

# KIC 006470973

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 006470973-01 | OBS      | No   | 0.509313      | 131.708781   | 35.2        | 1.285            | 10.2 | 9.8  | 2.98                        | 8548            | 1.84                   | 173032.50              |
| 006470973-02 | OBS      | No   | 1.507014      | 132.863868   | 43.9        | 7.686            | 8.8  | 8.7  | 2.98                        | 8548            | 2.22                   | 40733.45               |
| 006470973-03 | OBS      | No   | 68.595946     | 135.604533   | 305.4       | 10.291           | 12.3 | 7.5  | 2.98                        | 8548            | 5.83                   | 250.64                 |
| 006470973-04 | OBS      | No   | 95.200506     | 157.793112   | 760.5       | 7.481            | 11.1 | 9.5  | 2.98                        | 8548            | 10.09                  | 161.90                 |
| 006470973-05 | OBS      | No   | 43.824577     | 173.397932   | 266.9       | 11.025           | 9.9  | 7.4  | 2.98                        | 8548            | 5.20                   | 455.50                 |
| 006470973-06 | OBS      | No   | 43.851912     | 174.379270   | 265.5       | 5.706            | 9.4  | 6.5  | 2.98                        | 8548            | 5.91                   | 455.12                 |
| 006470973-07 | OBS      | No   | 96.994995     | 218.805364   | 538.8       | 4.480            | 9.0  | 9.0  | 2.98                        | 8548            | 7.65                   | 157.92                 |
| 006470973-09 | OBS      | No   | 203.109072    | 227.259250   | 243.1       | 6.000            | 8.5  | -1.0 | 2.98                        | 8548            | 4.71                   | 58.95                  |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 006470973-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT   |
| 006470973-02 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT   |
| 006470973-03 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT  |
| 006470973-04 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS |
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| 006470973-06 | OBS      | FP   | 0.00  | 1 | 0 | 1 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—HALO_GHOST                        |
| 006470973-07 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT  |
| 006470973-09 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—CENT_NOFITS   |

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

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

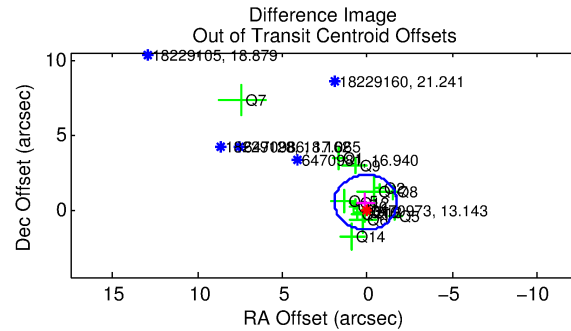
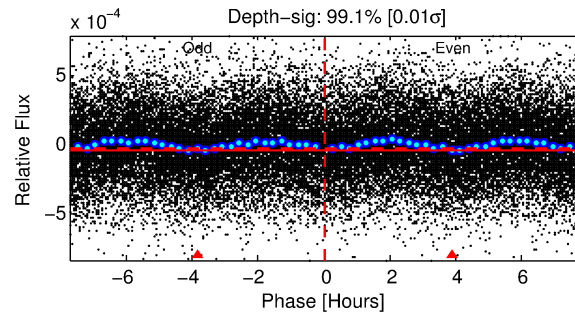
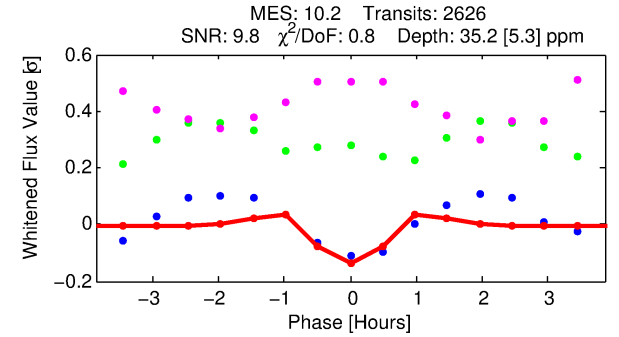
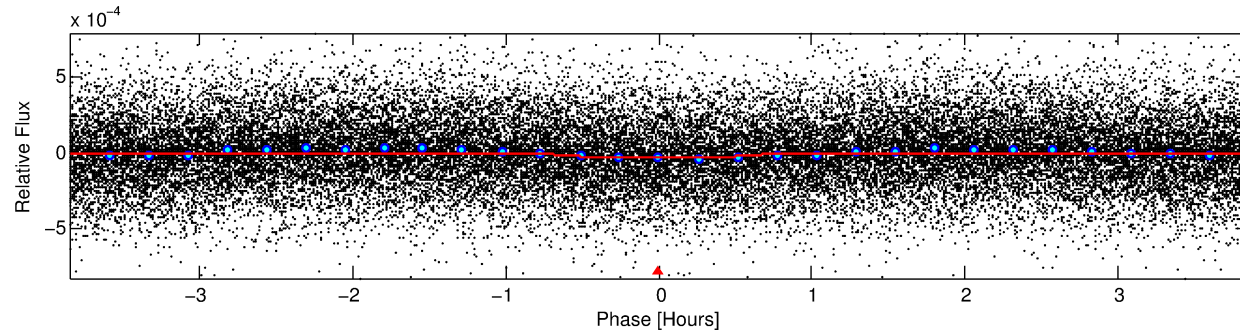
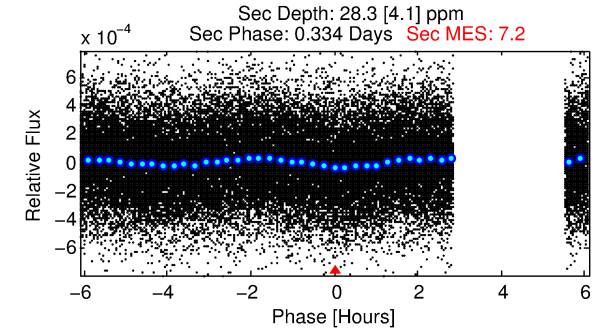
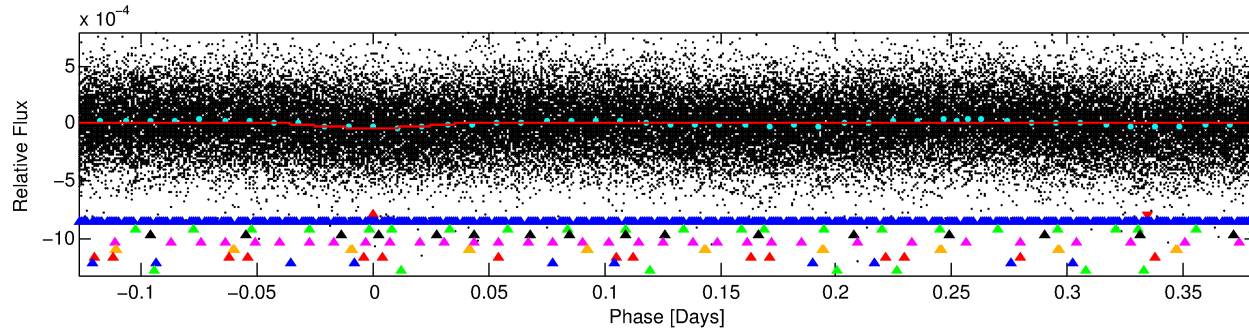
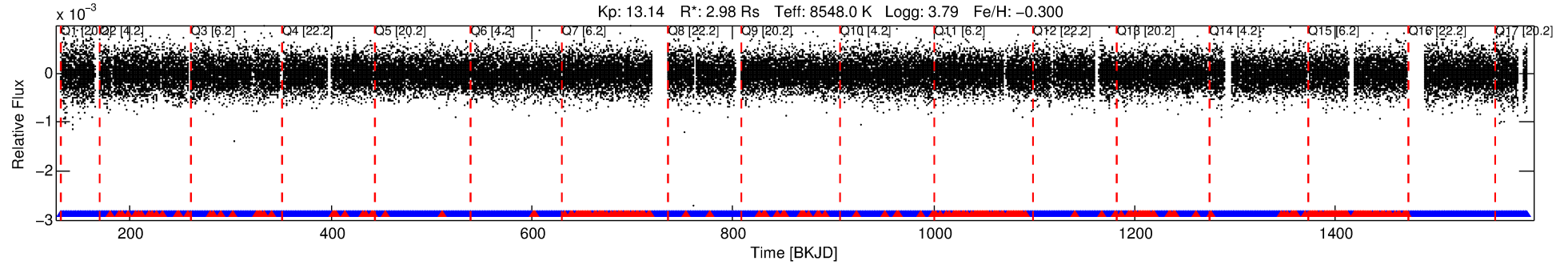
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 006470973-01

No Significant Match Found

# DV One-Page Summary

KIC: 6470973 Candidate: 1 of 9 Period: 0.509 d



## DV Fit Results:

Period = 0.50931 [0.00001] d  
Epoch = 131.7088 [0.0016] BKJD  
Rp/R\* = 0.0057 [0.0015]  
a/R\* = 2.76 [3.57]  
b = 0.48 [2.37]  
Seff = 173032.50 [122838.22]  
Teq = 5201 [923] K  
Rp = 1.84 [0.99] Re  
a = 0.0156 [0.0069] AU  
Ag = 1.13 [0.98] [0.13σ]  
Teffp = 8287 [1157] K [2.09σ]

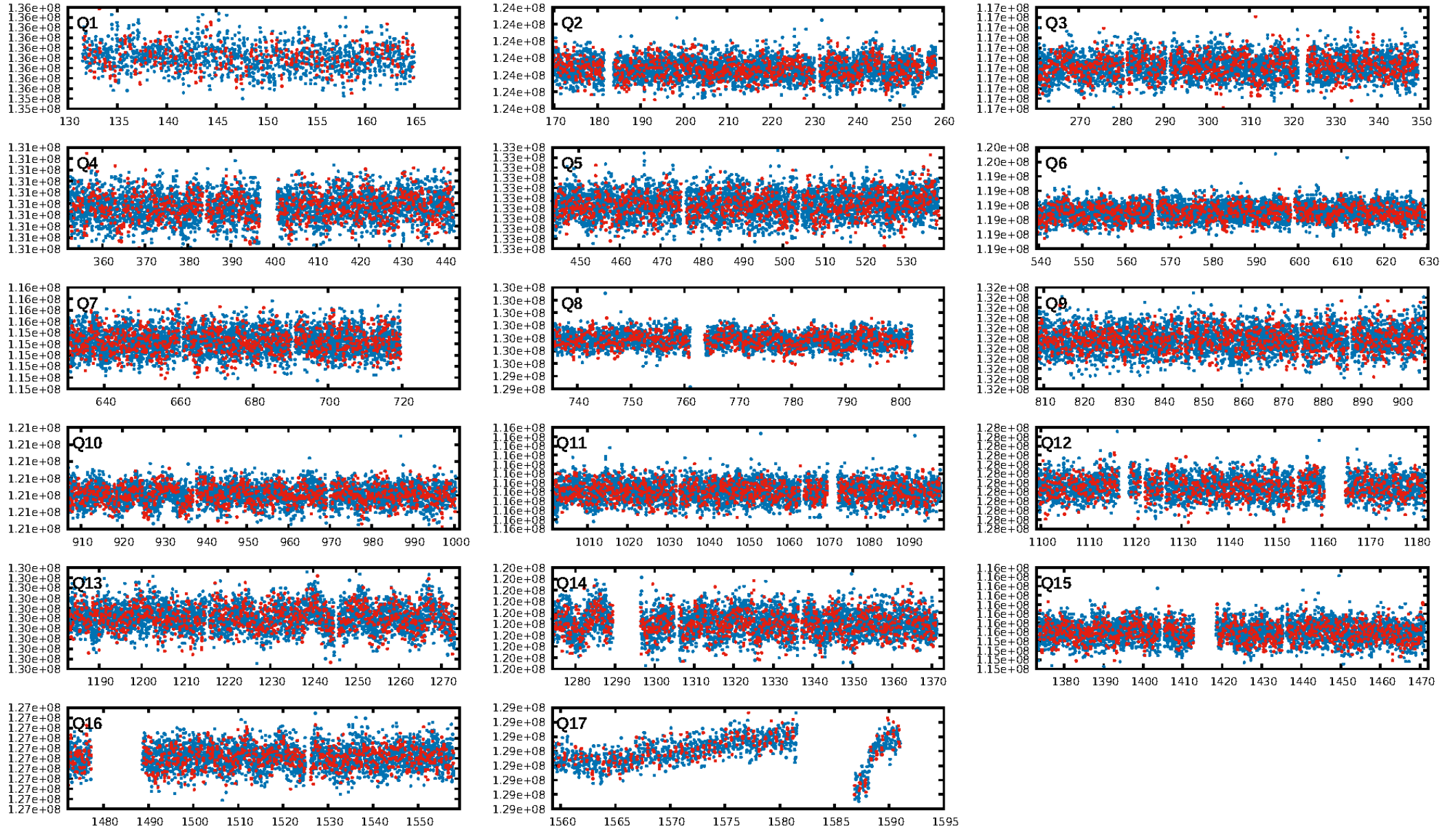
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 99.8% [3.07σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.87 [2185/2507]  
GhostDiagnostic-chr: 3.464  
Centroid-sig: 1.3%  
Centroid-so: 1.943 arcsec [2.07σ]  
OotOffset-rm: 0.483 arcsec [0.79σ]  
KicOffset-rm: 0.390 arcsec [0.64σ]  
OotOffset-st: 4/3/3/5 [15]  
KicOffset-st: 4/3/3/5 [15]  
DiffImageQuality-fgm: 0.73 [11/15]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 06:06:50 Z

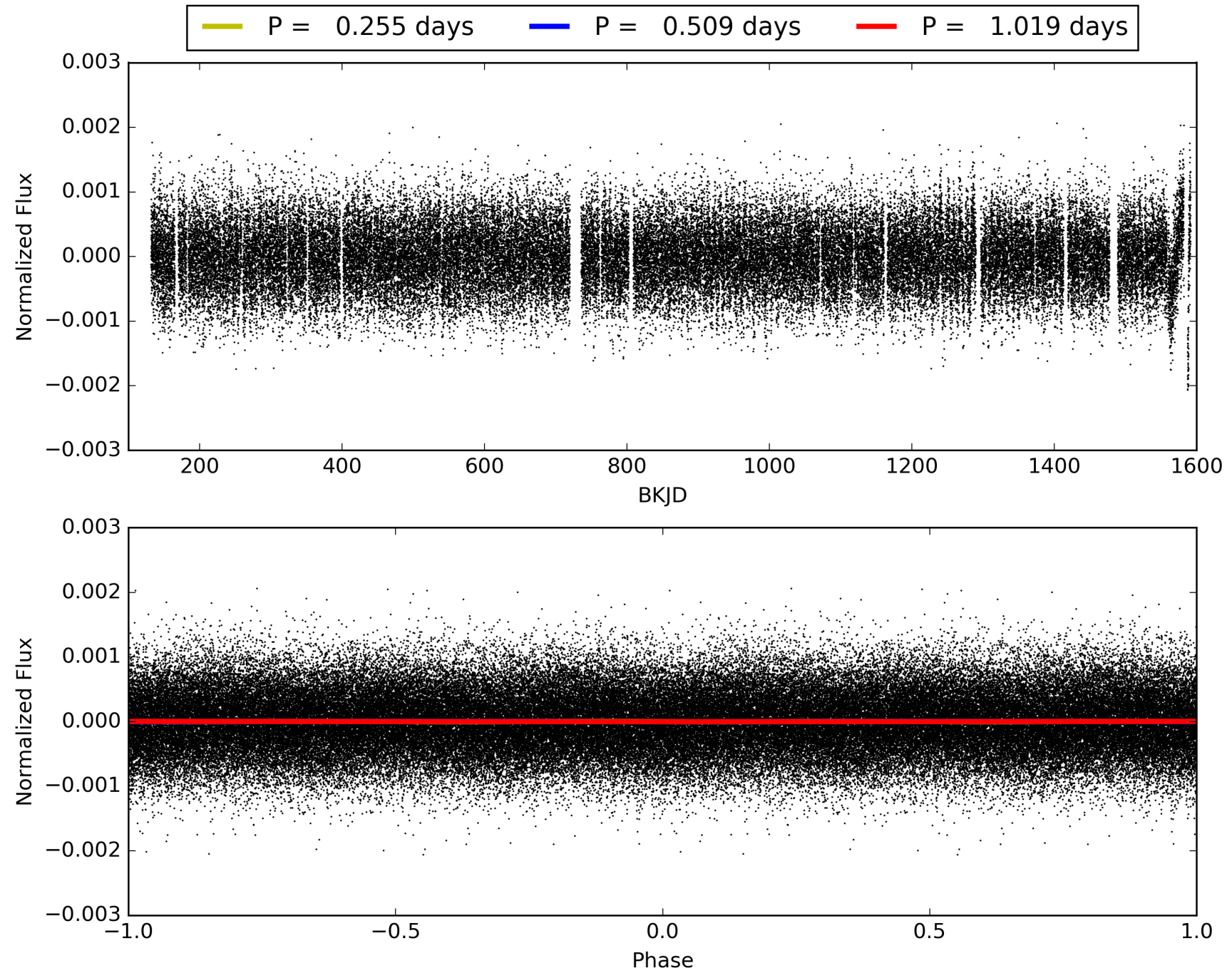
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 006470973-01, PDC Light Curves





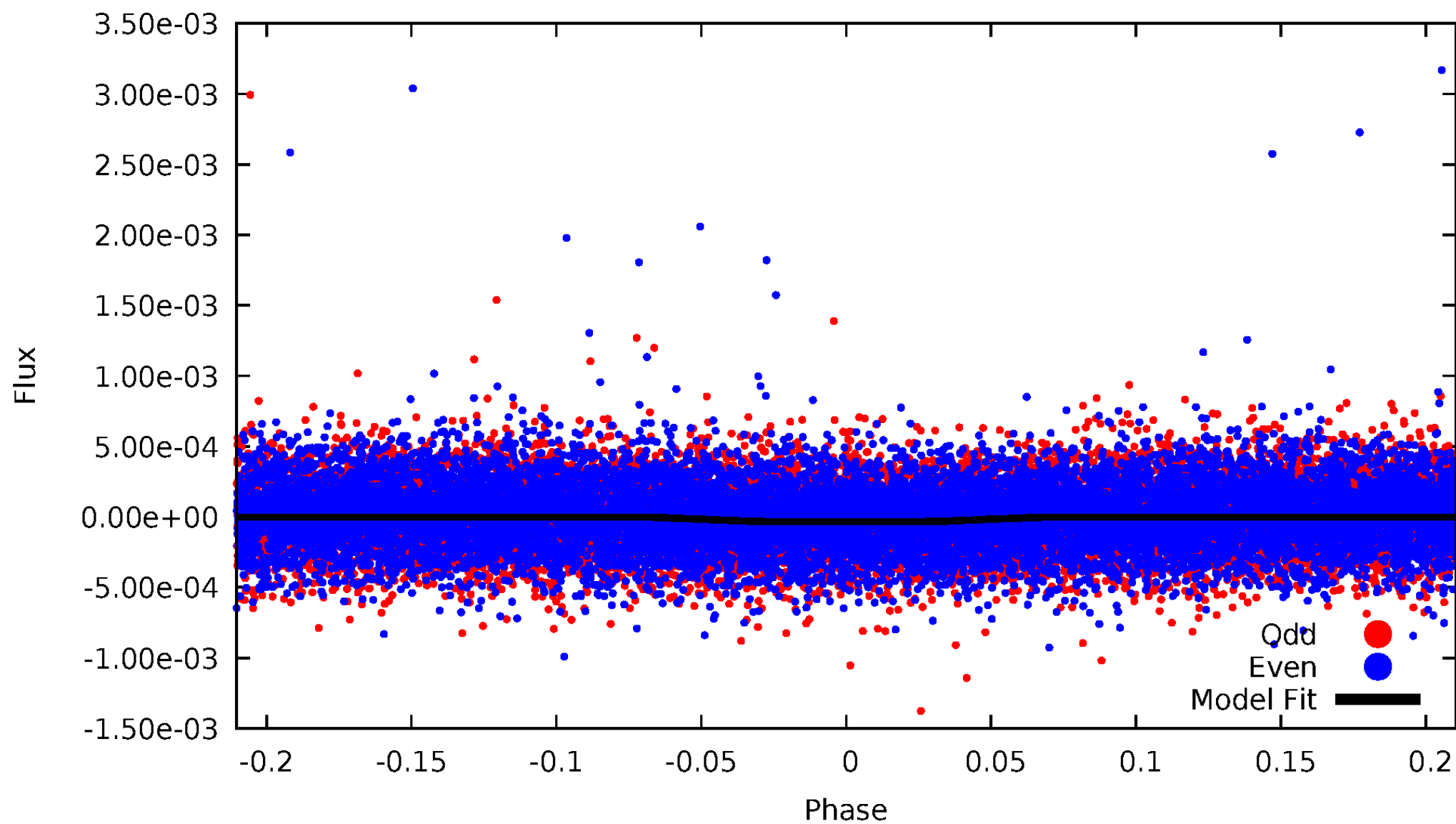
TCE 006470973-01





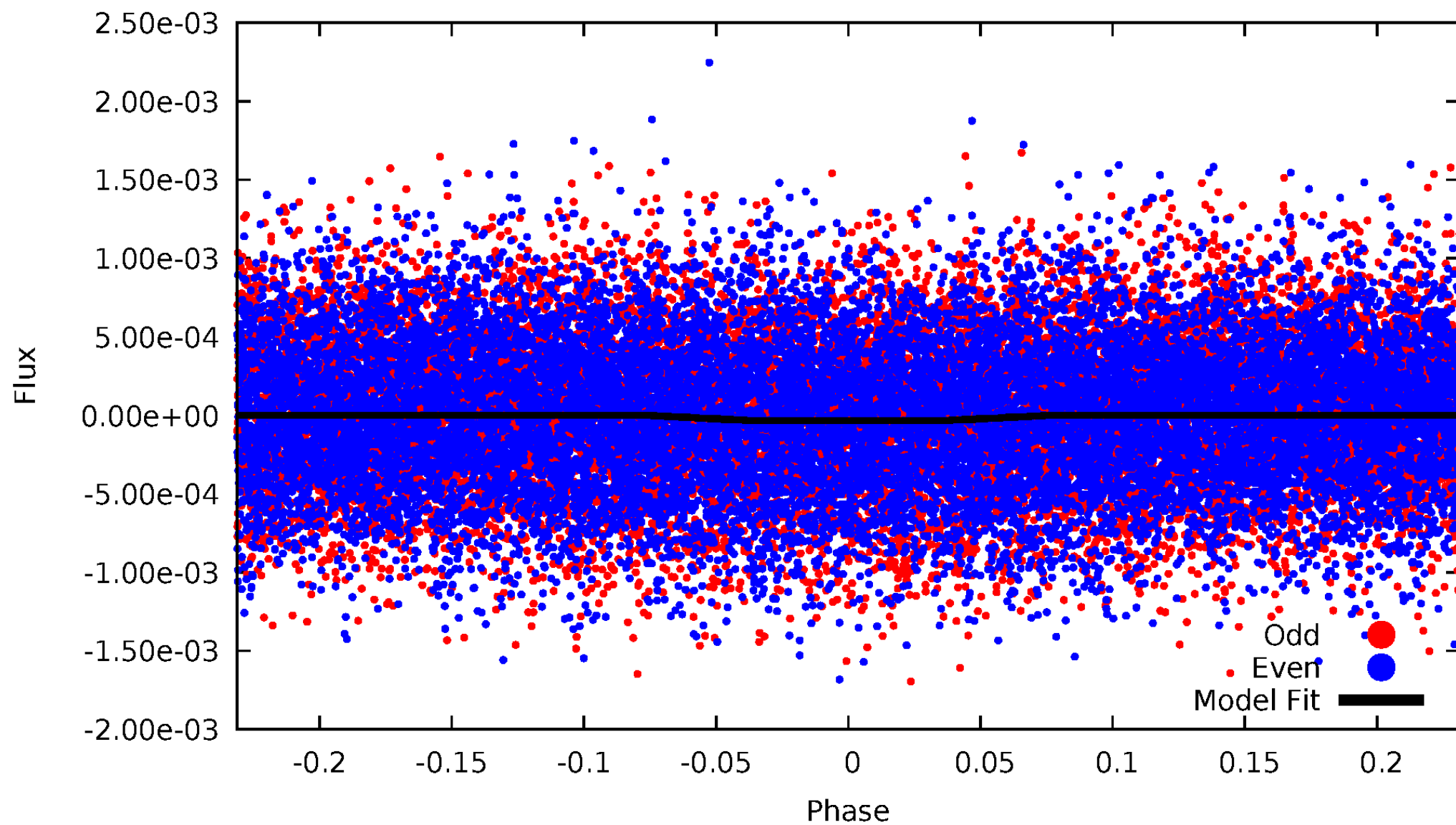
# DV Odd/Even

TCE 006470973-01

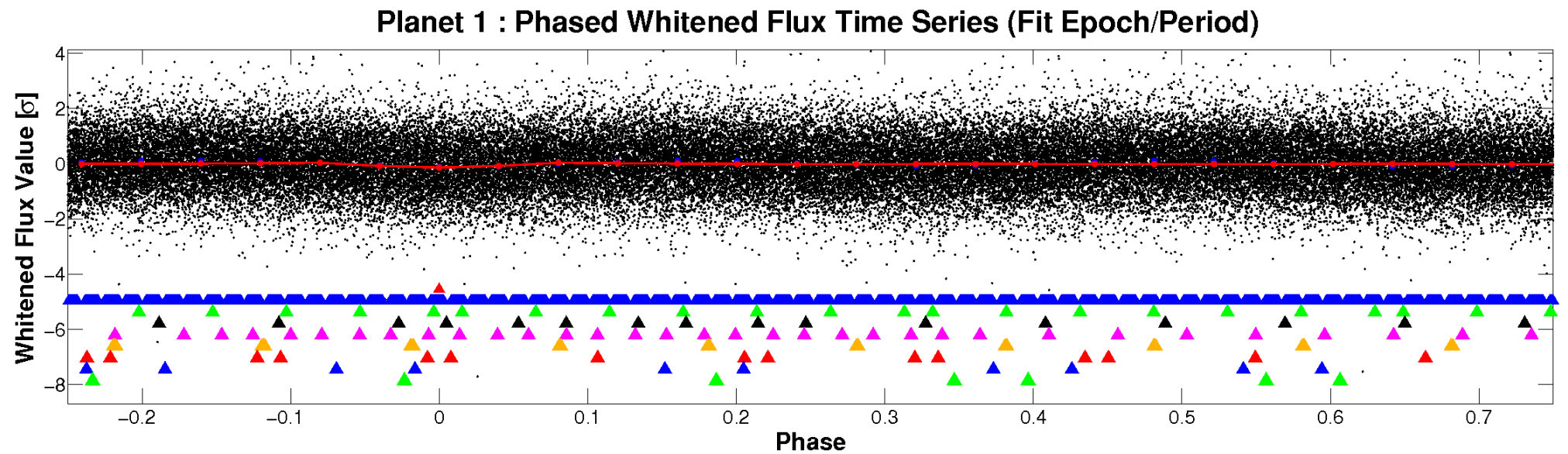
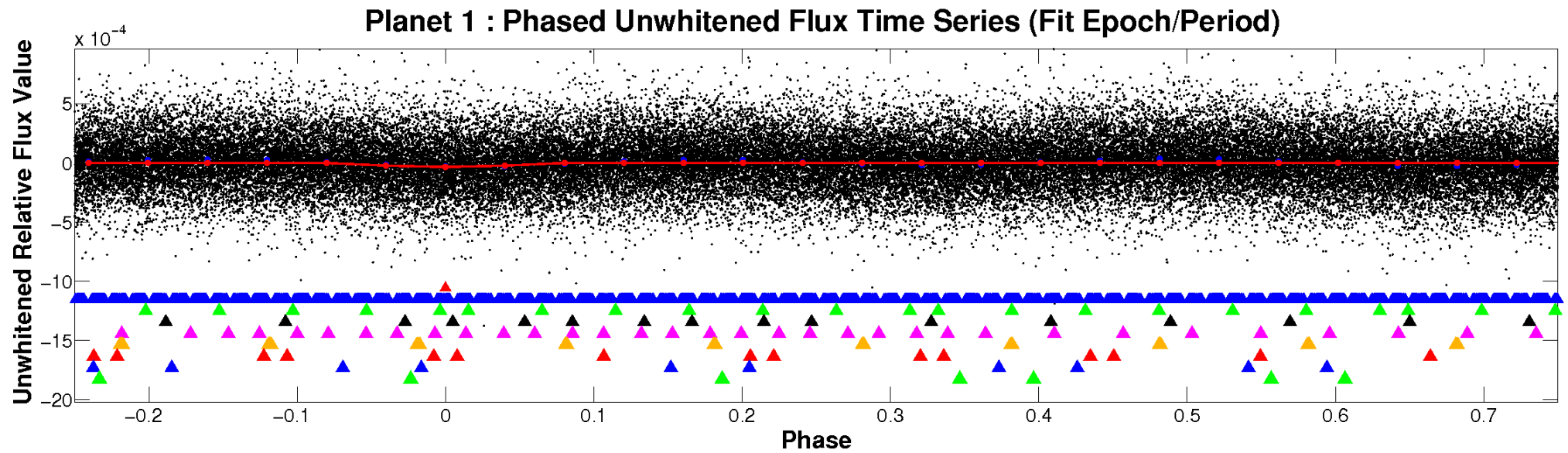


# ALT Odd/Even

TCE 006470973-01



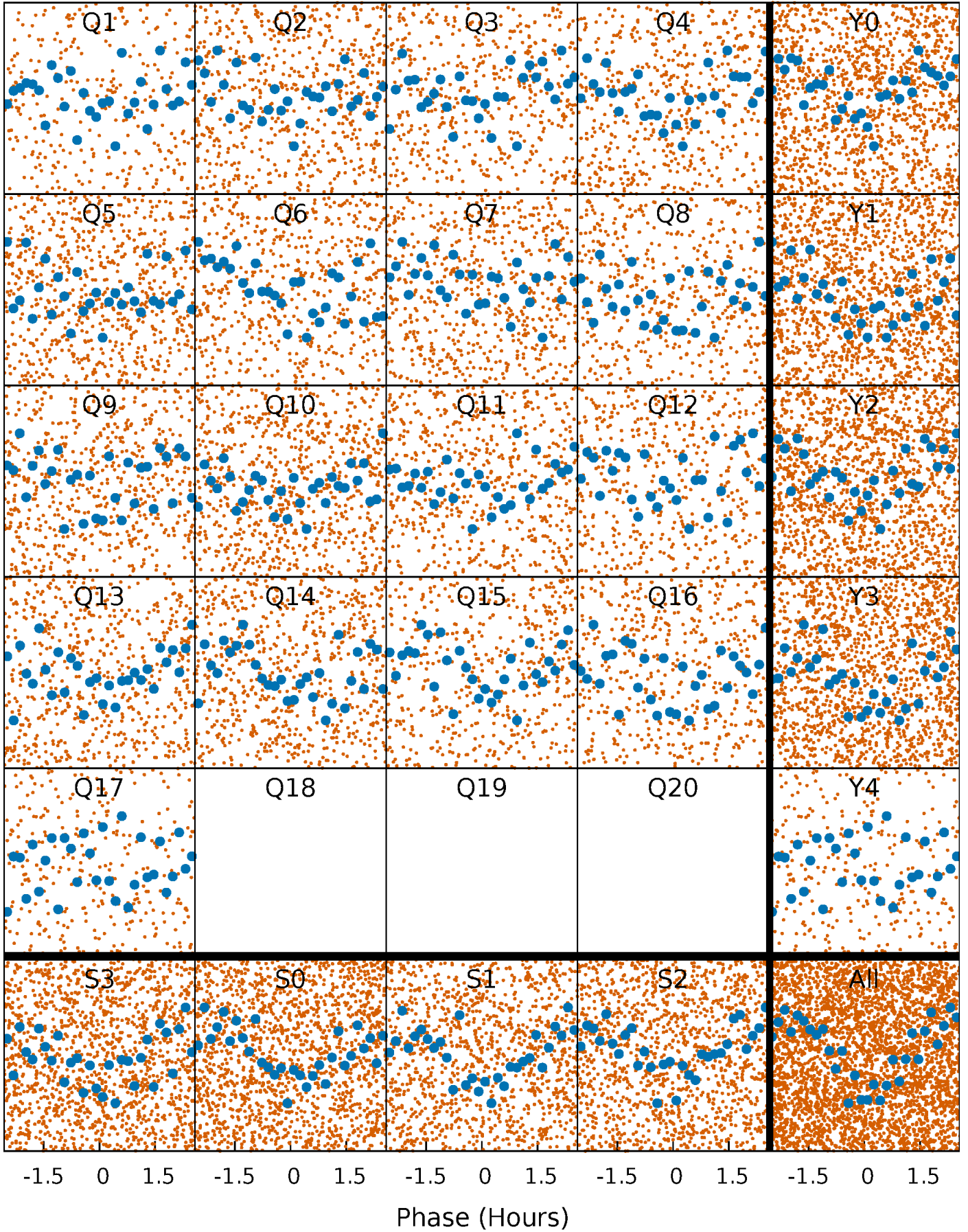
# Non-Whitened Vs. Whitened Light Curve





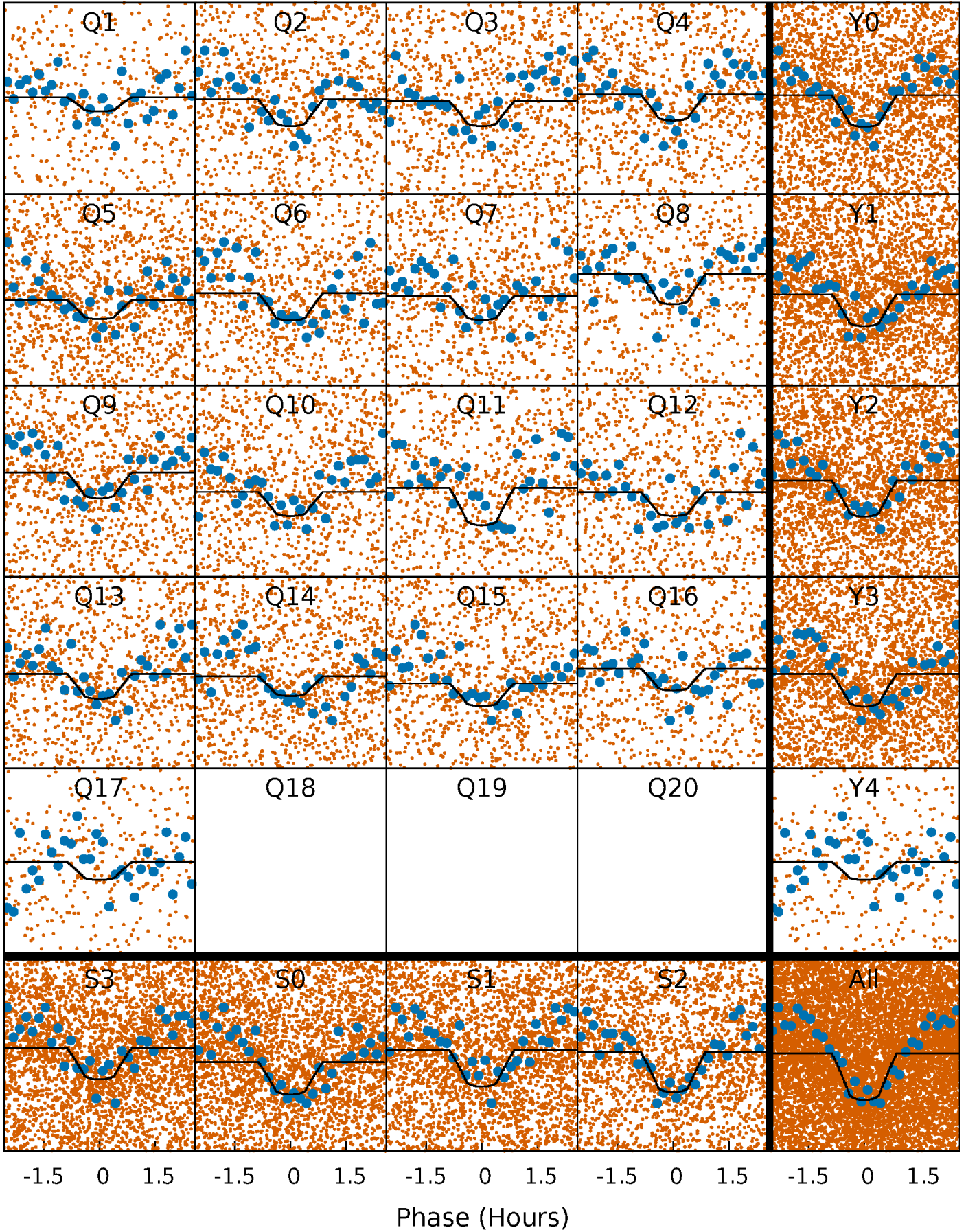
# PDC Quarter-Phased Transit Curves

TCE 006470973-01 P= 0.509313 Days  $T_0=131.708781$  (BKJD)



# DV Quarter-Phased Transit Curves

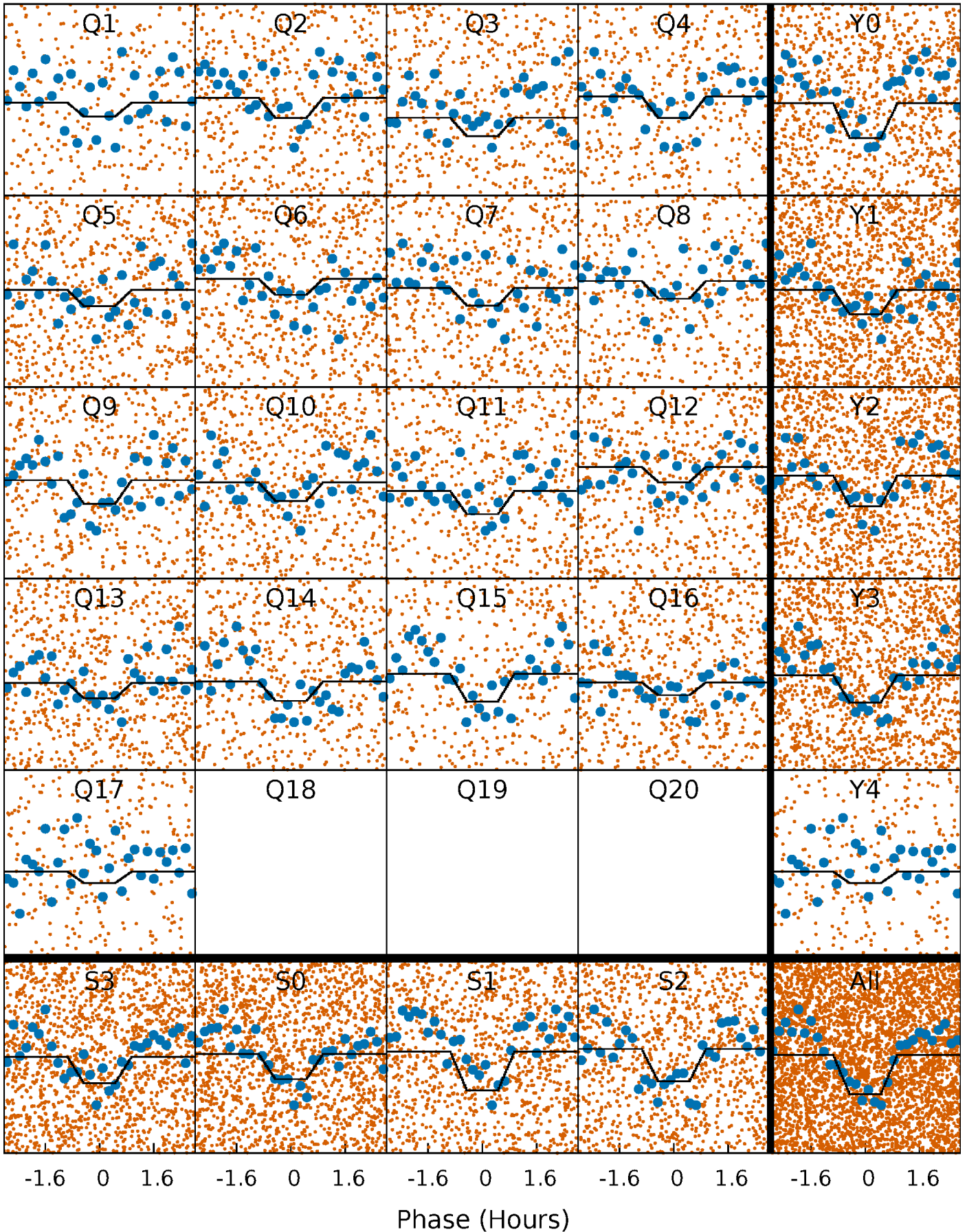
TCE 006470973-01 P= 0.509313 Days  $T_0=131.708781$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 006470973-01 P= 0.509317 Days  $T_0=131.708706$  (BKJD)

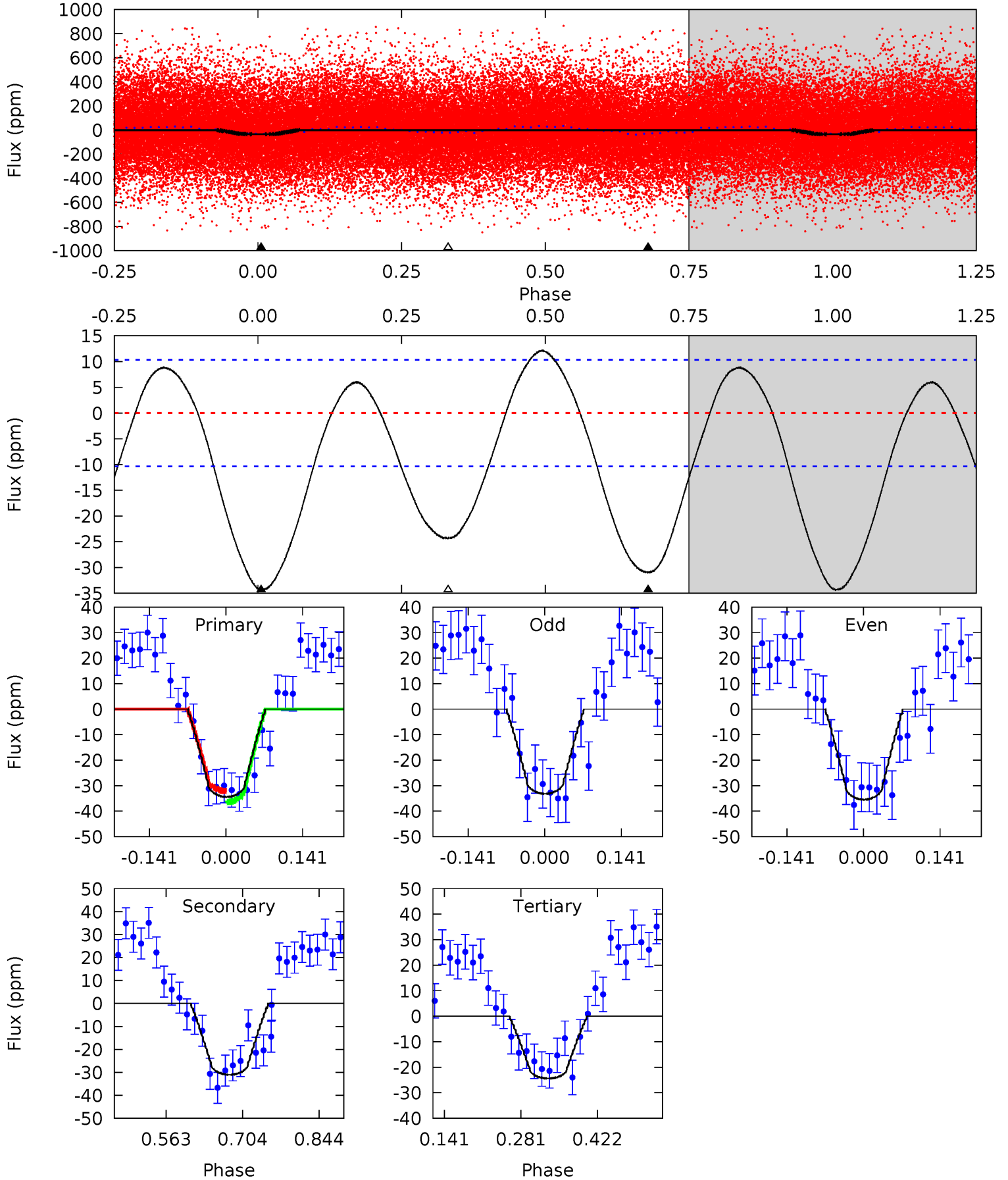




# DV Model-Shift Uniqueness Test

006470973-01, P = 0.509313 Days, E = 131.199468 Days

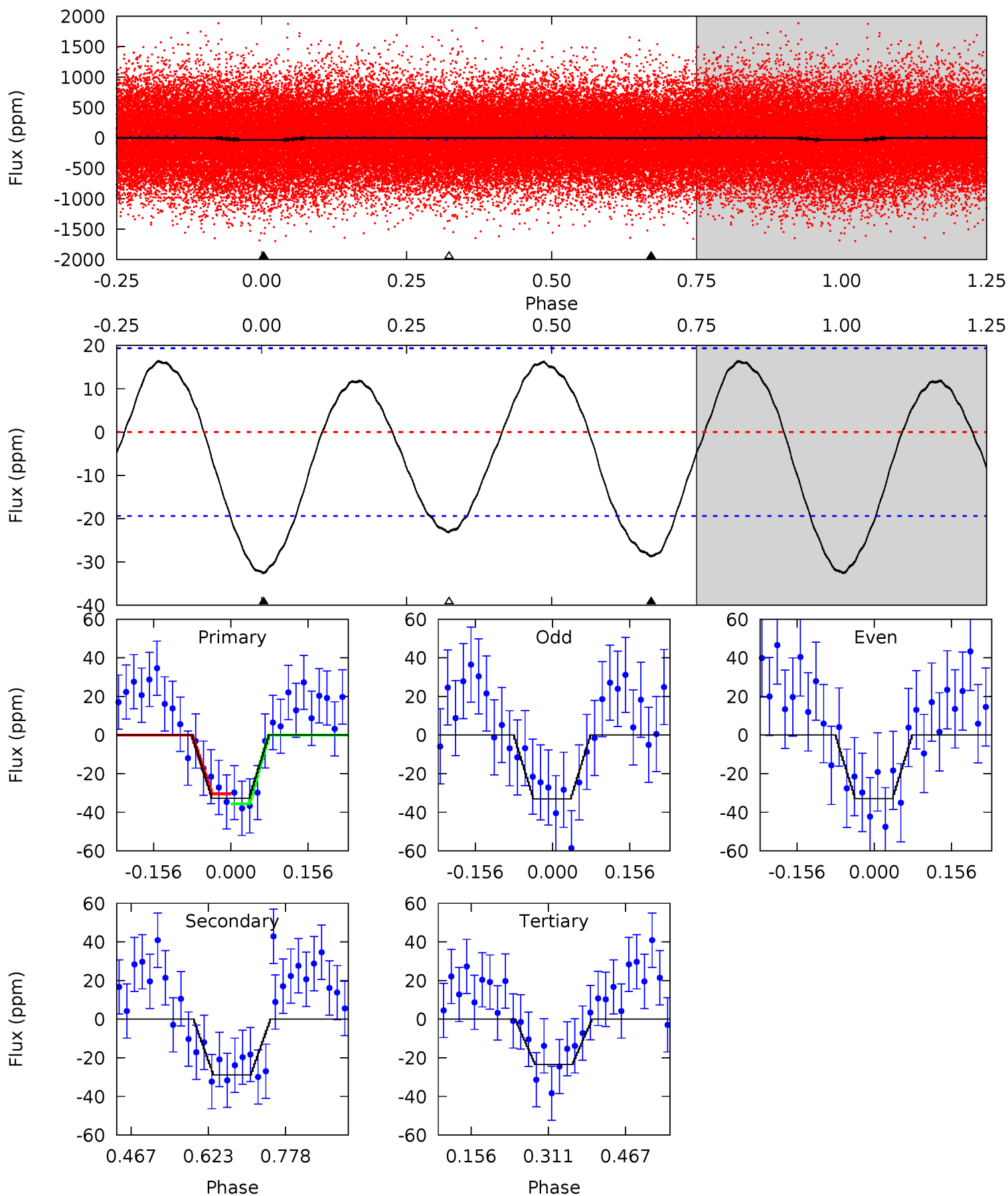
| Pri  | Sec  | Ter  | Pos | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 14.9 | 13.5 | 10.6 | 0   | 4.49            | 1.47            | 5.48             | 4.35    | 14.9    | 2.89    | 13.5    | 0.50    | 0.90 | 0.26  | 0.95 |



# Alt Model-Shift Uniqueness Test

006470973-01, P = 0.509317 Days, E = 131.199389 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  |
|------|------|------|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 7.56 | 6.67 | 5.39 | 0   | 4.47            | 1.42            | 3.18             | 2.17    | 7.56    | 1.28    | 6.67    | 0.01    | 2.10 | 0.34  | 0.58 |



### Stellar Parameters For KIC 006470973

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R$ ( $R_{\odot}$ )       | $M(M_{\odot})$            | $p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ ) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $8548^{+237}_{-356}$ | $3.785^{+0.400}_{-0.075}$ | $-0.300^{+0.300}_{-0.350}$ | $2.976^{+0.562}_{-1.406}$ | $1.971^{+0.382}_{-0.466}$ | $0.105^{+0.371}_{-0.033}$                     |
|        | +3%/-4%              | +11%/-2%                  | +100%/-117%                | +19%/-47%                 | +19%/-24%                 | +353%/-31%                                    |
| Source | KIC0                 | 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 006470973-01 / KOI

| Detrend | Depth (ppm) | $R_p$ ( $R_{\oplus}$ ) | $T_{\text{max}}$ (K) | $T_{\text{obs}}$ (K)   | $A_{\text{obs}}$          |
|---------|-------------|------------------------|----------------------|------------------------|---------------------------|
| DV      | $-31 \pm 2$ | $1.69^{+0.55}_{-0.52}$ | $7018^{+493}_{-768}$ | $7803^{+2150}_{-1323}$ | $1.498^{+1.623}_{-0.646}$ |
| Alt.    | $-29 \pm 4$ | $1.68^{+0.54}_{-0.55}$ | $7016^{+465}_{-713}$ | $7663^{+1950}_{-1354}$ | $1.395^{+1.482}_{-0.601}$ |

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature  
 $T_{\text{obs}}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )  
 $A_{\text{obs}}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{\text{obs}} \gg T_{\text{max}}$  AND  $A_{\text{obs}} \gg 1.0$



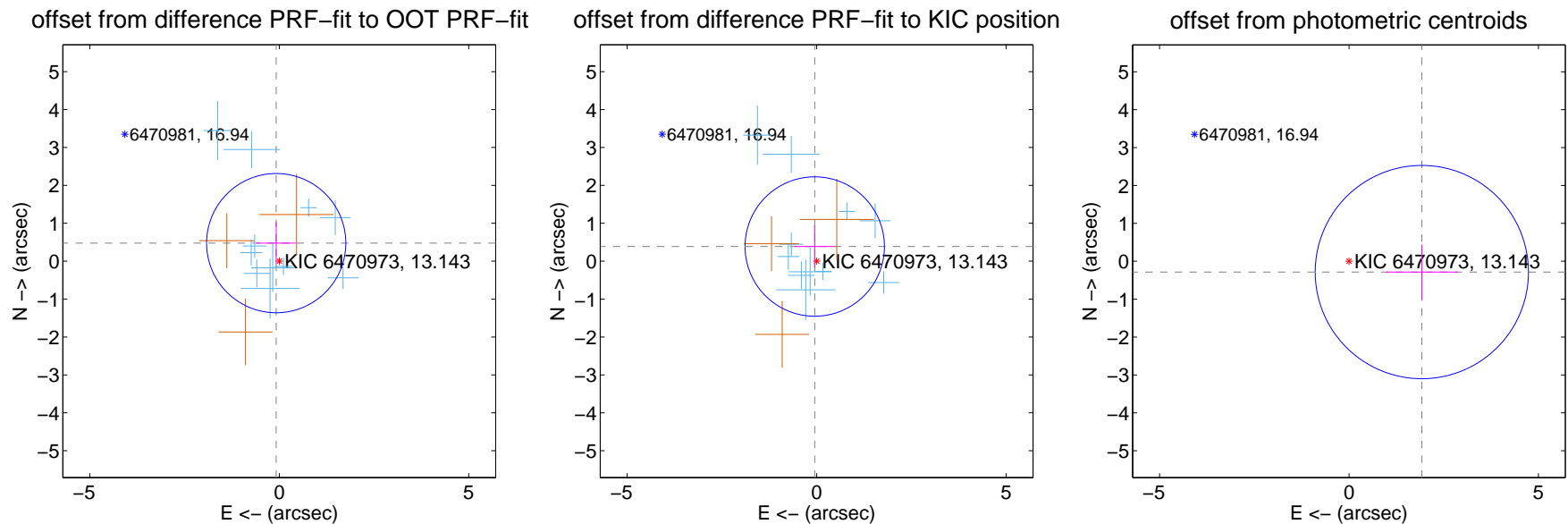
## DV Centroid Data

Supplemental centroid analysis for 006470973-01. Kepler magnitude: 13.14. Transit SNR 9.78

There are 11 quarters with good PRF difference image offsets

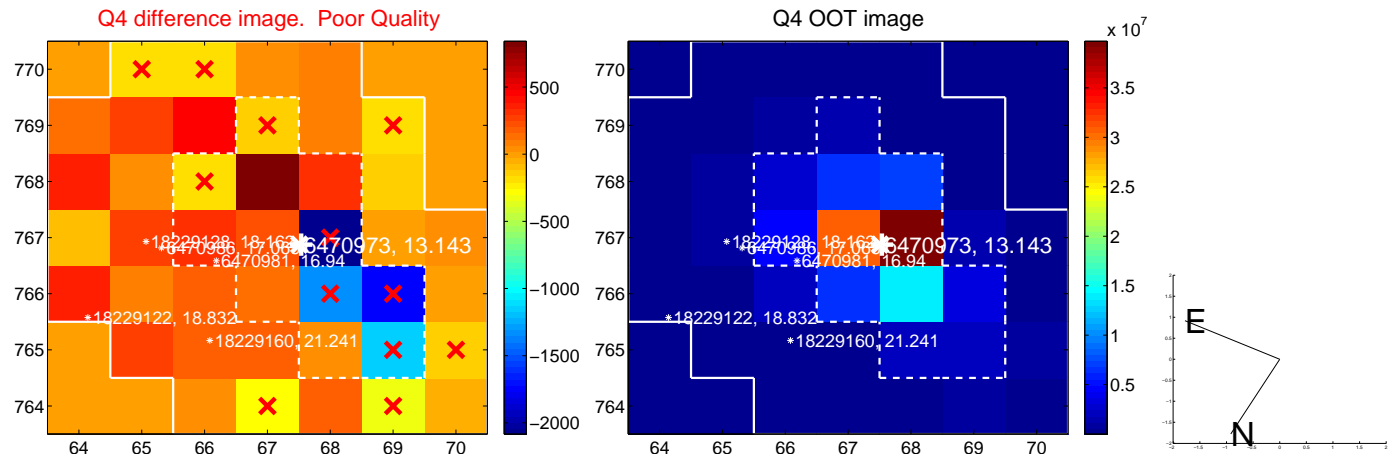
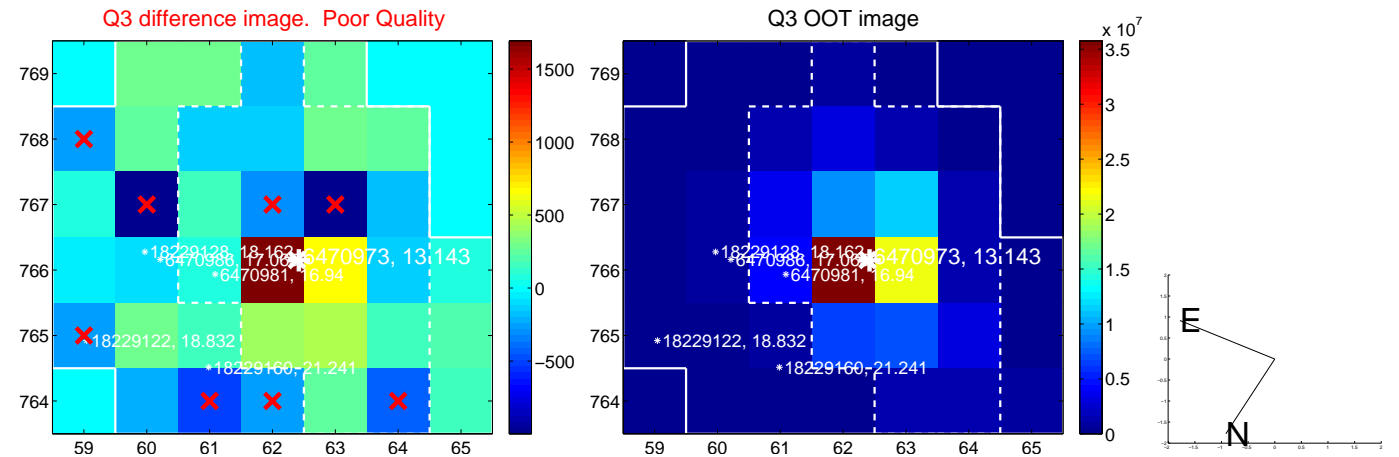
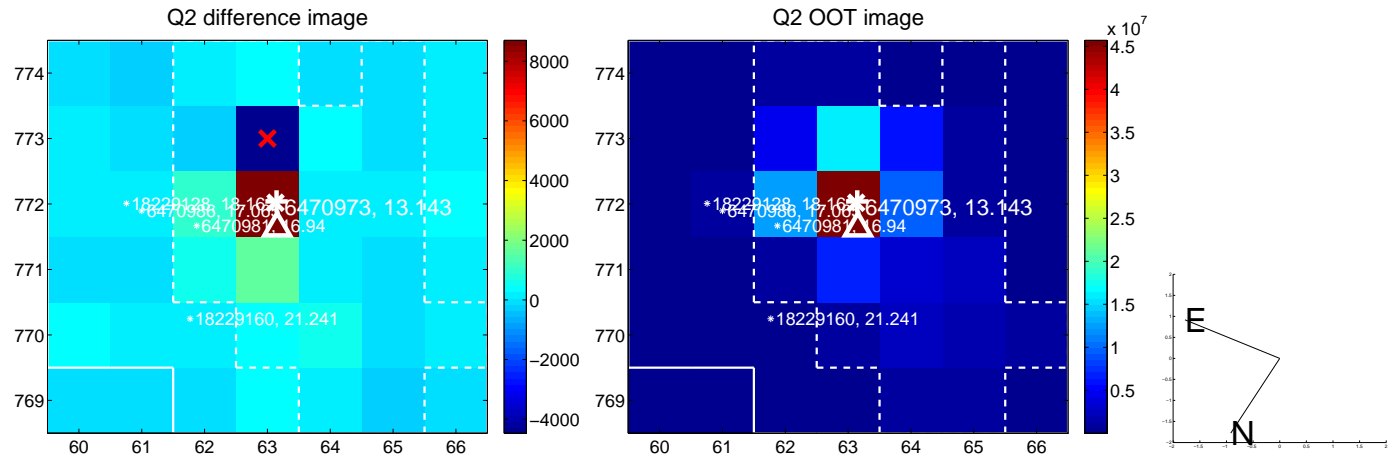
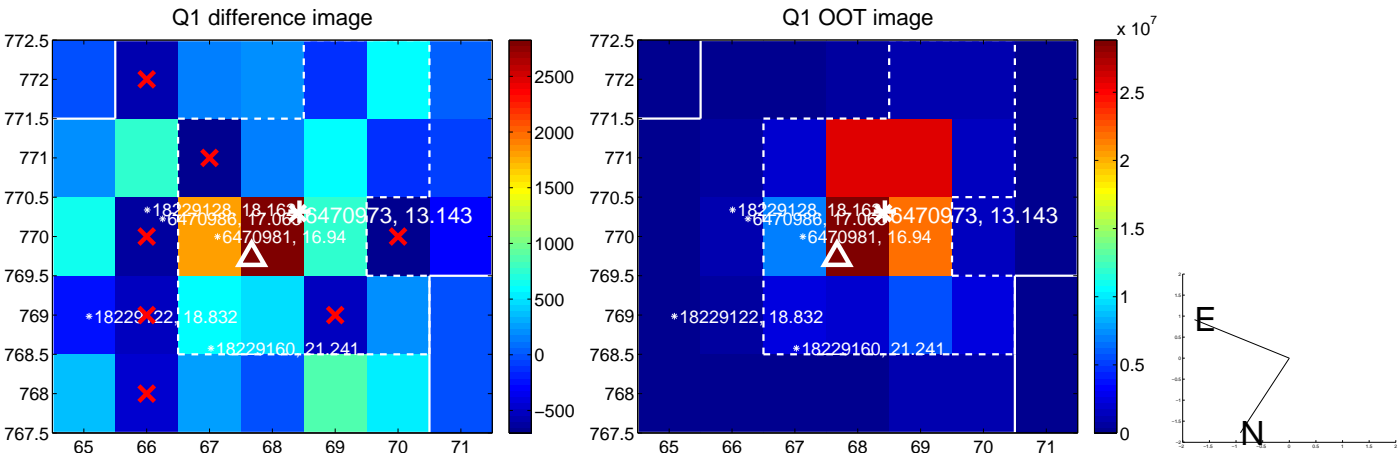
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA       | $\Delta$ Dec      |
|---|--------------------|---------------------|-------------------|-------------------|
| PRF-fit source offset from OOT          | $0.483 \pm 0.612$  | 0.79                | $0.082 \pm 0.517$ | $0.476 \pm 0.554$ |
| PRF-fit source offset from KIC position | $0.390 \pm 0.613$  | 0.64                | $0.051 \pm 0.533$ | $0.387 \pm 0.563$ |
| photometric centroid source offset      | $1.94 \pm 0.94$    | 2.07                | $-1.92 \pm 0.94$  | $-0.28 \pm 0.72$  |

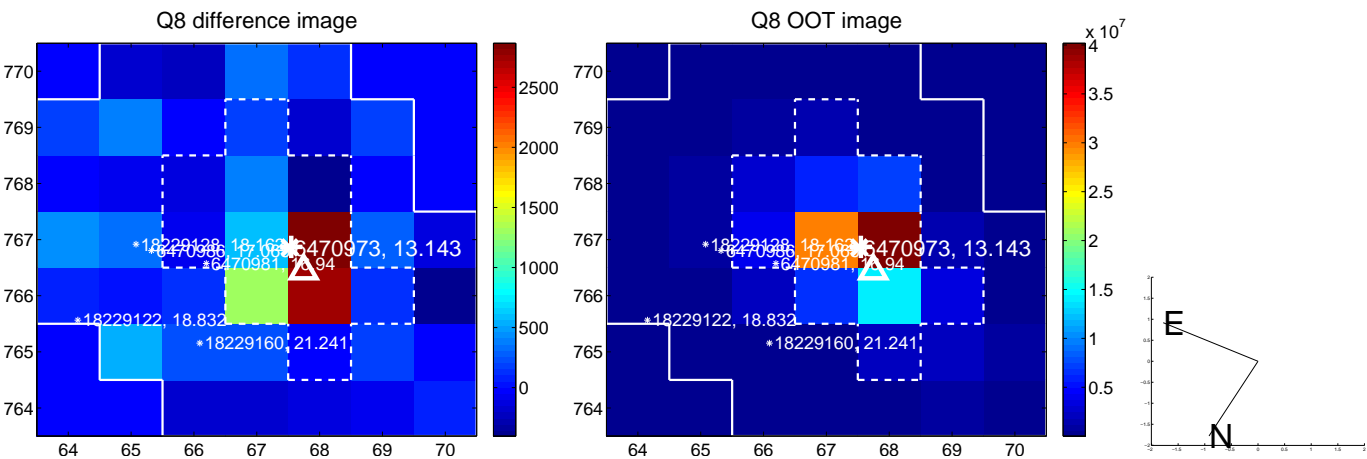
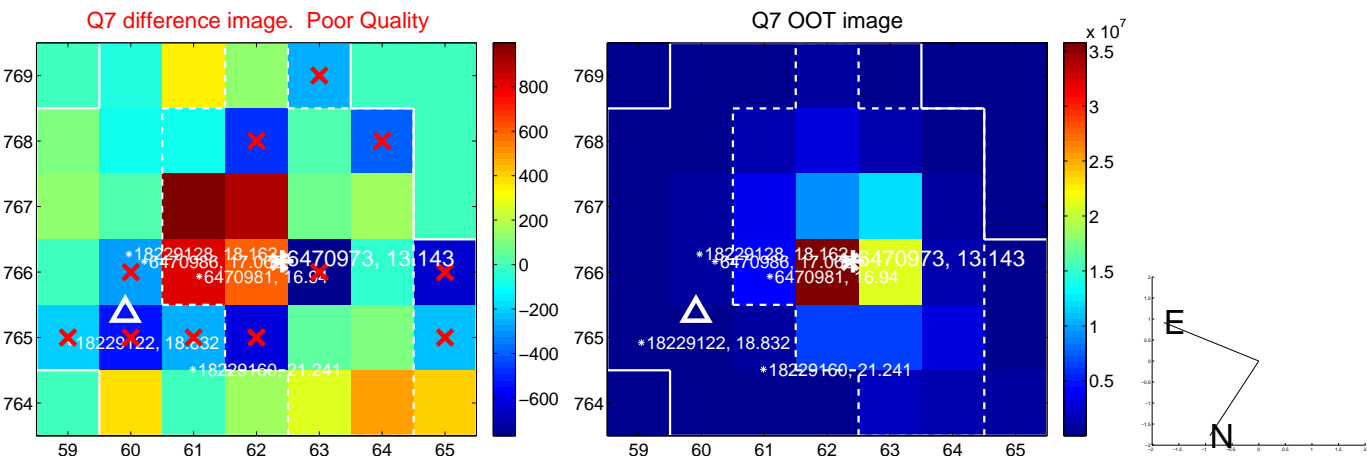
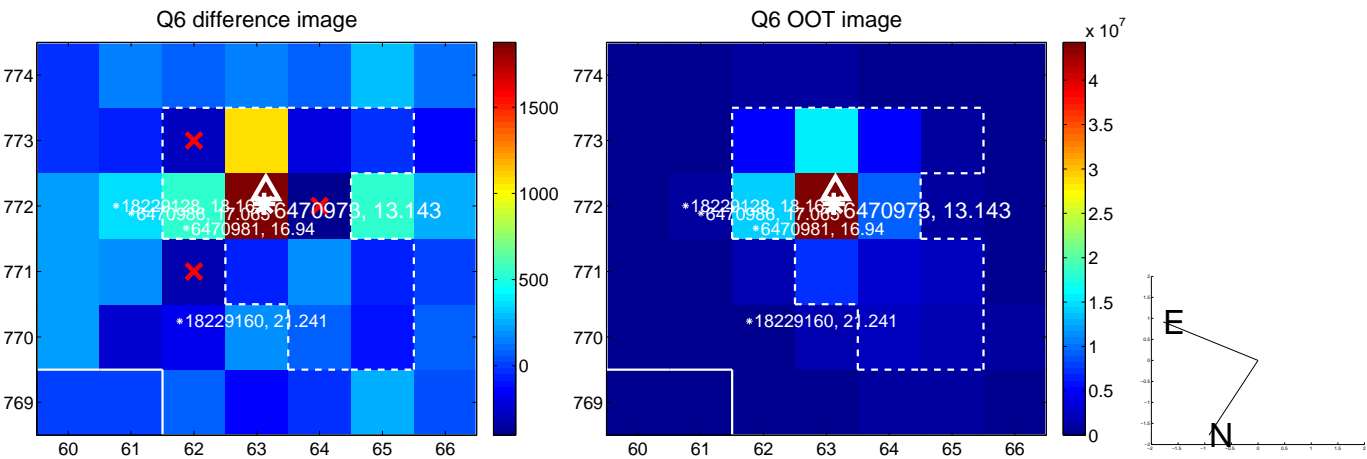
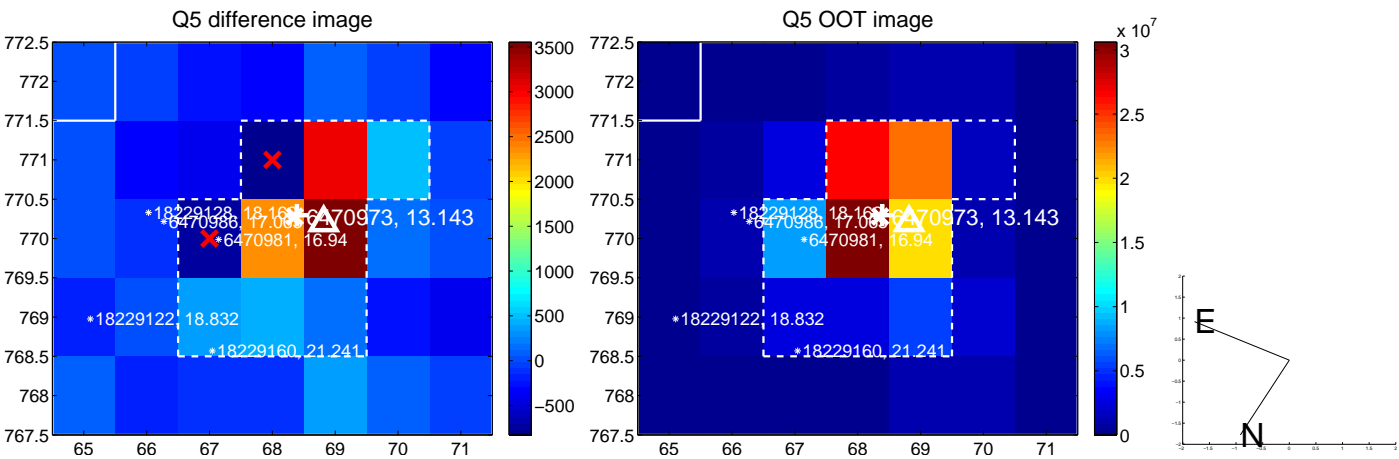


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

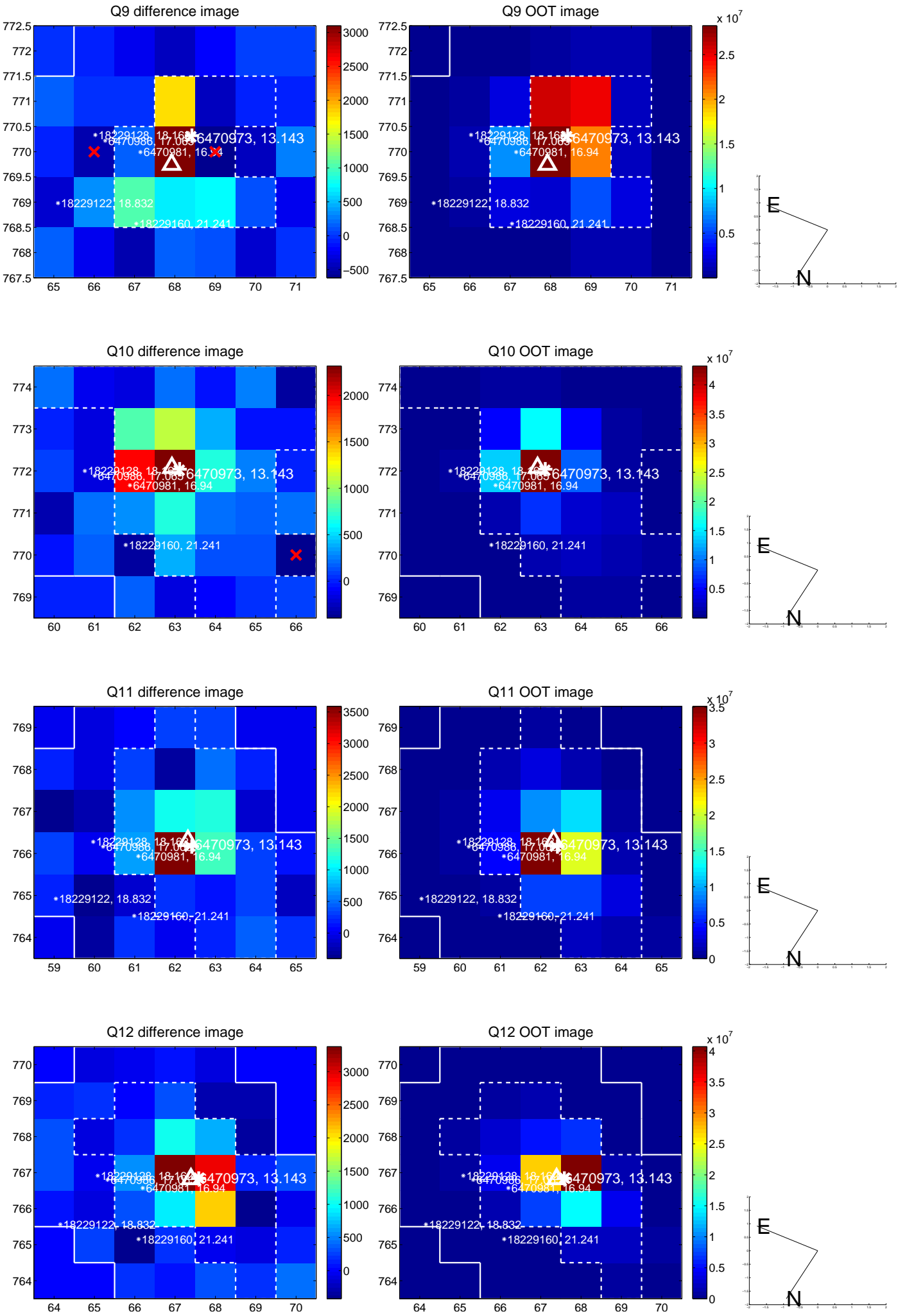


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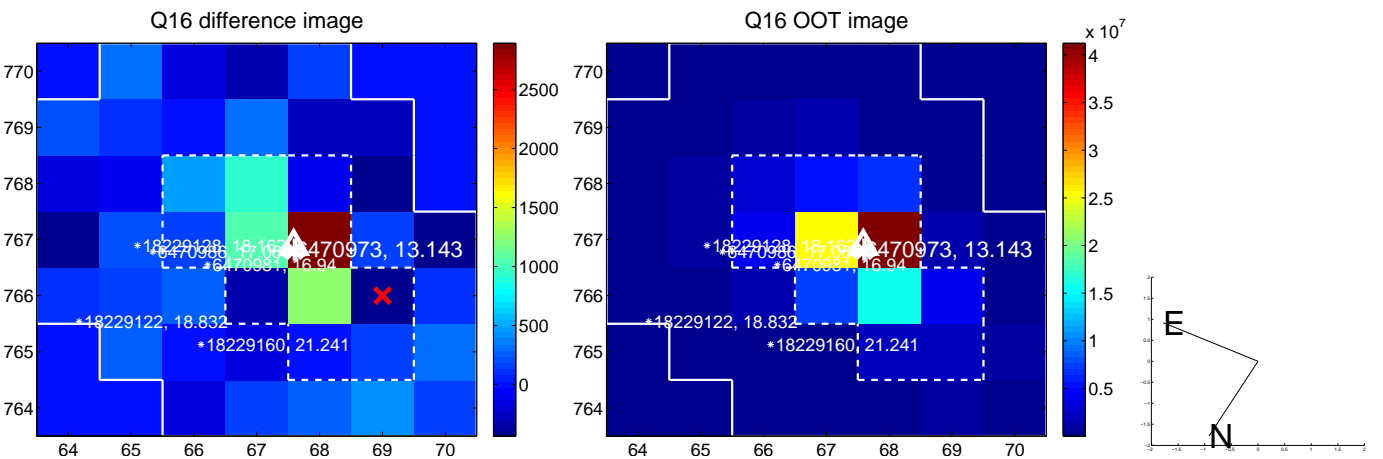
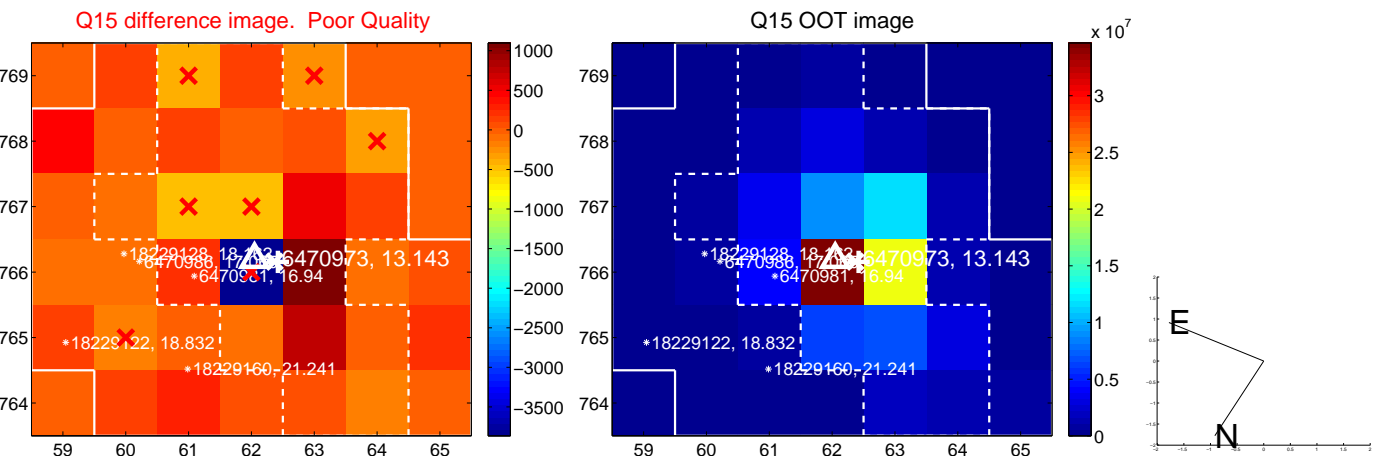
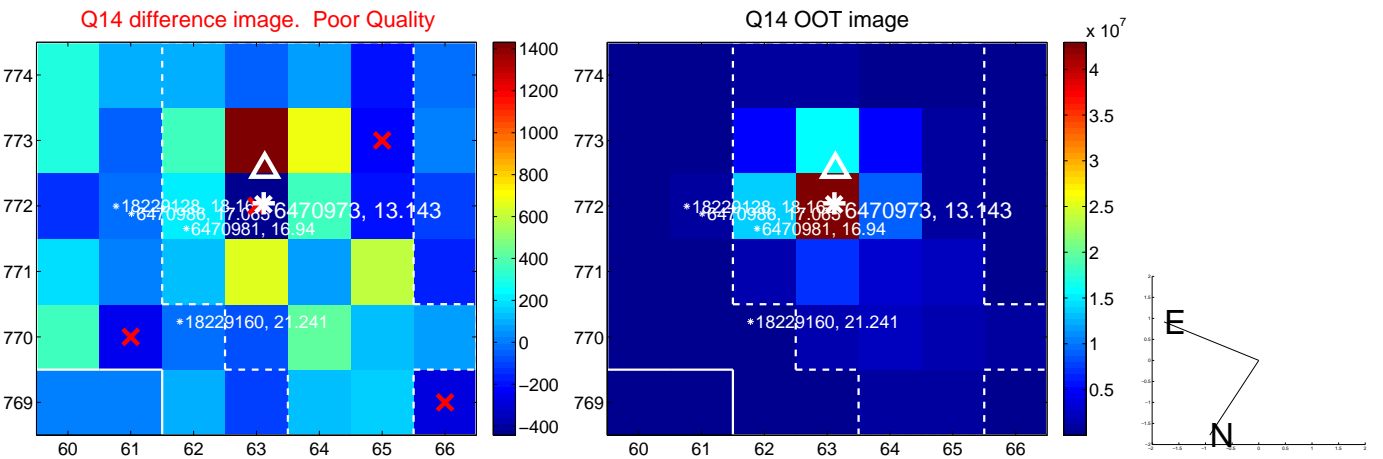
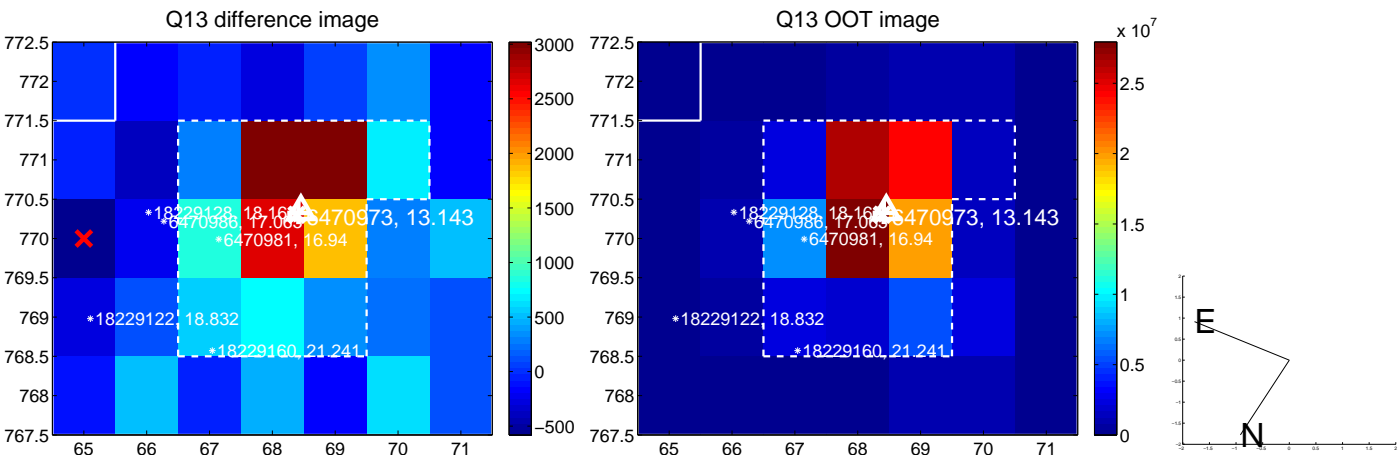




