

# KIC 006038713

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006038713-01	OBS	No	371.538430	143.447686	549.3	15.690	8.1	8.0	1.01	6139	2.56	1.22
006038713-02	OBS	No	363.203638	171.299516	365.8	30.084	9.4	8.1	1.01	6139	1.98	1.26

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006038713-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—CENT_FEW_DIFFS
006038713-02	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—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.

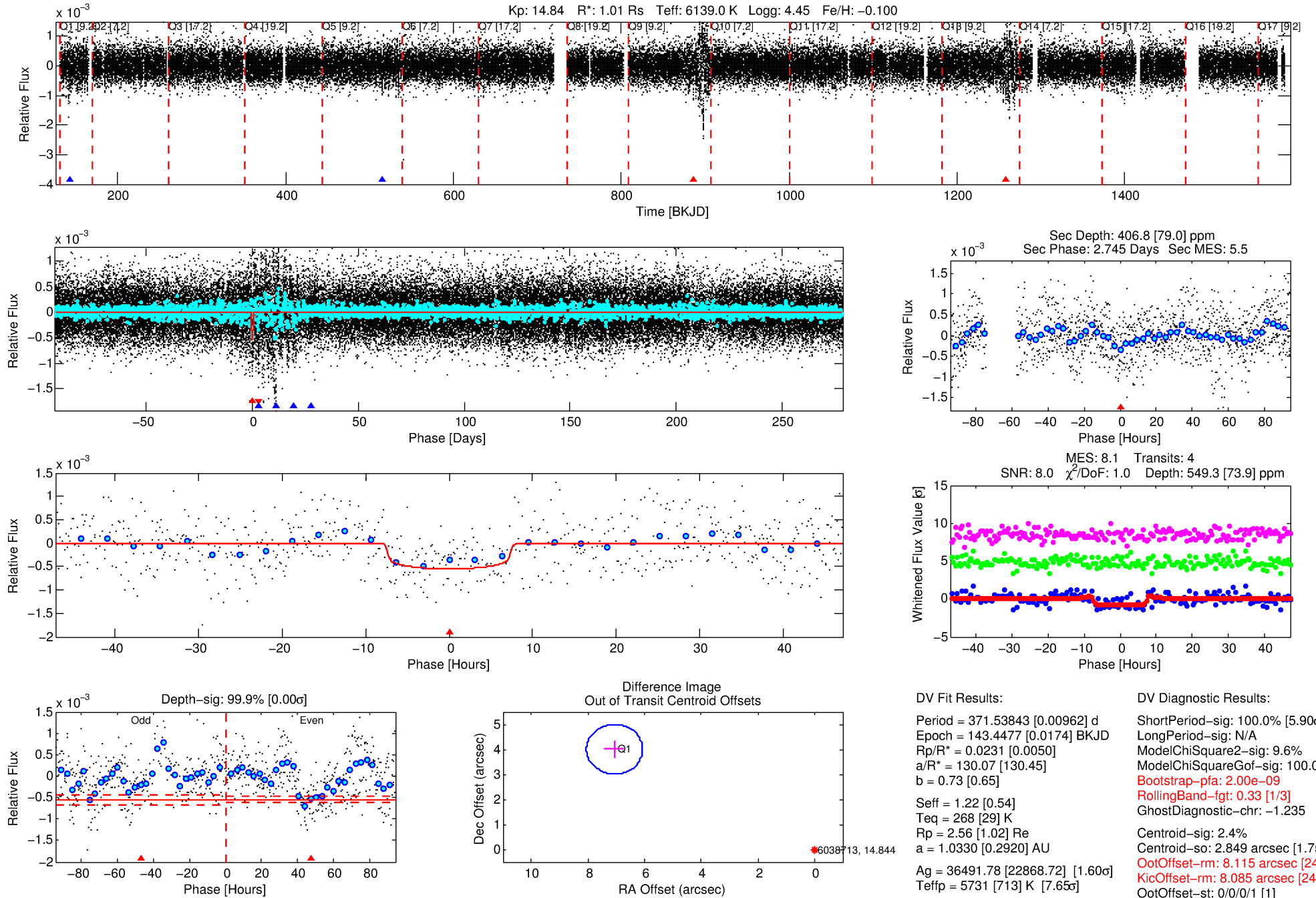
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006038713-01

No Significant Match Found

# DV One-Page Summary

KIC: 6038713 Candidate: 1 of 2 Period: 371.538 d



## DV Fit Results:

Period = 371.53843 [0.00962] d  
Epoch = 143.4477 [0.0174] BKJD  
Rp/R\* = 0.0231 [0.0050]  
a/R\* = 130.07 [130.45]  
b = 0.73 [0.65]  
Seff = 1.22 [0.54]  
Teq = 268 [29] K  
Rp = 2.56 [1.02] Re  
a = 1.0330 [0.2920] AU  
Ag = 36491.78 [22868.72] [1.60σ]  
Teffp = 5731 [713] K [7.65σ]

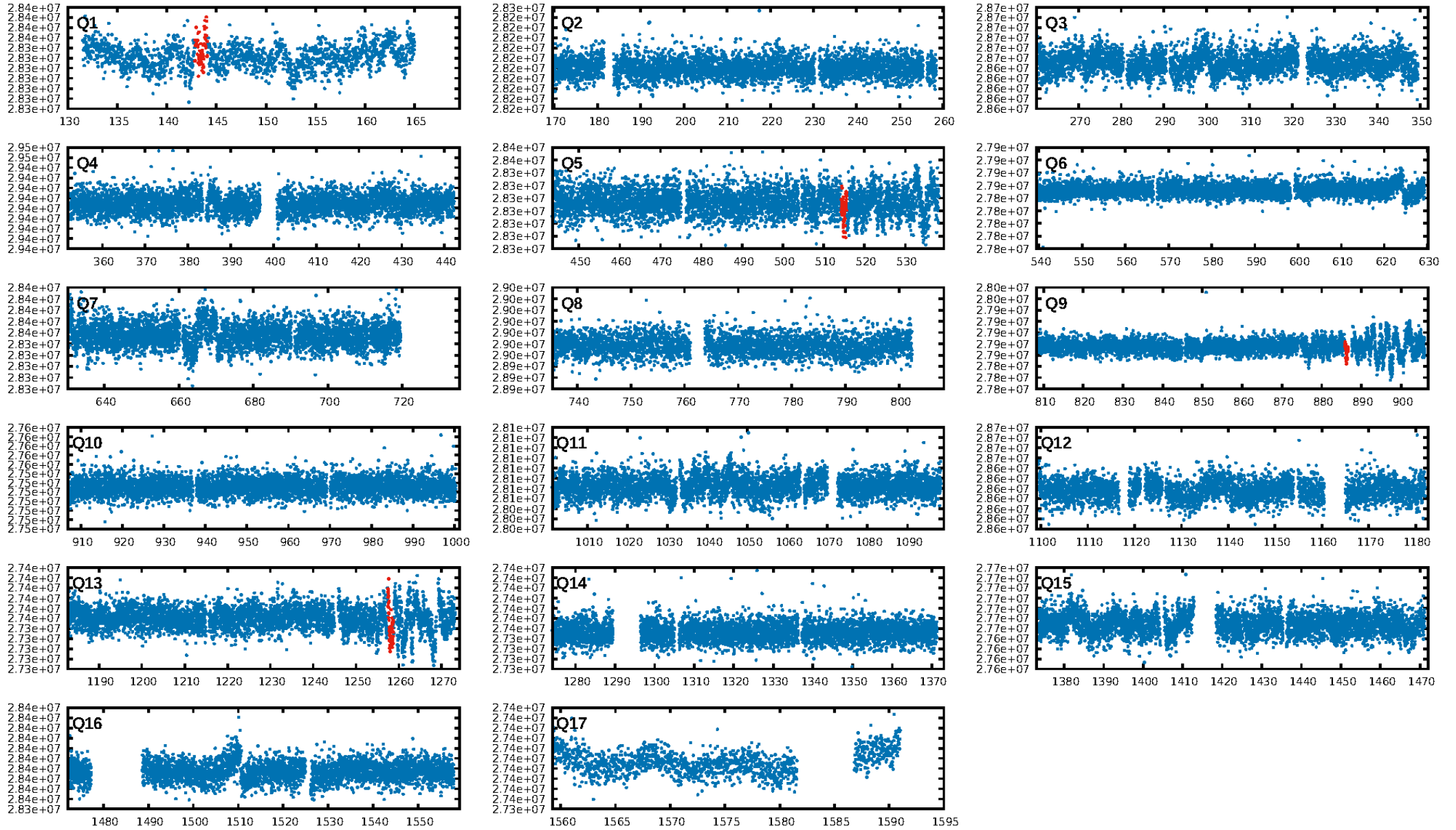
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [5.90σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 9.6%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 2.00e-09  
RollingBand-fgt: 0.33 [1/3]  
GhostDiagnostic-chr: -1.235  
Centroid-sig: 2.4%  
Centroid-so: 2.849 arcsec [1.75σ]  
OotOffset-rm: 8.115 arcsec [24.52σ]  
KicOffset-rm: 8.085 arcsec [24.43σ]  
OotOffset-st: 0/0/0/1 [1]  
KicOffset-st: 0/0/0/1 [1]  
DiffImageQuality-fgm: 0.00 [0/1]  
DiffImageOverlap-fno: 1.00 [3/3]

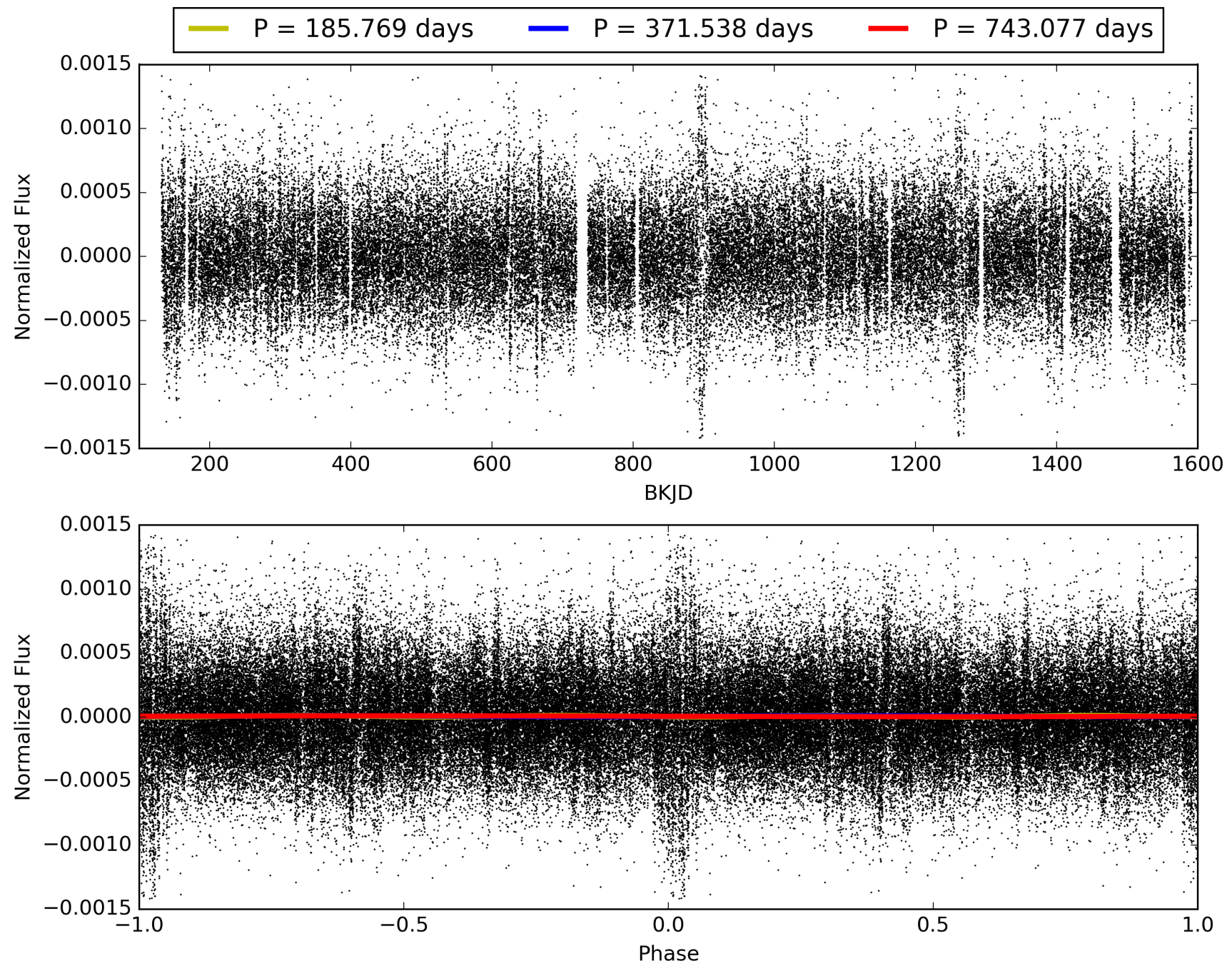
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 20:59:46 Z

