

# KIC 005476671

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005476671-01	OBS	4598.02	0.824168	131.695068	72.3	1.384	11.7	12.5	0.88	5977	0.89	3163.11
005476671-02	OBS	4598.01	0.824155	132.114408	51.7	1.648	10.7	10.1	0.88	5977	0.75	3163.17

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005476671-01	OBS	FP	0.00	1	0	1	0	MOD_NONUNIQ_ALT—CENT_RESOLVED_OFFSET
005476671-02	OBS	FP	0.00	1	0	1	0	MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_RESOLVED_OFFSET

**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 005476671-01

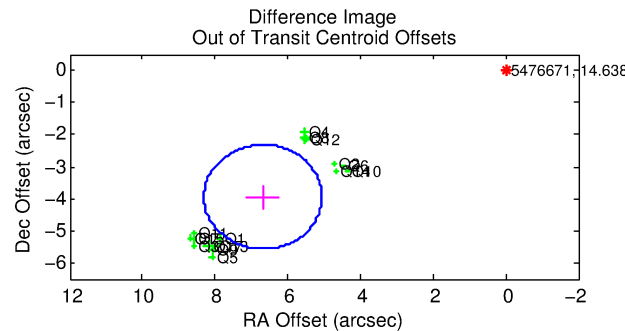
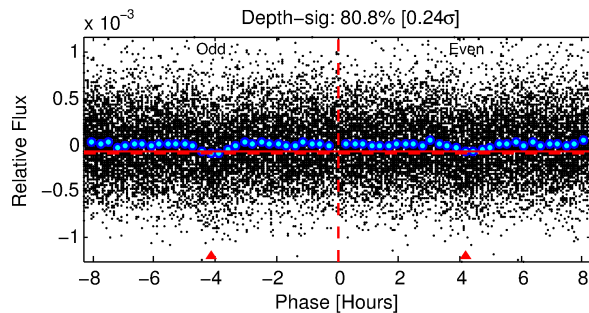
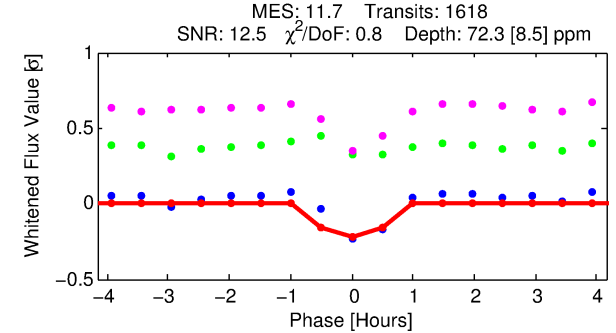
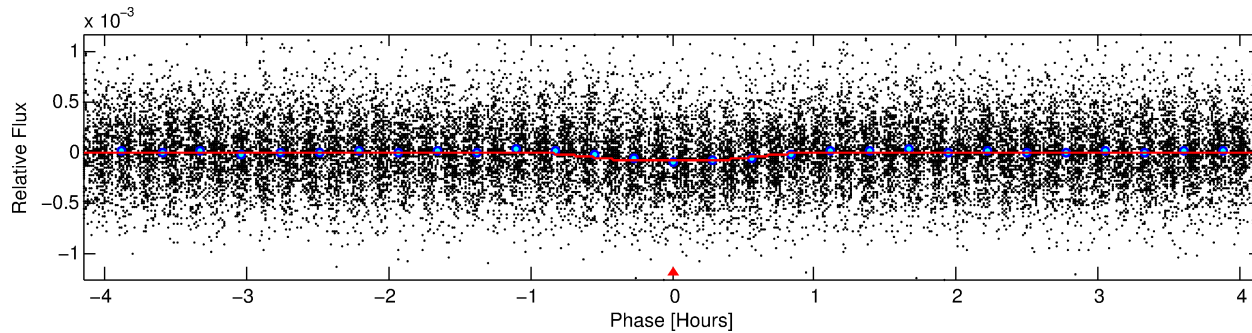
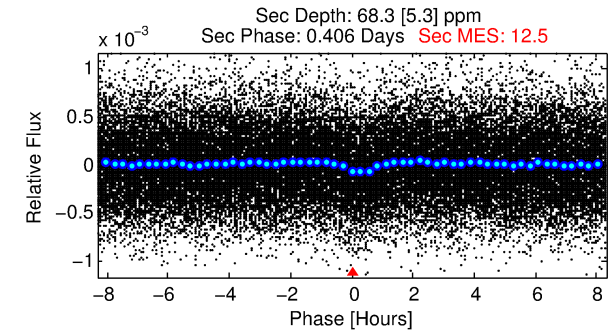
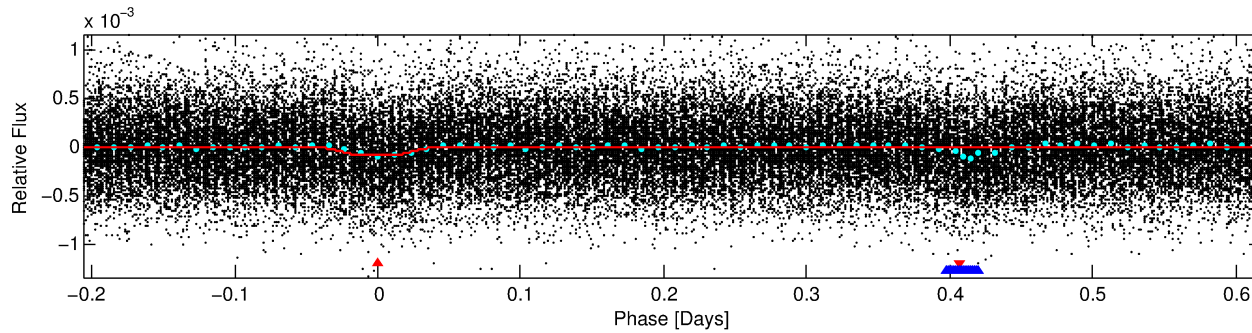
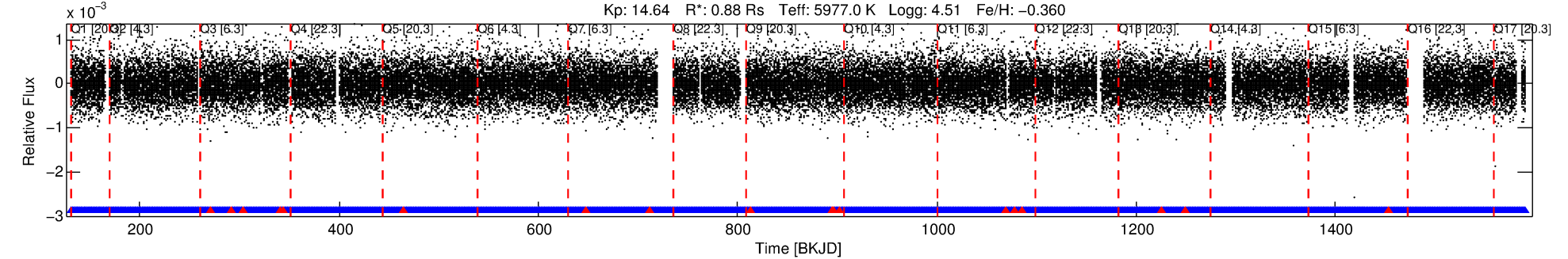
No Significant Match Found

# DV One-Page Summary

KIC: 5476671 Candidate: 1 of 2 Period: 0.824 d

KOI: K04598 Corr: No Ephemeris Match

Kp: 14.64 R\*: 0.88 Rs Teff: 5977.0 K Logg: 4.51 Fe/H: -0.360



## DV Fit Results:

Period = 0.82417 [0.00001] d  
Epoch = 131.6951 [0.0017] BKJD  
Rp/R\* = 0.0093 [0.0050]  
a/R\* = 2.23 [5.06]  
b = 0.91 [0.57]  
Seff = 3163.11 [1179.86]  
Teff = 1912 [178] K  
Rp = 0.89 [0.54] Re  
a = 0.0168 [0.0040] AU  
Ag = 13.29 [15.12] [0.81σ]  
Teffp = 5645 [1536] K [2.41σ]

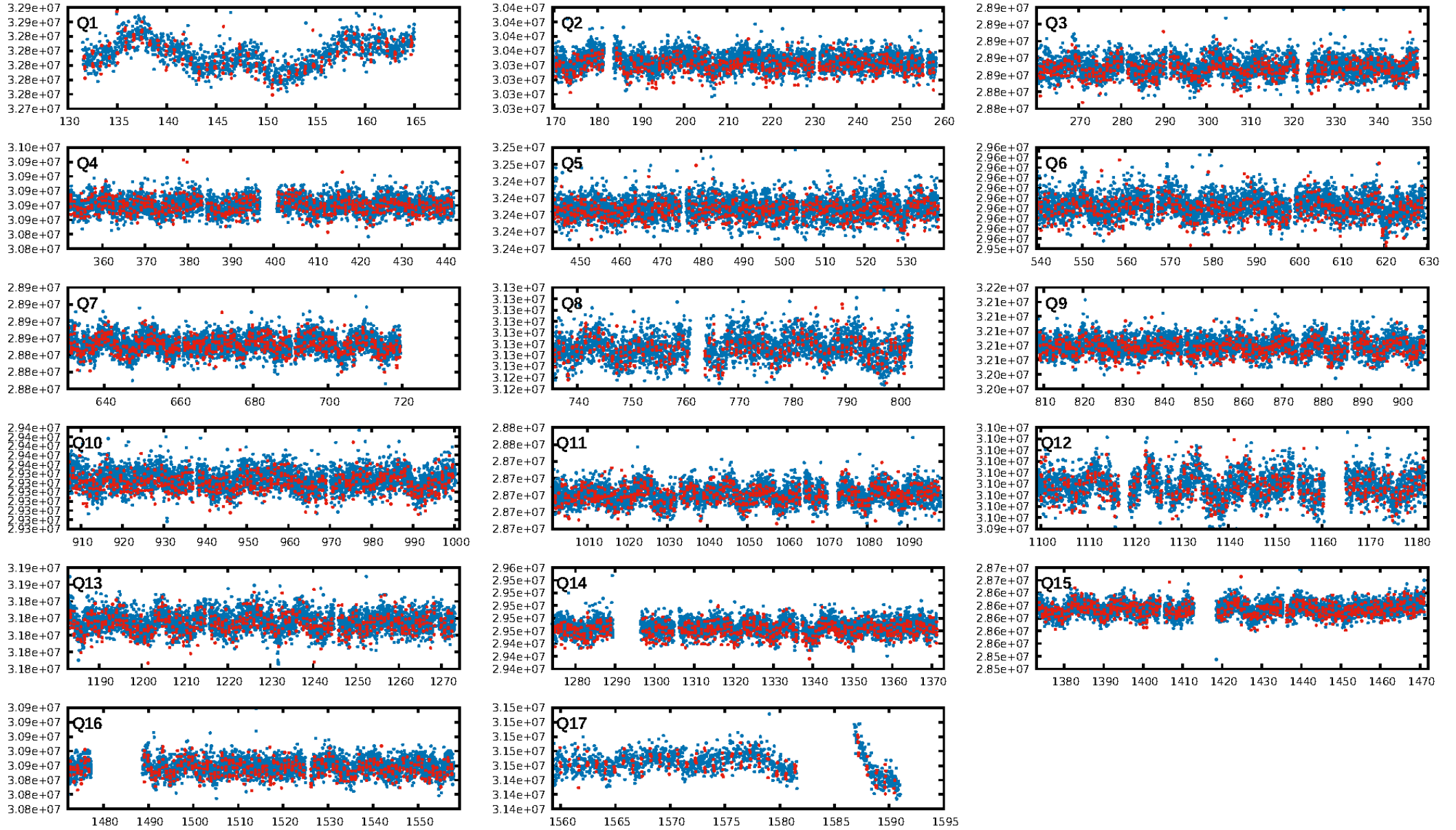
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 6.00e-34  
RollingBand-fgt: 0.99 [1527/1545]  
GhostDiagnostic-chr: -0.9473  
Centroid-sig: 0.0%  
Centroid-so: 5.244 arcsec [4.50σ]  
OotOffset-rm: 7.764 arcsec [14.35σ]  
KicOffset-rm: 7.675 arcsec [14.48σ]  
OotOffset-st: 4/4/3/5 [16]  
KicOffset-st: 4/4/3/5 [16]  
DiffImageQuality-fgm: 1.00 [16/16]  
DiffImageOverlap-fno: 1.00 [17/17]

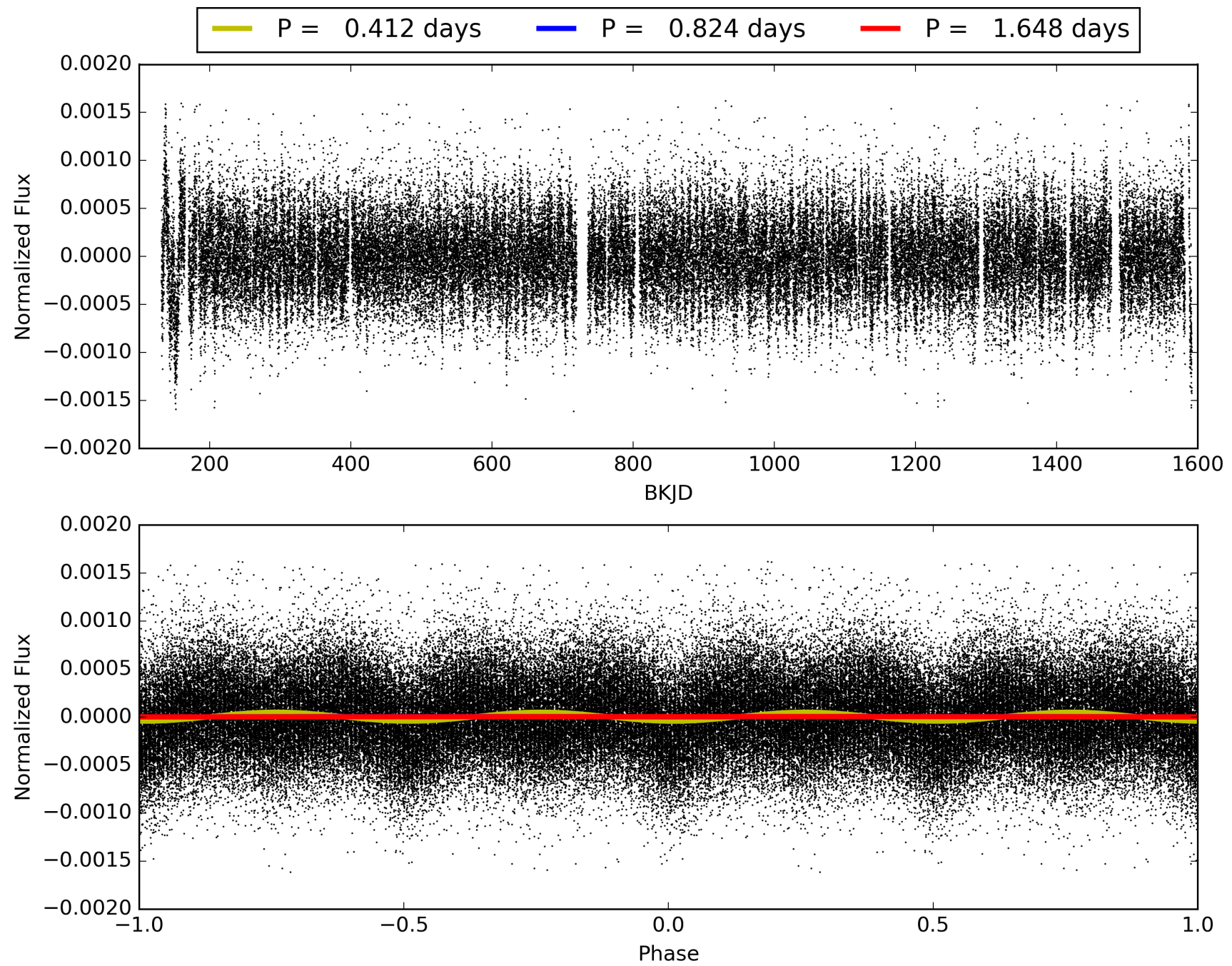
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 20:59:42 Z