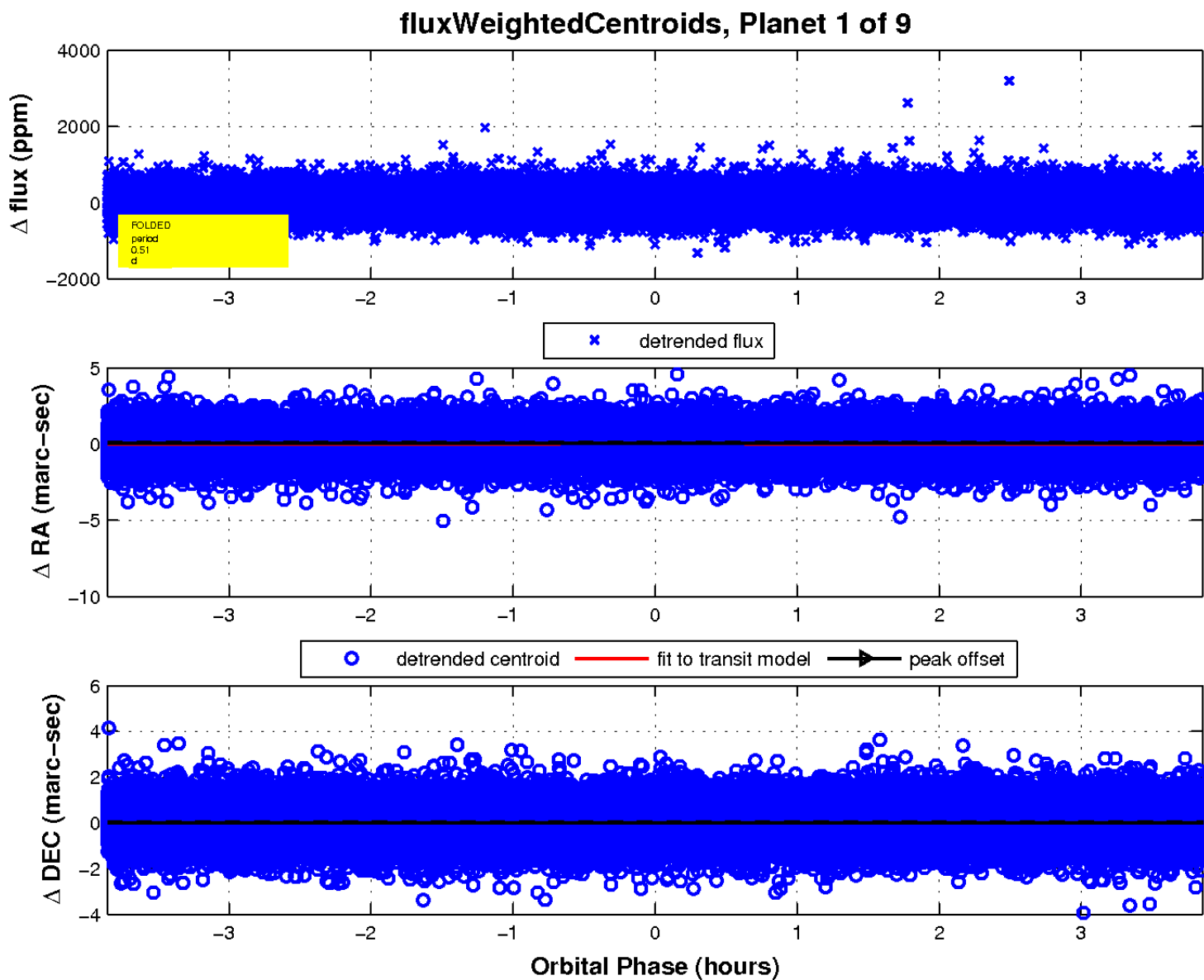
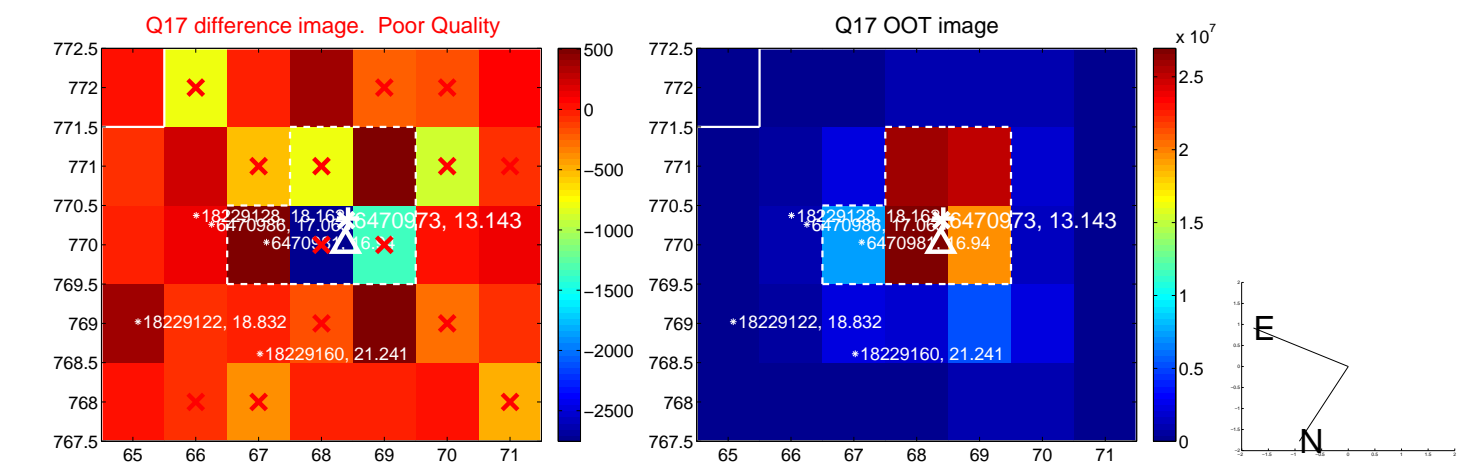
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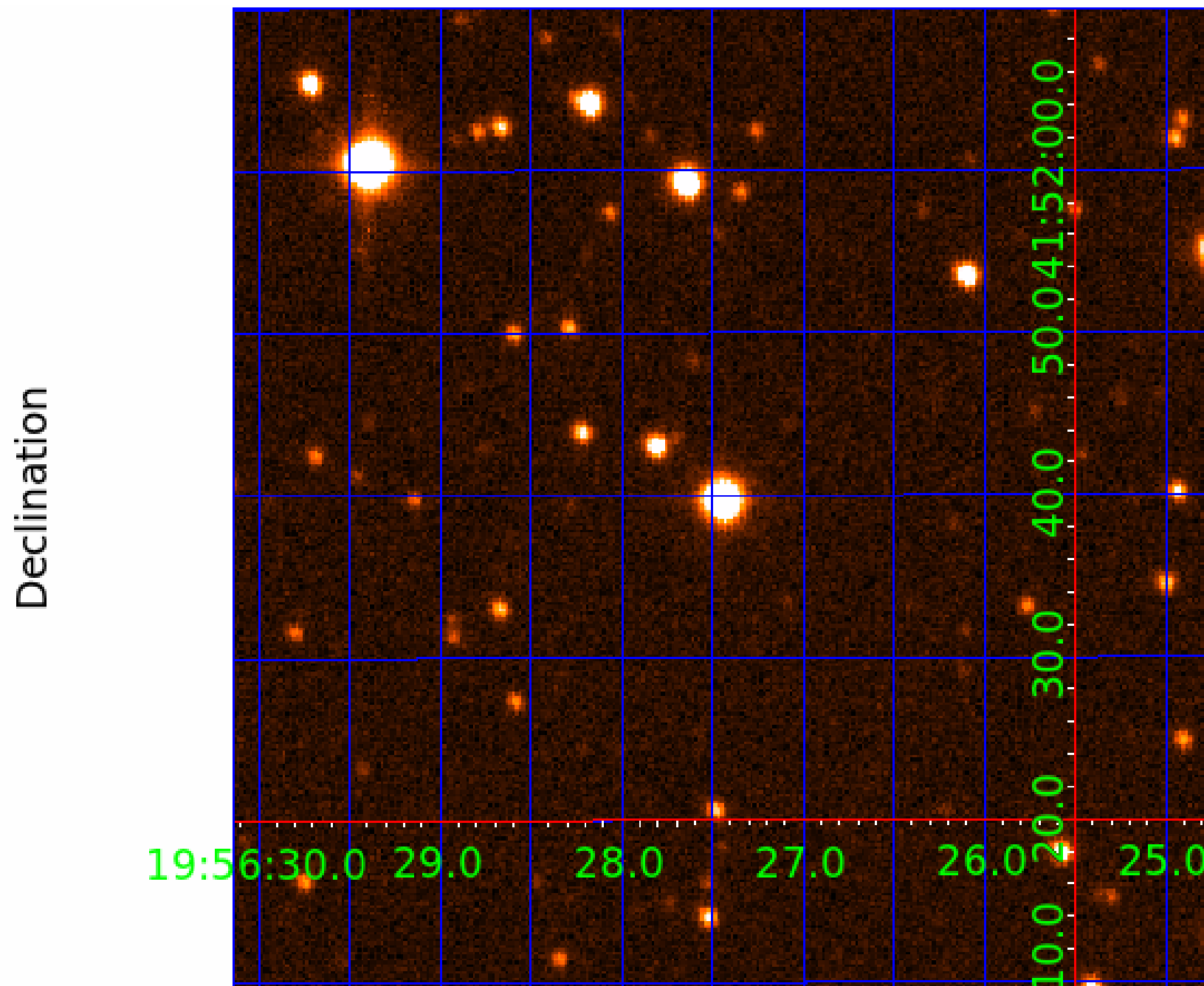
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UKIRT Image





# KIC 006470973

## 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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| 006470973-09 | OBS      | No   | 203.109072    | 227.259250   | 243.1       | 6.000            | 8.5  | -1.0 | 2.98                        | 8548            | 4.71                   | 58.95                  |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 006470973-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT   |
| 006470973-02 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT   |
| 006470973-03 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT  |
| 006470973-04 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS |
| 006470973-05 | 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   |
| 006470973-06 | OBS      | FP   | 0.00  | 1 | 0 | 1 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—HALO_GHOST                        |
| 006470973-07 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT  |
| 006470973-09 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—CENT_NOFITS   |

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

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

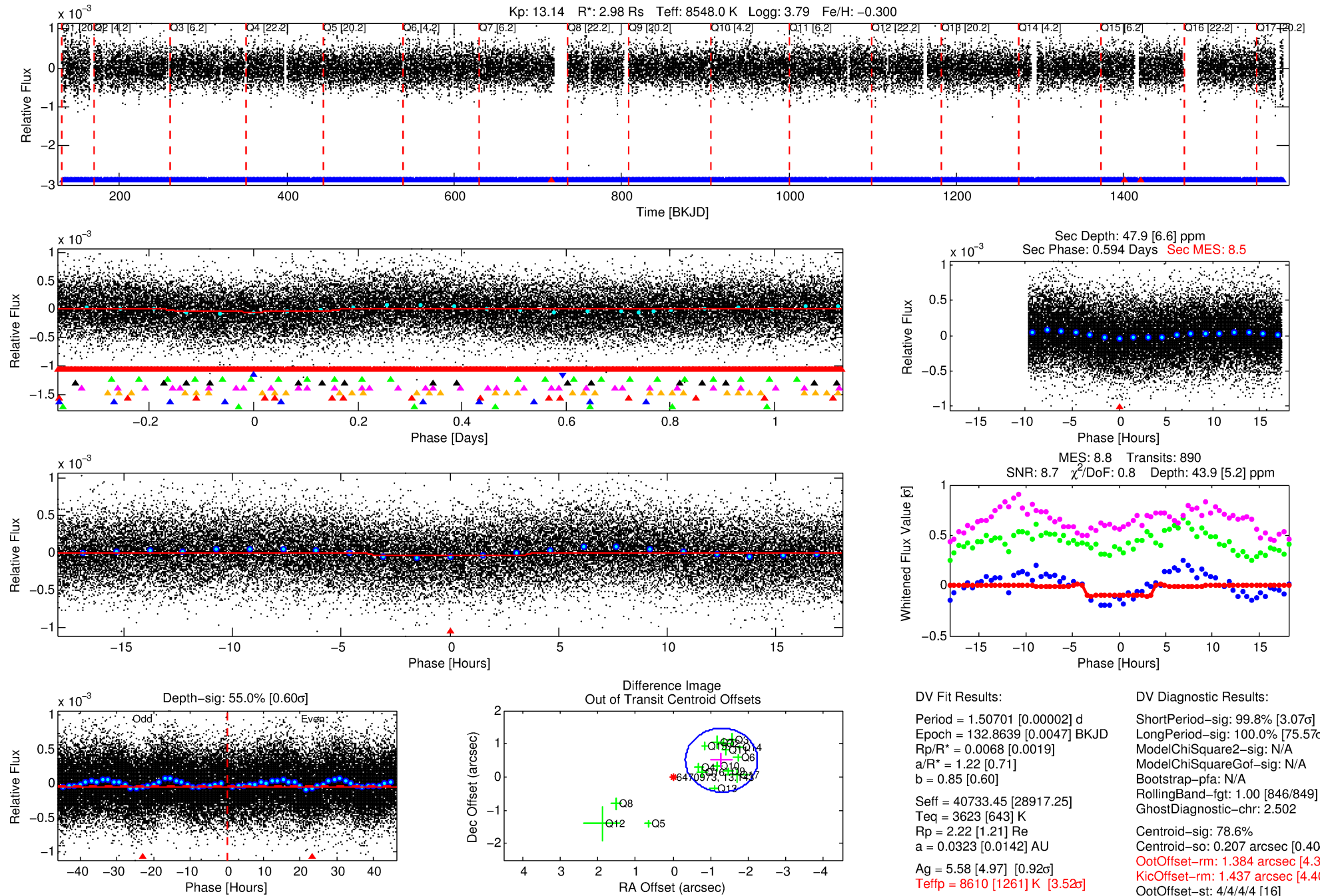
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006470973-02

No Significant Match Found

# DV One-Page Summary

KIC: 6470973 Candidate: 2 of 9 Period: 1.507 d



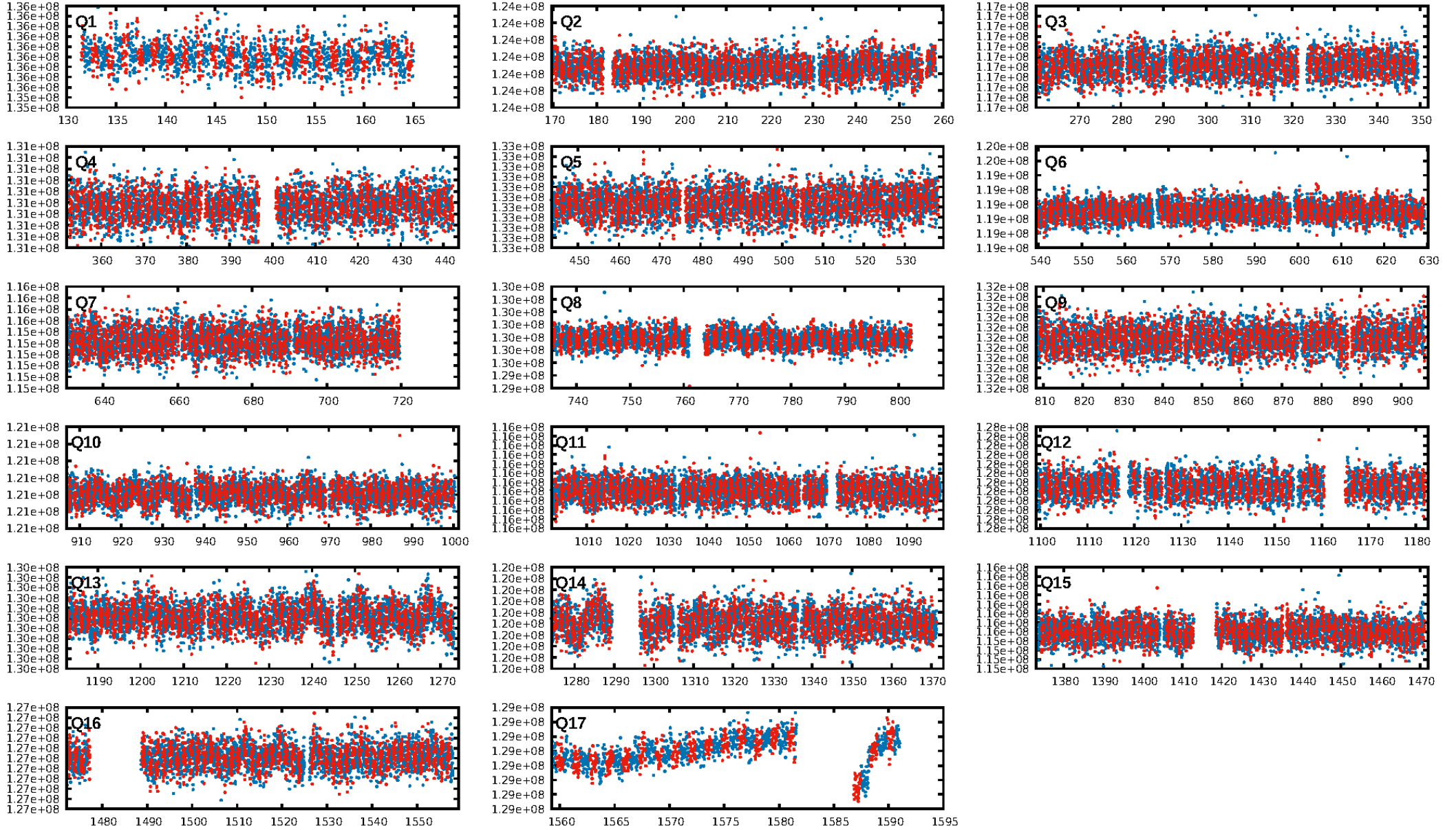
## DV Fit Results:

Period = 1.50701 [0.00002] d  
Epoch = 132.8639 [0.0047] BKJD  
Rp/R\* = 0.0068 [0.0019]  
a/R\* = 1.22 [0.71]  
b = 0.85 [0.60]  
Seff = 40733.45 [28917.25]  
Teff = 3623 [643] K  
Rp = 2.22 [1.21] Re  
a = 0.0323 [0.0142] AU  
Ag = 5.58 [4.97] [0.92σ]  
Teffp = 8610 [1261] K [3.52σ]

## DV Diagnostic Results:

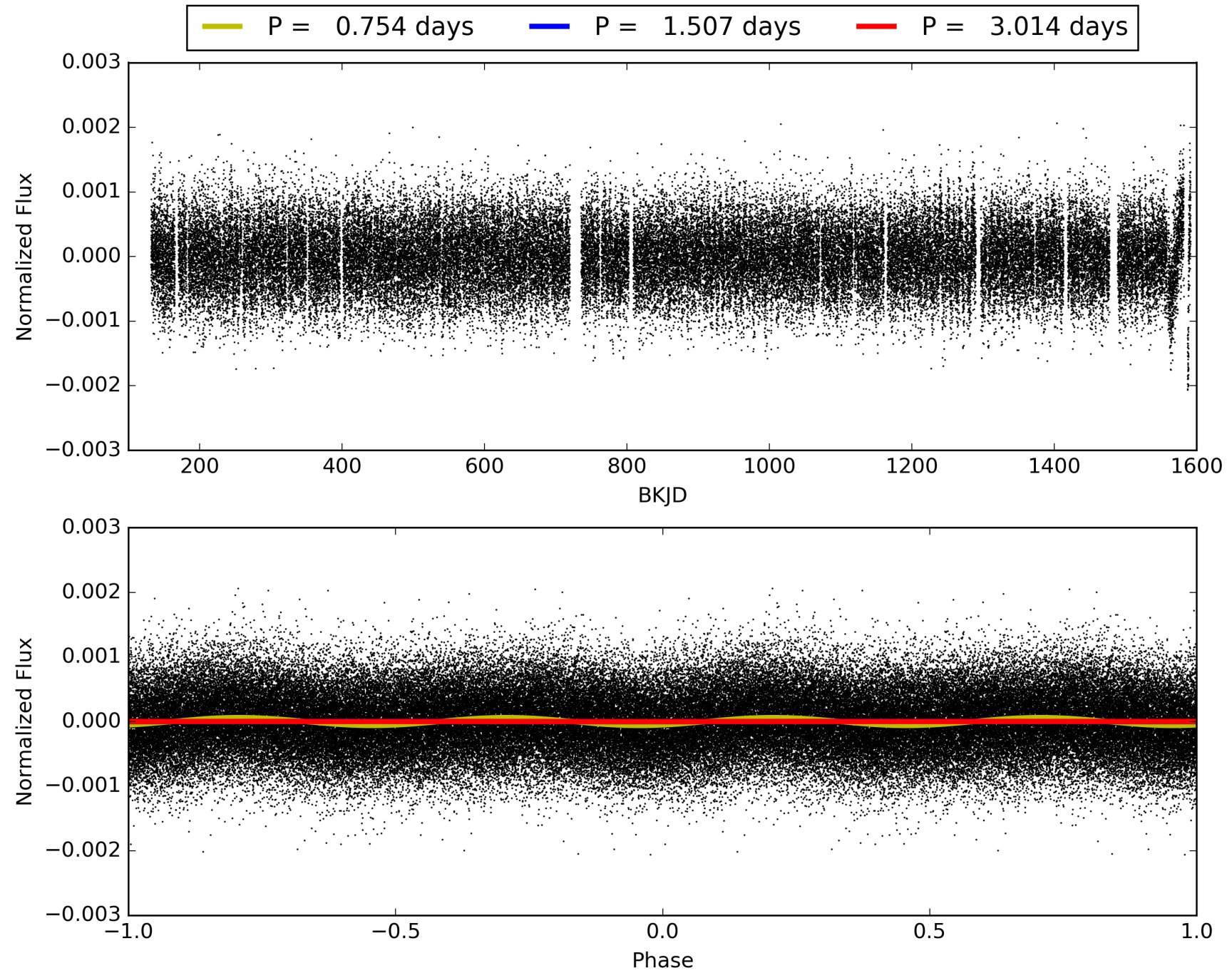
ShortPeriod-sig: 99.8% [3.07σ]  
LongPeriod-sig: 100.0% [75.57σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [846/849]  
GhostDiagnostic-chr: 2.502  
Centroid-sig: 78.6%  
Centroid-so: 0.207 arcsec [0.40σ]  
OotOffset-rm: 1.384 arcsec [4.33σ]  
KicOffset-rm: 1.437 arcsec [4.40σ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 0.94 [15/16]  
DiffImageOverlap-fno: 0.00 [0/17]

# TCE 006470973-02, PDC Light Curves





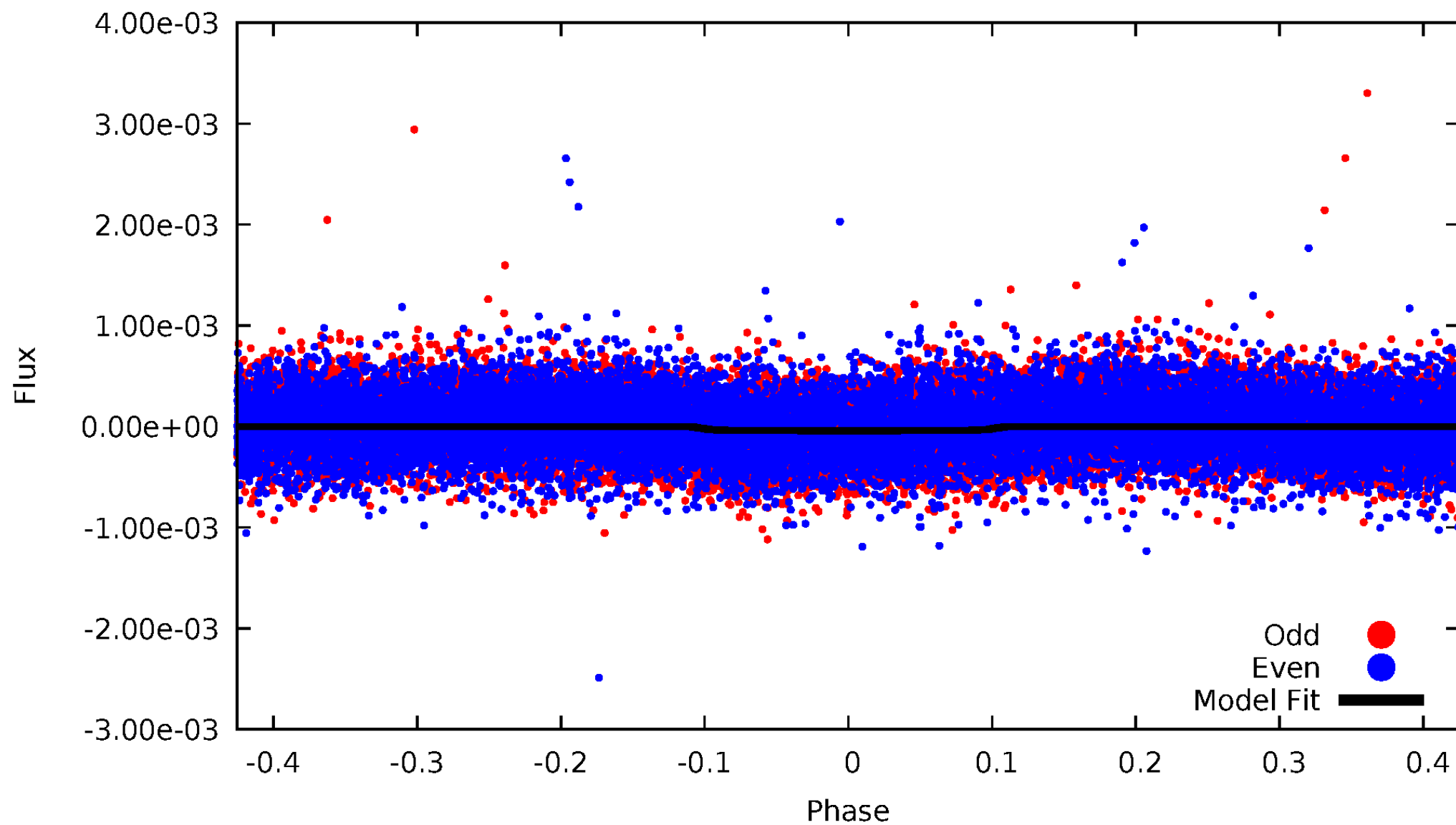
TCE 006470973-02





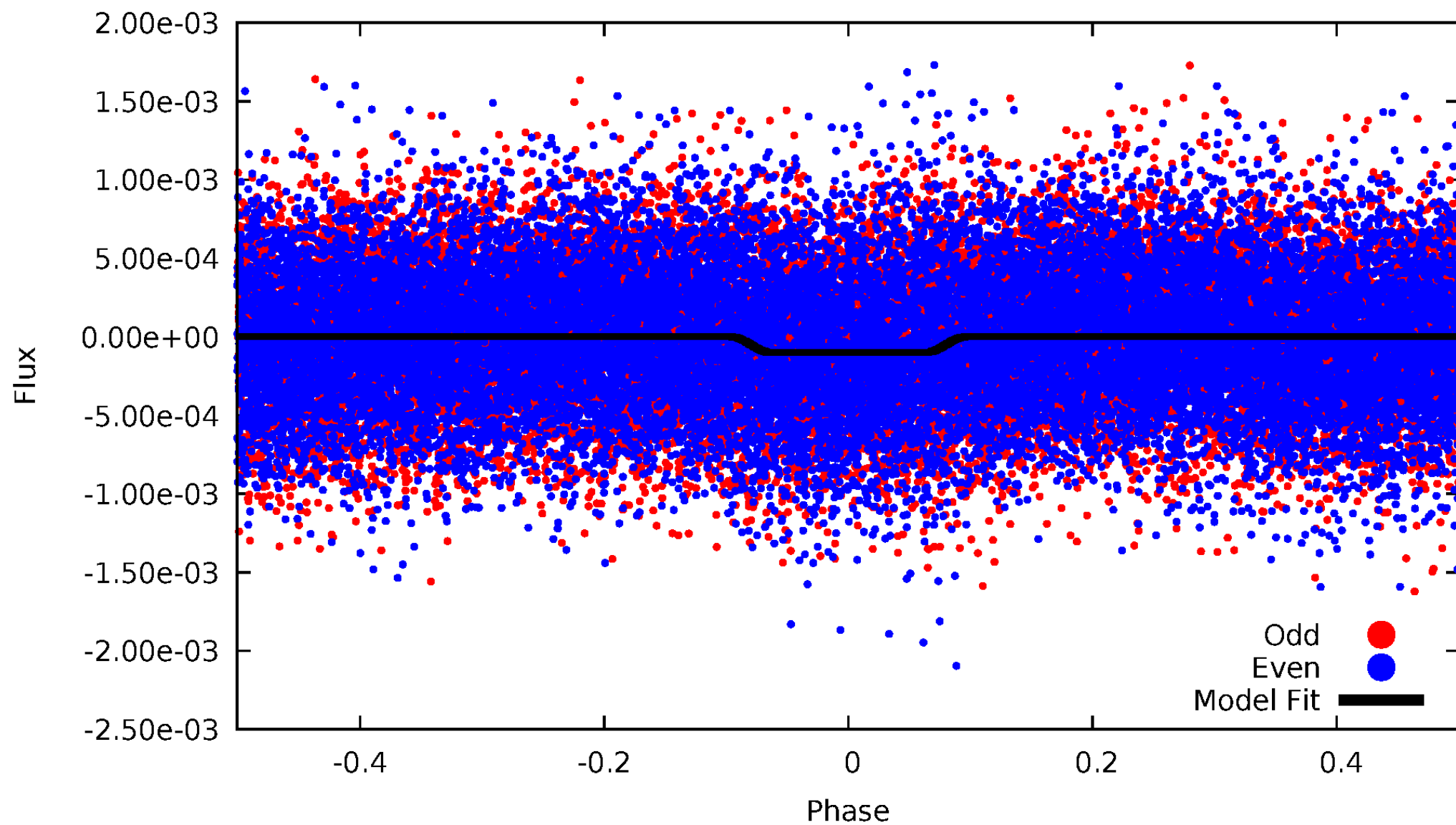
# DV Odd/Even

TCE 006470973-02



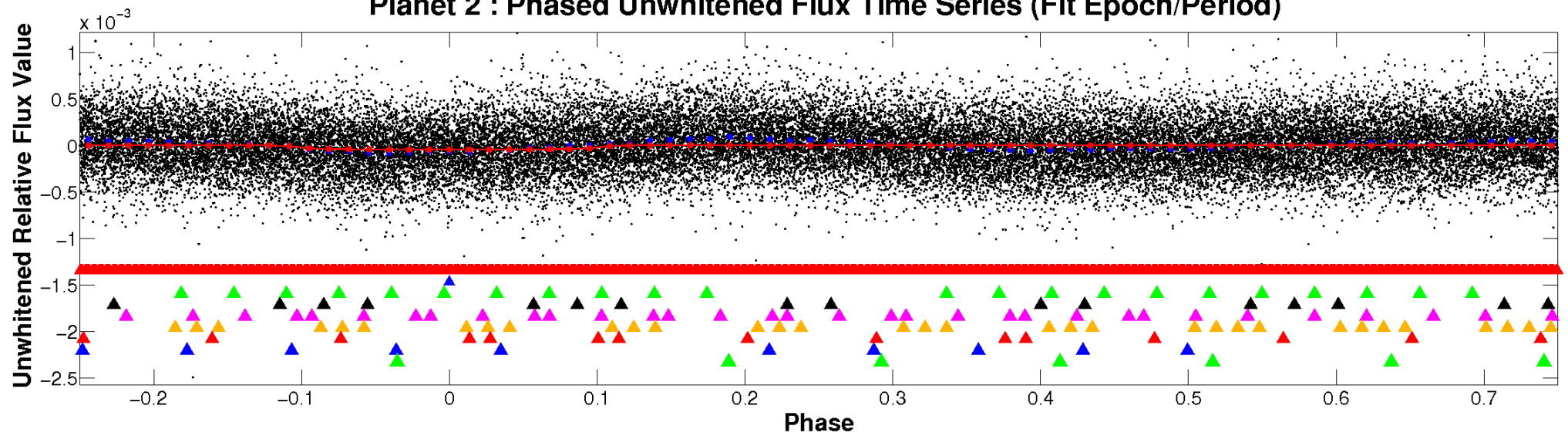
# ALT Odd/Even

TCE 006470973-02

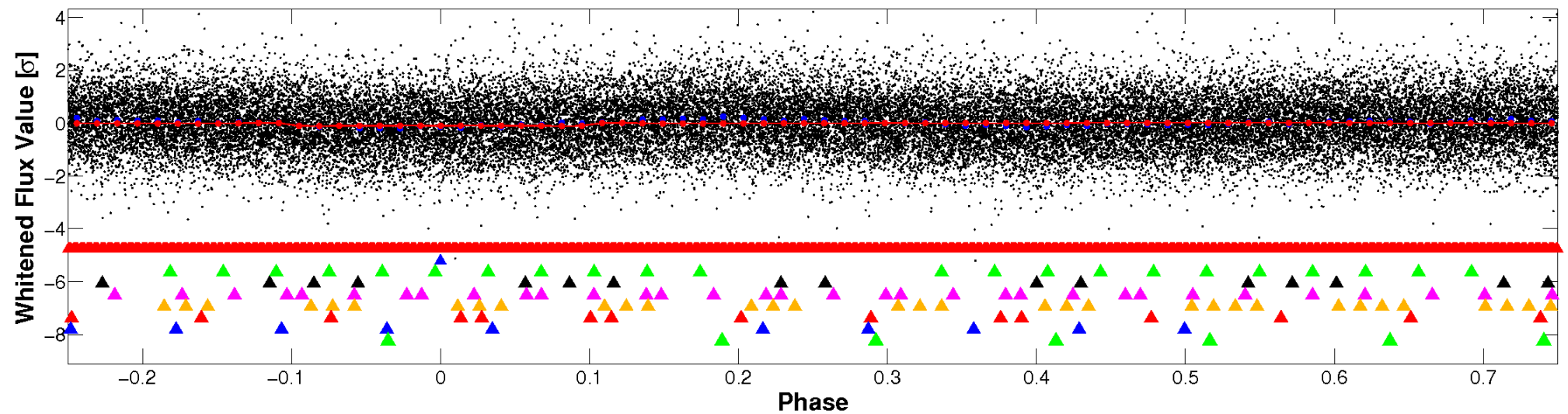


# Non-Whitened Vs. Whitened Light Curve

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

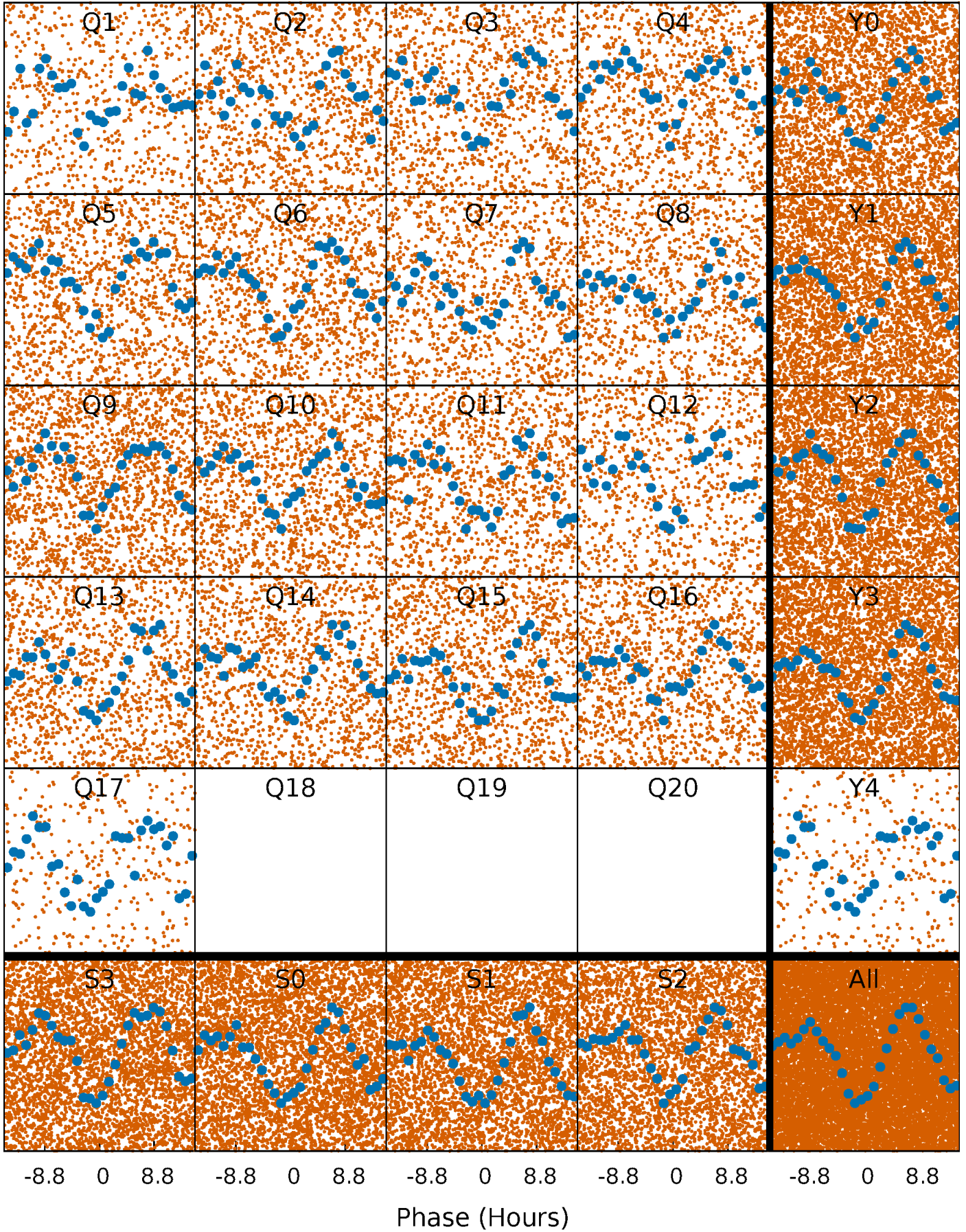


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

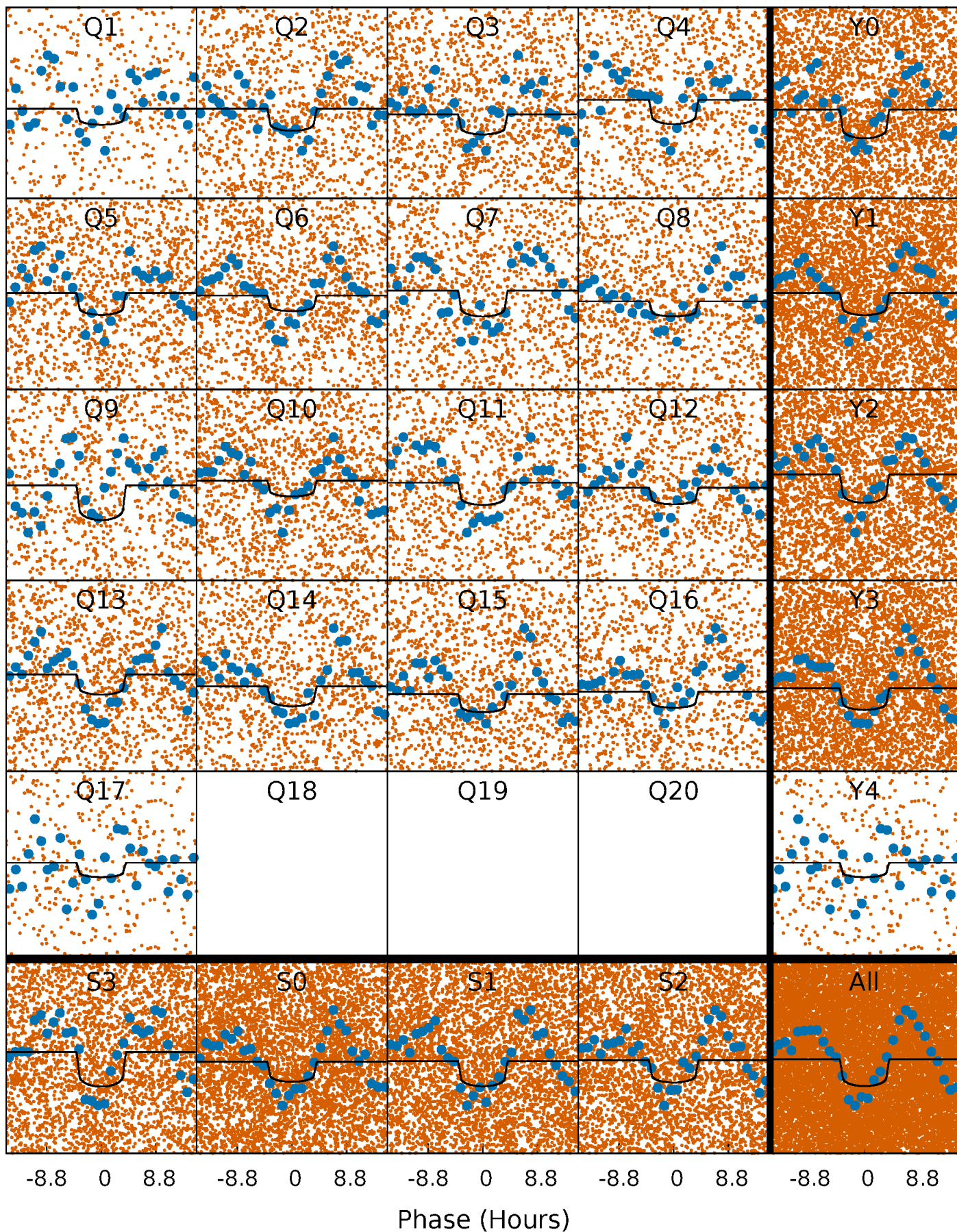
TCE 006470973-02   P= 1.507014 Days    $T_0=132.863868$  (BKJD)





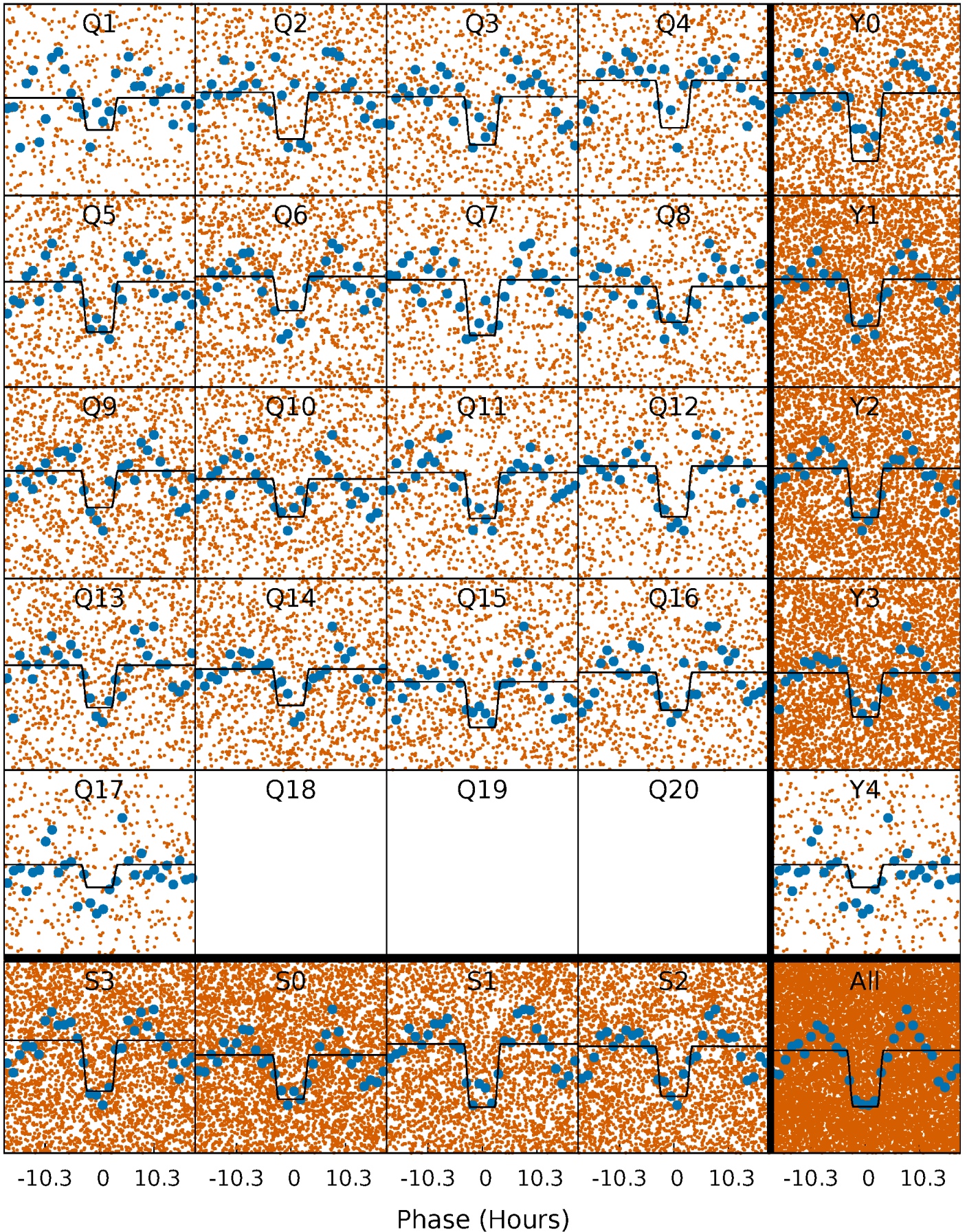
# DV Quarter-Phased Transit Curves

TCE 006470973-02 P= 1.507014 Days  $T_0=132.863868$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 006470973-02     $P = 1.506996$  Days     $T_0 = 132.835561$  (BKJD)

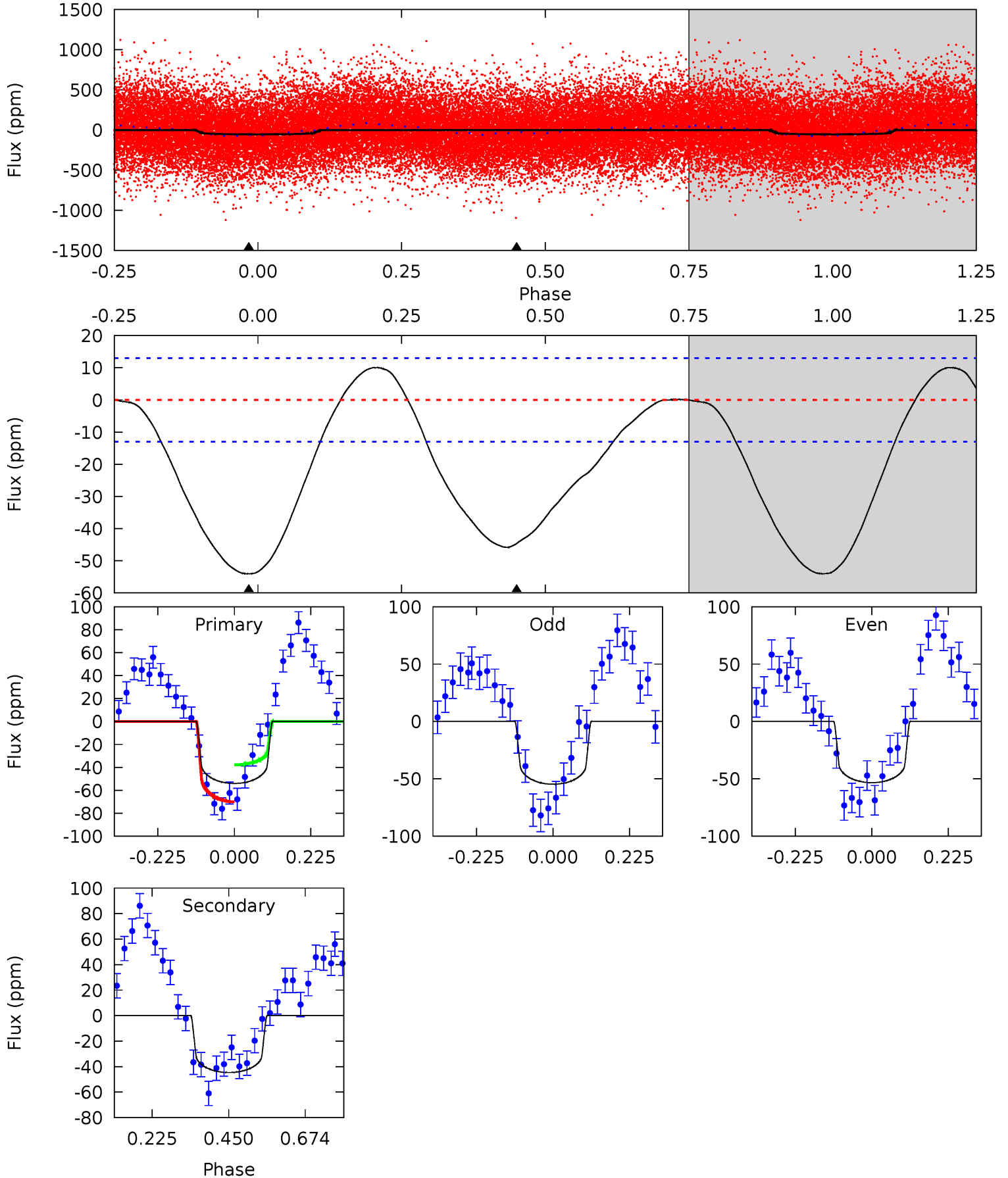




# DV Model-Shift Uniqueness Test

006470973-02, P = 1.507014 Days, E = 131.356854 Days

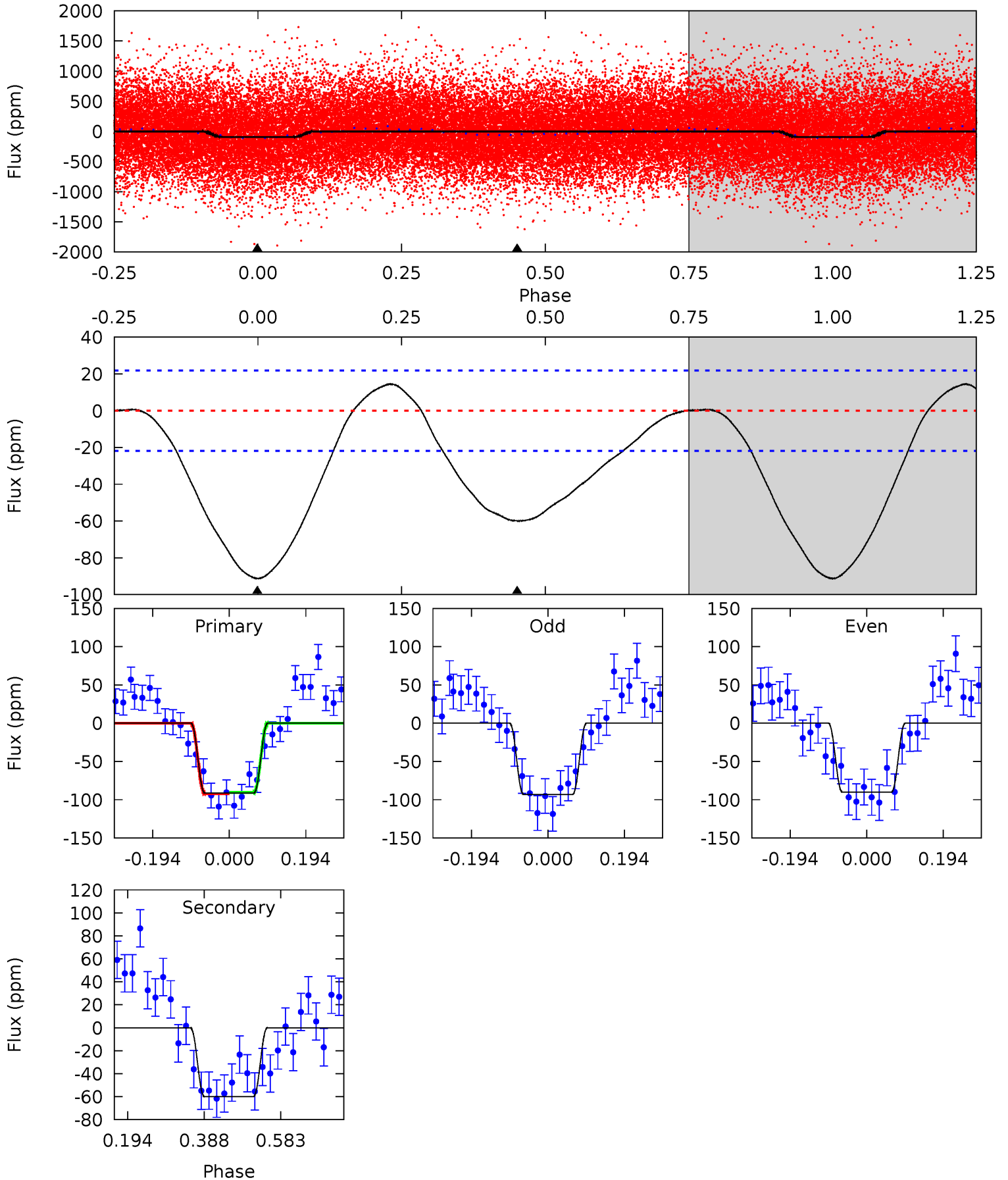
| Pri  | Sec  | Ter | Pos | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|-----|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 18.3 | 15.1 | 0   | 0   | 4.39            | 1.21            | 1.30             | 18.3    | 18.3    | 15.1    | 15.1    | 0.23    | 1.08 | 0.16  | 5.31 |



# Alt Model-Shift Uniqueness Test

006470973-02, P = 1.506996 Days, E = 131.328565 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  |
|------|------|-----|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 18.5 | 12.1 | 0   | 0   | 4.42            | 1.30            | 1.88             | 18.5    | 18.5    | 12.1    | 12.1    | 0.30    | 0.93 | 0.14  | 0.17 |





### Stellar Parameters For KIC 006470973

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R$ ( $R_{\odot}$ )       | $M(M_{\odot})$            | $p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ ) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $8548^{+237}_{-356}$ | $3.785^{+0.400}_{-0.075}$ | $-0.300^{+0.300}_{-0.350}$ | $2.976^{+0.562}_{-1.406}$ | $1.971^{+0.382}_{-0.466}$ | $0.105^{+0.371}_{-0.033}$                     |
|        | +3%/-4%              | +11%/-2%                  | +100%/-117%                | +19%/-47%                 | +19%/-24%                 | +353%/-31%                                    |
| Source | KIC0                 | 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 006470973-02 / KOI

| Detrend | Depth (ppm) | $R_p$ ( $R_{\oplus}$ ) | $T_{\text{max}}$ (K) | $T_{\text{obs}}$ (K)   | $A_{\text{obs}}$          |
|---------|-------------|------------------------|----------------------|------------------------|---------------------------|
| DV      | $-45 \pm 3$ | $1.99^{+0.72}_{-0.65}$ | $4857^{+344}_{-516}$ | $8306^{+1876}_{-1217}$ | $6.497^{+6.949}_{-2.887}$ |
| Alt.    | $-60 \pm 5$ | $3.00^{+0.75}_{-0.80}$ | $4865^{+369}_{-524}$ | $7054^{+1076}_{-691}$  | $3.879^{+3.376}_{-1.376}$ |

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature  
 $T_{\text{obs}}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )  
 $A_{\text{obs}}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{\text{obs}} \gg T_{\text{max}}$  AND  $A_{\text{obs}} \gg 1.0$

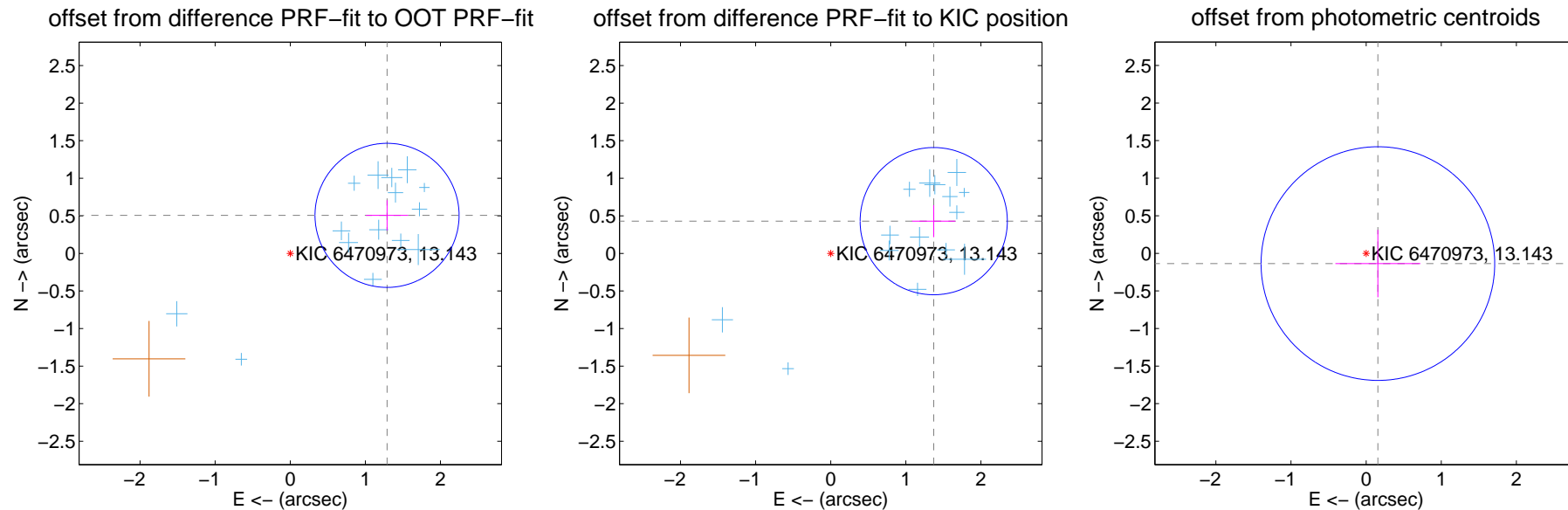
## DV Centroid Data

Supplemental centroid analysis for 006470973-02. Kepler magnitude: 13.14. Transit SNR 8.66

There are 15 quarters with good PRF difference image offsets

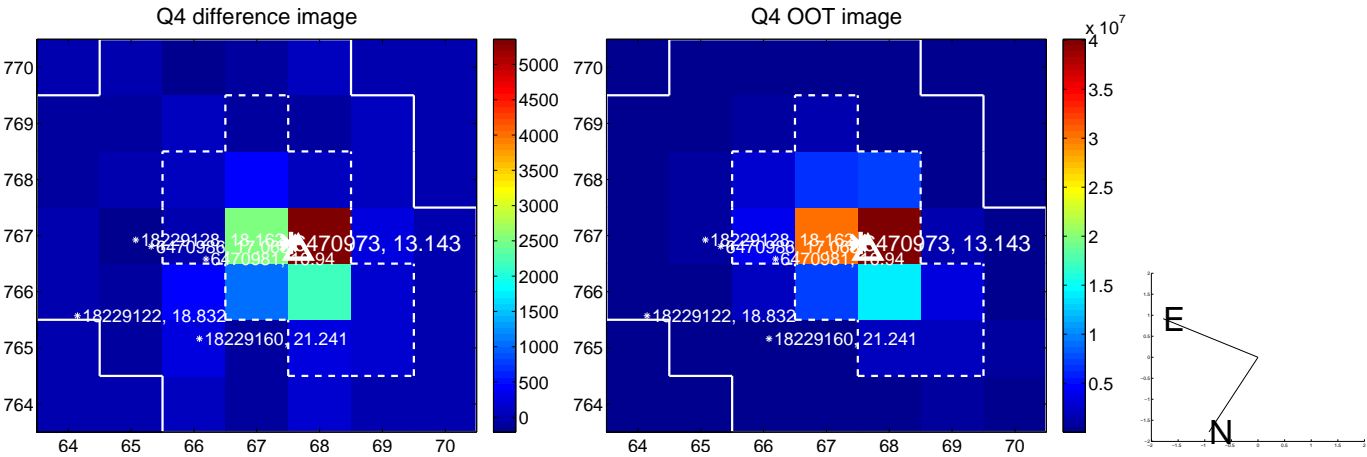
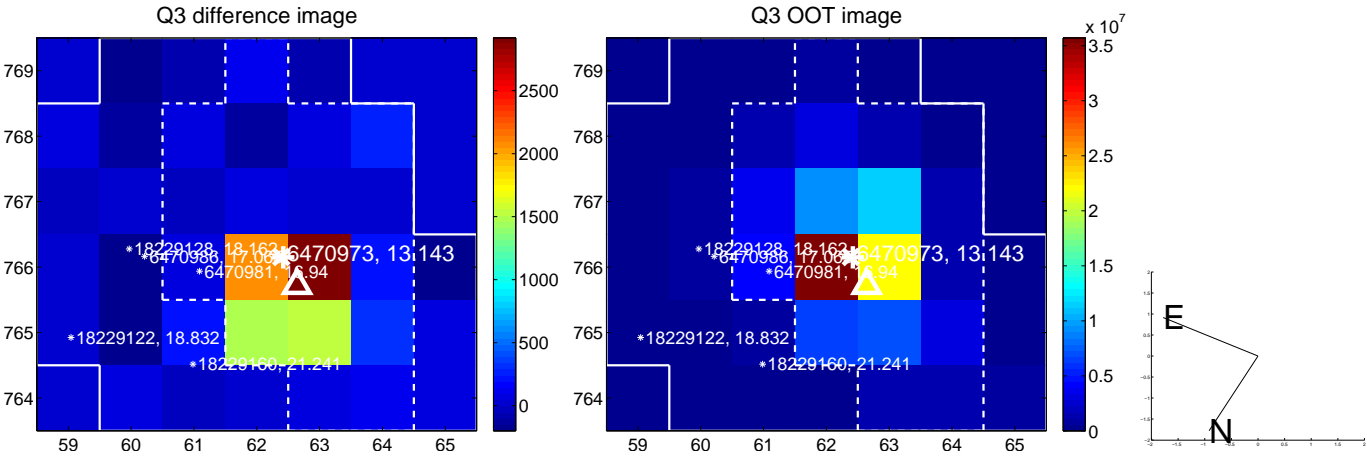
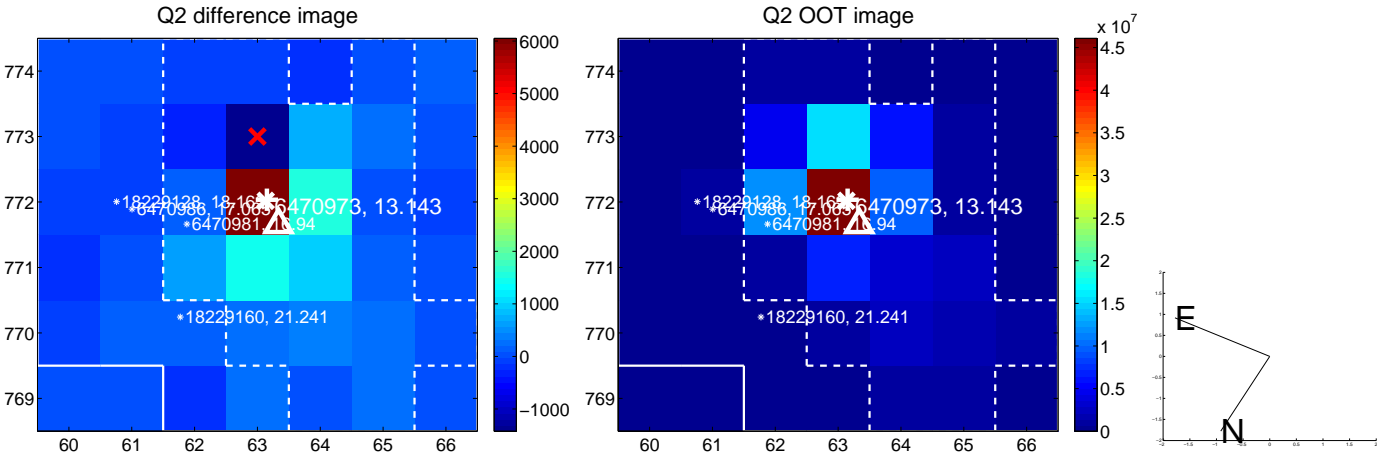
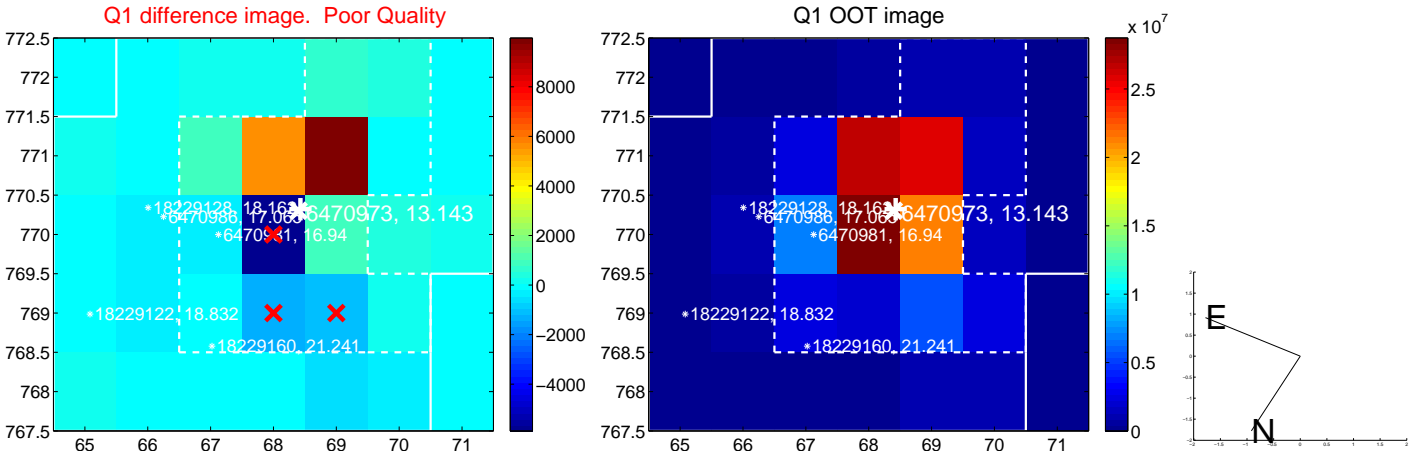
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA        | $\Delta$ Dec      |
|---|--------------------|---------------------|--------------------|-------------------|
| PRF-fit source offset from OOT          | $1.384 \pm 0.320$  | 4.33                | $-1.289 \pm 0.281$ | $0.507 \pm 0.201$ |
| PRF-fit source offset from KIC position | $1.437 \pm 0.327$  | 4.40                | $-1.371 \pm 0.289$ | $0.430 \pm 0.213$ |
| photometric centroid source offset      | $0.21 \pm 0.52$    | 0.40                | $-0.16 \pm 0.57$   | $-0.14 \pm 0.45$  |

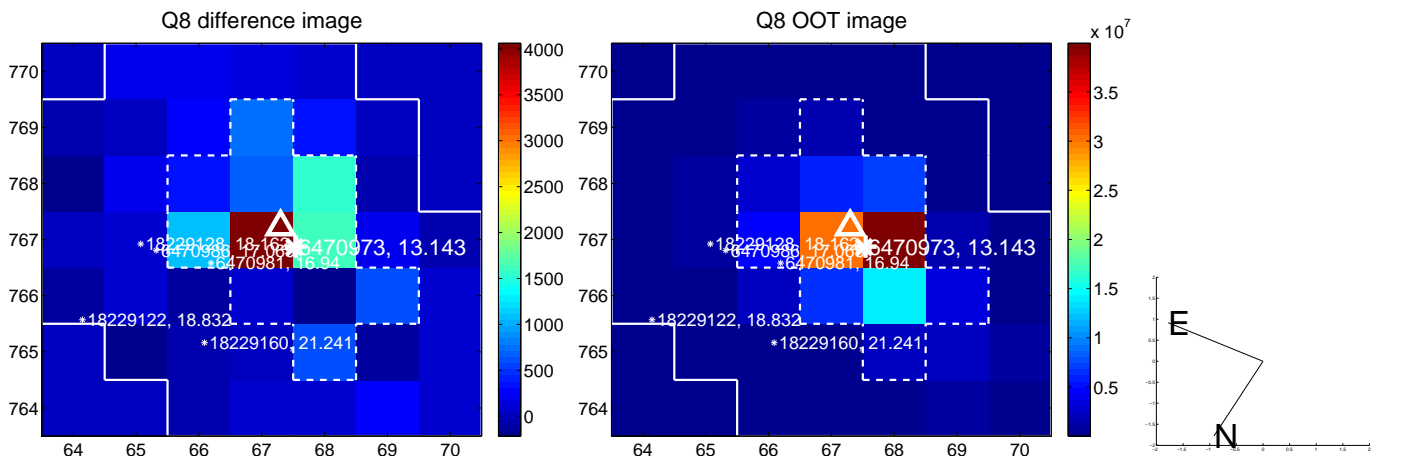
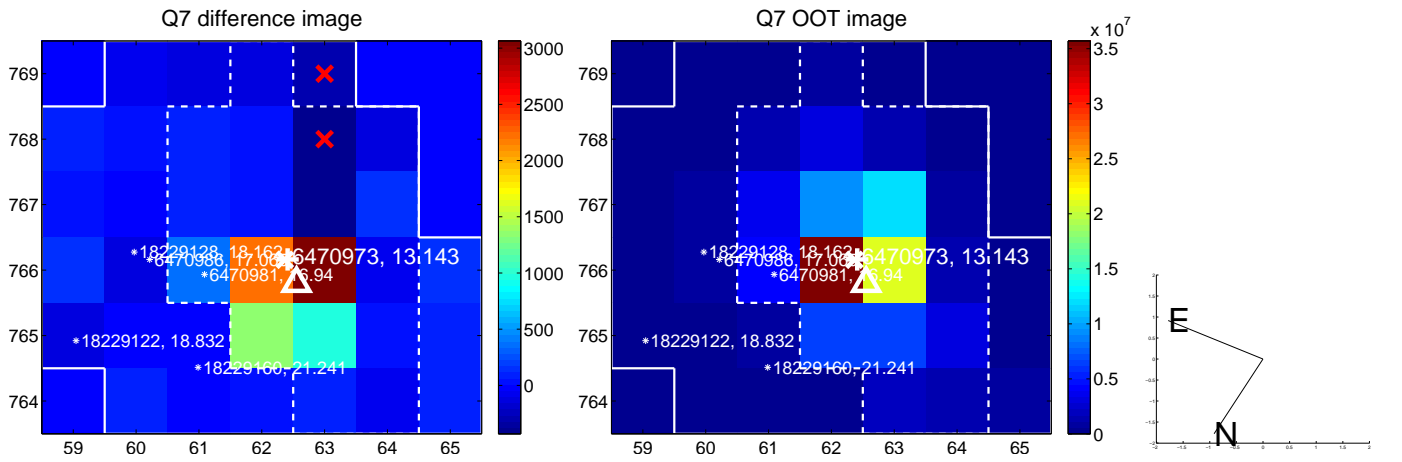
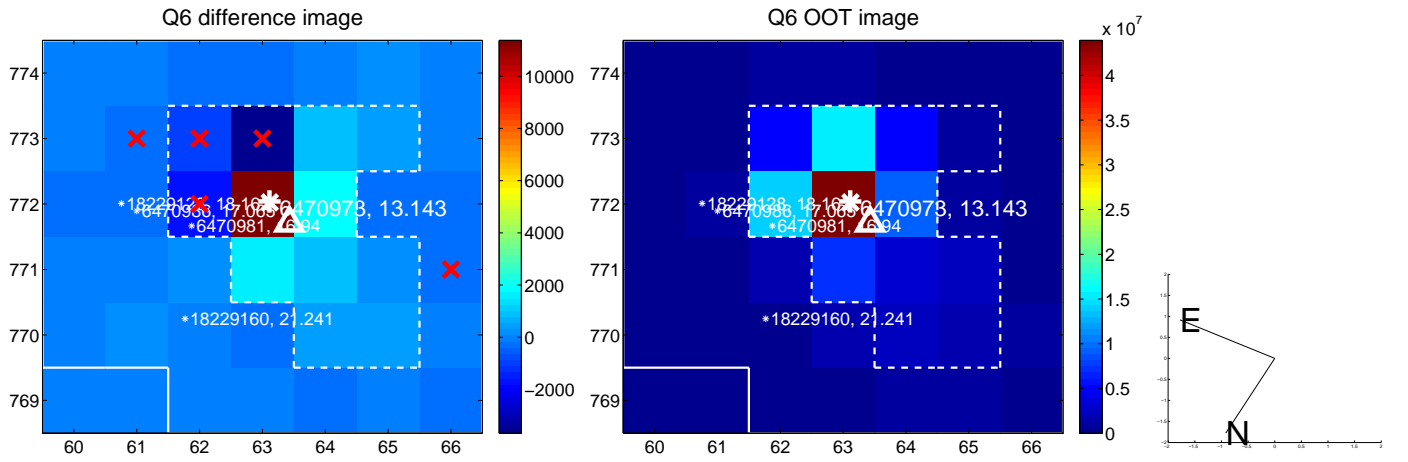
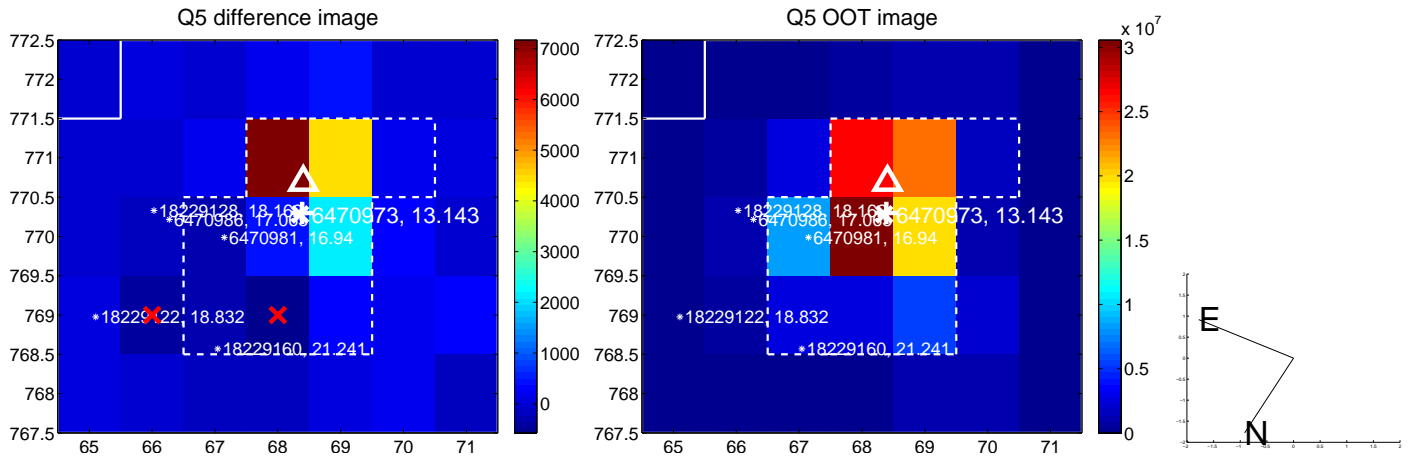


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

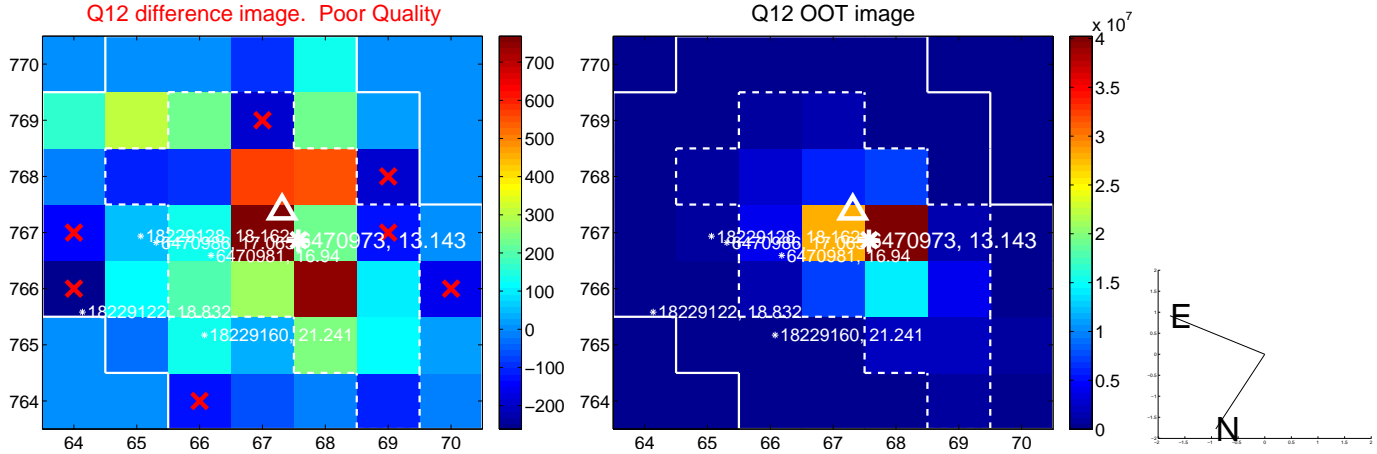
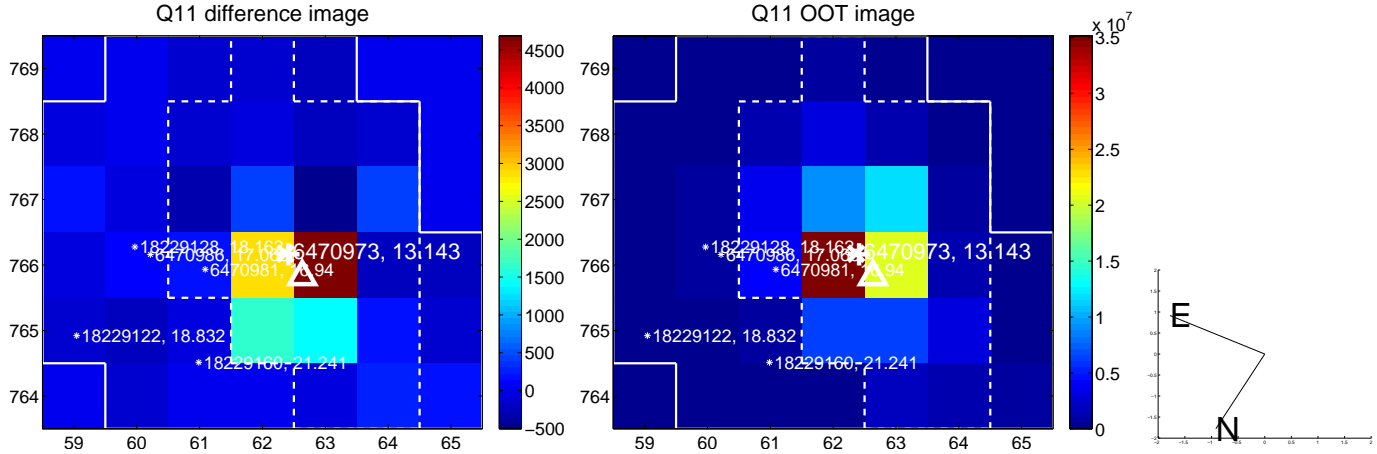
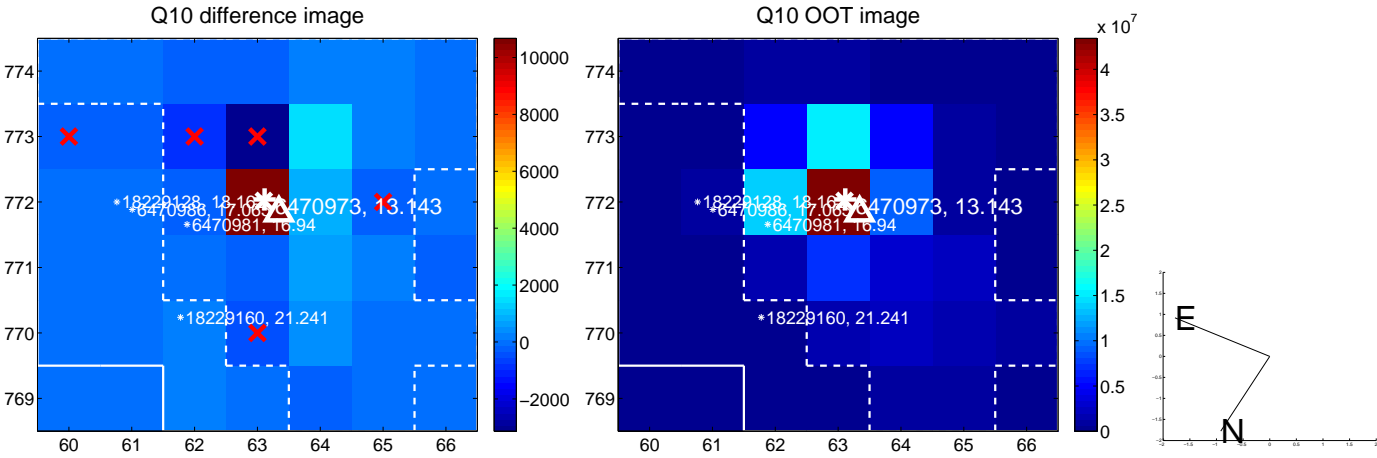
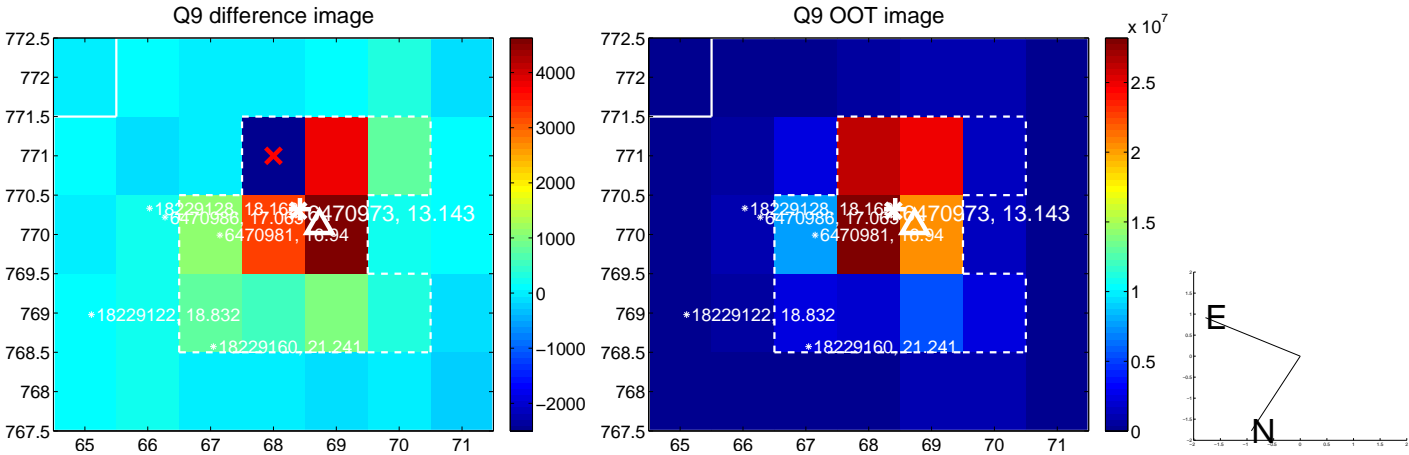
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

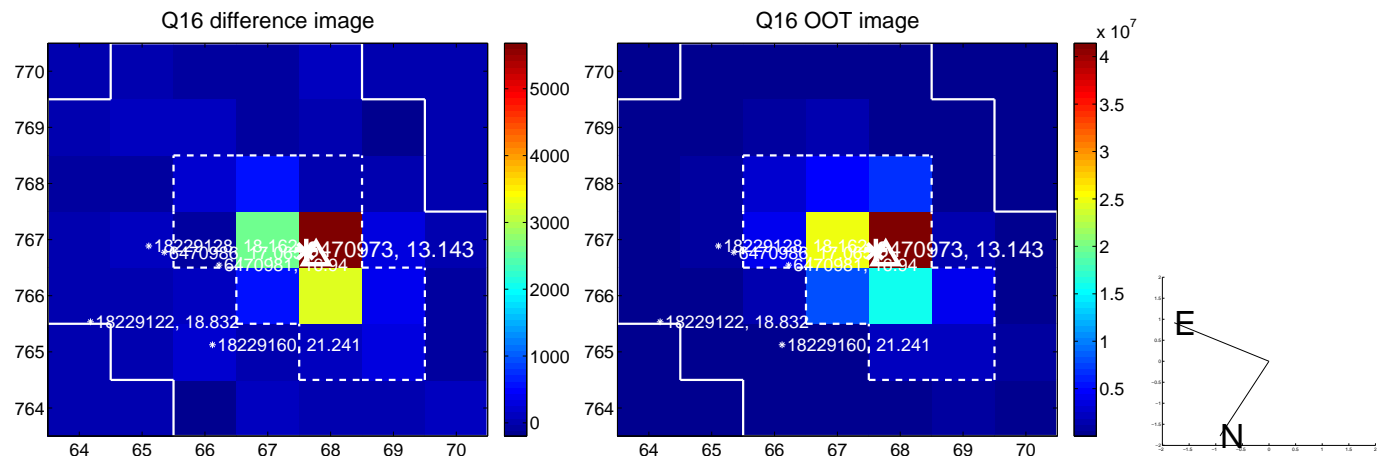
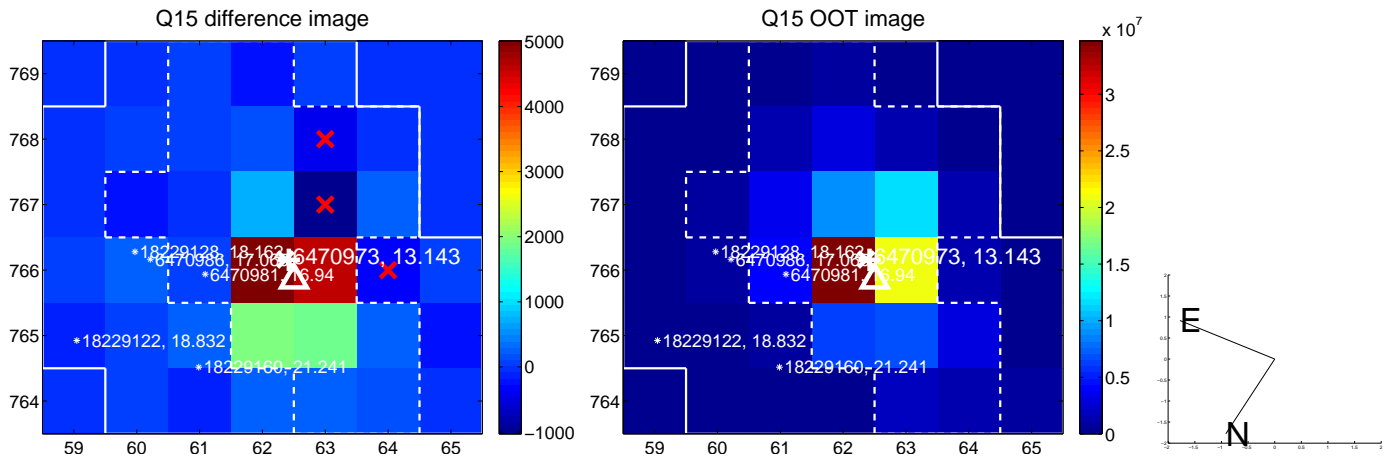
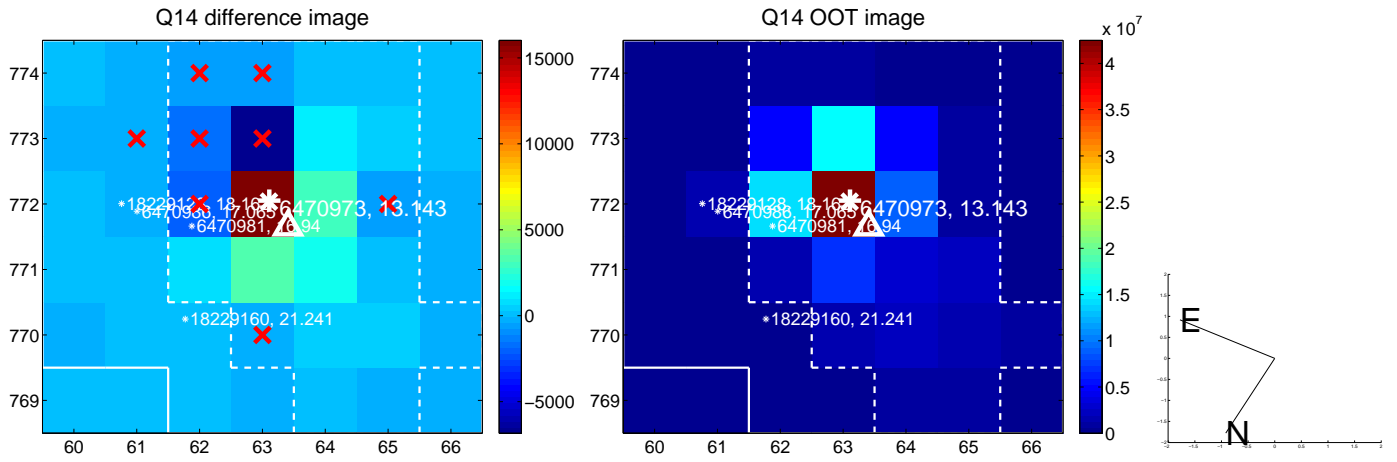
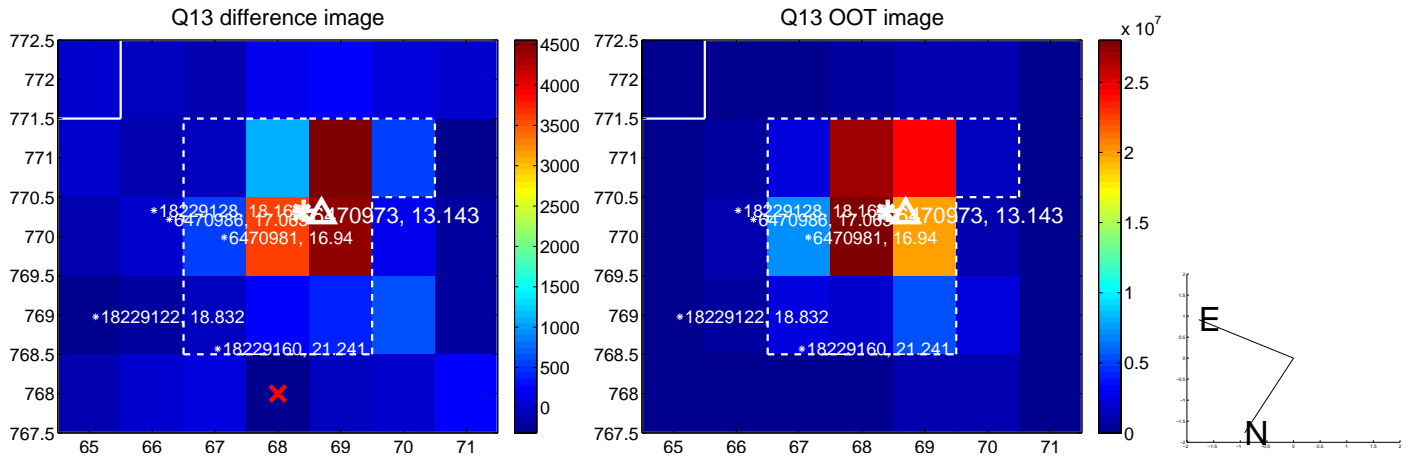