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

# TCE 006038713-01, PDC Light Curves

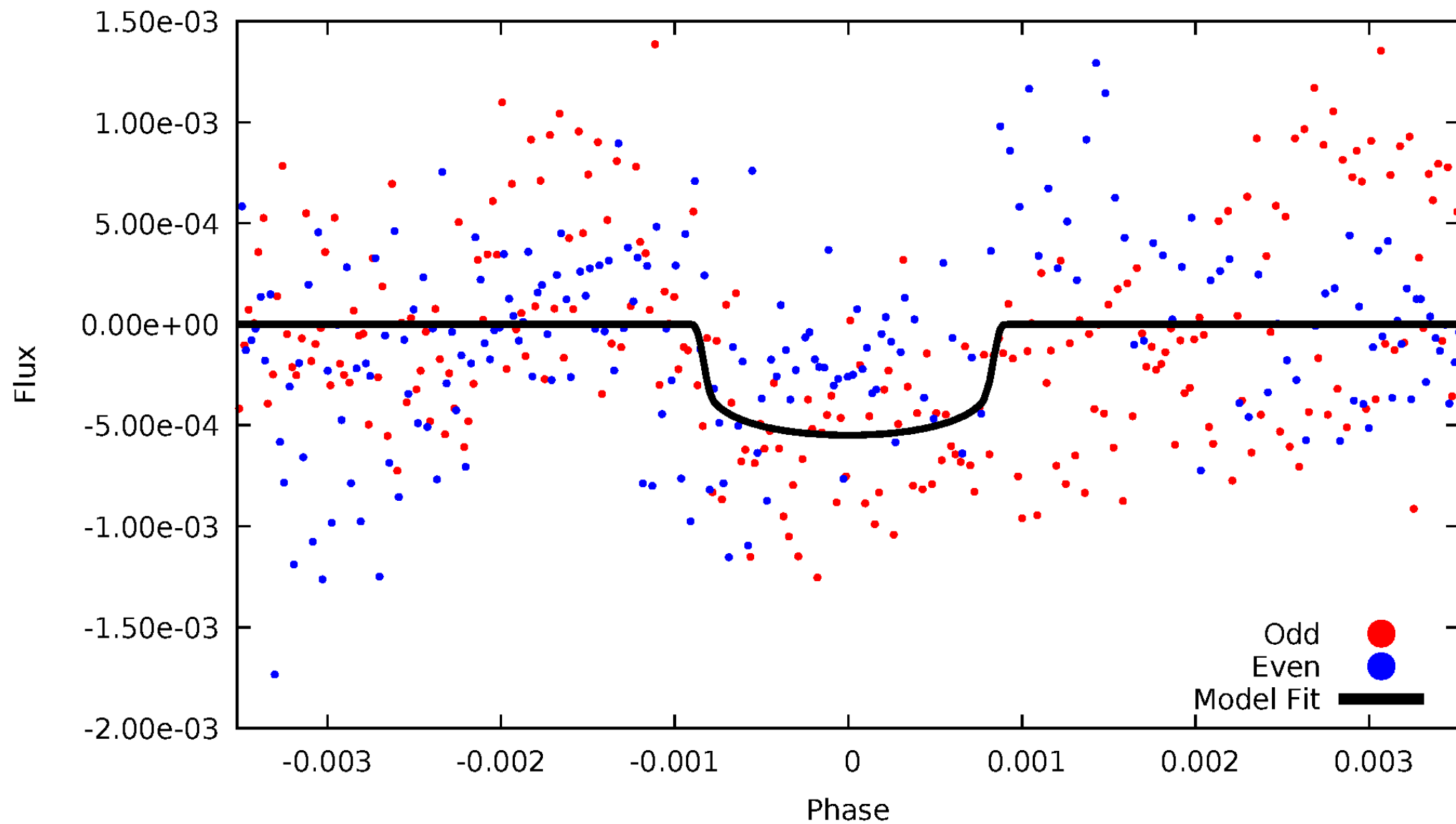


TCE 006038713-01



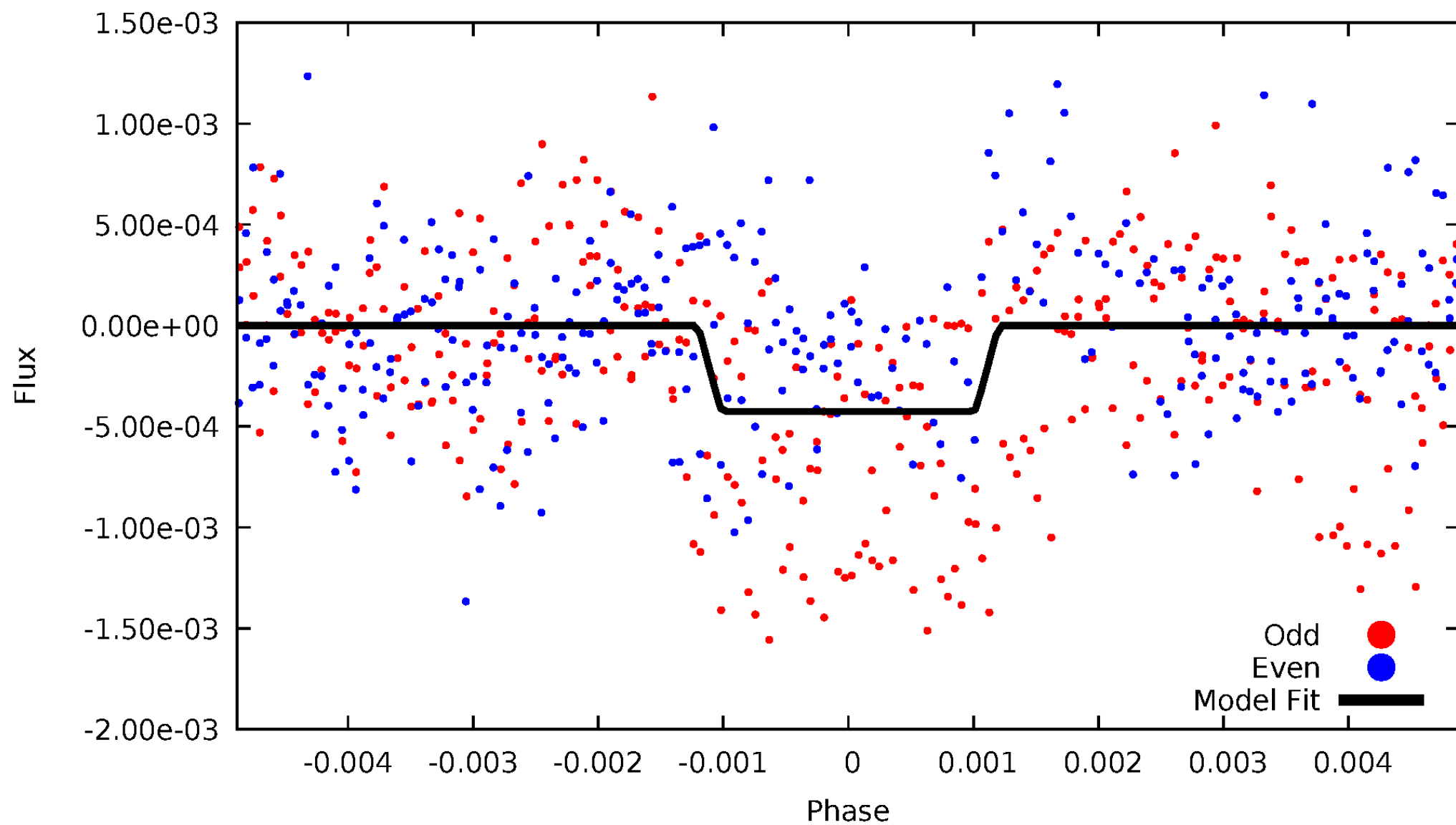
# DV Odd/Even

TCE 006038713-01



# ALT Odd/Even

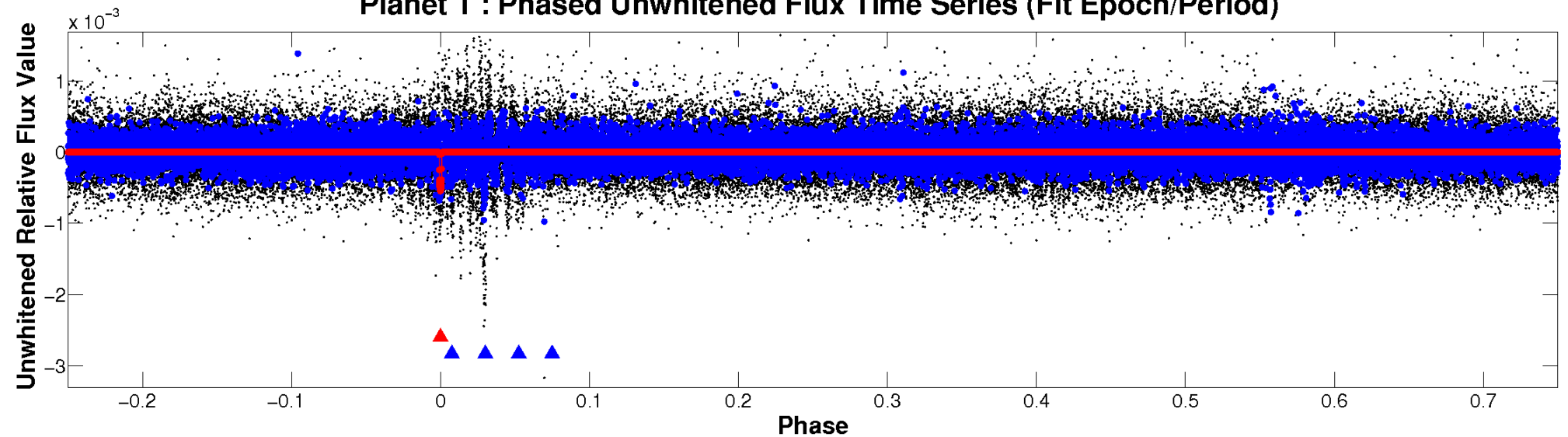
TCE 006038713-01



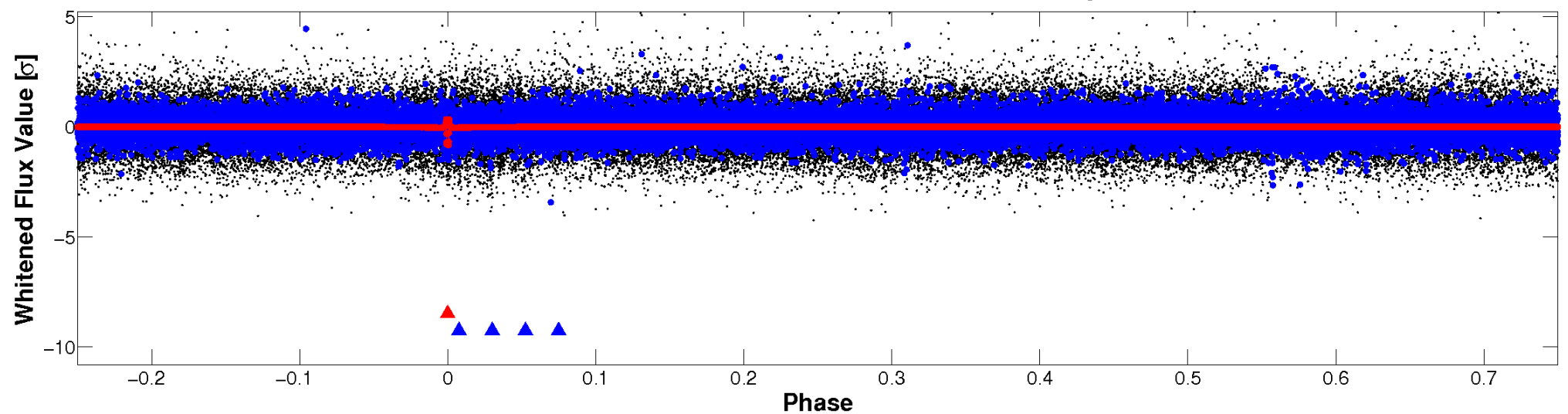


# Non-Whitened Vs. Whitened Light Curve

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

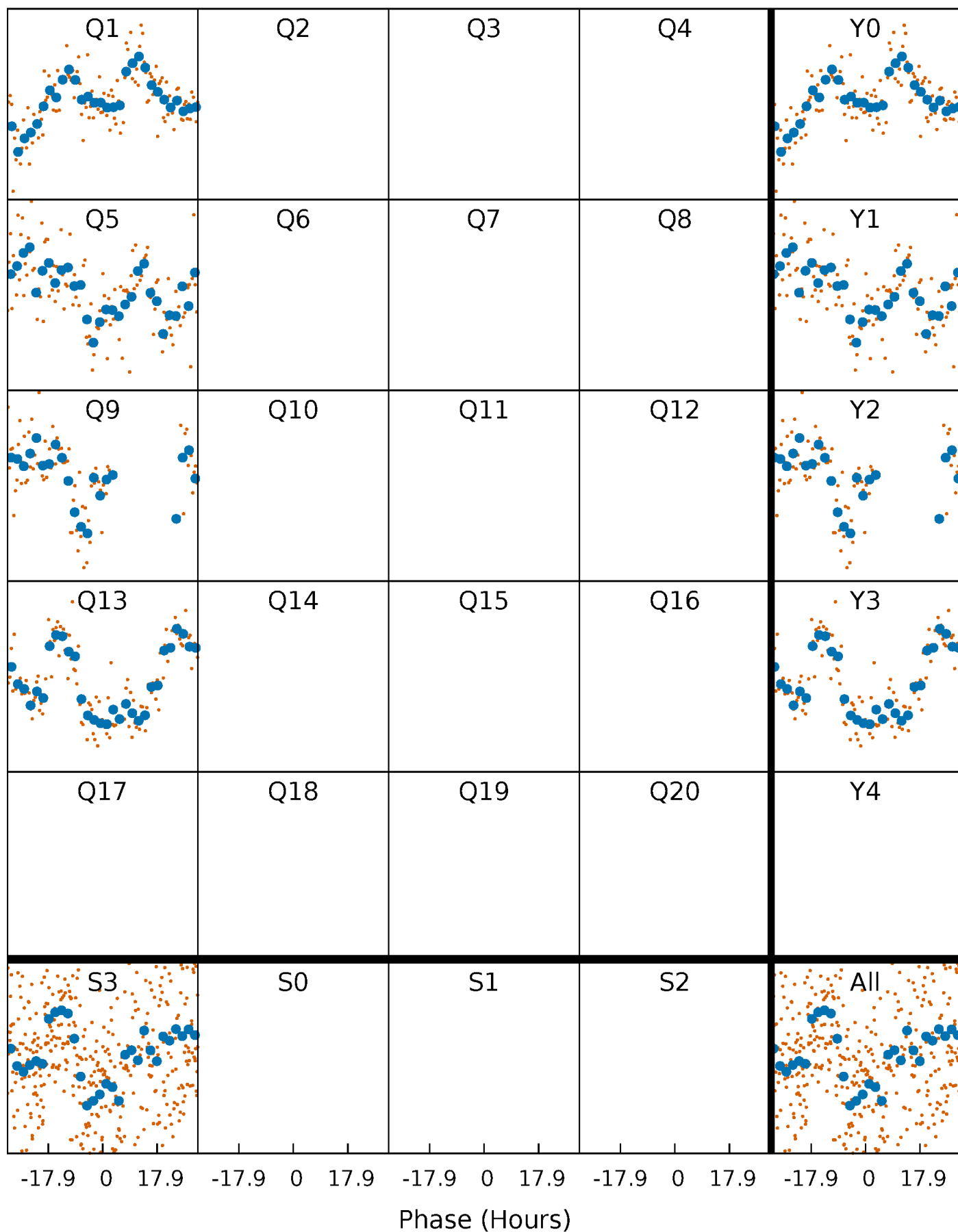


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

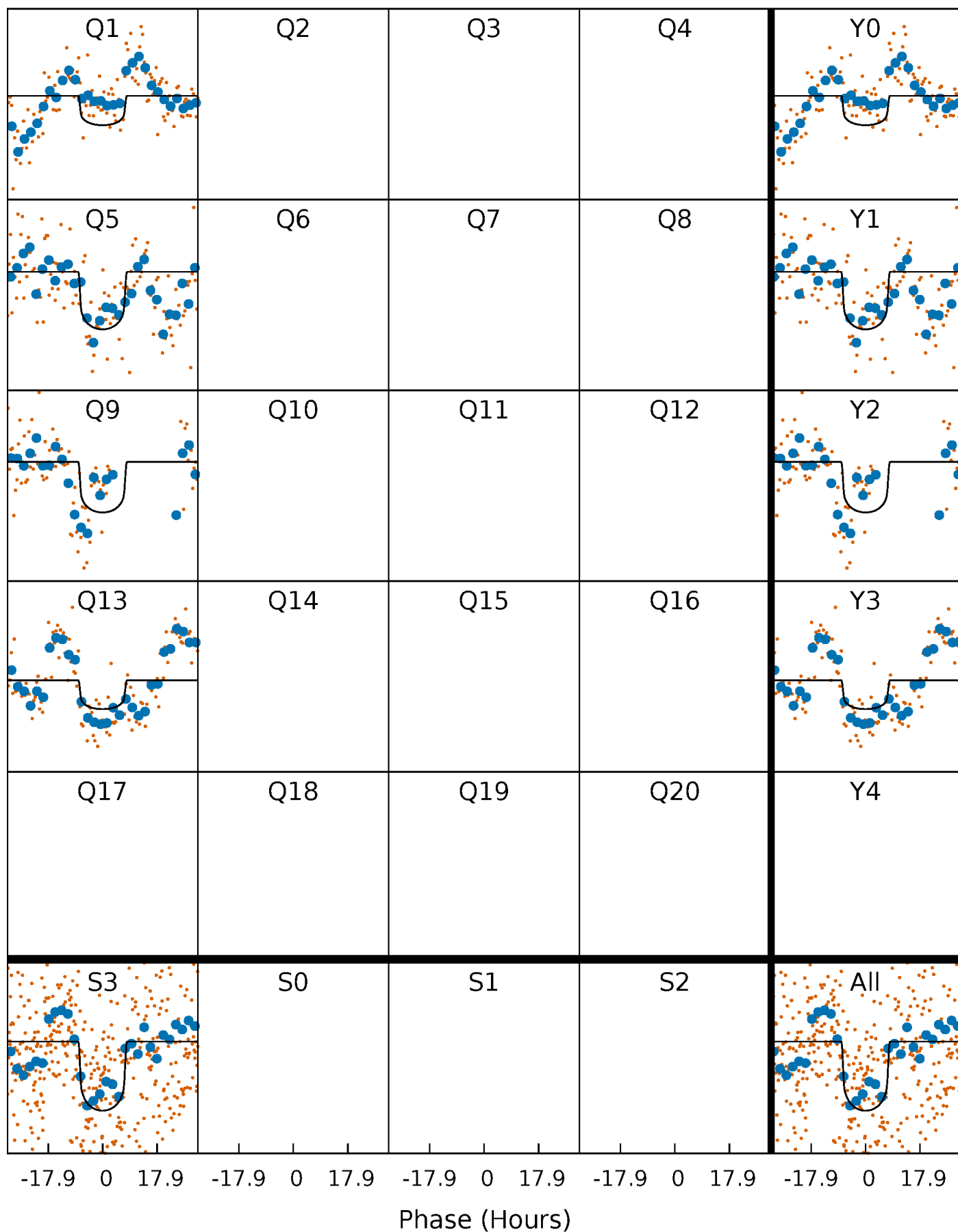
