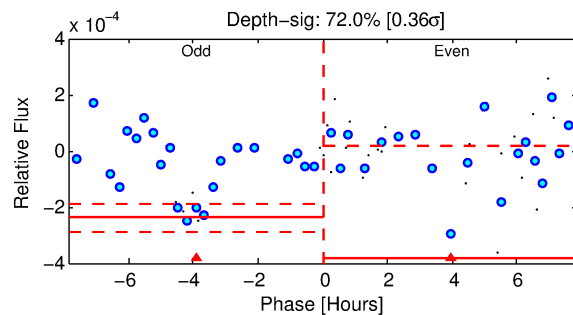
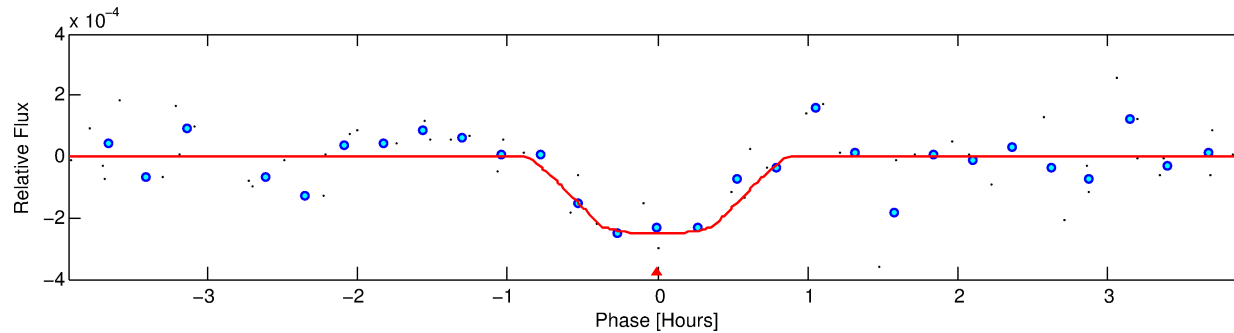
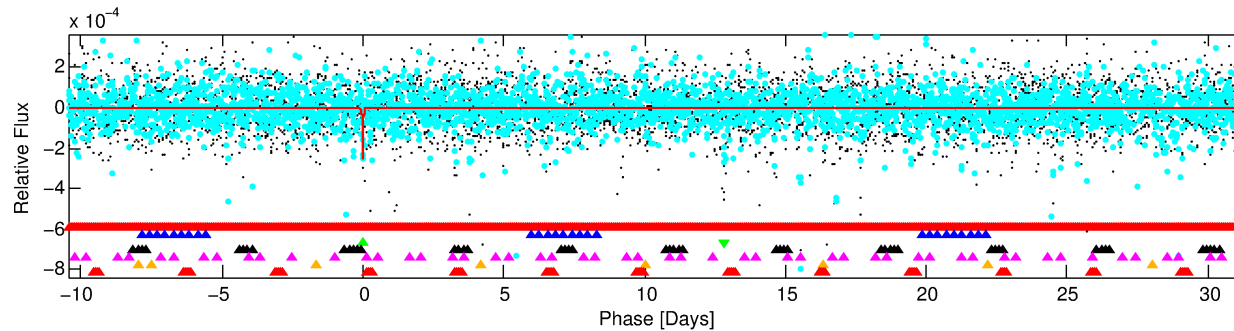
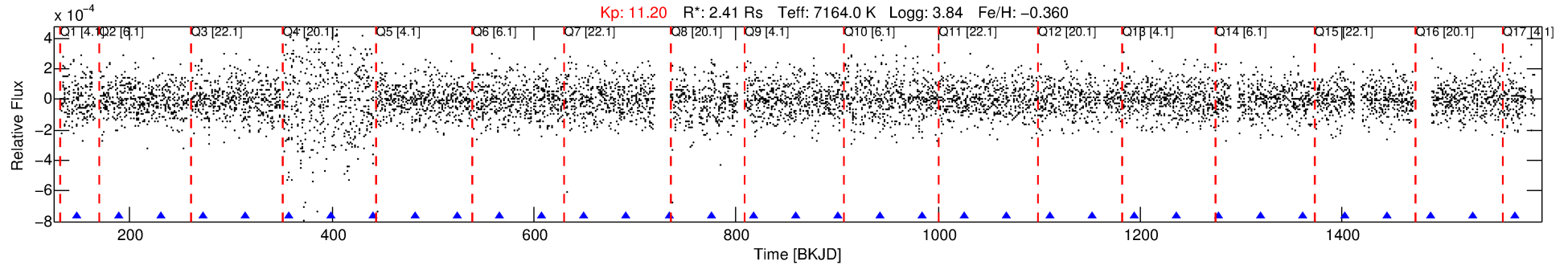
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004245701-03

No Significant Match Found

# DV One-Page Summary

KIC: 4245701 Candidate: 3 of 7 Period: 41.857 d



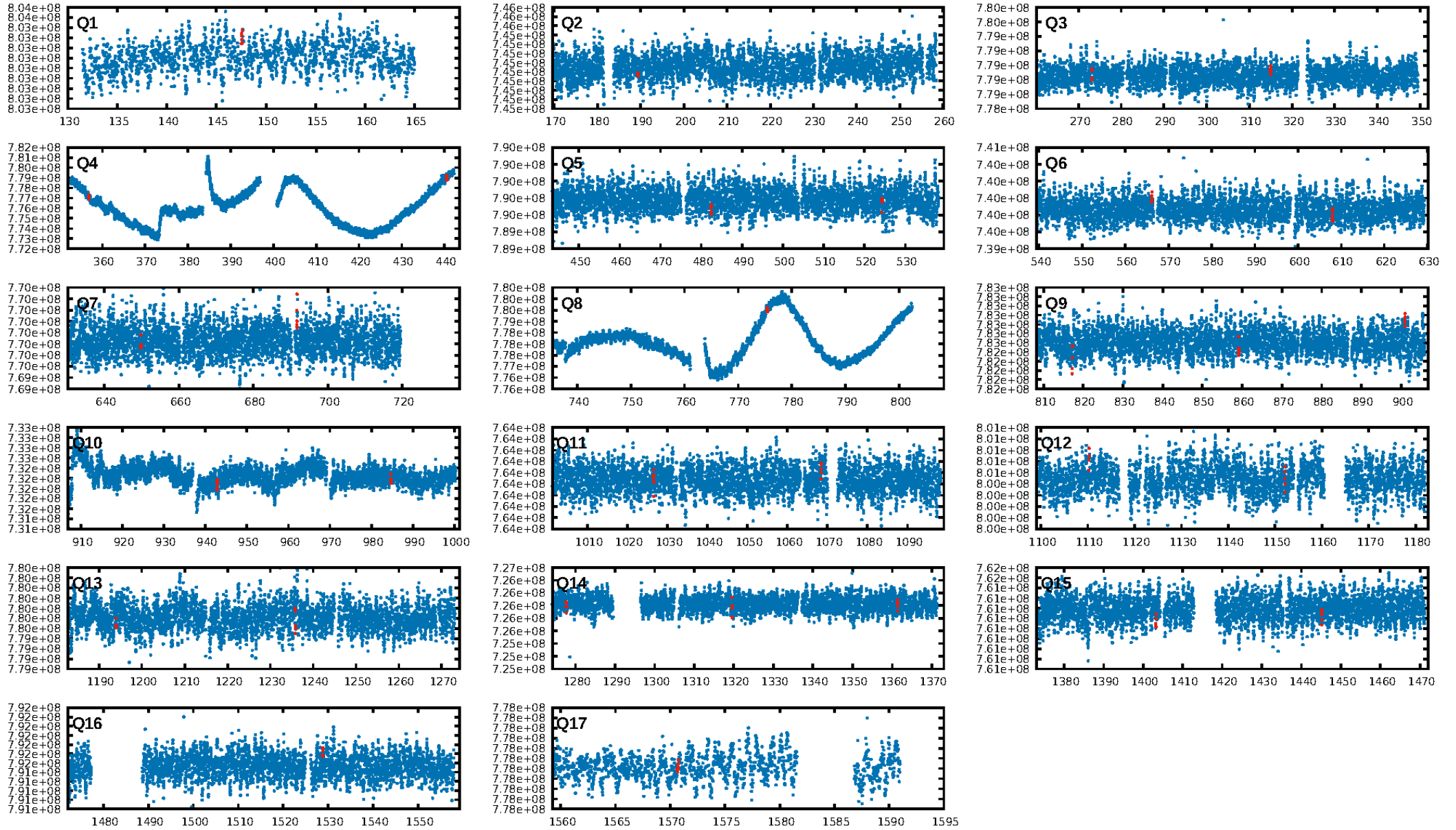
## DV Fit Results:

Period = 41.85749 [0.00029] d  
Epoch = 147.5451 [0.0065] BKJD  
 $R_p/R^* = 0.0163$  [0.0429]  
 $a/R^* = 143.22$  [2151.29]  
 $b = 0.83$  [5.76]  
 $\text{Seff} = 189.94$  [134.58]  
 $T_{\text{eq}} = 947$  [168] K  
 $R_p = 4.30$  [11.44]  $R_e$   
 $a = 0.2687$  [0.1165] AU  
 $A_g = 504.32$  [2676.72] [0.19 $\sigma$ ]  
 $T_{\text{eff}} = 6936$  [9127] K [0.66 $\sigma$ ]

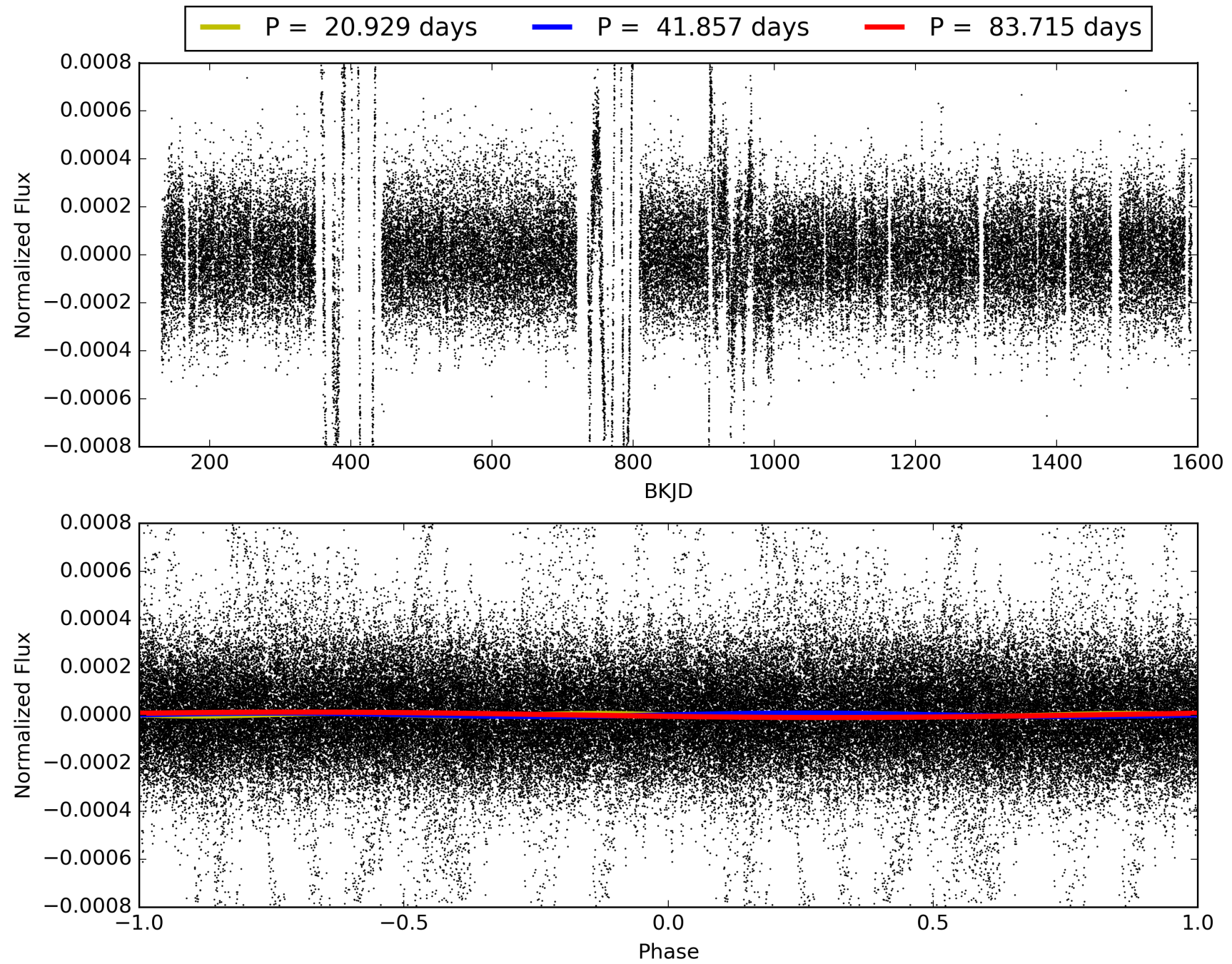
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [114.19 $\sigma$ ]  
LongPeriod-sig: 100.0% [52.78 $\sigma$ ]  
ModelChiSquare2-sig: 21.3%  
ModelChiSquareGof-sig: 97.9%  
**Bootstrap-pfa: 1.20e-06**  
RollingBand-fgt: 1.00 [7/7]  
**GhostDiagnostic-chr: 0.6056**  
Centroid-sig: 42.0%  
Centroid-so: 0.377 arcsec [1.03 $\sigma$ ]  
OotOffset-rm: 2.461 arcsec [2.15 $\sigma$ ]  
KicOffset-rm: 2.335 arcsec [2.50 $\sigma$ ]  
OotOffset-st: 2/3/3/3 [11]  
KicOffset-st: 2/3/3/3 [11]  
DiffImageQuality-fgm: 0.45 [5/11]  
DiffImageOverlap-fno: 0.29 [5/17]

# TCE 004245701-03, PDC Light Curves

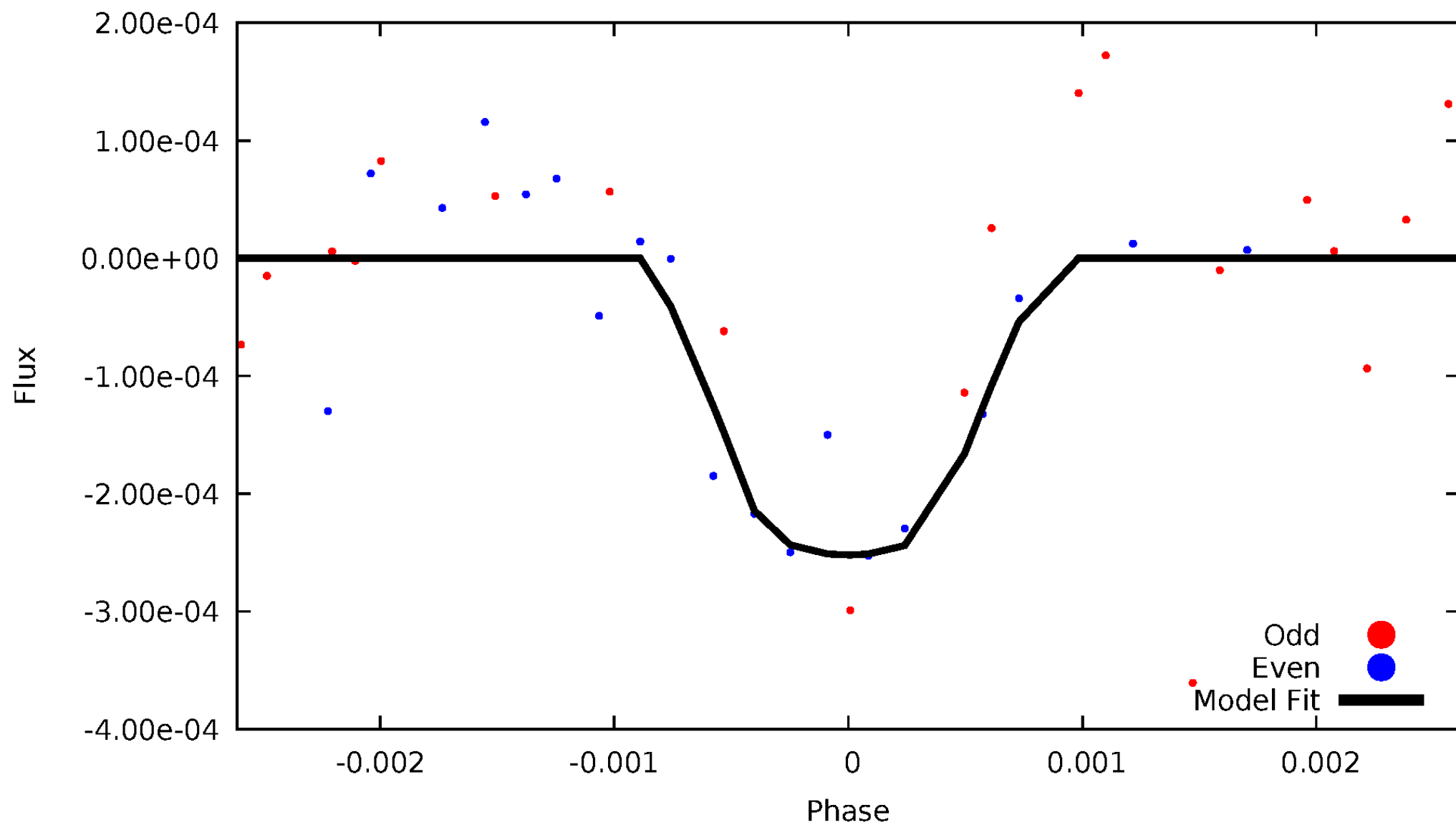


TCE 004245701-03



# DV Odd/Even

TCE 004245701-03





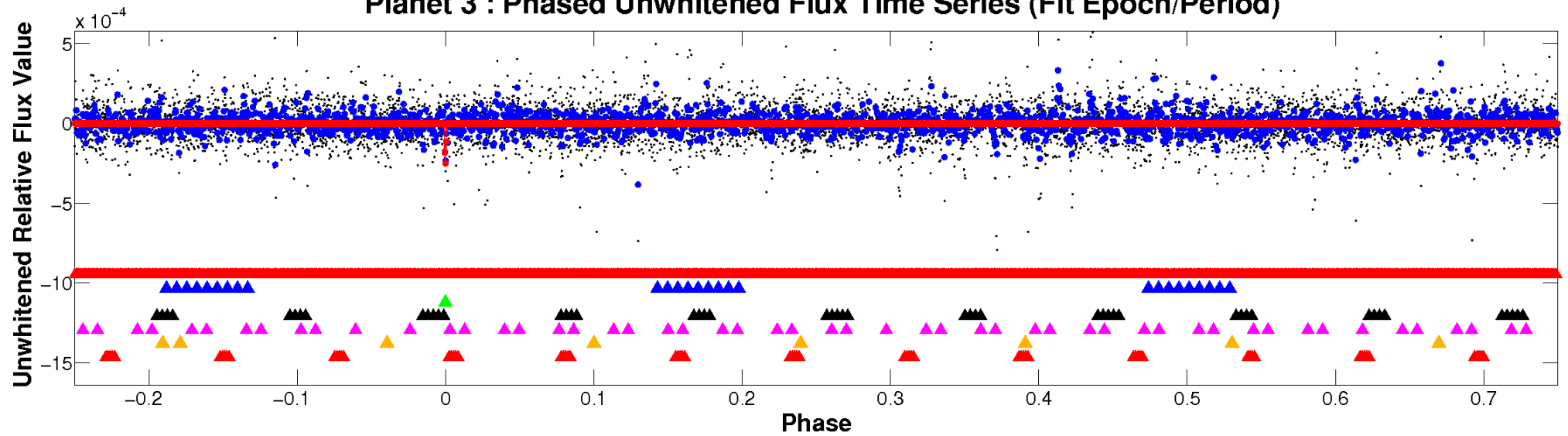


ALT Odd/Even

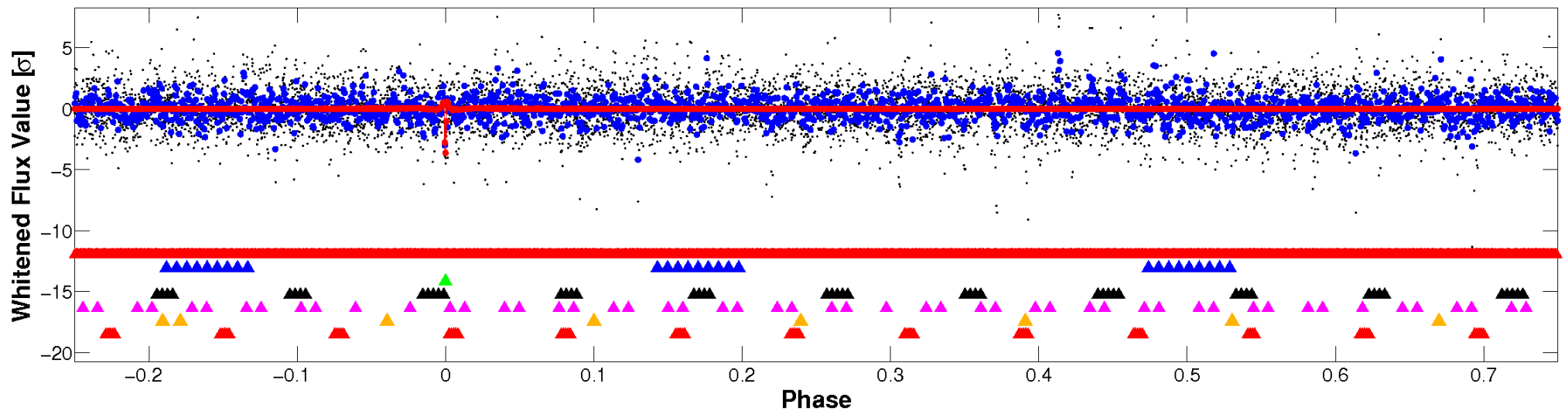
This plot does not exist for this TCE.

# Non-Whitened Vs. Whitened Light Curve

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

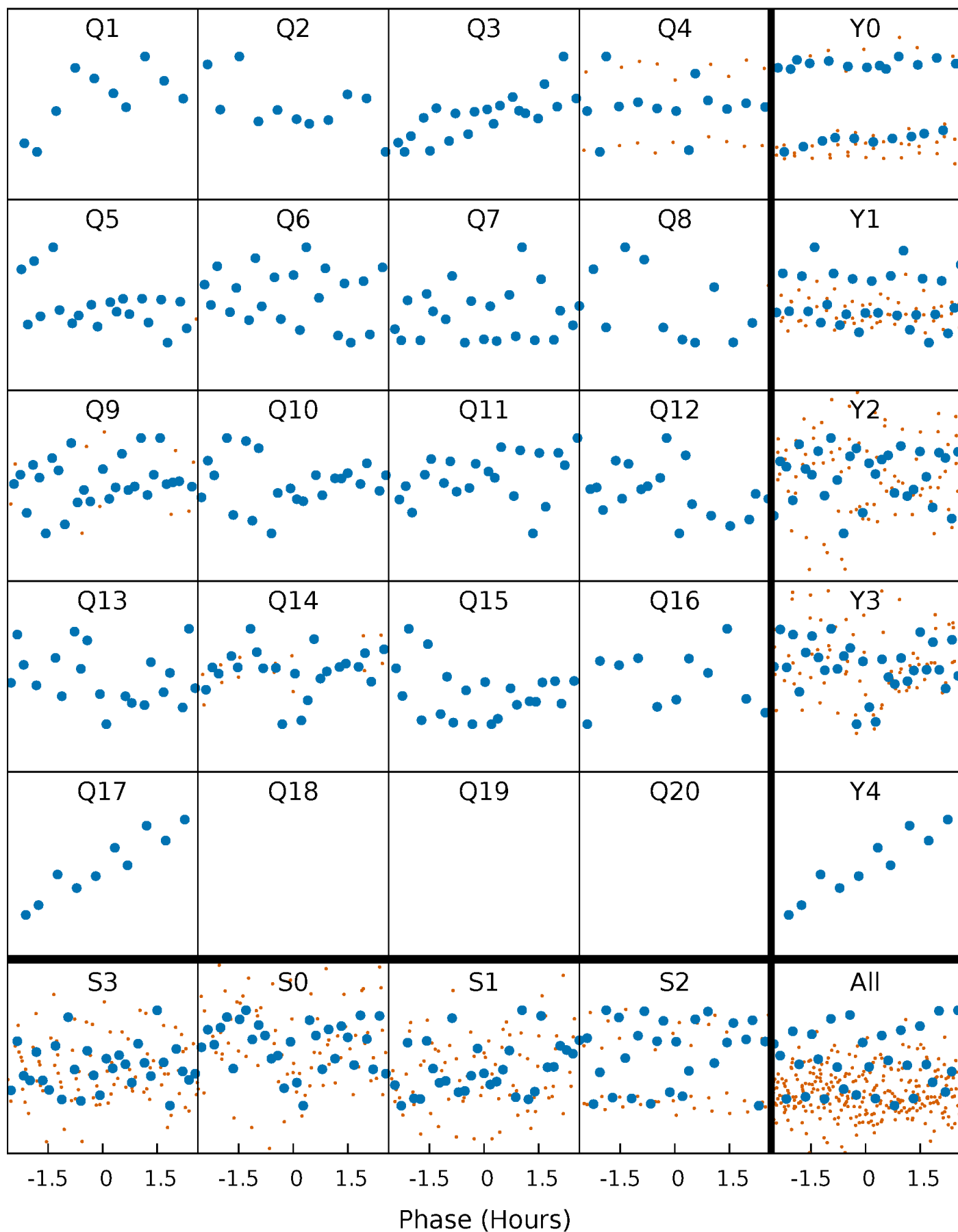


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



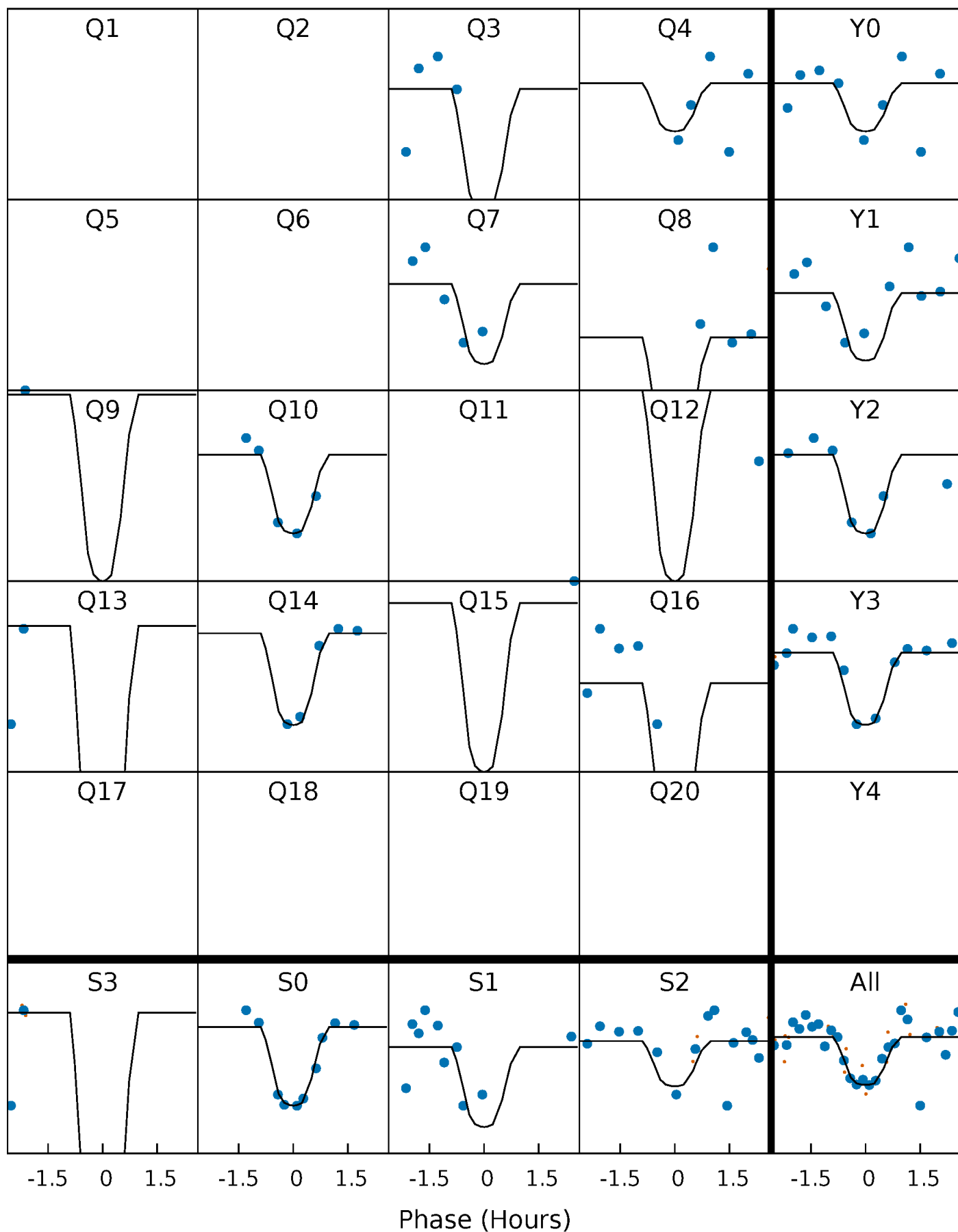
# PDC Quarter-Phased Transit Curves

TCE 004245701-03   P= 41.857491 Days    $T_0=147.545112$  (BKJD)



# DV Quarter-Phased Transit Curves

TCE 004245701-03 P= 41.857491 Days  $T_0=147.545112$  (BKJD)



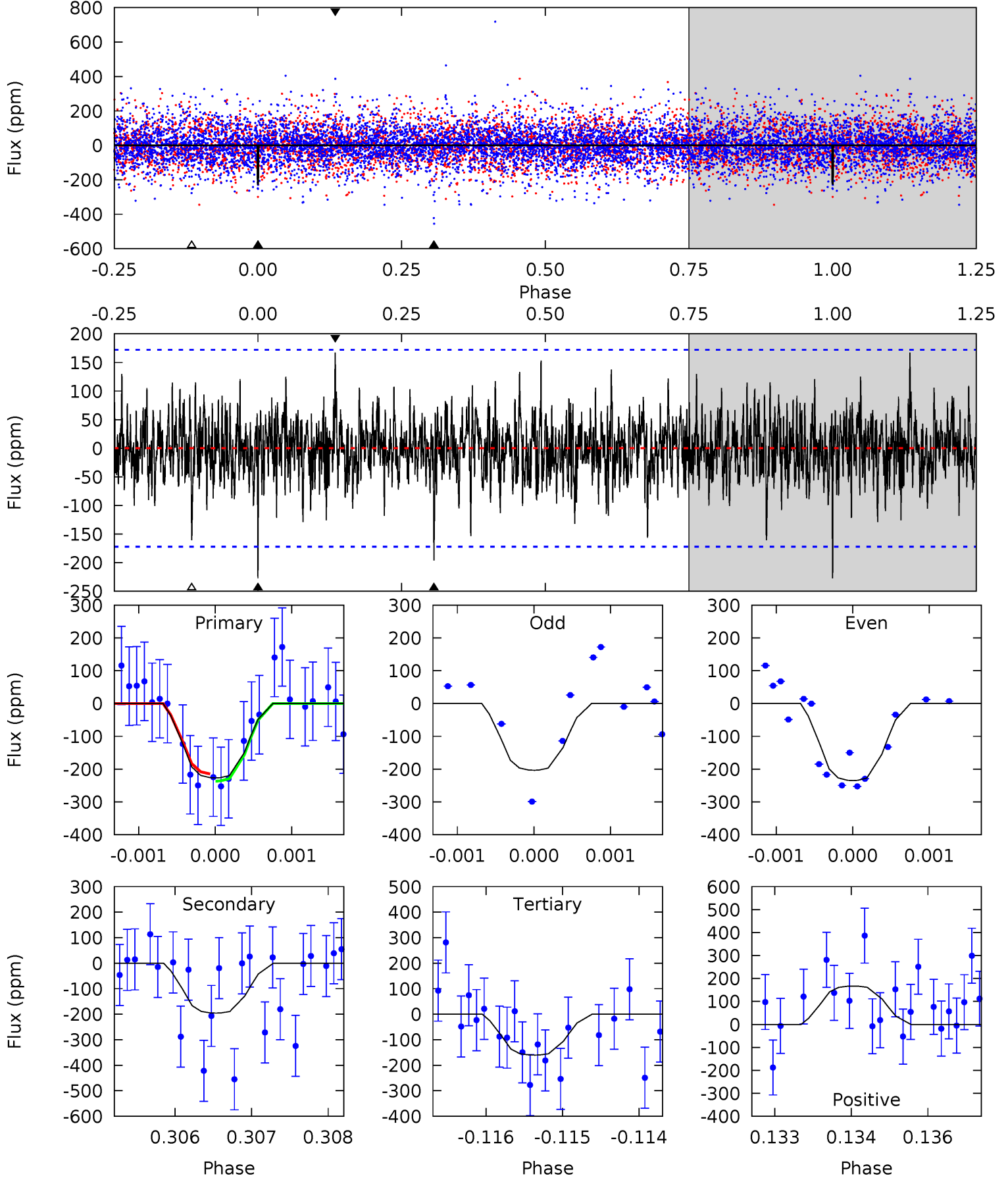


This plot does not exist for this TCE.

# DV Model-Shift Uniqueness Test

004245701-03, P = 41.857491 Days, E = 105.687621 Days

| Pri  | Sec  | Ter  | Pos  | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 7.14 | 6.15 | 5.04 | 5.25 | 5.40            | 3.21            | 1.32             | 2.10    | 1.88    | 1.11    | 0.90    | 0.48    | 0.95 | 0.42  | 0.35 |



## Alt Model-Shift Uniqueness Test

This plot does not exist for this TCE.

### Stellar Parameters For KIC 004245701

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R$ ( $R_{\odot}$ )       | $M$ ( $M_{\odot}$ )       | $p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ ) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $7164^{+176}_{-252}$ | $3.843^{+0.408}_{-0.102}$ | $-0.360^{+0.300}_{-0.300}$ | $2.411^{+0.465}_{-1.085}$ | $1.478^{+0.206}_{-0.308}$ | $0.148^{+0.471}_{-0.056}$                     |
|        | +2%/-4%              | +11%/-3%                  | +83%/-83%                  | +19%/-45%                 | +14%/-21%                 | +317%/-38%                                    |
| 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 004245701-03 / KOI

| Detrend | Depth (ppm)   | $R_p$ ( $R_{\oplus}$ ) | $T_{max}$ (K)       | $T_{obs}$ (K)          | $A_{obs}$          |
|---------|---------------|------------------------|---------------------|------------------------|--------------------|
| DV      | $-196 \pm 32$ | $8.44^{+8.94}_{-5.62}$ | $1288^{+90}_{-143}$ | $4596^{+3293}_{-1005}$ | $108^{+803}_{-81}$ |
| Alt.    | N/A           | N/A                    | N/A                 | N/A                    | N/A                |

$T_{max}$  = 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

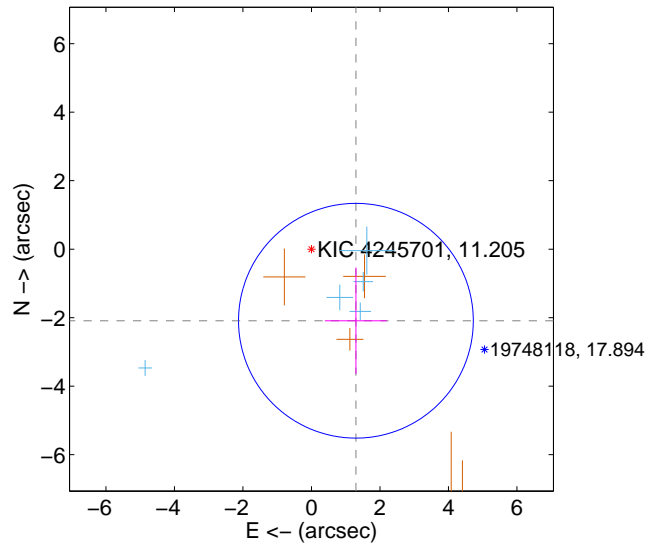
Supplemental centroid analysis for 004245701-03. **Kepler magnitude: 11.21.** Transit SNR 9.89

There are 5 quarters with good PRF difference image offsets

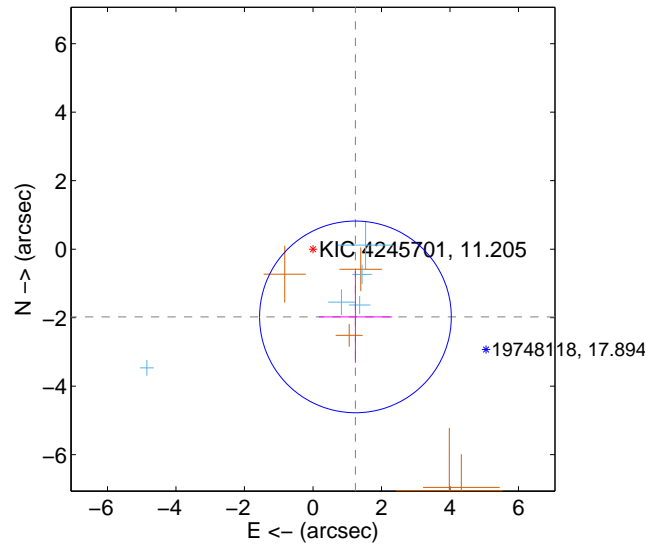
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA        | $\Delta$ Dec       |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT          | $2.461 \pm 1.143$  | 2.15                | $-1.299 \pm 0.904$ | $-2.090 \pm 1.552$ |
| PRF-fit source offset from KIC position | $2.335 \pm 0.933$  | 2.50                | $-1.240 \pm 1.072$ | $-1.978 \pm 1.341$ |
| photometric centroid source offset      | $0.38 \pm 0.36$    | 1.03                | $0.35 \pm 0.36$    | $0.13 \pm 0.41$    |

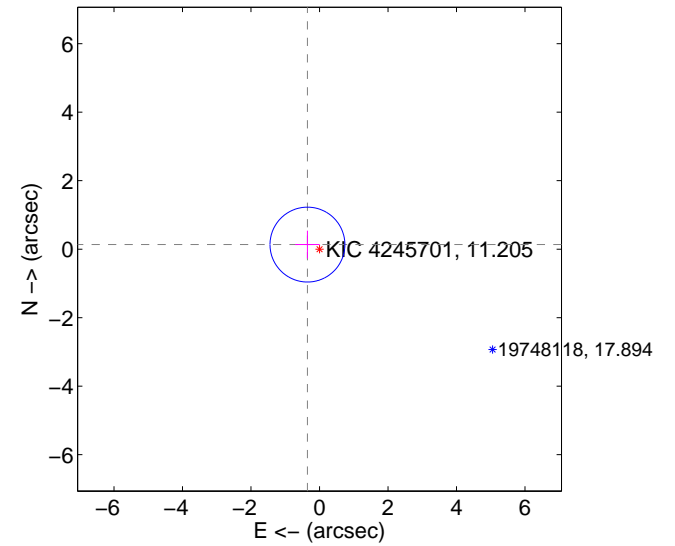
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

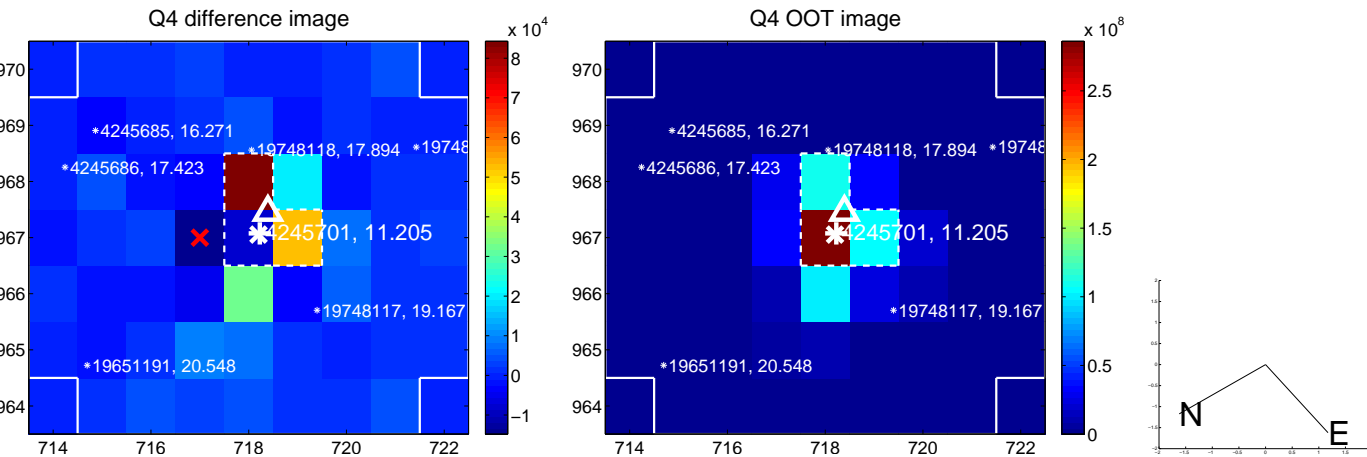
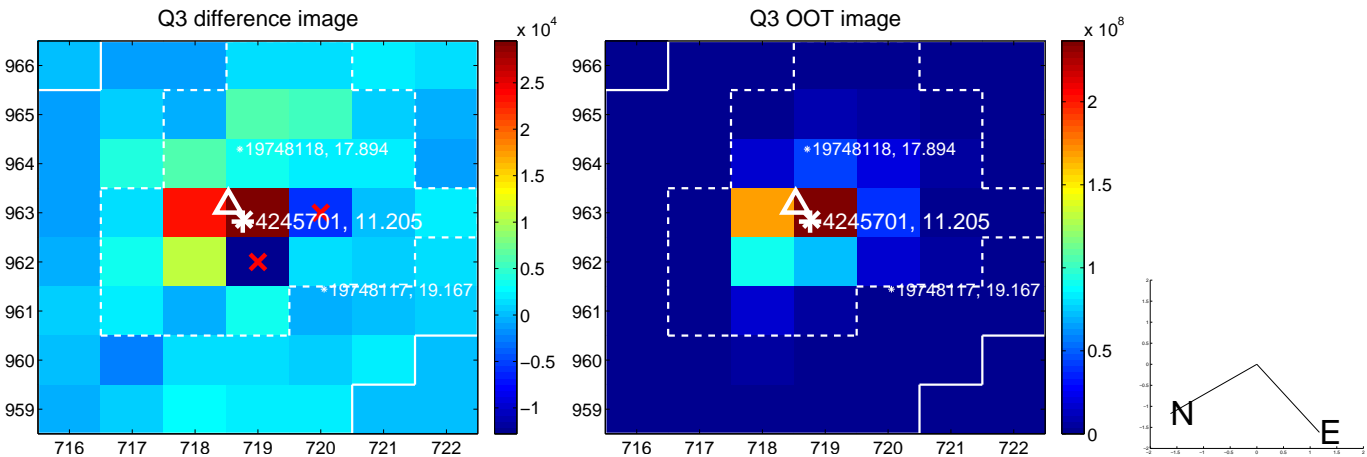
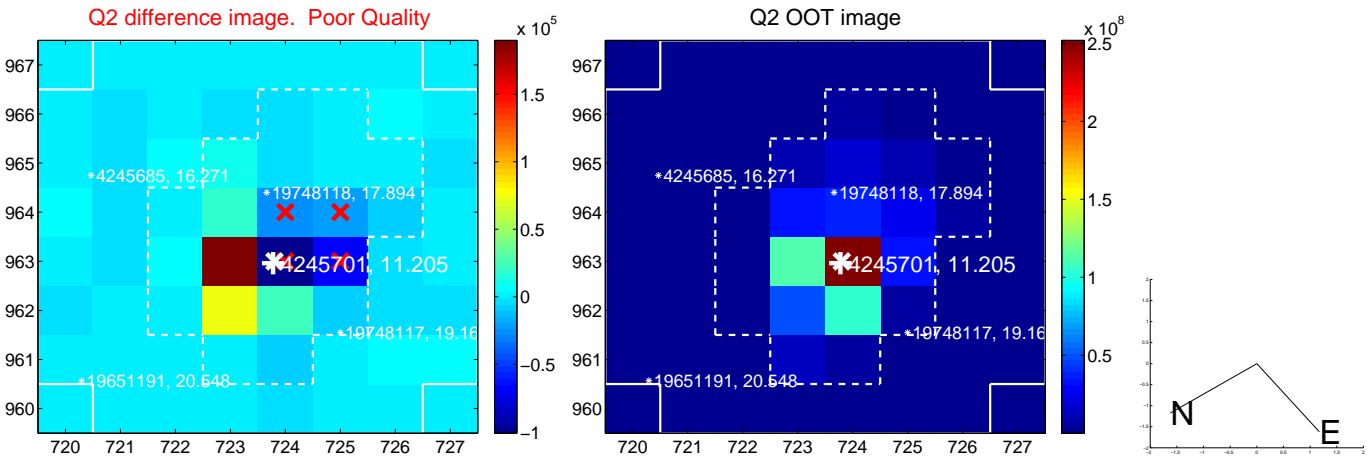
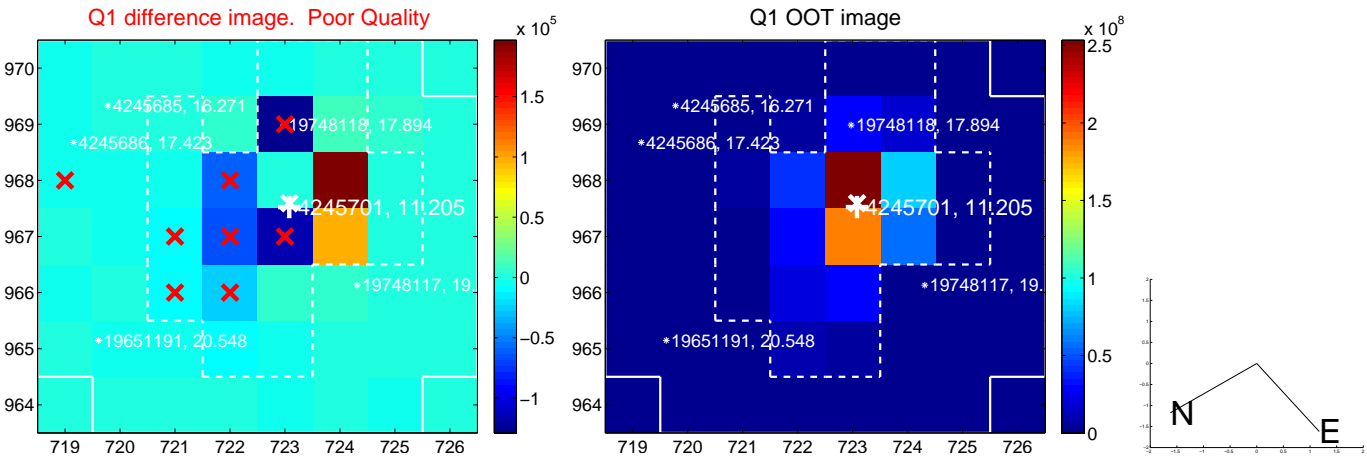


offset from photometric centroids



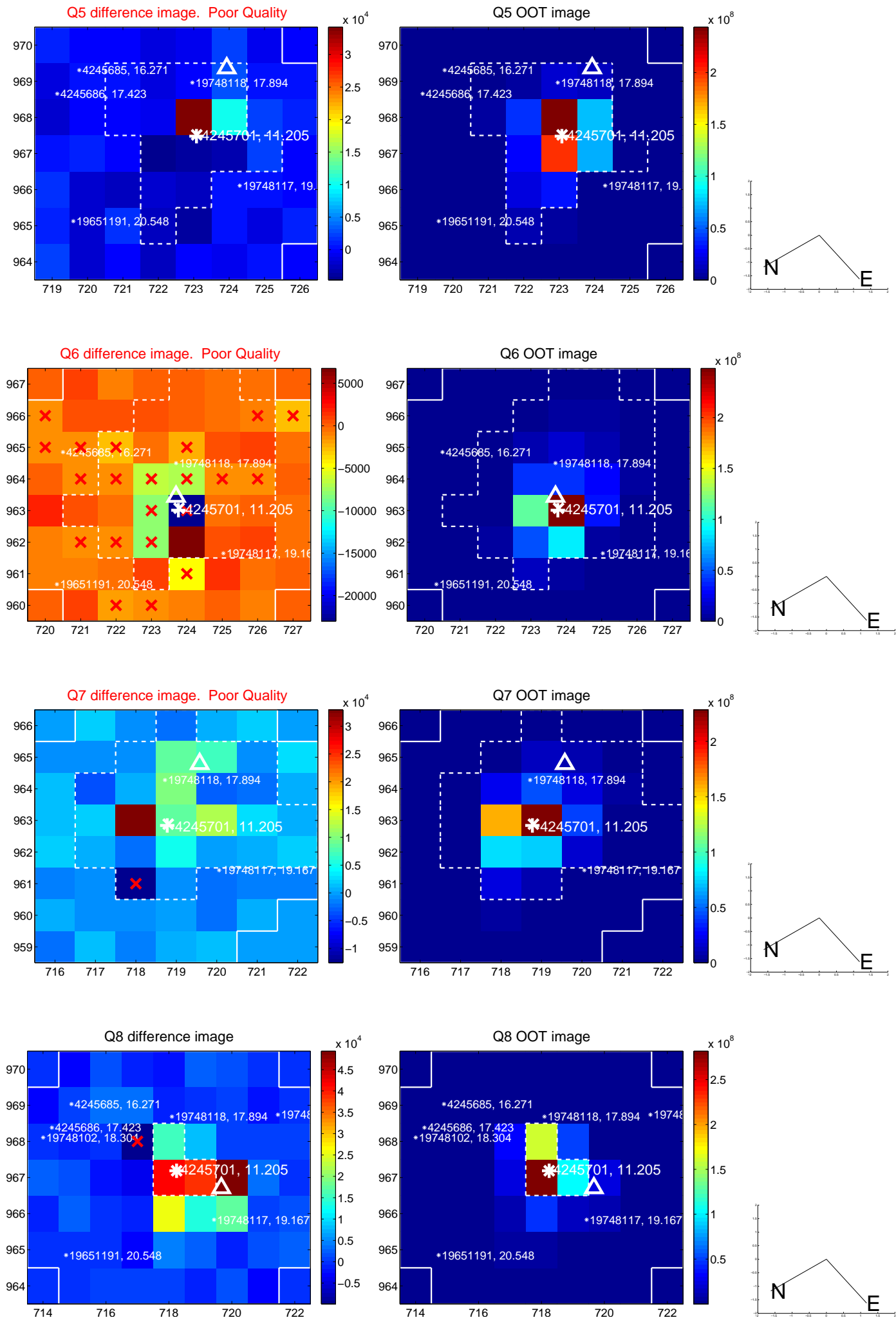
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

