

# KIC 006949061

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 006949061-01 | OBS      | 1960.01 | 8.968454      | 139.396195   | 238.6       | 4.608            | 32.7 | 36.4 | 1.37                        | 5808            | 2.50                   | 260.24                 |
| 006949061-02 | OBS      | 1960.02 | 23.221844     | 151.067915   | 197.6       | 2.723            | 14.0 | 15.0 | 1.37                        | 5808            | 2.32                   | 73.19                  |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments   |
|--------------|----------|------|-------|---|---|---|---|------------|
| 006949061-01 | OBS      | PC   | 1.00  | 0 | 0 | 0 | 0 | NO_COMMENT |
| 006949061-02 | OBS      | PC   | 0.99  | 0 | 0 | 0 | 0 | NO_COMMENT |

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

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

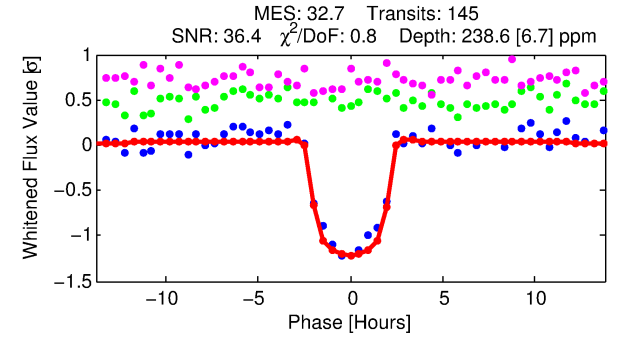
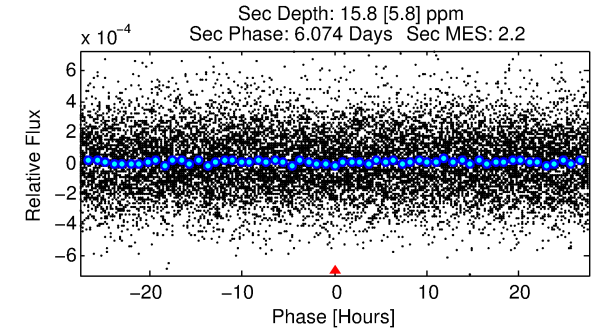
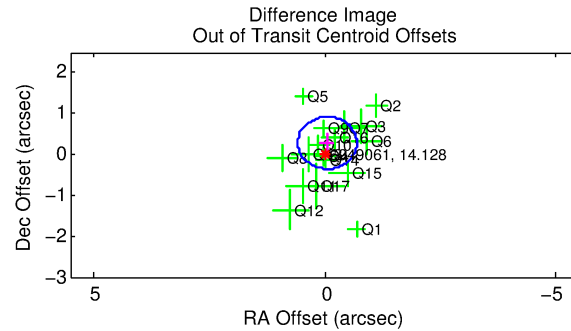
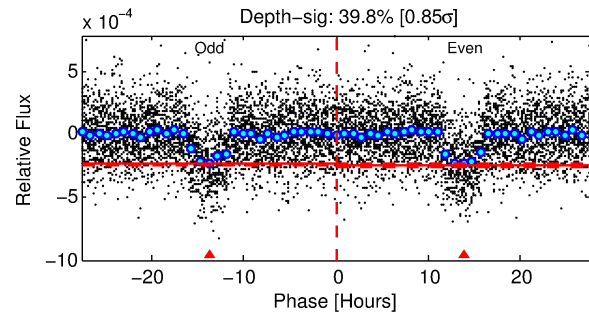
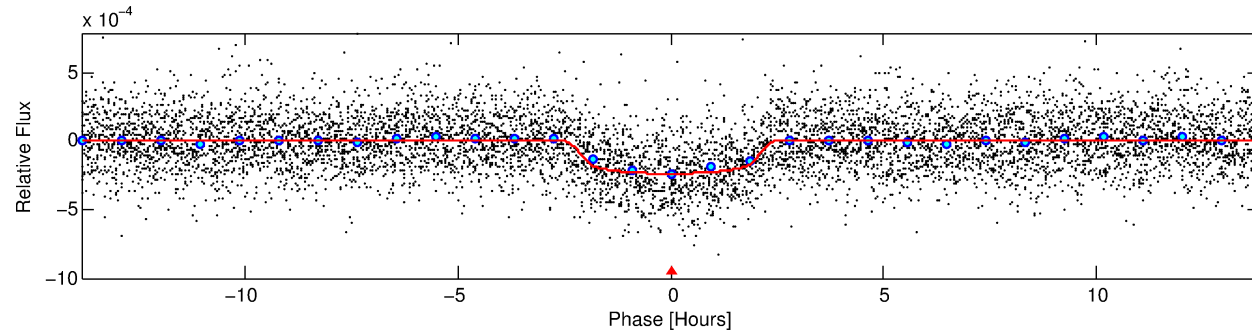
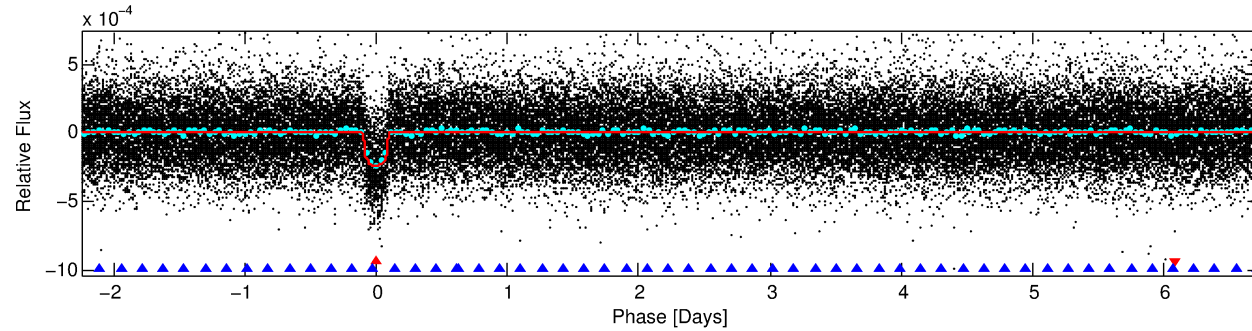
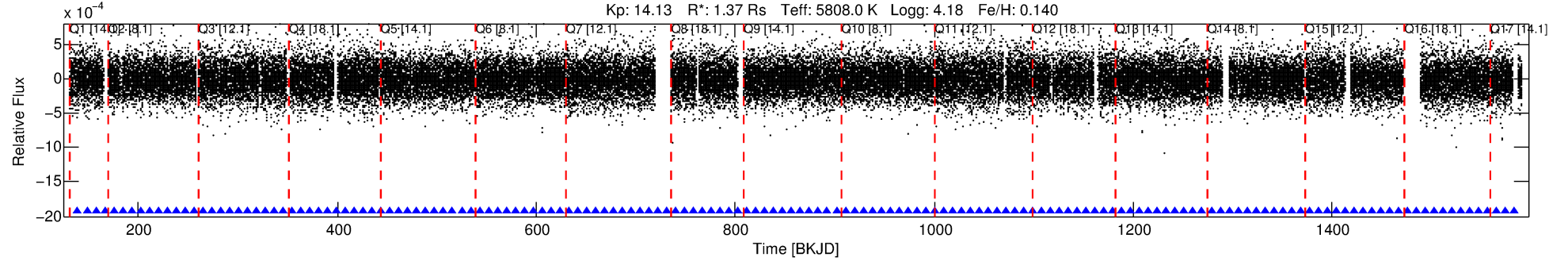
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006949061-01

No Significant Match Found

# DV One-Page Summary

KIC: 6949061 Candidate: 1 of 2 Period: 8.968 d  
KOI: K01960.01 Name: Kepler-343b Corr: 0.981



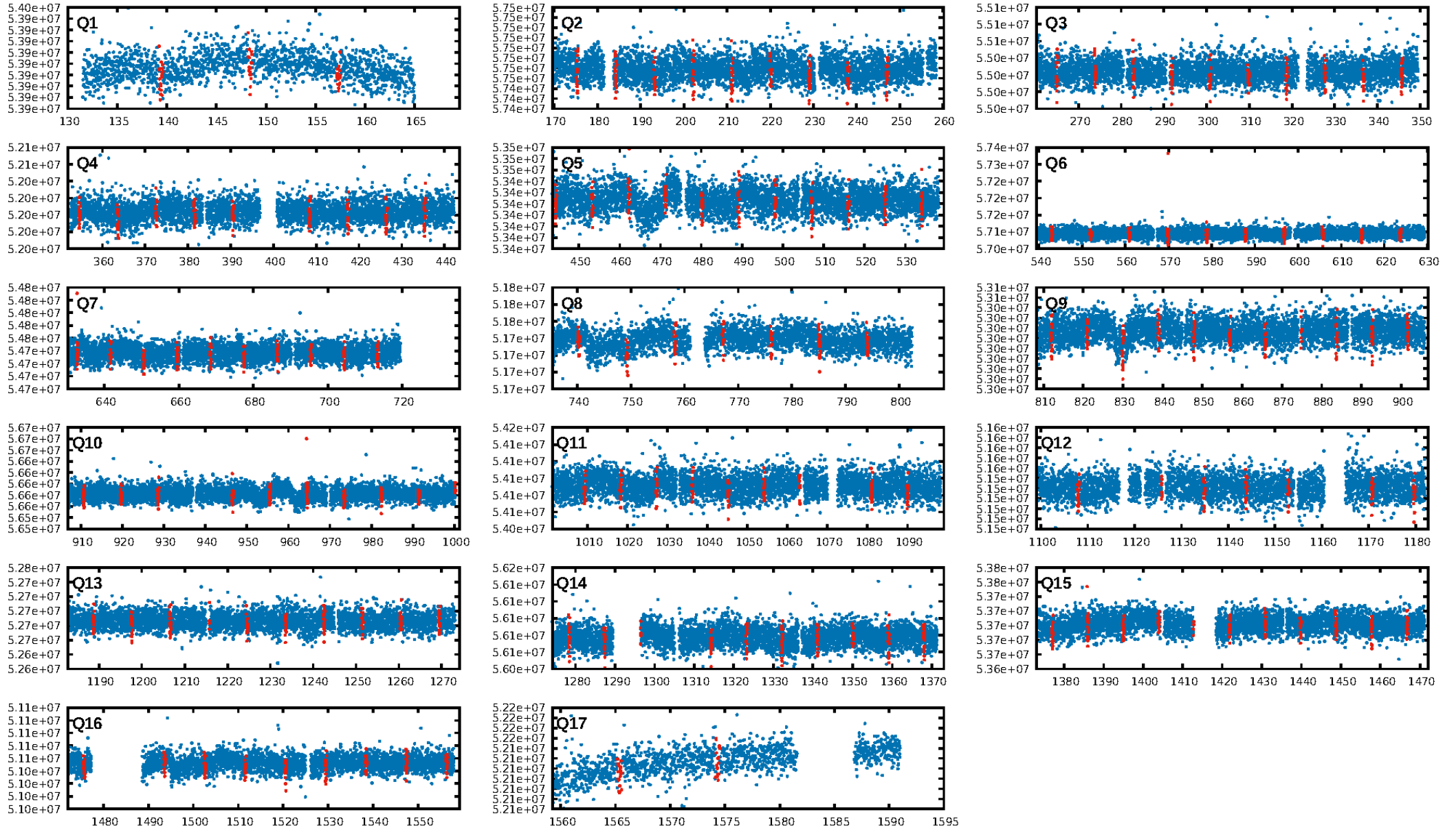
## DV Fit Results:

Period = 8.96845 [0.00003] d  
Epoch = 139.3962 [0.0025] BKJD  
Rp/R\* = 0.0167 [0.0018]  
a/R\* = 7.34 [3.71]  
b = 0.89 [0.12]  
Seff = 260.24 [79.67]  
Teq = 1024 [78] K  
Rp = 2.50 [0.53] Re  
a = 0.0860 [0.0155] AU  
Ag = 10.24 [5.32] [1.74 $\sigma$ ]  
Teffp = 2832 [308] K [5.69 $\sigma$ ]

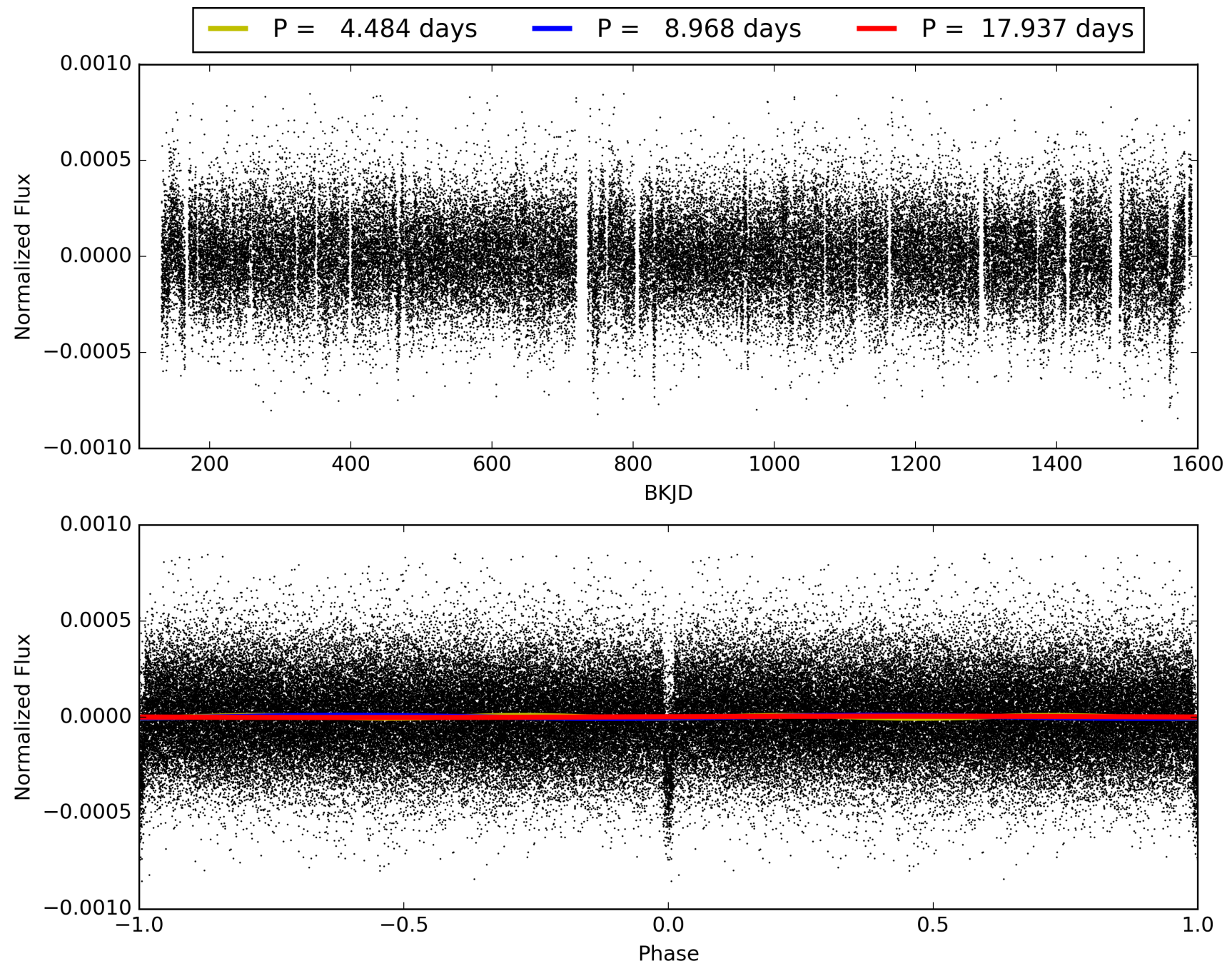
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [63.91 $\sigma$ ]  
ModelChiSquare2-sig: 99.4%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 3.58e-218  
RollingBand-fgt: 1.00 [140/140]  
GhostDiagnostic-chr: 5.873  
Centroid-sig: 0.3%  
Centroid-so: 0.890 arcsec [2.49 $\sigma$ ]  
OotOffset-rm: 0.290 arcsec [1.36 $\sigma$ ]  
KicOffset-rm: 0.225 arcsec [1.14 $\sigma$ ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 006949061-01, PDC Light Curves

