

# KIC 001721614

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
001721614-01	OBS	No	368.393798	422.013691	697.1	2.831	13.9	4.6	1.12	6221	3.09	1.84
001721614-02	OBS	No	523.980232	405.791177	319.6	2.345	19.3	1.6	1.12	6221	2.28	1.15

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
001721614-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
001721614-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

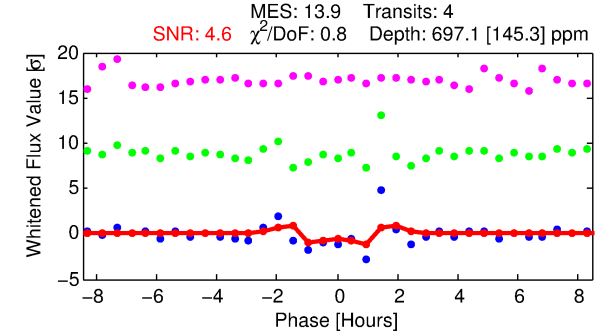
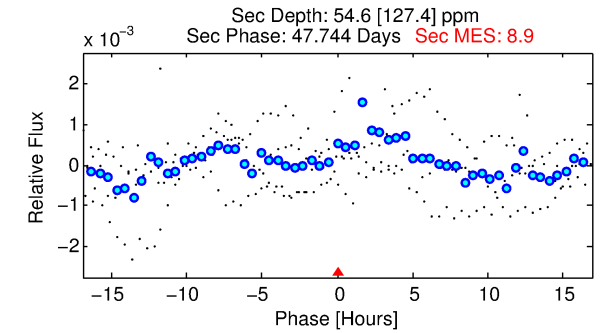
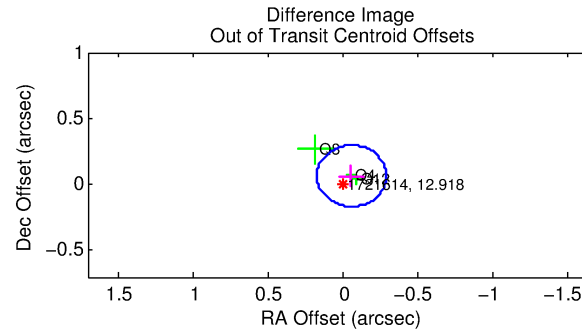
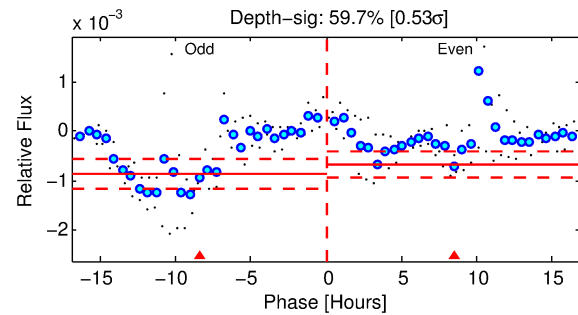
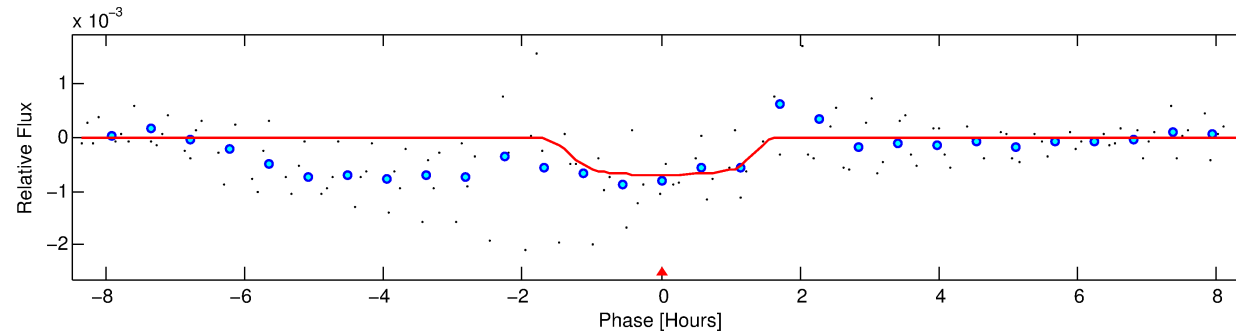
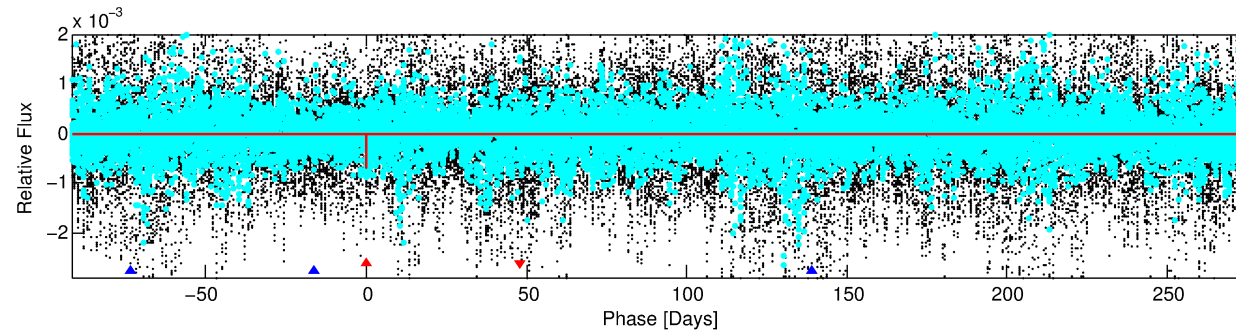
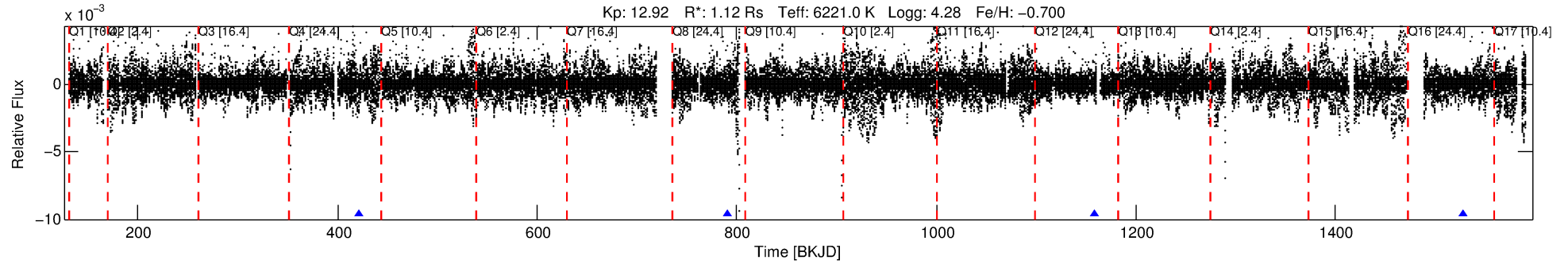
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 001721614-01

No Significant Match Found

# DV One-Page Summary

KIC: 1721614 Candidate: 1 of 2 Period: 368.394 d



## DV Fit Results:

Period = 368.39380 [0.00203] d  
Epoch = 422.0137 [0.0053] BKJD  
Rp/R\* = 0.0253 [0.0221]  
a/R\* = 844.96 [3923.40]  
b = 0.57 [5.47]  
Seff = 1.84 [0.72]  
Teq = 297 [29] K  
Rp = 3.09 [2.81] Re  
a = 0.9584 [0.2280] AU  
Ag = 2886.72 [8482.05] [0.34σ]  
Teffp = 3365 [2453] K [1.25σ]

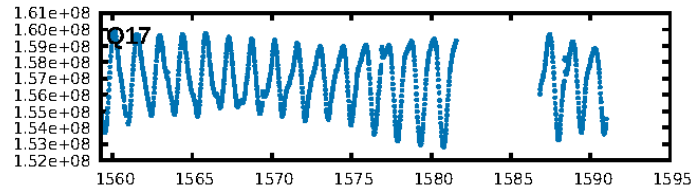
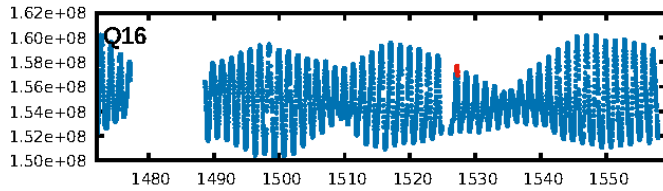
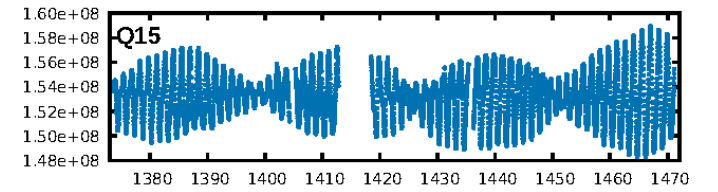
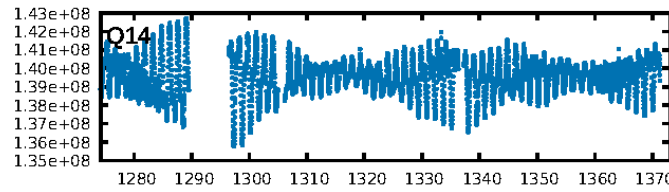
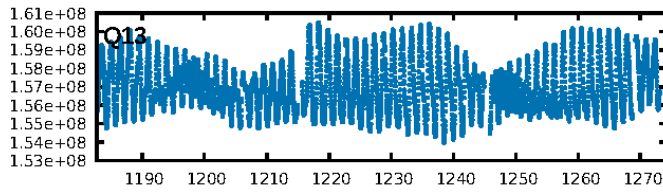
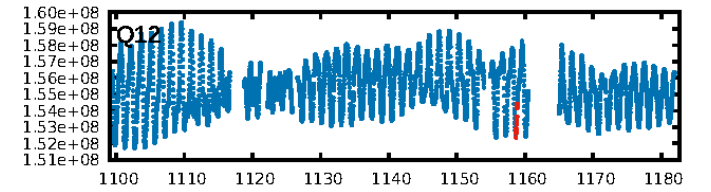
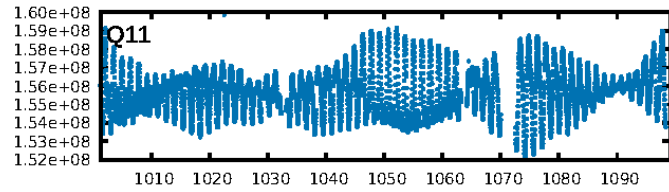
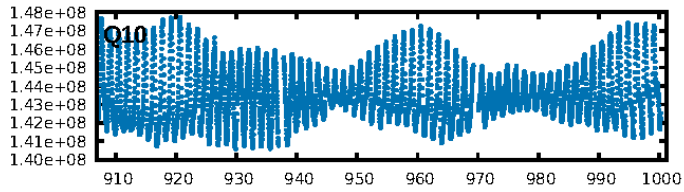
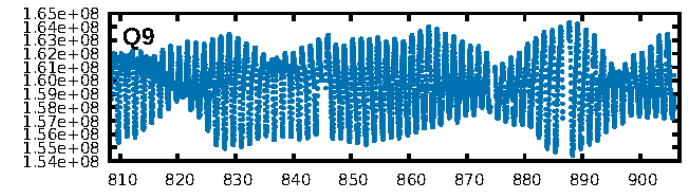
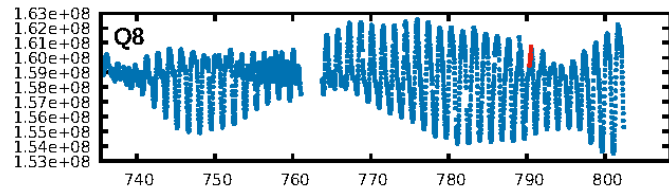
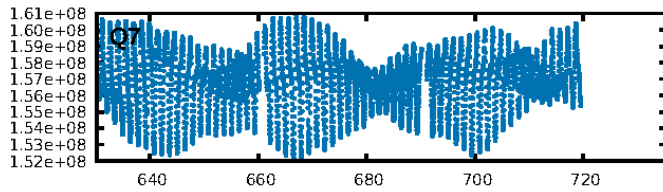
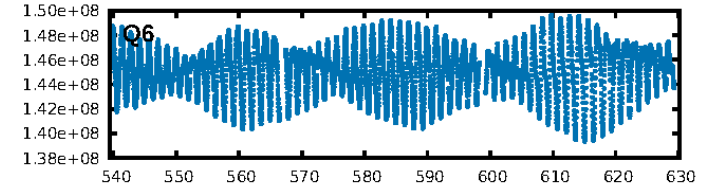
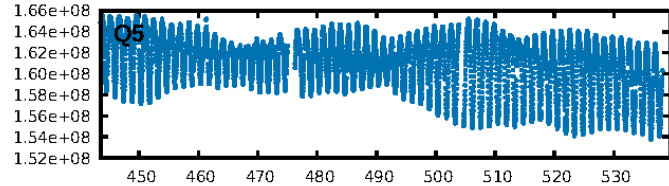
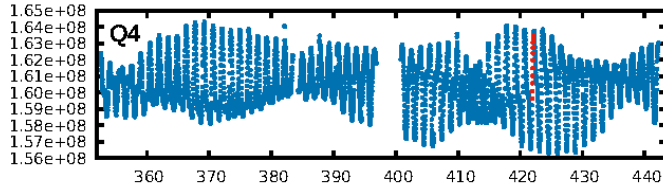
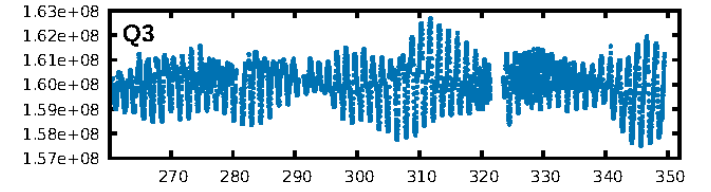
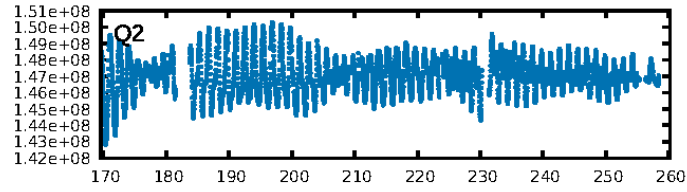
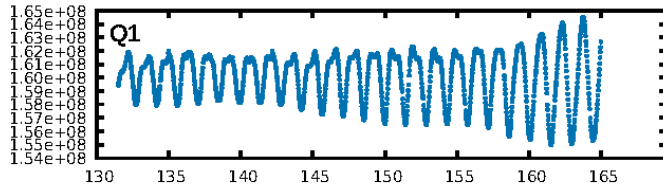
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [1015.73σ]  
ModelChiSquare2-sig: 41.9%  
ModelChiSquareGof-sig: 96.8%  
**Bootstrap-pfa: 1.60e-08**  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 1.758  
Centroid-sig: 29.6%  
Centroid-so: 0.751 arcsec [0.98σ]  
OotOffset-rm: 0.088 arcsec [1.14σ]  
**KicOffset-rm: 0.310 arcsec [3.56σ]**  
OotOffset-st: 0/0/3/0 [3]  
KicOffset-st: 0/0/3/0 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 1.00 [3/3]

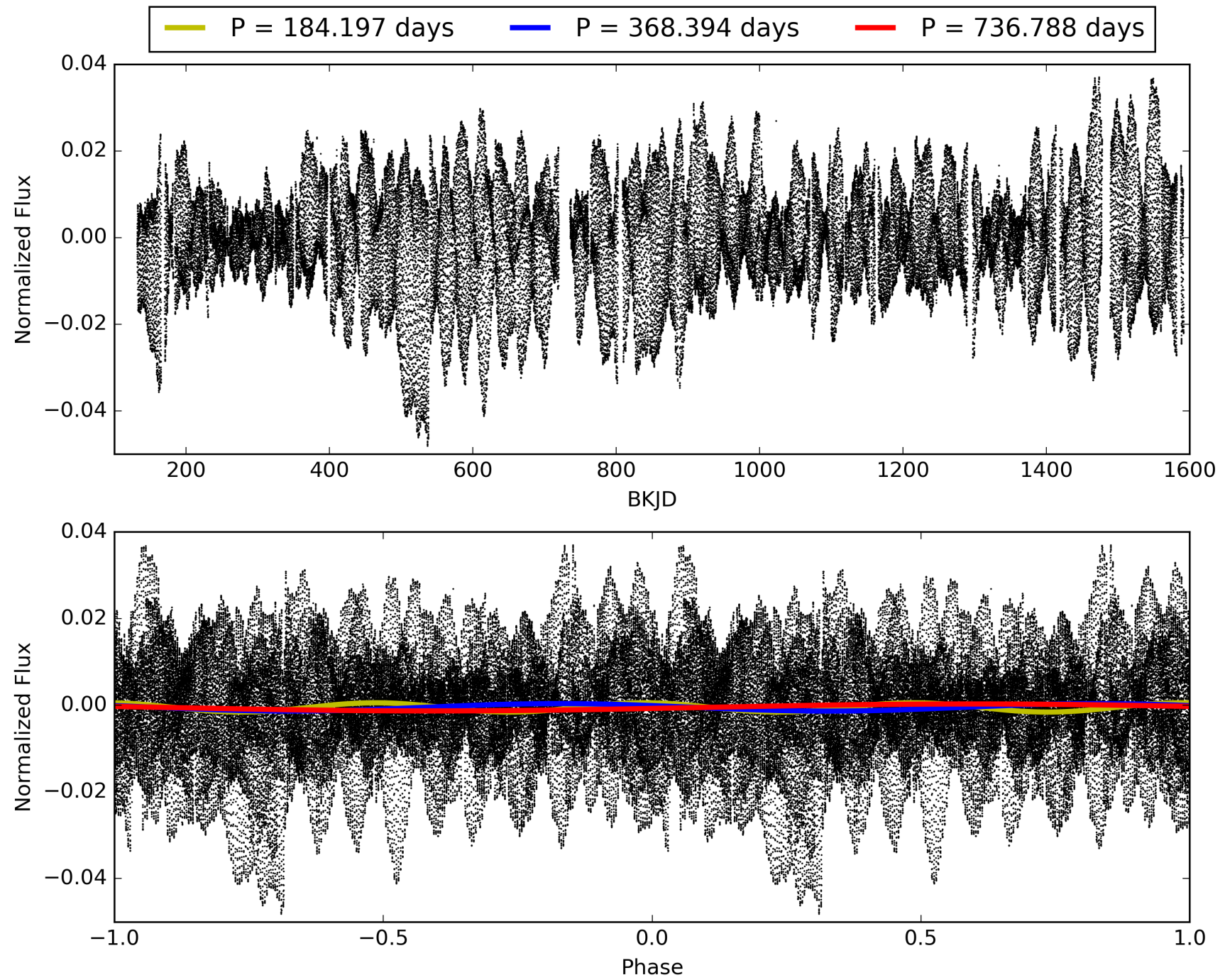
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This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 001721614-01, PDC Light Curves