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

# TCE 005476671-01, PDC Light Curves



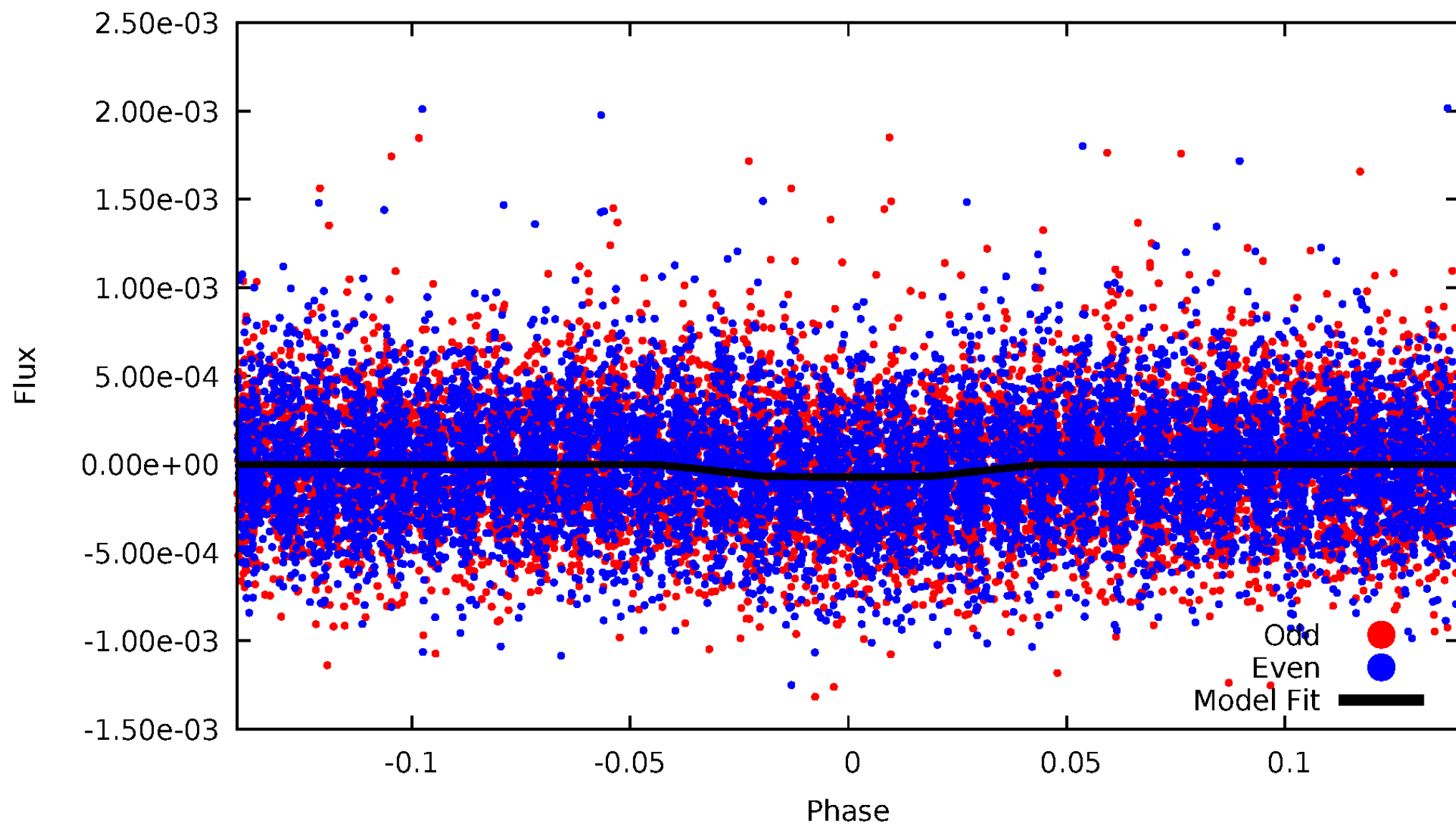
TCE 005476671-01





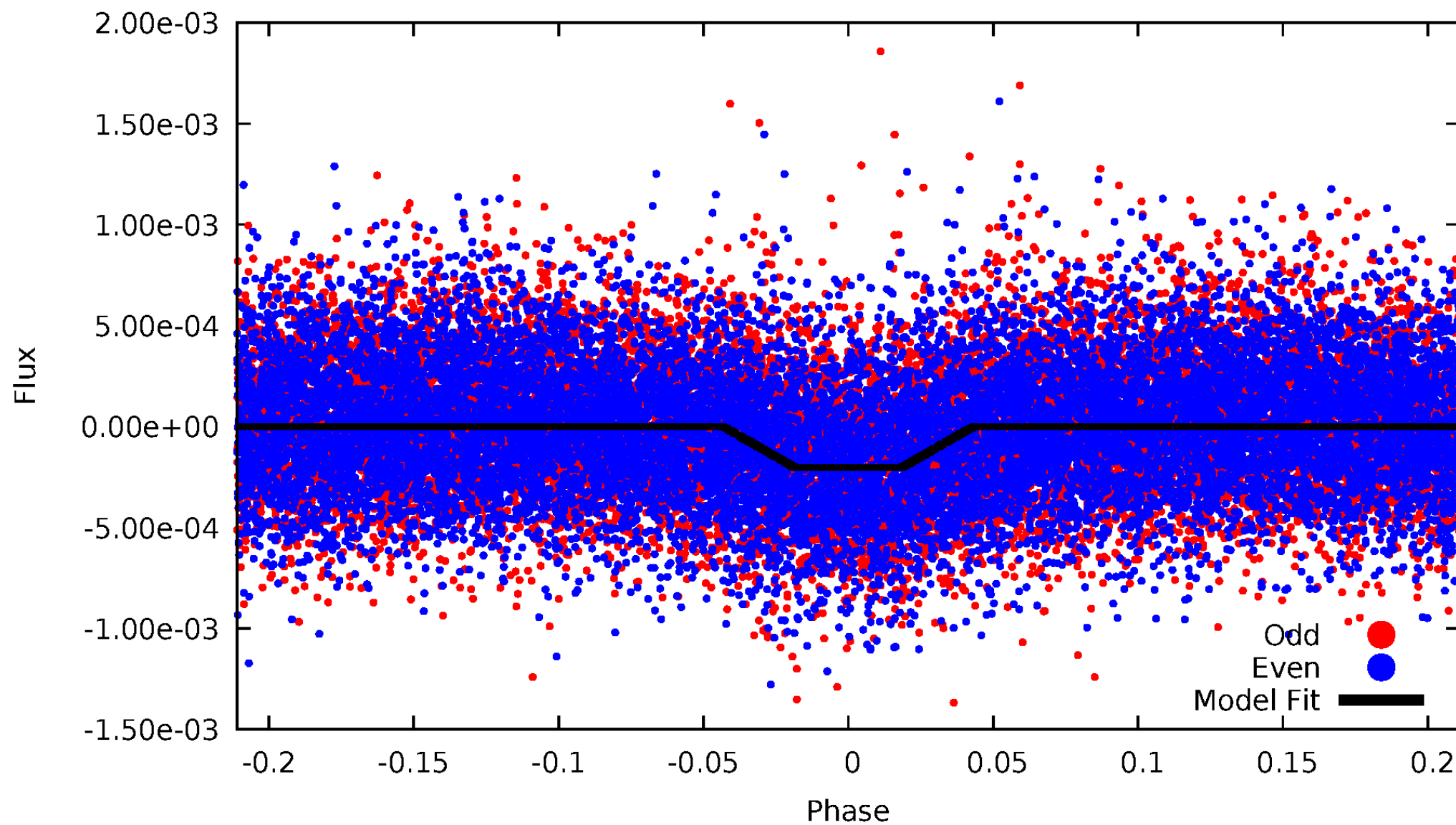
# DV Odd/Even

TCE 005476671-01

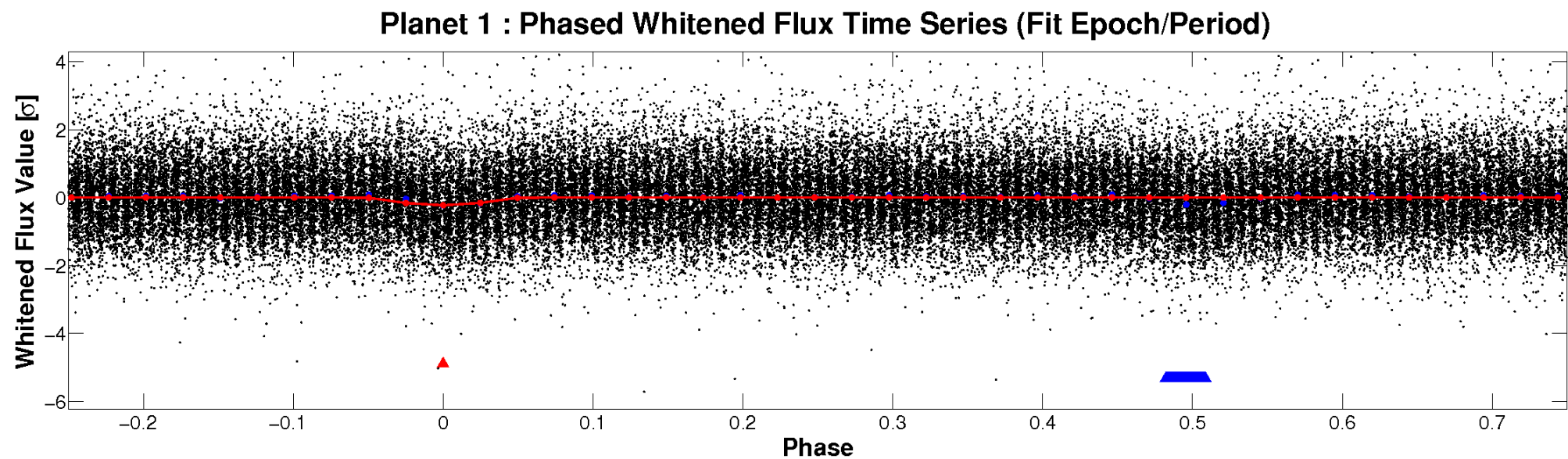
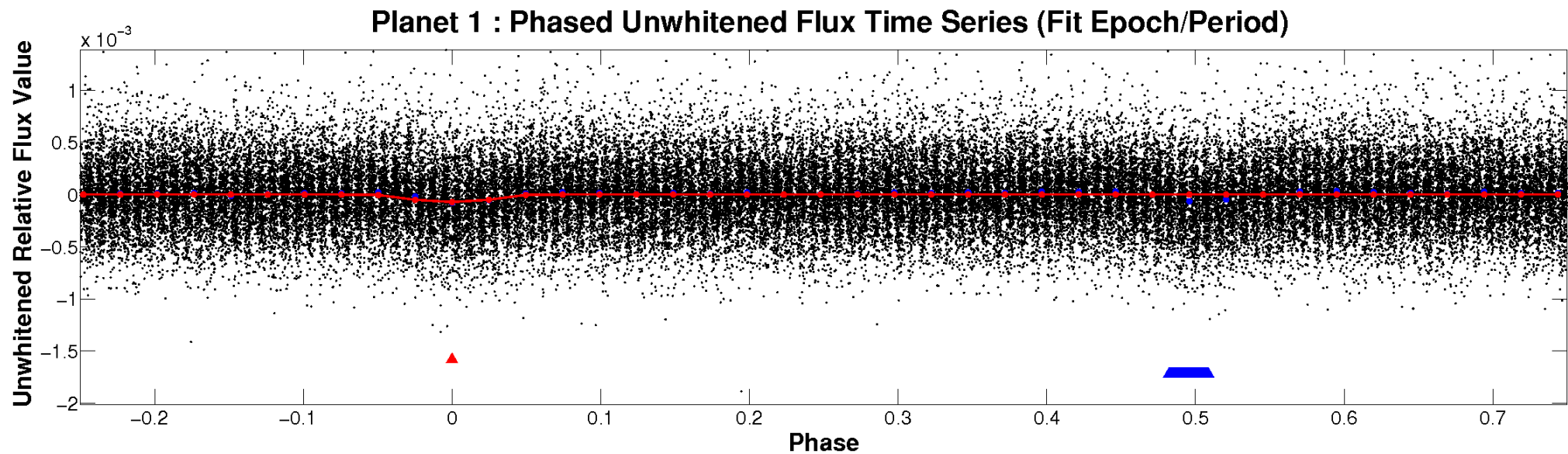


# ALT Odd/Even

TCE 005476671-01

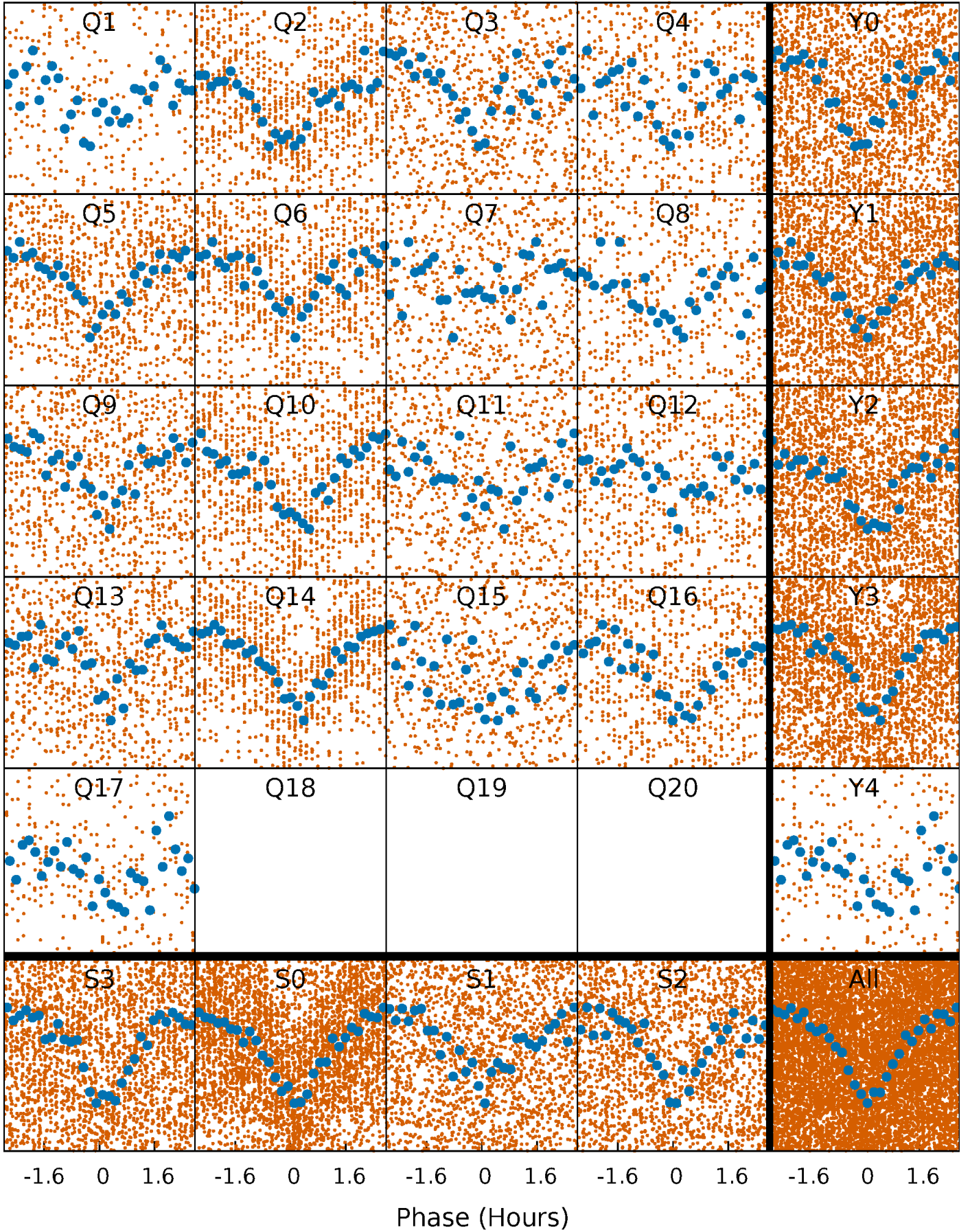


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

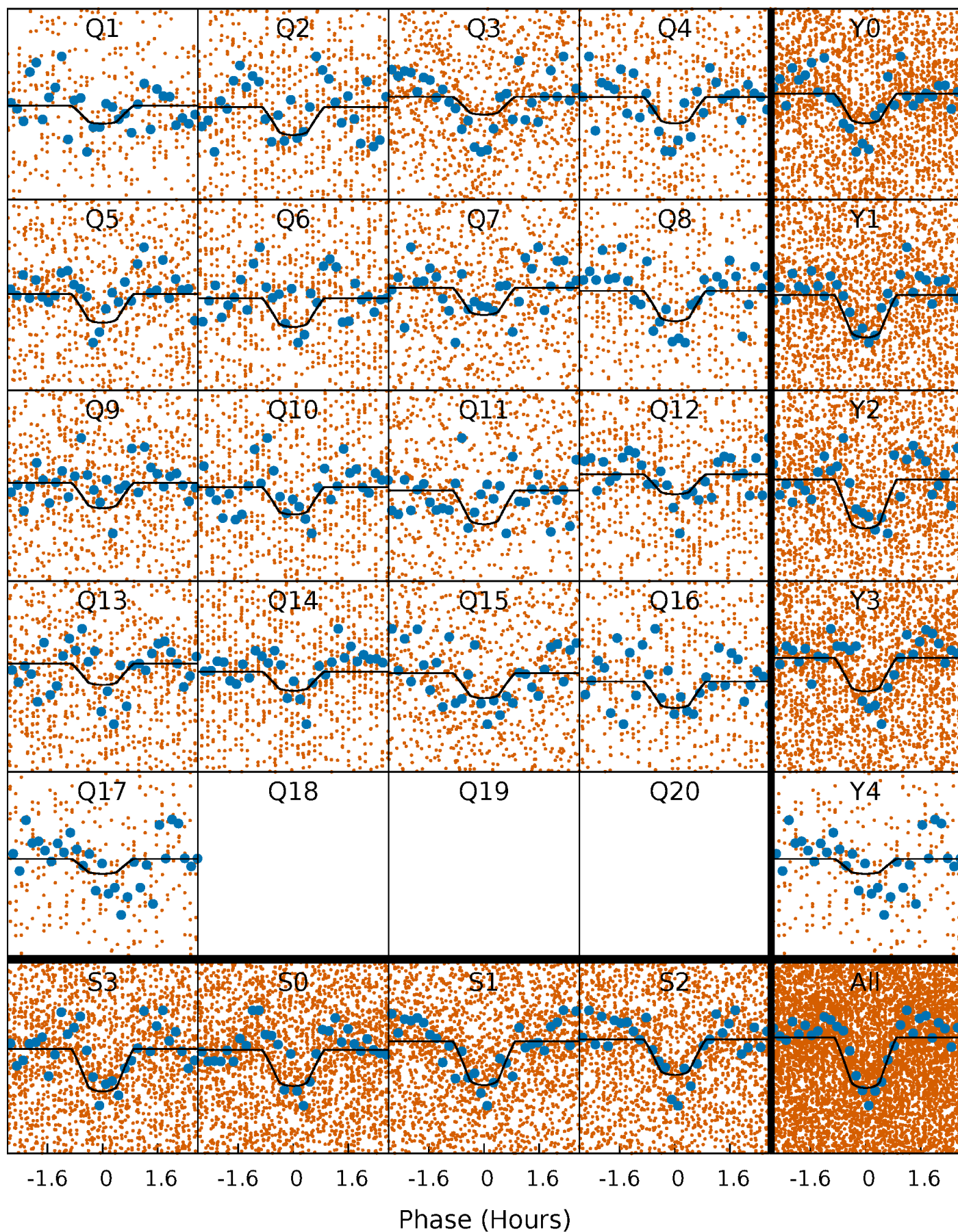
TCE 005476671-01   P= 0.824168 Days    $T_0=131.695068$  (BKJD)





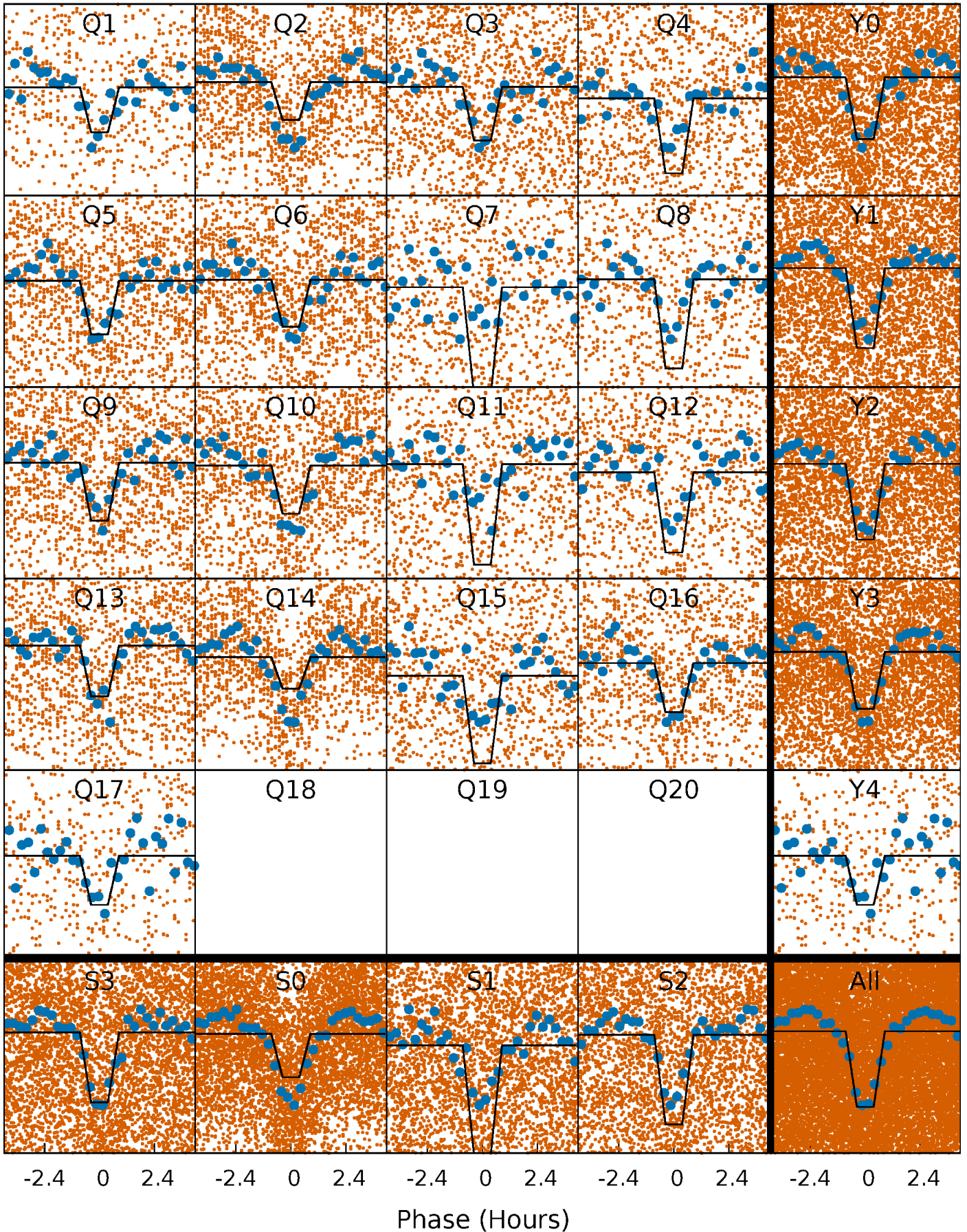
# DV Quarter-Phased Transit Curves

TCE 005476671-01 P= 0.824168 Days  $T_0=131.695068$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 005476671-01 P= 0.824181 Days  $T_0=131.689767$  (BKJD)