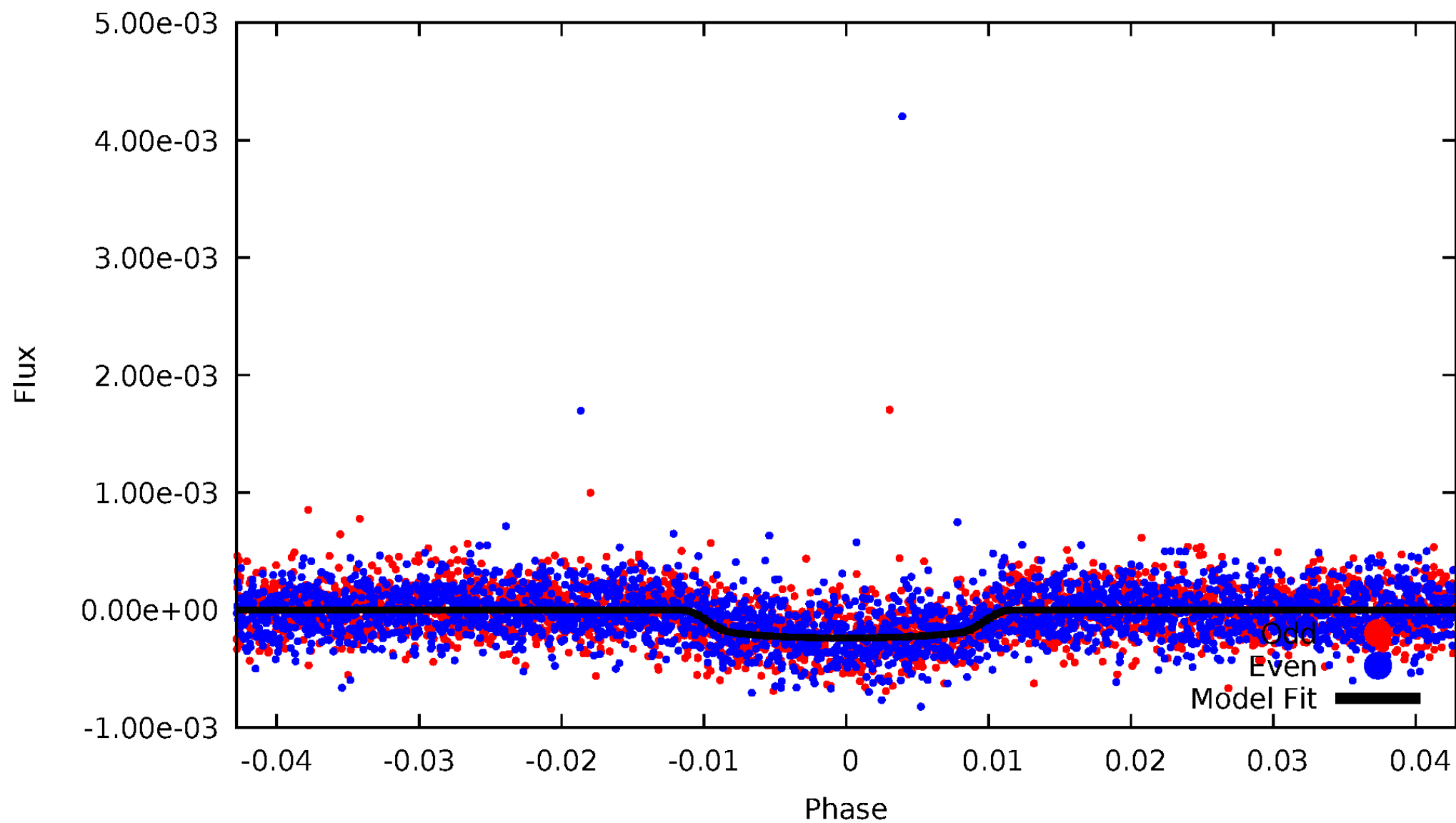


TCE 006949061-01



# DV Odd/Even

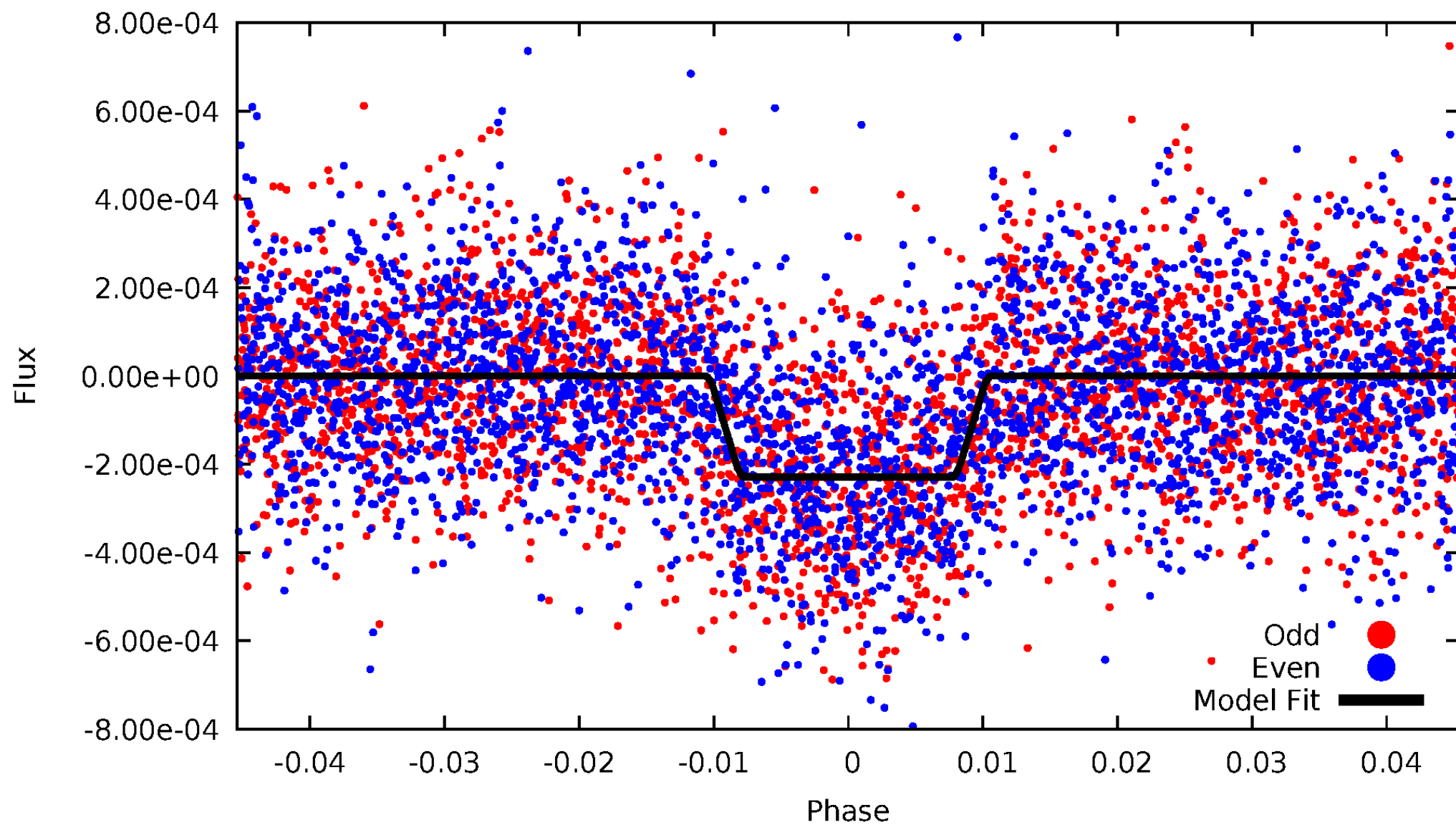
TCE 006949061-01



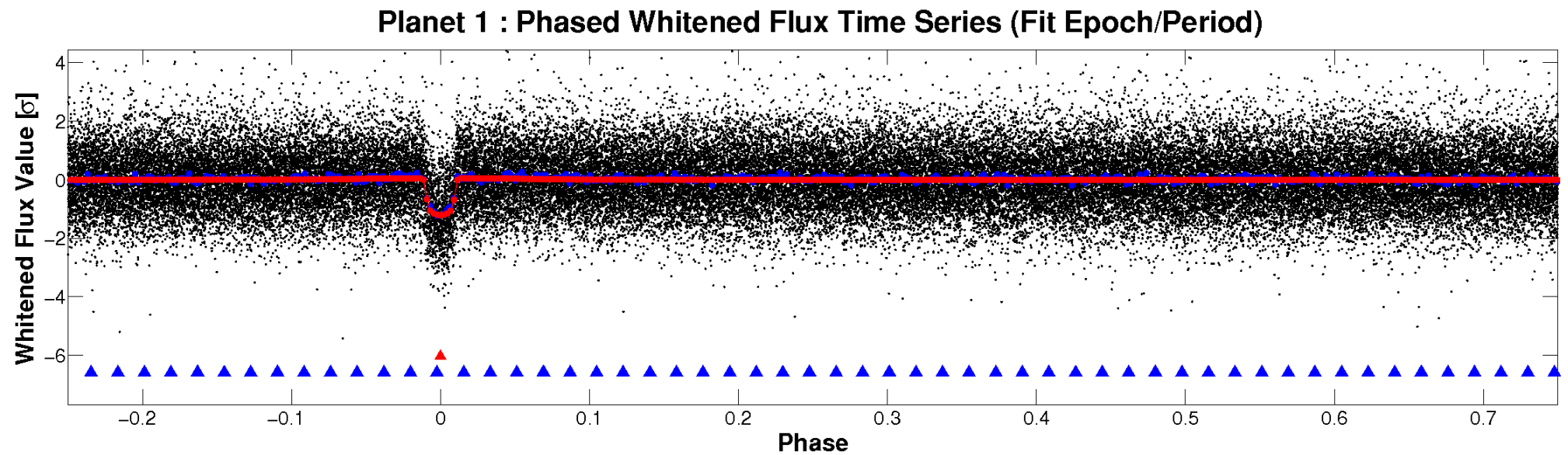
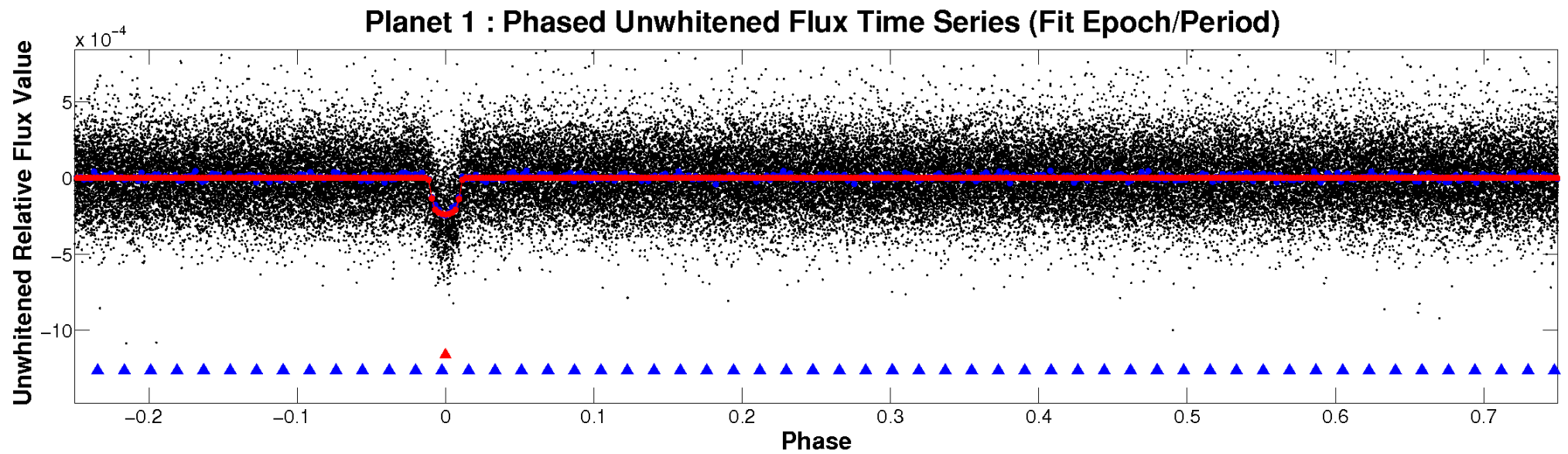


# ALT Odd/Even

TCE 006949061-01

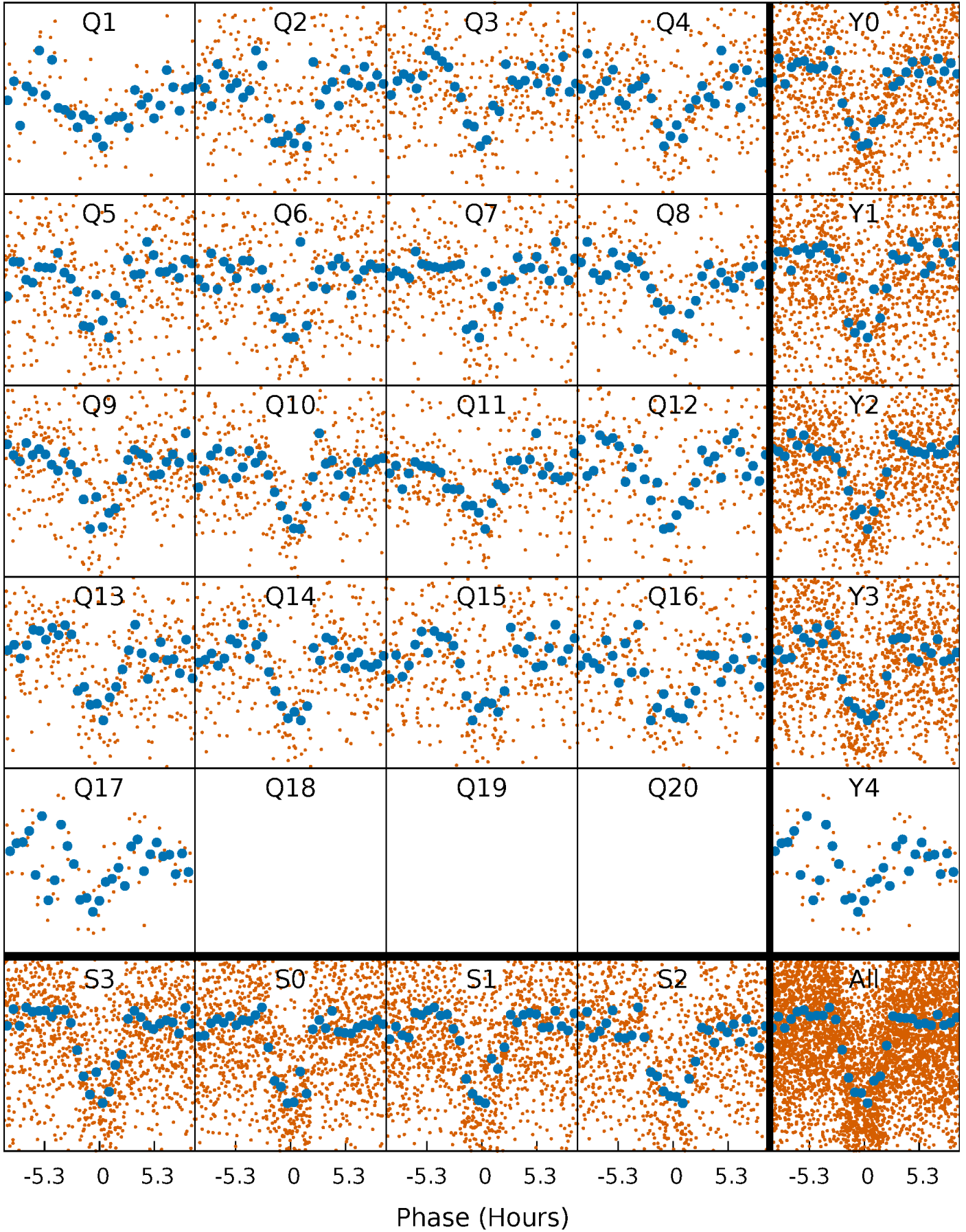


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

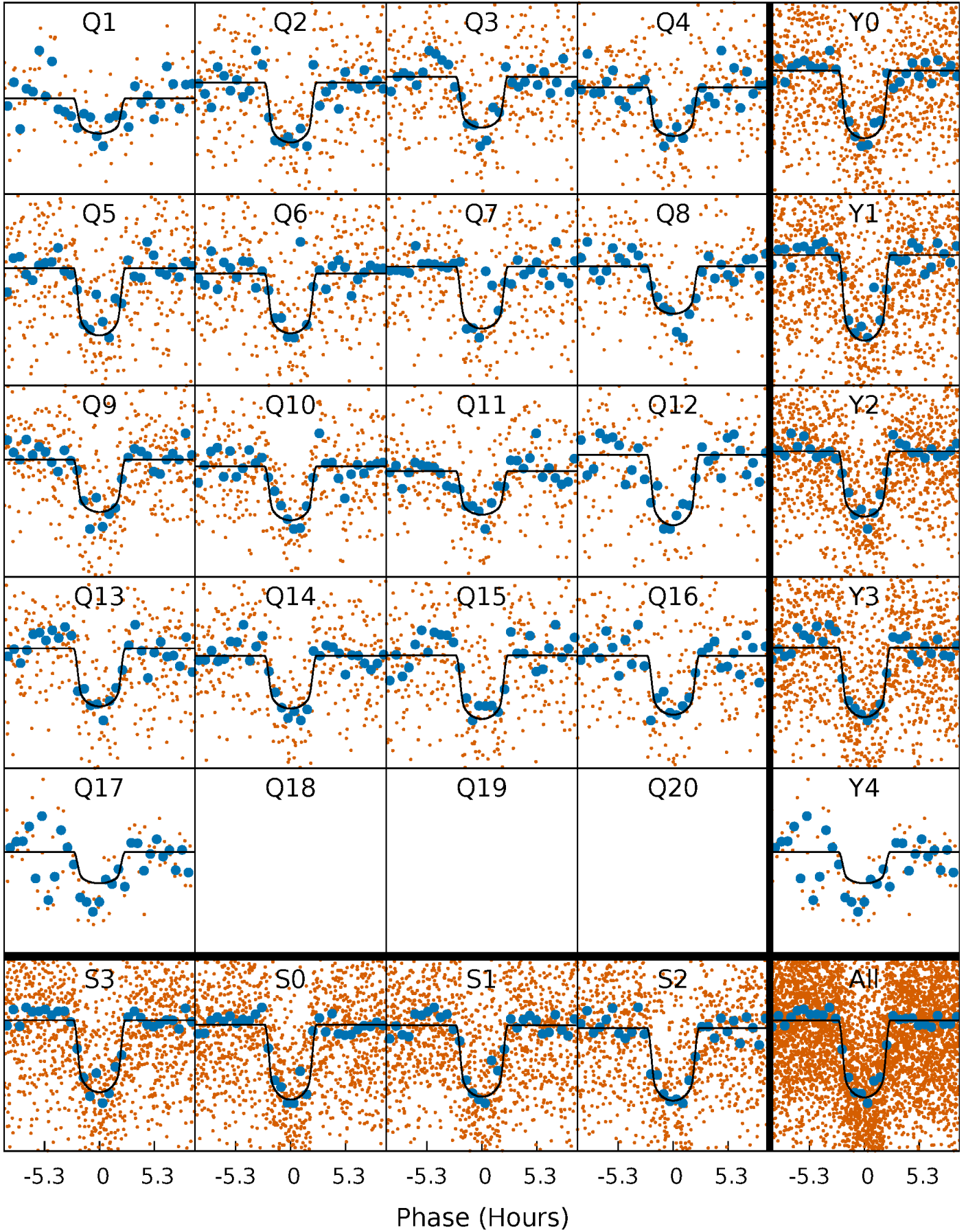
TCE 006949061-01 P= 8.968454 Days  $T_0=139.396195$  (BKJD)





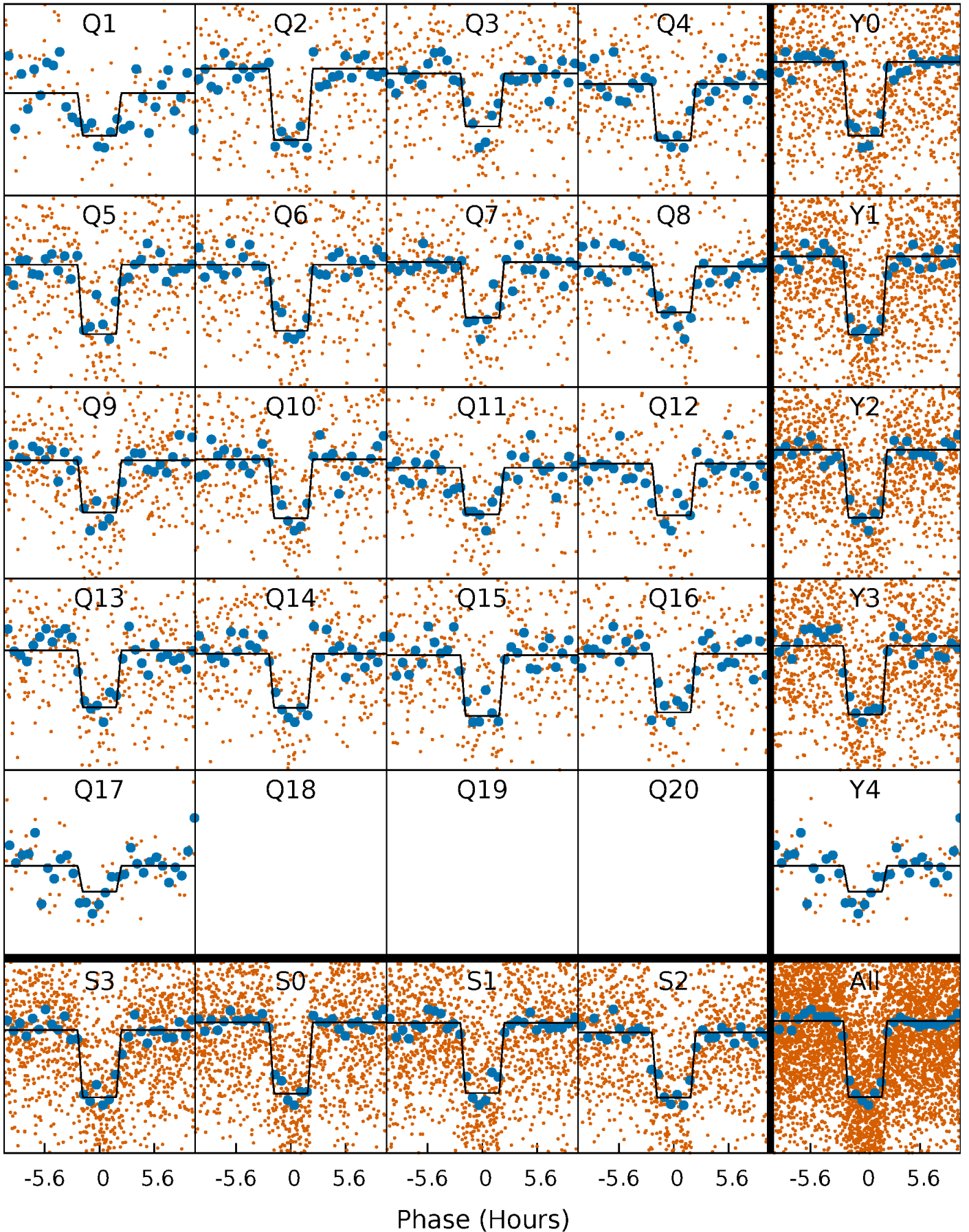
# DV Quarter-Phased Transit Curves

TCE 006949061-01 P= 8.968454 Days  $T_0=139.396195$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

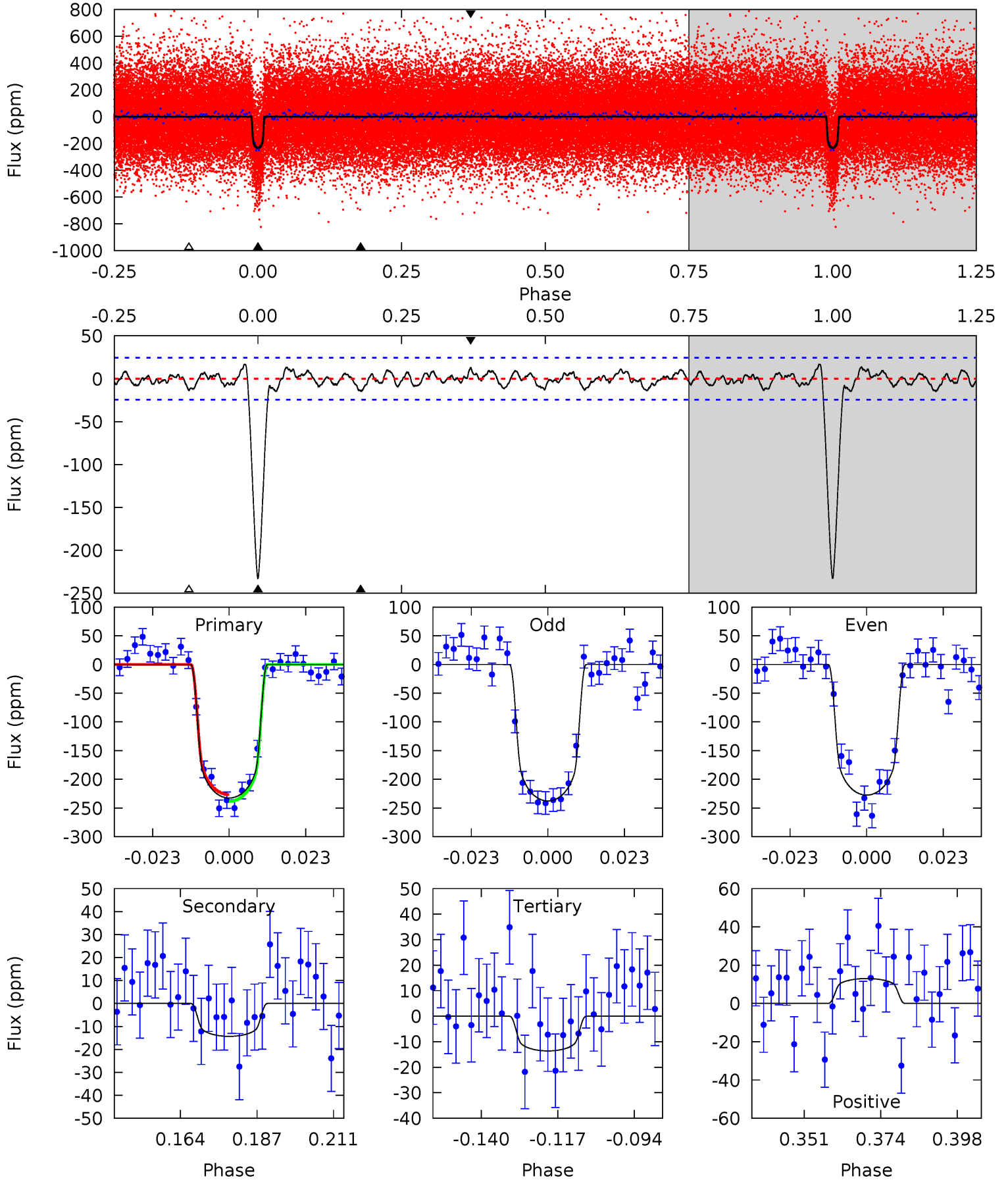
TCE 006949061-01 P= 8.968510 Days  $T_0=139.391489$  (BKJD)



# DV Model-Shift Uniqueness Test

006949061-01, P = 8.968454 Days, E = 130.427741 Days

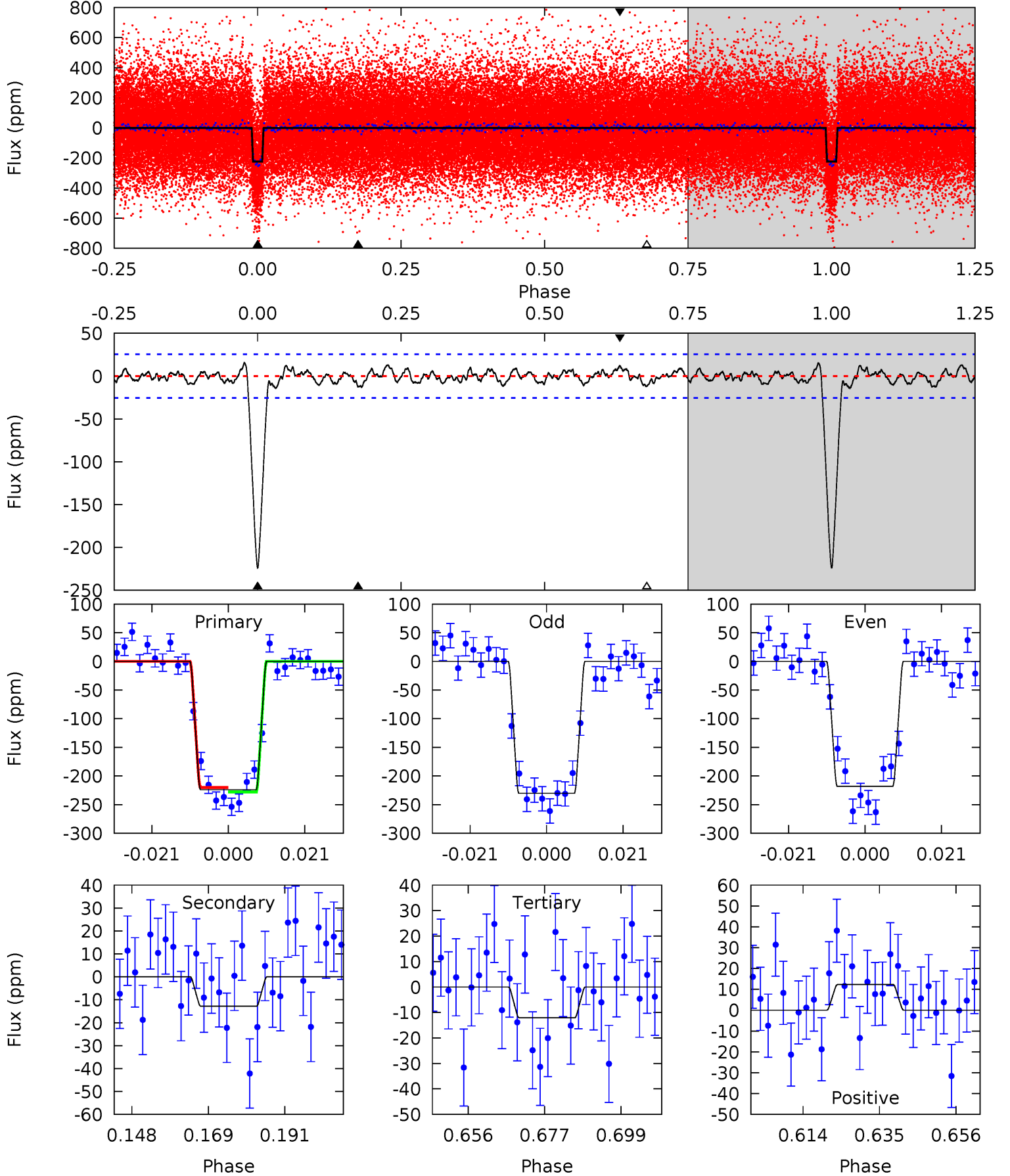
| Pri  | Sec  | Ter  | Pos  | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 46.5 | 2.86 | 2.72 | 2.60 | 4.86            | 2.27            | 1.19             | 43.7    | 43.9    | 0.14    | 0.26    | 1.01    | 0.99 | 0.07  | 1.19 |