TCE 006038713-01 P=371.538430 Days  $T_0=143.447686$  (BKJD)





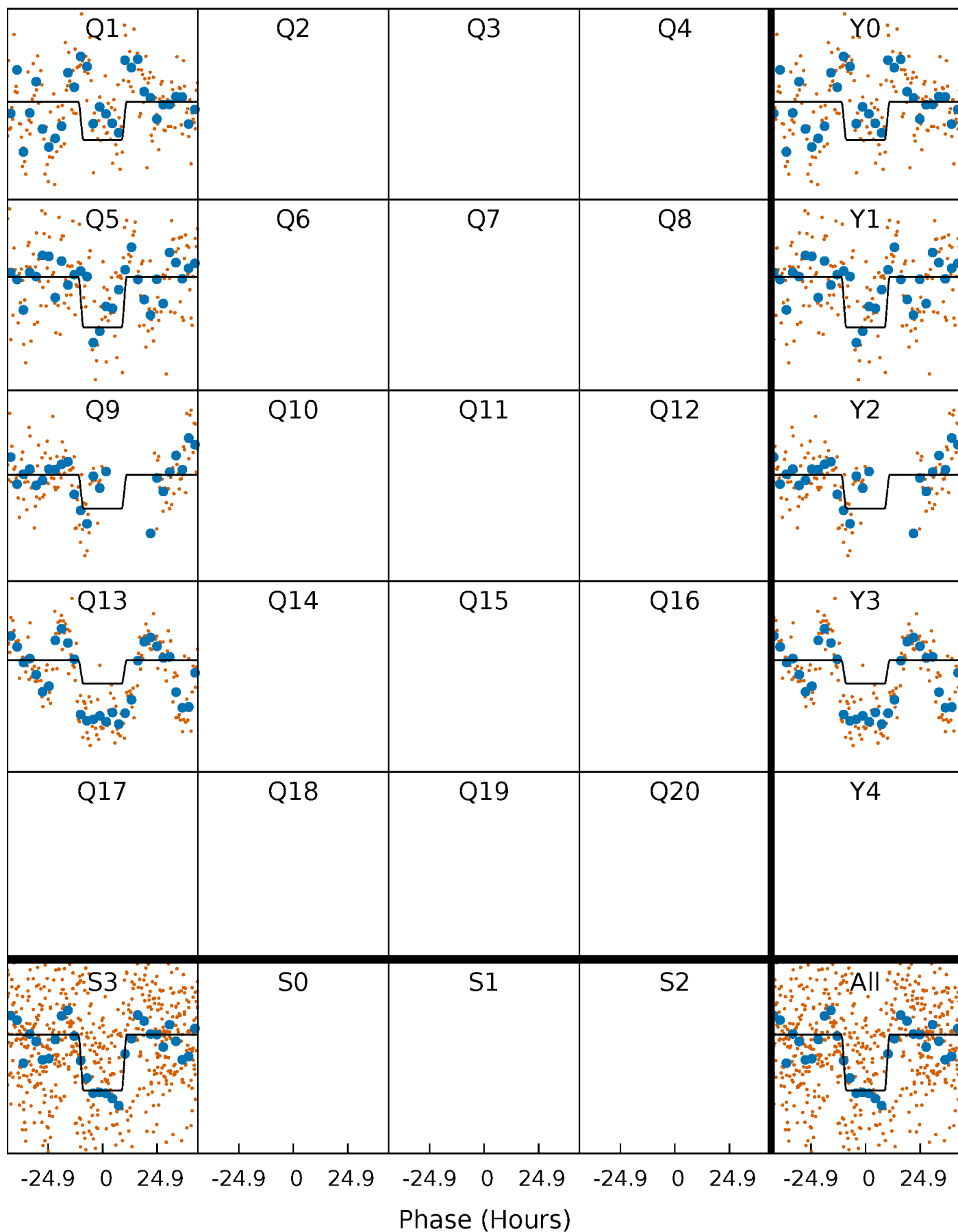
# DV Quarter-Phased Transit Curves

TCE 006038713-01   P=371.538430 Days    $T_0=143.447686$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

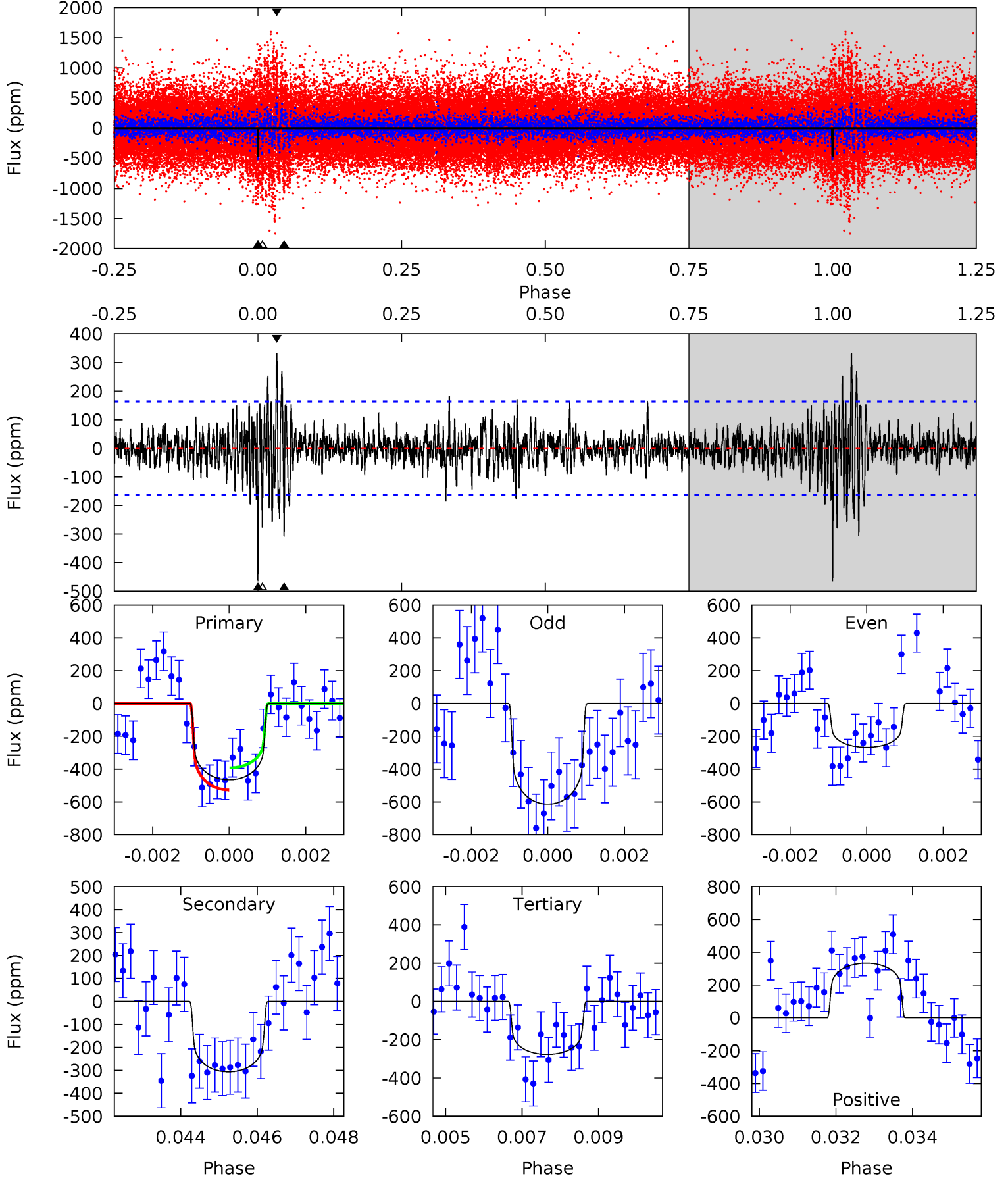
TCE 006038713-01 P=371.625156 Days  $T_0=143.356597$  (BKJD)



# DV Model-Shift Uniqueness Test

006038713-01, P = 371.538430 Days, E = 143.447686 Days

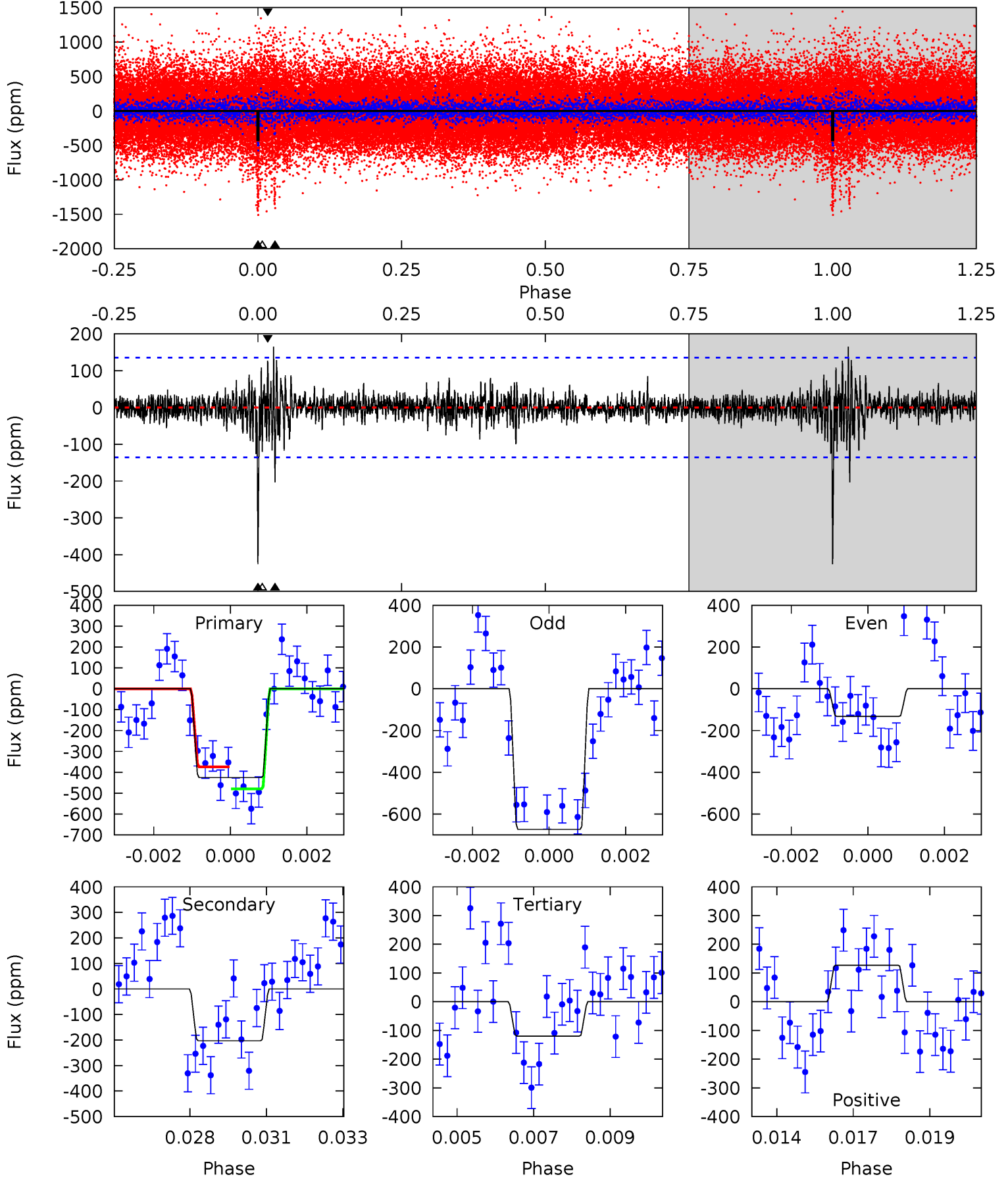
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
15.2	10.0	9.05	10.9	5.35	3.13	1.79	6.15	4.30	0.97	-0.87	5.65	1.03	0.42	2.18