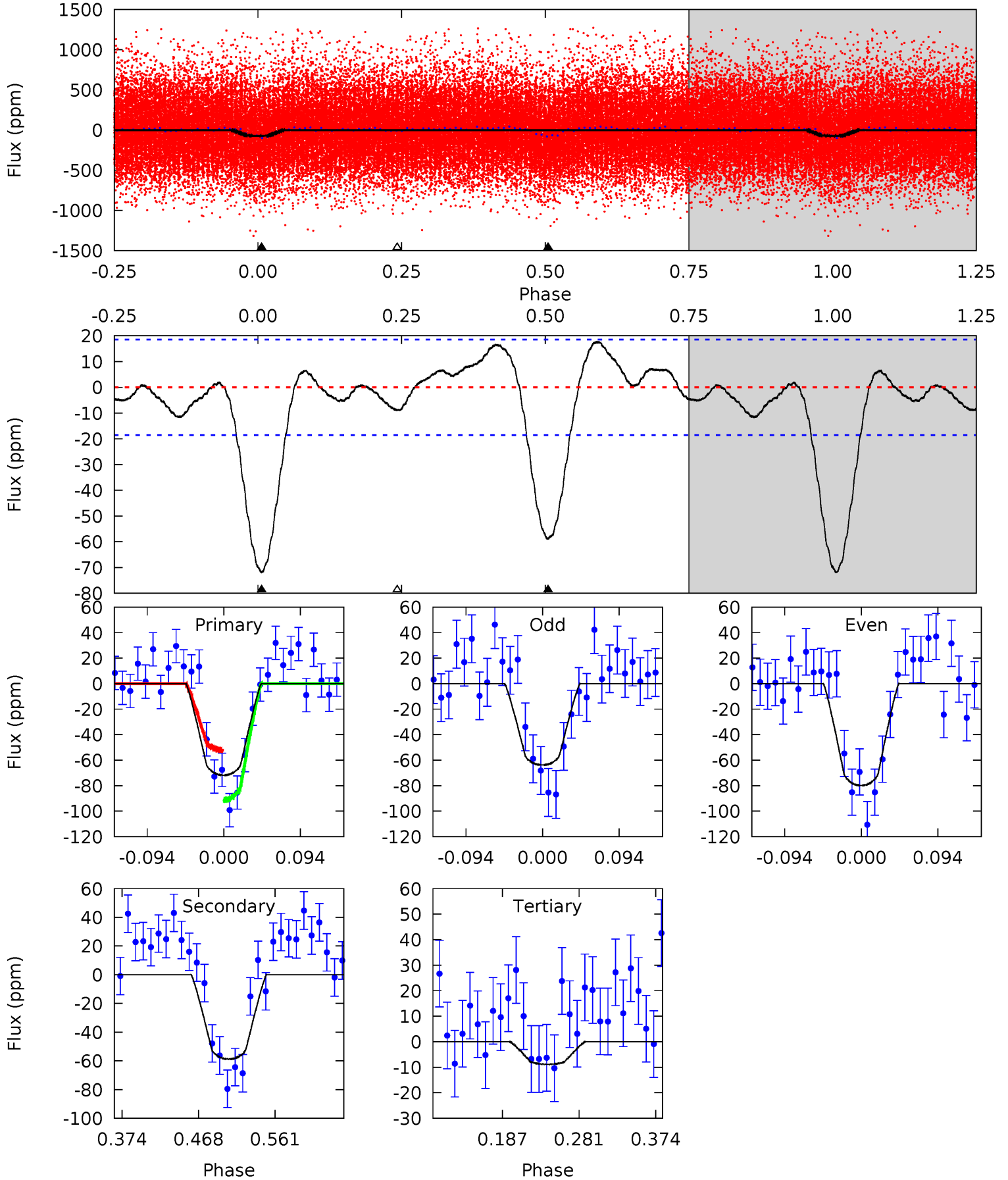




# DV Model-Shift Uniqueness Test

005476671-01, P = 0.824168 Days, E = 130.870900 Days

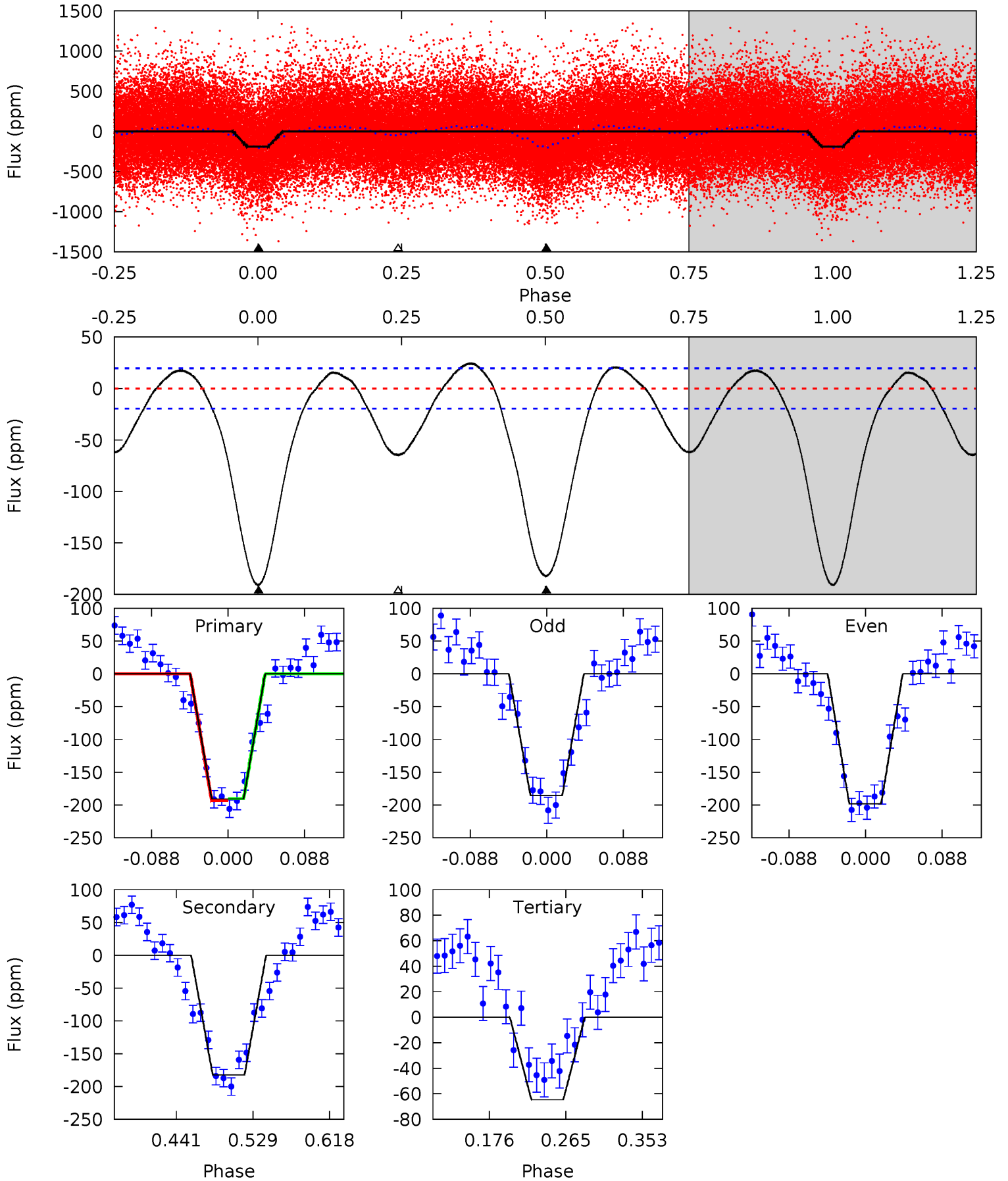
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
17.7	14.5	2.18	0	4.58	1.68	1.58	15.5	17.7	12.3	14.5	1.98	0.90	0.20	4.82



# Alt Model-Shift Uniqueness Test

005476671-01, P = 0.824181 Days, E = 130.865586 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
44.6	42.6	15.1	0	4.59	1.70	6.51	29.5	44.6	27.5	42.6	1.47	1.02	0.11	0.40





### Stellar Parameters For KIC 005476671

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5977^{+160}_{-178}$	$4.514^{+0.065}_{-0.195}$	$-0.360^{+0.300}_{-0.300}$	$0.883^{+0.249}_{-0.083}$	$0.929^{+0.109}_{-0.109}$	$1.897^{+0.488}_{-0.941}$
	+3%/-3%	+1%/-4%	+83%/-83%	+28%/-9%	+12%/-12%	+26%/-50%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 005476671-01 / KOI 4598.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-59 \pm 4$	$0.94^{+0.49}_{-0.44}$	$2709^{+185}_{-128}$	$5344^{+2136}_{-884}$	$10^{+24}_{-6}$
Alt.	$-182 \pm 4$	$1.40^{+0.53}_{-0.46}$	$2708^{+169}_{-130}$	$5814^{+1366}_{-734}$	$15^{+17}_{-7}$

$T_{max}$  = 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

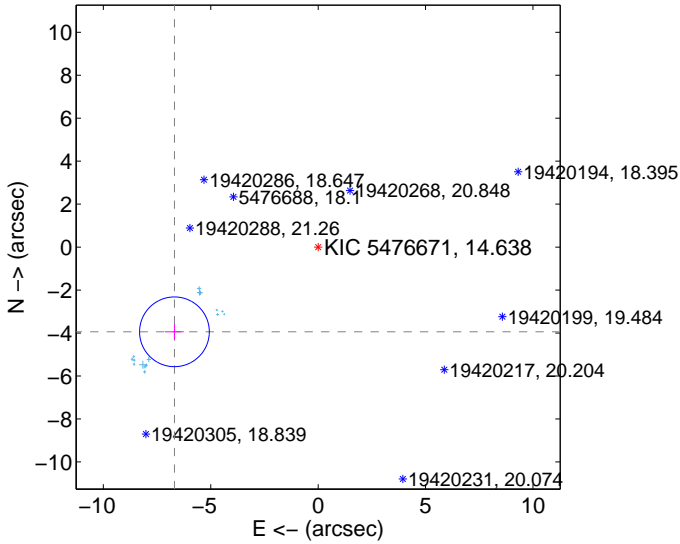
Supplemental centroid analysis for 005476671-01. Kepler magnitude: 14.64. Transit SNR 12.54

There are 16 quarters with good PRF difference image offsets

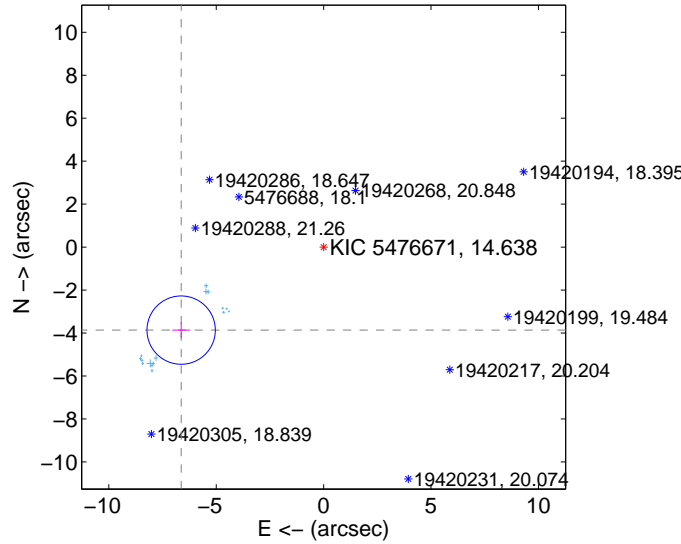
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$7.764 \pm 0.541$	14.35	$6.688 \pm 0.435$	$-3.943 \pm 0.356$
PRF-fit source offset from KIC position	$7.675 \pm 0.530$	14.48	$6.631 \pm 0.416$	$-3.864 \pm 0.371$
photometric centroid source offset	$5.24 \pm 1.17$	4.50	$3.55 \pm 1.20$	$-3.86 \pm 1.14$

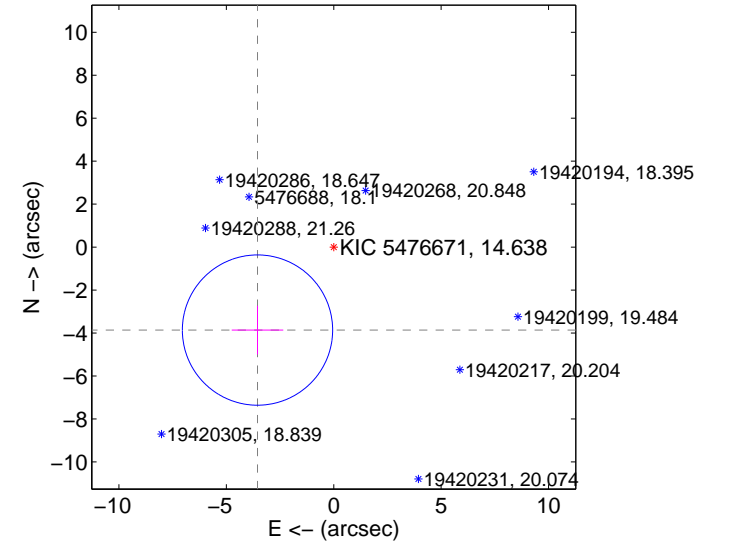
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

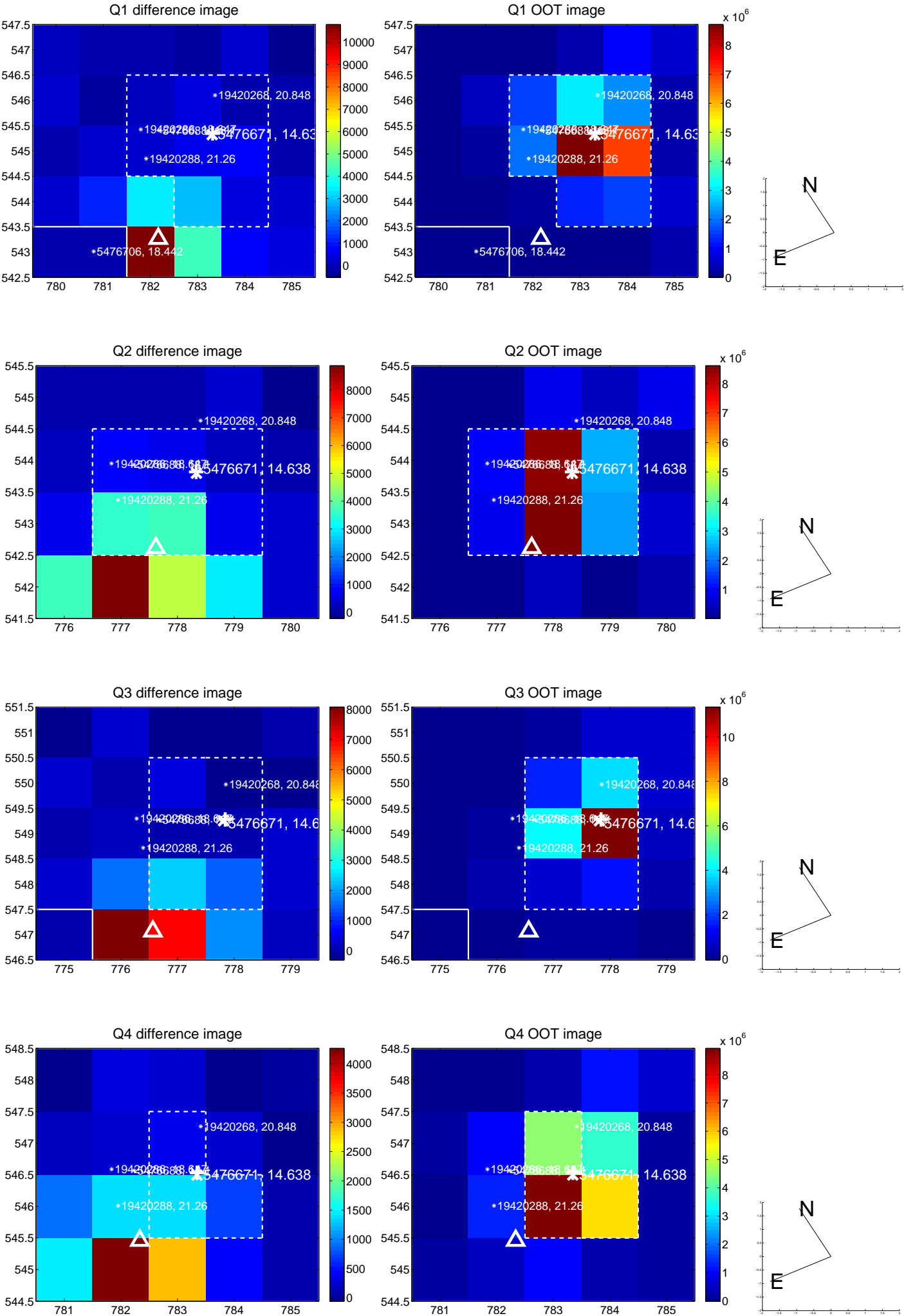


offset from photometric centroids

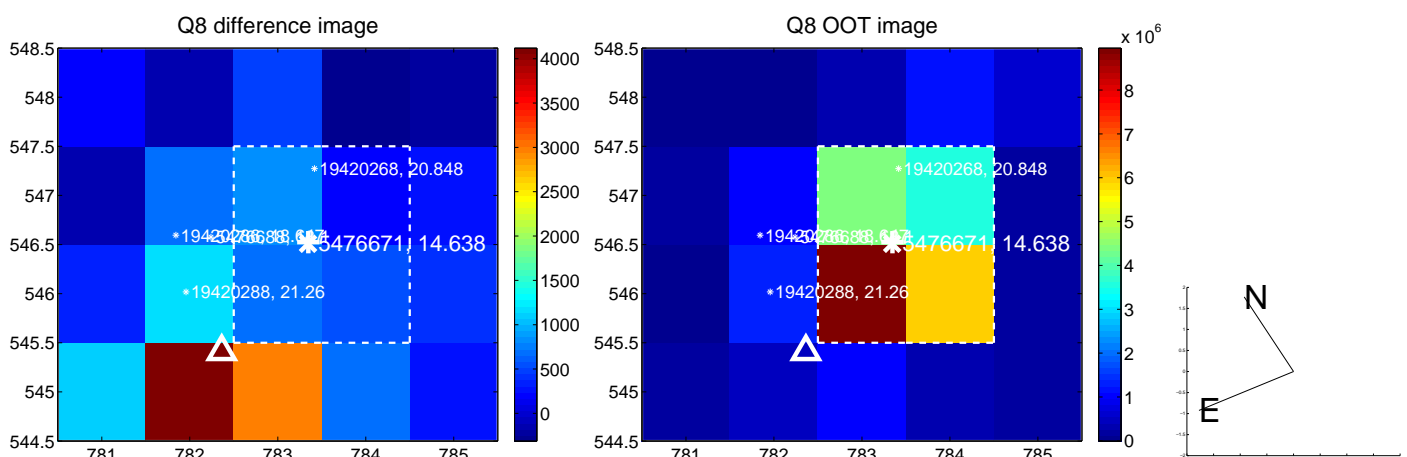
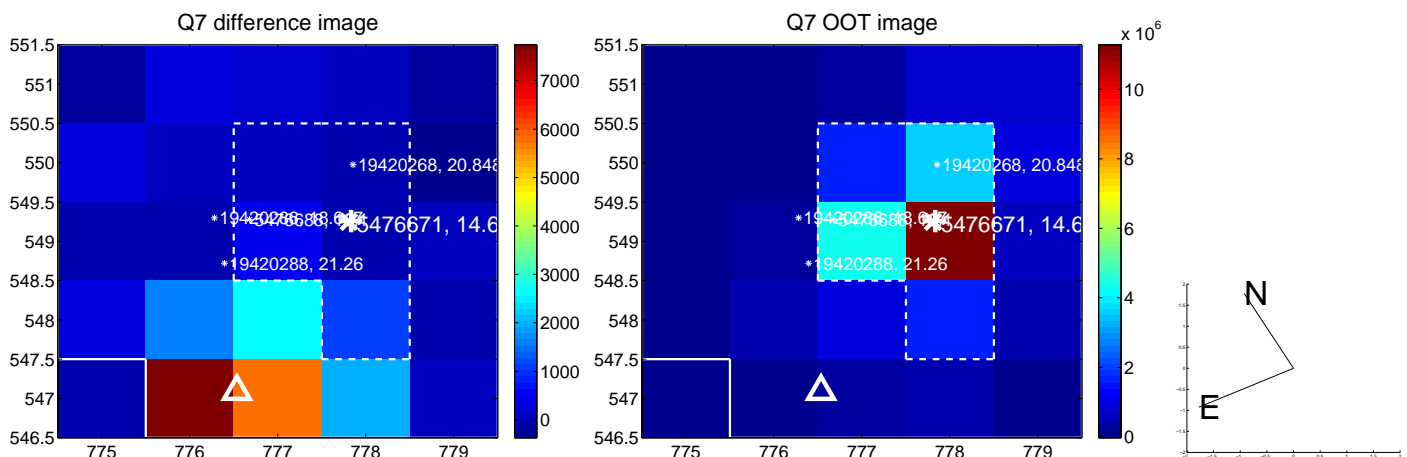
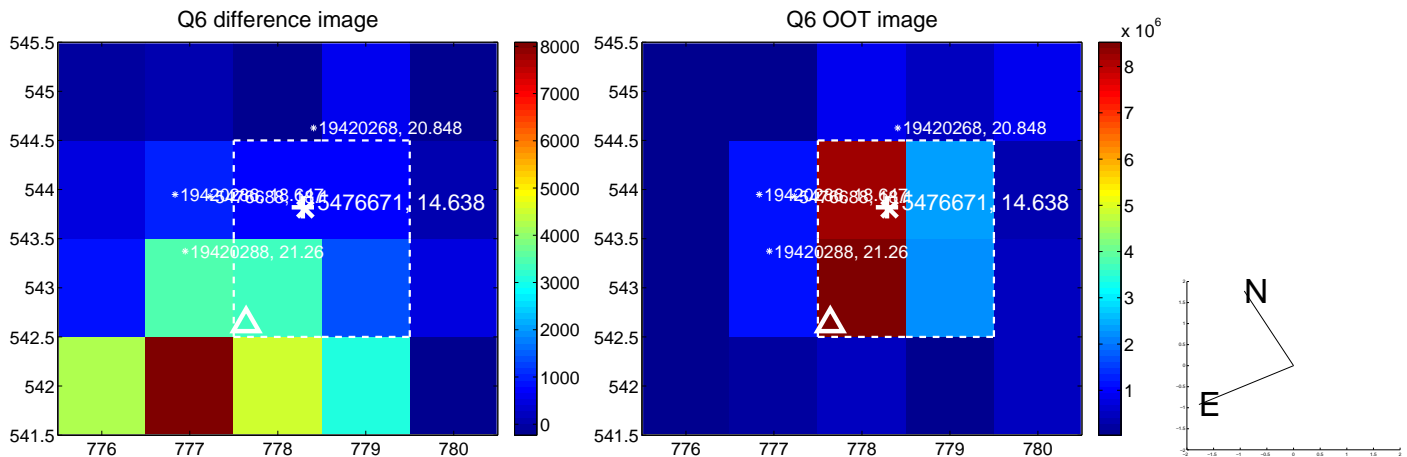
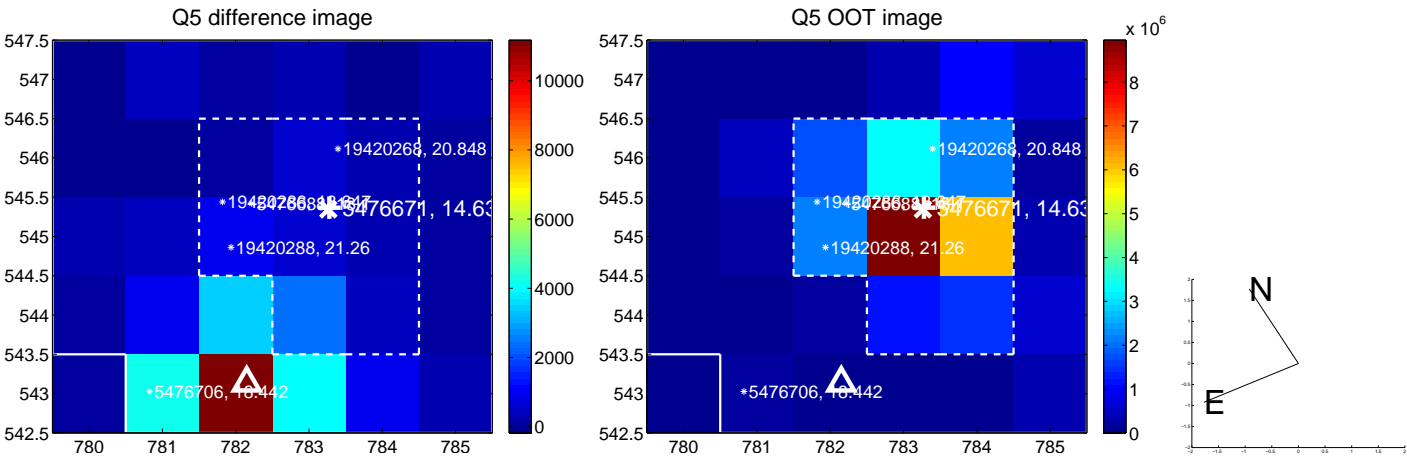