# Alt Model-Shift Uniqueness Test

006949061-01, P = 8.968510 Days, E = 130.422979 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  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 42.8 | 2.45 | 2.31 | 2.35 | 4.88            | 2.30            | 1.05             | 40.5    | 40.4    | 0.15    | 0.10    | 1.17    | 1.00 | 0.07  | 0.74 |



### Stellar Parameters For KIC 006949061

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                    | $R (R_{\odot})$           | $M(M_{\odot})$            | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|---------------------------|---------------------------|---------------------------|---|
|        | $5808^{+105}_{-117}$ | $4.185^{+0.176}_{-0.108}$ | $0.140^{+0.150}_{-0.150}$ | $1.374^{+0.221}_{-0.246}$ | $1.054^{+0.100}_{-0.080}$ | $0.573^{+0.463}_{-0.186}$                 |
|        | +2%/-2%              | +4%/-3%                   | +107%/-107%               | +16%/-18%                 | +9%/-8%                   | +81%/-33%                                 |
| Source | SPE58                | SPE58                     | SPE58                     | DSEP                      |                           |   |

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 006949061-01 / KOI 1960.01

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$     | $T_{max} (K)$      | $T_{obs} (K)$        | $A_{obs}$                 |
|---------|-------------|------------------------|--------------------|----------------------|---------------------------|
| DV      | $-14 \pm 5$ | $2.47^{+0.38}_{-0.36}$ | $1423^{+67}_{-80}$ | $3285^{+219}_{-238}$ | $9.386^{+5.178}_{-3.780}$ |
| Alt.    | $-13 \pm 5$ | $2.23^{+0.35}_{-0.34}$ | $1421^{+76}_{-79}$ | $3334^{+241}_{-290}$ | $10^{+6}_{-5}$            |

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



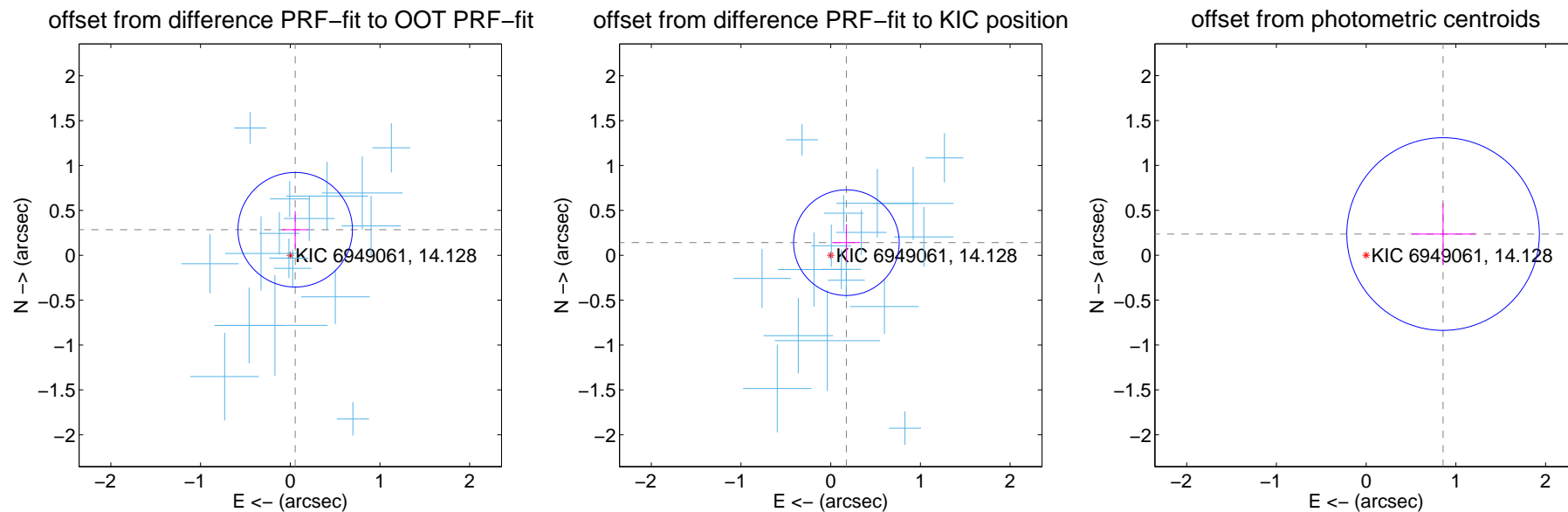
## DV Centroid Data

Supplemental centroid analysis for 006949061-01. Kepler magnitude: 14.13. Transit SNR 36.38

There are 17 quarters with good PRF difference image offsets

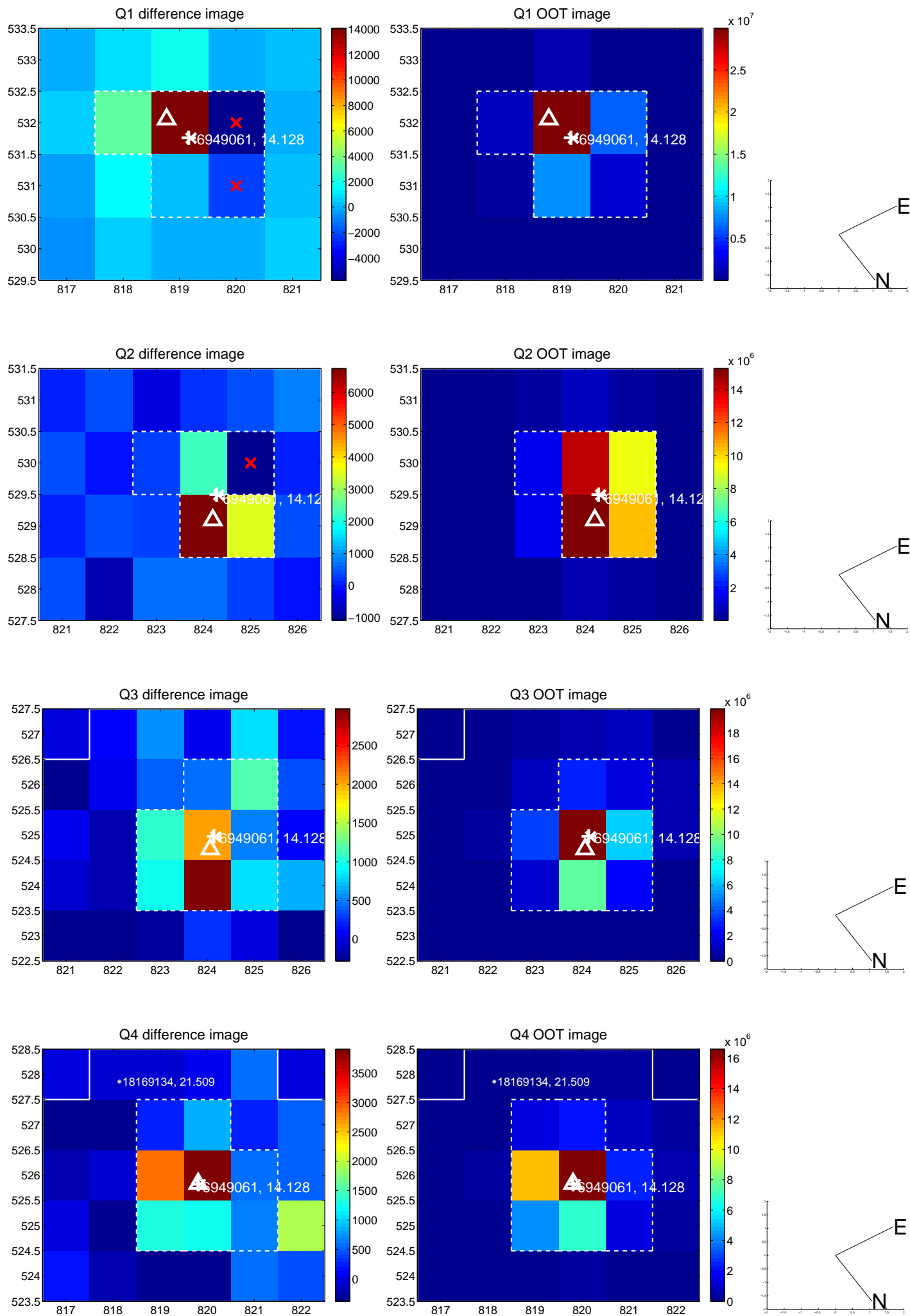
The direct PRF centroid is offset from the target star catalog position by about 0.22 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA        | $\Delta$ Dec      |
|---|--------------------|---------------------|--------------------|-------------------|
| PRF-fit source offset from OOT          | $0.290 \pm 0.213$  | 1.36                | $-0.055 \pm 0.147$ | $0.285 \pm 0.209$ |
| PRF-fit source offset from KIC position | $0.225 \pm 0.196$  | 1.14                | $-0.175 \pm 0.158$ | $0.141 \pm 0.205$ |
| photometric centroid source offset      | $0.89 \pm 0.36$    | 2.49                | $-0.86 \pm 0.36$   | $0.24 \pm 0.34$   |

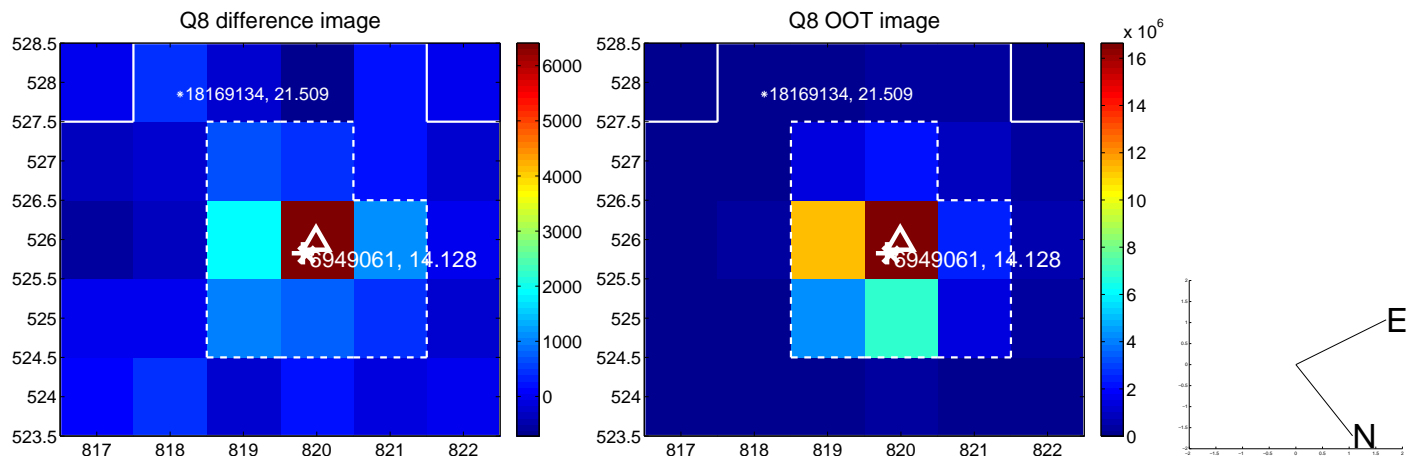
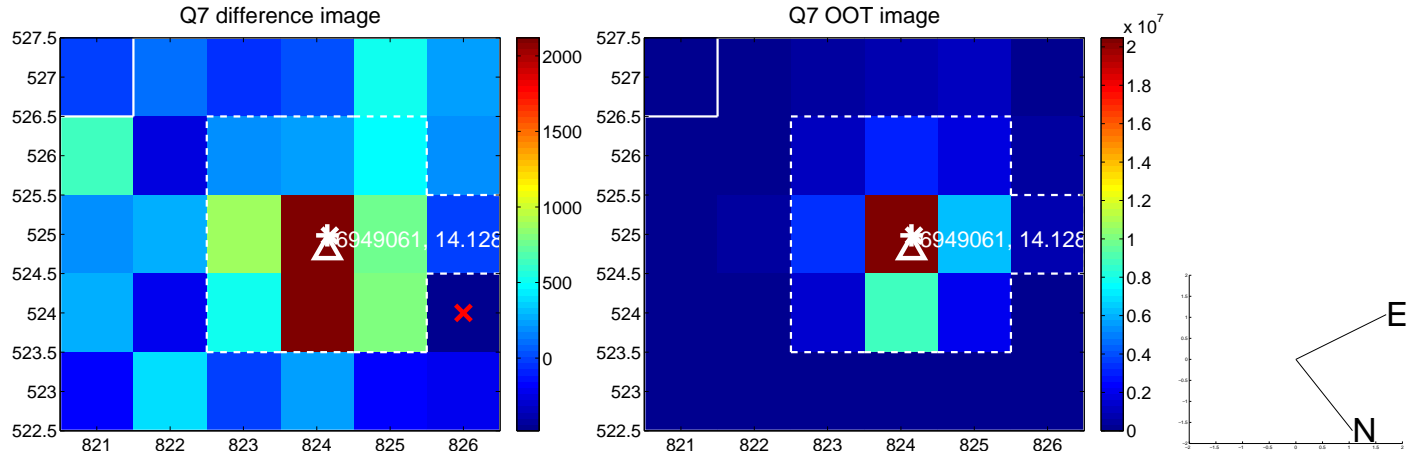
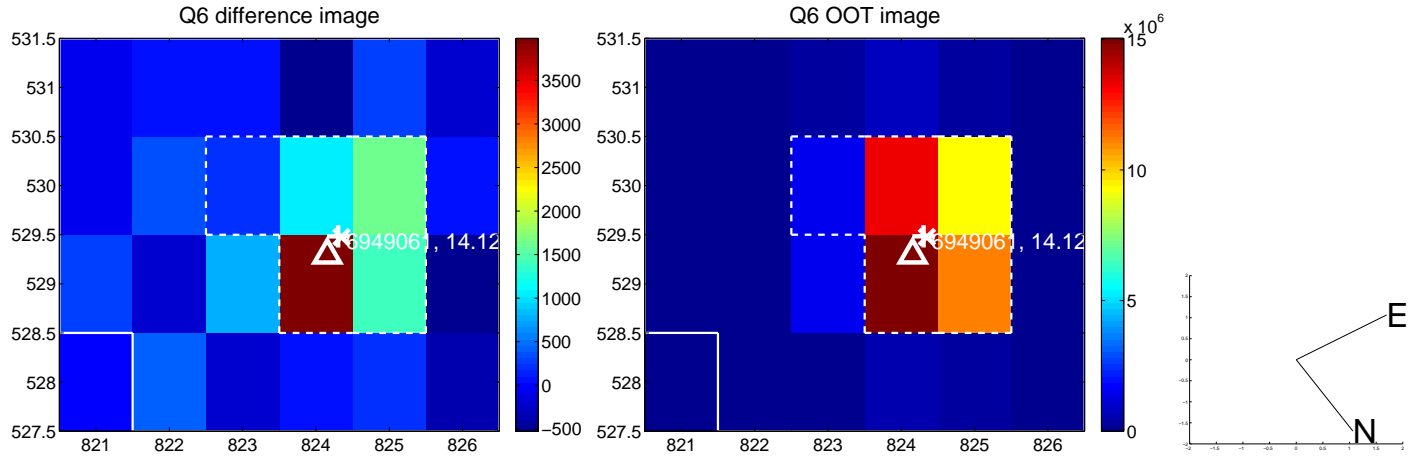
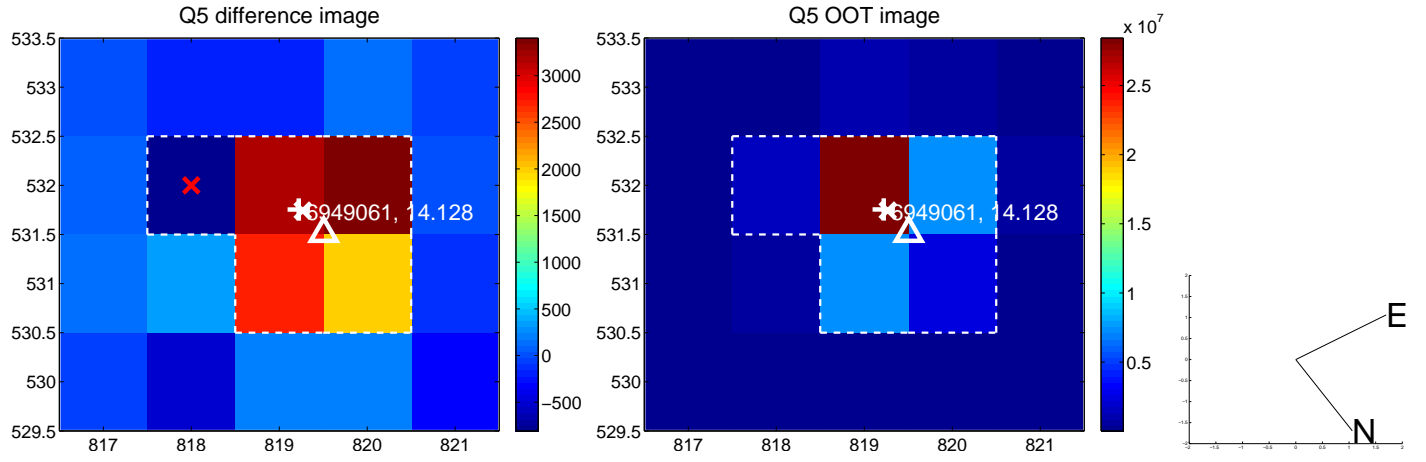