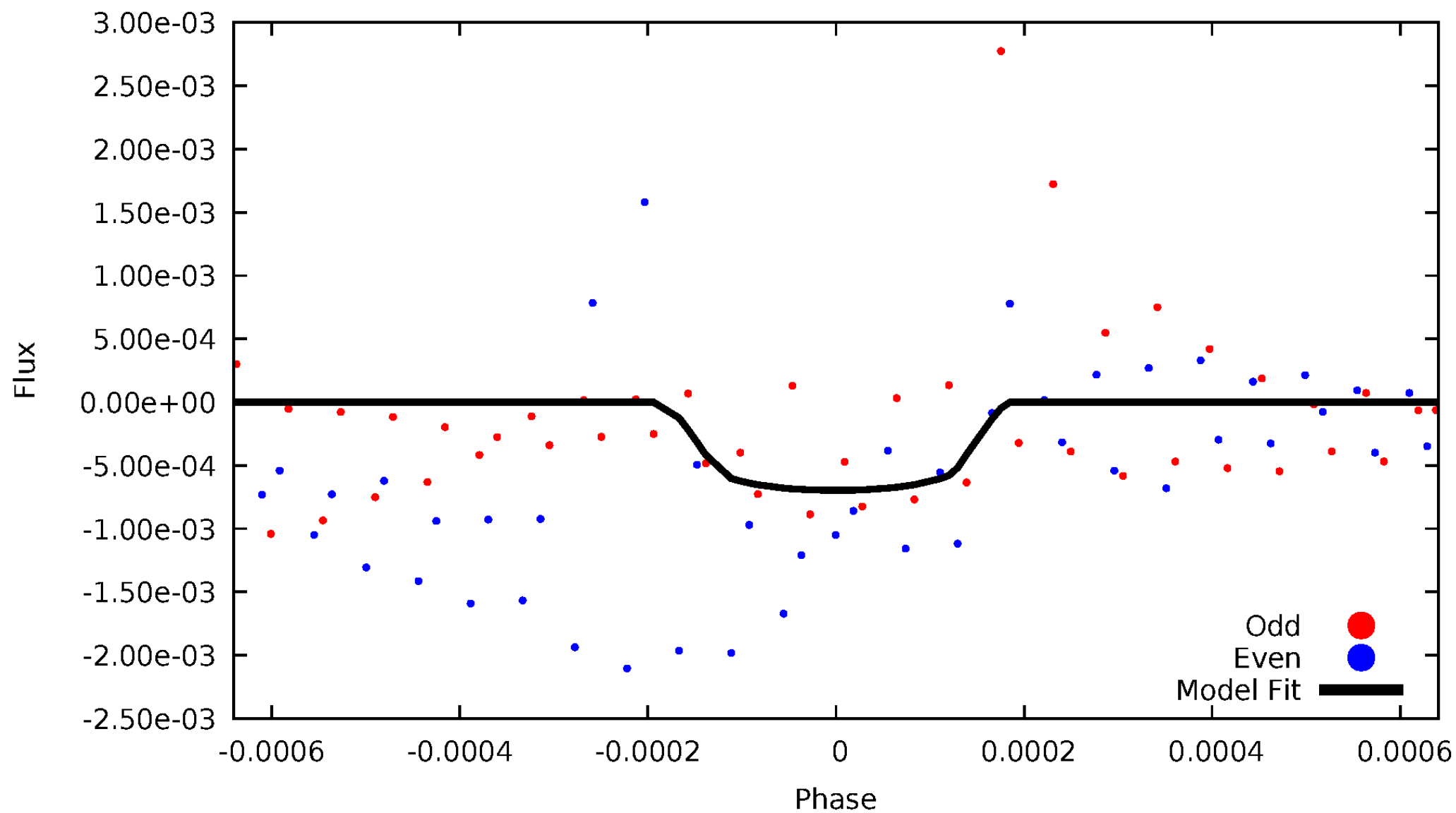


TCE 001721614-01



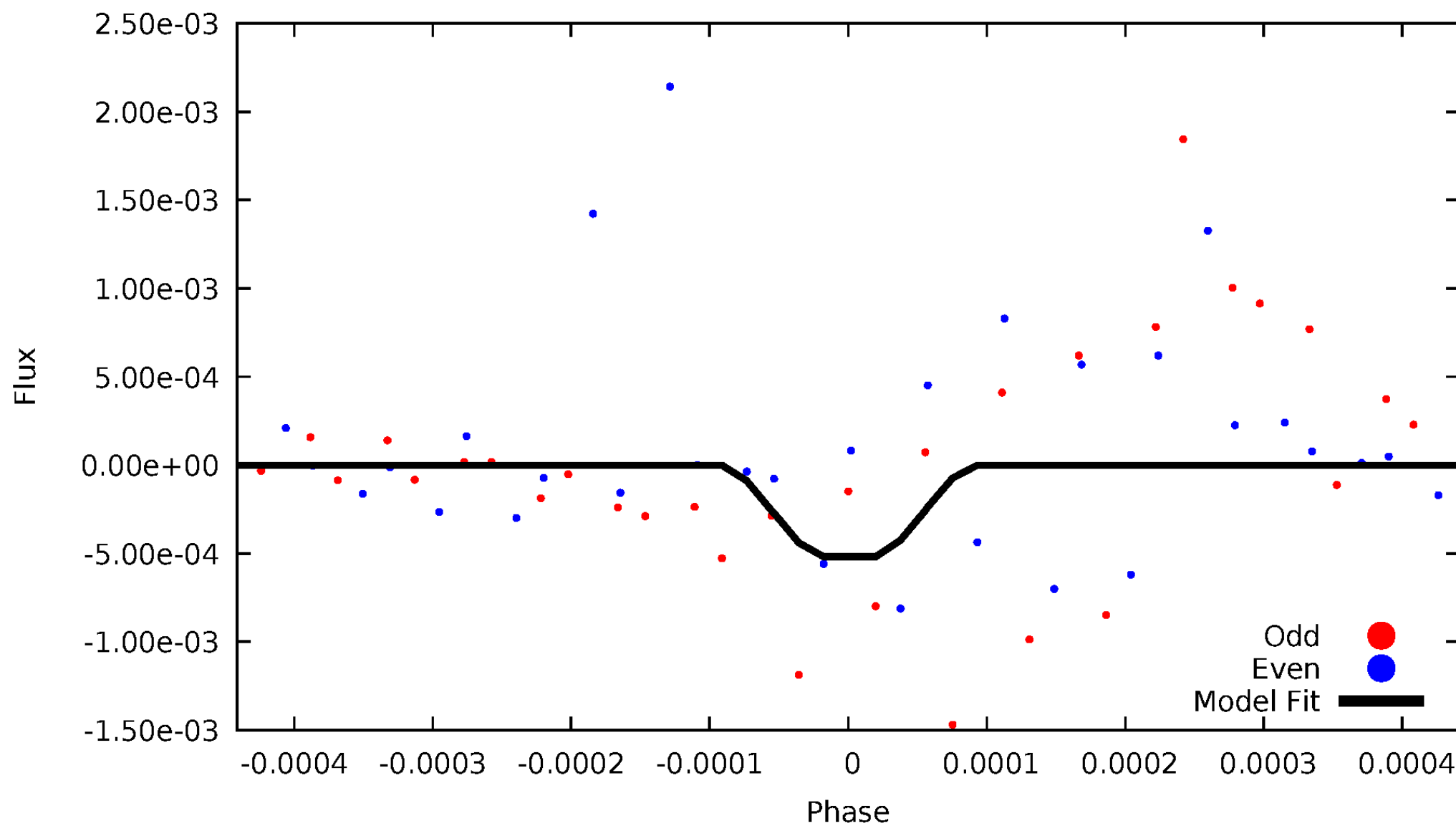
# DV Odd/Even

TCE 001721614-01



# ALT Odd/Even

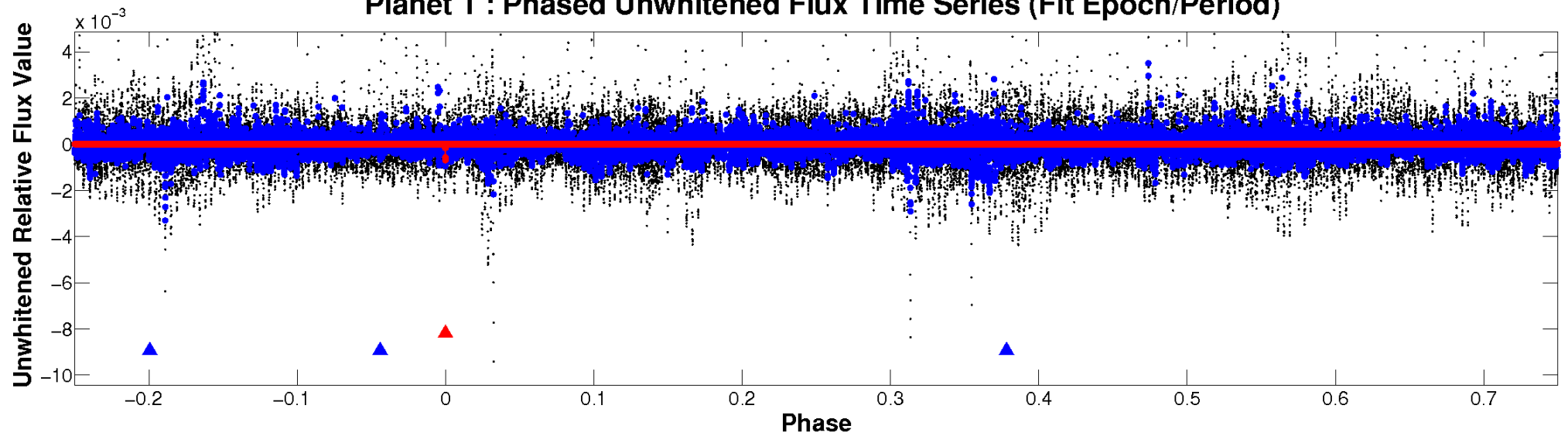
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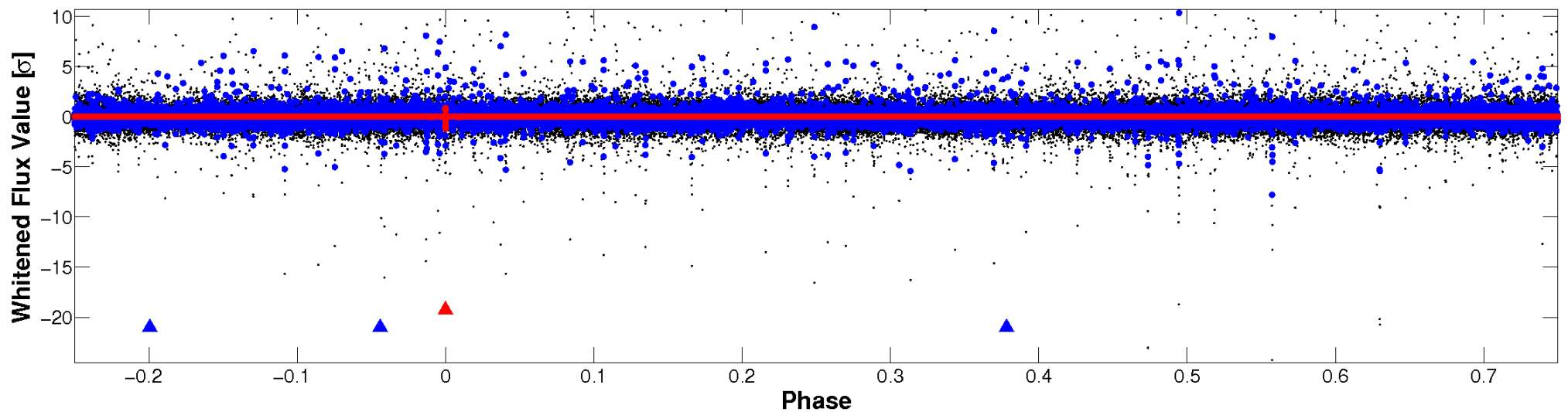


# Non-Whitened Vs. Whitened Light Curve

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

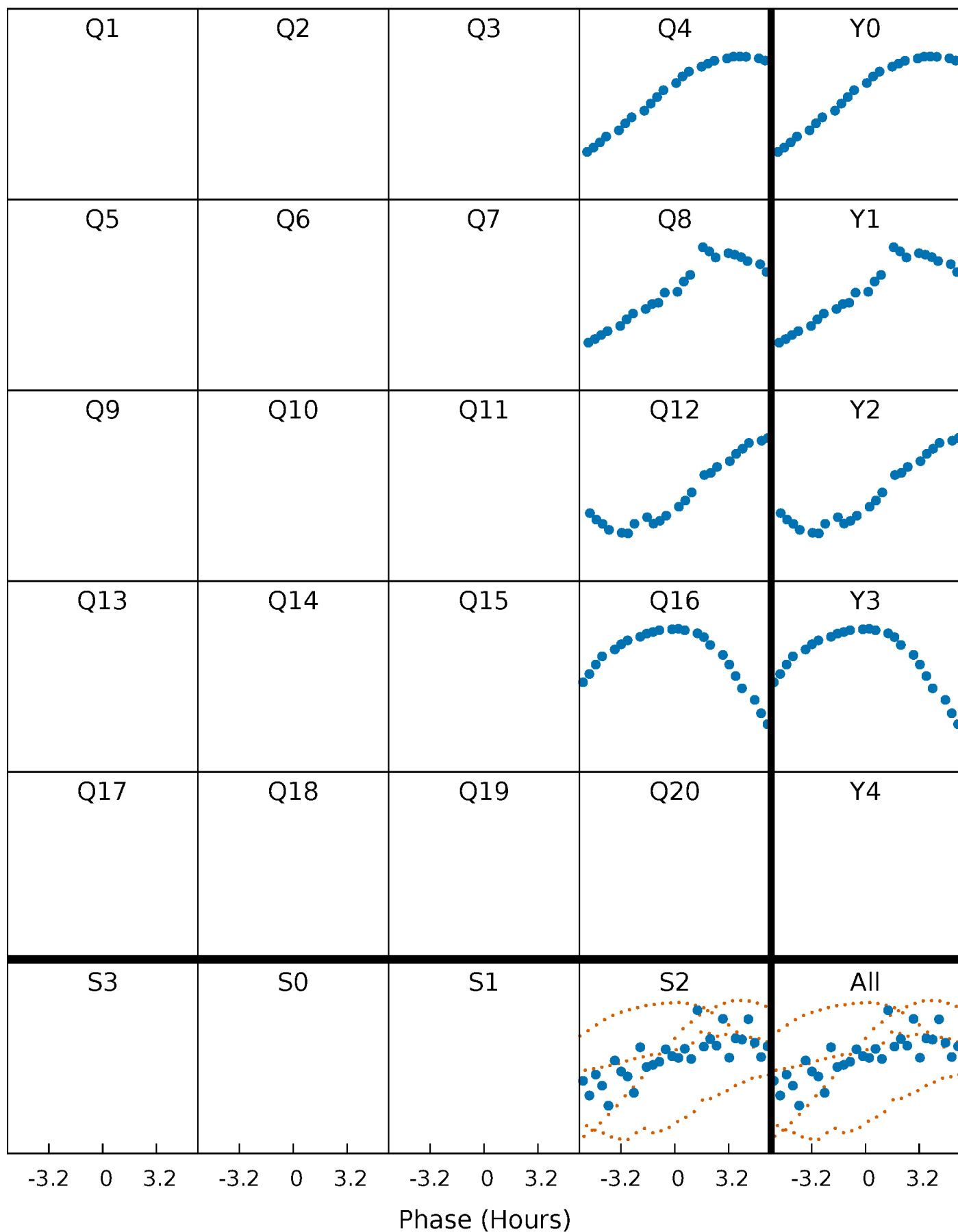


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

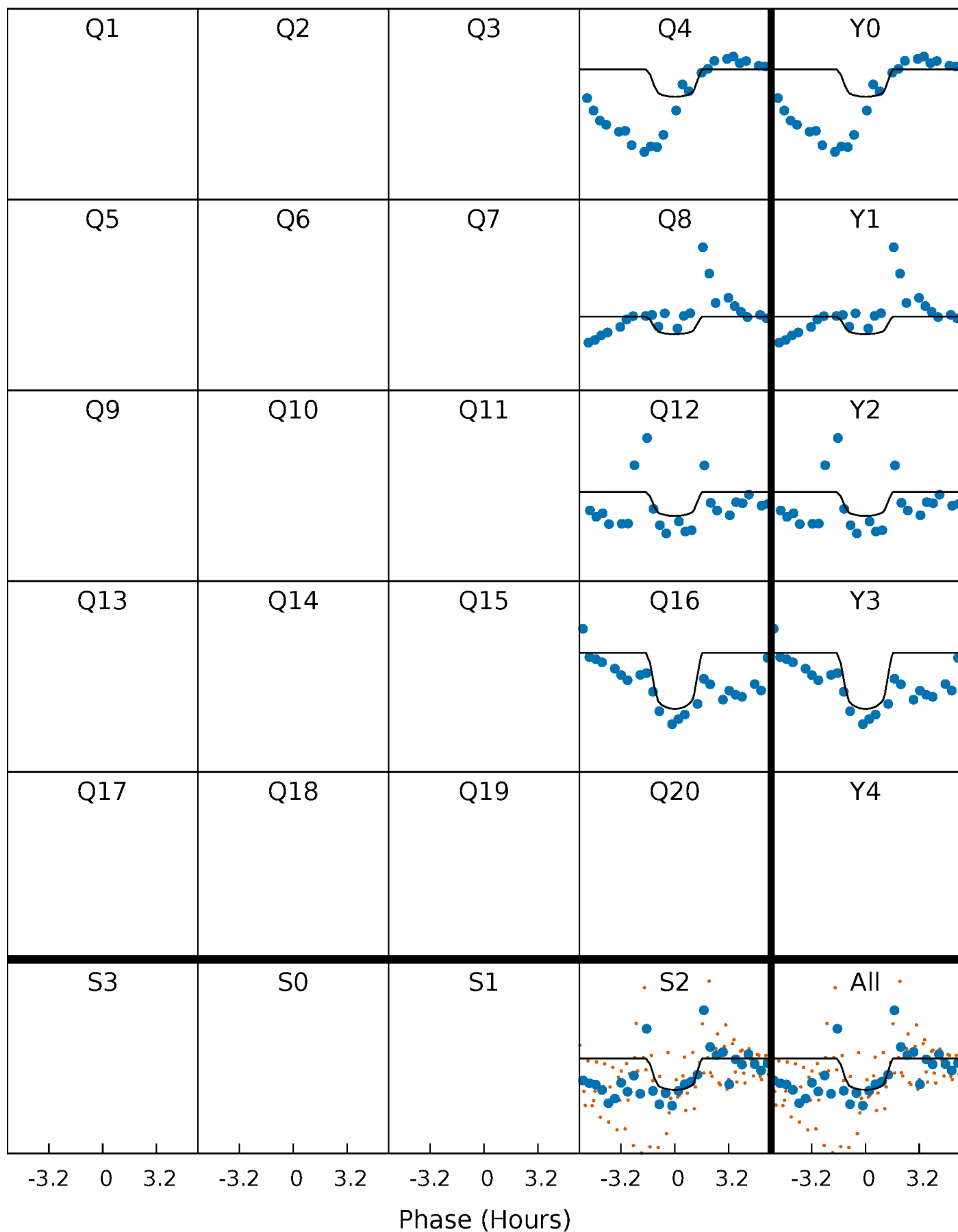
TCE 001721614-01 P=368.393798 Days  $T_0=422.013691$  (BKJD)