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

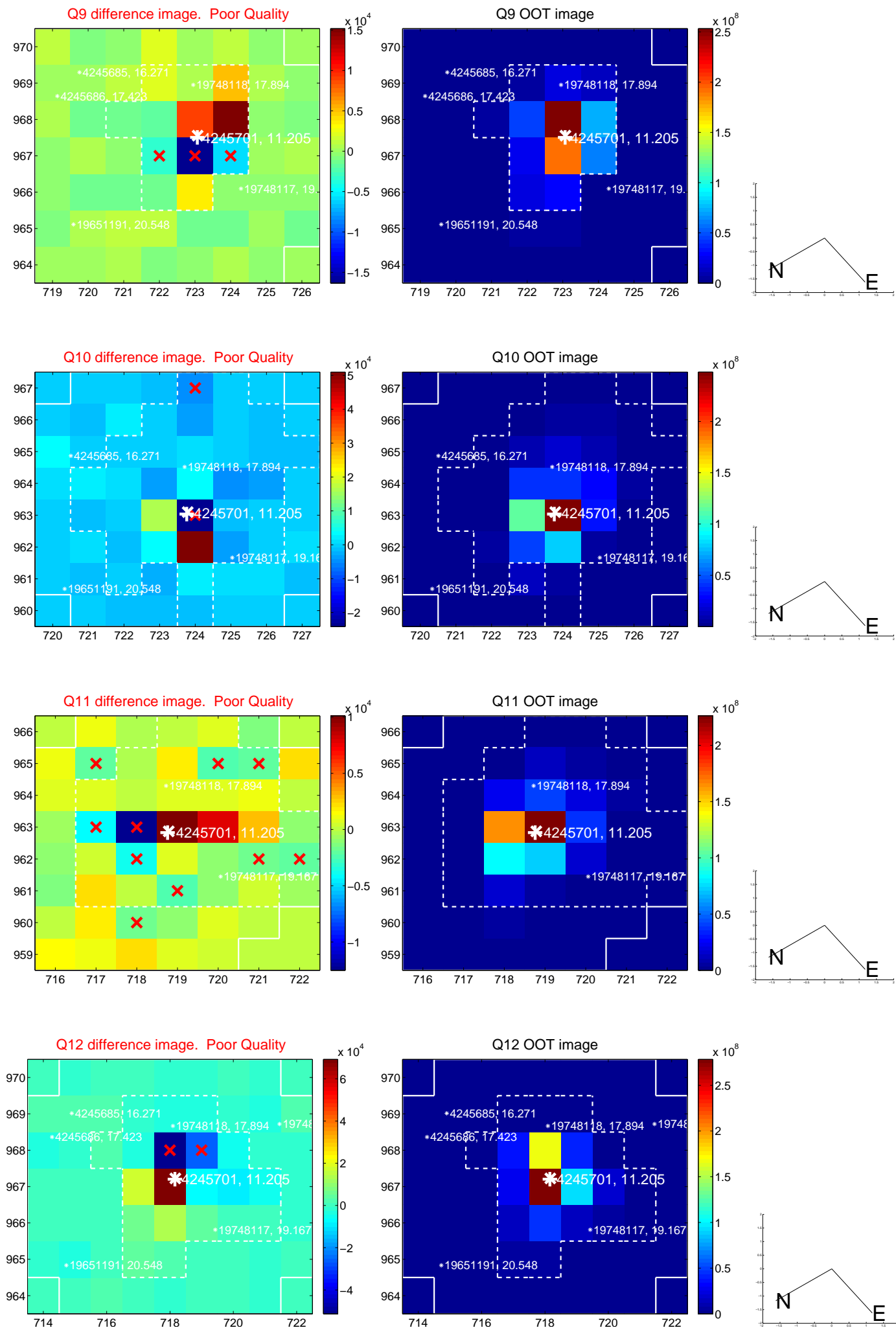




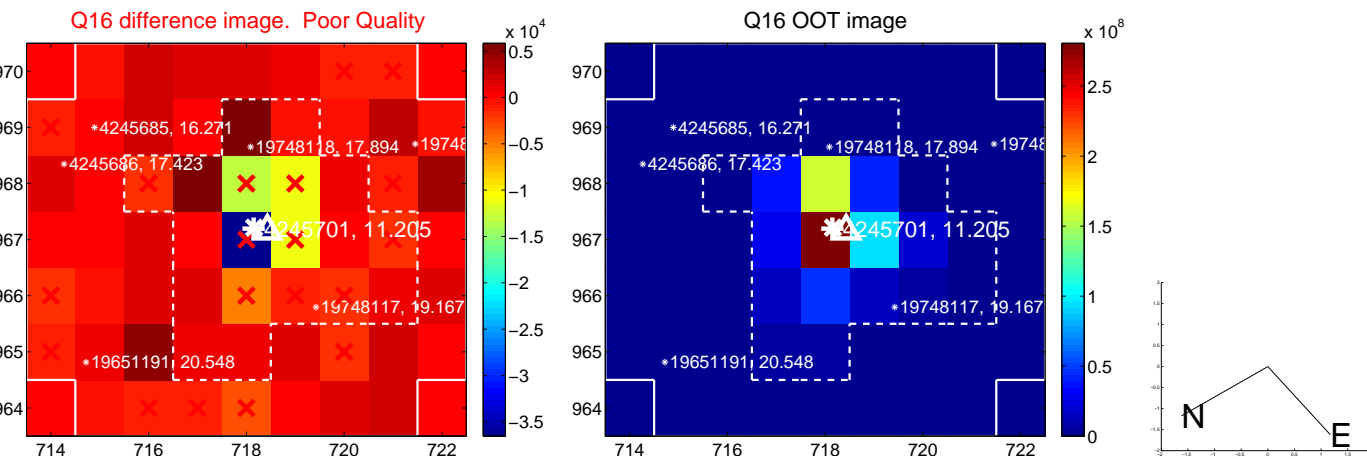
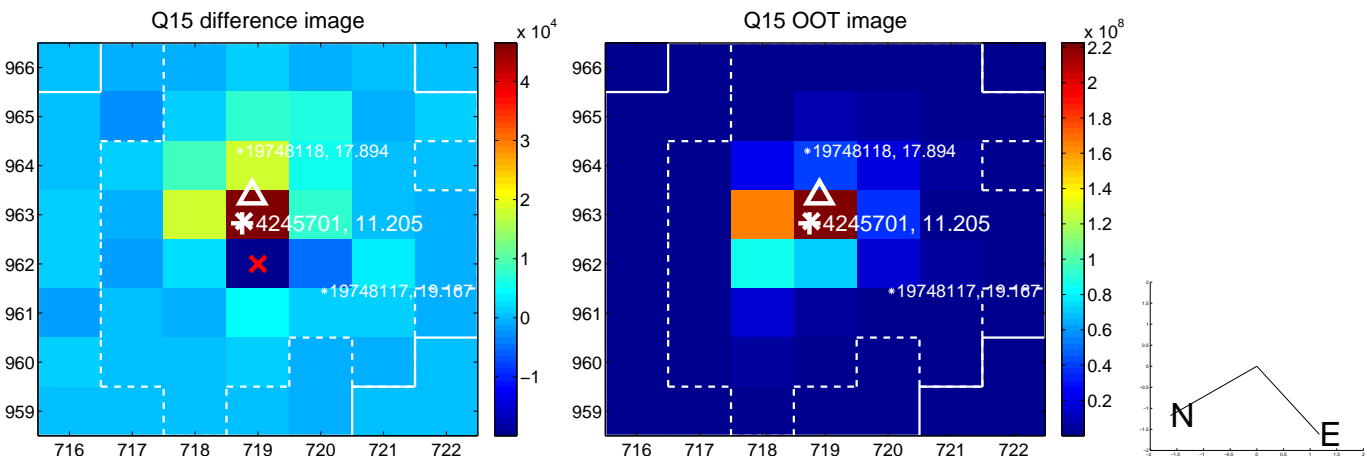
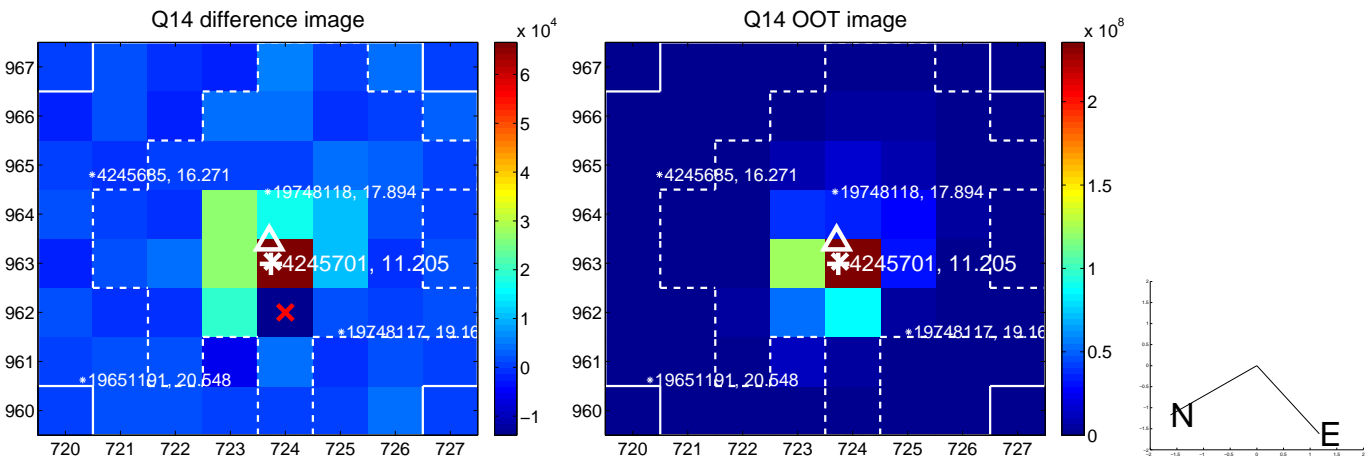
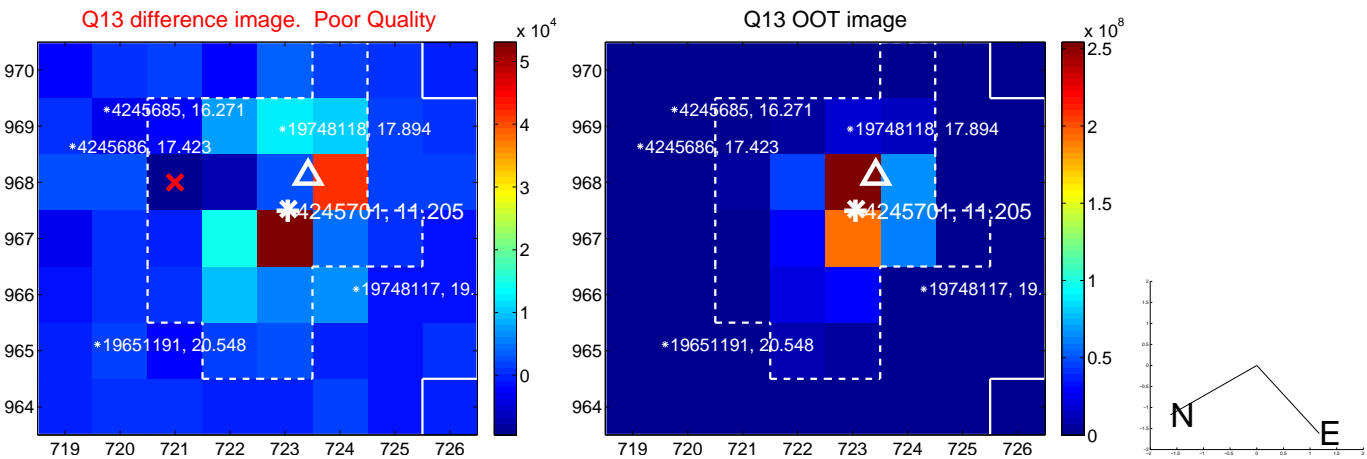
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



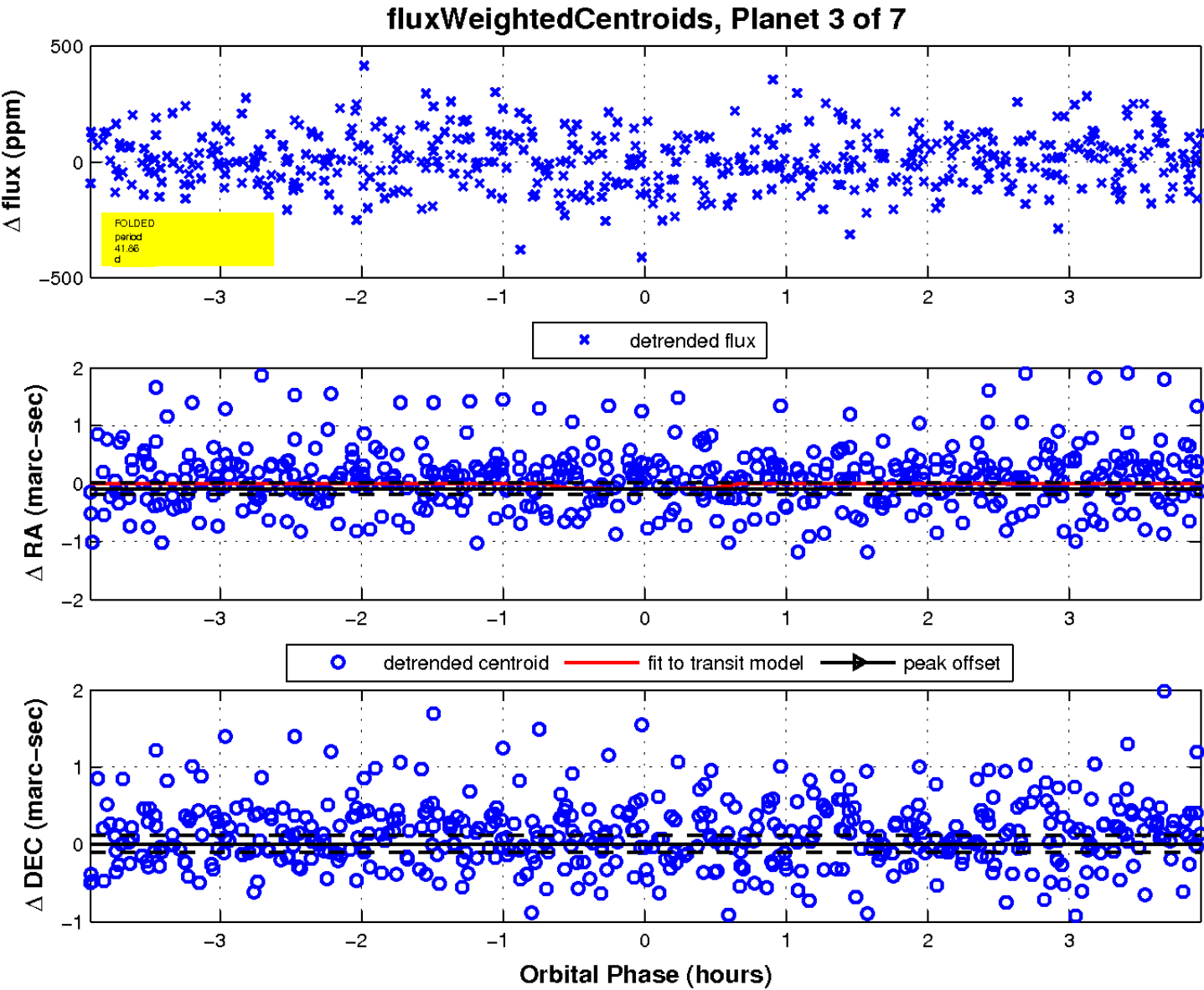
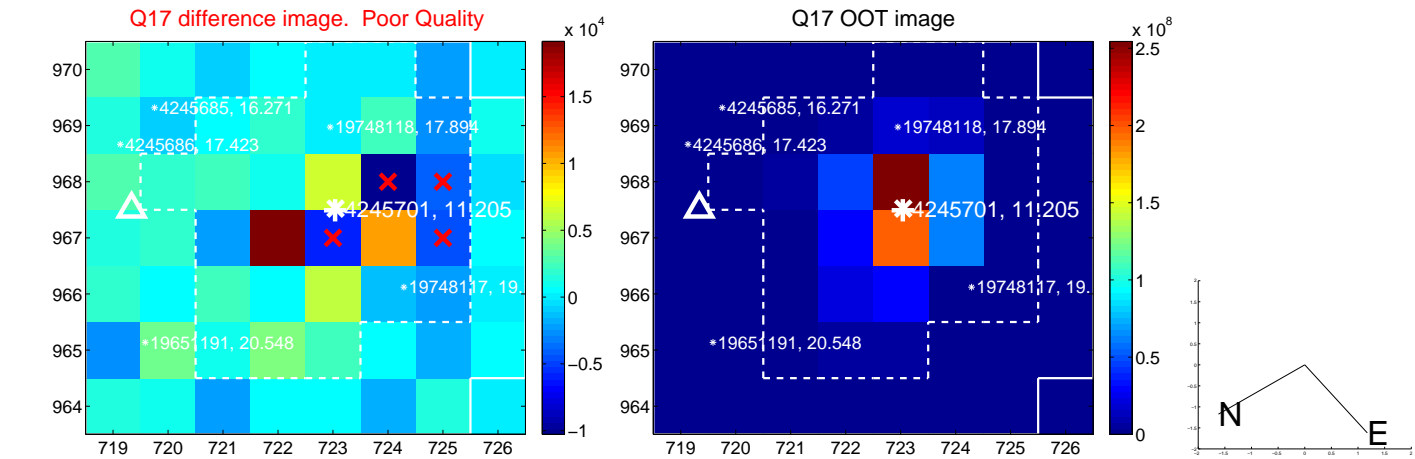
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

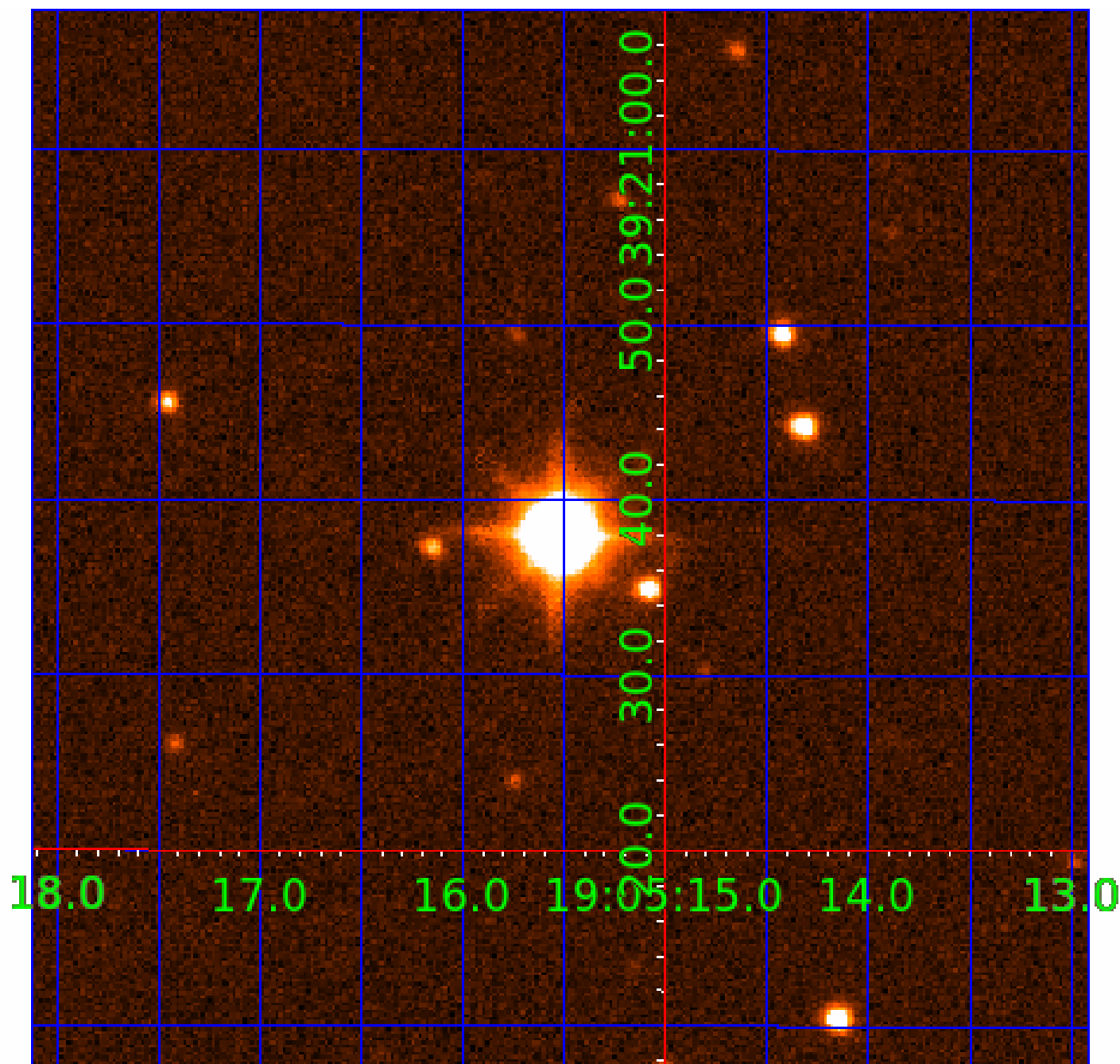


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 004245701

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 004245701-01 | OBS      | No   | 0.897843      | 132.180675   | 12.4        | 6.163            | 9.1  | 8.1  | 2.41                        | 7164            | 0.87                   | 31869.90               |
| 004245701-02 | OBS      | No   | 55.714468     | 141.964464   | 209.6       | 6.163            | 7.2  | 8.3  | 2.41                        | 7164            | 3.94                   | 129.72                 |
| 004245701-03 | OBS      | No   | 41.857491     | 147.545112   | 252.1       | 1.312            | 7.9  | 9.9  | 2.41                        | 7164            | 4.30                   | 189.94                 |
| 004245701-04 | OBS      | No   | 30.455228     | 158.307676   | 206.1       | 2.005            | 11.3 | 7.0  | 2.41                        | 7164            | 4.00                   | 290.25                 |
| 004245701-05 | OBS      | No   | 28.418026     | 132.694838   | 149.5       | 3.266            | 9.3  | 9.9  | 2.41                        | 7164            | 3.31                   | 318.31                 |
| 004245701-06 | OBS      | No   | 191.277248    | 181.918761   | 270.0       | 2.551            | 10.1 | 10.5 | 2.41                        | 7164            | 4.68                   | 25.05                  |
| 004245701-07 | OBS      | No   | 22.543458     | 150.815074   | 101.3       | 3.423            | 10.6 | 6.9  | 2.41                        | 7164            | 2.75                   | 433.46                 |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 004245701-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | LPP_DV—CENT_SATURATED   |
| 004245701-02 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED                  |
| 004245701-03 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—CENT_SATURATED   |
| 004245701-04 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED  |
| 004245701-05 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED  |
| 004245701-06 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED |
| 004245701-07 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—CENT_SATURATED  |

**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.

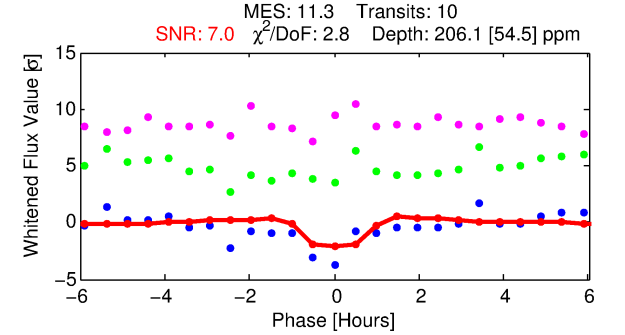
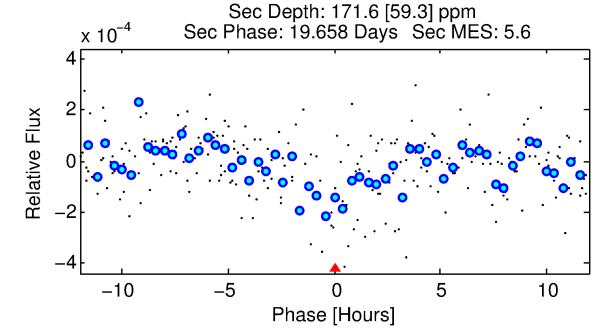
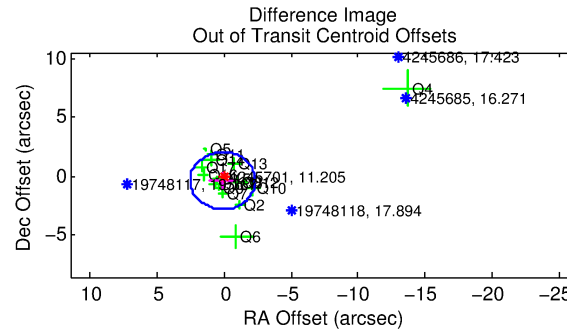
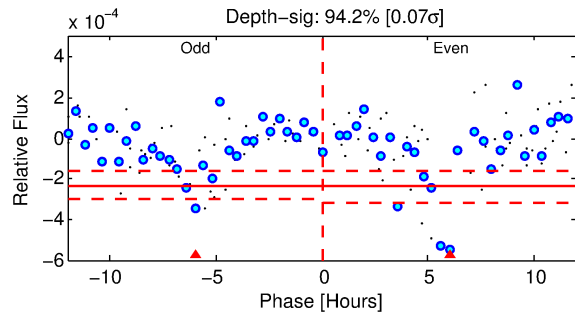
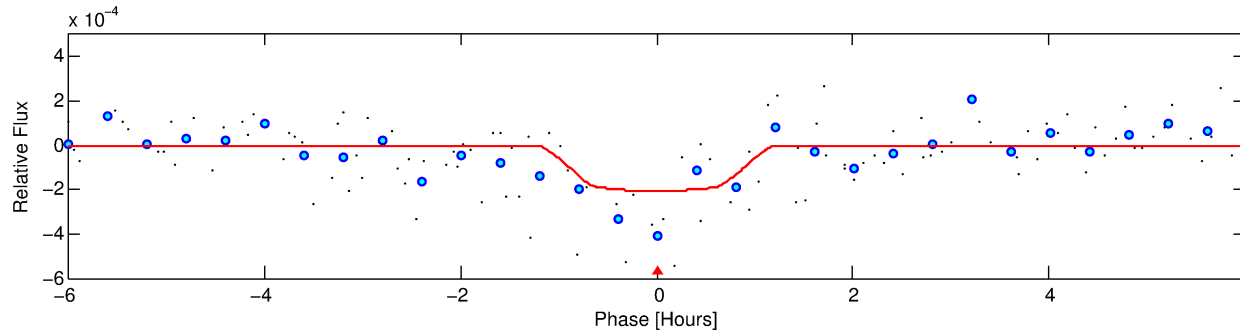
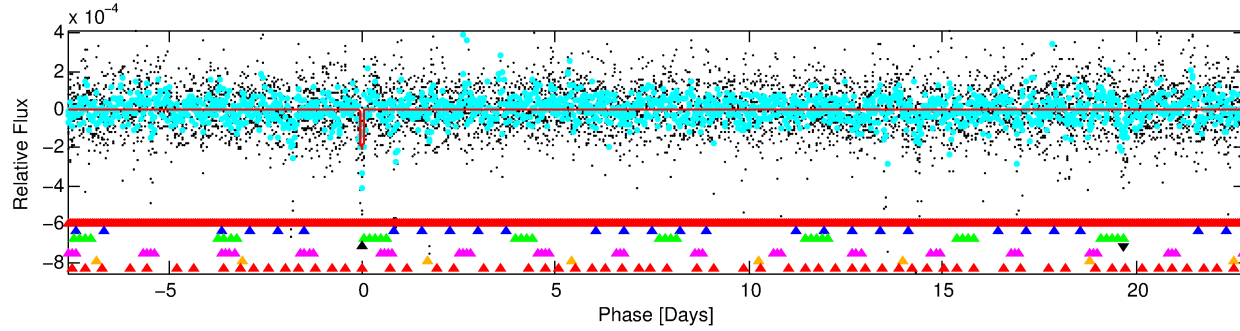
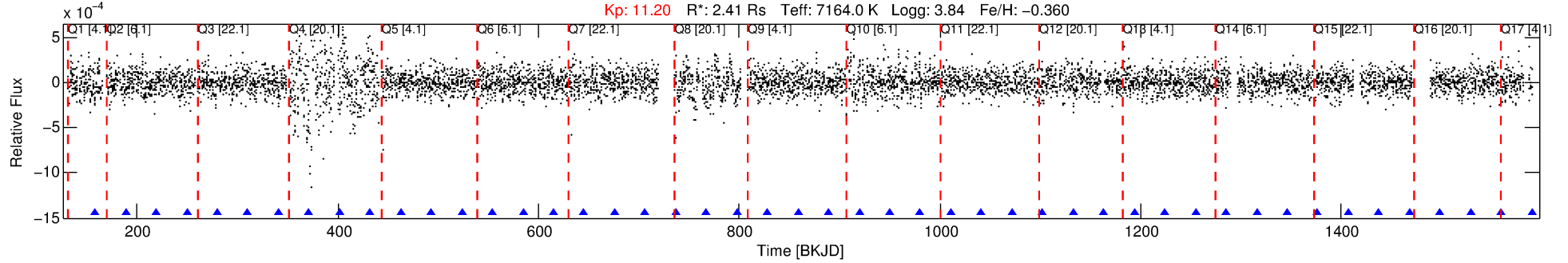
Ephemeris Match Information For 004245701-04

No Significant Match Found



# DV One-Page Summary

KIC: 4245701 Candidate: 4 of 7 Period: 30.455 d



## DV Fit Results:

Period = 30.45523 [0.00041] d  
Epoch = 158.3077 [0.0121] BKJD  
Rp/R\* = 0.0152 [0.0198]  
a/R\* = 57.60 [440.78]  
b = 0.89 [1.90]  
Seff = 290.25 [205.66]  
Teq = 1052 [186] K  
Rp = 4.00 [5.51] Re  
a = 0.2174 [0.0943] AU  
Ag = 279.05 [758.45] [0.37 $\sigma$ ]  
Teffp = 6651 [4375] K [1.28 $\sigma$ ]

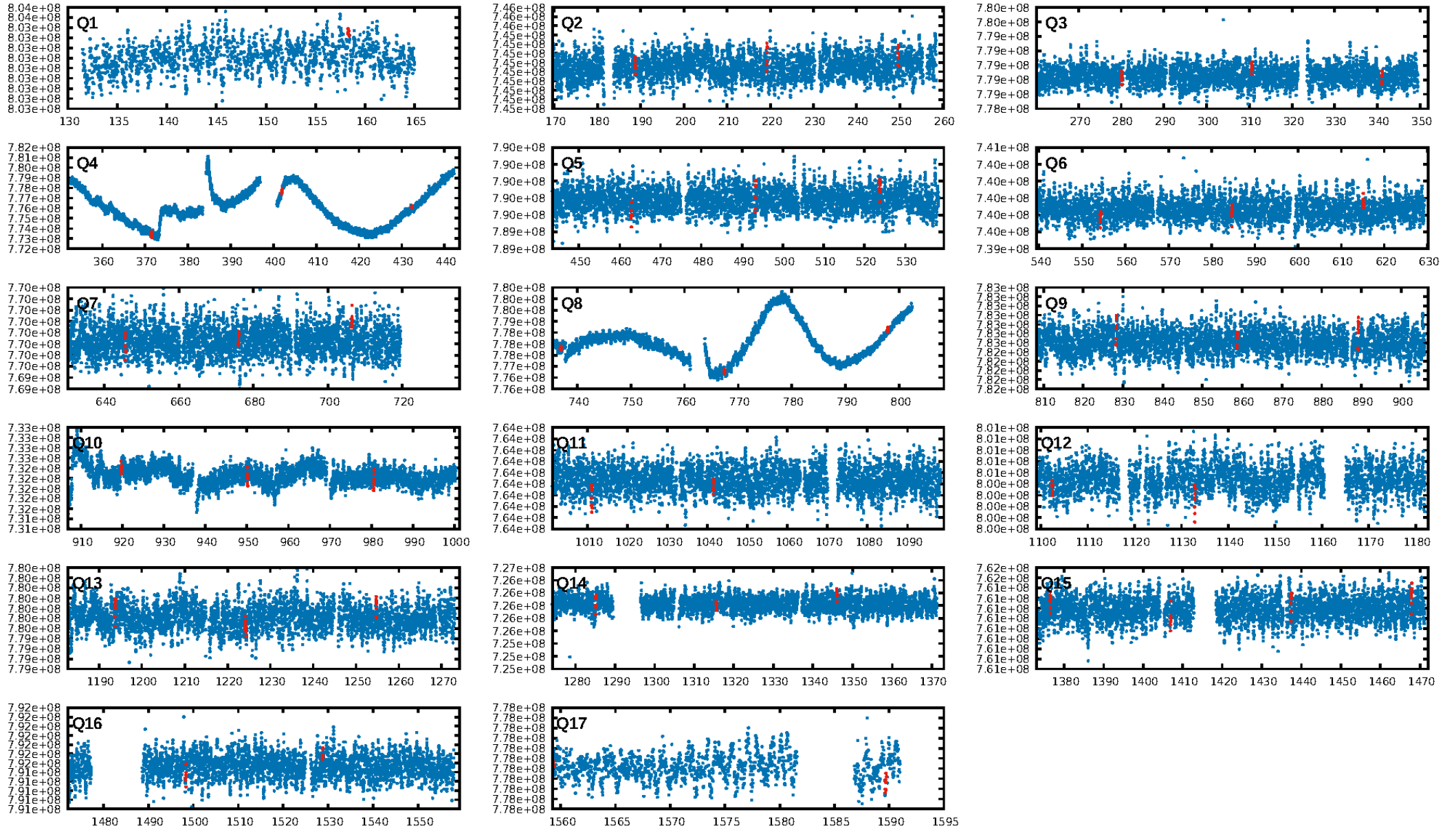
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [12.76 $\sigma$ ]  
LongPeriod-sig: 100.0% [114.19 $\sigma$ ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 16.0%  
Bootstrap-pfa: 7.27e-13  
RollingBand-fgt: 1.00 [9/9]  
GhostDiagnostic-chr: 0.8967  
Centroid-sig: 74.9%  
Centroid-so: 0.235 arcsec [0.71 $\sigma$ ]  
OotOffset-rm: 0.388 arcsec [0.48 $\sigma$ ]  
KicOffset-rm: 0.302 arcsec [0.37 $\sigma$ ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 0.25 [4/16]  
DiffImageOverlap-fno: 0.18 [3/17]

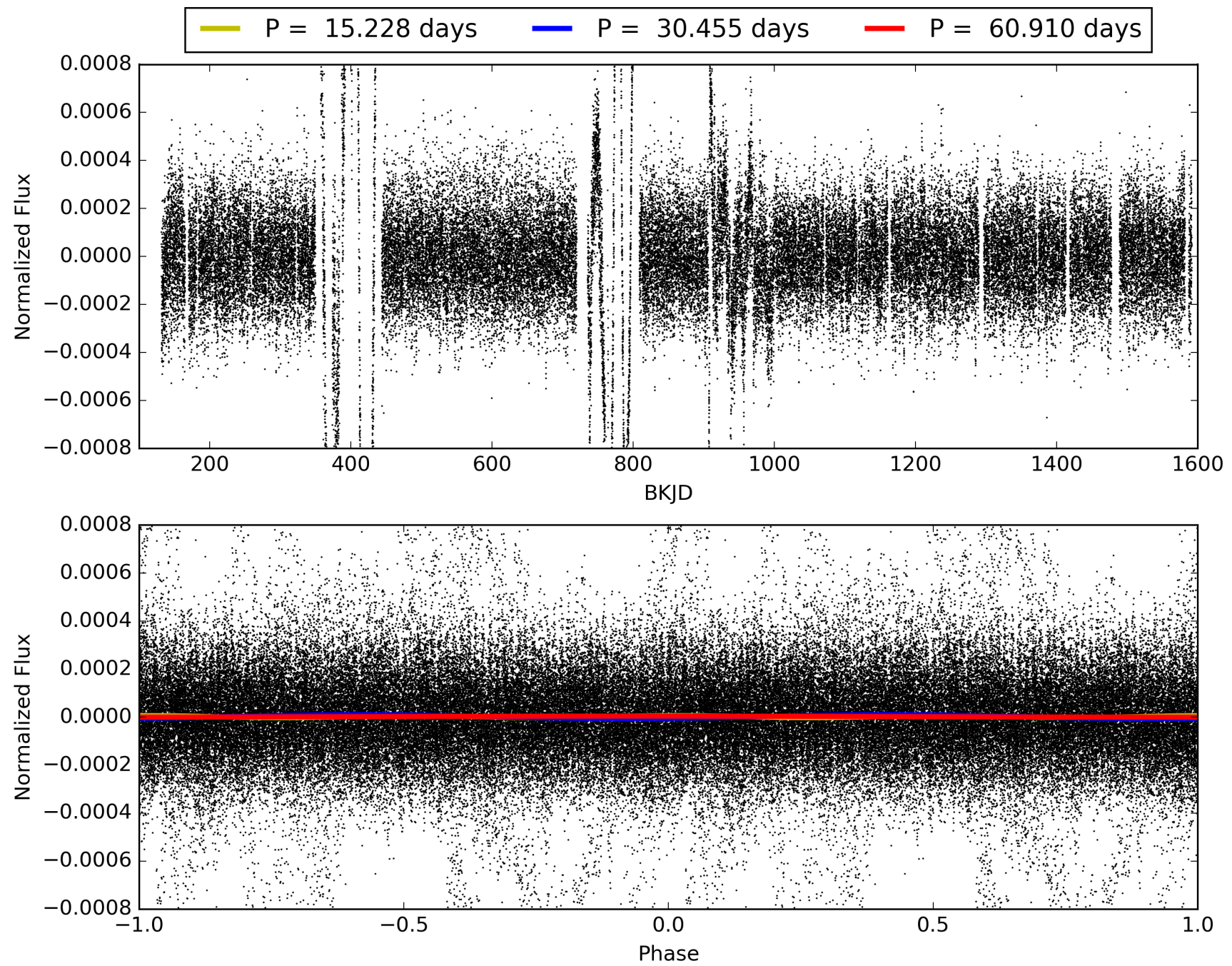
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 08:20:17 Z

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

# TCE 004245701-04, PDC Light Curves

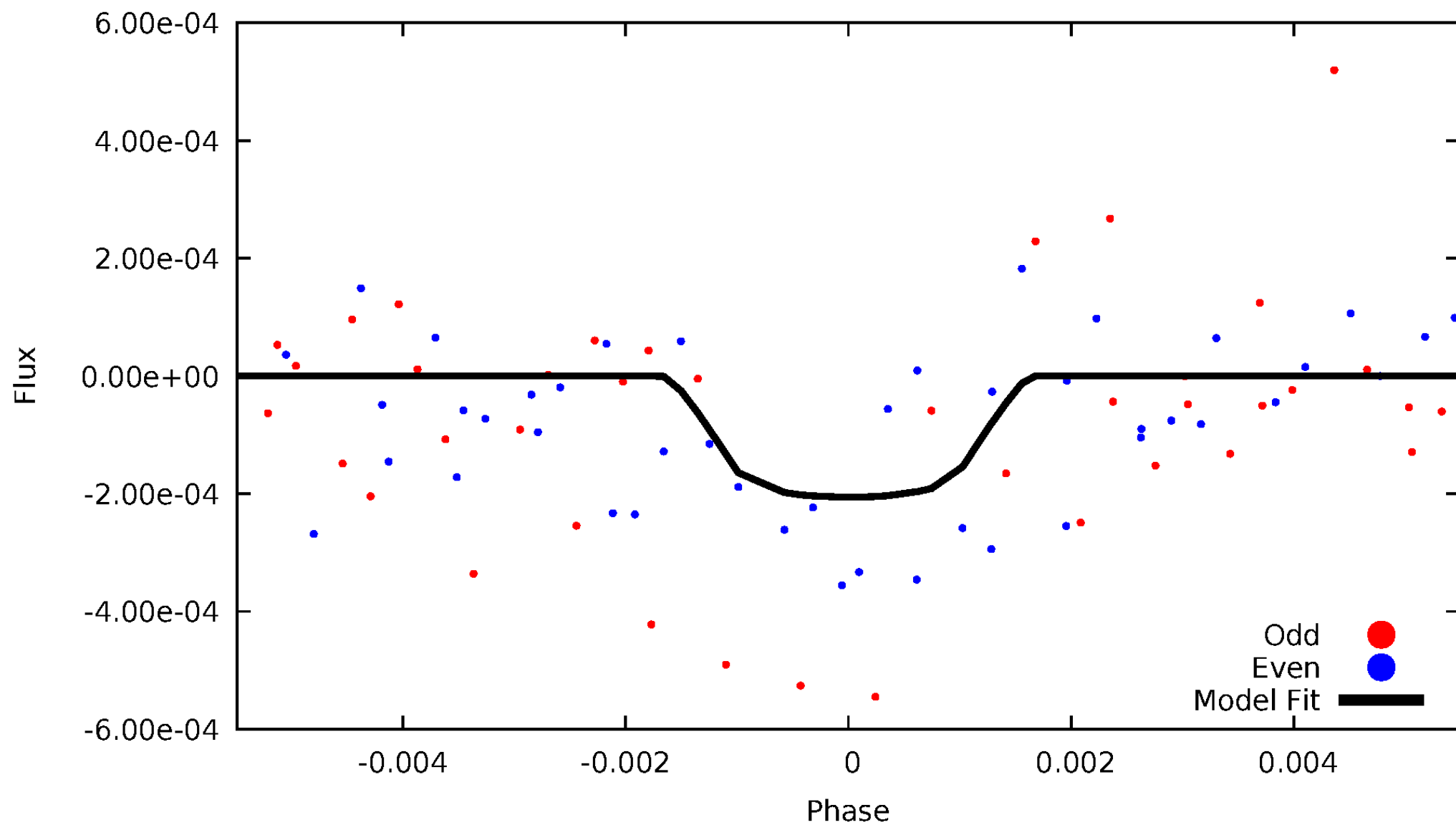


TCE 004245701-04



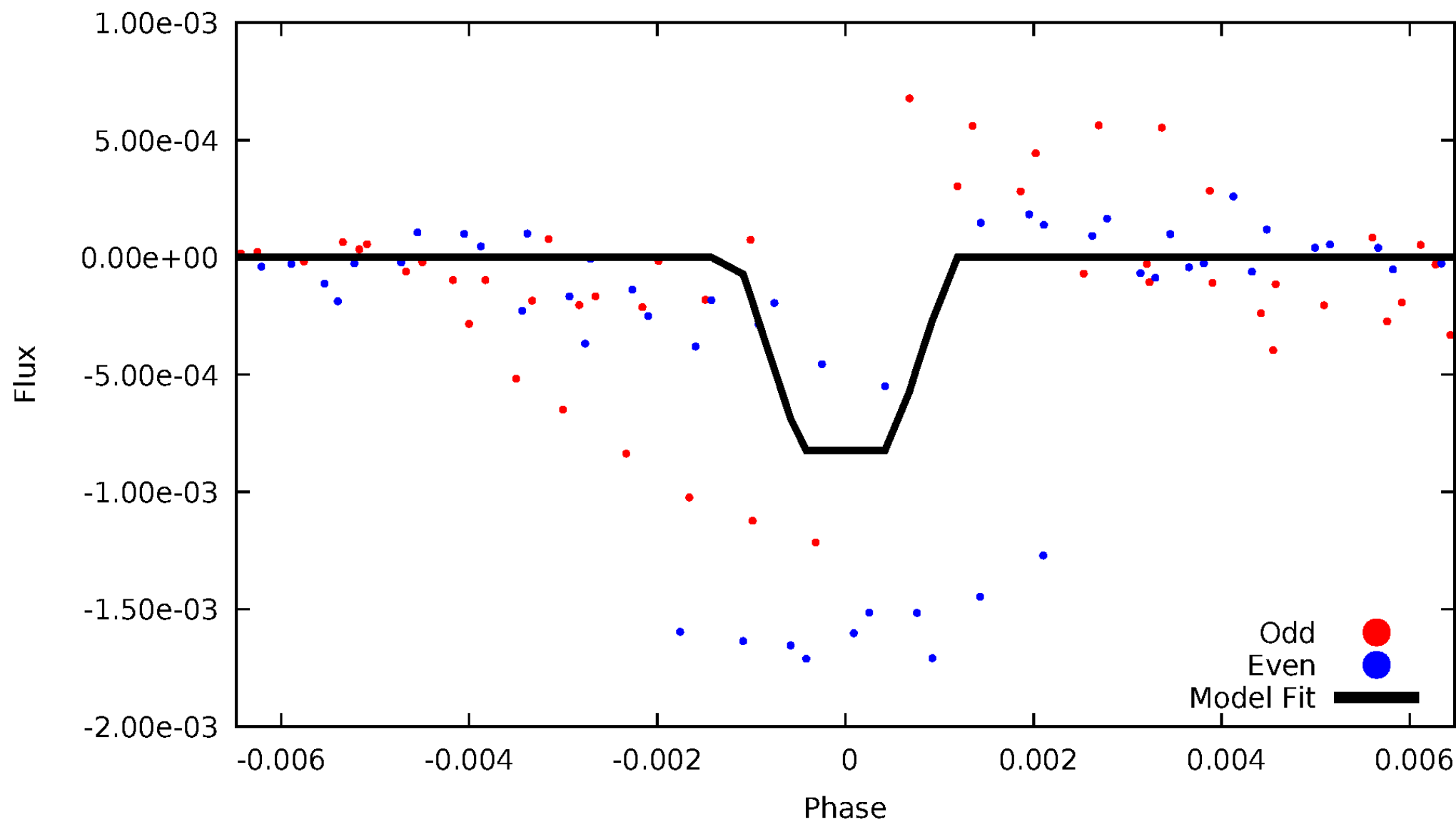
# DV Odd/Even

TCE 004245701-04



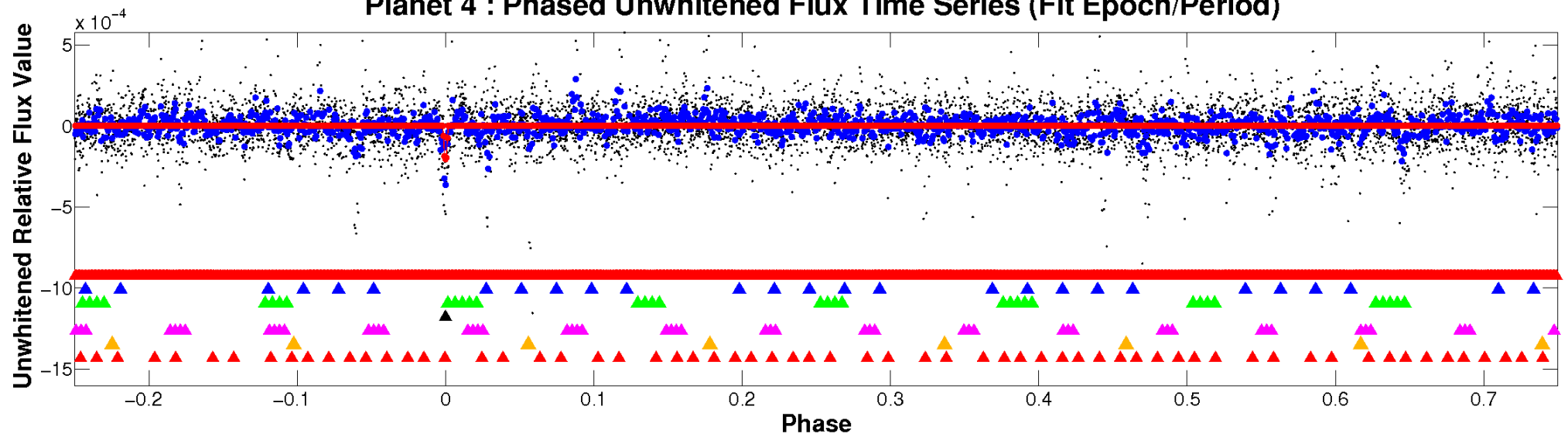
# ALT Odd/Even

TCE 004245701-04

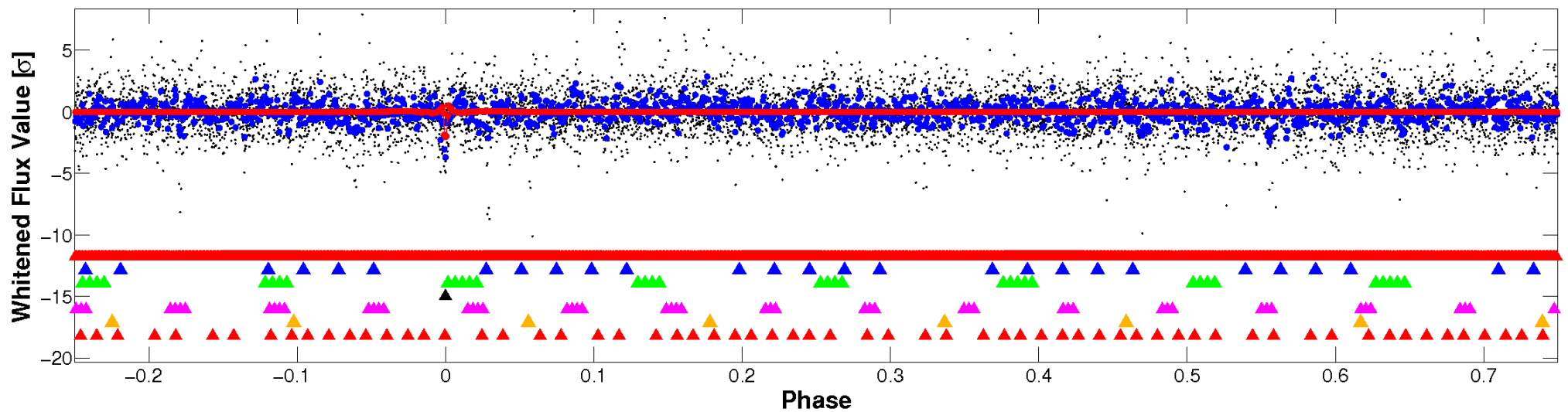


# Non-Whitened Vs. Whitened Light Curve

## Planet 4 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)



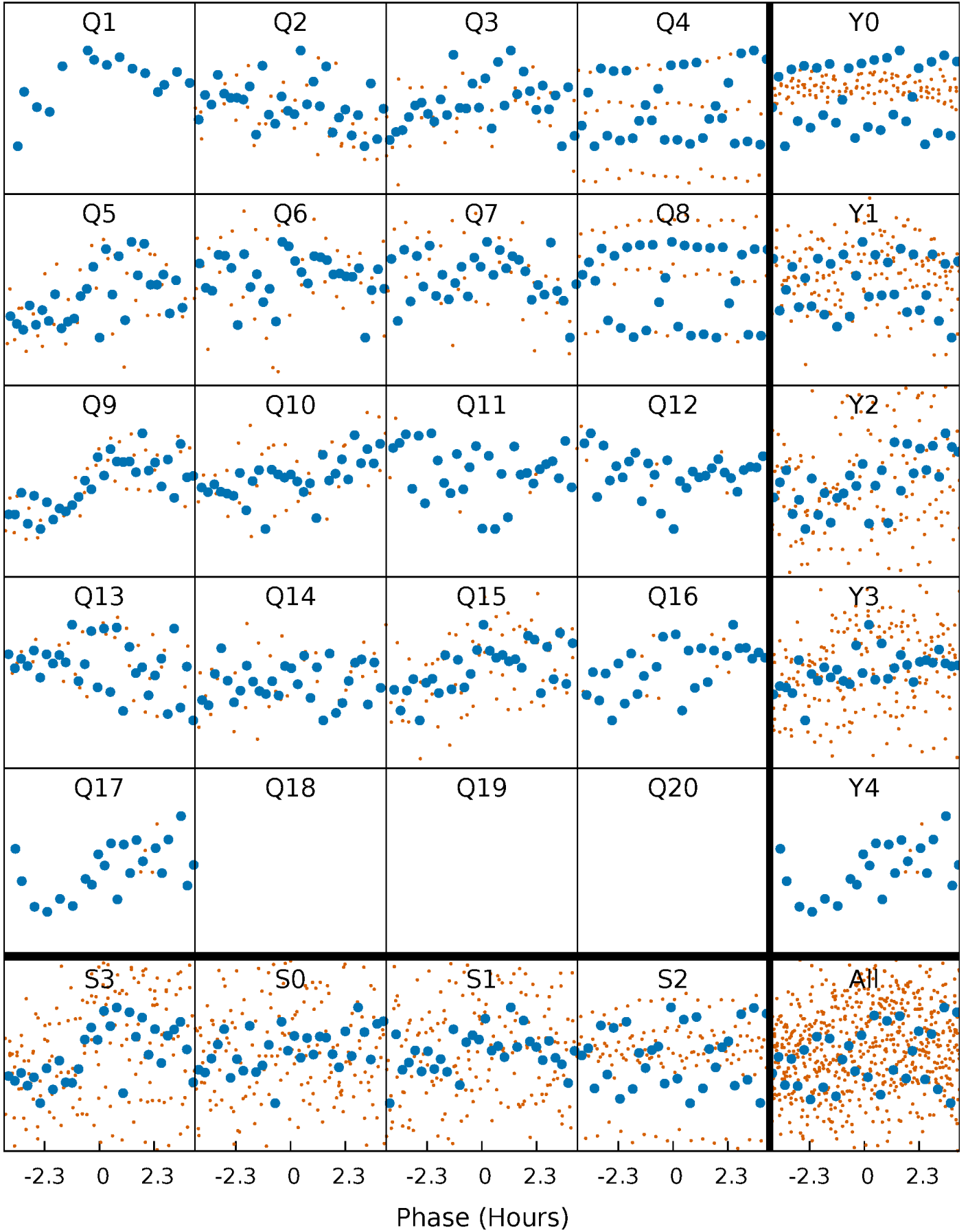
## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)