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

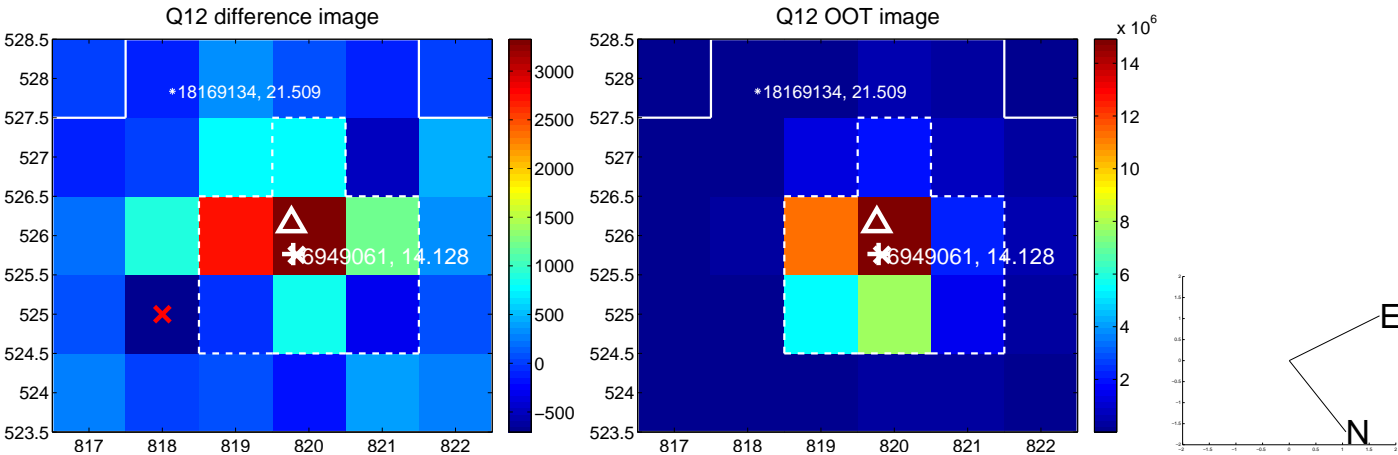
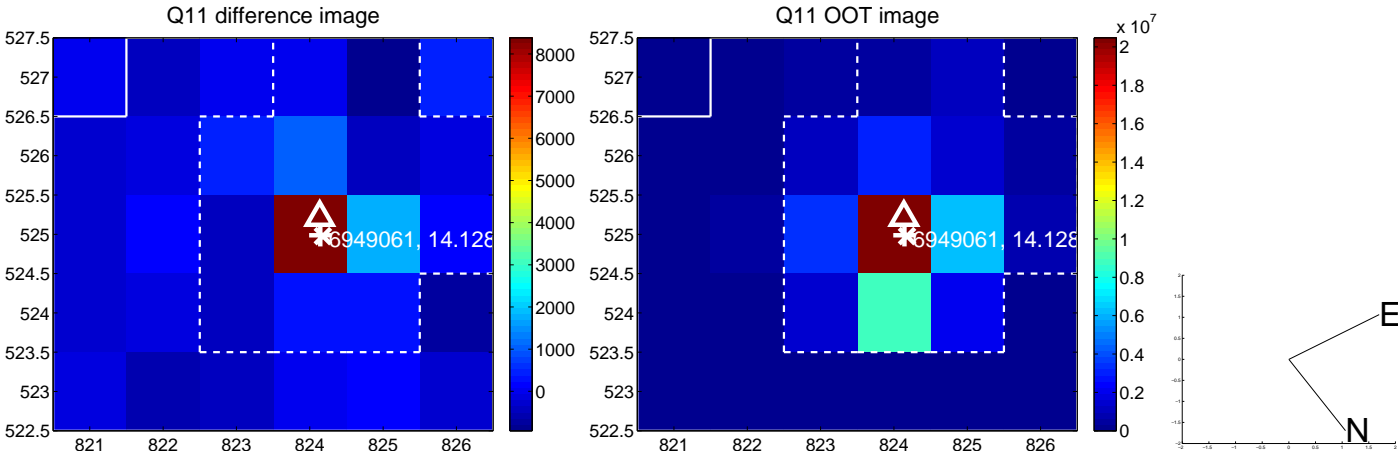
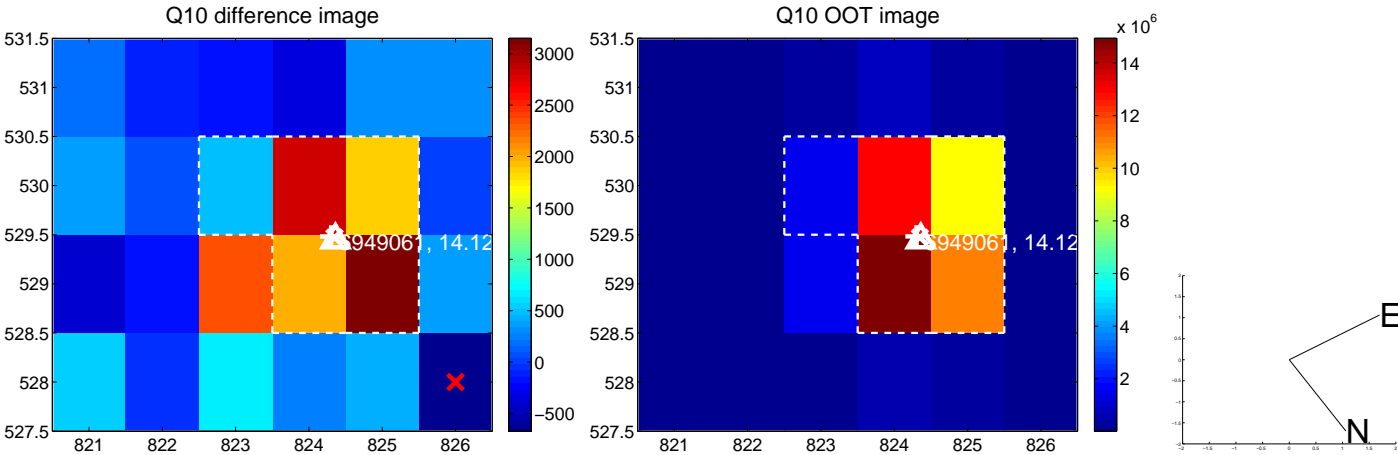
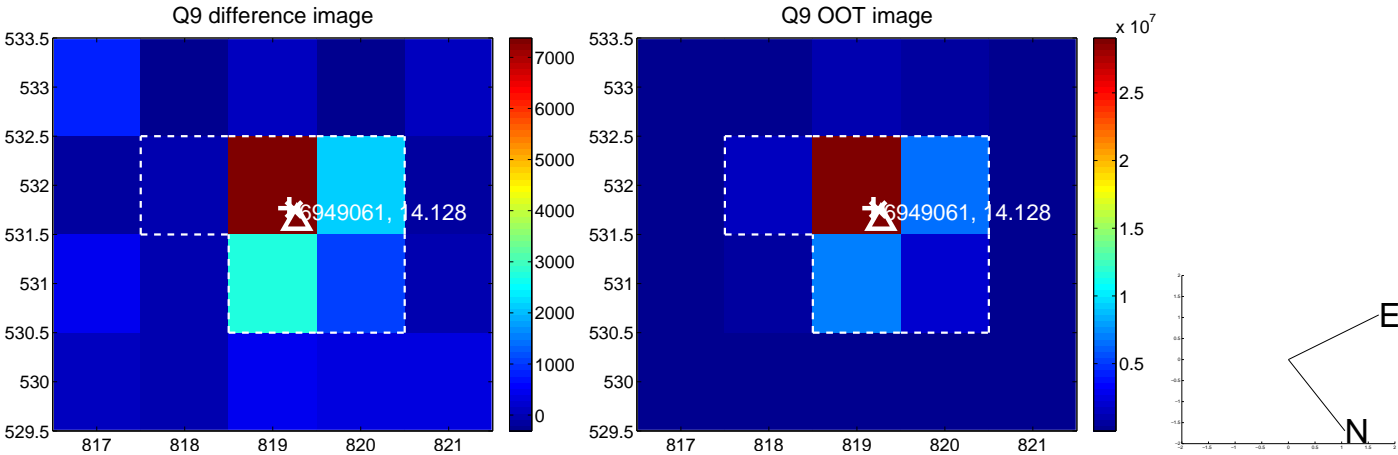
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



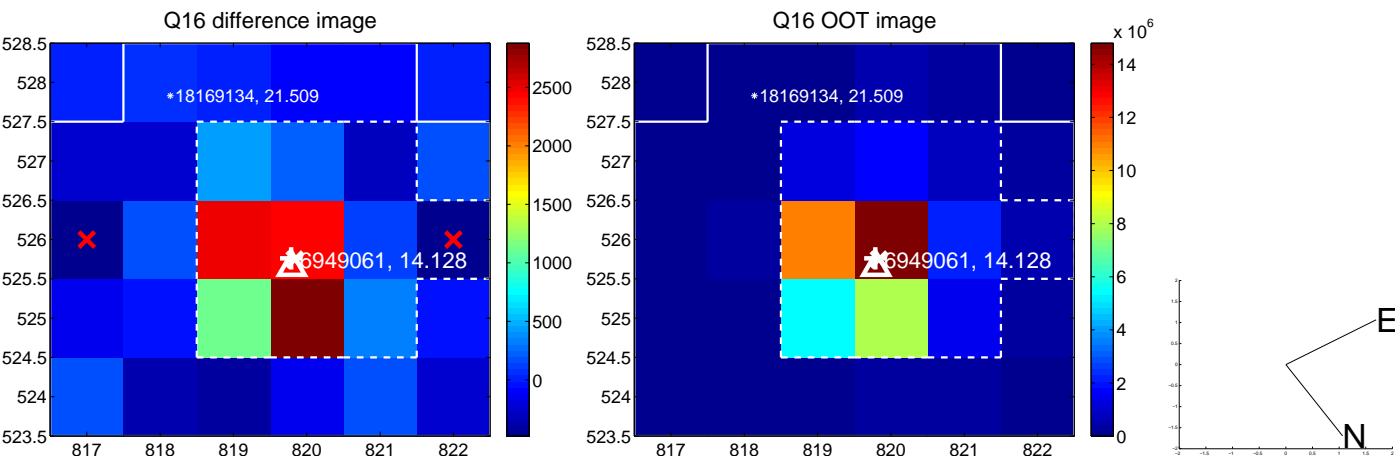
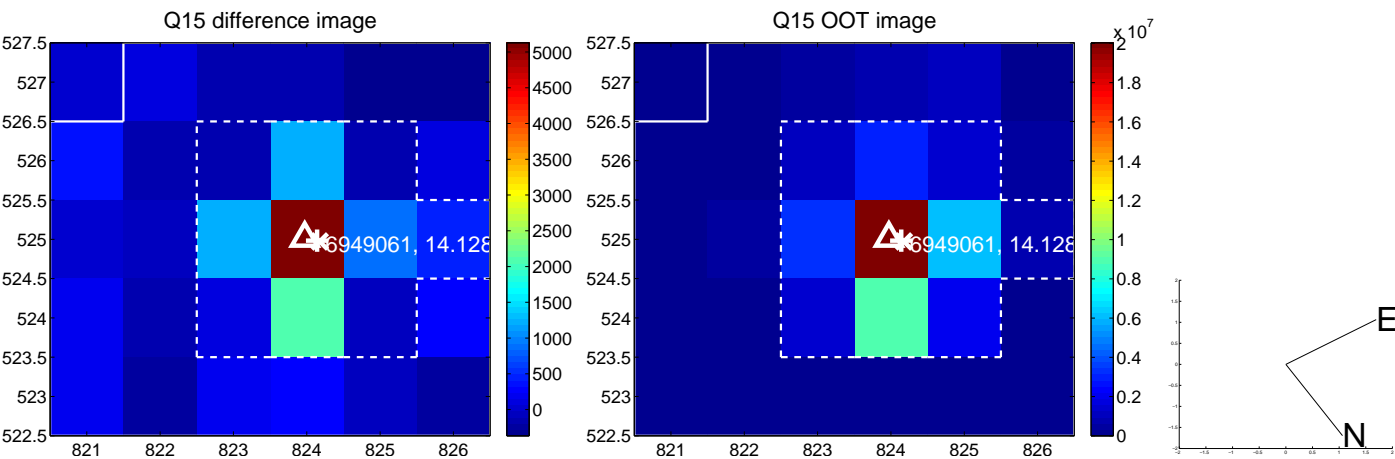
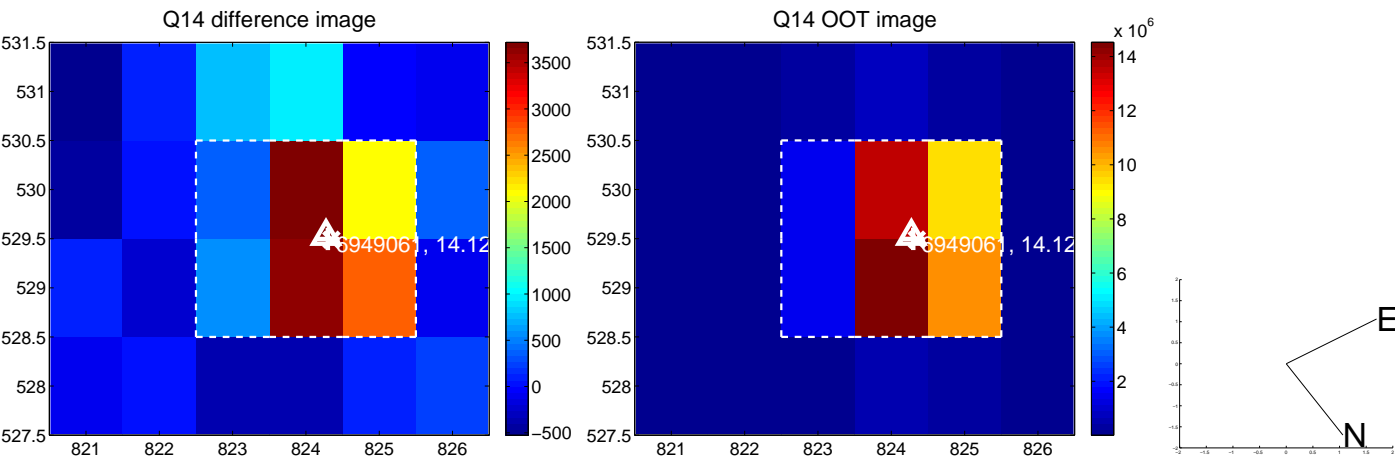
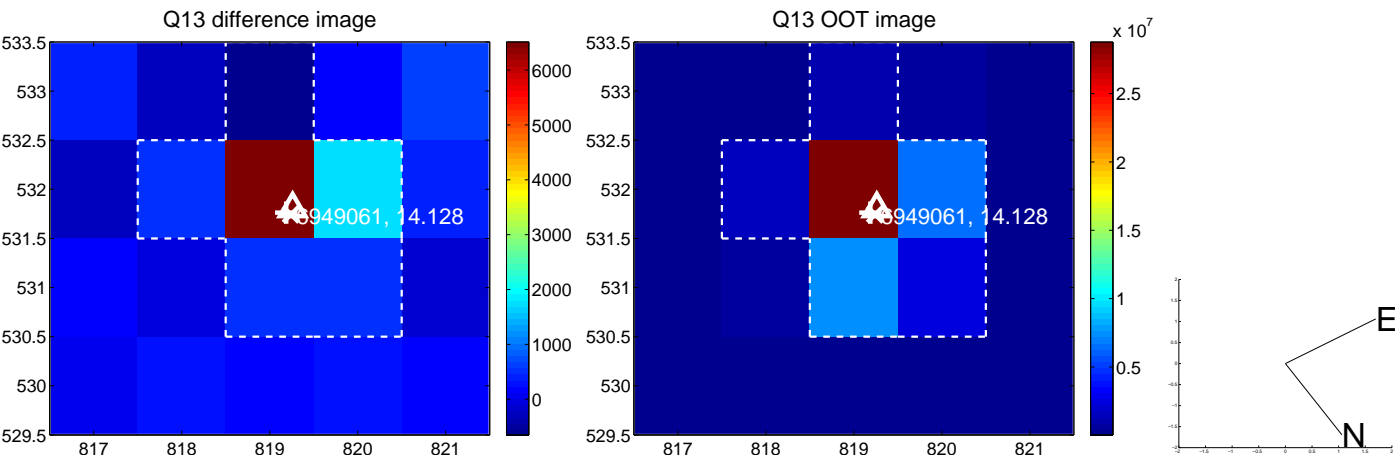
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

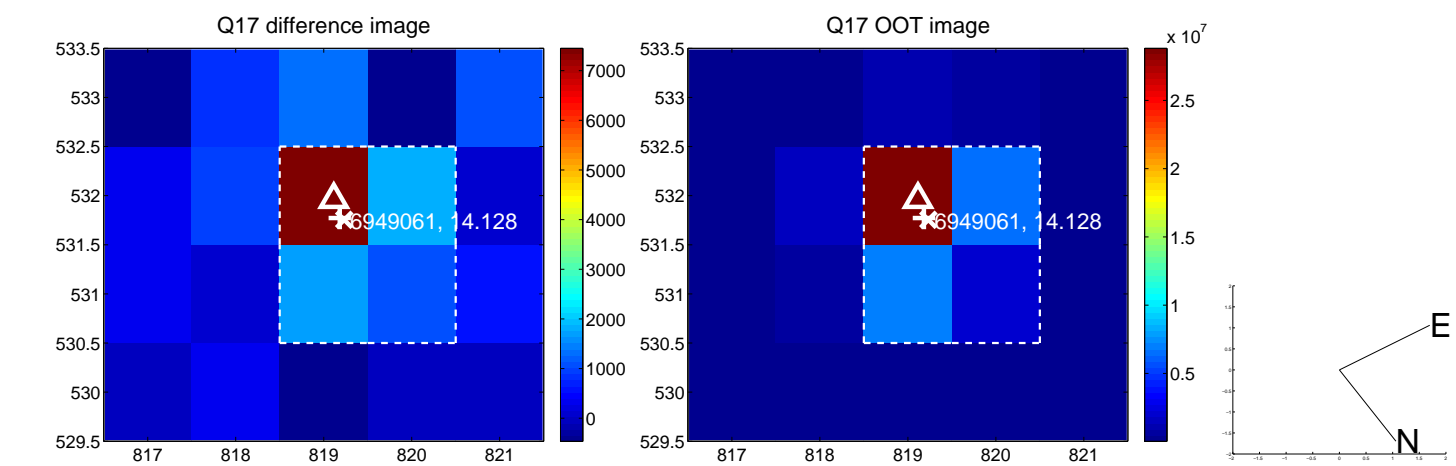


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

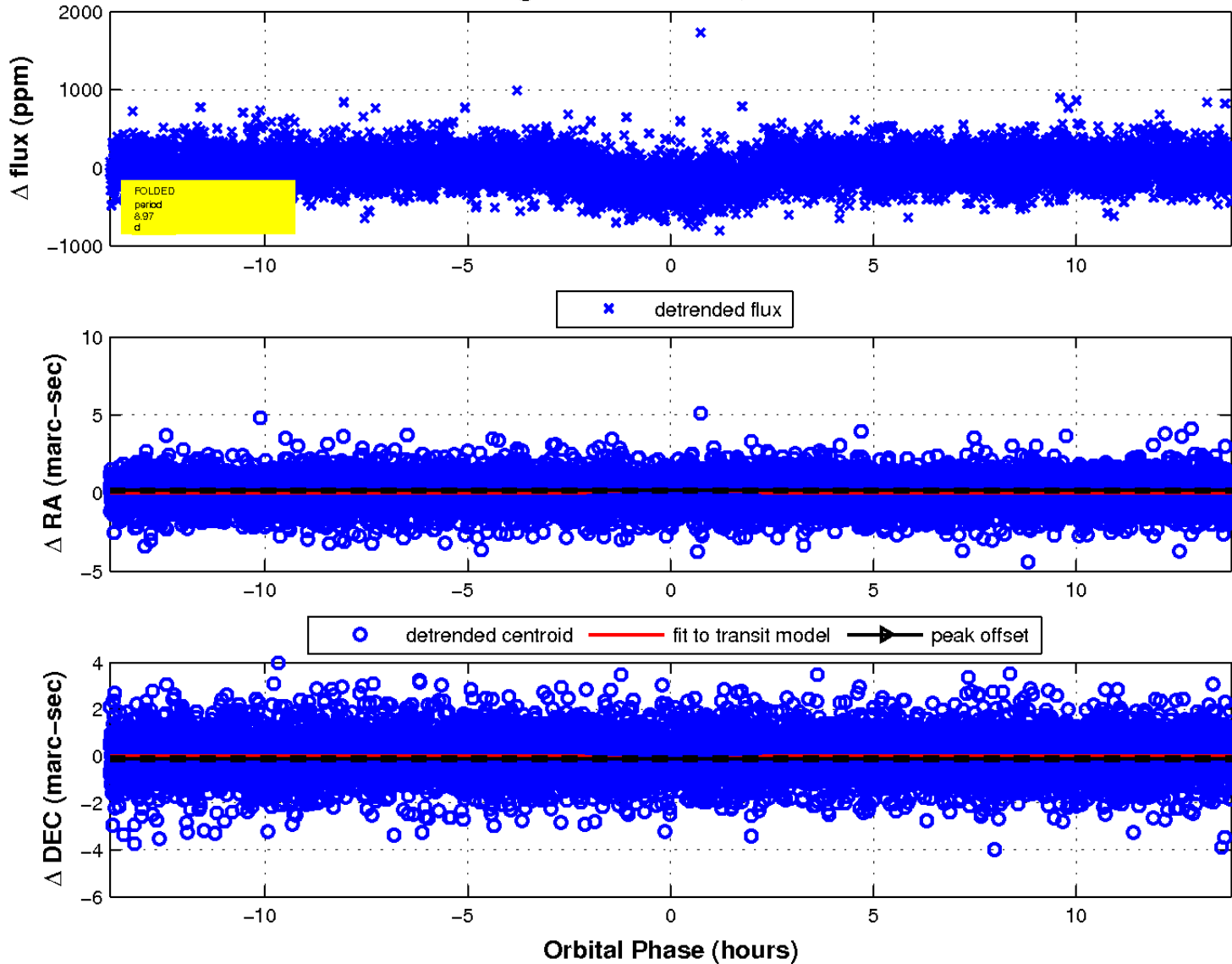




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

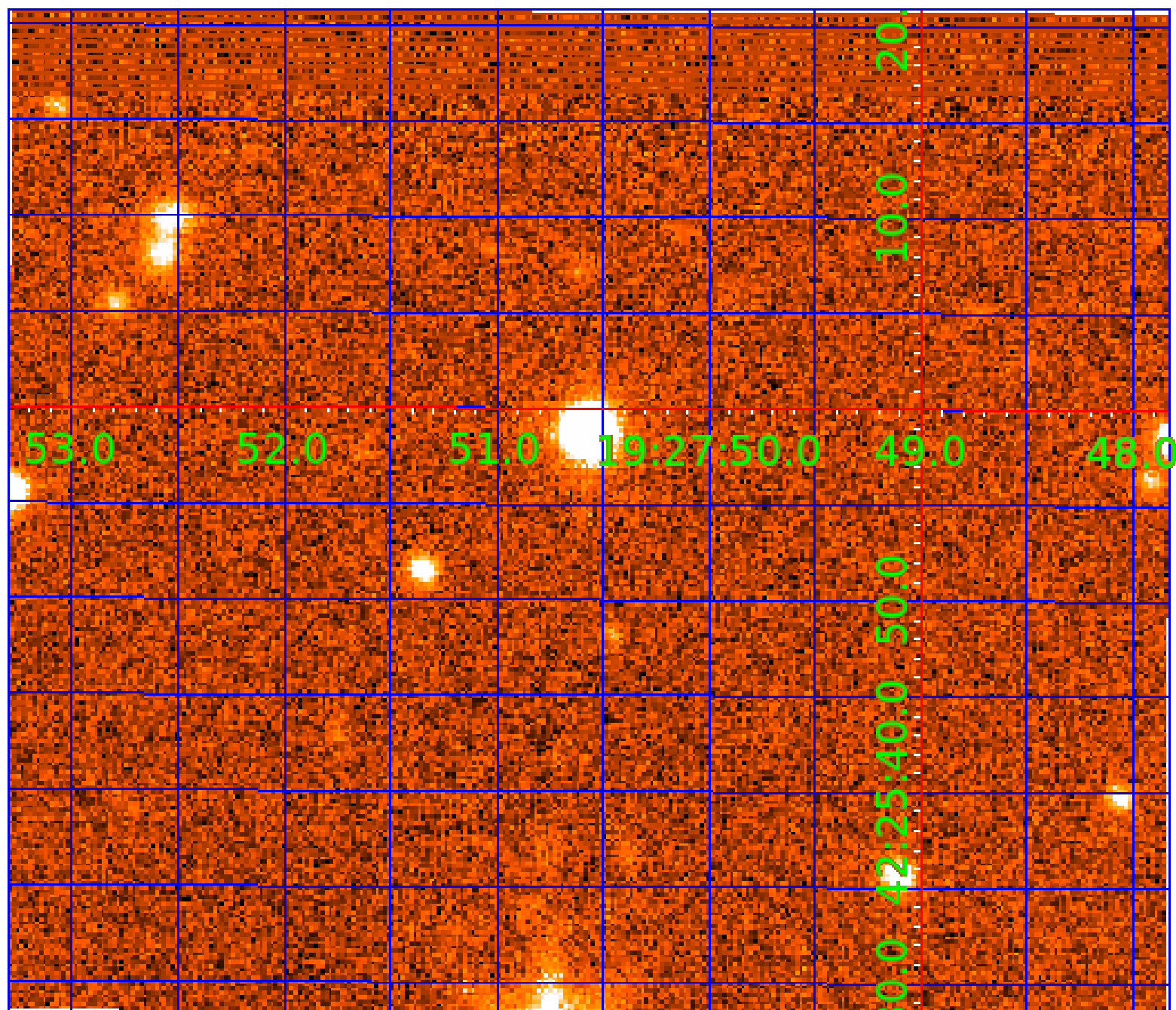


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination



# KIC 006949061

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 006949061-01 | OBS      | 1960.01 | 8.968454      | 139.396195   | 238.6       | 4.608            | 32.7 | 36.4 | 1.37                        | 5808            | 2.50                   | 260.24                 |
| 006949061-02 | OBS      | 1960.02 | 23.221844     | 151.067915   | 197.6       | 2.723            | 14.0 | 15.0 | 1.37                        | 5808            | 2.32                   | 73.19                  |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments   |
|--------------|----------|------|-------|---|---|---|---|------------|
| 006949061-01 | OBS      | PC   | 1.00  | 0 | 0 | 0 | 0 | NO_COMMENT |
| 006949061-02 | OBS      | PC   | 0.99  | 0 | 0 | 0 | 0 | NO_COMMENT |