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

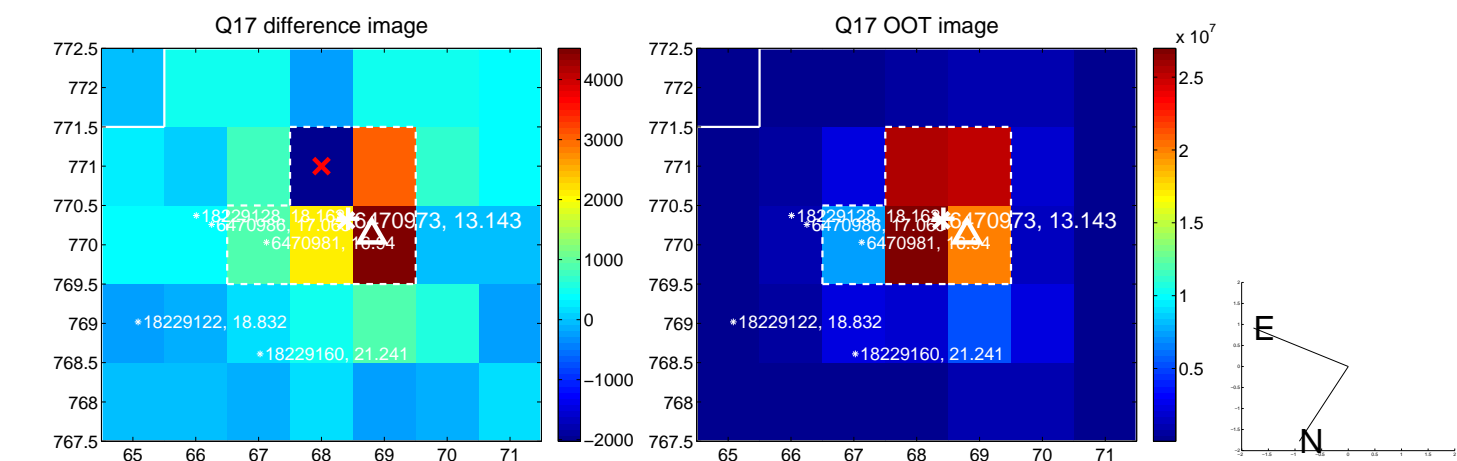




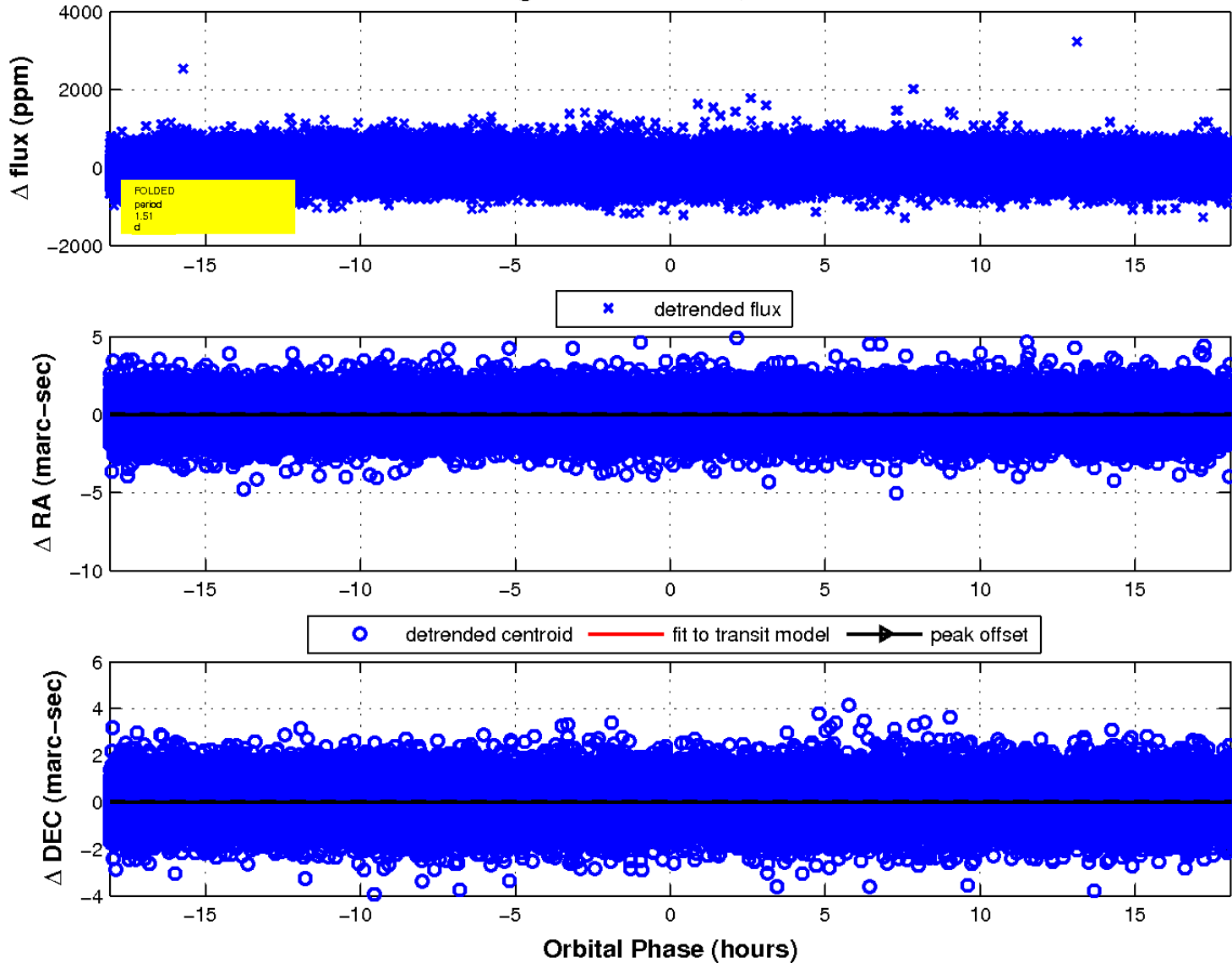
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



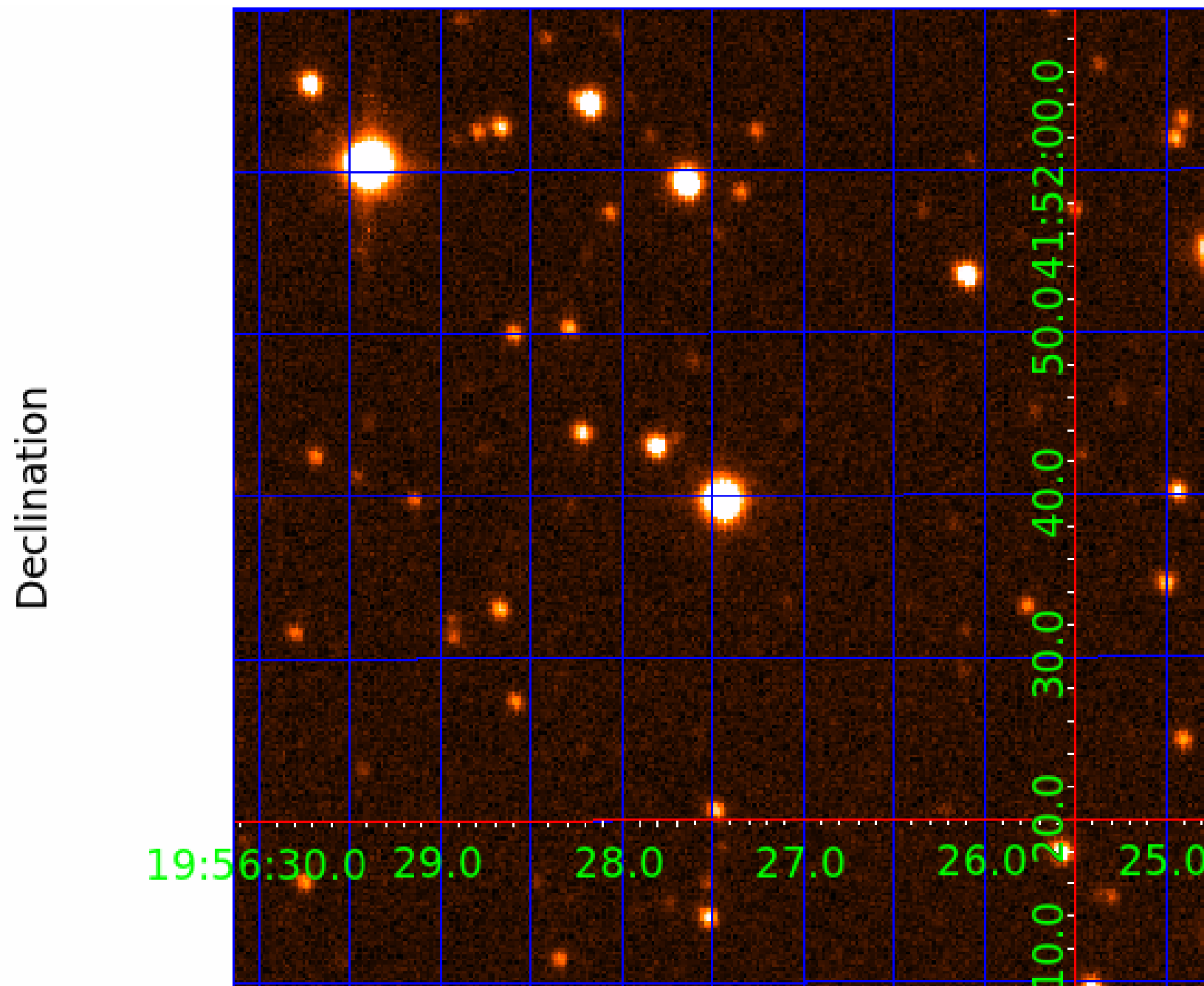
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 2 of 9



UKIRT Image



# KIC 006470973

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 006470973-01 | OBS      | No   | 0.509313      | 131.708781   | 35.2        | 1.285            | 10.2 | 9.8  | 2.98                        | 8548            | 1.84                   | 173032.50              |
| 006470973-02 | OBS      | No   | 1.507014      | 132.863868   | 43.9        | 7.686            | 8.8  | 8.7  | 2.98                        | 8548            | 2.22                   | 40733.45               |
| 006470973-03 | OBS      | No   | 68.595946     | 135.604533   | 305.4       | 10.291           | 12.3 | 7.5  | 2.98                        | 8548            | 5.83                   | 250.64                 |
| 006470973-04 | OBS      | No   | 95.200506     | 157.793112   | 760.5       | 7.481            | 11.1 | 9.5  | 2.98                        | 8548            | 10.09                  | 161.90                 |
| 006470973-05 | OBS      | No   | 43.824577     | 173.397932   | 266.9       | 11.025           | 9.9  | 7.4  | 2.98                        | 8548            | 5.20                   | 455.50                 |
| 006470973-06 | OBS      | No   | 43.851912     | 174.379270   | 265.5       | 5.706            | 9.4  | 6.5  | 2.98                        | 8548            | 5.91                   | 455.12                 |
| 006470973-07 | OBS      | No   | 96.994995     | 218.805364   | 538.8       | 4.480            | 9.0  | 9.0  | 2.98                        | 8548            | 7.65                   | 157.92                 |
| 006470973-09 | OBS      | No   | 203.109072    | 227.259250   | 243.1       | 6.000            | 8.5  | -1.0 | 2.98                        | 8548            | 4.71                   | 58.95                  |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 006470973-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT   |
| 006470973-02 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT   |
| 006470973-03 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT  |
| 006470973-04 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS |
| 006470973-05 | 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   |
| 006470973-06 | OBS      | FP   | 0.00  | 1 | 0 | 1 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—HALO_GHOST                        |
| 006470973-07 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT  |
| 006470973-09 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—CENT_NOFITS   |

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

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

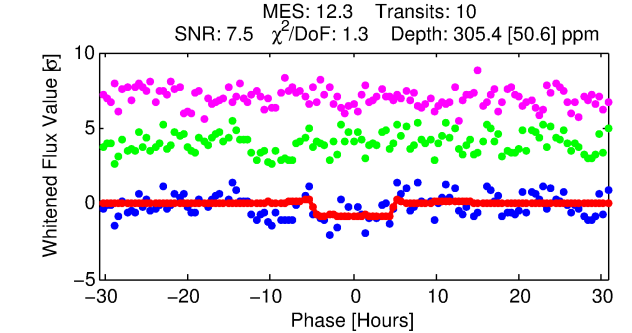
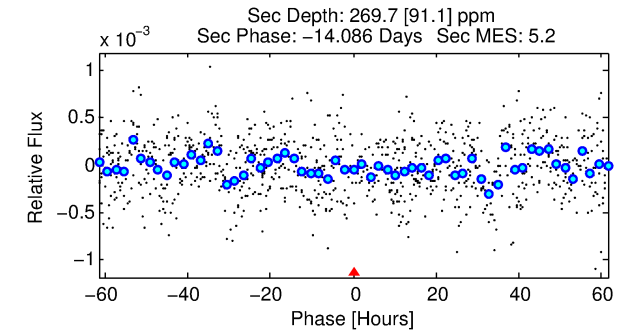
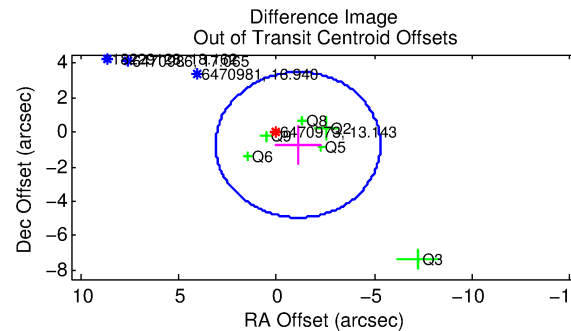
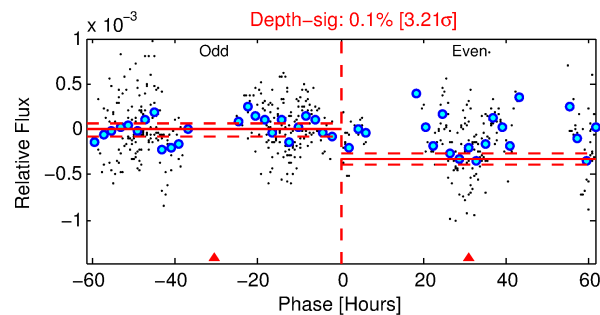
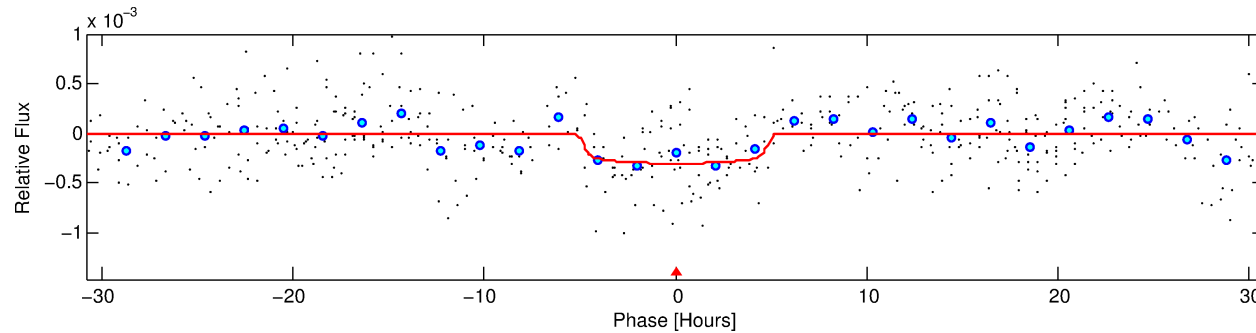
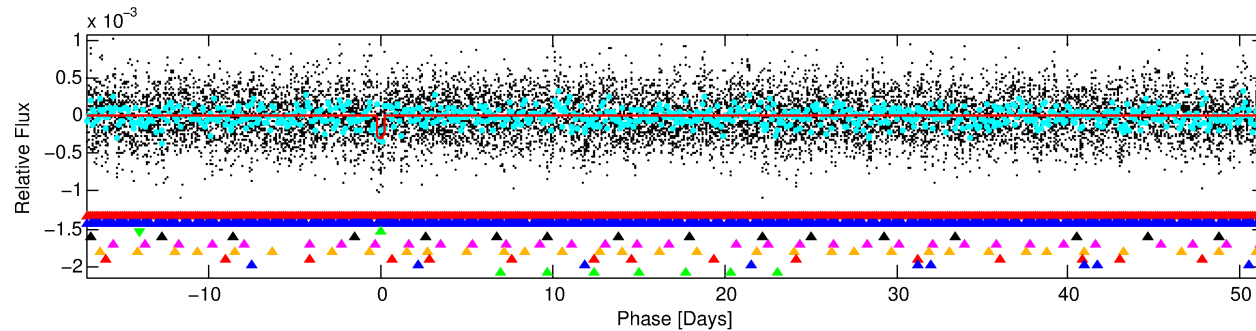
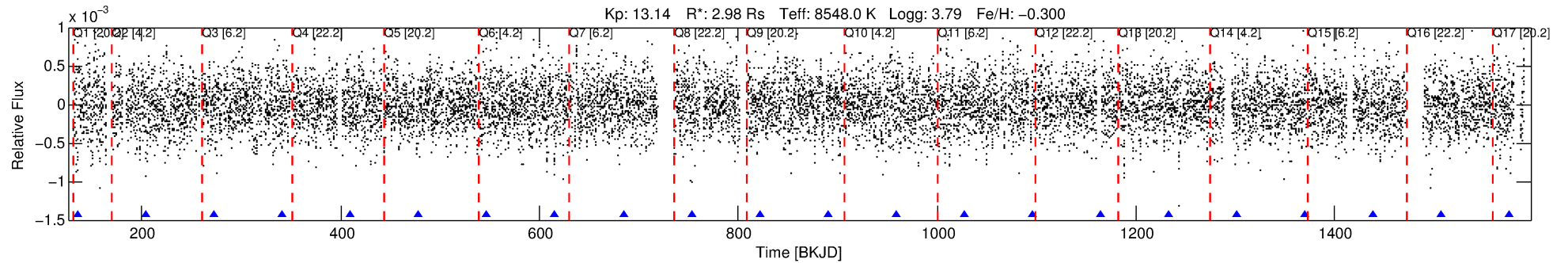
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006470973-03

No Significant Match Found

# DV One-Page Summary

KIC: 6470973 Candidate: 3 of 9 Period: 68.596 d



## DV Fit Results:

Period = 68.59595 [0.00216] d  
Epoch = 135.6045 [0.0258] BKJD  
Rp/R\* = 0.0179 [0.0039]  
a/R\* = 29.36 [37.59]  
b = 0.84 [0.45]  
Seff = 250.64 [177.93]  
Teff = 1015 [180] K  
Rp = 5.83 [3.03] Re  
a = 0.4111 [0.1808] AU  
Ag = 739.12 [651.68] [1.13σ]  
Teffp = 8179 [1173] K [6.04σ]

## DV Diagnostic Results:

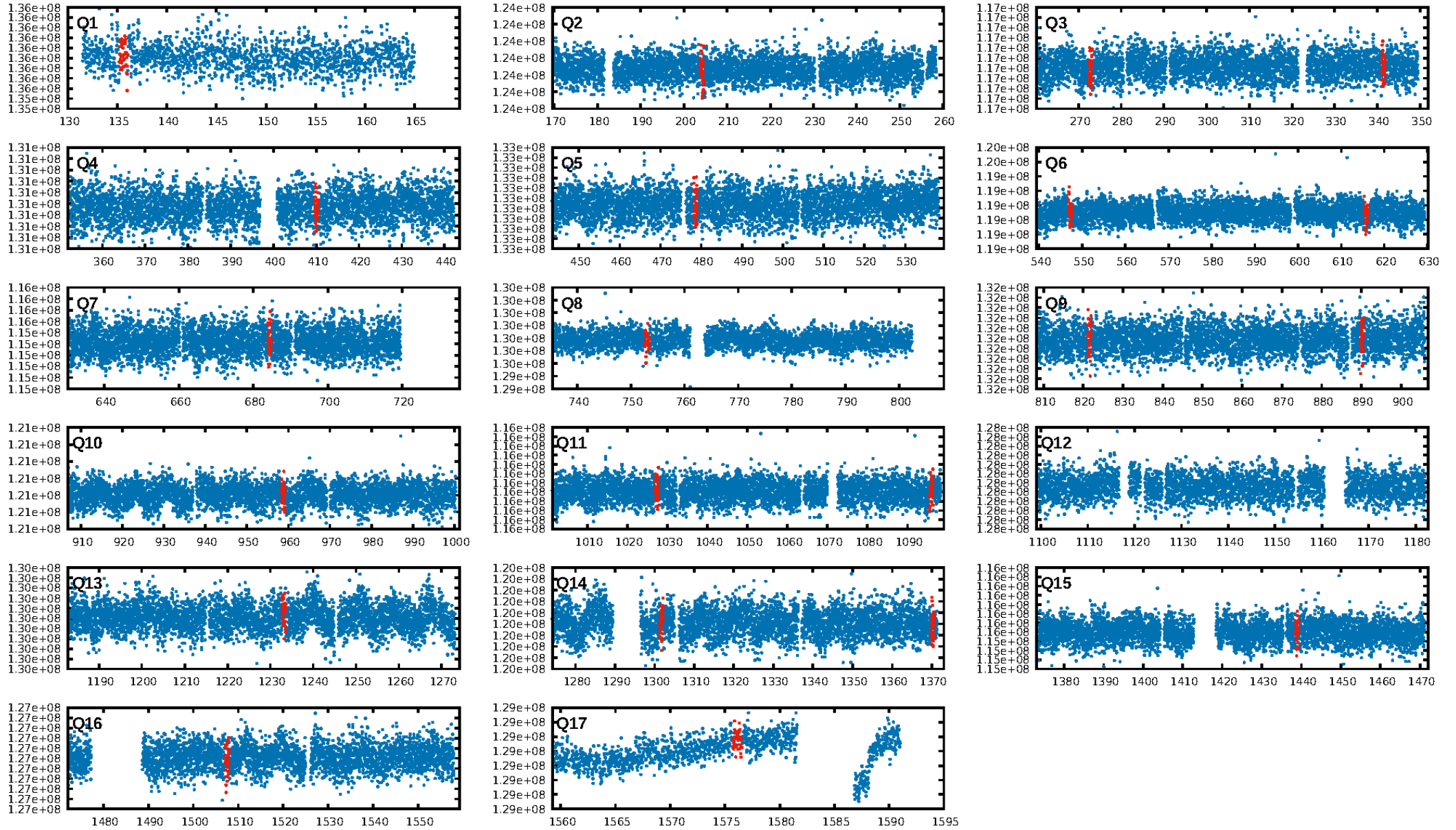
ShortPeriod-sig: 100.0% [50.47σ]  
LongPeriod-sig: 100.0% [50.19σ]  
ModelChiSquare2-sig: 6.4%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [9/9]  
GhostDiagnostic-chr: -4.824  
Centroid-sig: 2.1%  
Centroid-so: 0.918 arcsec [1.94σ]  
OotOffset-rm: 1.324 arcsec [0.94σ]  
KicOffset-rm: 1.440 arcsec [1.14σ]  
OotOffset-st: 2/1/1/2 [6]  
KicOffset-st: 2/1/1/2 [6]  
DiffImageQuality-fgm: 0.50 [3/6]  
DiffImageOverlap-fno: 0.00 [0/15]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 06:07:11 Z

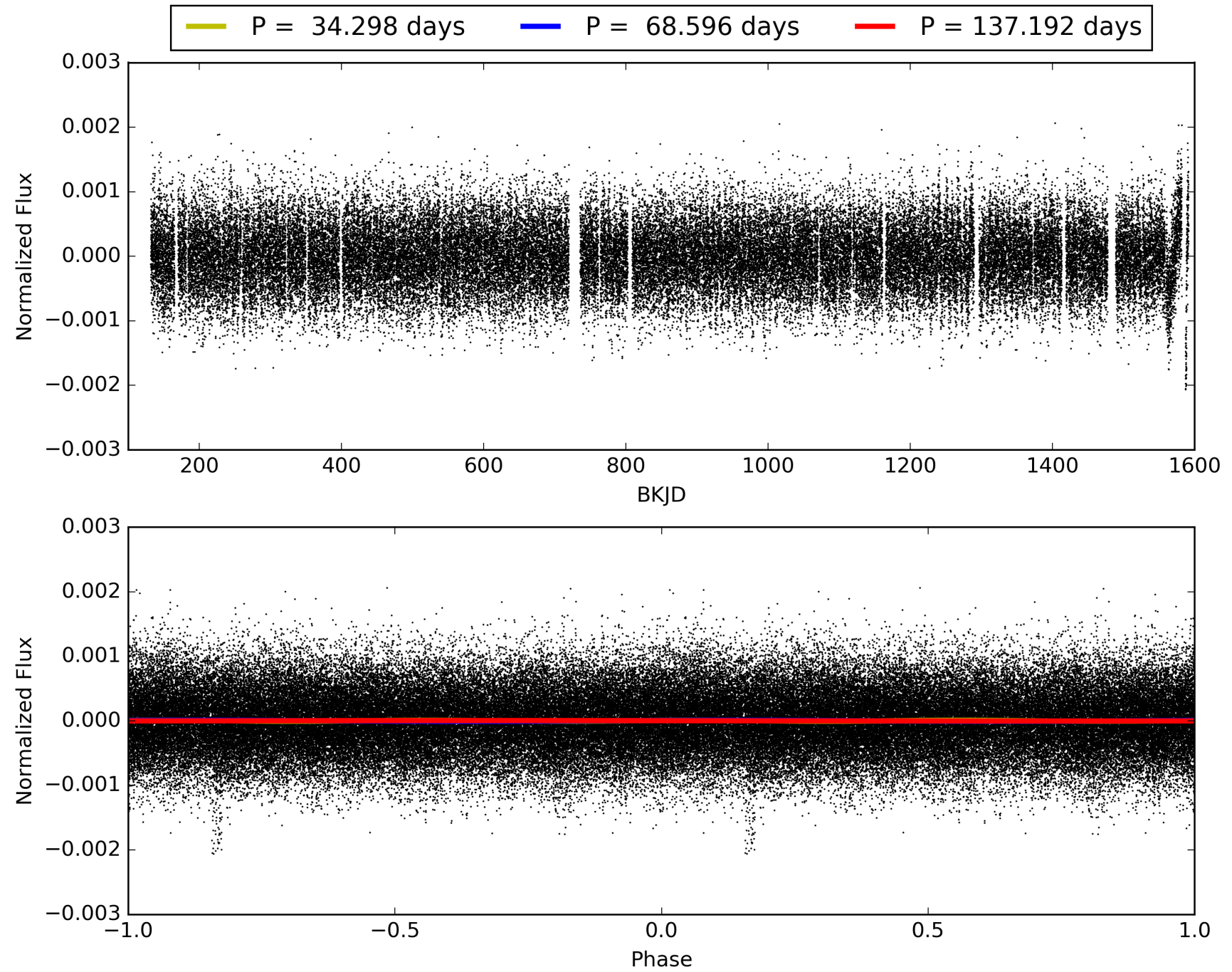
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 006470973-03, PDC Light Curves

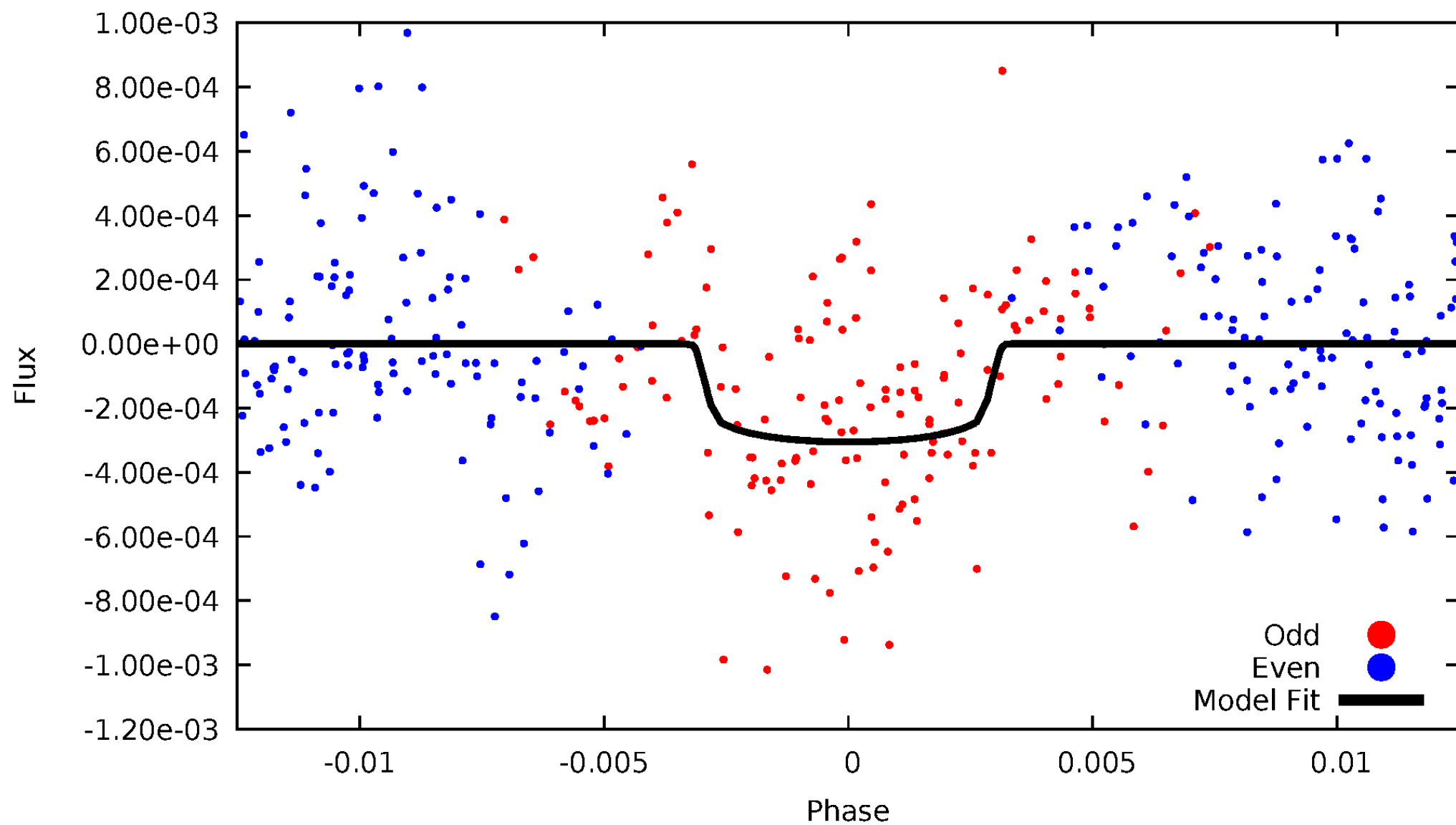


# TCE 006470973-03



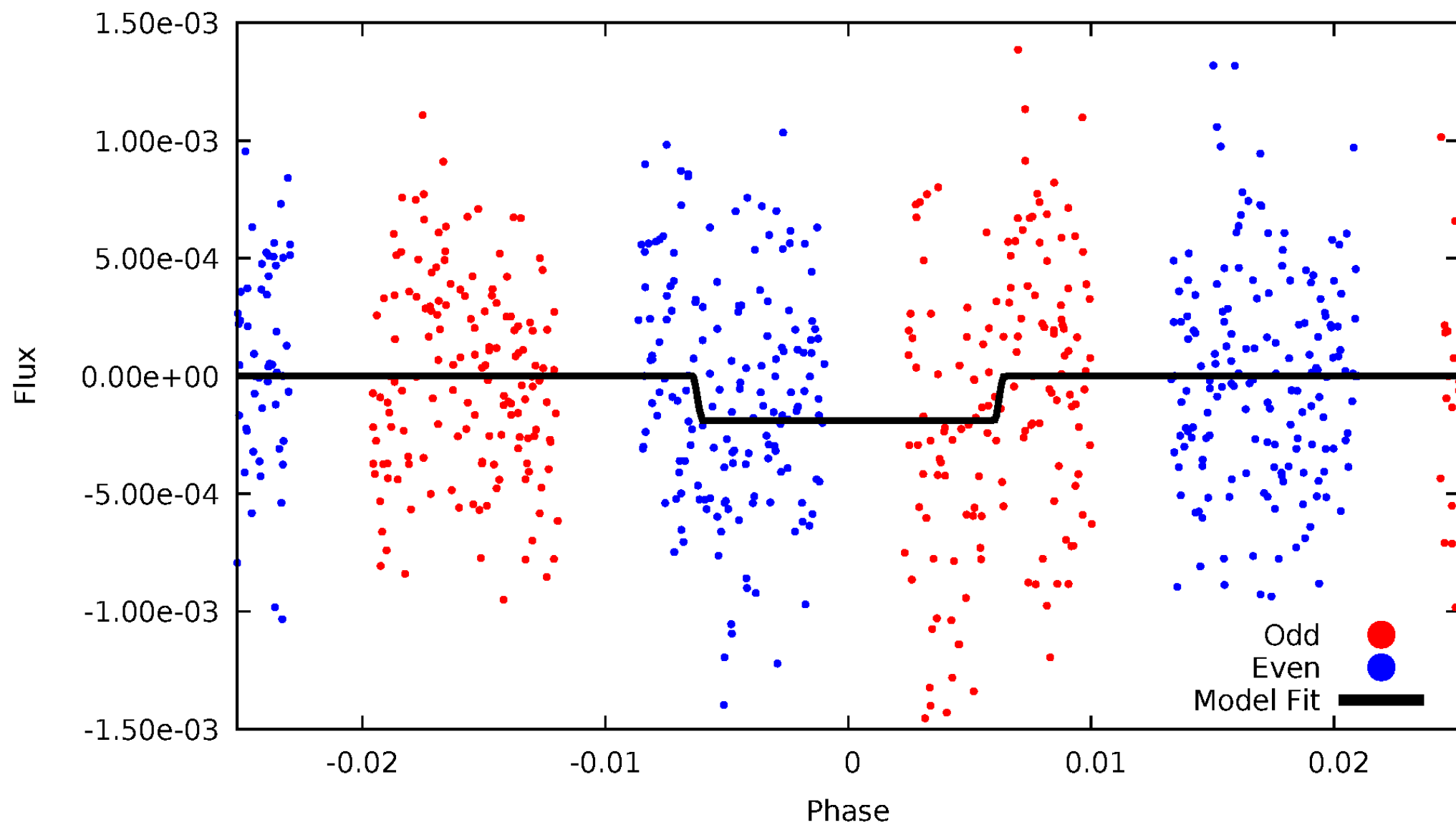
# DV Odd/Even

TCE 006470973-03



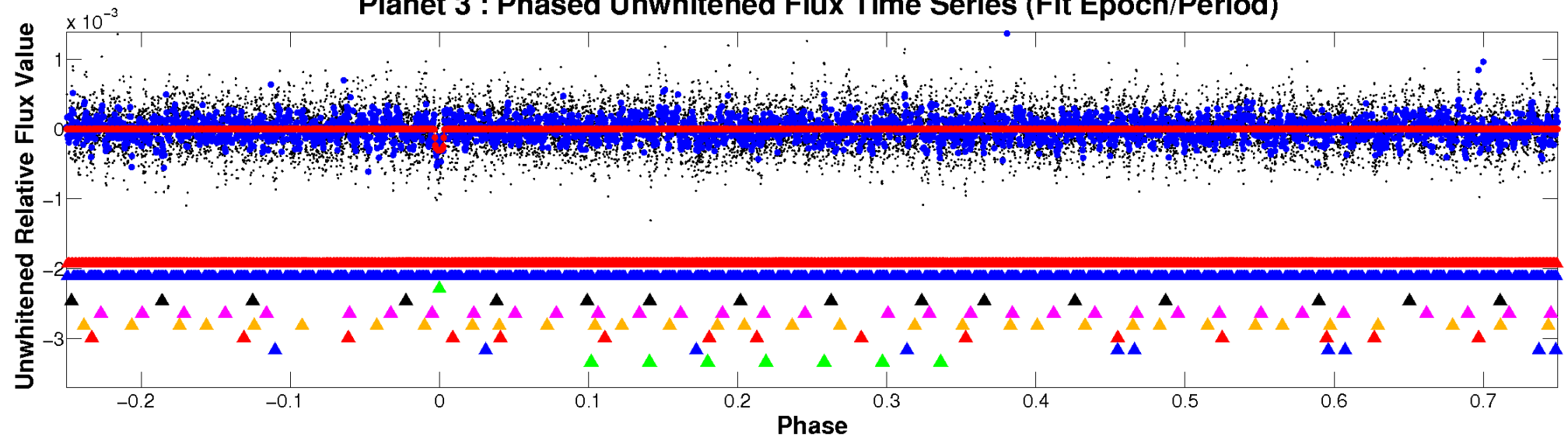
# ALT Odd/Even

TCE 006470973-03

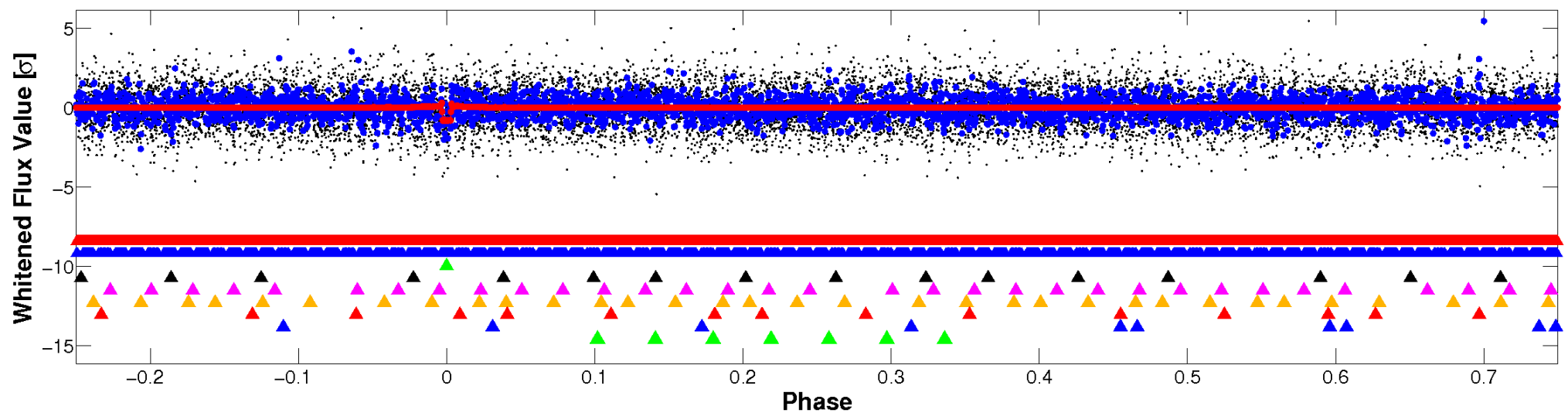


# Non-Whitened Vs. Whitened Light Curve

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



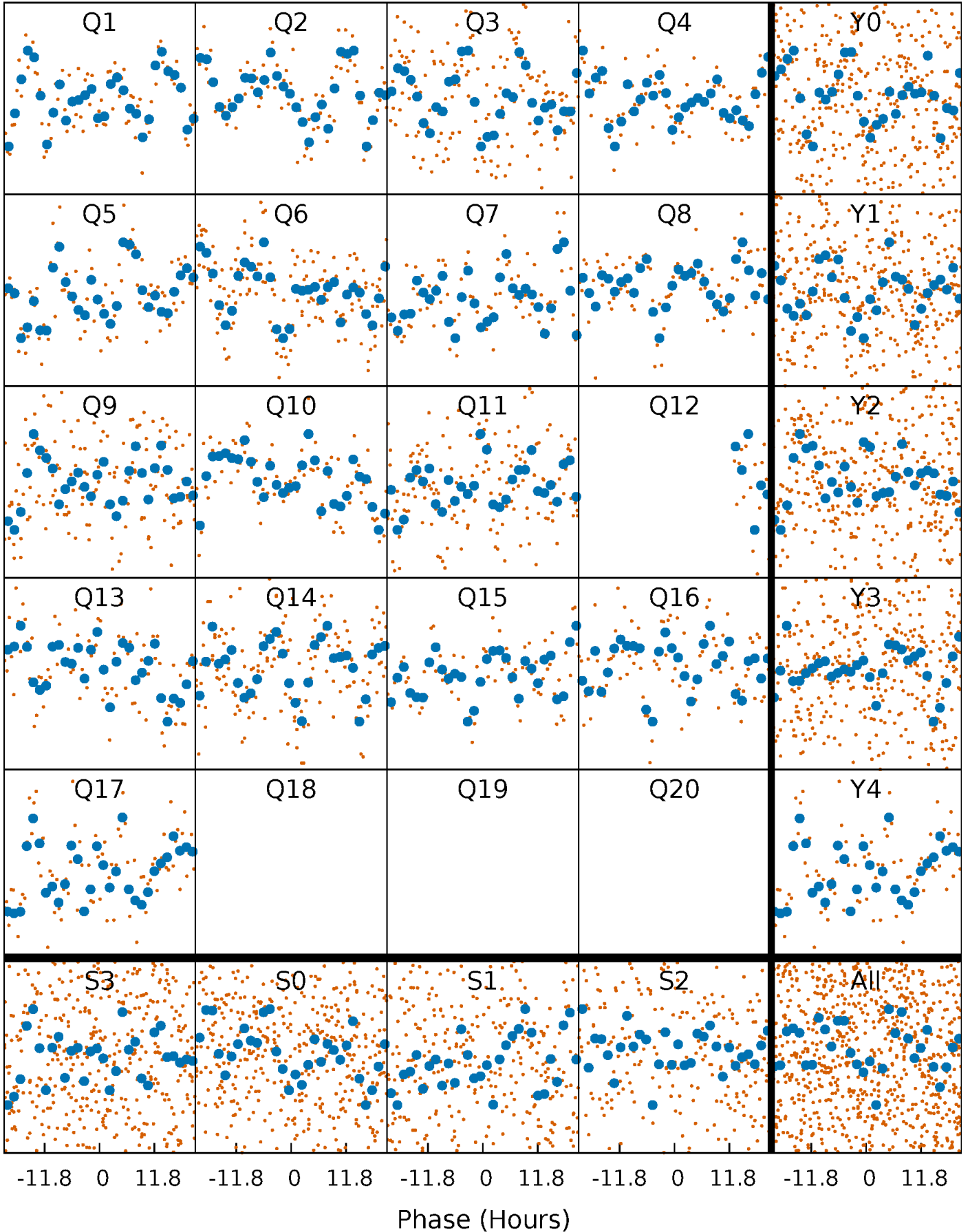
Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)





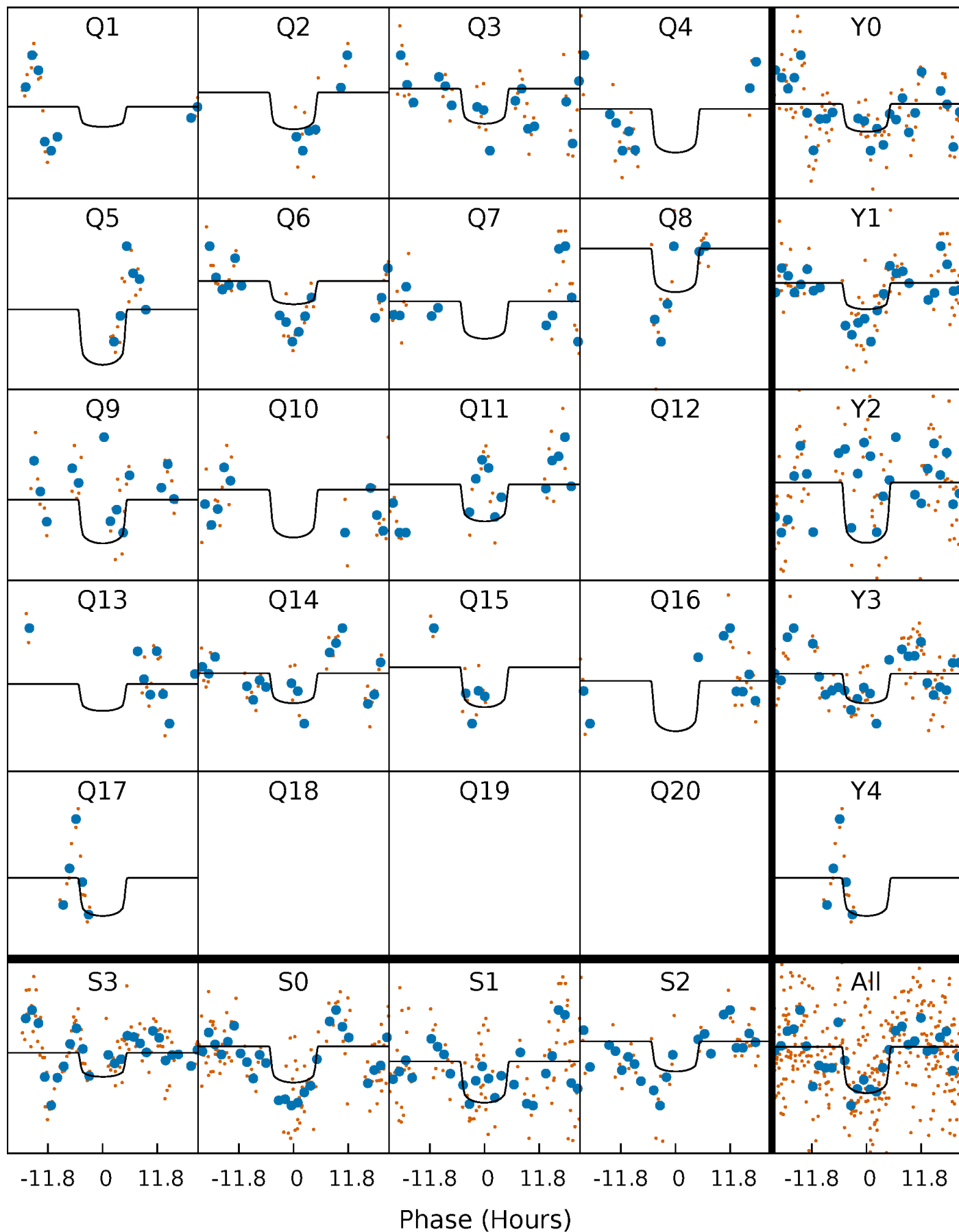
# PDC Quarter-Phased Transit Curves

TCE 006470973-03   P= 68.595946 Days    $T_0=135.604533$  (BKJD)



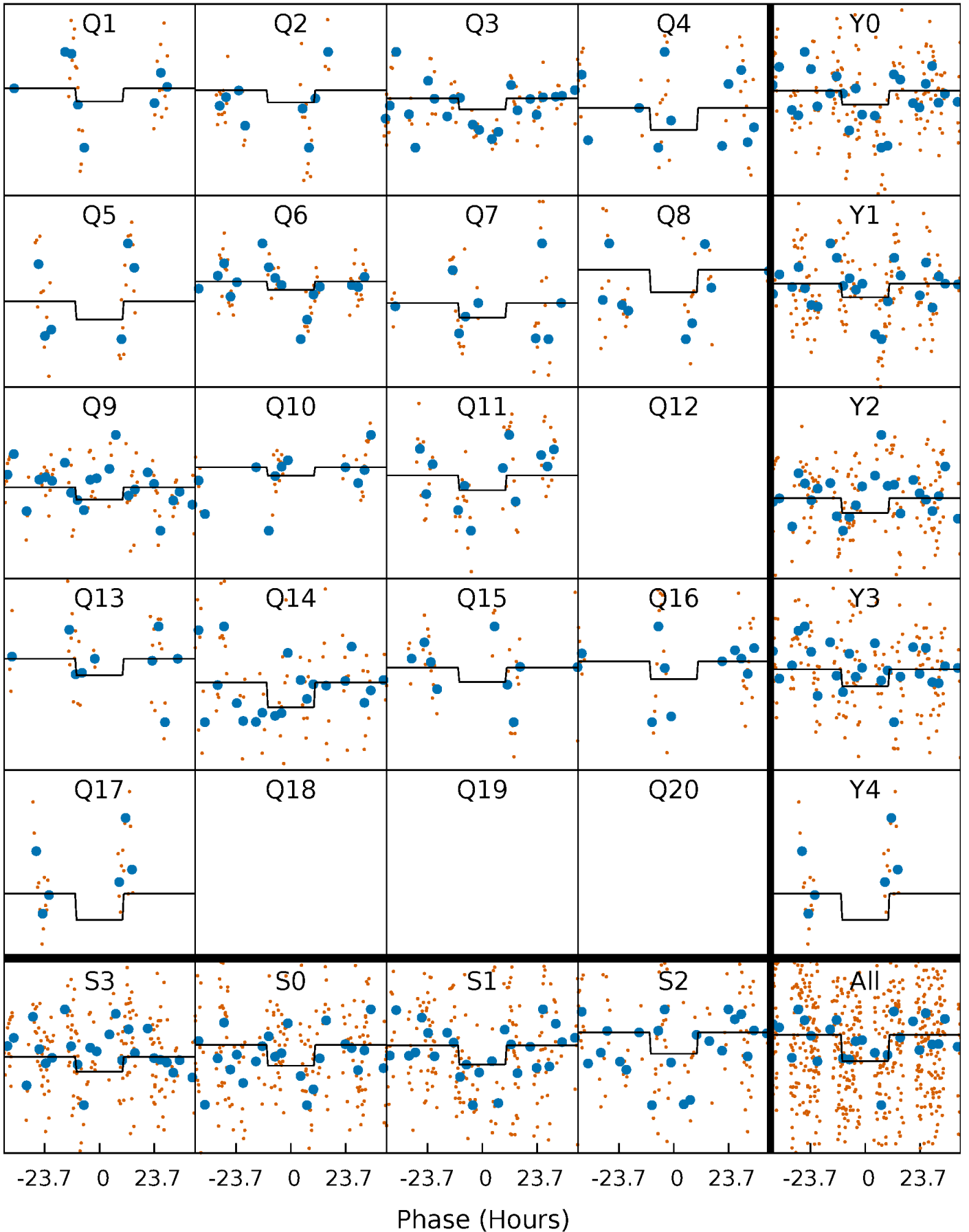
# DV Quarter-Phased Transit Curves

TCE 006470973-03 P= 68.595946 Days  $T_0=135.604533$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

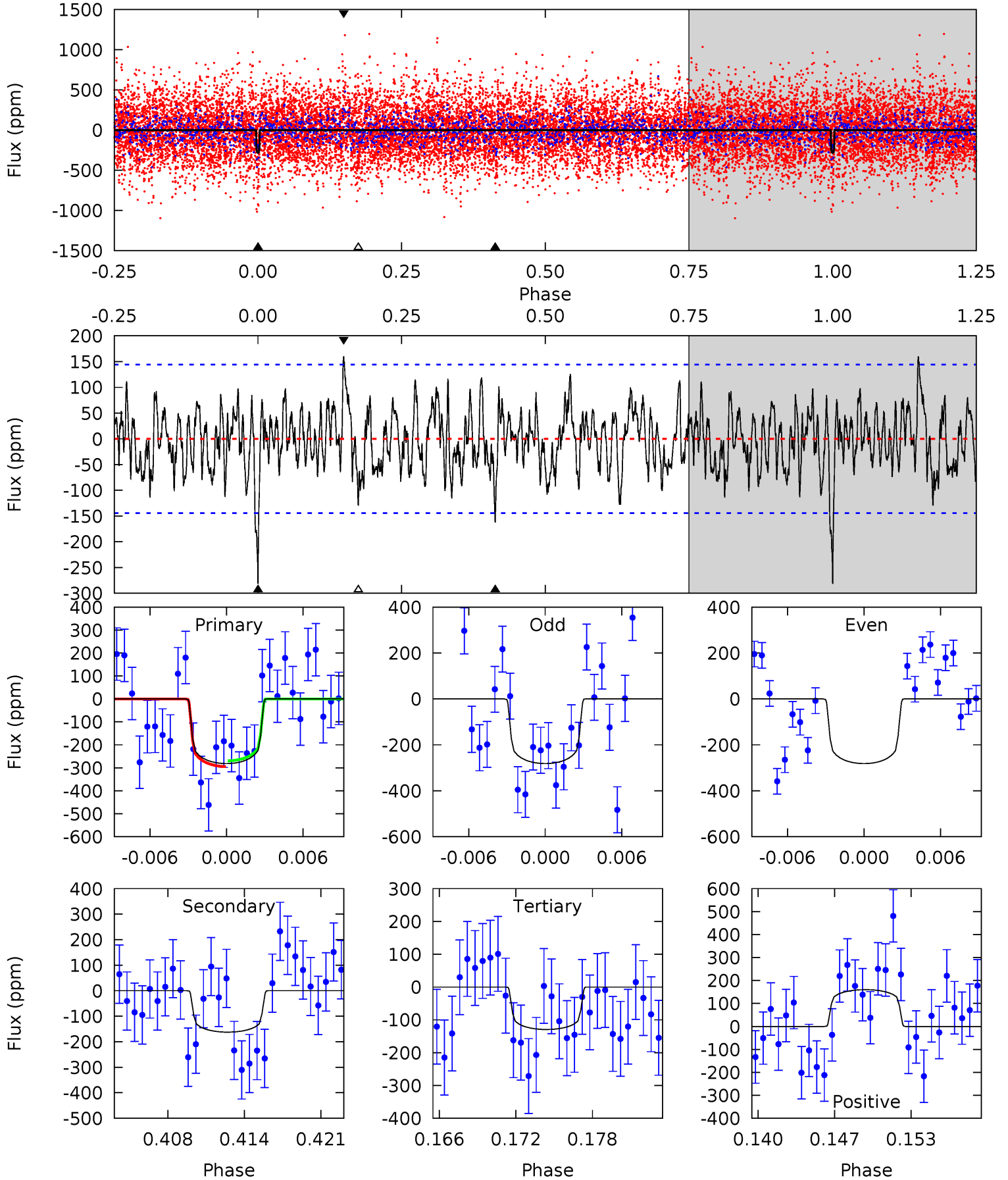
TCE 006470973-03   P= 68.568705 Days    $T_0=135.457776$  (BKJD)



# DV Model-Shift Uniqueness Test

006470973-03, P = 68.595946 Days, E = 67.008587 Days

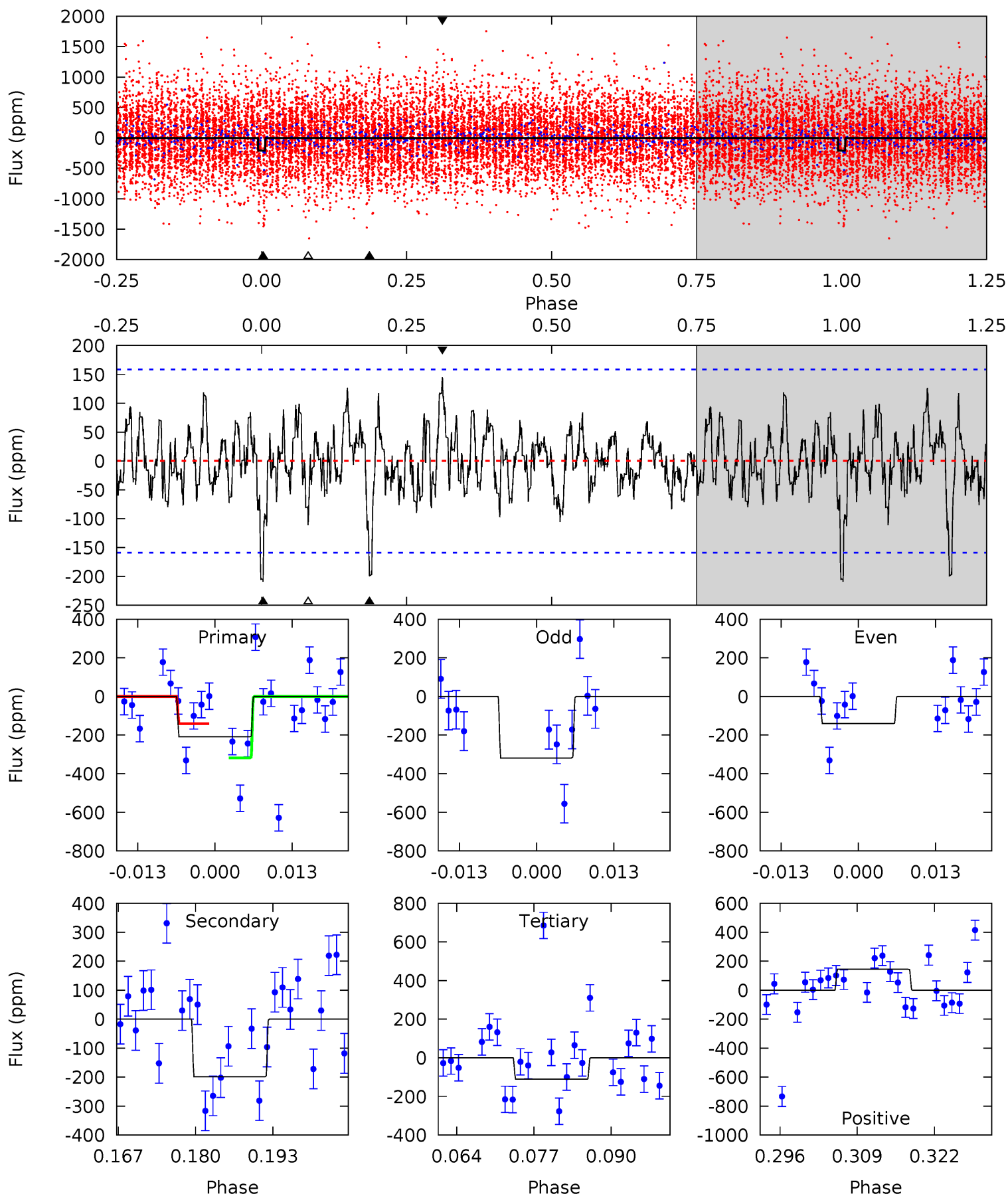
| Pri  | Sec  | Ter  | Pos  | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 9.98 | 5.76 | 4.59 | 5.67 | 5.11            | 2.73            | 1.78             | 5.40    | 4.31    | 1.17    | 0.09    | 0       | 1.15 | 0.36  | 0.44 |



# Alt Model-Shift Uniqueness Test

006470973-03, P = 68.568705 Days, E = 66.889071 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  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 6.55 | 6.24 | 3.48 | 4.54 | 4.98            | 2.49            | 1.32             | 3.07    | 2.02    | 2.76    | 1.71    | 2.70    | 1.11 | 0.41  | 2.73 |





### Stellar Parameters For KIC 006470973

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R$ ( $R_{\odot}$ )       | $M(M_{\odot})$            | $p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ ) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $8548^{+237}_{-356}$ | $3.785^{+0.400}_{-0.075}$ | $-0.300^{+0.300}_{-0.350}$ | $2.976^{+0.562}_{-1.406}$ | $1.971^{+0.382}_{-0.466}$ | $0.105^{+0.371}_{-0.033}$                     |
|        | +3%/-4%              | +11%/-2%                  | +100%/-117%                | +19%/-47%                 | +19%/-24%                 | +353%/-31%                                    |
| Source | KIC0                 | 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 006470973-03 / KOI

| Detrend | Depth (ppm)   | $R_p$ ( $R_{\oplus}$ ) | $T_{\text{max}}$ (K) | $T_{\text{obs}}$ (K)   | $A_{\text{obs}}$      |
|---------|---------------|------------------------|----------------------|------------------------|-----------------------|
| DV      | $-162 \pm 28$ | $5.37^{+1.55}_{-1.53}$ | $1363^{+95}_{-139}$  | $6890^{+1073}_{-753}$  | $526^{+490}_{-210}$   |
| Alt.    | $-199 \pm 32$ | $4.03^{+1.56}_{-1.35}$ | $1366^{+94}_{-162}$  | $8641^{+2326}_{-1268}$ | $1205^{+1358}_{-596}$ |

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature  
 $T_{\text{obs}}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )  
 $A_{\text{obs}}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{\text{obs}} \gg T_{\text{max}}$  AND  $A_{\text{obs}} \gg 1.0$

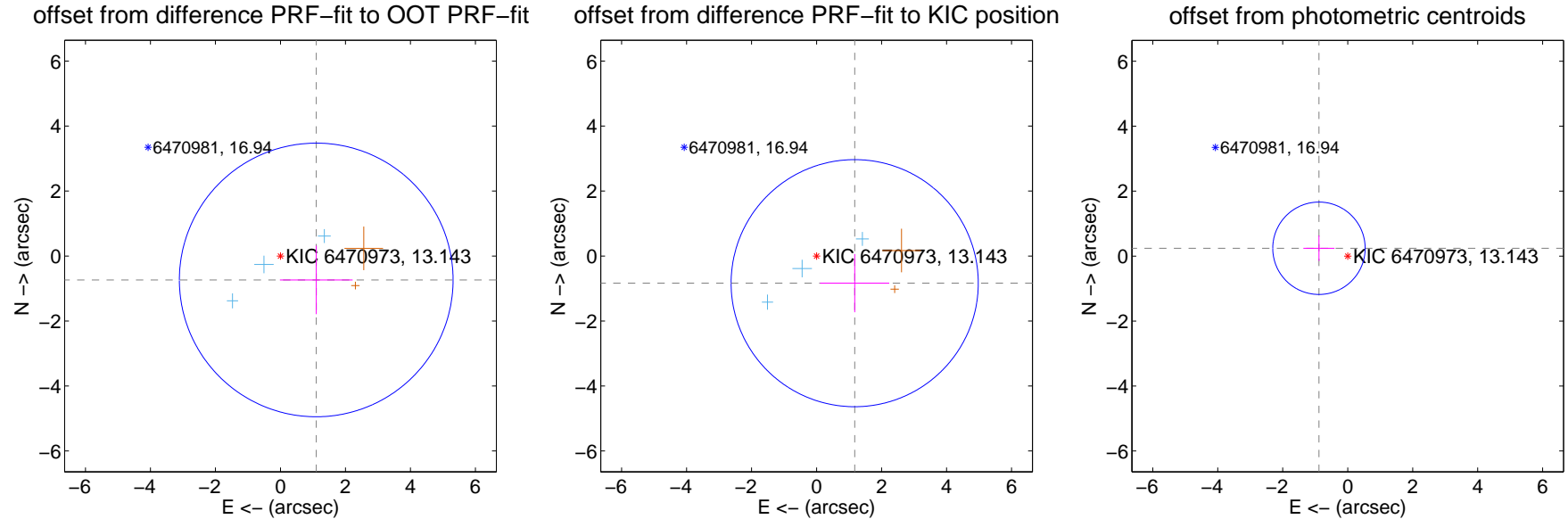
## DV Centroid Data

Supplemental centroid analysis for 006470973-03. Kepler magnitude: 13.14. Transit SNR 7.46

There are 3 quarters with good PRF difference image offsets

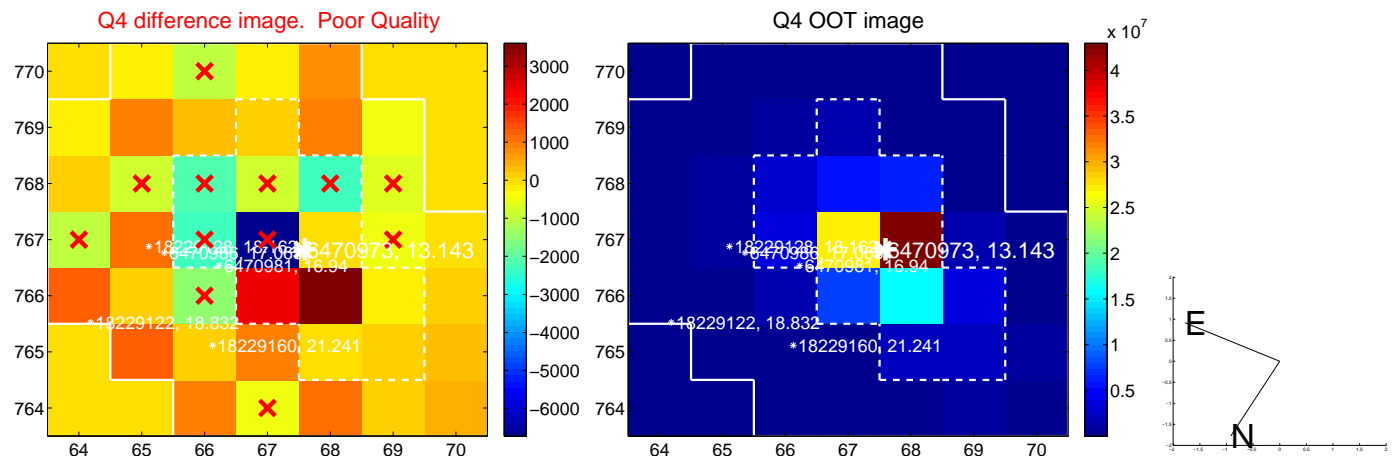
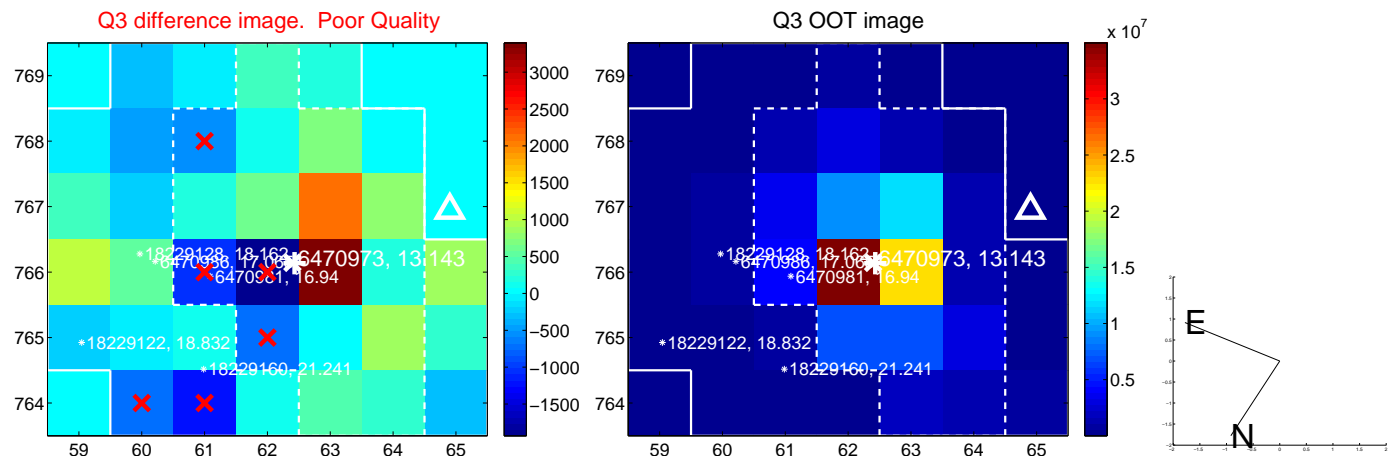
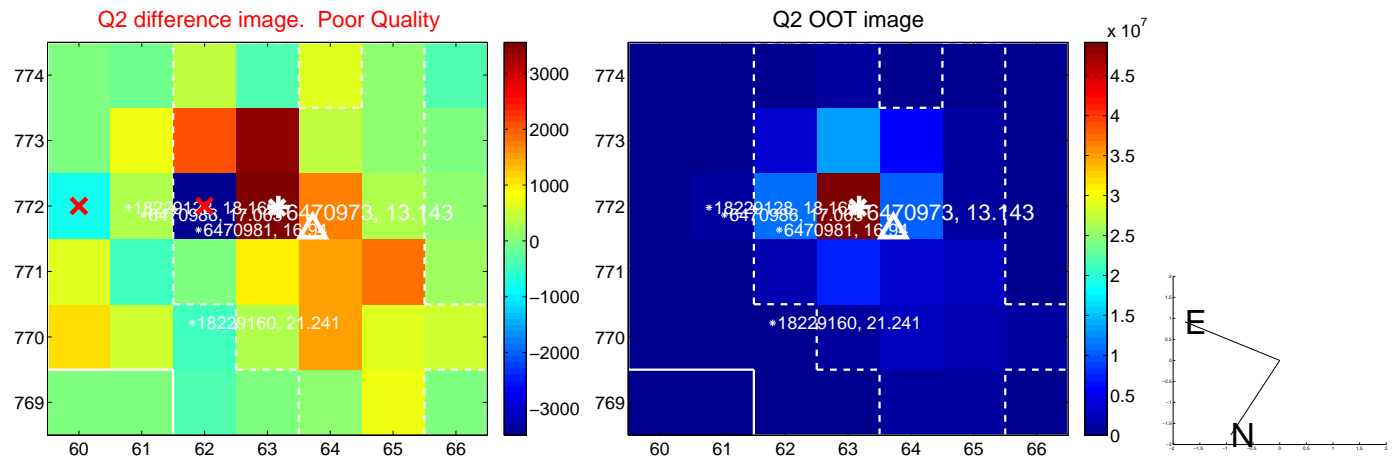
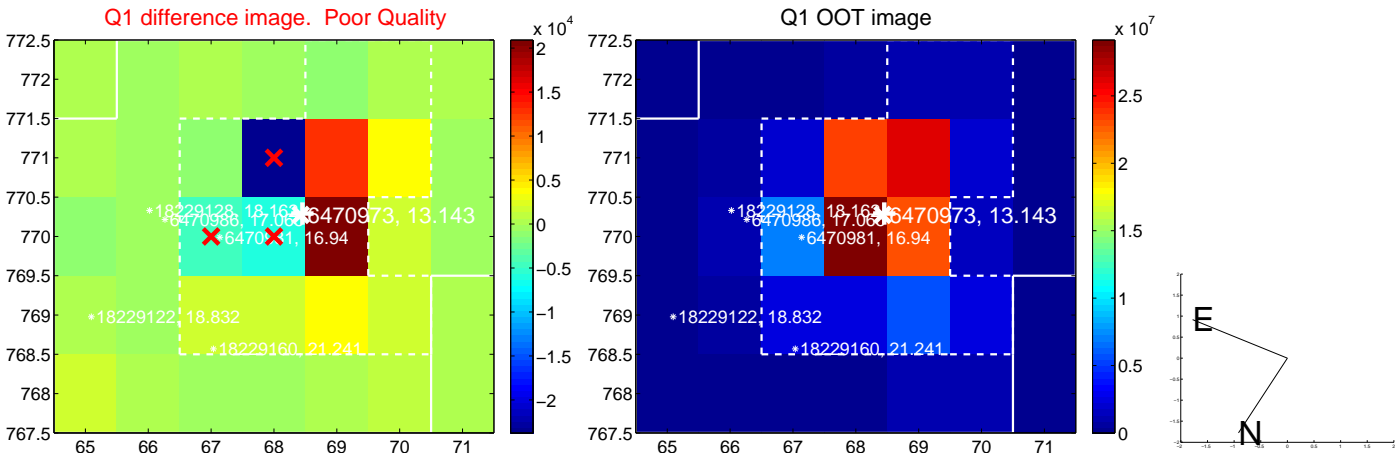
The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA        | $\Delta$ Dec       |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT          | $1.324 \pm 1.404$  | 0.94                | $-1.101 \pm 1.119$ | $-0.736 \pm 1.055$ |
| PRF-fit source offset from KIC position | $1.440 \pm 1.268$  | 1.14                | $-1.173 \pm 1.065$ | $-0.836 \pm 0.896$ |
| photometric centroid source offset      | $0.92 \pm 0.47$    | 1.94                | $0.89 \pm 0.48$    | $0.24 \pm 0.39$    |

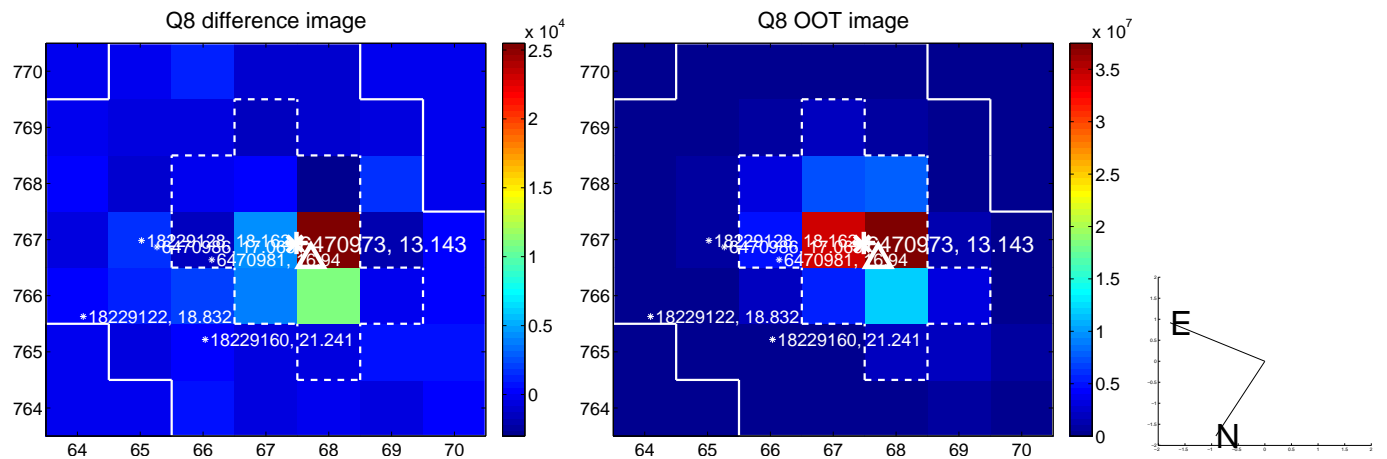
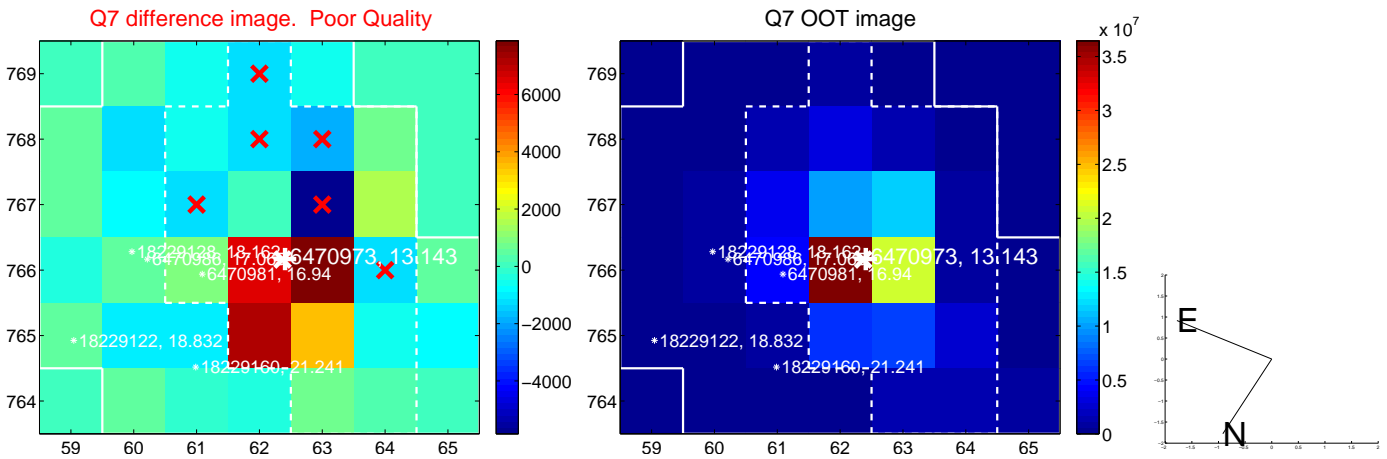
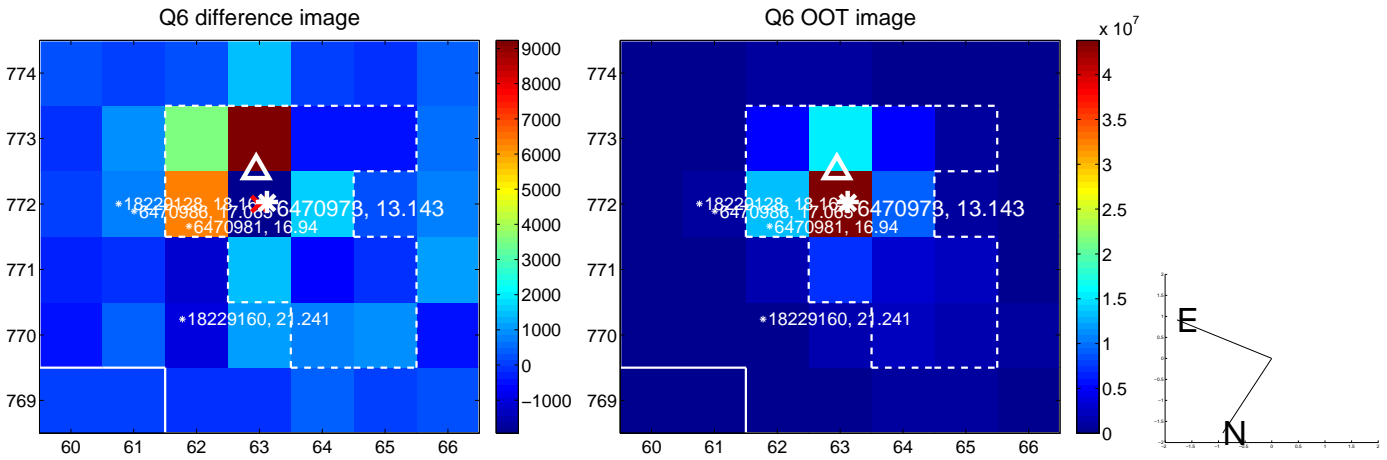
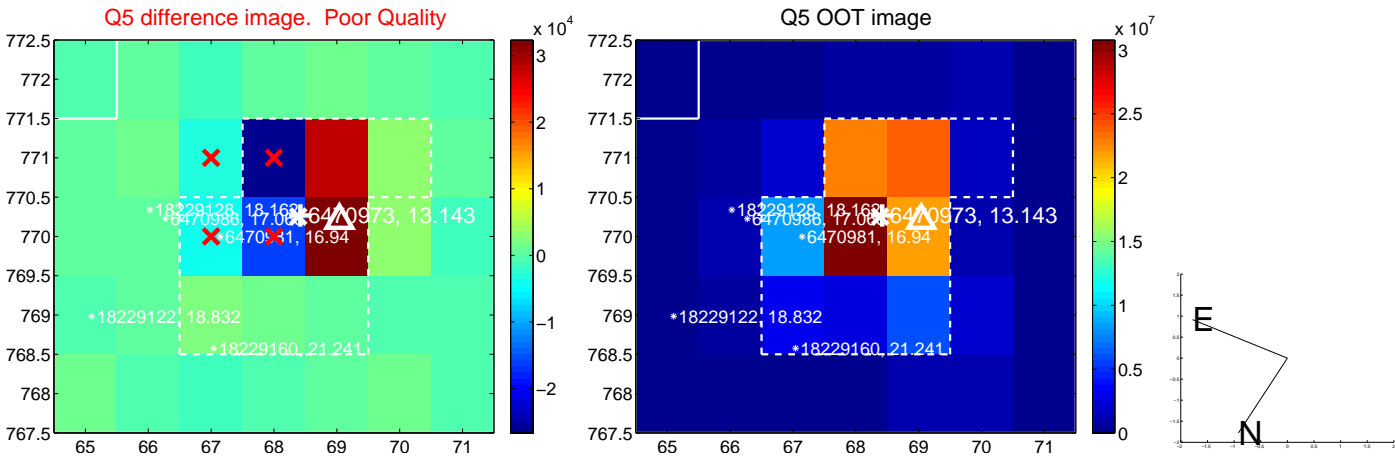


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

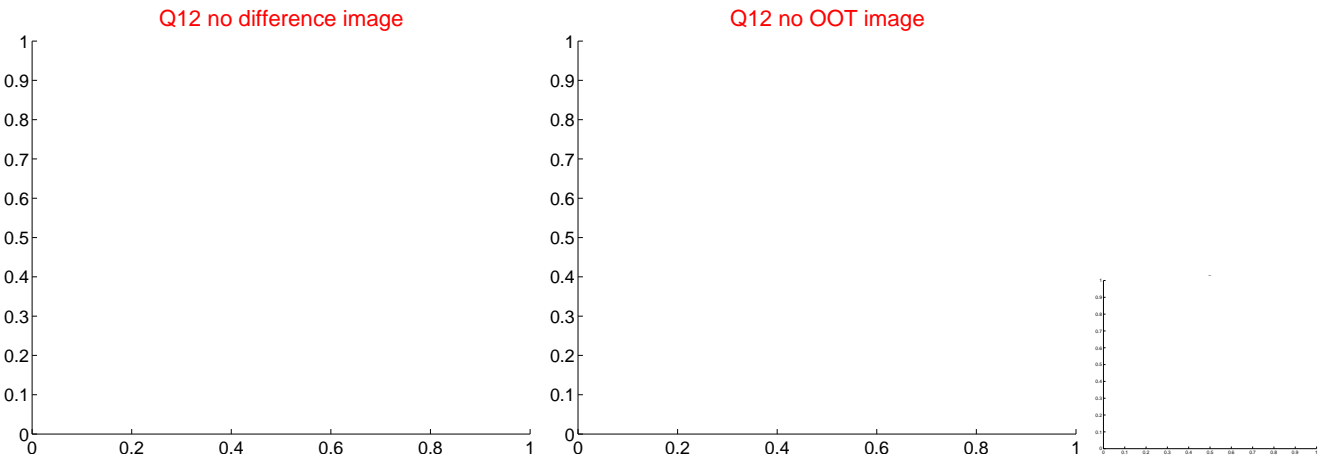
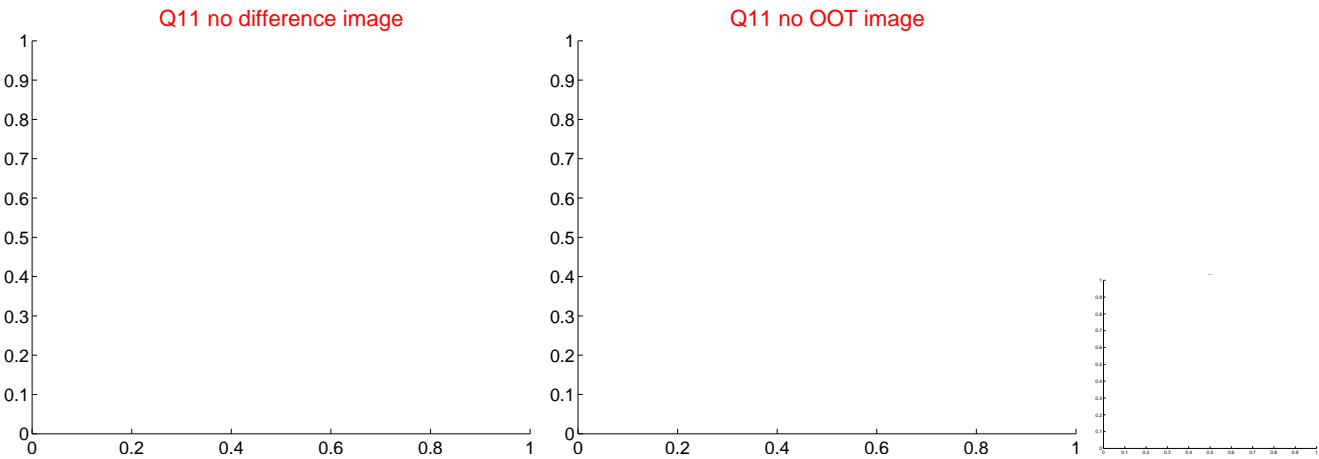
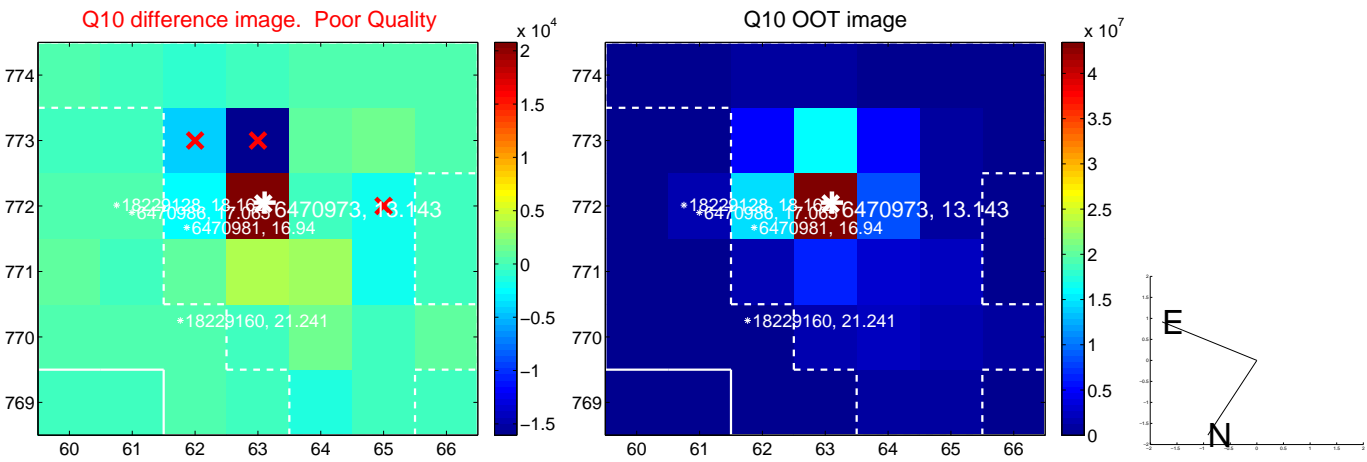
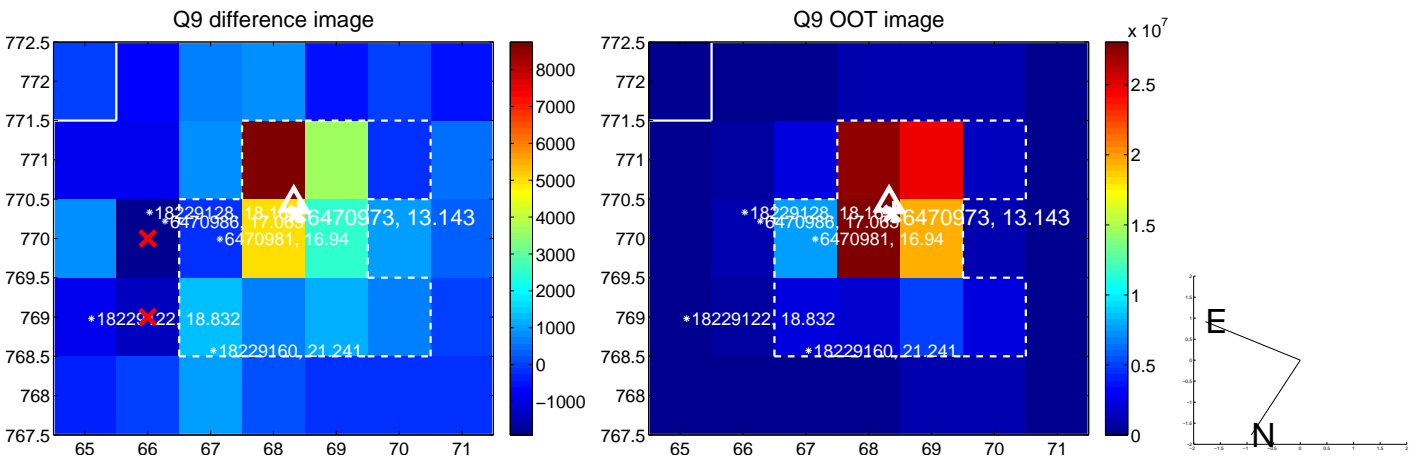
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