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

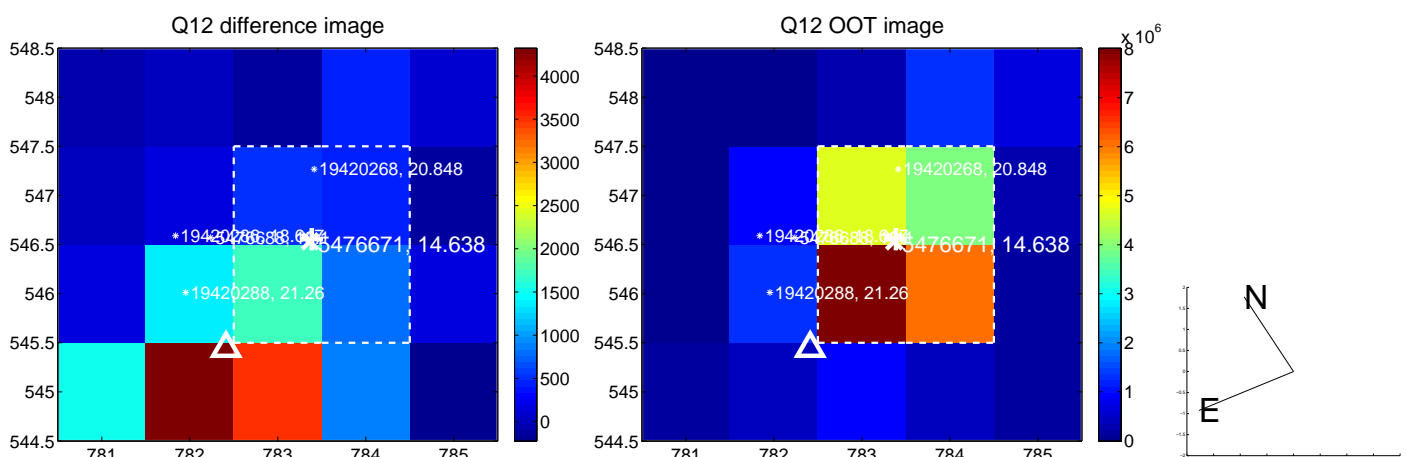
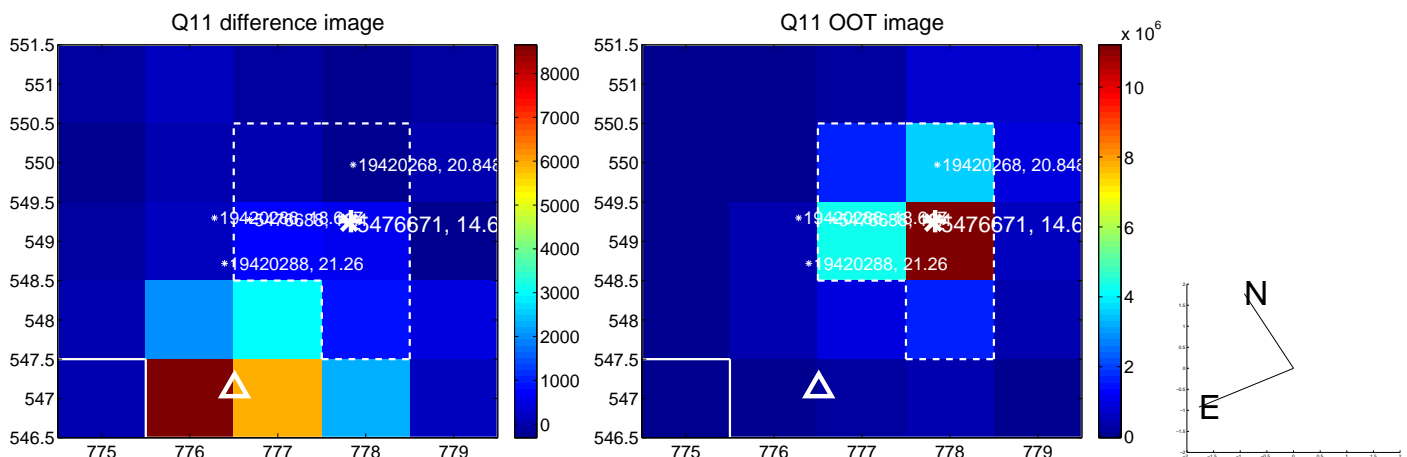
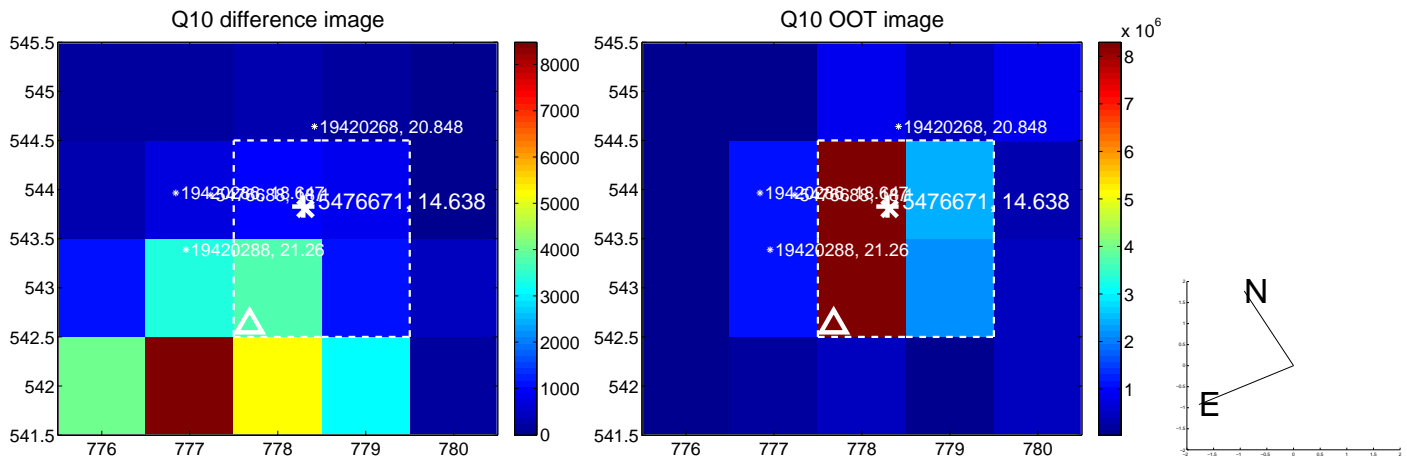
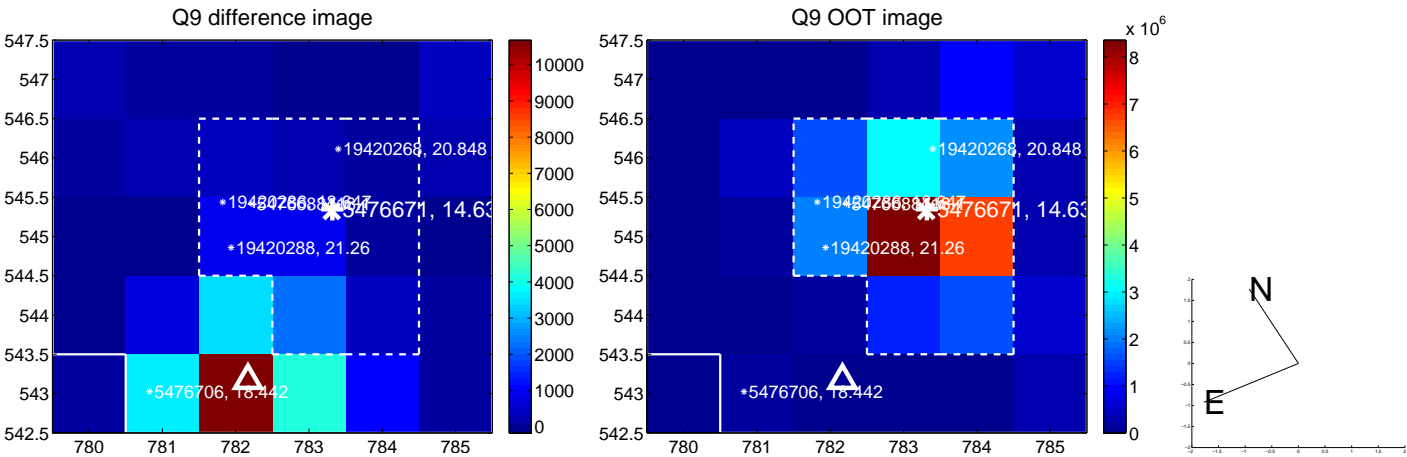


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

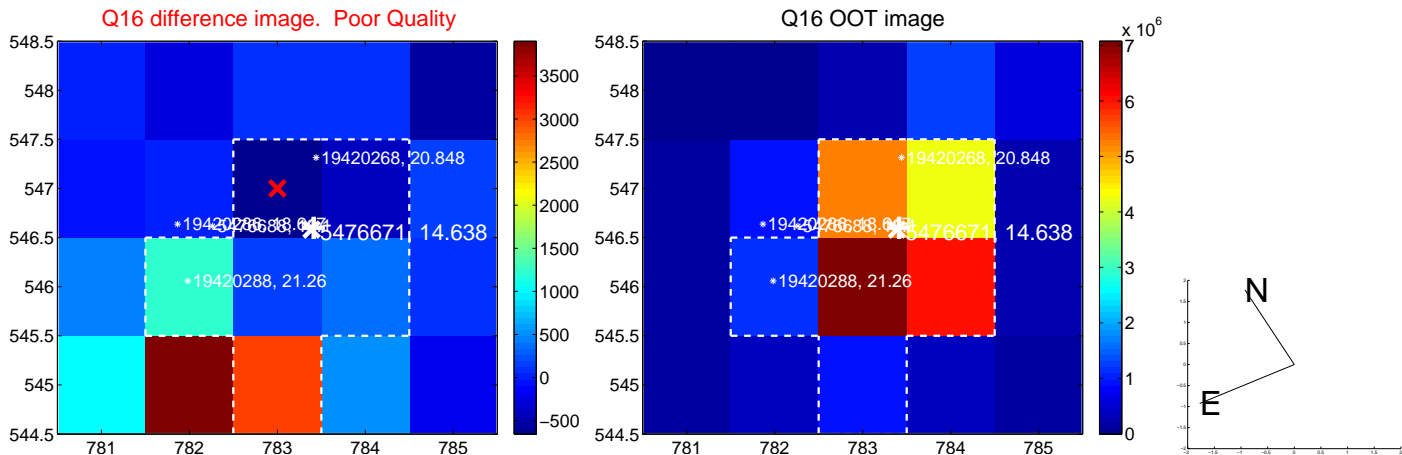
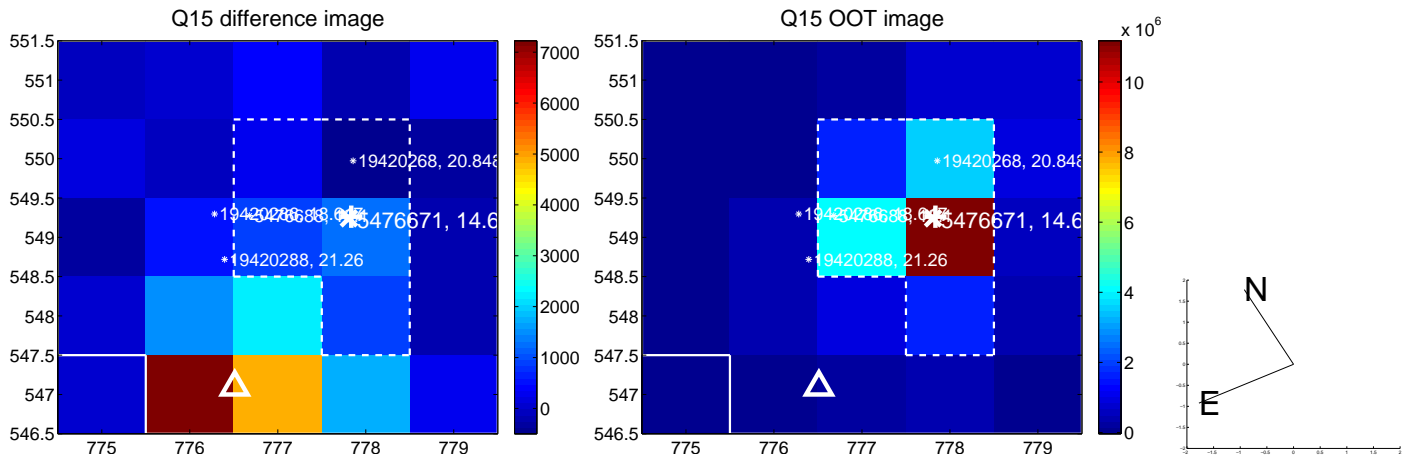
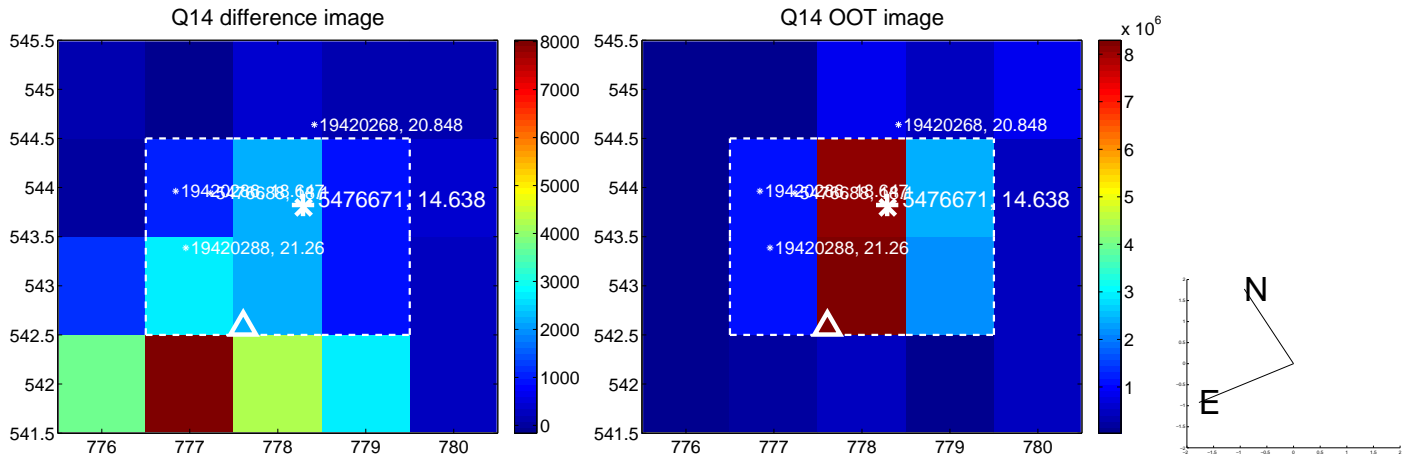
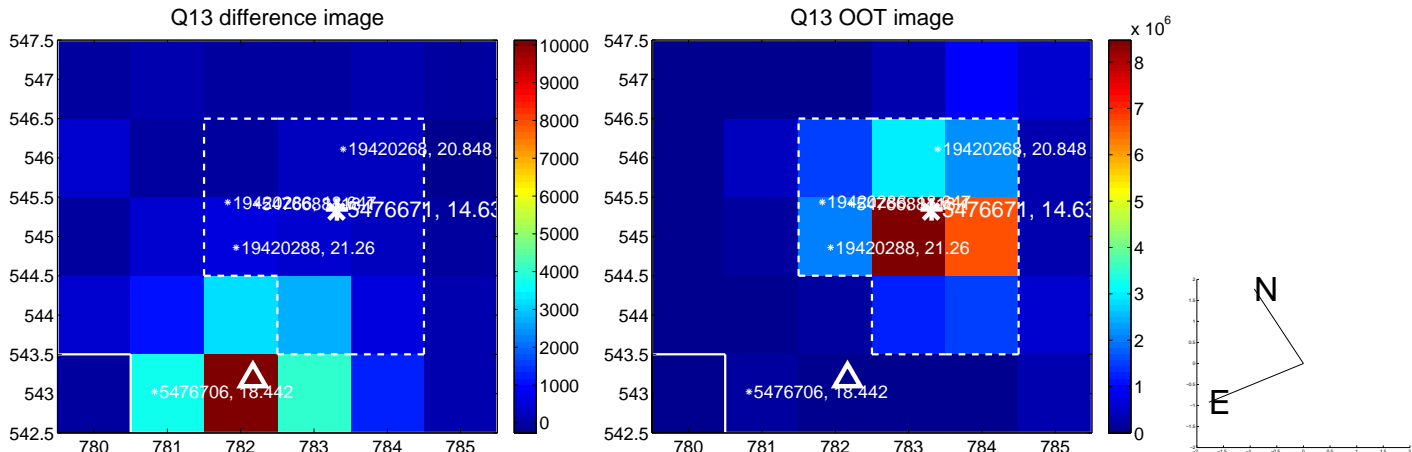




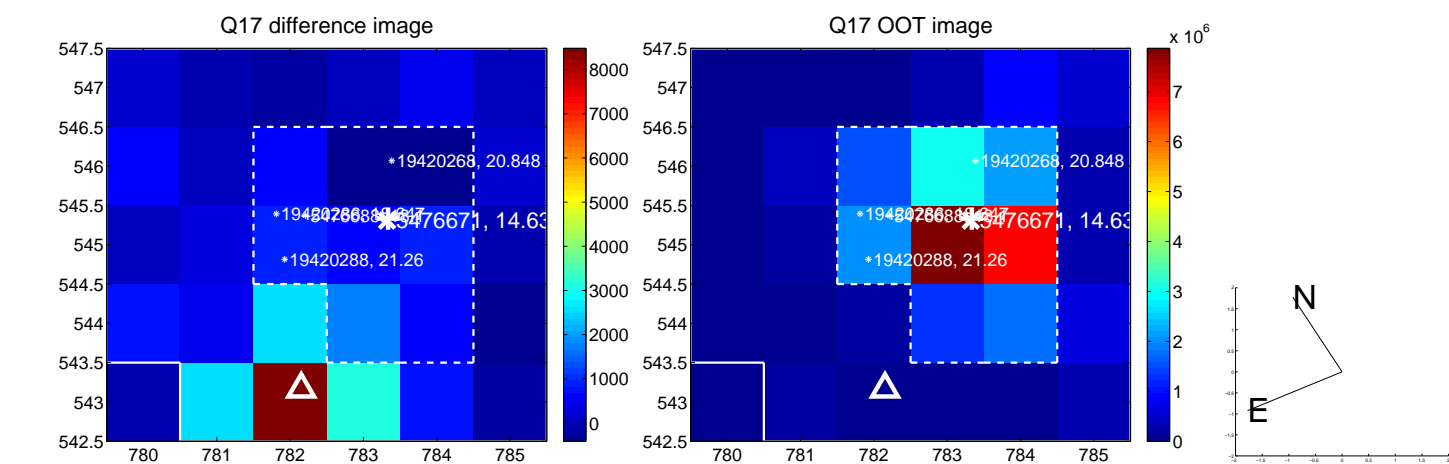
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



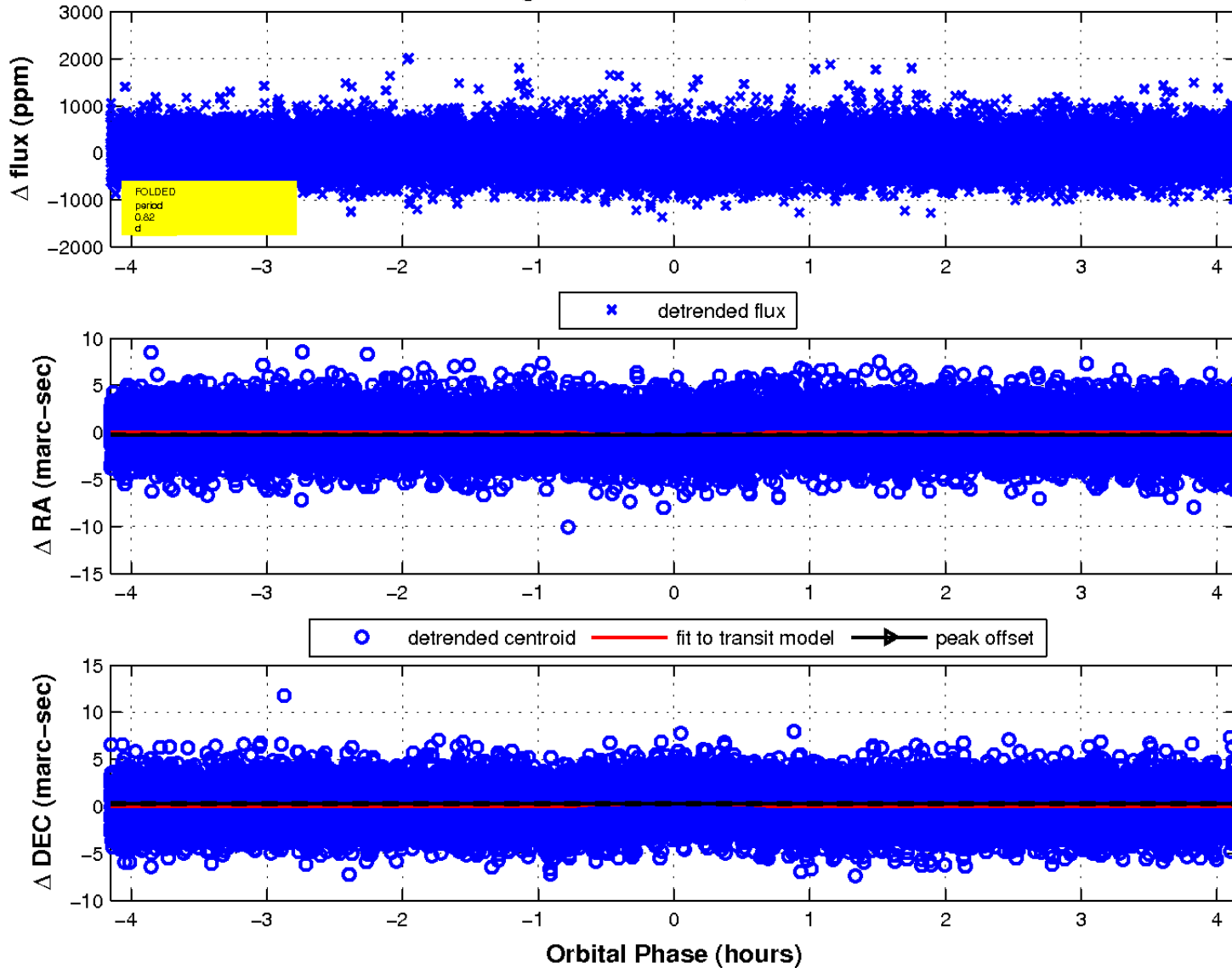
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