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

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

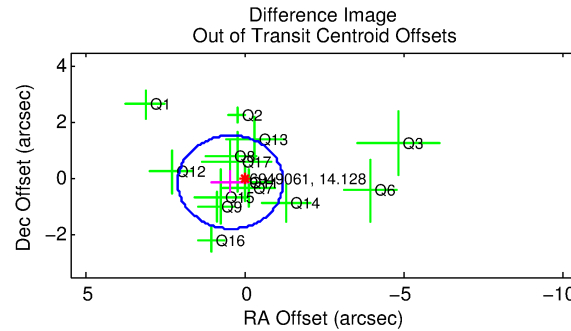
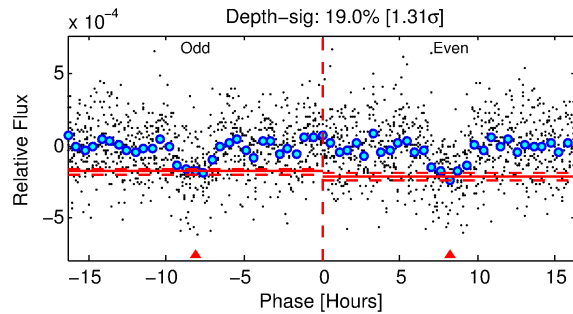
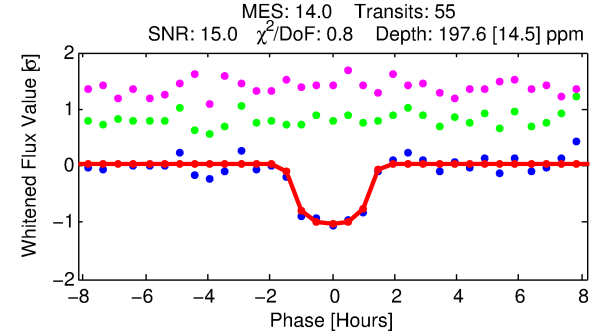
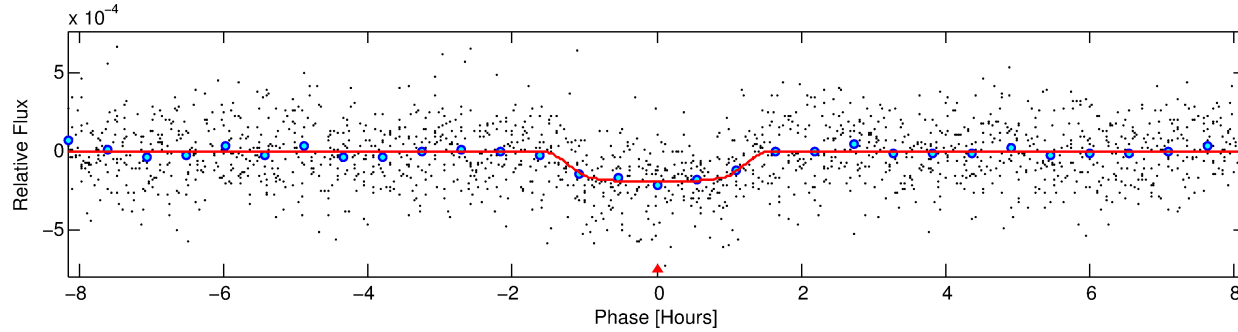
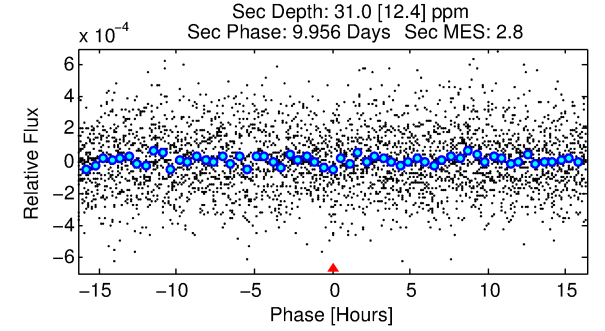
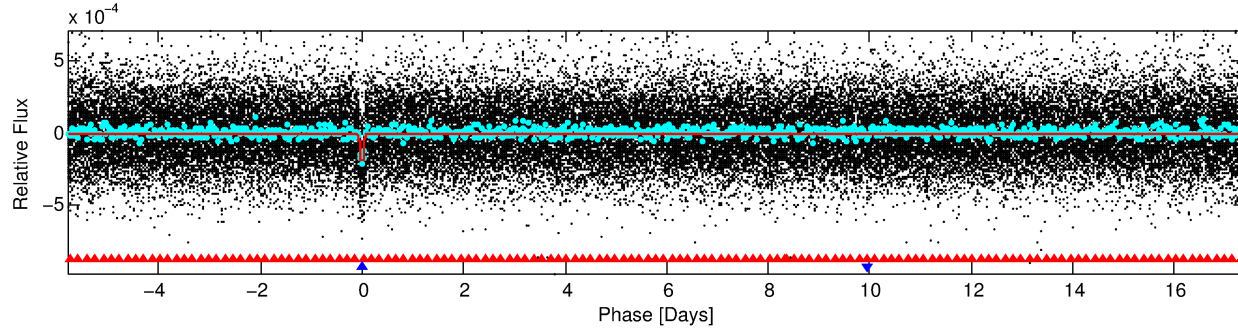
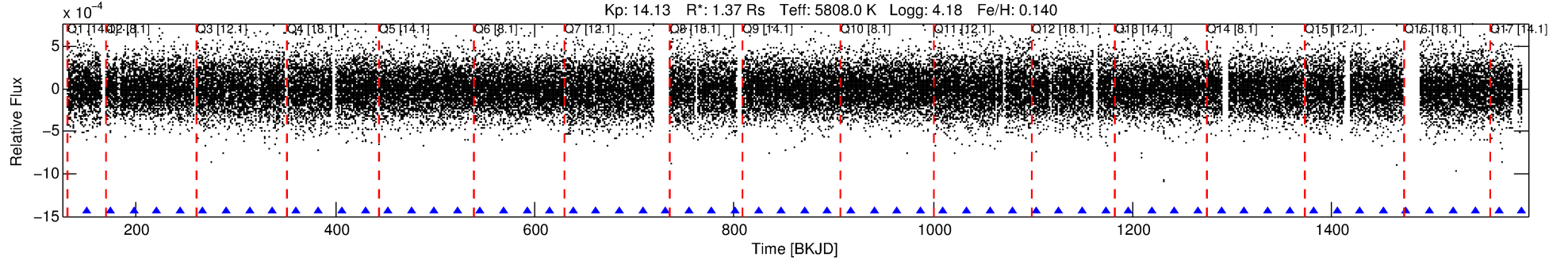
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006949061-02

No Significant Match Found

# DV One-Page Summary

KIC: 6949061 Candidate: 2 of 2 Period: 23.222 d  
KOI: K01960.02 Name: Kepler-343c Corr: 0.960



## DV Fit Results:

Period = 23.22184 [0.00013] d  
Epoch = 151.0679 [0.0047] BKJD  
Rp/R\* = 0.0155 [0.0057]  
a/R\* = 29.68 [51.77]  
b = 0.91 [0.35]  
Seff = 73.19 [22.41]  
Teq = 746 [57] K  
Rp = 2.32 [0.95] Re  
a = 0.1622 [0.0292] AU  
Ag = 83.42 [73.96] [1.11σ]  
Teffp = 3485 [732] K [3.73σ]

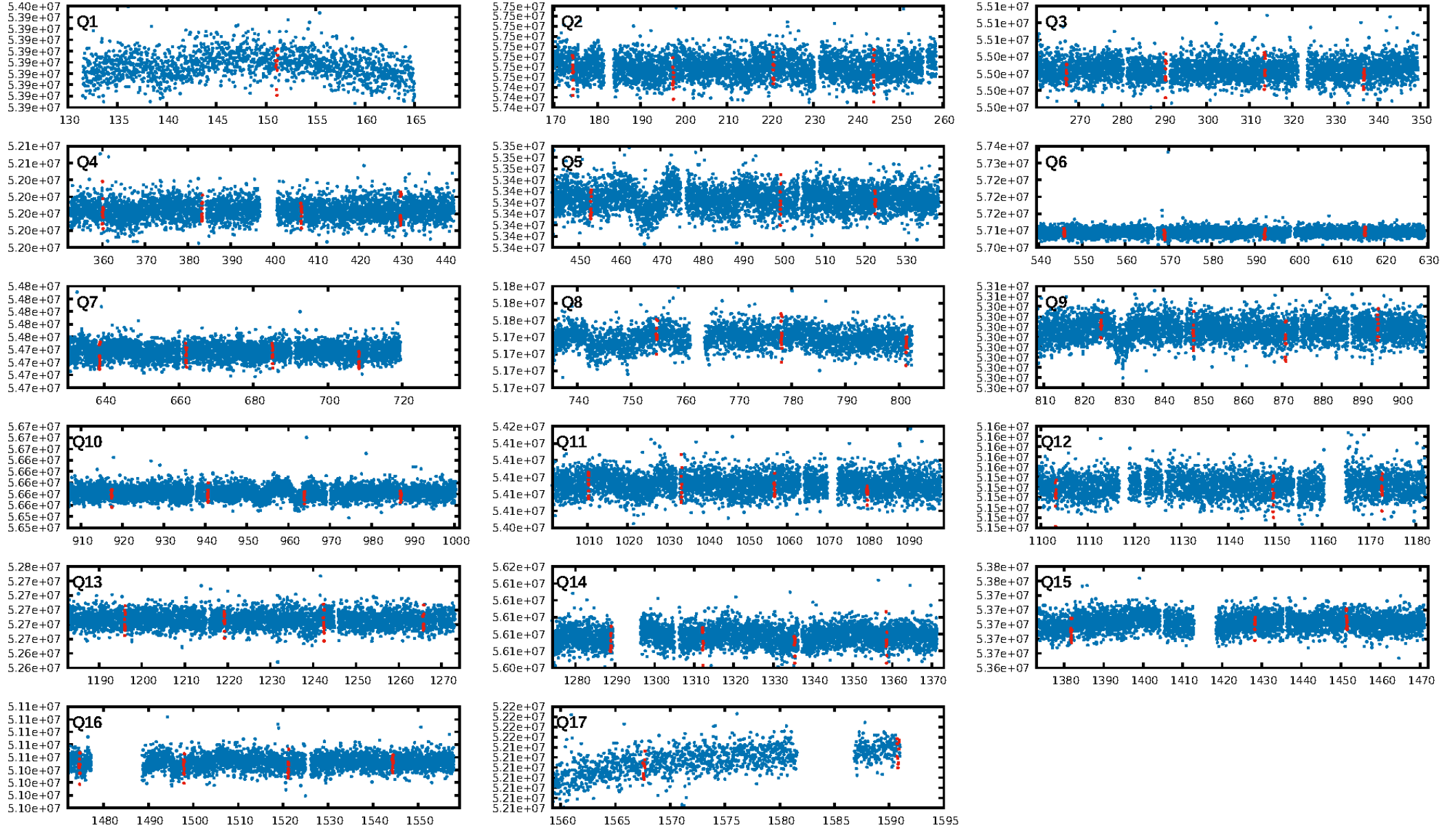
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [63.91σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 80.4%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 3.32e-43  
RollingBand-fgt: 1.00 [52/52]  
GhostDiagnostic-chr: 7.743  
Centroid-sig: 87.7%  
Centroid-so: 0.225 arcsec [0.26σ]  
OotOffset-rm: 0.480 arcsec [0.87σ]  
KicOffset-rm: 0.419 arcsec [0.94σ]  
OotOffset-st: 3/4/3/4 [14]  
KicOffset-st: 3/4/3/4 [14]  
DiffImageQuality-fgm: 0.79 [11/14]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 09:16:43 Z

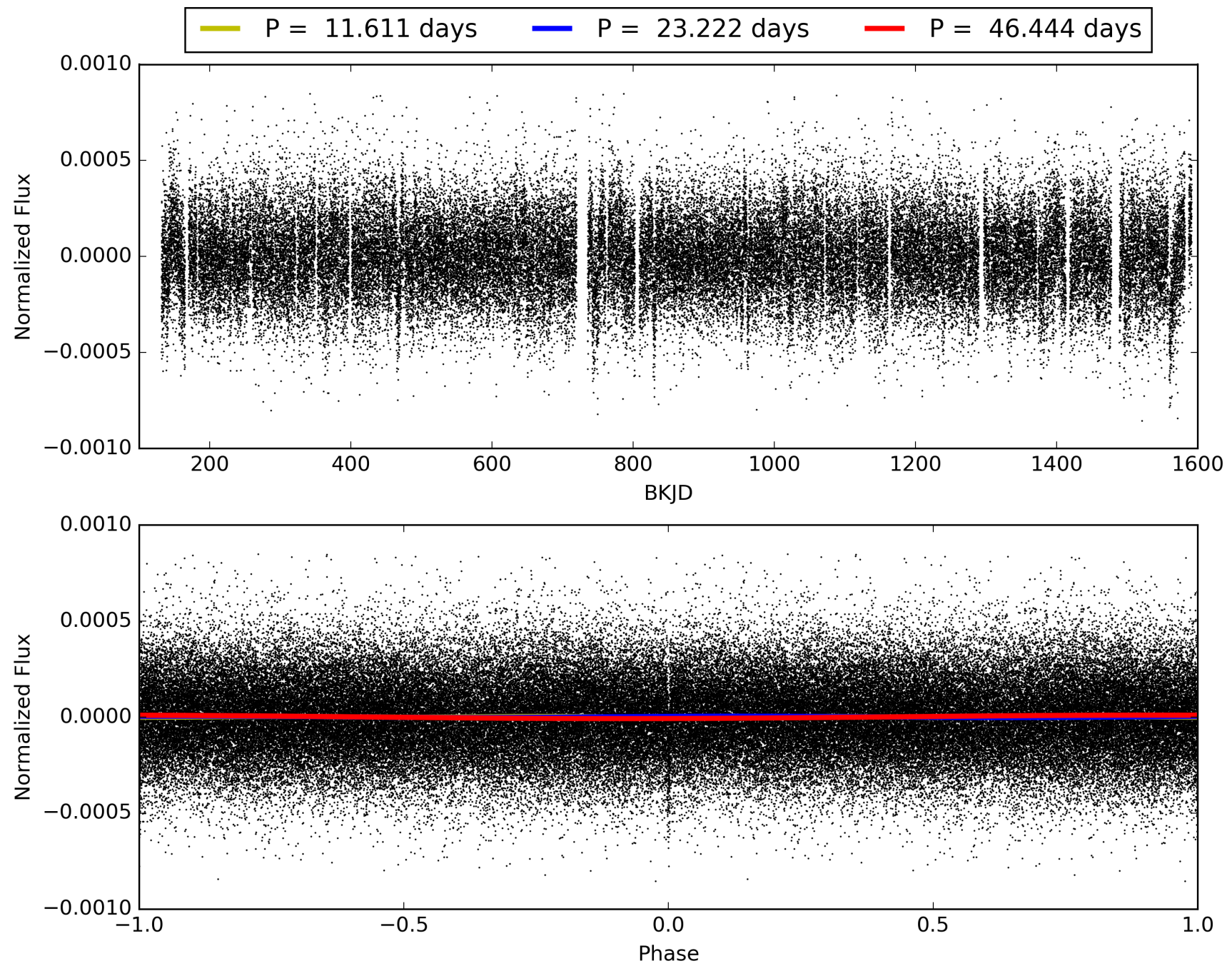
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 006949061-02, PDC Light Curves