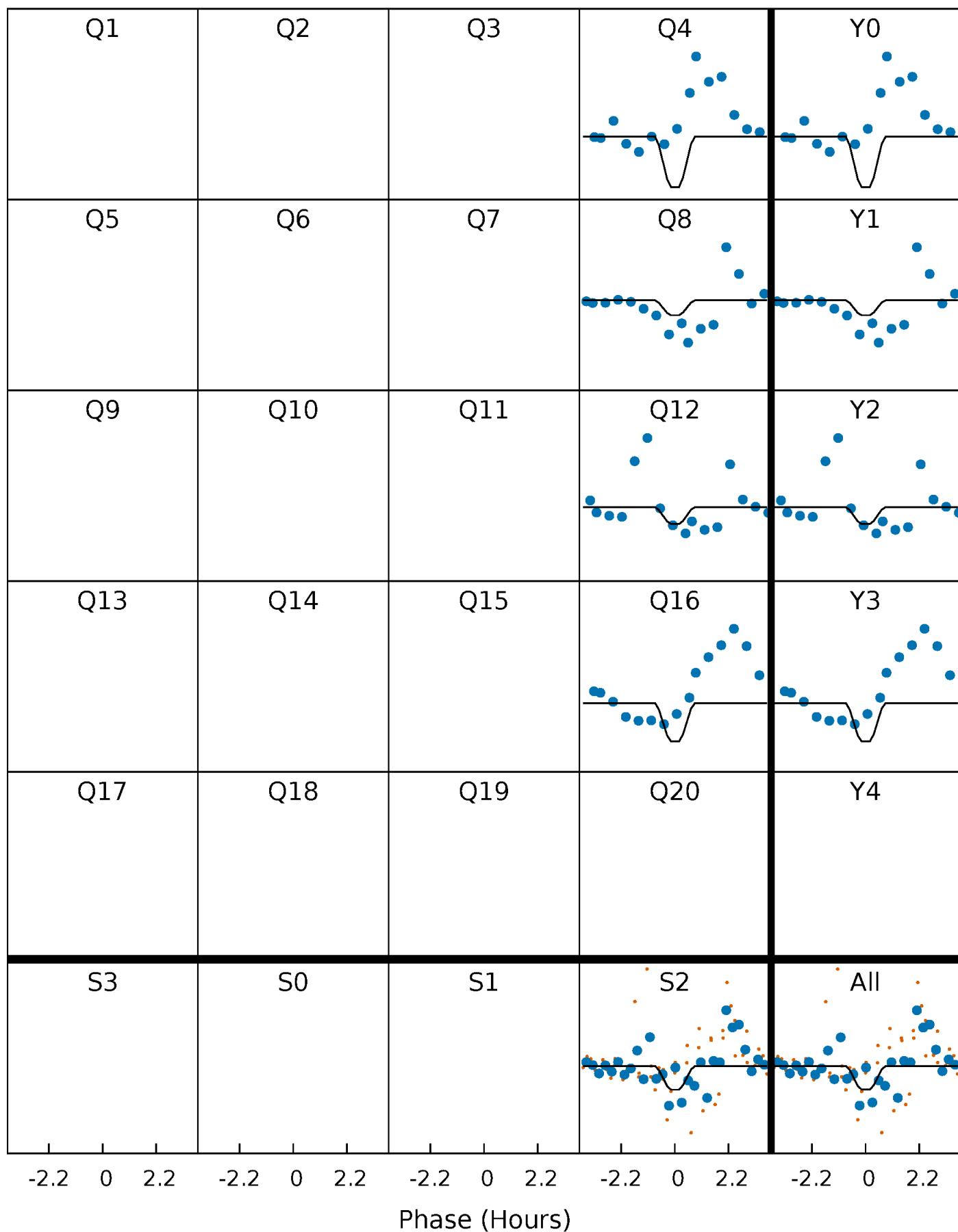
# DV Quarter-Phased Transit Curves

TCE 001721614-01 P=368.393798 Days  $T_0=422.013691$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

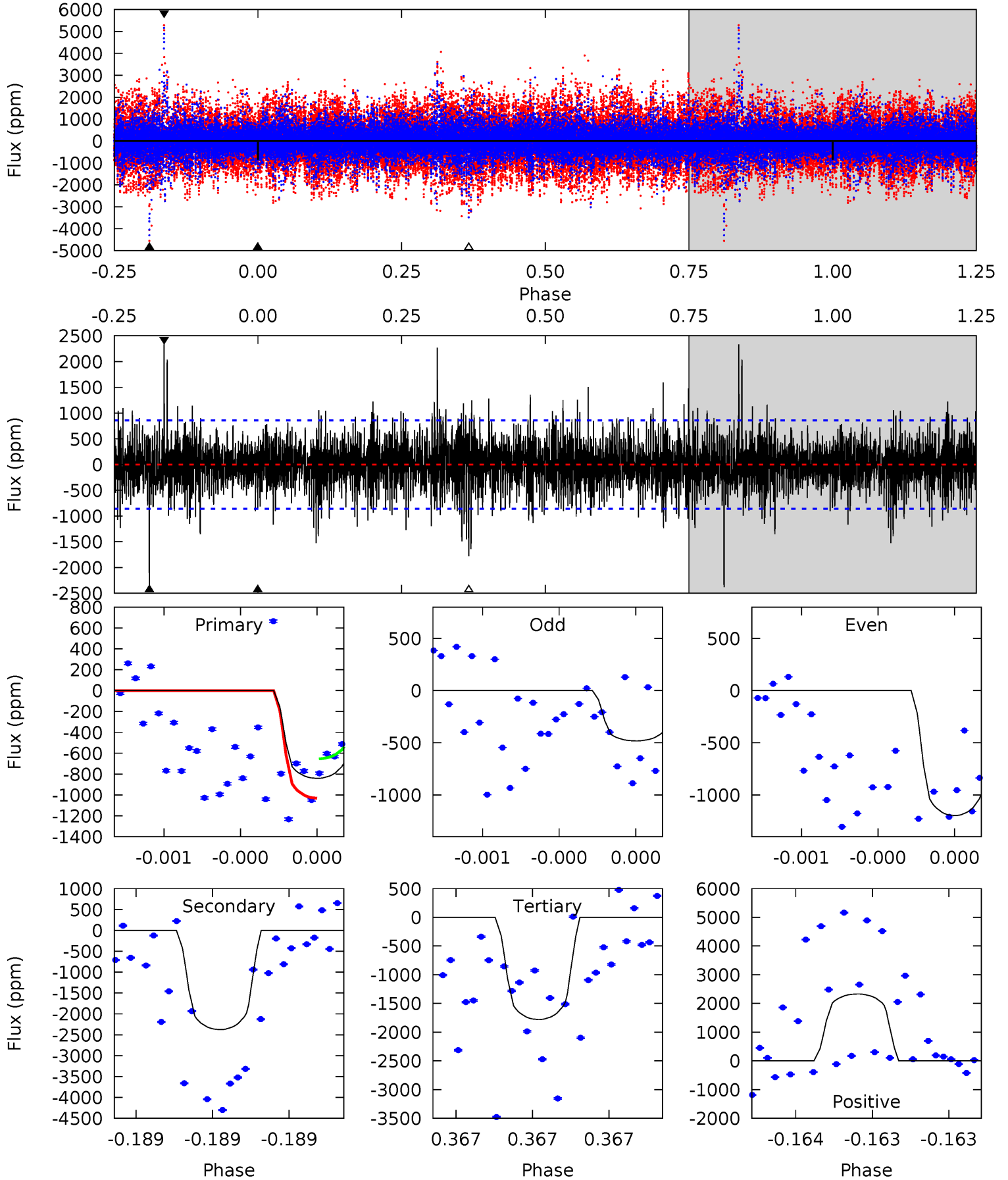
TCE 001721614-01 P=368.390688 Days  $T_0=421.992437$  (BKJD)



# DV Model-Shift Uniqueness Test

001721614-01, P = 368.393798 Days, E = 53.619893 Days

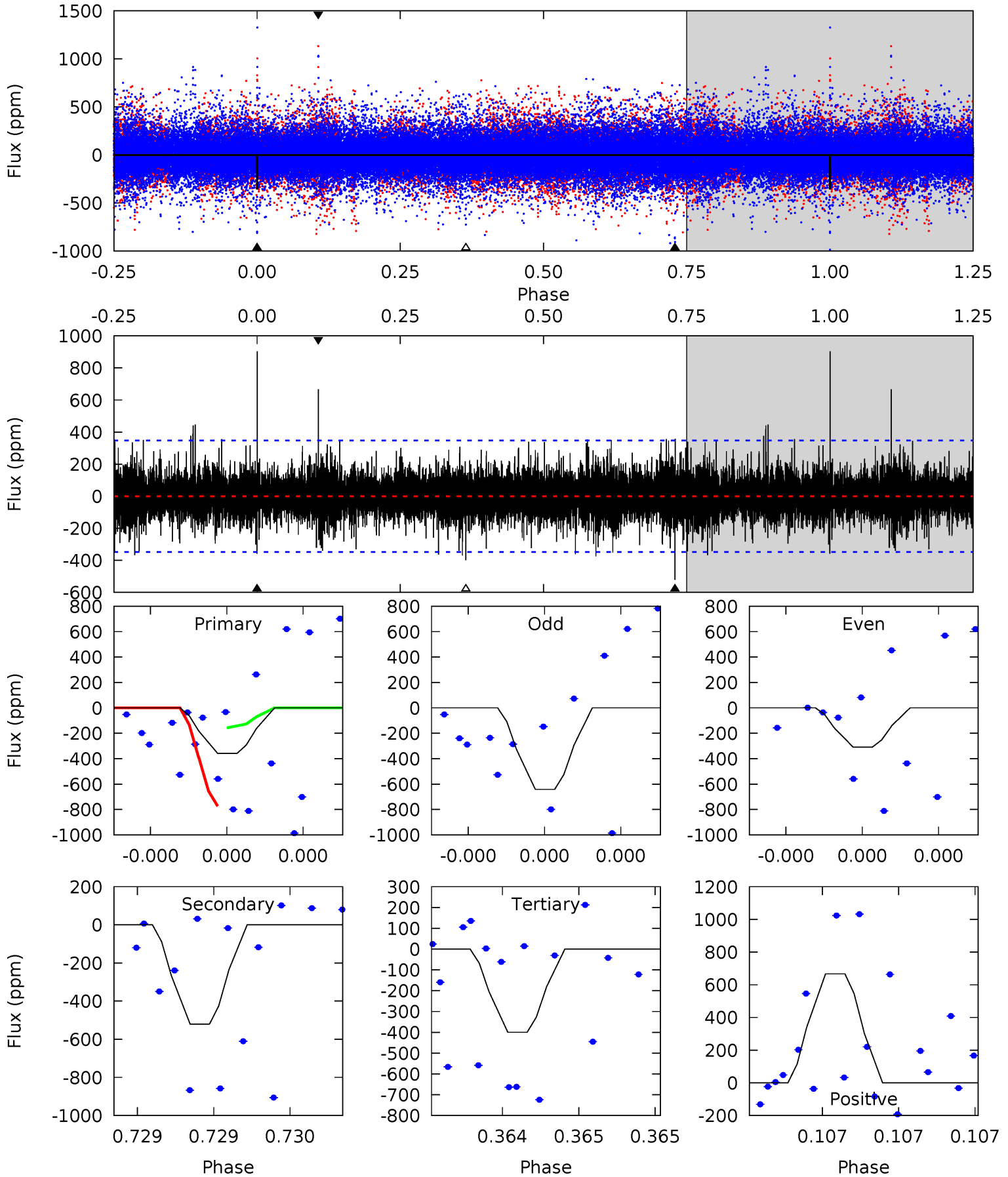
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.52	15.6	11.7	15.3	5.64	3.58	2.48	-6.17	-9.79	3.92	0.30	2.10	0.84	0.50	1.25



# Alt Model-Shift Uniqueness Test

001721614-01, P = 368.390688 Days, E = 53.601749 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.95	8.65	6.64	11.1	5.78	3.79	1.42	-0.69	-5.13	2.01	-2.43	2.77	1.05	0.63	4.95



### Stellar Parameters For KIC 001721614

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6221^{+169}_{-169}$	$4.275^{+0.220}_{-0.180}$	$-0.700^{+0.300}_{-0.300}$	$1.122^{+0.282}_{-0.254}$	$0.864^{+0.114}_{-0.066}$	$0.861^{+0.987}_{-0.397}$
	+3%/-3%	+5%/-4%	+43%/-43%	+25%/-23%	+13%/-8%	+115%/-46%
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 001721614-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-2377 \pm 152$	$3.37^{+2.58}_{-2.10}$	$414^{+32}_{-29}$	$8715^{+10351}_{-2496}$	$106238^{+662423}_{-72316}$
Alt.	$-521 \pm 60$	$3.19^{+2.57}_{-2.05}$	$413^{+30}_{-28}$	$5810^{+4805}_{-1319}$	$26800^{+182256}_{-18755}$

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

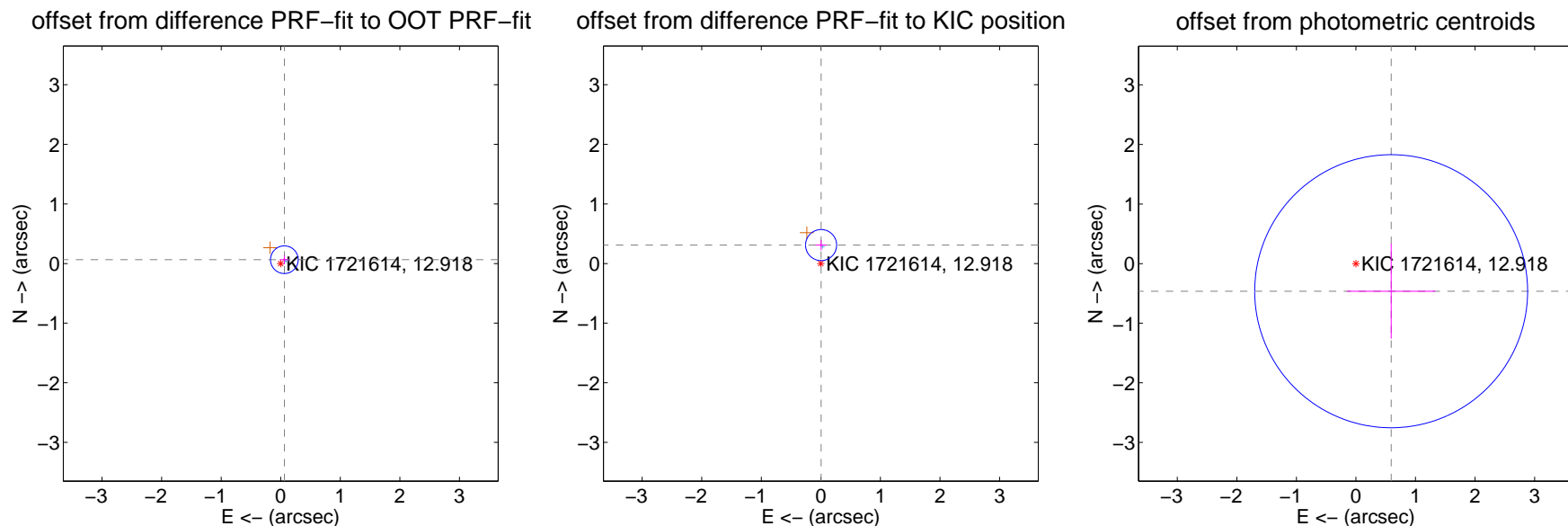
## DV Centroid Data

Supplemental centroid analysis for 001721614-01. Kepler magnitude: 12.92. Transit SNR 4.63