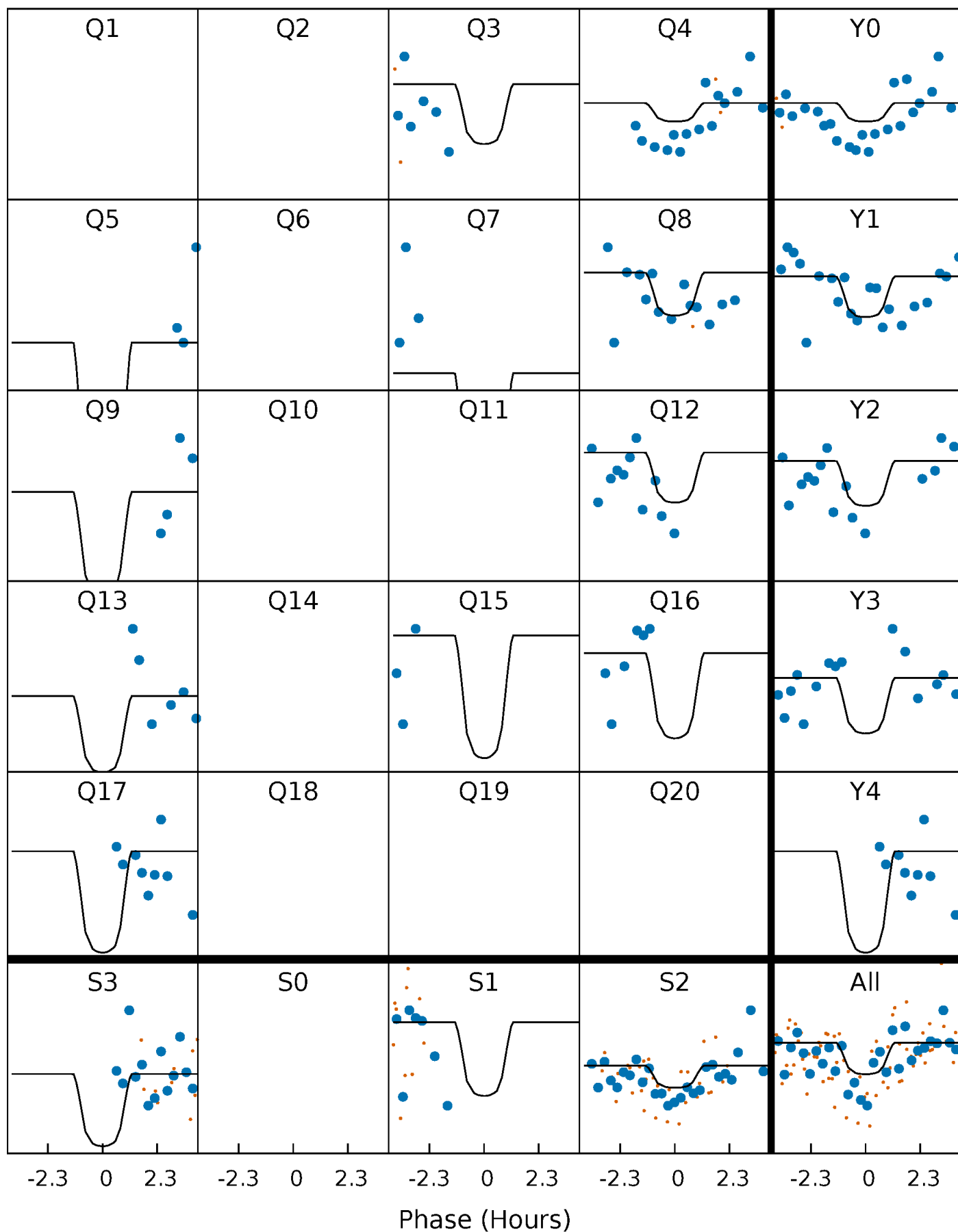
# PDC Quarter-Phased Transit Curves

TCE 004245701-04   P= 30.455228 Days    $T_0=158.307676$  (BKJD)



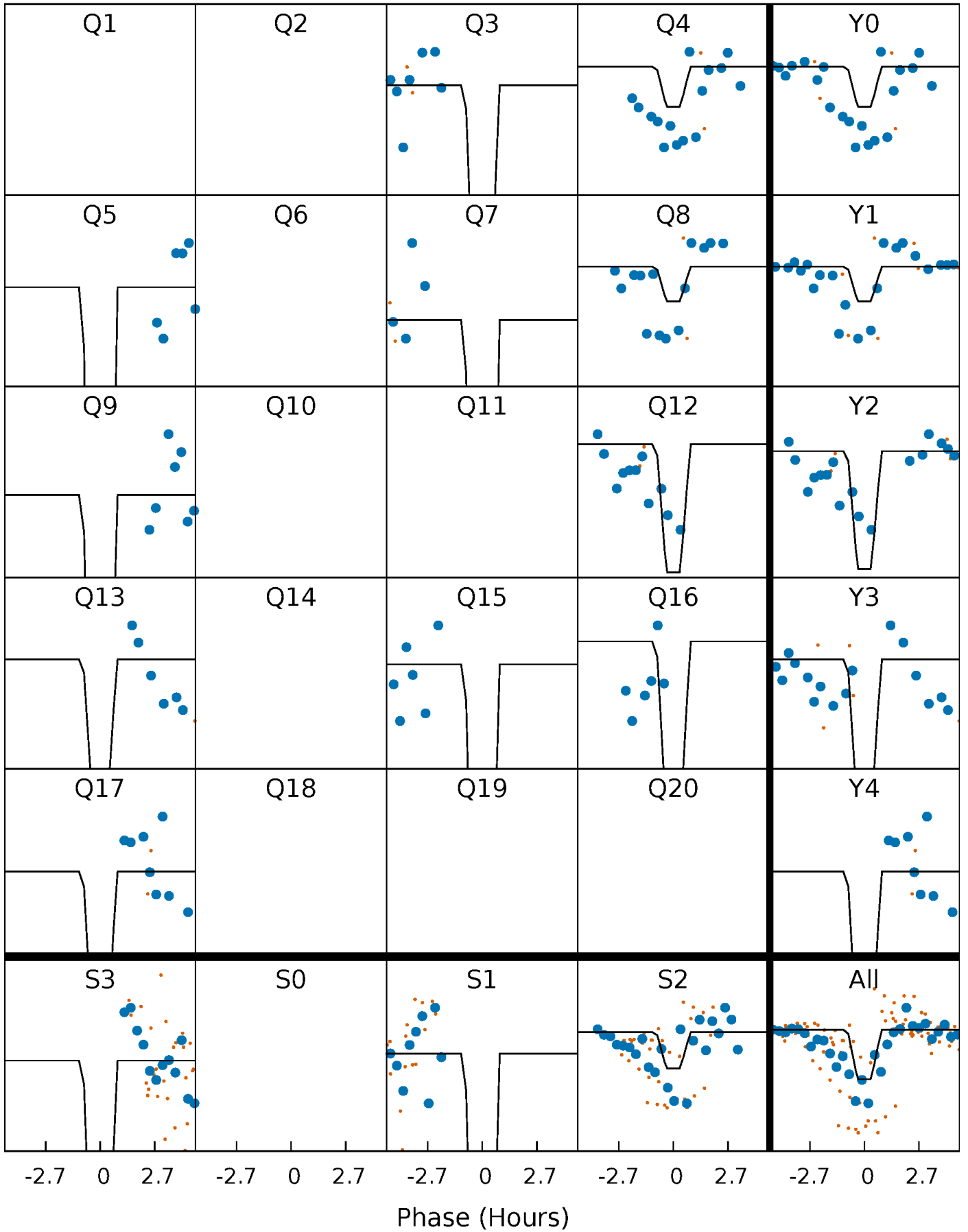
# DV Quarter-Phased Transit Curves

TCE 004245701-04     $P = 30.455228$  Days     $T_0 = 158.307676$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

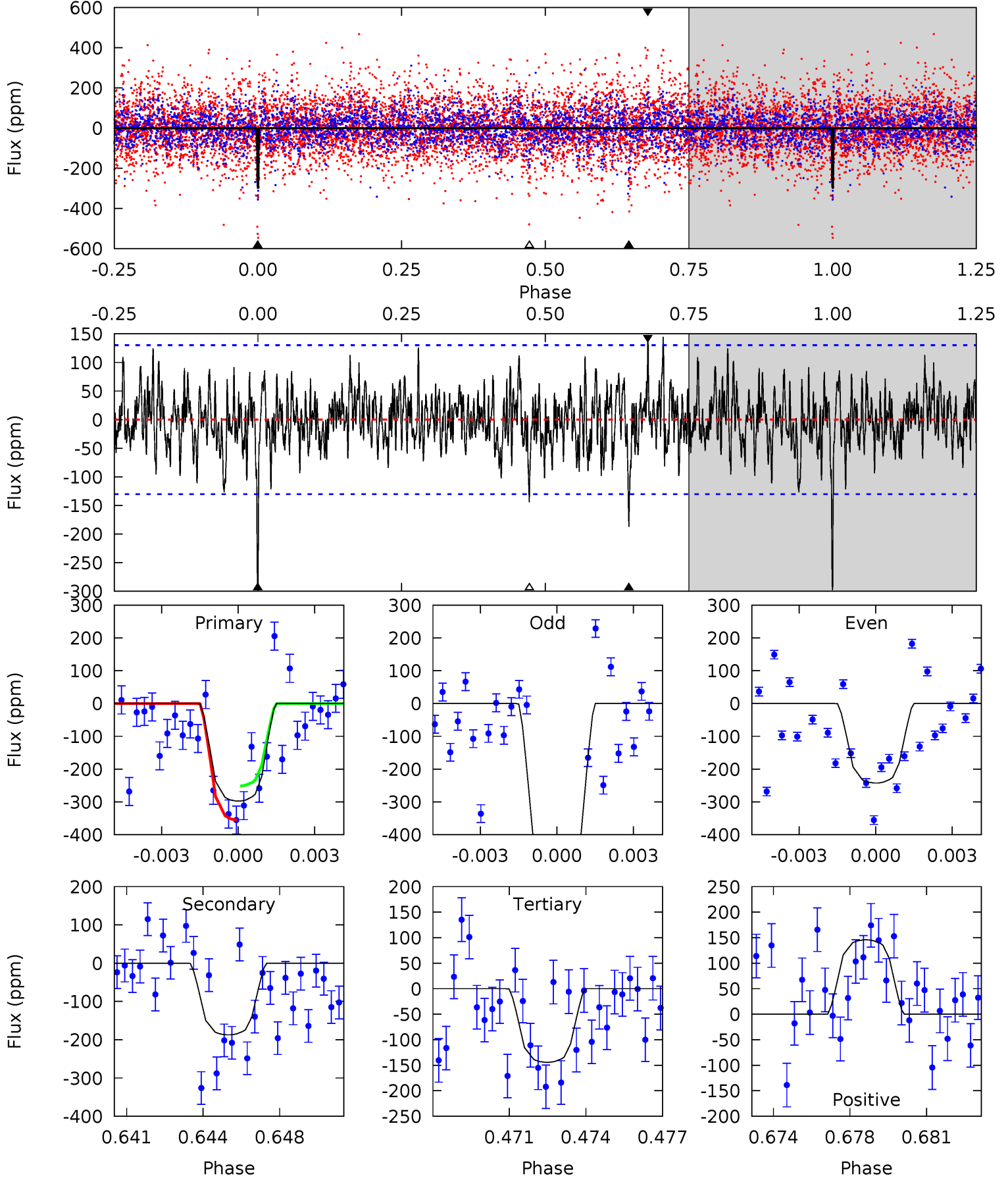
TCE 004245701-04     $P = 30.454151$  Days     $T_0 = 158.332257$  (BKJD)



# DV Model-Shift Uniqueness Test

004245701-04, P = 30.455228 Days, E = 127.852448 Days

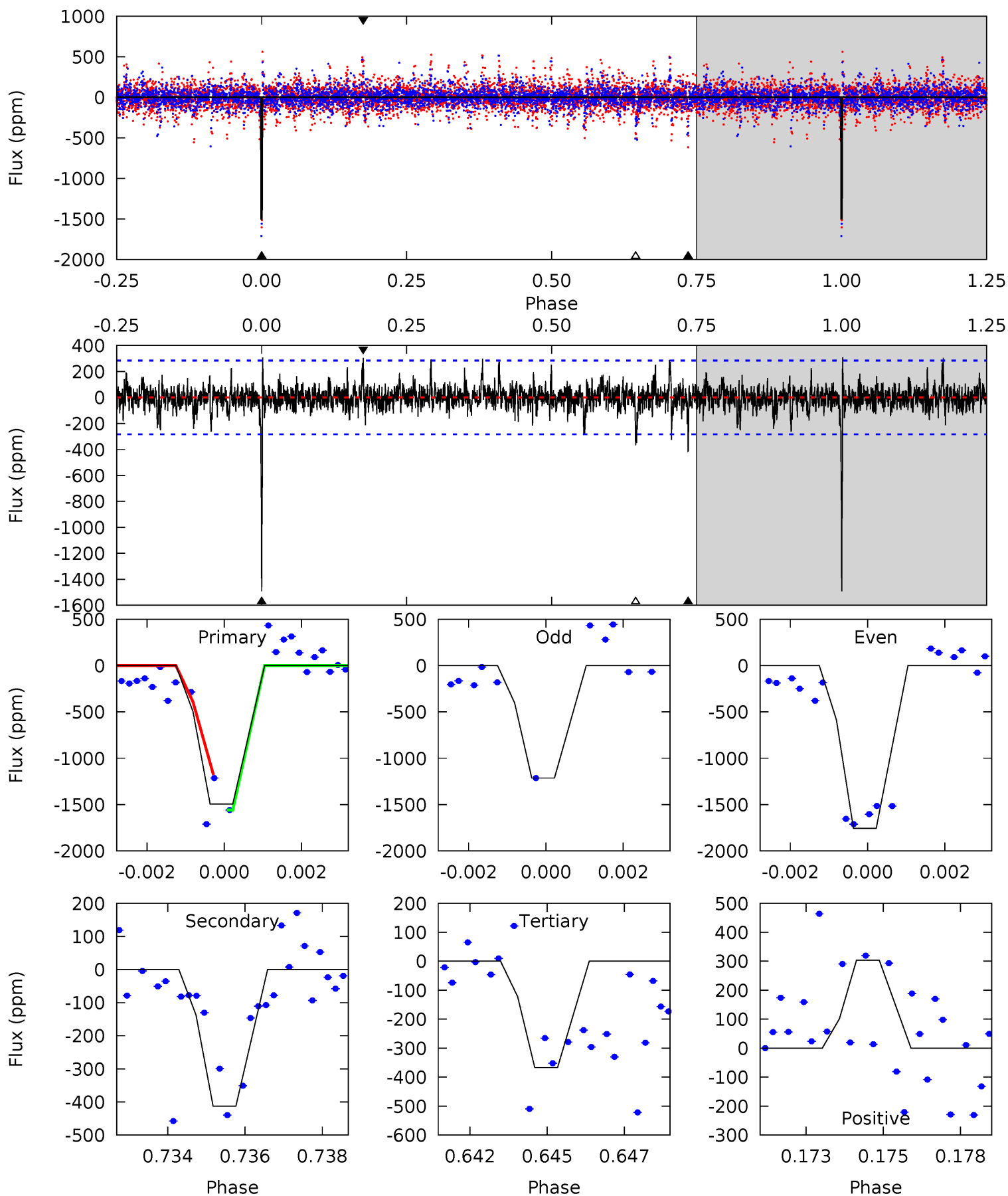
| Pri  | Sec  | Ter  | Pos  | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 12.0 | 7.53 | 5.80 | 5.86 | 5.23            | 2.93            | 1.66             | 6.17    | 6.11    | 1.73    | 1.67    | 5.31    | 1.05 | 0.33  | 2.08 |



# Alt Model-Shift Uniqueness Test

004245701-04, P = 30.454151 Days, E = 127.878106 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 |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|-----|
| 27.9 | 7.72 | 6.86 | 5.68 | 5.30            | 3.05            | 1.23             | 21.0    | 22.2    | 0.86    | 2.04    | 3.58    | 0.87 | 0.17  | 0   |



### Stellar Parameters For KIC 004245701

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R$ ( $R_{\odot}$ )       | $M$ ( $M_{\odot}$ )       | $p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ ) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $7164^{+176}_{-252}$ | $3.843^{+0.408}_{-0.102}$ | $-0.360^{+0.300}_{-0.300}$ | $2.411^{+0.465}_{-1.085}$ | $1.478^{+0.206}_{-0.308}$ | $0.148^{+0.471}_{-0.056}$                     |
|        | +2%/-4%              | +11%/-3%                  | +83%/-83%                  | +19%/-45%                 | +14%/-21%                 | +317%/-38%                                    |
| 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 004245701-04 / KOI

| Detrend | Depth (ppm)   | $R_p$ ( $R_{\oplus}$ ) | $T_{max}$ (K)        | $T_{obs}$ (K)          | $A_{obs}$            |
|---------|---------------|------------------------|----------------------|------------------------|----------------------|
| DV      | $-187 \pm 25$ | $5.20^{+4.62}_{-3.30}$ | $1431^{+101}_{-139}$ | $5659^{+4321}_{-1263}$ | $181^{+1102}_{-132}$ |
| Alt.    | $-413 \pm 53$ | $7.13^{+5.77}_{-4.33}$ | $1440^{+91}_{-160}$  | $5804^{+4182}_{-1159}$ | $210^{+1236}_{-144}$ |

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

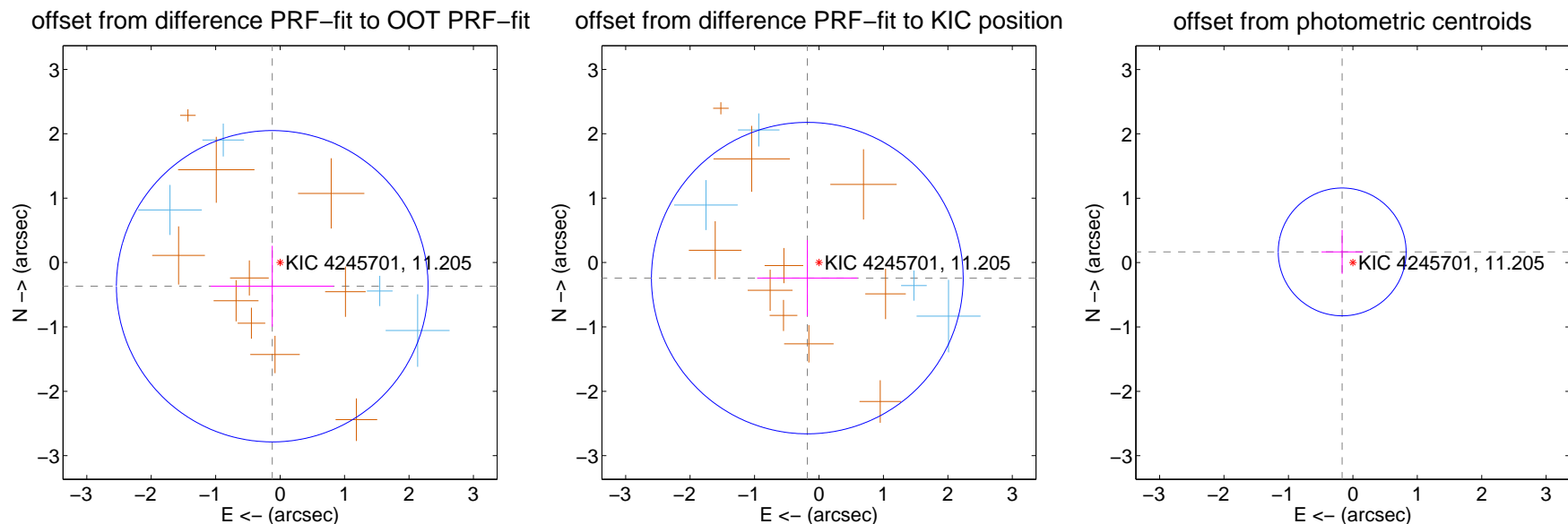
## DV Centroid Data

Supplemental centroid analysis for 004245701-04. **Kepler magnitude: 11.21.** Transit SNR 6.98

There are 4 quarters with good PRF difference image offsets

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

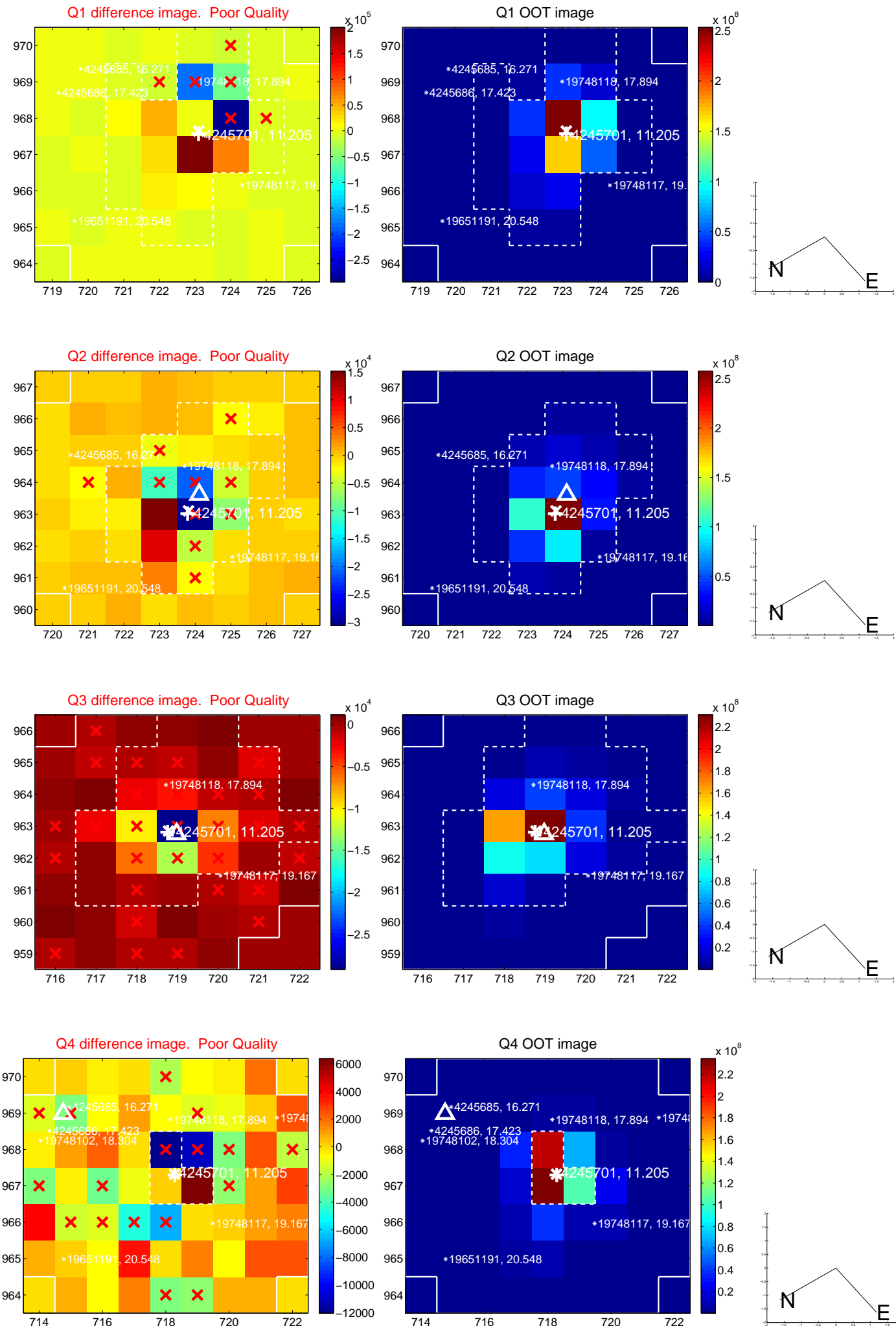
|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA       | $\Delta$ Dec       |
|---|--------------------|---------------------|-------------------|--------------------|
| PRF-fit source offset from OOT          | $0.388 \pm 0.806$  | 0.48                | $0.122 \pm 0.952$ | $-0.368 \pm 0.629$ |
| PRF-fit source offset from KIC position | $0.302 \pm 0.806$  | 0.37                | $0.181 \pm 0.778$ | $-0.242 \pm 0.590$ |
| photometric centroid source offset      | $0.23 \pm 0.33$    | 0.71                | $0.17 \pm 0.32$   | $0.17 \pm 0.34$    |



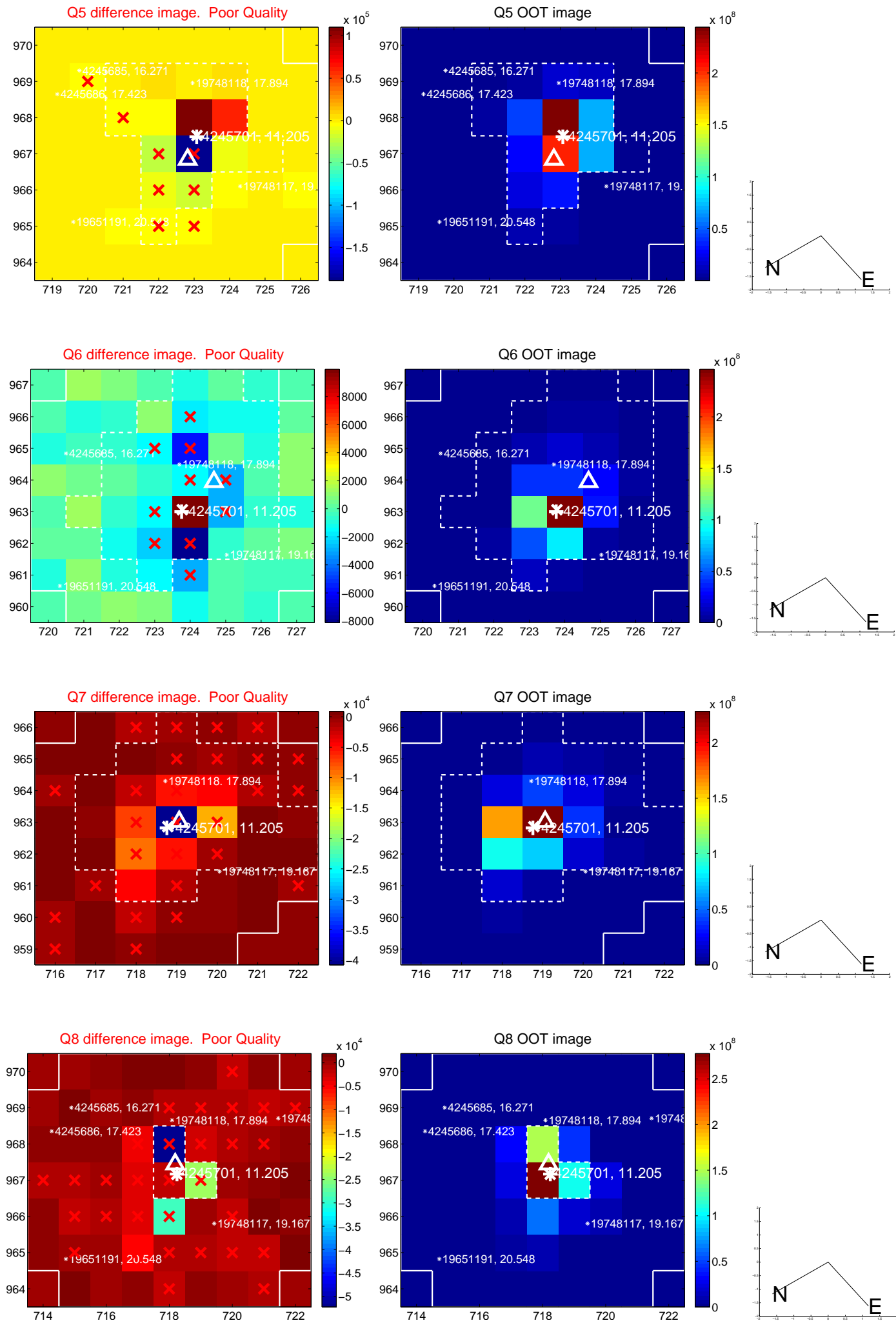
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



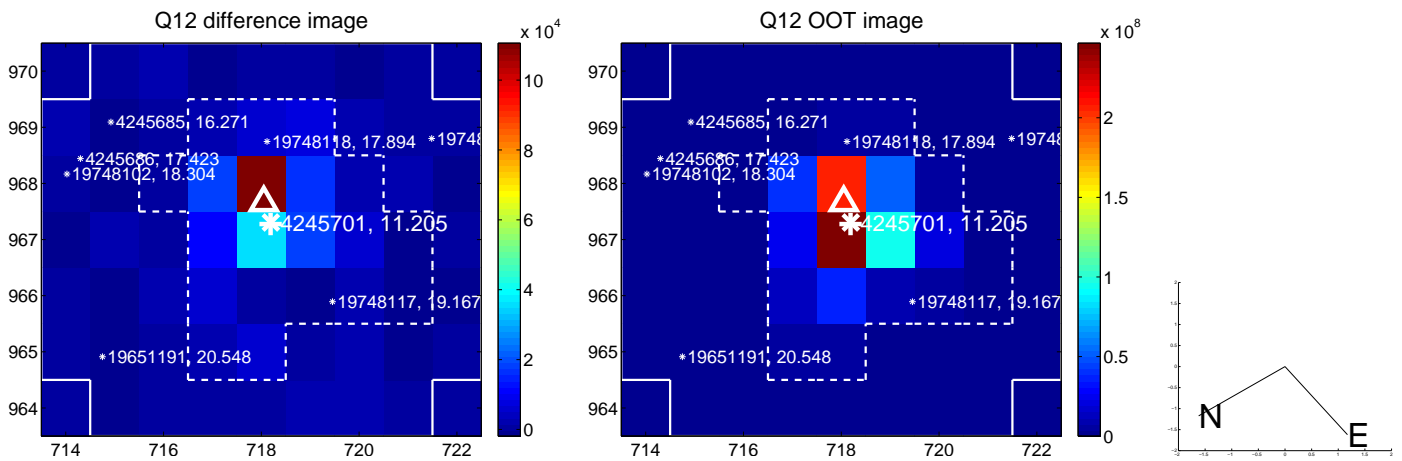
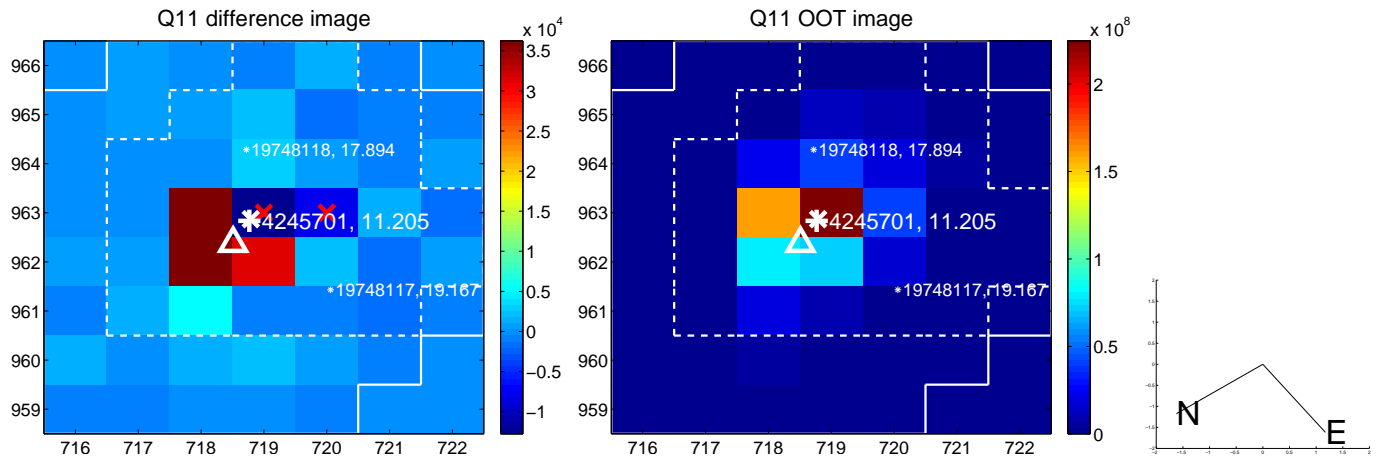
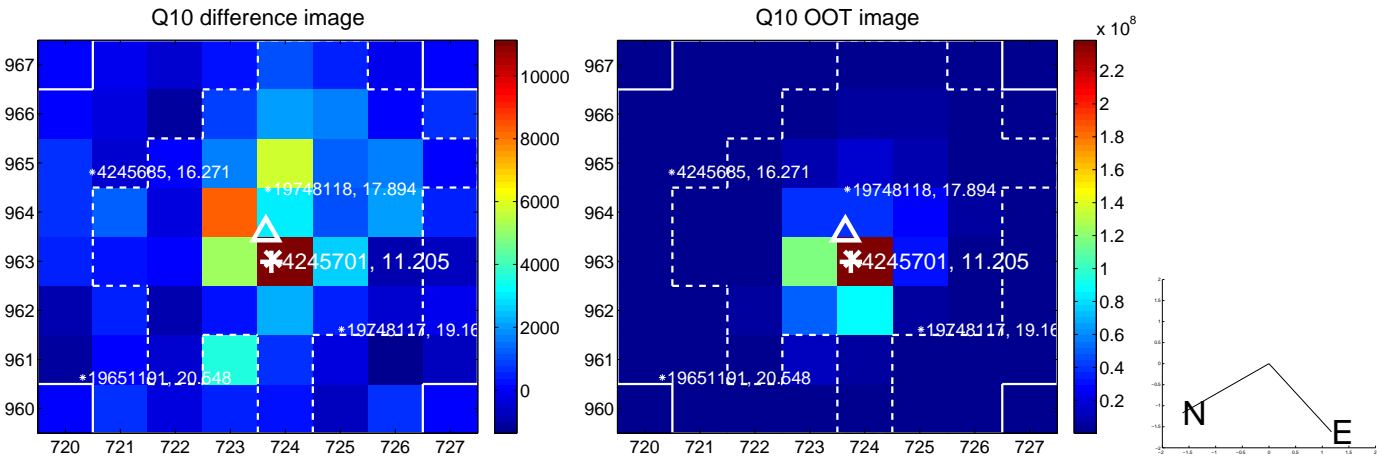
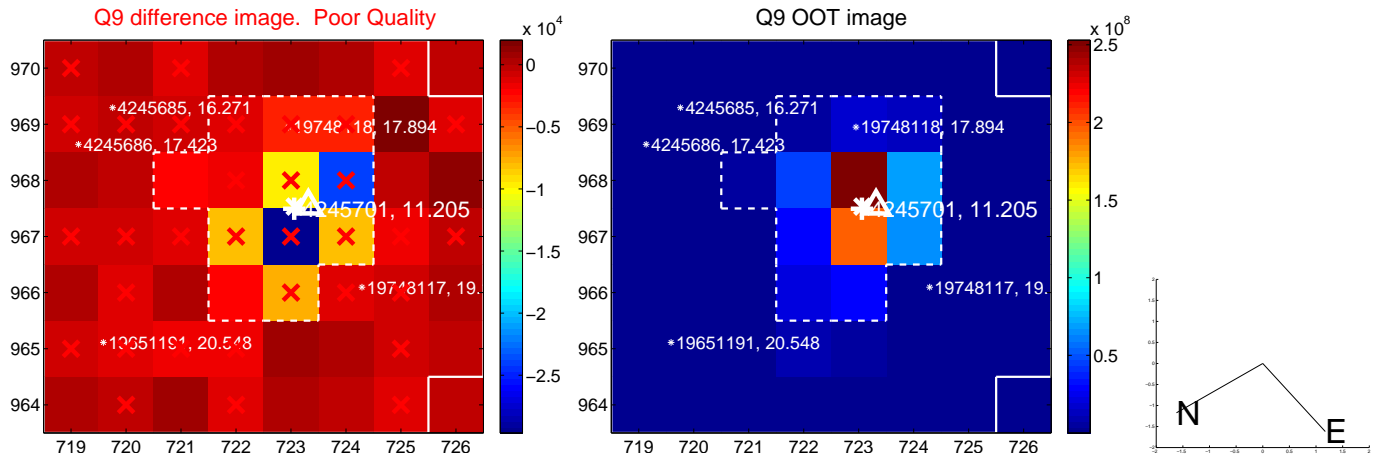
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



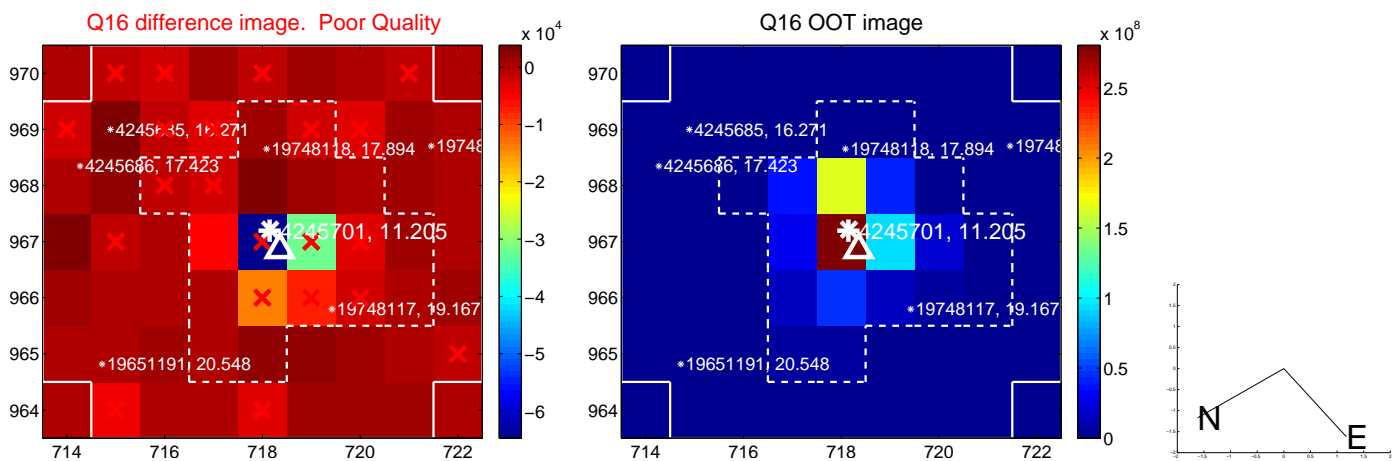
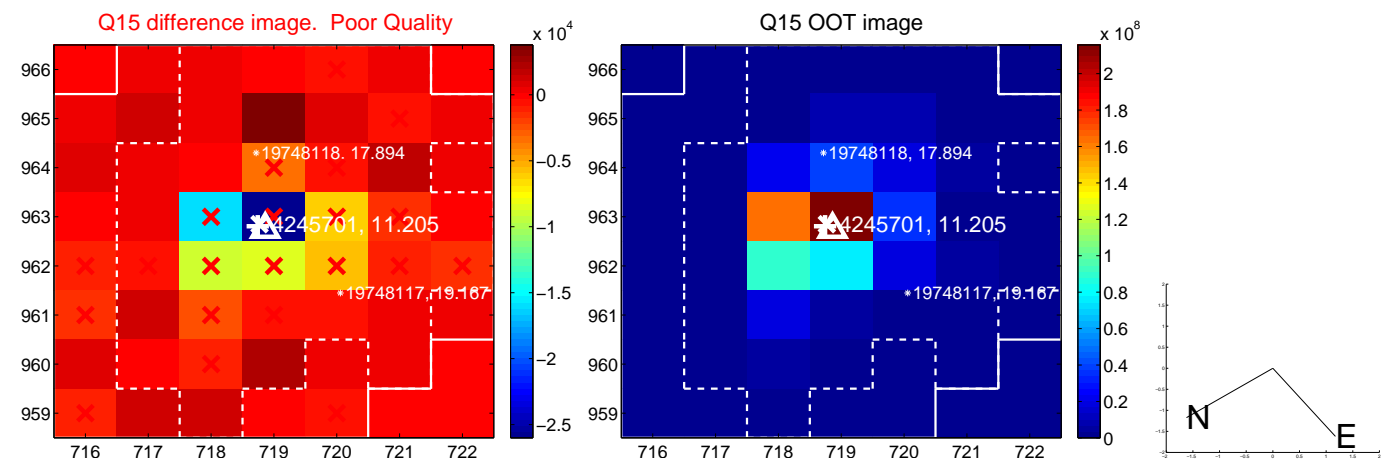
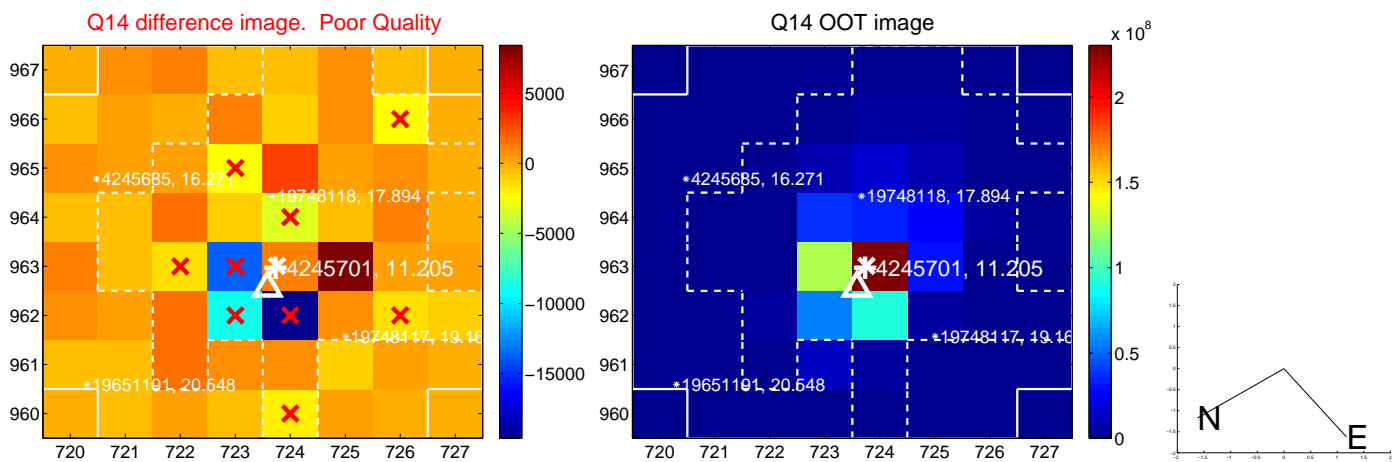
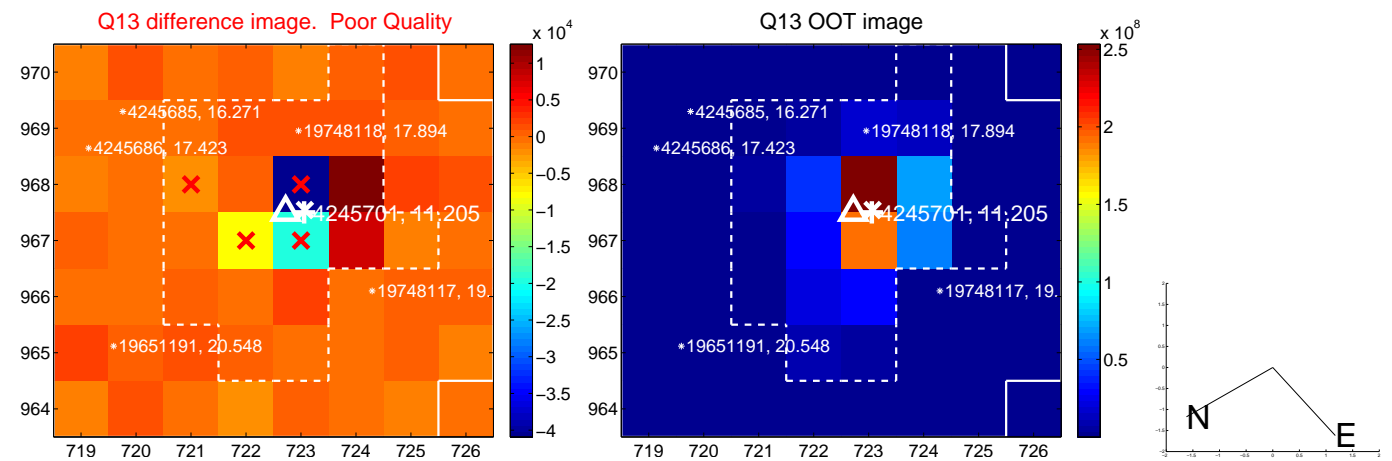
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



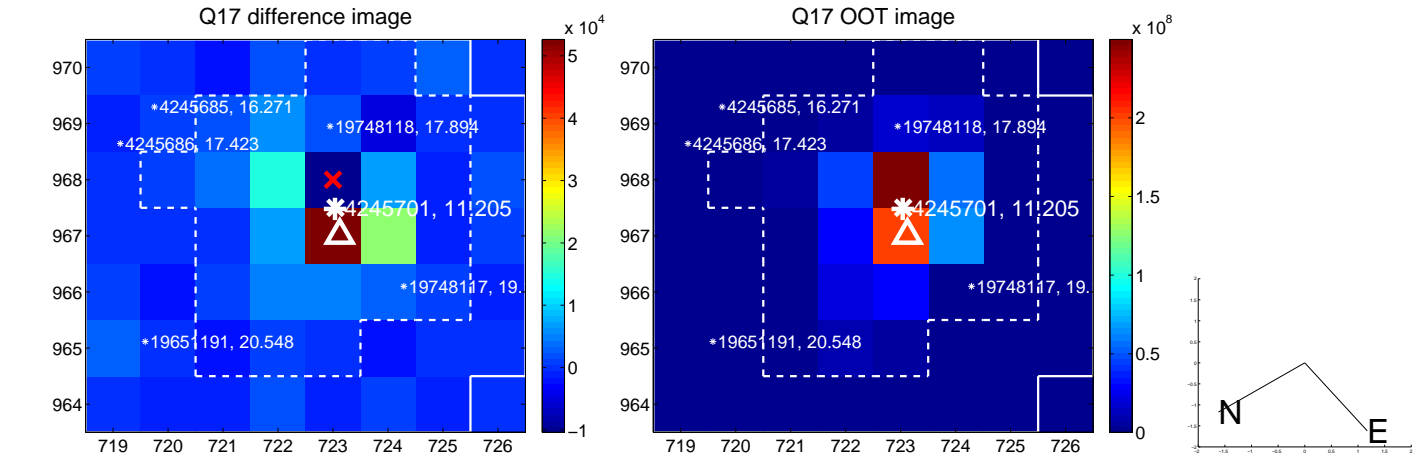
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