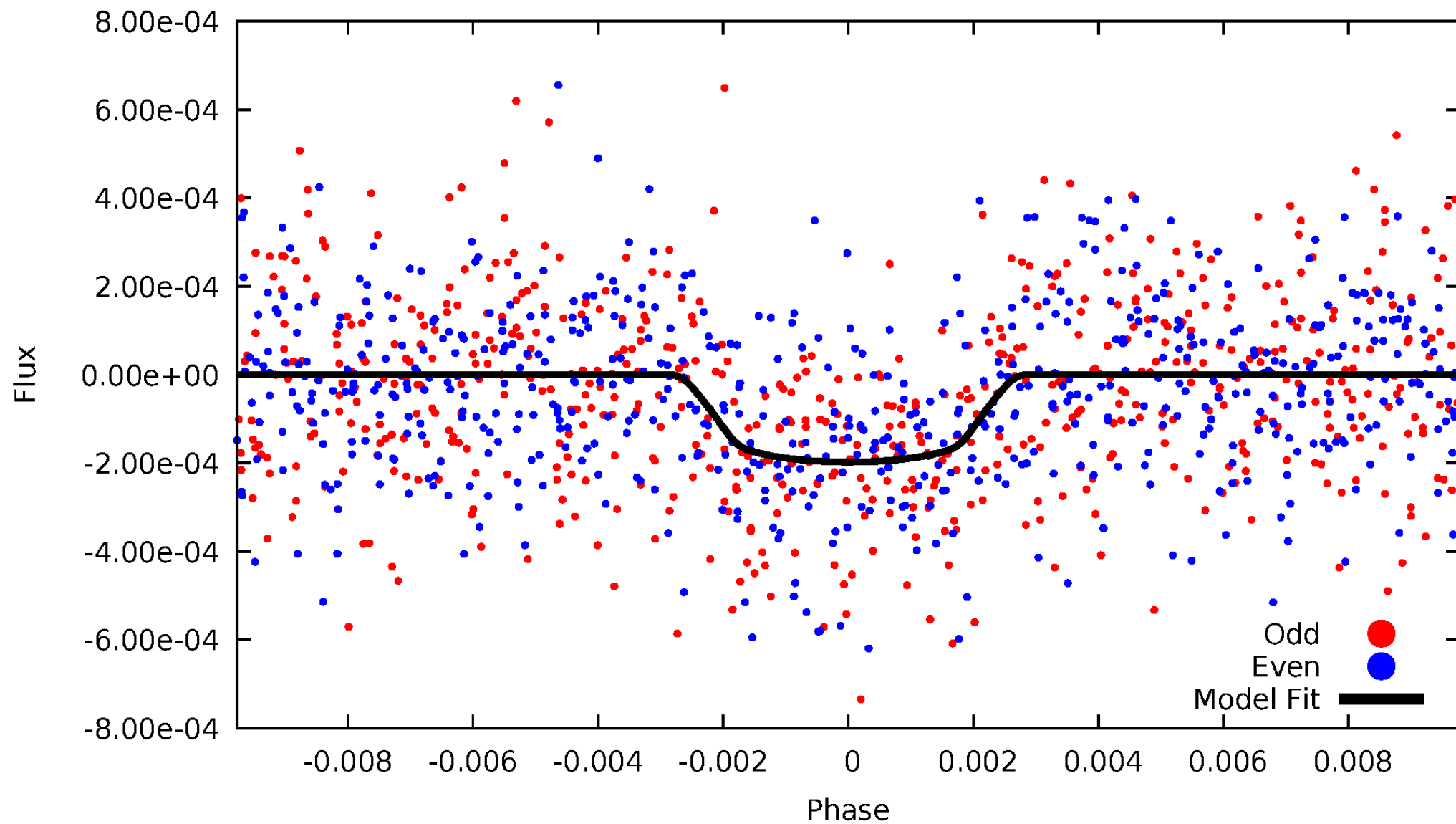


TCE 006949061-02



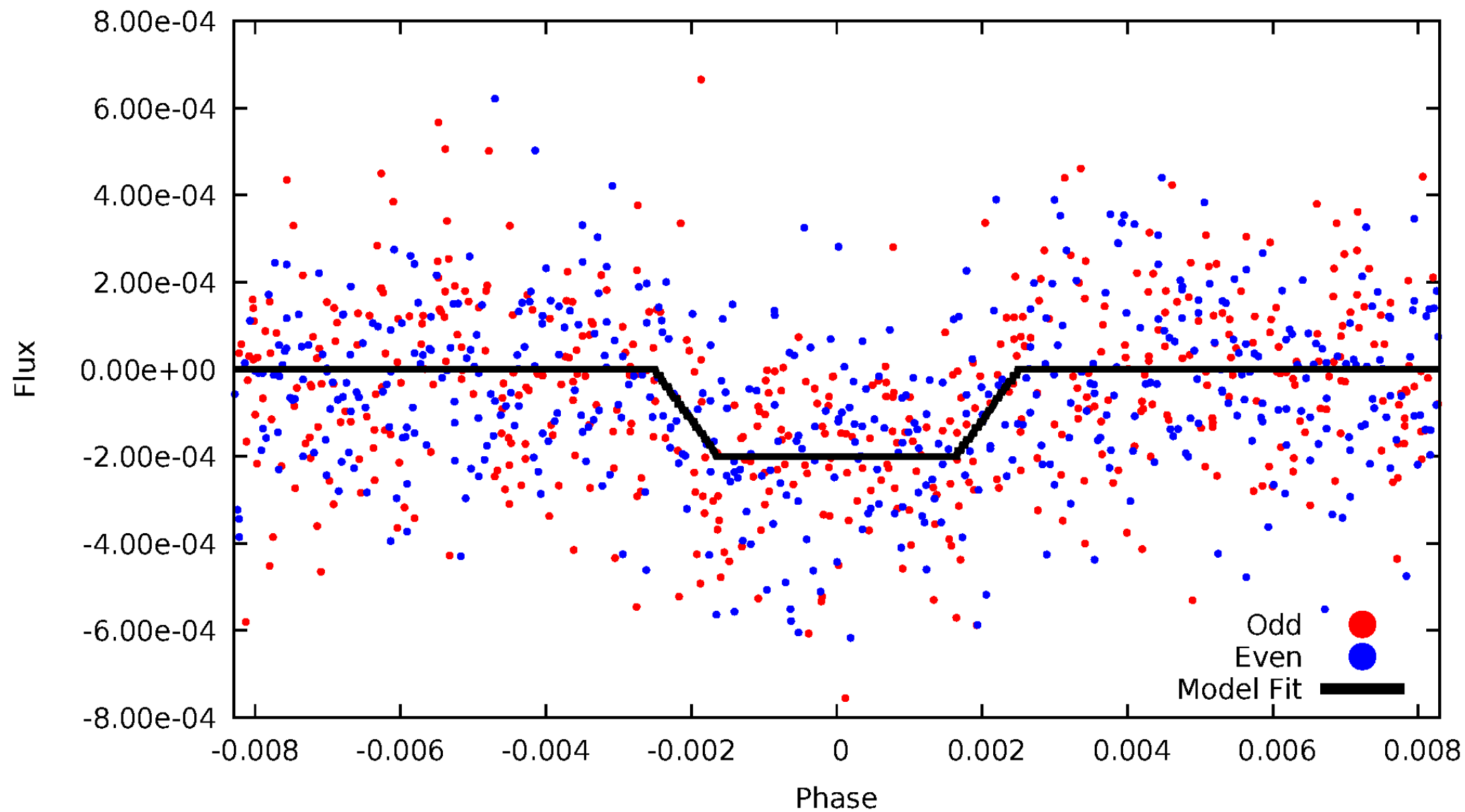
# DV Odd/Even

TCE 006949061-02



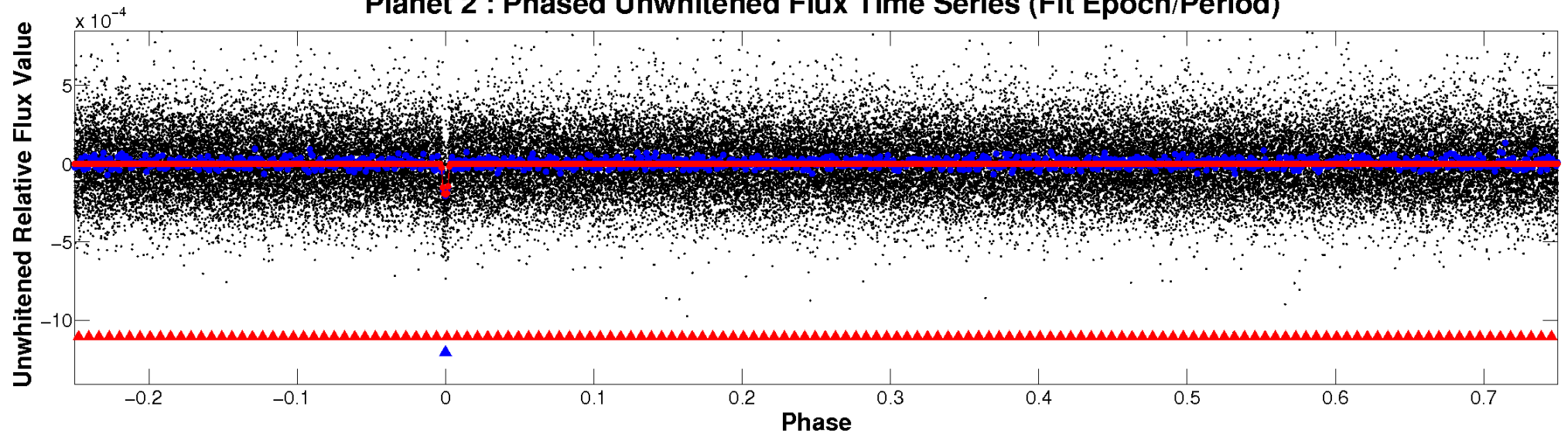
# ALT Odd/Even

TCE 006949061-02

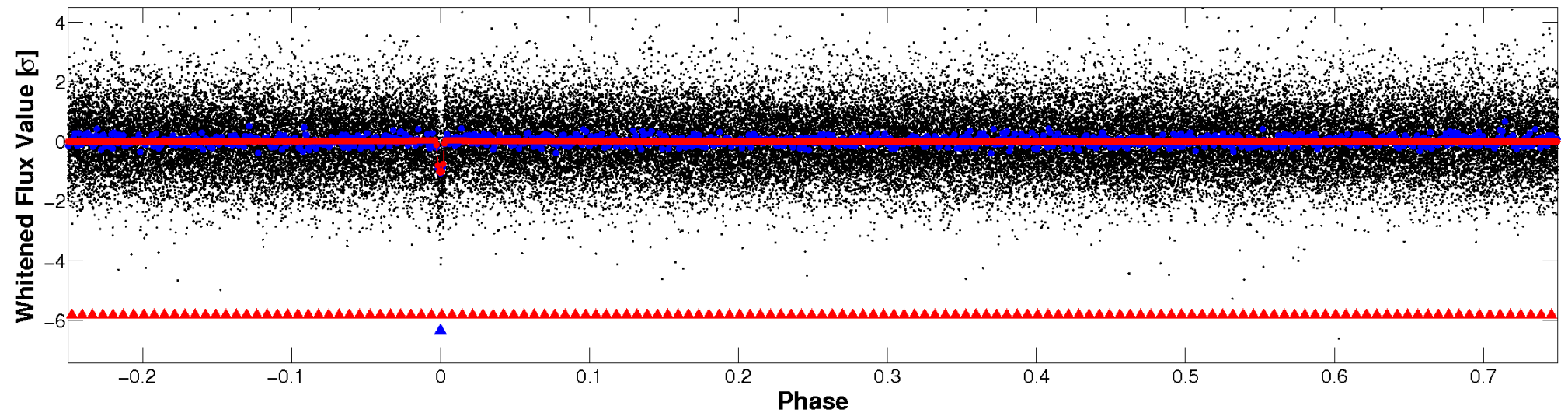


# Non-Whitened Vs. Whitened Light Curve

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

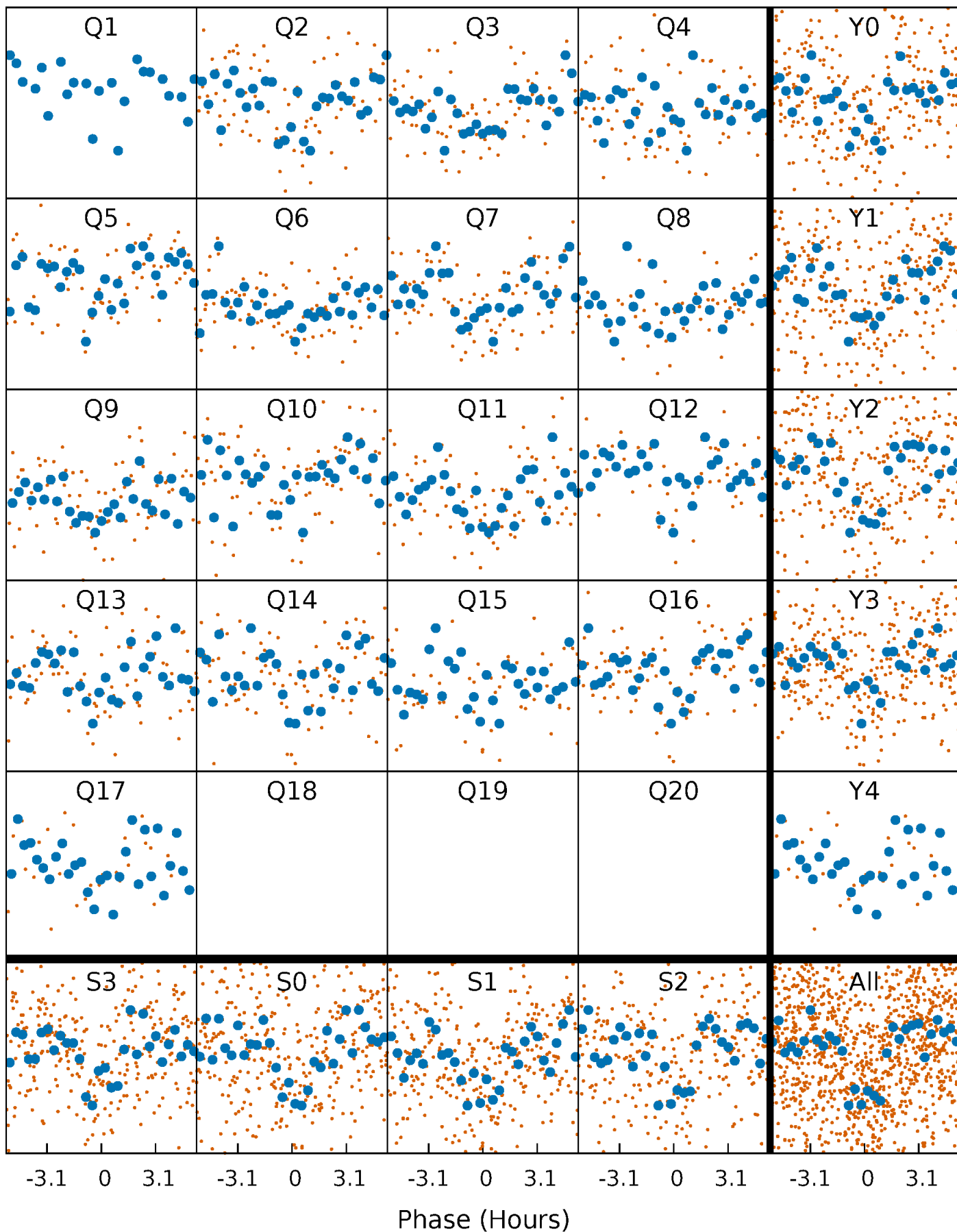


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

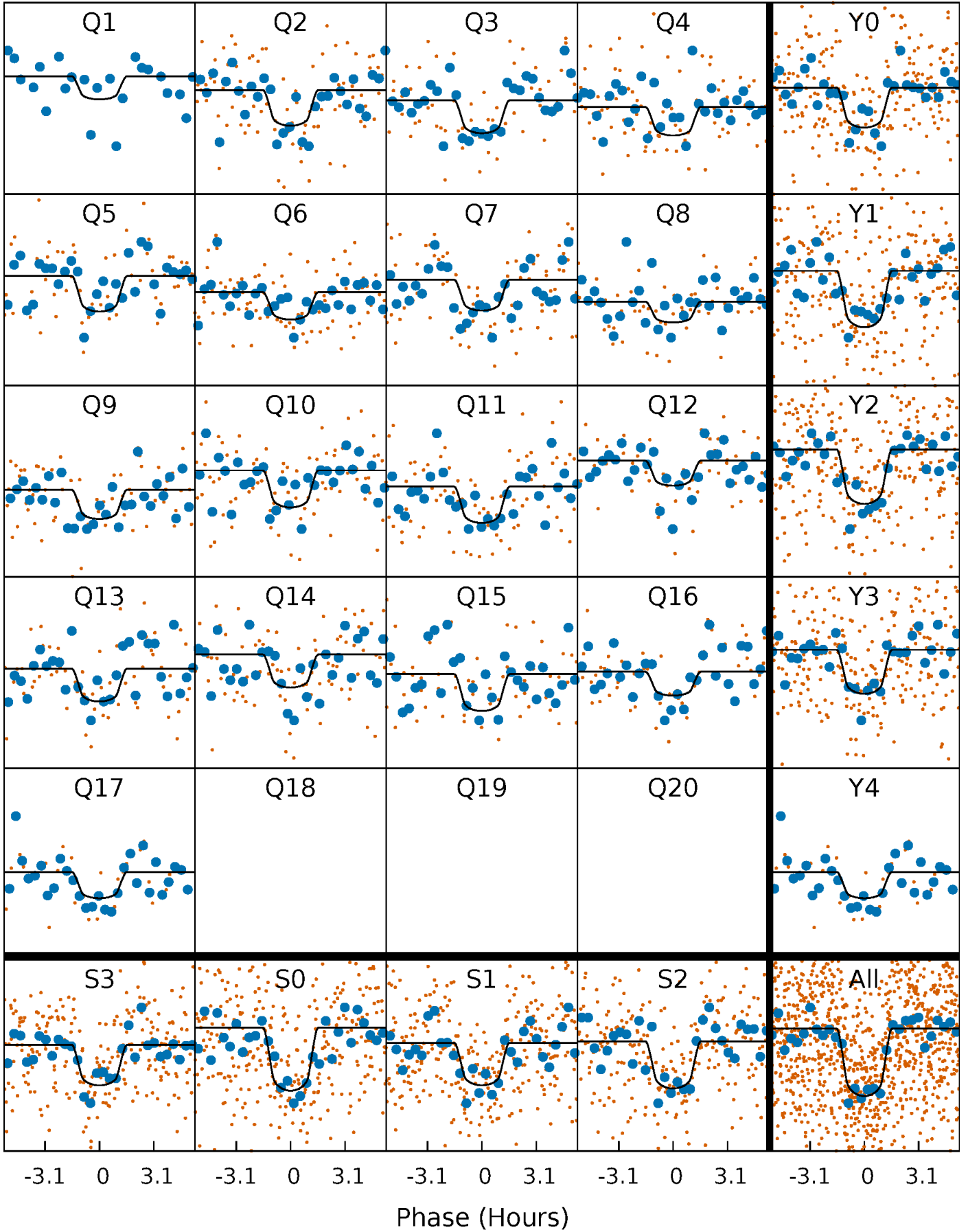
TCE 006949061-02   P= 23.221844 Days    $T_0=151.067915$  (BKJD)





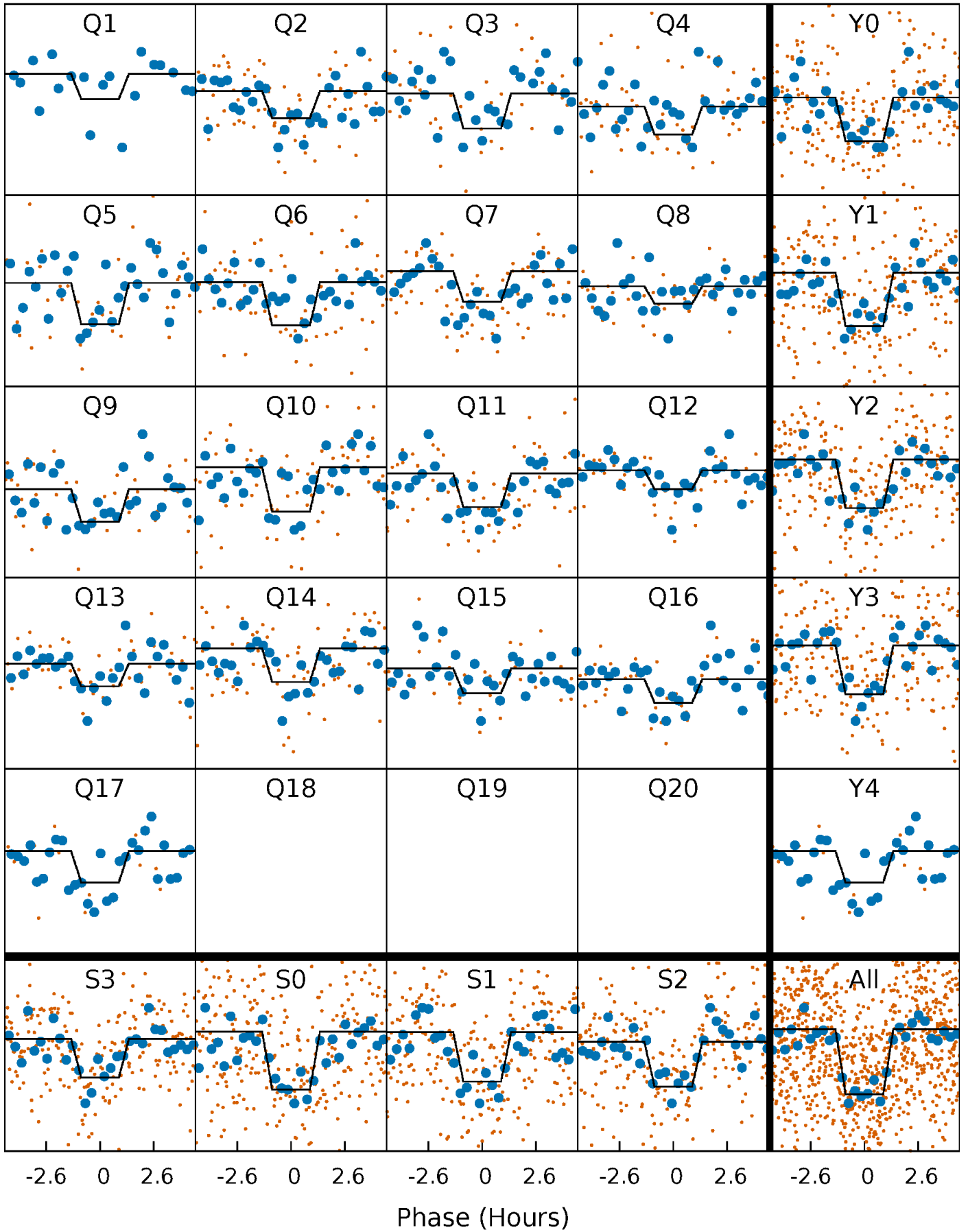
# DV Quarter-Phased Transit Curves

TCE 006949061-02 P= 23.221844 Days  $T_0=151.067915$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

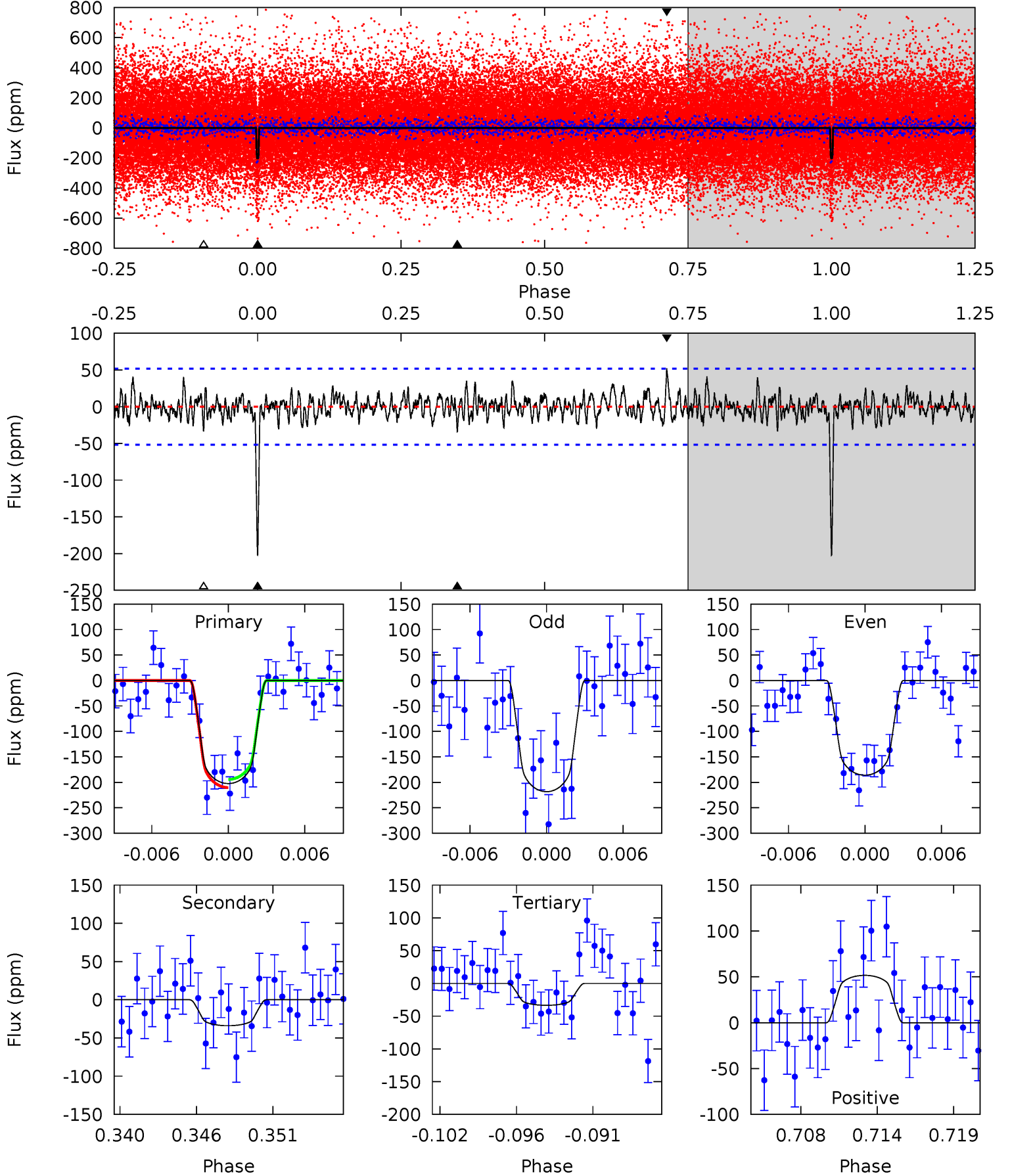
TCE 006949061-02   P= 23.221984 Days    $T_0=151.064025$  (BKJD)



# DV Model-Shift Uniqueness Test

006949061-02, P = 23.221844 Days, E = 127.846071 Days

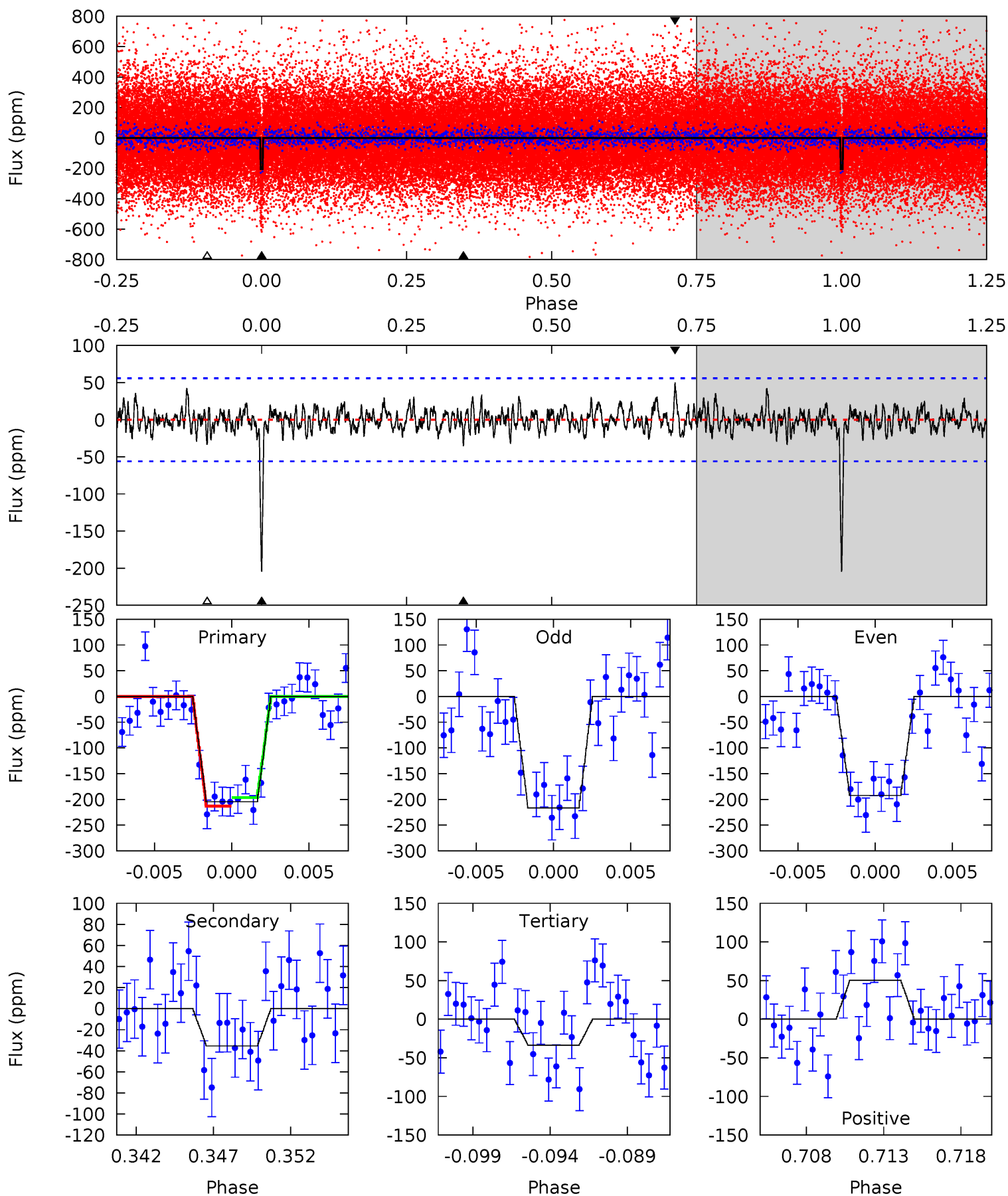
| Pri  | Sec  | Ter  | Pos  | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 20.1 | 3.37 | 3.32 | 5.13 | 5.13            | 2.77            | 1.21             | 16.8    | 15.0    | 0.05    | -1.76   | 1.61    | 0.96 | 0.20  | 0.79 |