There are 1 quarters with good PRF difference image offsets

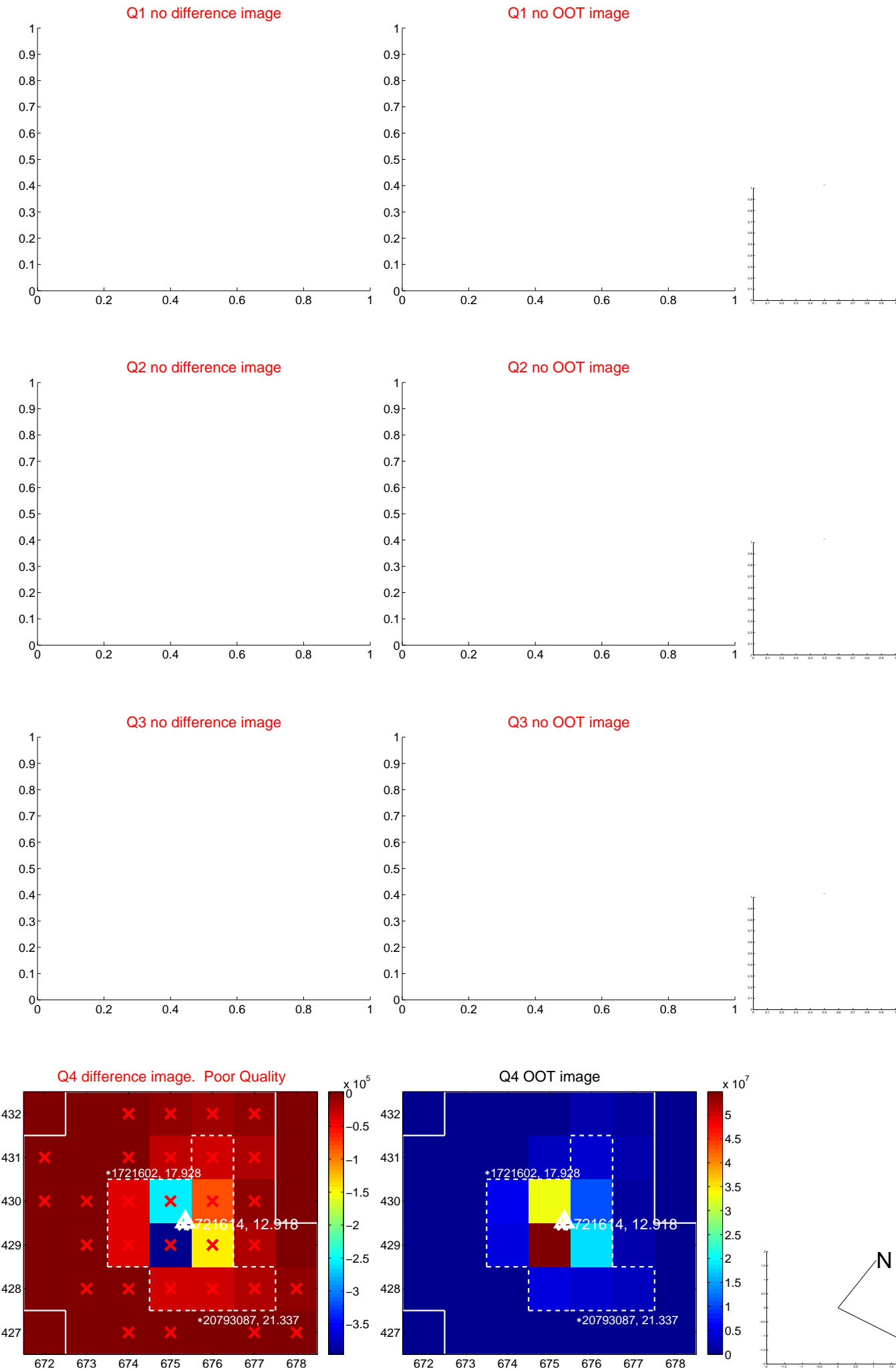
The direct PRF centroid is offset from the target star catalog position by about 0.25 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.088 \pm 0.077$	1.14	$-0.060 \pm 0.079$	$0.065 \pm 0.076$
PRF-fit source offset from KIC position	$0.310 \pm 0.087$	3.56	$-0.004 \pm 0.093$	$0.310 \pm 0.087$
photometric centroid source offset	$0.75 \pm 0.76$	0.98	$-0.59 \pm 0.74$	$-0.46 \pm 0.80$



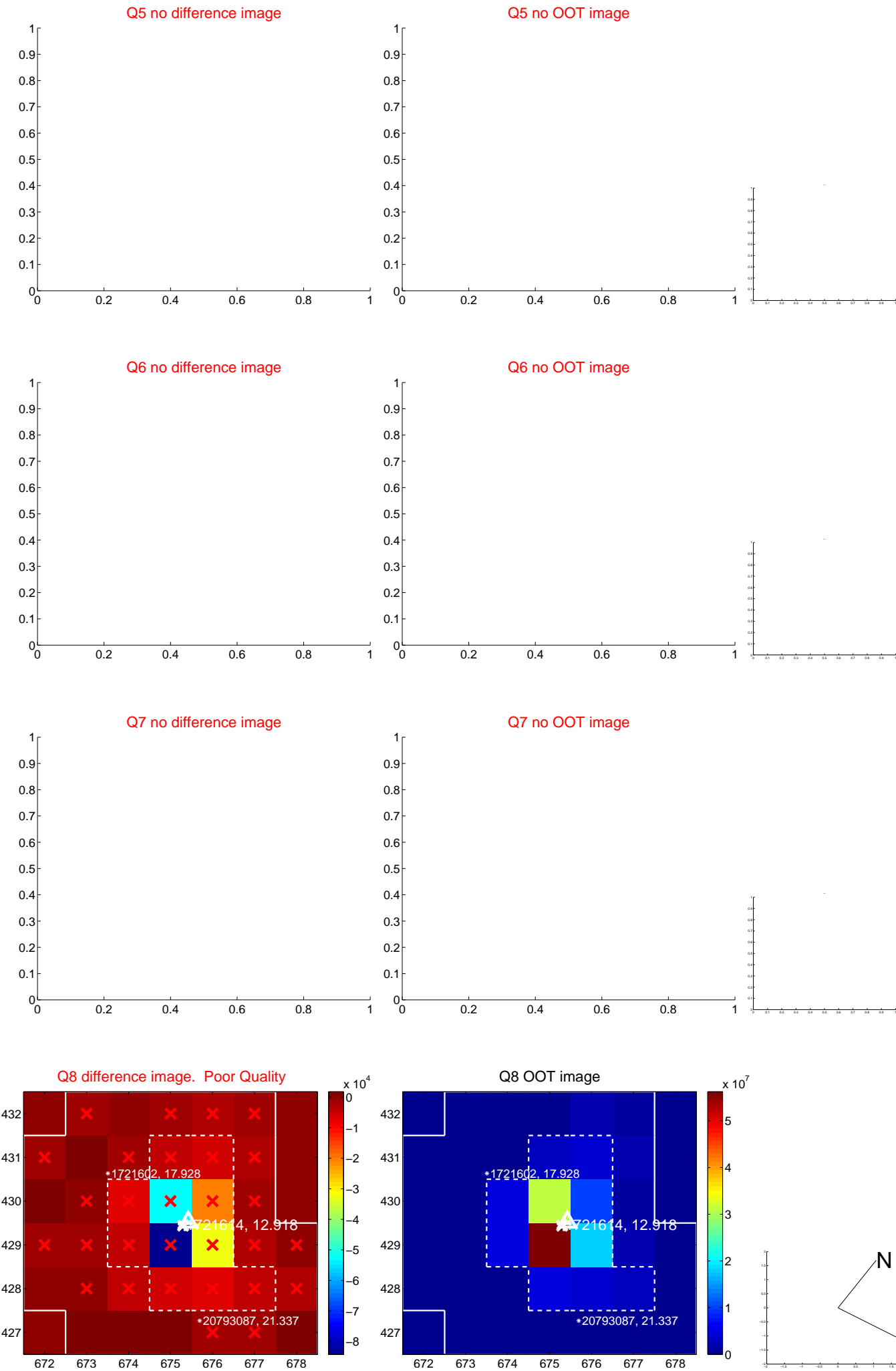
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

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

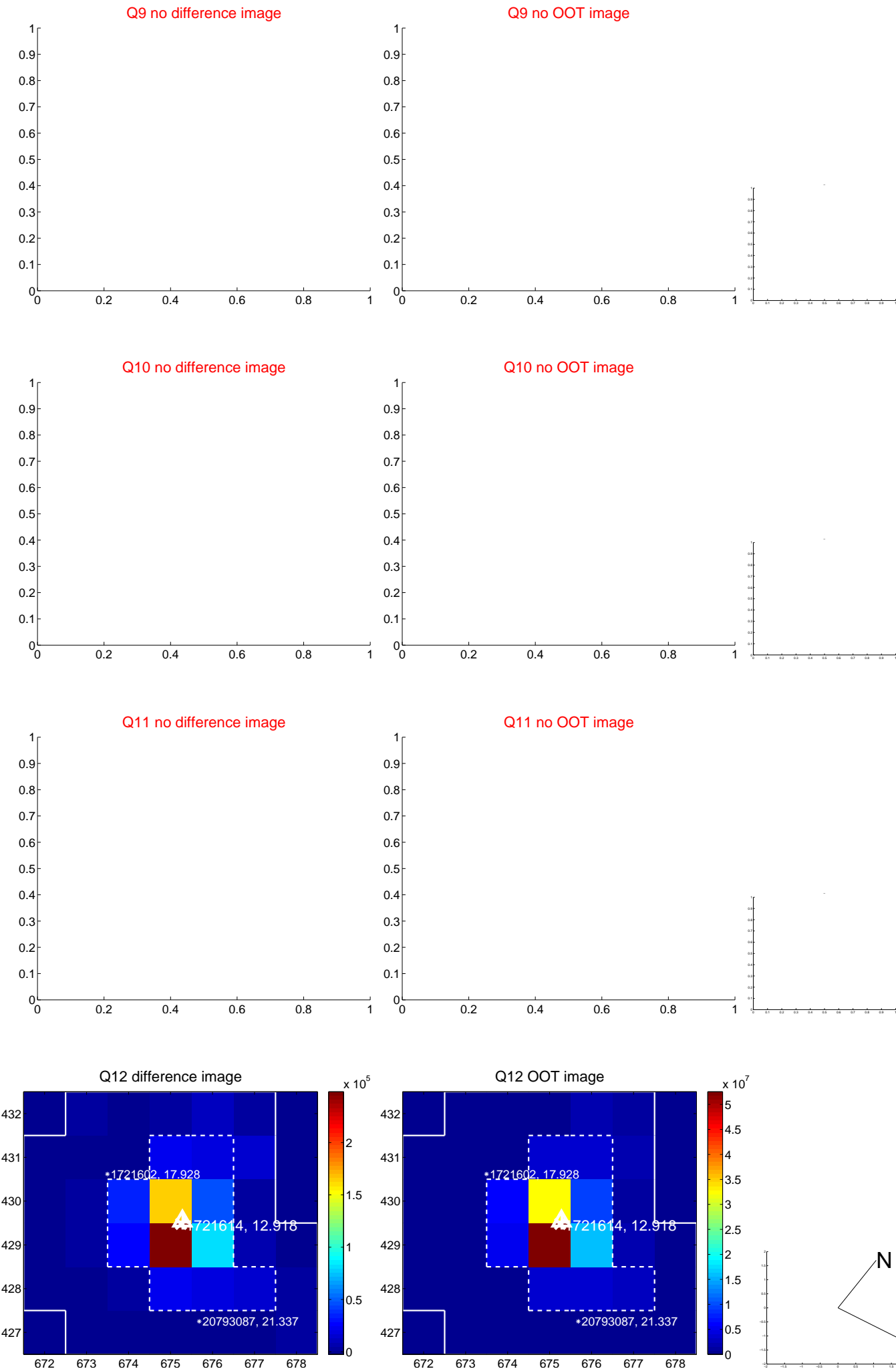




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



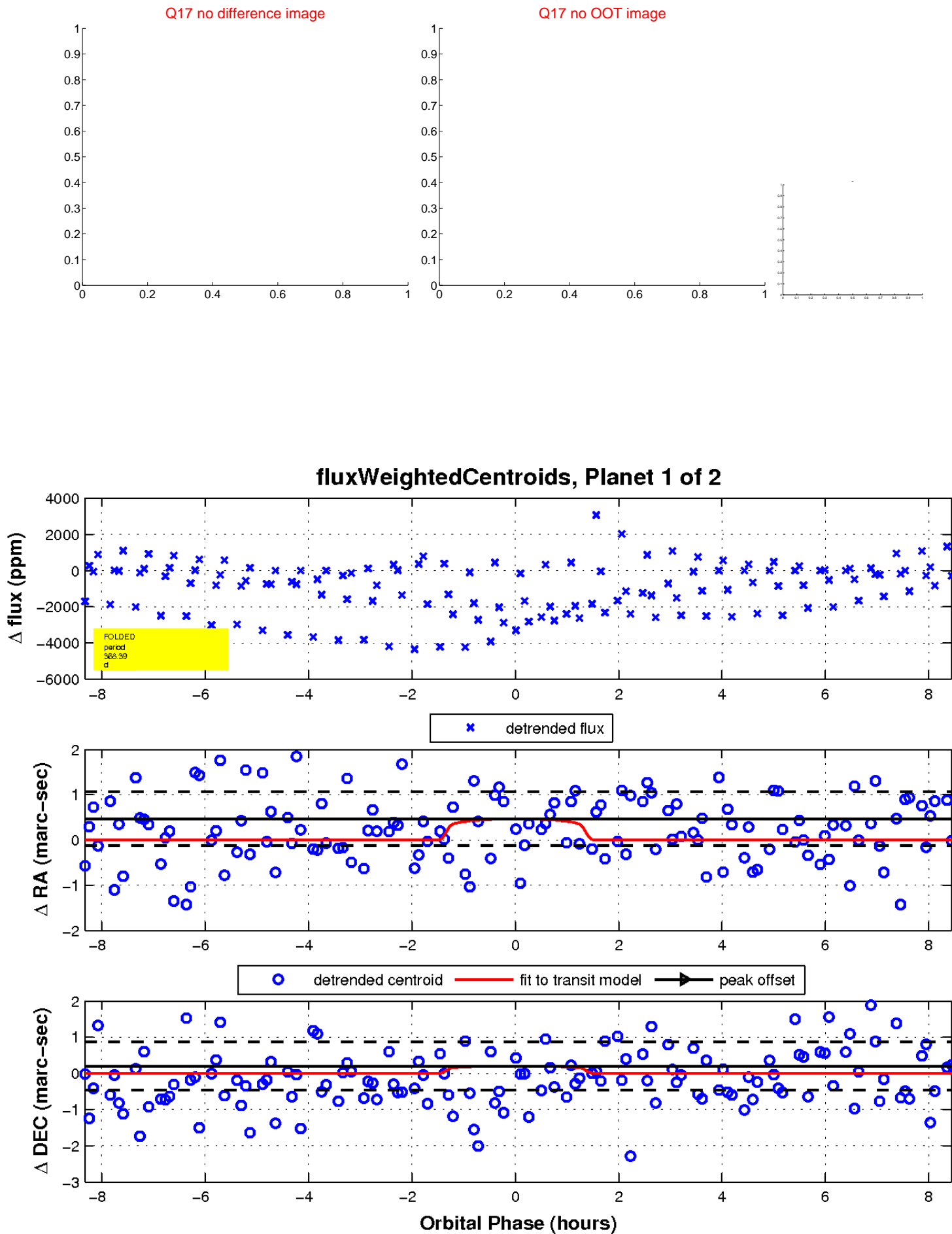
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

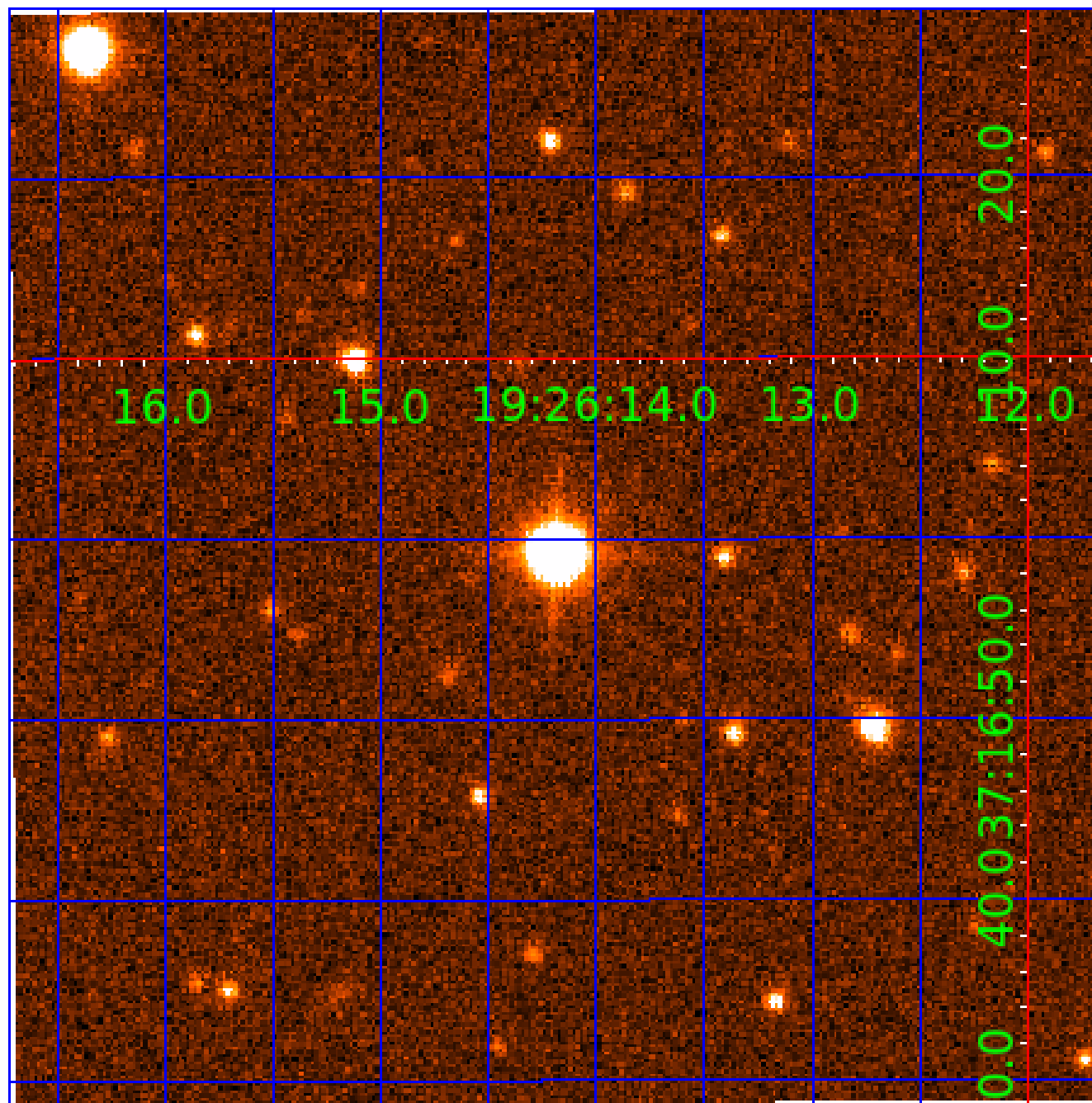


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 001721614

## 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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001721614-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