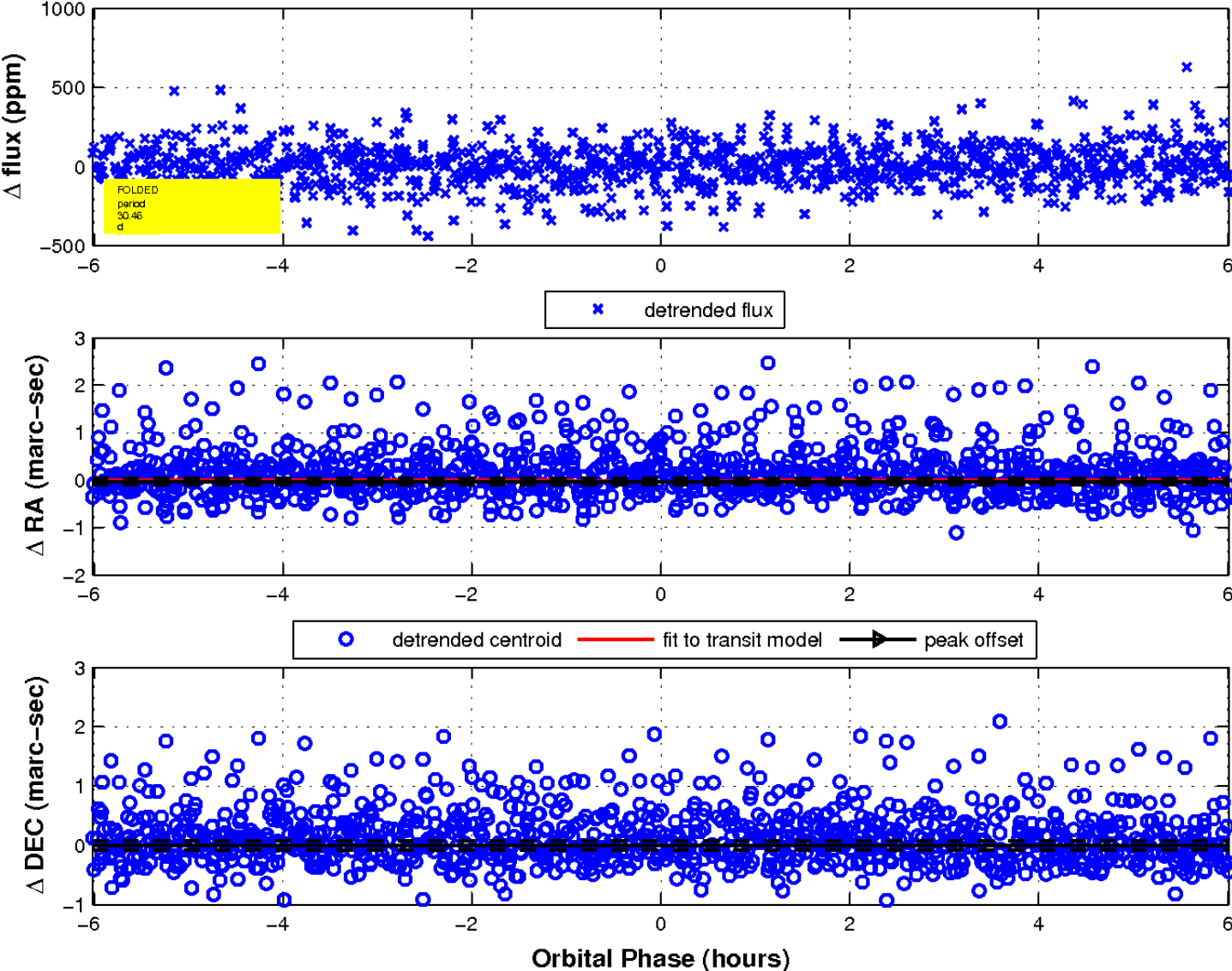
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

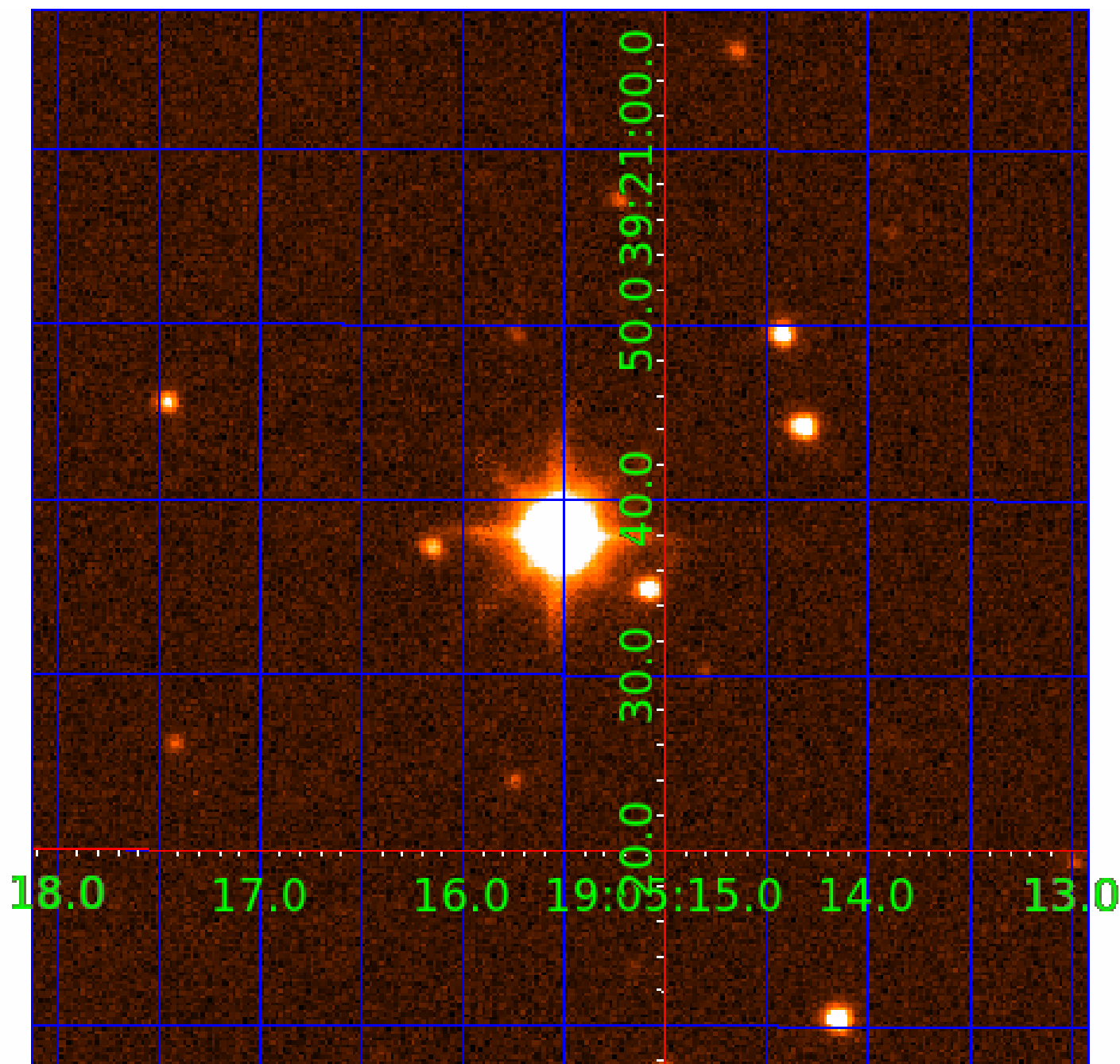


fluxWeightedCentroids, Planet 4 of 7



UKIRT Image

Declination



# KIC 004245701

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 004245701-01 | OBS      | No   | 0.897843      | 132.180675   | 12.4        | 6.163            | 9.1  | 8.1  | 2.41                        | 7164            | 0.87                   | 31869.90               |
| 004245701-02 | OBS      | No   | 55.714468     | 141.964464   | 209.6       | 6.163            | 7.2  | 8.3  | 2.41                        | 7164            | 3.94                   | 129.72                 |
| 004245701-03 | OBS      | No   | 41.857491     | 147.545112   | 252.1       | 1.312            | 7.9  | 9.9  | 2.41                        | 7164            | 4.30                   | 189.94                 |
| 004245701-04 | OBS      | No   | 30.455228     | 158.307676   | 206.1       | 2.005            | 11.3 | 7.0  | 2.41                        | 7164            | 4.00                   | 290.25                 |
| 004245701-05 | OBS      | No   | 28.418026     | 132.694838   | 149.5       | 3.266            | 9.3  | 9.9  | 2.41                        | 7164            | 3.31                   | 318.31                 |
| 004245701-06 | OBS      | No   | 191.277248    | 181.918761   | 270.0       | 2.551            | 10.1 | 10.5 | 2.41                        | 7164            | 4.68                   | 25.05                  |
| 004245701-07 | OBS      | No   | 22.543458     | 150.815074   | 101.3       | 3.423            | 10.6 | 6.9  | 2.41                        | 7164            | 2.75                   | 433.46                 |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 004245701-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | LPP_DV—CENT_SATURATED   |
| 004245701-02 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED                  |
| 004245701-03 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—CENT_SATURATED   |
| 004245701-04 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED  |
| 004245701-05 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED  |
| 004245701-06 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED |
| 004245701-07 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—CENT_SATURATED  |

**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.

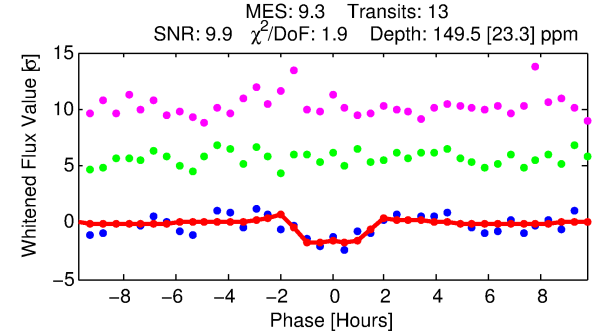
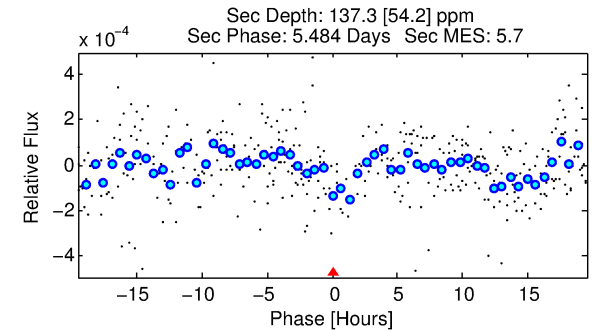
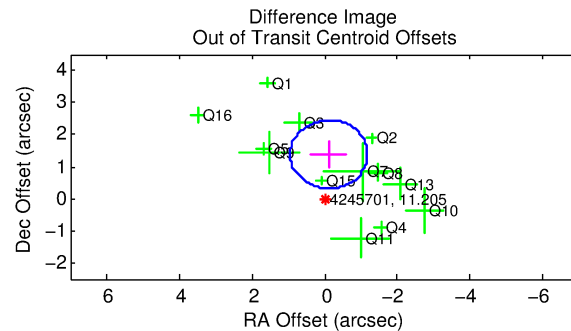
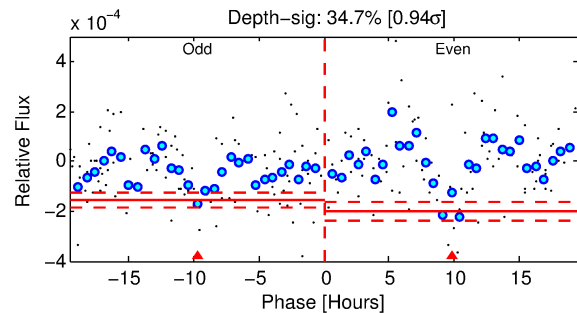
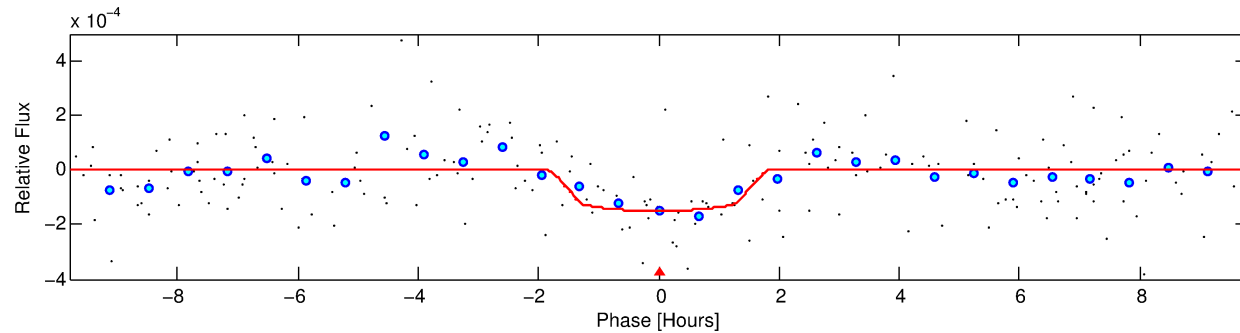
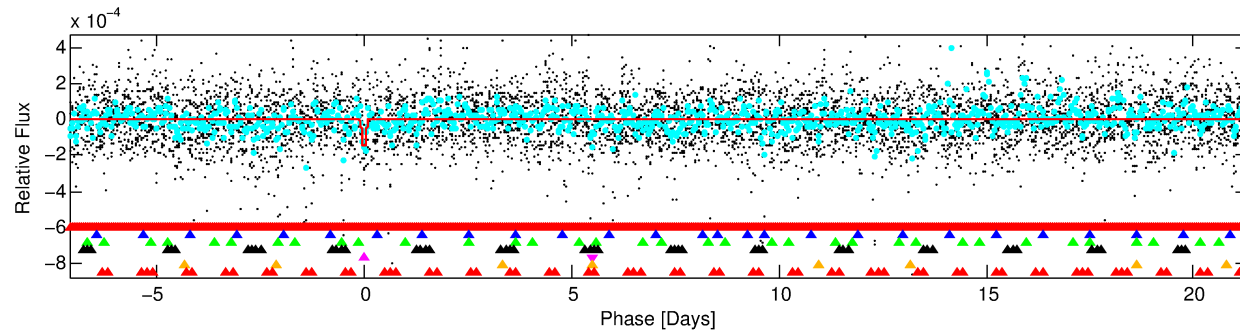
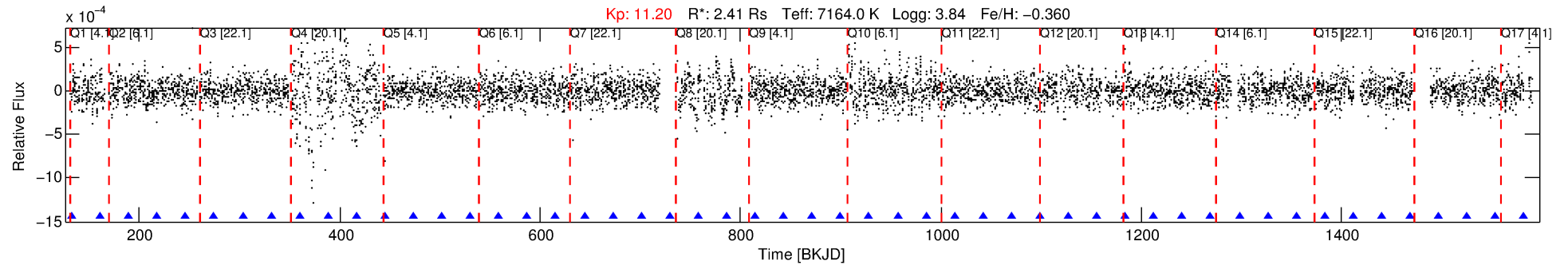
Ephemeris Match Information For 004245701-05

No Significant Match Found



# DV One-Page Summary

KIC: 4245701 Candidate: 5 of 7 Period: 28.418 d



## DV Fit Results:

Period = 28.41803 [0.00037] d  
Epoch = 132.6948 [0.0109] BKJD  
Rp/R\* = 0.0126 [0.0153]  
a/R\* = 37.69 [266.50]  
b = 0.84 [2.53]  
Seff = 318.31 [225.55]  
Teq = 1077 [191] K  
Rp = 3.31 [4.29] Re  
a = 0.2076 [0.0900] AU  
Ag = 296.89 [759.78] [0.39 $\sigma$ ]  
Teffp = 6912 [4263] K [1.37 $\sigma$ ]

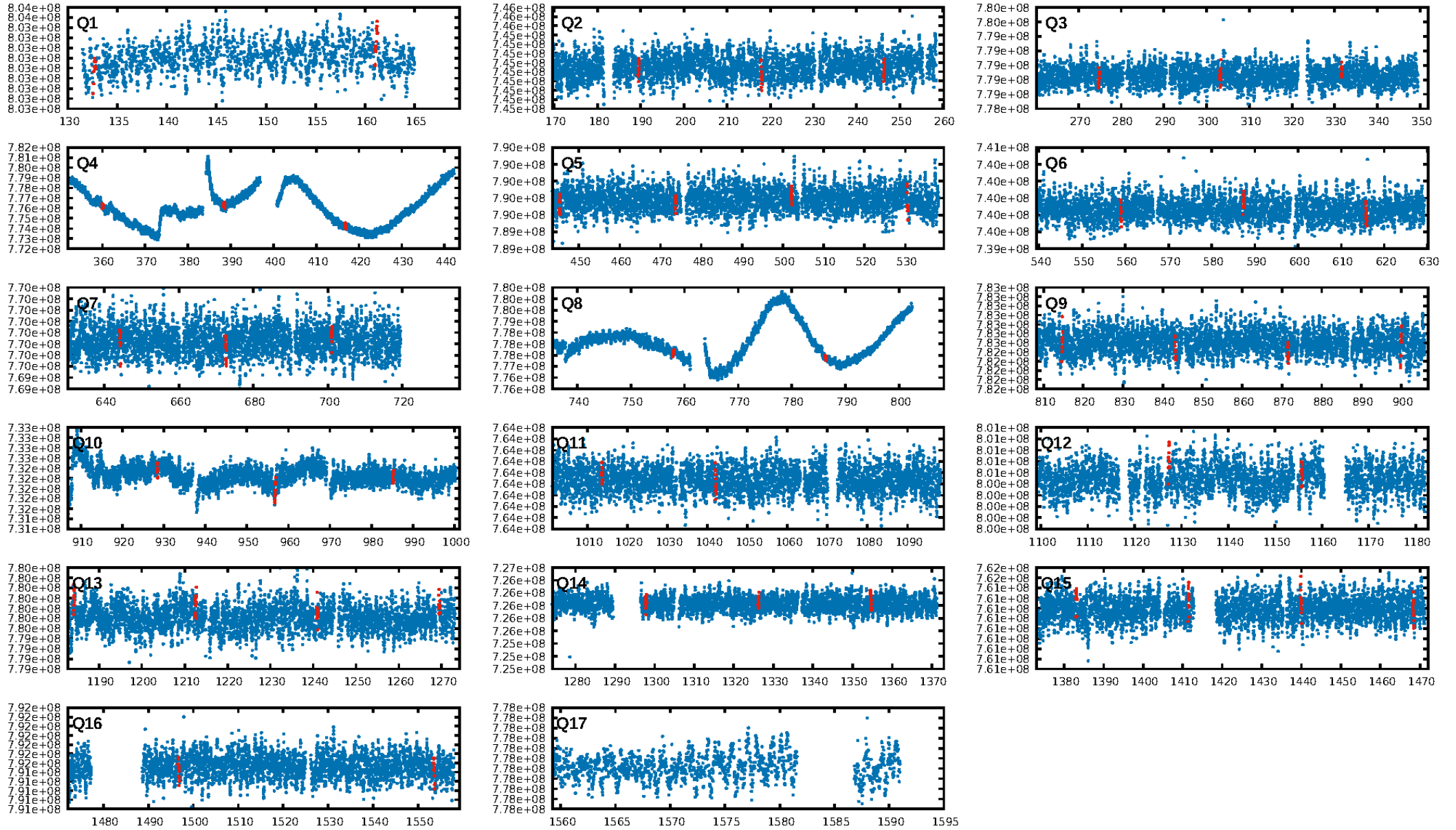
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [29.80 $\sigma$ ]  
LongPeriod-sig: 100.0% [12.76 $\sigma$ ]  
ModelChiSquare2-sig: 3.4%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 1.10e-08**  
RollingBand-fgt: 1.00 [12/12]  
GhostDiagnostic-chr: 11.72  
Centroid-sig: 30.3%  
Centroid-so: 0.169 arcsec [0.41 $\sigma$ ]  
**OotOffset-rm: 1.387 arcsec [3.91 $\sigma$ ]**  
**KicOffset-rm: 1.530 arcsec [4.31 $\sigma$ ]**  
OotOffset-st: 2/4/3/4 [13]  
KicOffset-st: 2/4/3/4 [13]  
DiffImageQuality-fgm: 0.31 [4/13]  
DiffImageOverlap-fno: 0.00 [0/15]

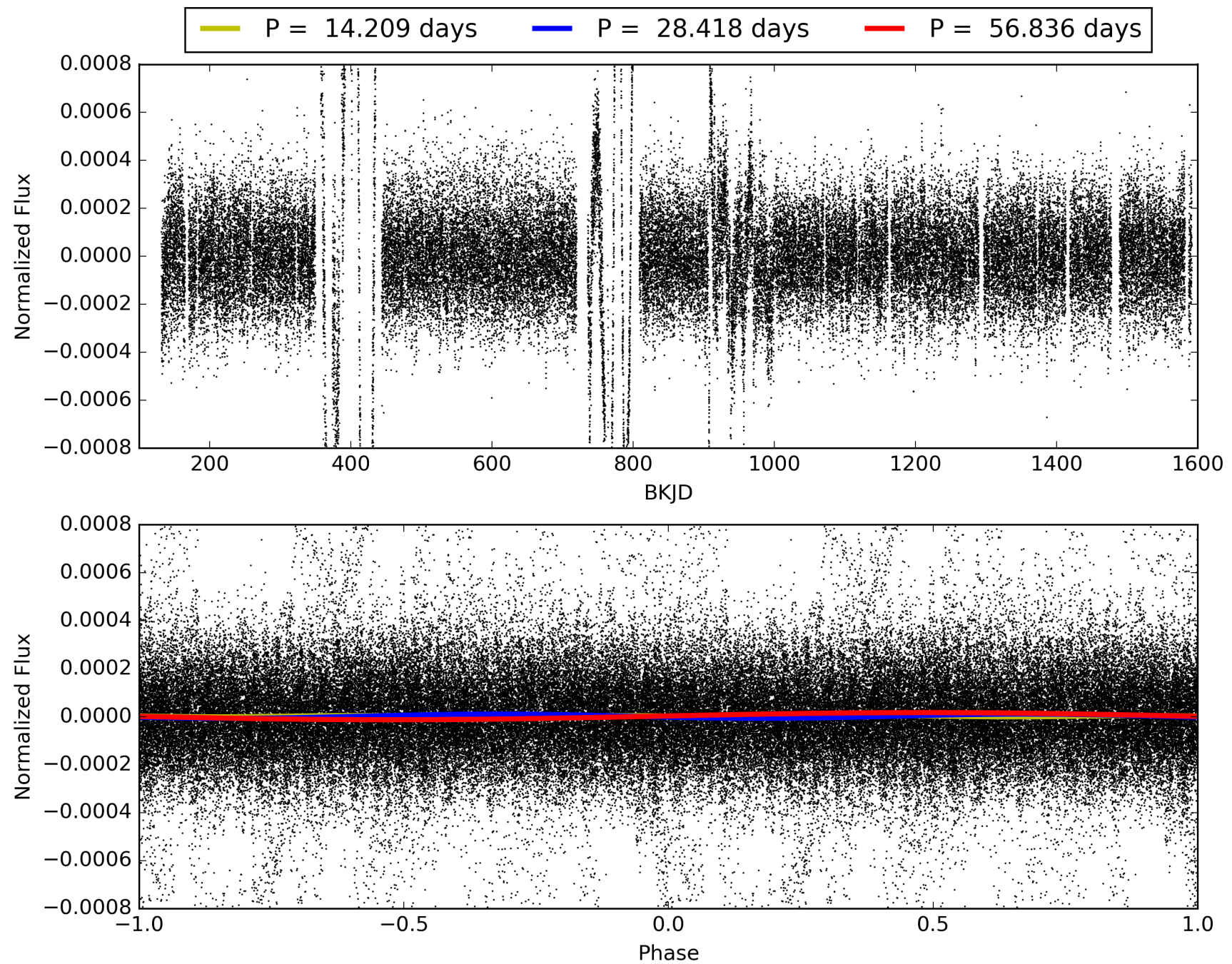
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 08:20:21 Z

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

# TCE 004245701-05, PDC Light Curves

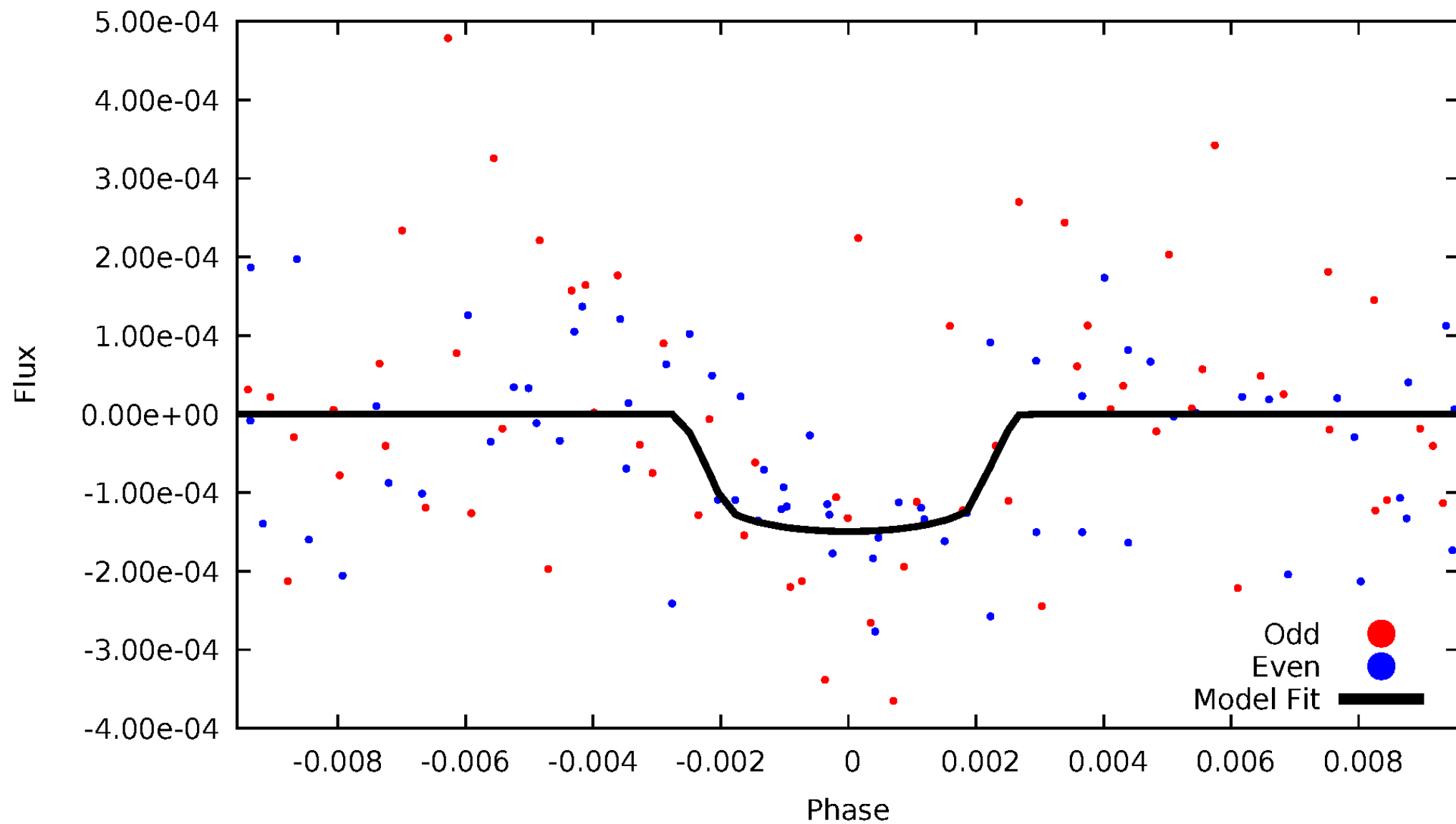


TCE 004245701-05



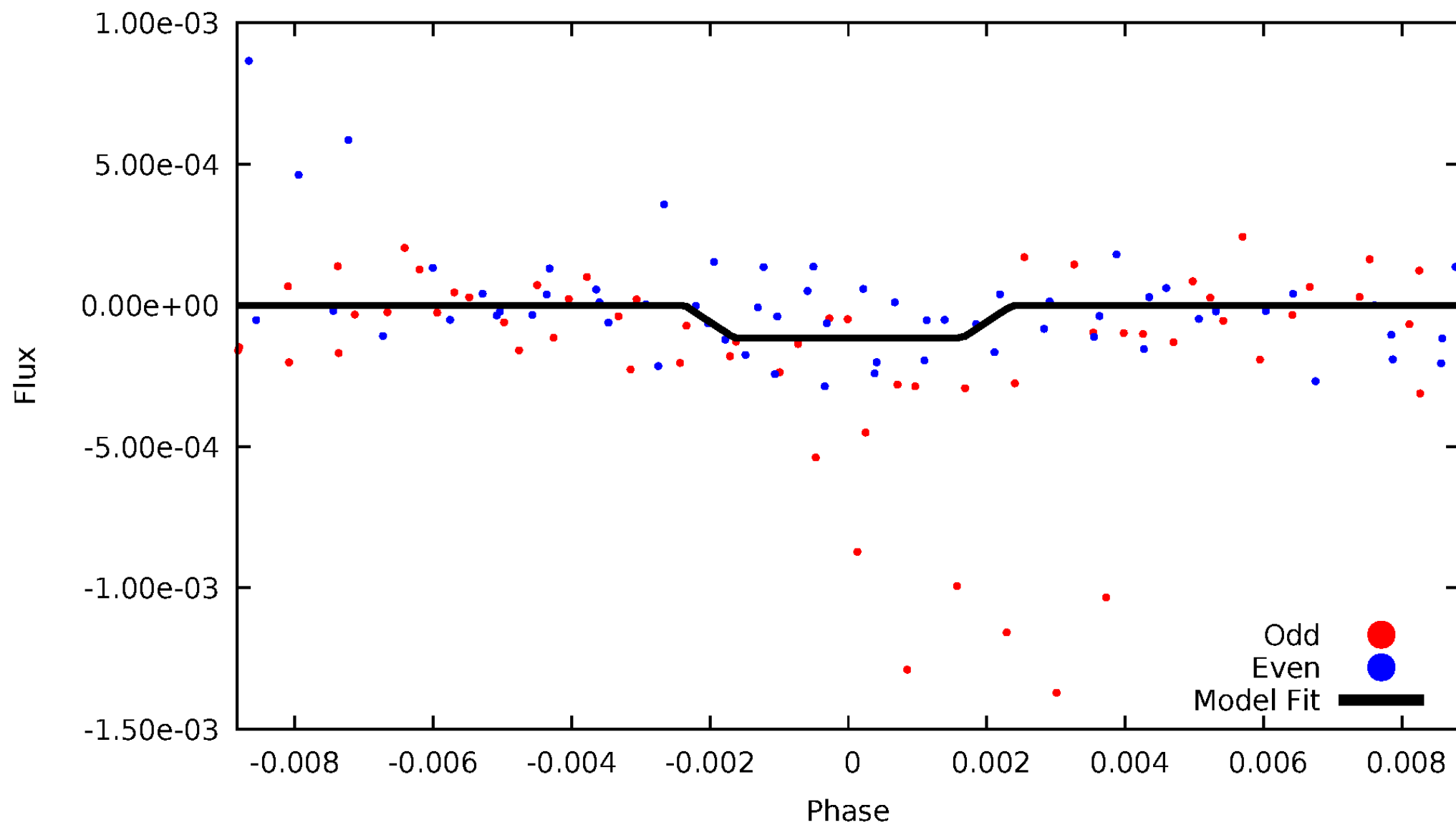
# DV Odd/Even

TCE 004245701-05



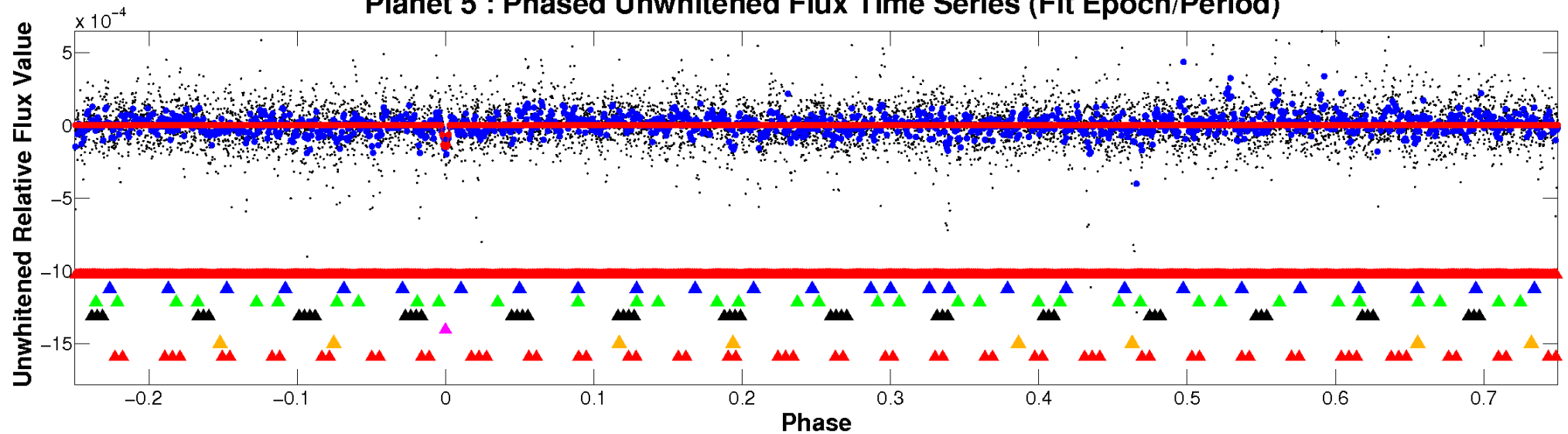
# ALT Odd/Even

TCE 004245701-05

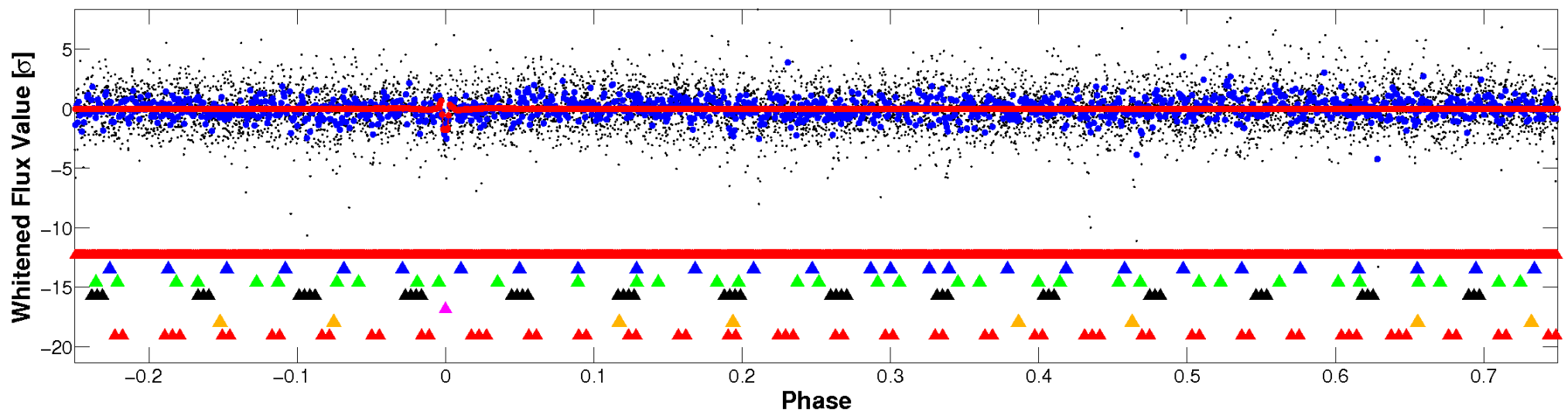


# Non-Whitened Vs. Whitened Light Curve

## Planet 5 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)



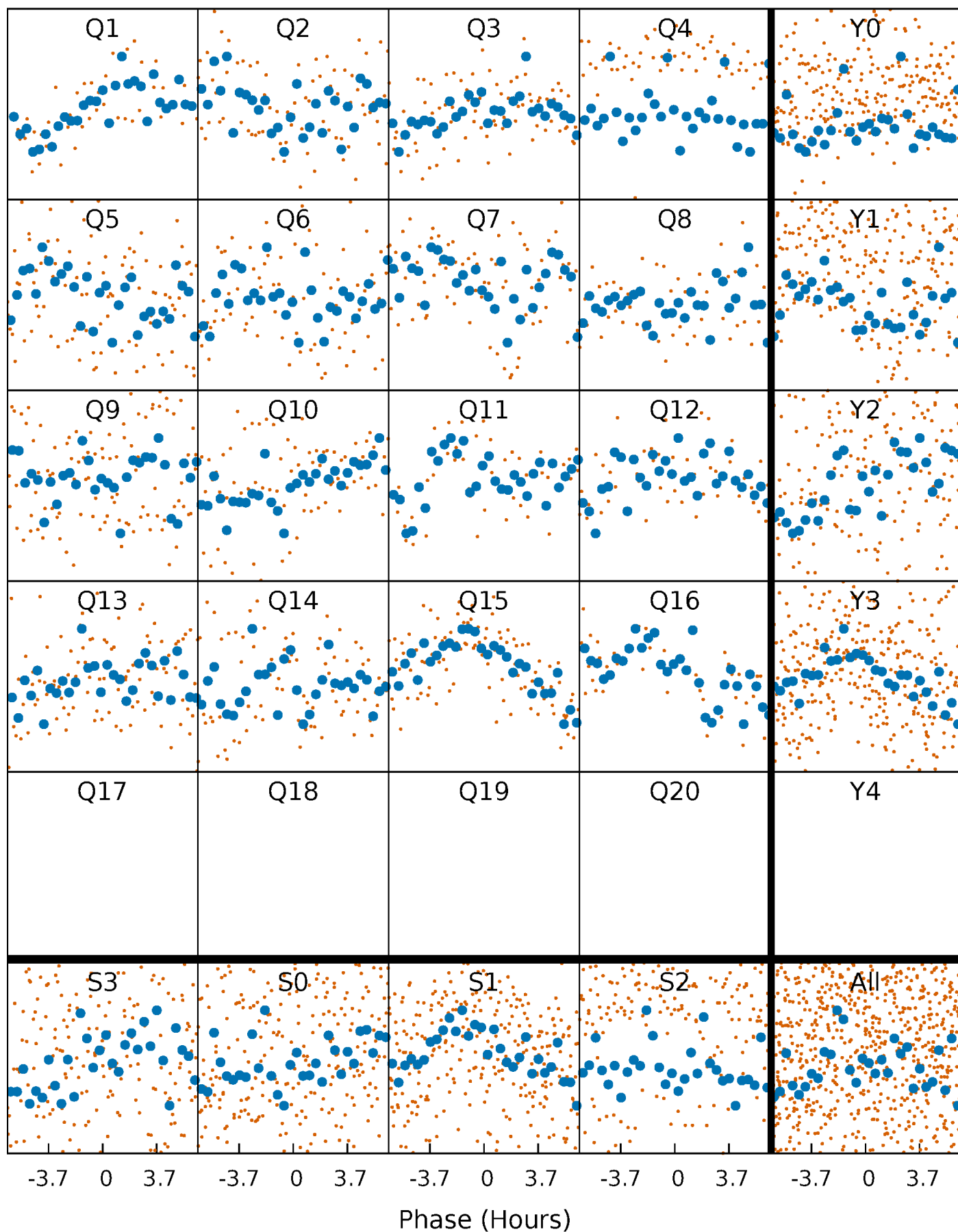
## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

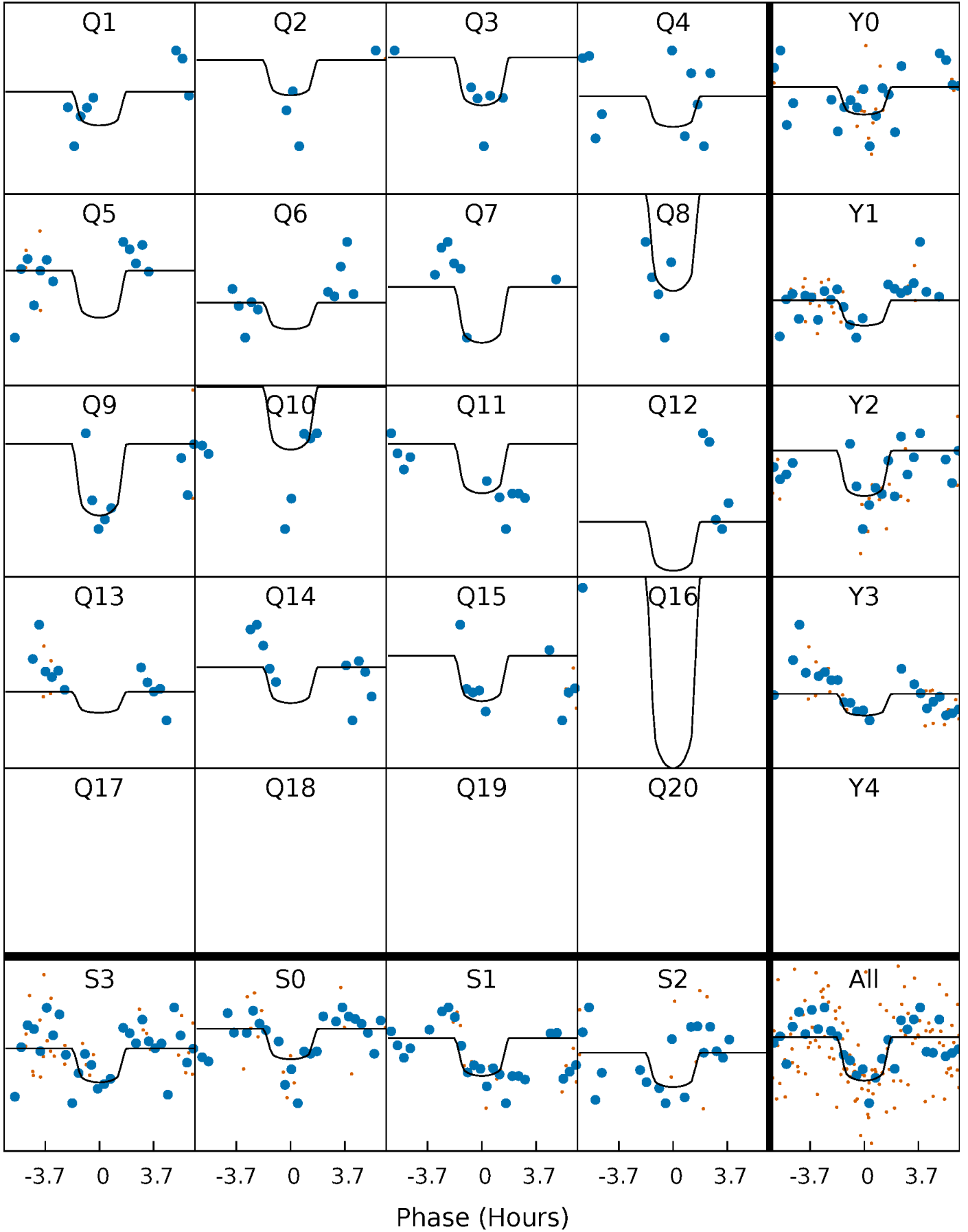
TCE 004245701-05   P= 28.418026 Days    $T_0=132.694838$  (BKJD)





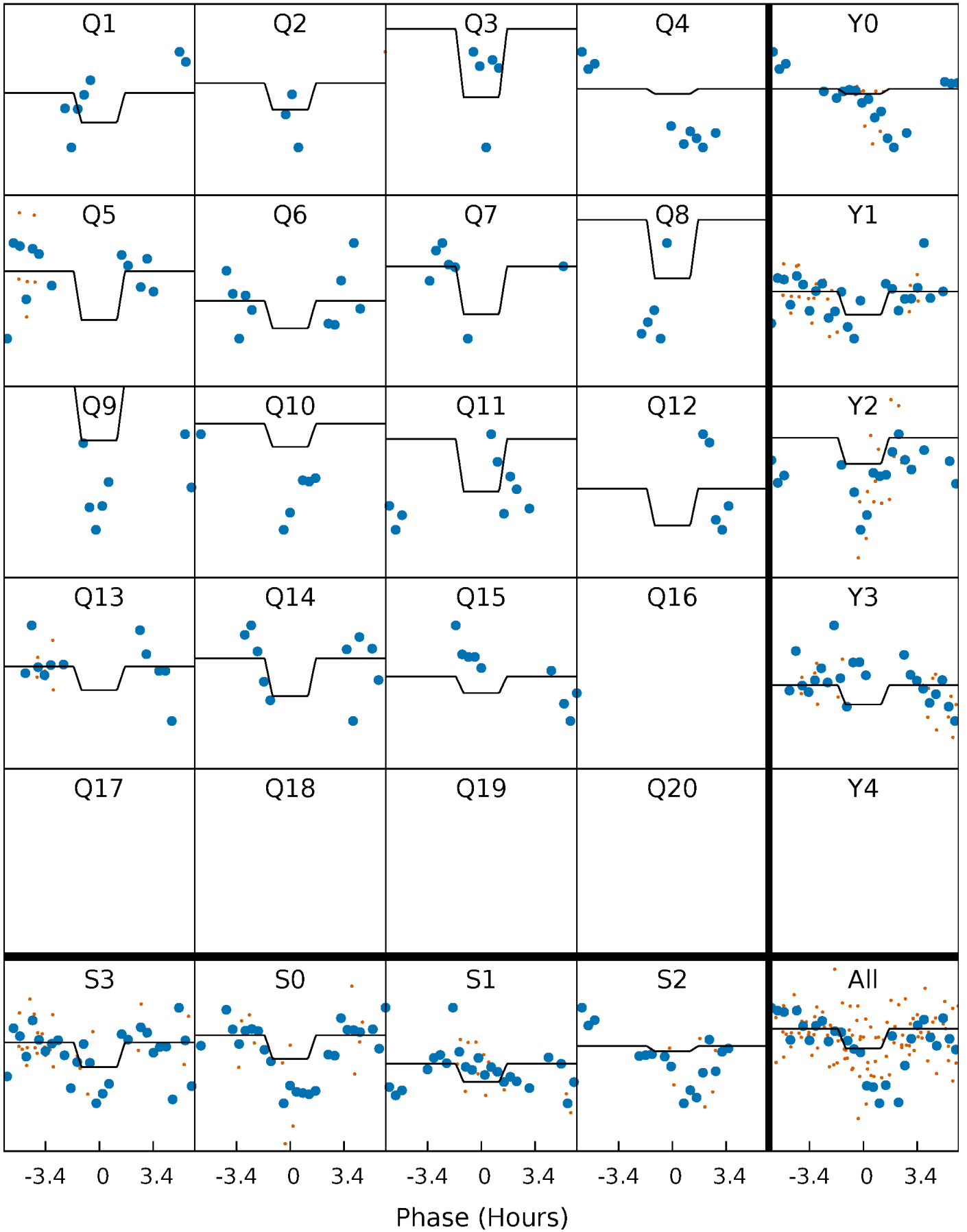
# DV Quarter-Phased Transit Curves

TCE 004245701-05   P= 28.418026 Days    $T_0=132.694838$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

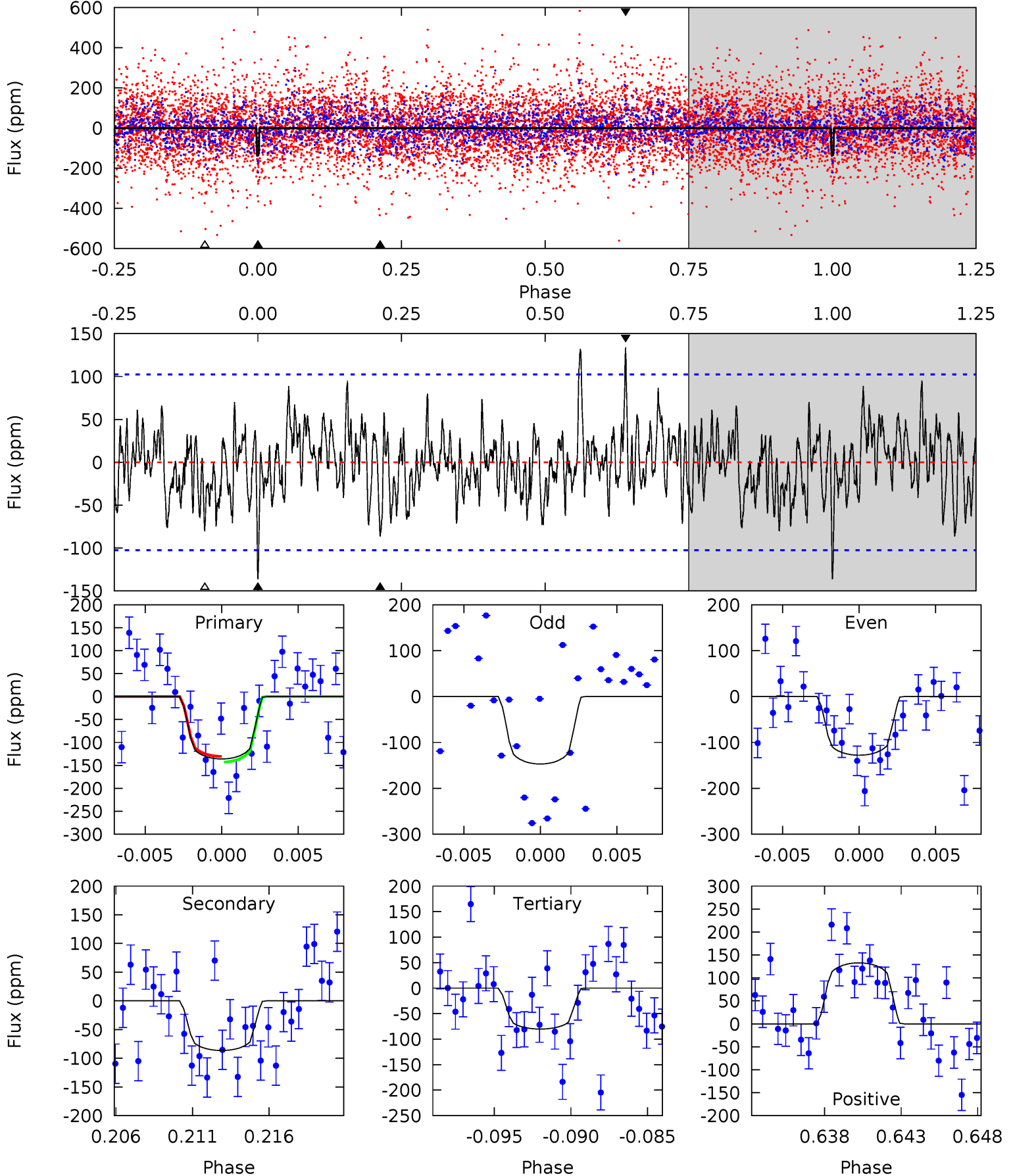
TCE 004245701-05   P= 28.418142 Days    $T_0=132.694461$  (BKJD)