# Alt Model-Shift Uniqueness Test

006038713-01, P = 371.625156 Days, E = 143.356597 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
16.6	7.94	4.69	4.98	5.30	3.04	0.98	12.0	11.7	3.25	2.96	10.6	1.56	0.28	2.04



### Stellar Parameters For KIC 006038713

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6139^{+193}_{-236}$	$4.454^{+0.056}_{-0.224}$	$-0.100^{+0.250}_{-0.300}$	$1.013^{+0.341}_{-0.114}$	$1.057^{+0.151}_{-0.135}$	$1.433^{+0.431}_{-0.779}$
	+3%/-4%	+1%/-5%	+250%/-300%	+34%/-11%	+14%/-13%	+30%/-54%
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 006038713-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-306 \pm 31$	$2.70^{+0.71}_{-0.64}$	$385^{+32}_{-23}$	$5361^{+656}_{-476}$	$23801^{+17360}_{-8511}$
Alt.	$-203 \pm 26$	$2.37^{+0.69}_{-0.66}$	$383^{+27}_{-22}$	$5175^{+830}_{-495}$	$21240^{+18130}_{-8748}$

$T_{\text{max}}$  = 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

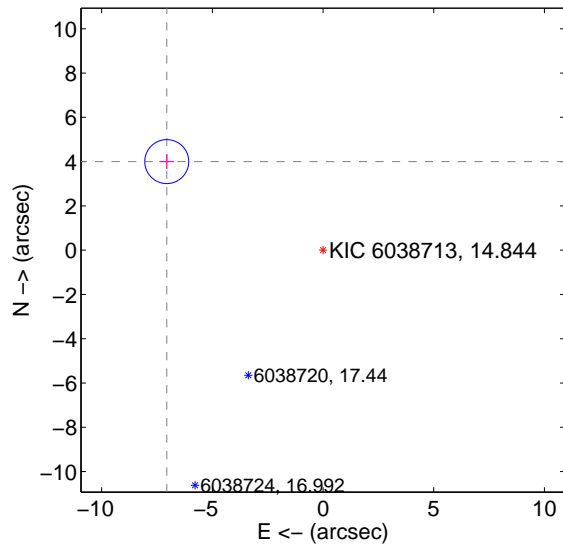
Supplemental centroid analysis for 006038713-01. Kepler magnitude: 14.84. Transit SNR 8.04

There are 0 quarters with good PRF difference image offsets

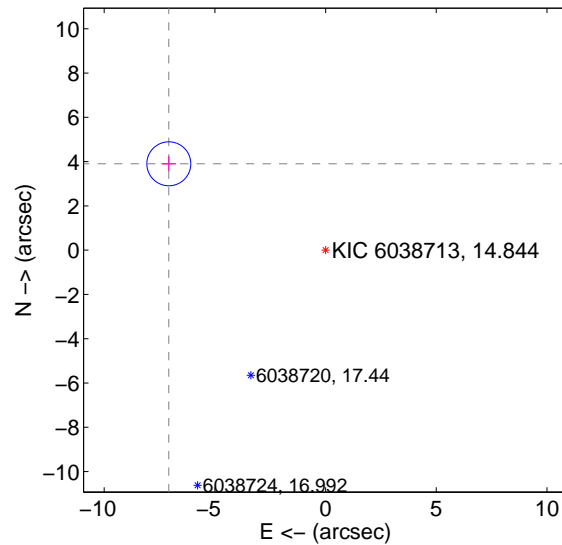
The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$8.115 \pm 0.331$	24.52	$7.059 \pm 0.330$	$4.001 \pm 0.334$
PRF-fit source offset from KIC position	$8.085 \pm 0.331$	24.43	$7.081 \pm 0.330$	$3.902 \pm 0.334$
photometric centroid source offset	$2.85 \pm 1.63$	1.75	$-2.51 \pm 1.63$	$1.34 \pm 1.64$

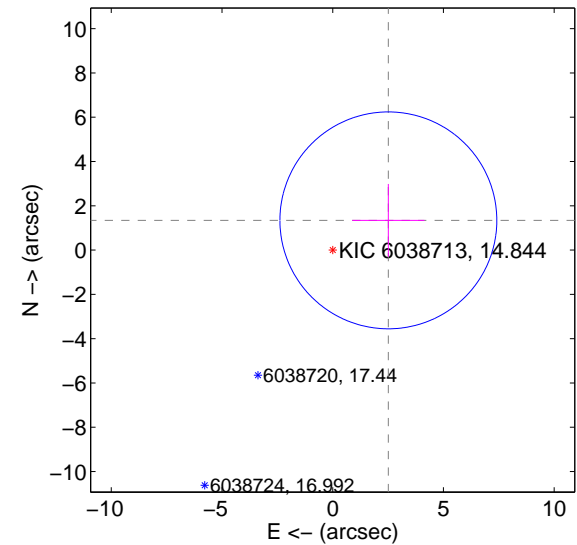
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



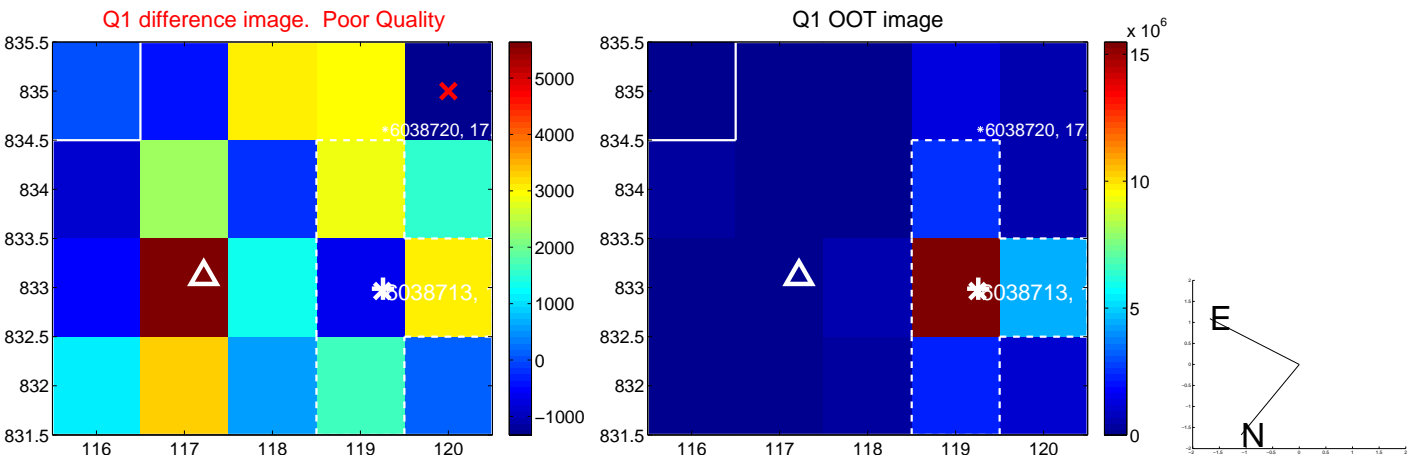
offset from photometric centroids



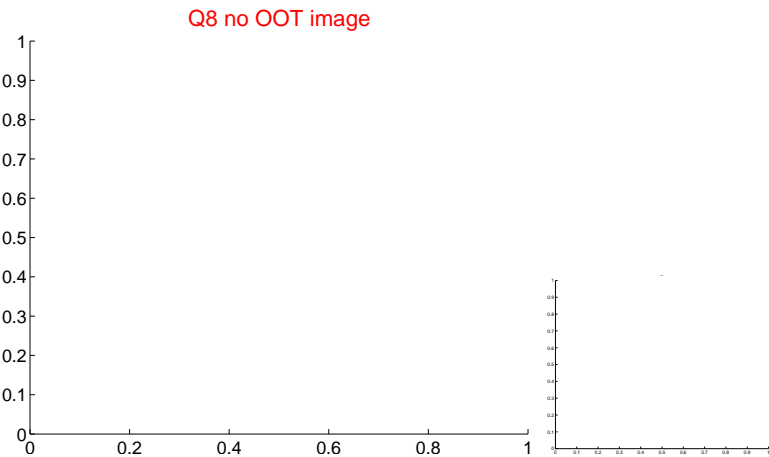
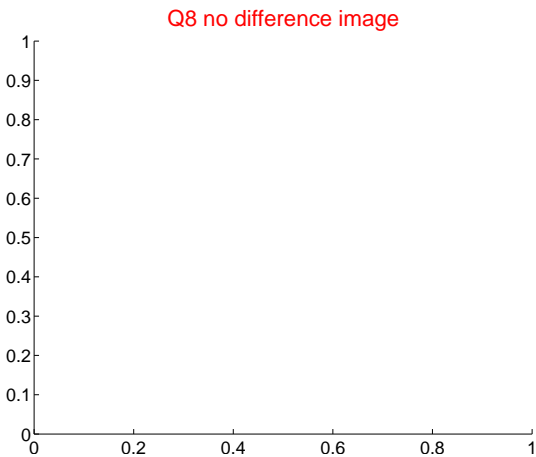
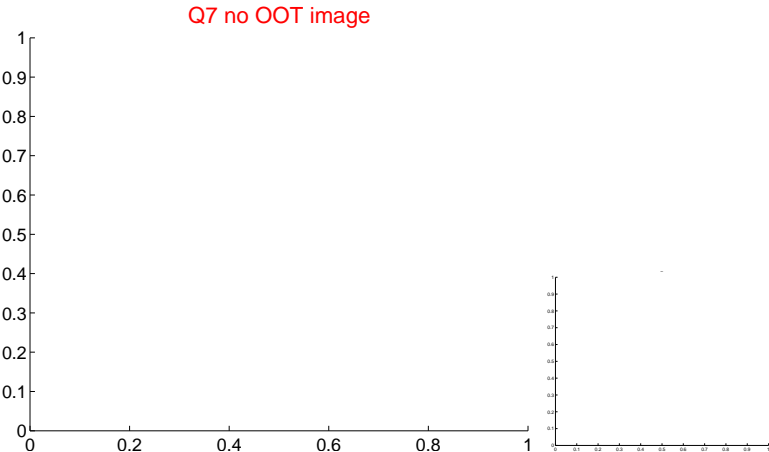
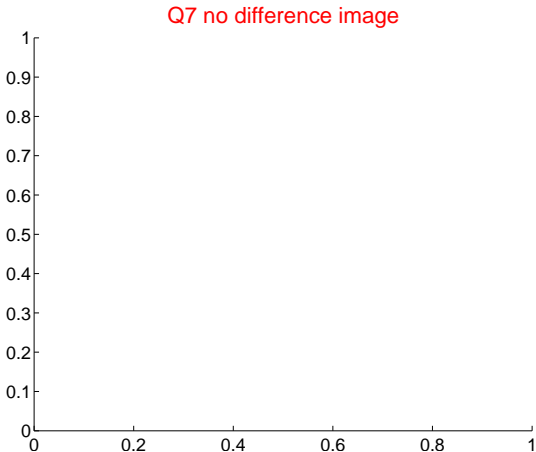
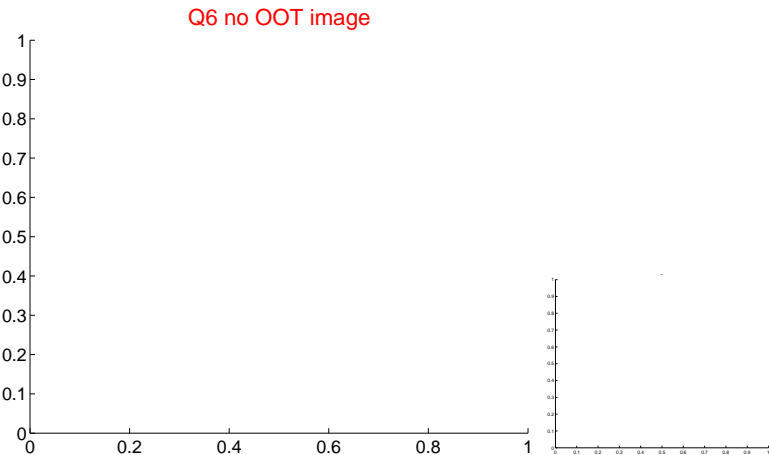
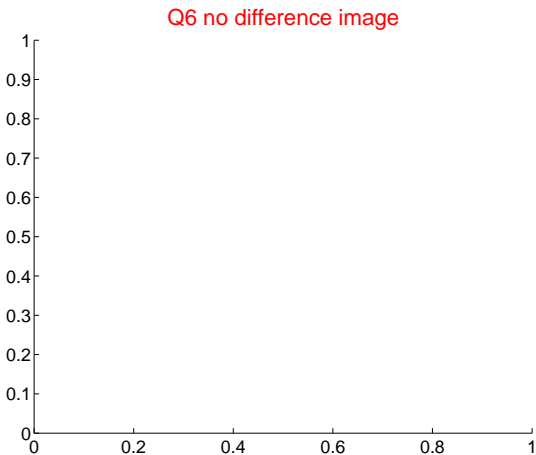
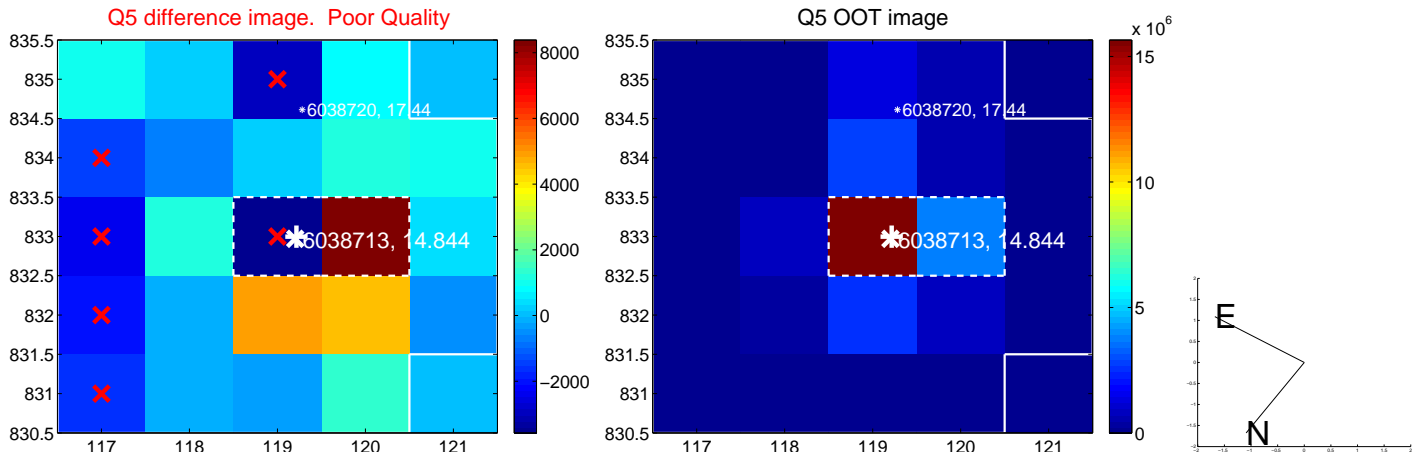
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