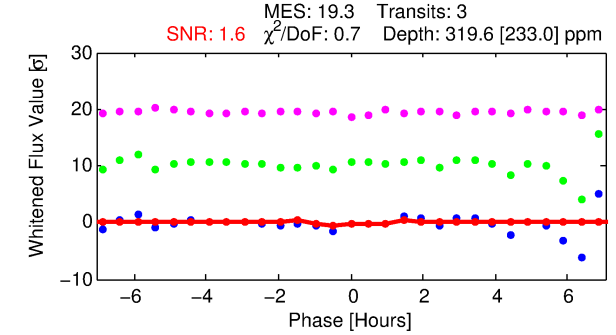
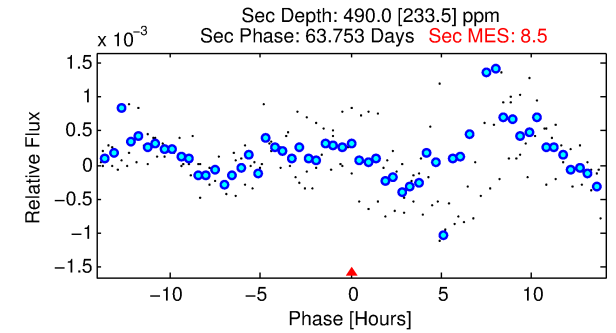
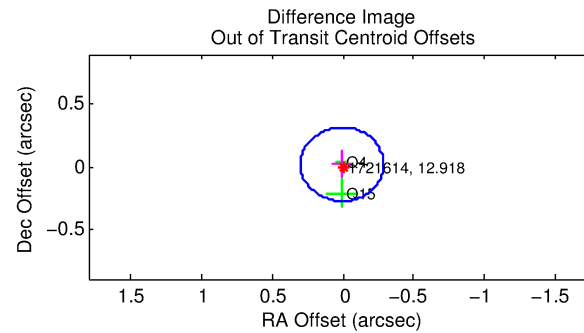
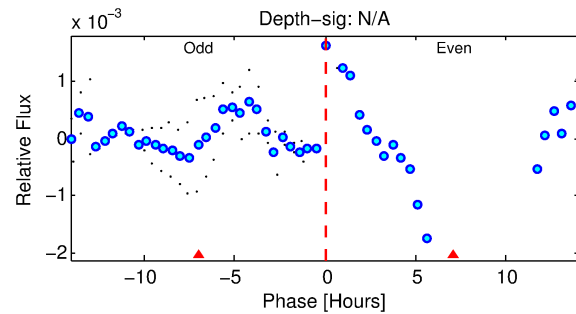
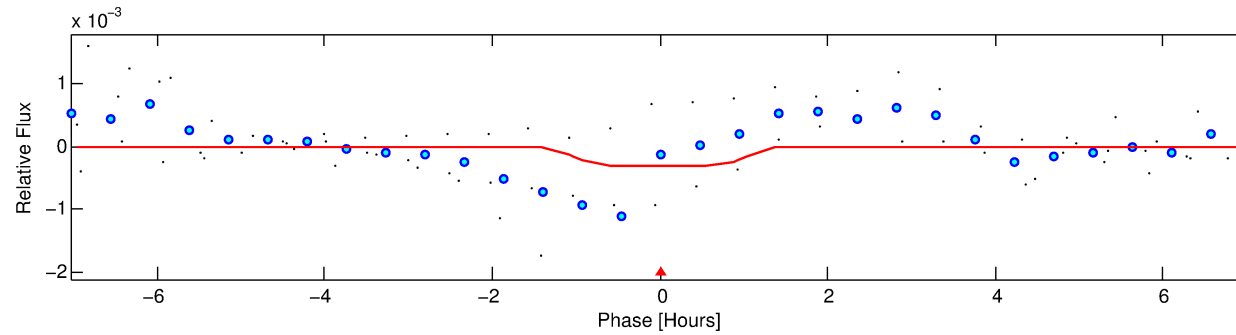
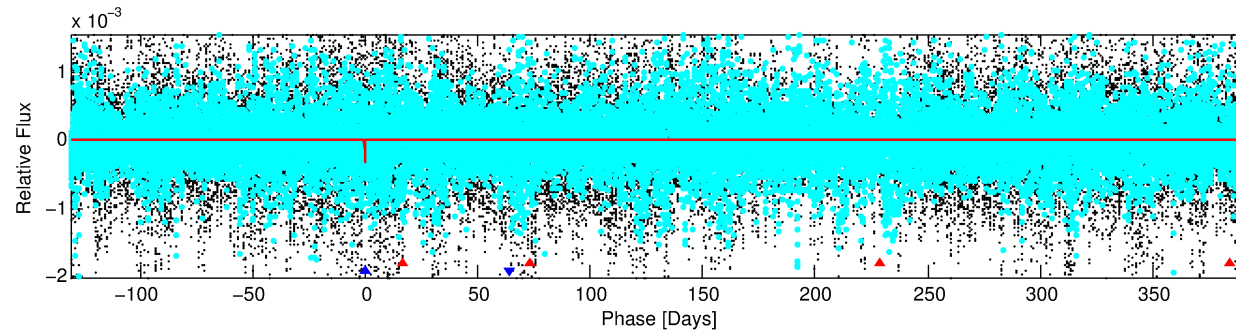
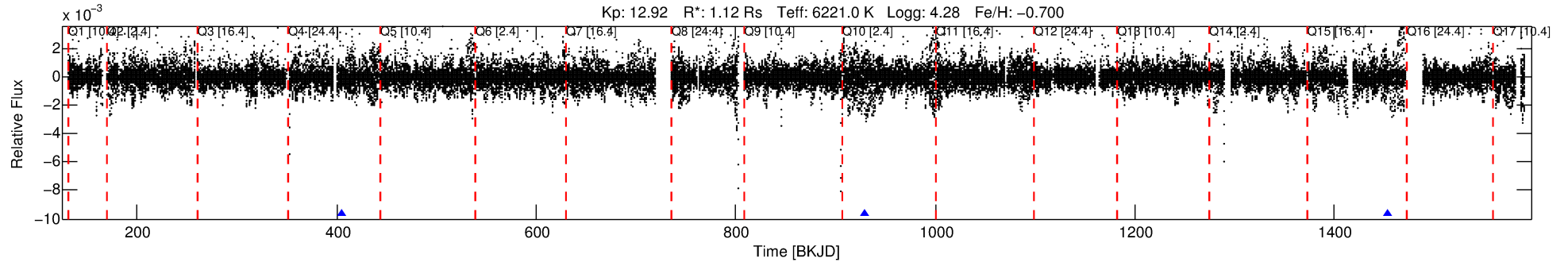
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 001721614-02

No Significant Match Found

# DV One-Page Summary

KIC: 1721614 Candidate: 2 of 2 Period: 523.980 d



## DV Fit Results:

Period = 523.98023 [0.00998] d  
Epoch = 405.7912 [0.0126] BKJD  
Rp/R\* = 0.0186 [0.0392]  
a/R\* = 940.12 [10657.23]  
b = 0.86 [3.55]  
Seff = 1.15 [0.45]  
Teq = 264 [26] K  
Rp = 2.28 [4.83] Re  
a = 1.2122 [0.2884] AU  
Ag = 76194.68 [324135.88] [0.24σ]  
Teffp = 6783 [7187] K [0.91σ]

## DV Diagnostic Results:

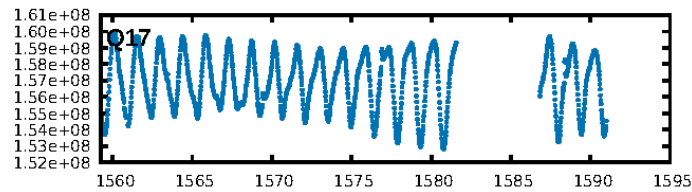
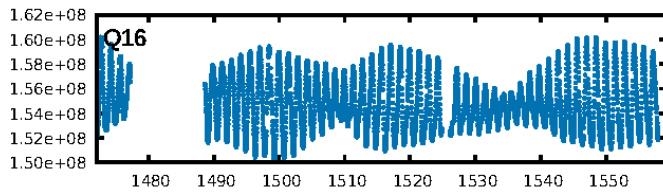
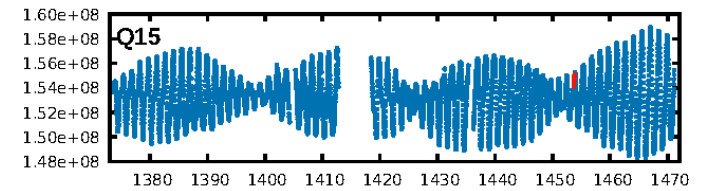
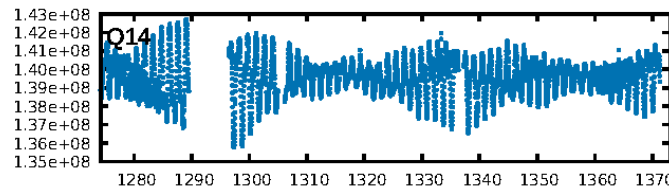
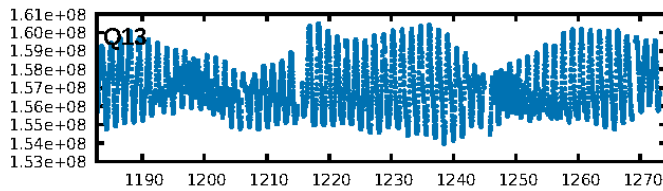
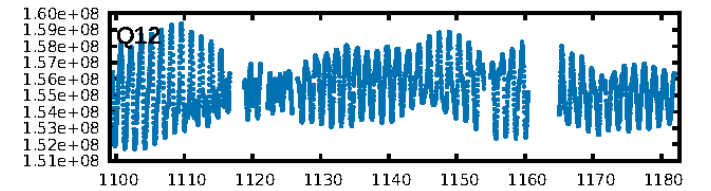
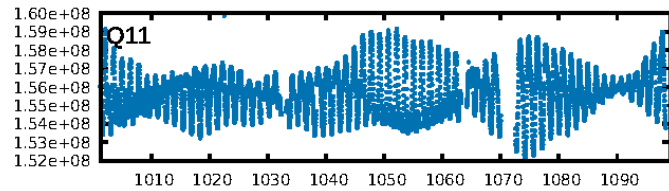
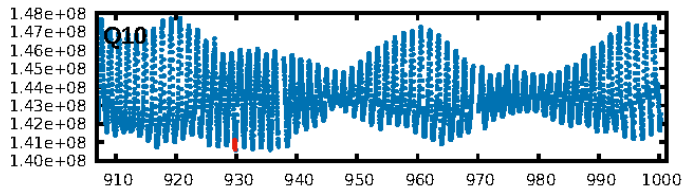
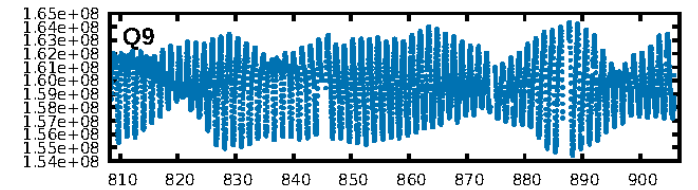
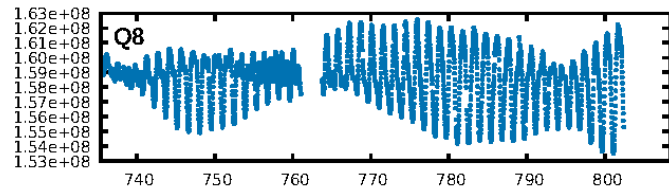
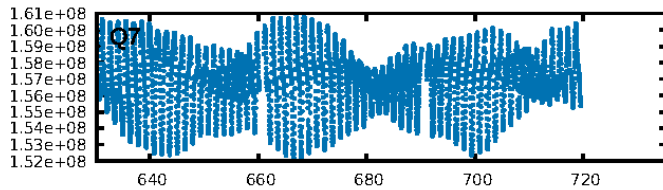
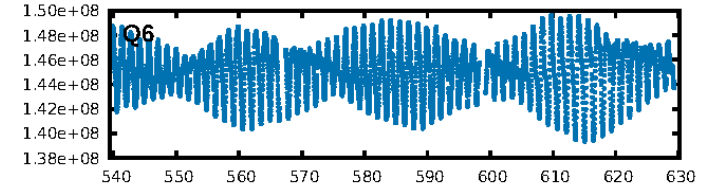
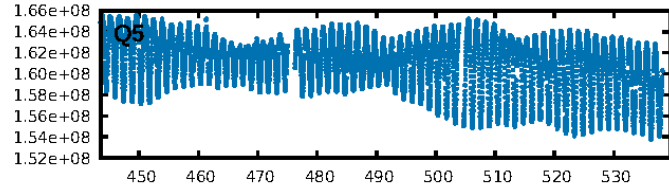
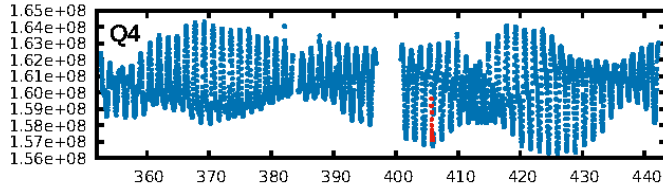
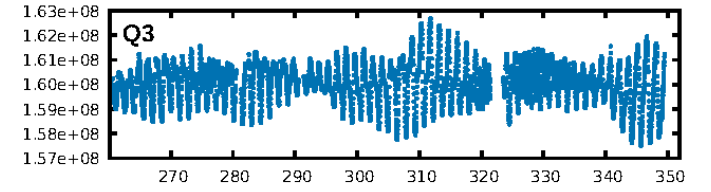
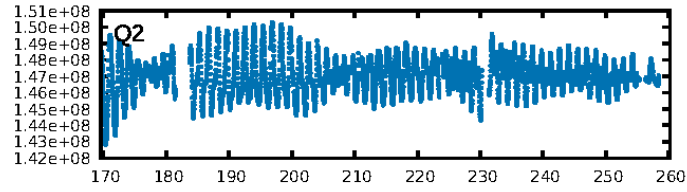
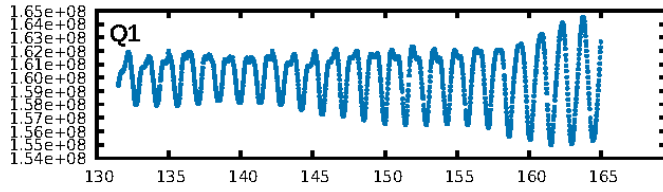
ShortPeriod-sig: 100.0% [1015.73σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 15.9%  
ModelChiSquareGof-sig: 99.5%  
**Bootstrap-pfa: 3.43e-11**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 0.4697  
Centroid-sig: 66.5%  
Centroid-so: 1.321 arcsec [0.49σ]  
OotOffset-rm: 0.020 arcsec [0.20σ]  
KicOffset-rm: 0.266 arcsec [3.00σ]  
OotOffset-st: 0/1/1/0 [2]  
KicOffset-st: 0/1/1/0 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 1.00 [2/2]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 19:58:18 Z

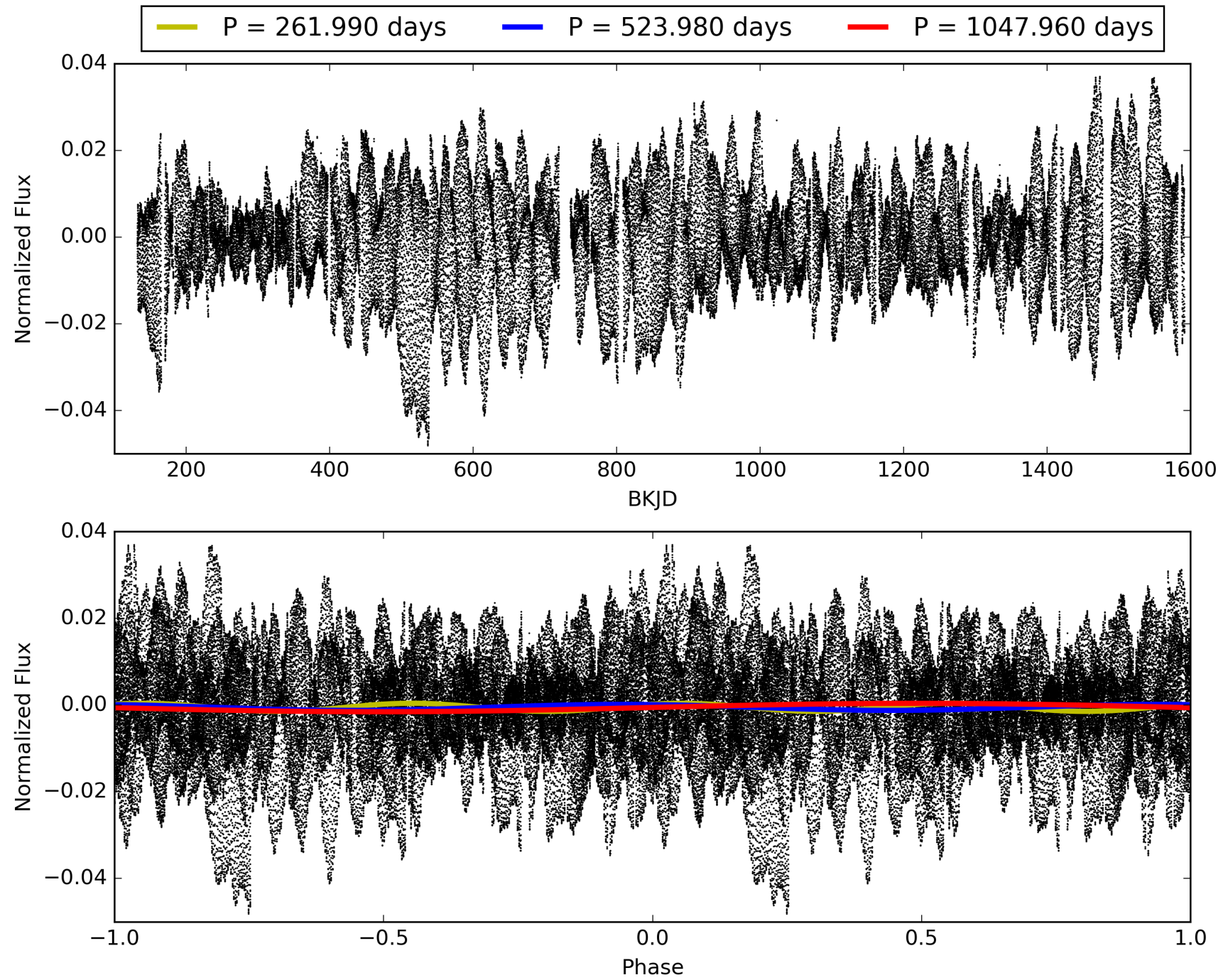
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 001721614-02, PDC Light Curves