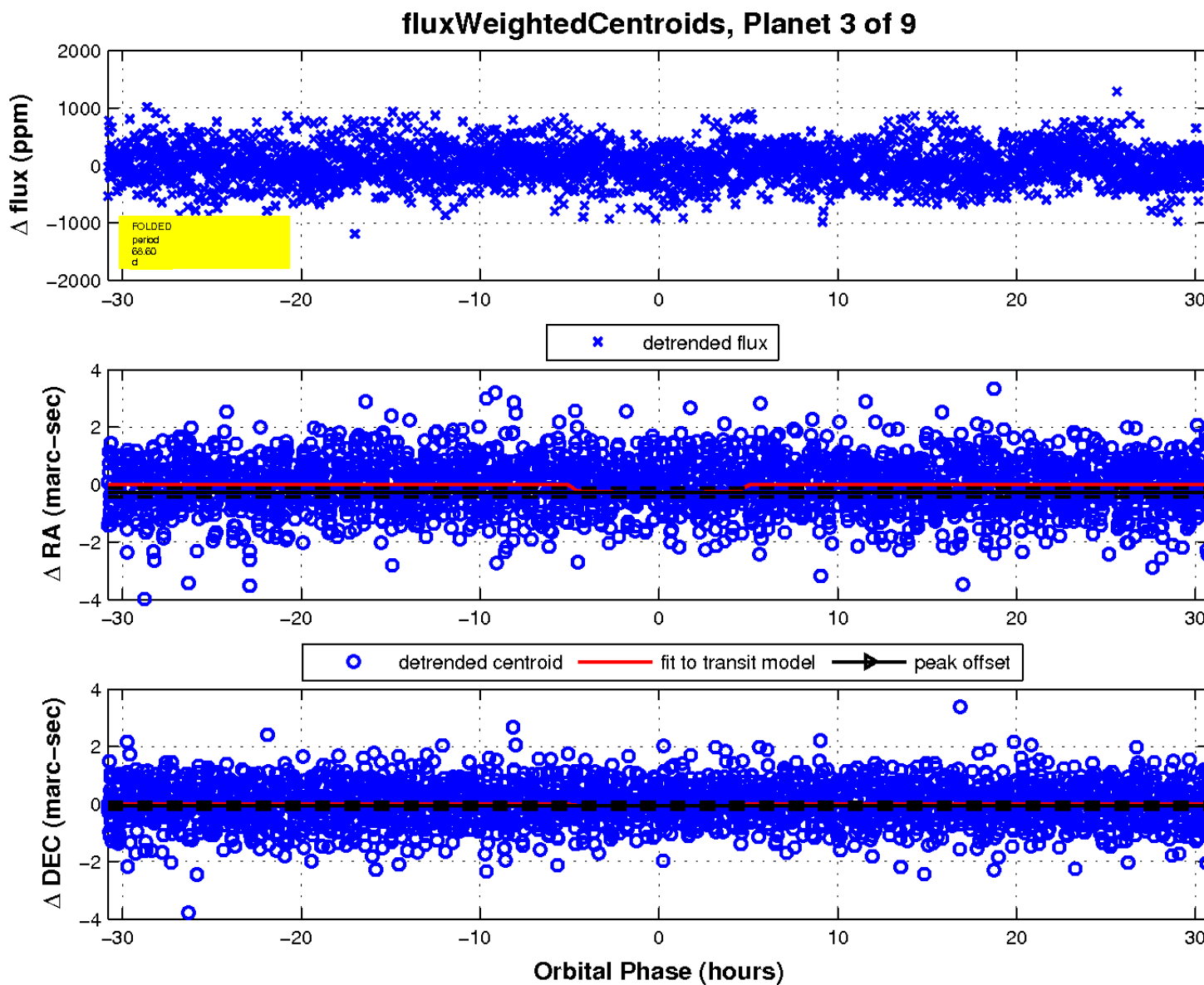
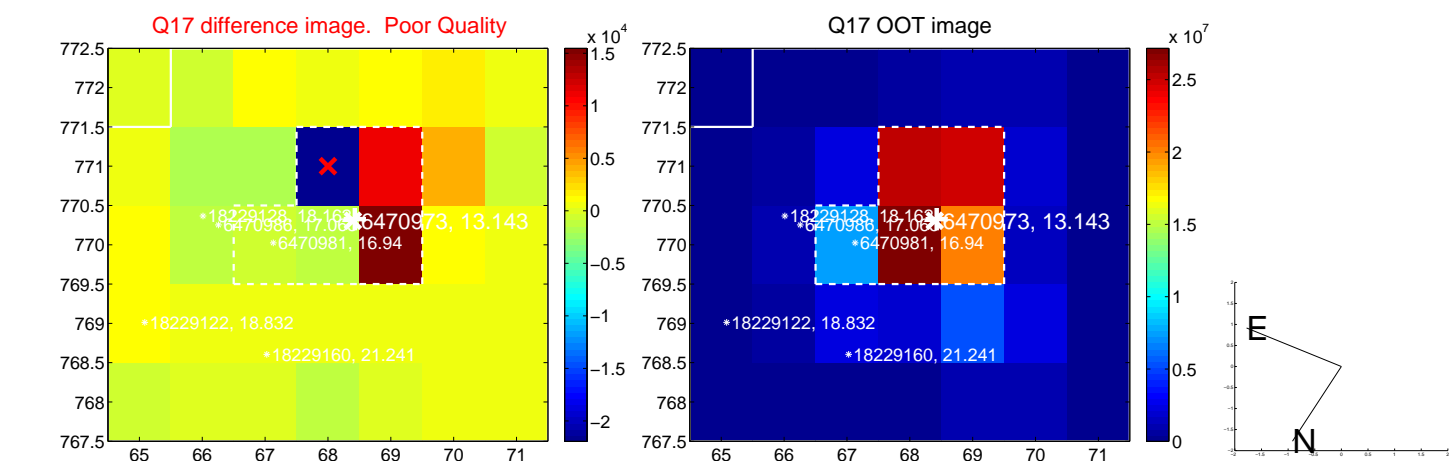
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



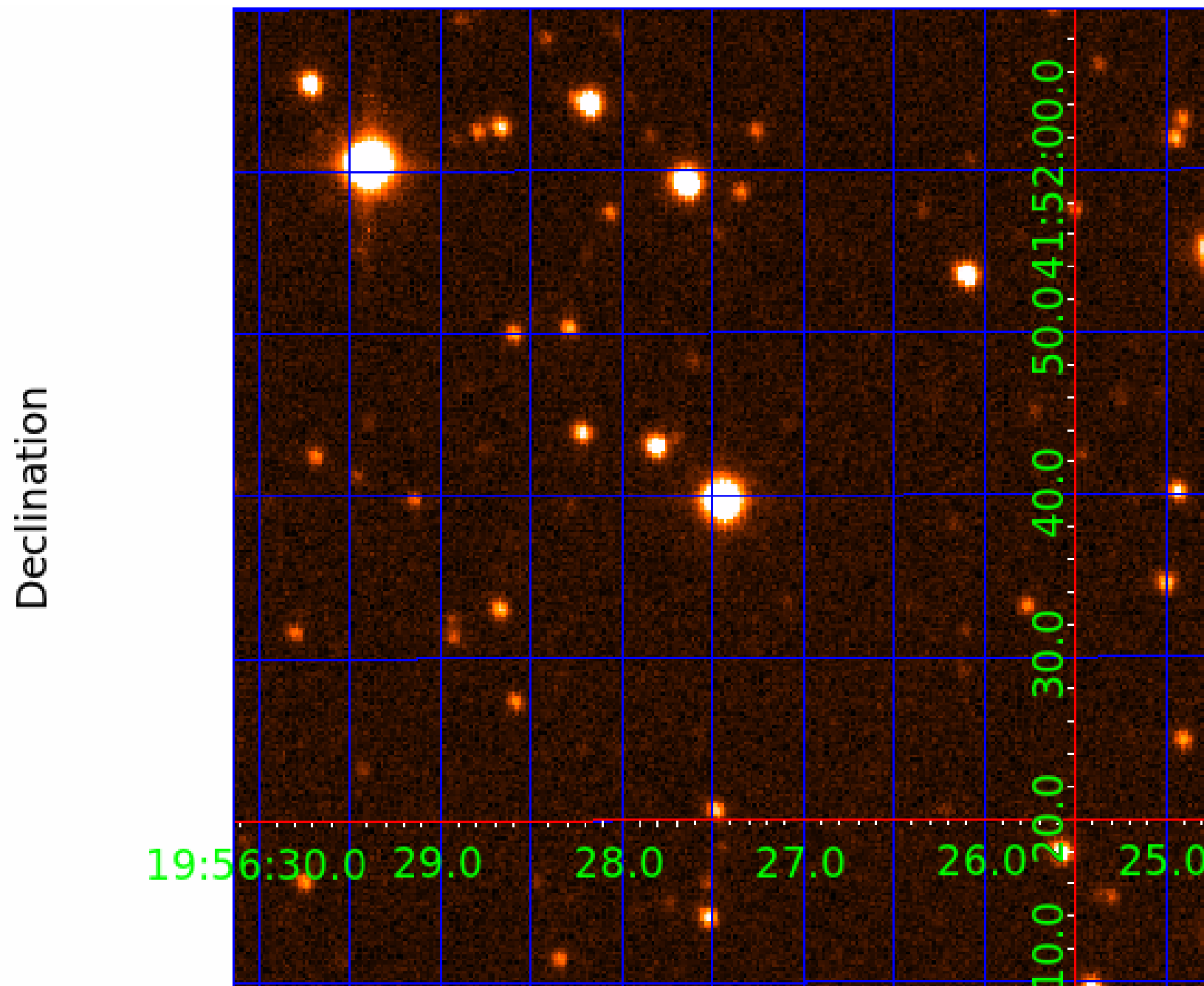




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image



# KIC 006470973

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 006470973-01 | OBS      | No   | 0.509313      | 131.708781   | 35.2        | 1.285            | 10.2 | 9.8  | 2.98                        | 8548            | 1.84                   | 173032.50              |
| 006470973-02 | OBS      | No   | 1.507014      | 132.863868   | 43.9        | 7.686            | 8.8  | 8.7  | 2.98                        | 8548            | 2.22                   | 40733.45               |
| 006470973-03 | OBS      | No   | 68.595946     | 135.604533   | 305.4       | 10.291           | 12.3 | 7.5  | 2.98                        | 8548            | 5.83                   | 250.64                 |
| 006470973-04 | OBS      | No   | 95.200506     | 157.793112   | 760.5       | 7.481            | 11.1 | 9.5  | 2.98                        | 8548            | 10.09                  | 161.90                 |
| 006470973-05 | OBS      | No   | 43.824577     | 173.397932   | 266.9       | 11.025           | 9.9  | 7.4  | 2.98                        | 8548            | 5.20                   | 455.50                 |
| 006470973-06 | OBS      | No   | 43.851912     | 174.379270   | 265.5       | 5.706            | 9.4  | 6.5  | 2.98                        | 8548            | 5.91                   | 455.12                 |
| 006470973-07 | OBS      | No   | 96.994995     | 218.805364   | 538.8       | 4.480            | 9.0  | 9.0  | 2.98                        | 8548            | 7.65                   | 157.92                 |
| 006470973-09 | OBS      | No   | 203.109072    | 227.259250   | 243.1       | 6.000            | 8.5  | -1.0 | 2.98                        | 8548            | 4.71                   | 58.95                  |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 006470973-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT   |
| 006470973-02 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT   |
| 006470973-03 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT  |
| 006470973-04 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS |
| 006470973-05 | 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   |
| 006470973-06 | OBS      | FP   | 0.00  | 1 | 0 | 1 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—HALO_GHOST                        |
| 006470973-07 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT  |
| 006470973-09 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—CENT_NOFITS   |

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

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

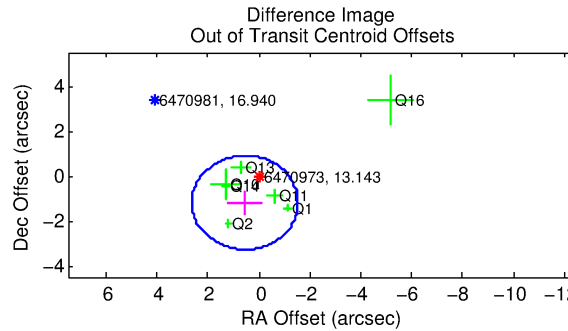
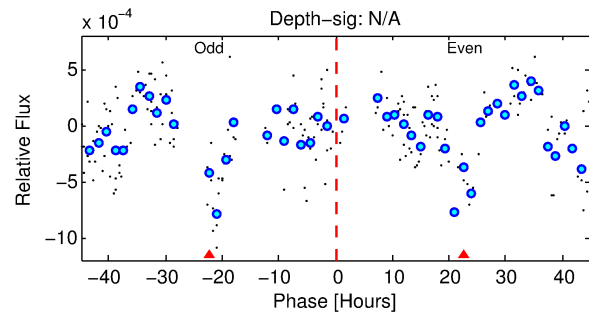
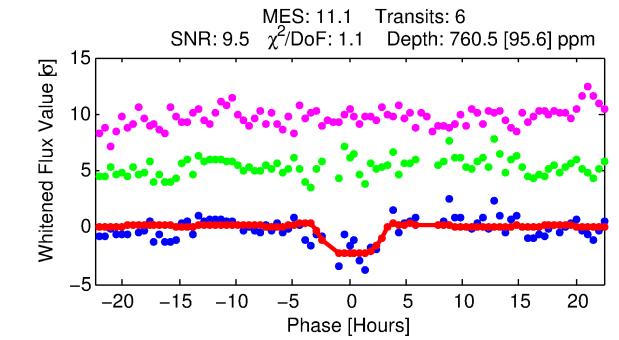
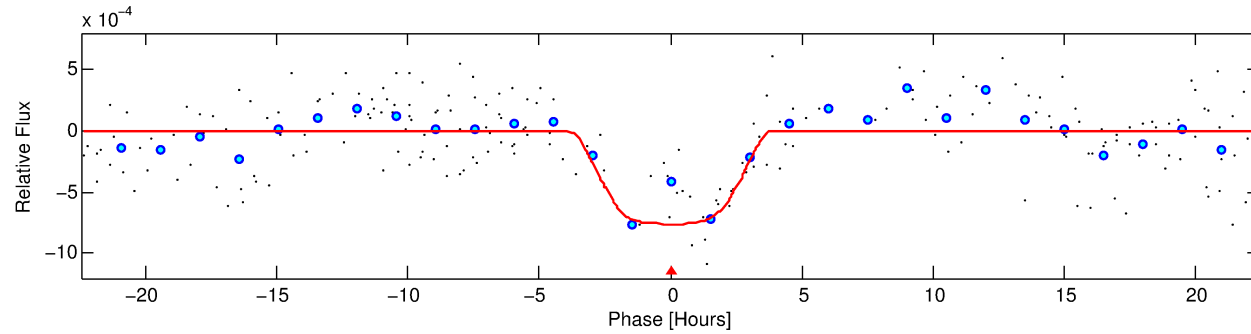
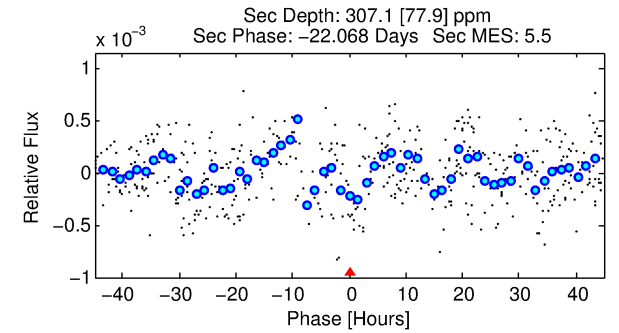
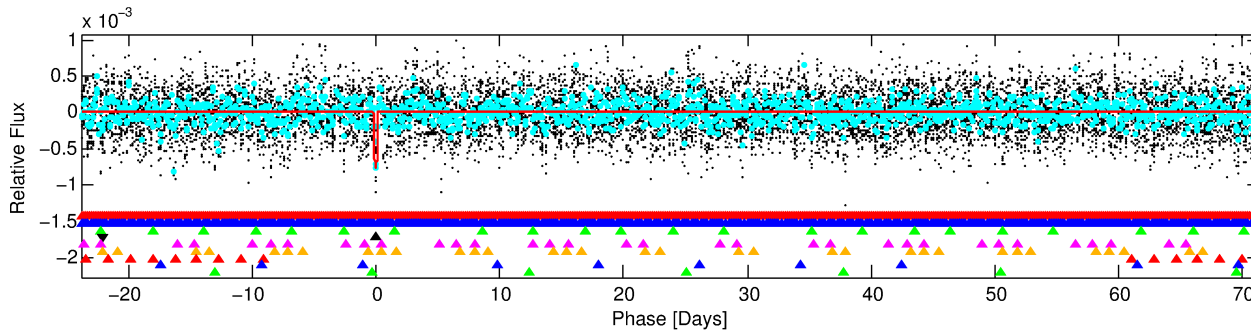
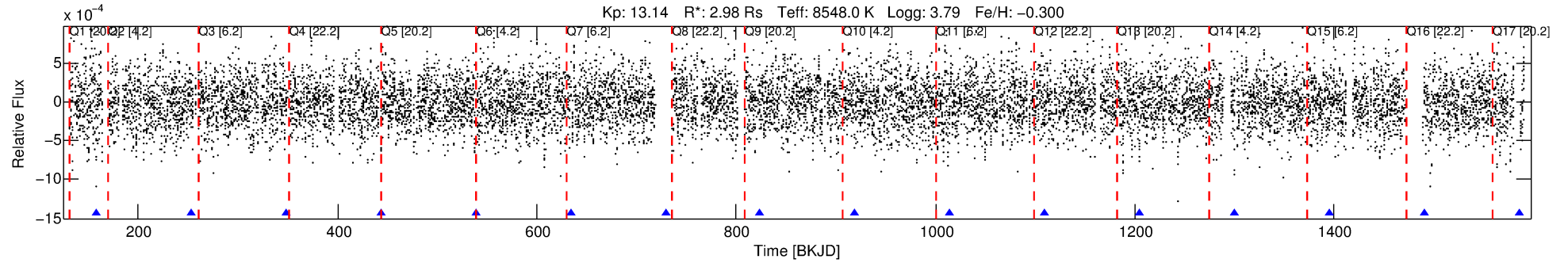
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006470973-04

No Significant Match Found

# DV One-Page Summary

KIC: 6470973 Candidate: 4 of 9 Period: 95.201 d



## DV Fit Results:

Period = 95.20051 [0.00187] d  
Epoch = 157.7931 [0.0156] BKJD  
Rp/R\* = 0.0311 [0.0023]  
a/R\* = 37.46 [7.26]  
b = 0.96 [0.02]  
Seff = 161.90 [114.94]  
Teff = 910 [161] K  
Rp = 10.09 [4.83] Re  
a = 0.5115 [0.2250] AU  
Ag = 434.21 [325.84] [1.33 $\sigma$ ]  
Teffp = 6420 [543] K [9.72 $\sigma$ ]

## DV Diagnostic Results:

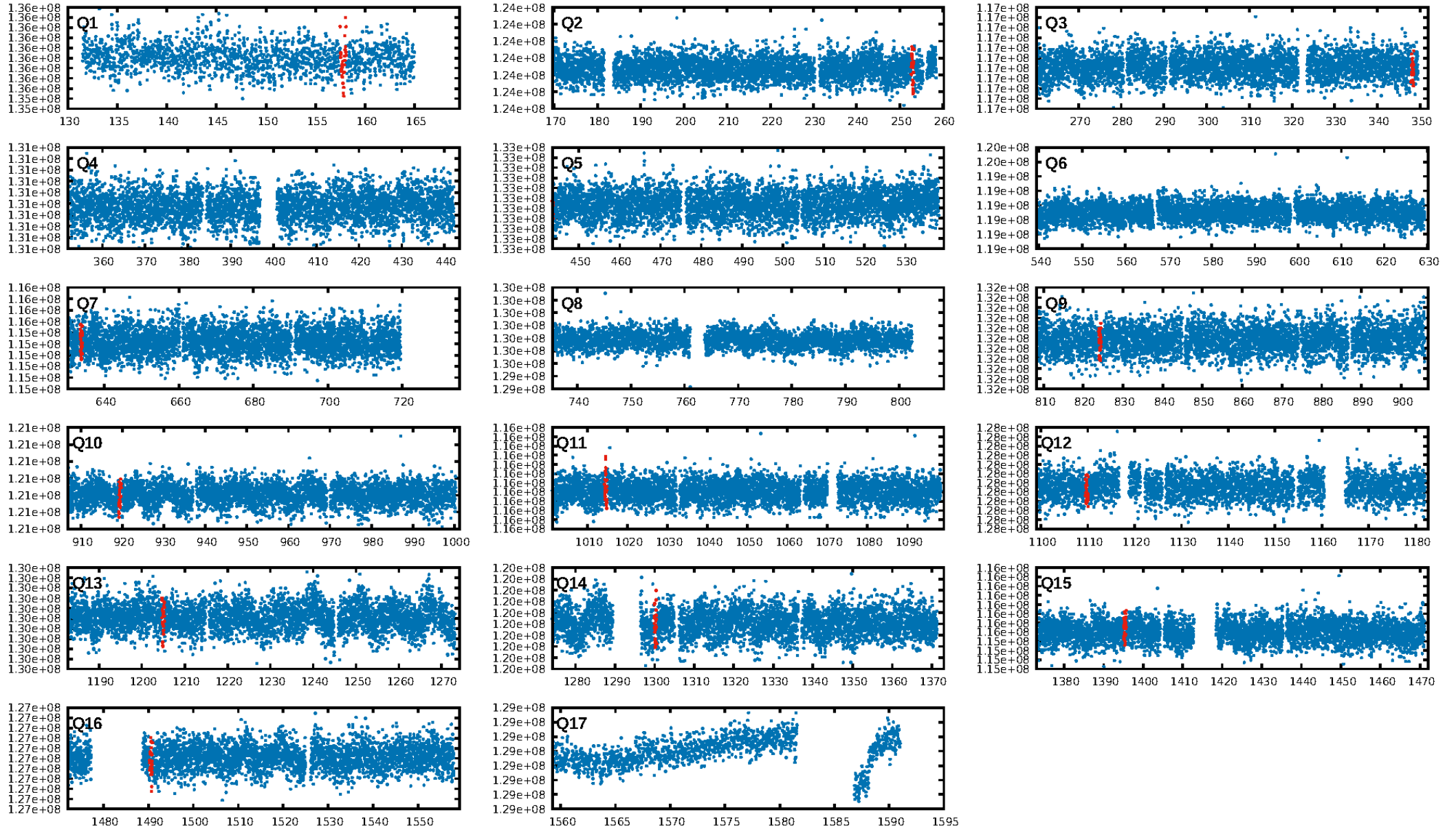
ShortPeriod-sig: 100.0% [50.19 $\sigma$ ]  
LongPeriod-sig: 100.0% [4.94 $\sigma$ ]  
ModelChiSquare2-sig: 46.8%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 4.042  
Centroid-sig: 0.1%  
Centroid-so: 0.782 arcsec [2.49 $\sigma$ ]  
OotOffset-rm: 1.309 arcsec [1.88 $\sigma$ ]  
KicOffset-rm: 1.378 arcsec [1.91 $\sigma$ ]  
OotOffset-st: 3/1/1/2 [7]  
KicOffset-st: 3/1/1/2 [7]  
DiffImageQuality-fgm: 0.43 [3/7]  
DiffImageOverlap-fno: 0.00 [0/10]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 06:07:14 Z

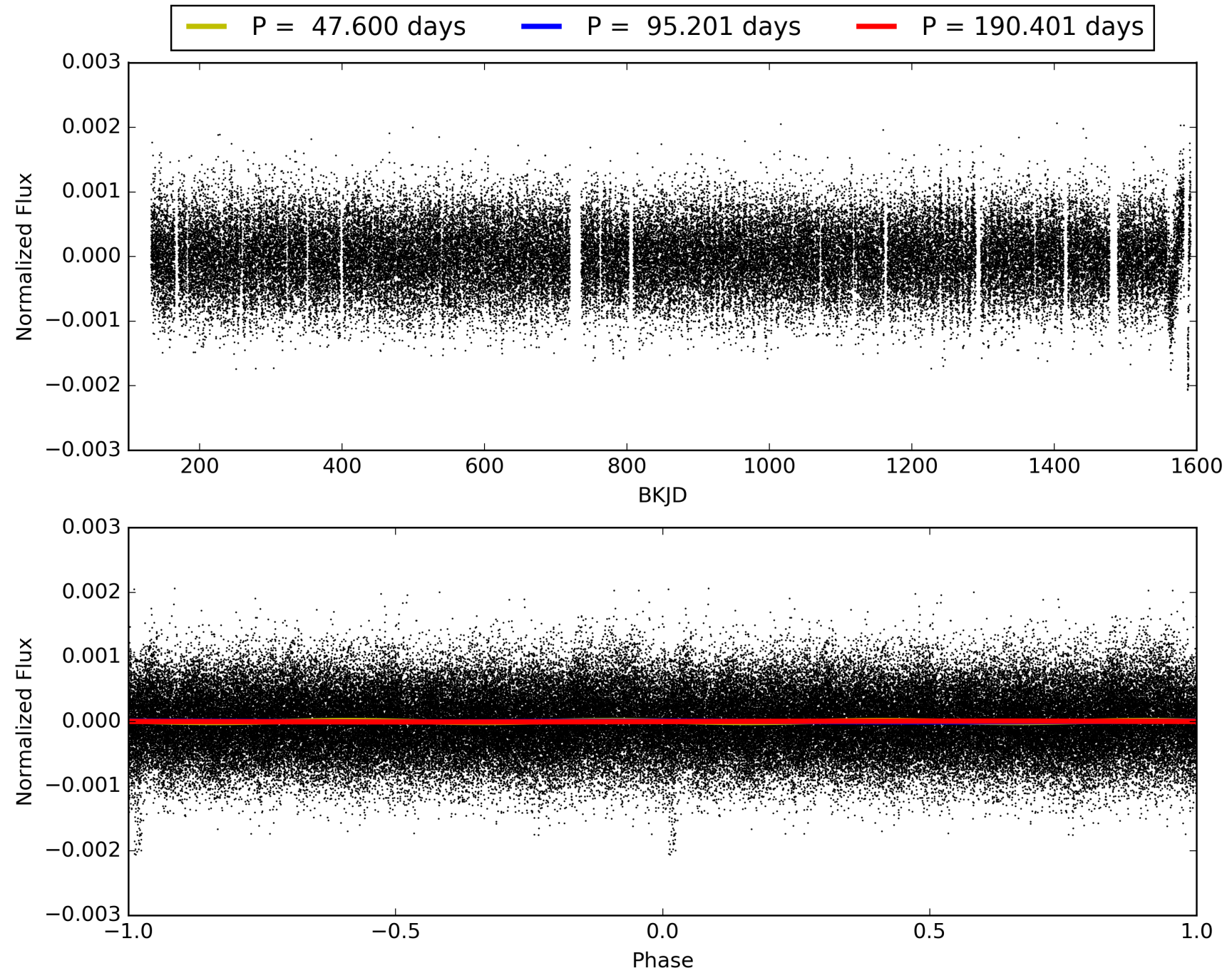
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 006470973-04, PDC Light Curves

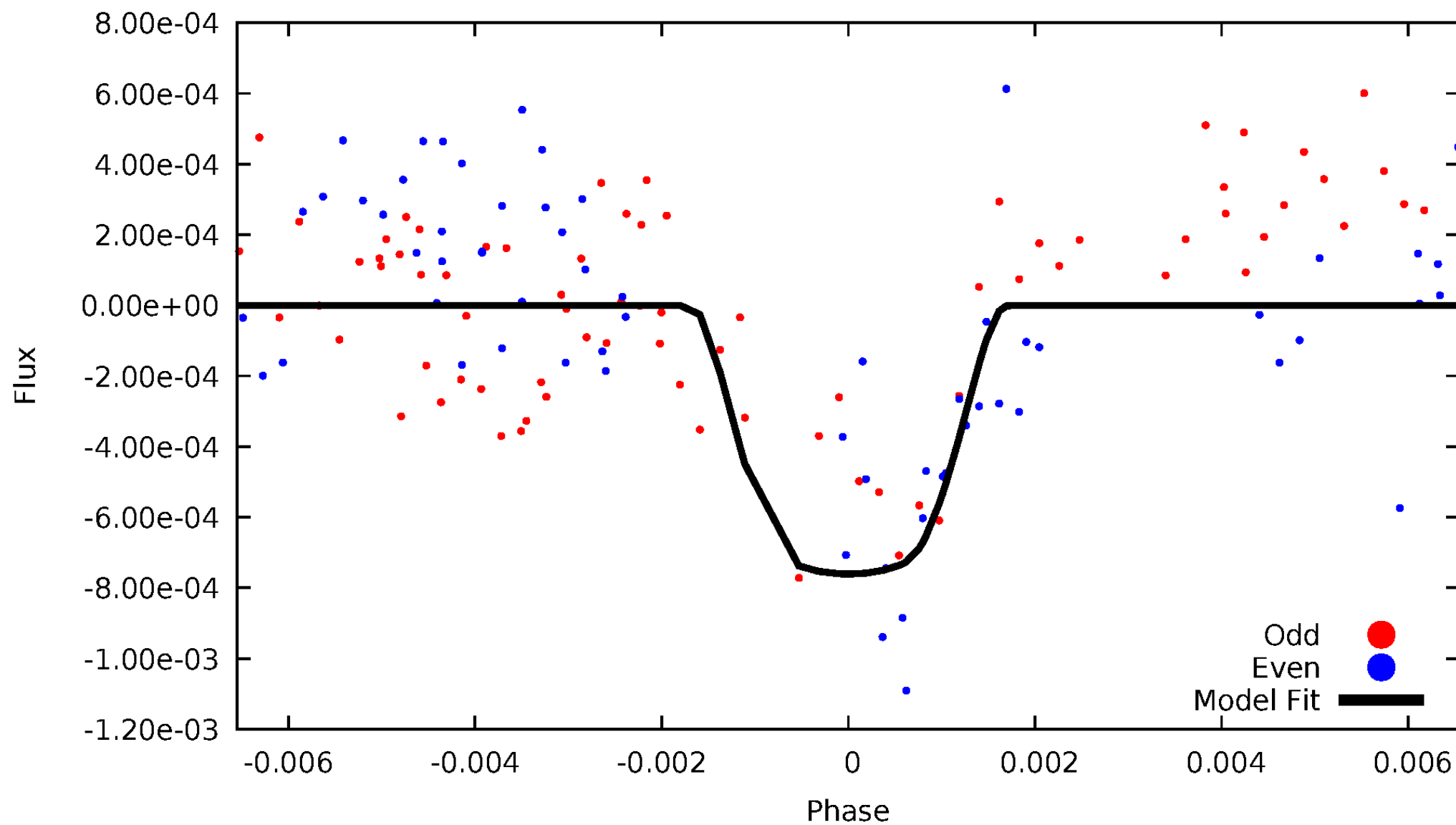


TCE 006470973-04



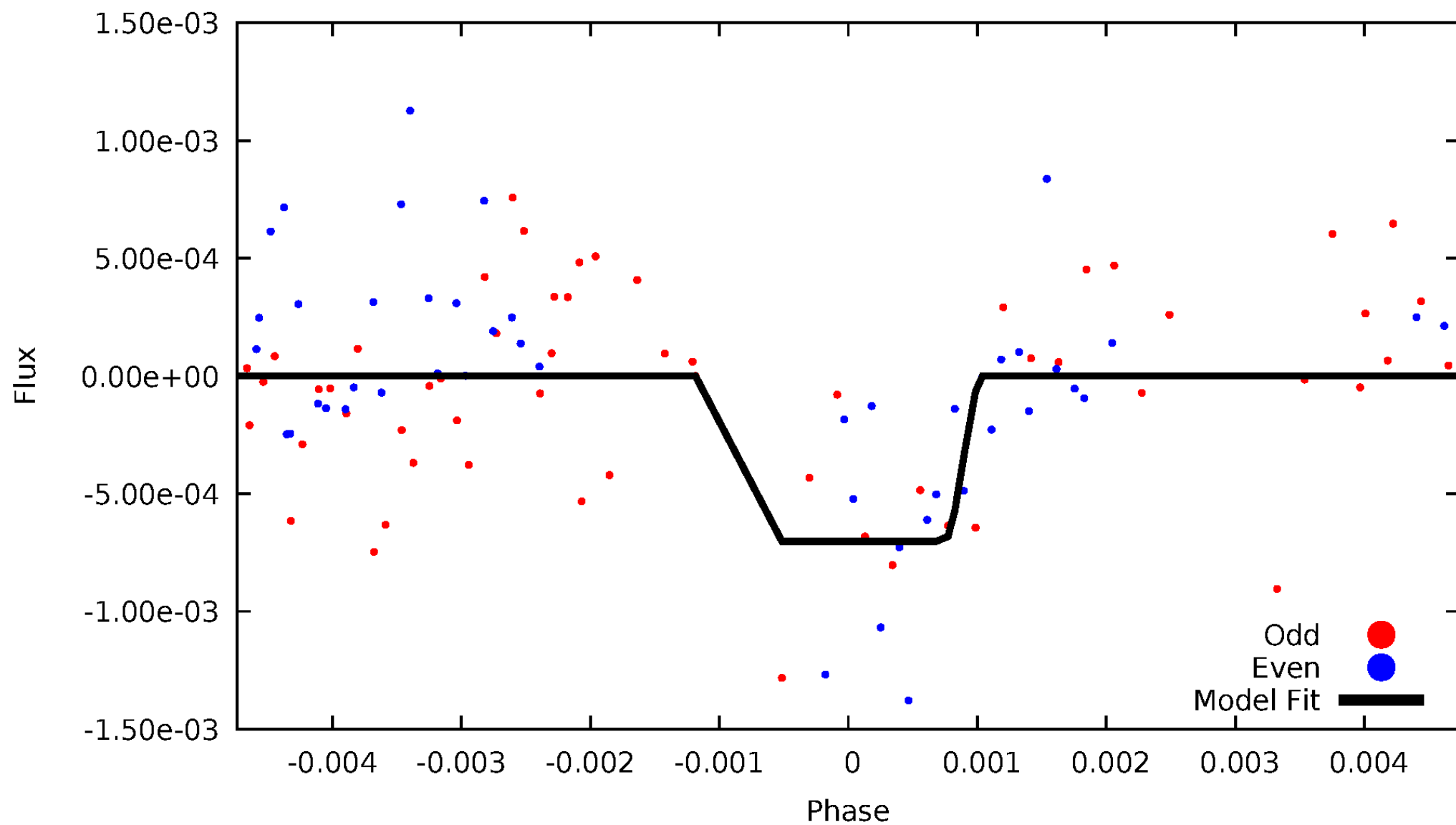
# DV Odd/Even

TCE 006470973-04



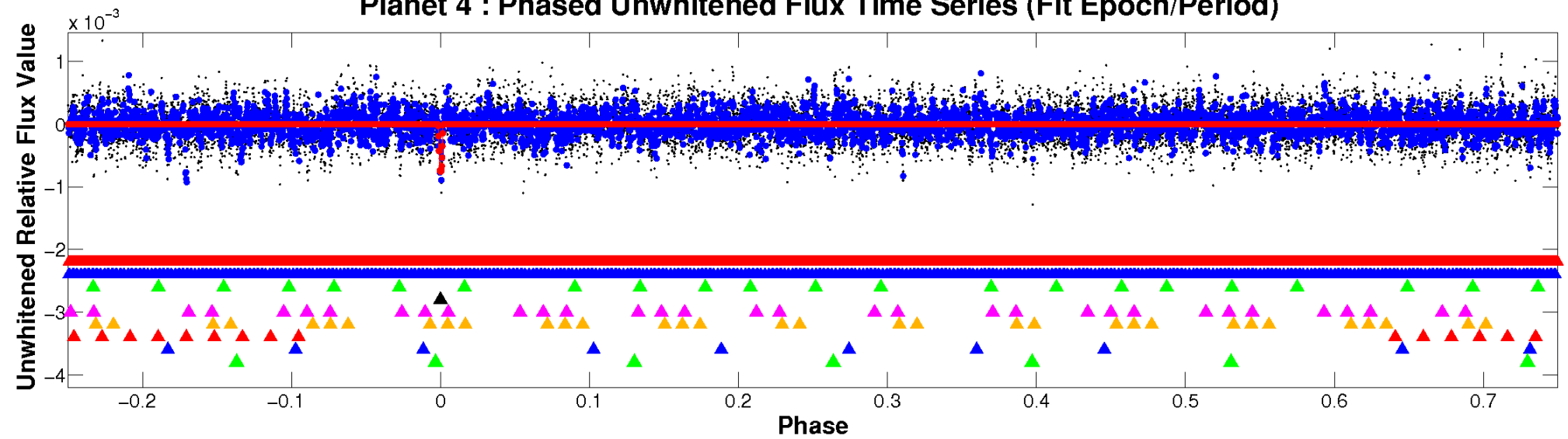
# ALT Odd/Even

TCE 006470973-04

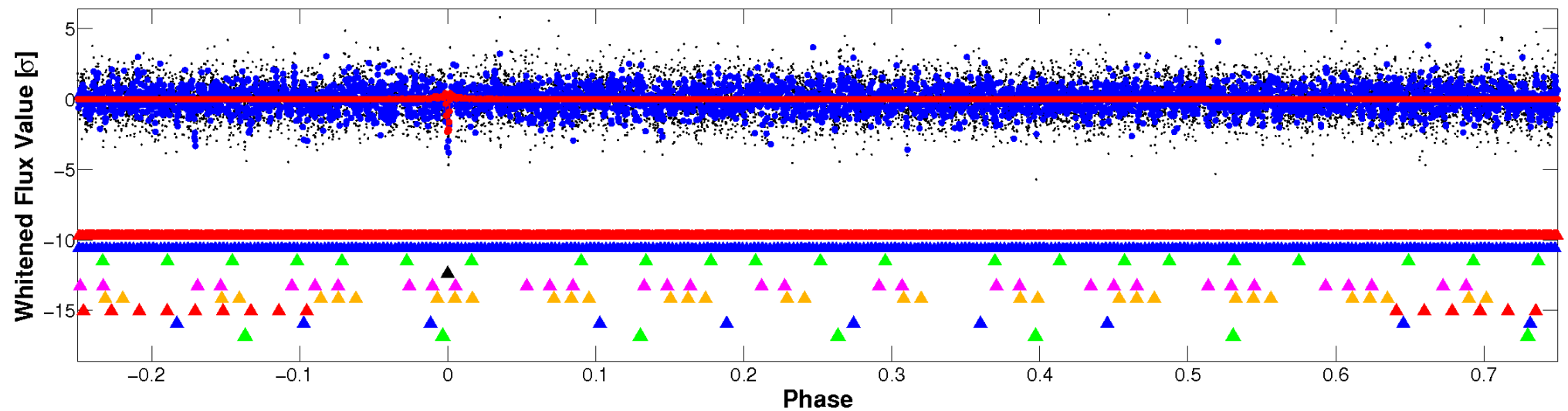


# Non-Whitened Vs. Whitened Light Curve

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



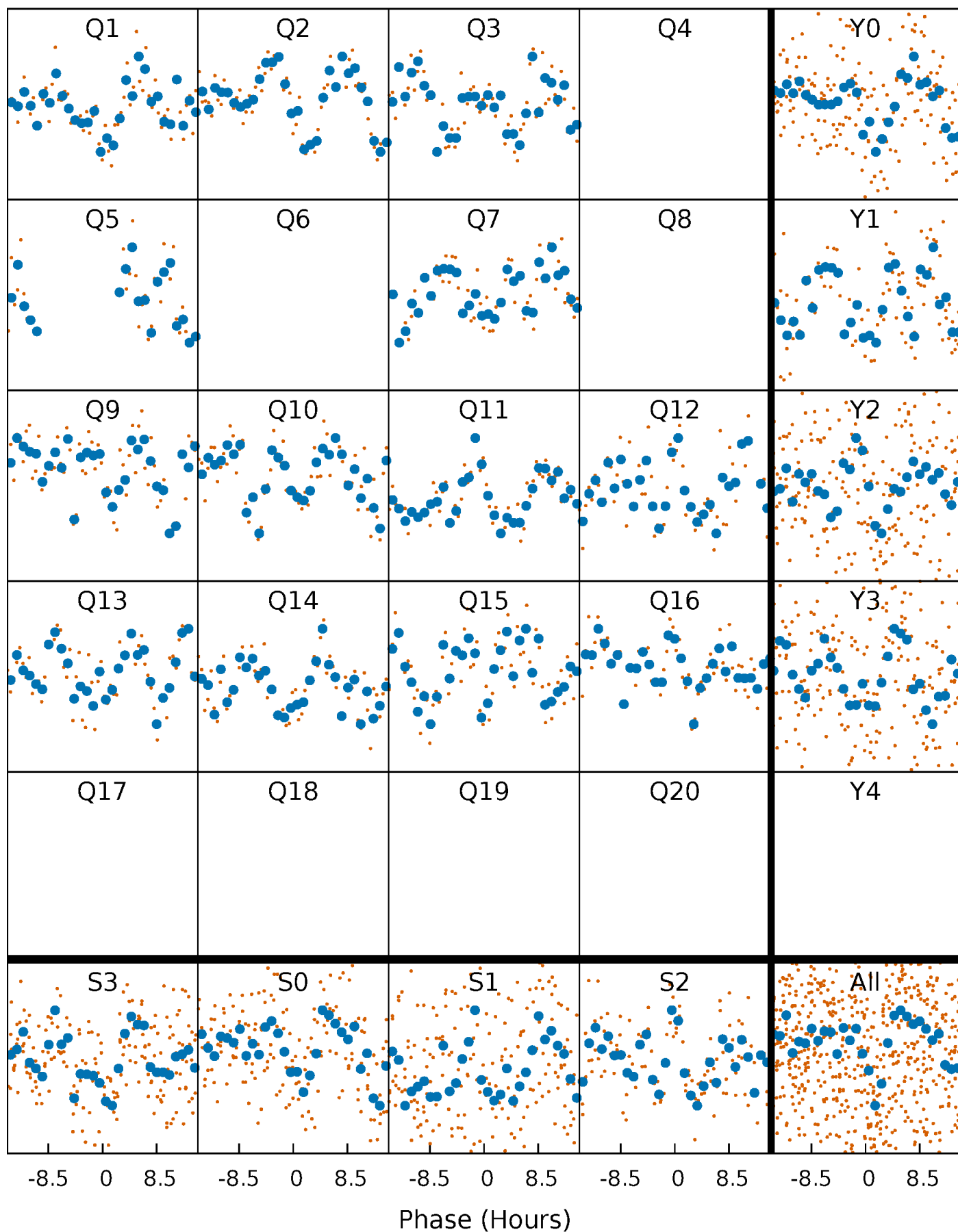
Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)





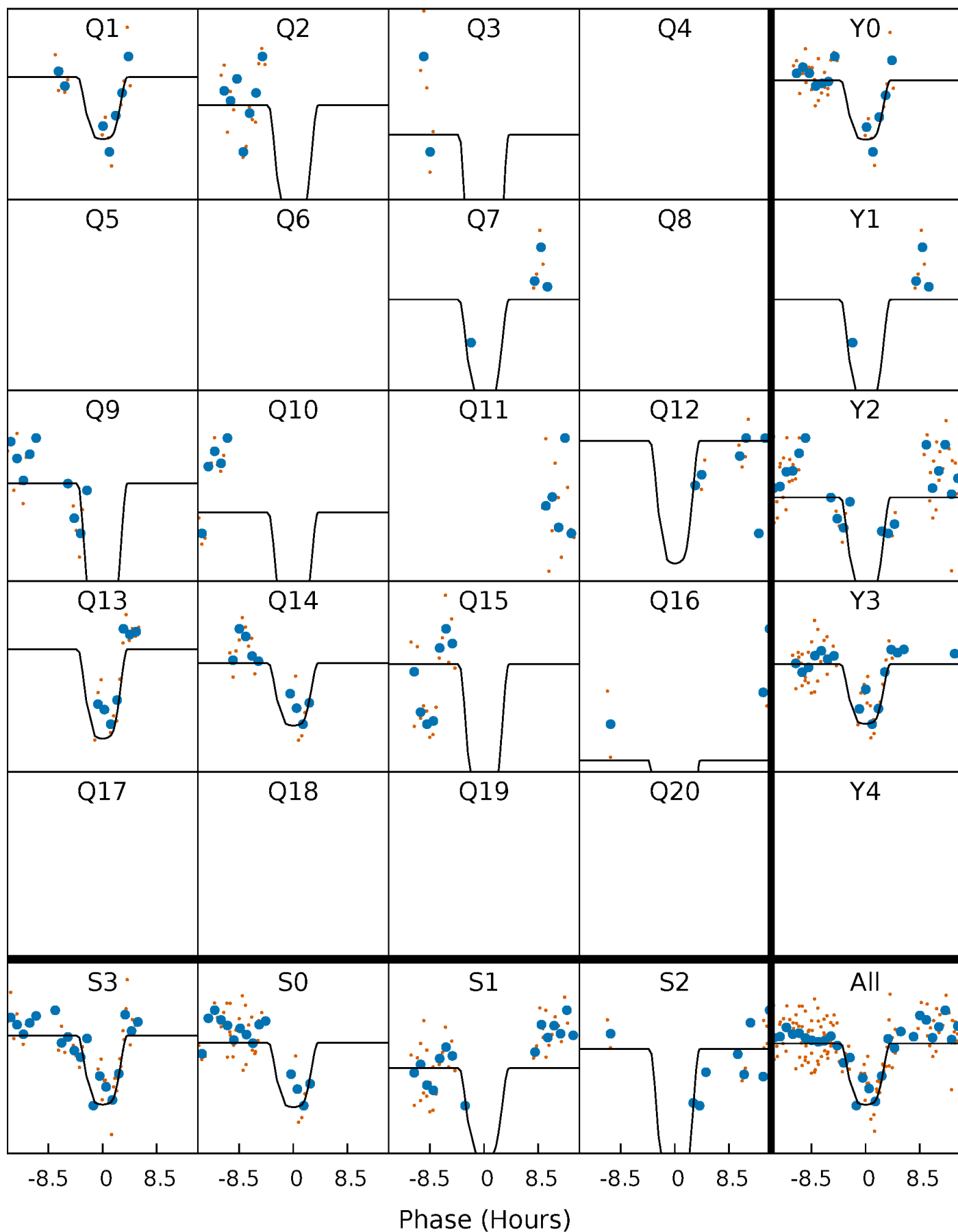
# PDC Quarter-Phased Transit Curves

TCE 006470973-04   P= 95.200506 Days    $T_0=157.793112$  (BKJD)



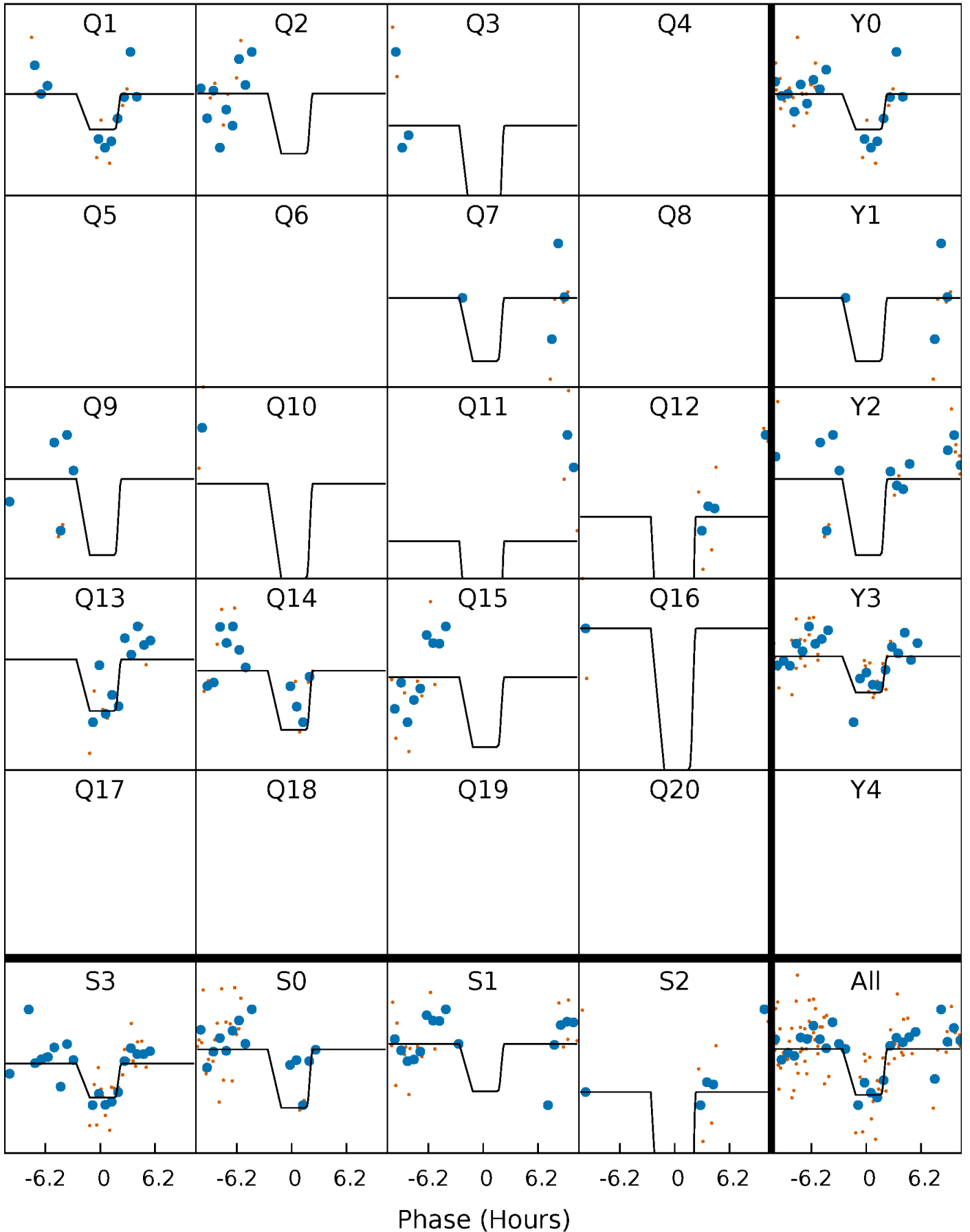
# DV Quarter-Phased Transit Curves

TCE 006470973-04 P= 95.200506 Days  $T_0=157.793112$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

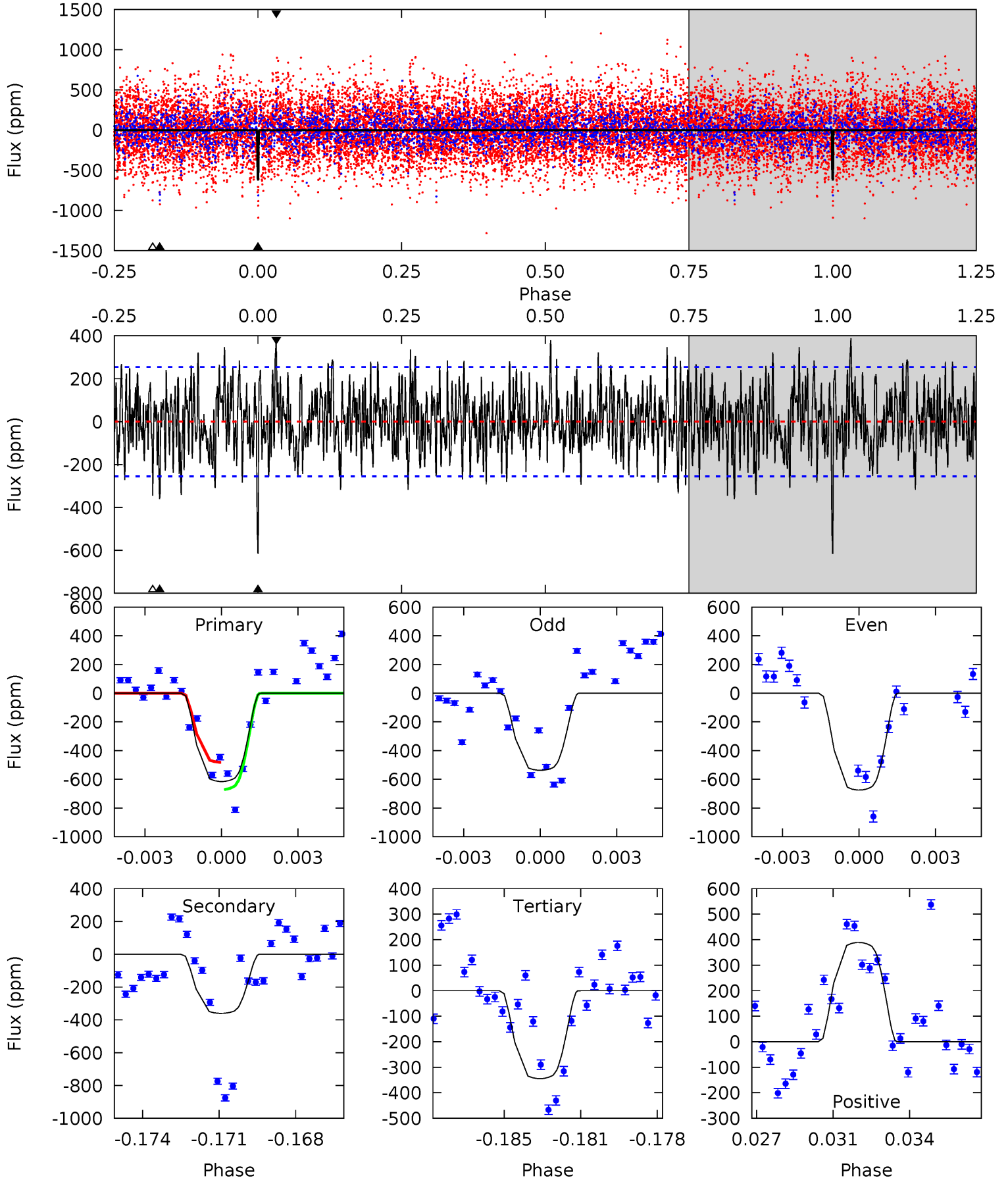
TCE 006470973-04 P= 95.199070 Days  $T_0=157.807624$  (BKJD)



# DV Model-Shift Uniqueness Test

006470973-04, P = 95.200506 Days, E = 62.592606 Days

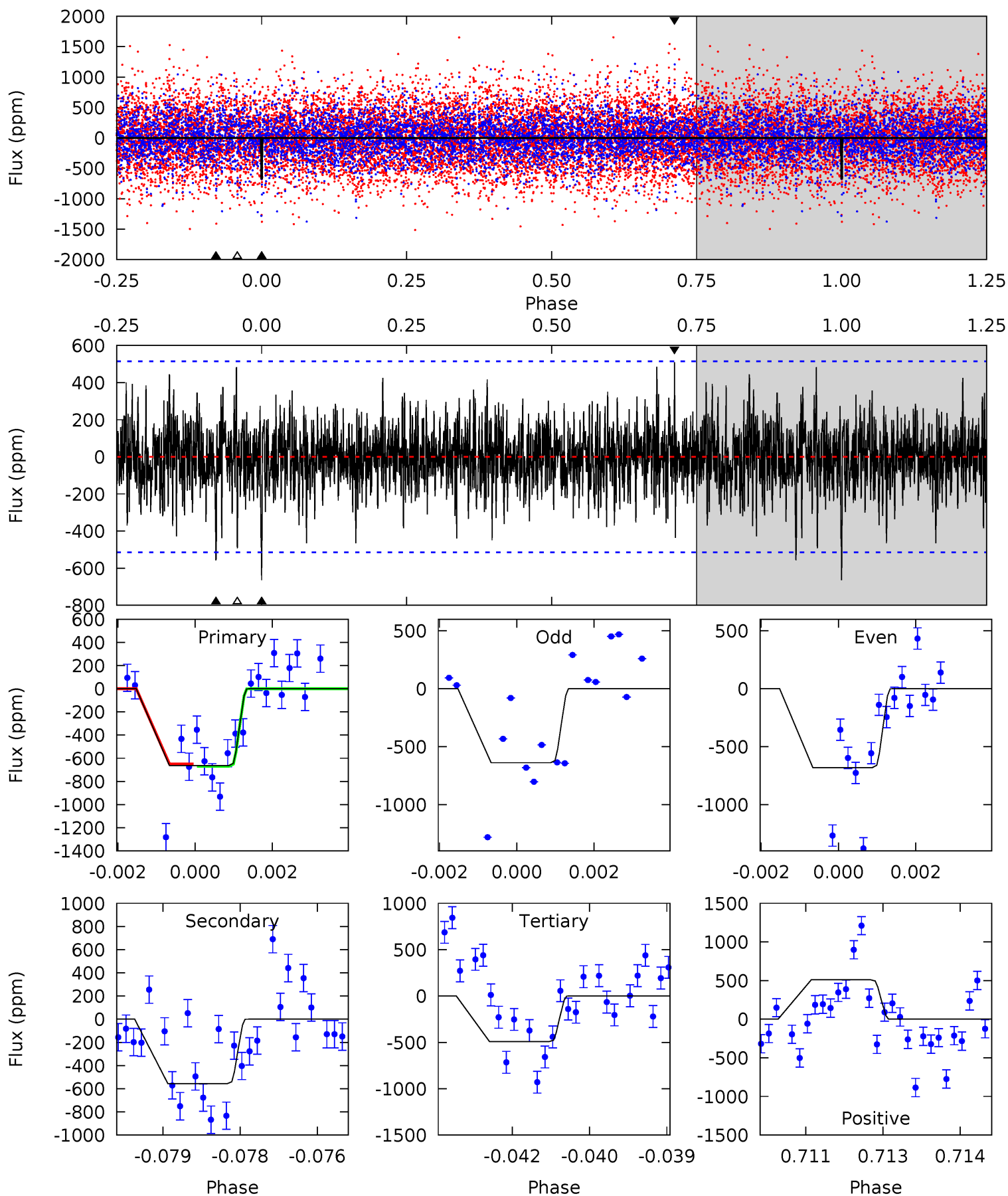
| Pri  | Sec  | Ter  | Pos  | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 12.6 | 7.38 | 7.06 | 7.97 | 5.23            | 2.93            | 2.45             | 5.55    | 4.64    | 0.32    | -0.59   | 1.40    | 0.90 | 0.39  | 1.67 |



# Alt Model-Shift Uniqueness Test

006470973-04, P = 95.199070 Days, E = 62.608554 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  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 6.93 | 5.81 | 5.13 | 5.31 | 5.37            | 3.16            | 1.41             | 1.79    | 1.61    | 0.68    | 0.49    | 0.22    | 1.03 | 0.43  | 0.09 |





### Stellar Parameters For KIC 006470973

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R$ ( $R_{\odot}$ )       | $M(M_{\odot})$            | $p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ ) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $8548^{+237}_{-356}$ | $3.785^{+0.400}_{-0.075}$ | $-0.300^{+0.300}_{-0.350}$ | $2.976^{+0.562}_{-1.406}$ | $1.971^{+0.382}_{-0.466}$ | $0.105^{+0.371}_{-0.033}$                     |
|        | +3%/-4%              | +11%/-2%                  | +100%/-117%                | +19%/-47%                 | +19%/-24%                 | +353%/-31%                                    |
| Source | KIC0                 | 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 006470973-04 / KOI

| Detrend | Depth (ppm)   | $R_p$ ( $R_{\oplus}$ ) | $T_{\text{max}}$ (K) | $T_{\text{obs}}$ (K) | $A_{\text{obs}}$     |
|---------|---------------|------------------------|----------------------|----------------------|----------------------|
| DV      | $-360 \pm 49$ | $9.66^{+1.58}_{-2.33}$ | $1227^{+81}_{-137}$  | $6388^{+402}_{-359}$ | $593^{+354}_{-168}$  |
| Alt.    | $-557 \pm 96$ | $8.15^{+1.50}_{-1.97}$ | $1224^{+87}_{-139}$  | $7883^{+690}_{-619}$ | $1260^{+763}_{-400}$ |

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature  
 $T_{\text{obs}}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )  
 $A_{\text{obs}}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{\text{obs}} \gg T_{\text{max}}$  AND  $A_{\text{obs}} \gg 1.0$

## DV Centroid Data

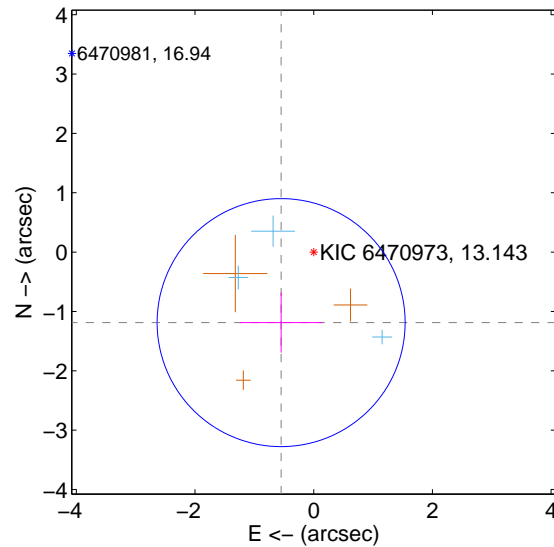
Supplemental centroid analysis for 006470973-04. Kepler magnitude: 13.14. Transit SNR 9.54

There are 3 quarters with good PRF difference image offsets

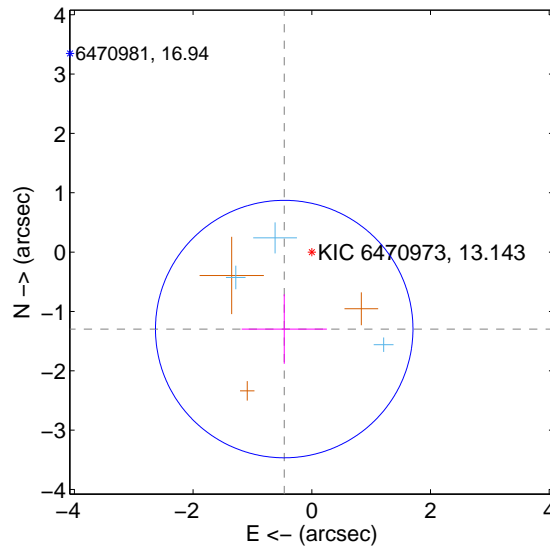
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA       | $\Delta$ Dec       |
|---|--------------------|---------------------|-------------------|--------------------|
| PRF-fit source offset from OOT          | $1.309 \pm 0.696$  | 1.88                | $0.549 \pm 0.695$ | $-1.188 \pm 0.506$ |
| PRF-fit source offset from KIC position | $1.378 \pm 0.723$  | 1.91                | $0.465 \pm 0.718$ | $-1.297 \pm 0.585$ |
| photometric centroid source offset      | $0.78 \pm 0.31$    | 2.49                | $0.54 \pm 0.35$   | $0.56 \pm 0.28$    |

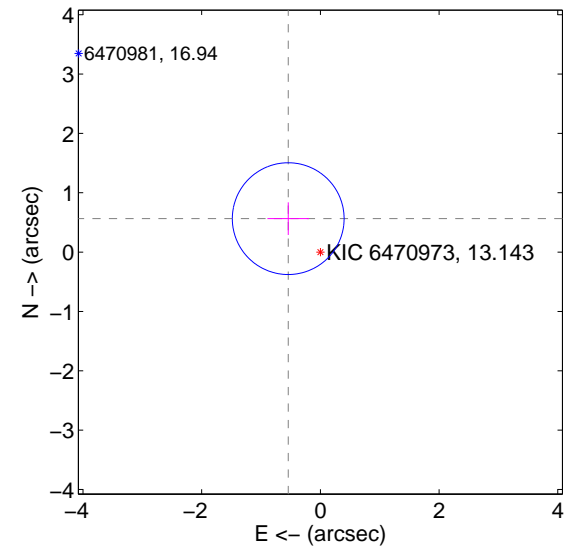
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

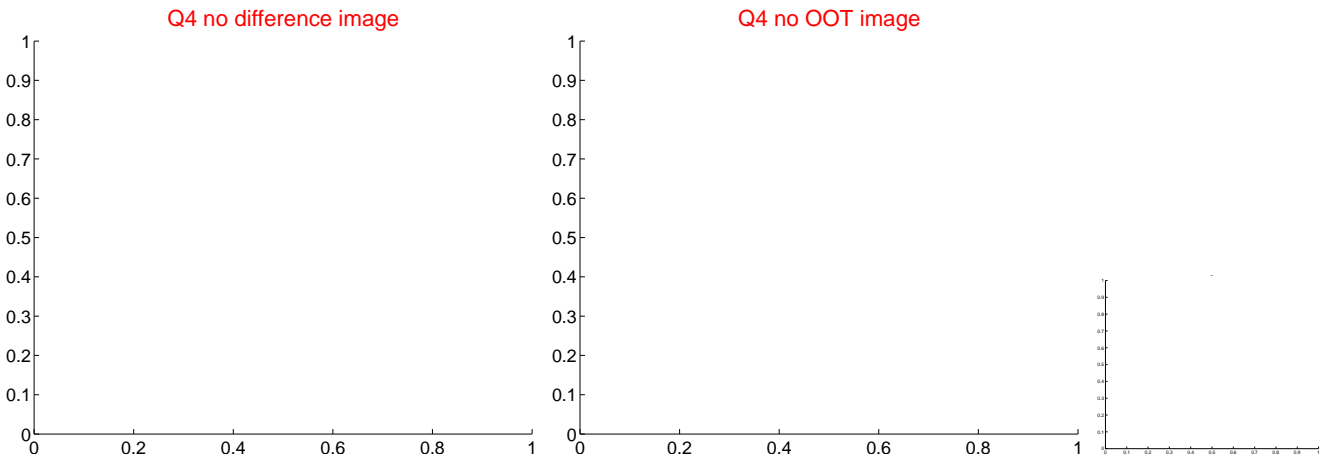
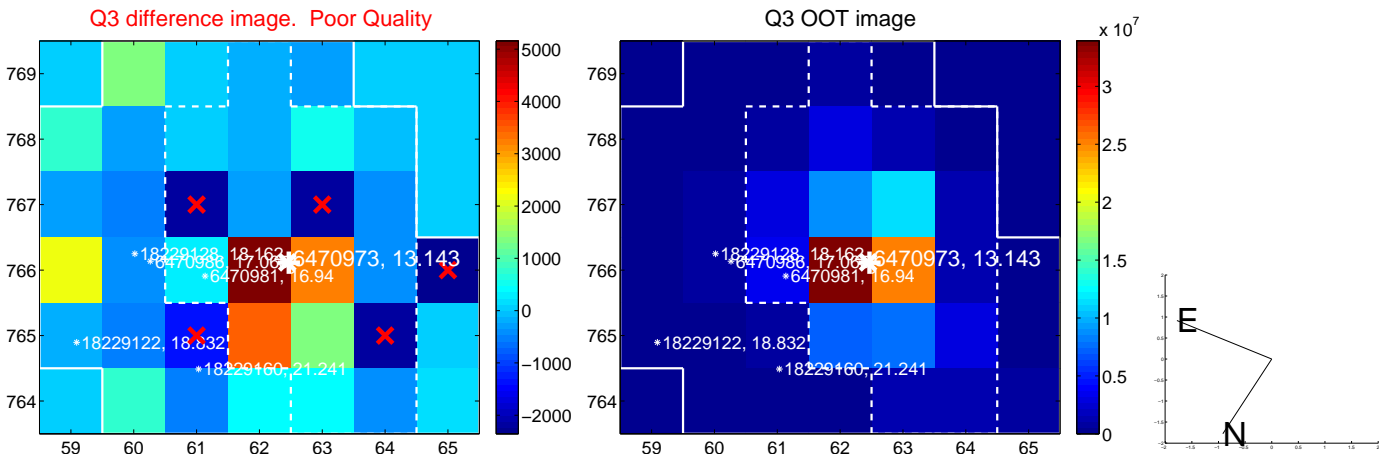
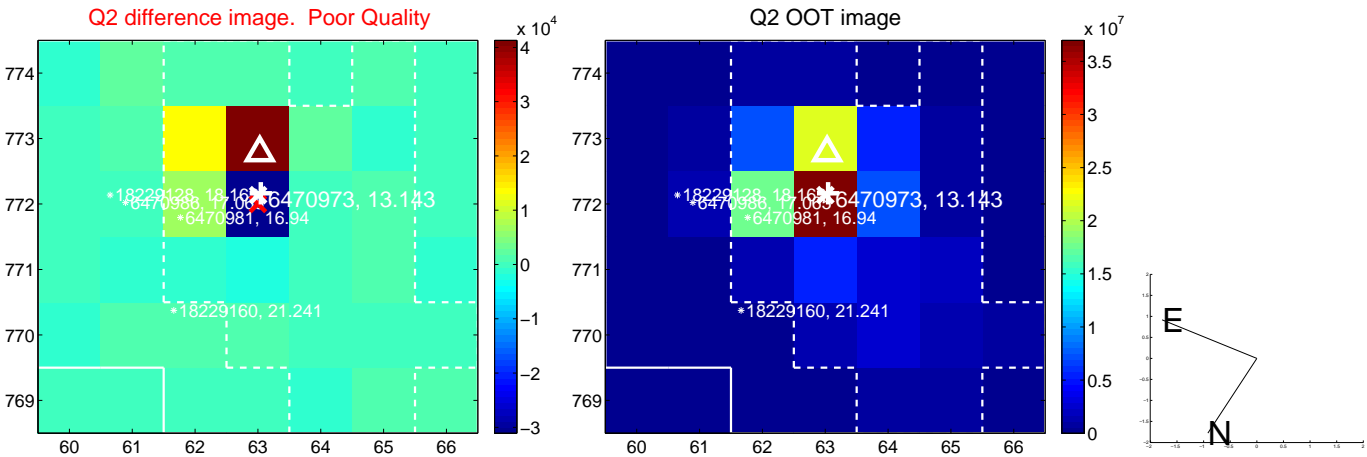
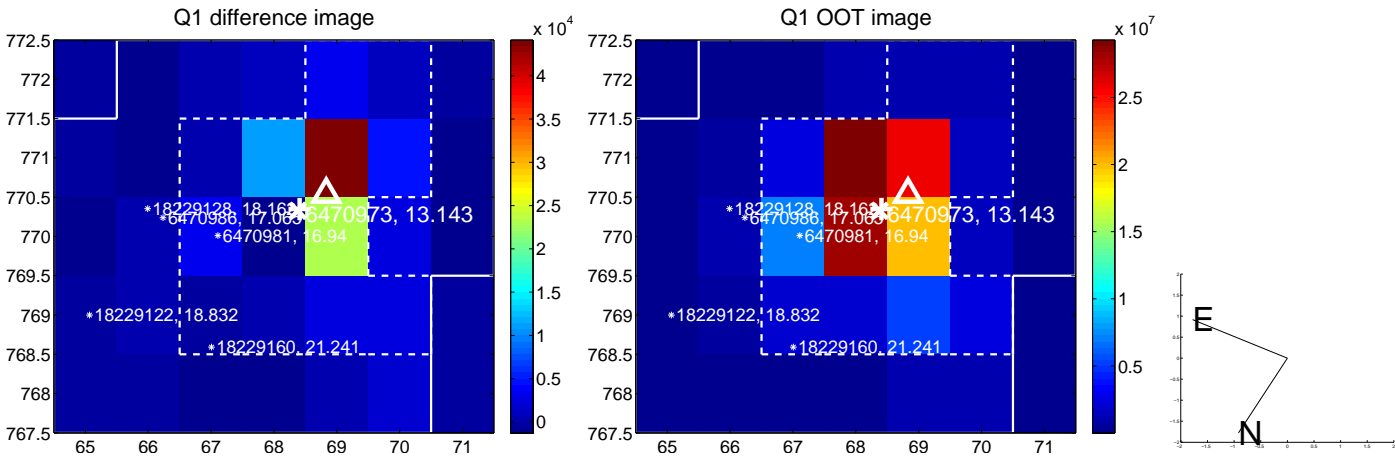


offset from photometric centroids



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.