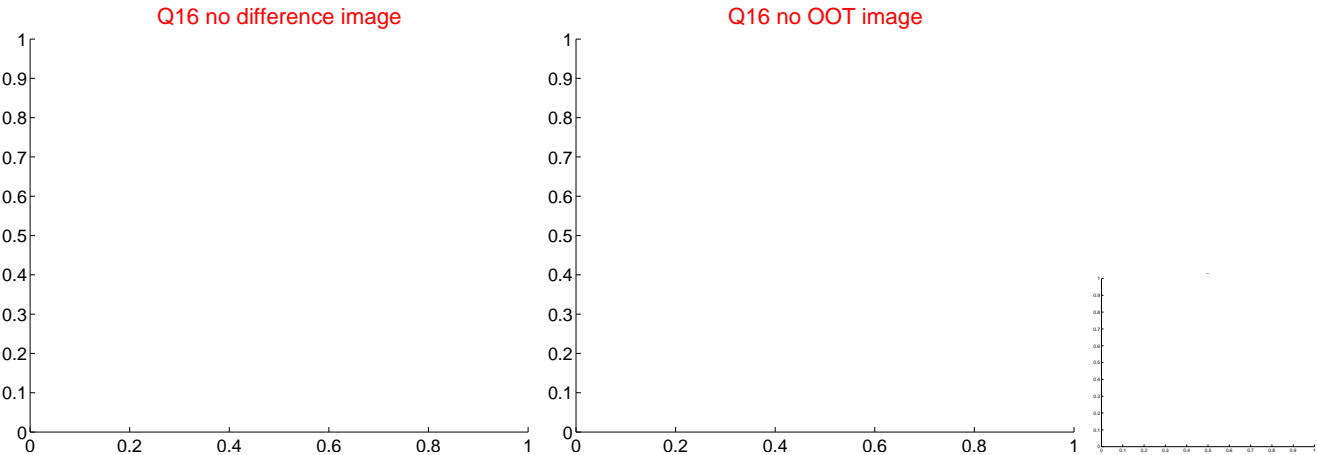
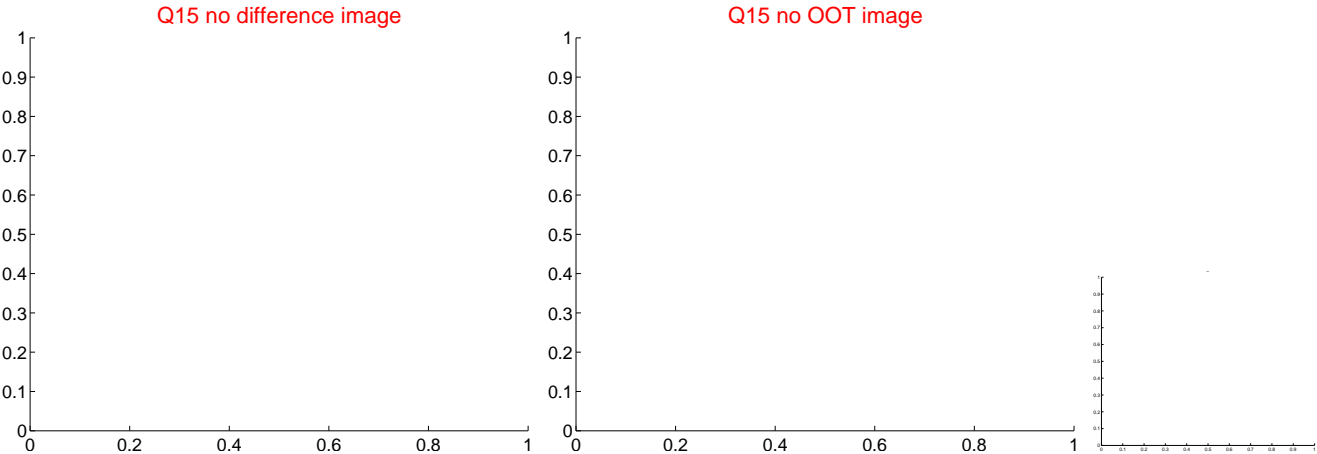
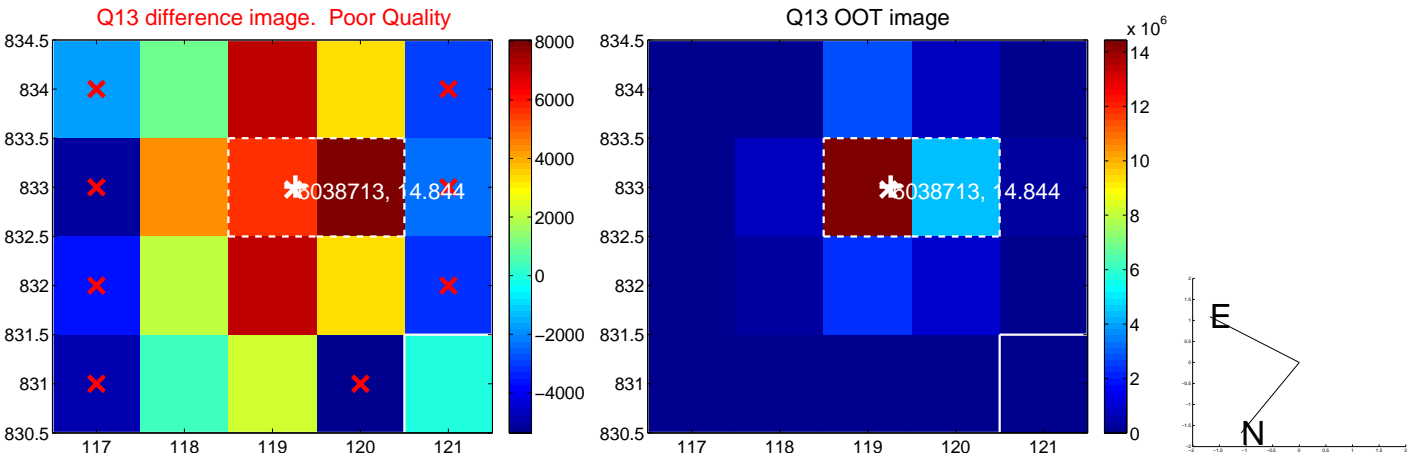
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



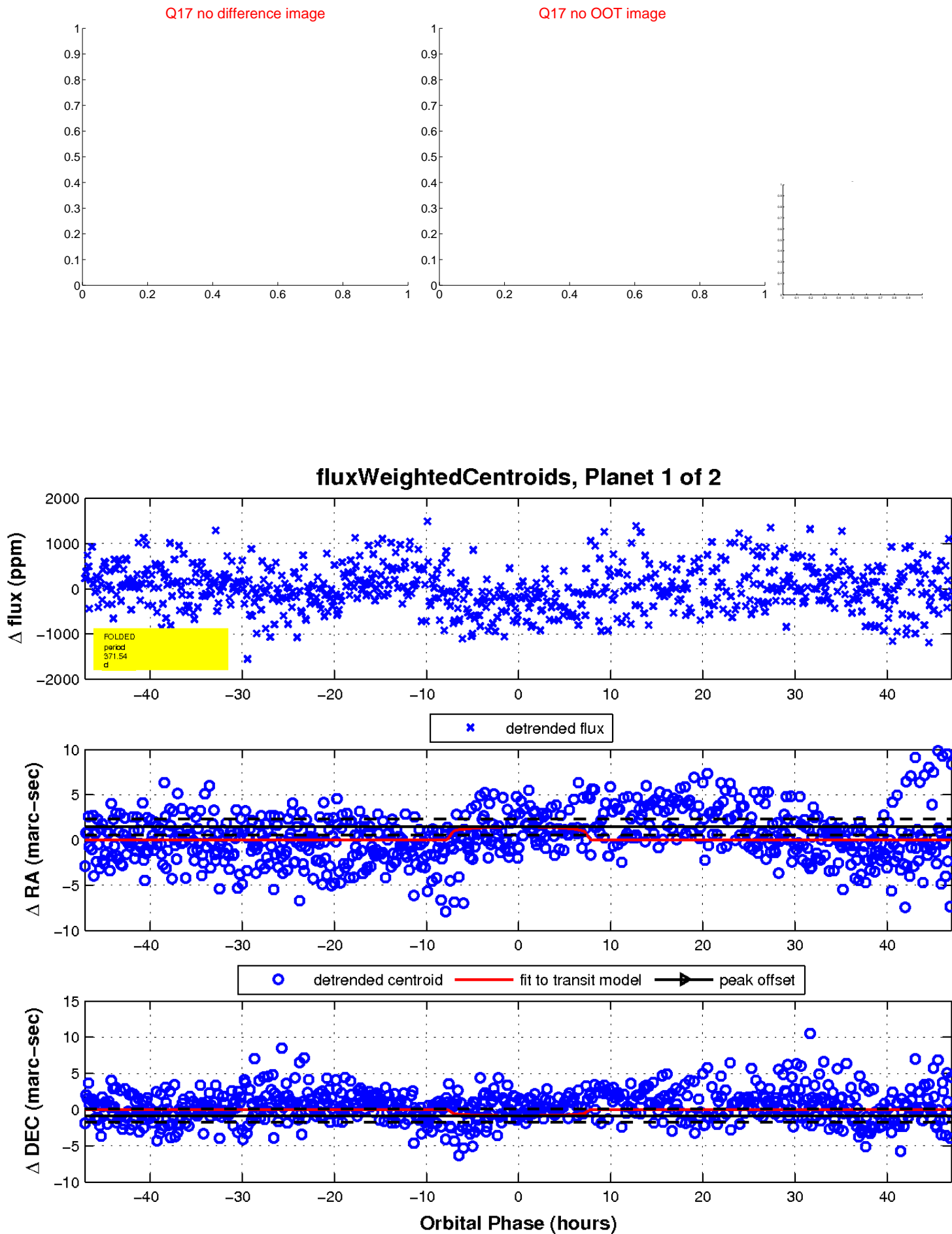
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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



Declination



# KIC 006038713

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006038713-01	OBS	No	371.538430	143.447686	549.3	15.690	8.1	8.0	1.01	6139	2.56	1.22
006038713-02	OBS	No	363.203638	171.299516	365.8	30.084	9.4	8.1	1.01	6139	1.98	1.26

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006038713-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—CENT_FEW_DIFFS
006038713-02	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—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.

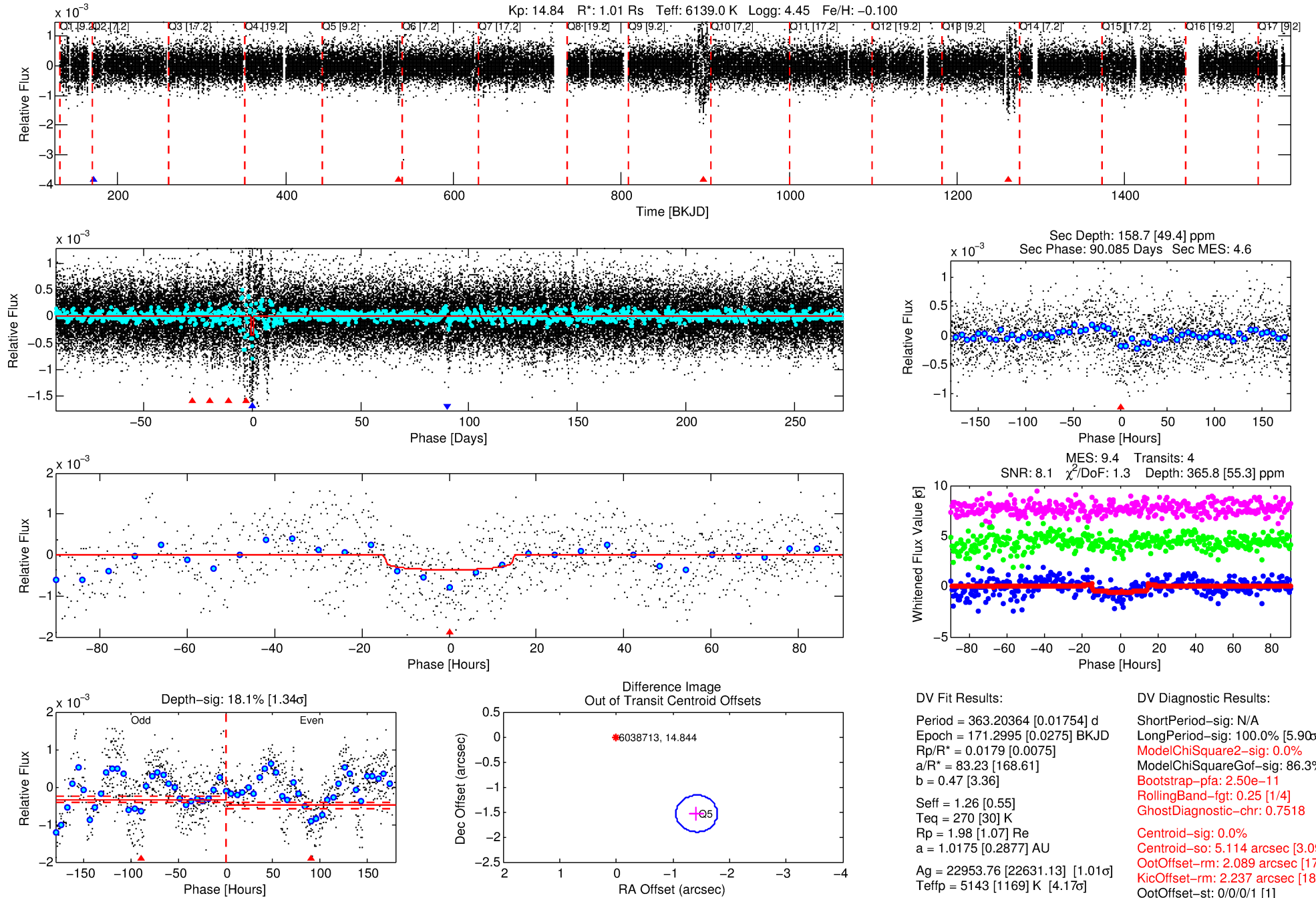
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006038713-02

No Significant Match Found

# DV One-Page Summary

KIC: 6038713 Candidate: 2 of 2 Period: 363.204 d



## DV Fit Results:

Period = 363.20364 [0.01754] d  
Epoch = 171.2995 [0.0275] BKJD  
Rp/R\* = 0.0179 [0.0075]  
a/R\* = 83.23 [168.61]  
b = 0.47 [3.36]  
Seff = 1.26 [0.55]  
Teq = 270 [30] K  
Rp = 1.98 [1.07] Re  
a = 1.0175 [0.2877] AU  
Ag = 22953.76 [22631.13] [1.01σ]  
Teffp = 5143 [1169] K [4.17σ]