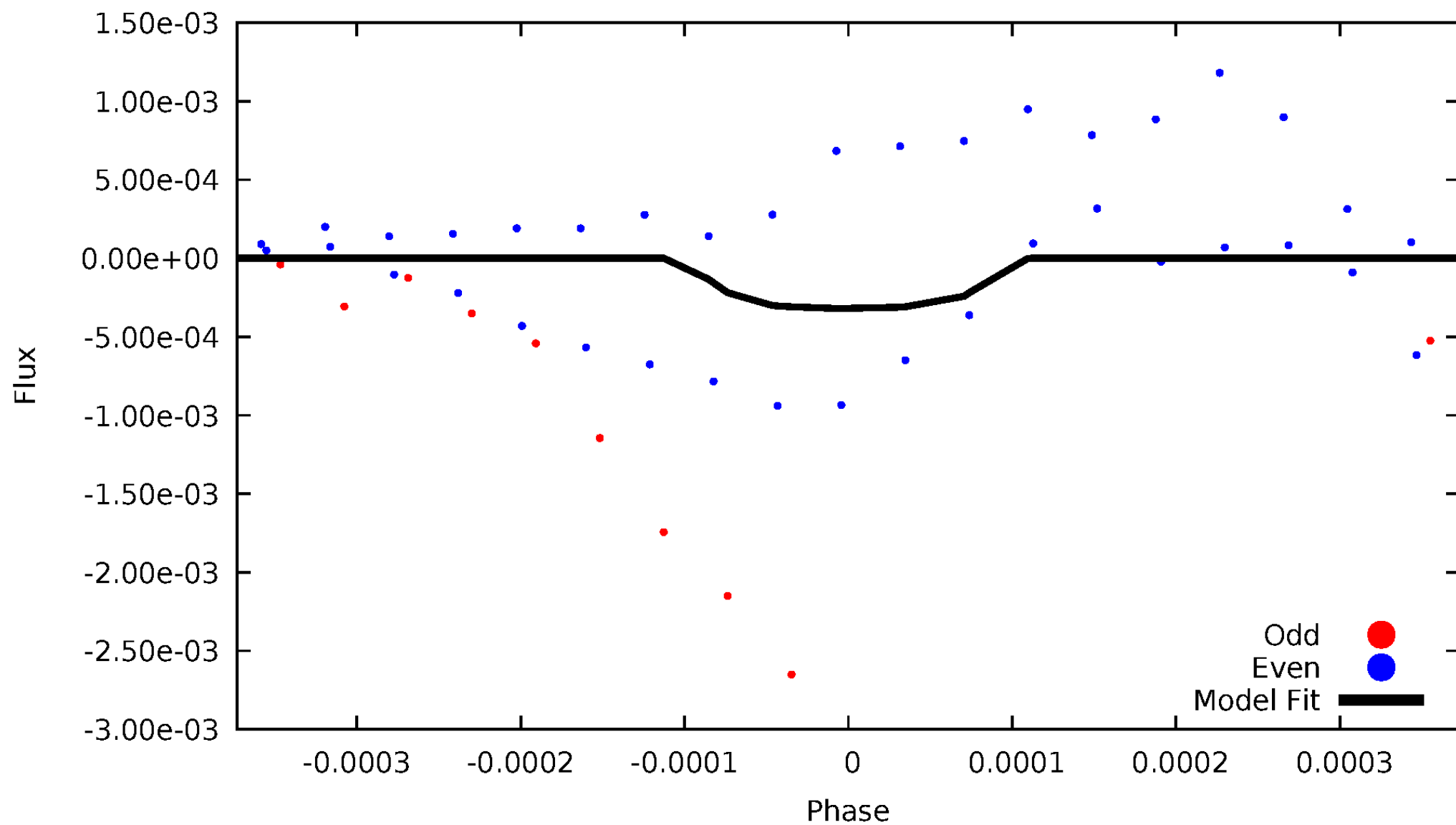


# TCE 001721614-02



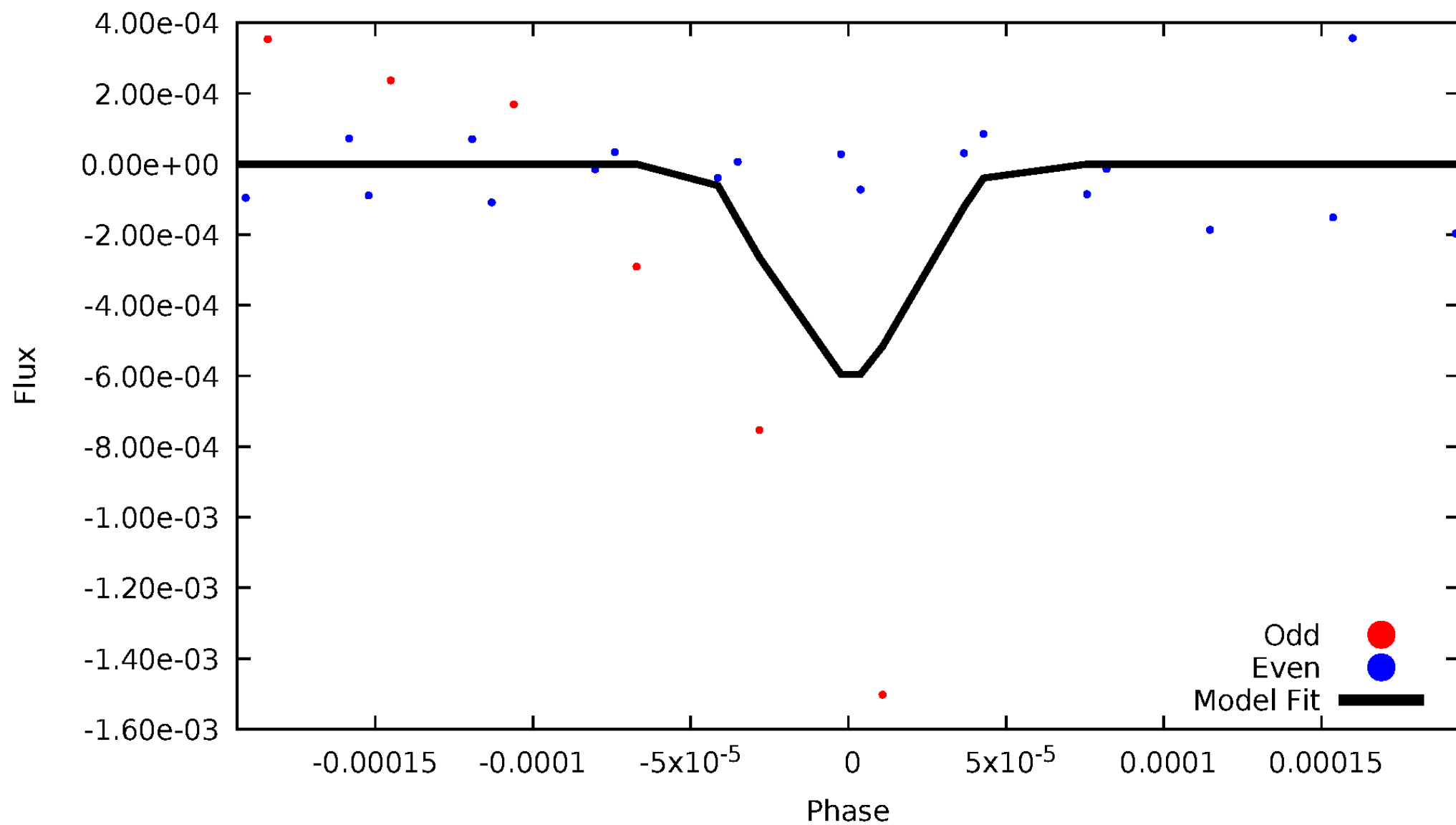
# DV Odd/Even

TCE 001721614-02



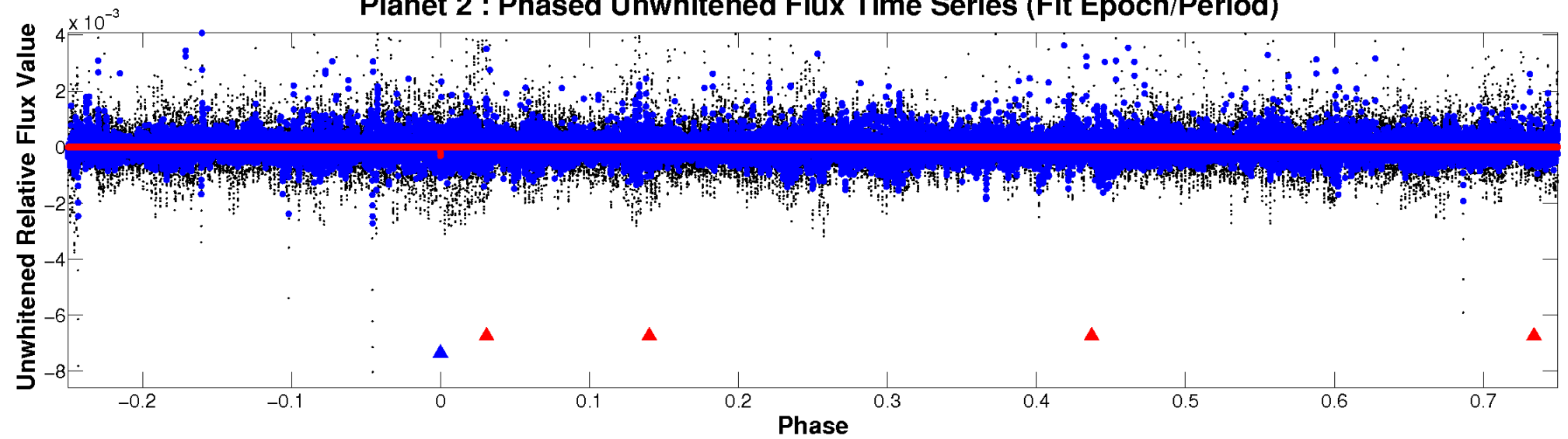
# ALT Odd/Even

TCE 001721614-02

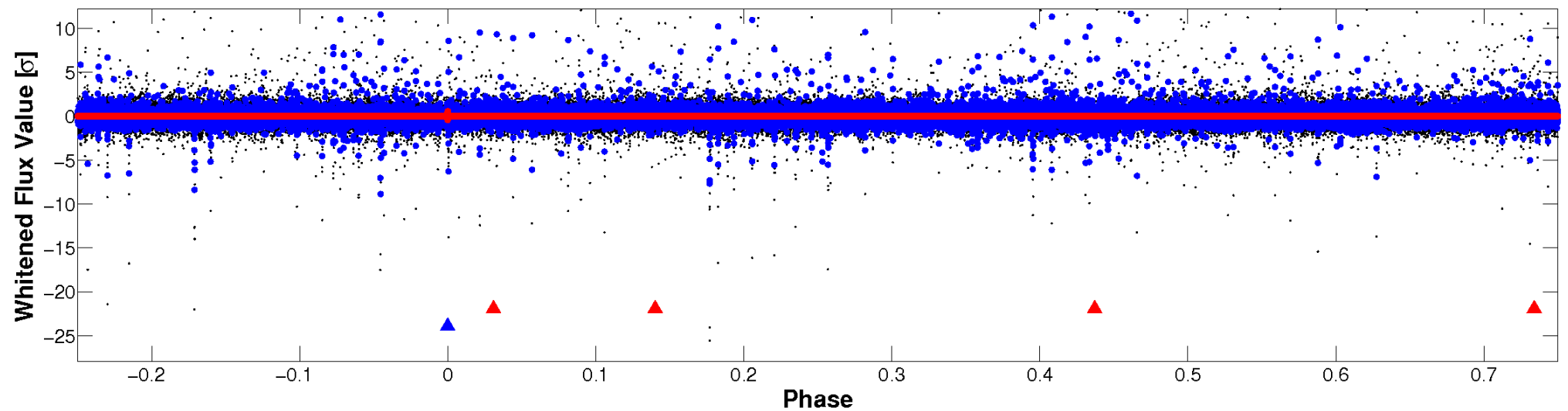


# Non-Whitened Vs. Whitened Light Curve

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

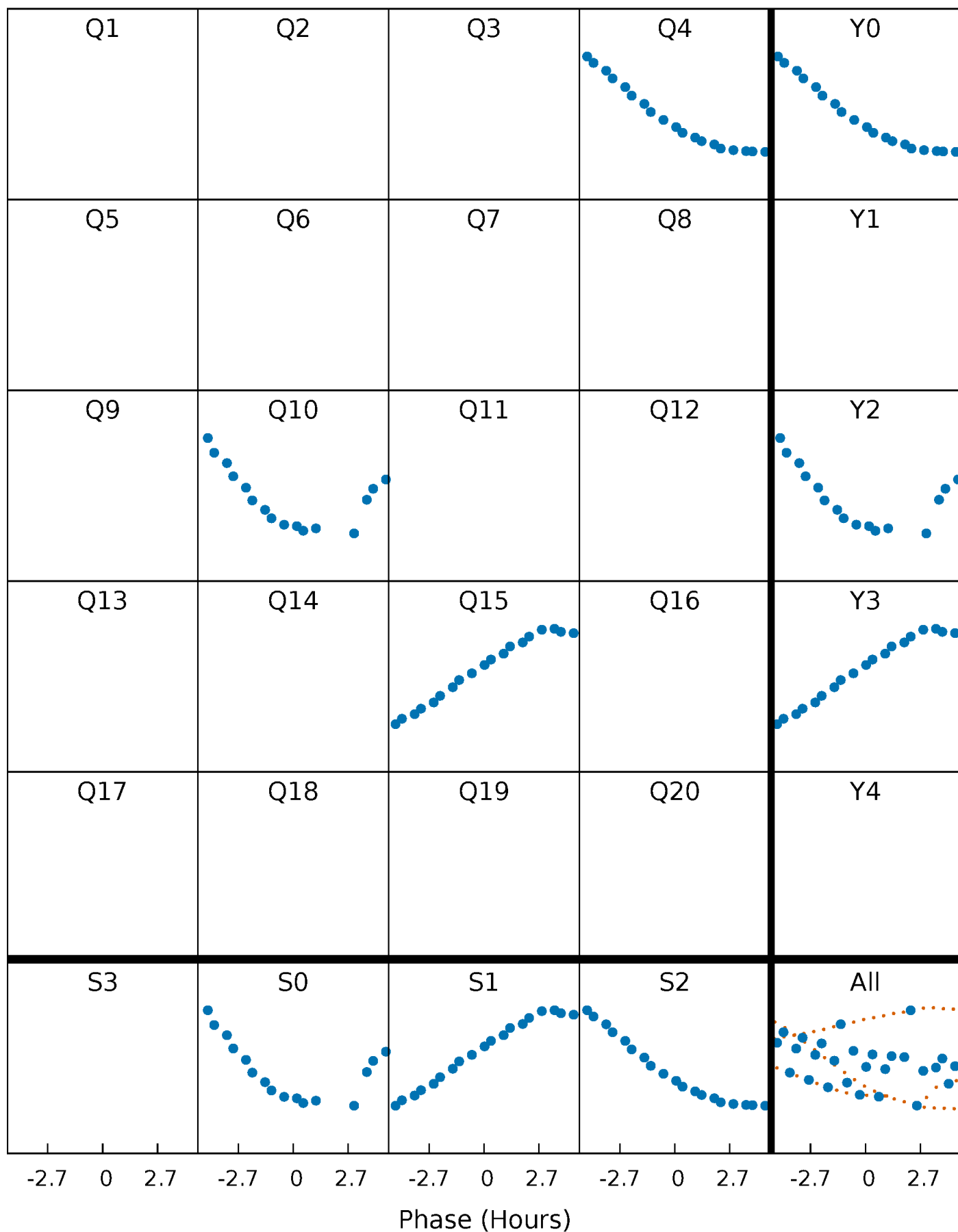


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



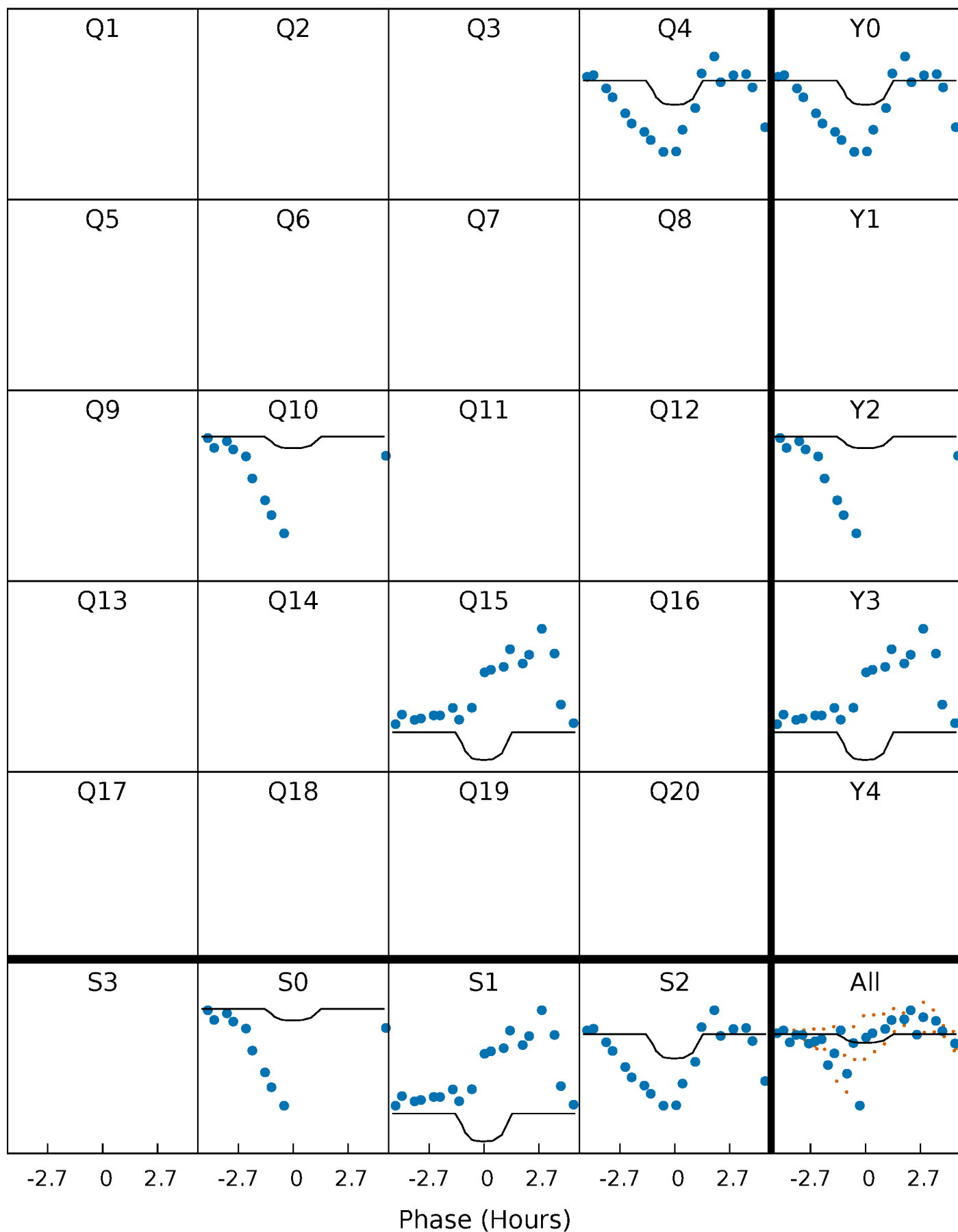
# PDC Quarter-Phased Transit Curves

TCE 001721614-02 P=523.980232 Days  $T_0=405.791177$  (BKJD)



# DV Quarter-Phased Transit Curves

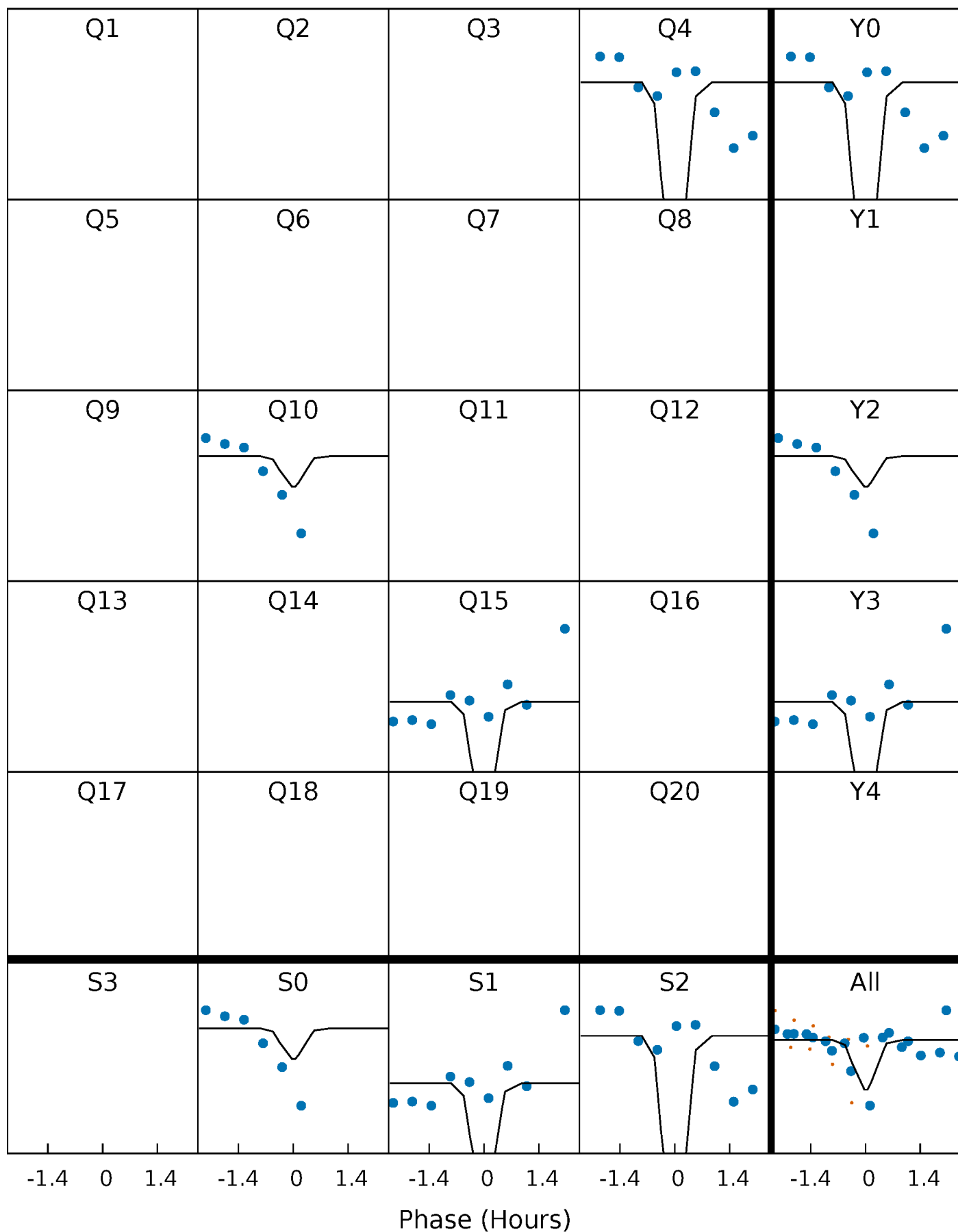
TCE 001721614-02 P=523.980232 Days  $T_0=405.791177$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

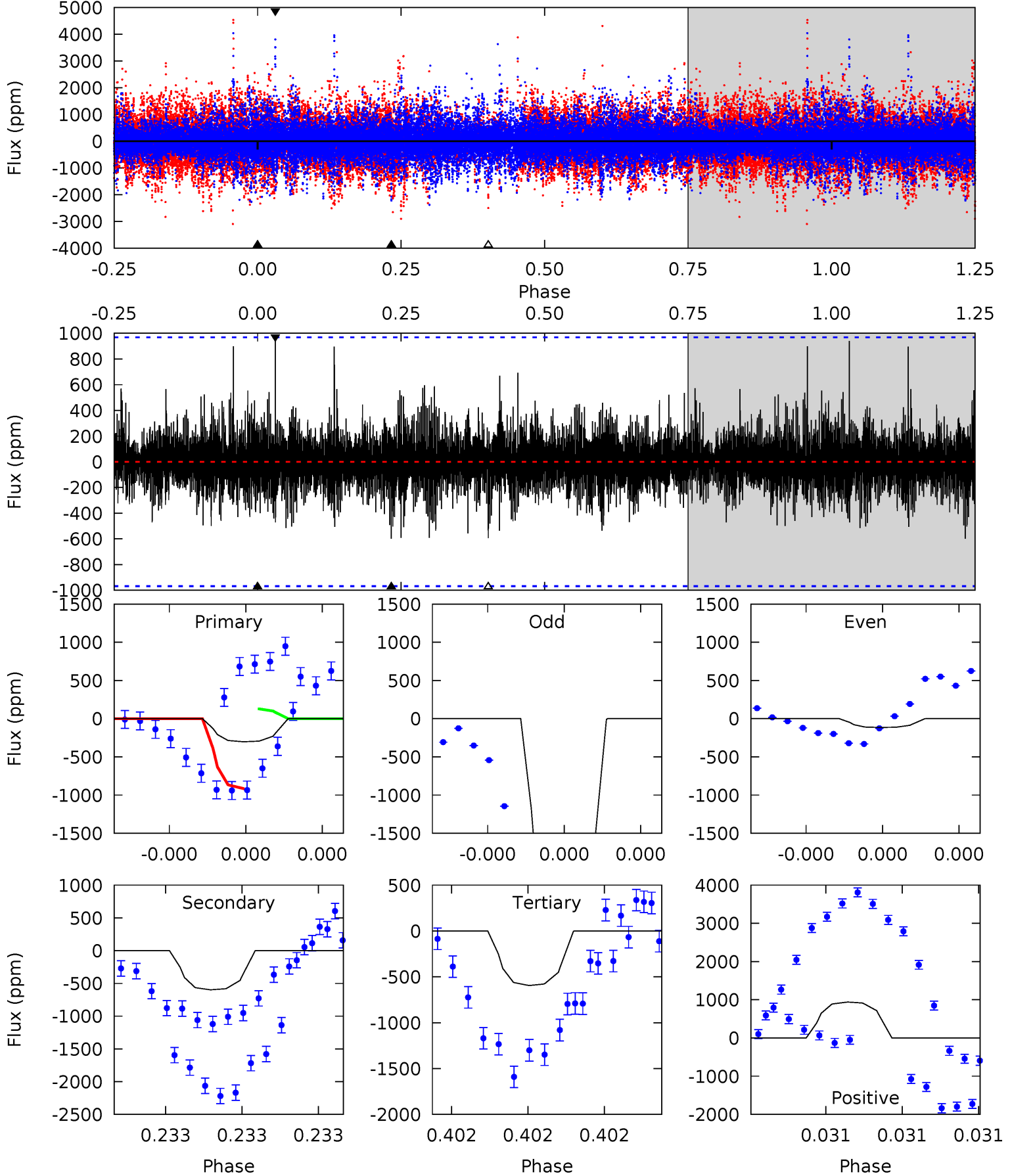
TCE 001721614-02 P=523.998213 Days  $T_0=405.728884$  (BKJD)



# DV Model-Shift Uniqueness Test

001721614-02,  $P = 523.980232$  Days,  $E = 405.791177$  Days

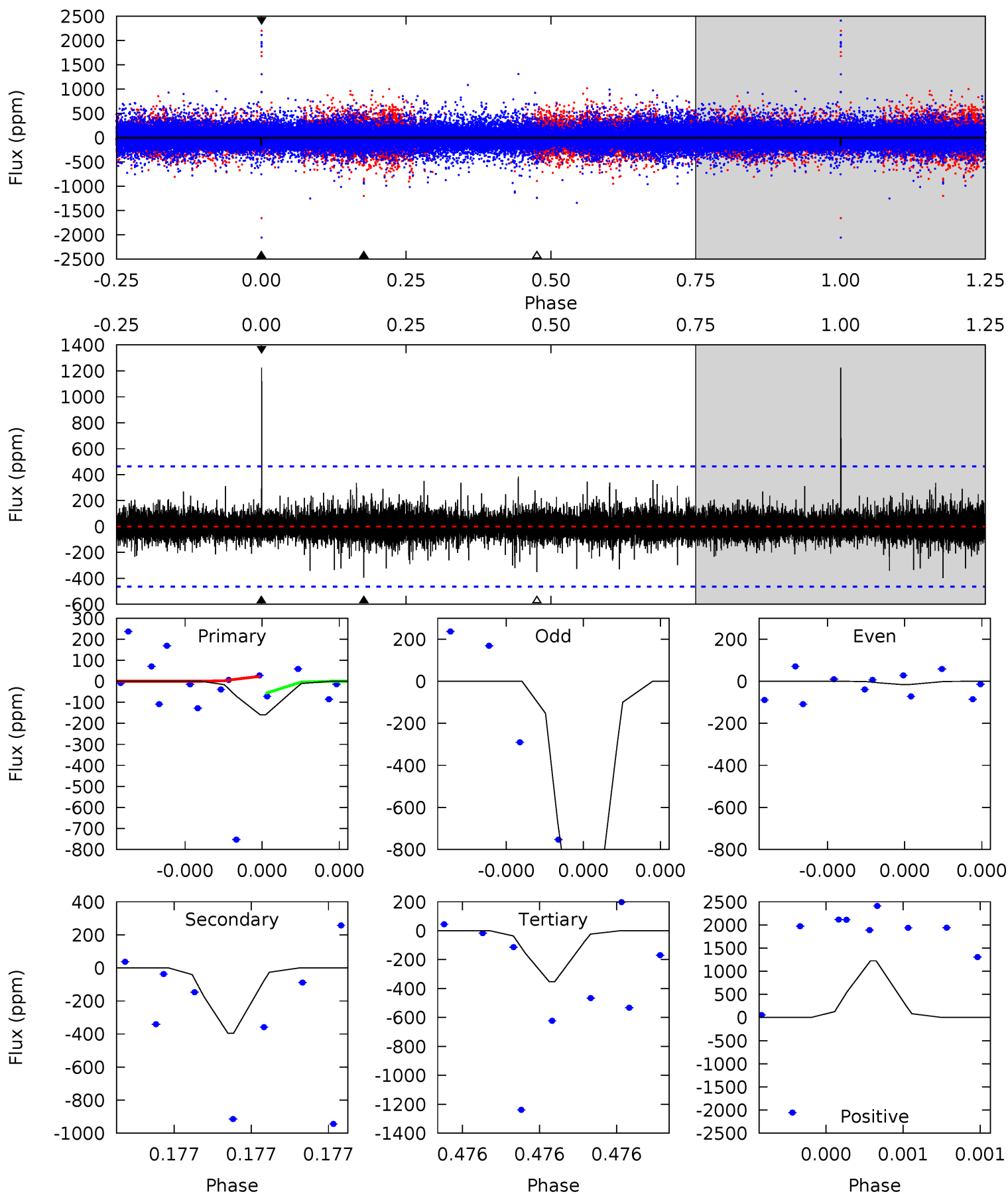
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1.79	3.54	3.52	5.56	5.73	3.72	0.82	-1.73	-3.77	0.02	-2.02	5.54	1.19	0.61	2.24