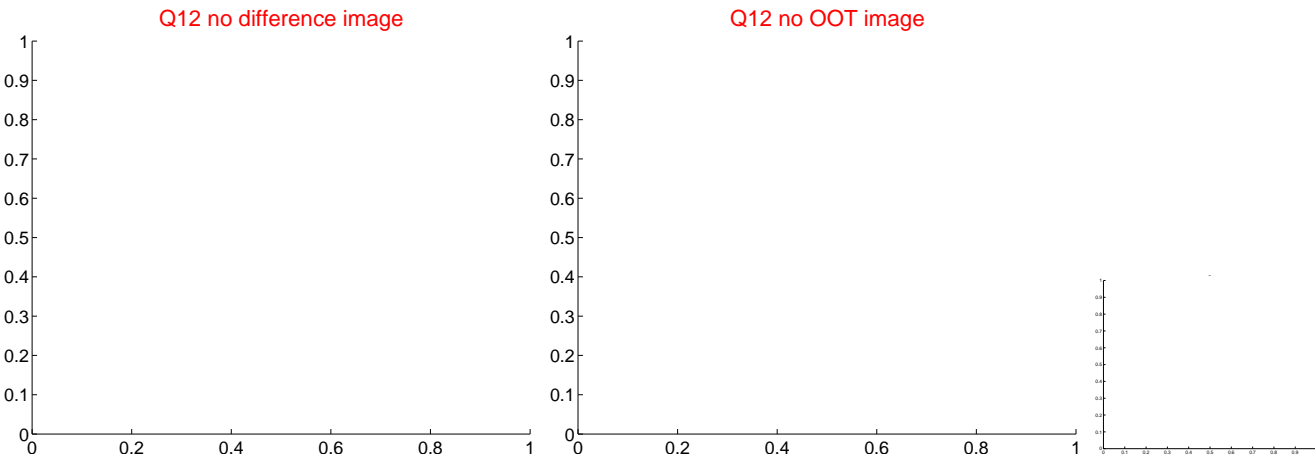
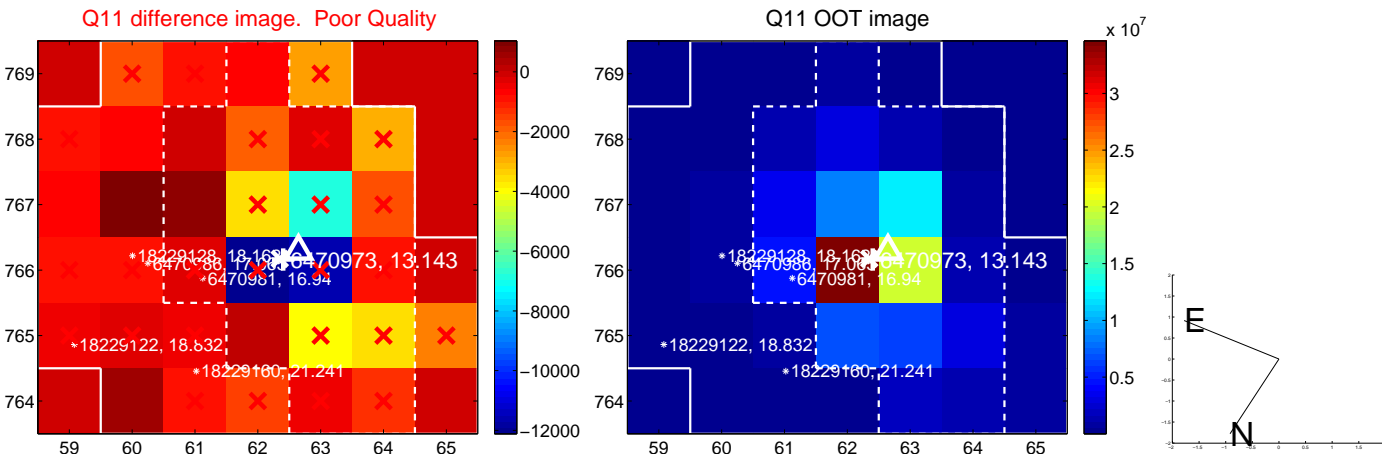
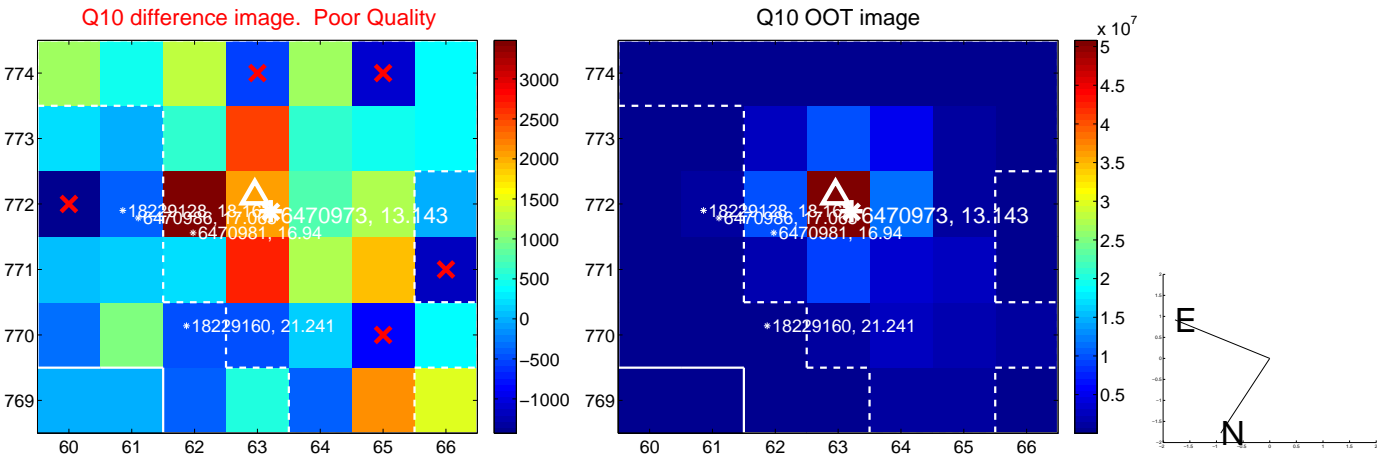
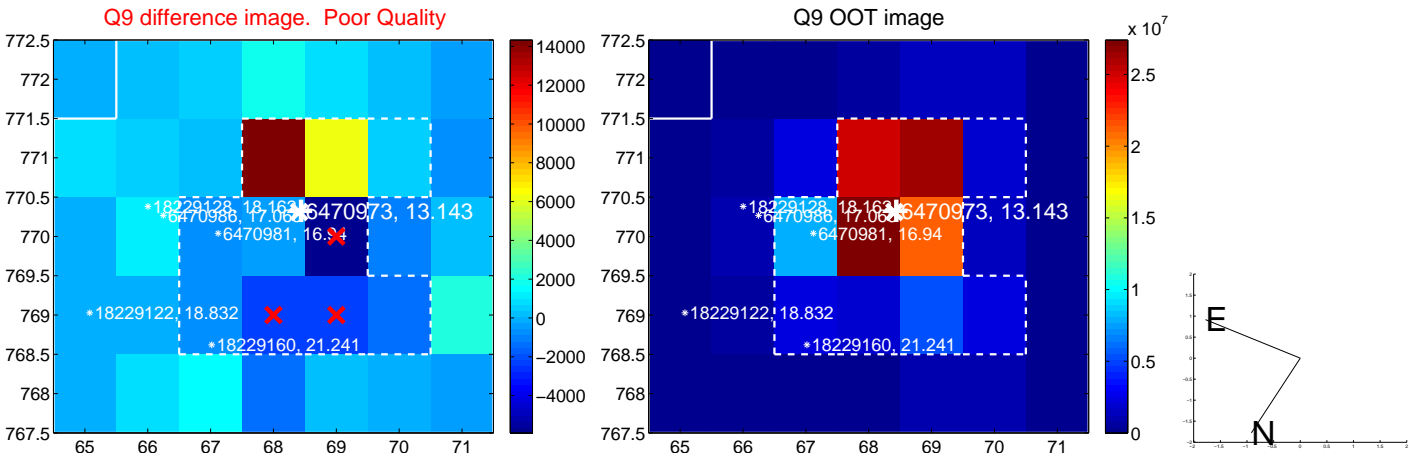
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



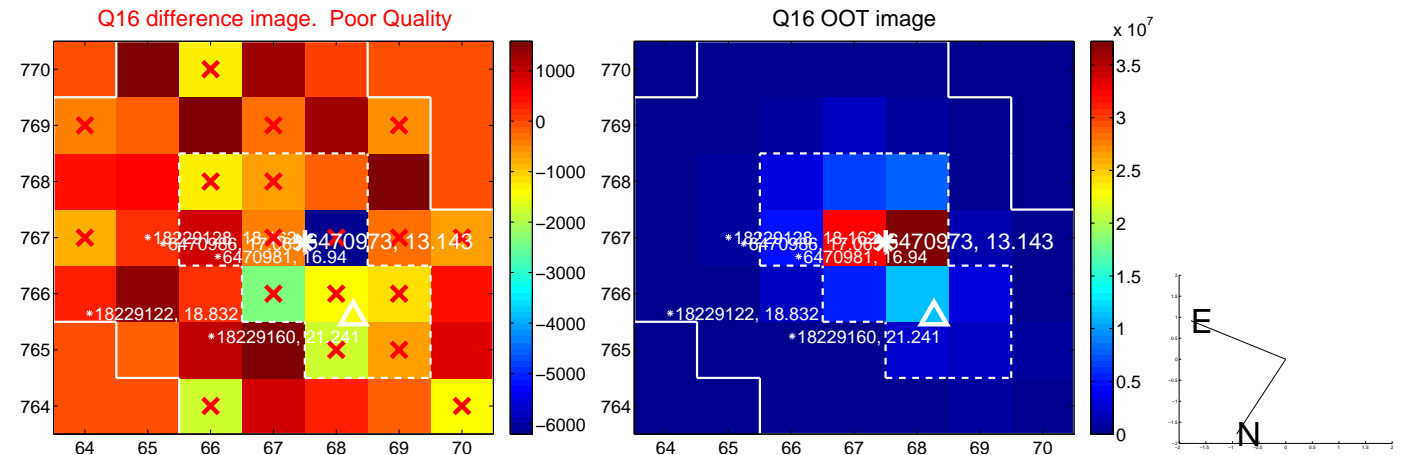
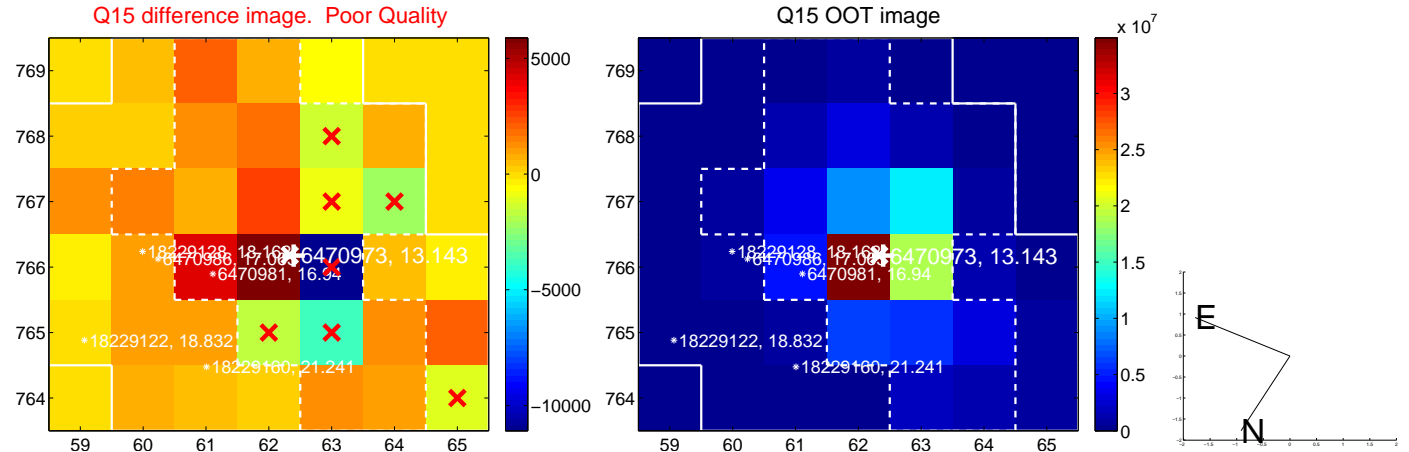
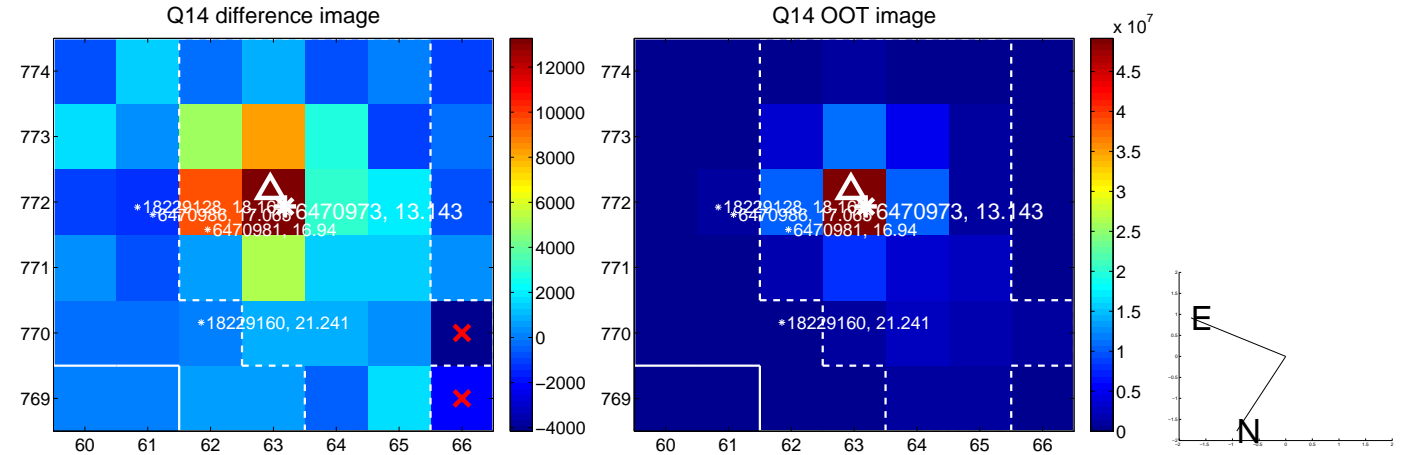
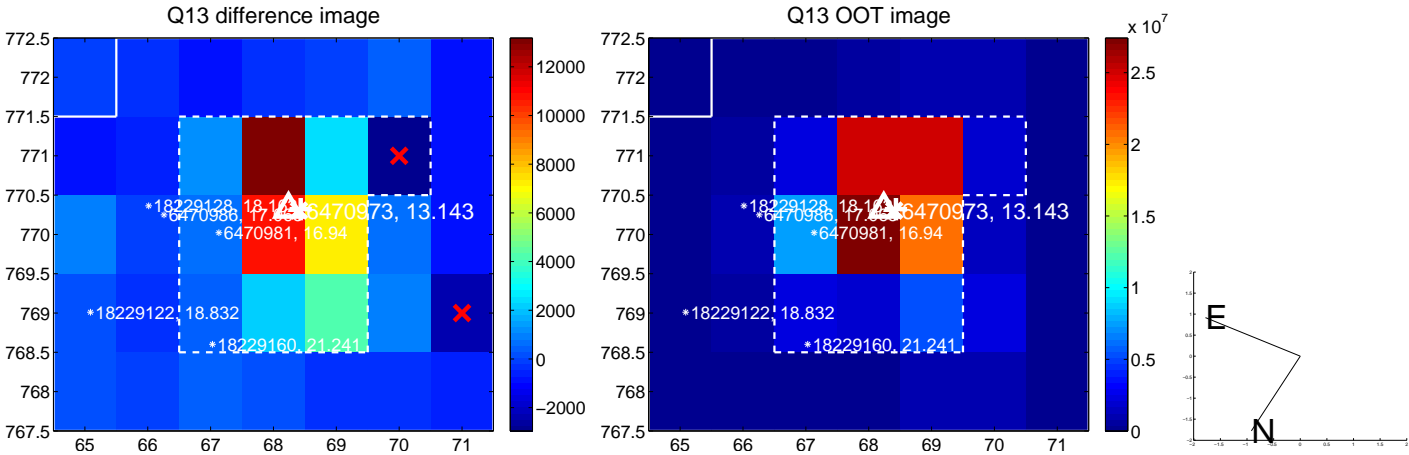
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

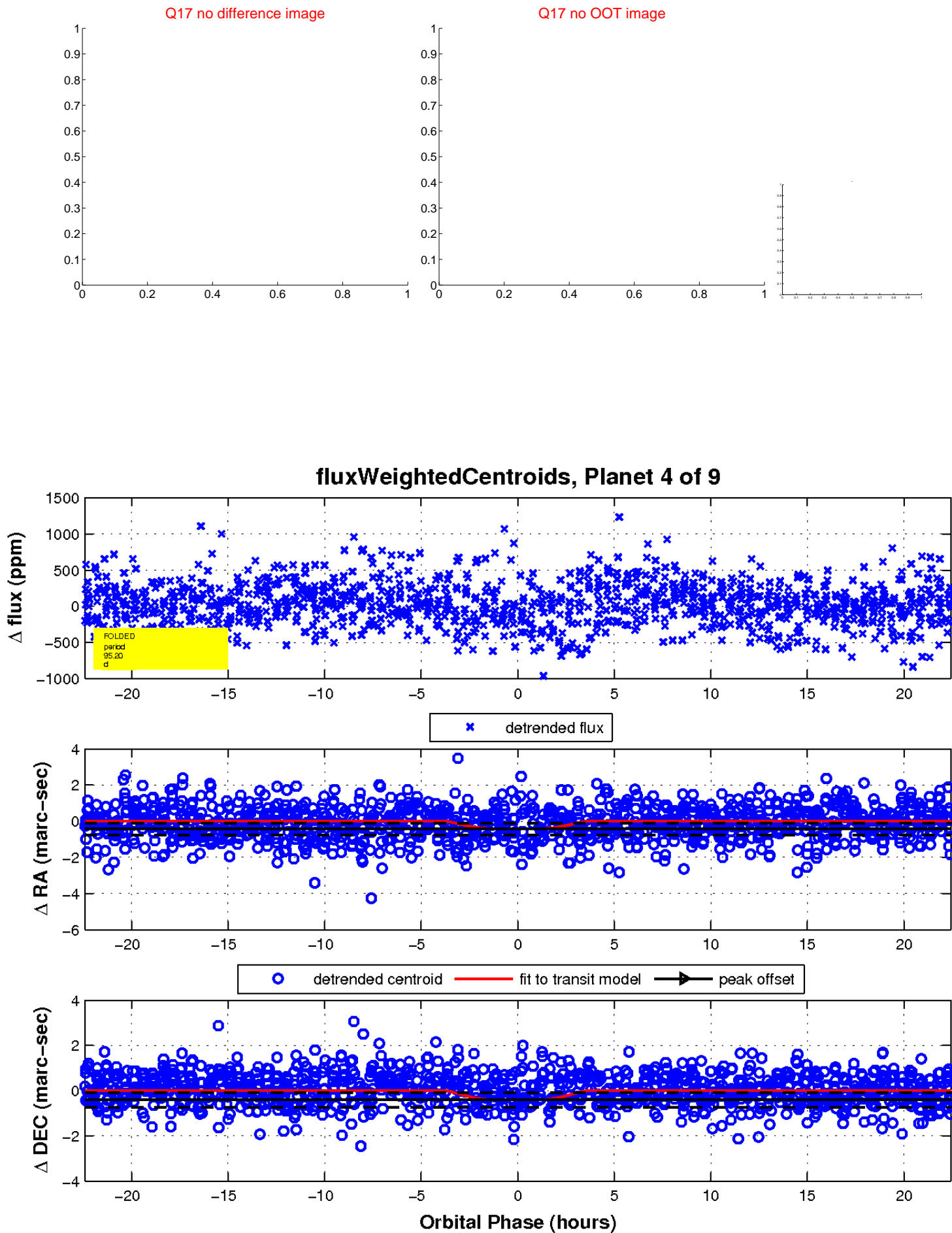


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

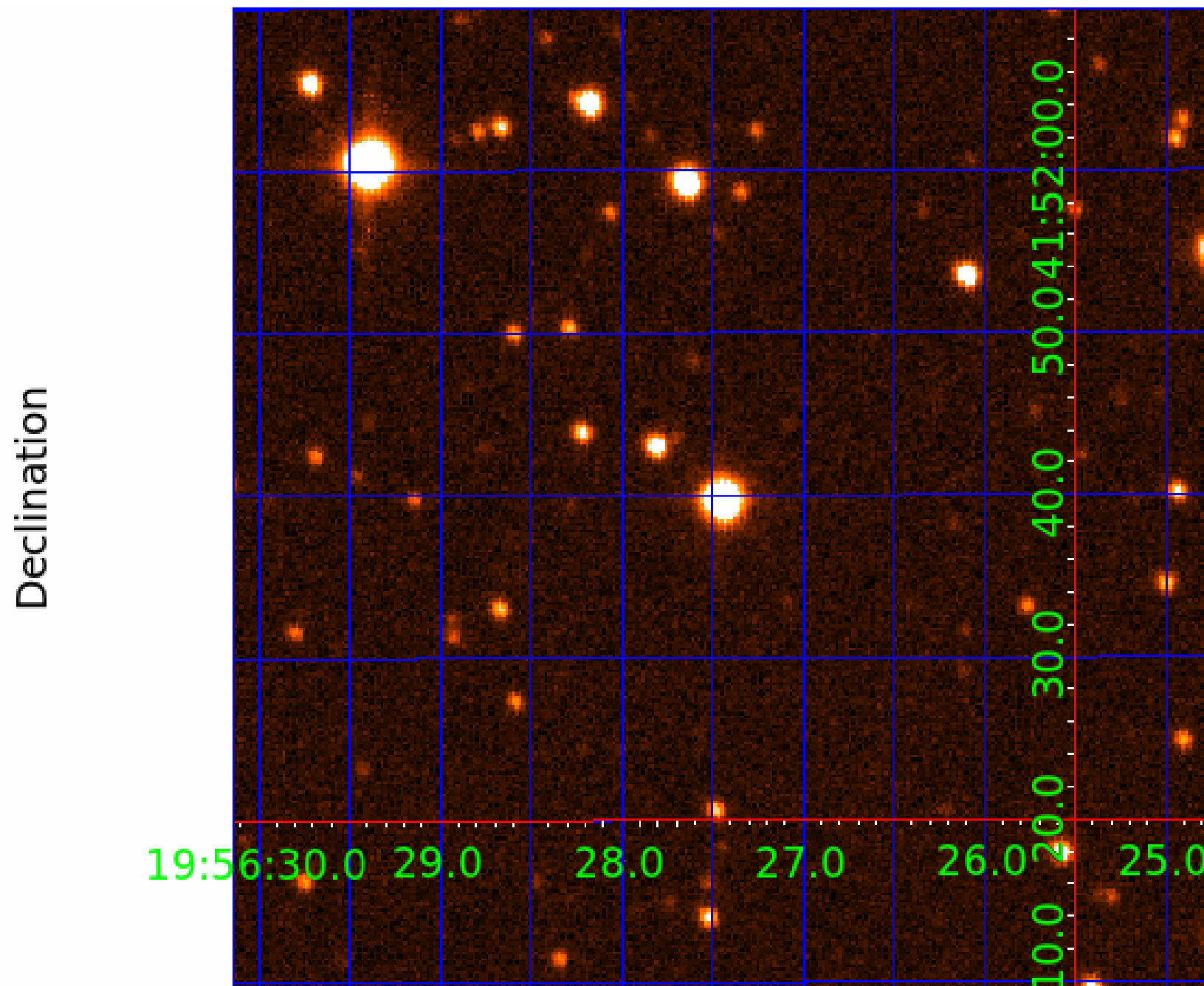




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image



# KIC 006470973

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 006470973-01 | OBS      | No   | 0.509313      | 131.708781   | 35.2        | 1.285            | 10.2 | 9.8  | 2.98                        | 8548            | 1.84                   | 173032.50              |
| 006470973-02 | OBS      | No   | 1.507014      | 132.863868   | 43.9        | 7.686            | 8.8  | 8.7  | 2.98                        | 8548            | 2.22                   | 40733.45               |
| 006470973-03 | OBS      | No   | 68.595946     | 135.604533   | 305.4       | 10.291           | 12.3 | 7.5  | 2.98                        | 8548            | 5.83                   | 250.64                 |
| 006470973-04 | OBS      | No   | 95.200506     | 157.793112   | 760.5       | 7.481            | 11.1 | 9.5  | 2.98                        | 8548            | 10.09                  | 161.90                 |
| 006470973-05 | OBS      | No   | 43.824577     | 173.397932   | 266.9       | 11.025           | 9.9  | 7.4  | 2.98                        | 8548            | 5.20                   | 455.50                 |
| 006470973-06 | OBS      | No   | 43.851912     | 174.379270   | 265.5       | 5.706            | 9.4  | 6.5  | 2.98                        | 8548            | 5.91                   | 455.12                 |
| 006470973-07 | OBS      | No   | 96.994995     | 218.805364   | 538.8       | 4.480            | 9.0  | 9.0  | 2.98                        | 8548            | 7.65                   | 157.92                 |
| 006470973-09 | OBS      | No   | 203.109072    | 227.259250   | 243.1       | 6.000            | 8.5  | -1.0 | 2.98                        | 8548            | 4.71                   | 58.95                  |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 006470973-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT   |
| 006470973-02 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT   |
| 006470973-03 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT  |
| 006470973-04 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS |
| 006470973-05 | 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   |
| 006470973-06 | OBS      | FP   | 0.00  | 1 | 0 | 1 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—HALO_GHOST                        |
| 006470973-07 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT  |
| 006470973-09 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—CENT_NOFITS   |

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

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

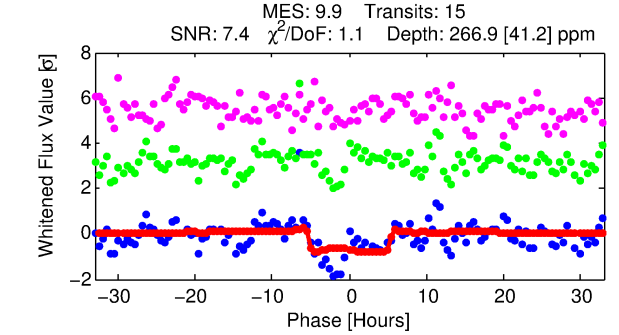
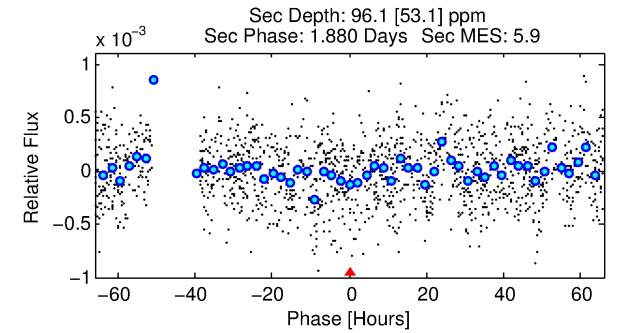
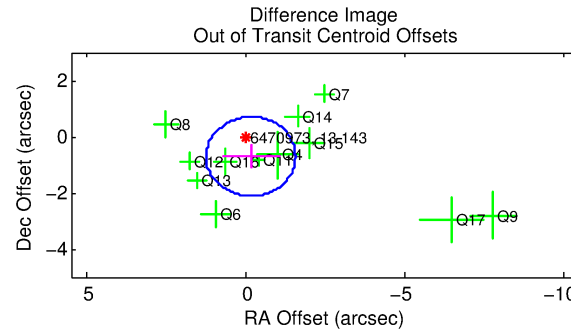
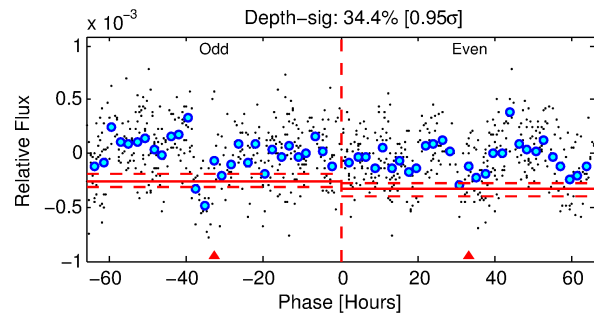
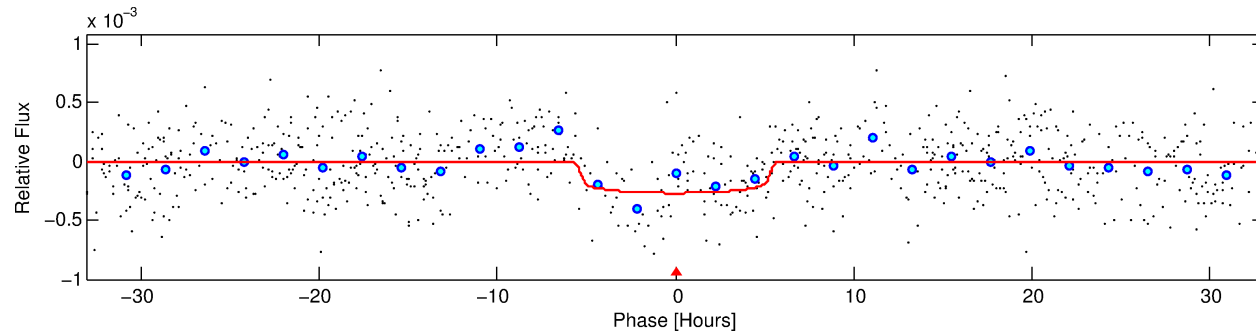
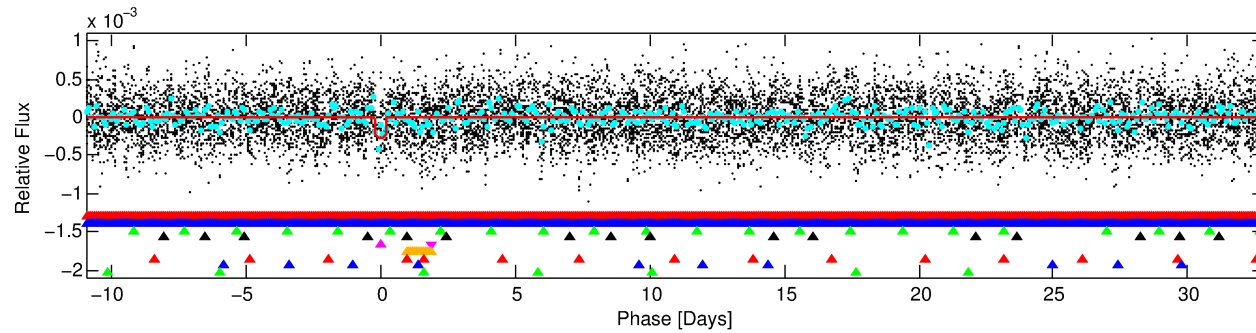
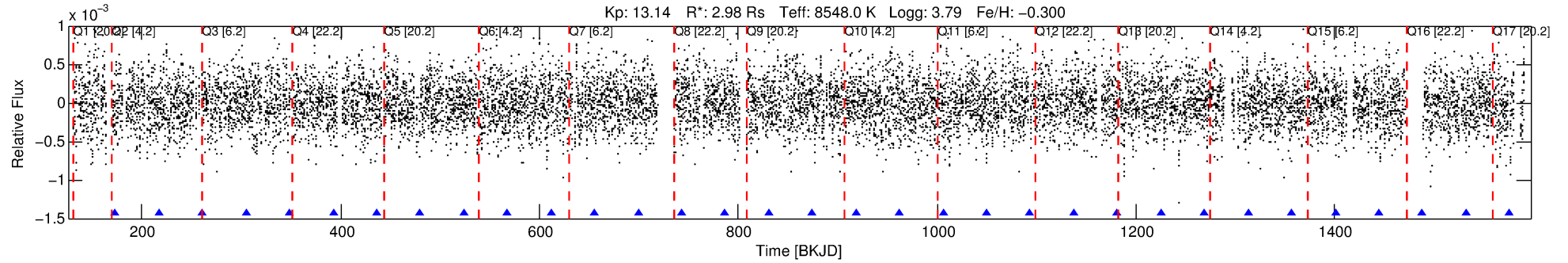
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006470973-05

No Significant Match Found

# DV One-Page Summary

KIC: 6470973 Candidate: 5 of 9 Period: 43.825 d



## DV Fit Results:

Period = 43.82458 [0.00095] d  
Epoch = 173.3979 [0.0195] BKJD  
Rp/R\* = 0.0160 [0.0057]  
a/R\* = 22.75 [48.04]  
b = 0.69 [1.63]  
Seff = 455.50 [323.36]  
Teq = 1178 [209] K  
Rp = 5.20 [3.07] Re  
a = 0.3050 [0.1341] AU  
Ag = 181.97 [206.15] [0.88 $\sigma$ ]  
Teffp = 6689 [1528] K [3.57 $\sigma$ ]

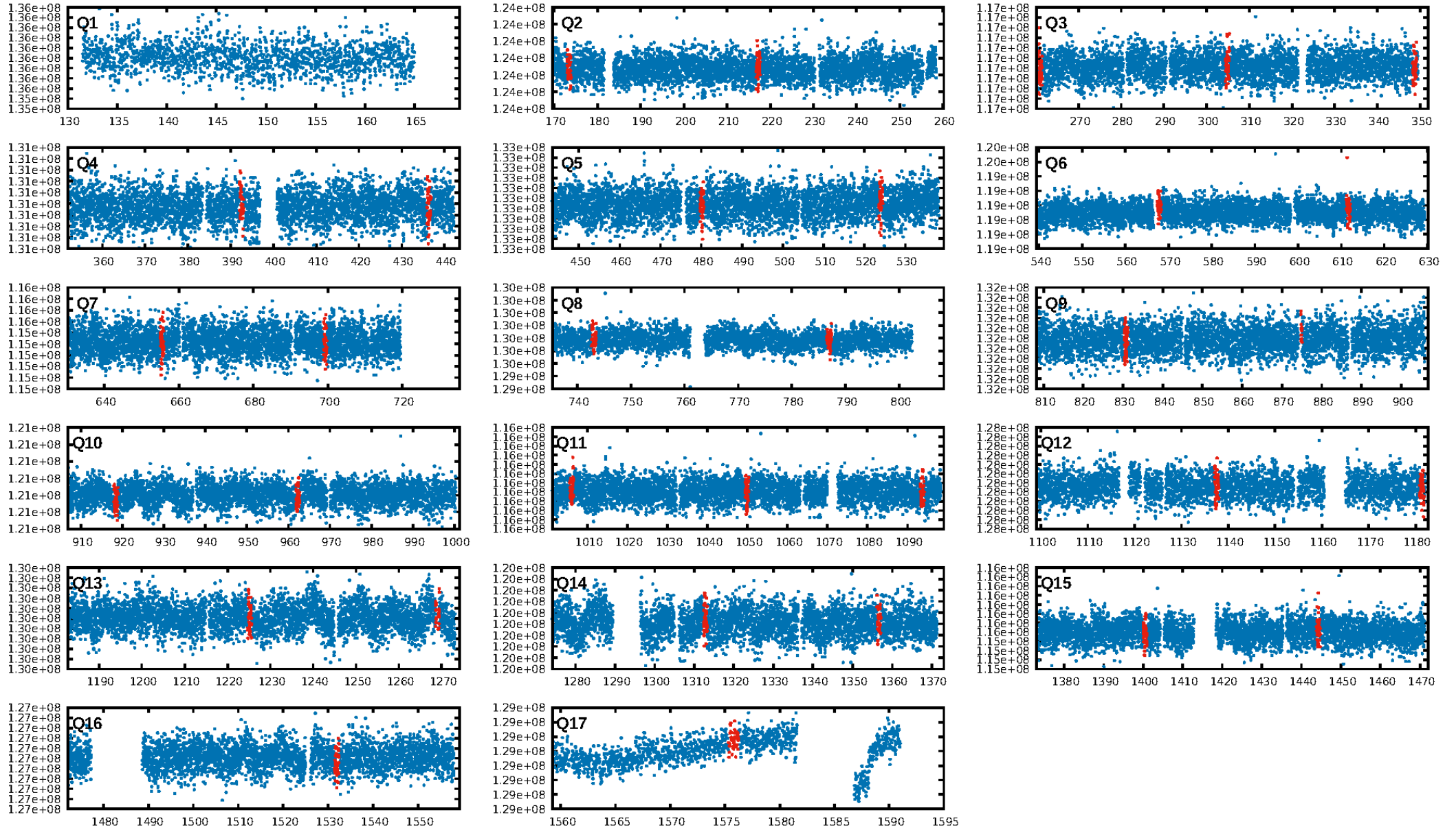
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [75.57 $\sigma$ ]  
LongPeriod-sig: 4.2% [0.05 $\sigma$ ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [15/15]  
GhostDiagnostic-chr: 0.6833  
Centroid-sig: 3.0%  
Centroid-so: 0.834 arcsec [1.81 $\sigma$ ]  
OotOffset-rm: 0.726 arcsec [1.55 $\sigma$ ]  
KicOffset-rm: 0.812 arcsec [1.59 $\sigma$ ]  
OotOffset-st: 2/3/4/3 [12]  
KicOffset-st: 2/3/4/3 [12]  
DiffImageQuality-fgm: 0.50 [6/12]  
DiffImageOverlap-fno: 0.00 [0/16]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 06:07:18 Z

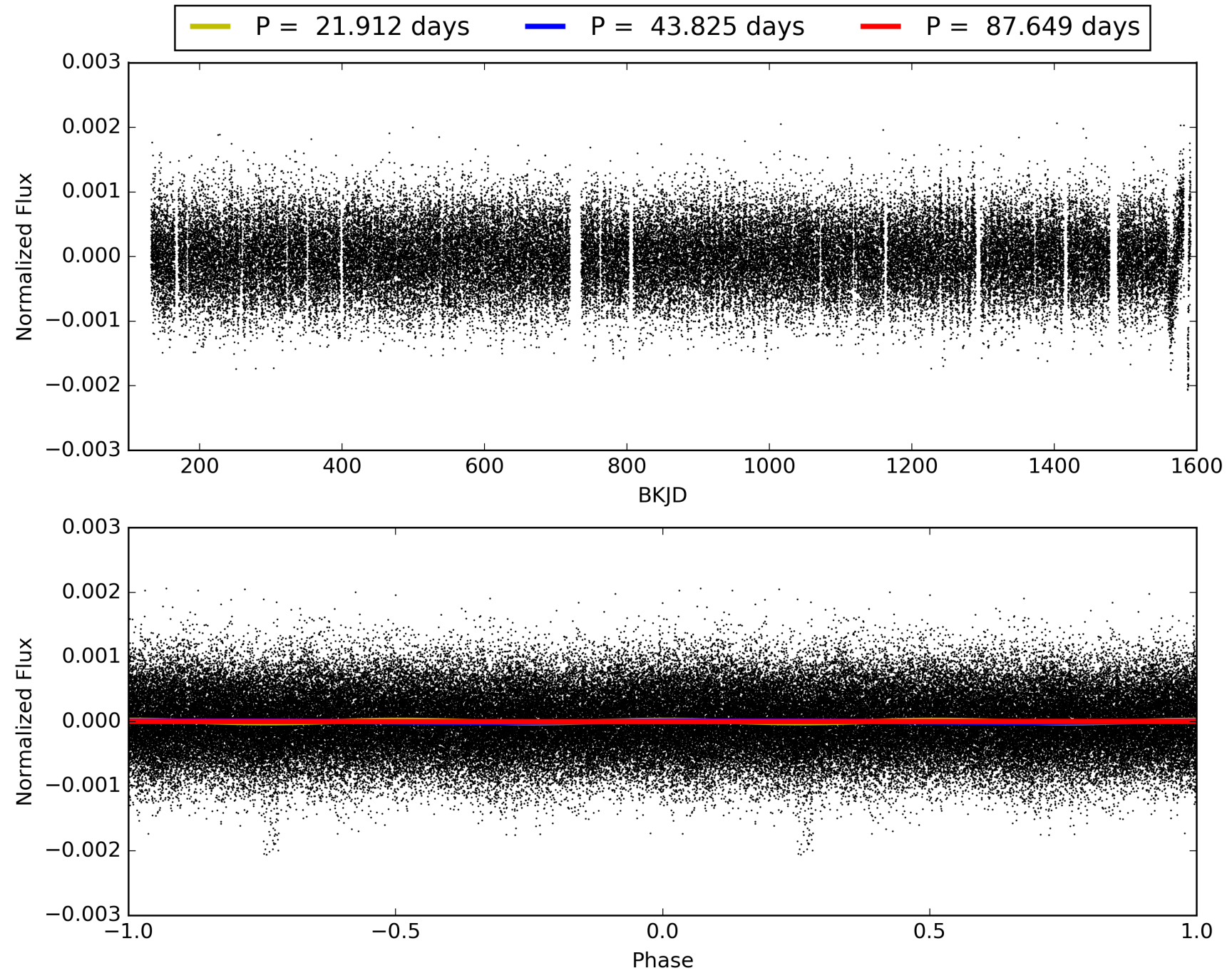
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 006470973-05, PDC Light Curves





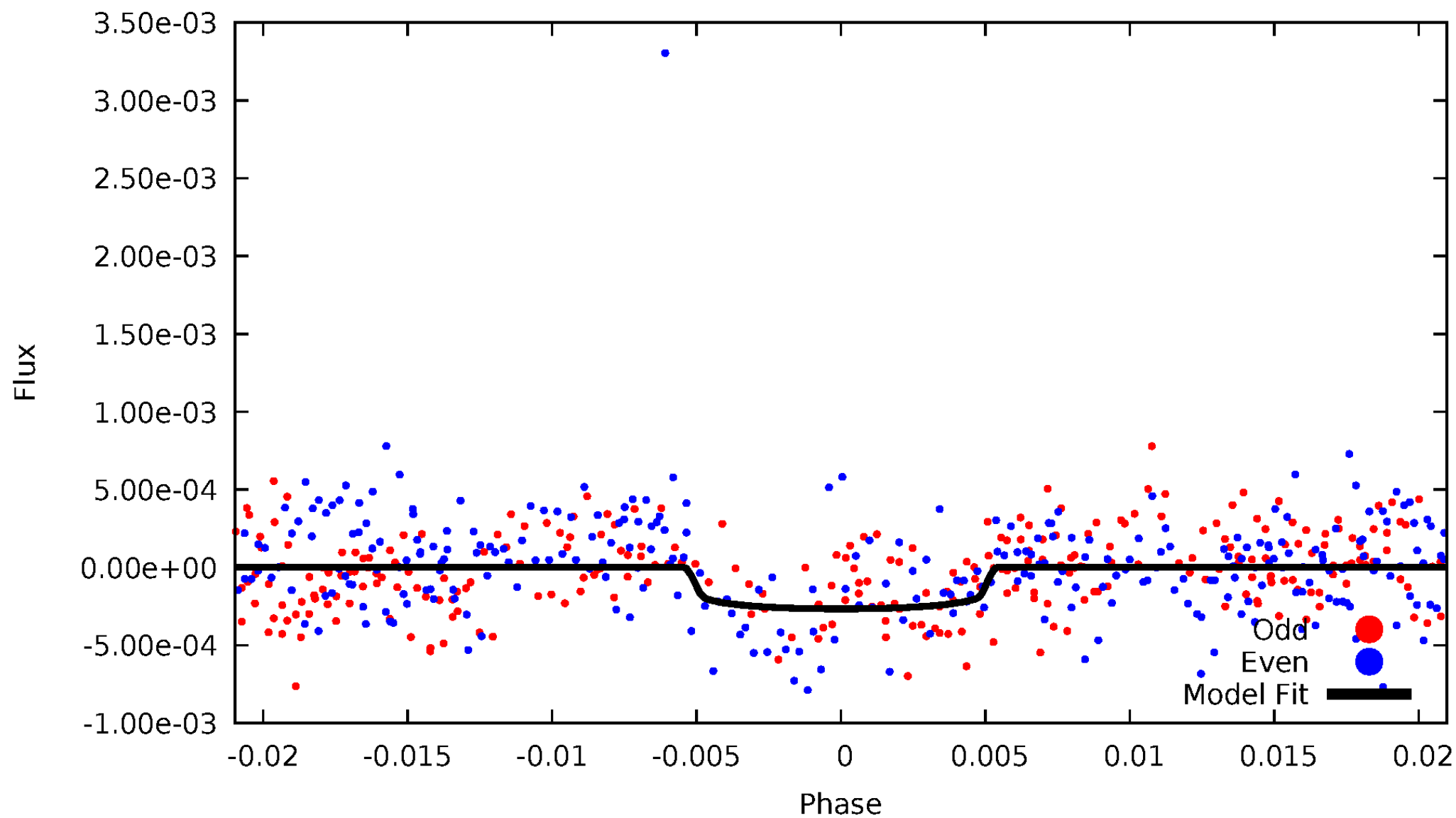
TCE 006470973-05





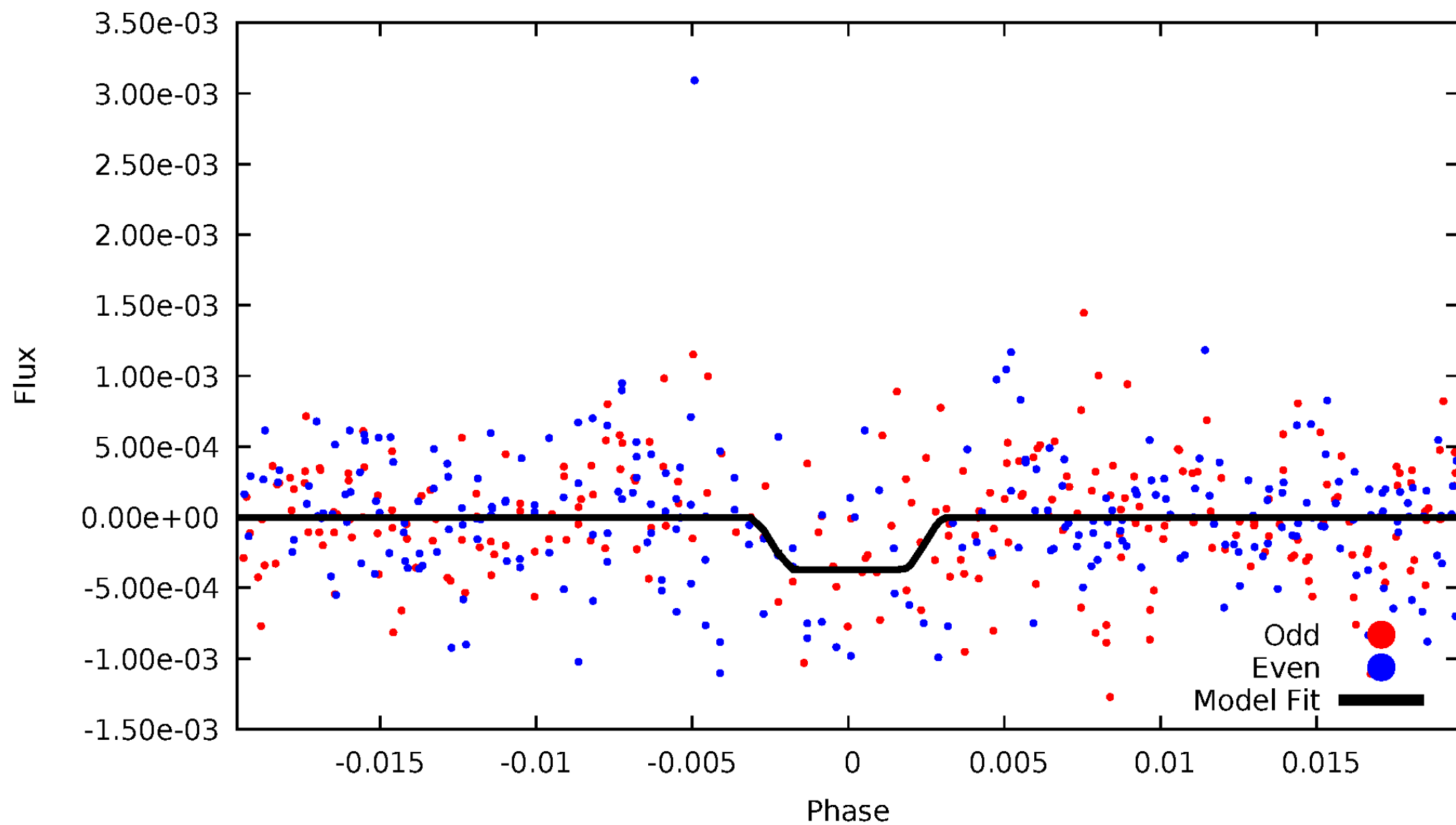
# DV Odd/Even

TCE 006470973-05



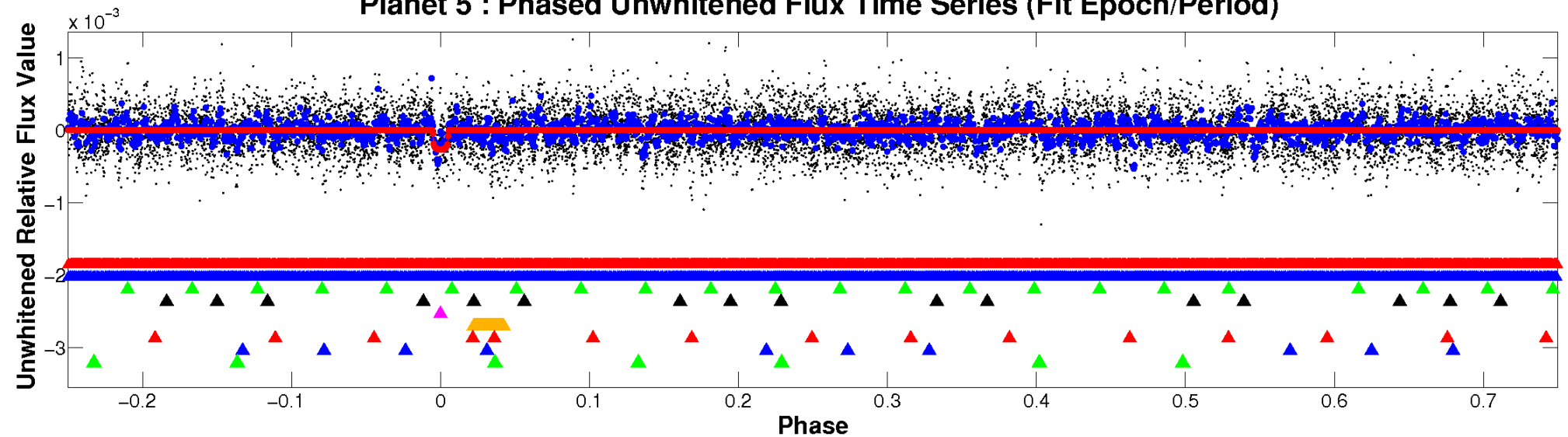
# ALT Odd/Even

TCE 006470973-05

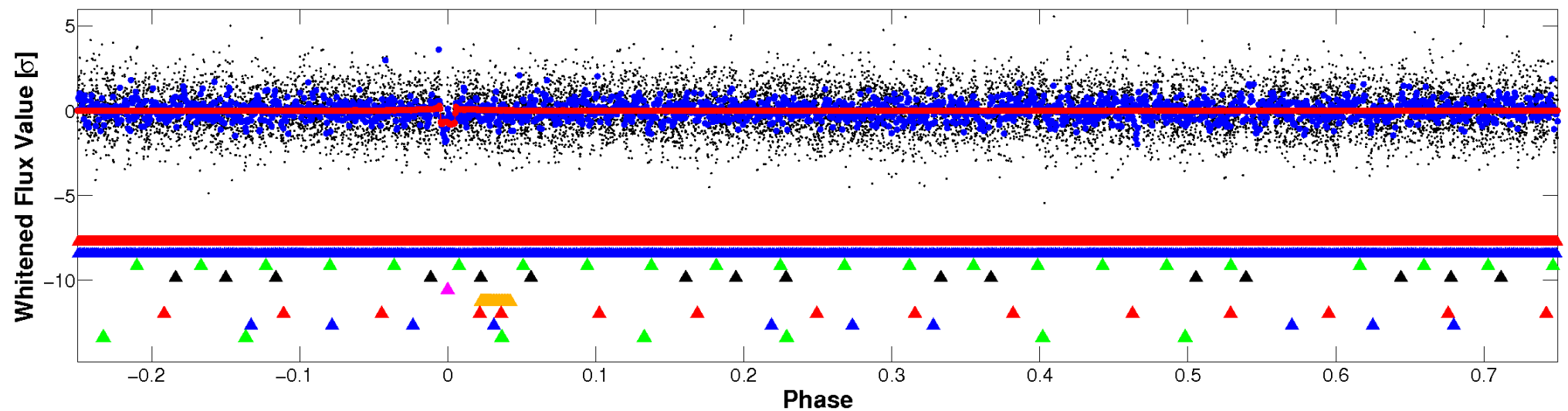


# Non-Whitened Vs. Whitened Light Curve

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

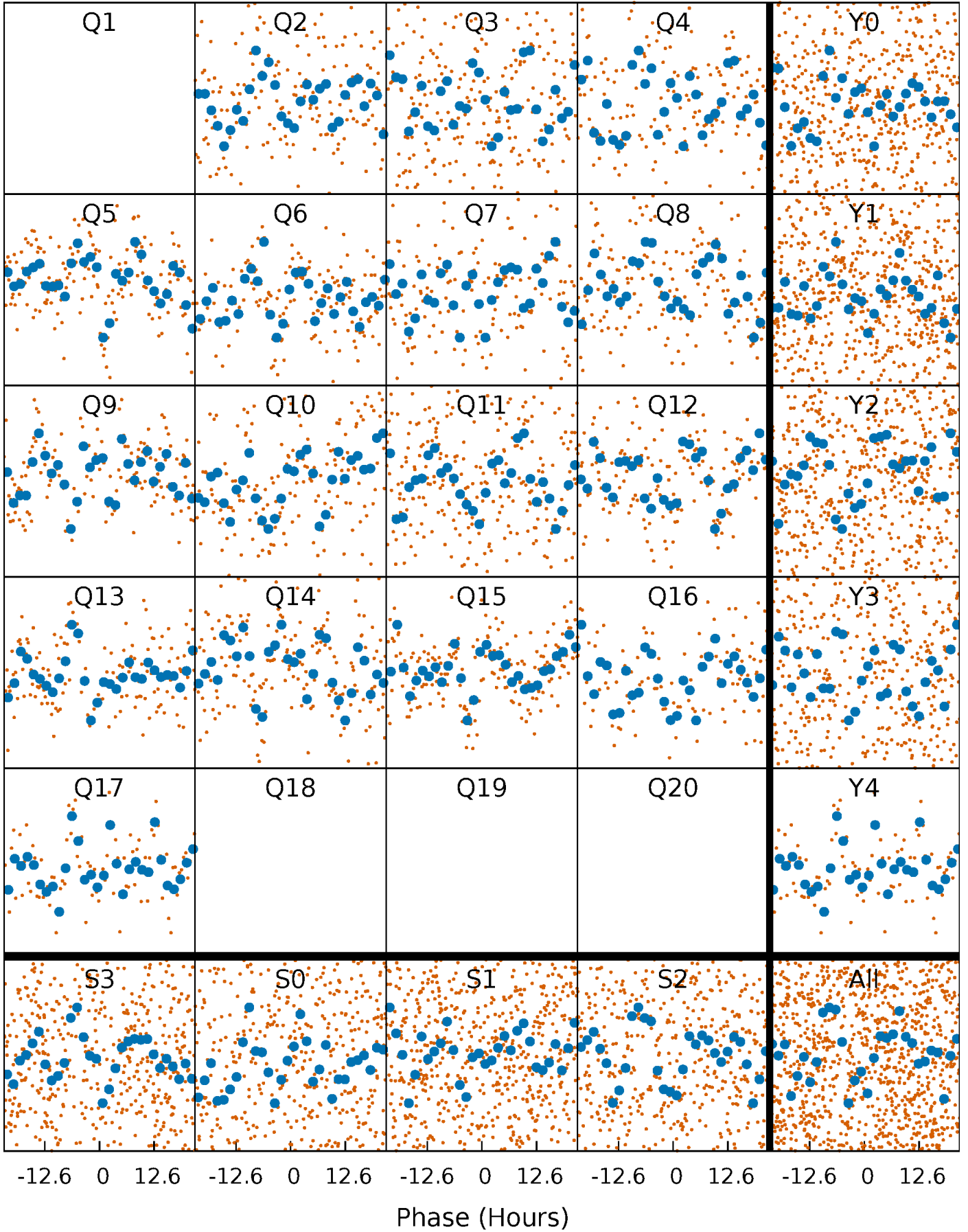


## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



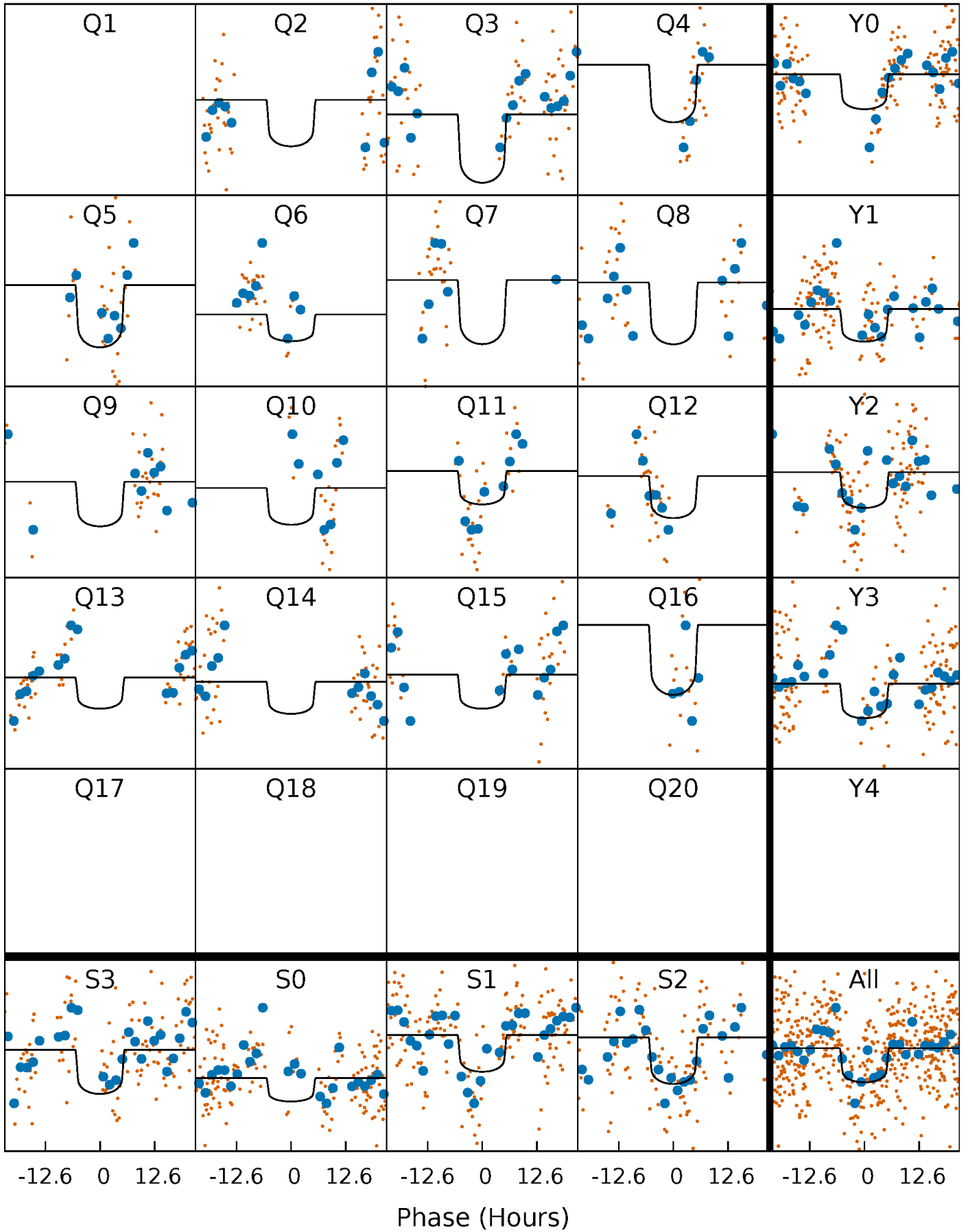
# PDC Quarter-Phased Transit Curves

TCE 006470973-05     $P = 43.824577$  Days     $T_0 = 173.397931$  (BKJD)



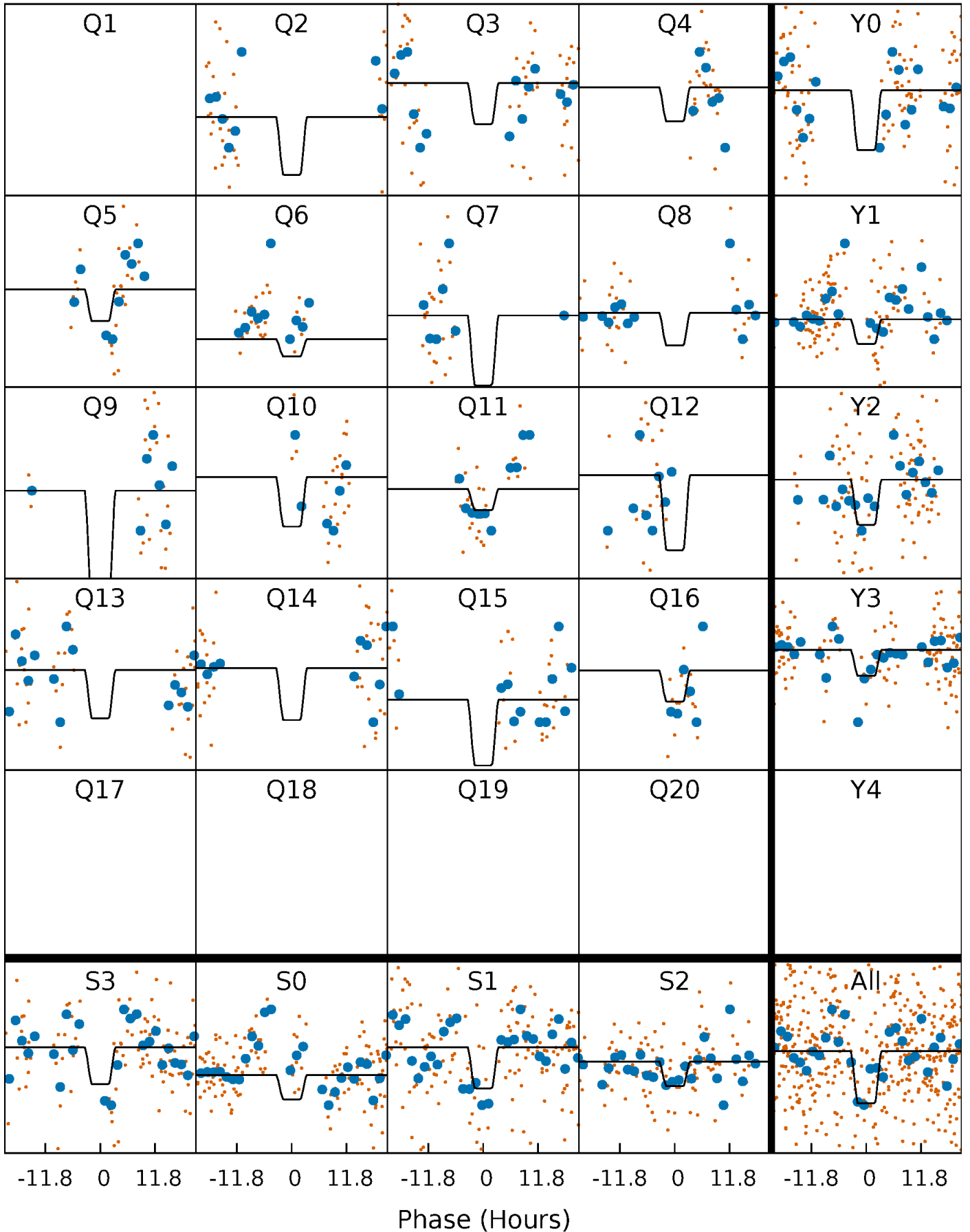
# DV Quarter-Phased Transit Curves

TCE 006470973-05   P= 43.824577 Days    $T_0=173.397931$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 006470973-05     $P = 43.828322$  Days     $T_0 = 173.309830$  (BKJD)

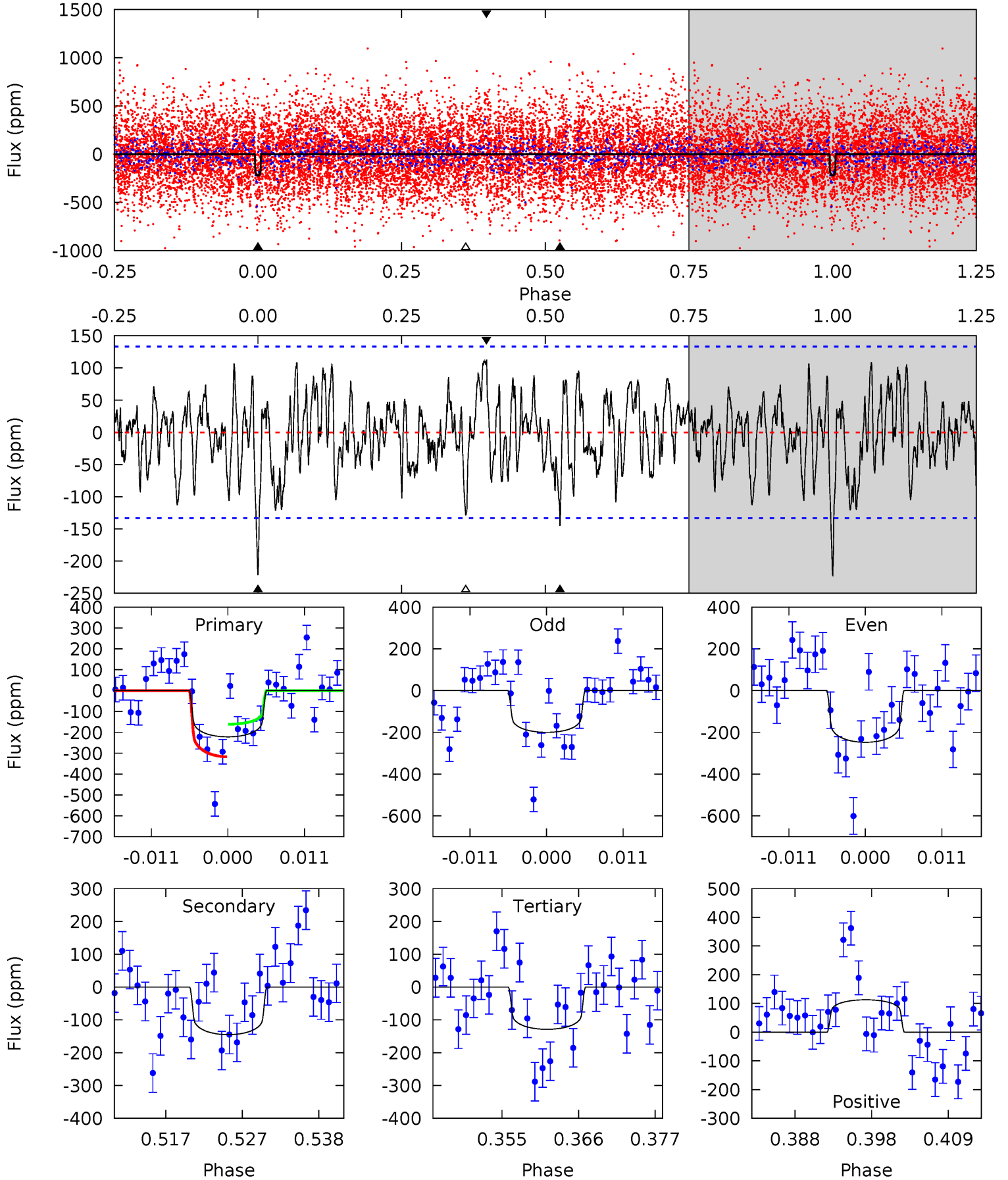




# DV Model-Shift Uniqueness Test

006470973-05, P = 43.824577 Days, E = 129.573354 Days

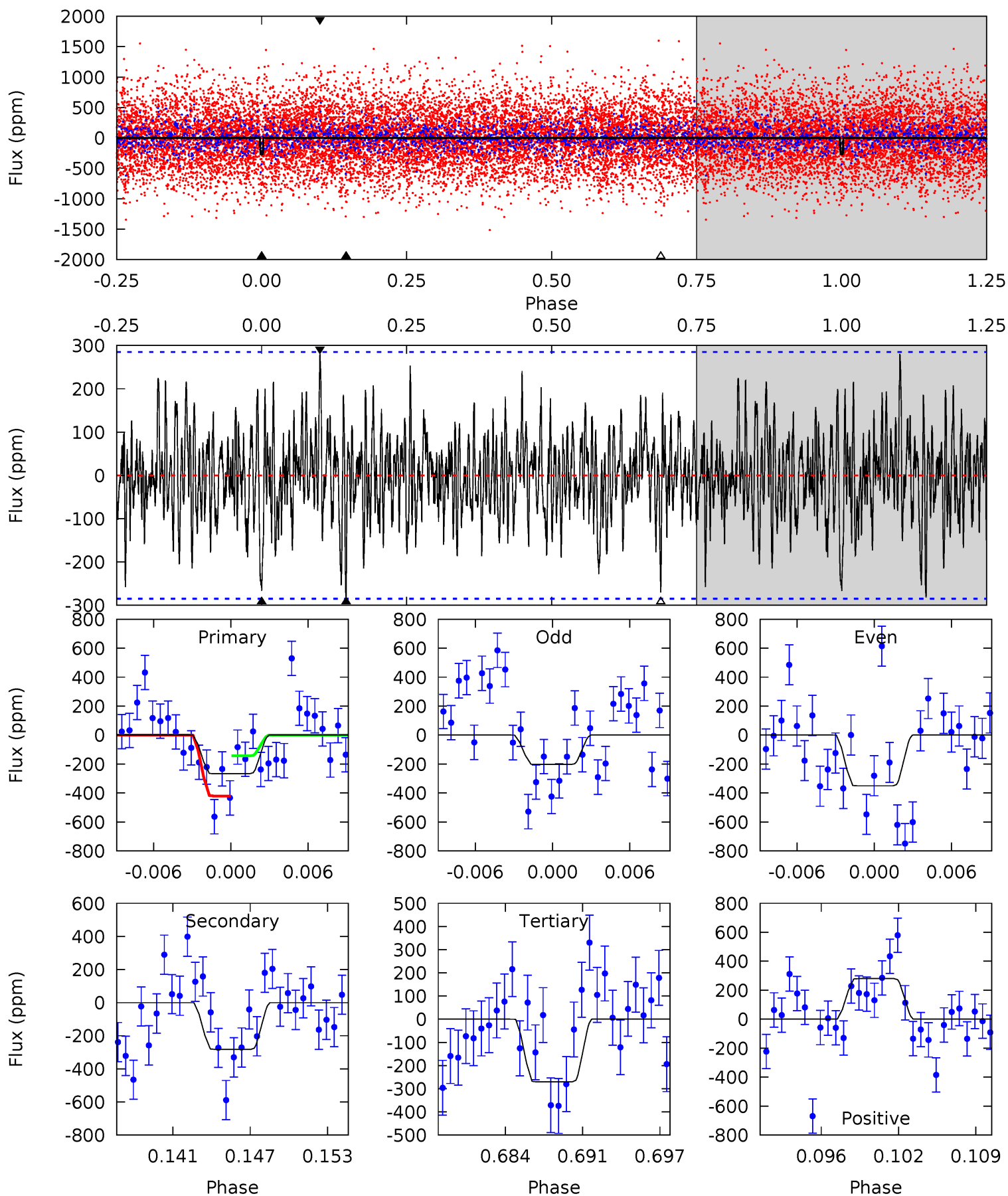
| Pri  | Sec  | Ter  | Pos  | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 8.33 | 5.45 | 4.84 | 4.24 | 5.01            | 2.55            | 1.73             | 3.49    | 4.10    | 0.61    | 1.22    | 0.89    | 0.71 | 0.34  | 2.85 |



# Alt Model-Shift Uniqueness Test

006470973-05, P = 43.828322 Days, E = 129.481508 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  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 4.79 | 5.06 | 4.85 | 5.02 | 5.11            | 2.73            | 1.50             | -0.06   | -0.24   | 0.21    | 0.04    | 1.31    | 0.68 | 0.50  | 2.48 |



### Stellar Parameters For KIC 006470973

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R$ ( $R_{\odot}$ )       | $M(M_{\odot})$            | $p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ ) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $8548^{+237}_{-356}$ | $3.785^{+0.400}_{-0.075}$ | $-0.300^{+0.300}_{-0.350}$ | $2.976^{+0.562}_{-1.406}$ | $1.971^{+0.382}_{-0.466}$ | $0.105^{+0.371}_{-0.033}$                     |
|        | +3%/-4%              | +11%/-2%                  | +100%/-117%                | +19%/-47%                 | +19%/-24%                 | +353%/-31%                                    |
| Source | KIC0                 | 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 006470973-05 / KOI

| Detrend | Depth (ppm)   | $R_p$ ( $R_{\oplus}$ ) | $T_{\text{max}}$ (K) | $T_{\text{obs}}$ (K)   | $A_{\text{obs}}$    |
|---------|---------------|------------------------|----------------------|------------------------|---------------------|
| DV      | $-145 \pm 27$ | $4.72^{+2.08}_{-1.91}$ | $1577^{+117}_{-176}$ | $7075^{+2187}_{-1157}$ | $330^{+584}_{-172}$ |
| Alt.    | $-282 \pm 56$ | $5.68^{+2.32}_{-2.01}$ | $1587^{+116}_{-184}$ | $7740^{+2164}_{-1144}$ | $450^{+615}_{-224}$ |

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature  
 $T_{\text{obs}}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )  
 $A_{\text{obs}}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{\text{obs}} \gg T_{\text{max}}$  AND  $A_{\text{obs}} \gg 1.0$

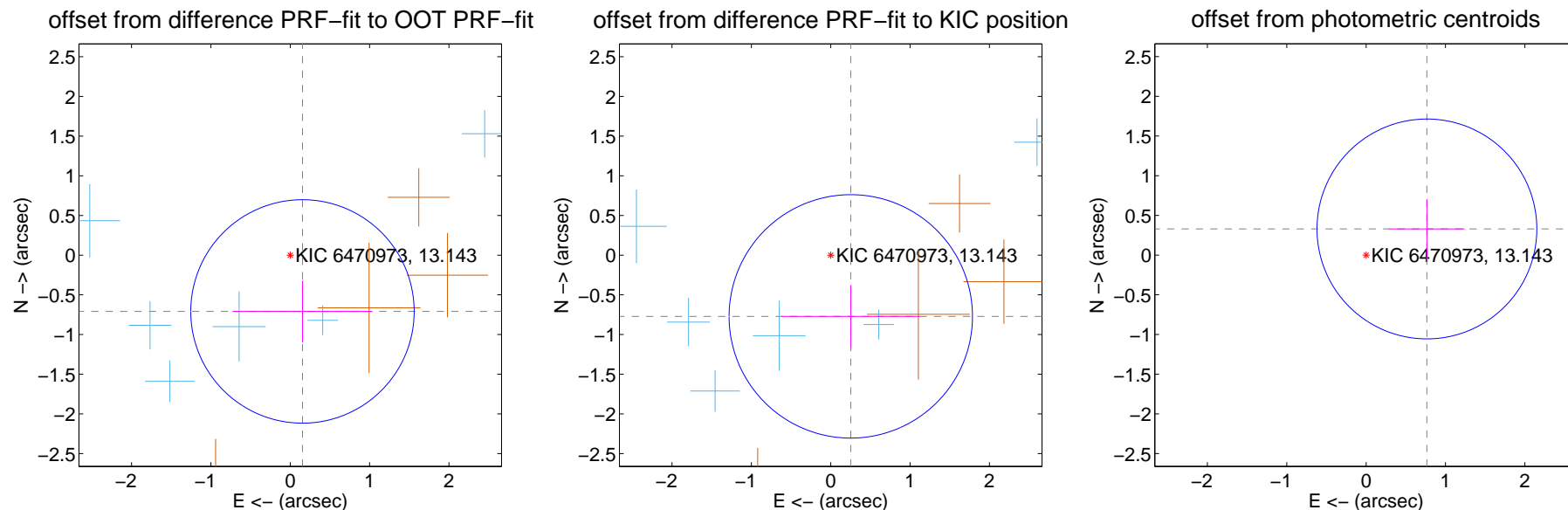
## DV Centroid Data

Supplemental centroid analysis for 006470973-05. Kepler magnitude: 13.14. Transit SNR 7.40

There are 6 quarters with good PRF difference image offsets

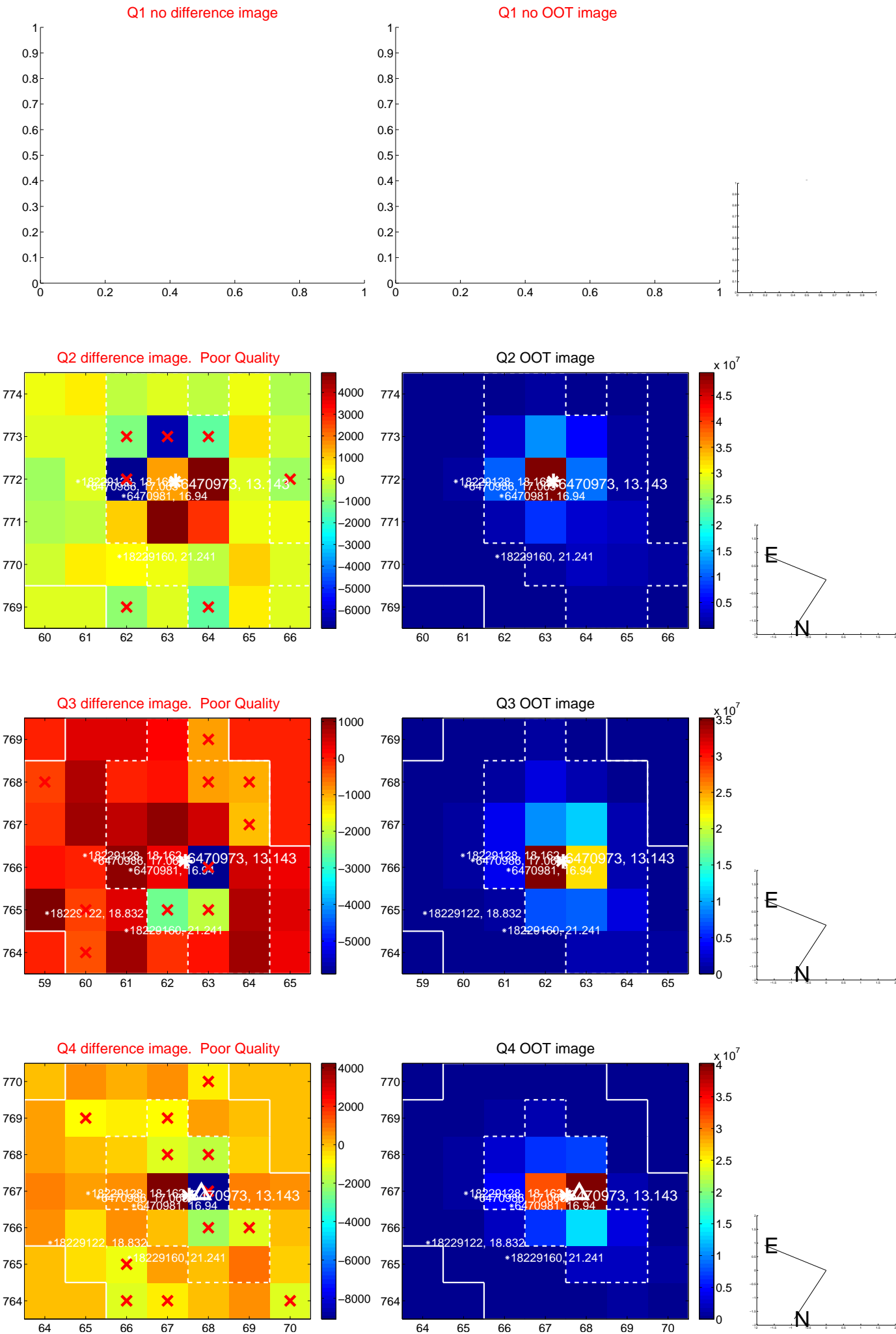
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA        | $\Delta$ Dec       |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT          | $0.726 \pm 0.469$  | 1.55                | $-0.154 \pm 0.881$ | $-0.709 \pm 0.388$ |
| PRF-fit source offset from KIC position | $0.812 \pm 0.511$  | 1.59                | $-0.253 \pm 0.875$ | $-0.771 \pm 0.394$ |
| photometric centroid source offset      | $0.83 \pm 0.46$    | 1.81                | $-0.77 \pm 0.48$   | $0.33 \pm 0.37$    |

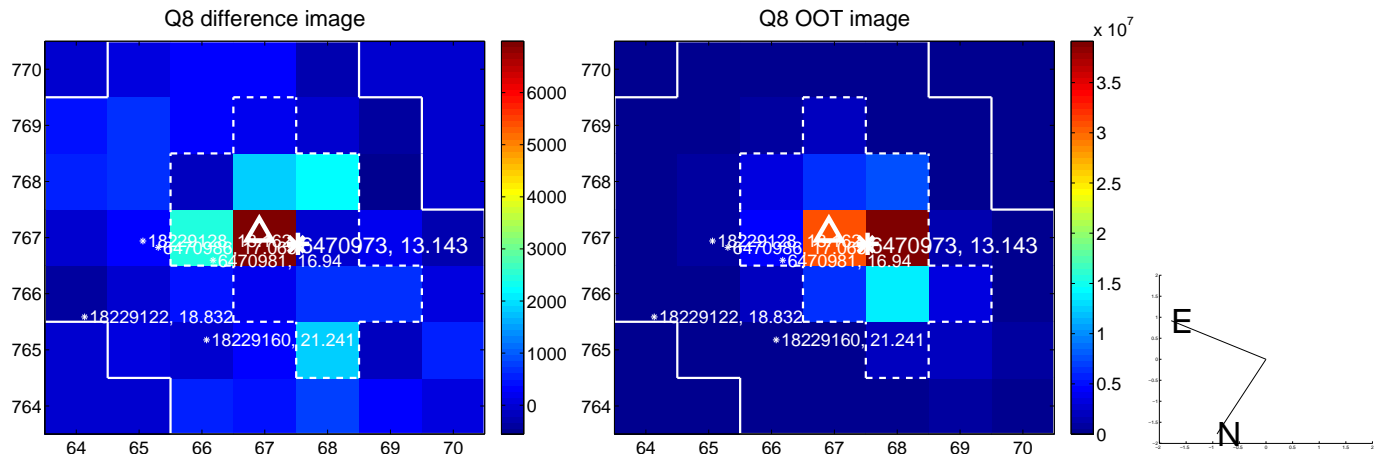
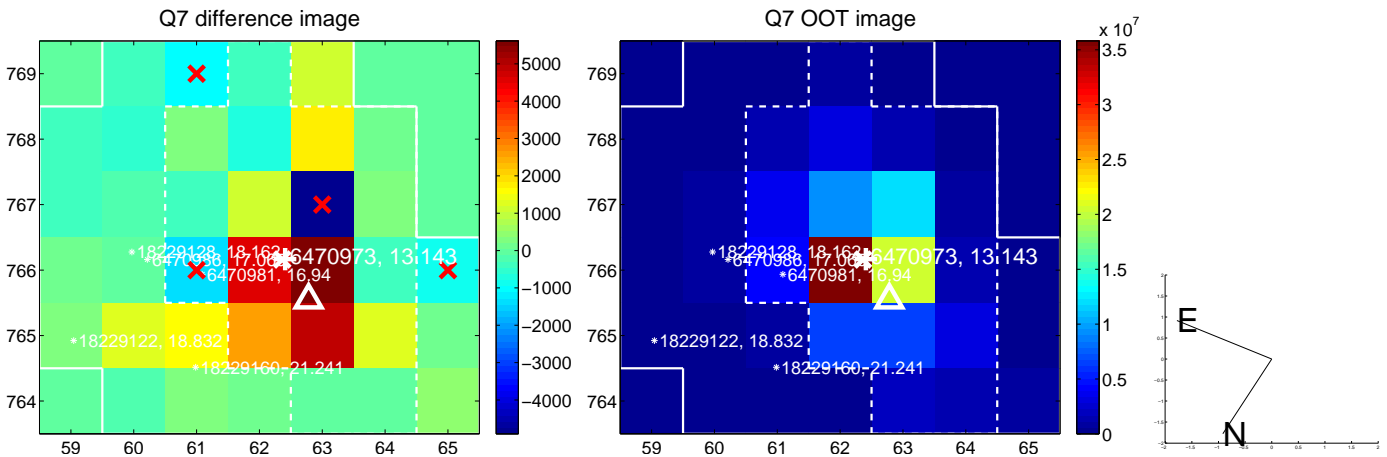
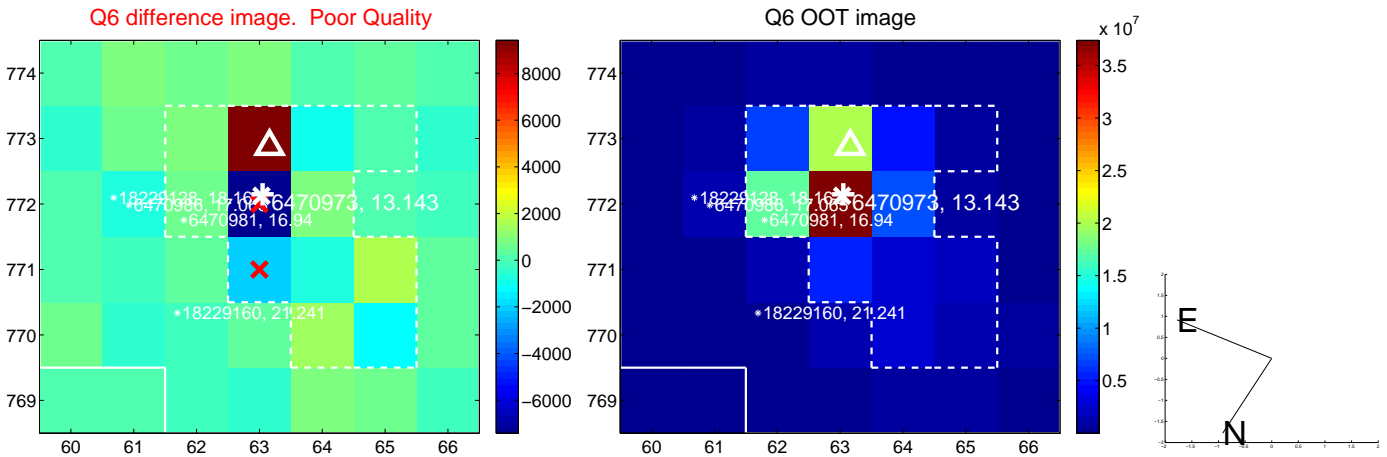
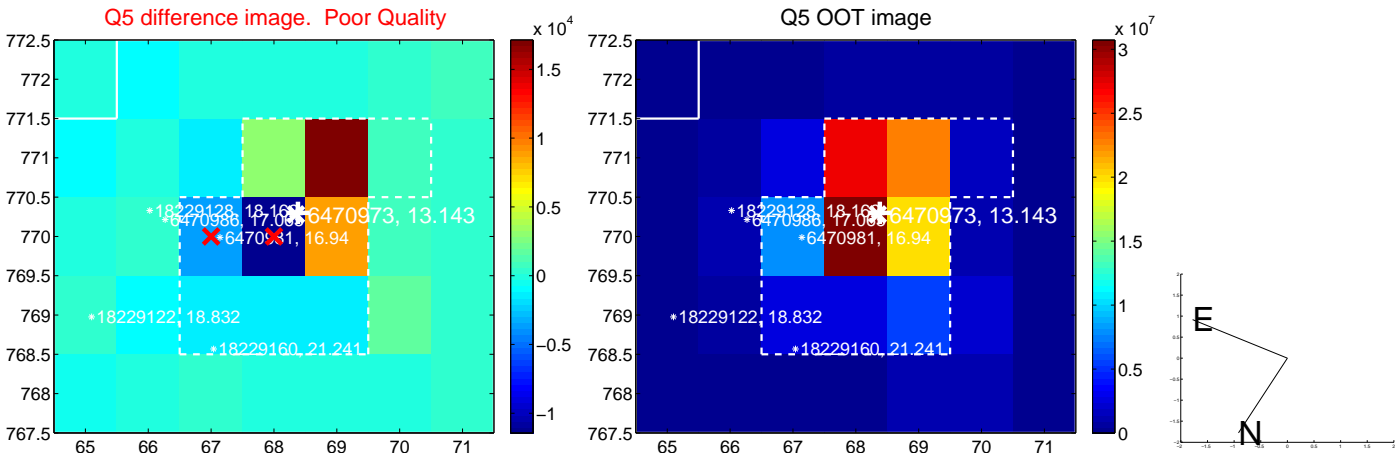


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

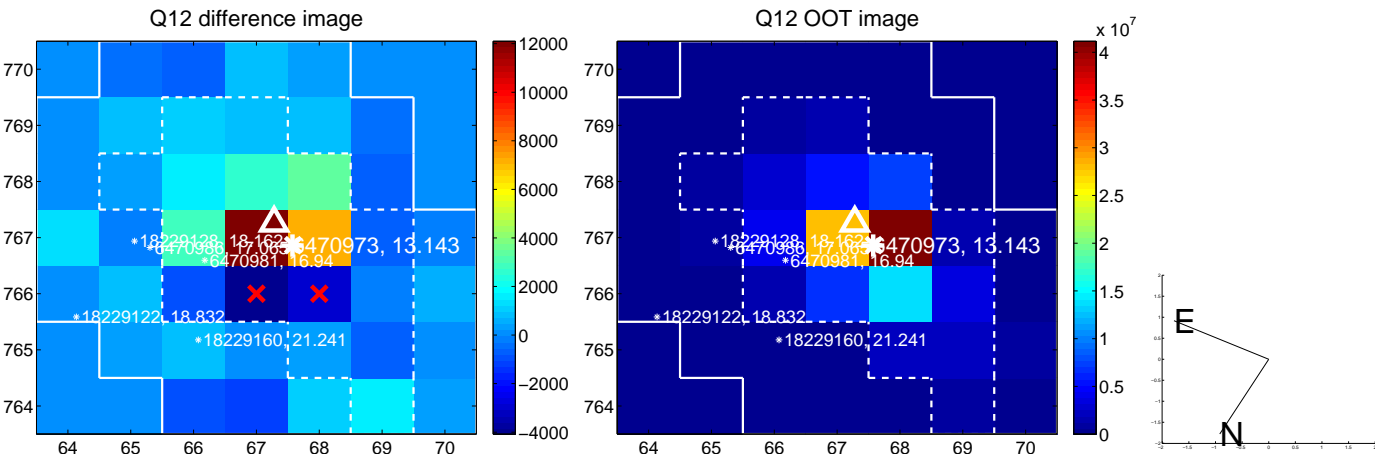
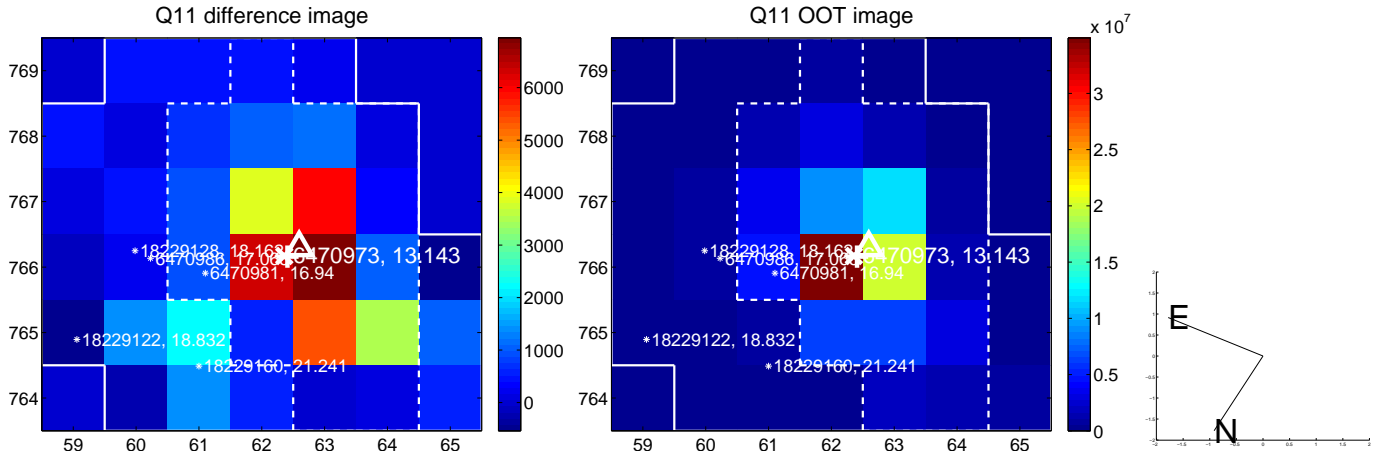
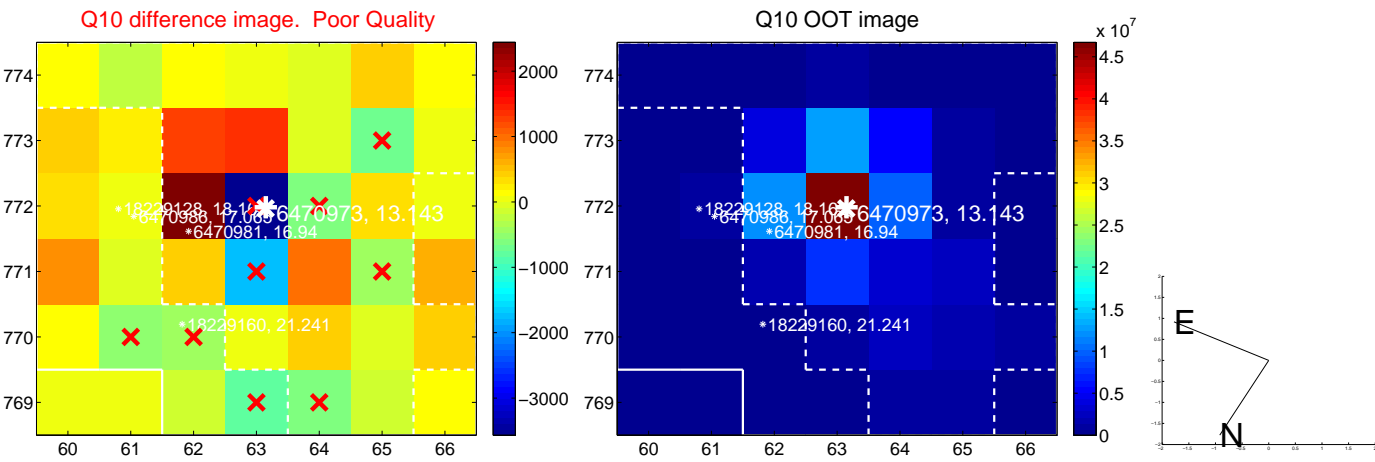
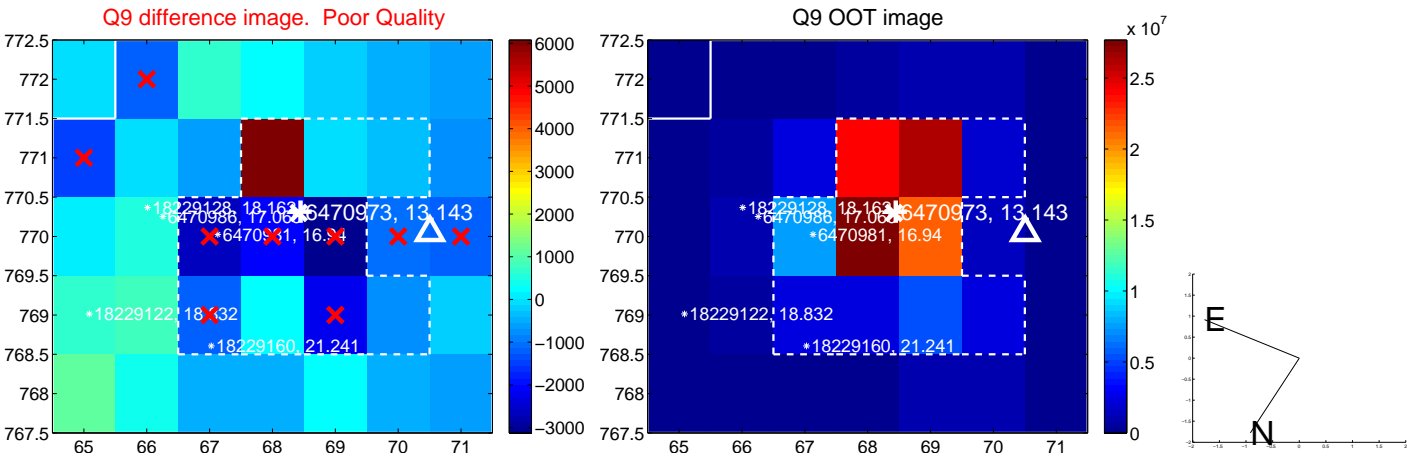