# Alt Model-Shift Uniqueness Test

006949061-02, P = 23.221984 Days, E = 127.842041 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  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 18.9 | 3.26 | 3.11 | 4.63 | 5.16            | 2.81            | 1.11             | 15.8    | 14.2    | 0.15    | -1.37   | 1.13    | 0.92 | 0.20  | 0.77 |



### Stellar Parameters For KIC 006949061

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                    | $R (R_{\odot})$           | $M(M_{\odot})$            | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|---------------------------|---------------------------|---------------------------|---|
|        | $5808^{+105}_{-117}$ | $4.185^{+0.176}_{-0.108}$ | $0.140^{+0.150}_{-0.150}$ | $1.374^{+0.221}_{-0.246}$ | $1.054^{+0.100}_{-0.080}$ | $0.573^{+0.463}_{-0.186}$                 |
|        | +2%/-2%              | +4%/-3%                   | +107%/-107%               | +16%/-18%                 | +9%/-8%                   | +81%/-33%                                 |
| Source | SPE58                | SPE58                     | SPE58                     | DSEP                      |                           |   |

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 006949061-02 / KOI 1960.02

| Detrend | Depth (ppm)  | $R_p (R_{\oplus})$     | $T_{\text{max}} (K)$ | $T_{\text{obs}} (K)$ | $A_{\text{obs}}$   |
|---------|--------------|------------------------|----------------------|----------------------|--------------------|
| DV      | $-34 \pm 10$ | $2.35^{+0.86}_{-0.96}$ | $1031^{+52}_{-57}$   | $3853^{+760}_{-411}$ | $90^{+159}_{-47}$  |
| Alt.    | $-35 \pm 11$ | $2.08^{+0.92}_{-0.80}$ | $1036^{+52}_{-54}$   | $4032^{+947}_{-473}$ | $118^{+230}_{-65}$ |

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

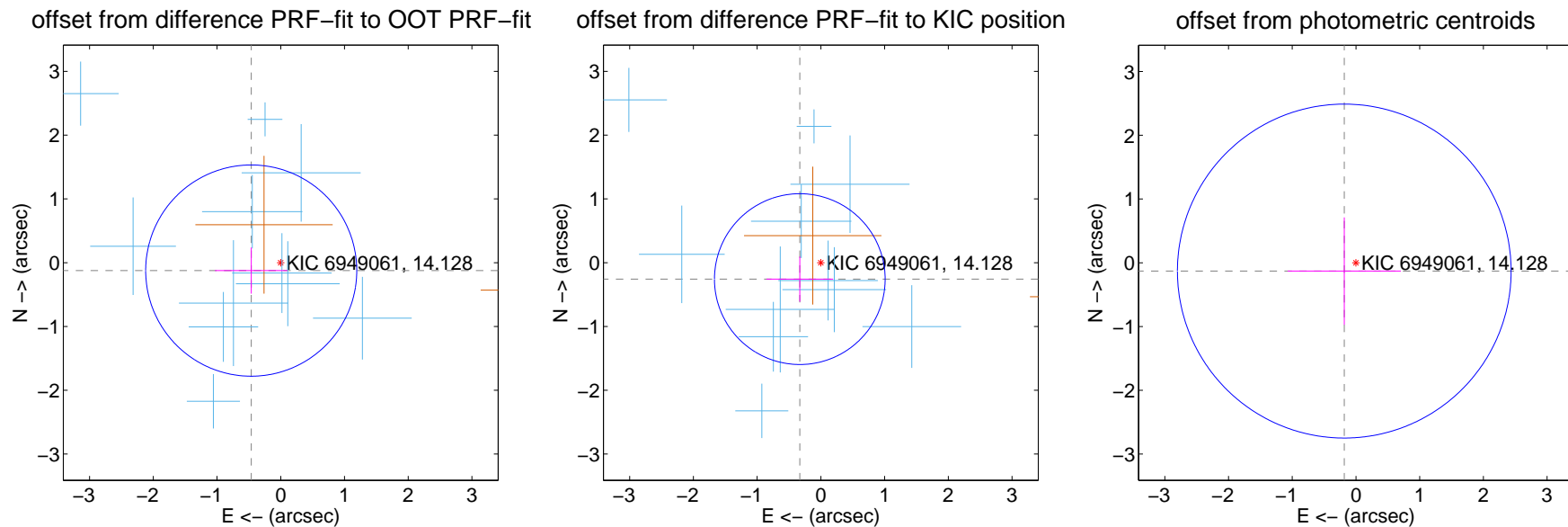
## DV Centroid Data

Supplemental centroid analysis for 006949061-02. Kepler magnitude: 14.13. Transit SNR 15.03

There are 11 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.22 arcsec

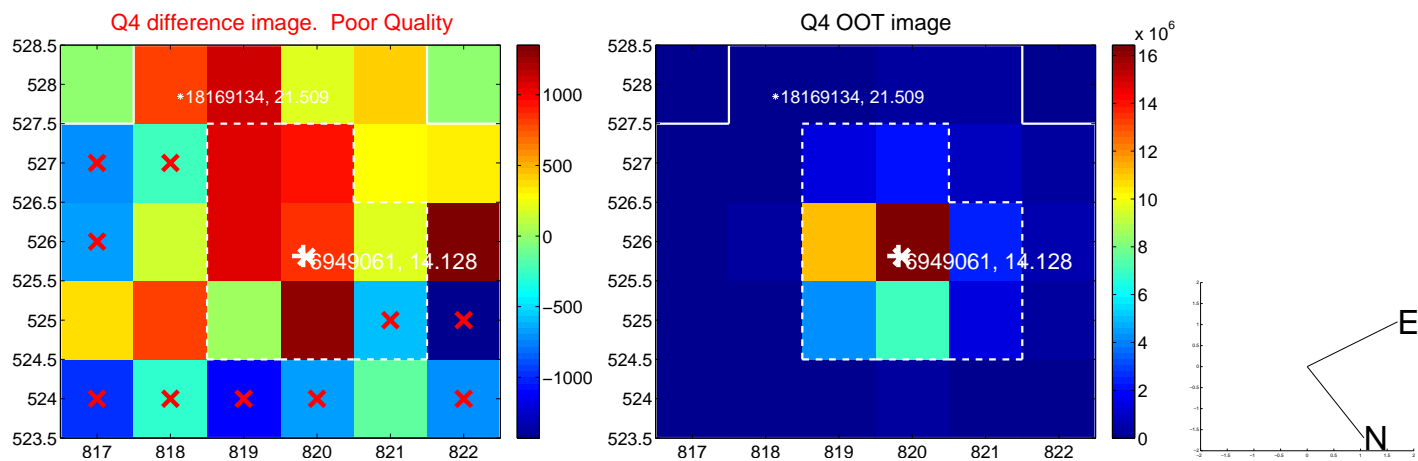
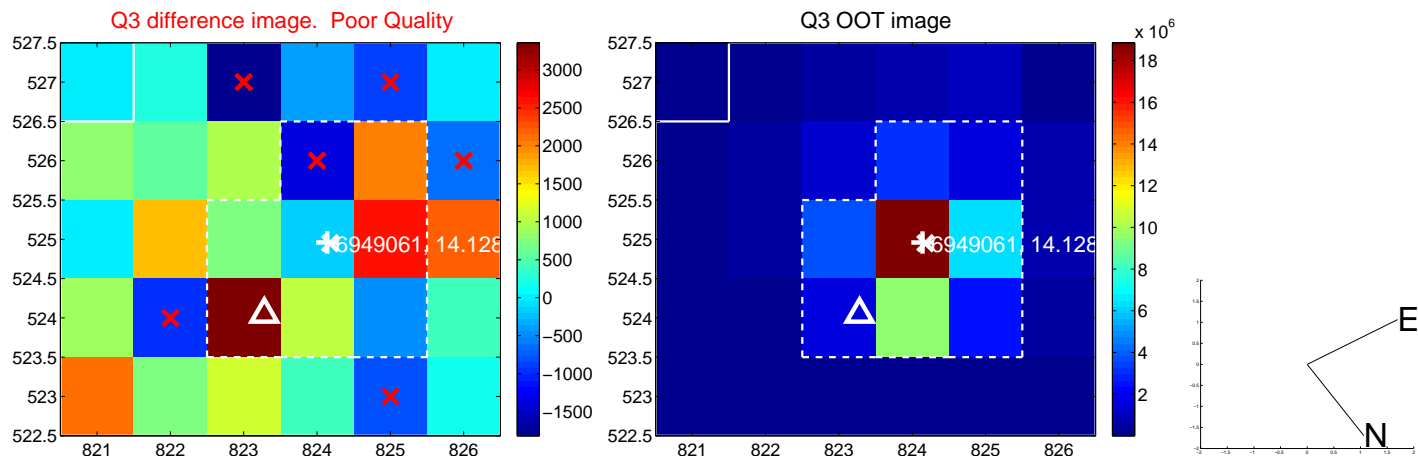
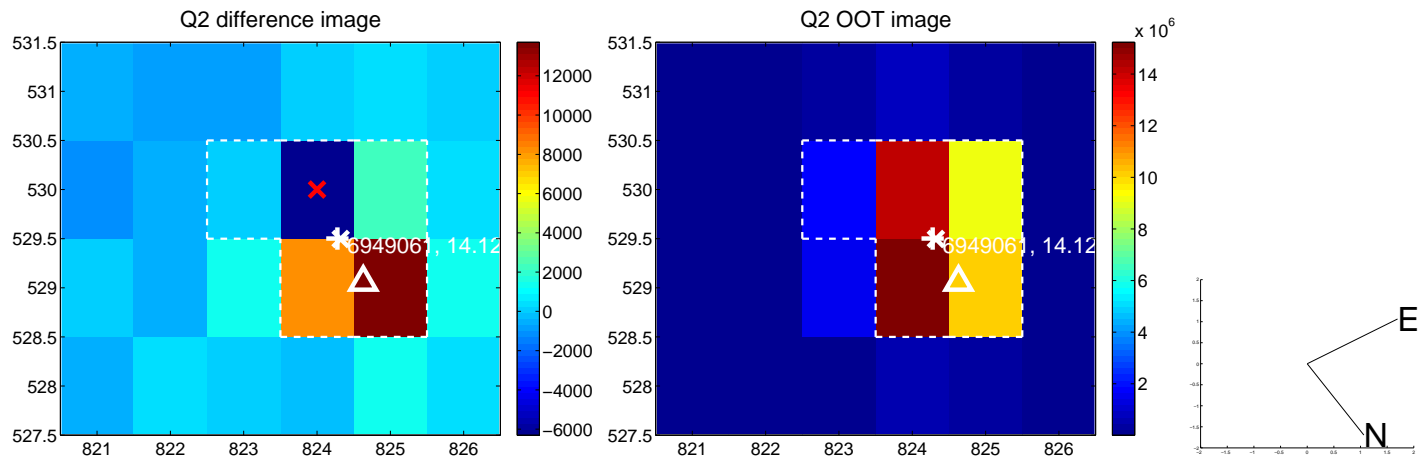
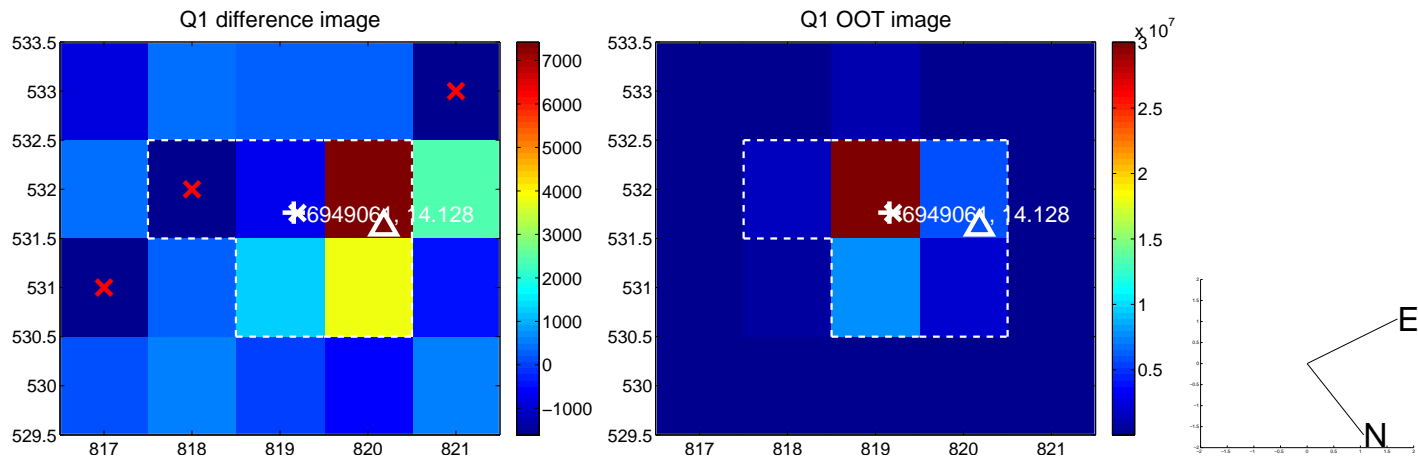
|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA       | $\Delta$ Dec       |
|---|--------------------|---------------------|-------------------|--------------------|
| PRF-fit source offset from OOT          | $0.480 \pm 0.552$  | 0.87                | $0.464 \pm 0.568$ | $-0.124 \pm 0.361$ |
| PRF-fit source offset from KIC position | $0.419 \pm 0.446$  | 0.94                | $0.331 \pm 0.523$ | $-0.257 \pm 0.354$ |
| photometric centroid source offset      | $0.23 \pm 0.87$    | 0.26                | $0.18 \pm 0.89$   | $-0.13 \pm 0.84$   |



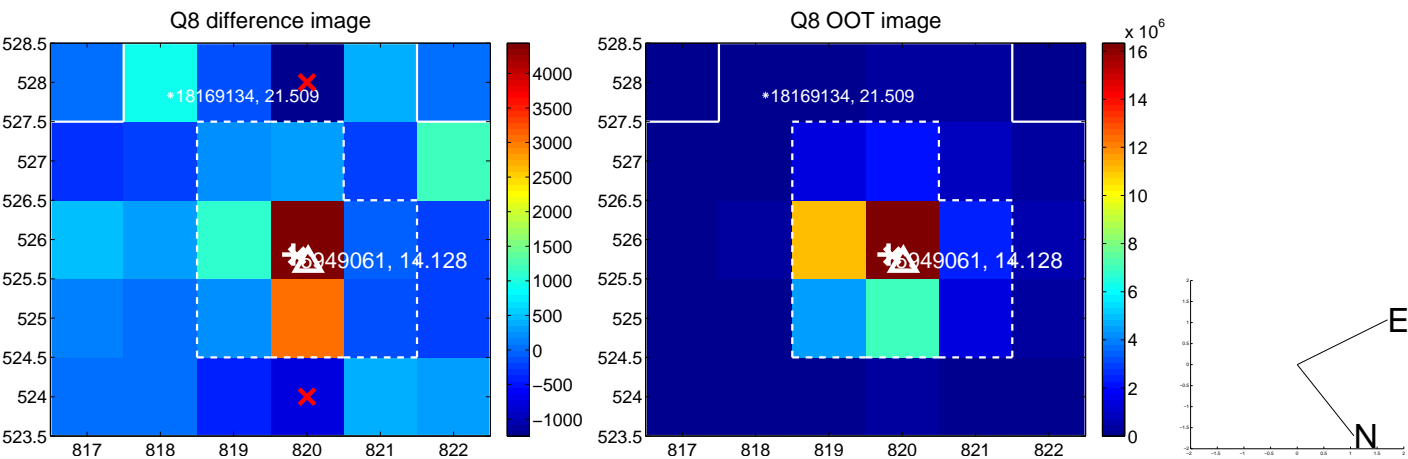
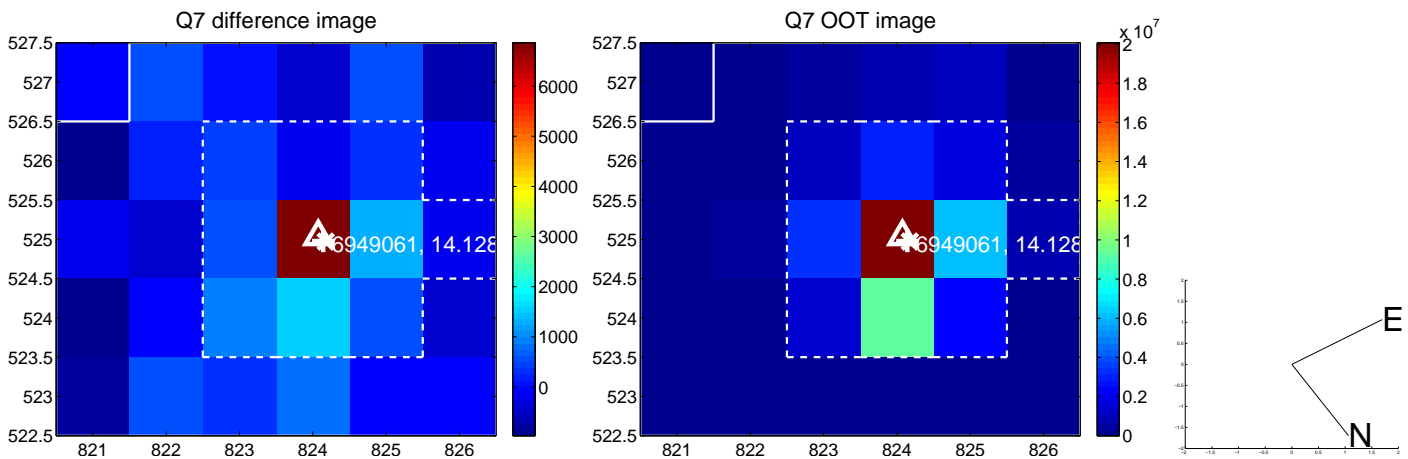
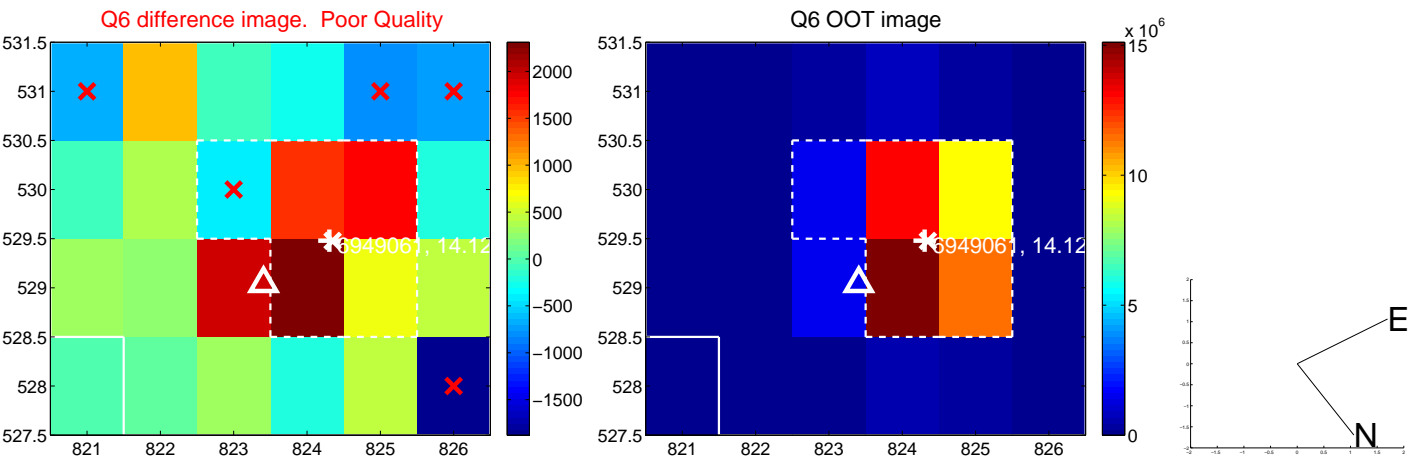
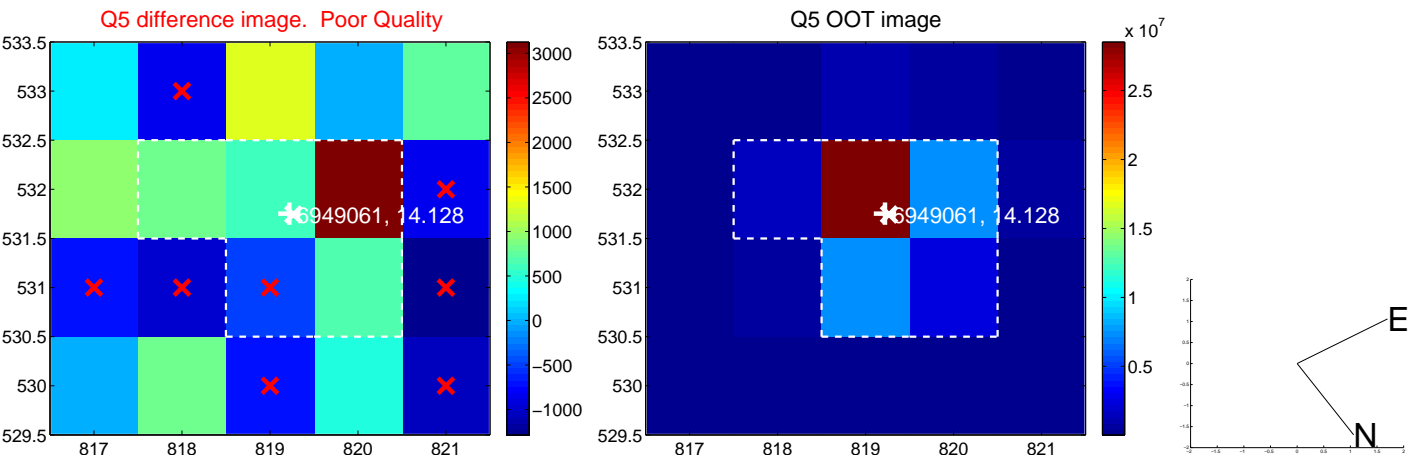
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