# Alt Model-Shift Uniqueness Test

001721614-02, P = 523.998213 Days, E = 405.728884 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
2.02	5.01	4.45	15.5	5.88	3.93	0.72	-2.44	-13.5	0.55	-10.5	9.08	9.73	0.76	0.19



### Stellar Parameters For KIC 001721614

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6221^{+169}_{-169}$	$4.275^{+0.220}_{-0.180}$	$-0.700^{+0.300}_{-0.300}$	$1.122^{+0.282}_{-0.254}$	$0.864^{+0.114}_{-0.066}$	$0.861^{+0.987}_{-0.397}$
	+3%/-3%	+5%/-4%	+43%/-43%	+25%/-23%	+13%/-8%	+115%/-46%
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 001721614-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-598 \pm 169$	$3.97^{+4.12}_{-2.60}$	$368^{+26}_{-27}$	$5358^{+4754}_{-1295}$	$31333^{+243244}_{-24195}$
Alt.	$-395 \pm 79$	$4.30^{+4.41}_{-2.84}$	$368^{+27}_{-25}$	$4781^{+3351}_{-1105}$	$17083^{+135390}_{-12820}$

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

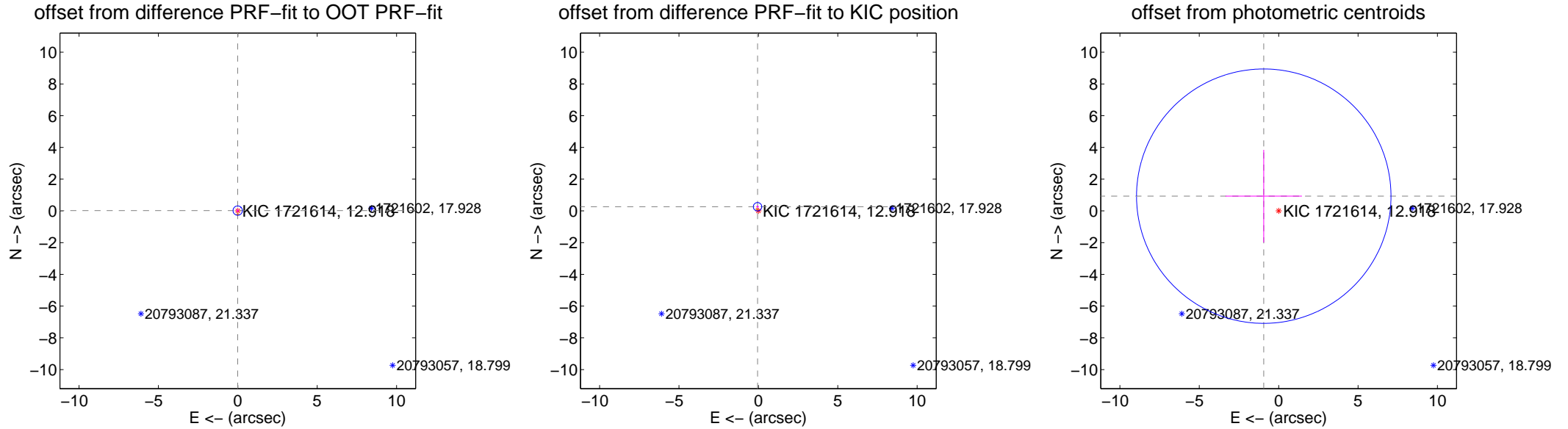
## DV Centroid Data

Supplemental centroid analysis for 001721614-02. Kepler magnitude: 12.92. Transit SNR 1.60