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

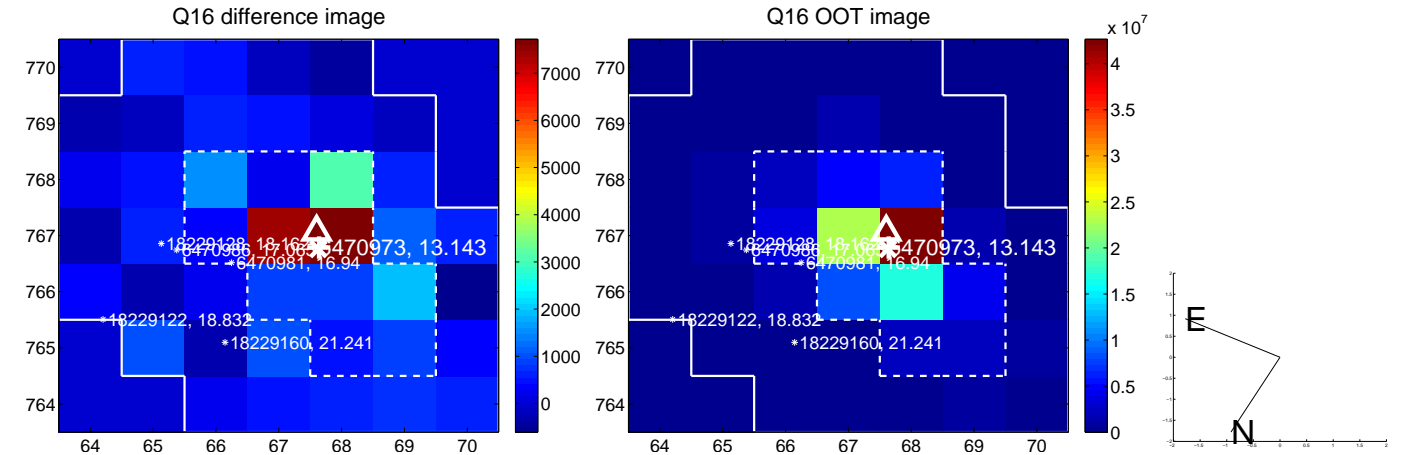
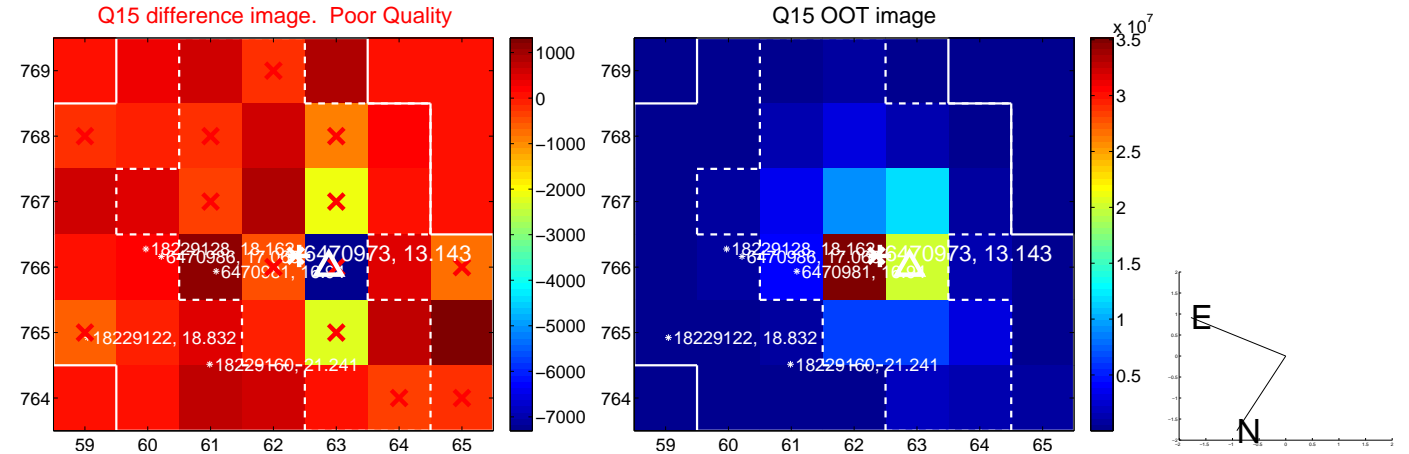
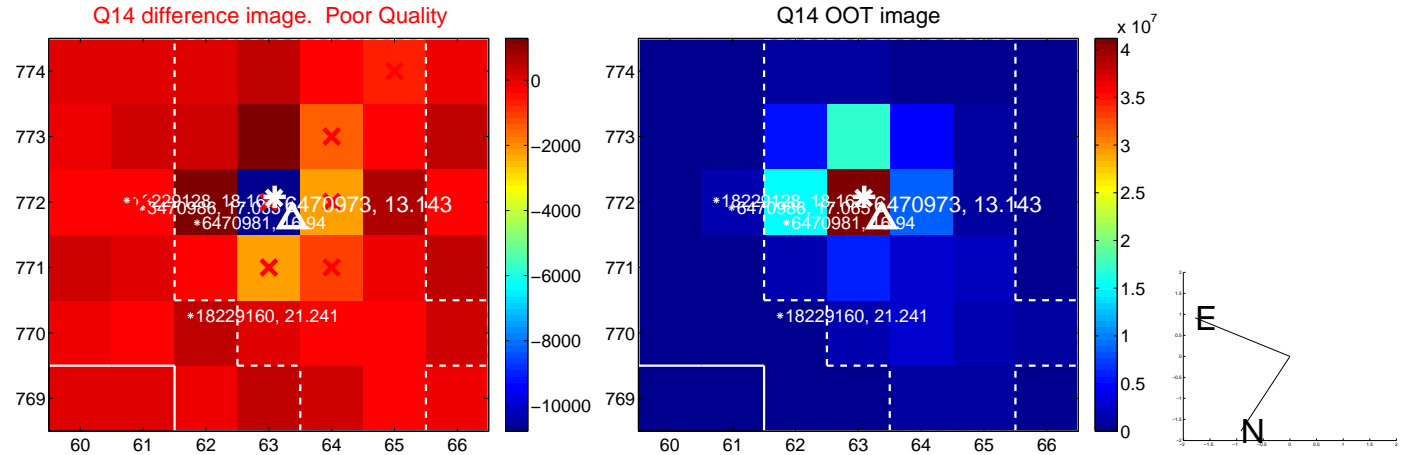
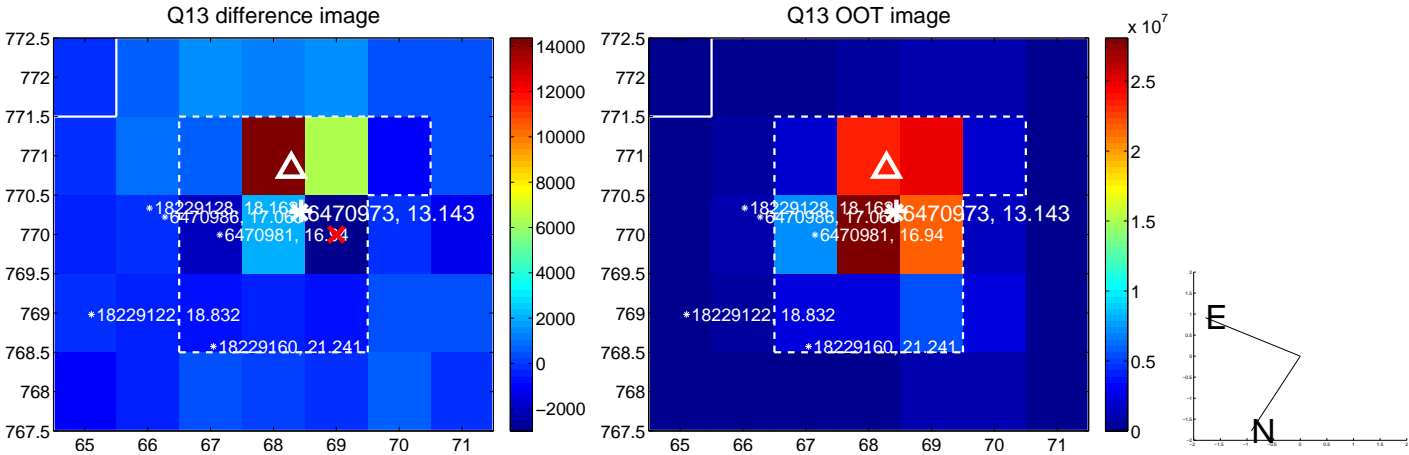




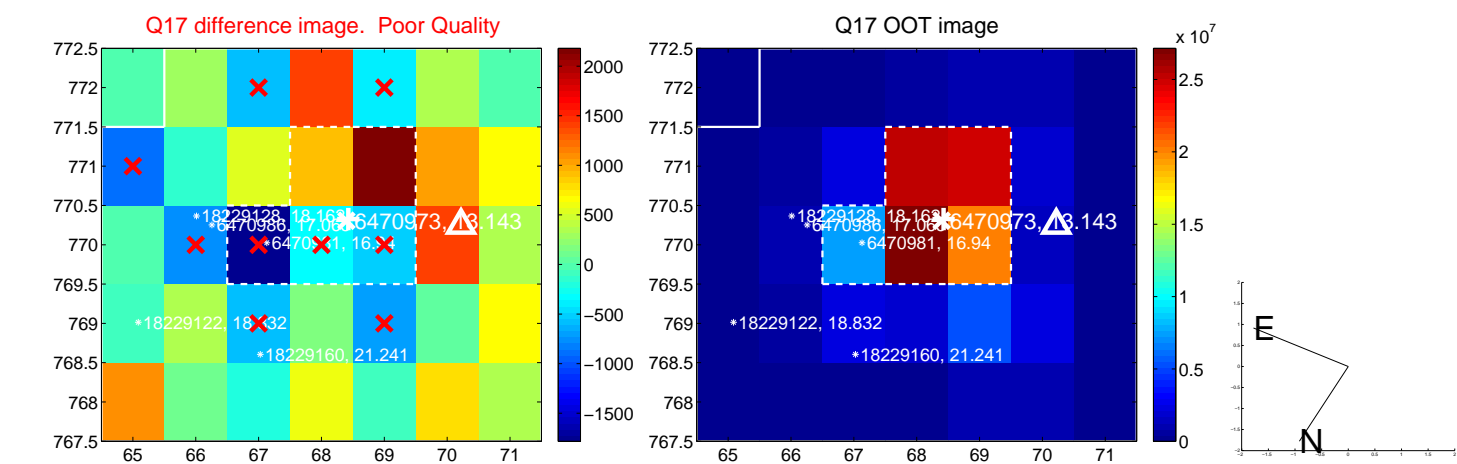
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



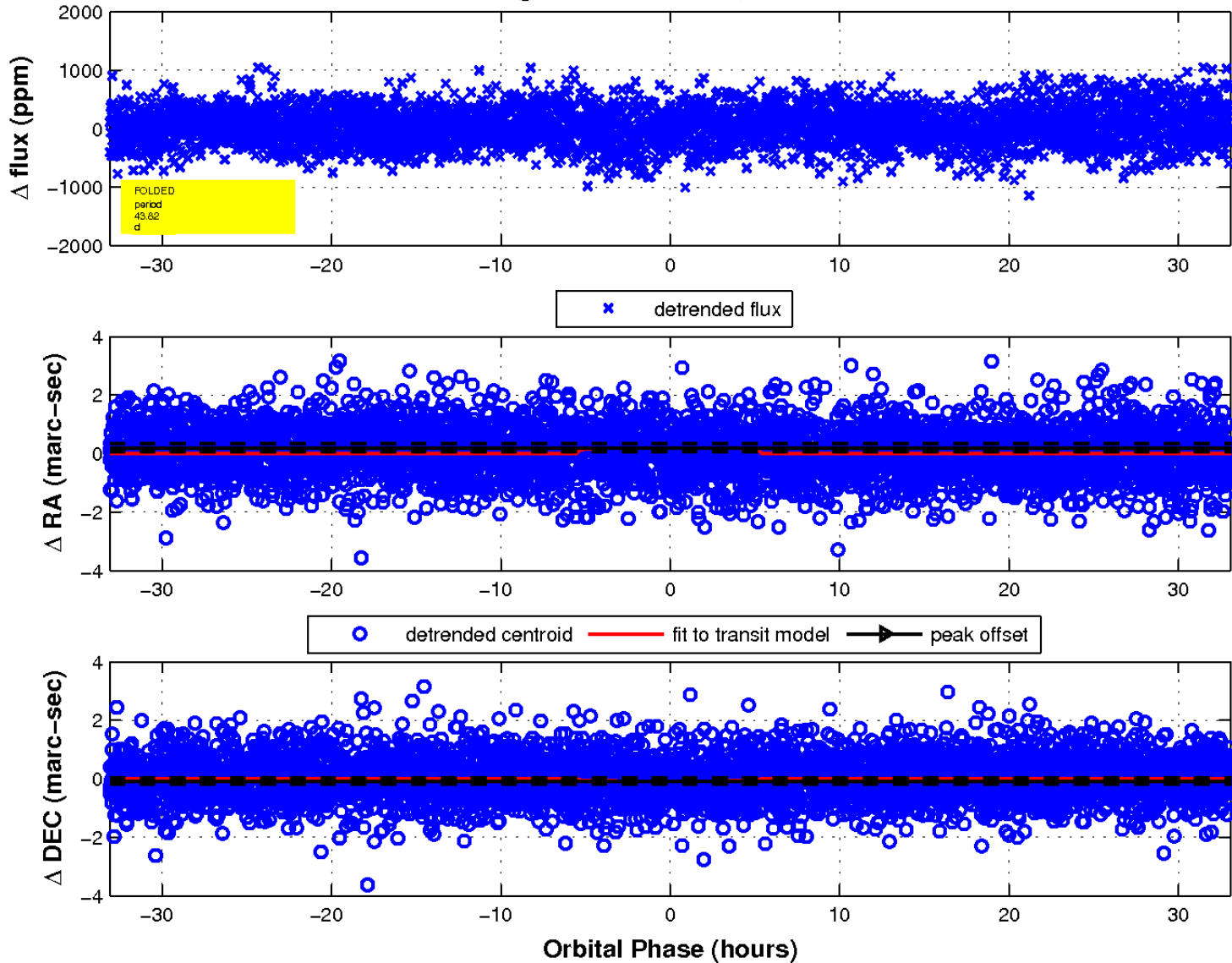
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



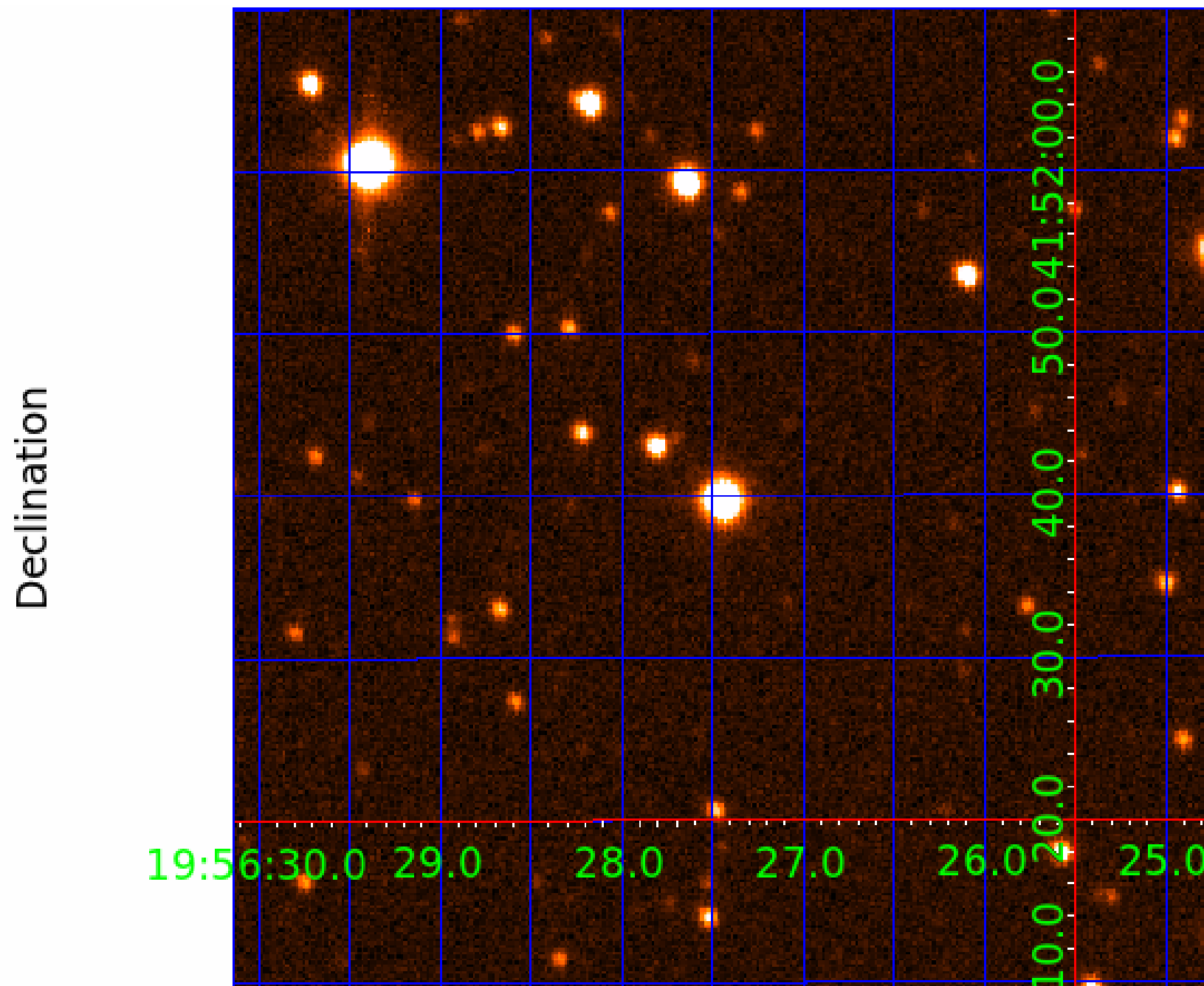
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 5 of 9



UKIRT Image



# KIC 006470973

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 006470973-01 | OBS      | No   | 0.509313      | 131.708781   | 35.2        | 1.285            | 10.2 | 9.8  | 2.98                        | 8548            | 1.84                   | 173032.50              |
| 006470973-02 | OBS      | No   | 1.507014      | 132.863868   | 43.9        | 7.686            | 8.8  | 8.7  | 2.98                        | 8548            | 2.22                   | 40733.45               |
| 006470973-03 | OBS      | No   | 68.595946     | 135.604533   | 305.4       | 10.291           | 12.3 | 7.5  | 2.98                        | 8548            | 5.83                   | 250.64                 |
| 006470973-04 | OBS      | No   | 95.200506     | 157.793112   | 760.5       | 7.481            | 11.1 | 9.5  | 2.98                        | 8548            | 10.09                  | 161.90                 |
| 006470973-05 | OBS      | No   | 43.824577     | 173.397932   | 266.9       | 11.025           | 9.9  | 7.4  | 2.98                        | 8548            | 5.20                   | 455.50                 |
| 006470973-06 | OBS      | No   | 43.851912     | 174.379270   | 265.5       | 5.706            | 9.4  | 6.5  | 2.98                        | 8548            | 5.91                   | 455.12                 |
| 006470973-07 | OBS      | No   | 96.994995     | 218.805364   | 538.8       | 4.480            | 9.0  | 9.0  | 2.98                        | 8548            | 7.65                   | 157.92                 |
| 006470973-09 | OBS      | No   | 203.109072    | 227.259250   | 243.1       | 6.000            | 8.5  | -1.0 | 2.98                        | 8548            | 4.71                   | 58.95                  |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 006470973-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT   |
| 006470973-02 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT   |
| 006470973-03 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT  |
| 006470973-04 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS |
| 006470973-05 | 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   |
| 006470973-06 | OBS      | FP   | 0.00  | 1 | 0 | 1 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—HALO_GHOST                        |
| 006470973-07 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT  |
| 006470973-09 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—CENT_NOFITS   |

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

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

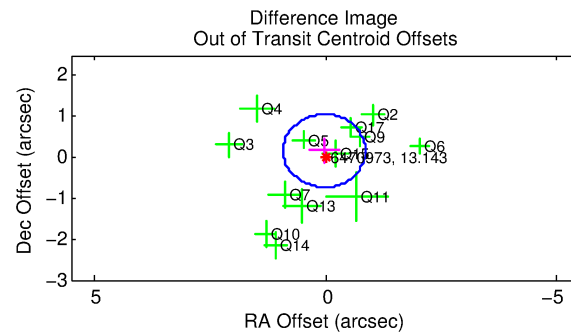
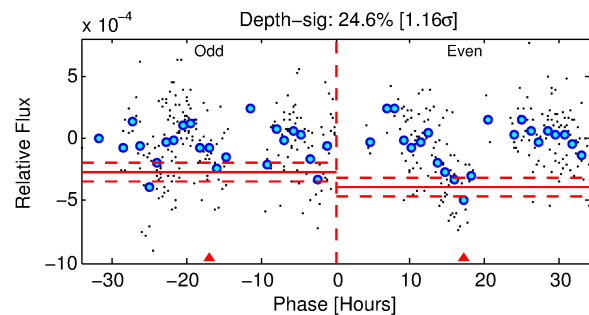
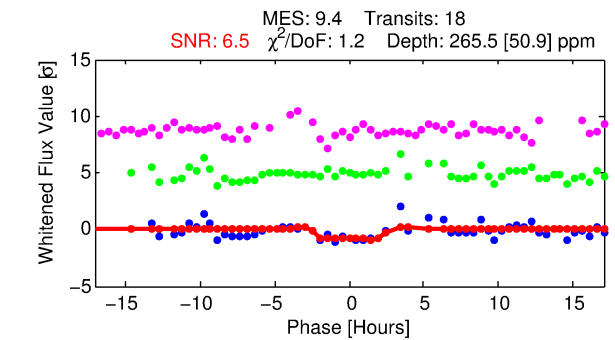
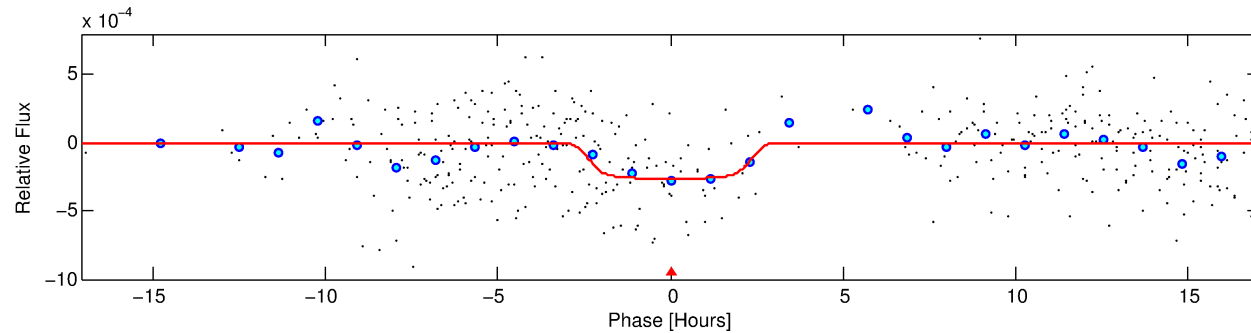
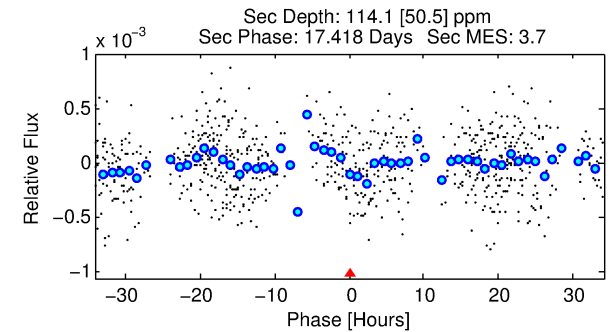
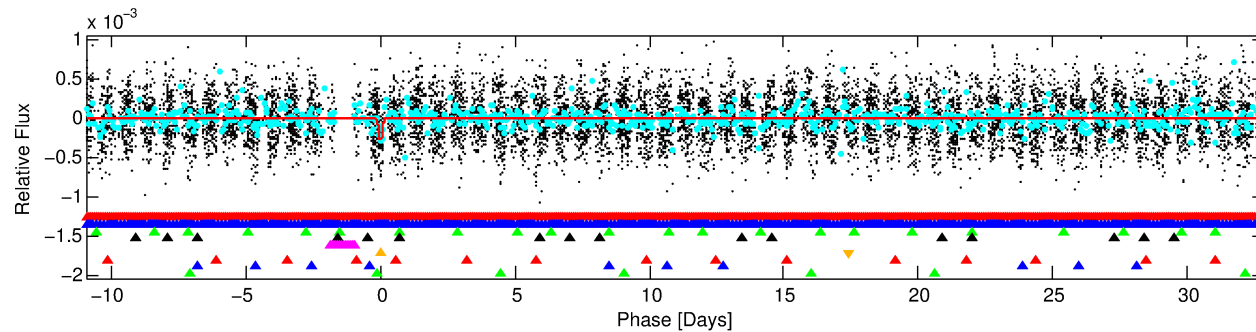
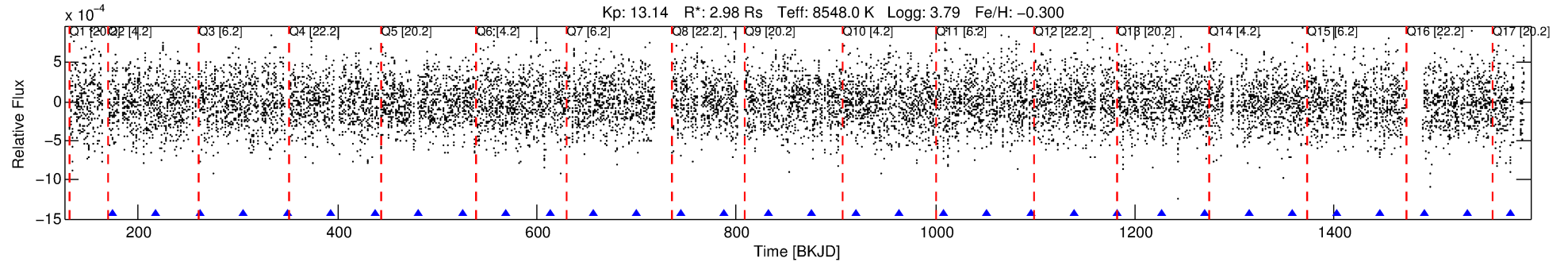
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006470973-06

No Significant Match Found

# DV One-Page Summary

KIC: 6470973 Candidate: 6 of 9 Period: 43.852 d



## DV Fit Results:

Period = 43.85191 [0.00081] d  
Epoch = 174.3793 [0.0178] BKJD  
Rp/R\* = 0.0182 [0.0023]  
a/R\* = 21.21 [10.31]  
b = 0.95 [0.05]  
Seff = 455.12 [323.09]  
Teff = 1178 [209] K  
Rp = 5.91 [2.89] Re  
a = 0.3051 [0.1342] AU  
Ag = 167.26 [143.72] [1.16 $\sigma$ ]  
Teffp = 6549 [881] K [5.93 $\sigma$ ]

## DV Diagnostic Results:

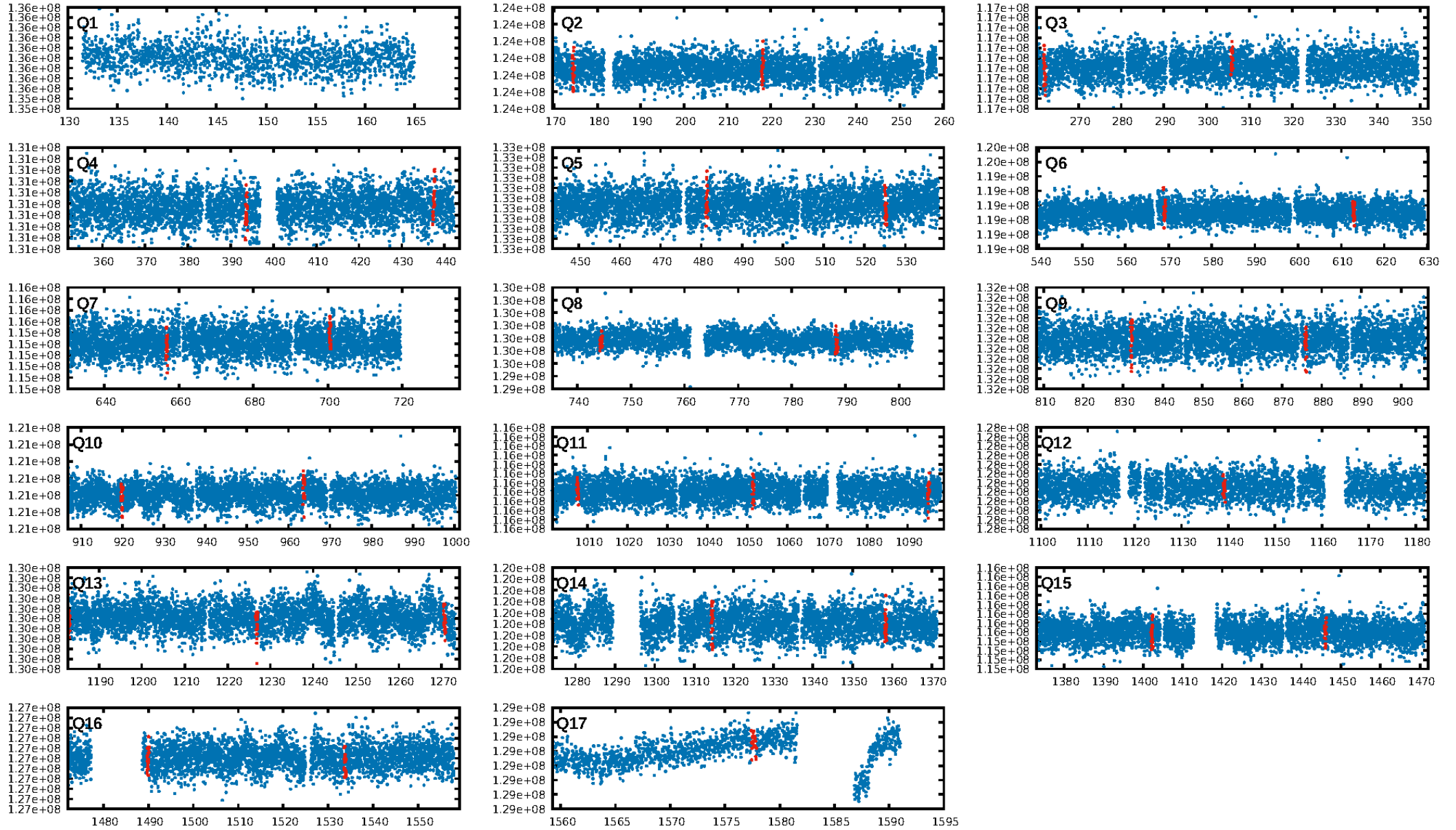
ShortPeriod-sig: 4.2% [0.05 $\sigma$ ]  
LongPeriod-sig: 100.0% [50.47 $\sigma$ ]  
ModelChiSquare2-sig: 4.4%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [17/17]  
GhostDiagnostic-chr: 0.2309  
Centroid-sig: 5.4%  
Centroid-so: 0.860 arcsec [1.50 $\sigma$ ]  
OotOffset-rm: 0.165 arcsec [0.56 $\sigma$ ]  
KicOffset-rm: 0.092 arcsec [0.27 $\sigma$ ]  
OotOffset-st: 4/4/1/4 [13]  
KicOffset-st: 4/4/1/4 [13]  
DiffImageQuality-fgm: 0.46 [6/13]  
DiffImageOverlap-fno: 0.00 [0/15]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 06:07:22 Z

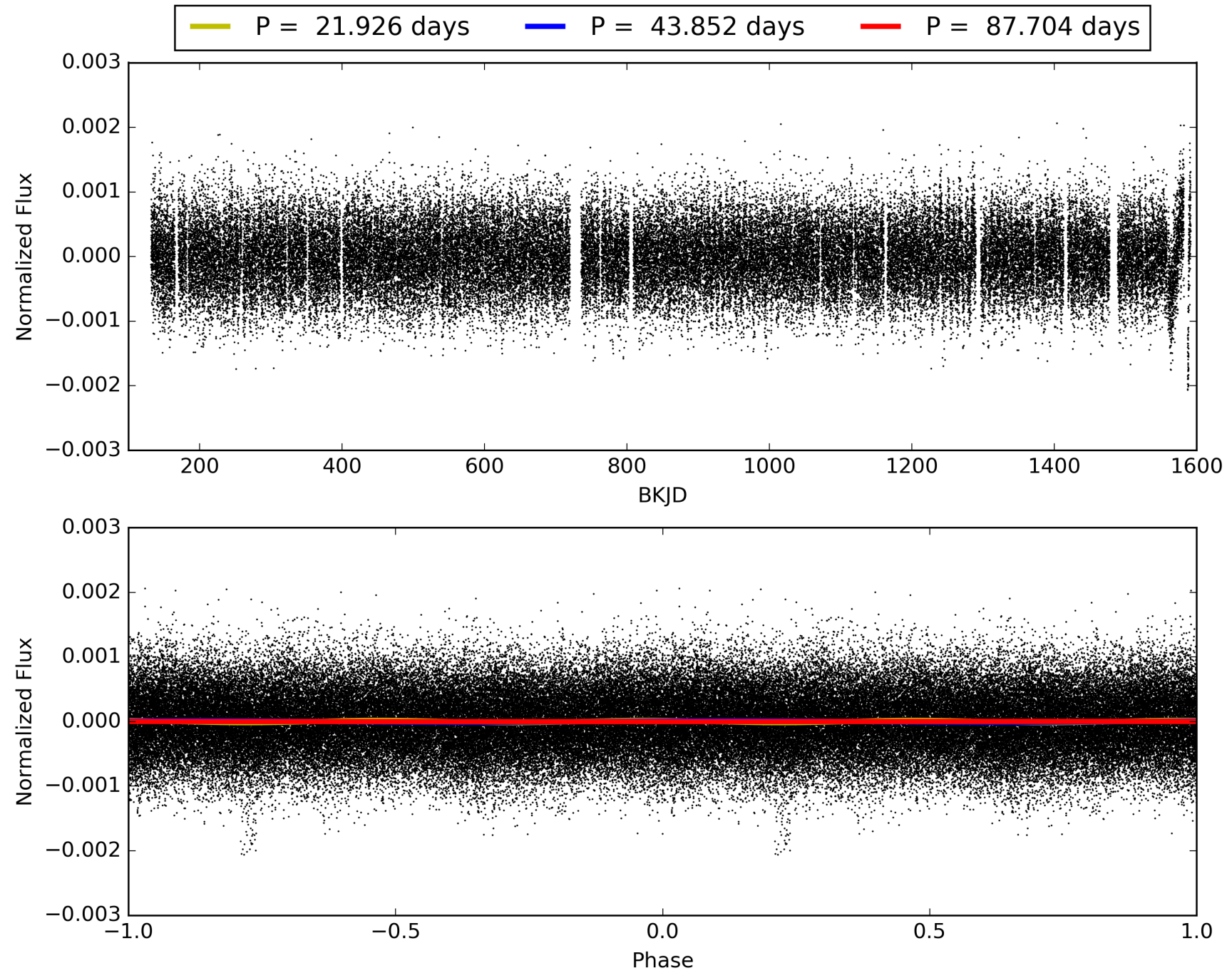
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 006470973-06, PDC Light Curves

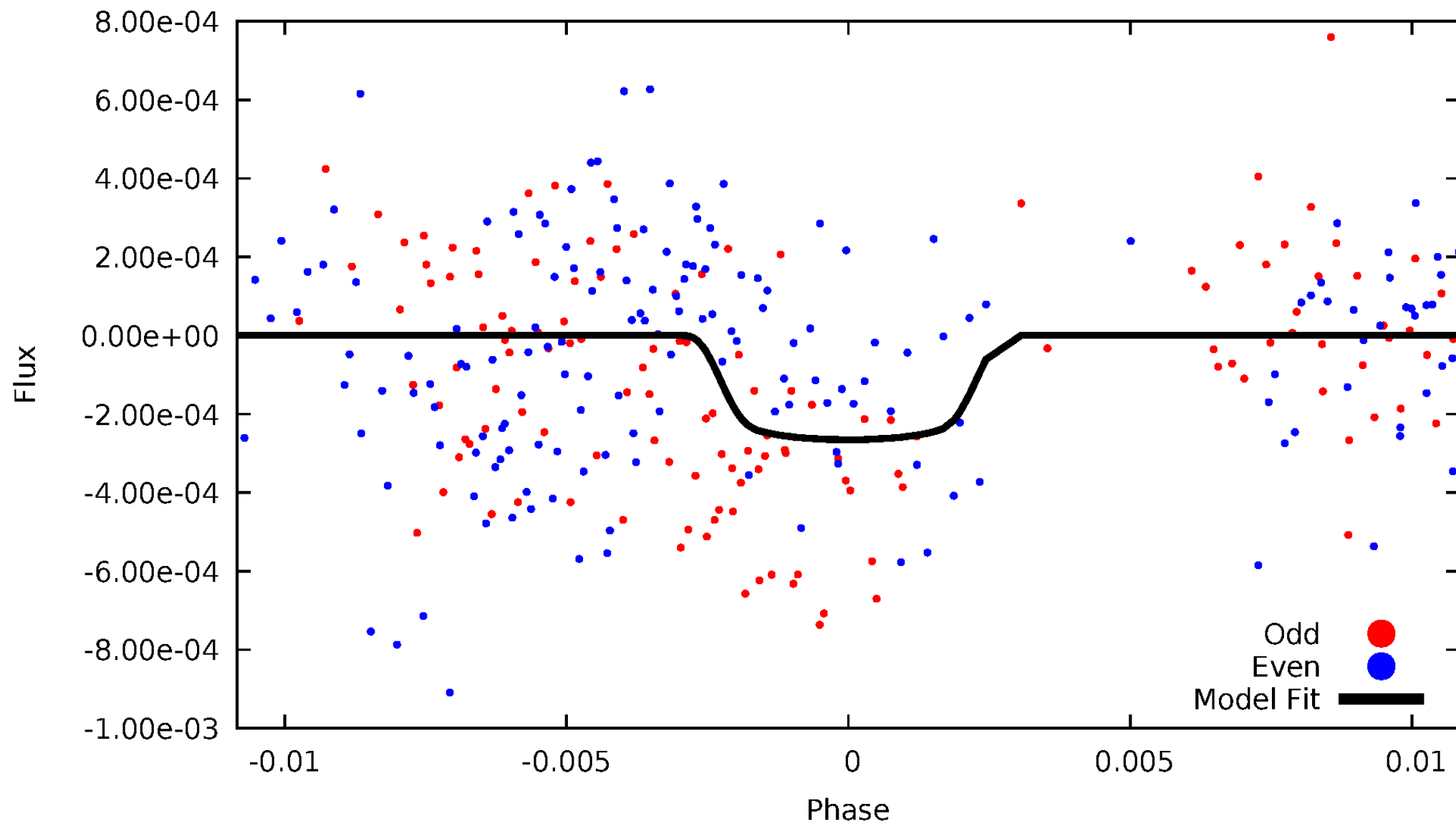


TCE 006470973-06



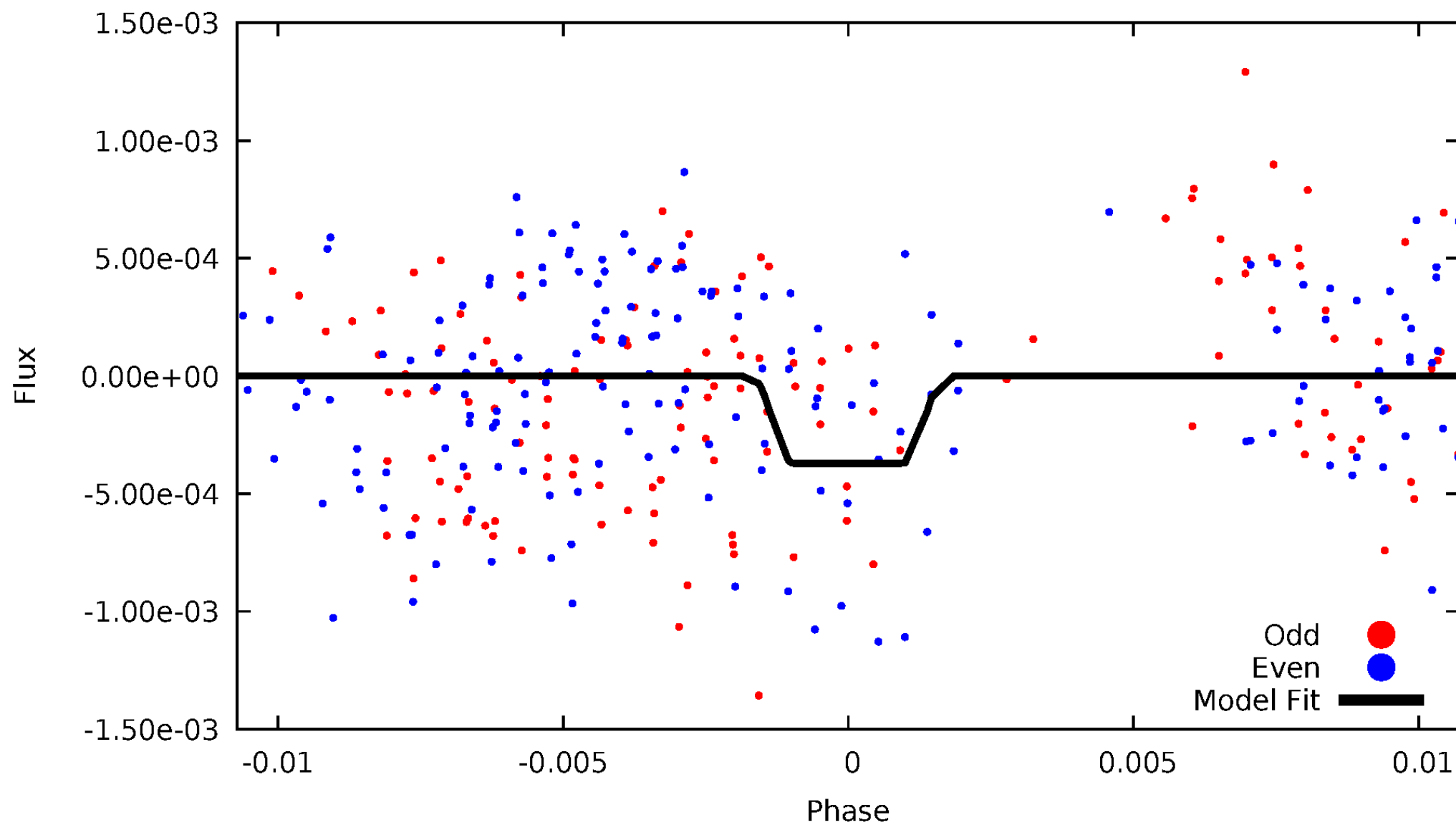
# DV Odd/Even

TCE 006470973-06



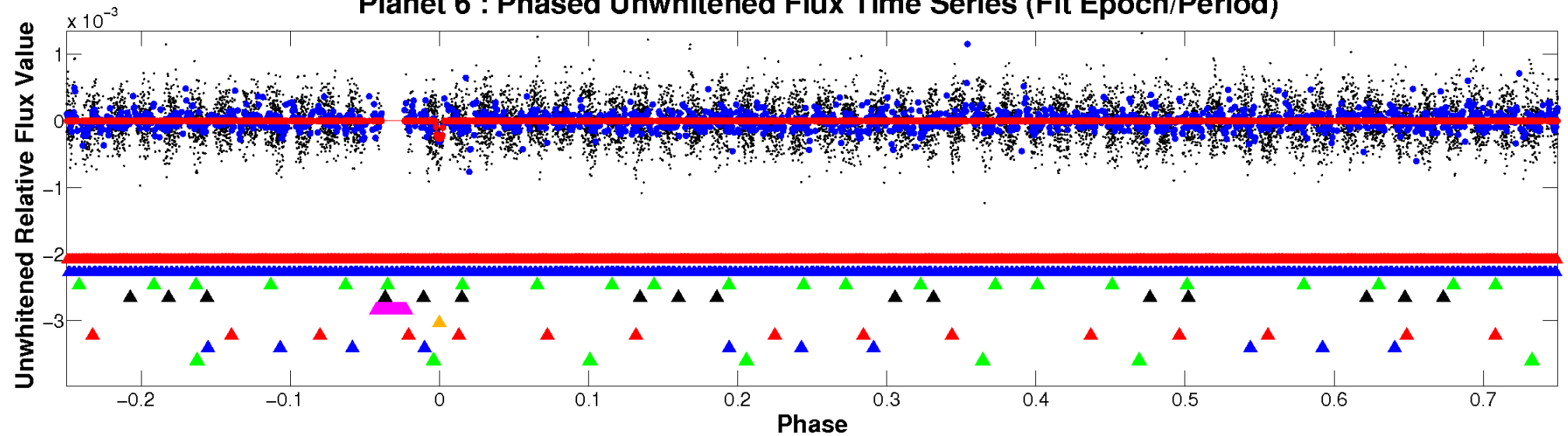
# ALT Odd/Even

TCE 006470973-06

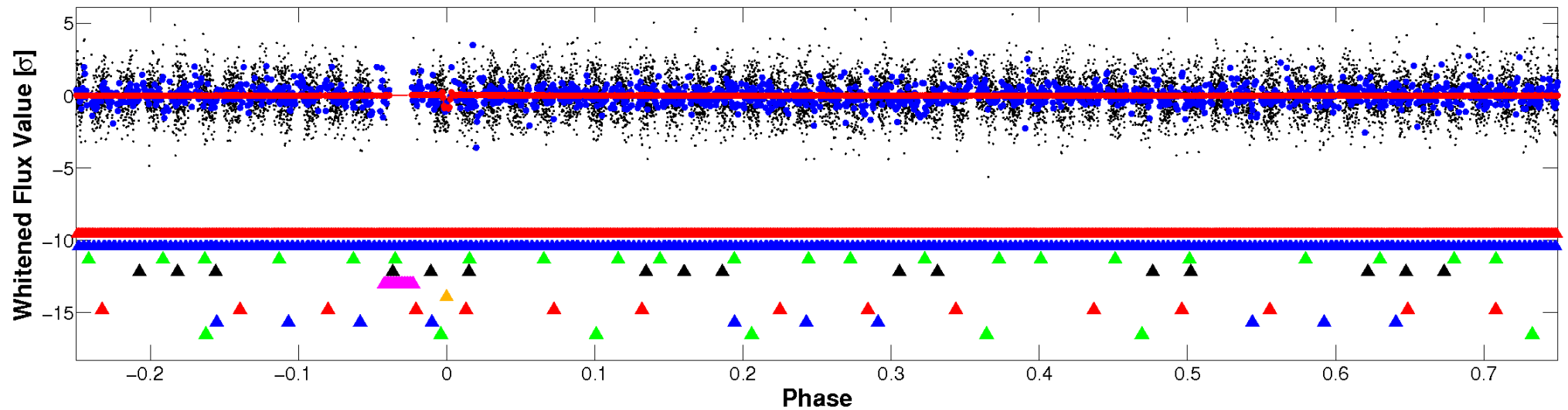


# Non-Whitened Vs. Whitened Light Curve

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

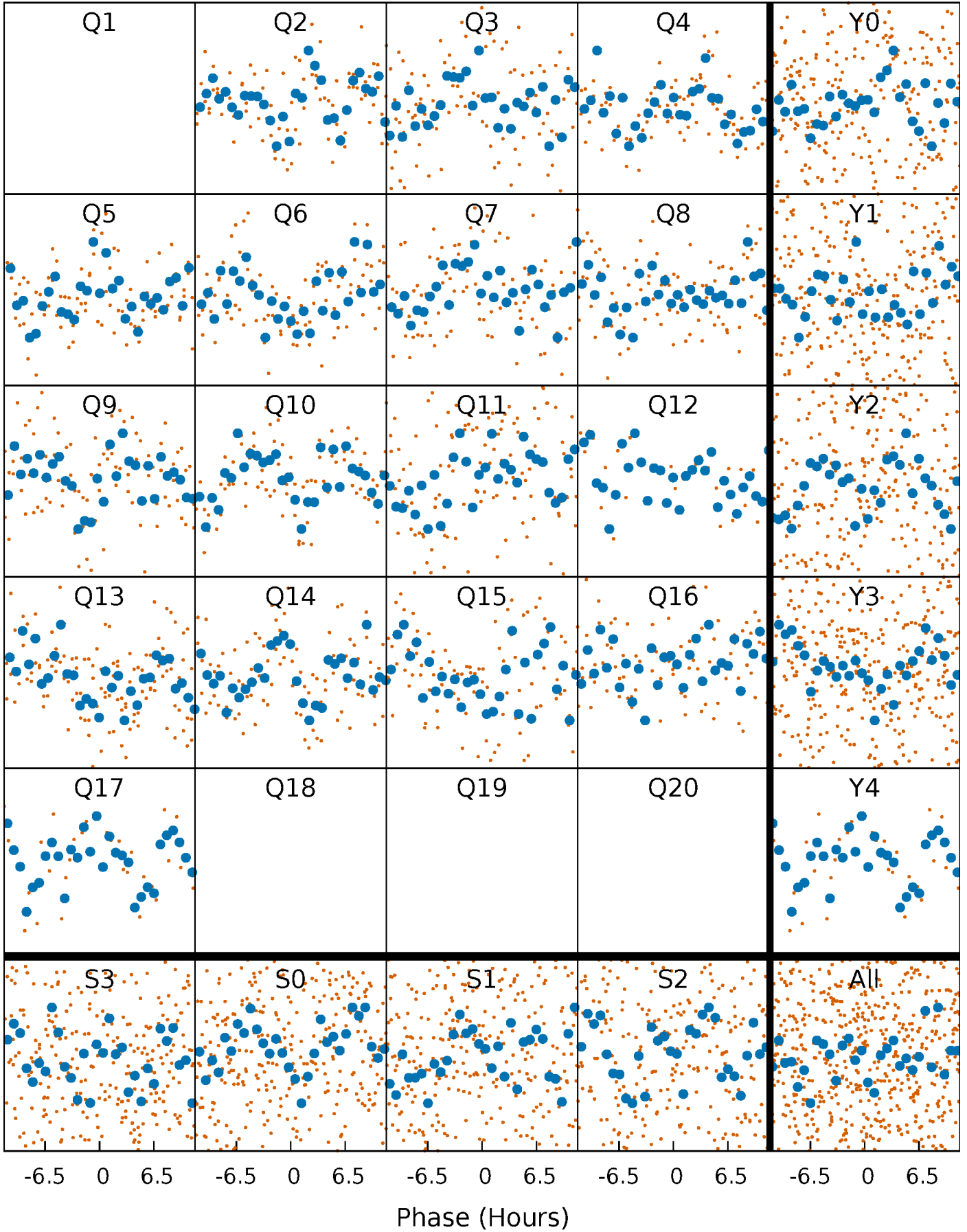


## Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

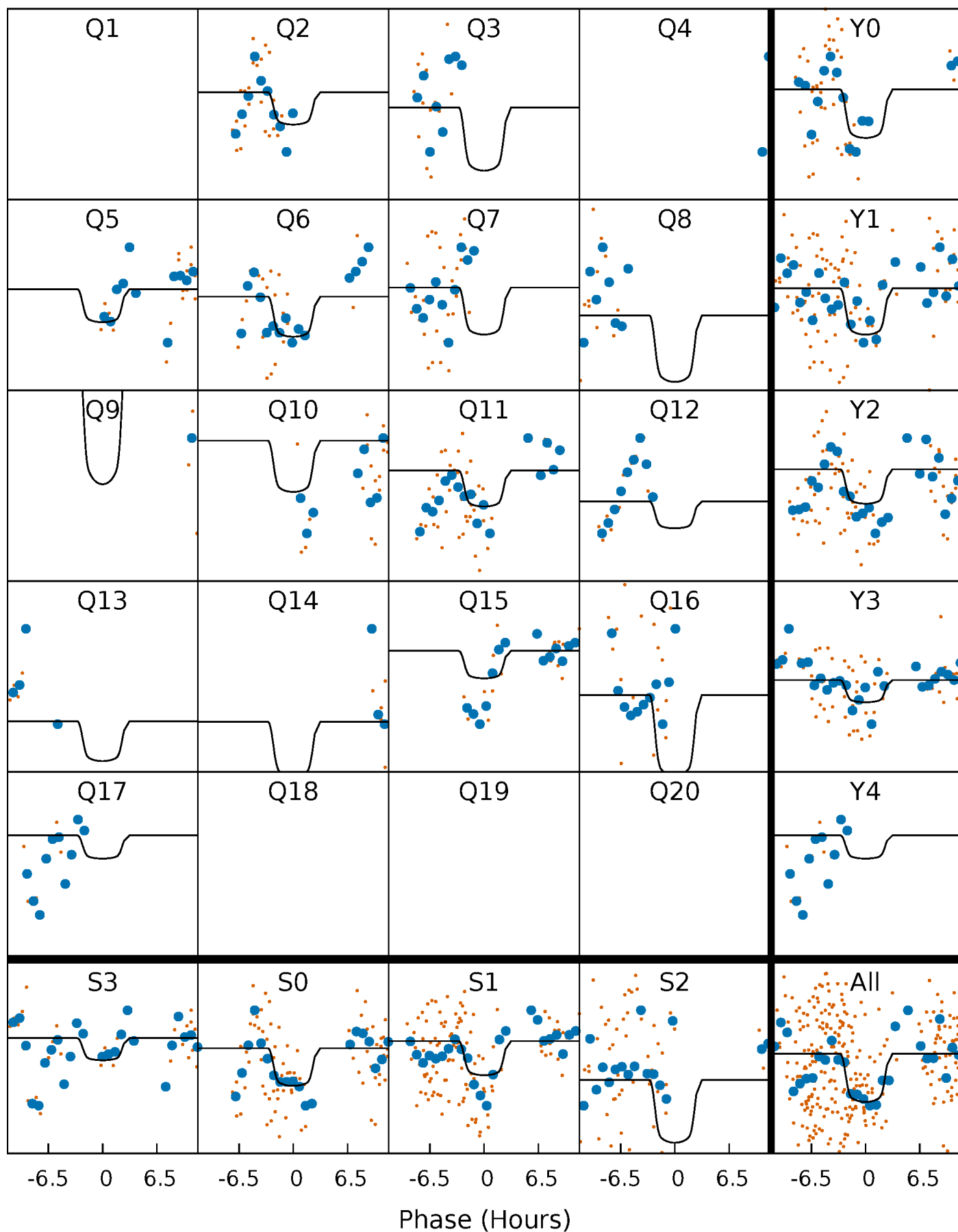
TCE 006470973-06 P= 43.851912 Days  $T_0=174.379270$  (BKJD)





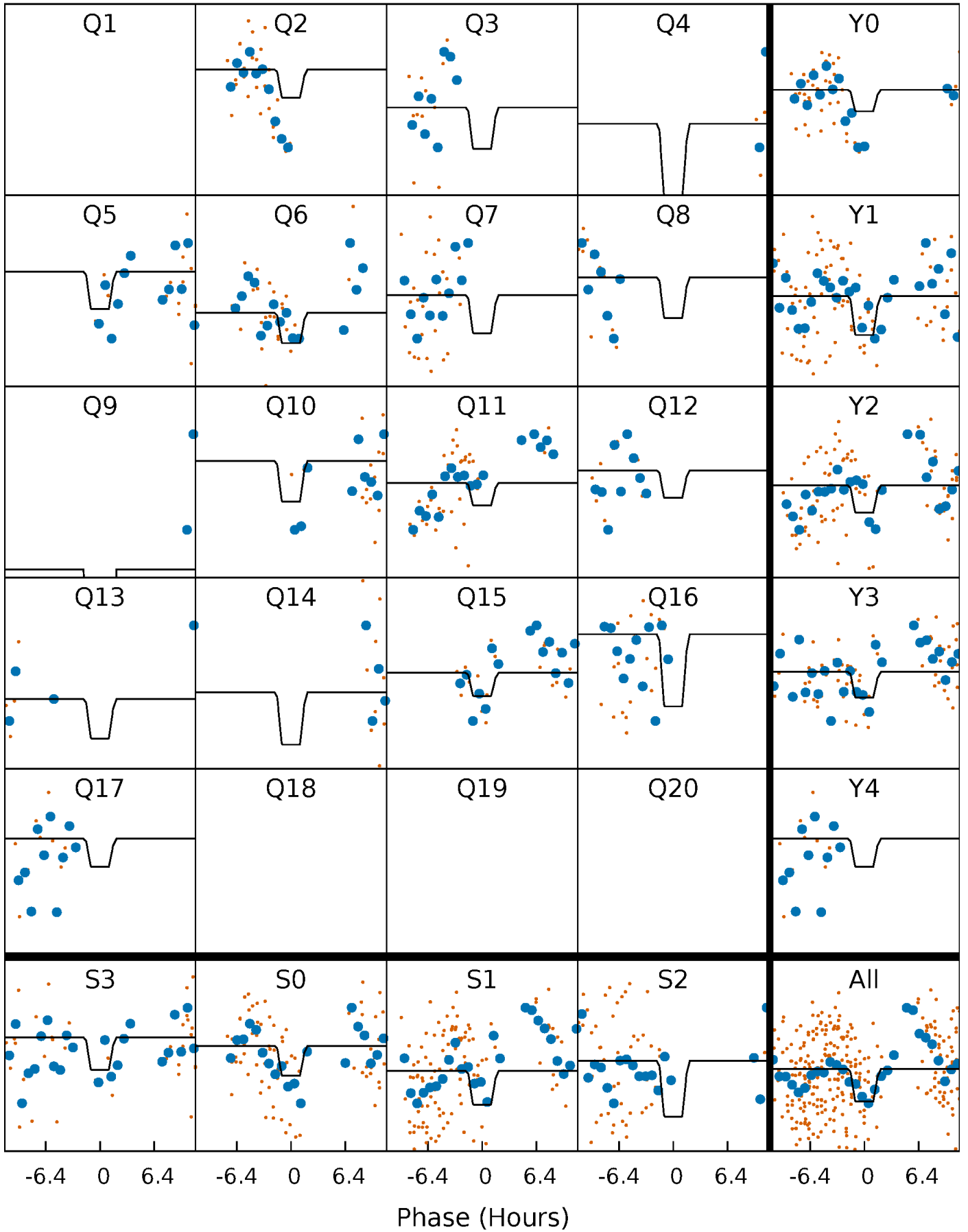
# DV Quarter-Phased Transit Curves

TCE 006470973-06 P= 43.851912 Days  $T_0=174.379270$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

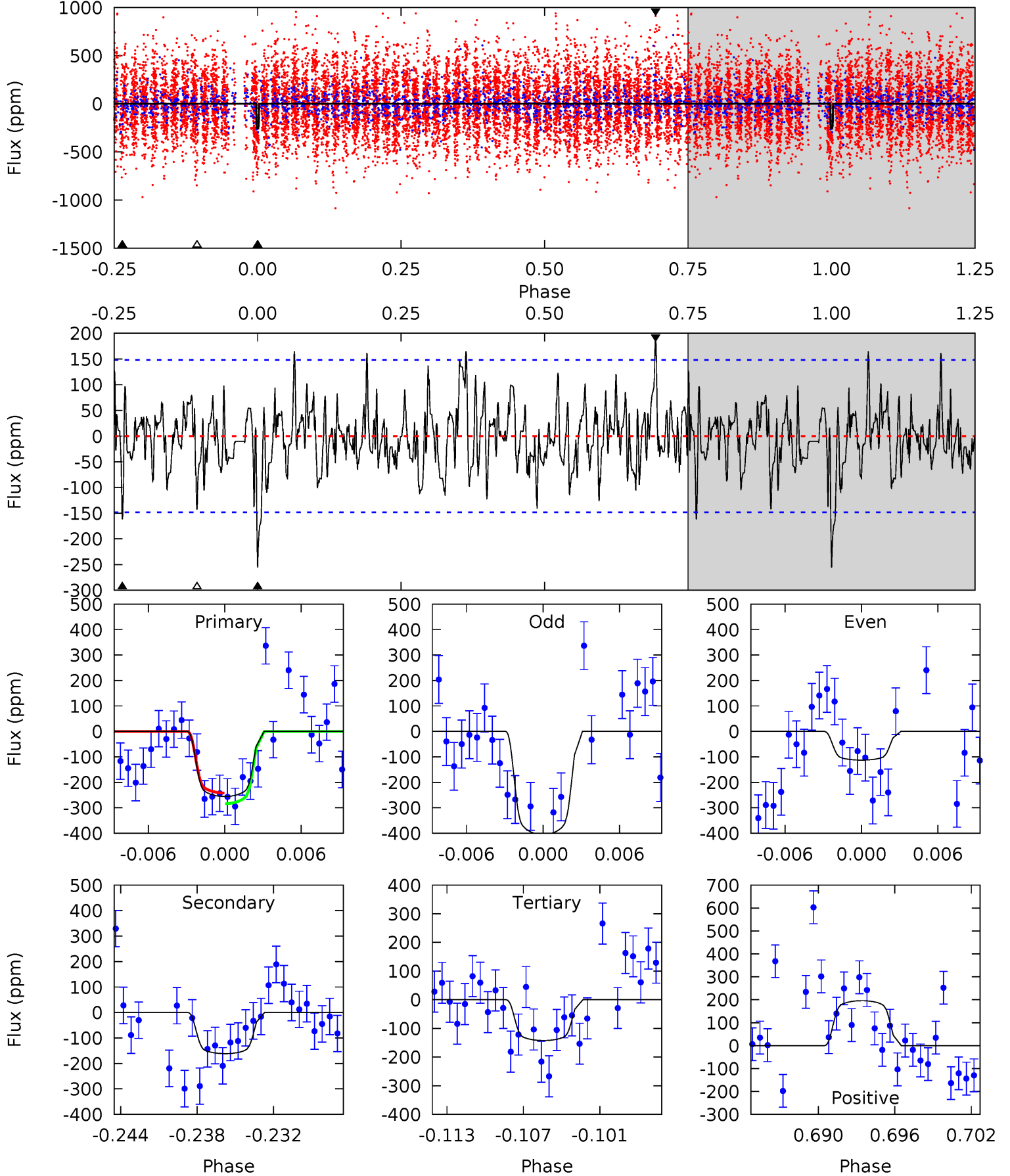
TCE 006470973-06 P= 43.852384 Days  $T_0=174.388724$  (BKJD)



# DV Model-Shift Uniqueness Test

006470973-06, P = 43.851912 Days, E = 130.527358 Days

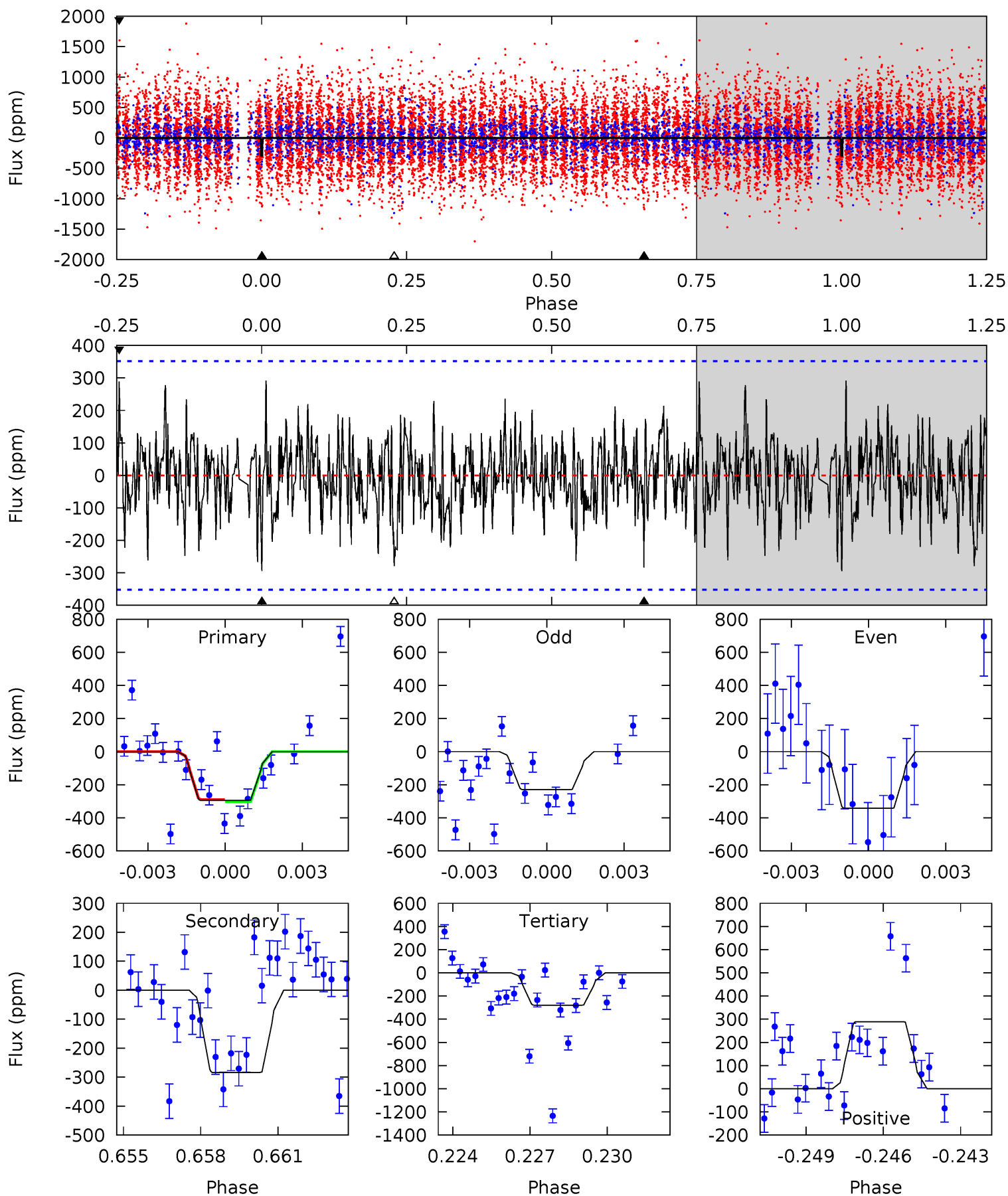
| Pri  | Sec  | Ter  | Pos  | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 8.83 | 5.58 | 4.92 | 6.77 | 5.13            | 2.75            | 1.86             | 3.92    | 2.06    | 0.67    | -1.19   | 5.05    | 0.69 | 0.43  | 0.64 |



# Alt Model-Shift Uniqueness Test

006470973-06, P = 43.852384 Days, E = 130.536340 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  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 4.40 | 4.23 | 4.17 | 4.31 | 5.25            | 2.96            | 1.32             | 0.23    | 0.08    | 0.07    | -0.08   | 0.84    | 1.79 | 0.50  | 0.09 |



### Stellar Parameters For KIC 006470973

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R$ ( $R_{\odot}$ )       | $M(M_{\odot})$            | $p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ ) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $8548^{+237}_{-356}$ | $3.785^{+0.400}_{-0.075}$ | $-0.300^{+0.300}_{-0.350}$ | $2.976^{+0.562}_{-1.406}$ | $1.971^{+0.382}_{-0.466}$ | $0.105^{+0.371}_{-0.033}$                     |
|        | +3%/-4%              | +11%/-2%                  | +100%/-117%                | +19%/-47%                 | +19%/-24%                 | +353%/-31%                                    |
| Source | KIC0                 | 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 006470973-06 / KOI

| Detrend | Depth (ppm)   | $R_p$ ( $R_{\oplus}$ ) | $T_{max}$ (K)        | $T_{obs}$ (K)        | $A_{obs}$           |
|---------|---------------|------------------------|----------------------|----------------------|---------------------|
| DV      | $-162 \pm 29$ | $5.56^{+1.17}_{-1.42}$ | $1586^{+111}_{-175}$ | $6880^{+645}_{-605}$ | $275^{+194}_{-88}$  |
| Alt.    | $-284 \pm 67$ | $5.73^{+1.30}_{-1.26}$ | $1569^{+120}_{-162}$ | $7790^{+881}_{-730}$ | $443^{+305}_{-157}$ |

$T_{max}$  = 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

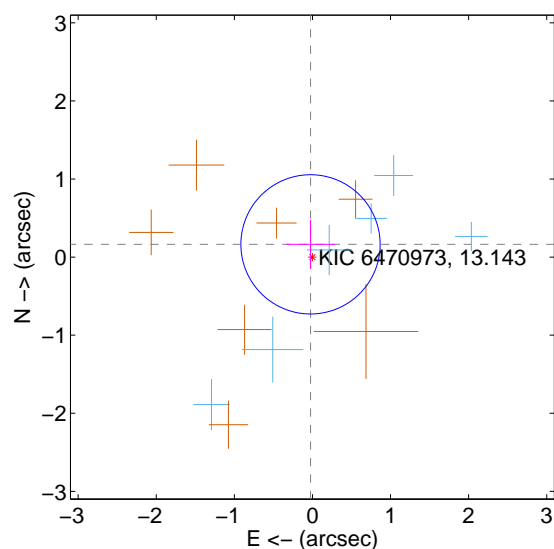
Supplemental centroid analysis for 006470973-06. Kepler magnitude: 13.14. Transit SNR 6.54

There are 6 quarters with good PRF difference image offsets

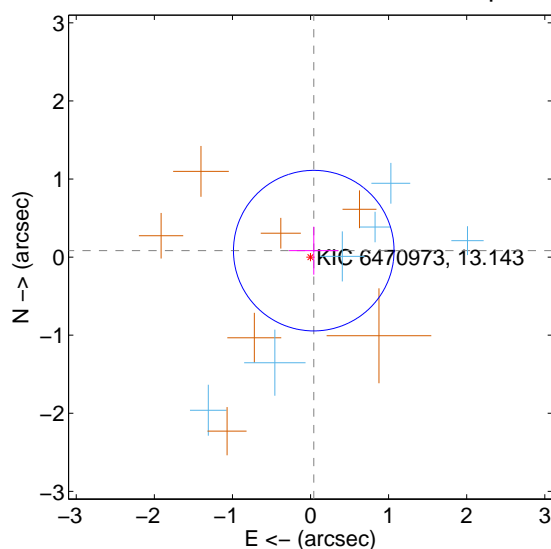
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA        | $\Delta$ Dec      |
|---|--------------------|---------------------|--------------------|-------------------|
| PRF-fit source offset from OOT          | $0.165 \pm 0.297$  | 0.56                | $0.025 \pm 0.310$  | $0.163 \pm 0.313$ |
| PRF-fit source offset from KIC position | $0.092 \pm 0.343$  | 0.27                | $-0.041 \pm 0.318$ | $0.083 \pm 0.307$ |
| photometric centroid source offset      | $0.86 \pm 0.57$    | 1.50                | $-0.68 \pm 0.62$   | $-0.52 \pm 0.48$  |

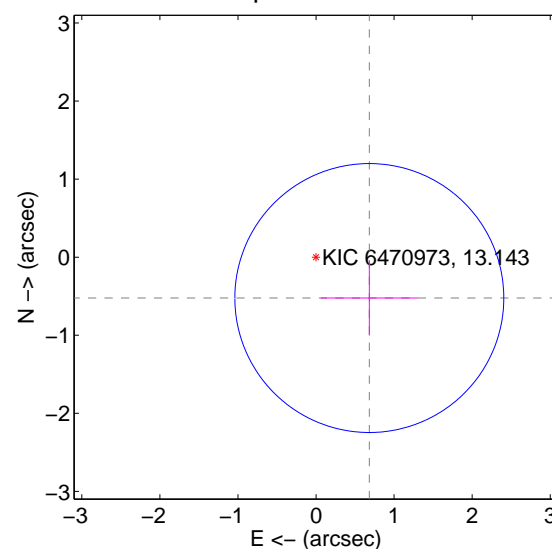
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



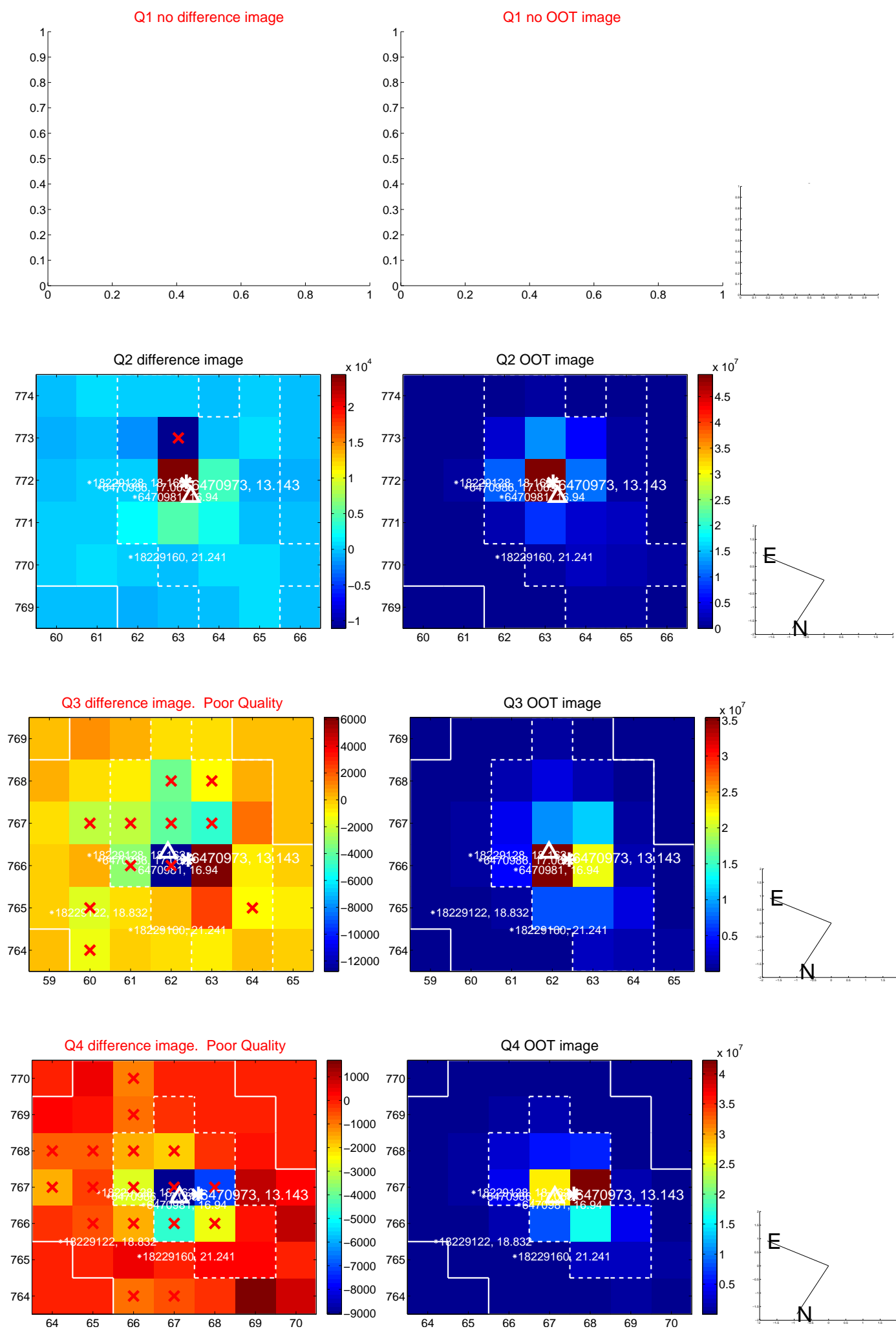
offset from photometric centroids



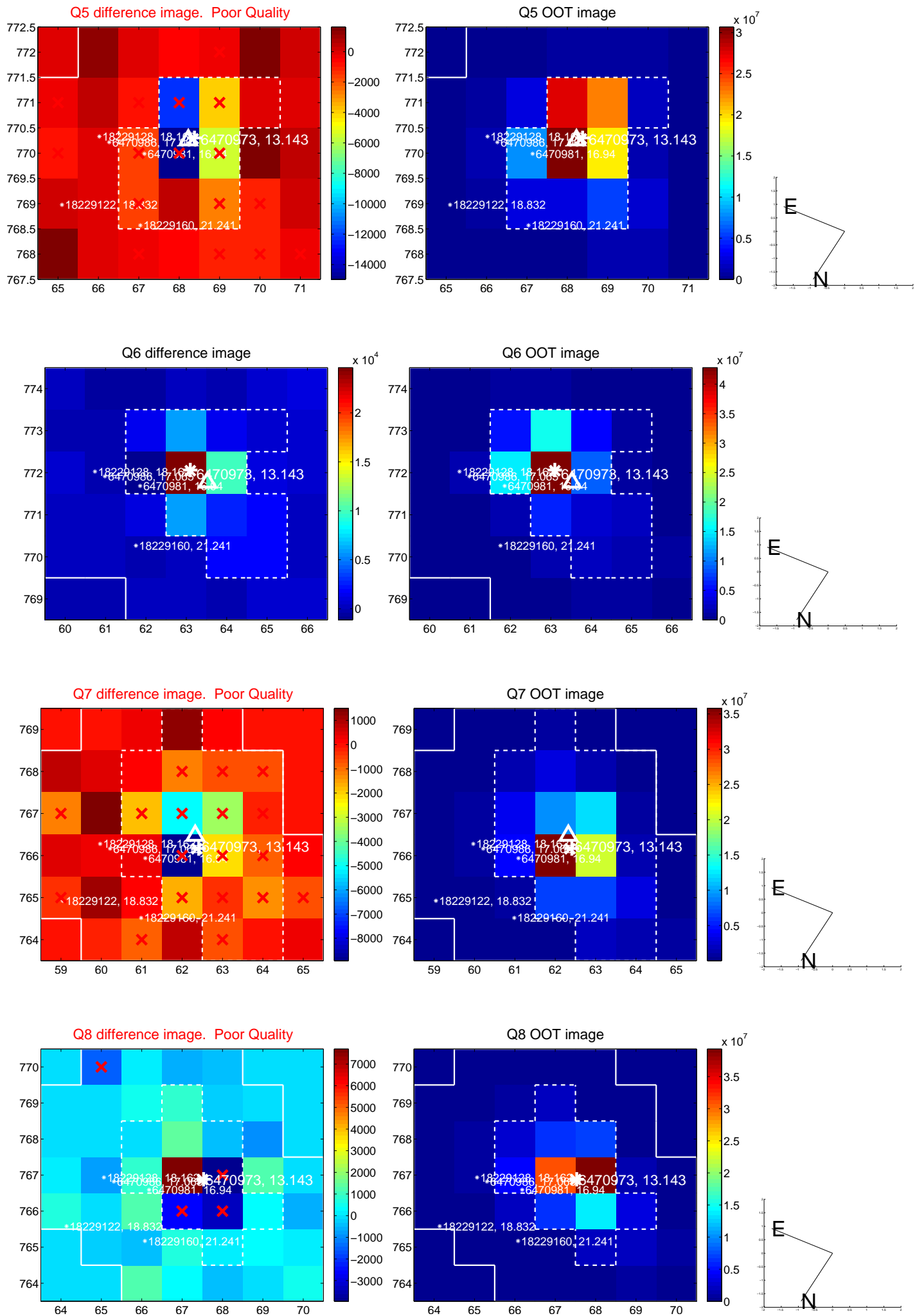
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



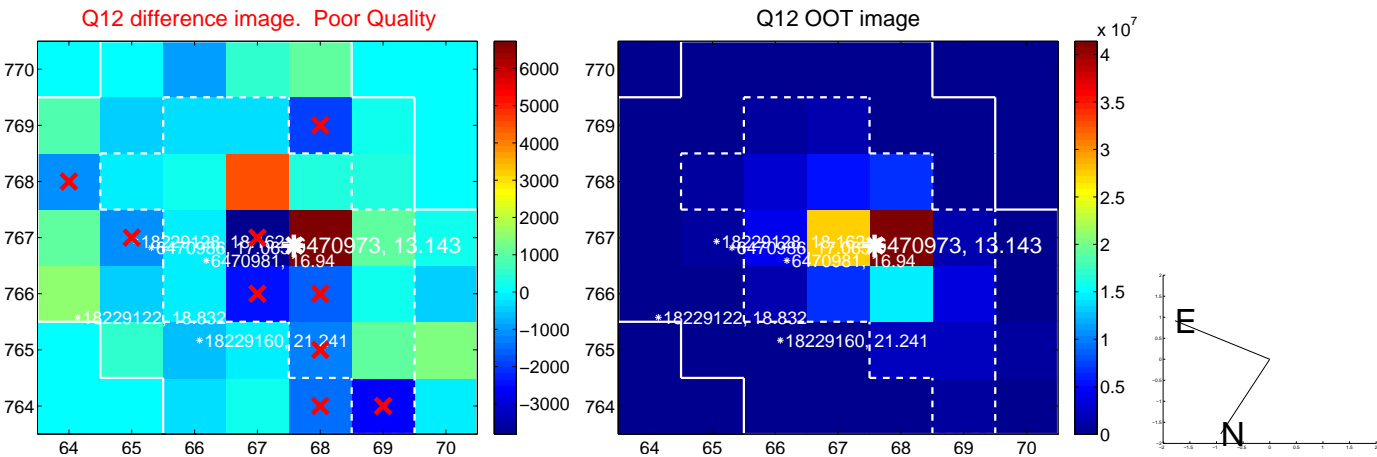
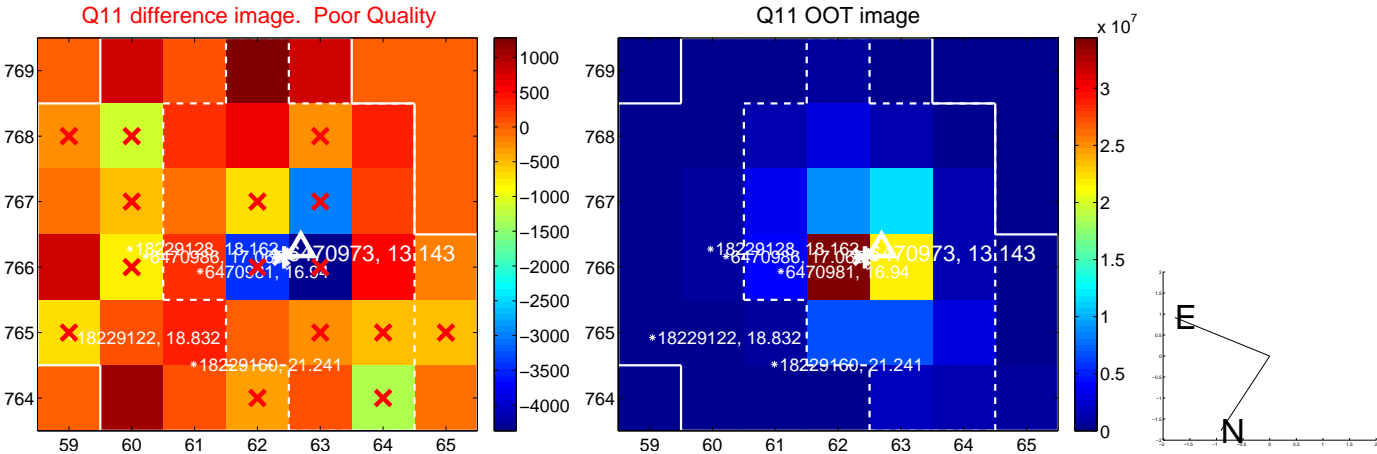
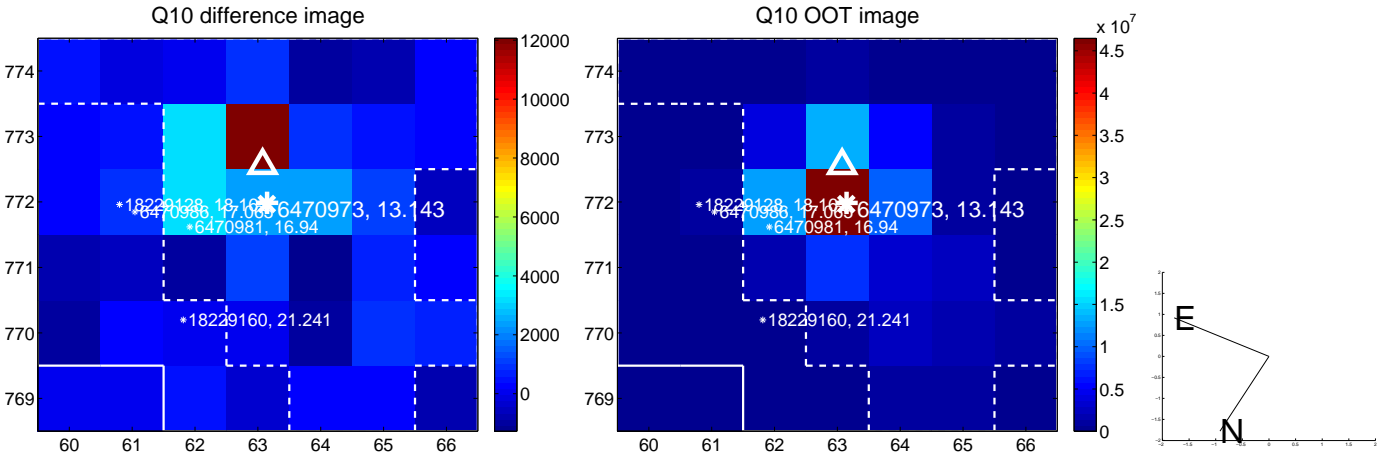
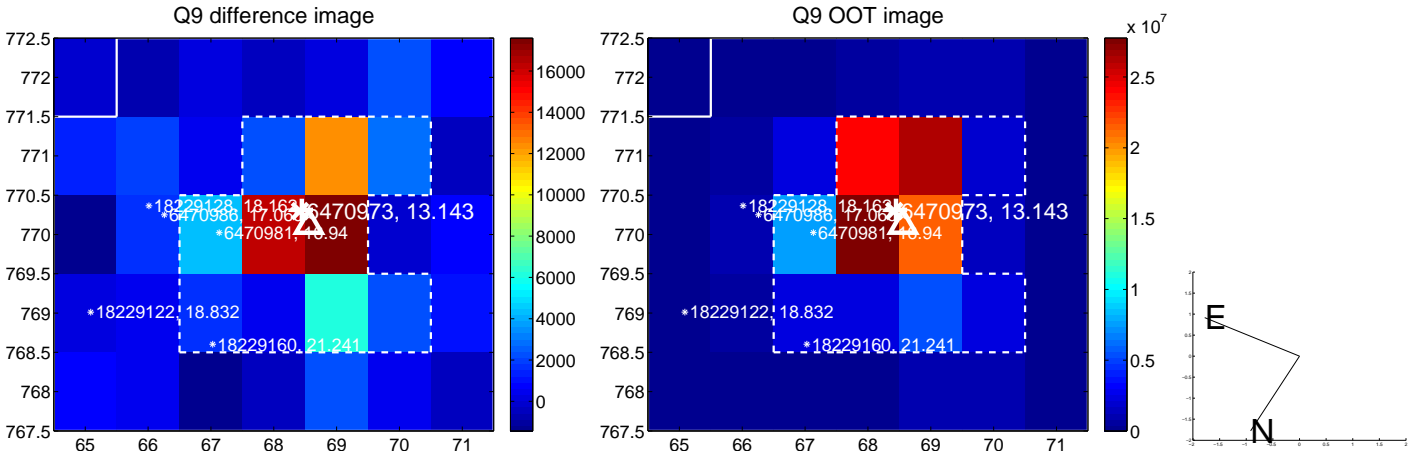
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