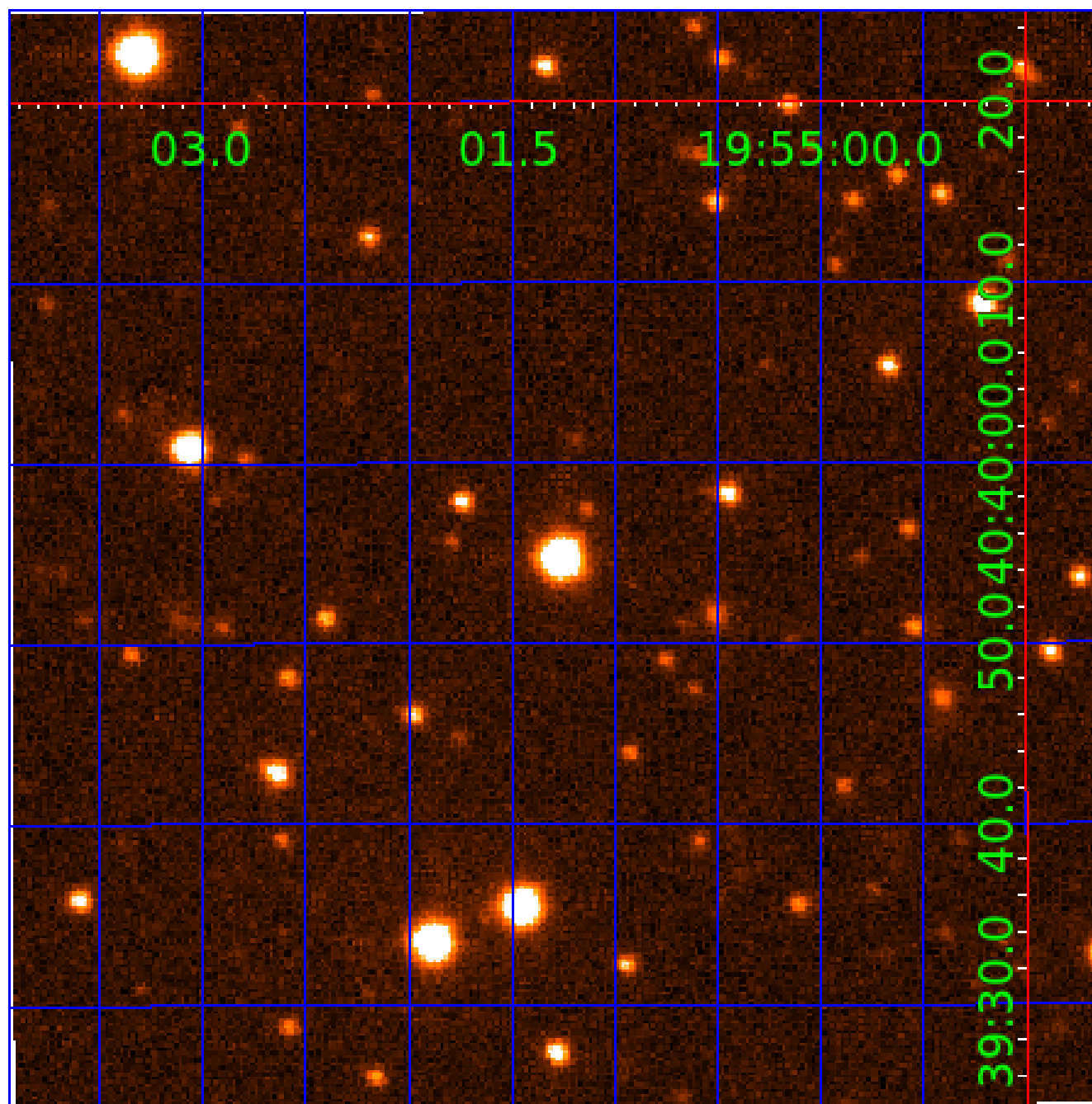


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination





# KIC 005476671

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005476671-01	OBS	4598.02	0.824168	131.695068	72.3	1.384	11.7	12.5	0.88	5977	0.89	3163.11
005476671-02	OBS	4598.01	0.824155	132.114408	51.7	1.648	10.7	10.1	0.88	5977	0.75	3163.17

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005476671-01	OBS	FP	0.00	1	0	1	0	MOD_NONUNIQ_ALT—CENT_RESOLVED_OFFSET
005476671-02	OBS	FP	0.00	1	0	1	0	MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_RESOLVED_OFFSET

**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 005476671-02

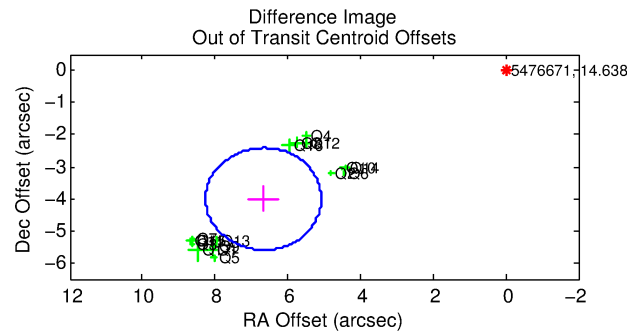
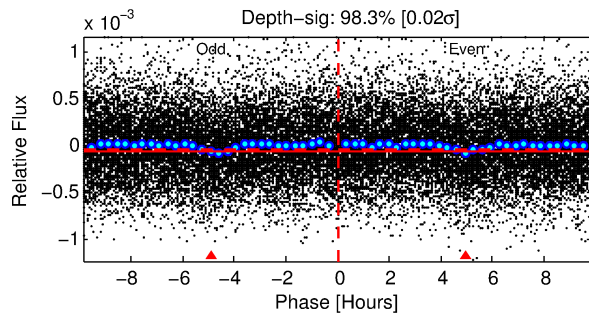
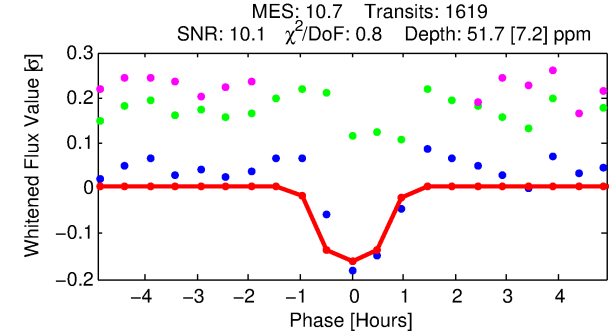
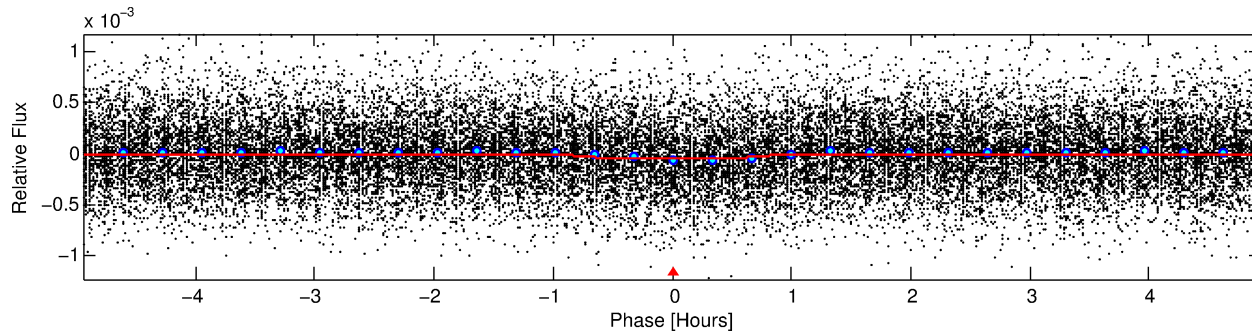
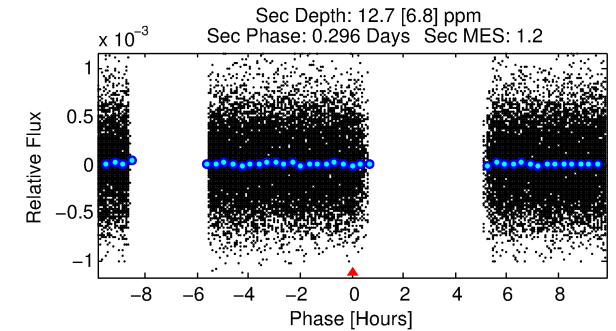
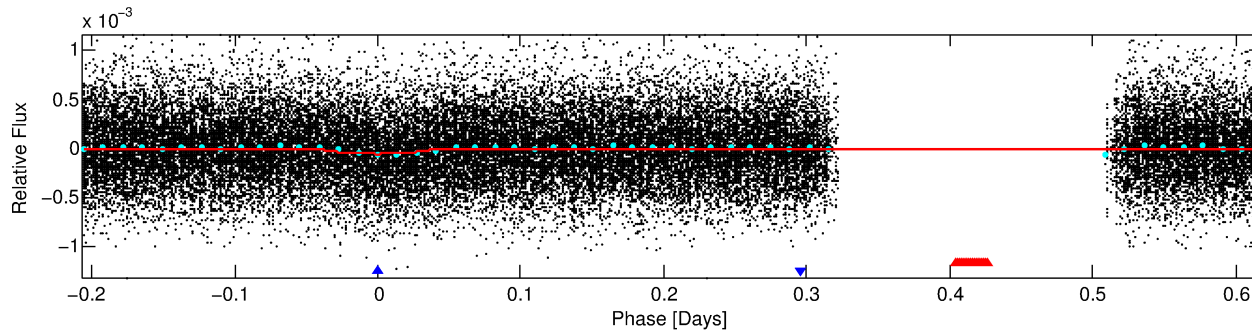
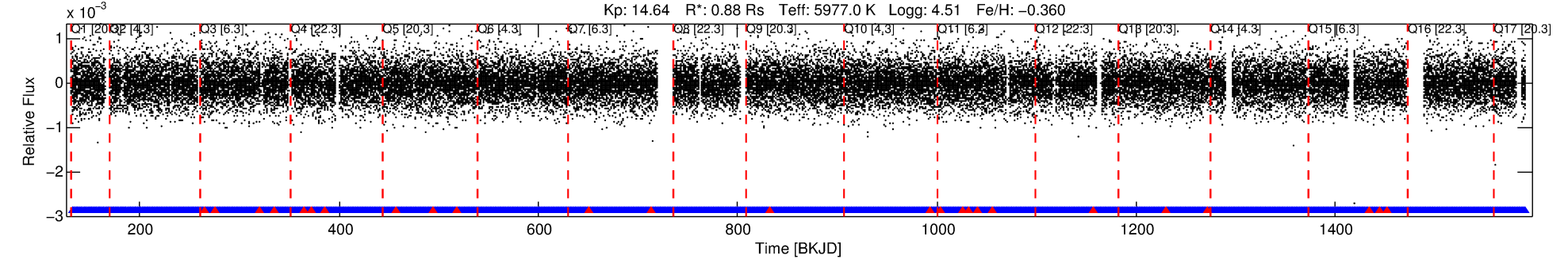
No Significant Match Found

# DV One-Page Summary

KIC: 5476671 Candidate: 2 of 2 Period: 0.824 d

KOI: K04598 Corr: No Ephemeris Match

Kp: 14.64 R\*: 0.88 Rs Teff: 5977.0 K Logg: 4.51 Fe/H: -0.360



## DV Fit Results:

Period = 0.82416 [0.00001] d  
Epoch = 132.1144 [0.0025] BKJD  
Rp/R\* = 0.0078 [0.0052]  
a/R\* = 1.95 [5.08]  
b = 0.90 [0.73]  
Seff = 3163.17 [1179.89]  
Teq = 1912 [178] K  
Rp = 0.75 [0.54] Re  
a = 0.0168 [0.0040] AU  
Ag = 3.49 [5.15] [0.48σ]  
Teffp = 4042 [1451] K [1.46σ]

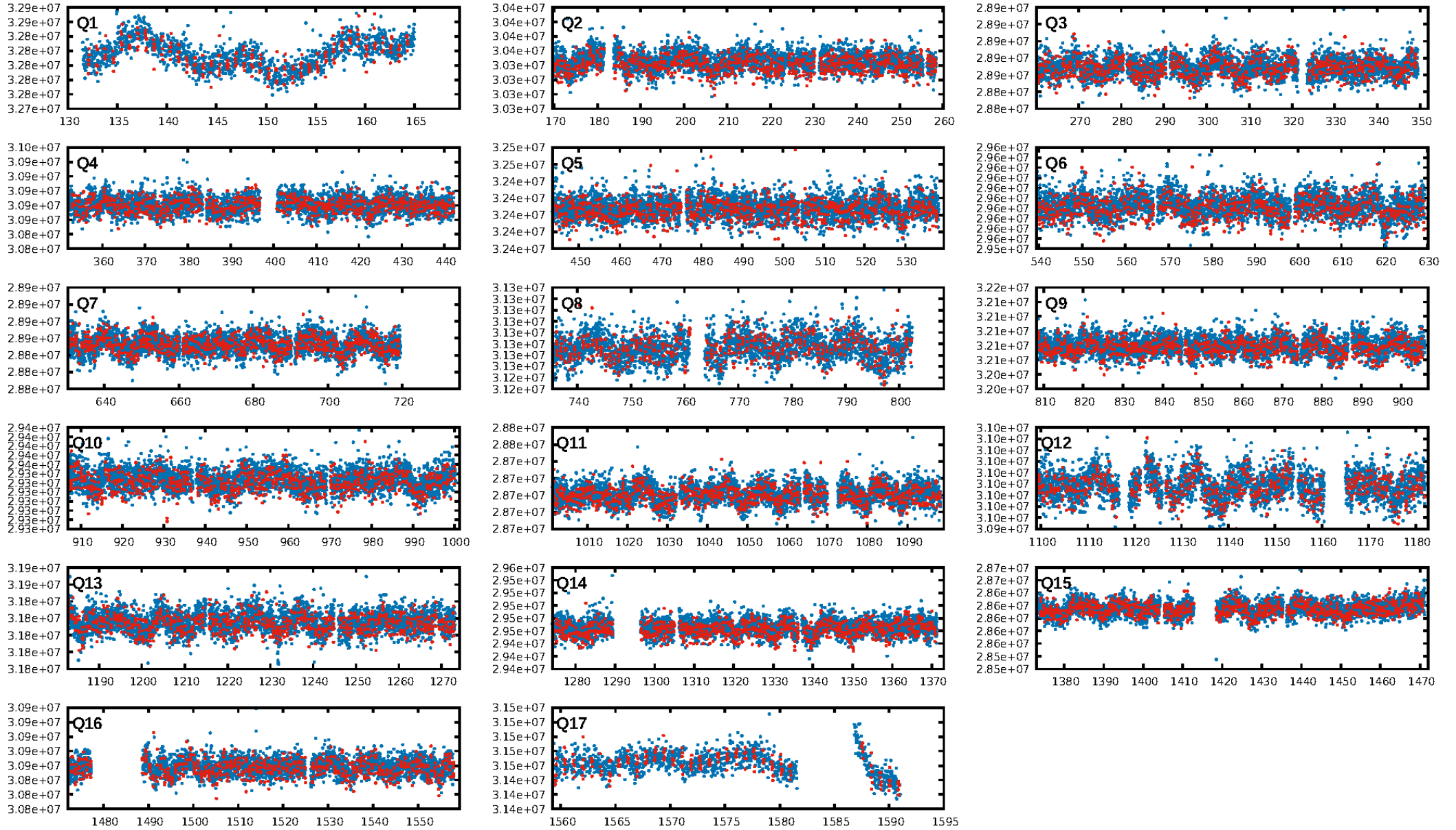
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 4.14e-29  
RollingBand-fgt: 0.98 [1522/1547]  
GhostDiagnostic-chr: -2.086  
Centroid-sig: 0.0%  
Centroid-so: 6.229 arcsec [4.31σ]  
OotOffset-rm: 7.784 arcsec [14.69σ]  
KicOffset-rm: 7.695 arcsec [15.85σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 1.00 [17/17]

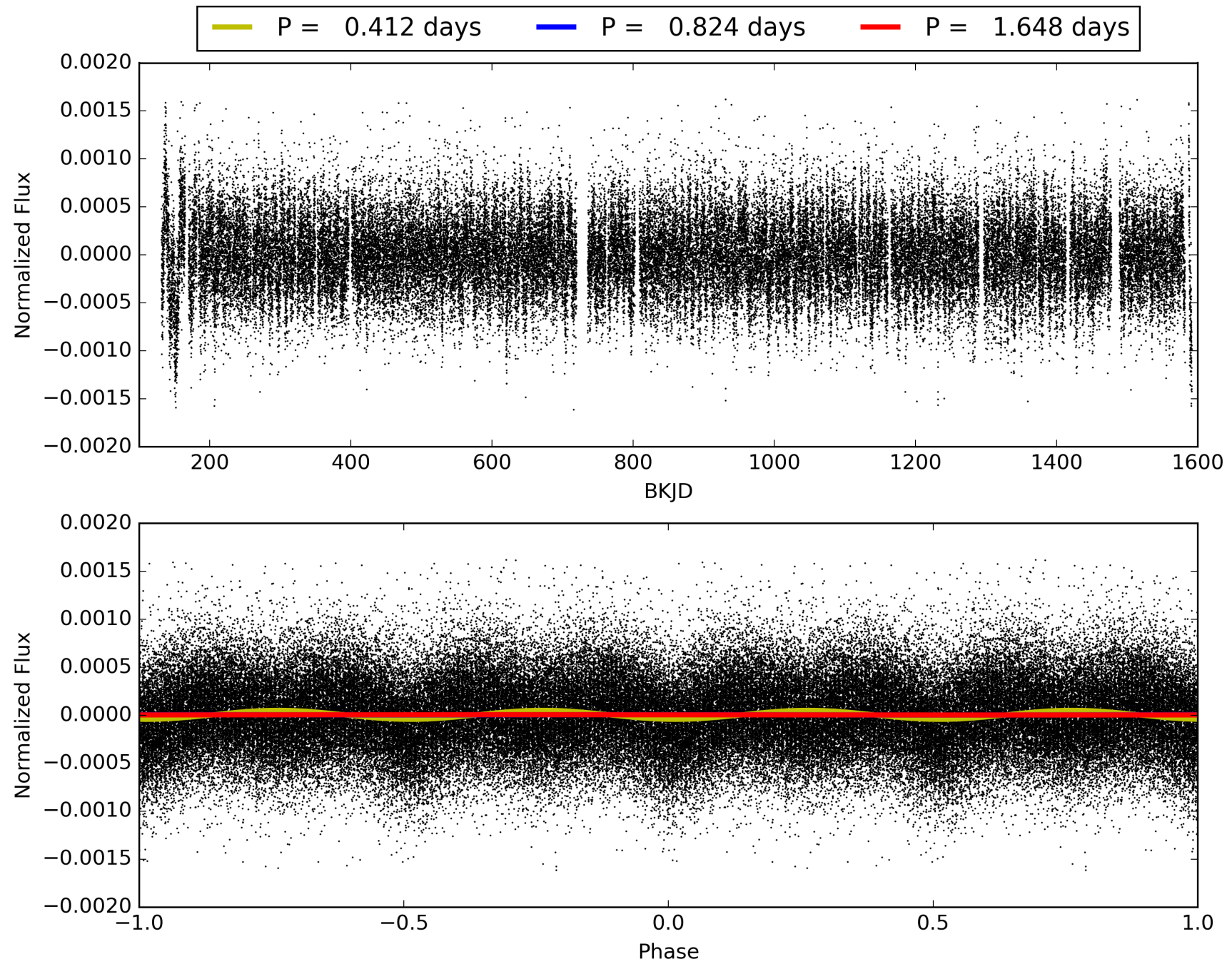
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 20:59:53 Z