# DV Model-Shift Uniqueness Test

004245701-05, P = 28.418026 Days, E = 104.276812 Days

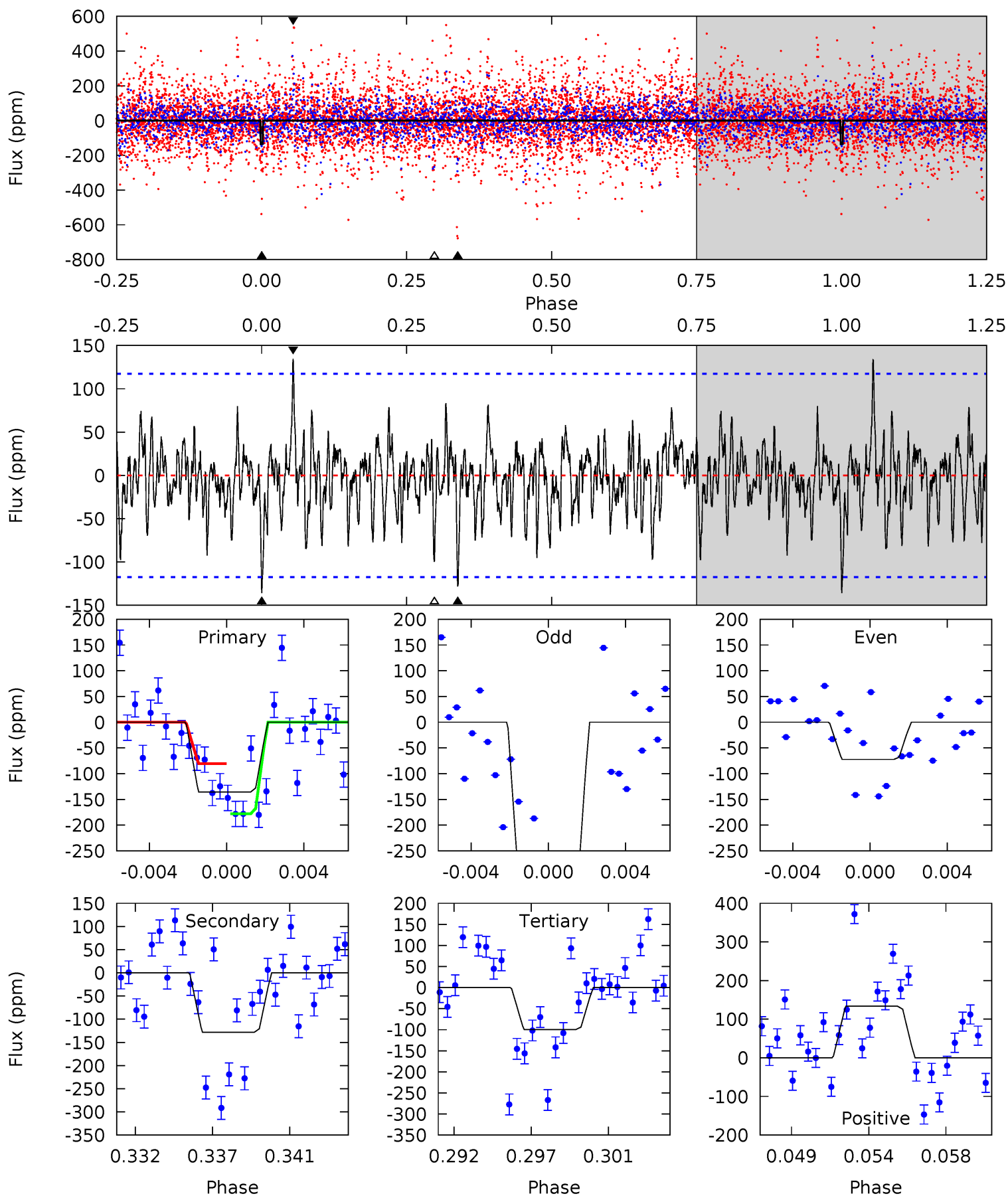
| Pri  | Sec  | Ter  | Pos  | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 6.85 | 4.35 | 4.04 | 6.68 | 5.16            | 2.81            | 1.64             | 2.81    | 0.17    | 0.31    | -2.33   | 0.47    | 0.96 | 0.49  | 0.31 |



# Alt Model-Shift Uniqueness Test

004245701-05, P = 28.418142 Days, E = 104.276319 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  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 5.98 | 5.65 | 4.39 | 5.88 | 5.18            | 2.84            | 1.41             | 1.59    | 0.10    | 1.26    | -0.23   | 4.86    | 1.36 | 0.50  | 2.11 |



### Stellar Parameters For KIC 004245701

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R$ ( $R_{\odot}$ )       | $M$ ( $M_{\odot}$ )       | $p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ ) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $7164^{+176}_{-252}$ | $3.843^{+0.408}_{-0.102}$ | $-0.360^{+0.300}_{-0.300}$ | $2.411^{+0.465}_{-1.085}$ | $1.478^{+0.206}_{-0.308}$ | $0.148^{+0.471}_{-0.056}$                     |
|        | +2%/-4%              | +11%/-3%                  | +83%/-83%                  | +19%/-45%                 | +14%/-21%                 | +317%/-38%                                    |
| 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 004245701-05 / KOI

| Detrend | Depth (ppm)   | $R_p$ ( $R_{\oplus}$ ) | $T_{max}$ (K)        | $T_{obs}$ (K)          | $A_{obs}$            |
|---------|---------------|------------------------|----------------------|------------------------|----------------------|
| DV      | $-86 \pm 20$  | $4.04^{+3.35}_{-2.55}$ | $1468^{+105}_{-163}$ | $5231^{+3989}_{-1052}$ | $124^{+814}_{-88}$   |
| Alt.    | $-128 \pm 23$ | $3.67^{+3.26}_{-2.46}$ | $1466^{+105}_{-170}$ | $5945^{+6232}_{-1366}$ | $211^{+1808}_{-150}$ |

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

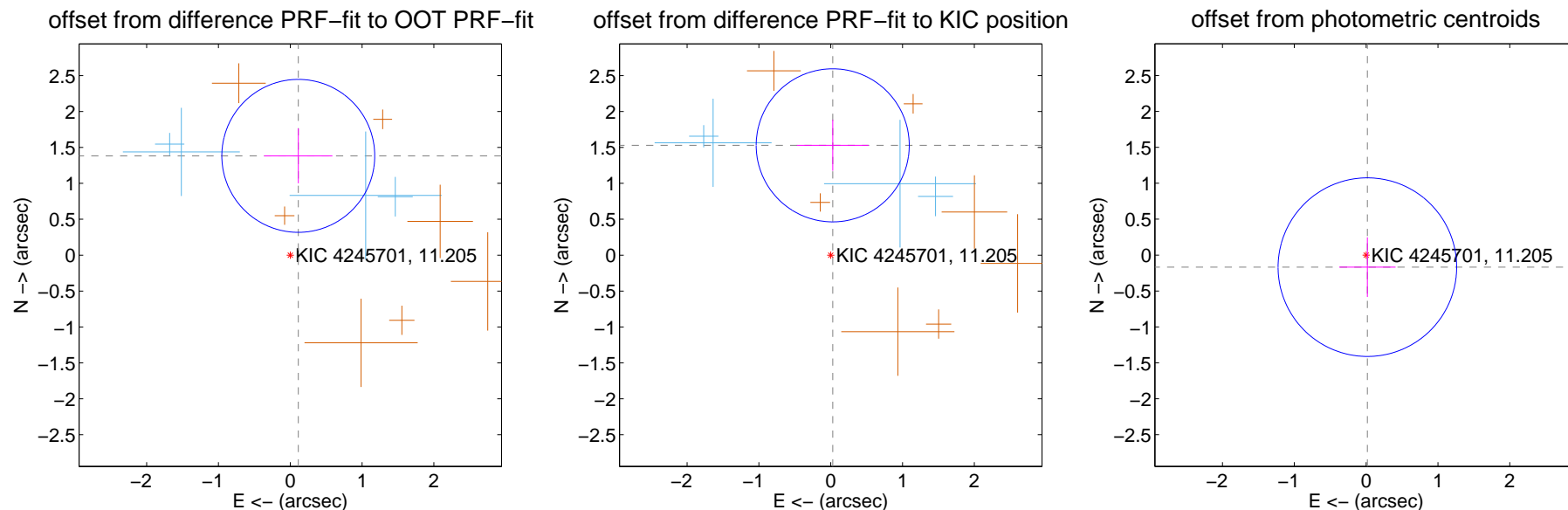
## DV Centroid Data

Supplemental centroid analysis for 004245701-05. **Kepler magnitude: 11.21.** Transit SNR 9.95

There are 4 quarters with good PRF difference image offsets

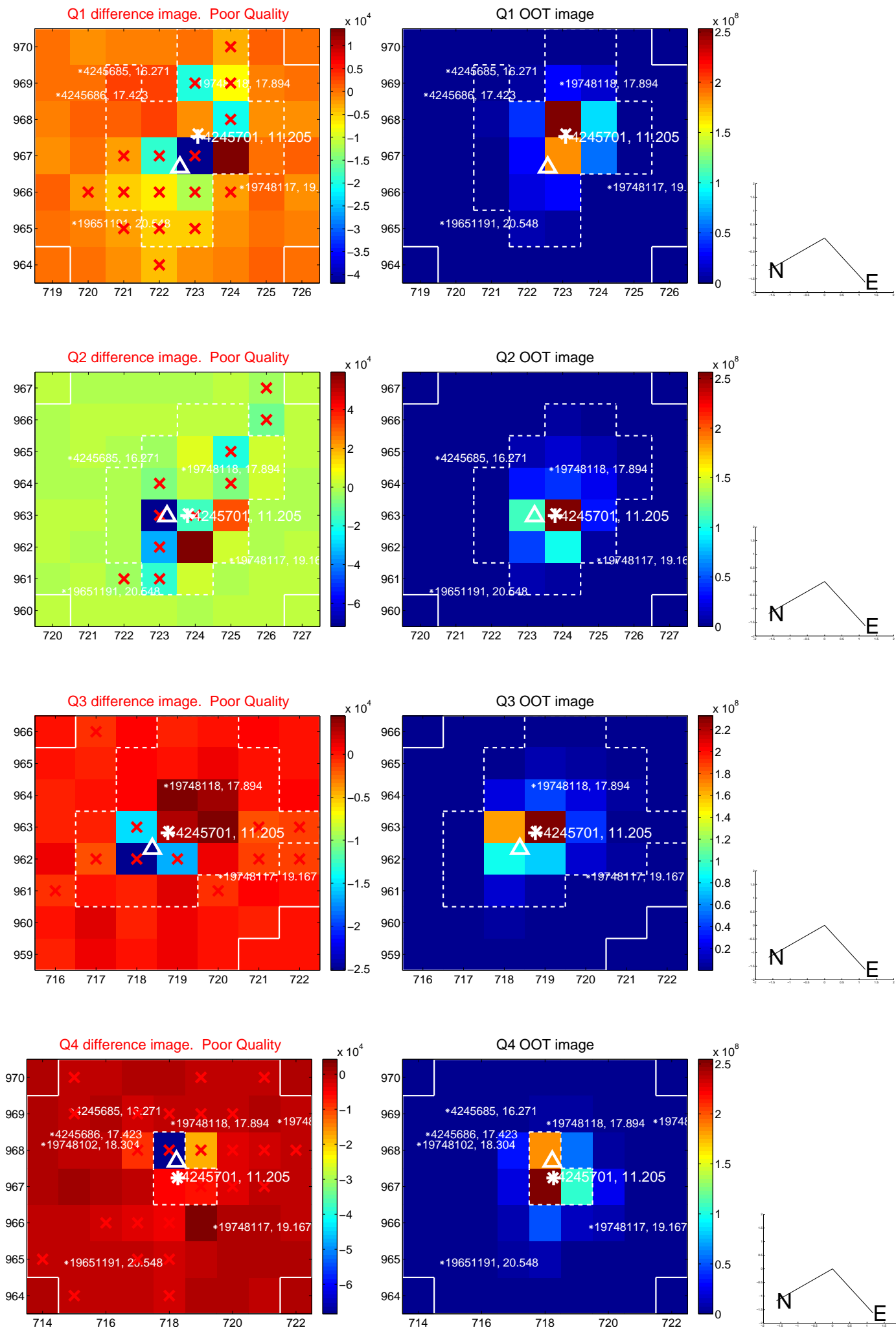
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

|   | Distance in arcsec                  | Distance / $\sigma$ | $\Delta$ RA        | $\Delta$ Dec      |
|---|-------------------------------------|---------------------|--------------------|-------------------|
| PRF-fit source offset from OOT          | <b><math>1.387 \pm 0.355</math></b> | <b>3.91</b>         | $-0.112 \pm 0.476$ | $1.383 \pm 0.383$ |
| PRF-fit source offset from KIC position | <b><math>1.530 \pm 0.355</math></b> | <b>4.31</b>         | $-0.028 \pm 0.500$ | $1.529 \pm 0.355$ |
| photometric centroid source offset      | $0.17 \pm 0.41$                     | 0.41                | $-0.02 \pm 0.39$   | $-0.17 \pm 0.41$  |



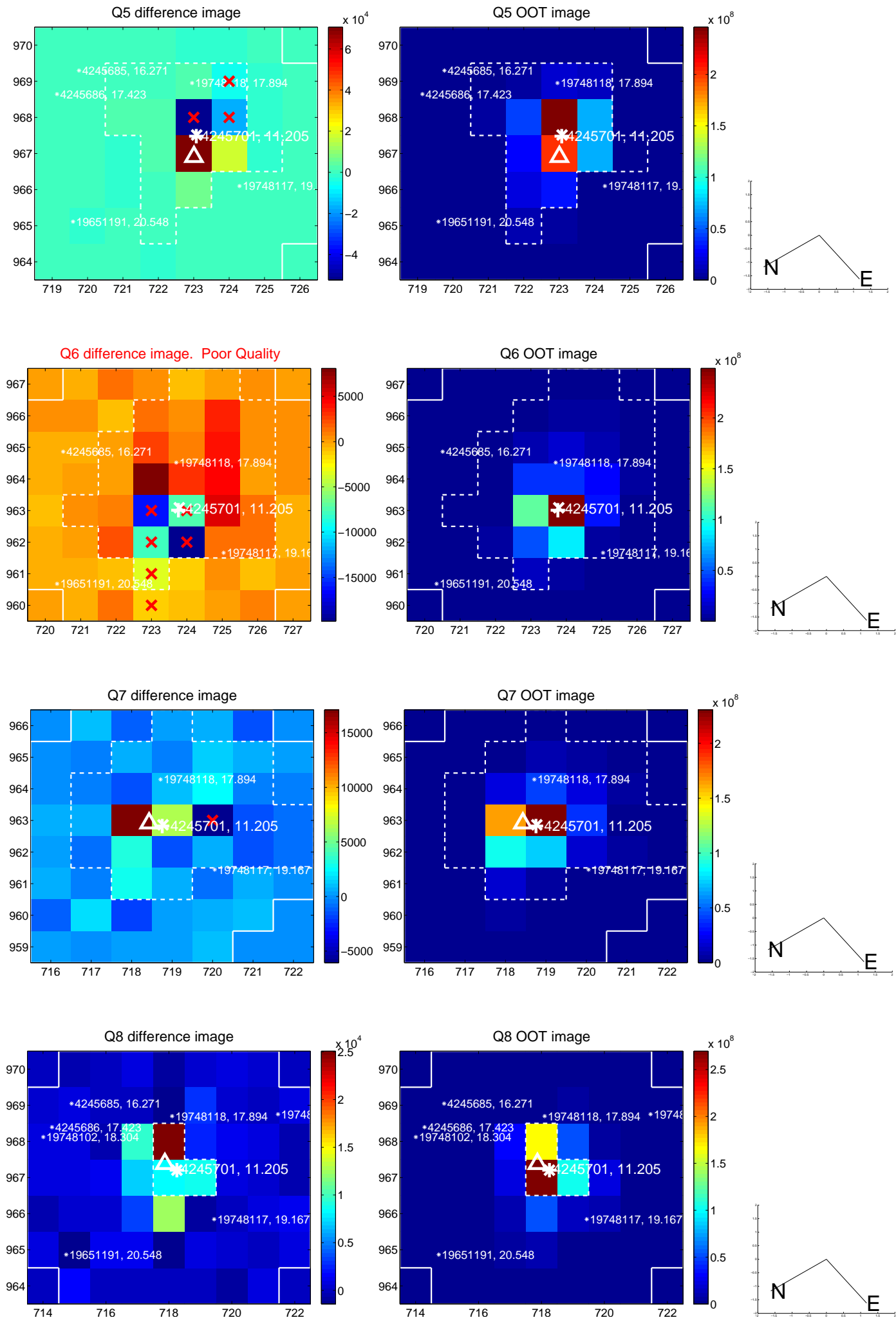
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

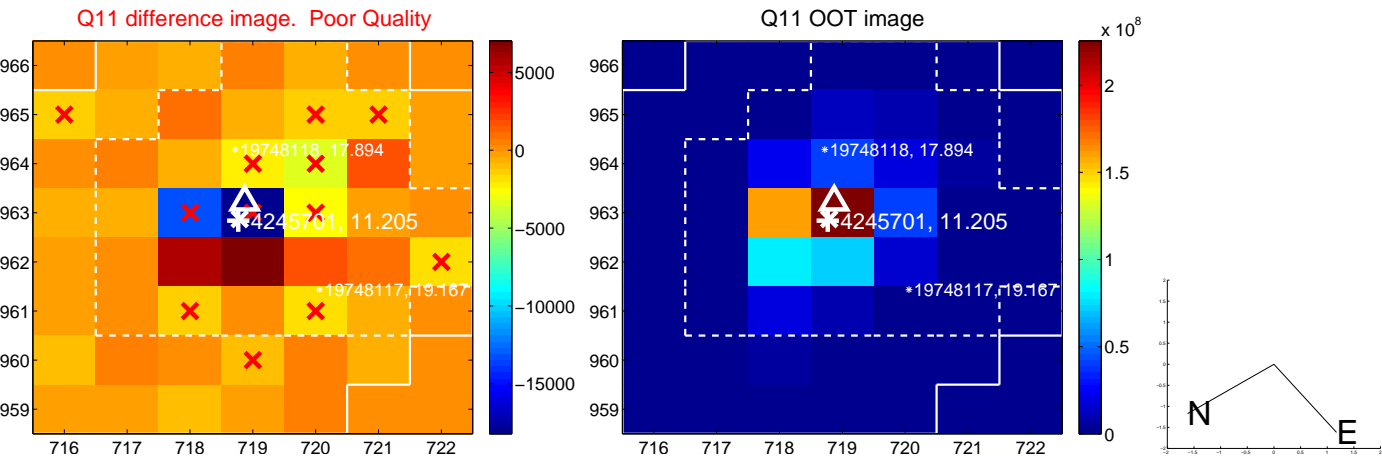
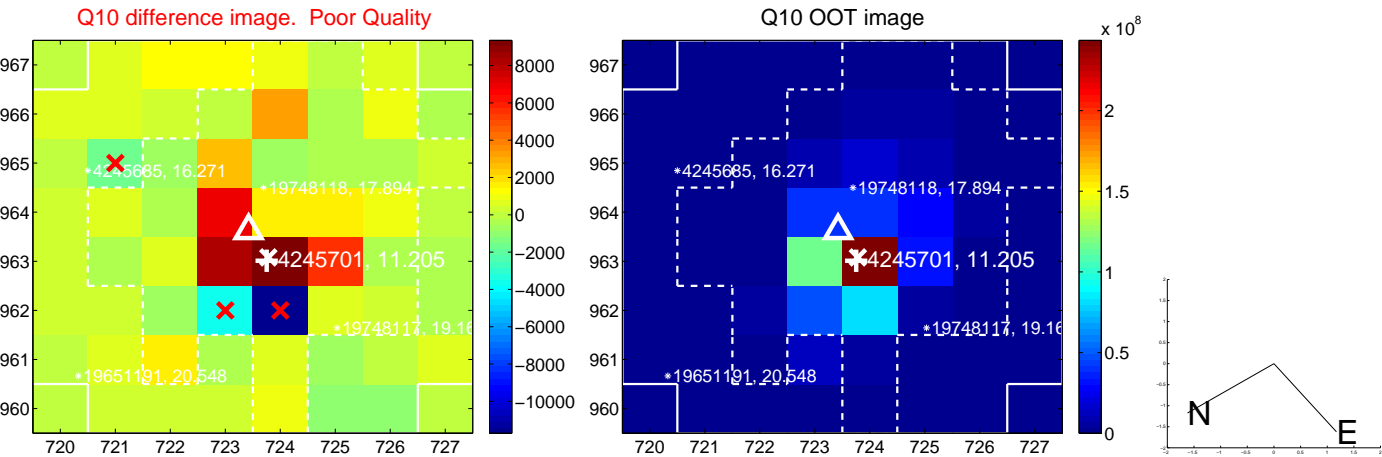
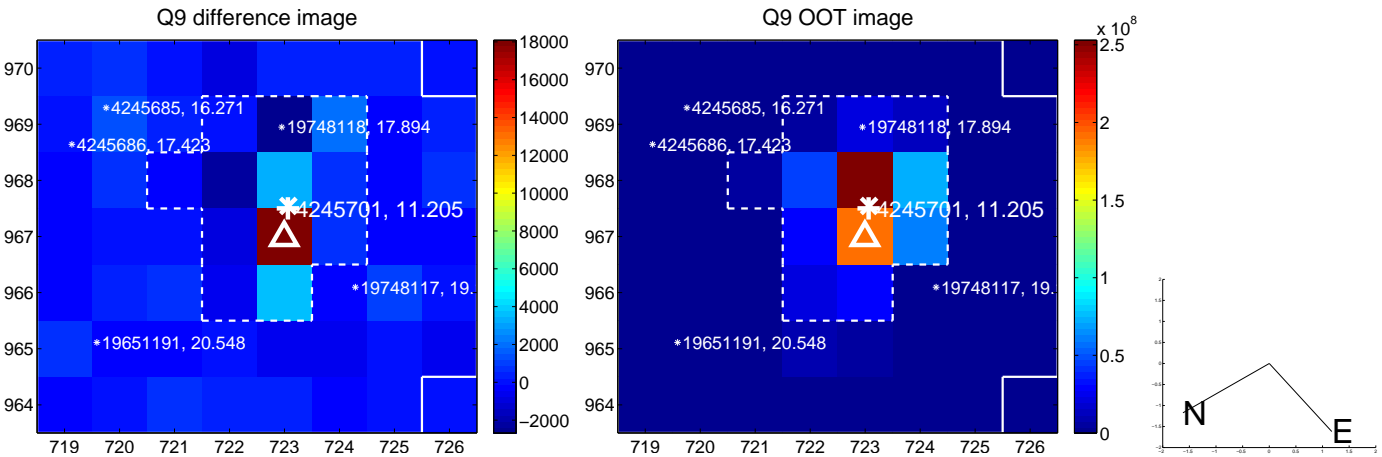




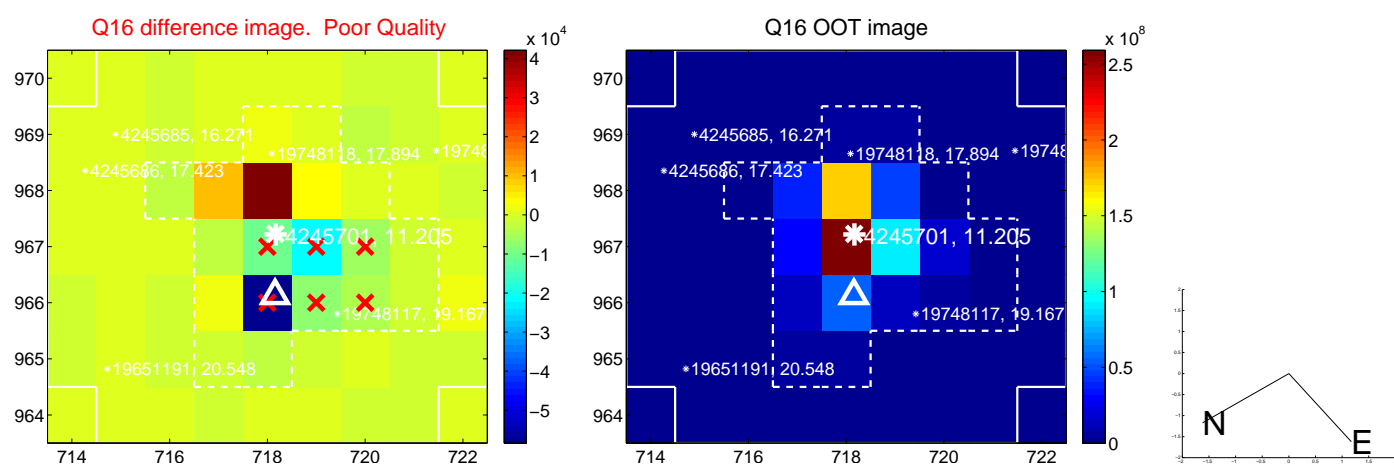
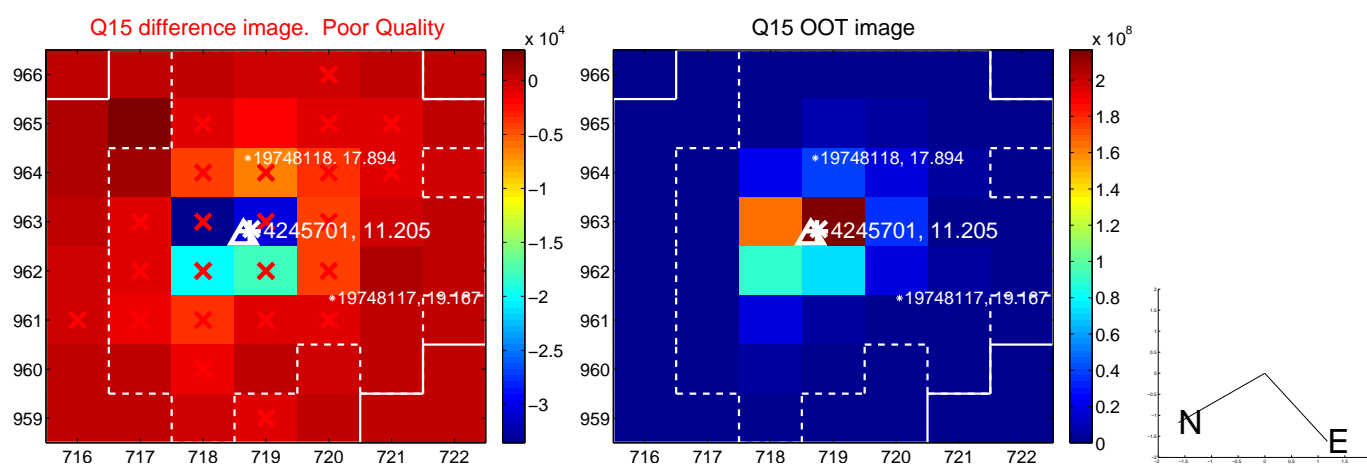
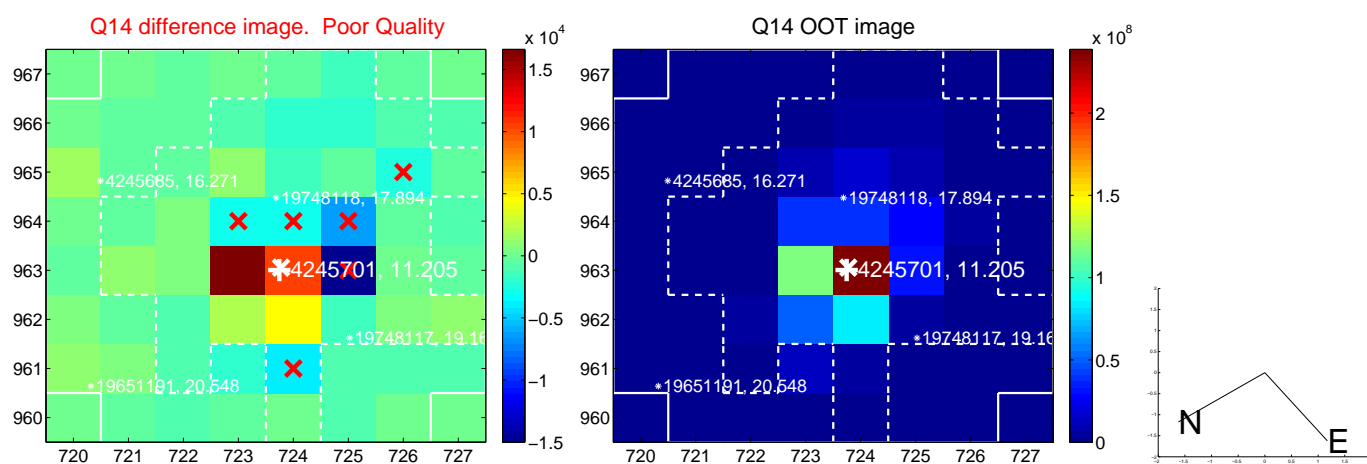
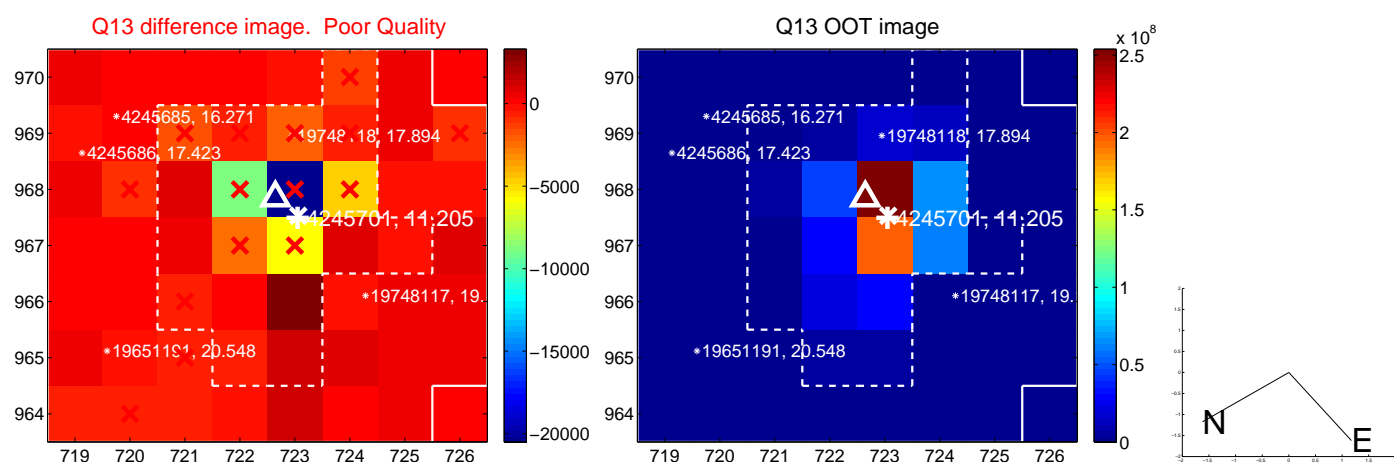
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



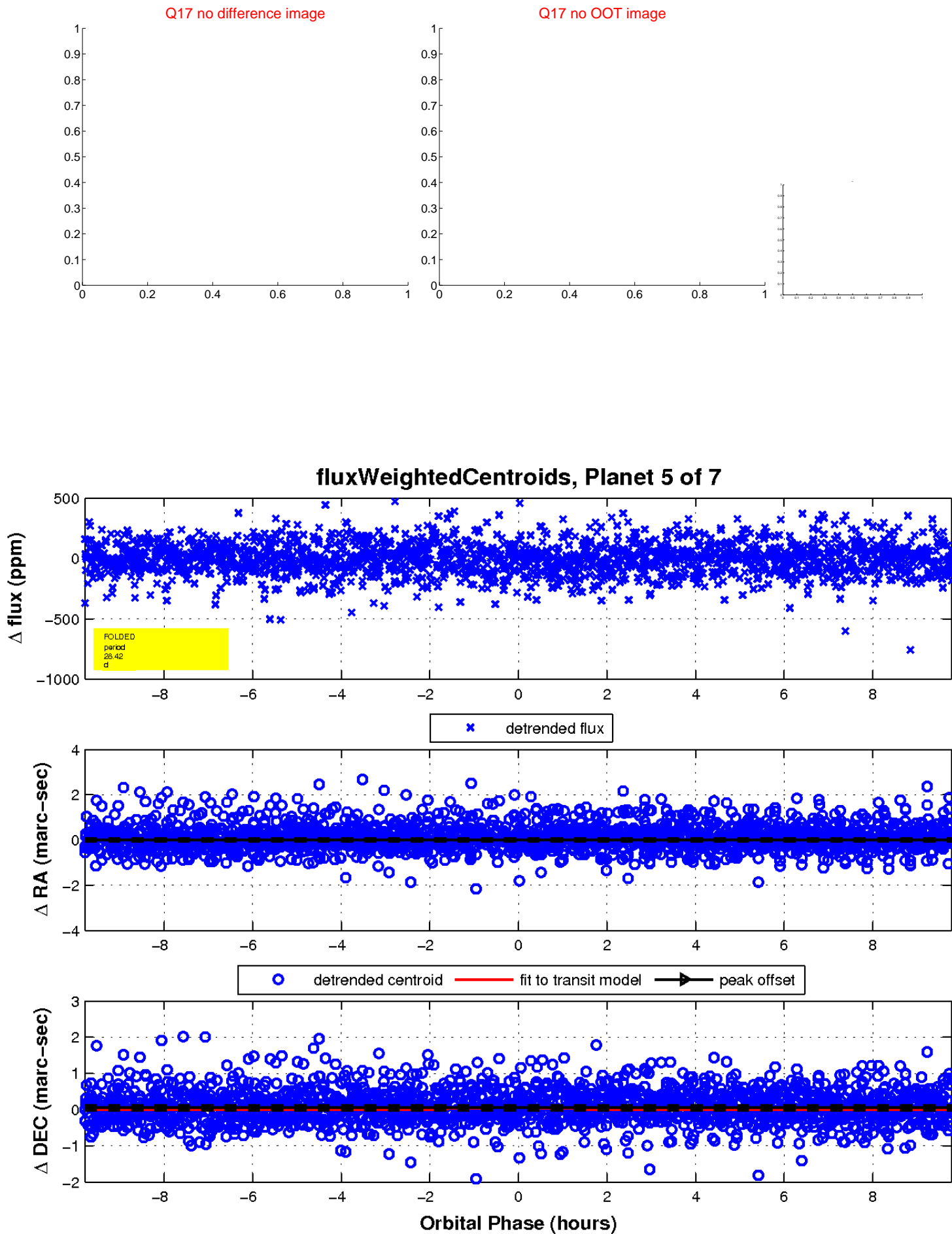
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

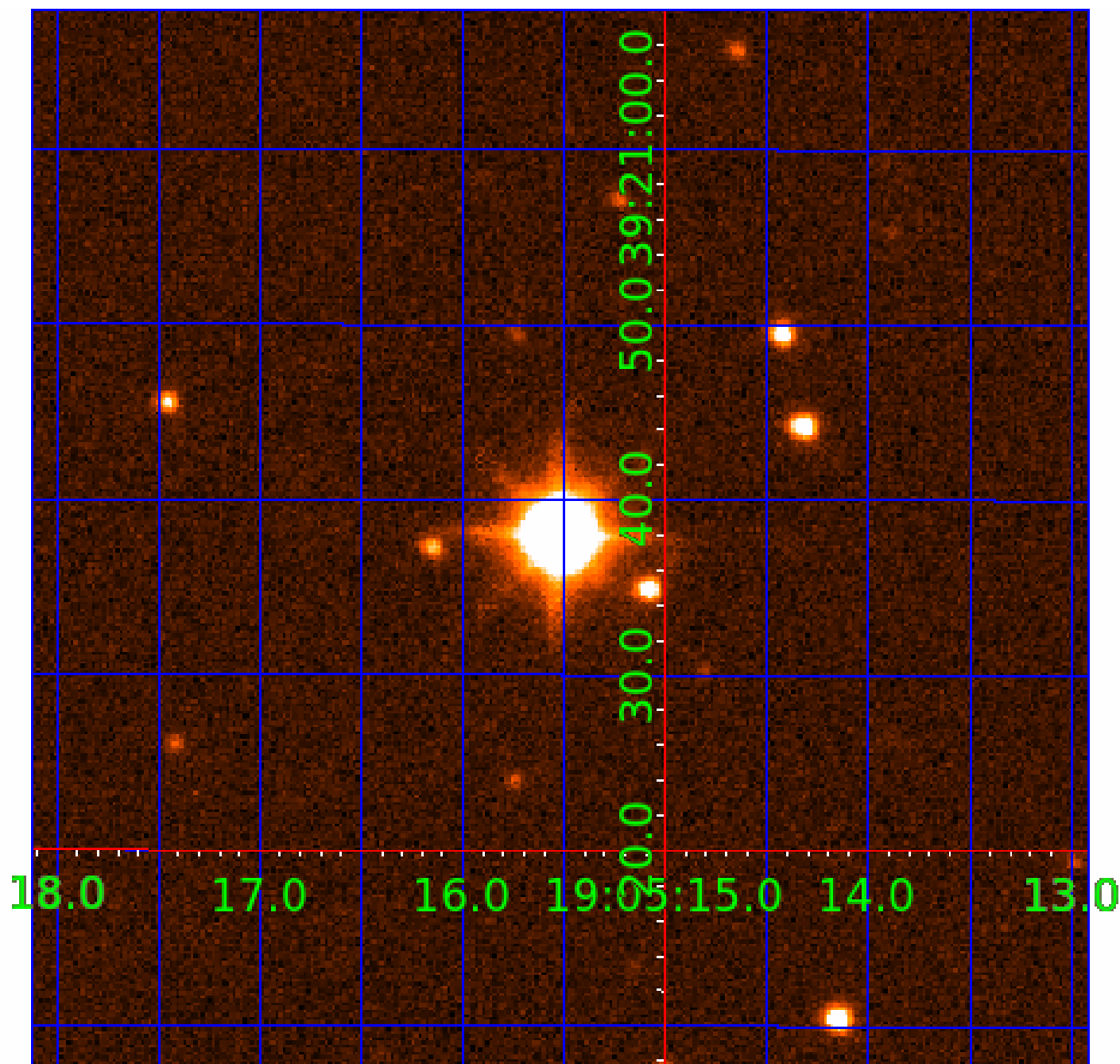


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 004245701

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 004245701-01 | OBS      | No   | 0.897843      | 132.180675   | 12.4        | 6.163            | 9.1  | 8.1  | 2.41                        | 7164            | 0.87                   | 31869.90               |
| 004245701-02 | OBS      | No   | 55.714468     | 141.964464   | 209.6       | 6.163            | 7.2  | 8.3  | 2.41                        | 7164            | 3.94                   | 129.72                 |
| 004245701-03 | OBS      | No   | 41.857491     | 147.545112   | 252.1       | 1.312            | 7.9  | 9.9  | 2.41                        | 7164            | 4.30                   | 189.94                 |
| 004245701-04 | OBS      | No   | 30.455228     | 158.307676   | 206.1       | 2.005            | 11.3 | 7.0  | 2.41                        | 7164            | 4.00                   | 290.25                 |
| 004245701-05 | OBS      | No   | 28.418026     | 132.694838   | 149.5       | 3.266            | 9.3  | 9.9  | 2.41                        | 7164            | 3.31                   | 318.31                 |
| 004245701-06 | OBS      | No   | 191.277248    | 181.918761   | 270.0       | 2.551            | 10.1 | 10.5 | 2.41                        | 7164            | 4.68                   | 25.05                  |
| 004245701-07 | OBS      | No   | 22.543458     | 150.815074   | 101.3       | 3.423            | 10.6 | 6.9  | 2.41                        | 7164            | 2.75                   | 433.46                 |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 004245701-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | LPP_DV—CENT_SATURATED   |
| 004245701-02 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED                  |
| 004245701-03 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—CENT_SATURATED   |
| 004245701-04 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED  |
| 004245701-05 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED  |
| 004245701-06 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED |
| 004245701-07 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—CENT_SATURATED  |

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

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

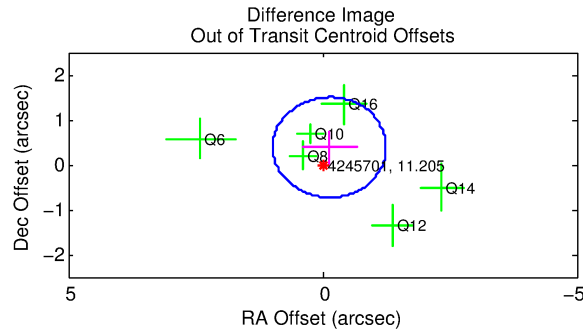
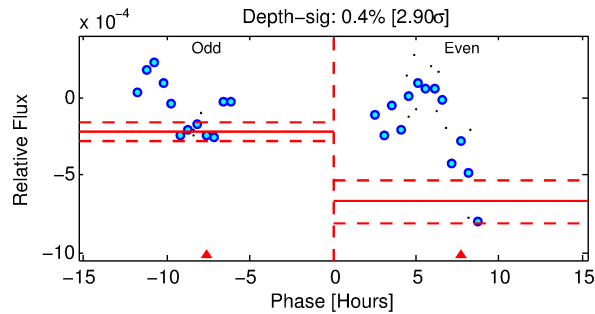
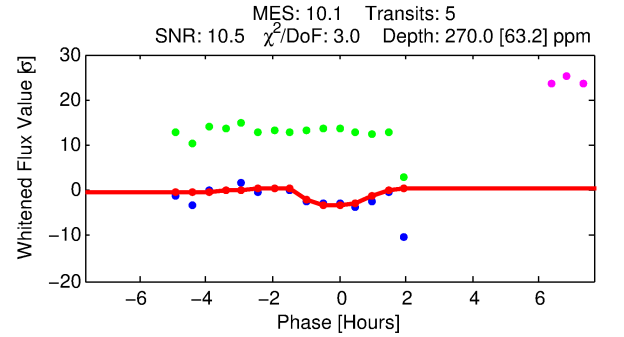
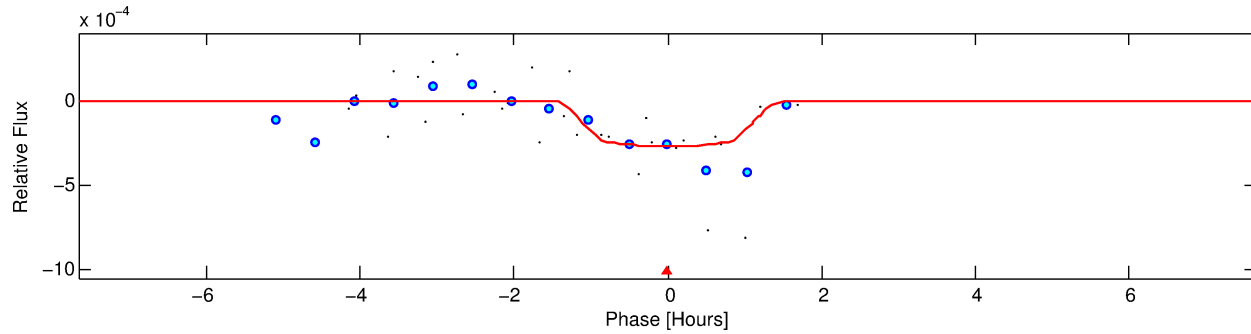
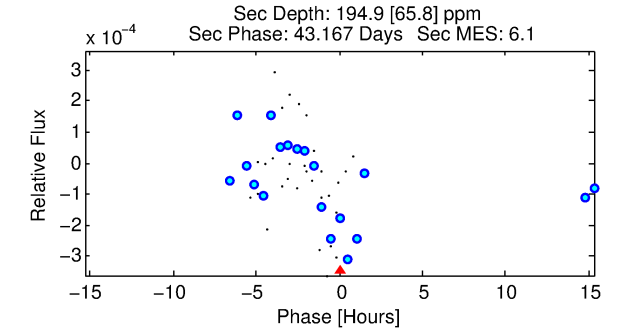
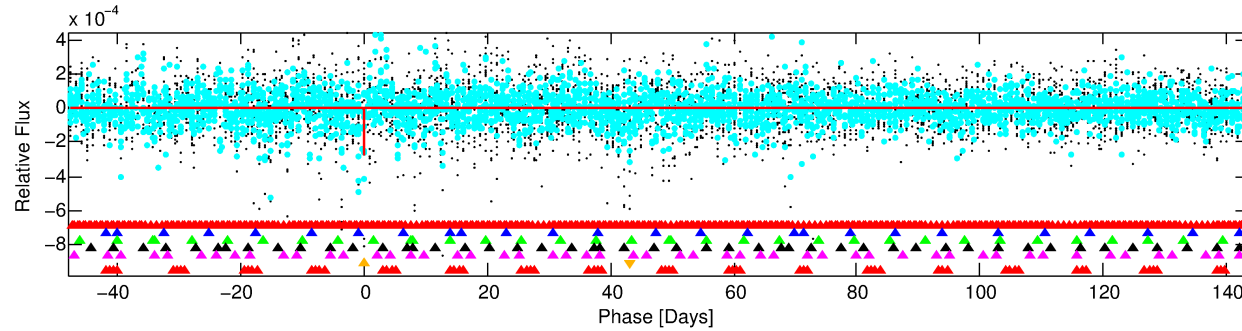
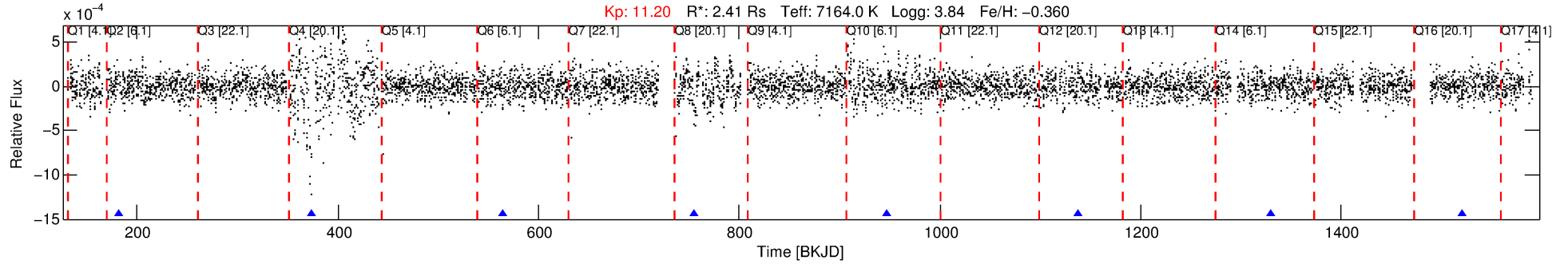
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004245701-06

No Significant Match Found

# DV One-Page Summary

KIC: 4245701 Candidate: 6 of 7 Period: 191.277 d



## DV Fit Results:

Period = 191.27725 [0.00795] d  
Epoch = 181.9188 [0.0242] BKJD  
Rp/R\* = 0.0178 [0.0164]  
a/R\* = 256.24 [1404.91]  
b = 0.91 [0.99]  
Seff = 25.05 [17.75]  
Teq = 570 [101] K  
Rp = 4.68 [4.80] Re  
a = 0.7401 [0.3209] AU  
Ag = 2681.83 [5365.78] [0.50 $\sigma$ ]  
Teffp = 6347 [2986] K [1.93 $\sigma$ ]

## DV Diagnostic Results:

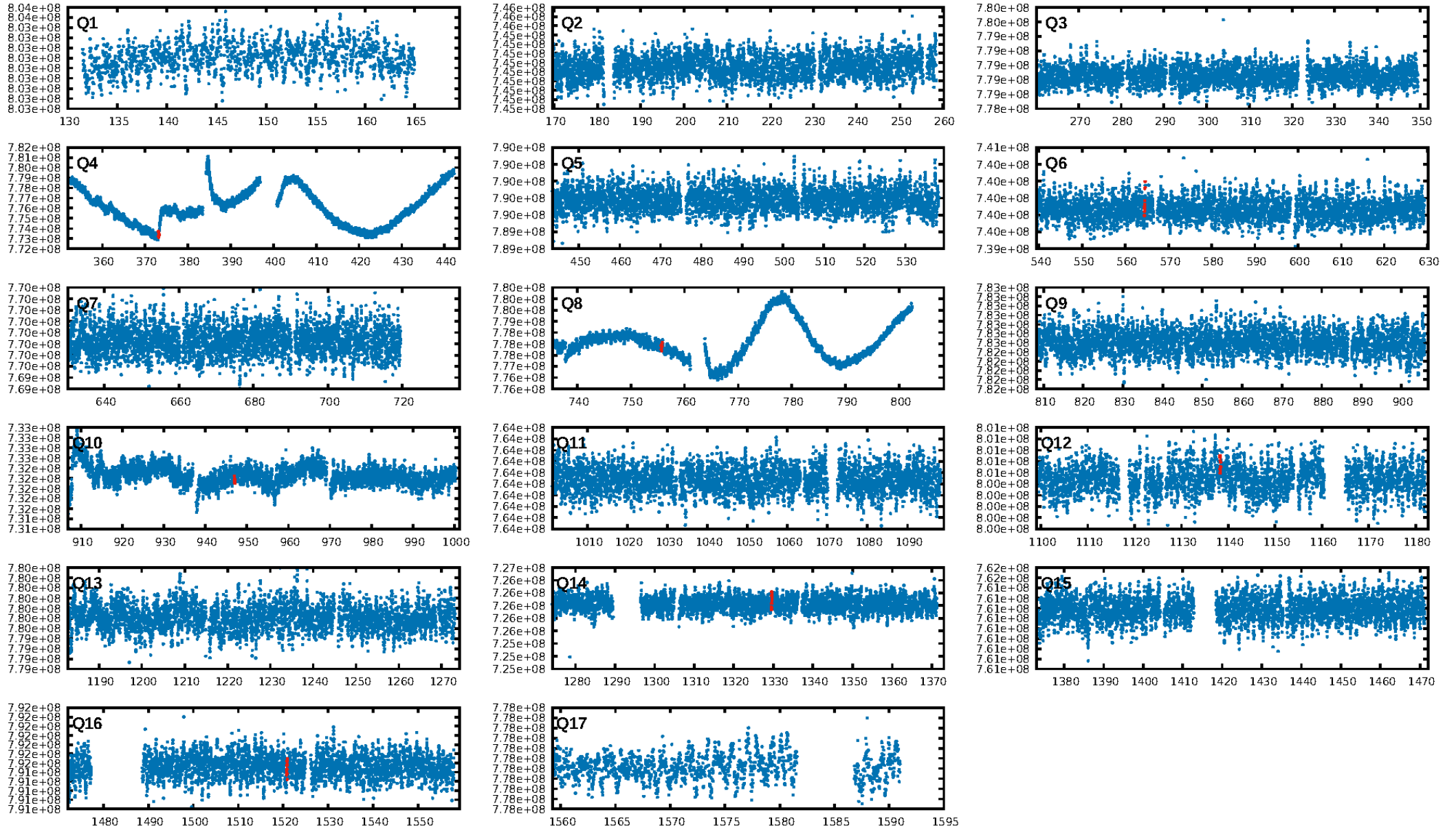
ShortPeriod-sig: 100.0% [487.78 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.1%  
ModelChiSquareGof-sig: 72.3%  
Bootstrap-pfa: 3.65e-09  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: -1.378  
Centroid-sig: 7.8%  
Centroid-so: 0.708 arcsec [1.30 $\sigma$ ]  
OotOffset-rm: 0.409 arcsec [1.10 $\sigma$ ]  
OotOffset-st: 3/0/3/0 [6]  
KicOffset-rm: 0.532 arcsec [1.48 $\sigma$ ]  
KicOffset-st: 3/0/3/0 [6]  
DiffImageQuality-fgm: 0.33 [2/6]  
DiffImageOverlap-fno: 0.33 [2/6]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 08:20:25 Z