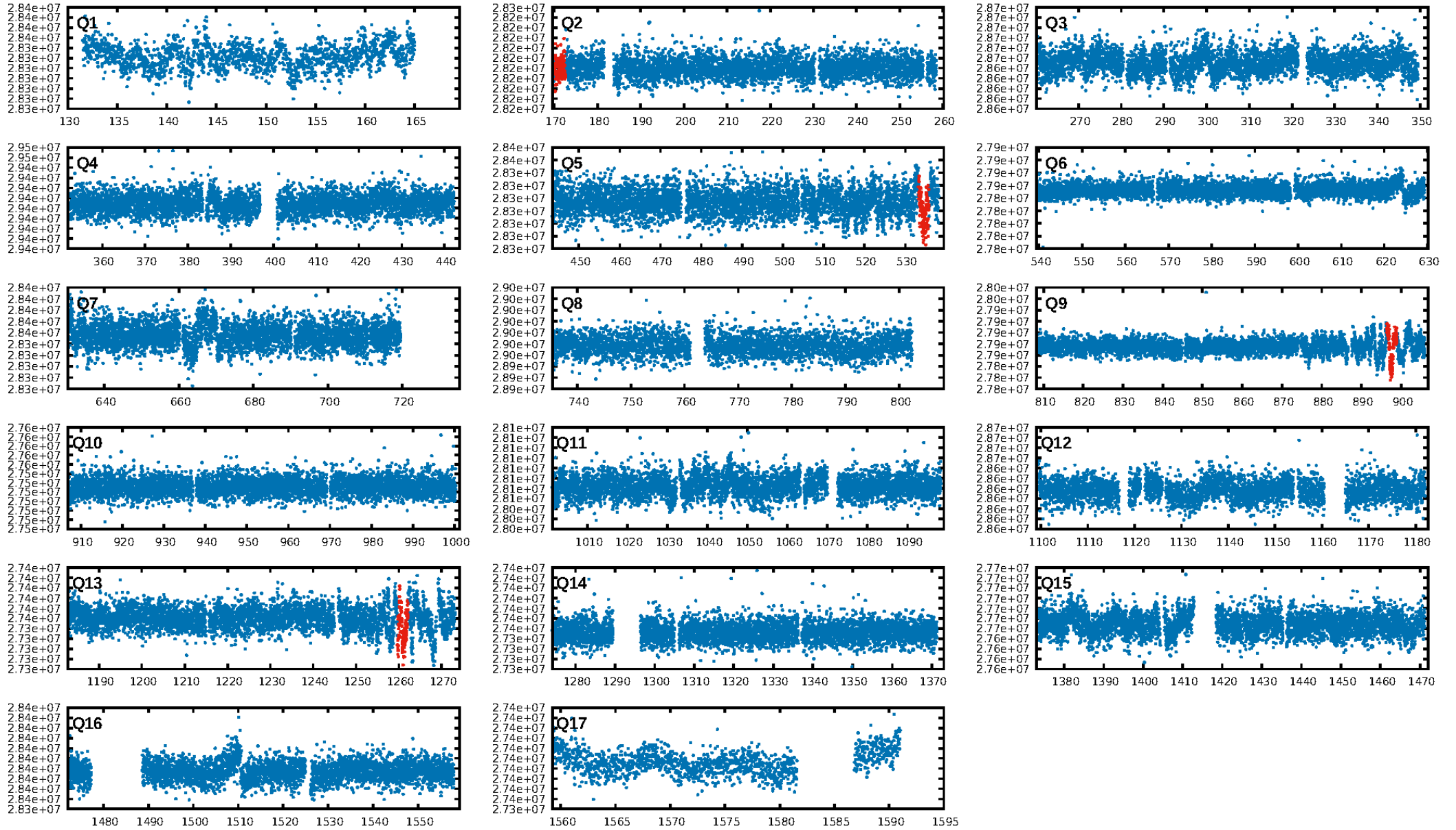
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [5.90σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 86.3%  
Bootstrap-pfa: 2.50e-11  
RollingBand-fgt: 0.25 [1/4]  
GhostDiagnostic-chr: 0.7518  
Centroid-sig: 0.0%  
Centroid-so: 5.114 arcsec [3.09σ]  
OotOffset-rm: 2.089 arcsec [17.06σ]  
KicOffset-rm: 2.237 arcsec [18.31σ]  
OotOffset-st: 0/0/0/1 [1]  
KicOffset-st: 0/0/0/1 [1]  
DiffImageQuality-fgm: 1.00 [1/1]  
DiffImageOverlap-fno: 1.00 [3/3]

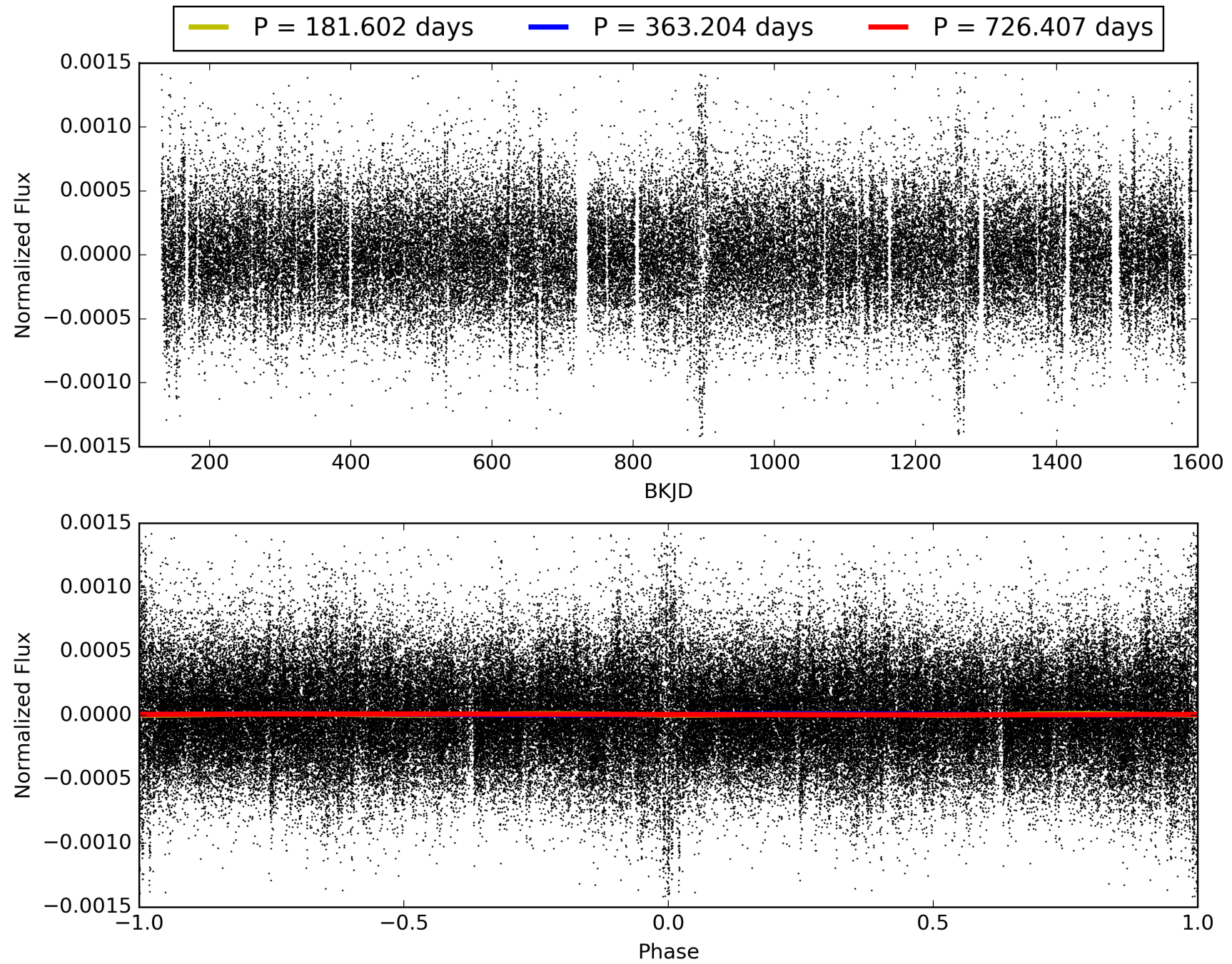
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 20:59:54 Z