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

# TCE 005476671-02, PDC Light Curves



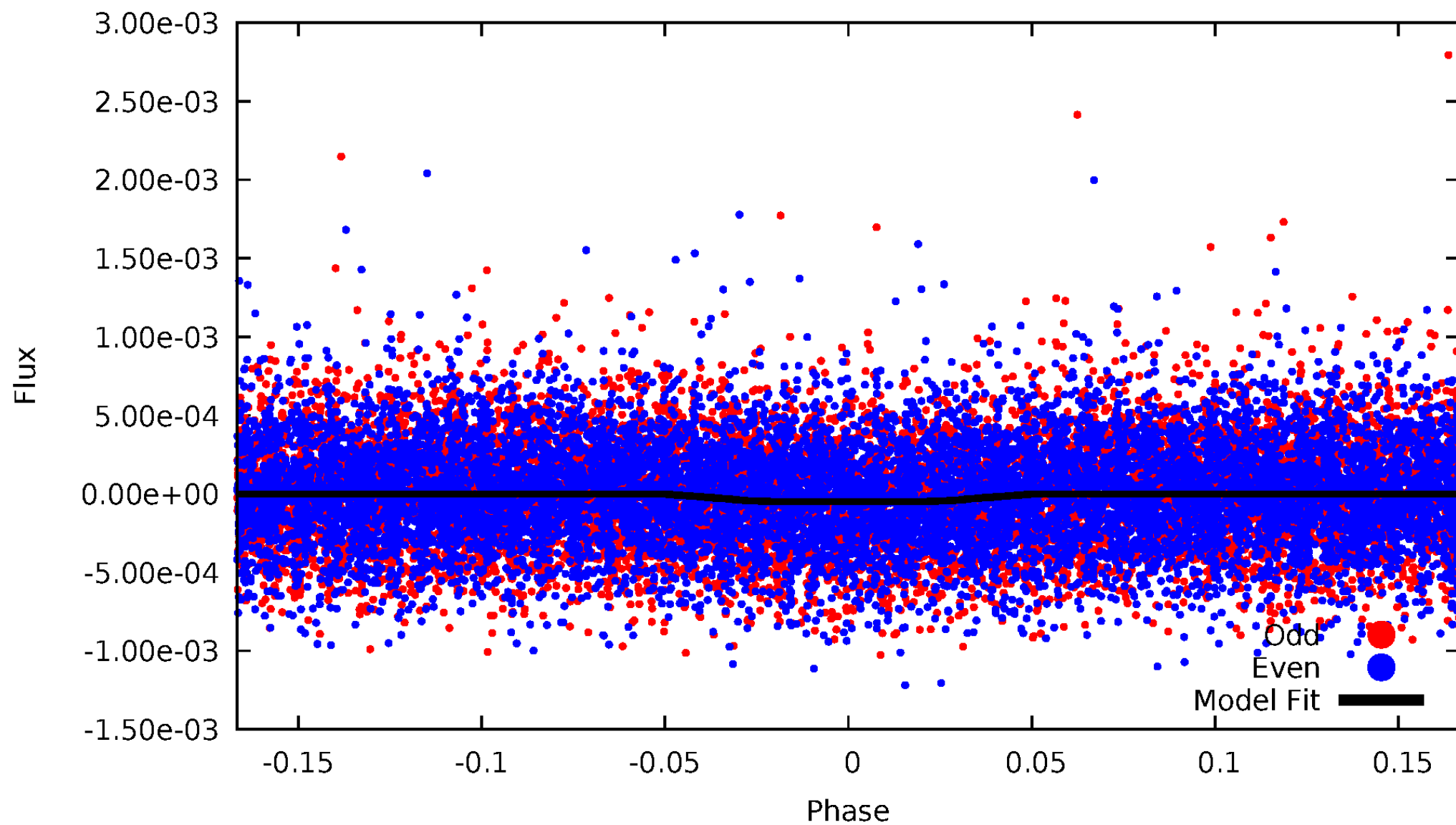
TCE 005476671-02





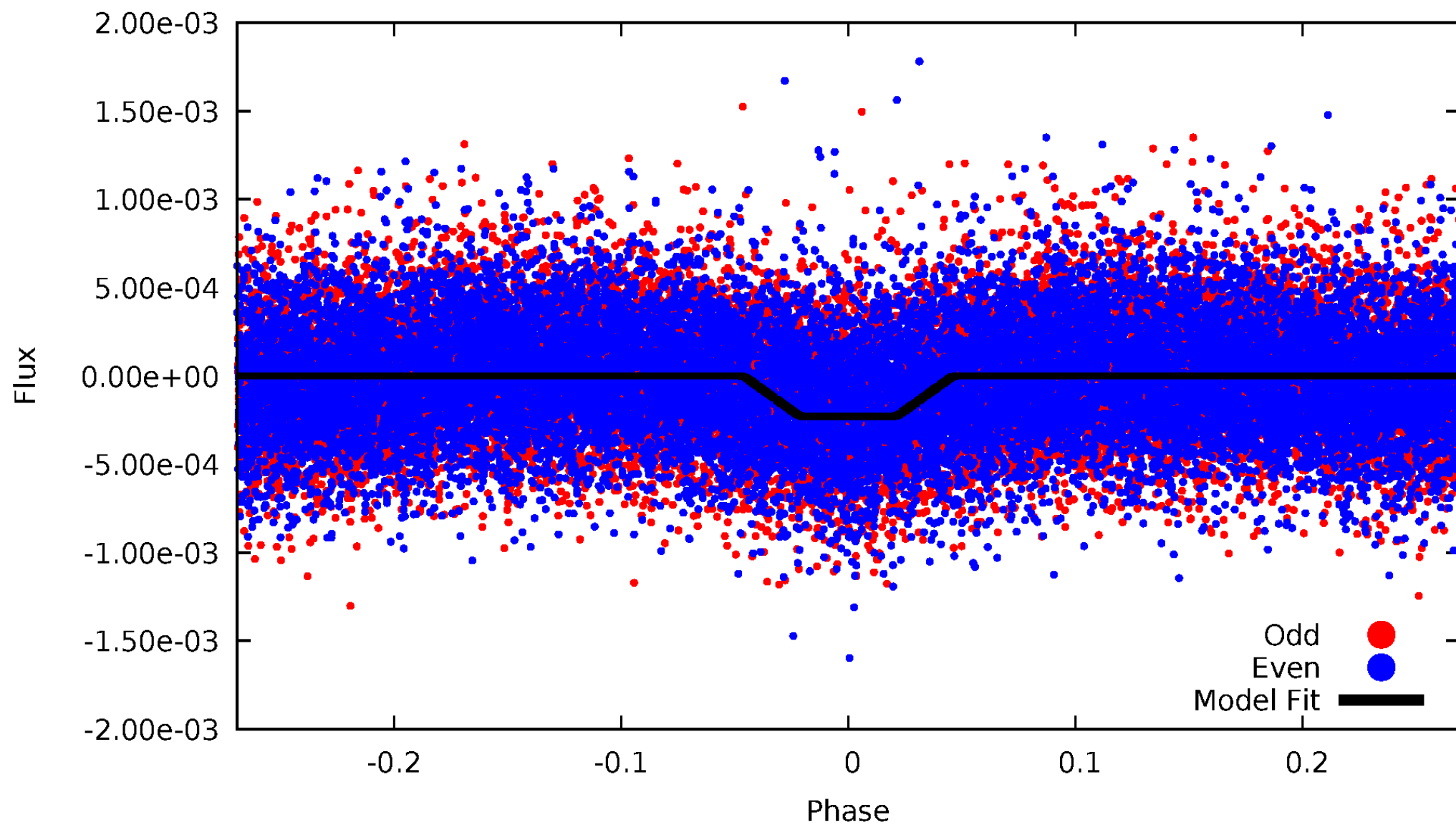
# DV Odd/Even

TCE 005476671-02



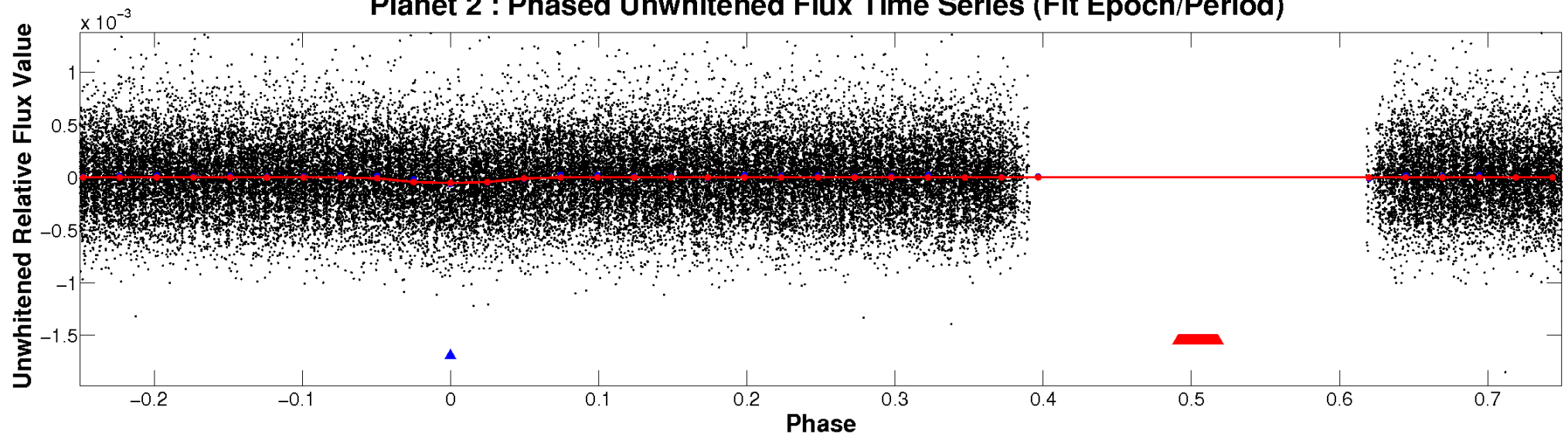
# ALT Odd/Even

TCE 005476671-02

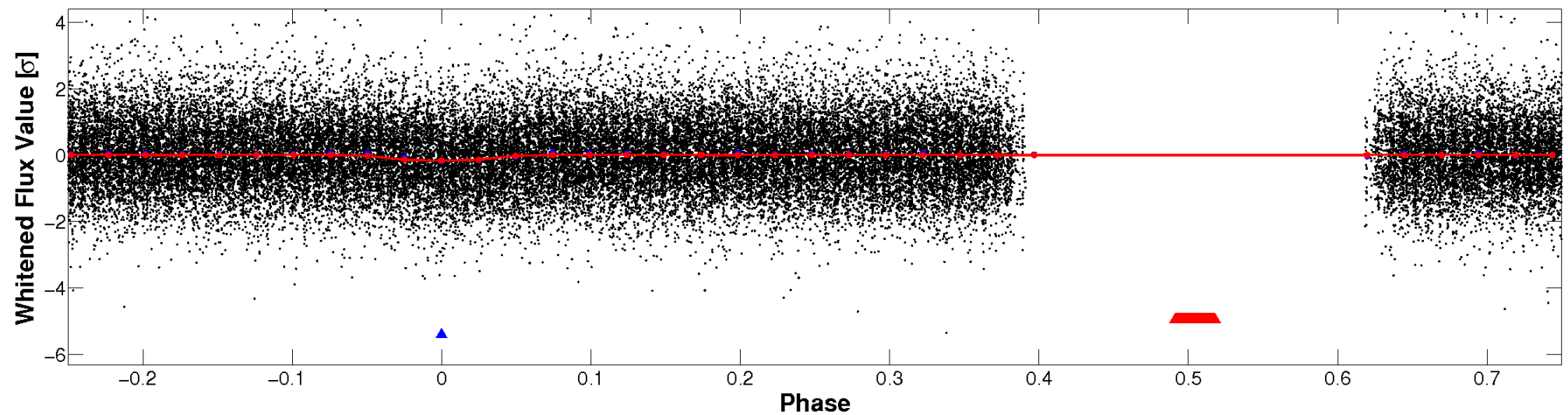


# Non-Whitened Vs. Whitened Light Curve

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

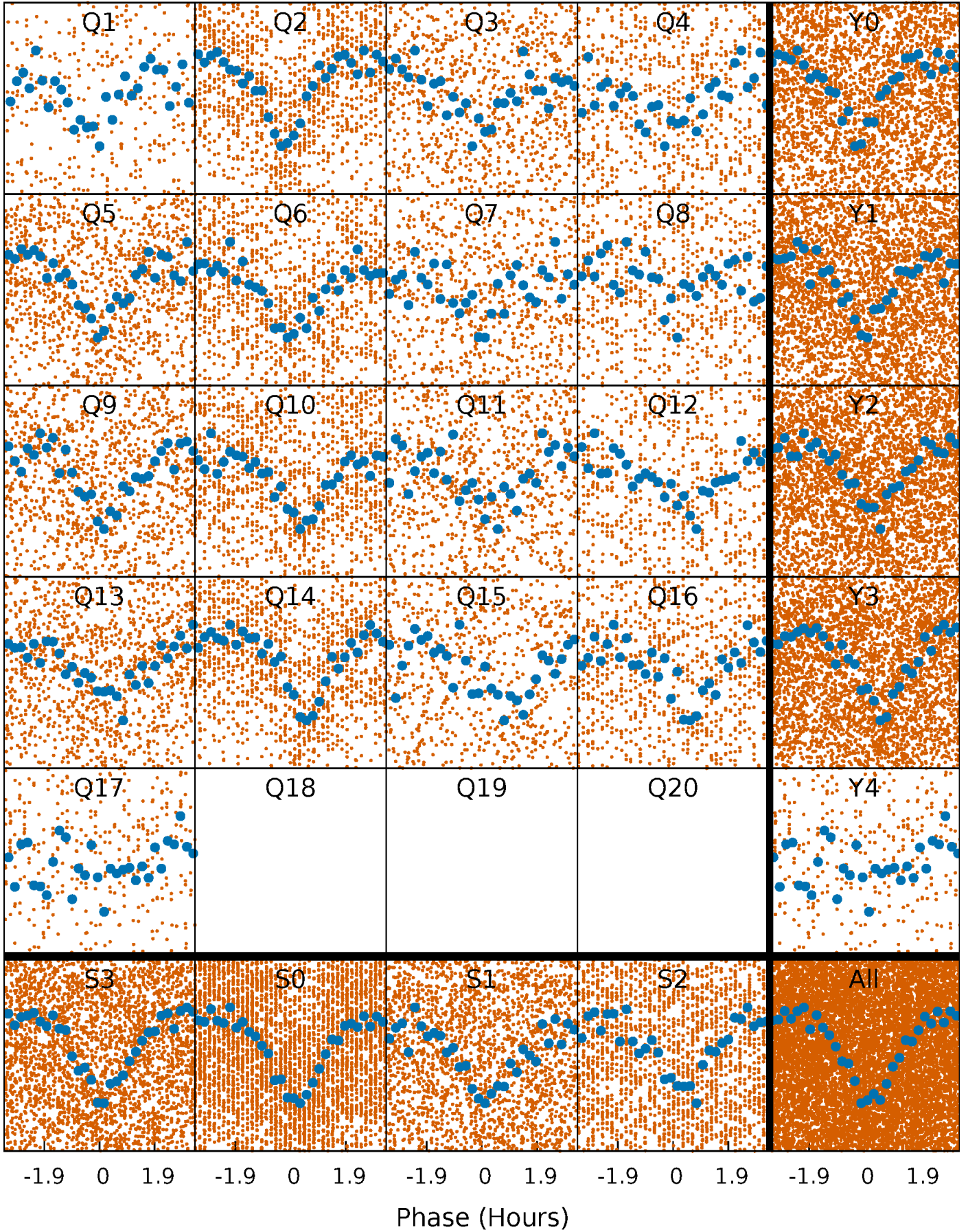


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

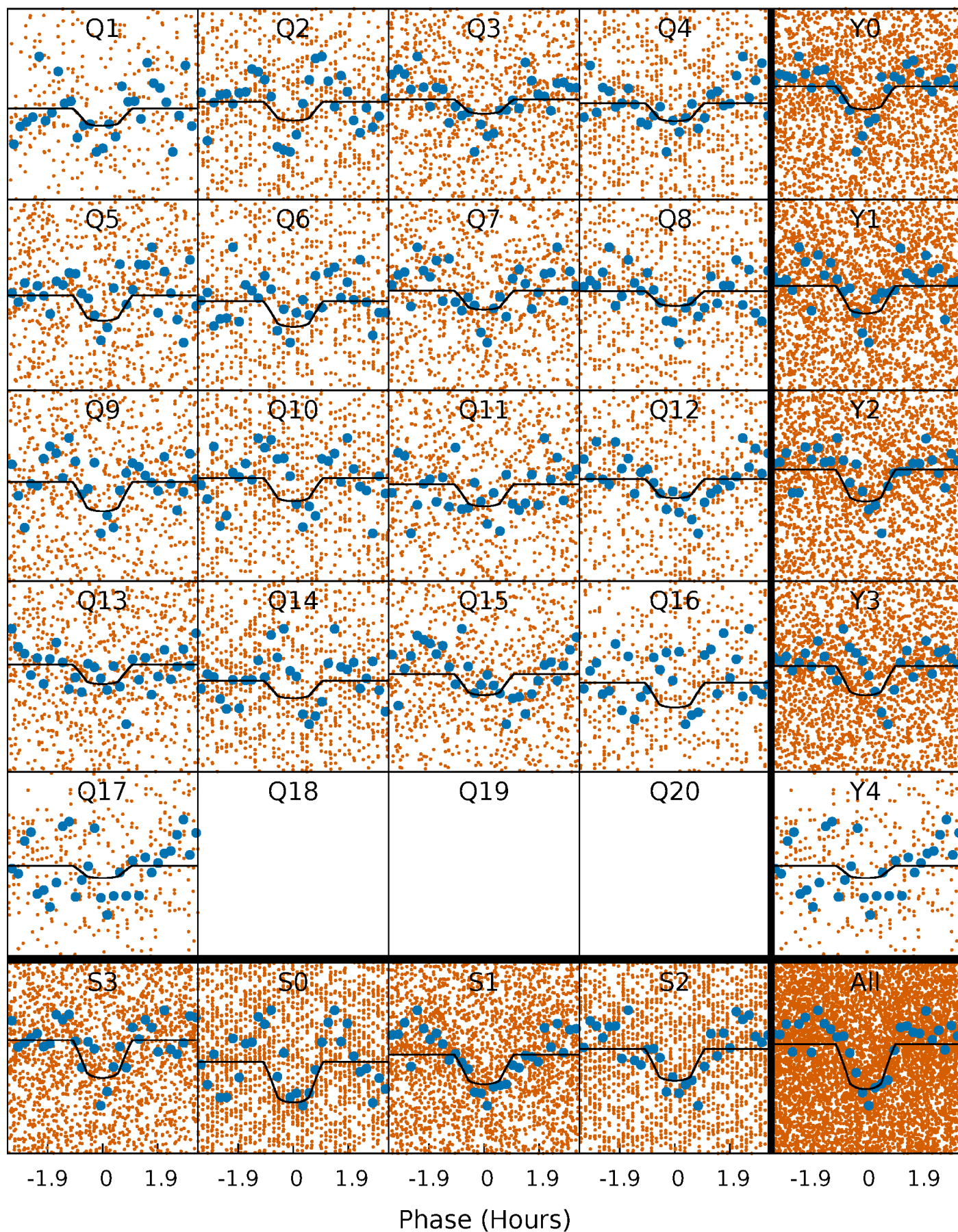
TCE 005476671-02   P= 0.824155 Days    $T_0=132.114408$  (BKJD)





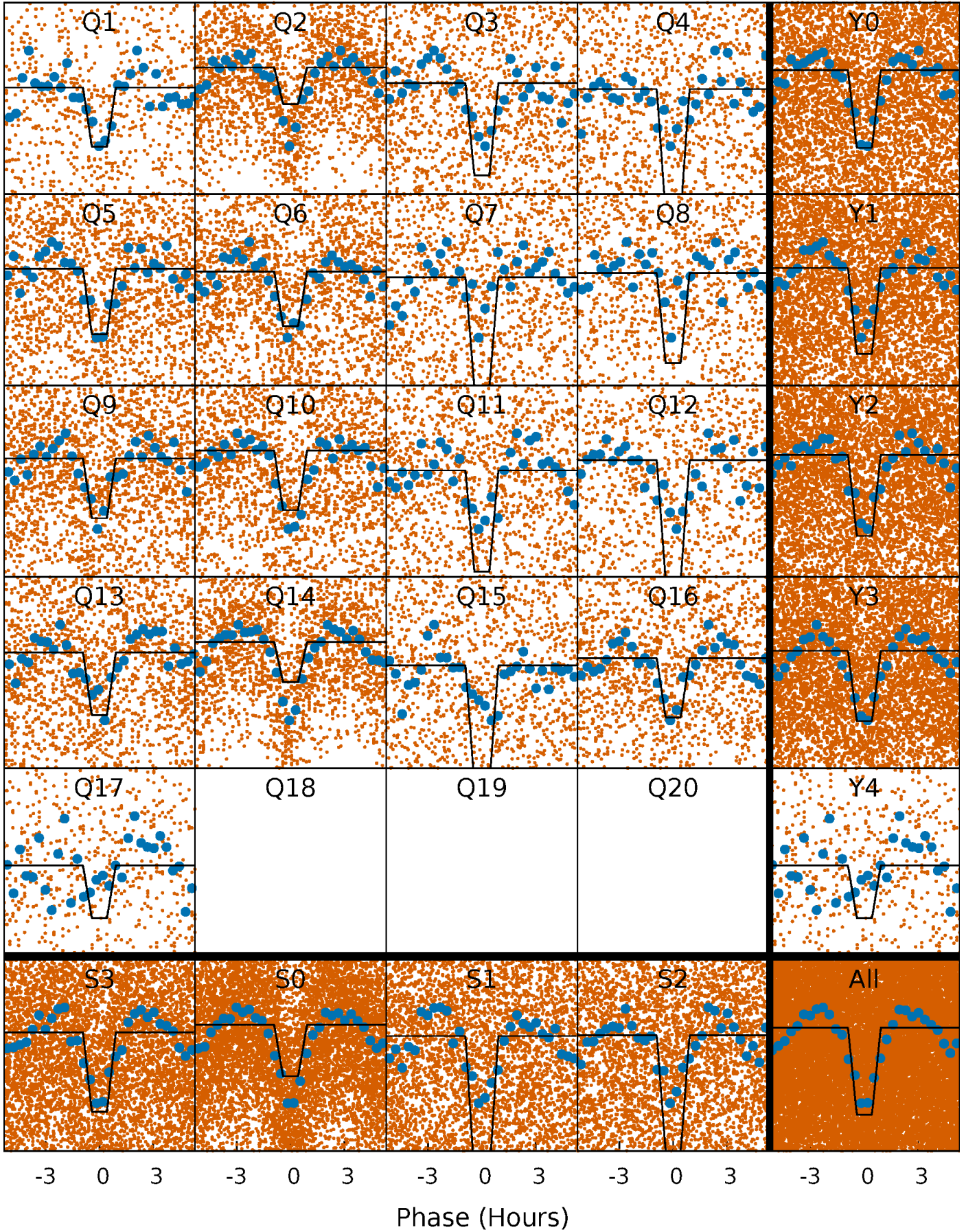
# DV Quarter-Phased Transit Curves

TCE 005476671-02 P= 0.824155 Days  $T_0=132.114408$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 005476671-02 P= 0.824181 Days  $T_0=132.102241$  (BKJD)