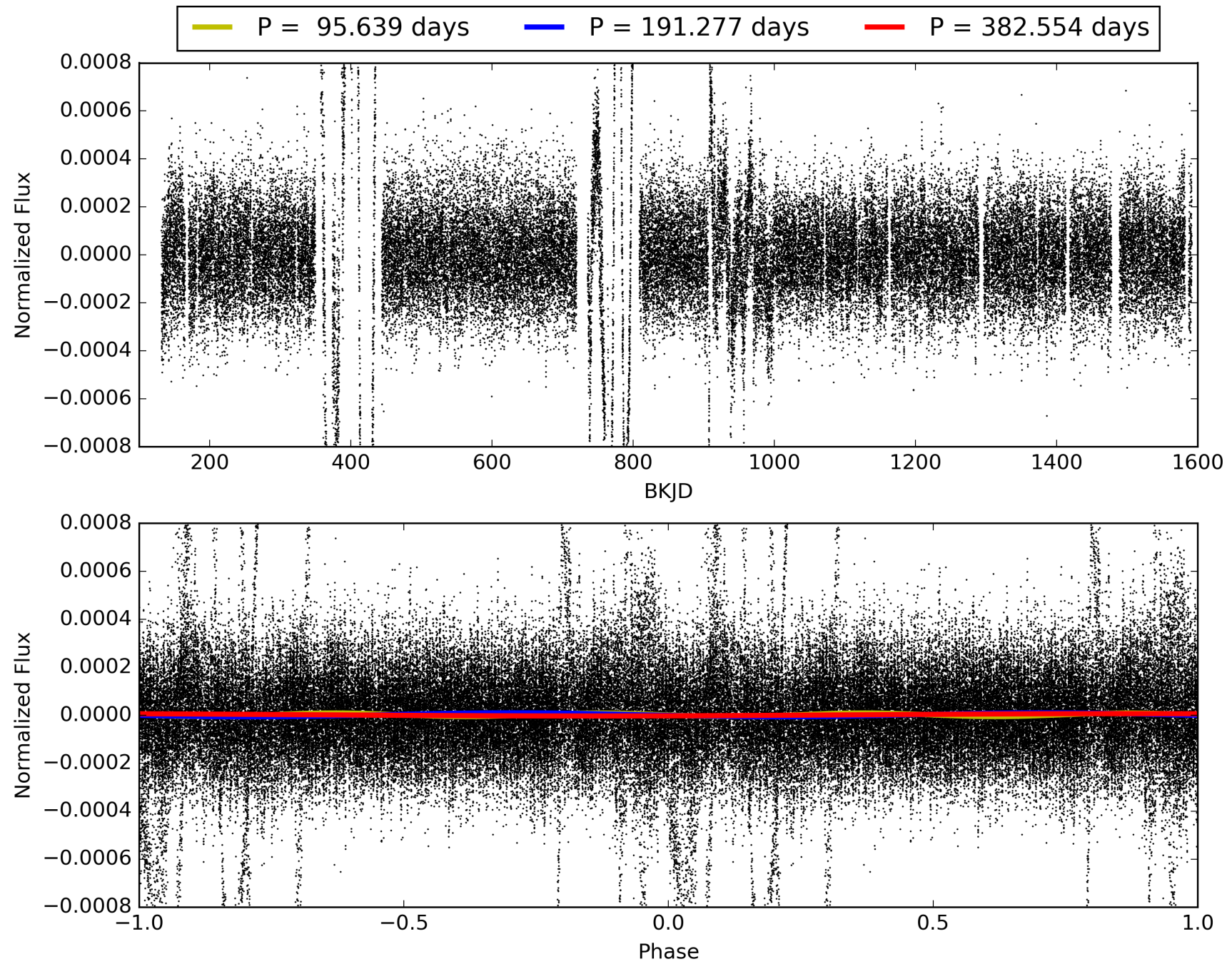
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 004245701-06, PDC Light Curves

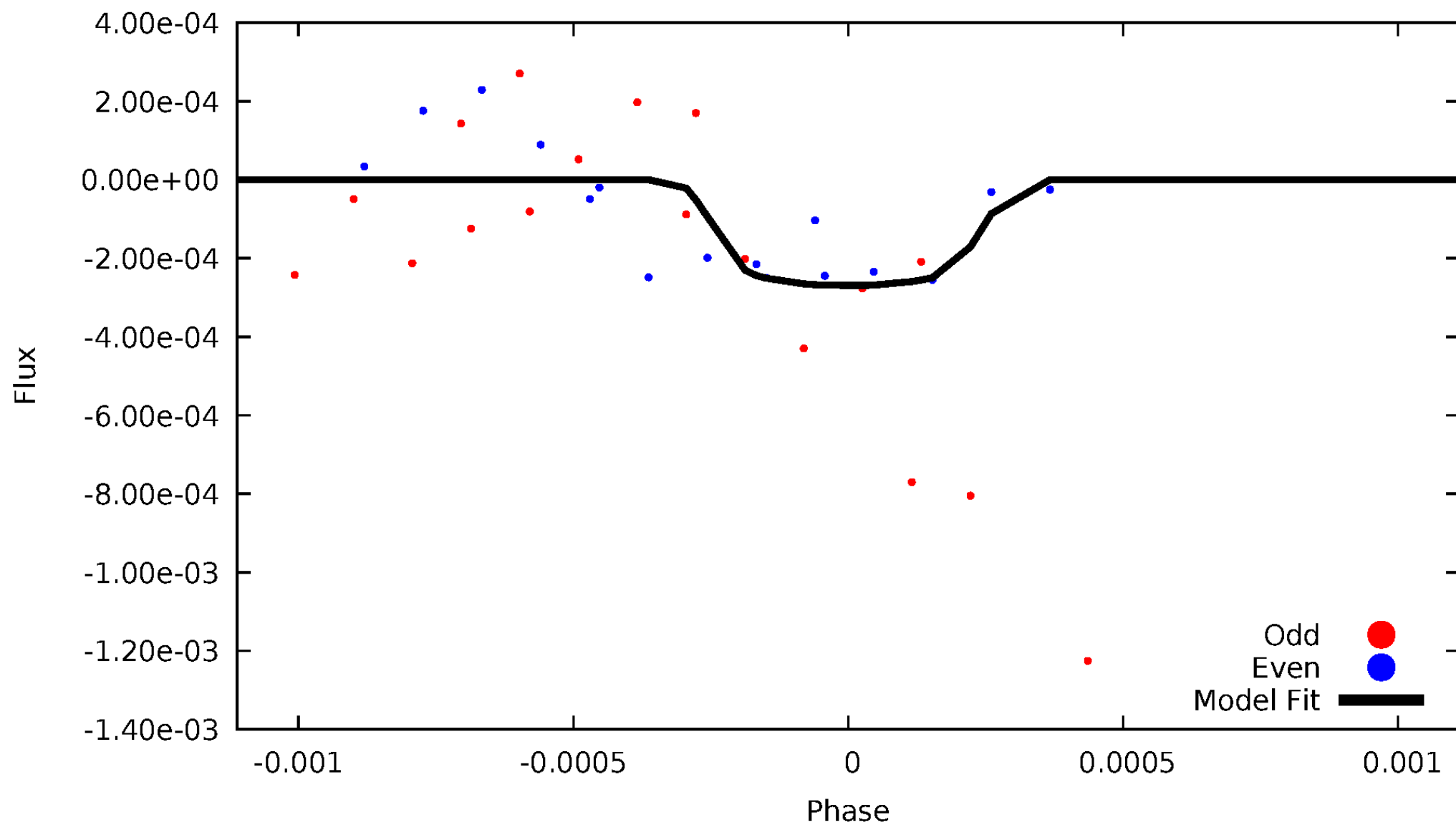


TCE 004245701-06



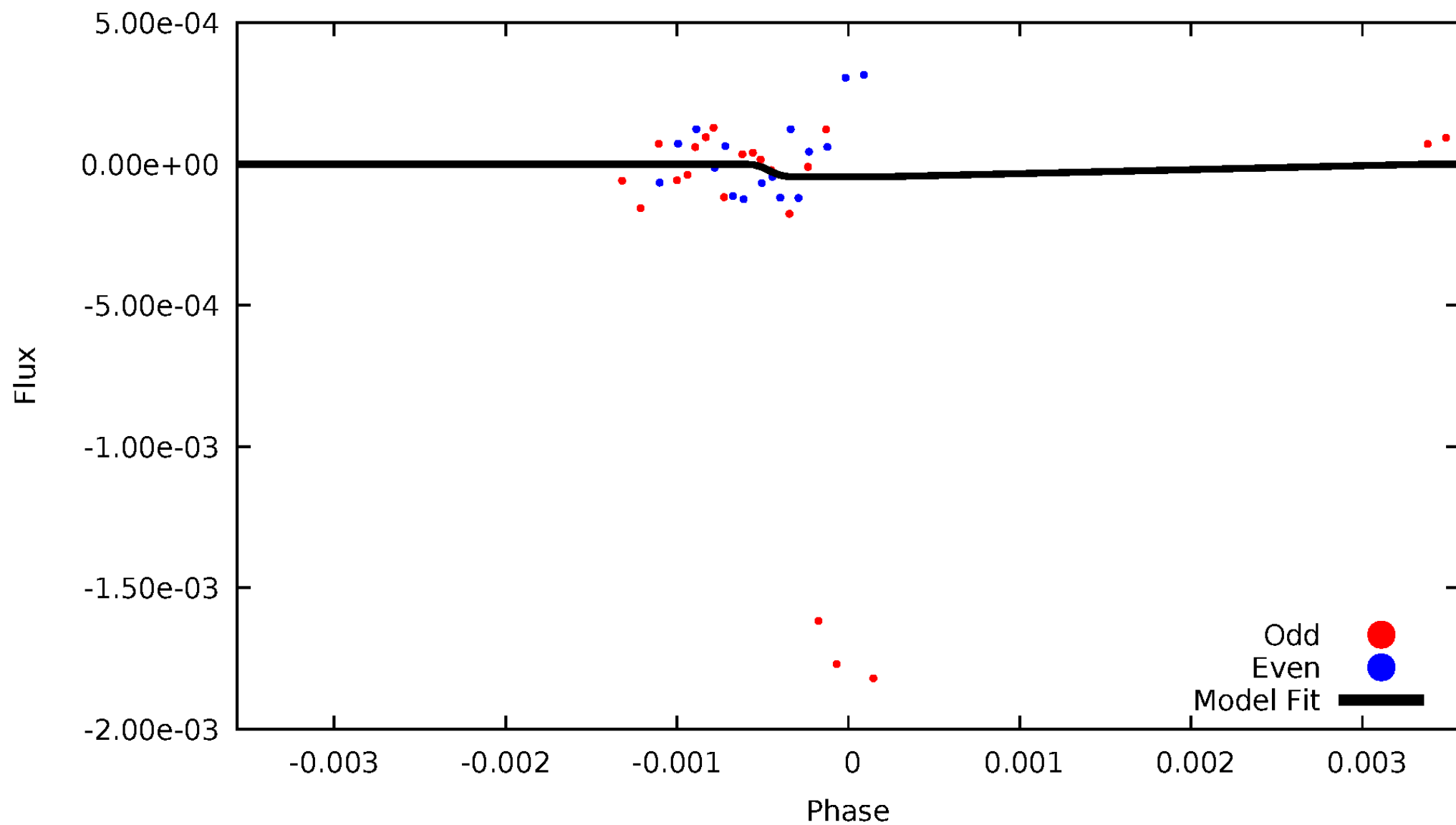
# DV Odd/Even

TCE 004245701-06



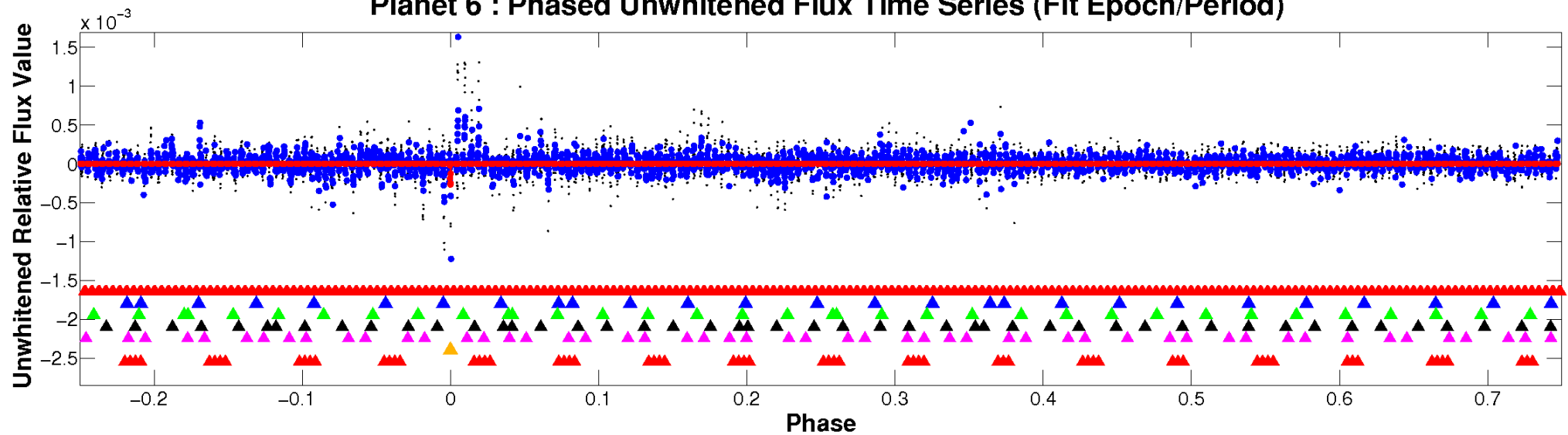
# ALT Odd/Even

TCE 004245701-06

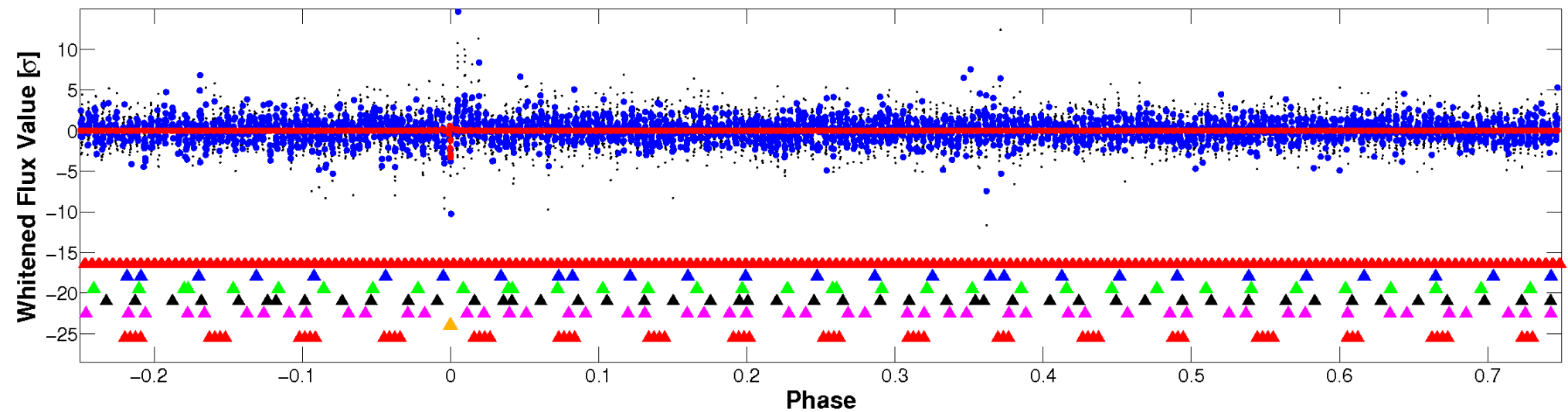


# Non-Whitened Vs. Whitened Light Curve

## Planet 6 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

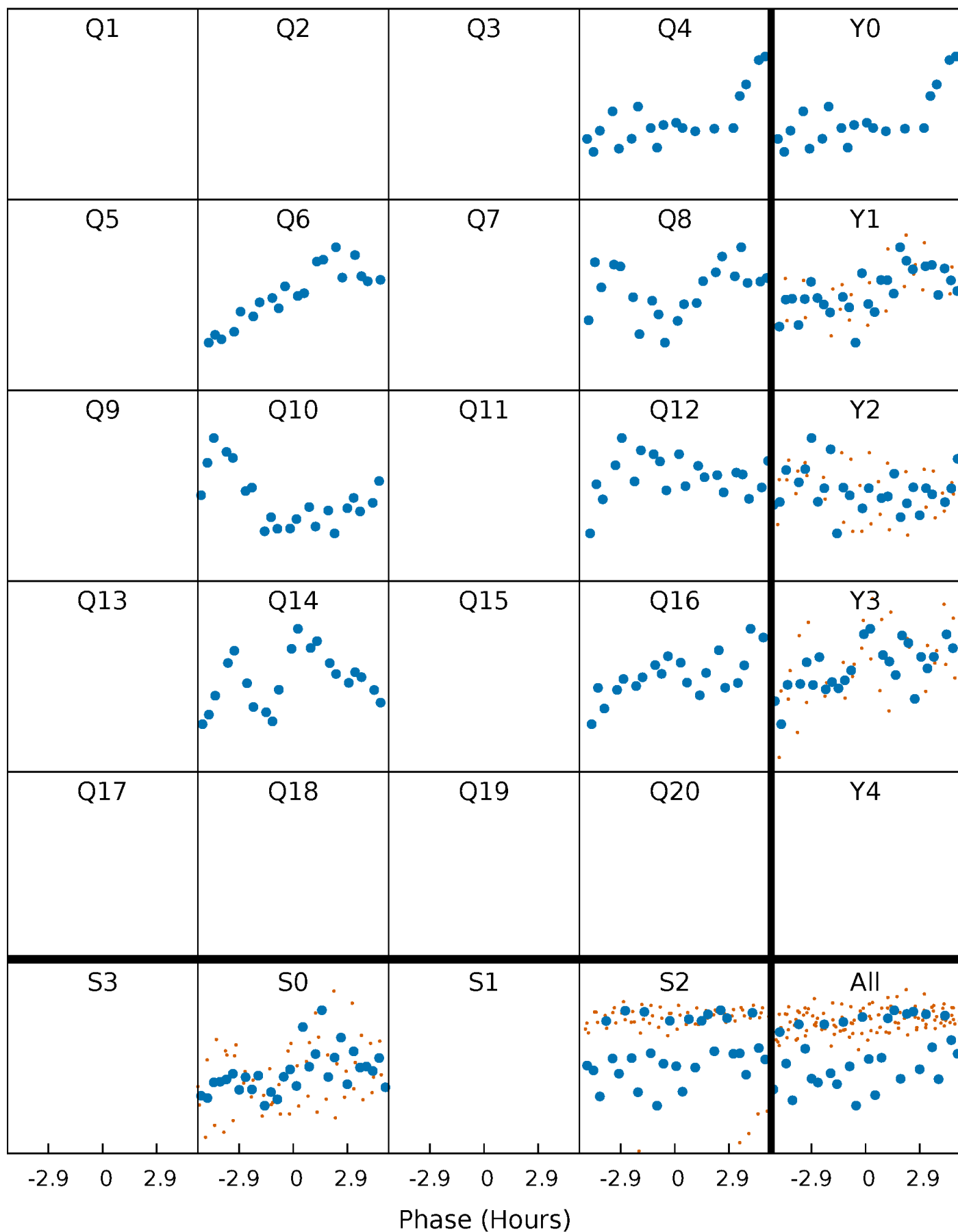


## Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)



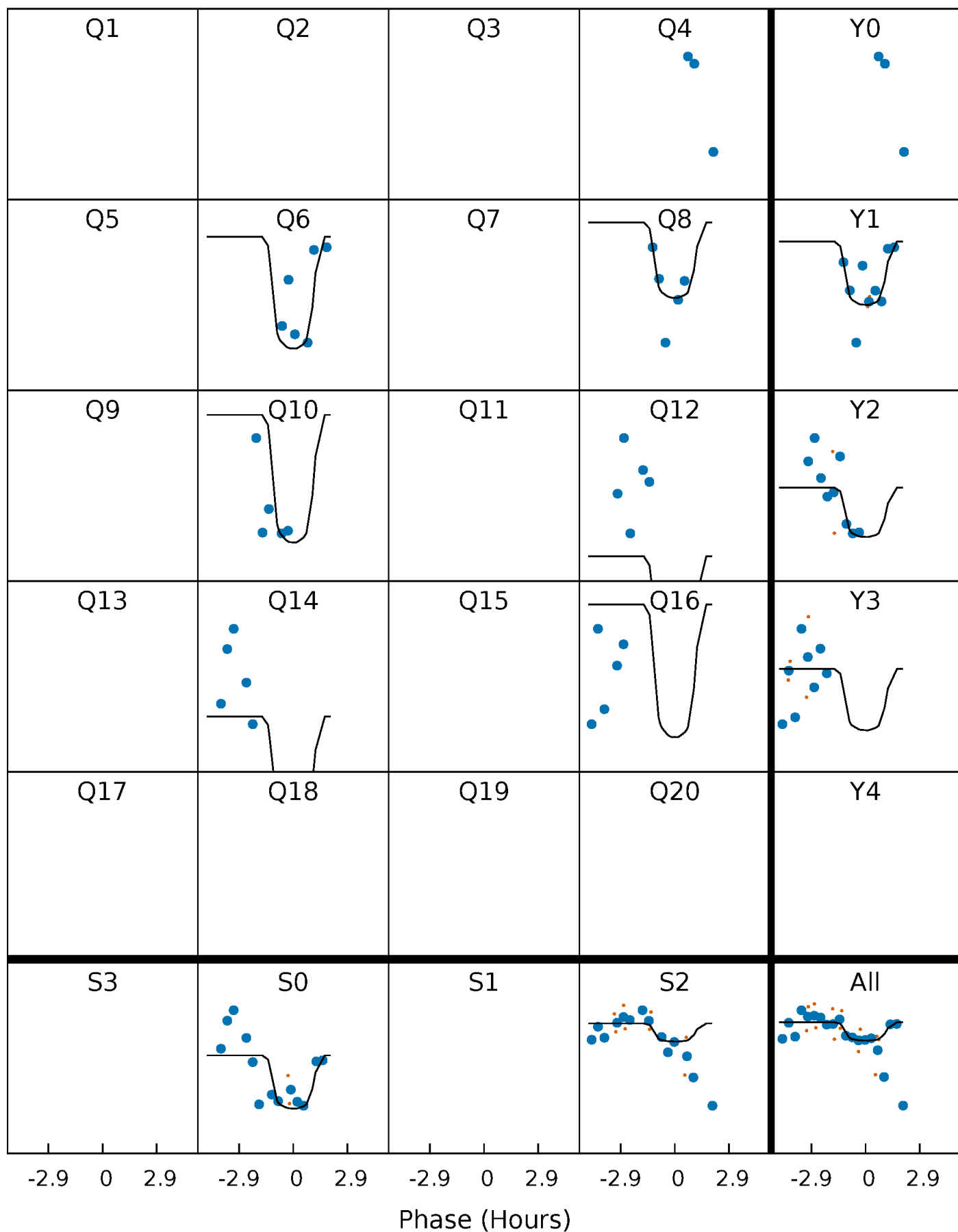
# PDC Quarter-Phased Transit Curves

TCE 004245701-06 P=191.277248 Days  $T_0=181.918761$  (BKJD)



# DV Quarter-Phased Transit Curves

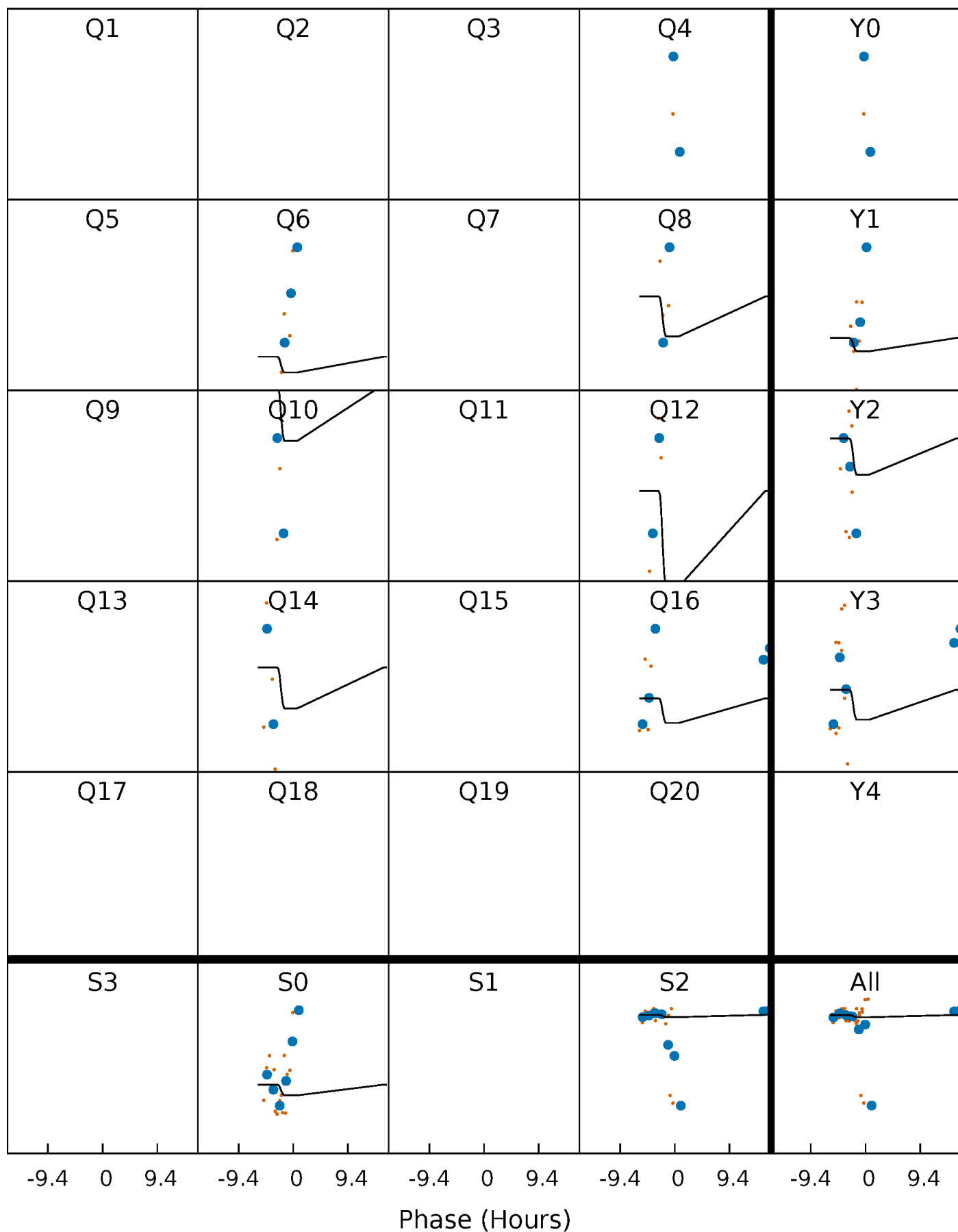
TCE 004245701-06 P=191.277248 Days  $T_0=181.918761$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

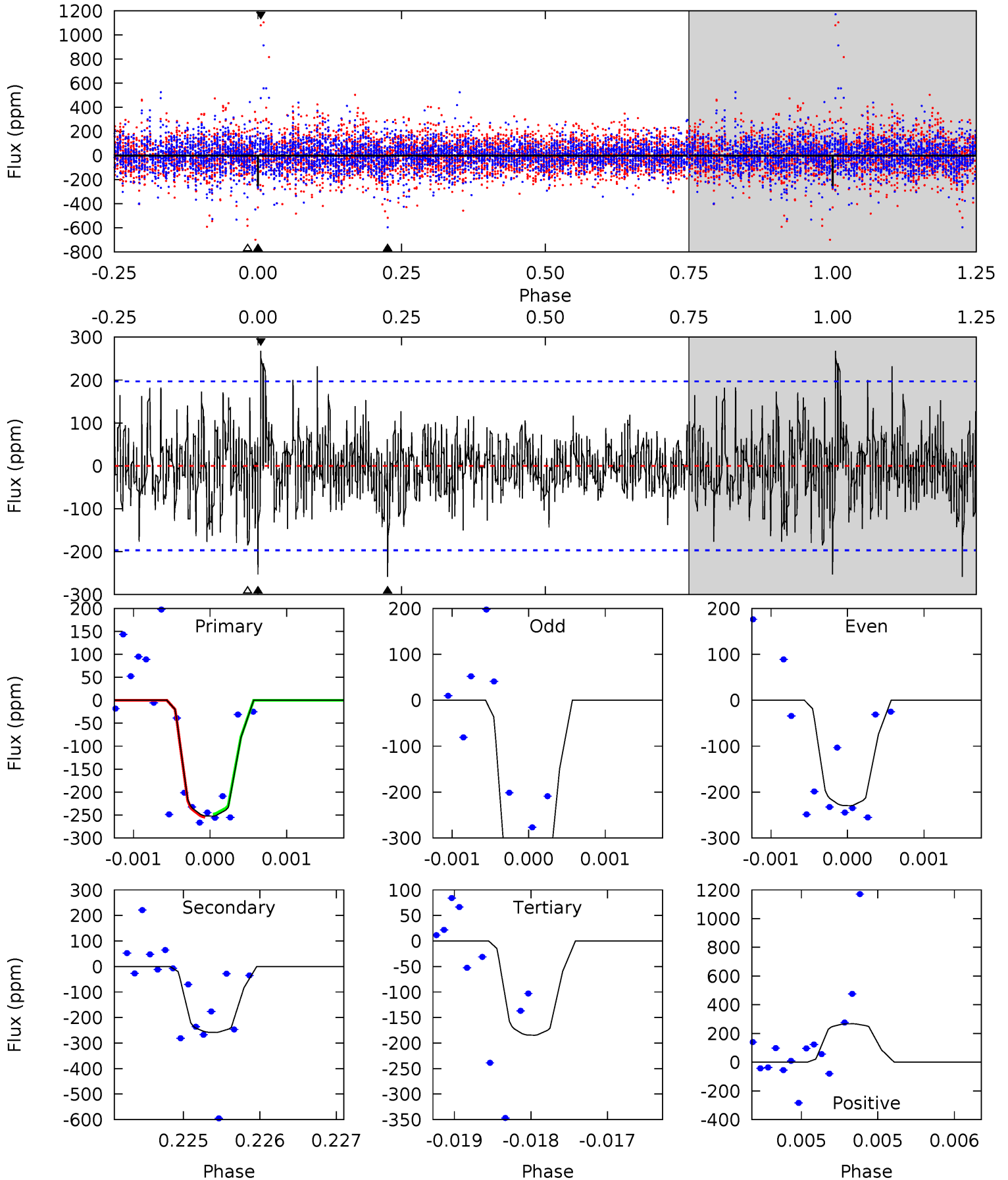
TCE 004245701-06 P=191.274613 Days  $T_0=181.976749$  (BKJD)



# DV Model-Shift Uniqueness Test

004245701-06, P = 191.277248 Days, E = 181.918761 Days

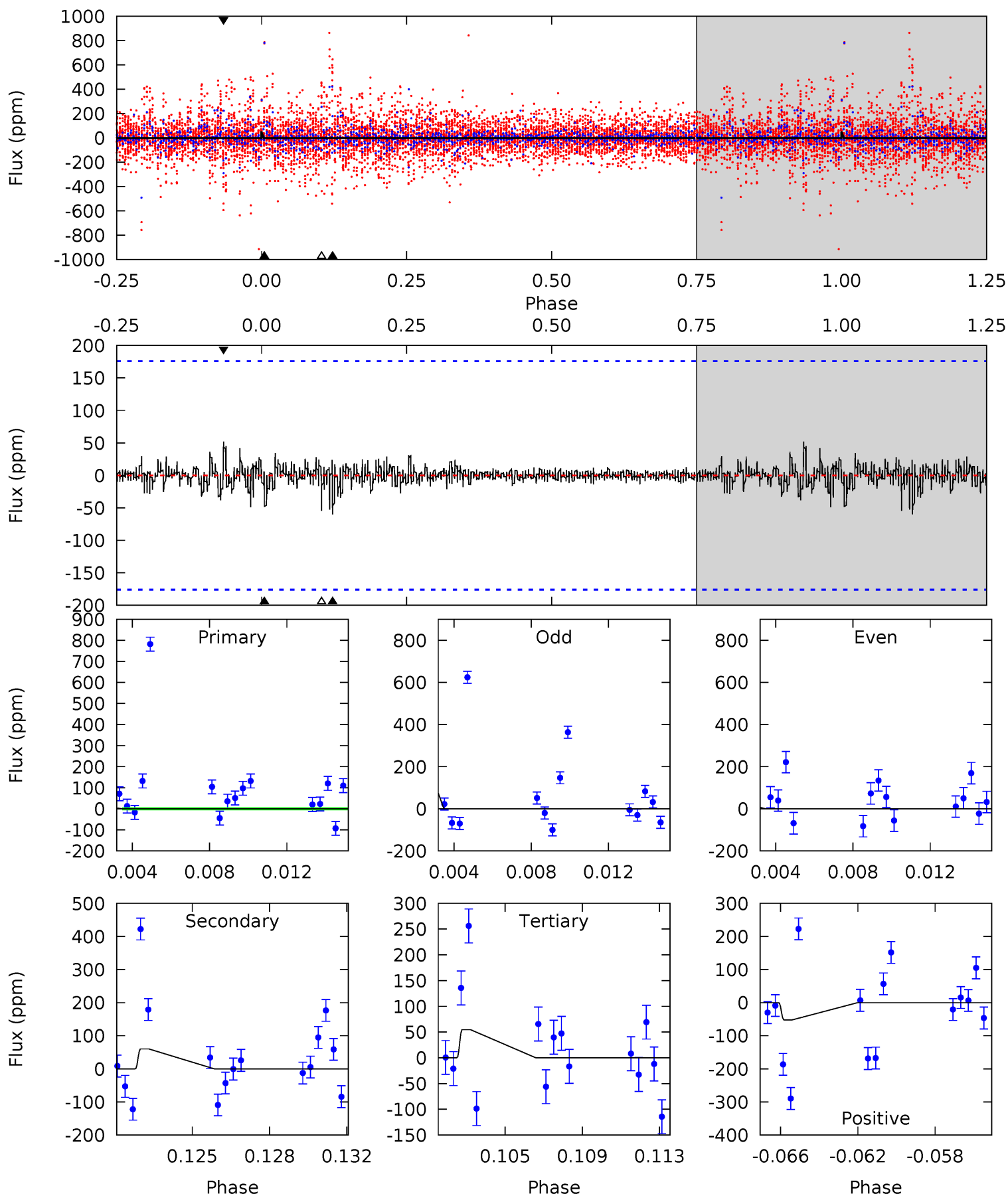
| Pri  | Sec  | Ter  | Pos  | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 7.10 | 7.26 | 5.19 | 7.52 | 5.53            | 3.41            | 1.54             | 1.91    | -0.43   | 2.07    | -0.26   | 3.22    | 1.50 | 0.51  | 0.09 |



# Alt Model-Shift Uniqueness Test

004245701-06, P = 191.274613 Days, E = 181.976749 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 |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|-----|
| 1.42 | 1.77 | 1.61 | 1.53 | 5.20            | 2.89            | 0.28             | -0.19   | -0.11   | 0.16    | 0.24    | 7.61    | 5.62 | 0.46  | 0   |



### Stellar Parameters For KIC 004245701

|        | $T_{\text{eff}} (K)$ | $\log(g)$                 | $[\text{Fe}/\text{H}]$     | $R (R_{\odot})$           | $M (M_{\odot})$           | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $7164^{+176}_{-252}$ | $3.843^{+0.408}_{-0.102}$ | $-0.360^{+0.300}_{-0.300}$ | $2.411^{+0.465}_{-1.085}$ | $1.478^{+0.206}_{-0.308}$ | $0.148^{+0.471}_{-0.056}$                 |
|        | +2%/-4%              | +11%/-3%                  | +83%/-83%                  | +19%/-45%                 | +14%/-21%                 | +317%/-38%                                |
| 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 004245701-06 / KOI

| Detrend | Depth (ppm)   | $R_p (R_{\oplus})$     | $T_{max} (K)$     | $T_{obs} (K)$          | $A_{obs}$               |
|---------|---------------|------------------------|-------------------|------------------------|-------------------------|
| DV      | $-258 \pm 36$ | $4.68^{+3.97}_{-3.00}$ | $776^{+55}_{-85}$ | $6326^{+6047}_{-1435}$ | $3472^{+23013}_{-2472}$ |
| Alt.    | $-60 \pm 34$  | $3.41^{+3.61}_{-2.33}$ | $777^{+52}_{-89}$ | $4957^{+4648}_{-1197}$ | $1230^{+12772}_{-1002}$ |

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

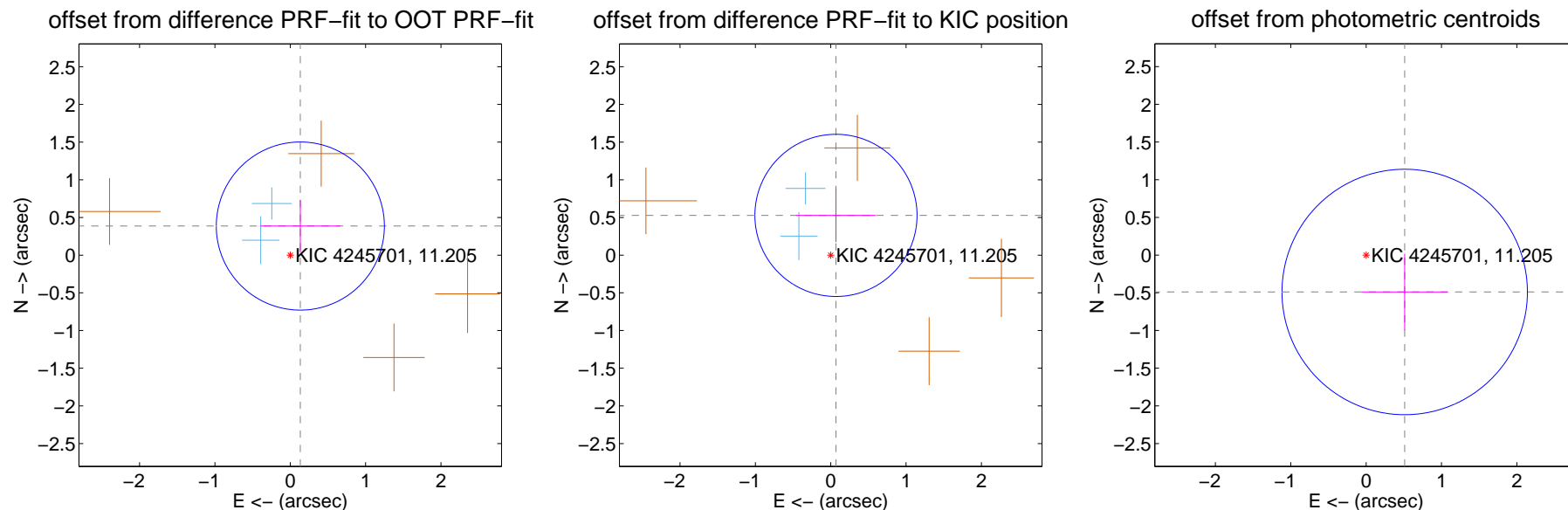
## DV Centroid Data

Supplemental centroid analysis for 004245701-06. **Kepler magnitude: 11.21.** Transit SNR 10.47

**There are 2 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          | $0.409 \pm 0.372$  | 1.10                | $-0.134 \pm 0.531$ | $0.386 \pm 0.348$ |
| PRF-fit source offset from KIC position | $0.532 \pm 0.359$  | 1.48                | $-0.070 \pm 0.529$ | $0.527 \pm 0.355$ |
| photometric centroid source offset      | $0.71 \pm 0.54$    | 1.30                | $-0.51 \pm 0.57$   | $-0.49 \pm 0.51$  |

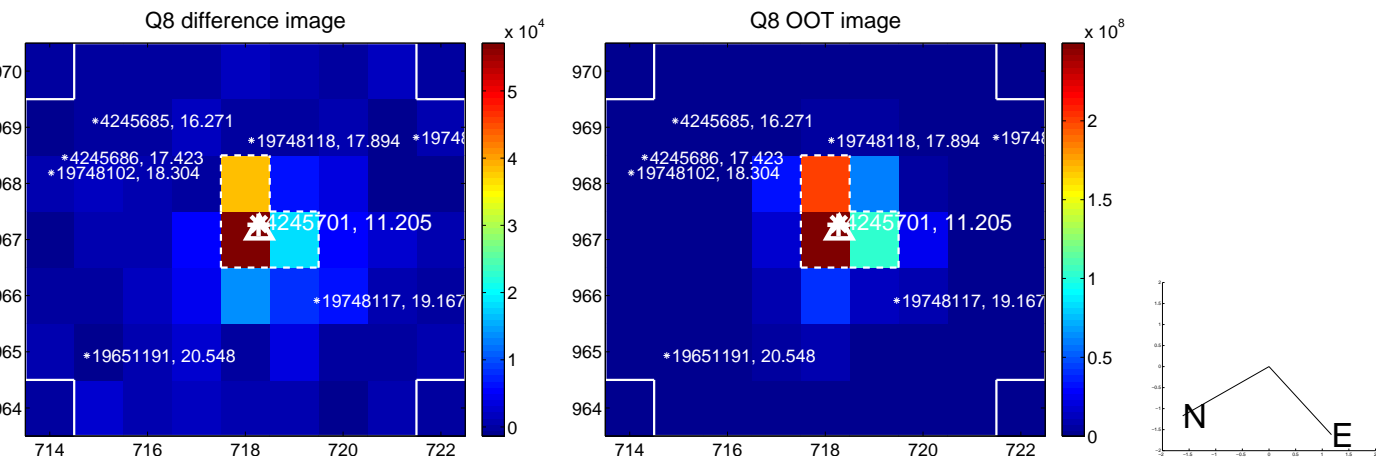
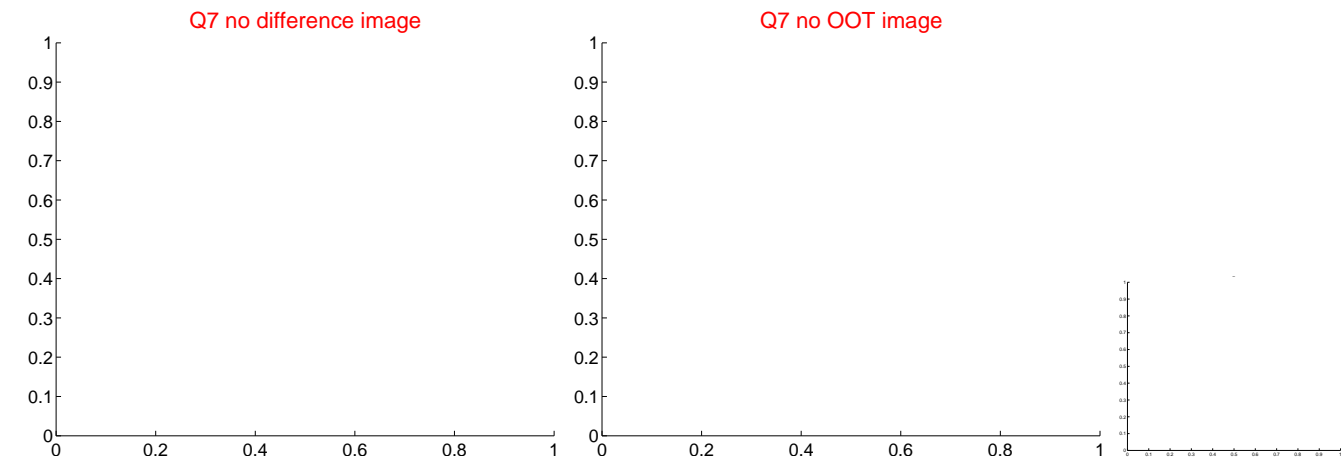
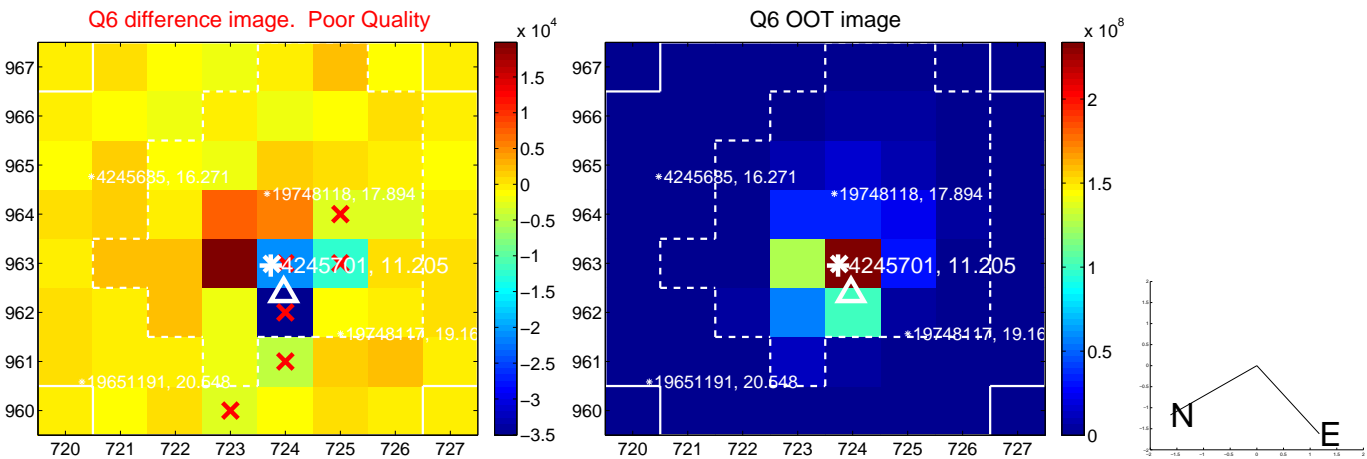
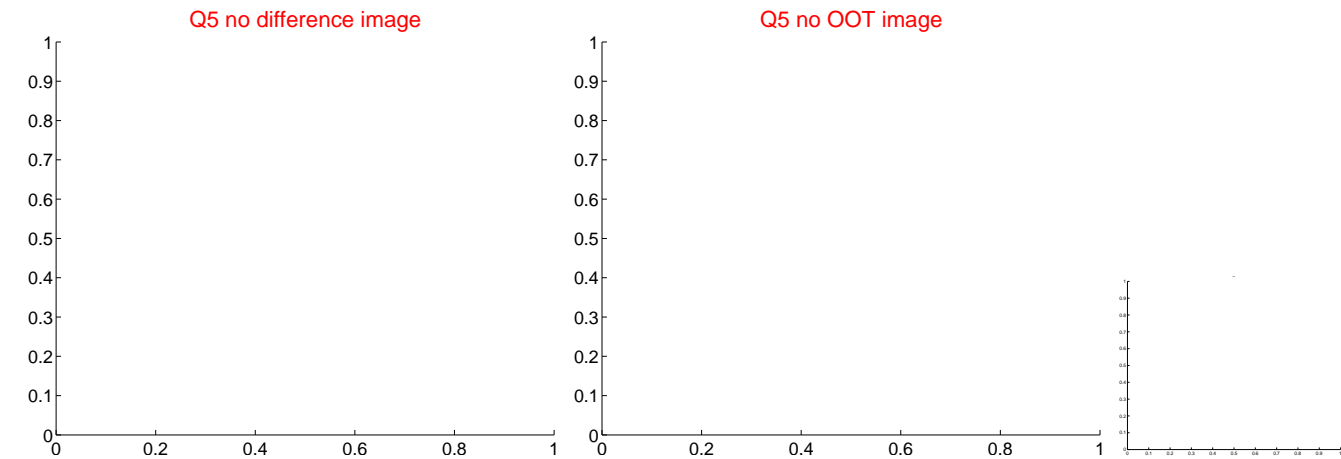