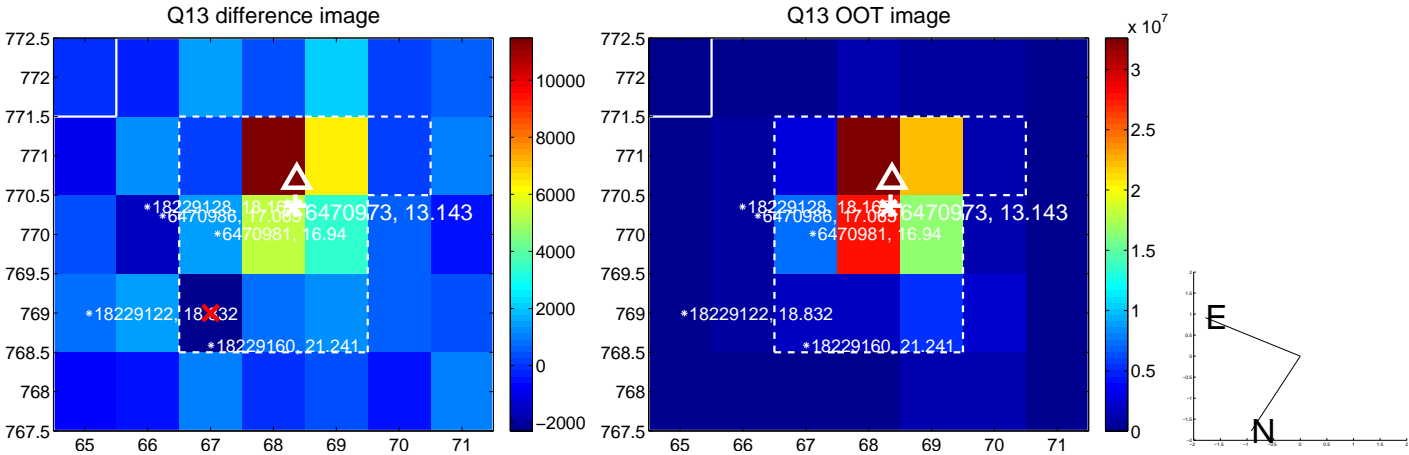
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



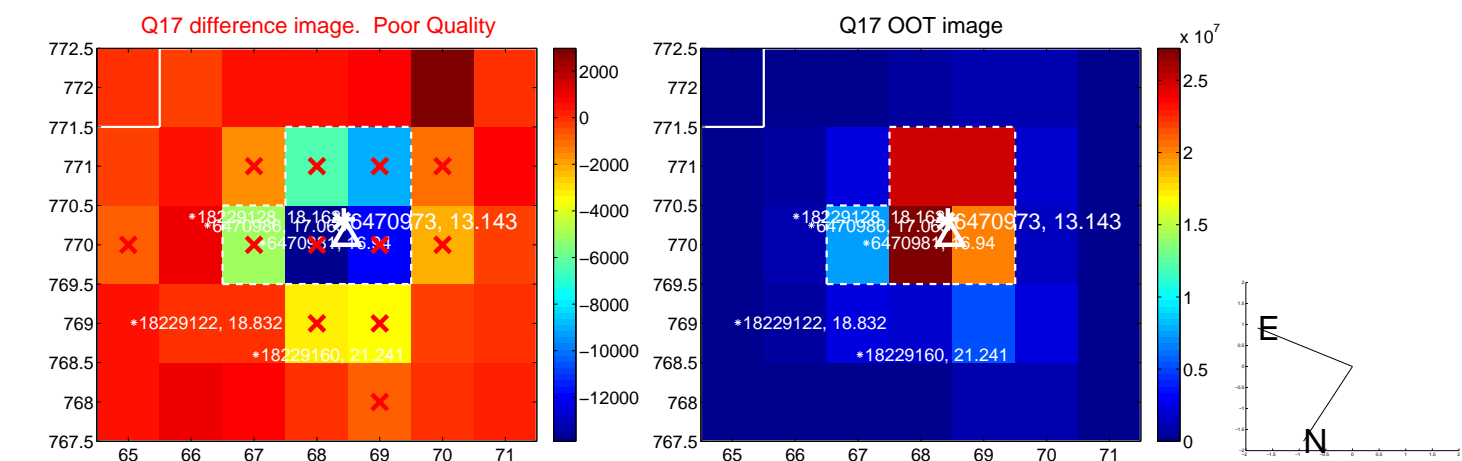
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



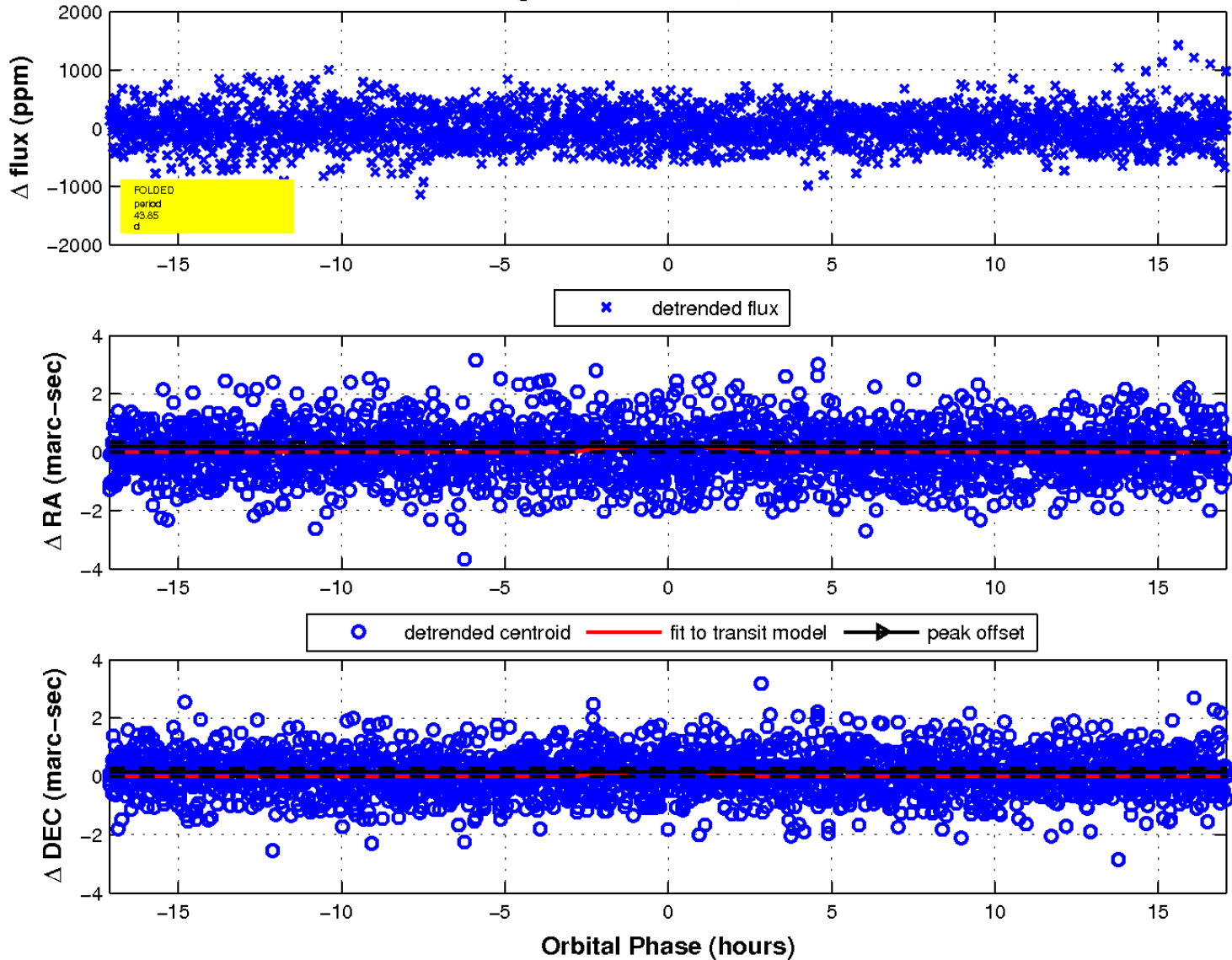
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



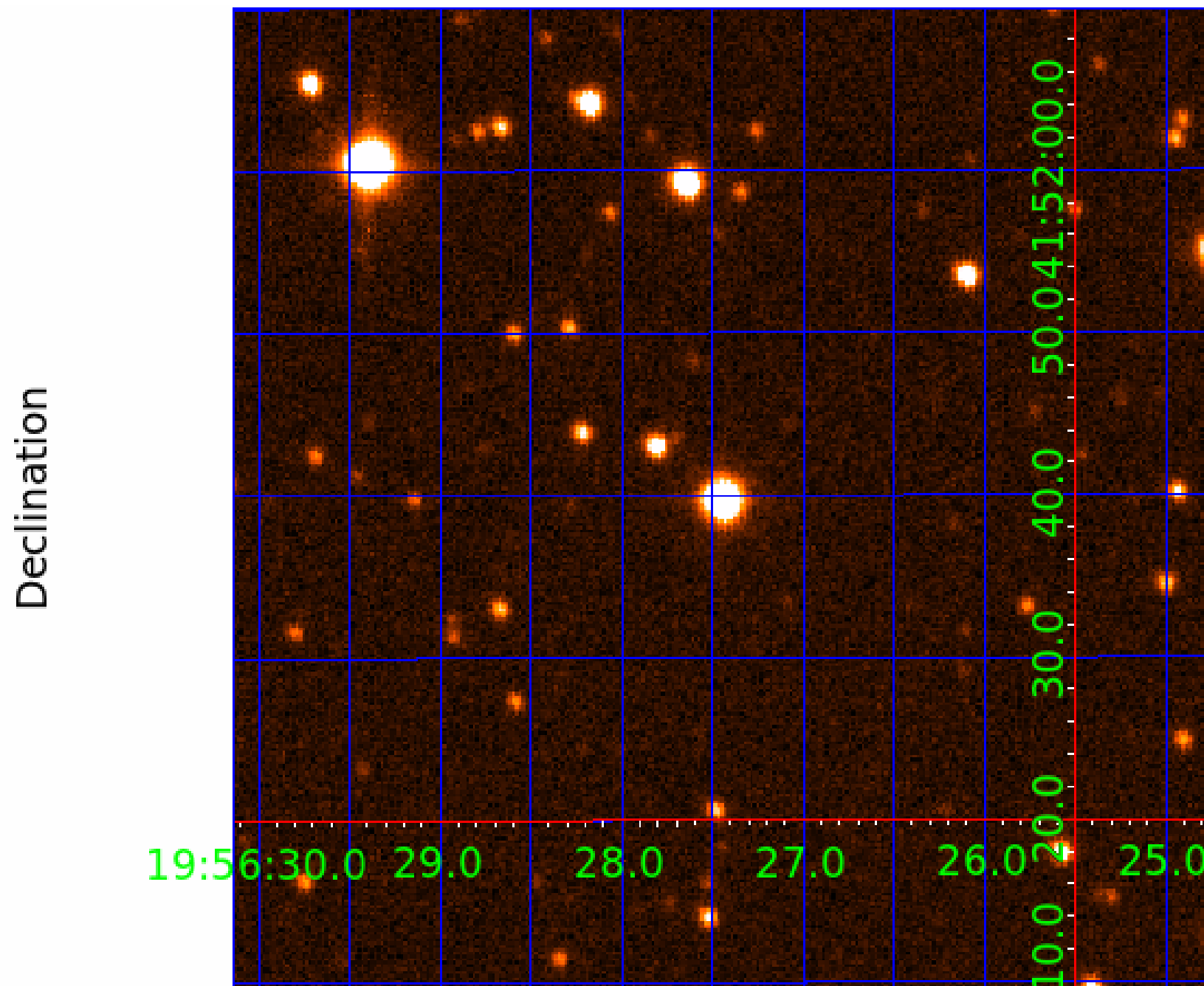
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 6 of 9



UKIRT Image



# KIC 006470973

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 006470973-01 | OBS      | No   | 0.509313      | 131.708781   | 35.2        | 1.285            | 10.2 | 9.8  | 2.98                        | 8548            | 1.84                   | 173032.50              |
| 006470973-02 | OBS      | No   | 1.507014      | 132.863868   | 43.9        | 7.686            | 8.8  | 8.7  | 2.98                        | 8548            | 2.22                   | 40733.45               |
| 006470973-03 | OBS      | No   | 68.595946     | 135.604533   | 305.4       | 10.291           | 12.3 | 7.5  | 2.98                        | 8548            | 5.83                   | 250.64                 |
| 006470973-04 | OBS      | No   | 95.200506     | 157.793112   | 760.5       | 7.481            | 11.1 | 9.5  | 2.98                        | 8548            | 10.09                  | 161.90                 |
| 006470973-05 | OBS      | No   | 43.824577     | 173.397932   | 266.9       | 11.025           | 9.9  | 7.4  | 2.98                        | 8548            | 5.20                   | 455.50                 |
| 006470973-06 | OBS      | No   | 43.851912     | 174.379270   | 265.5       | 5.706            | 9.4  | 6.5  | 2.98                        | 8548            | 5.91                   | 455.12                 |
| 006470973-07 | OBS      | No   | 96.994995     | 218.805364   | 538.8       | 4.480            | 9.0  | 9.0  | 2.98                        | 8548            | 7.65                   | 157.92                 |
| 006470973-09 | OBS      | No   | 203.109072    | 227.259250   | 243.1       | 6.000            | 8.5  | -1.0 | 2.98                        | 8548            | 4.71                   | 58.95                  |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 006470973-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT   |
| 006470973-02 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT   |
| 006470973-03 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT  |
| 006470973-04 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS |
| 006470973-05 | 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   |
| 006470973-06 | OBS      | FP   | 0.00  | 1 | 0 | 1 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—HALO_GHOST                        |
| 006470973-07 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT  |
| 006470973-09 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—CENT_NOFITS   |

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

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

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

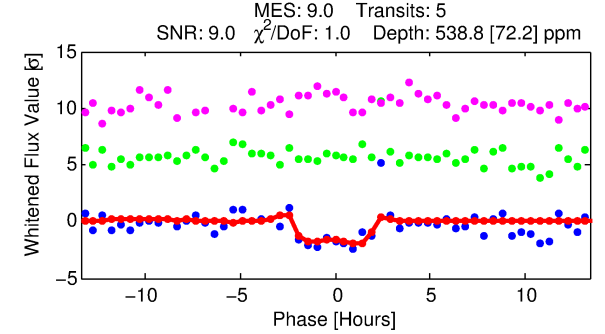
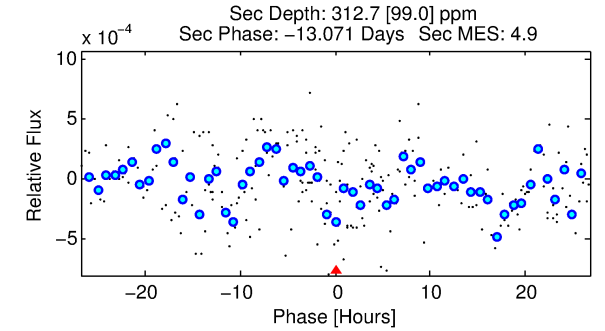
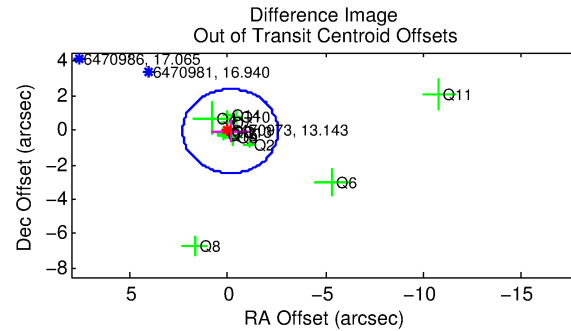
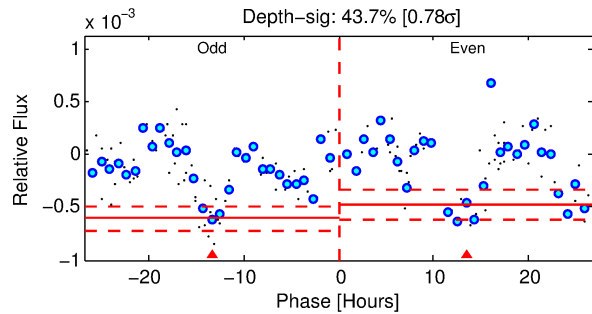
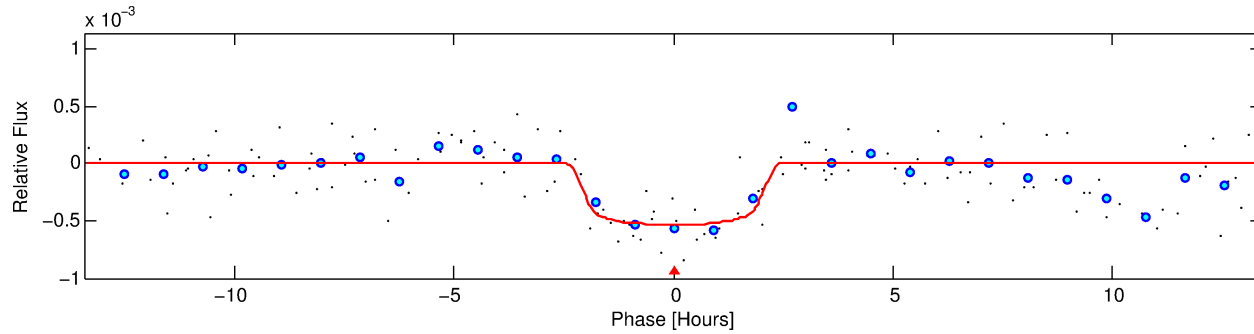
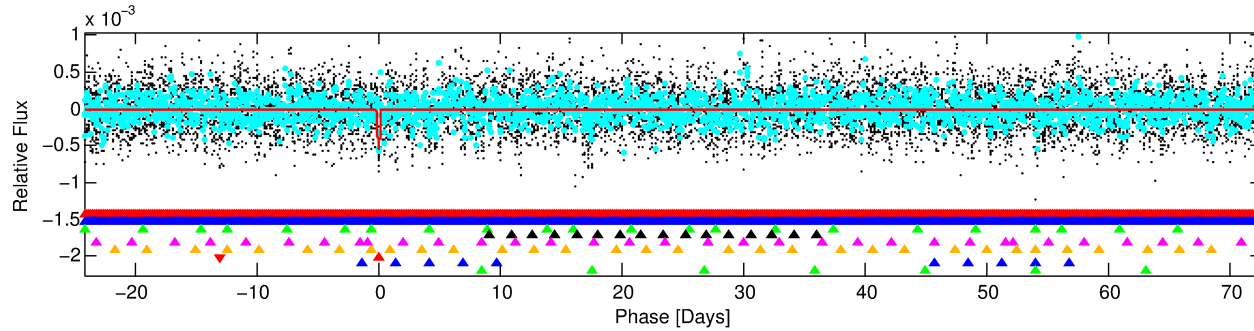
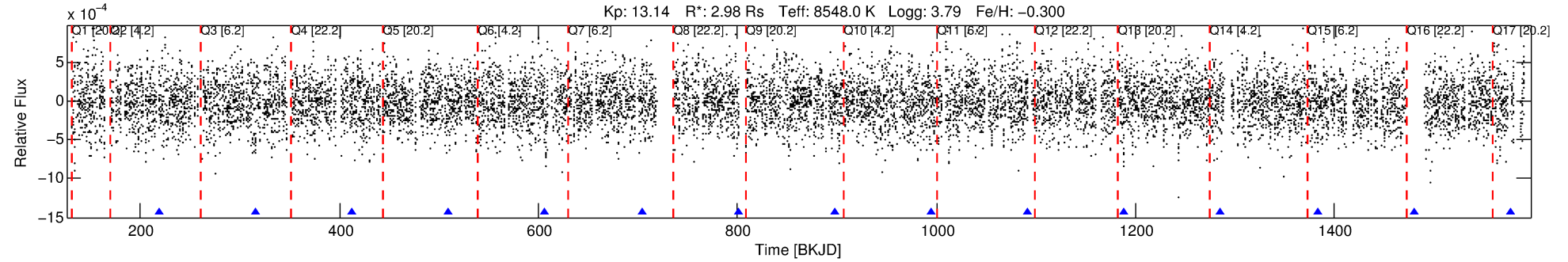
Ephemeris Match Information For 006470973-07

No Significant Match Found



# DV One-Page Summary

KIC: 6470973 Candidate: 7 of 9 Period: 96.995 d



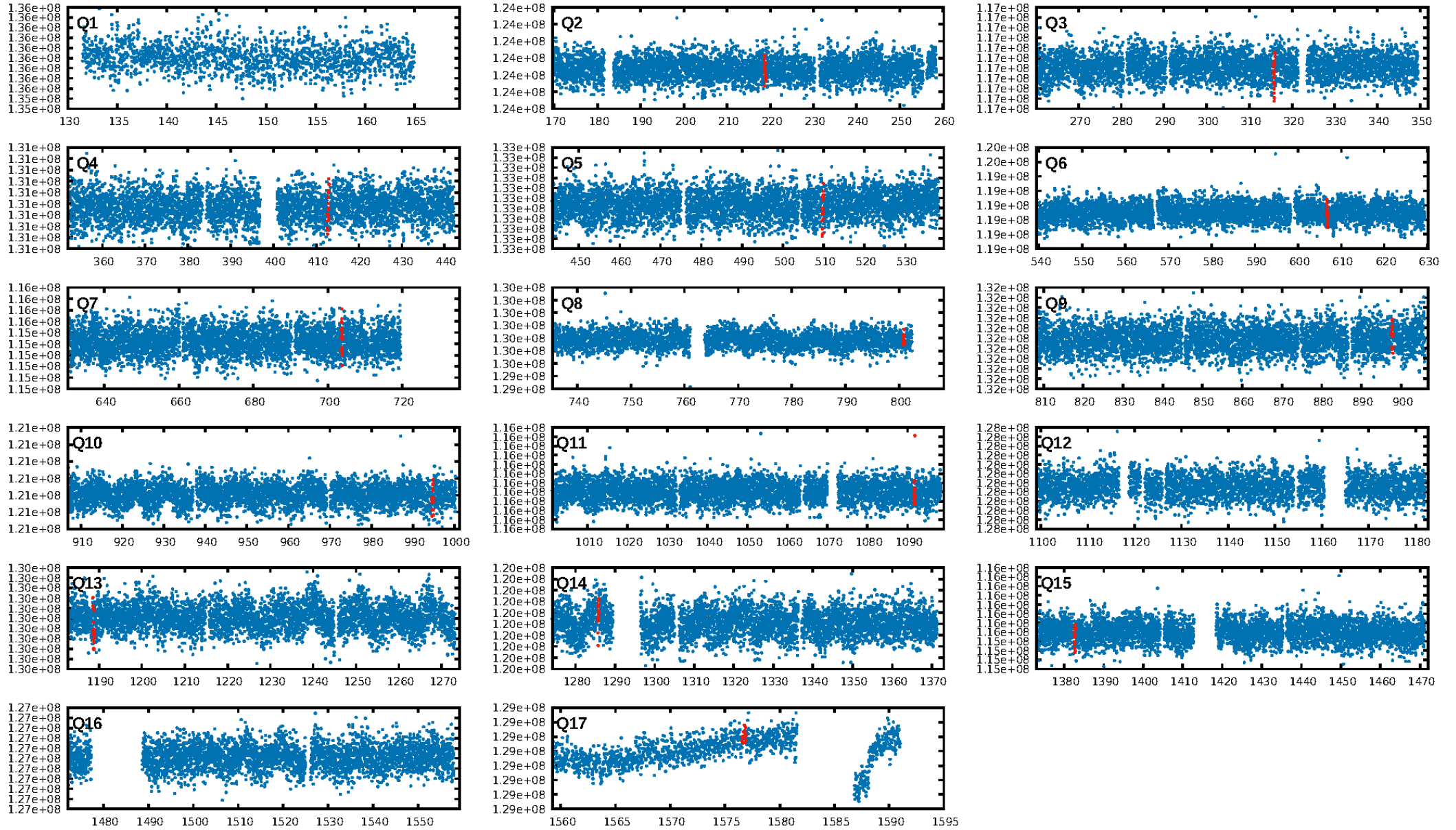
## DV Fit Results:

Period = 96.99500 [0.00158] d  
Epoch = 218.8054 [0.0104] BKJD  
Rp/R\* = 0.0236 [0.0173]  
a/R\* = 103.35 [476.52]  
b = 0.81 [1.97]  
Seff = 157.92 [112.11]  
Teff = 904 [160] K  
Rp = 7.65 [6.68] Re  
a = 0.5179 [0.2278] AU  
Ag = 788.31 [1303.06] [0.60 $\sigma$ ]  
Teffp = 7405 [2798] K [2.32 $\sigma$ ]

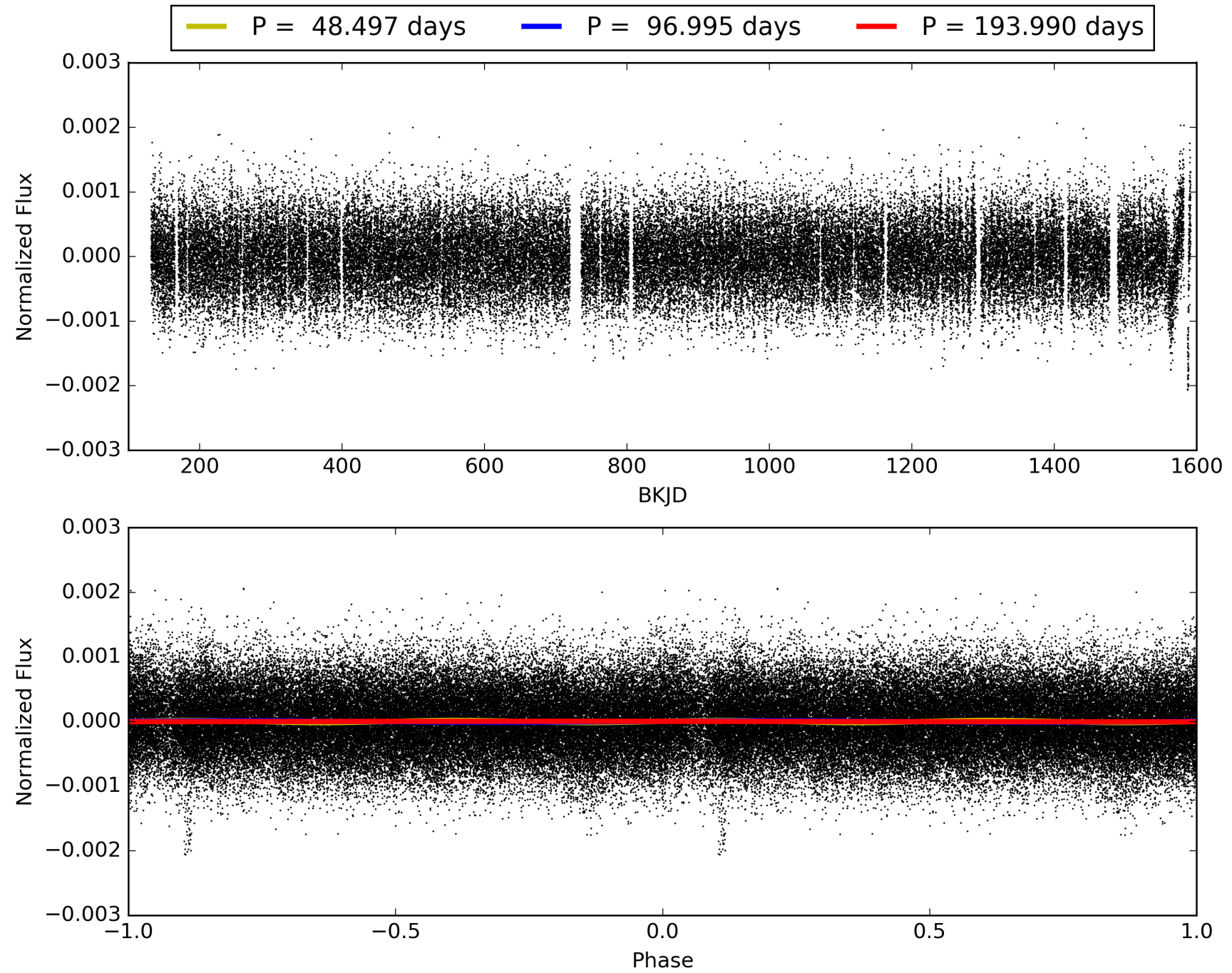
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [4.94 $\sigma$ ]  
LongPeriod-sig: 100.0% [141.84 $\sigma$ ]  
ModelChiSquare2-sig: 10.5%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: -2.756  
Centroid-sig: 1.4%  
Centroid-so: 0.704 arcsec [1.80 $\sigma$ ]  
OotOffset-rm: 0.150 arcsec [0.19 $\sigma$ ]  
KicOffset-rm: 0.249 arcsec [0.34 $\sigma$ ]  
OotOffset-st: 4/4/2/3 [13]  
KicOffset-st: 4/4/2/3 [13]  
DiffImageQuality-fgm: 0.38 [5/13]  
DiffImageOverlap-fno: 0.00 [0/14]

# TCE 006470973-07, PDC Light Curves

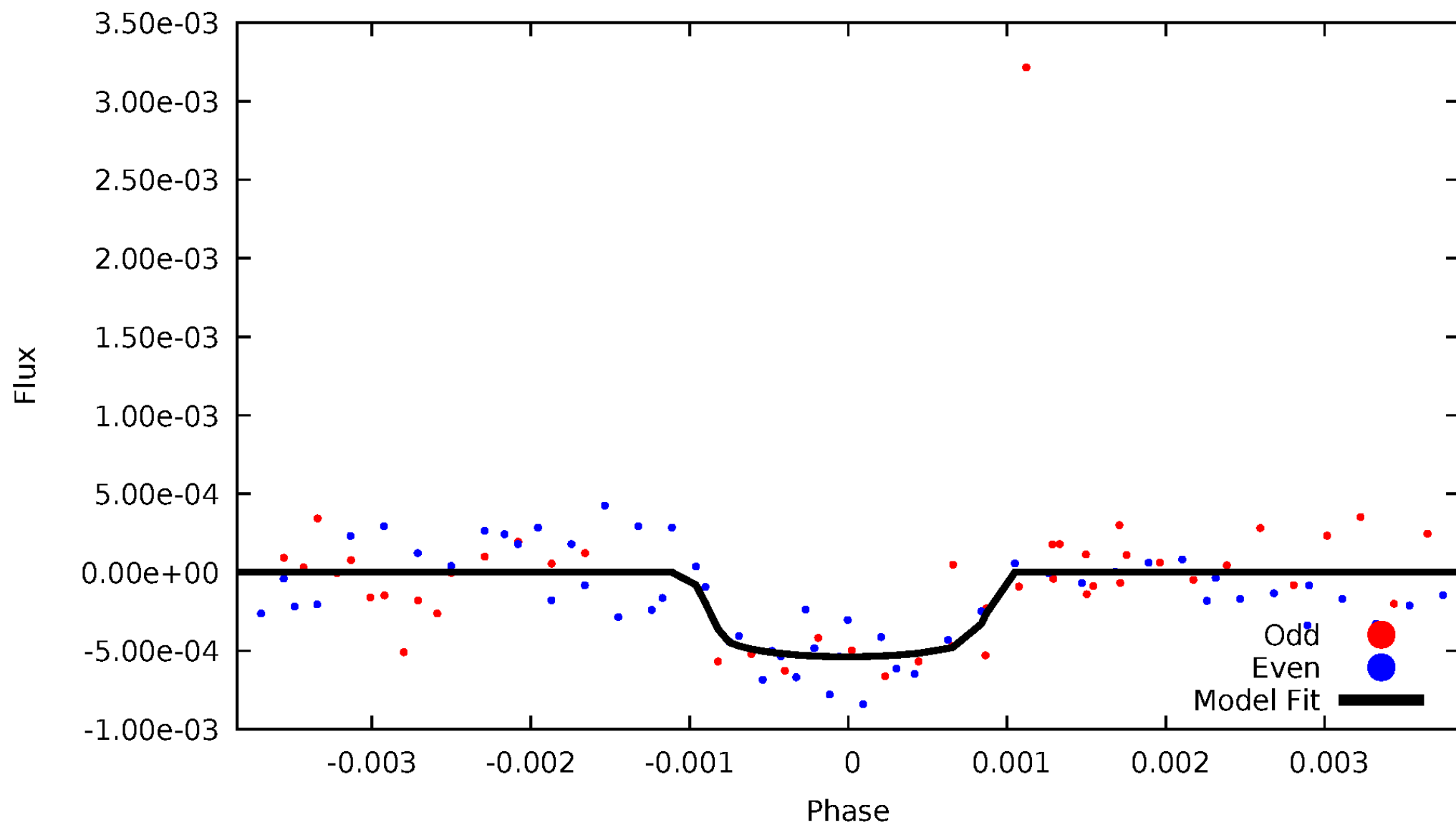


TCE 006470973-07



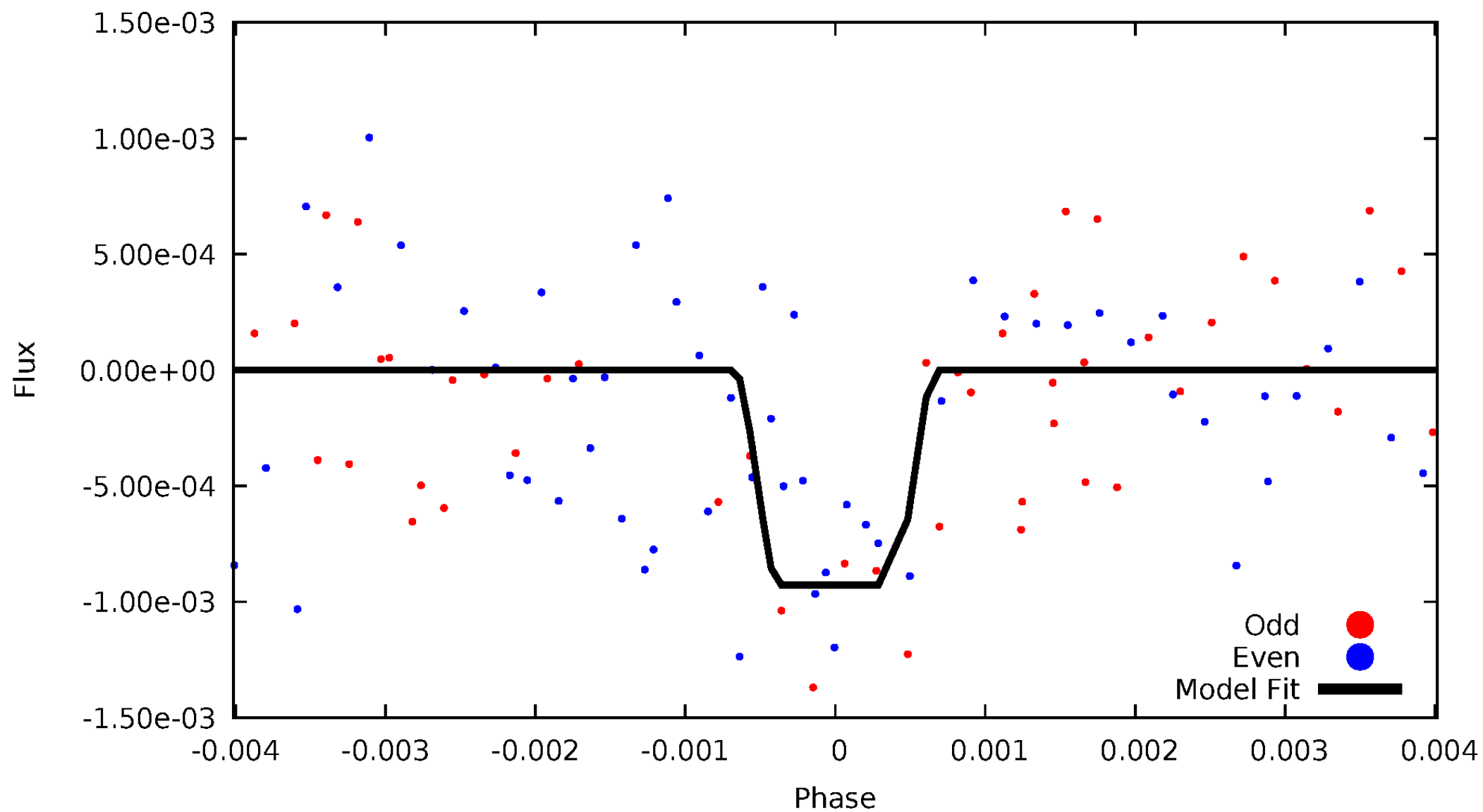
# DV Odd/Even

TCE 006470973-07



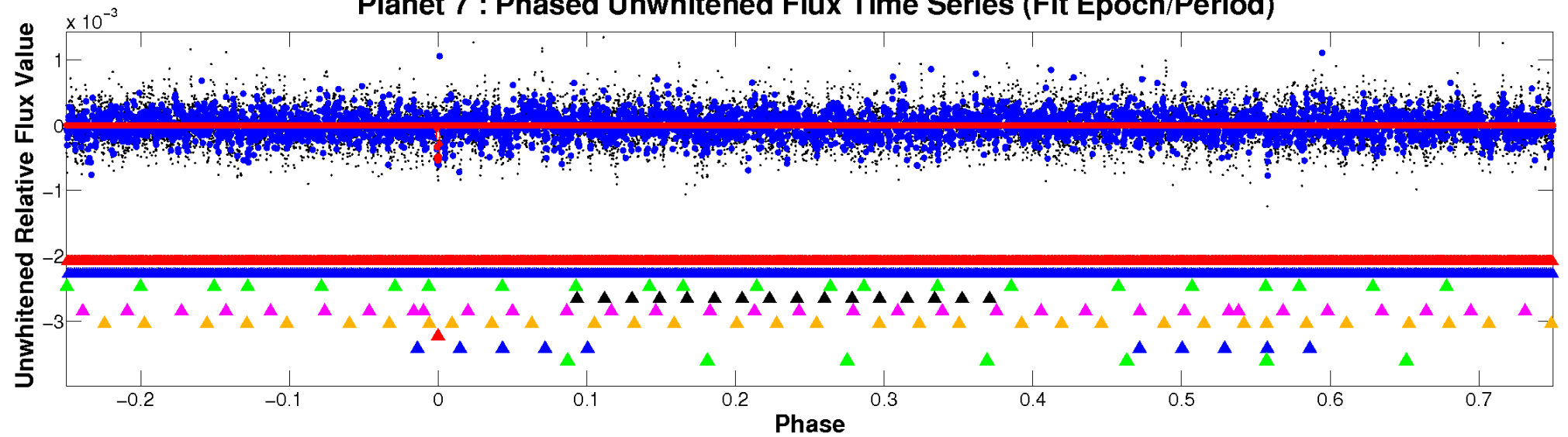
# ALT Odd/Even

TCE 006470973-07

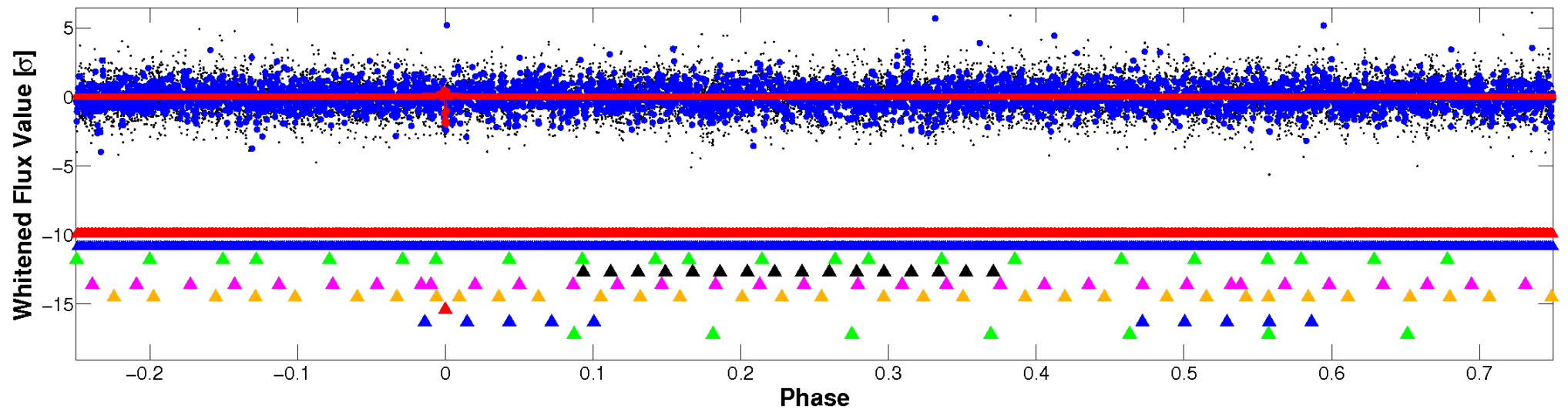


# Non-Whitened Vs. Whitened Light Curve

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

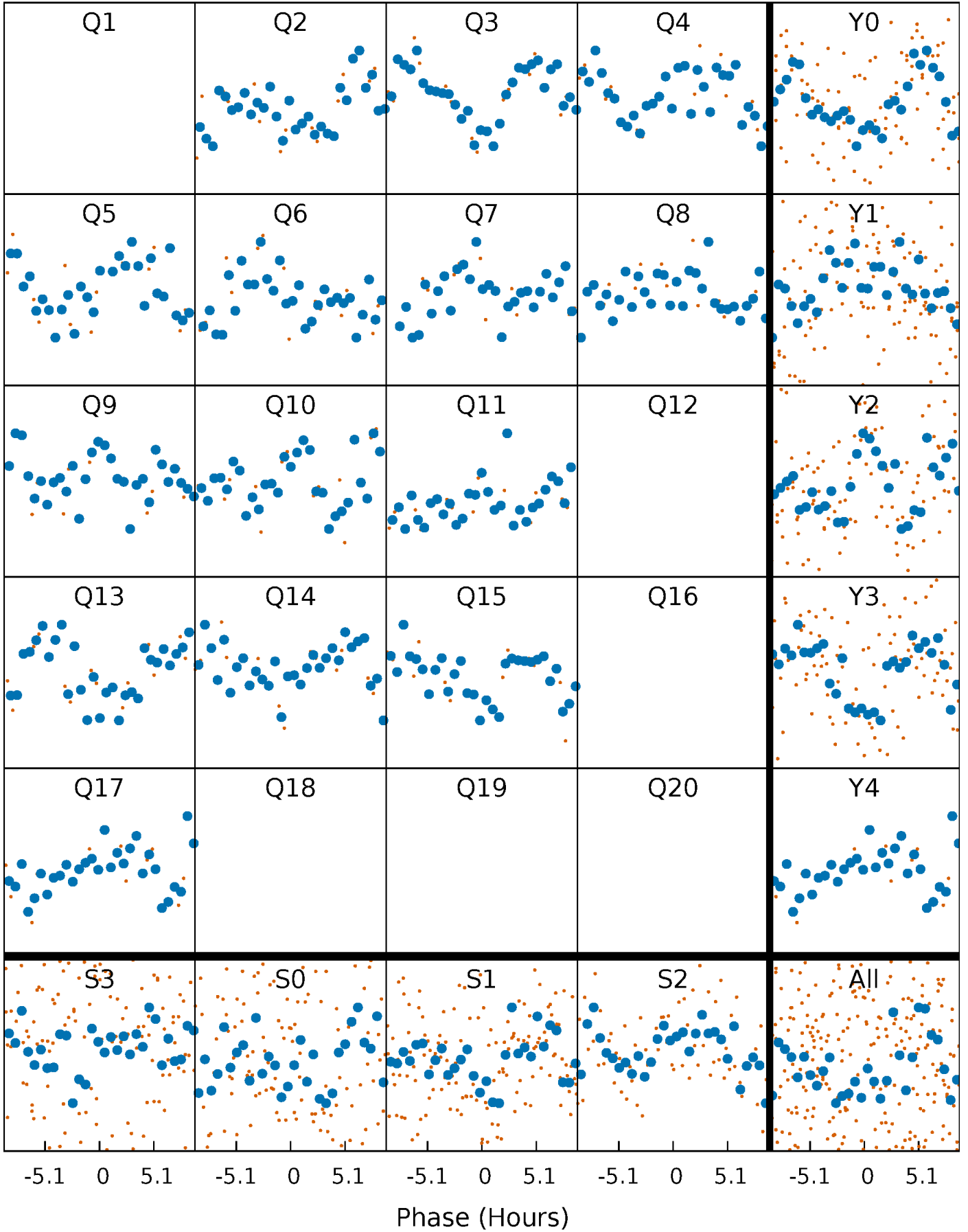


Planet 7 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

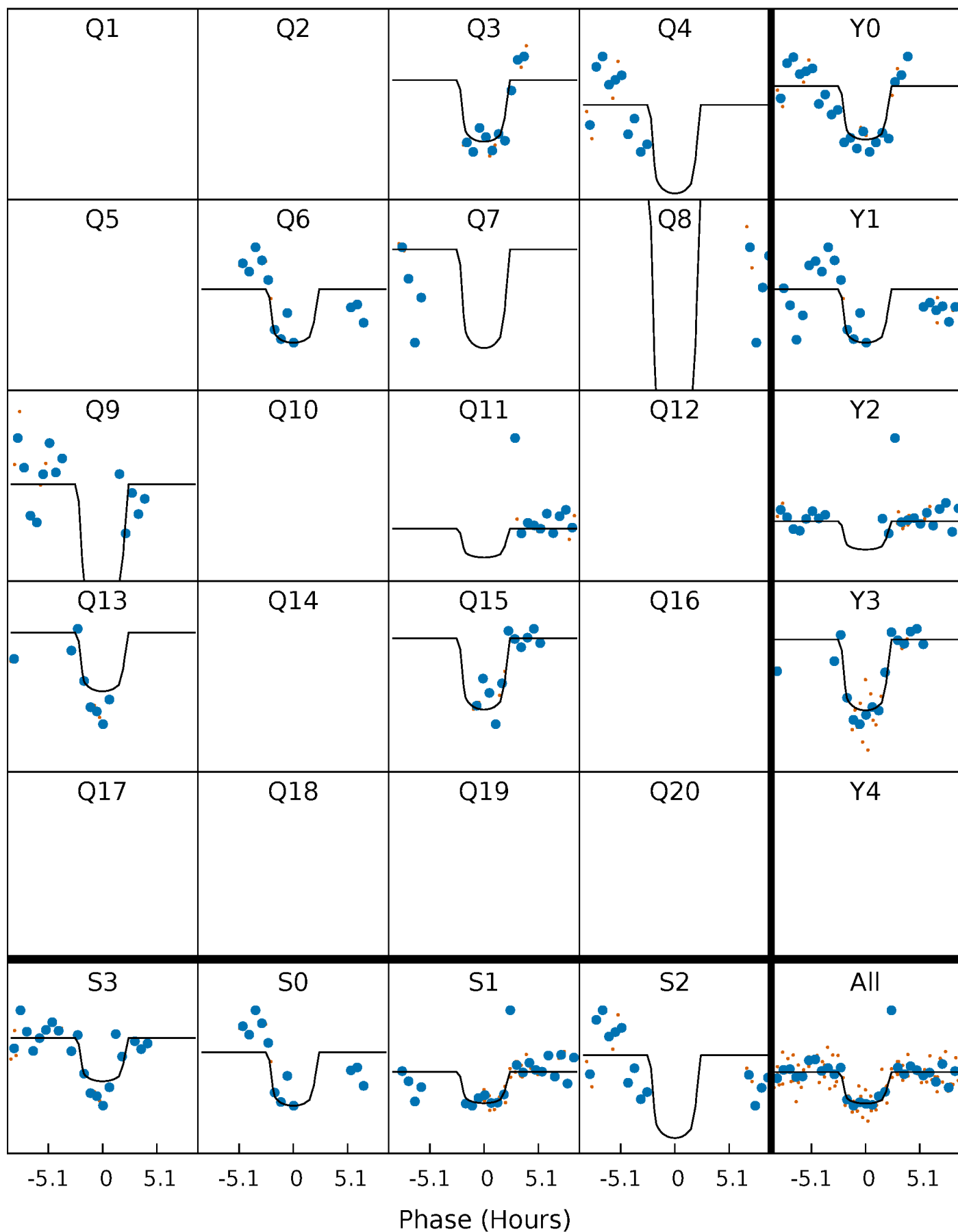
TCE 006470973-07    P= 96.994995 Days     $T_0=218.805364$  (BKJD)





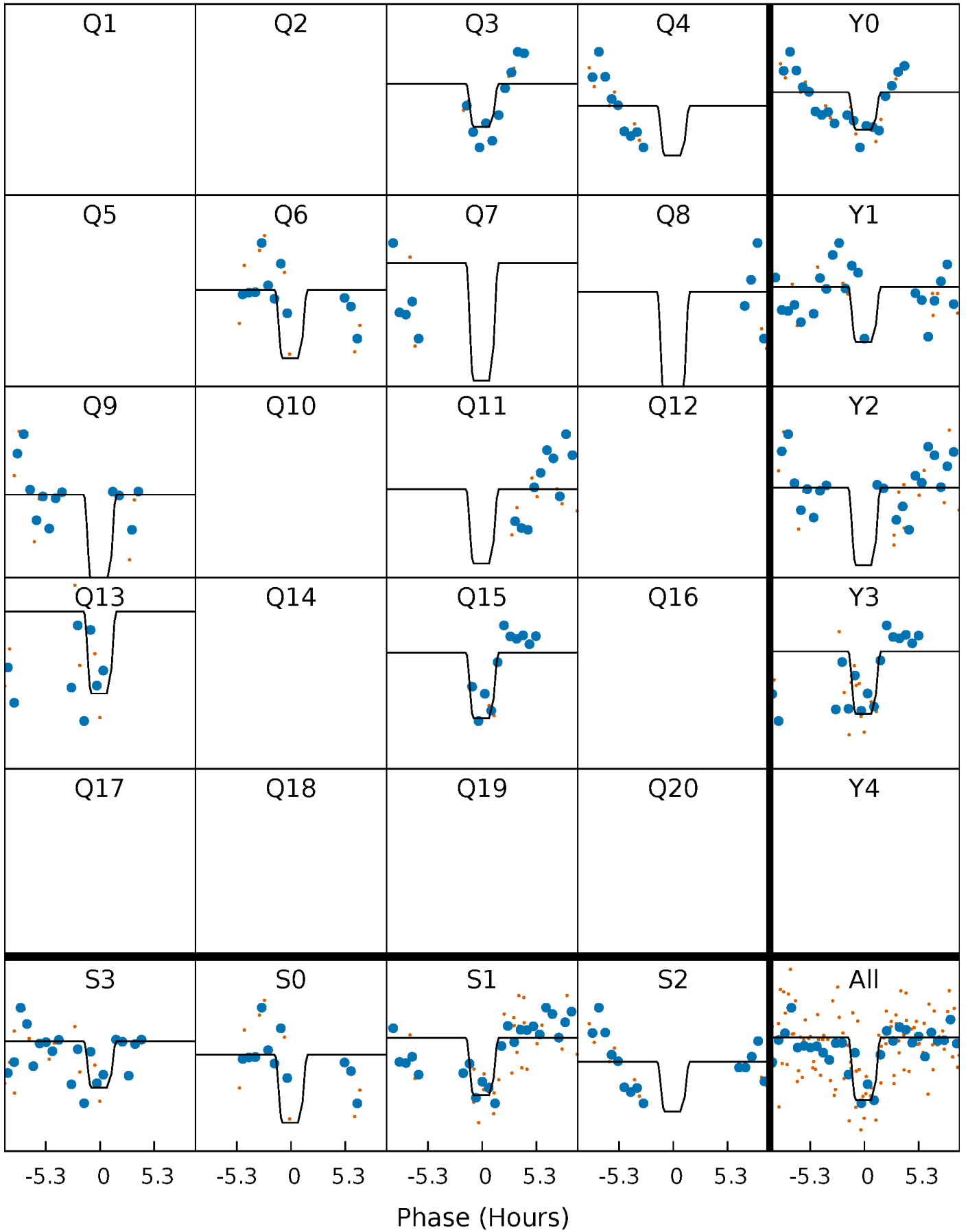
# DV Quarter-Phased Transit Curves

TCE 006470973-07    P= 96.994995 Days     $T_0=218.805364$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

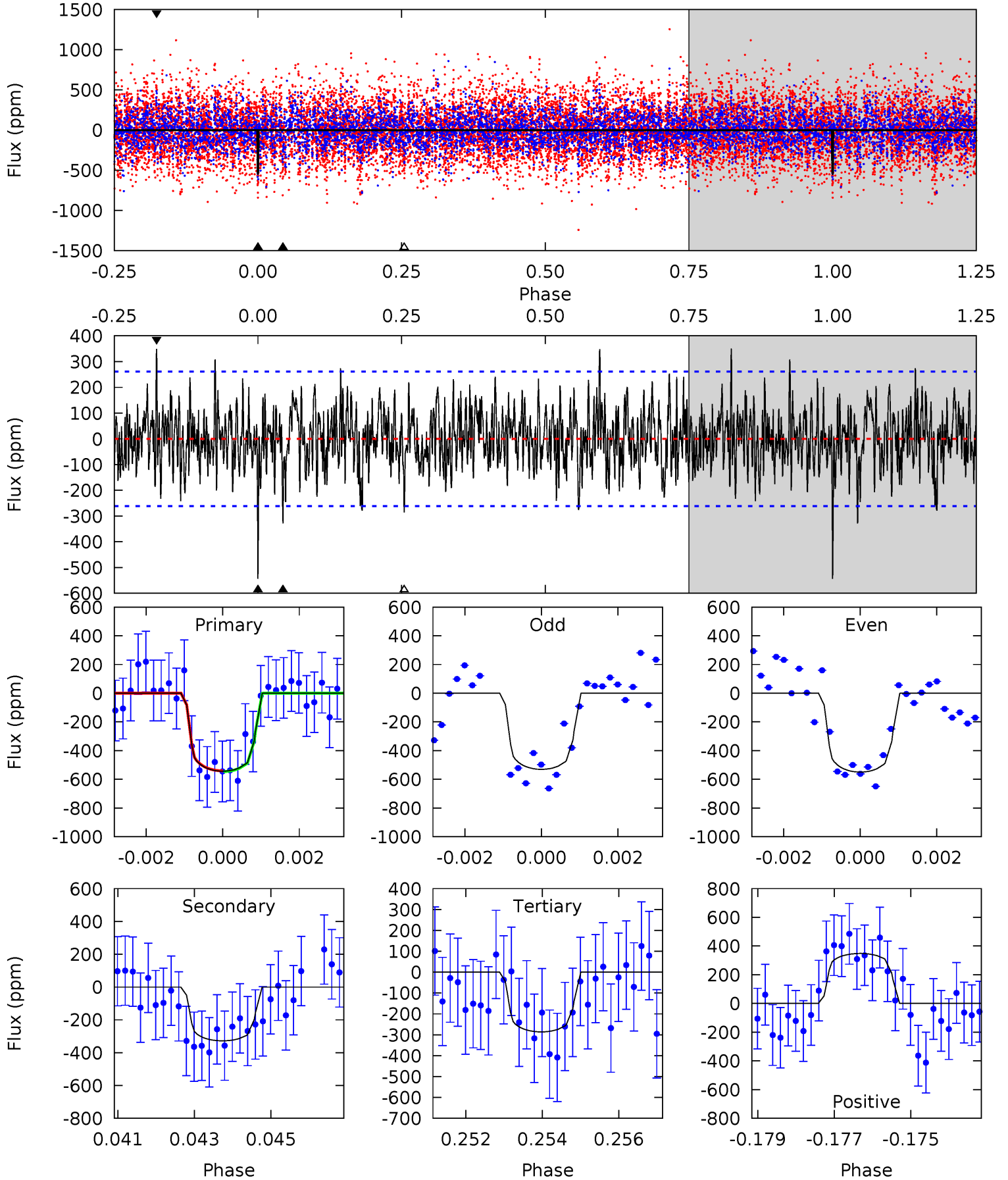
TCE 006470973-07     $P = 96.996506$  Days     $T_0 = 218.799856$  (BKJD)



# DV Model-Shift Uniqueness Test

006470973-07, P = 96.994995 Days, E = 121.810369 Days

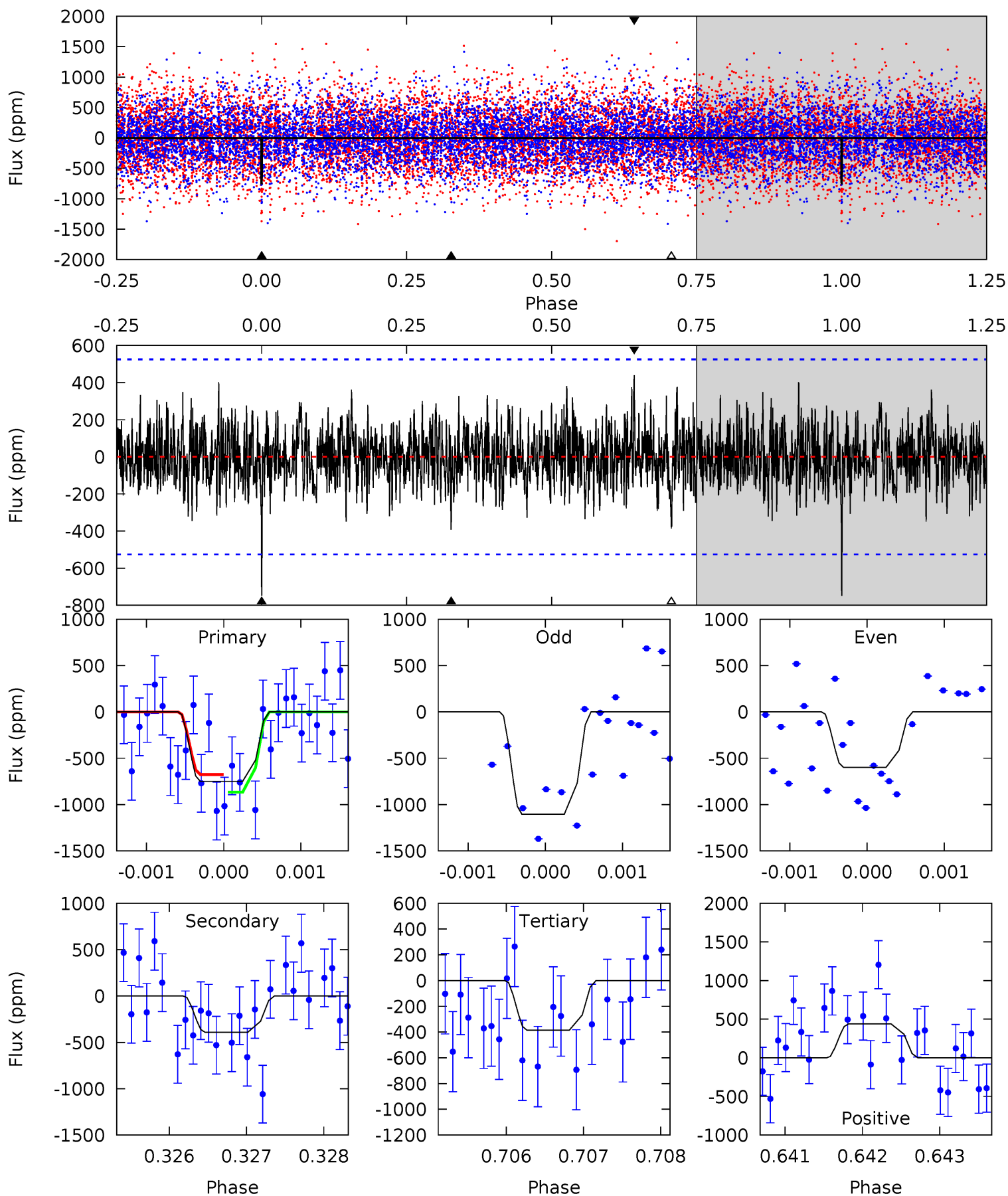
| Pri  | Sec  | Ter  | Pos  | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 11.1 | 6.68 | 5.83 | 7.09 | 5.32            | 3.09            | 1.99             | 5.24    | 3.97    | 0.85    | -0.42   | 0.19    | 0.95 | 0.39  | 0.05 |



# Alt Model-Shift Uniqueness Test

006470973-07, P = 96.996506 Days, E = 121.803350 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  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 7.73 | 4.05 | 3.98 | 4.53 | 5.42            | 3.24            | 1.23             | 3.75    | 3.19    | 0.07    | -0.49   | 2.34    | 0.94 | 0.37  | 0.95 |



### Stellar Parameters For KIC 006470973

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R$ ( $R_{\odot}$ )       | $M(M_{\odot})$            | $p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ ) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $8548^{+237}_{-356}$ | $3.785^{+0.400}_{-0.075}$ | $-0.300^{+0.300}_{-0.350}$ | $2.976^{+0.562}_{-1.406}$ | $1.971^{+0.382}_{-0.466}$ | $0.105^{+0.371}_{-0.033}$                     |
|        | +3%/-4%              | +11%/-2%                  | +100%/-117%                | +19%/-47%                 | +19%/-24%                 | +353%/-31%                                    |
| Source | KIC0                 | 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 006470973-07 / KOI

| Detrend | Depth (ppm)   | $R_p$ ( $R_{\oplus}$ ) | $T_{\text{max}}$ (K) | $T_{\text{obs}}$ (K)   | $A_{\text{obs}}$     |
|---------|---------------|------------------------|----------------------|------------------------|----------------------|
| DV      | $-328 \pm 49$ | $7.73^{+5.44}_{-4.59}$ | $1217^{+84}_{-135}$  | $6772^{+5794}_{-1446}$ | $825^{+4043}_{-538}$ |
| Alt.    | $-392 \pm 97$ | $8.94^{+6.33}_{-4.79}$ | $1219^{+84}_{-145}$  | $6504^{+3671}_{-1334}$ | $703^{+2638}_{-453}$ |

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature  
 $T_{\text{obs}}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )  
 $A_{\text{obs}}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{\text{obs}} \gg T_{\text{max}}$  AND  $A_{\text{obs}} \gg 1.0$

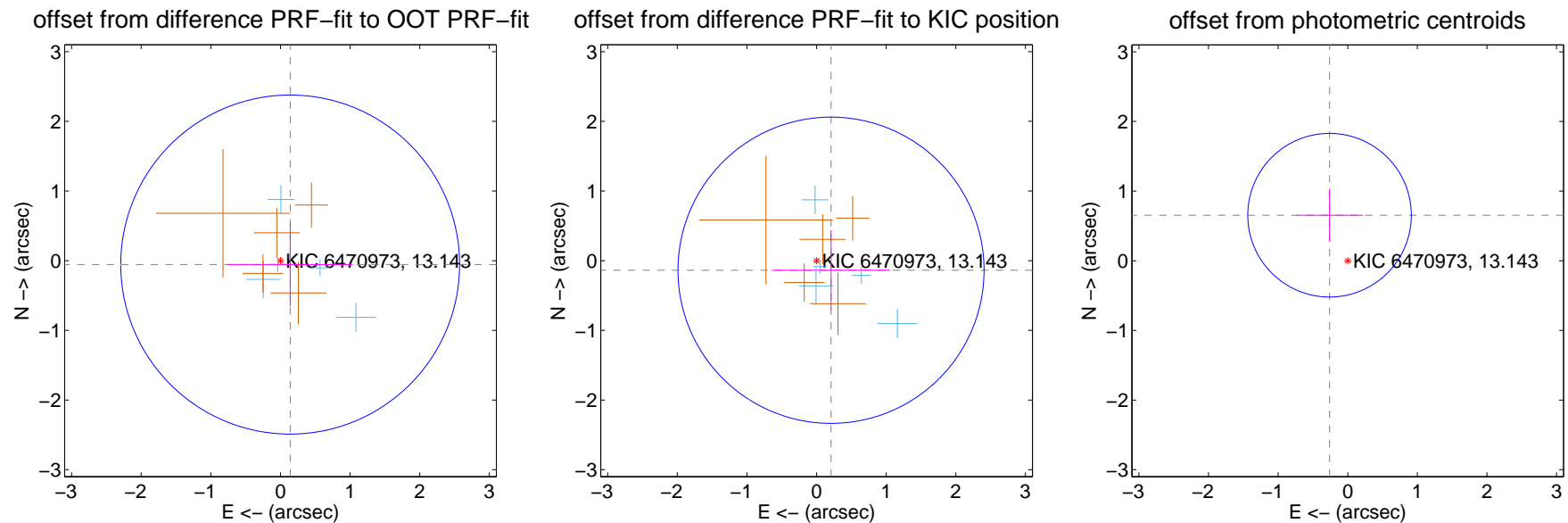
## DV Centroid Data

Supplemental centroid analysis for 006470973-07. Kepler magnitude: 13.14. Transit SNR 8.99

There are 5 quarters with good PRF difference image offsets

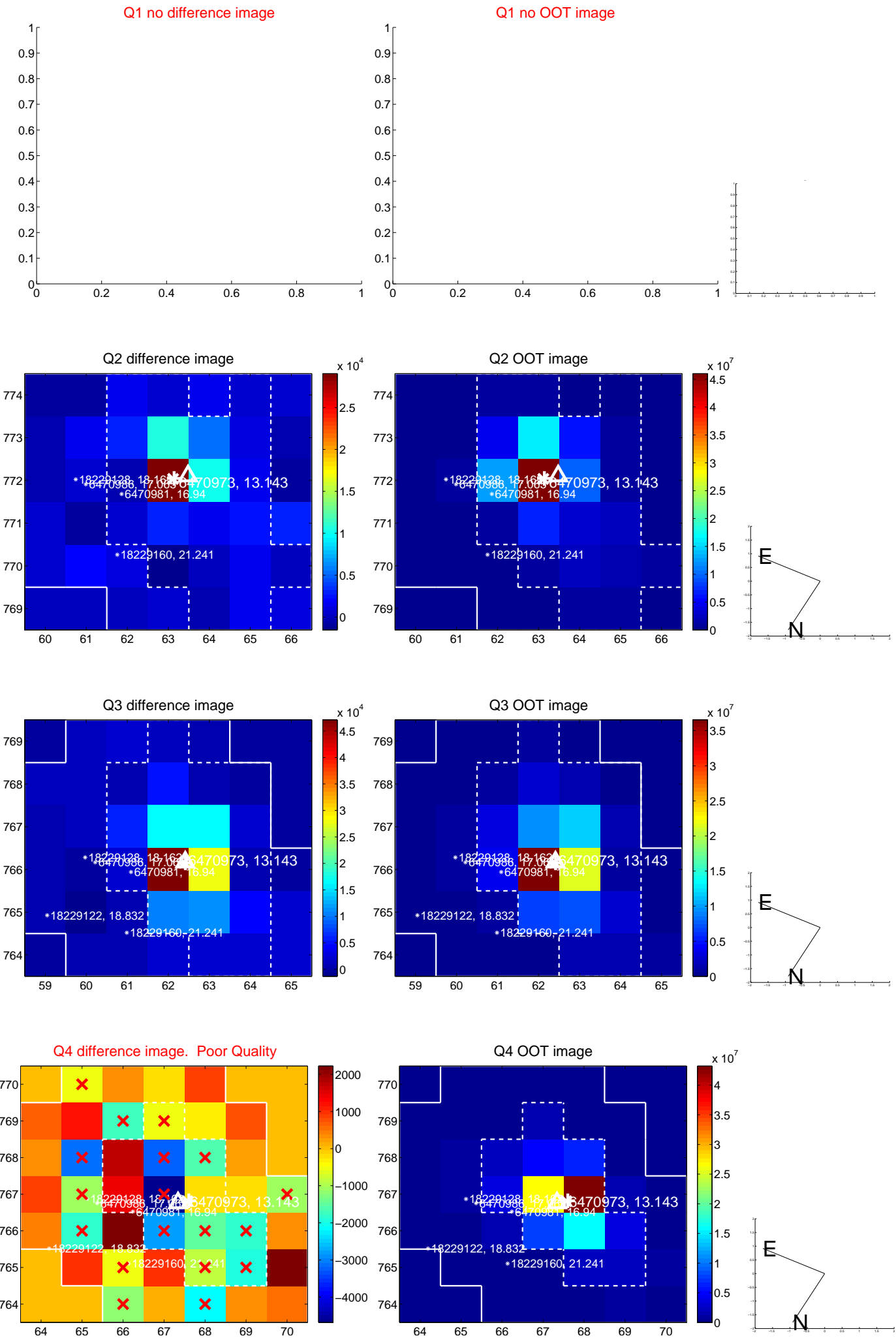
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA        | $\Delta$ Dec       |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT          | $0.150 \pm 0.811$  | 0.19                | $-0.140 \pm 0.899$ | $-0.056 \pm 0.598$ |
| PRF-fit source offset from KIC position | $0.249 \pm 0.733$  | 0.34                | $-0.207 \pm 0.848$ | $-0.137 \pm 0.575$ |
| photometric centroid source offset      | $0.70 \pm 0.39$    | 1.80                | $0.26 \pm 0.48$    | $0.65 \pm 0.38$    |



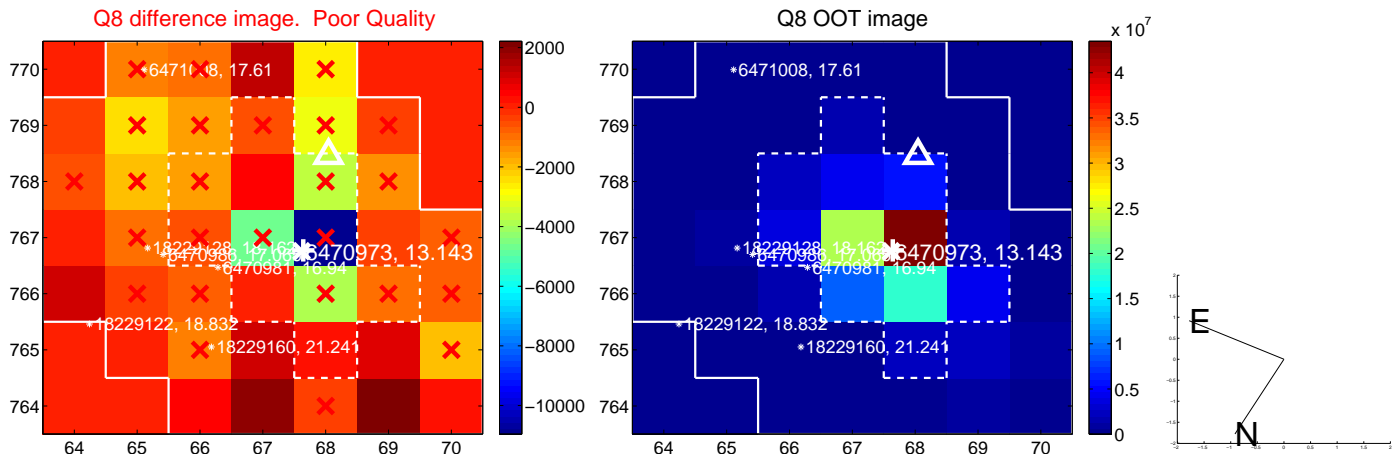
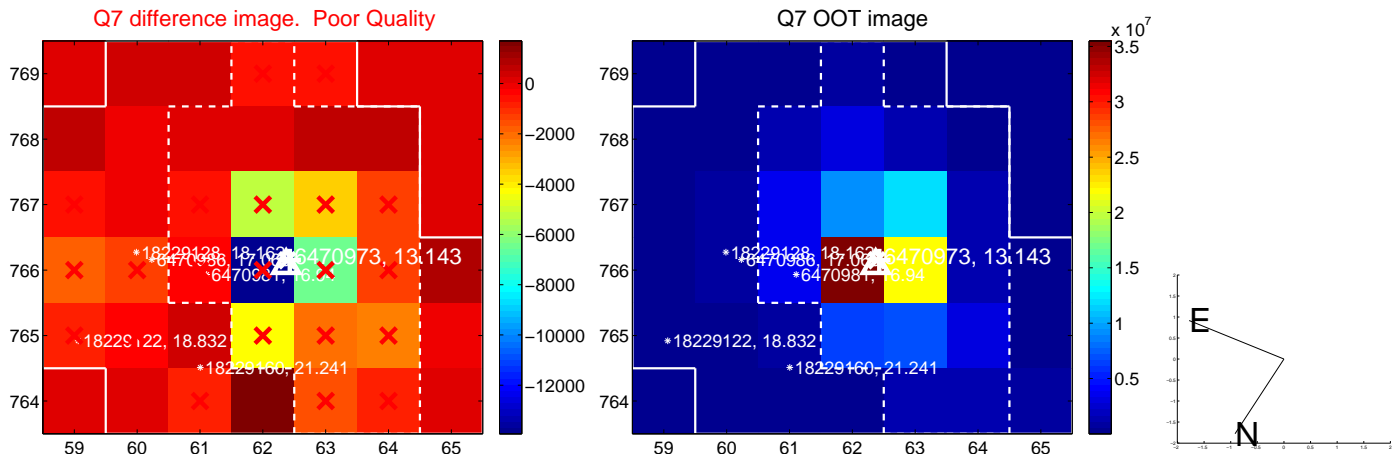
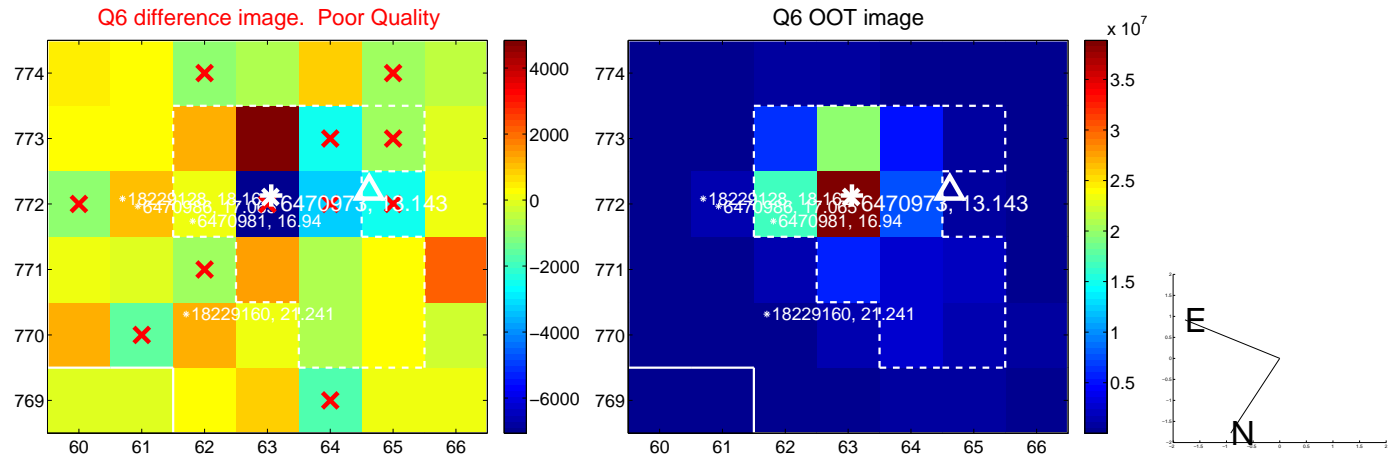
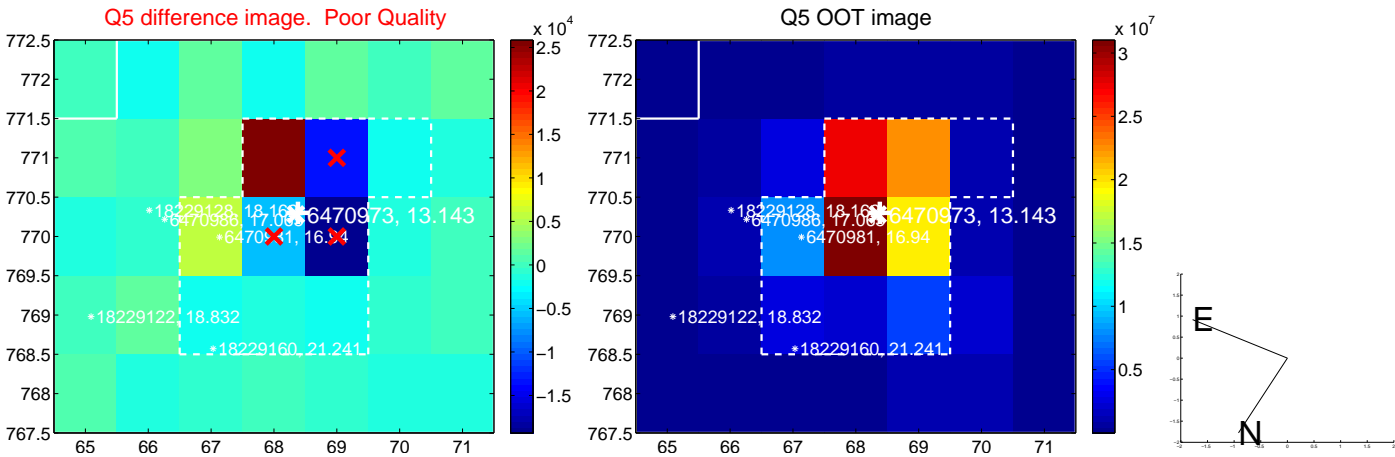
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

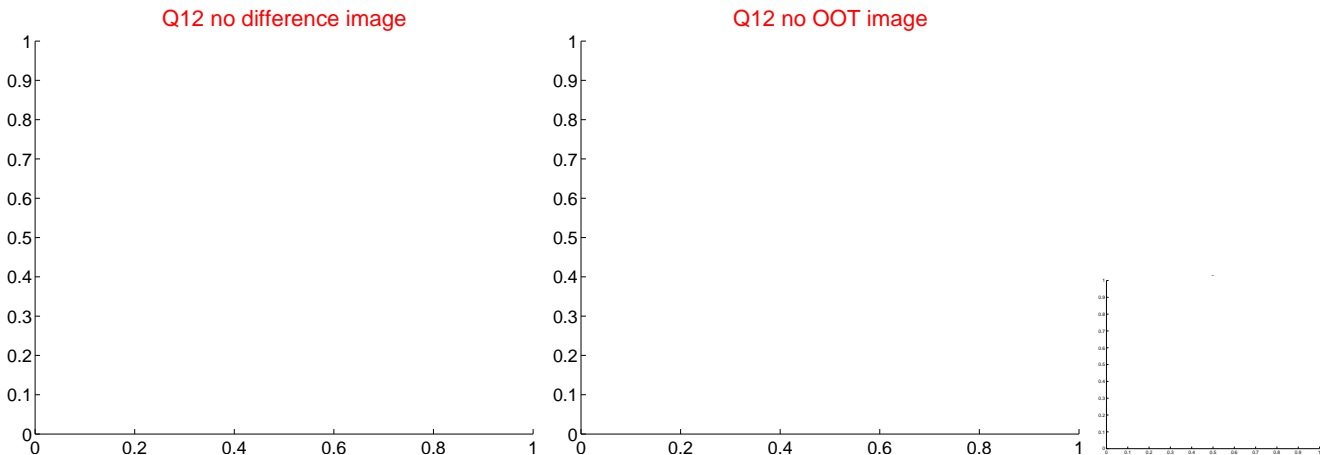
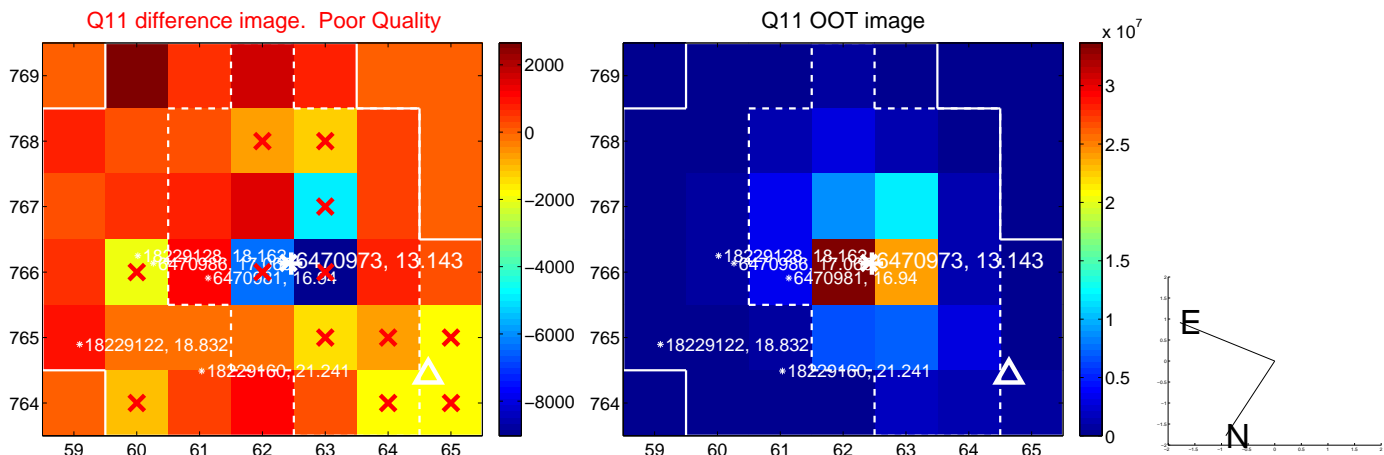
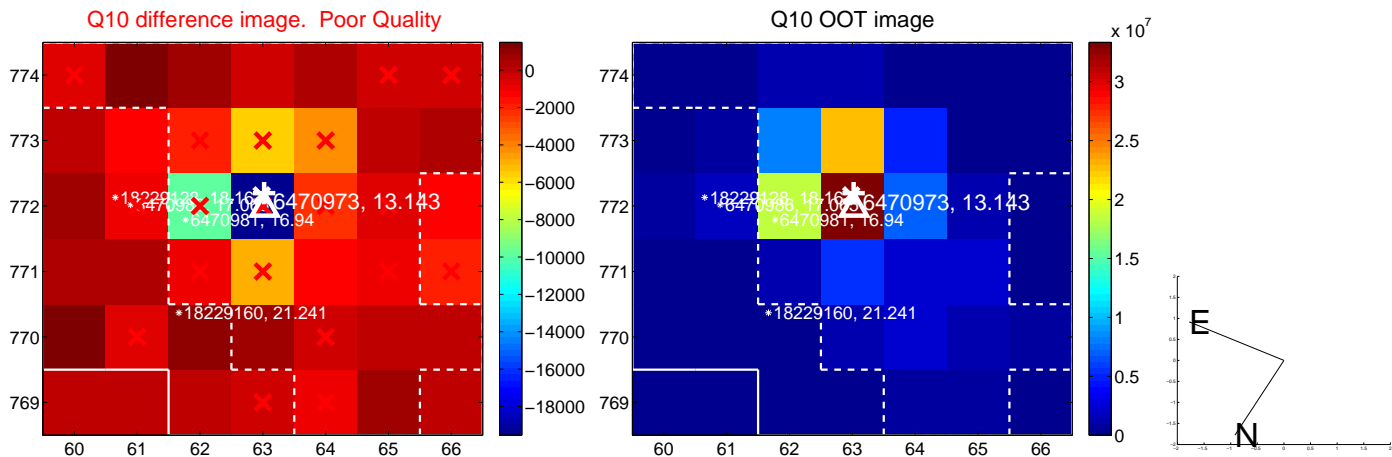
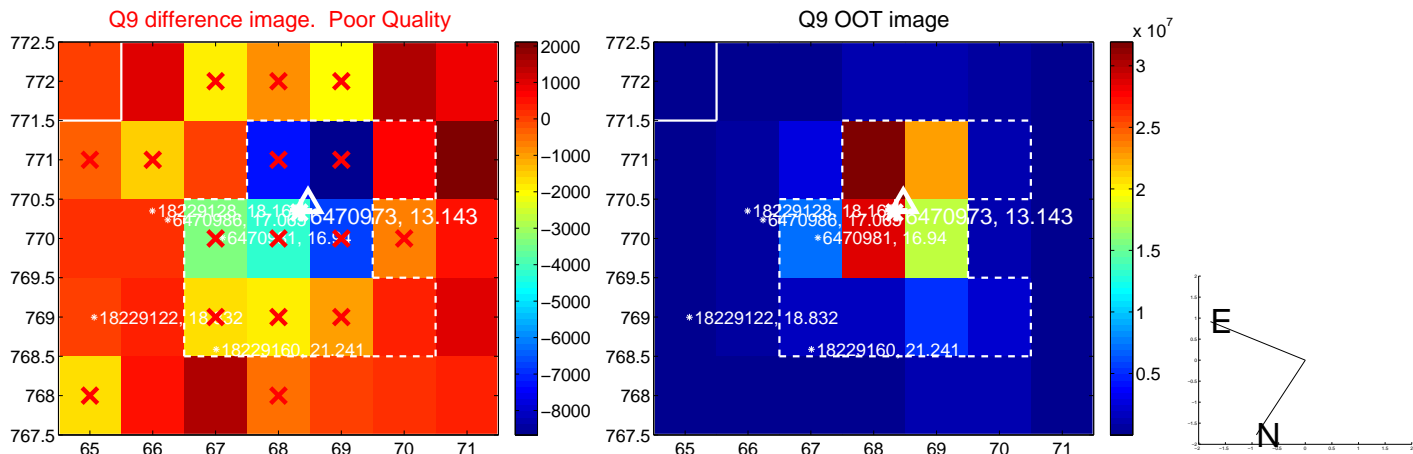