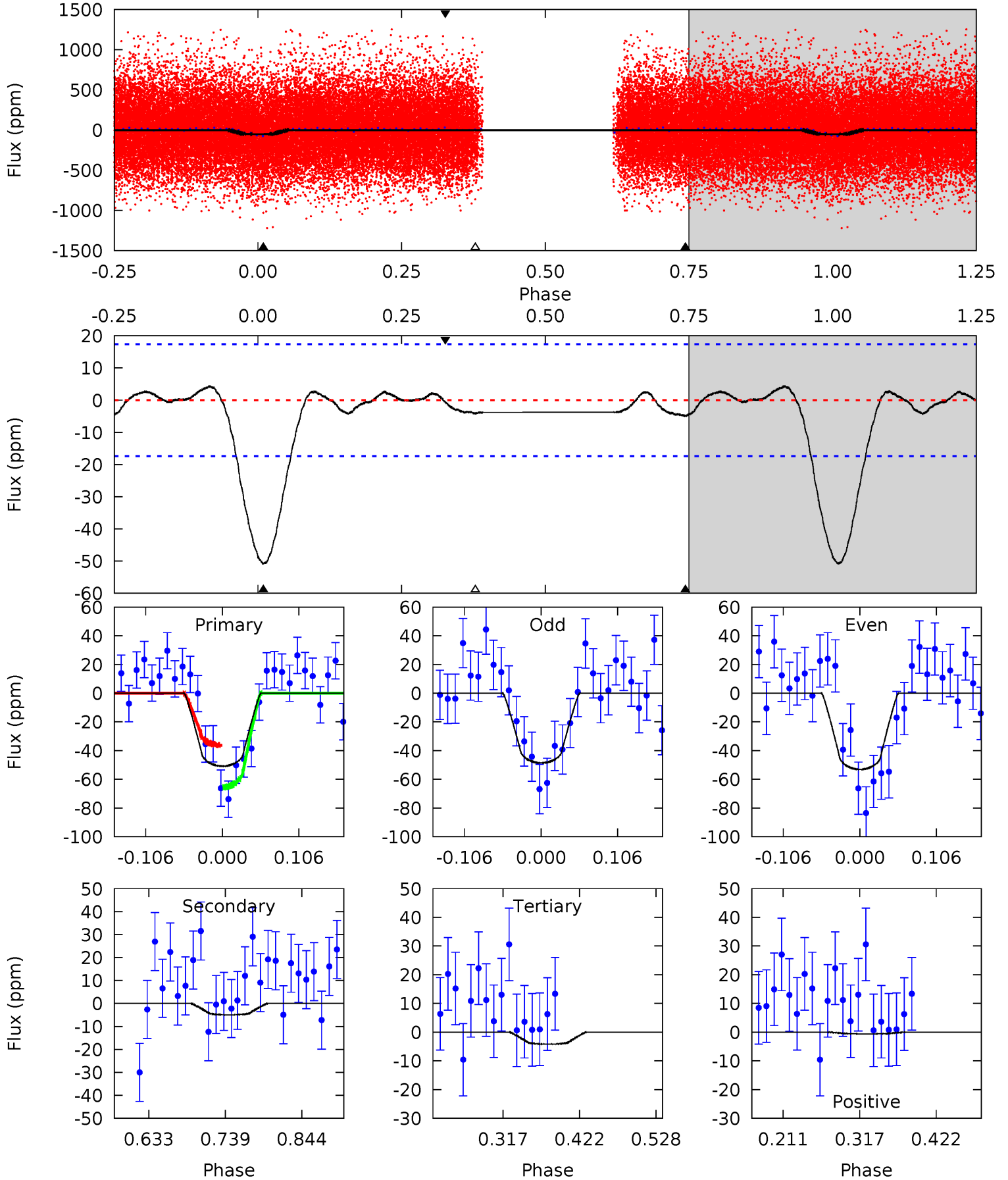




# DV Model-Shift Uniqueness Test

005476671-02, P = 0.824155 Days, E = 131.290253 Days

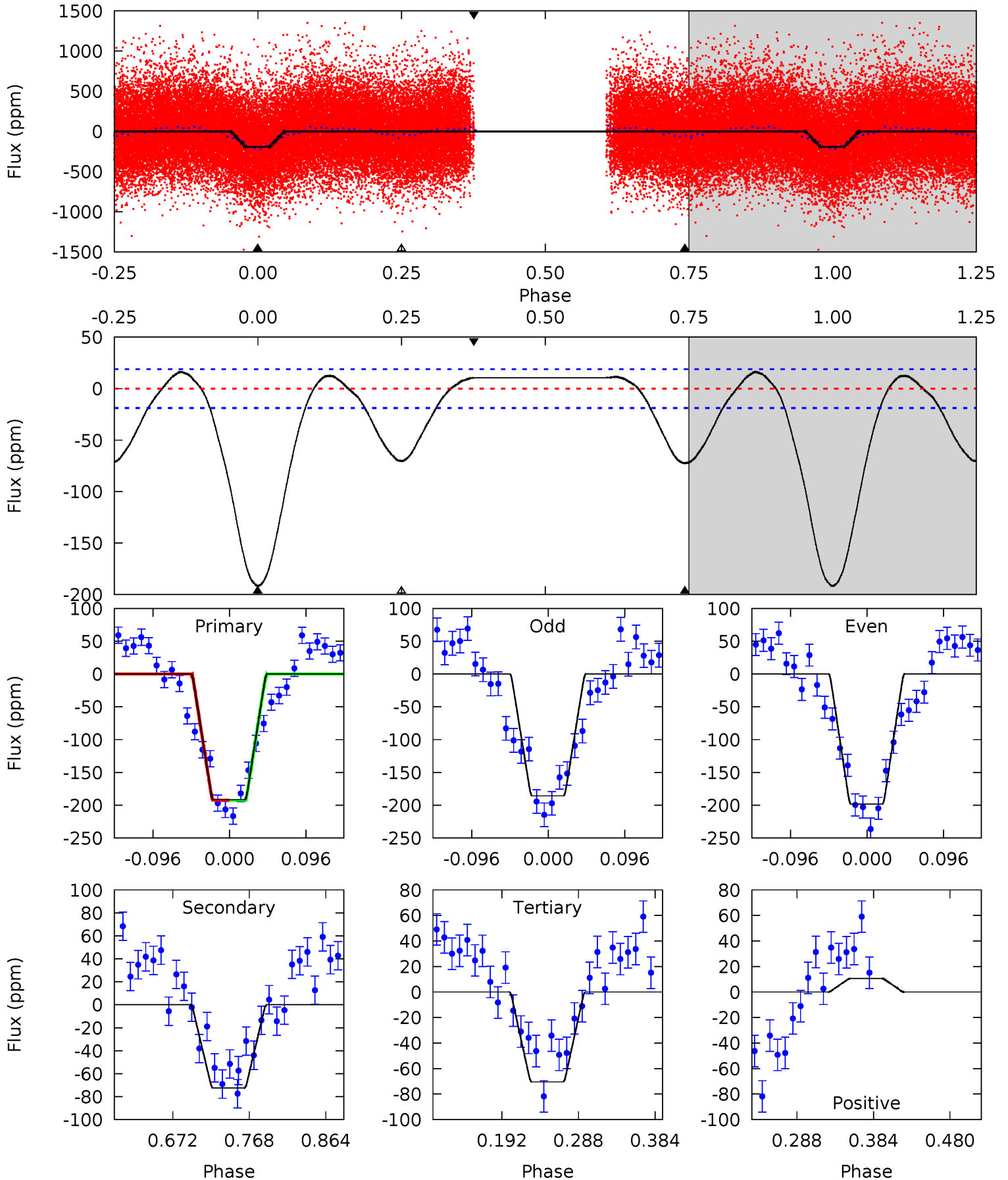
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.3	1.30	1.10	-0.16	4.55	1.62	0.52	12.2	13.5	0.21	1.46	0.59	1.03	0.08	3.81



# Alt Model-Shift Uniqueness Test

005476671-02, P = 0.824181 Days, E = 131.278060 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	17.6	17.1	2.56	4.57	1.66	6.81	29.4	43.9	0.48	15.0	1.54	1.00	0.08	0.01



### Stellar Parameters For KIC 005476671

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5977^{+160}_{-178}$	$4.514^{+0.065}_{-0.195}$	$-0.360^{+0.300}_{-0.300}$	$0.883^{+0.249}_{-0.083}$	$0.929^{+0.109}_{-0.109}$	$1.897^{+0.488}_{-0.941}$
	+3%/-3%	+1%/-4%	+83%/-83%	+28%/-9%	+12%/-12%	+26%/-50%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 005476671-02 / KOI 4598.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-5 \pm 4$	$0.81^{+0.52}_{-0.43}$	$2709^{+186}_{-121}$	$3282^{+1341}_{-5975}$	$0.950^{+4.057}_{-0.796}$
Alt.	$-72 \pm 4$	$1.51^{+0.63}_{-0.57}$	$2708^{+199}_{-127}$	$4549^{+1039}_{-551}$	$4.944^{+7.084}_{-2.475}$

$T_{max}$  = 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

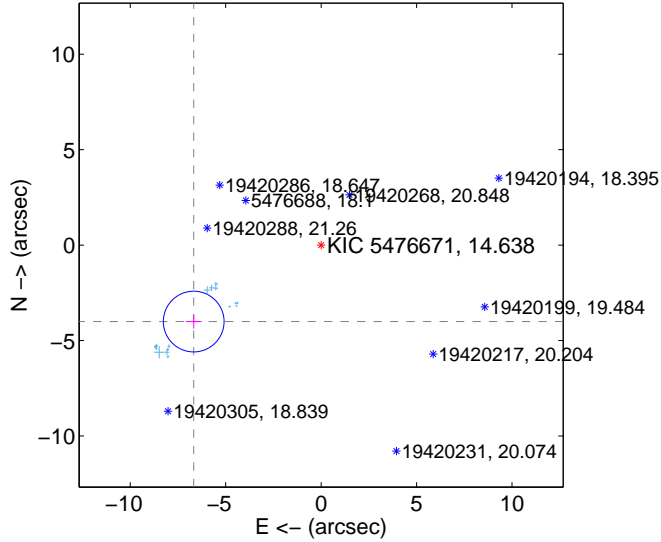
Supplemental centroid analysis for 005476671-02. Kepler magnitude: 14.64. Transit SNR 10.05

There are 17 quarters with good PRF difference image offsets

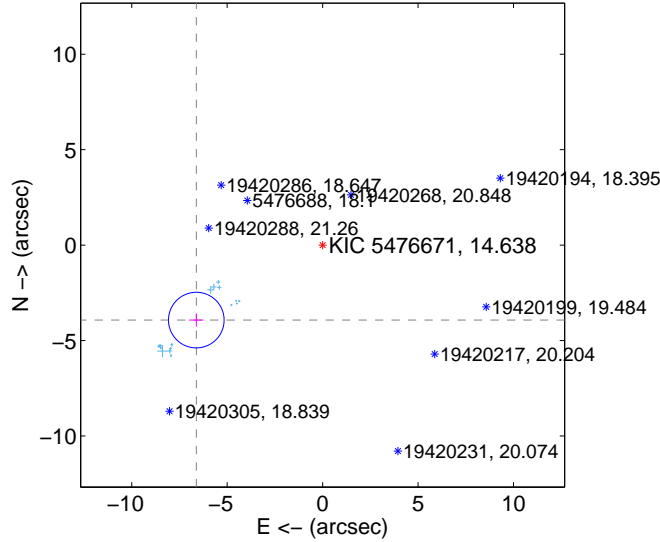
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$7.784 \pm 0.530$	14.69	$6.675 \pm 0.418$	$-4.006 \pm 0.367$
PRF-fit source offset from KIC position	$7.695 \pm 0.486$	15.85	$6.616 \pm 0.381$	$-3.928 \pm 0.342$
photometric centroid source offset	$6.23 \pm 1.44$	4.31	$0.66 \pm 1.53$	$-6.19 \pm 1.44$

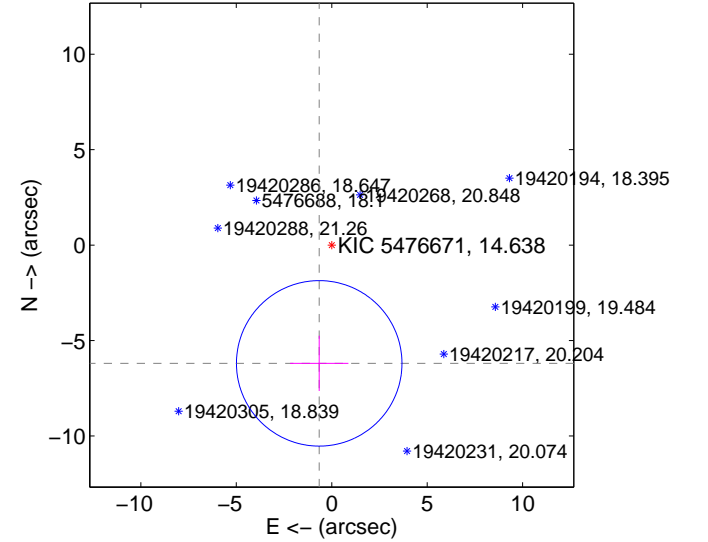
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

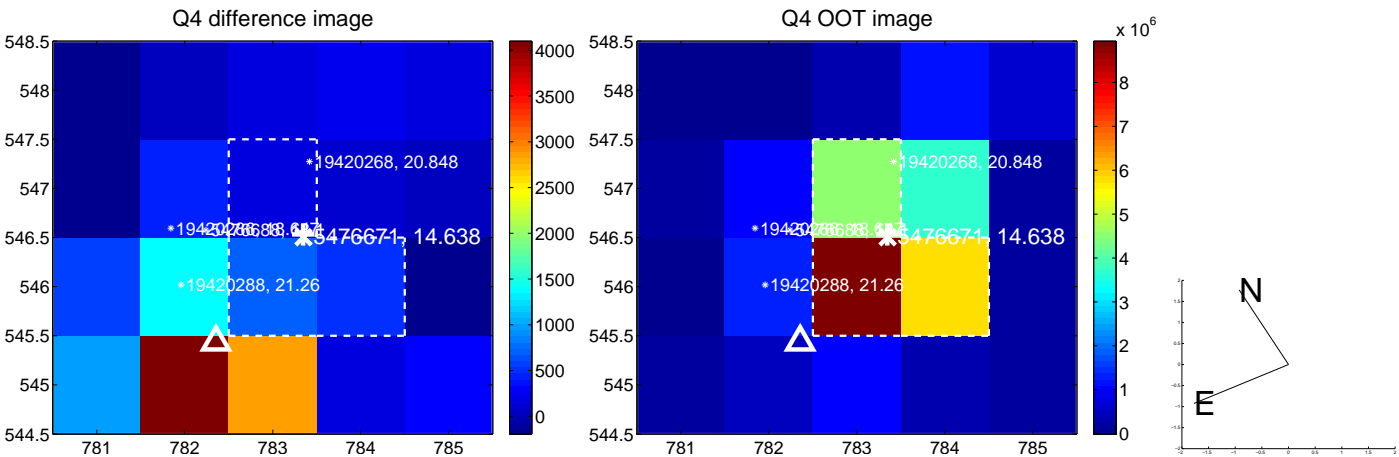
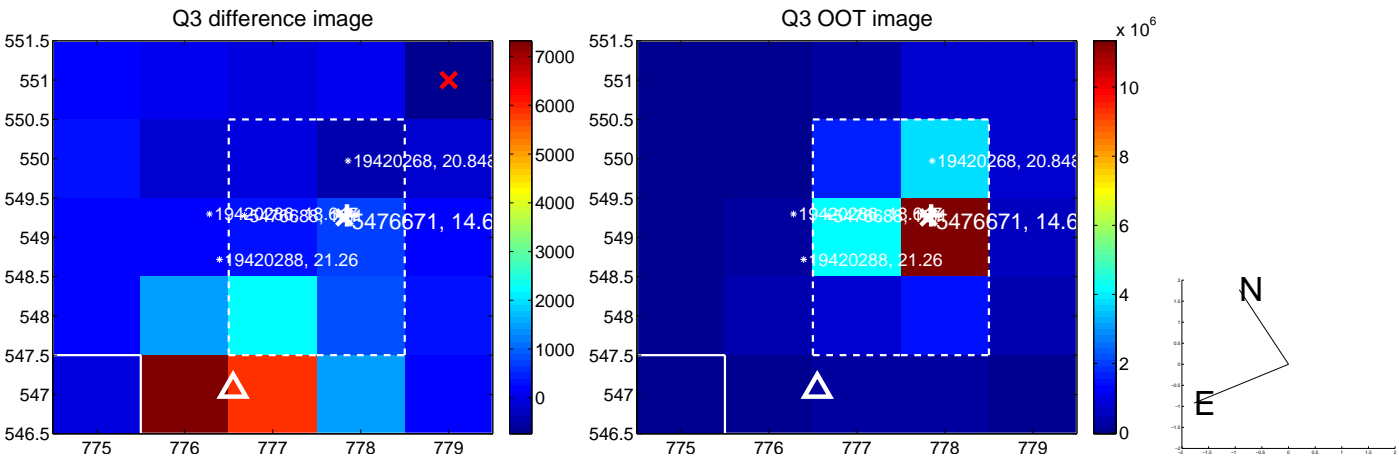
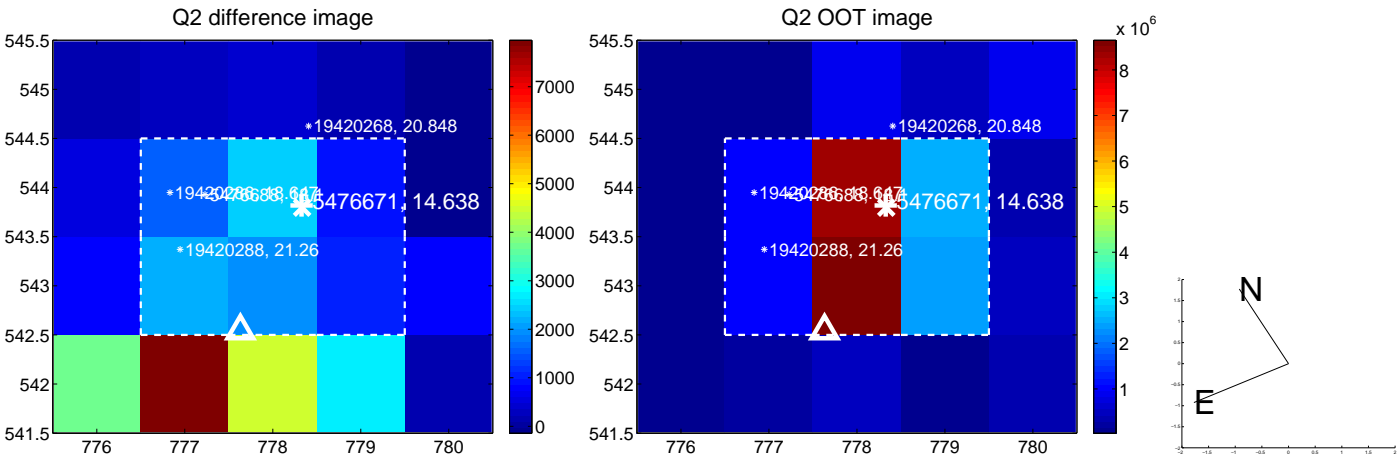
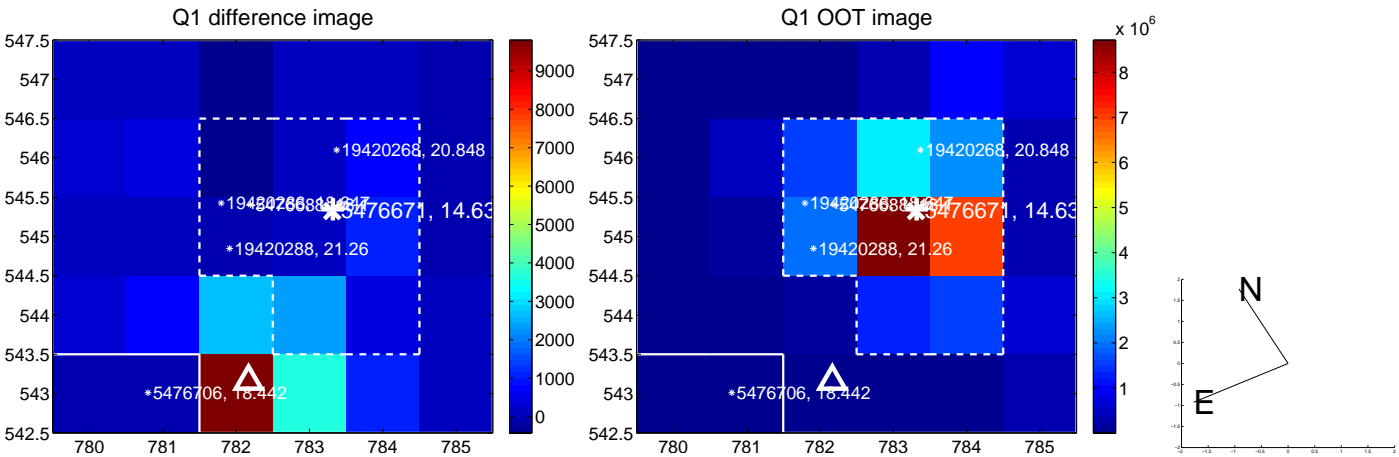