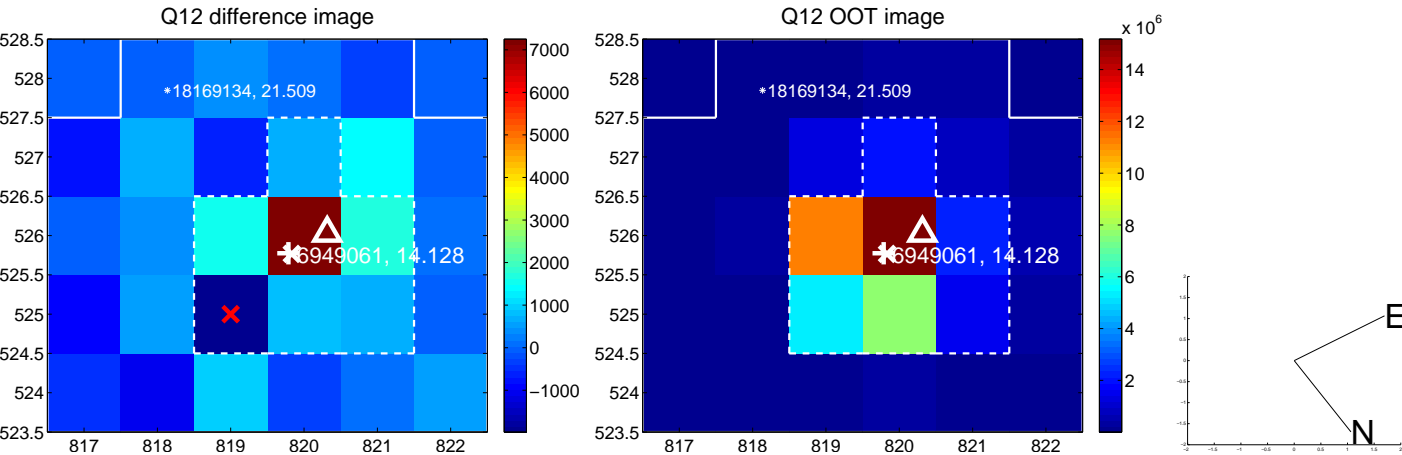
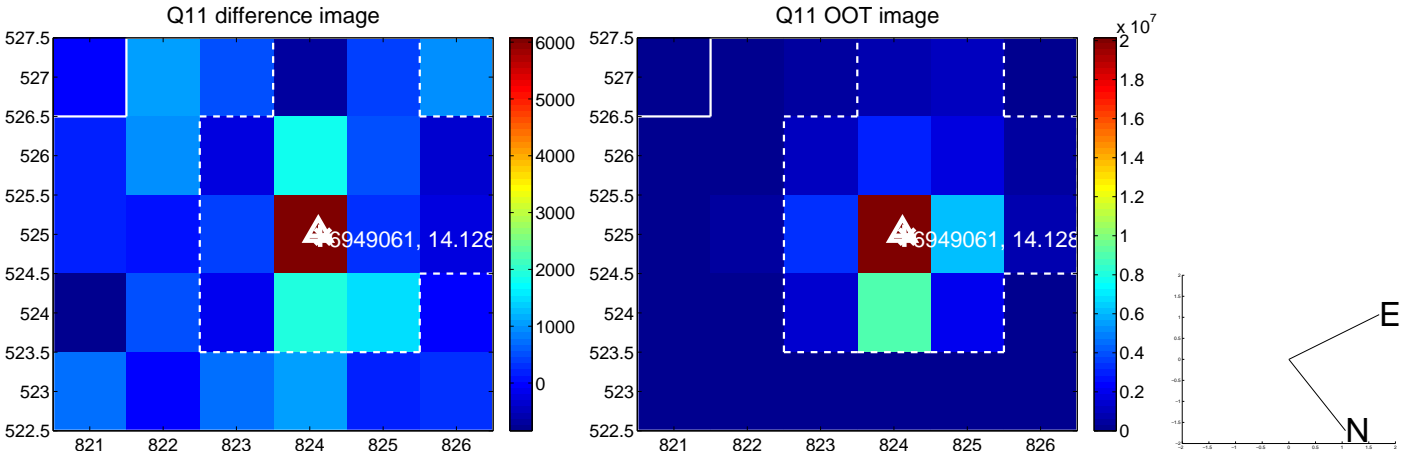
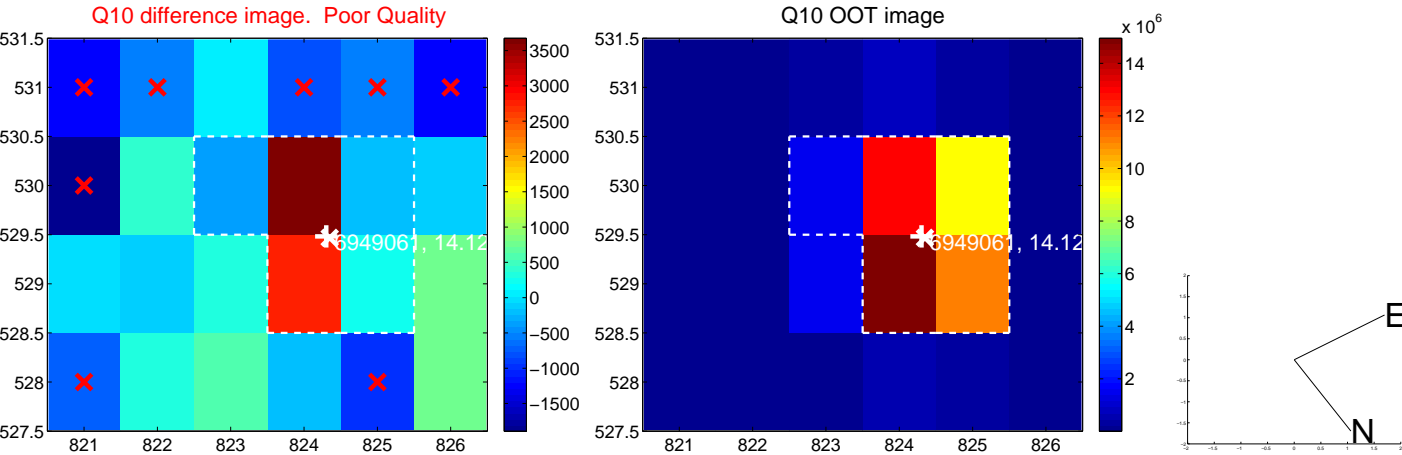
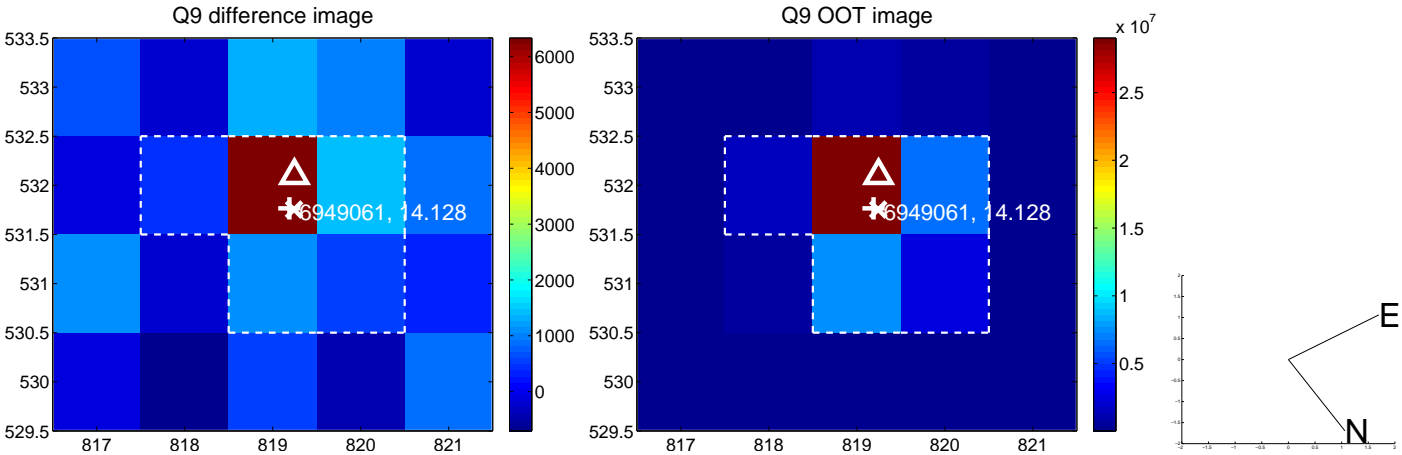
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



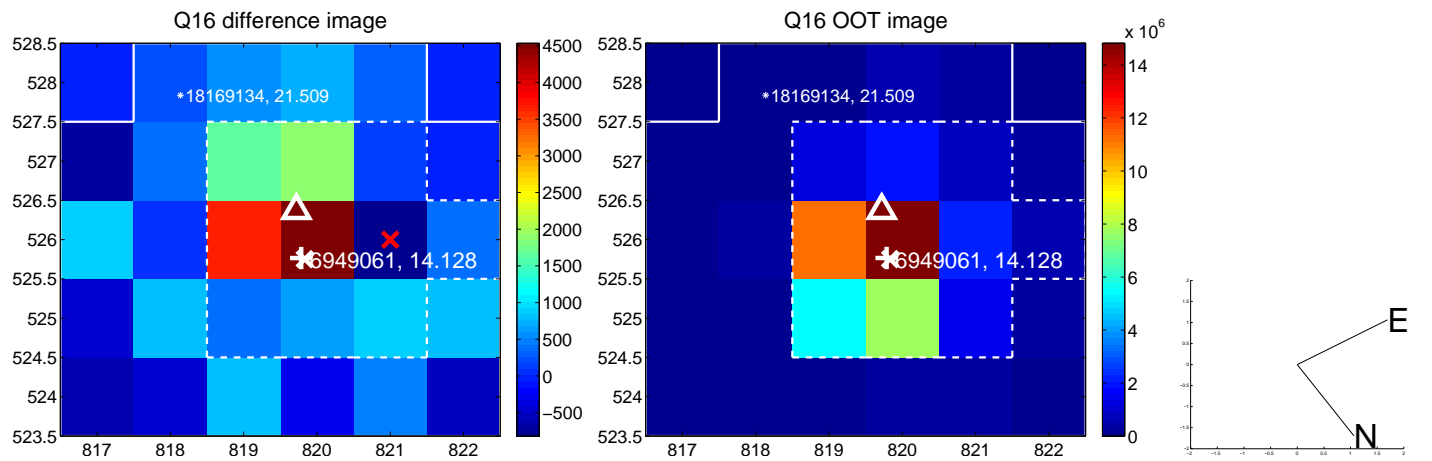
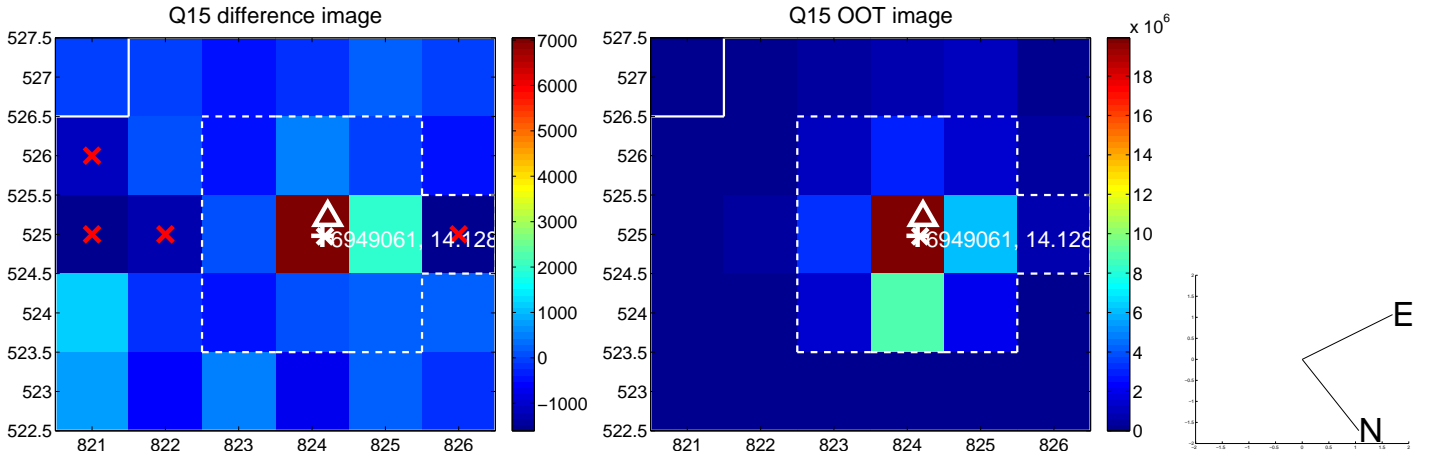
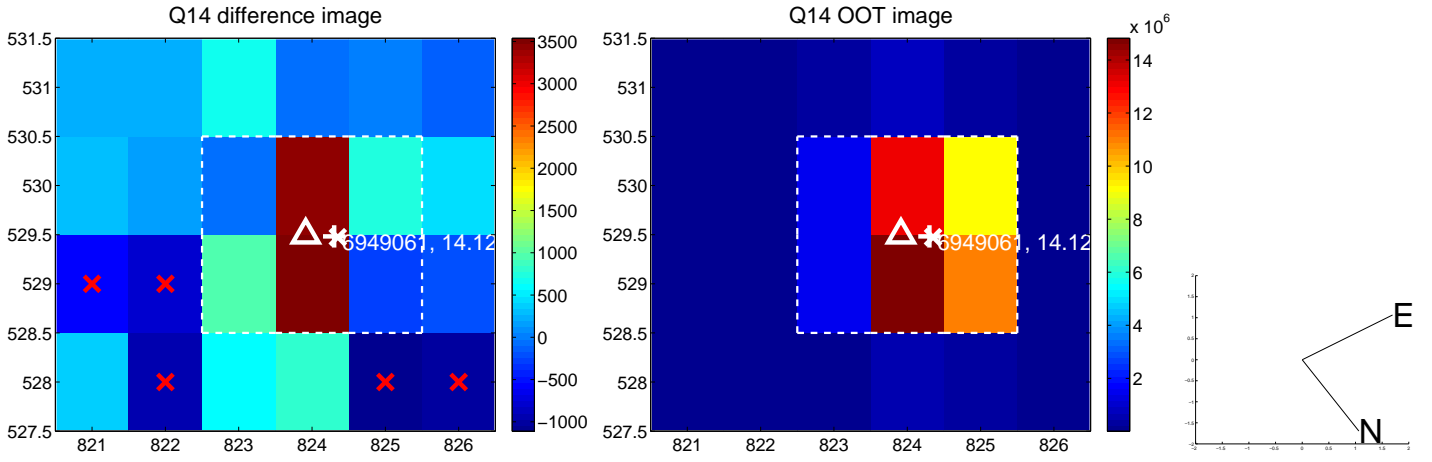
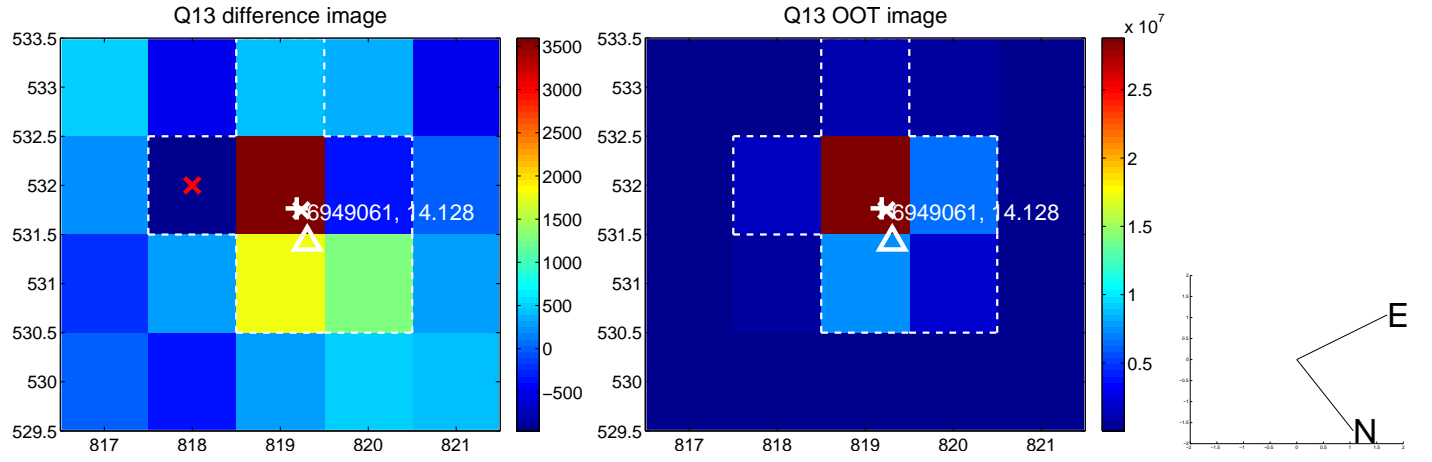
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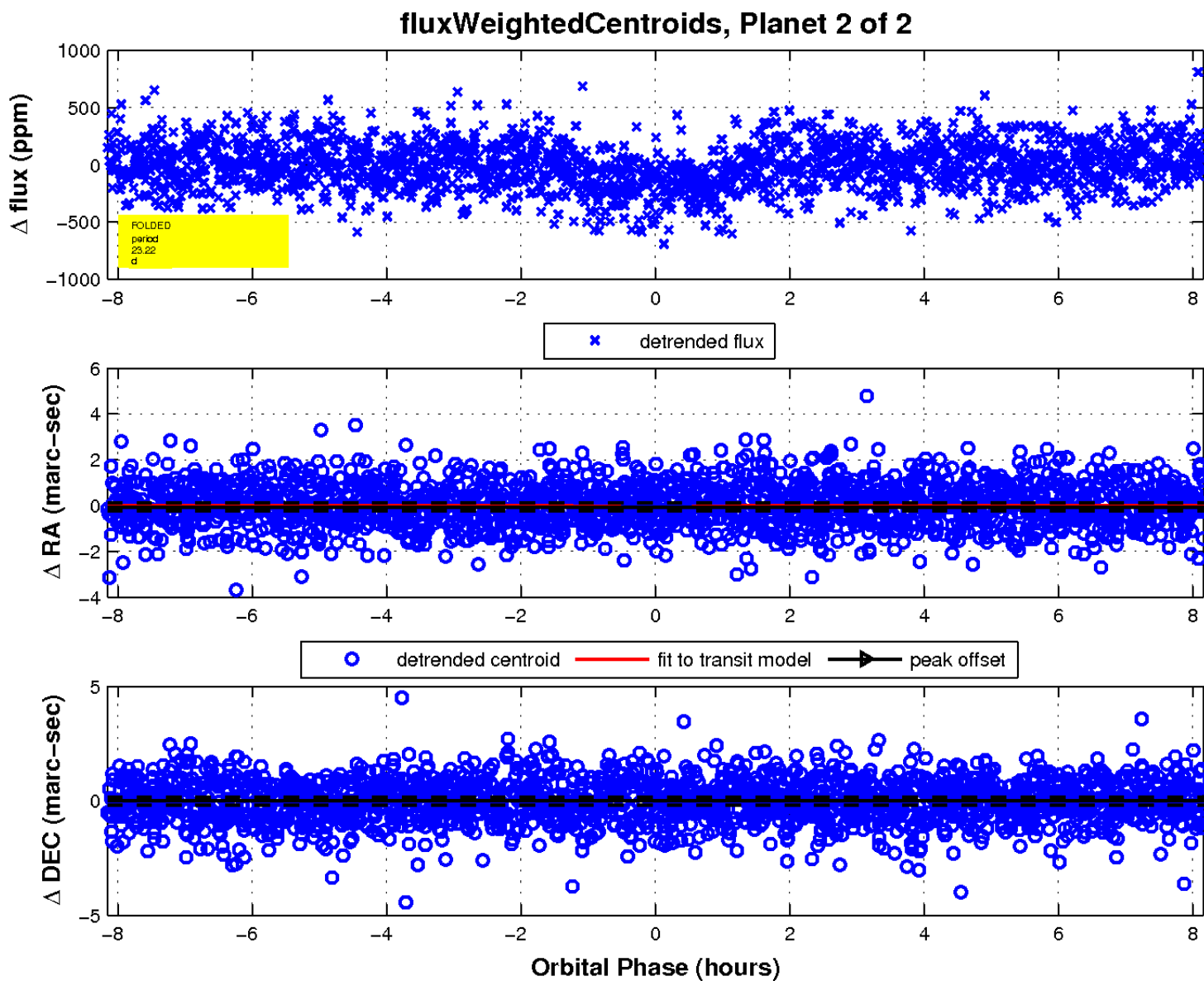
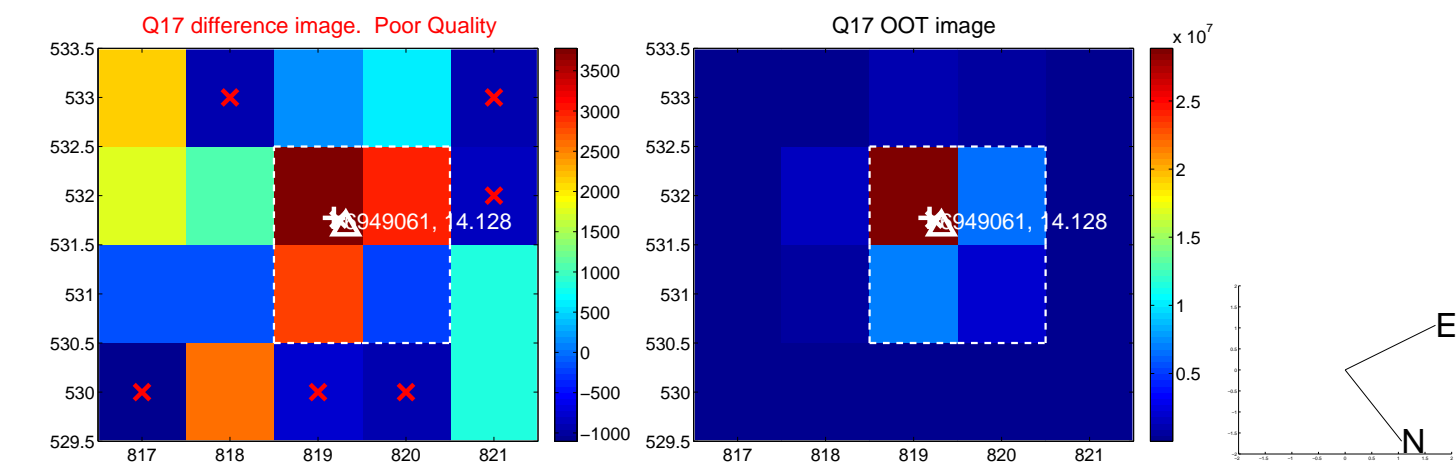
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image

Declination