There are 1 quarters with good PRF difference image offsets

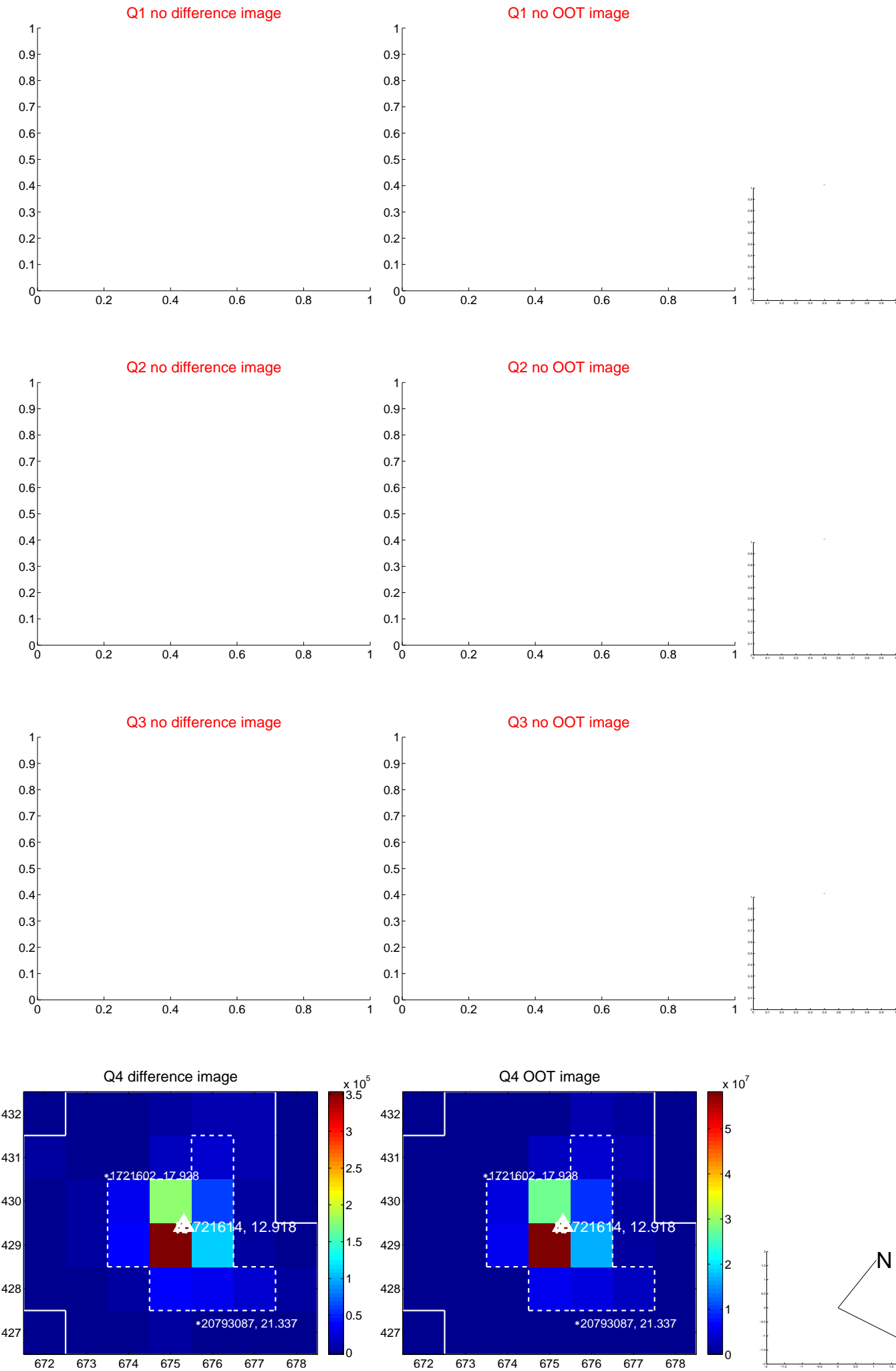
The direct PRF centroid is offset from the target star catalog position by about 0.33 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.020 \pm 0.098$	0.20	$0.007 \pm 0.067$	$0.019 \pm 0.102$
PRF-fit source offset from KIC position	$0.266 \pm 0.089$	3.00	$0.052 \pm 0.086$	$0.260 \pm 0.089$
photometric centroid source offset	$1.32 \pm 2.67$	0.49	$0.94 \pm 2.41$	$0.93 \pm 2.92$

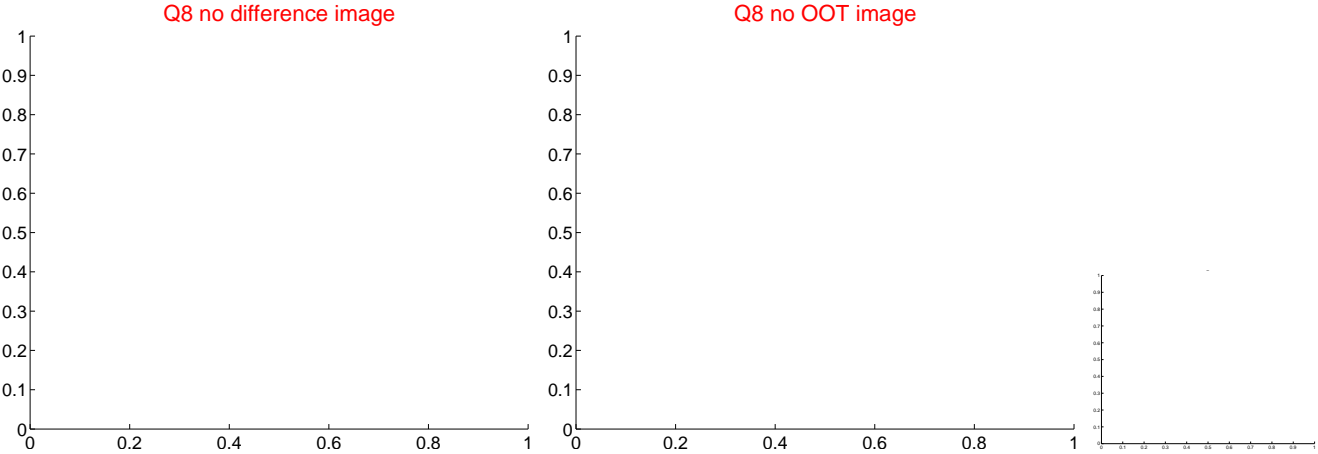
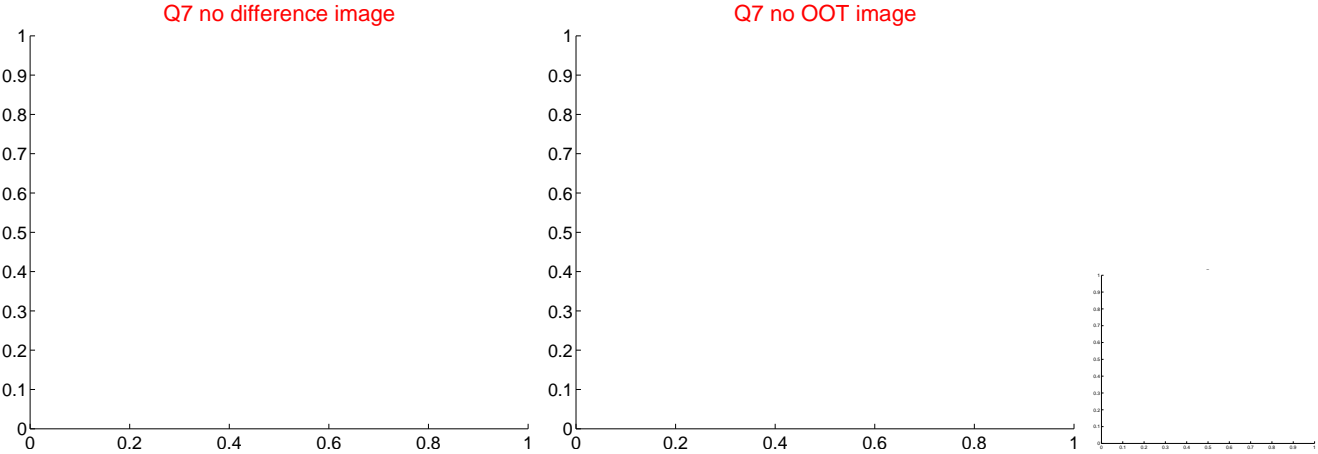
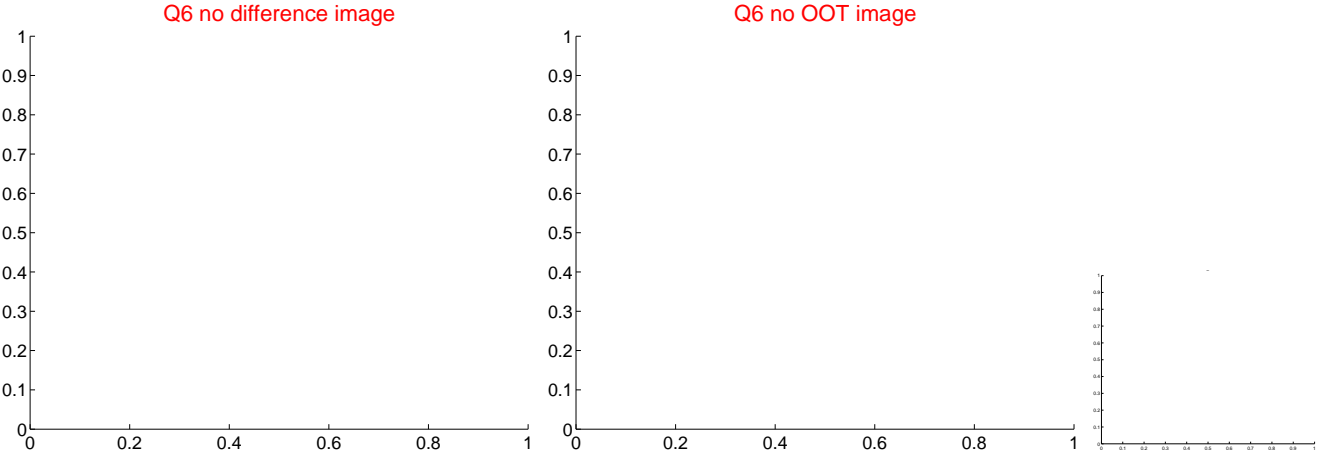
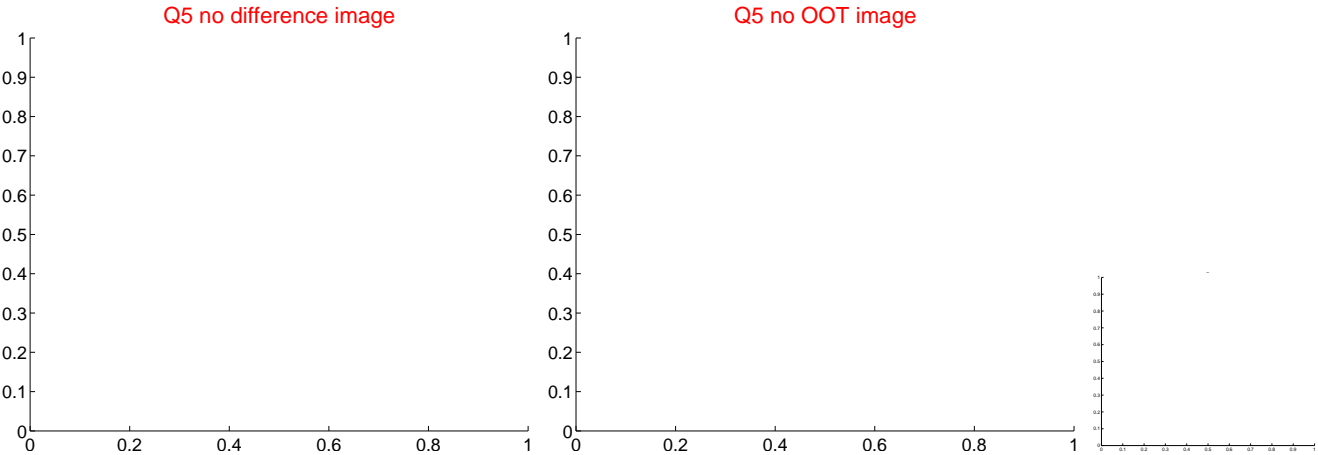


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

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



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

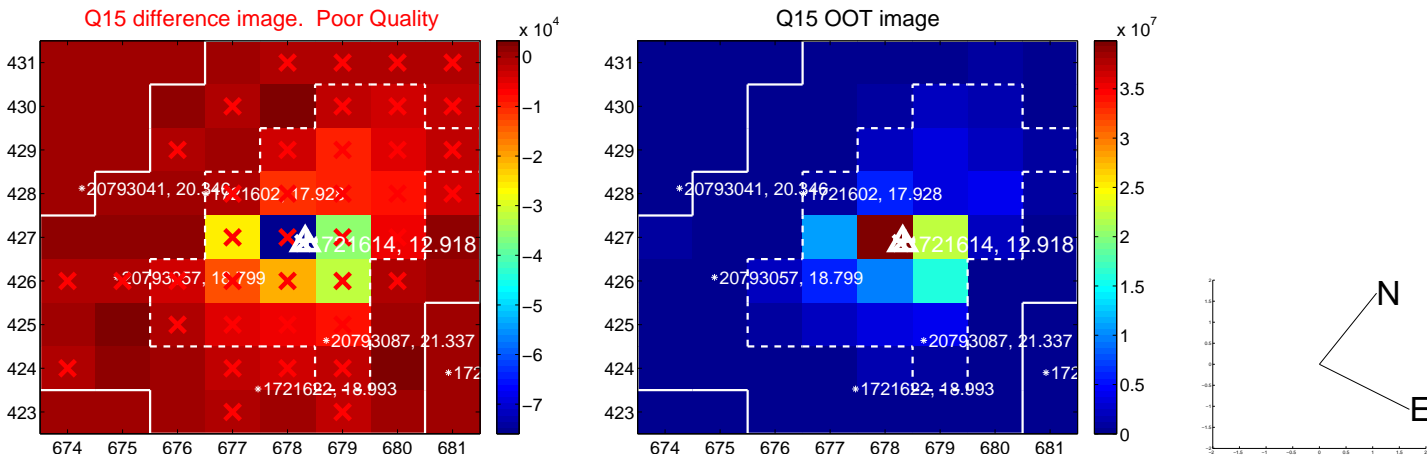




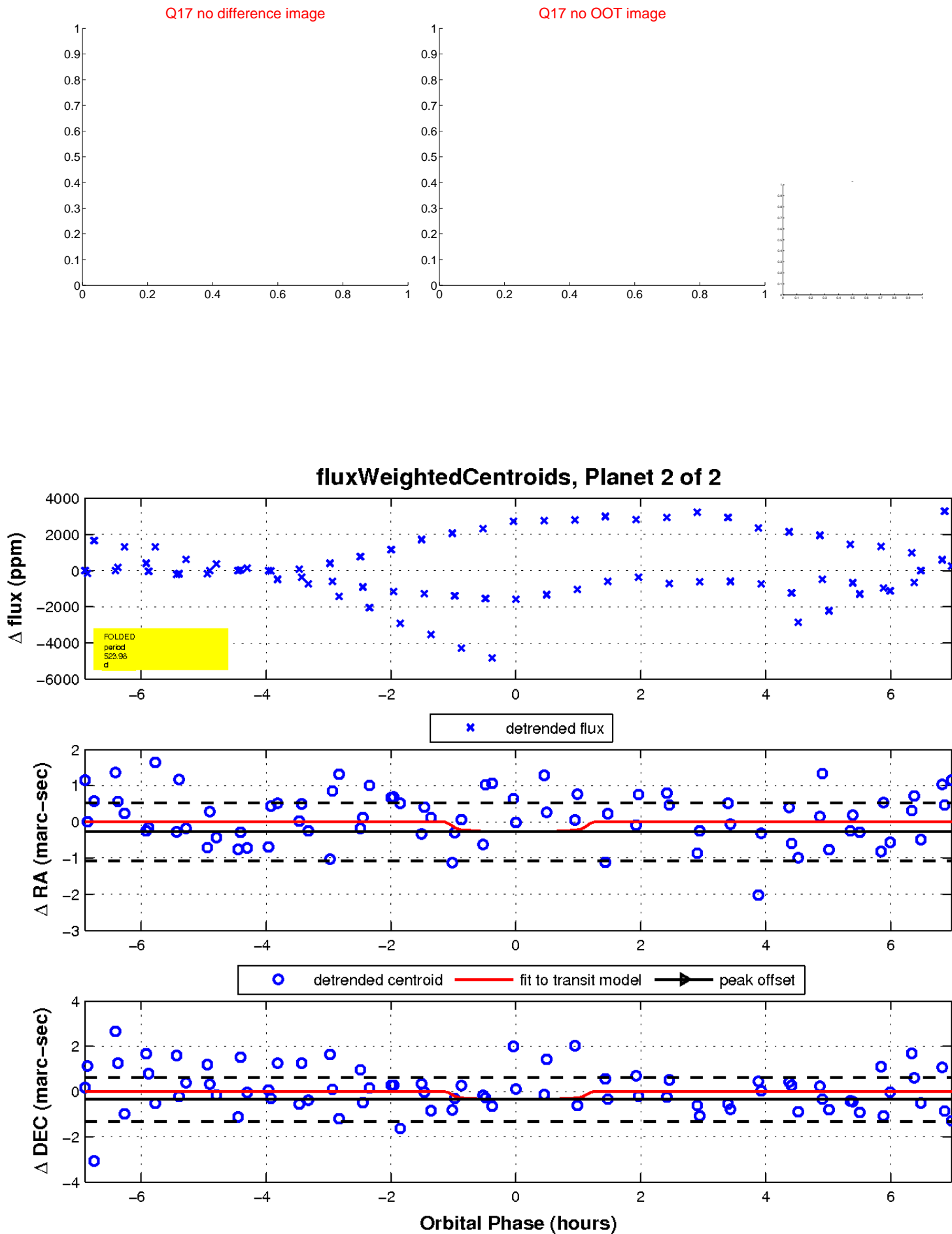
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



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



UKIRT Image

Declination