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

# TCE 006038713-02, PDC Light Curves

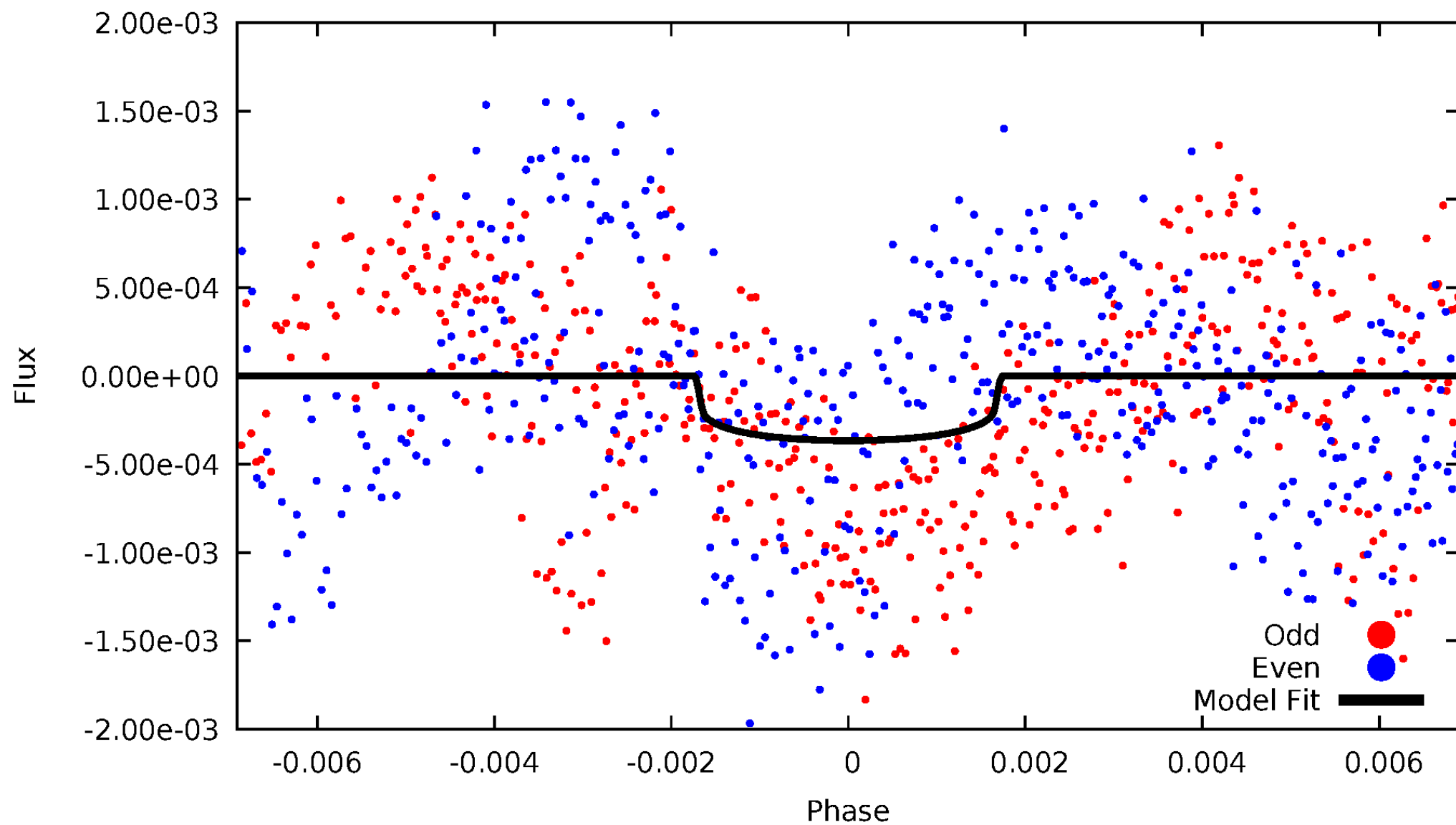


TCE 006038713-02



# DV Odd/Even

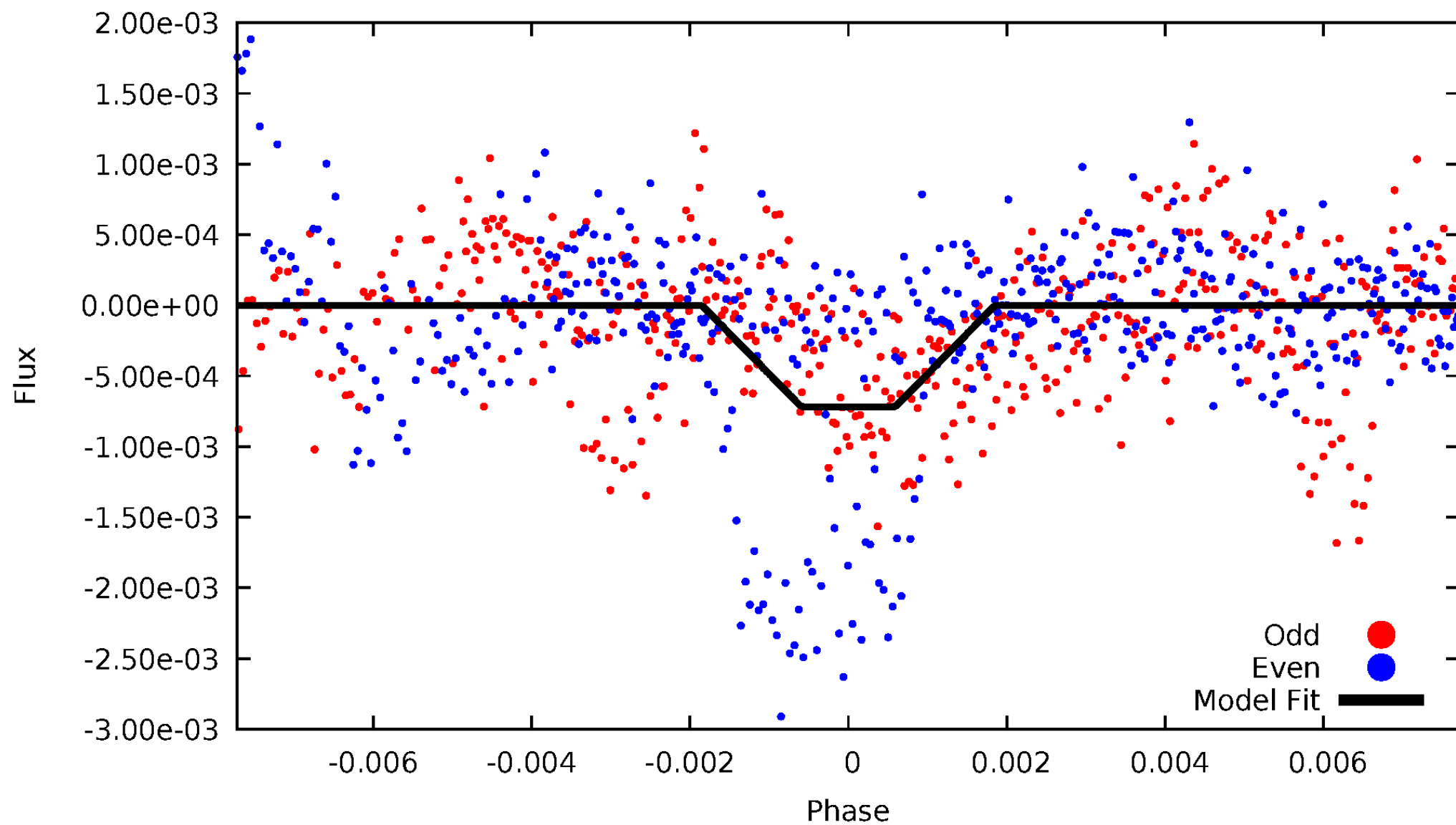
TCE 006038713-02





# ALT Odd/Even

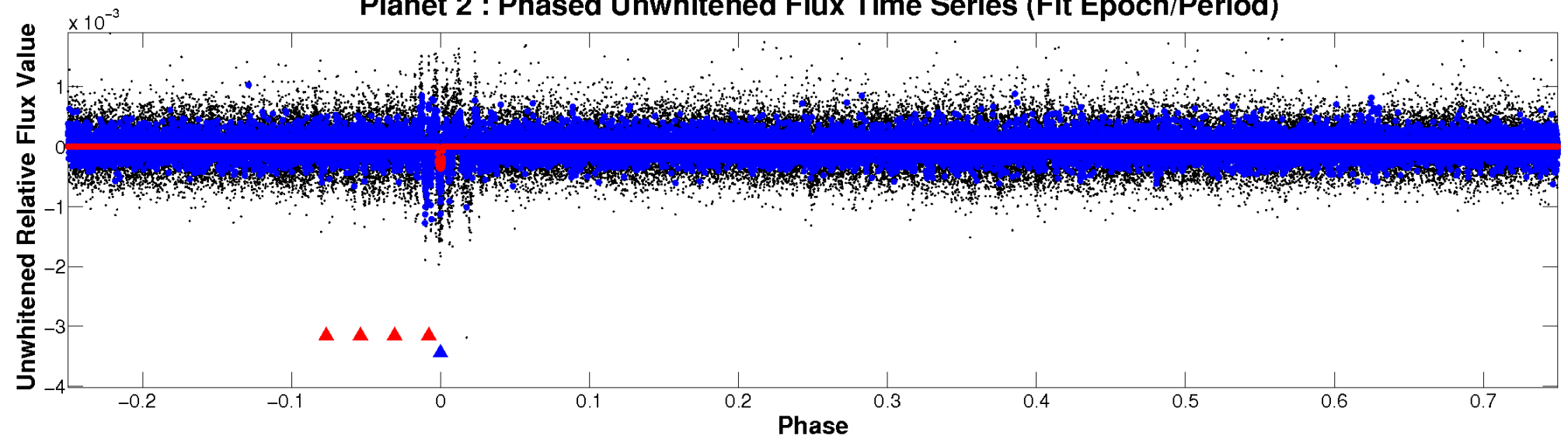
TCE 006038713-02



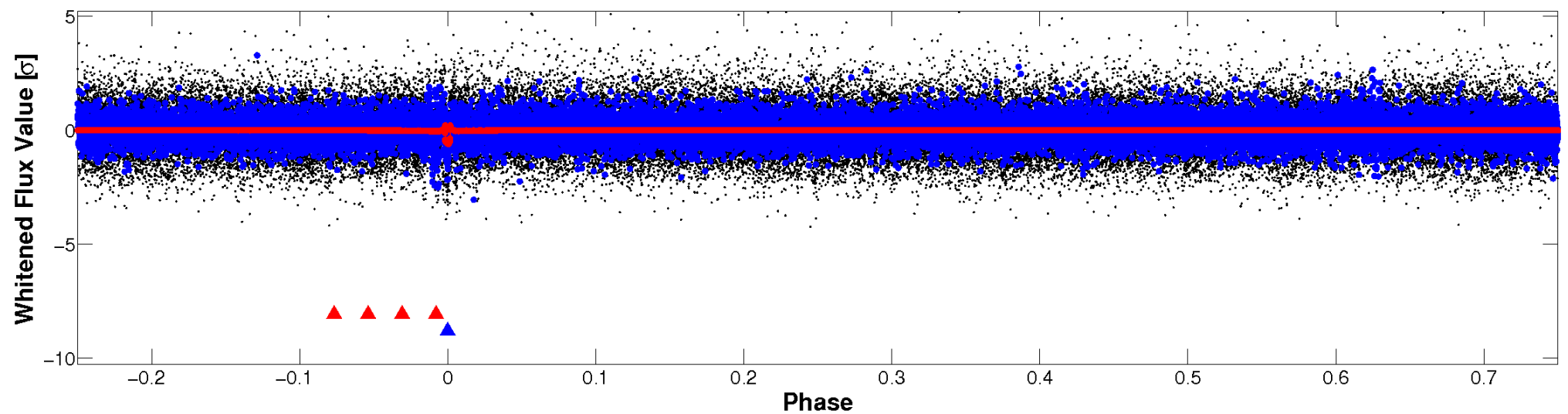


# Non-Whitened Vs. Whitened Light Curve

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

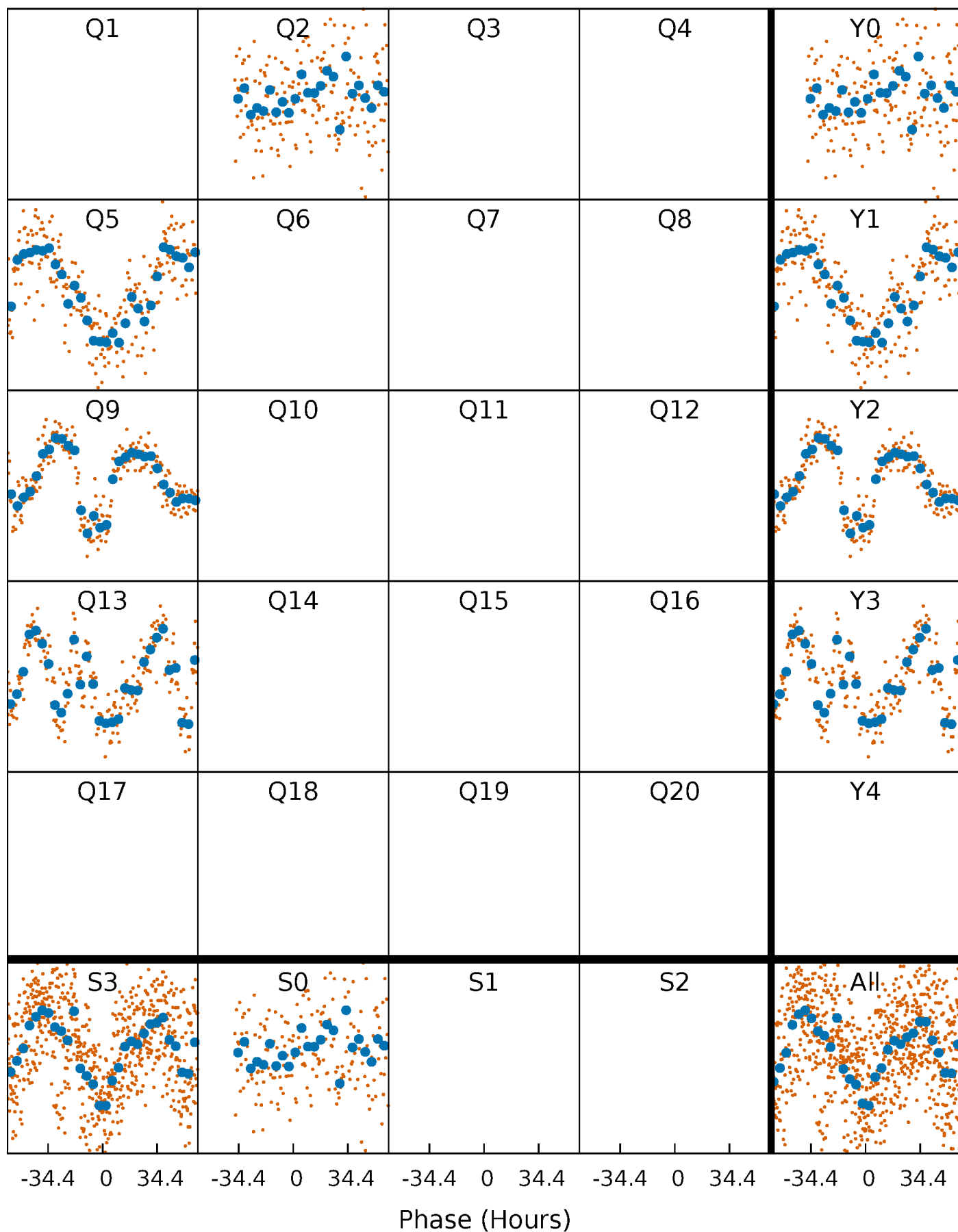


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



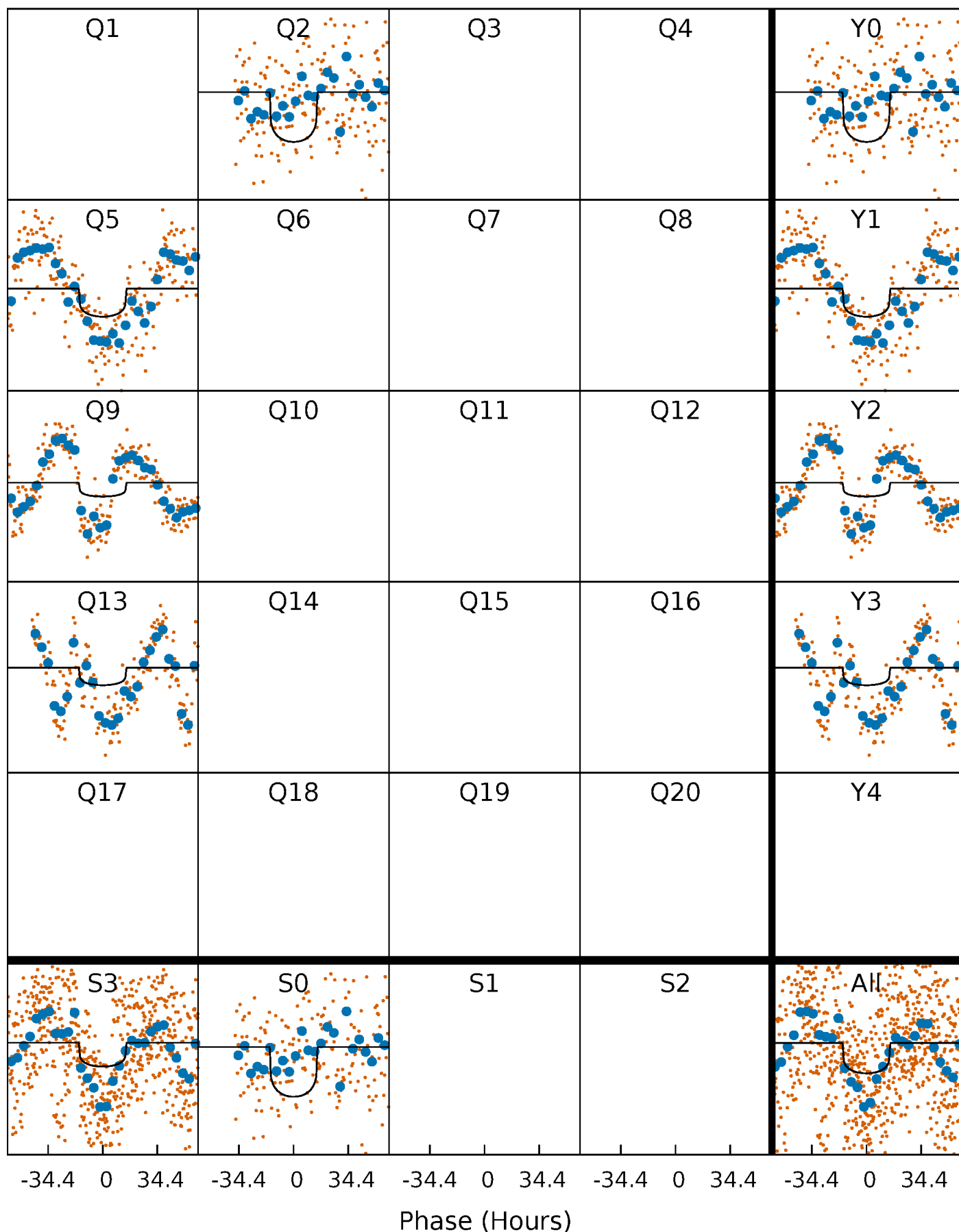
# PDC Quarter-Phased Transit Curves

TCE 006038713-02 P=363.203638 Days  $T_0=171.299516$  (BKJD)