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

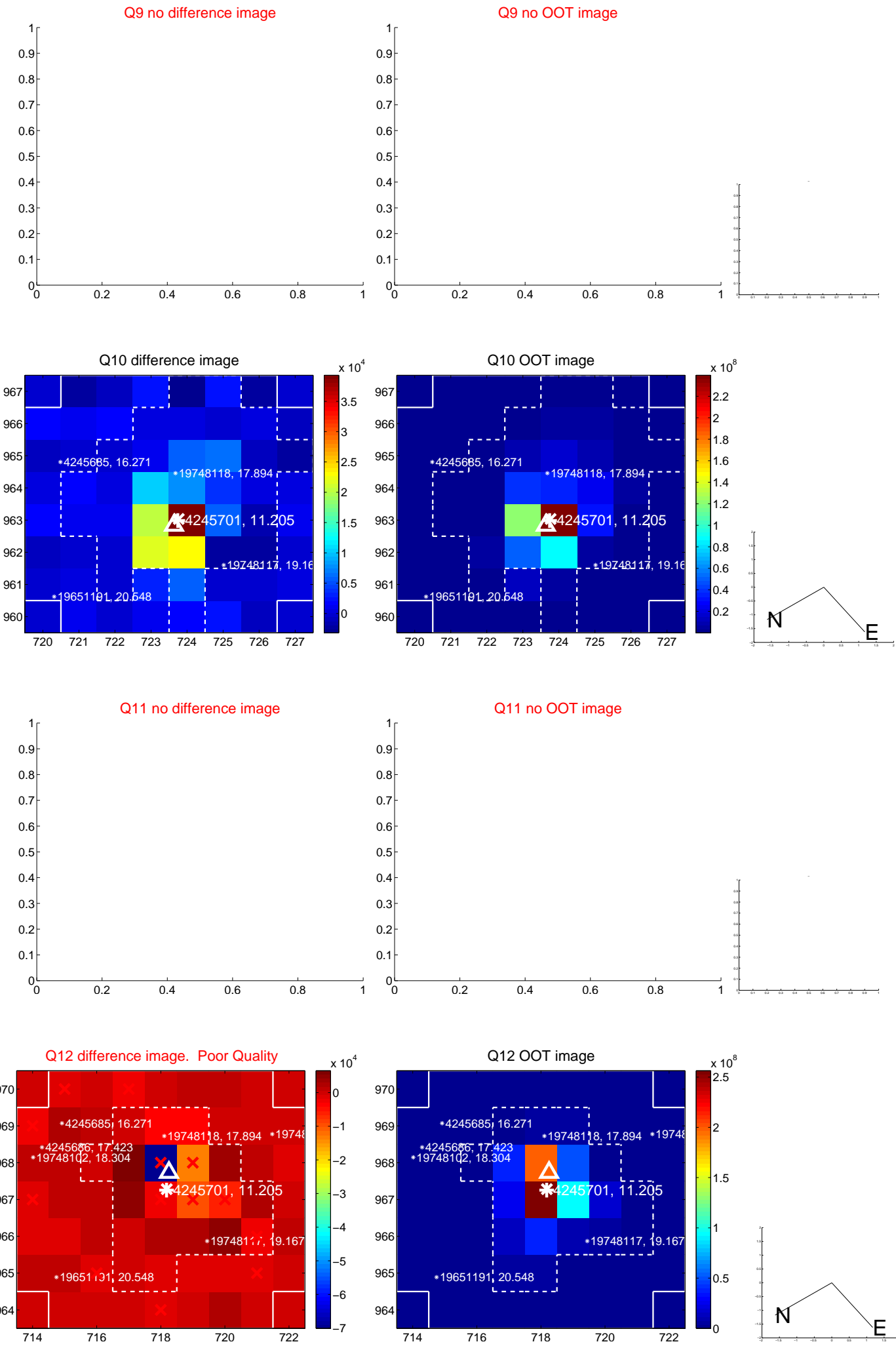


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

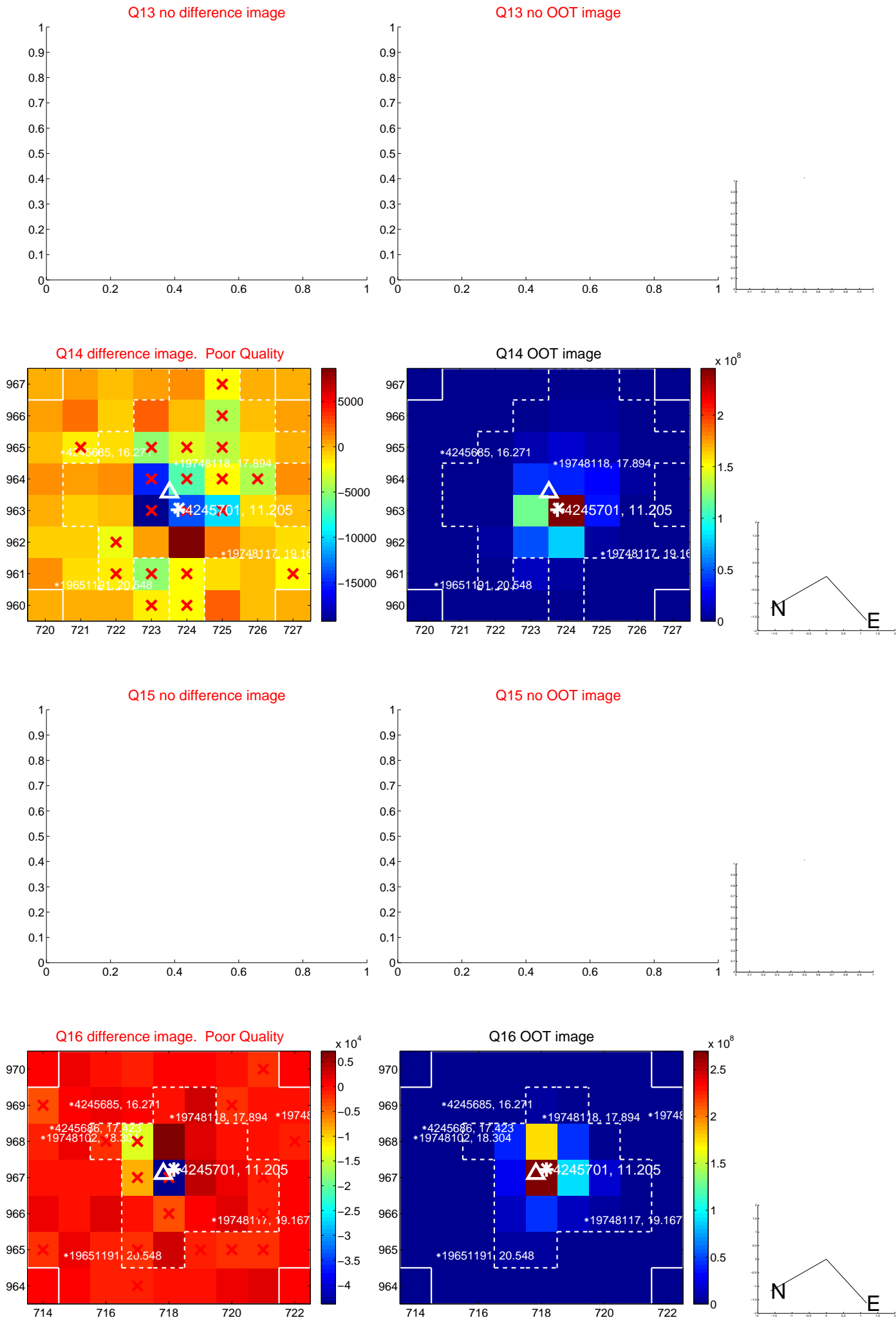




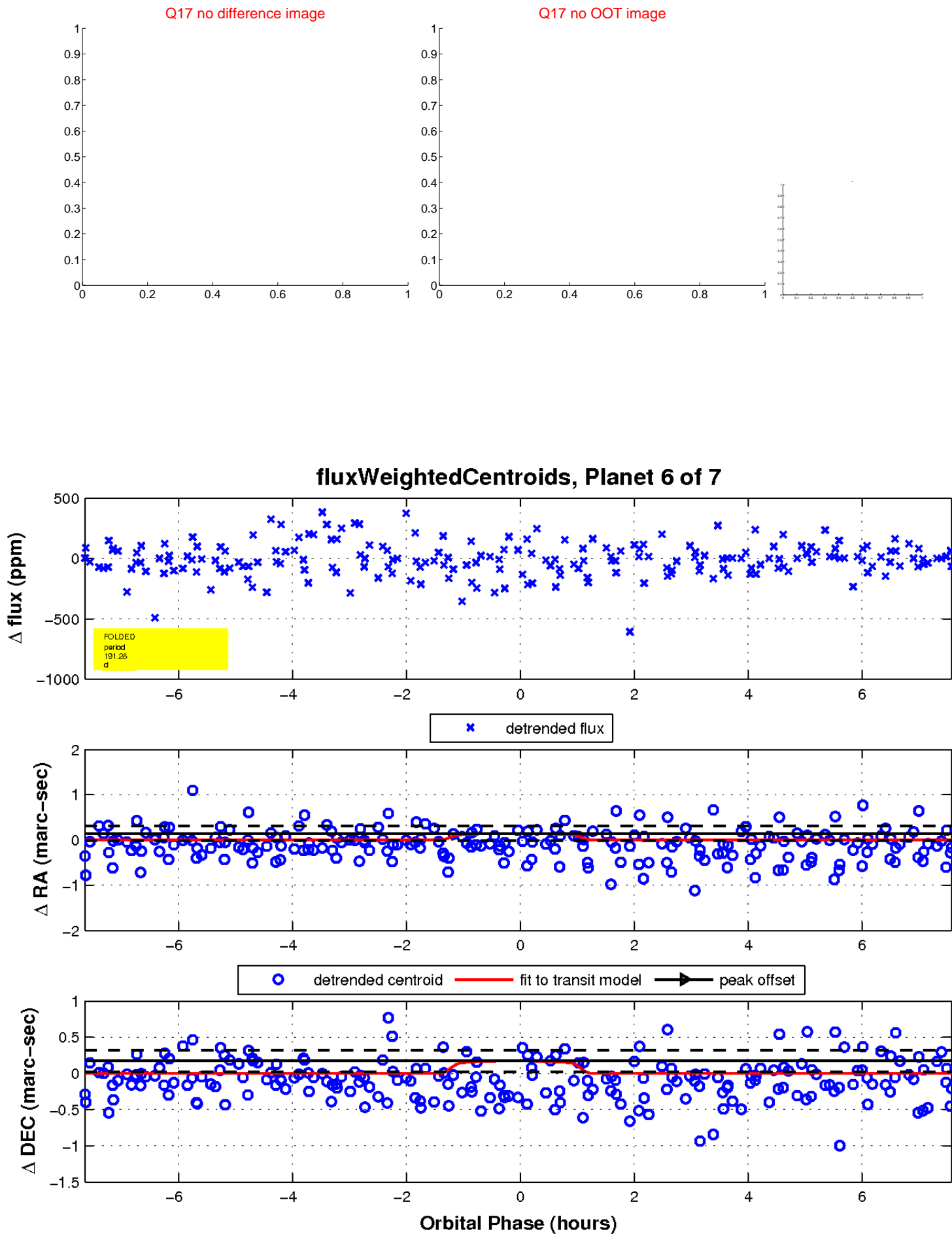
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

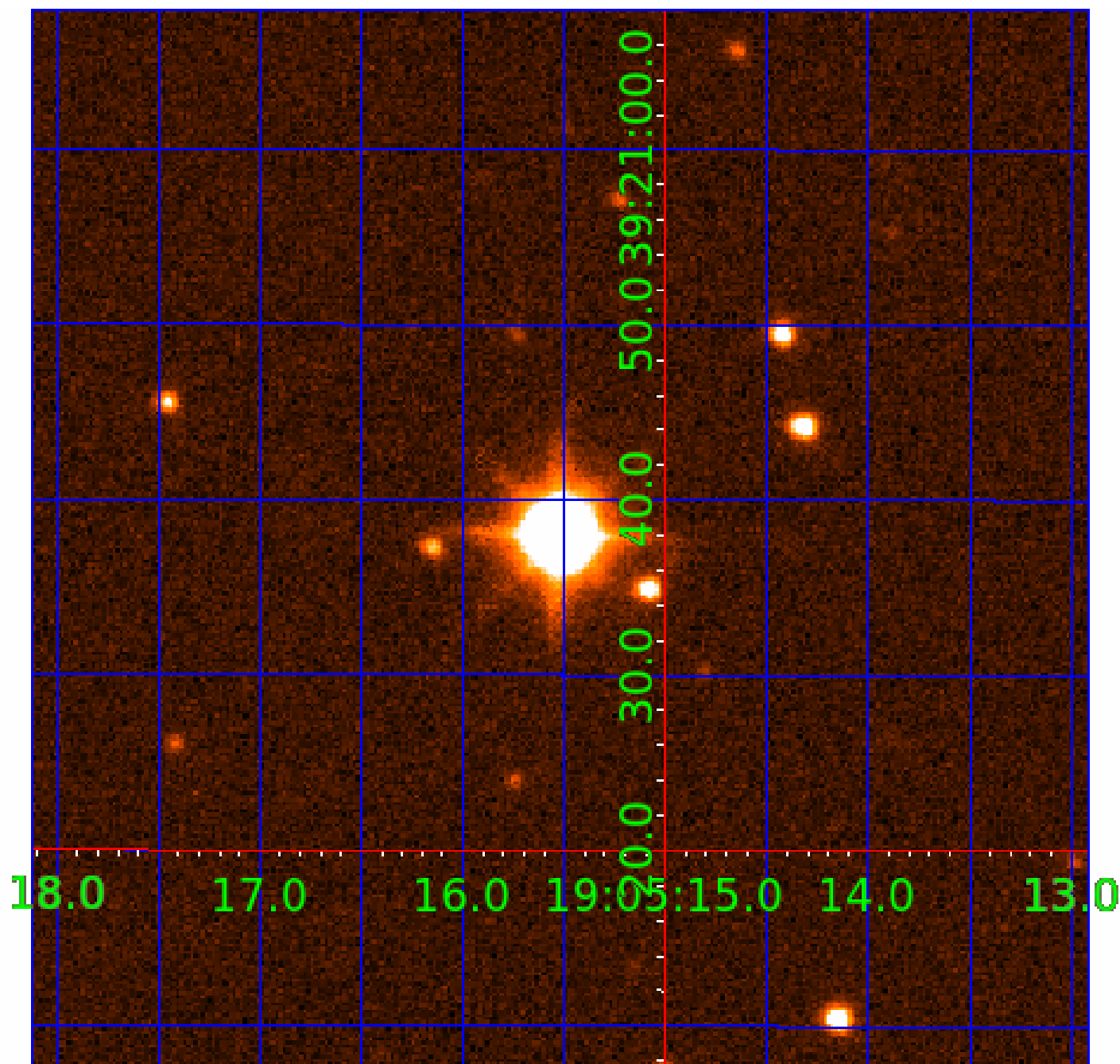


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 004245701

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 004245701-01 | OBS      | No   | 0.897843      | 132.180675   | 12.4        | 6.163            | 9.1  | 8.1  | 2.41                        | 7164            | 0.87                   | 31869.90               |
| 004245701-02 | OBS      | No   | 55.714468     | 141.964464   | 209.6       | 6.163            | 7.2  | 8.3  | 2.41                        | 7164            | 3.94                   | 129.72                 |
| 004245701-03 | OBS      | No   | 41.857491     | 147.545112   | 252.1       | 1.312            | 7.9  | 9.9  | 2.41                        | 7164            | 4.30                   | 189.94                 |
| 004245701-04 | OBS      | No   | 30.455228     | 158.307676   | 206.1       | 2.005            | 11.3 | 7.0  | 2.41                        | 7164            | 4.00                   | 290.25                 |
| 004245701-05 | OBS      | No   | 28.418026     | 132.694838   | 149.5       | 3.266            | 9.3  | 9.9  | 2.41                        | 7164            | 3.31                   | 318.31                 |
| 004245701-06 | OBS      | No   | 191.277248    | 181.918761   | 270.0       | 2.551            | 10.1 | 10.5 | 2.41                        | 7164            | 4.68                   | 25.05                  |
| 004245701-07 | OBS      | No   | 22.543458     | 150.815074   | 101.3       | 3.423            | 10.6 | 6.9  | 2.41                        | 7164            | 2.75                   | 433.46                 |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 004245701-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | LPP_DV—CENT_SATURATED   |
| 004245701-02 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED                  |
| 004245701-03 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—CENT_SATURATED   |
| 004245701-04 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED  |
| 004245701-05 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED  |
| 004245701-06 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED |
| 004245701-07 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—CENT_SATURATED  |

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

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

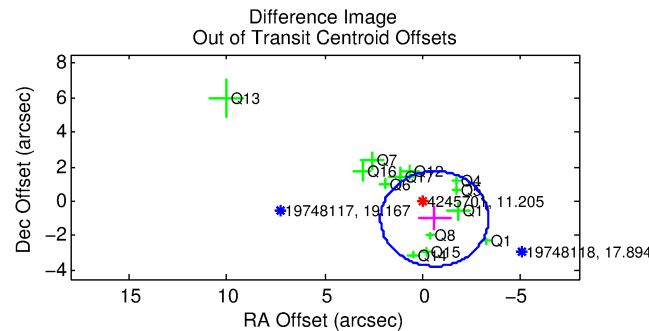
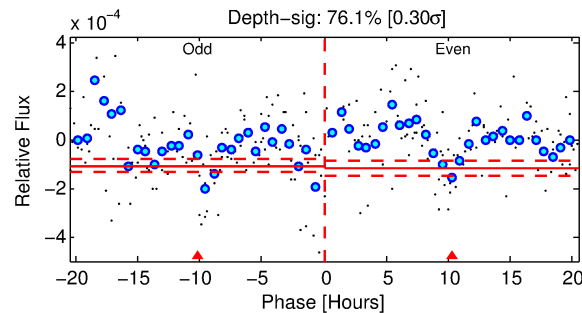
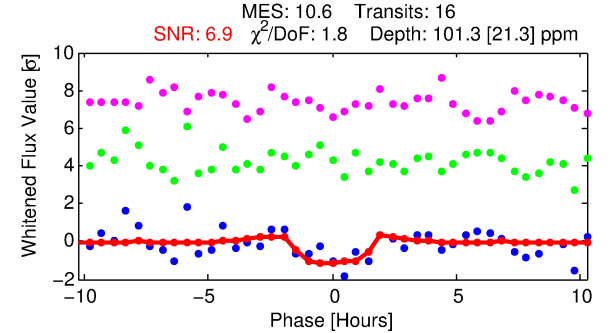
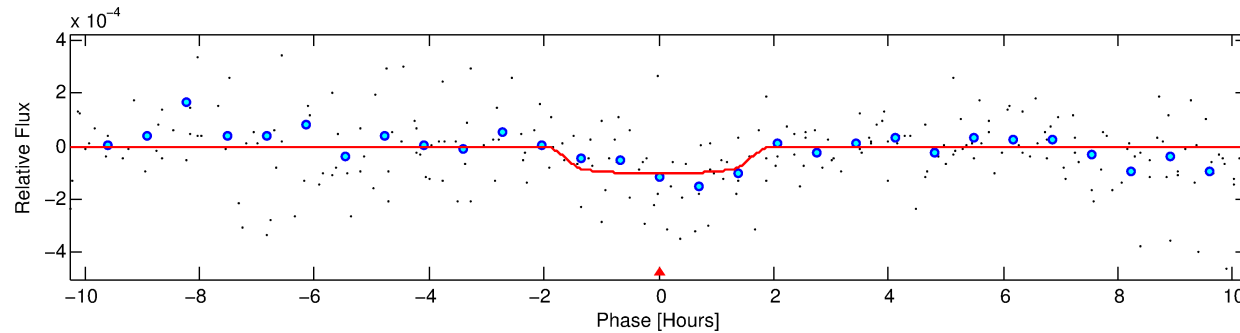
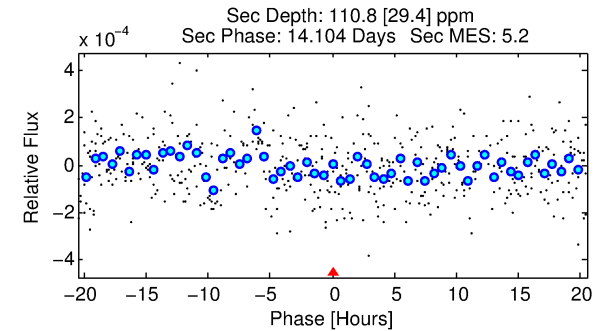
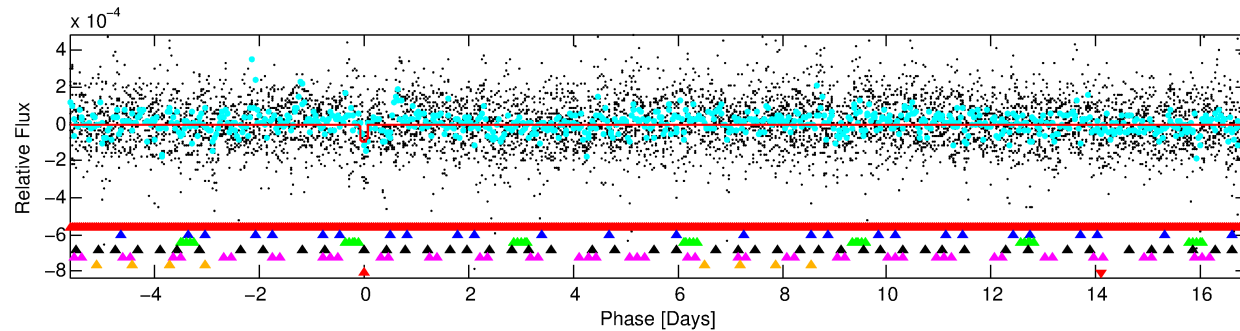
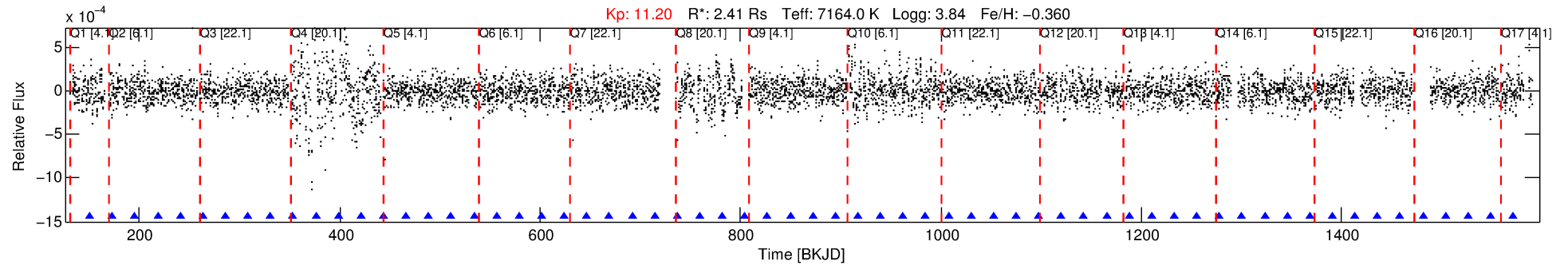
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004245701-07

No Significant Match Found

# DV One-Page Summary

KIC: 4245701 Candidate: 7 of 7 Period: 22.543 d



## DV Fit Results:

Period = 22.54346 [0.00039] d  
Epoch = 150.8151 [0.0171] BKJD  
 $R_p/R^*$  = 0.0105 [0.0091]  
 $a/R^*$  = 26.99 [137.69]  
 $b$  = 0.86 [1.59]  
 $\text{Seff}$  = 433.47 [307.14]  
 $T_{\text{eq}}$  = 1163 [206] K  
 $R_p$  = 2.75 [2.69]  $R_e$   
 $a$  = 0.1779 [0.0772] AU  
 $A_g$  = 255.00 [482.16] [0.53σ]  
 $T_{\text{eff}}$  = 7189 [3171] K [1.90σ]

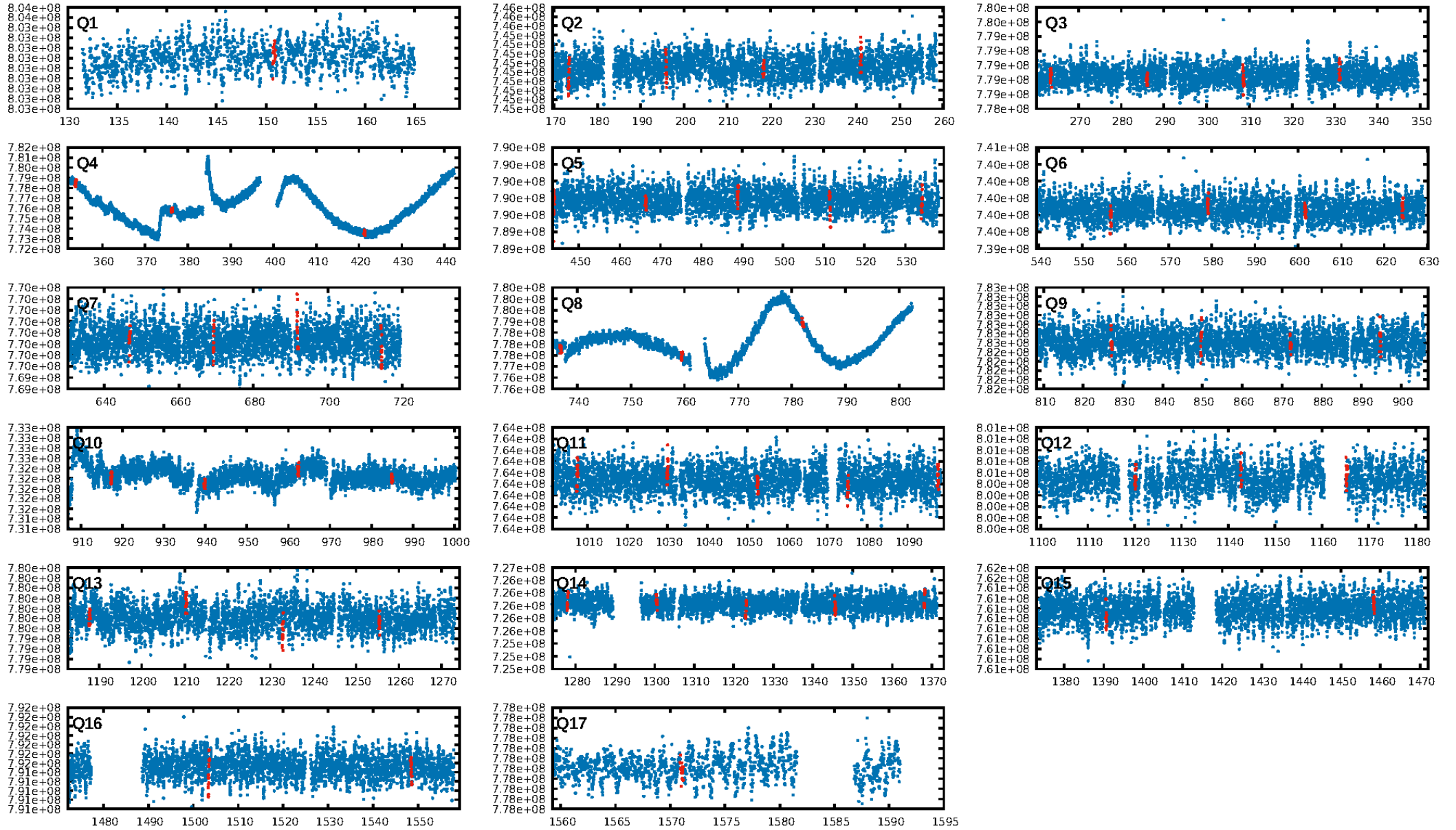
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [73.69σ]  
LongPeriod-sig: 100.0% [29.80σ]  
ModelChiSquare2-sig: 4.6%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 1.70e-10**  
RollingBand-fgt: 1.00 [15/15]  
**GhostDiagnostic-chr: -1.051**  
Centroid-sig: 5.1%  
Centroid-so: 0.646 arcsec [1.28σ]  
OotOffset-rm: 1.182 arcsec [1.29σ]  
OotOffset-st: 2/3/4/4 [13]  
KicOffset-rm: 1.037 arcsec [0.99σ]  
KicOffset-st: 2/3/4/4 [13]  
DiffImageQuality-fgm: 0.54 [7/13]  
DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 08:20:28 Z

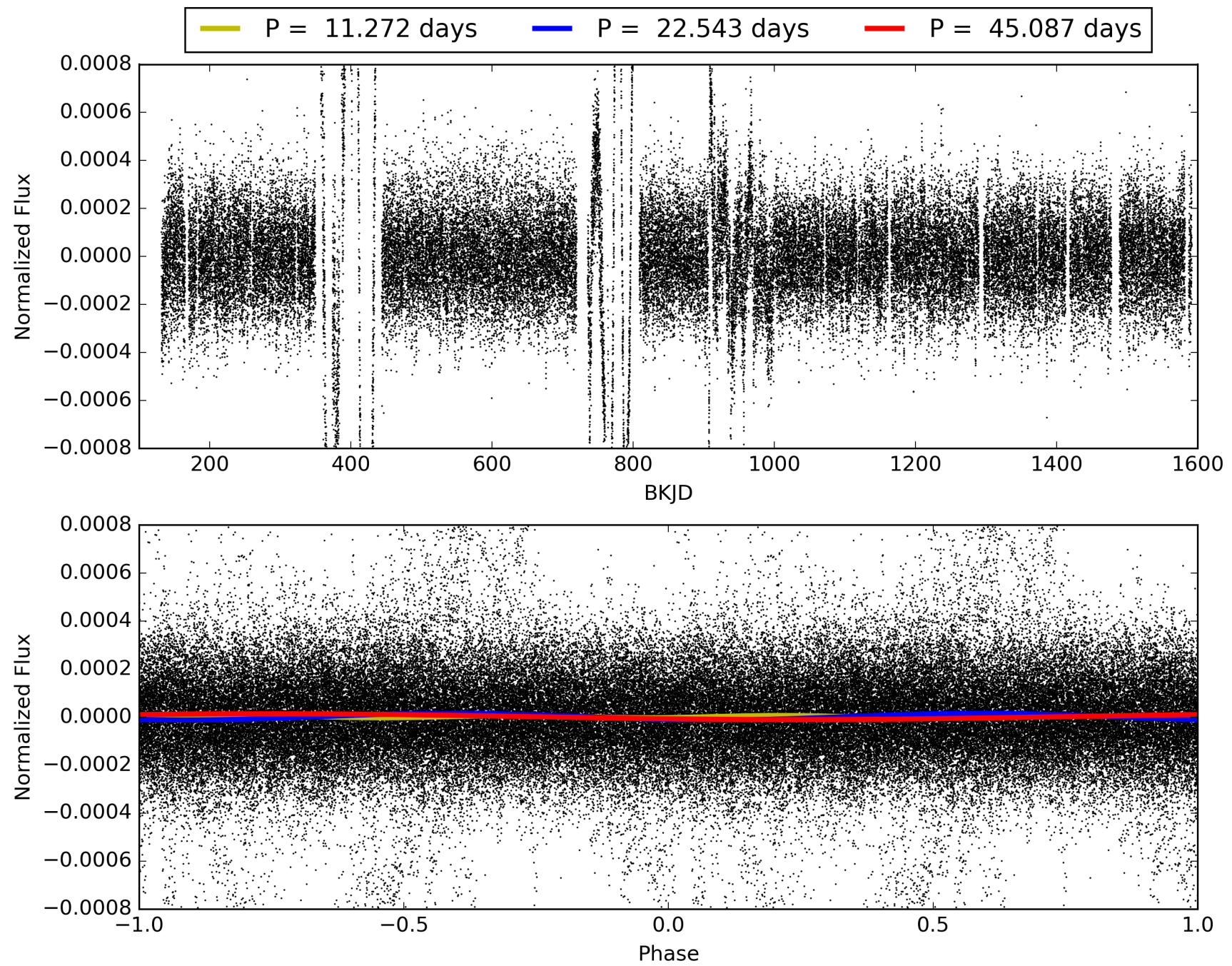
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004245701-07, PDC Light Curves





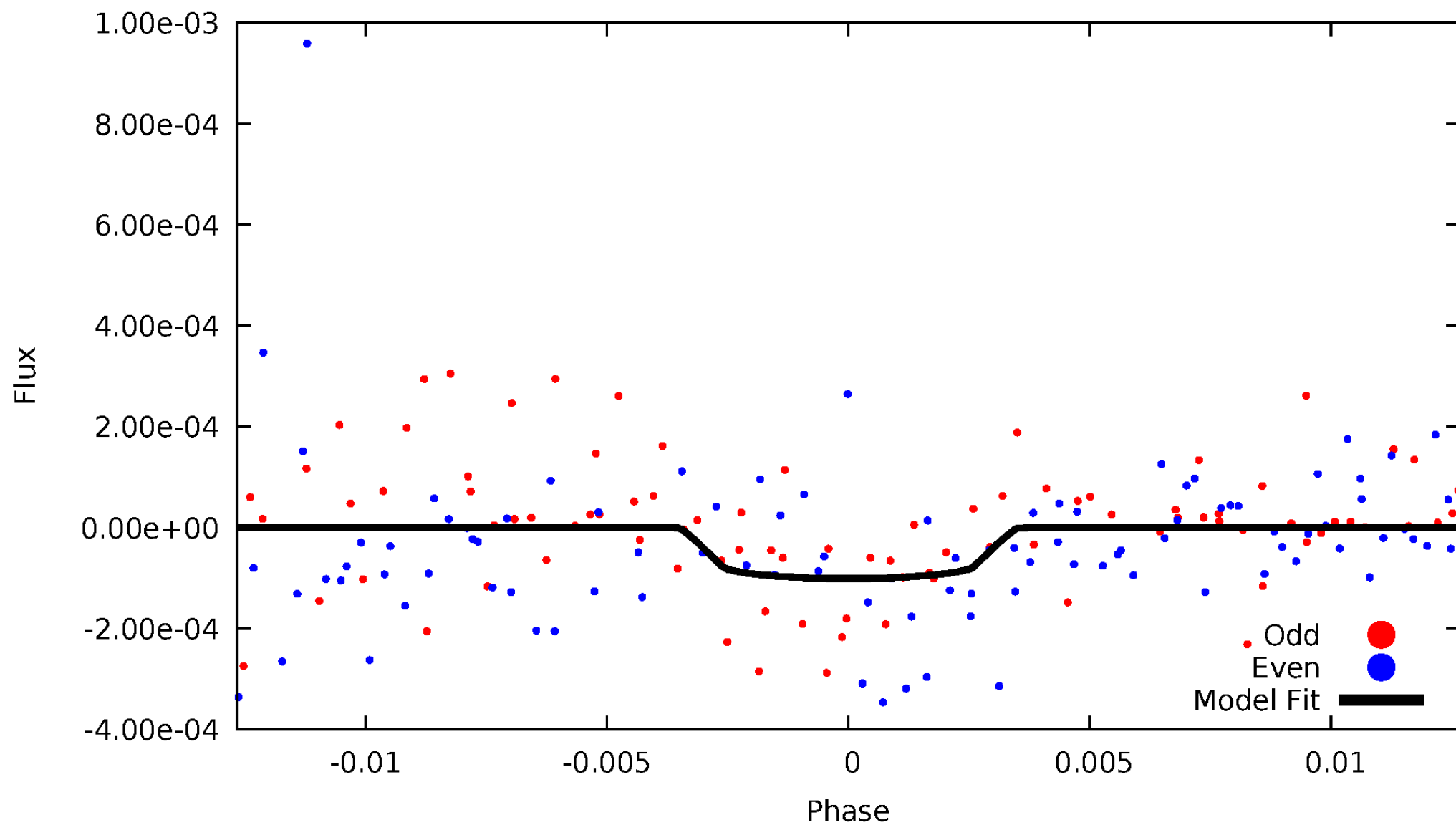
TCE 004245701-07





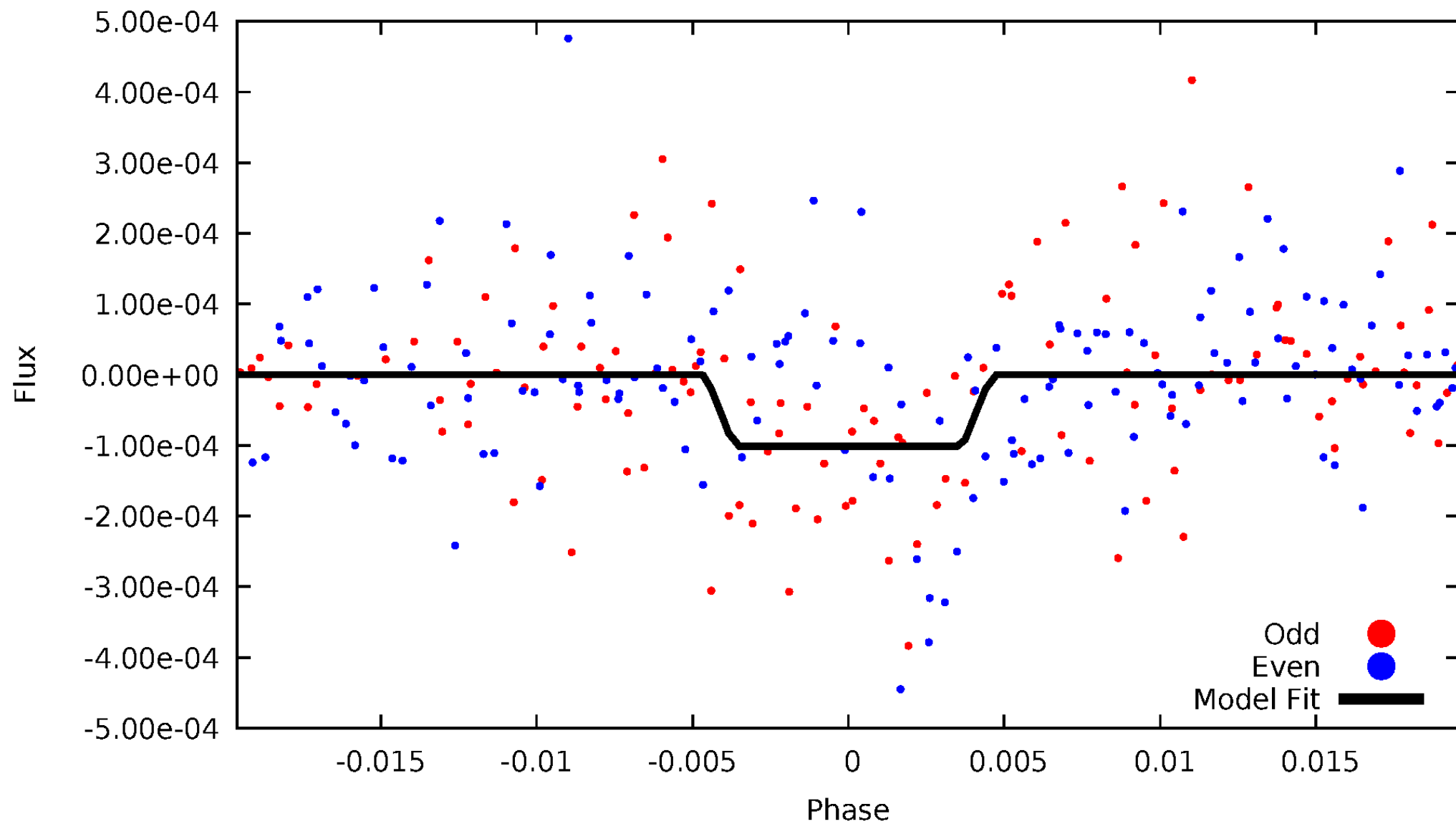
# DV Odd/Even

TCE 004245701-07



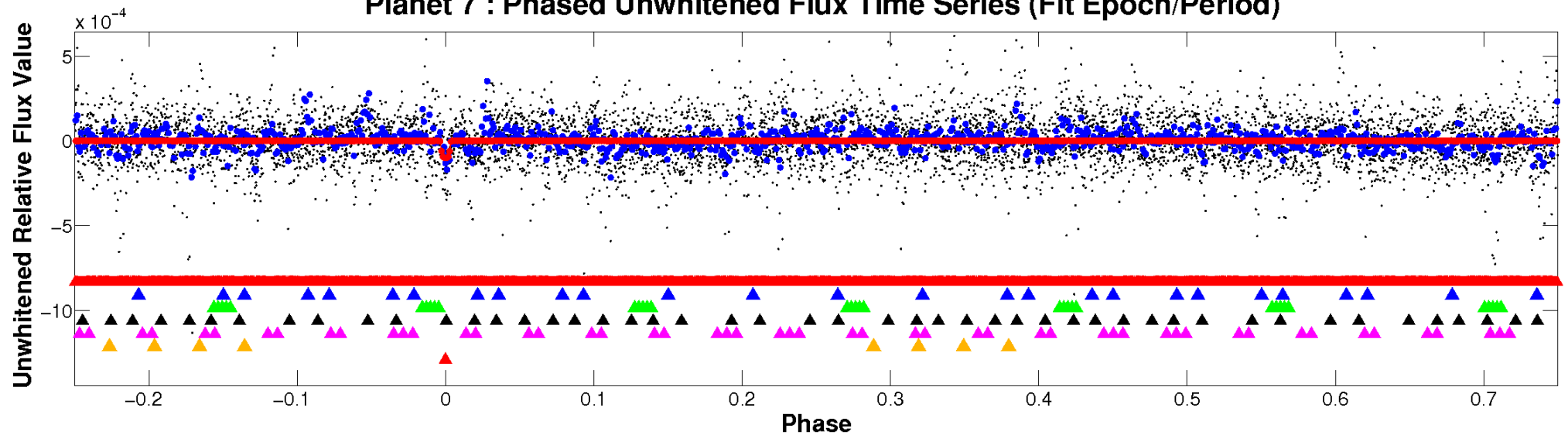
# ALT Odd/Even

TCE 004245701-07

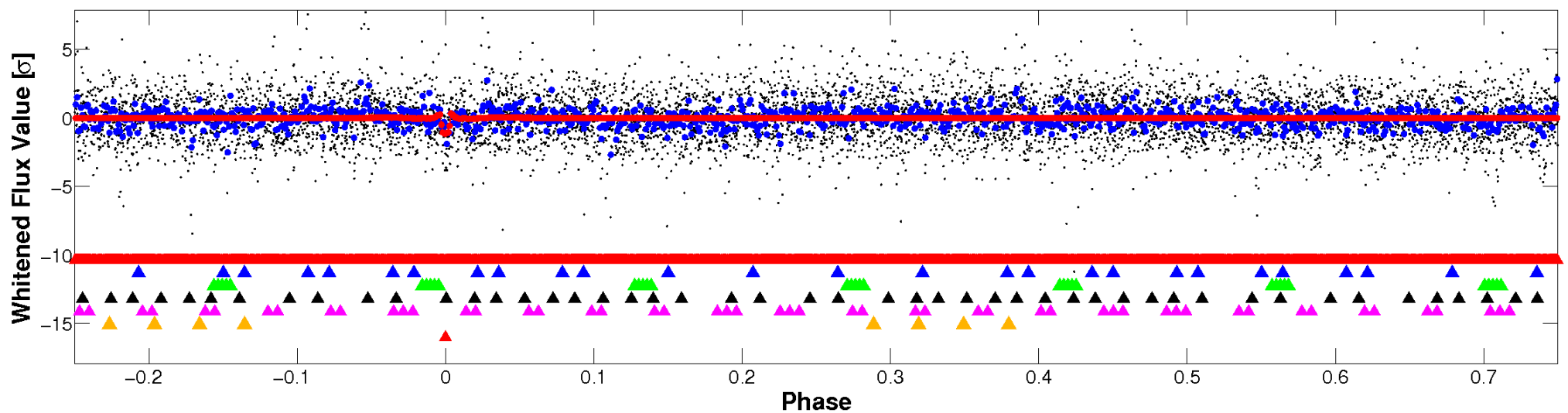


# Non-Whitened Vs. Whitened Light Curve

## Planet 7 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

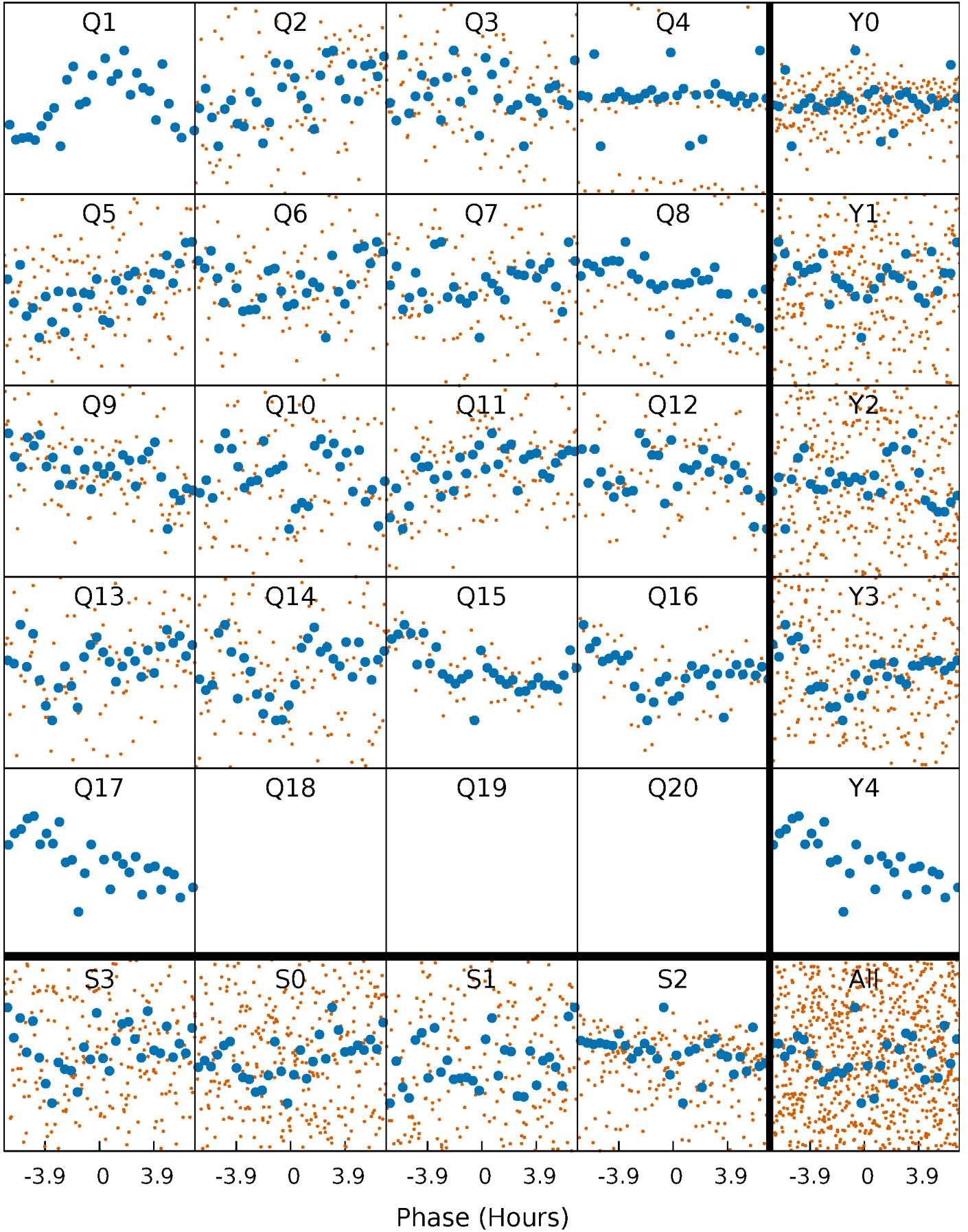


## Planet 7 : Phased Whitened Flux Time Series (Fit Epoch/Period)



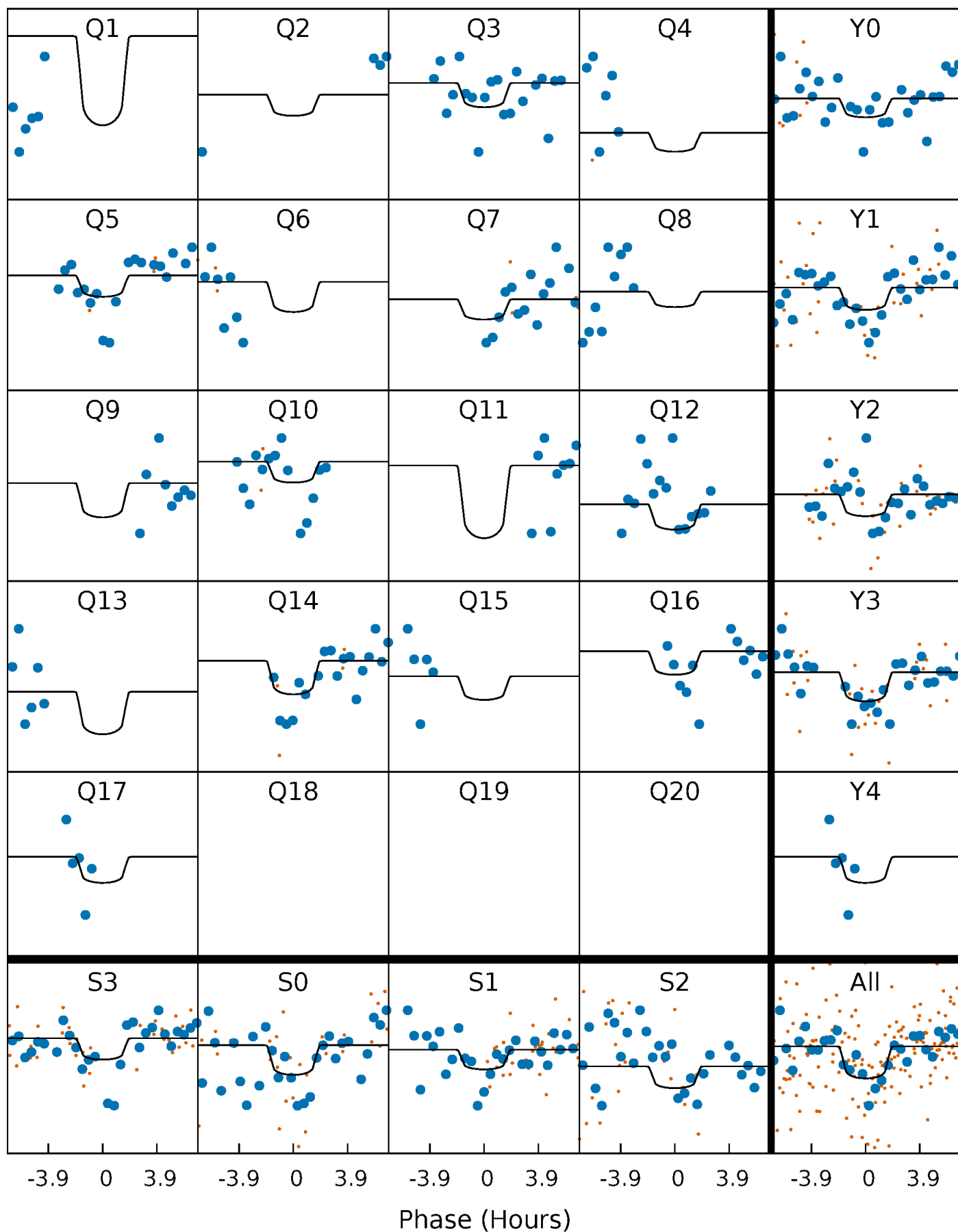
# PDC Quarter-Phased Transit Curves

TCE 004245701-07     $P = 22.543458$  Days     $T_0 = 150.815074$  (BKJD)