offset from photometric centroids

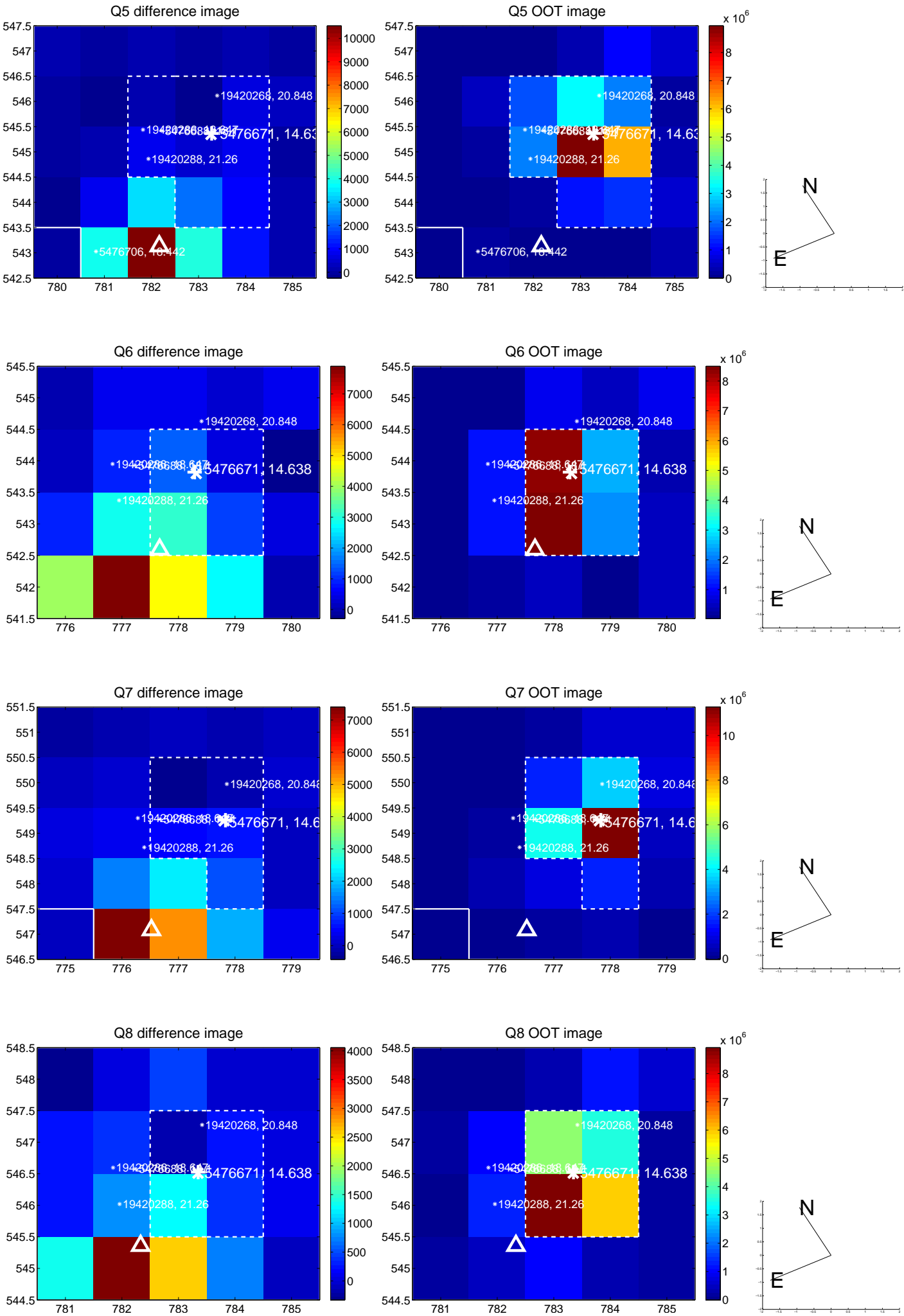


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

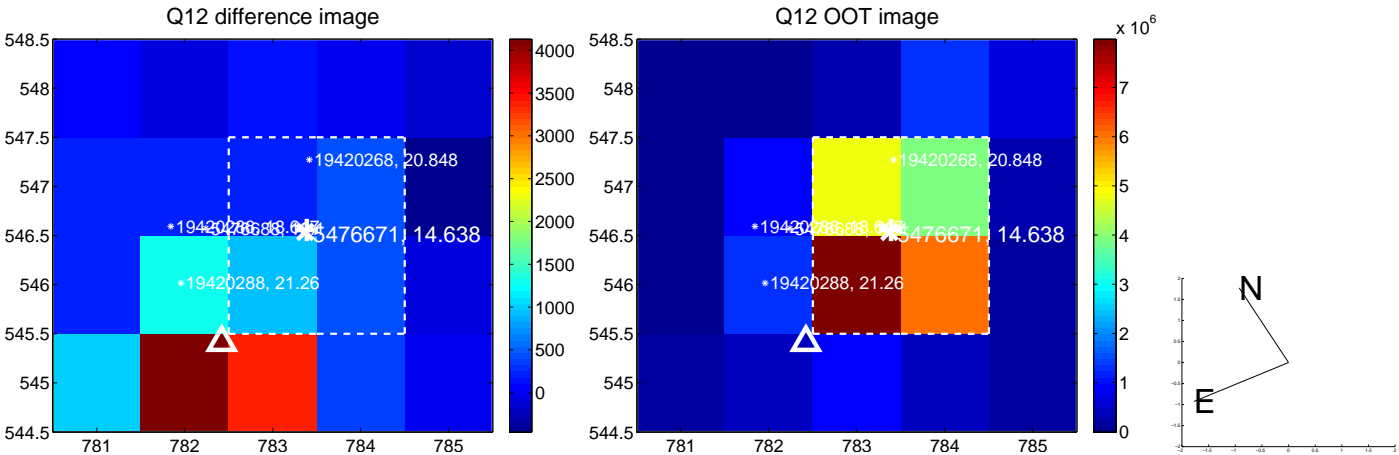
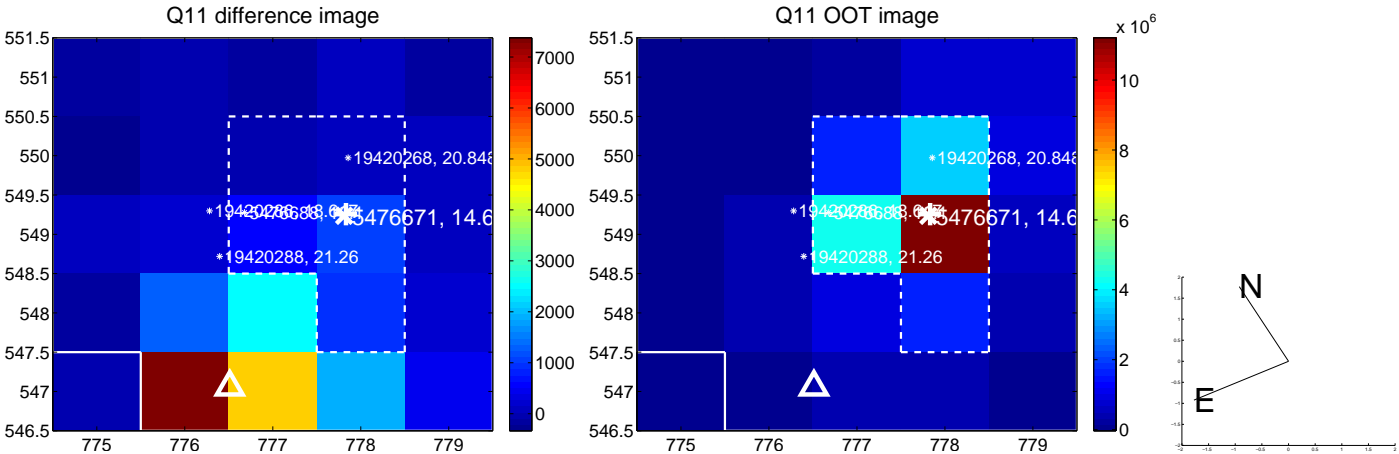
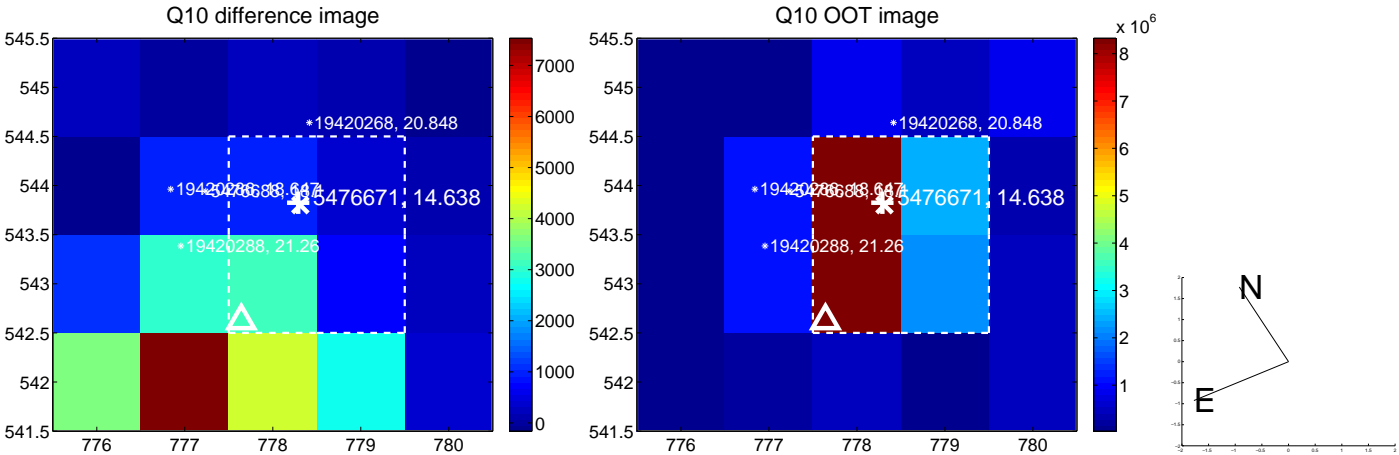
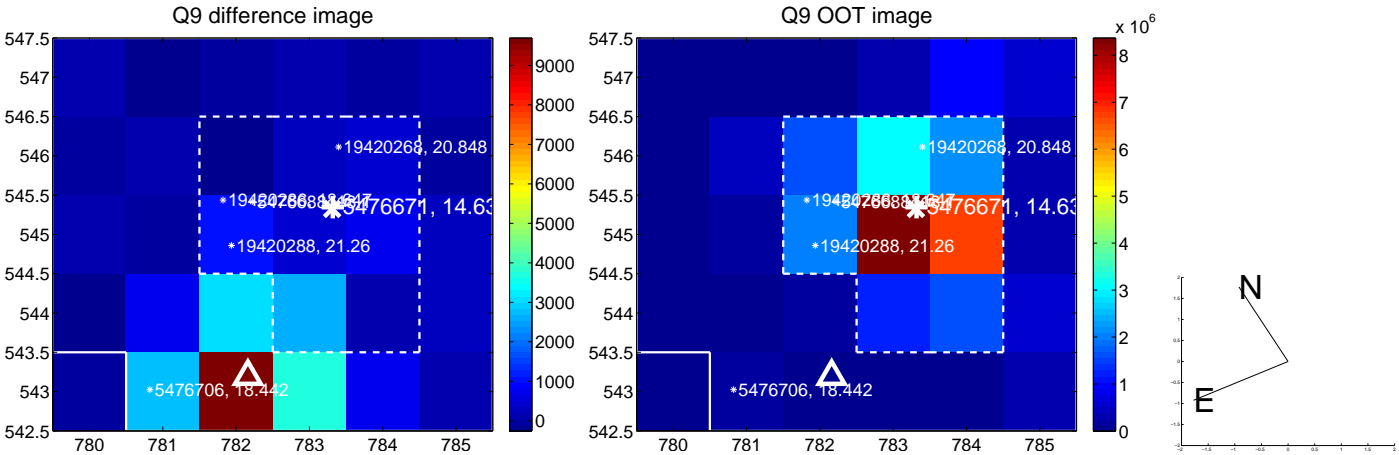


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

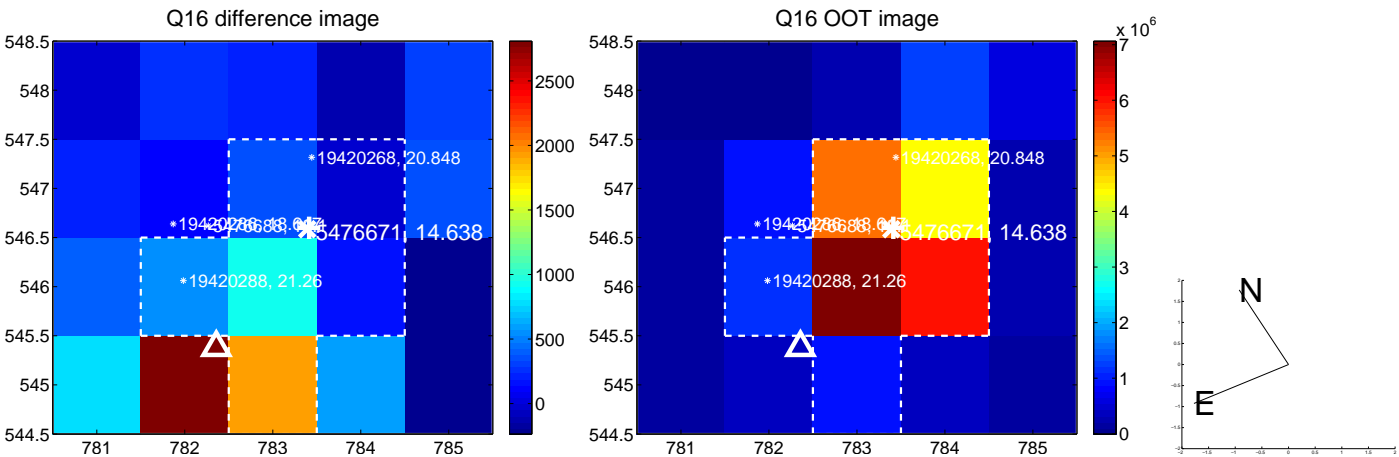
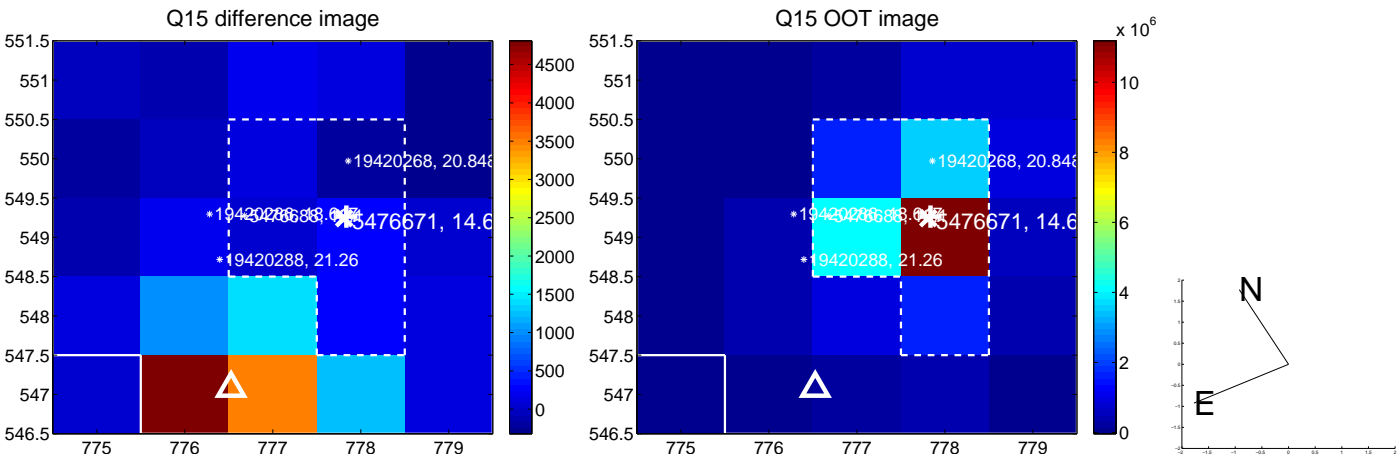
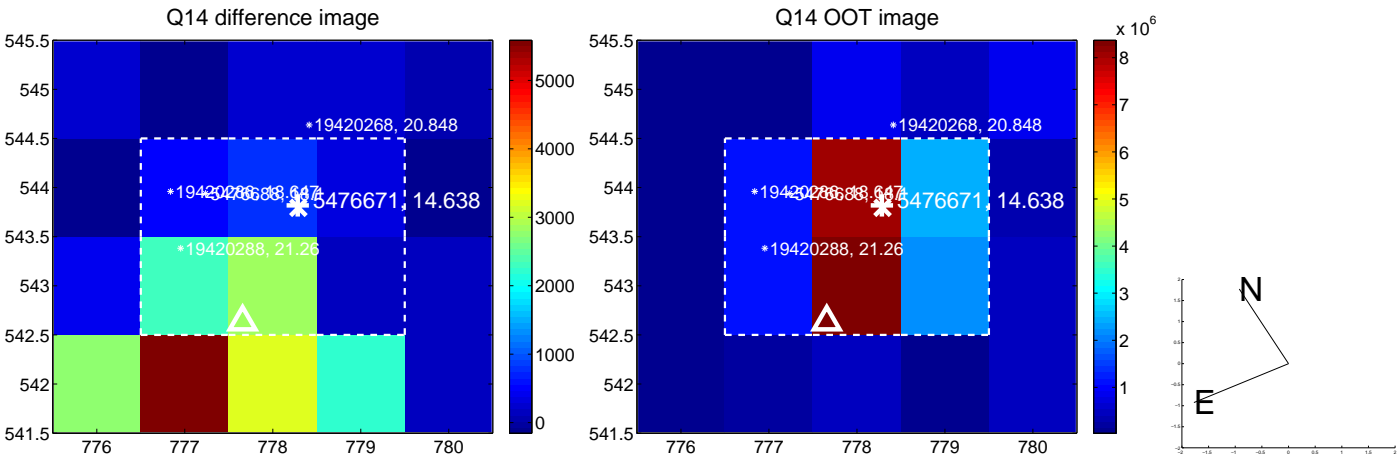
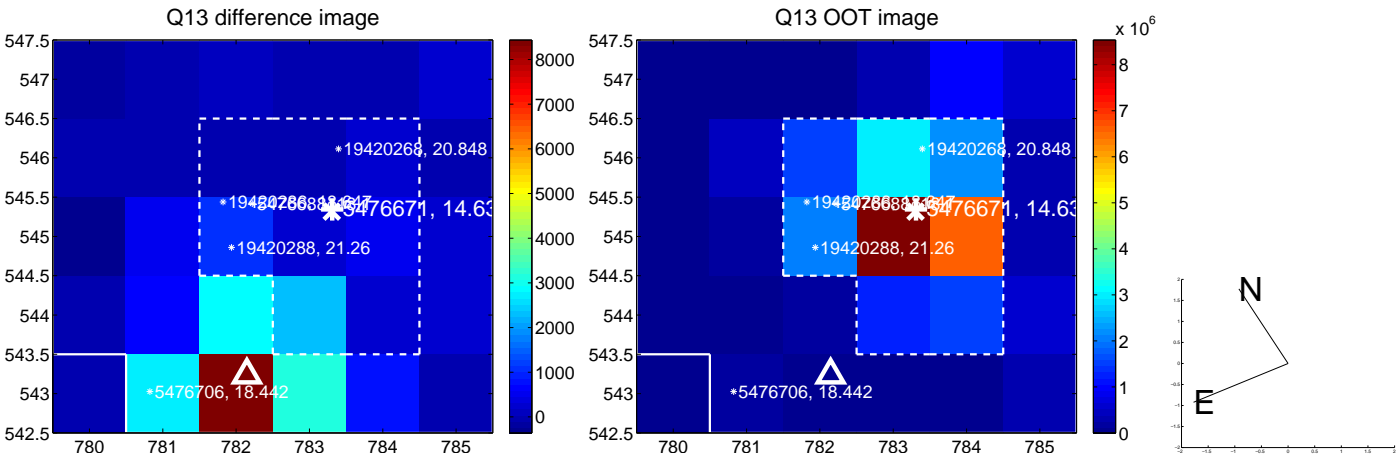




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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UKIRT Image

Declination