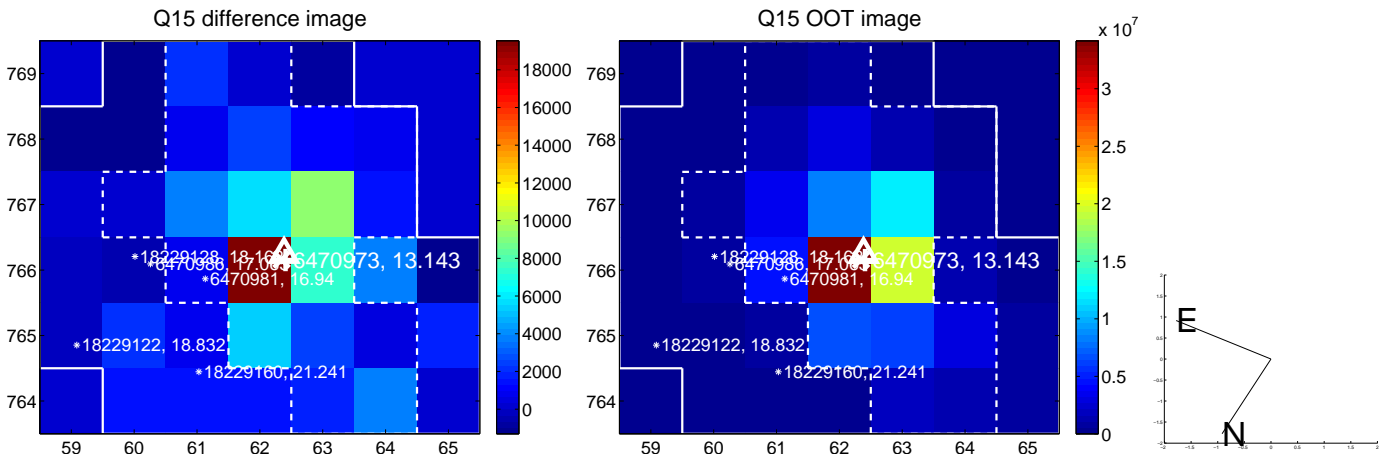
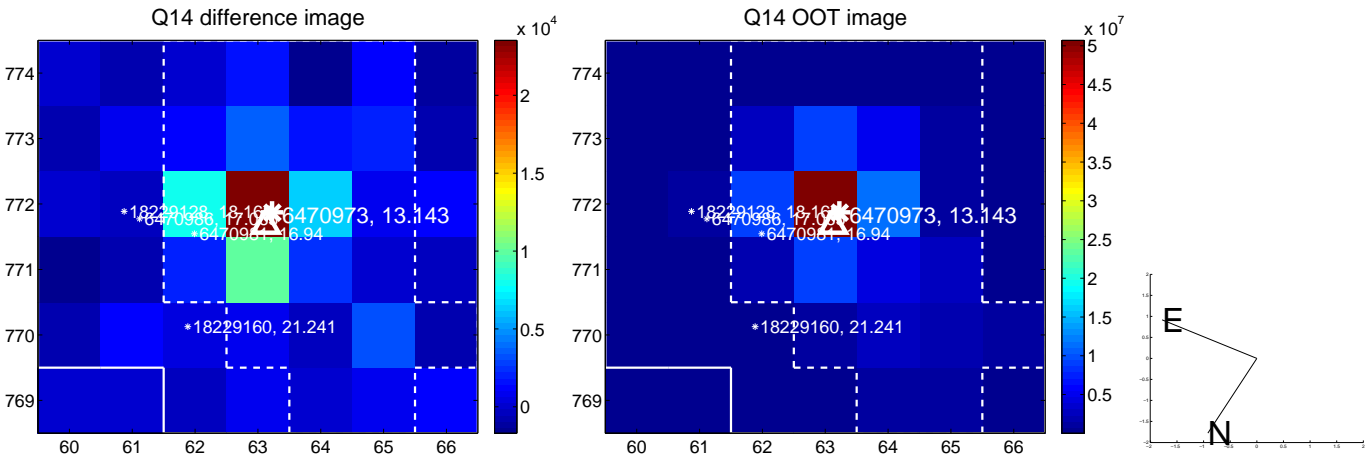
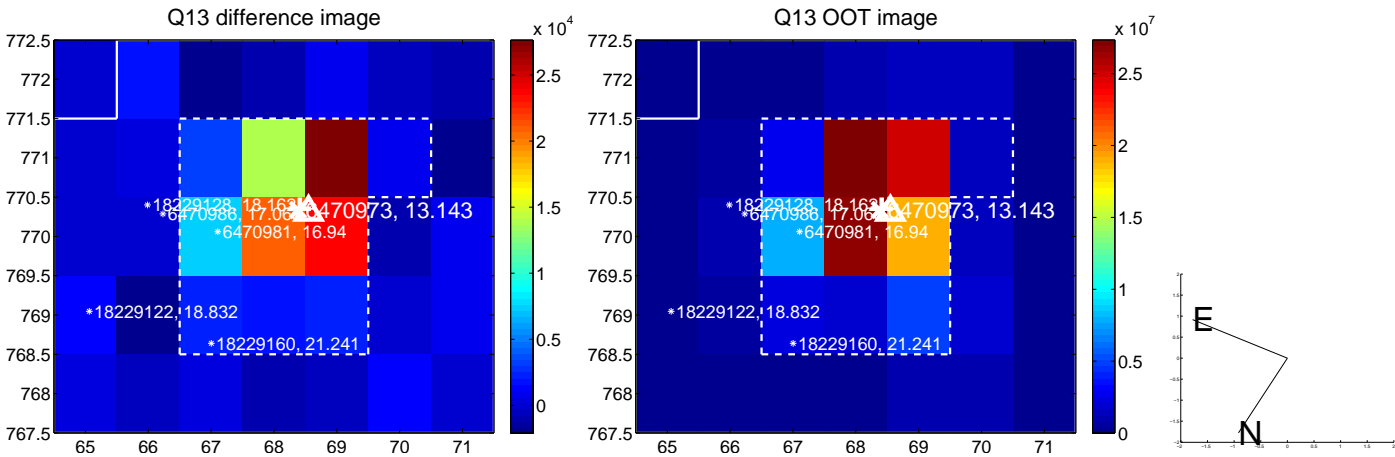
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



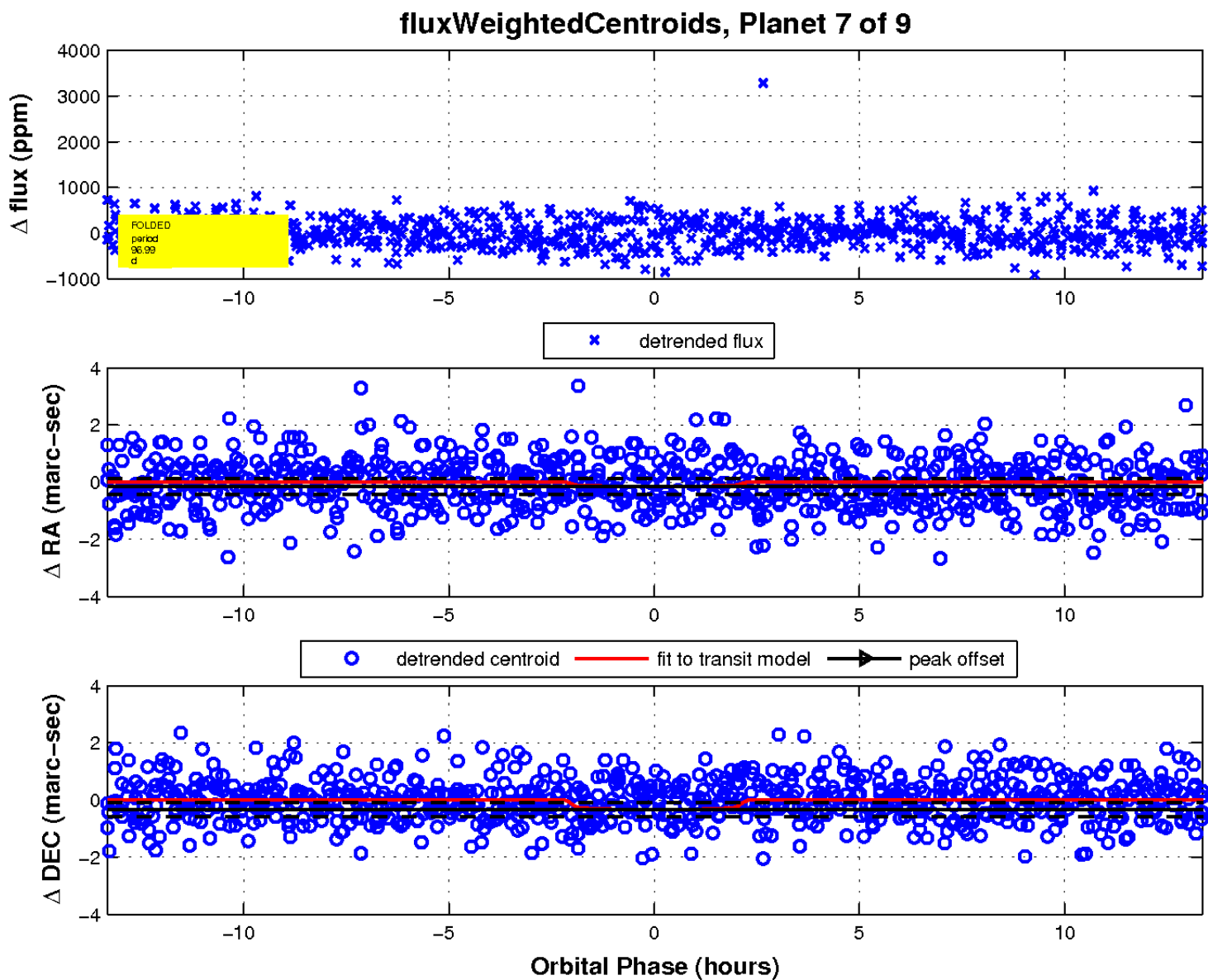
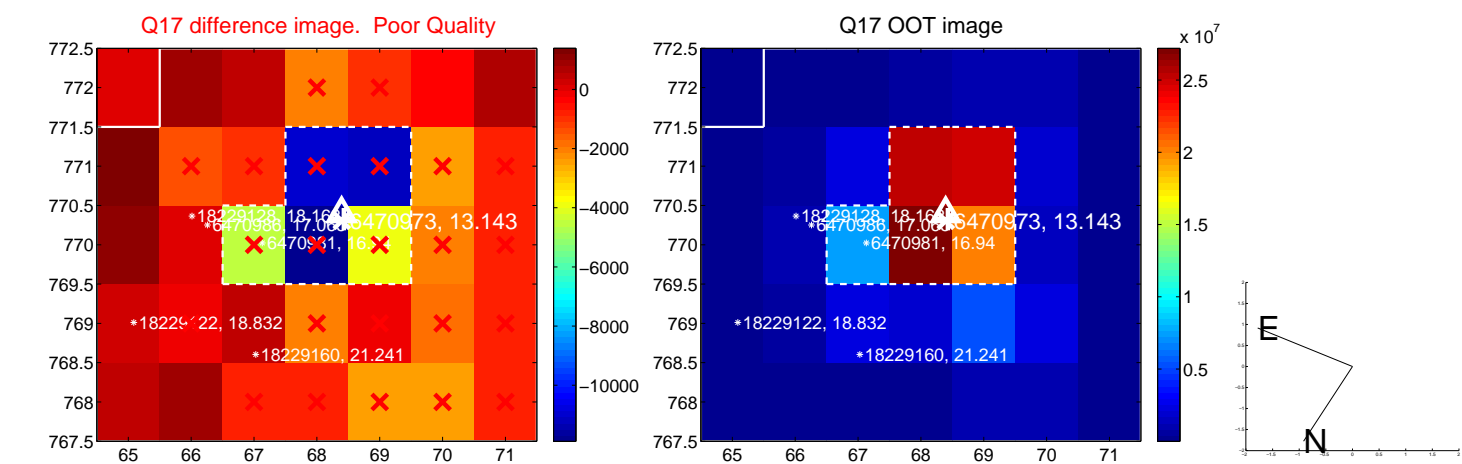
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



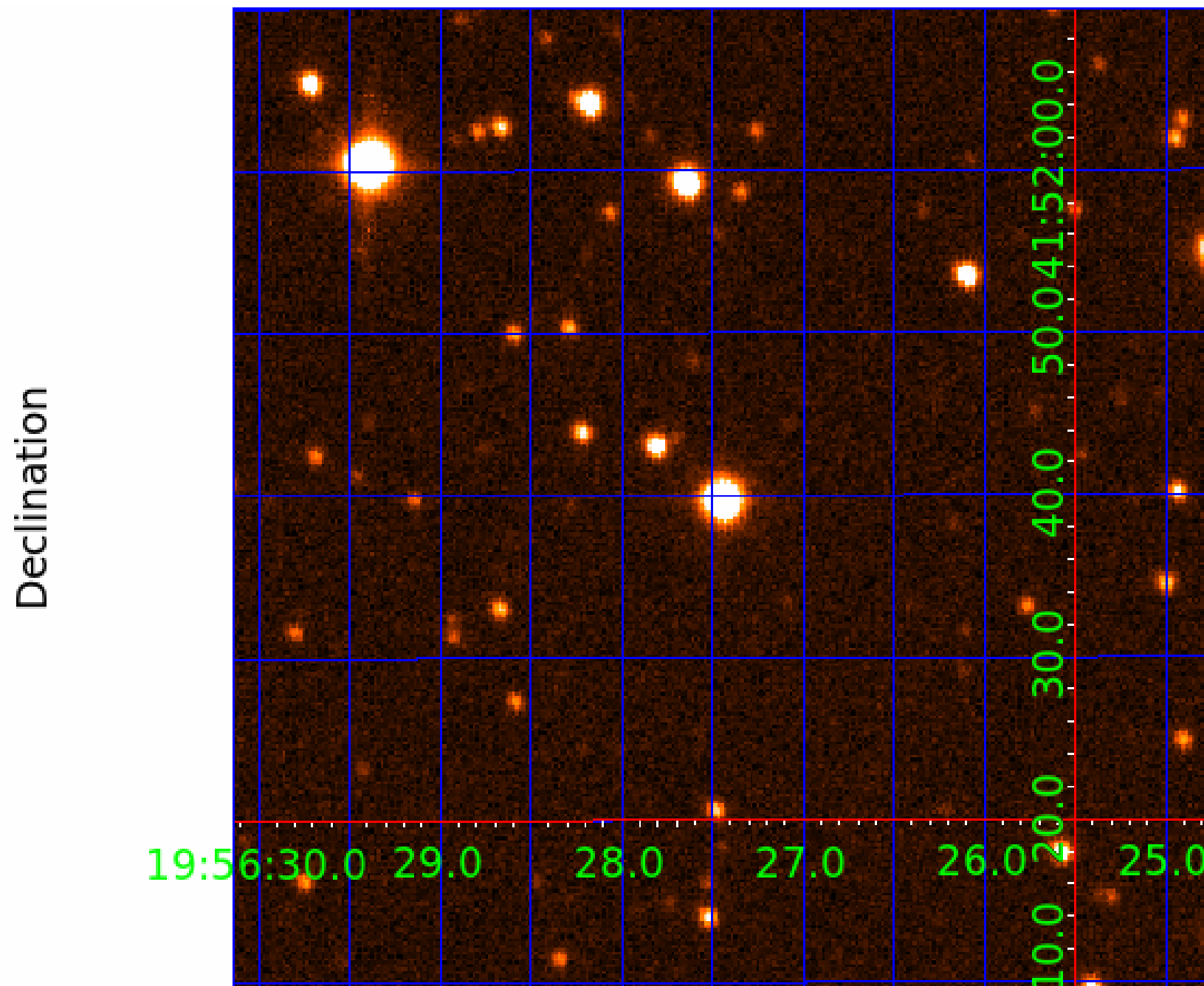
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image



# KIC 006470973

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 006470973-01 | OBS      | No   | 0.509313      | 131.708781   | 35.2        | 1.285            | 10.2 | 9.8  | 2.98                        | 8548            | 1.84                   | 173032.50              |
| 006470973-02 | OBS      | No   | 1.507014      | 132.863868   | 43.9        | 7.686            | 8.8  | 8.7  | 2.98                        | 8548            | 2.22                   | 40733.45               |
| 006470973-03 | OBS      | No   | 68.595946     | 135.604533   | 305.4       | 10.291           | 12.3 | 7.5  | 2.98                        | 8548            | 5.83                   | 250.64                 |
| 006470973-04 | OBS      | No   | 95.200506     | 157.793112   | 760.5       | 7.481            | 11.1 | 9.5  | 2.98                        | 8548            | 10.09                  | 161.90                 |
| 006470973-05 | OBS      | No   | 43.824577     | 173.397932   | 266.9       | 11.025           | 9.9  | 7.4  | 2.98                        | 8548            | 5.20                   | 455.50                 |
| 006470973-06 | OBS      | No   | 43.851912     | 174.379270   | 265.5       | 5.706            | 9.4  | 6.5  | 2.98                        | 8548            | 5.91                   | 455.12                 |
| 006470973-07 | OBS      | No   | 96.994995     | 218.805364   | 538.8       | 4.480            | 9.0  | 9.0  | 2.98                        | 8548            | 7.65                   | 157.92                 |
| 006470973-09 | OBS      | No   | 203.109072    | 227.259250   | 243.1       | 6.000            | 8.5  | -1.0 | 2.98                        | 8548            | 4.71                   | 58.95                  |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 006470973-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT   |
| 006470973-02 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT   |
| 006470973-03 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT  |
| 006470973-04 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS |
| 006470973-05 | 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   |
| 006470973-06 | OBS      | FP   | 0.00  | 1 | 0 | 1 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—HALO_GHOST                        |
| 006470973-07 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT  |
| 006470973-09 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—CENT_NOFITS   |

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

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

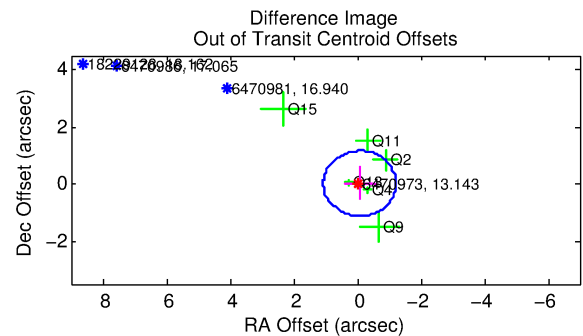
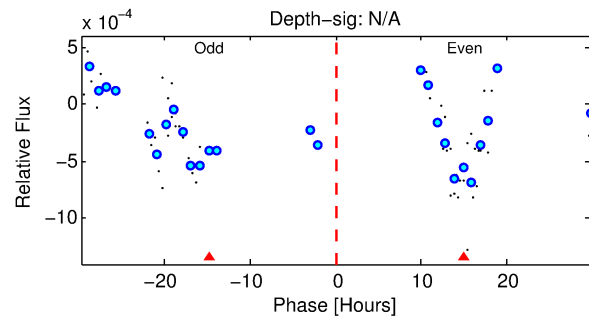
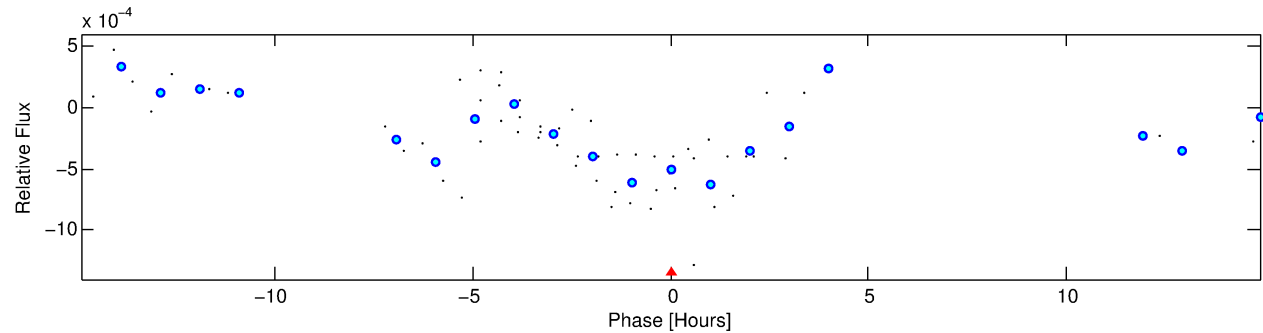
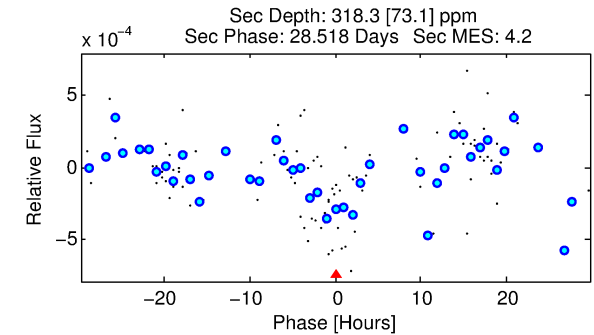
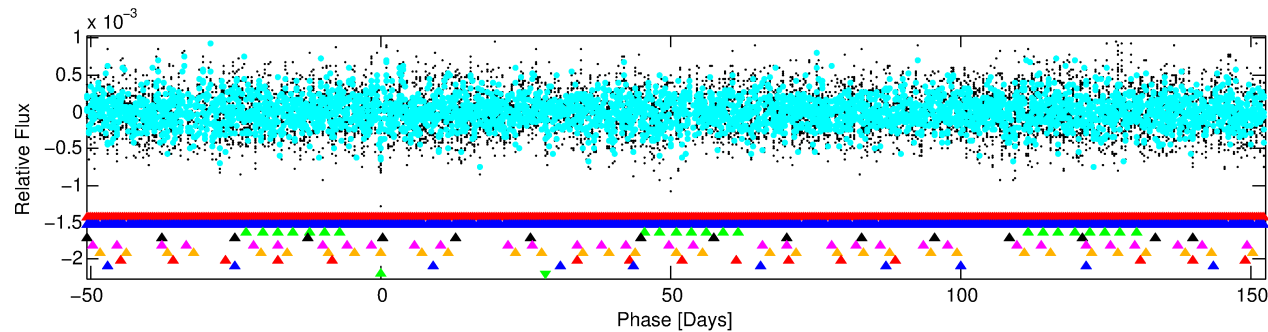
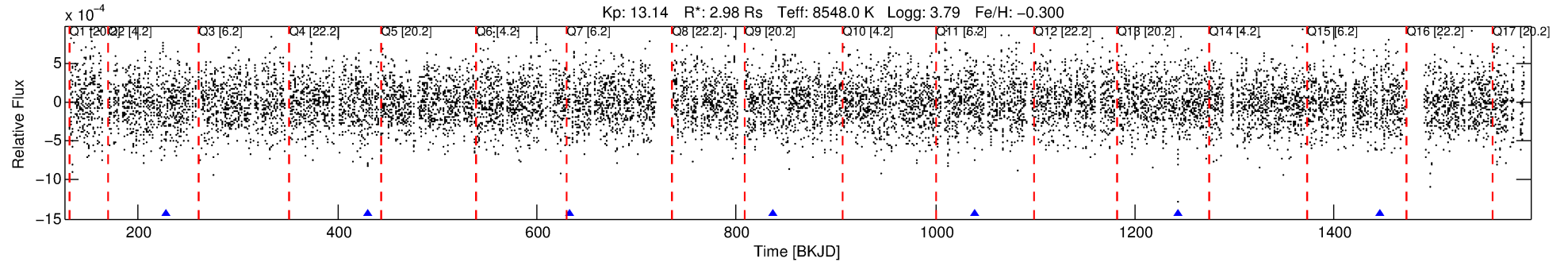
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 006470973-09

No Significant Match Found

# DV One-Page Summary

KIC: 6470973 Candidate: 9 of 9 Period: 203.109 d



## TPS TCE Results:

Period = 203.10907 d  
Epoch = 227.2593 BKJD

DV fit results are unavailable

## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [144.53σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -0.6741

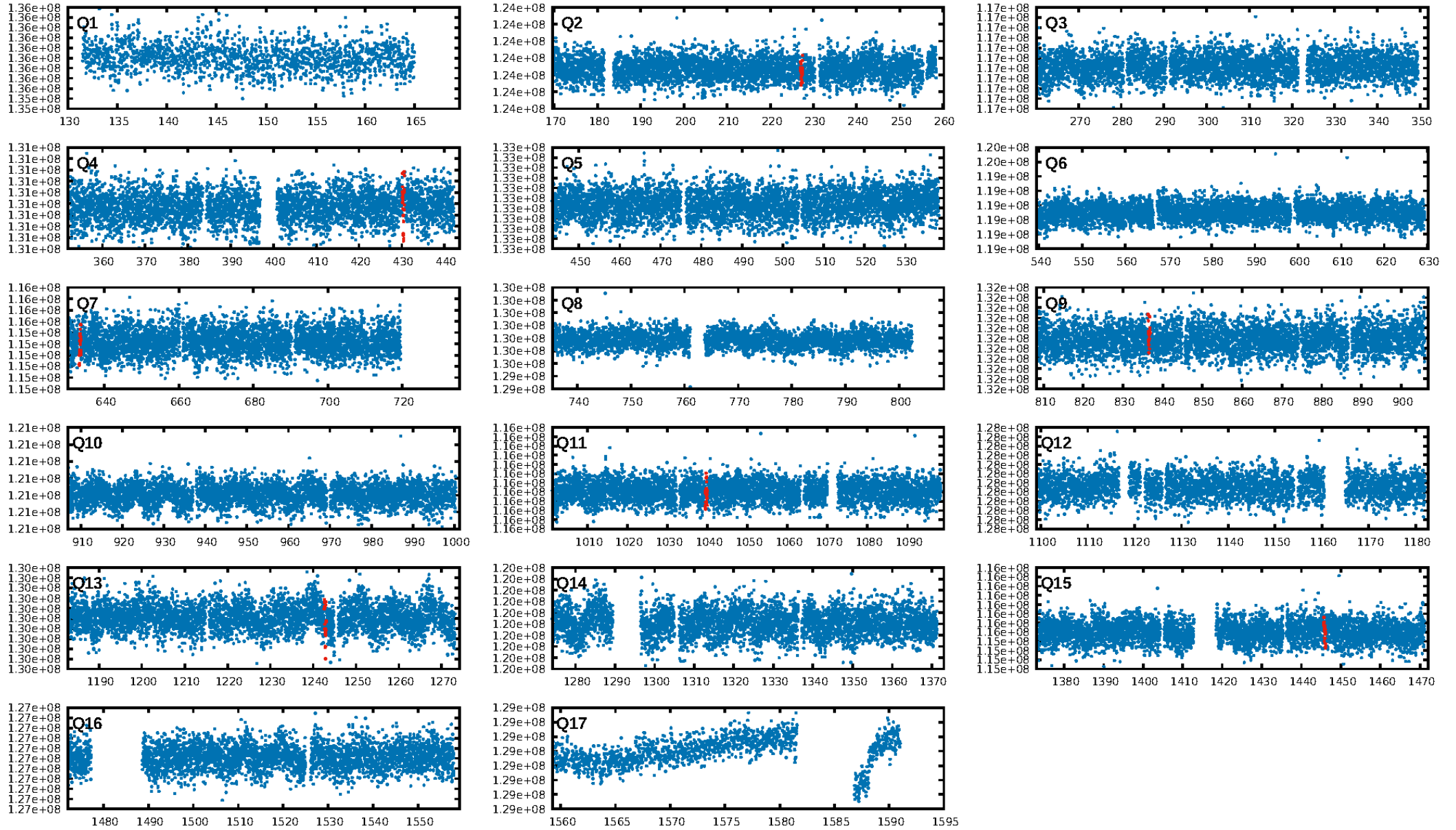
Centroid-sig: 3.7%  
Centroid-so: 0.675 arcsec [1.54σ]  
OotOffset-rm: 0.081 arcsec [0.21σ]  
KicOffset-rm: 0.177 arcsec [0.35σ]  
OotOffset-st: 1/2/1/2 [6]  
KicOffset-st: 1/2/1/2 [6]  
DiffImageQuality-fgm: 0.67 [4/6]  
DiffImageOverlap-fno: 0.00 [0/6]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 06:07:34 Z

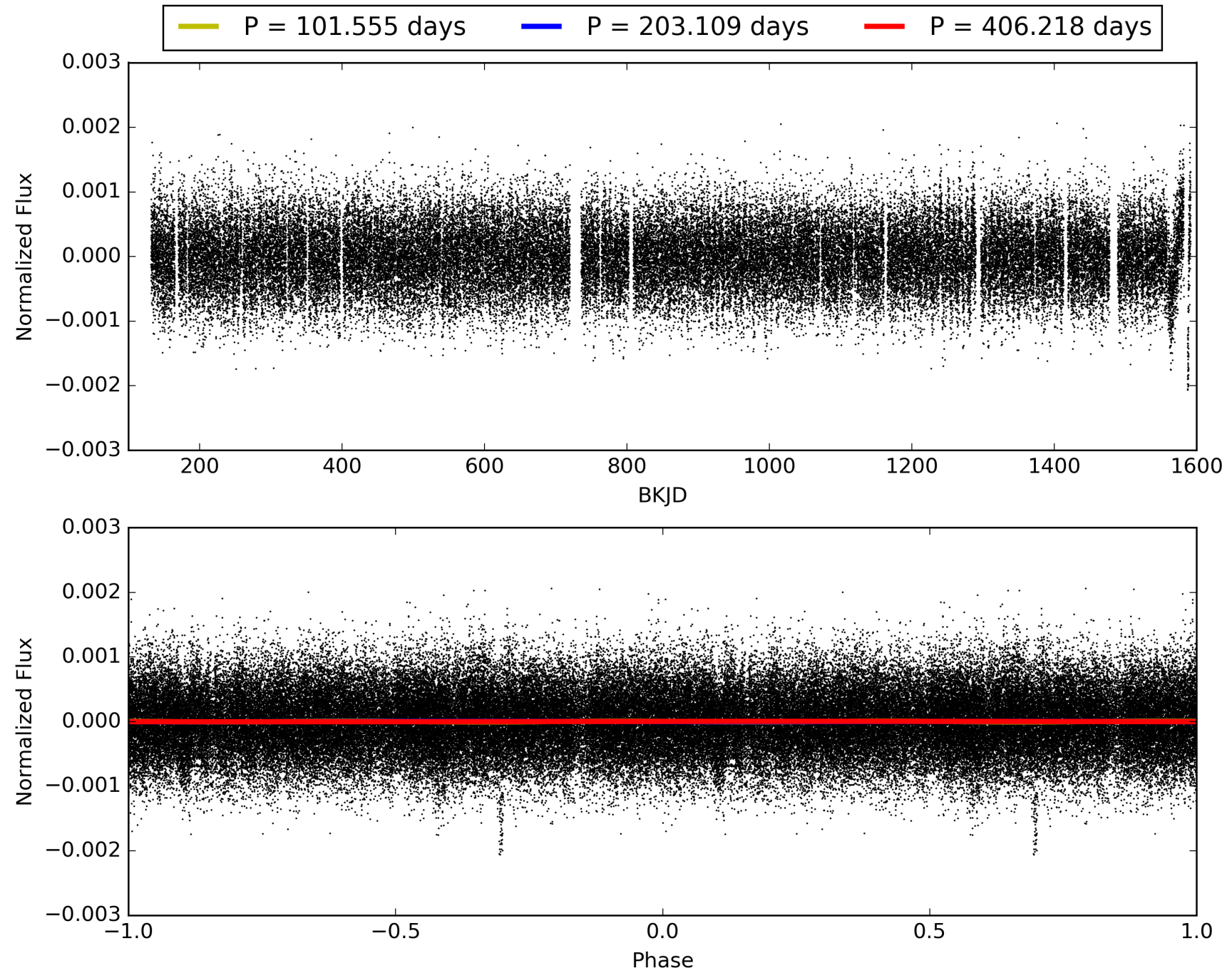
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 006470973-09, PDC Light Curves

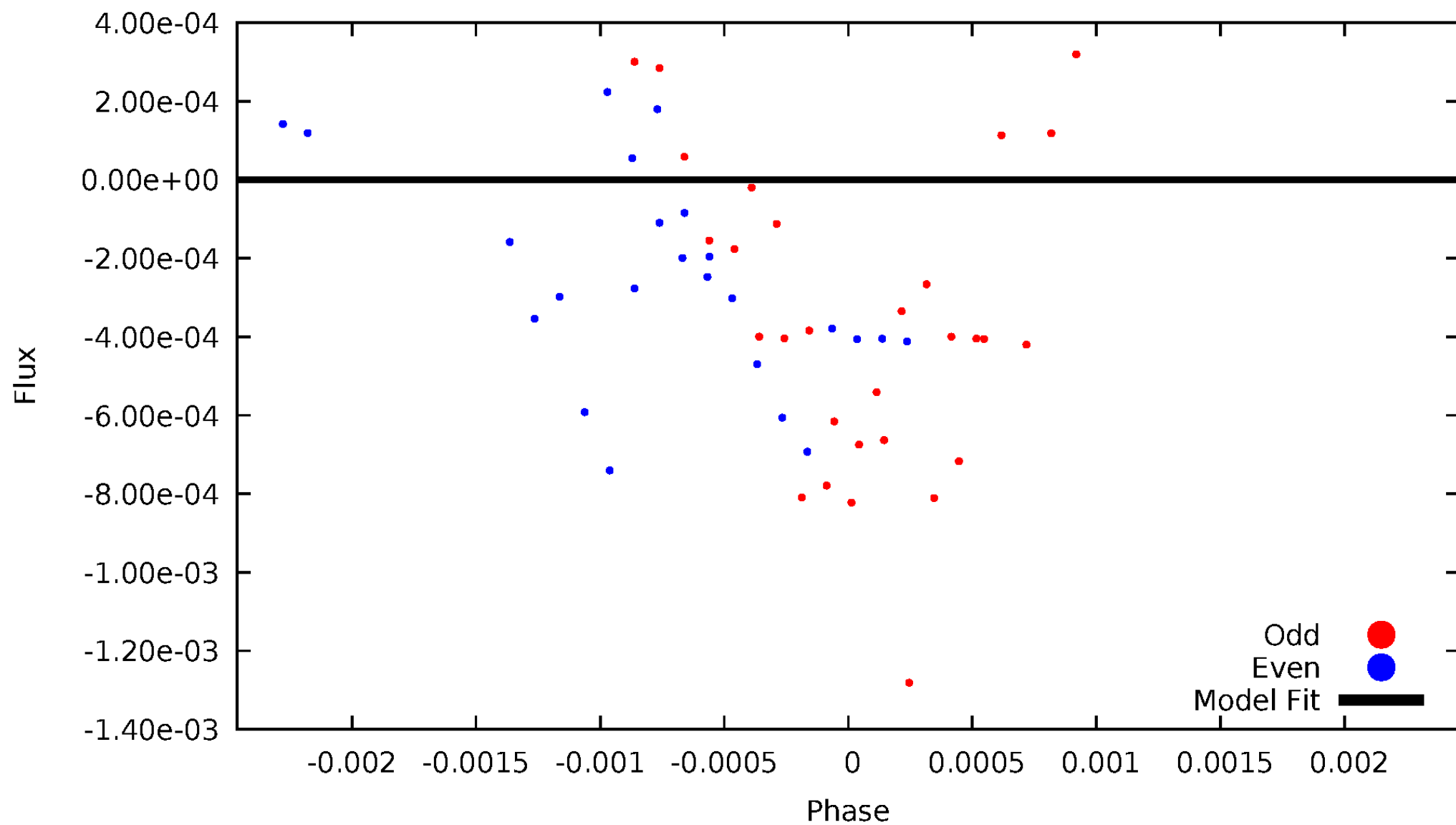


TCE 006470973-09



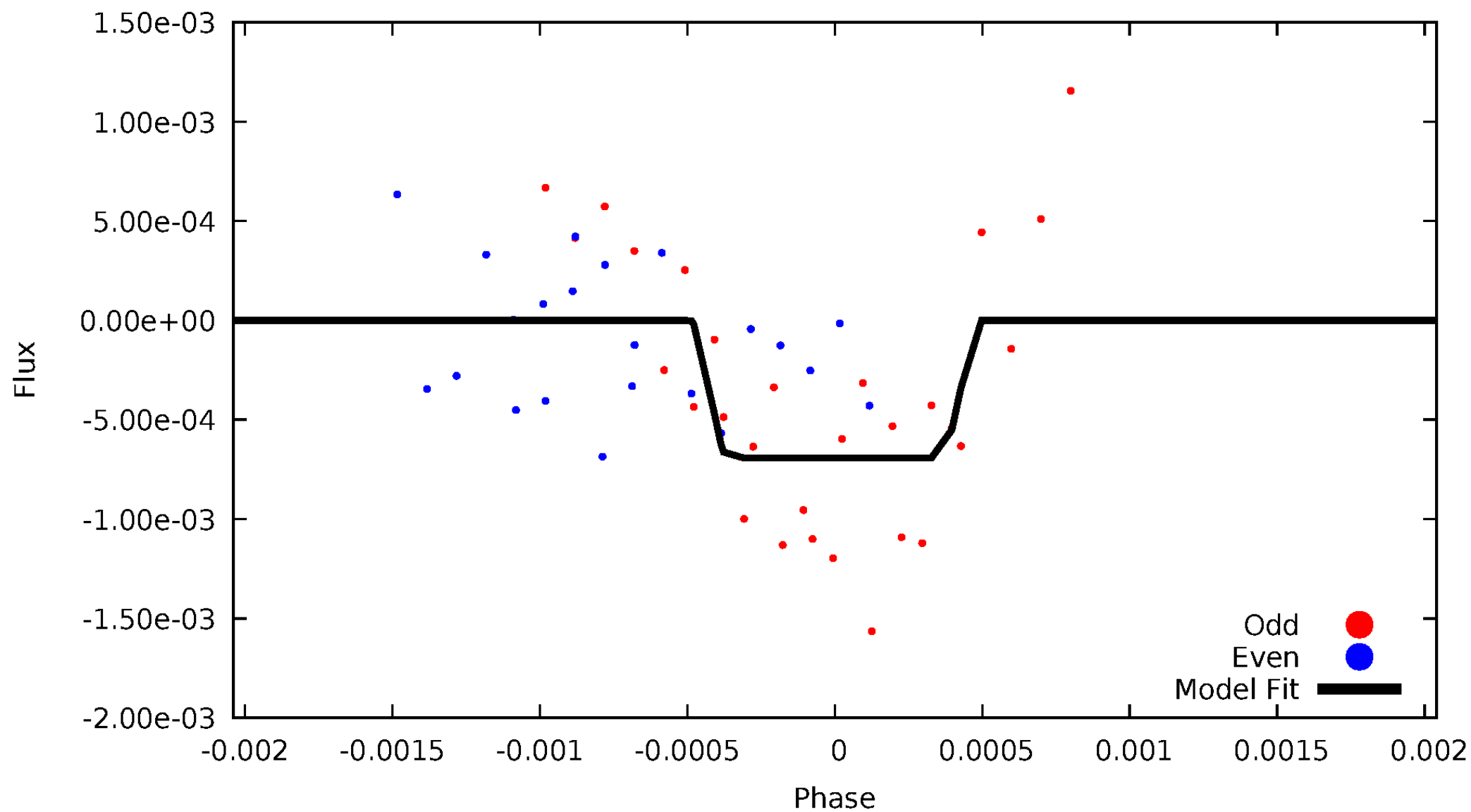
# DV Odd/Even

TCE 006470973-09

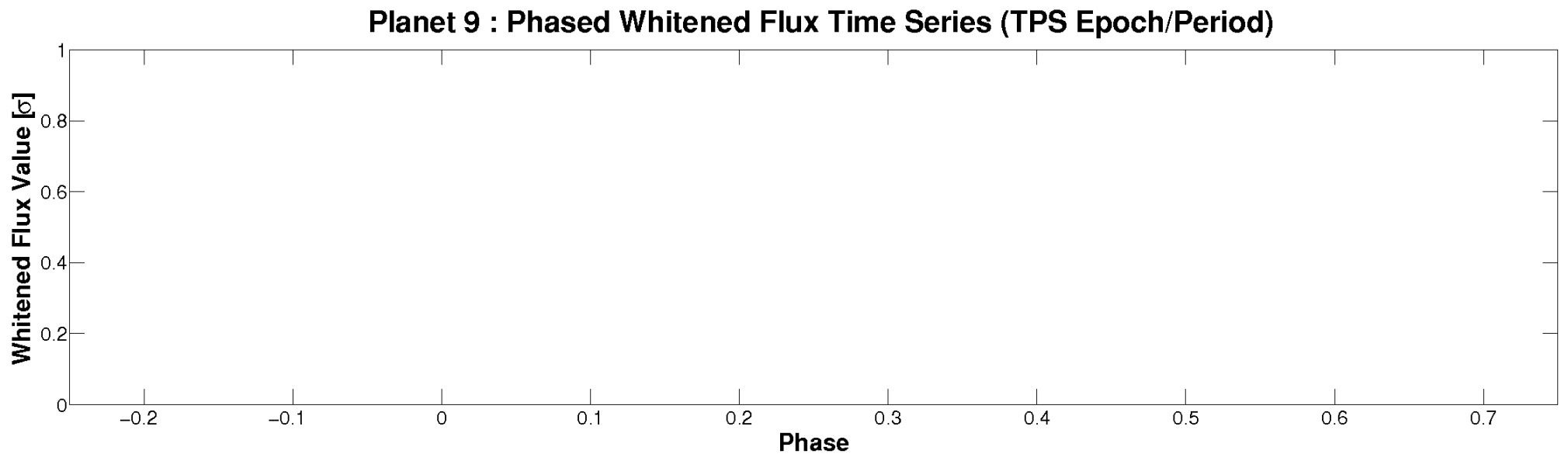
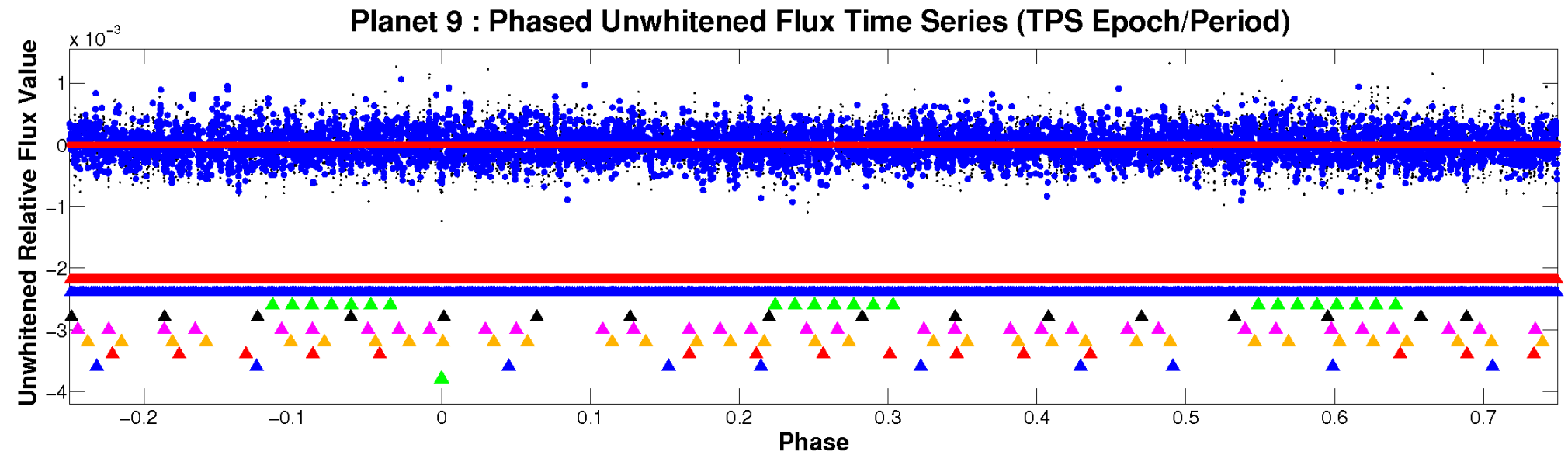


# ALT Odd/Even

TCE 006470973-09

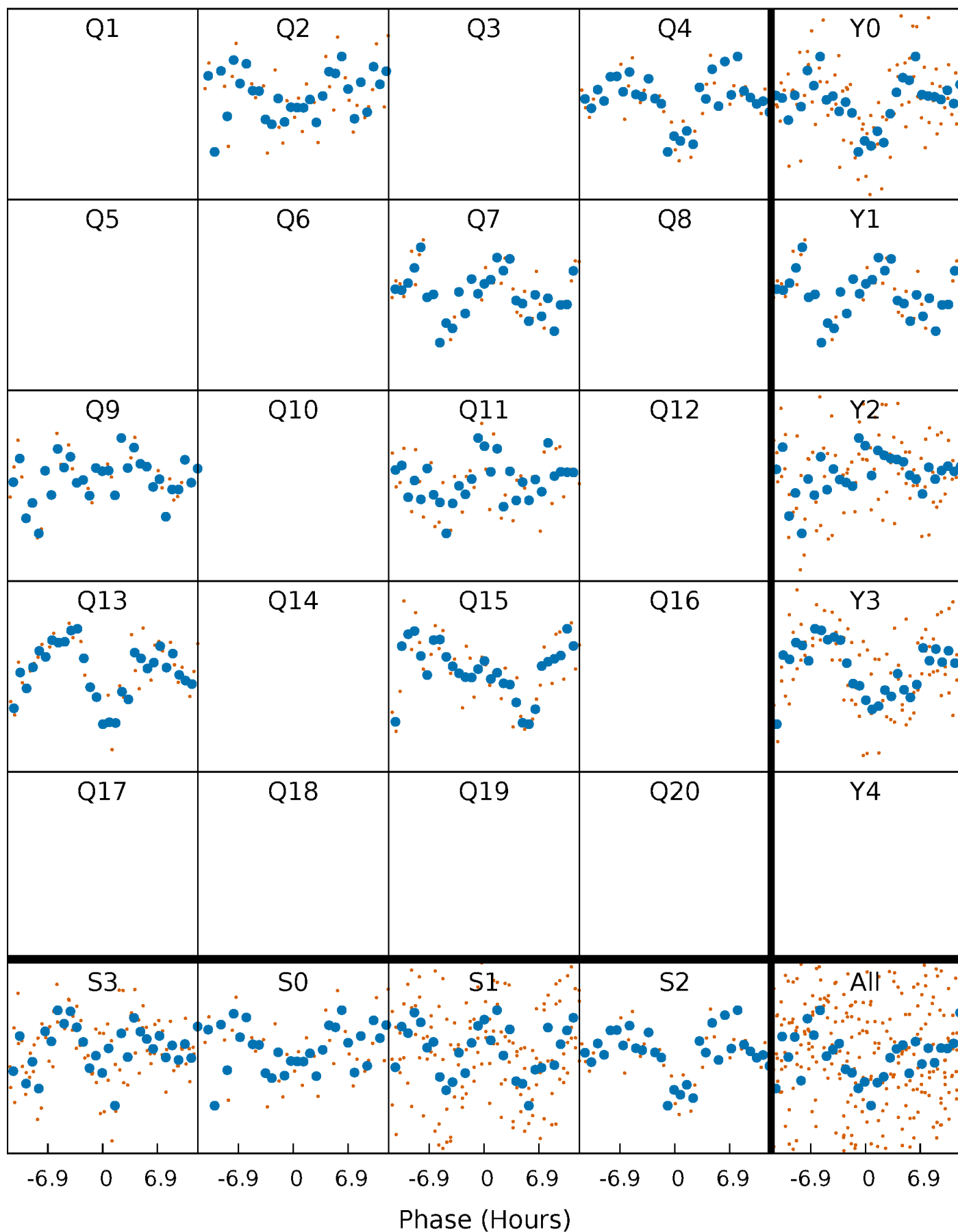


# Non-Whitened Vs. Whitened Light Curve



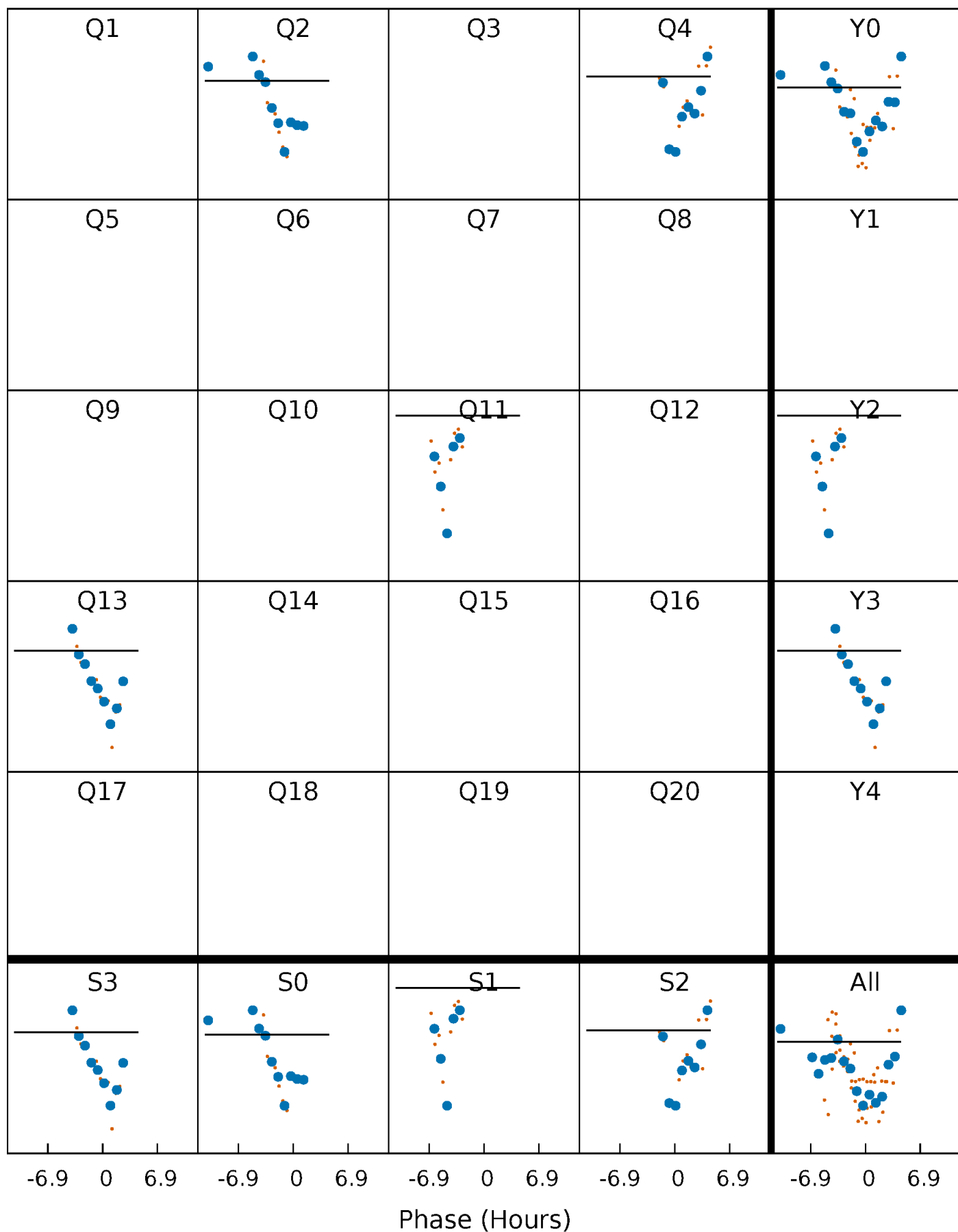
# PDC Quarter-Phased Transit Curves

TCE 006470973-09 P=203.109072 Days  $T_0=227.259250$  (BKJD)



# DV Quarter-Phased Transit Curves

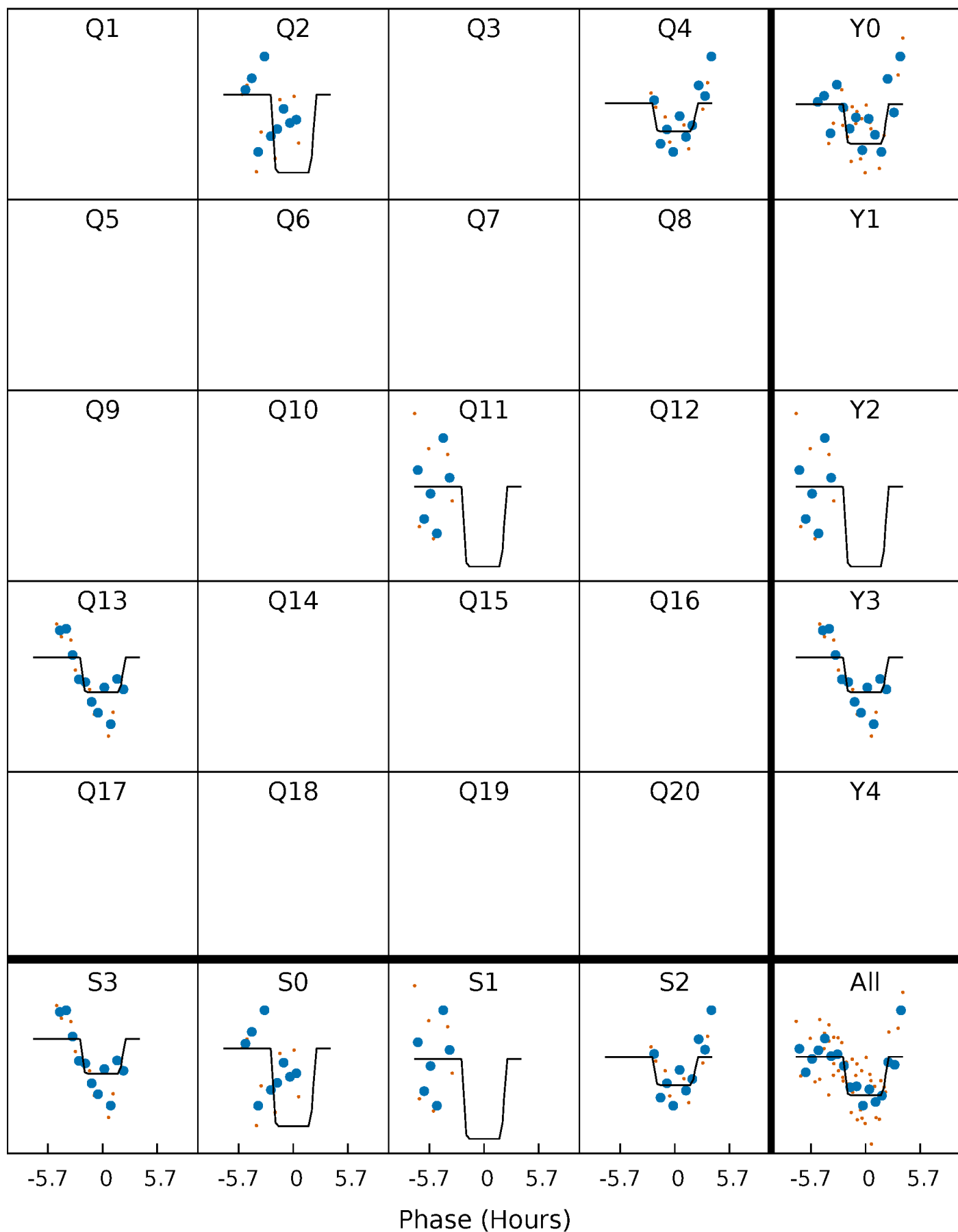
TCE 006470973-09 P=203.109072 Days  $T_0=227.259250$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

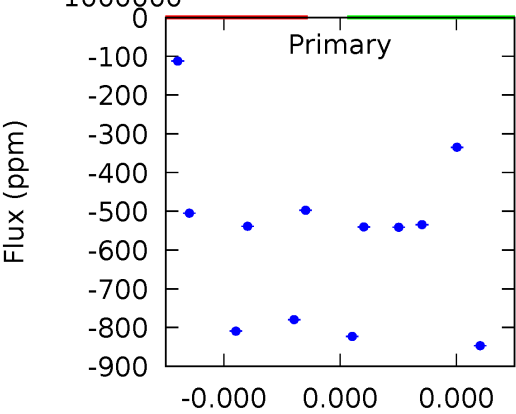
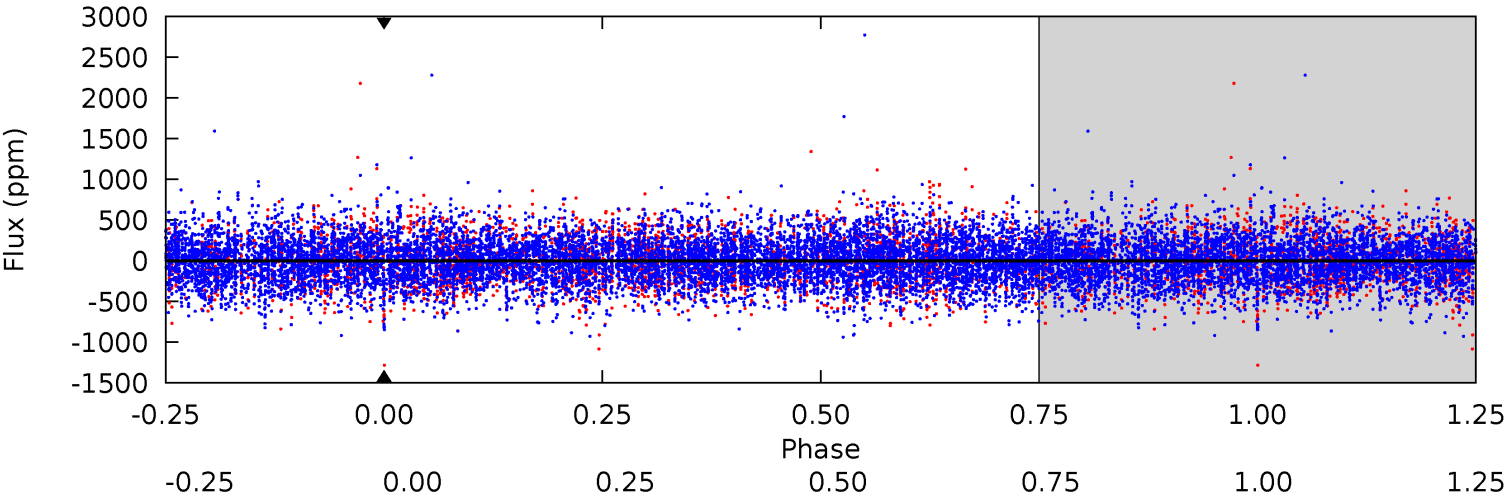
TCE 006470973-09 P=203.109072 Days  $T_0=227.283500$  (BKJD)



# DV Model-Shift Uniqueness Test

006470973-09, P = 203.109072 Days, E = 24.150178 Days

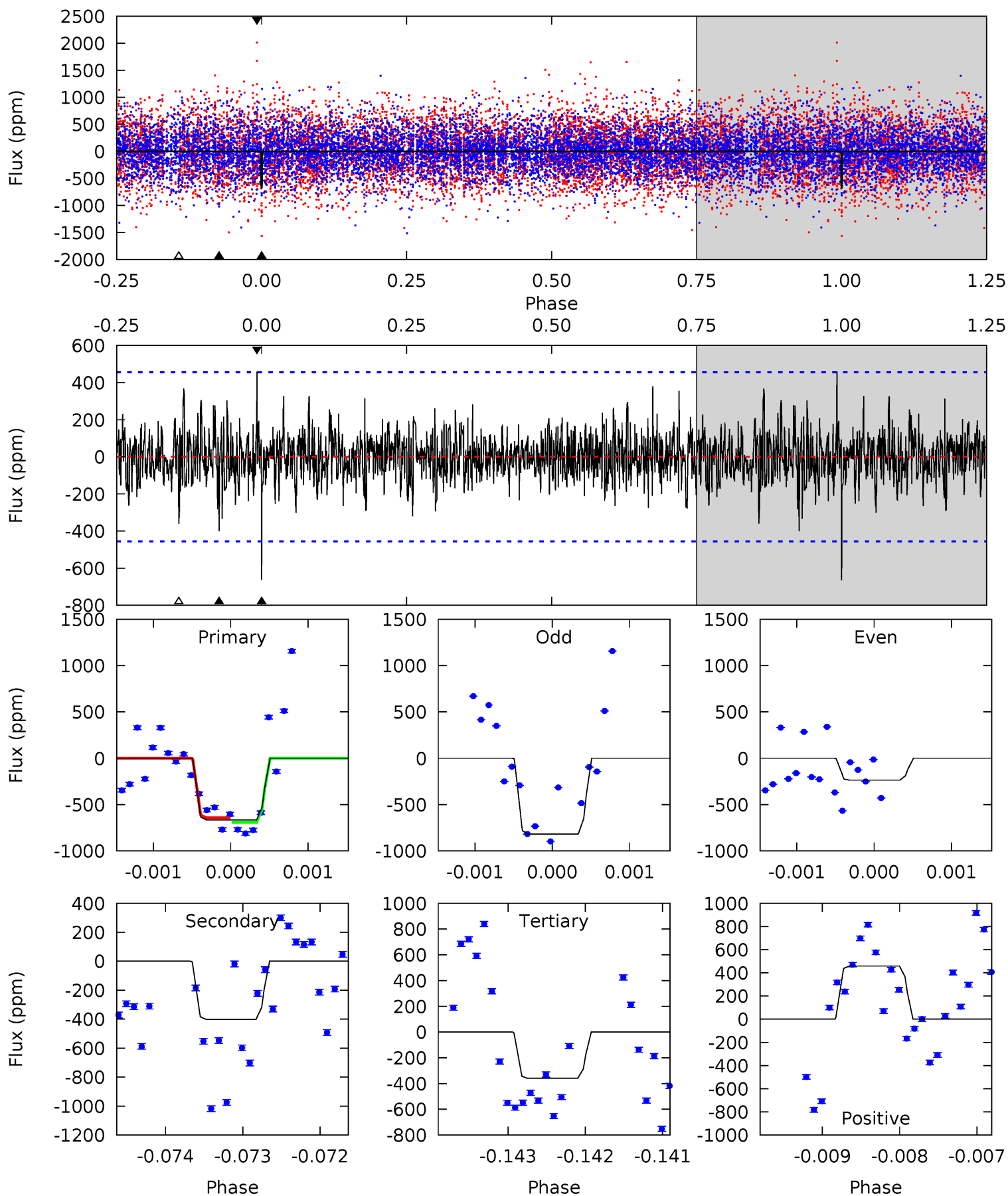
| Pri | Sec | Ter | Pos | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|-----|-----|-----|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|-----|-------|-----|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



# Alt Model-Shift Uniqueness Test

006470973-09, P = 203.109072 Days, E = 24.174428 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  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 7.96 | 4.80 | 4.30 | 5.49 | 5.46            | 3.30            | 1.19             | 3.66    | 2.47    | 0.49    | -0.69   | 3.02    | 0.85 | 0.41  | 0.30 |



### Stellar Parameters For KIC 006470973

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R$ ( $R_{\odot}$ )       | $M(M_{\odot})$            | $\rho_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ ) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|--|
|        | $8548^{+237}_{-356}$ | $3.785^{+0.400}_{-0.075}$ | $-0.300^{+0.300}_{-0.350}$ | $2.976^{+0.562}_{-1.406}$ | $1.971^{+0.382}_{-0.466}$ | $0.105^{+0.371}_{-0.033}$                        |
|        | +3%/-4%              | +11%/-2%                  | +100%/-117%                | +19%/-47%                 | +19%/-24%                 | +353%/-31%                                       |
| Source | KIC0                 | 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 006470973-09 / KOI

| Detrend | Depth (ppm)     | $R_p$ ( $R_{\oplus}$ )    | $T_{\text{max}}$ (K) | $T_{\text{obs}}$ (K)     | $A_{\text{obs}}$          |
|---------|-----------------|---------------------------|----------------------|--------------------------|---------------------------|
| DV      | $0 \pm 1000000$ | $20.91^{+24.34}_{-13.99}$ | $952^{+67}_{-101}$   | $5107^{+50646}_{-53875}$ | $629^{+148177}_{-142435}$ |
| Alt.    | $-401 \pm 83$   | $23.85^{+23.75}_{-16.48}$ | $952^{+67}_{-104}$   | $4288^{+2878}_{-898}$    | $277^{+2712}_{-212}$      |

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature  
 $T_{\text{obs}}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )  
 $A_{\text{obs}}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{\text{obs}} \gg T_{\text{max}}$  AND  $A_{\text{obs}} \gg 1.0$

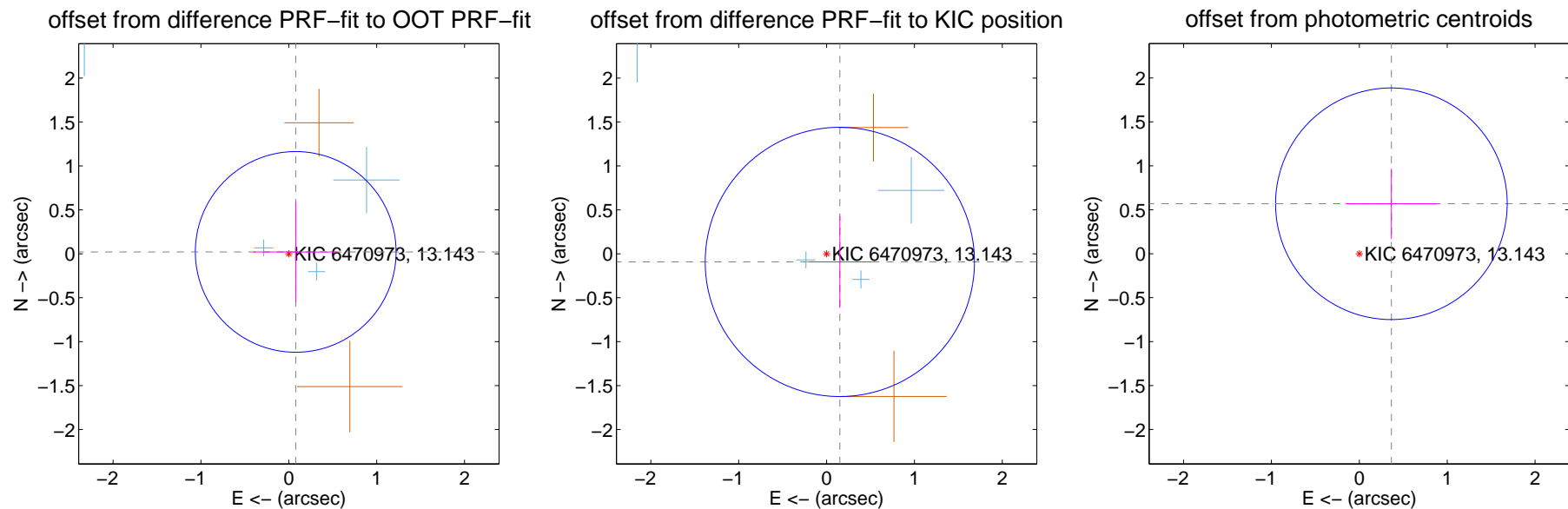
## DV Centroid Data

Supplemental centroid analysis for 006470973-09. Kepler magnitude: 13.14. Transit SNR -1.00

There are 4 quarters with good PRF difference image offsets

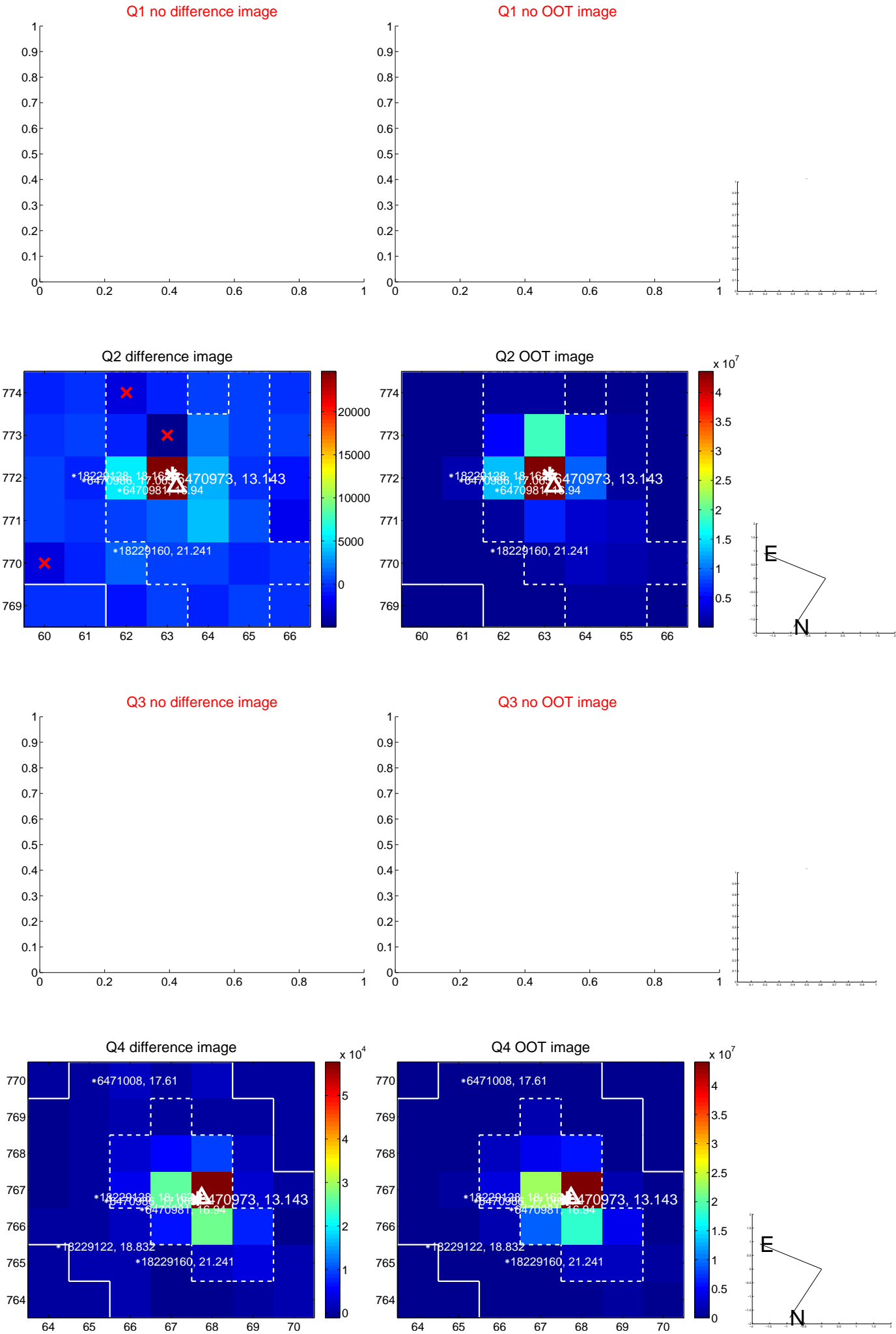
The direct PRF centroid is offset from the target star catalog position by about 0.19 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA        | $\Delta$ Dec       |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT          | $0.081 \pm 0.381$  | 0.21                | $-0.078 \pm 0.482$ | $0.021 \pm 0.567$  |
| PRF-fit source offset from KIC position | $0.177 \pm 0.511$  | 0.35                | $-0.151 \pm 0.362$ | $-0.093 \pm 0.522$ |
| photometric centroid source offset      | $0.68 \pm 0.44$    | 1.54                | $-0.36 \pm 0.52$   | $0.57 \pm 0.40$    |



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.

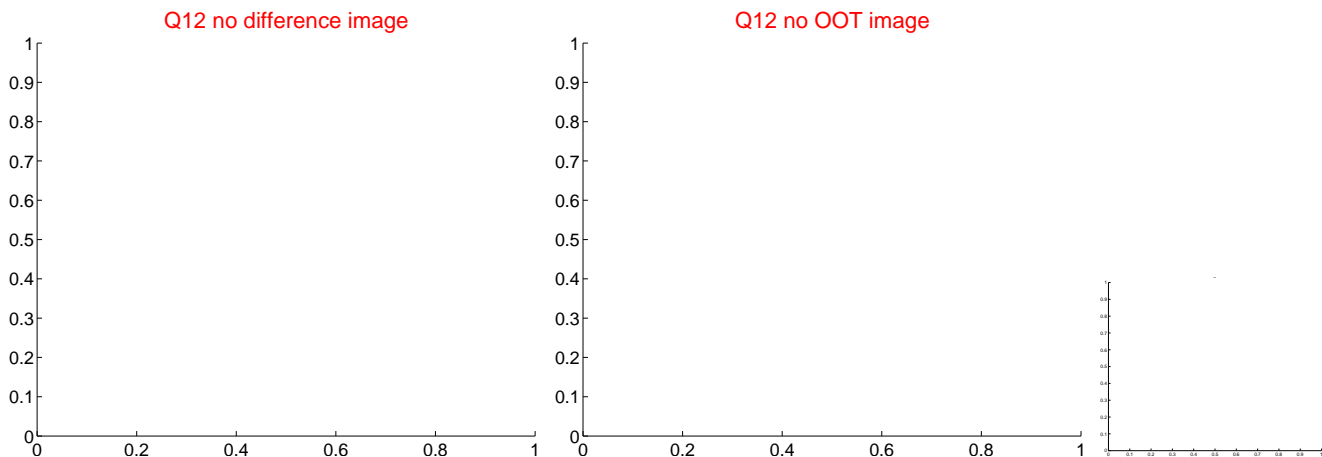
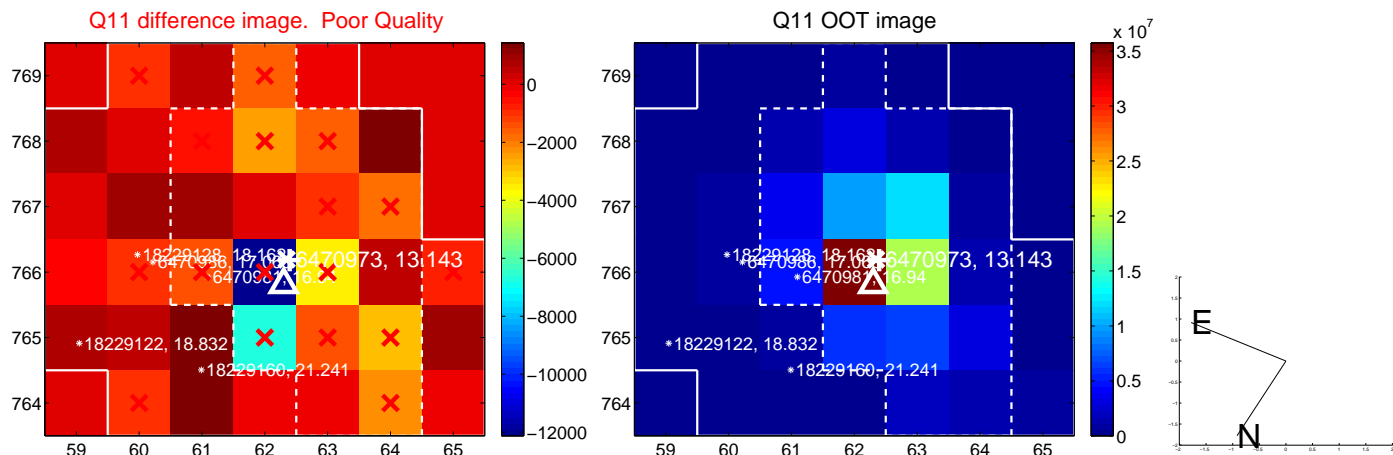
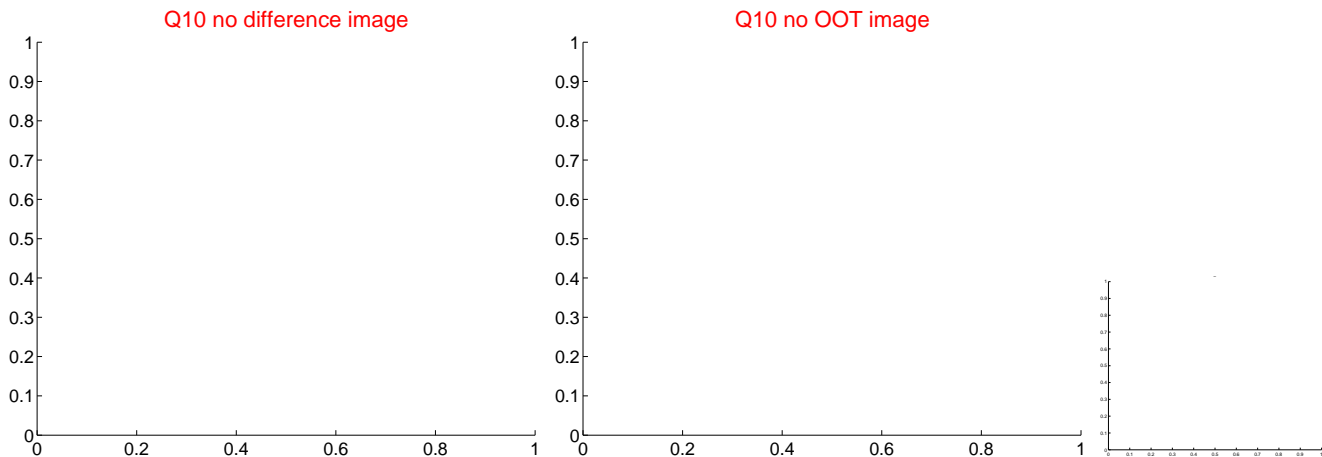
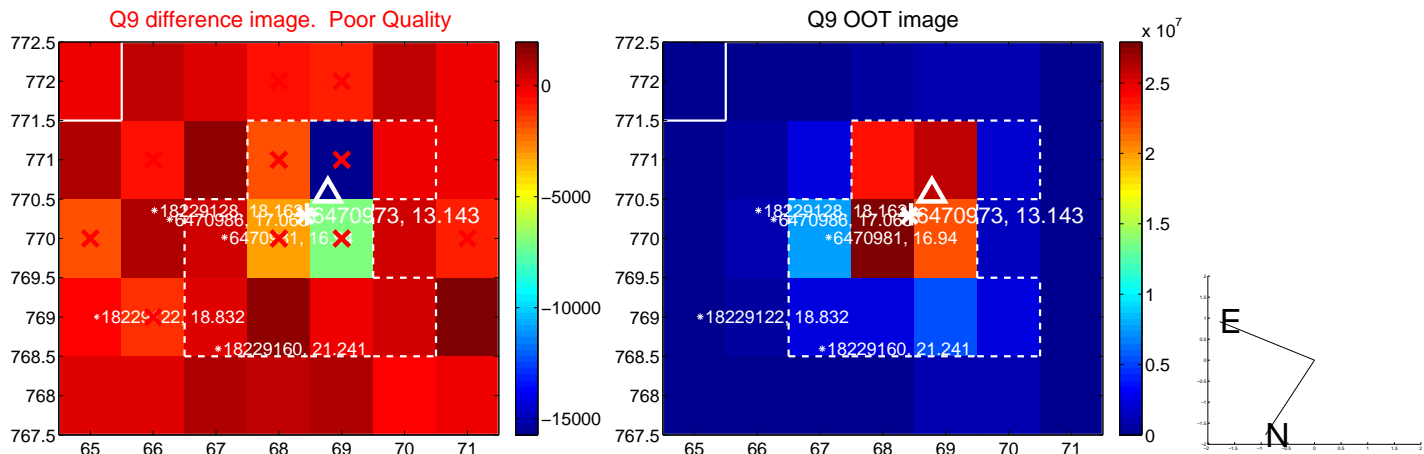


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

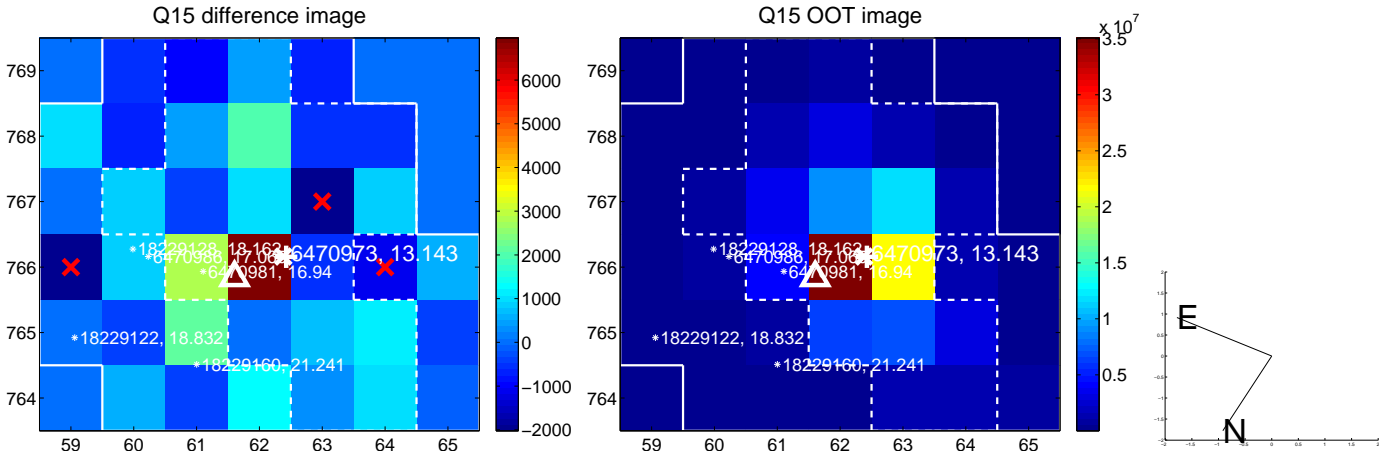
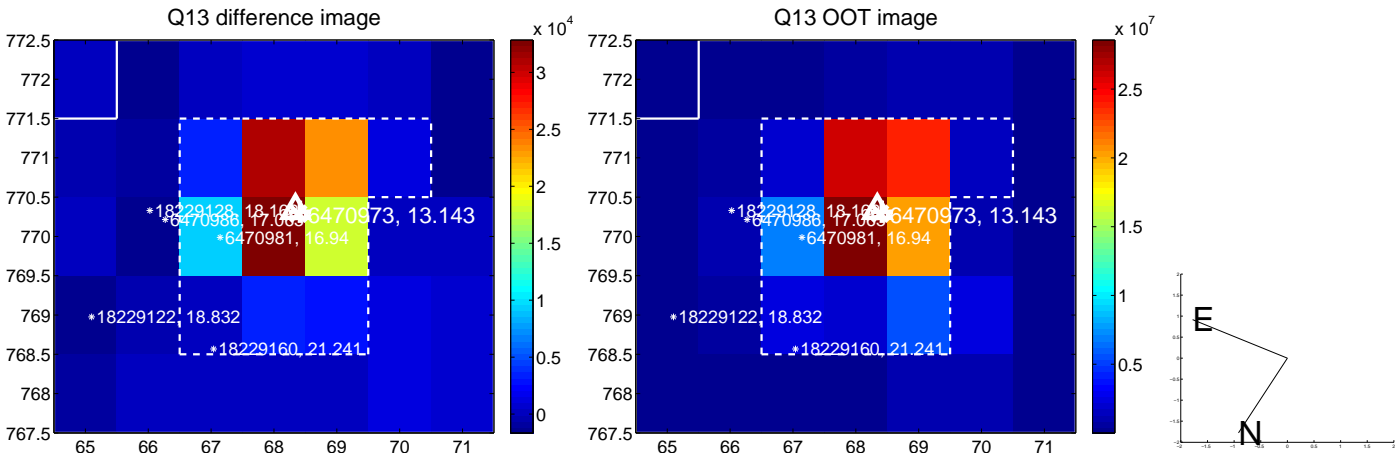




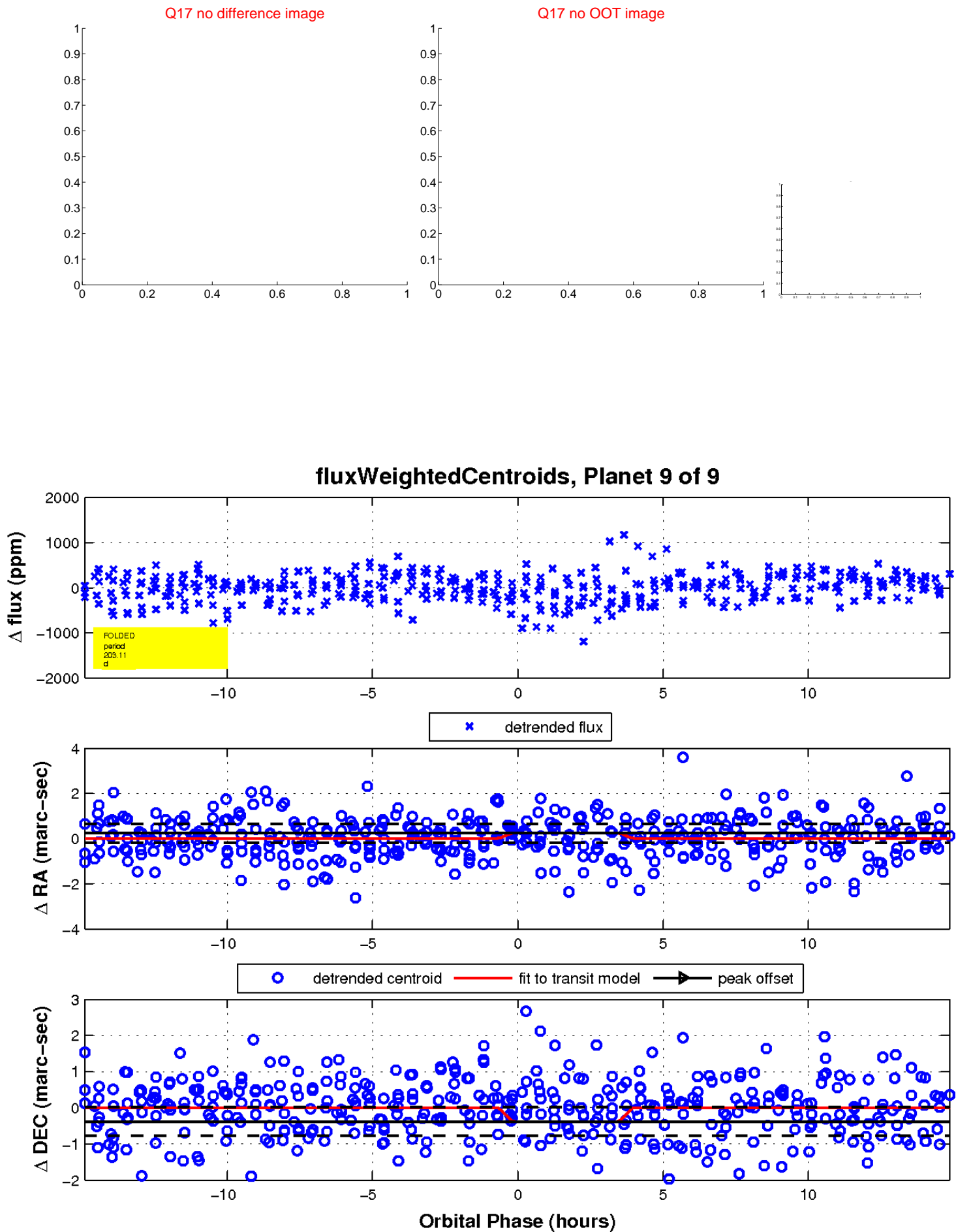
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