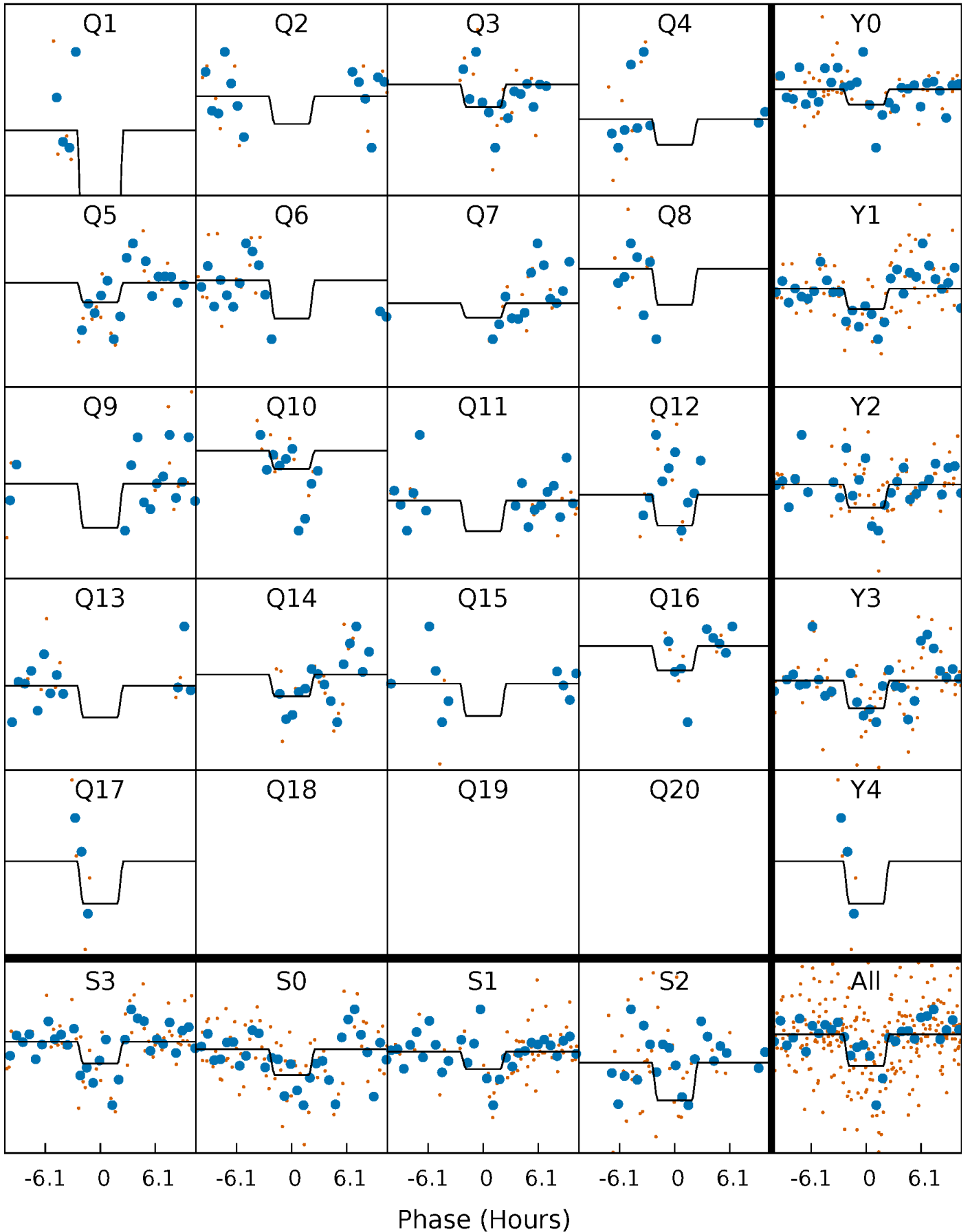
# DV Quarter-Phased Transit Curves

TCE 004245701-07   P= 22.543458 Days    $T_0=150.815074$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

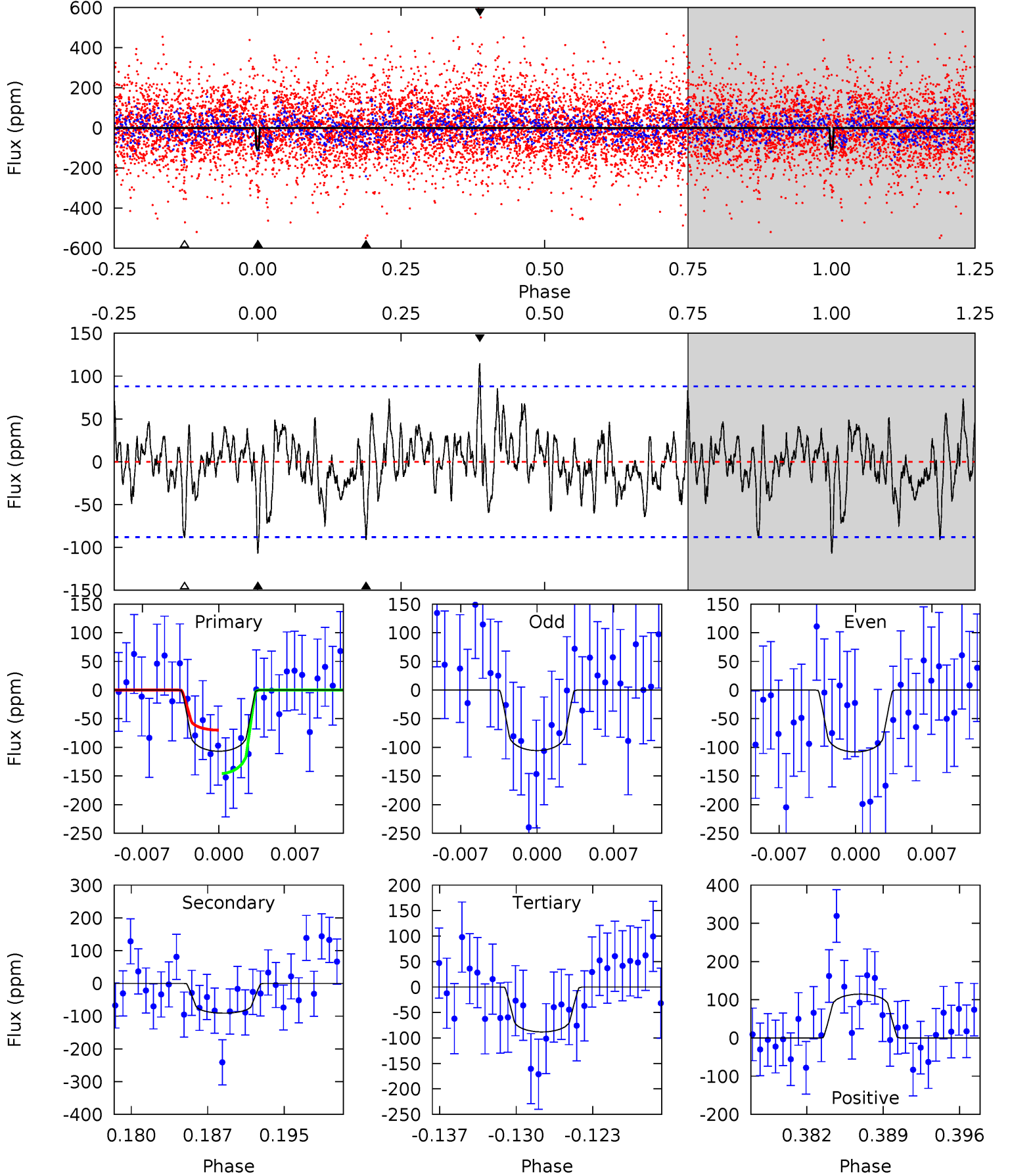
TCE 004245701-07     $P = 22.544645$  Days     $T_0 = 150.753108$  (BKJD)



# DV Model-Shift Uniqueness Test

004245701-07, P = 22.543458 Days, E = 128.271616 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  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 6.17 | 5.26 | 5.10 | 6.64 | 5.09            | 2.69            | 1.59             | 1.08    | -0.46   | 0.16    | -1.38   | 0.07    | 1.02 | 0.52  | 2.22 |

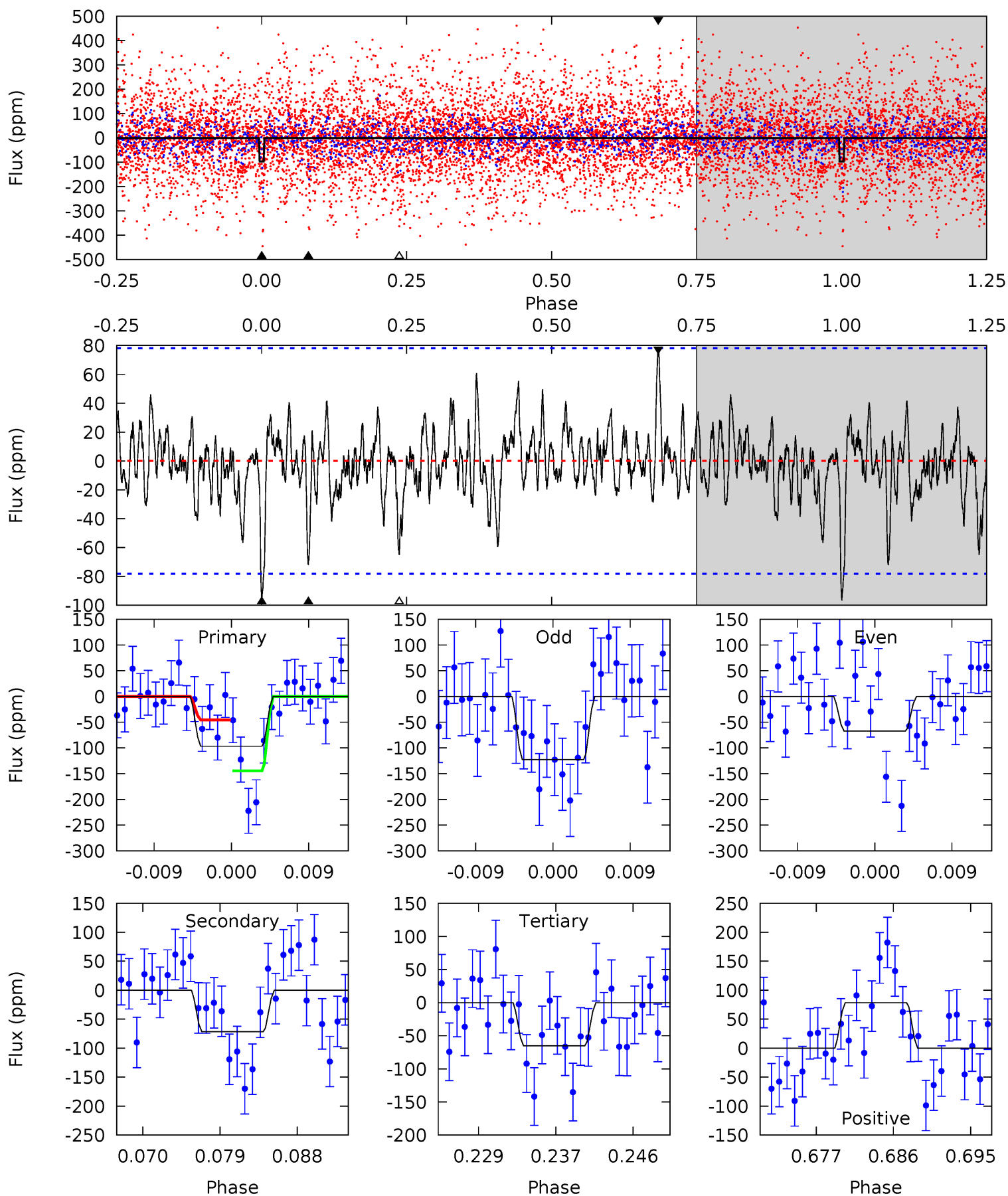




# Alt Model-Shift Uniqueness Test

004245701-07, P = 22.544645 Days, E = 128.208463 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  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 6.24 | 4.63 | 4.20 | 5.07 | 5.05            | 2.62            | 1.25             | 2.04    | 1.17    | 0.43    | -0.44   | 1.78    | 0.87 | 0.45  | 3.23 |



### Stellar Parameters For KIC 004245701

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R$ ( $R_{\odot}$ )       | $M$ ( $M_{\odot}$ )       | $p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ ) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $7164^{+176}_{-252}$ | $3.843^{+0.408}_{-0.102}$ | $-0.360^{+0.300}_{-0.300}$ | $2.411^{+0.465}_{-1.085}$ | $1.478^{+0.206}_{-0.308}$ | $0.148^{+0.471}_{-0.056}$                     |
|        | +2%/-4%              | +11%/-3%                  | +83%/-83%                  | +19%/-45%                 | +14%/-21%                 | +317%/-38%                                    |
| 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 004245701-07 / KOI

| Detrend | Depth (ppm)  | $R_p$ ( $R_{\oplus}$ ) | $T_{max}$ (K)        | $T_{obs}$ (K)          | $A_{obs}$           |
|---------|--------------|------------------------|----------------------|------------------------|---------------------|
| DV      | $-91 \pm 17$ | $2.79^{+2.19}_{-1.66}$ | $1574^{+112}_{-188}$ | $6395^{+4432}_{-1429}$ | $201^{+892}_{-135}$ |
| Alt.    | $-72 \pm 15$ | $2.80^{+2.17}_{-1.66}$ | $1591^{+107}_{-183}$ | $6019^{+4497}_{-1283}$ | $165^{+873}_{-113}$ |

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

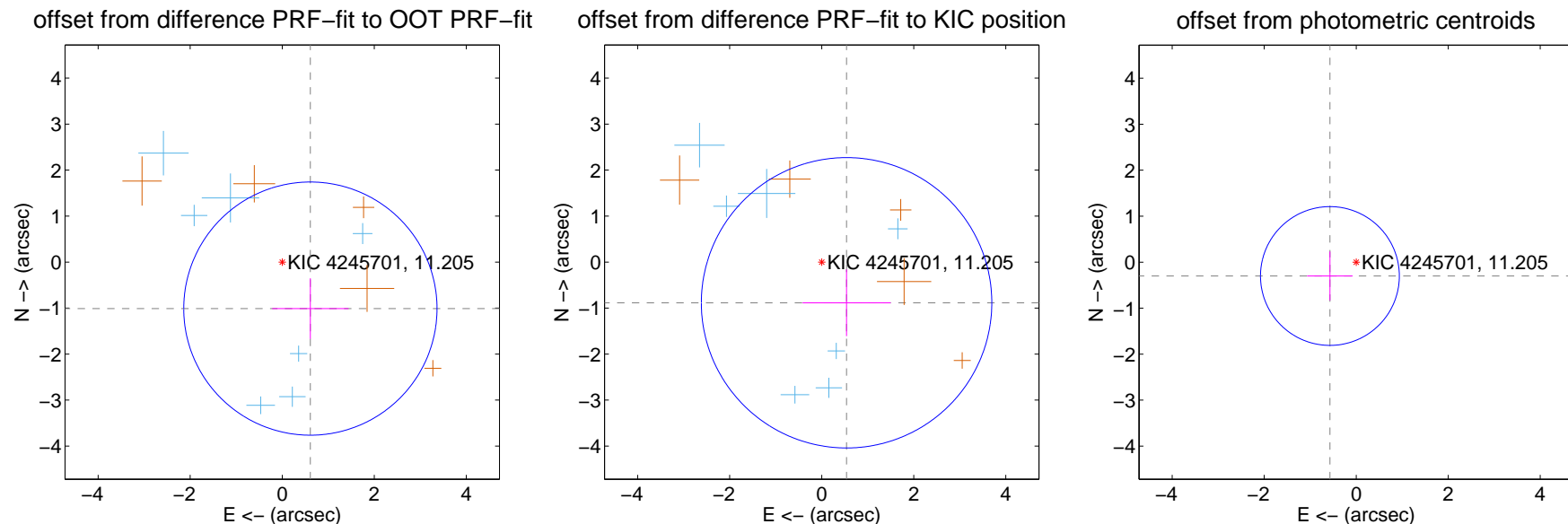
## DV Centroid Data

Supplemental centroid analysis for 004245701-07. **Kepler magnitude: 11.21.** Transit SNR 6.94

There are 7 quarters with good PRF difference image offsets

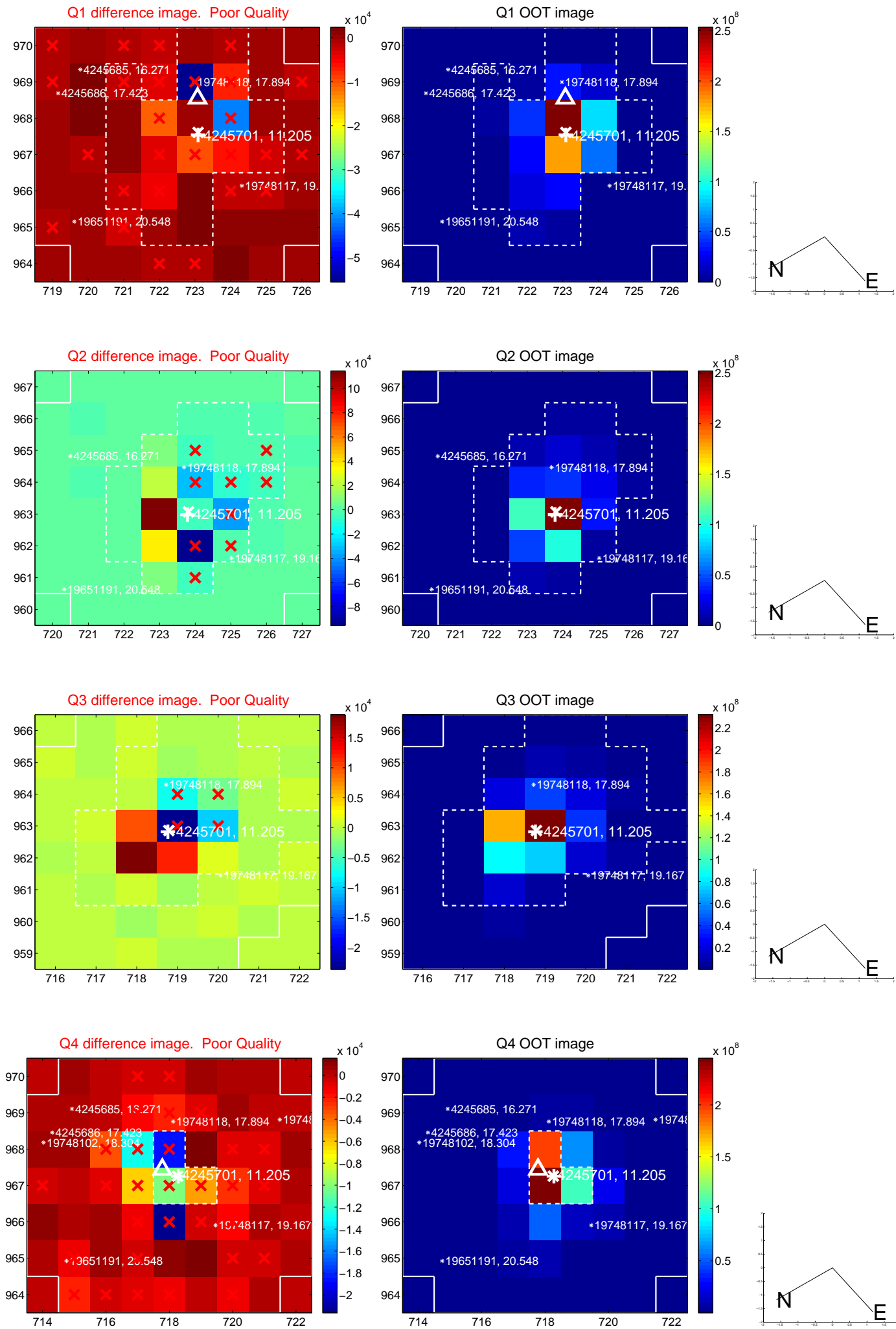
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA        | $\Delta$ Dec       |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT          | $1.182 \pm 0.917$  | 1.29                | $-0.612 \pm 0.829$ | $-1.011 \pm 0.659$ |
| PRF-fit source offset from KIC position | $1.037 \pm 1.052$  | 0.99                | $-0.540 \pm 0.958$ | $-0.885 \pm 0.724$ |
| photometric centroid source offset      | $0.65 \pm 0.50$    | 1.28                | $0.57 \pm 0.49$    | $-0.30 \pm 0.53$   |

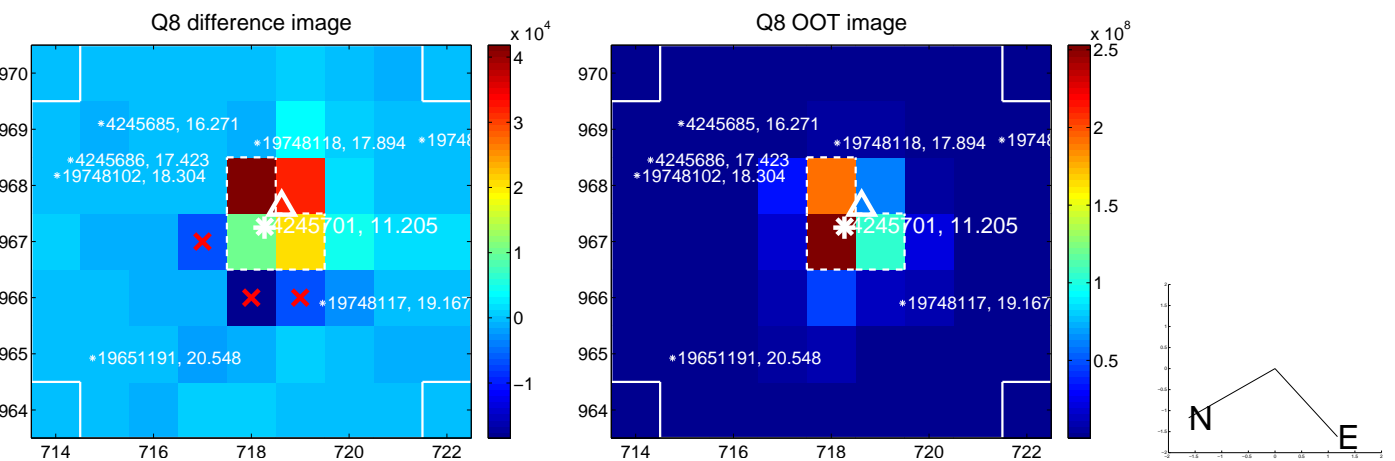
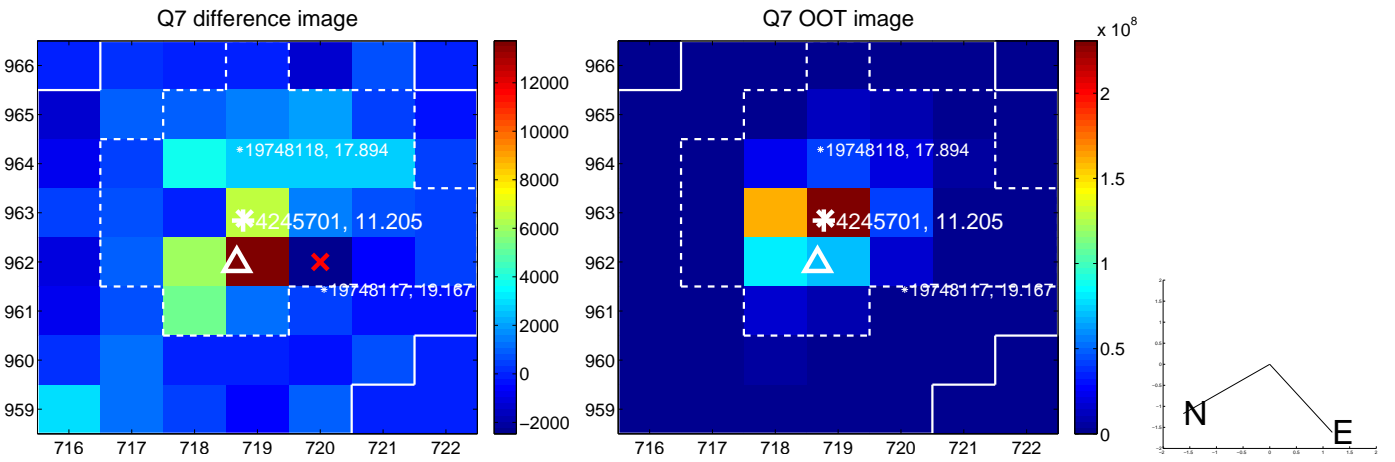
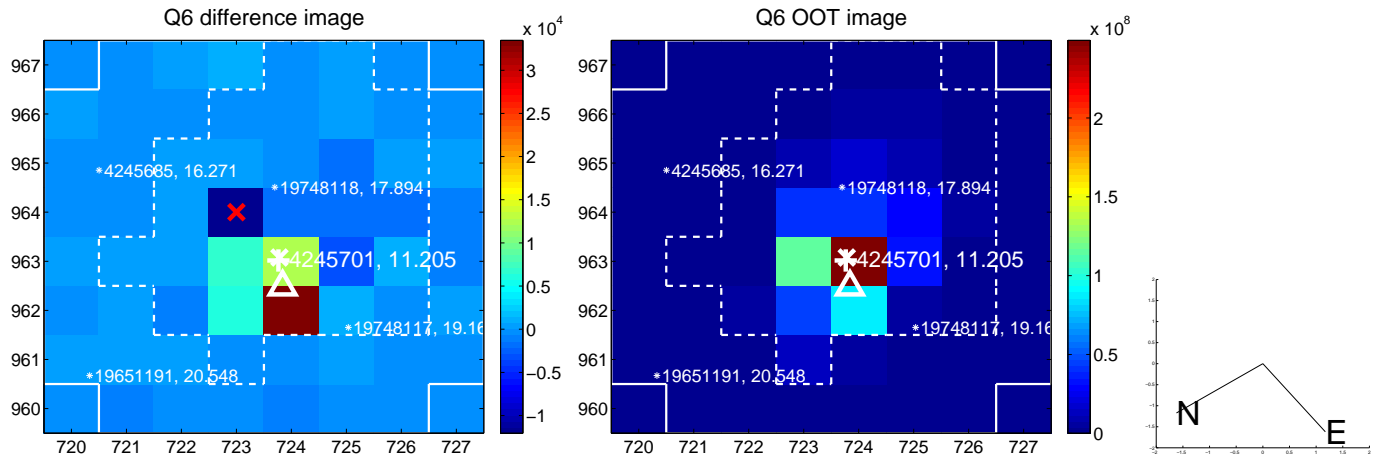
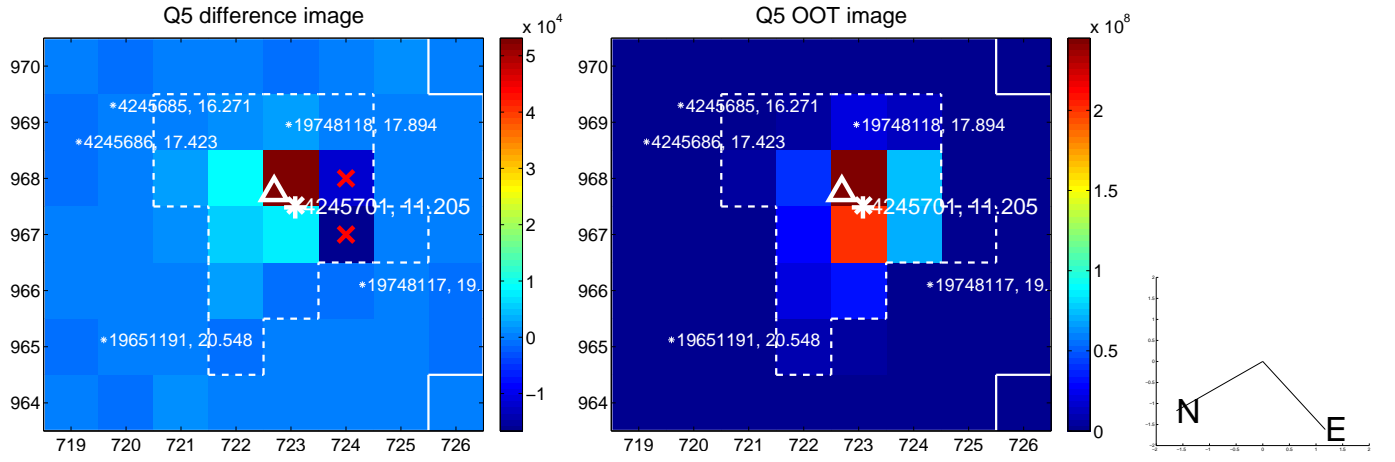


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

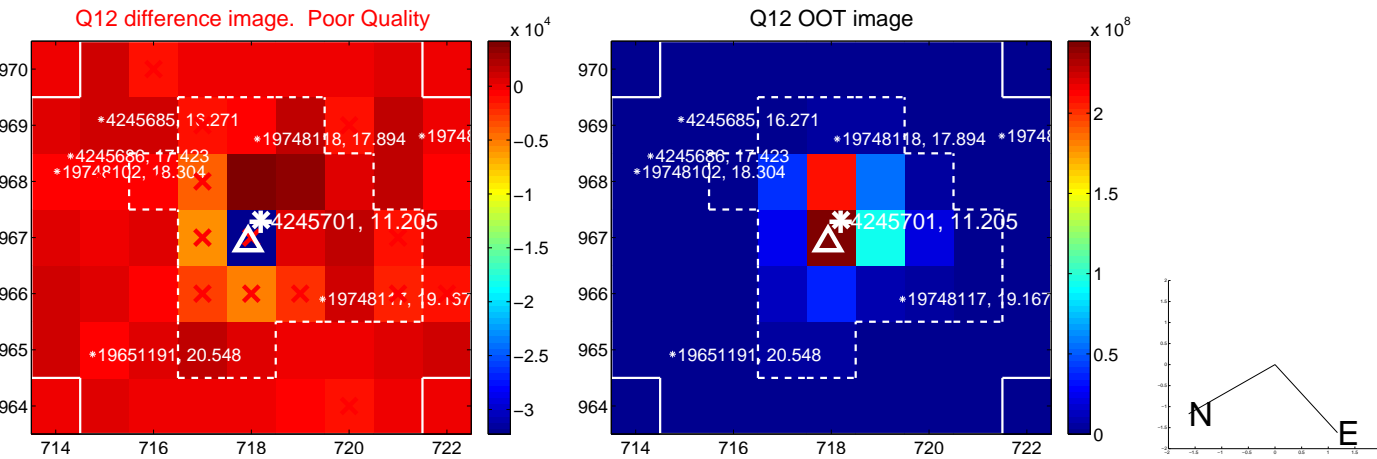
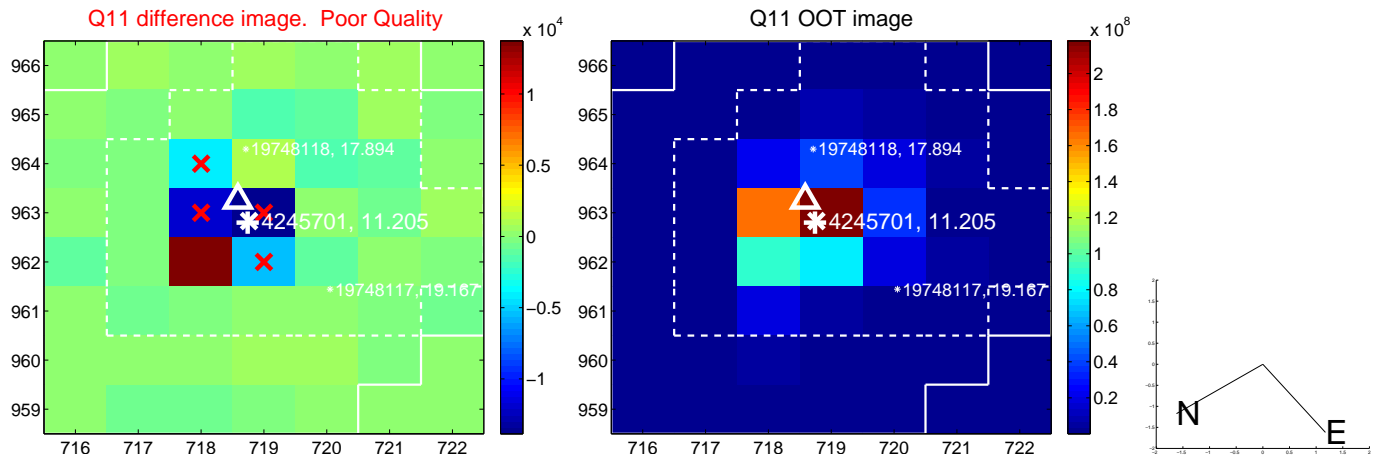
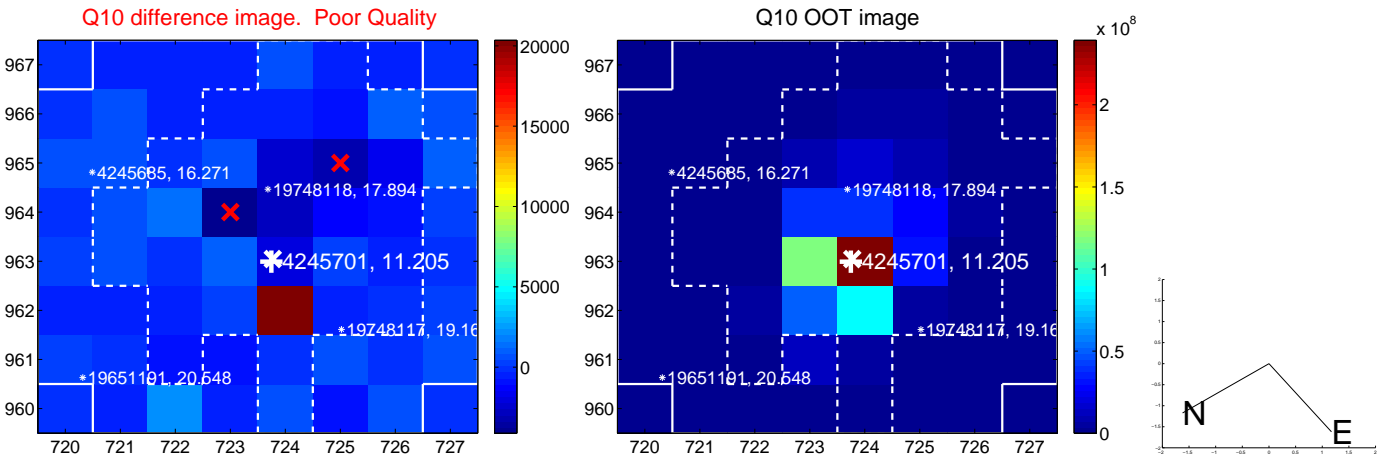
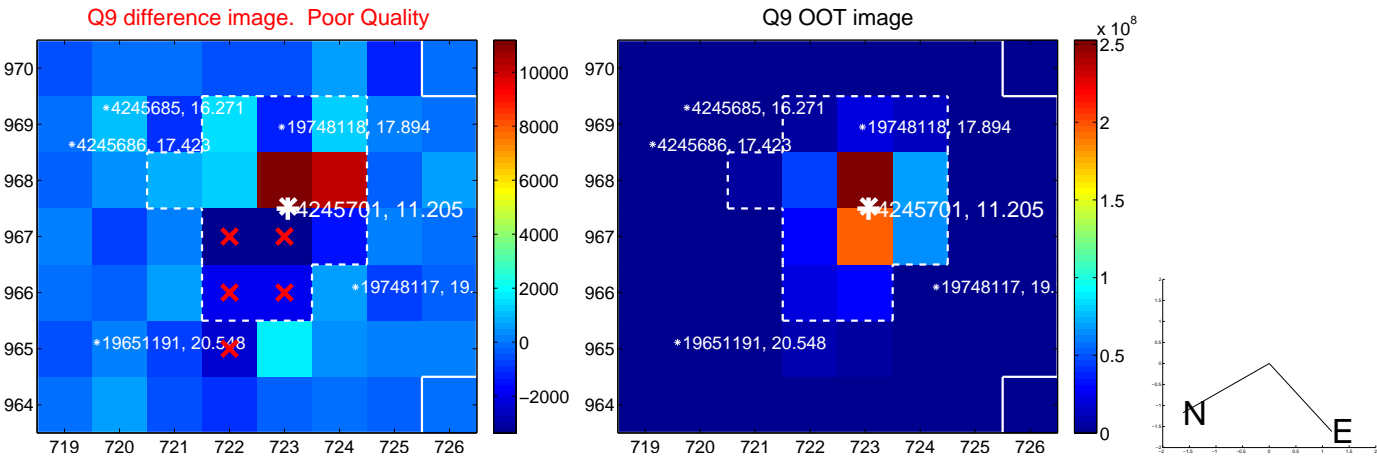
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



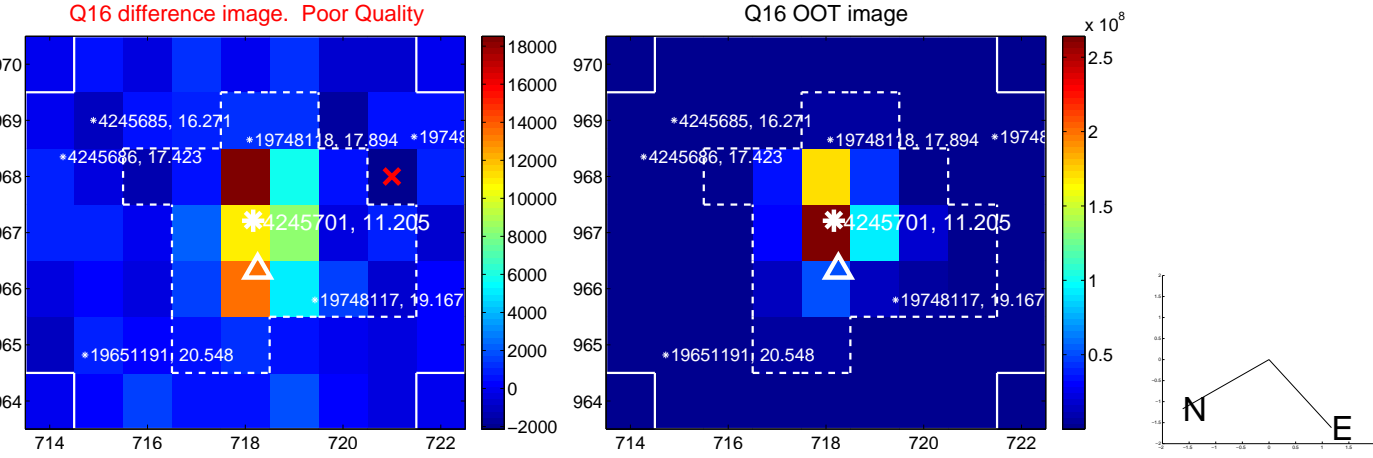
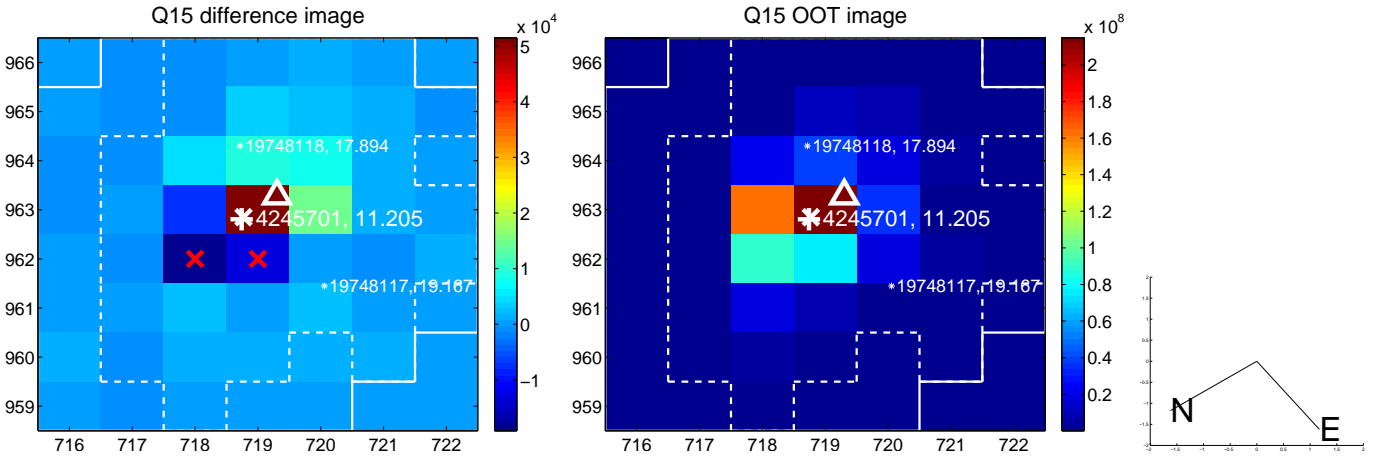
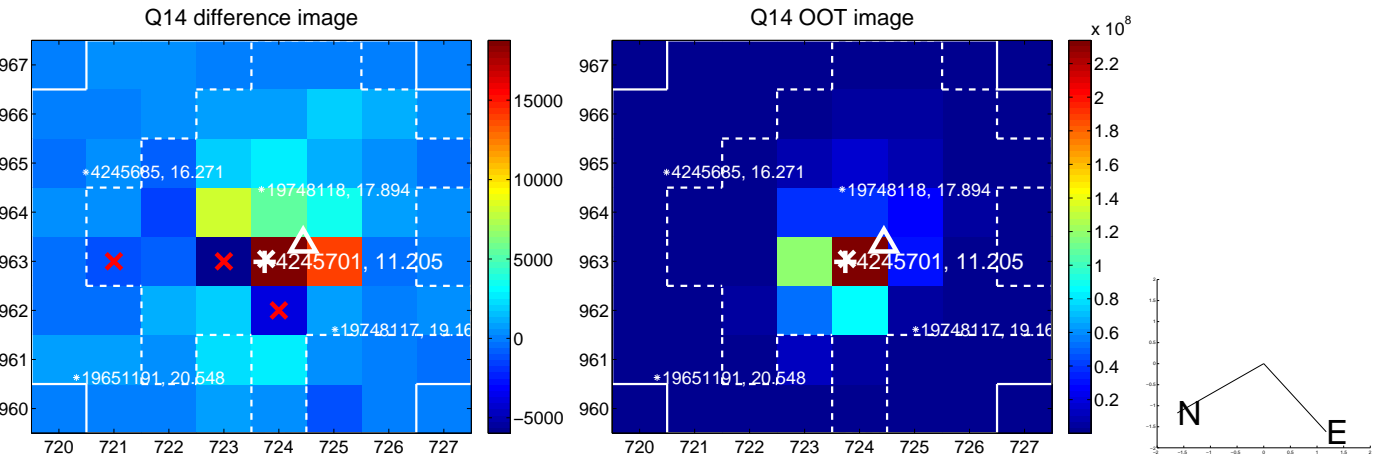
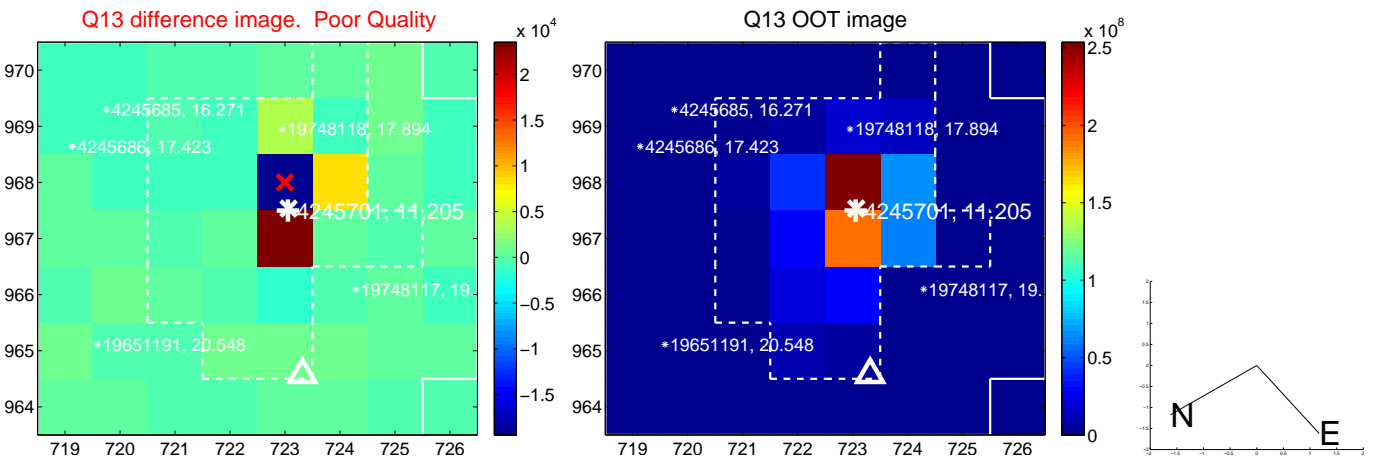
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



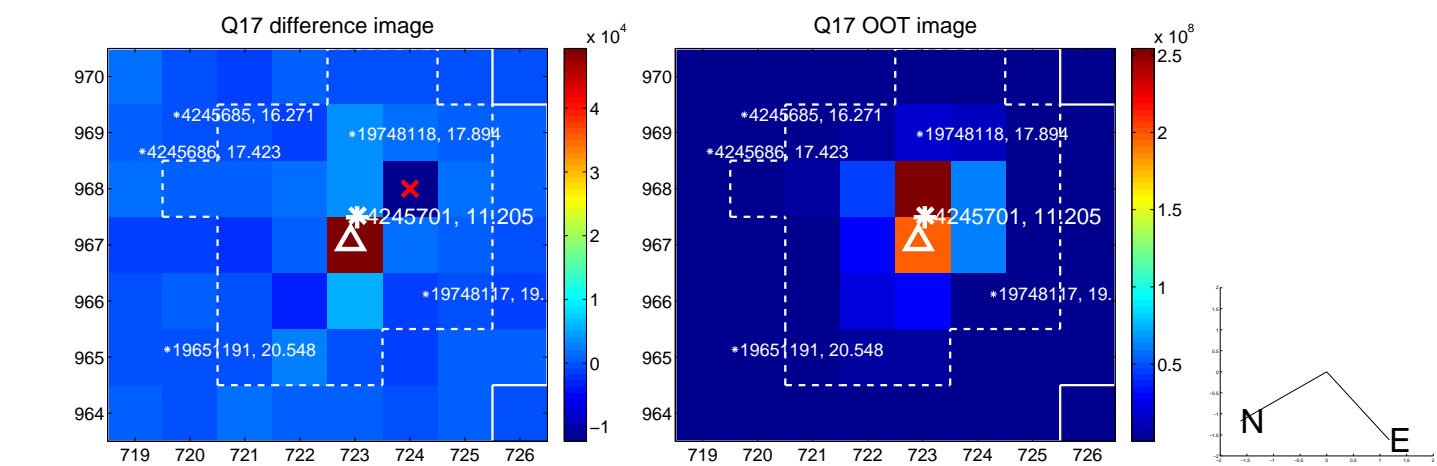
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



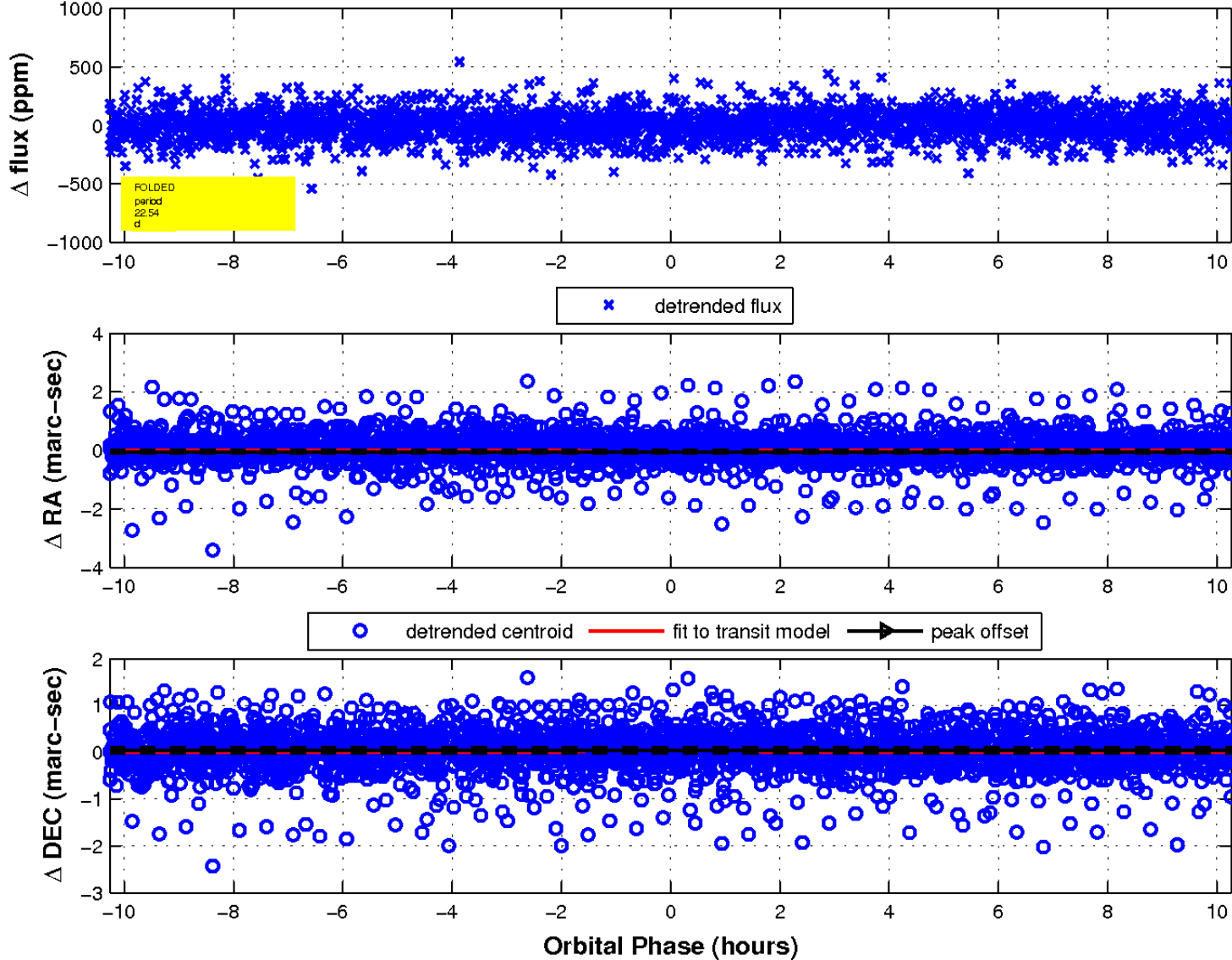
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 7 of 7





UKIRT Image

Declination