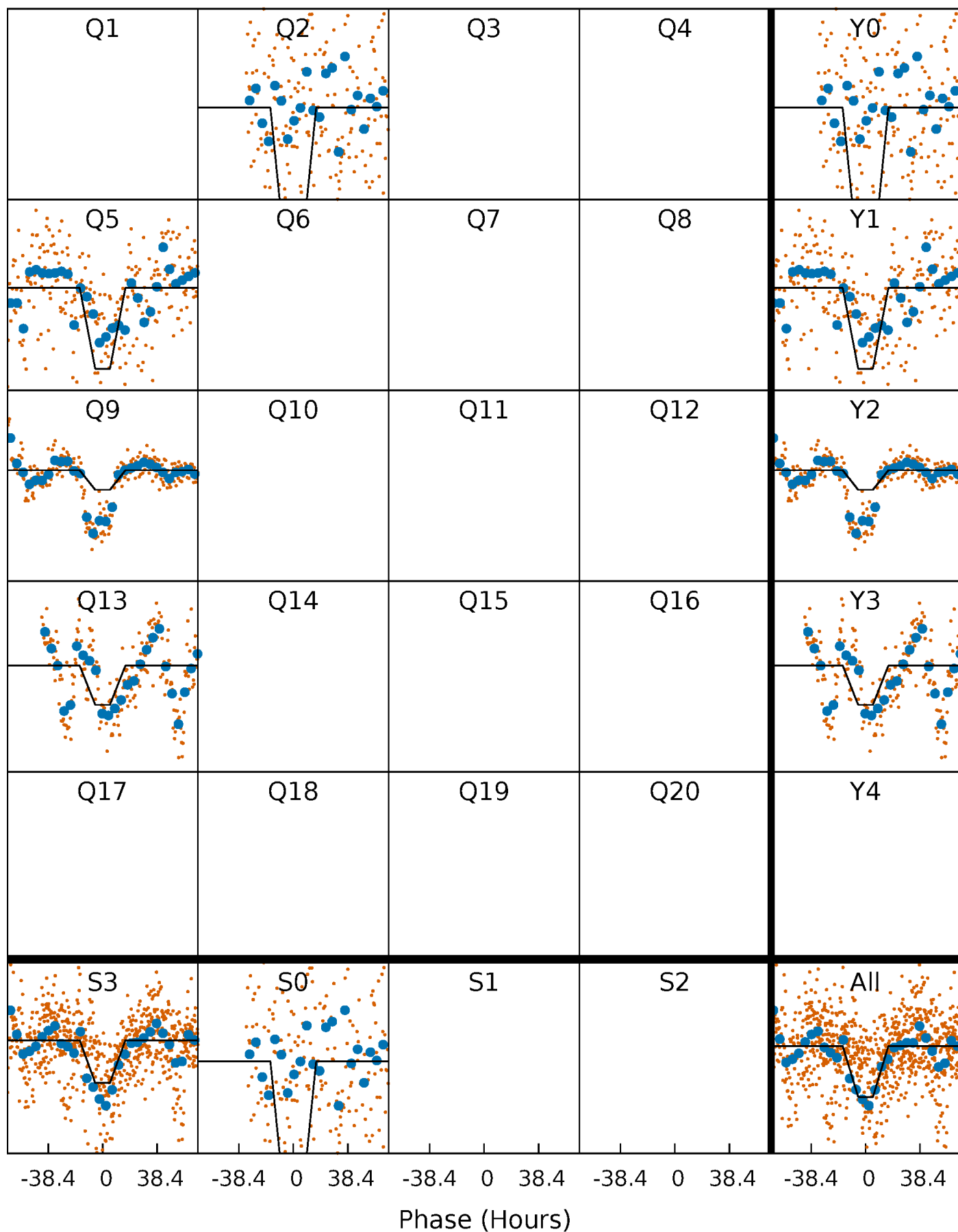
# DV Quarter-Phased Transit Curves

TCE 006038713-02 P=363.203638 Days  $T_0=171.299516$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

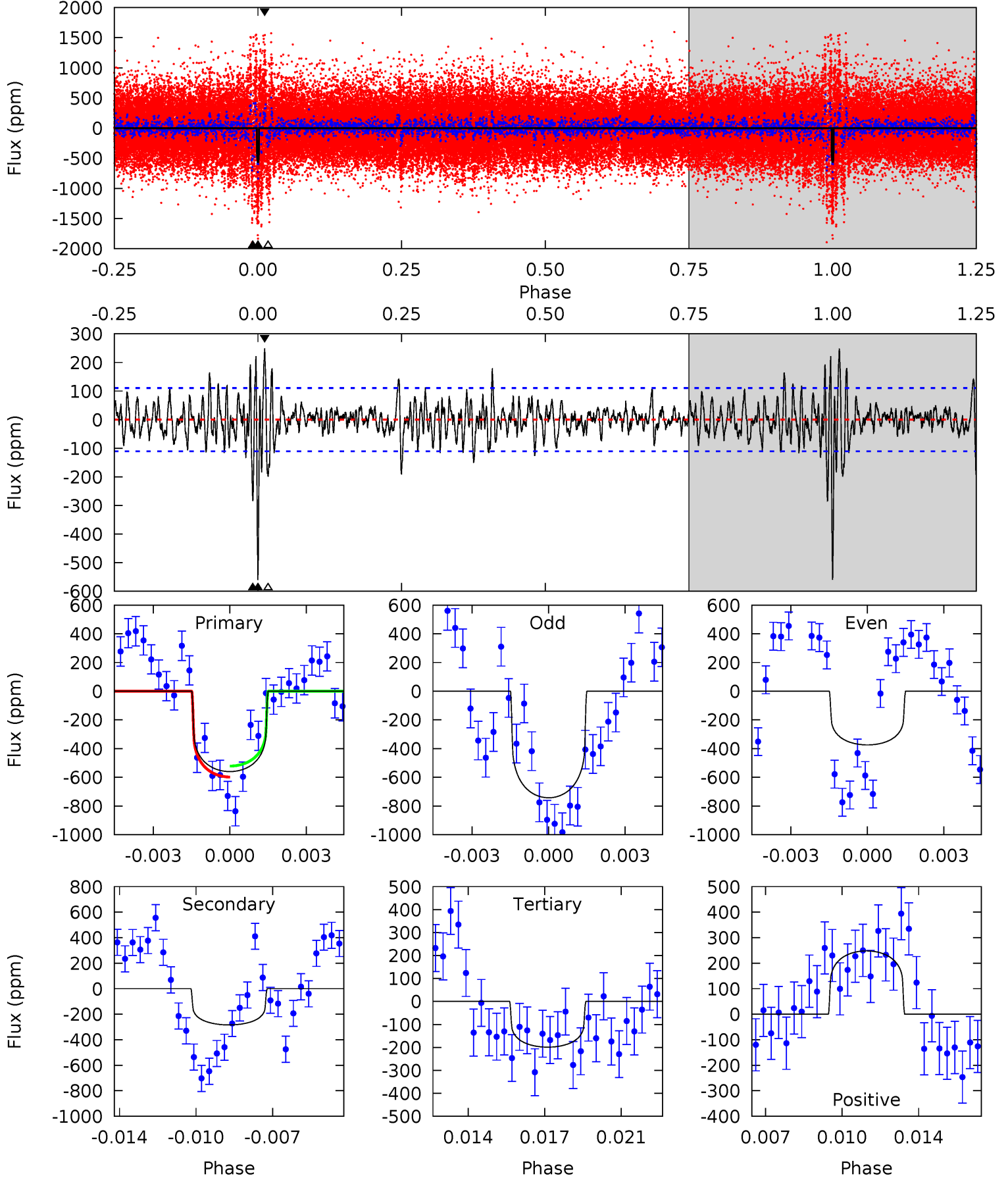
TCE 006038713-02 P=363.233774 Days  $T_0=171.144420$  (BKJD)



# DV Model-Shift Uniqueness Test

006038713-02, P = 363.203638 Days, E = 171.299516 Days

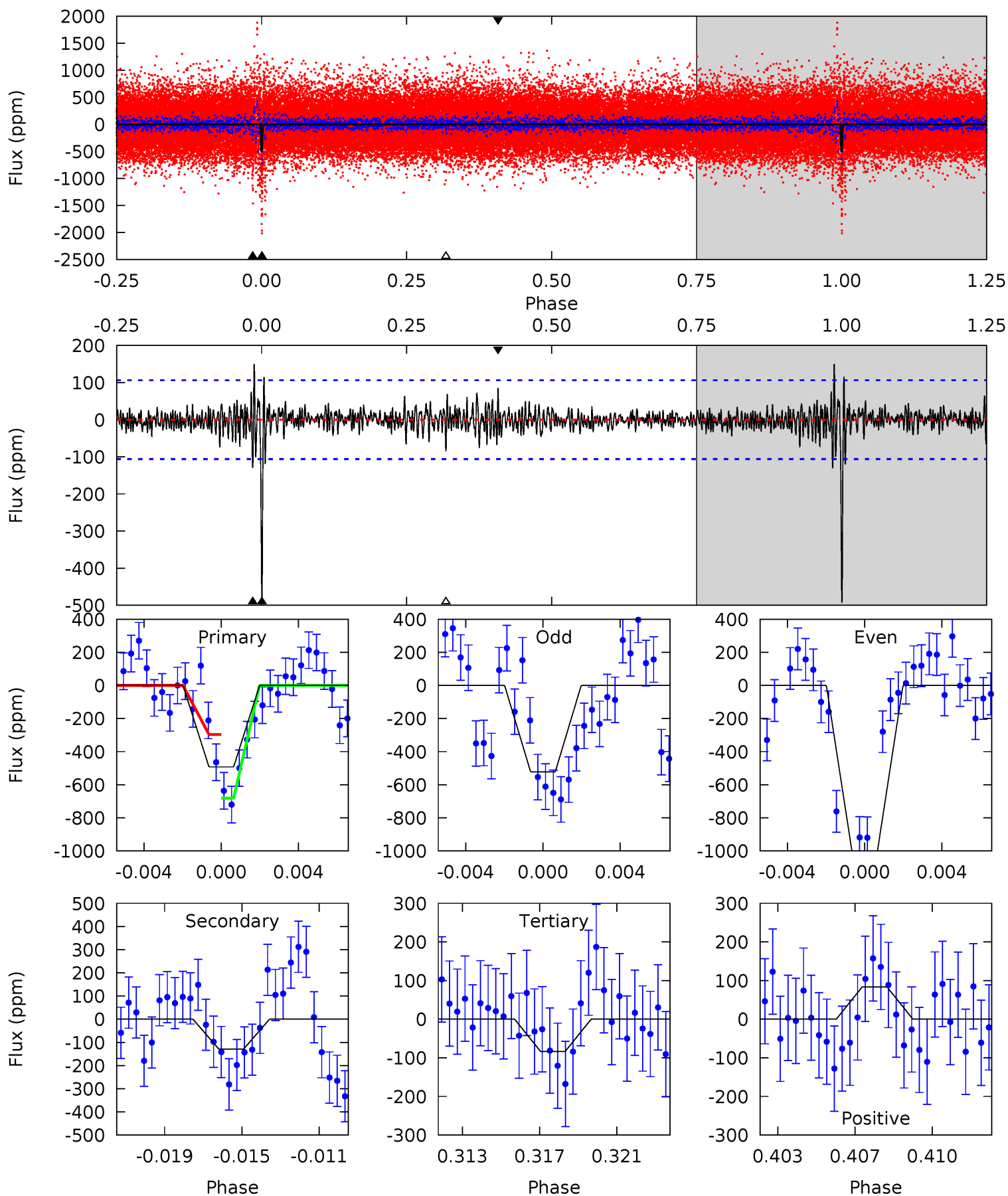
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
26.4	13.4	9.39	11.7	5.22	2.92	2.35	17.1	14.7	4.01	1.69	8.70	0.84	0.31	1.80



# Alt Model-Shift Uniqueness Test

006038713-02, P = 363.233774 Days, E = 171.144420 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
24.2	6.35	4.10	4.12	5.21	2.90	1.03	20.1	20.1	2.25	2.23	12.8	1.47	0.23	9.39



### Stellar Parameters For KIC 006038713

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6139^{+193}_{-236}$	$4.454^{+0.056}_{-0.224}$	$-0.100^{+0.250}_{-0.300}$	$1.013^{+0.341}_{-0.114}$	$1.057^{+0.151}_{-0.135}$	$1.433^{+0.431}_{-0.779}$
	+3%/-4%	+1%/-5%	+250%/-300%	+34%/-11%	+14%/-13%	+30%/-54%
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 006038713-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-284 \pm 21$	$2.08^{+0.91}_{-0.86}$	$385^{+31}_{-20}$	$5954^{+1957}_{-926}$	$37191^{+66982}_{-19658}$
Alt.	$-129 \pm 20$	$3.11^{+0.94}_{-0.89}$	$387^{+33}_{-21}$	$4253^{+613}_{-399}$	$7339^{+7679}_{-3225}$

$T_{max}$  = 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

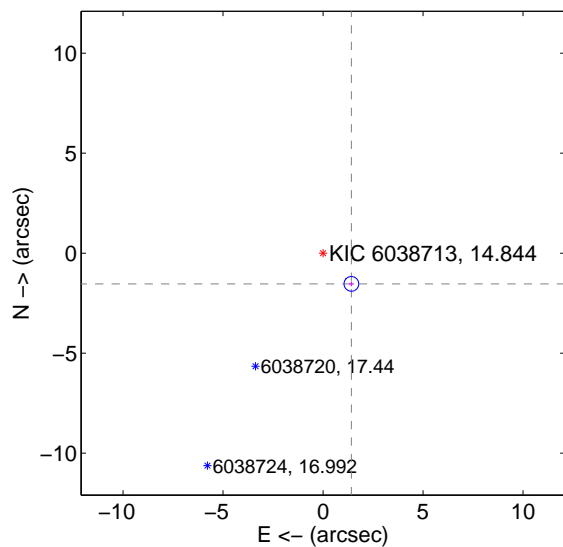
Supplemental centroid analysis for 006038713-02. Kepler magnitude: 14.84. Transit SNR 8.09

There are 1 quarters with good PRF difference image offsets

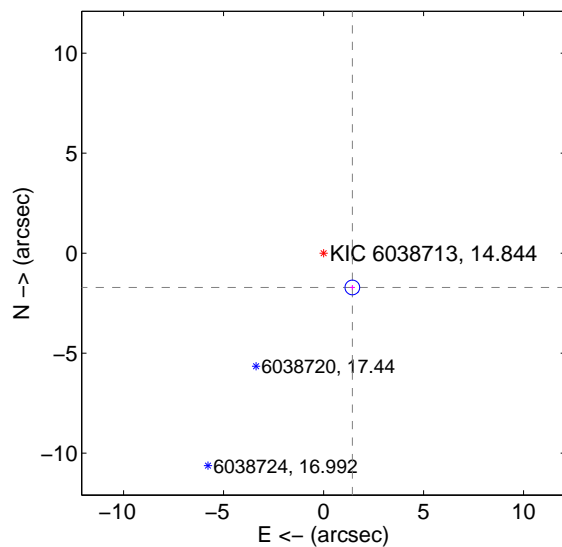
The direct PRF centroid is offset from the target star catalog position by about 0.18 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.089 \pm 0.122$	17.06	$-1.417 \pm 0.125$	$-1.535 \pm 0.120$
PRF-fit source offset from KIC position	$2.237 \pm 0.122$	18.31	$-1.438 \pm 0.125$	$-1.714 \pm 0.120$
photometric centroid source offset	$5.11 \pm 1.66$	3.09	$1.08 \pm 1.53$	$5.00 \pm 1.66$

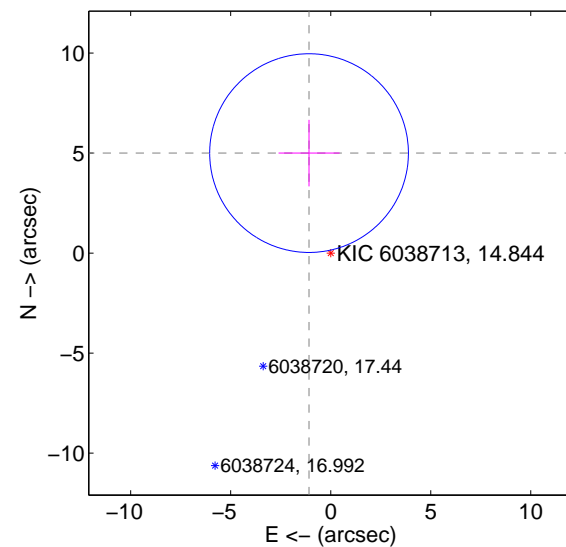
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids



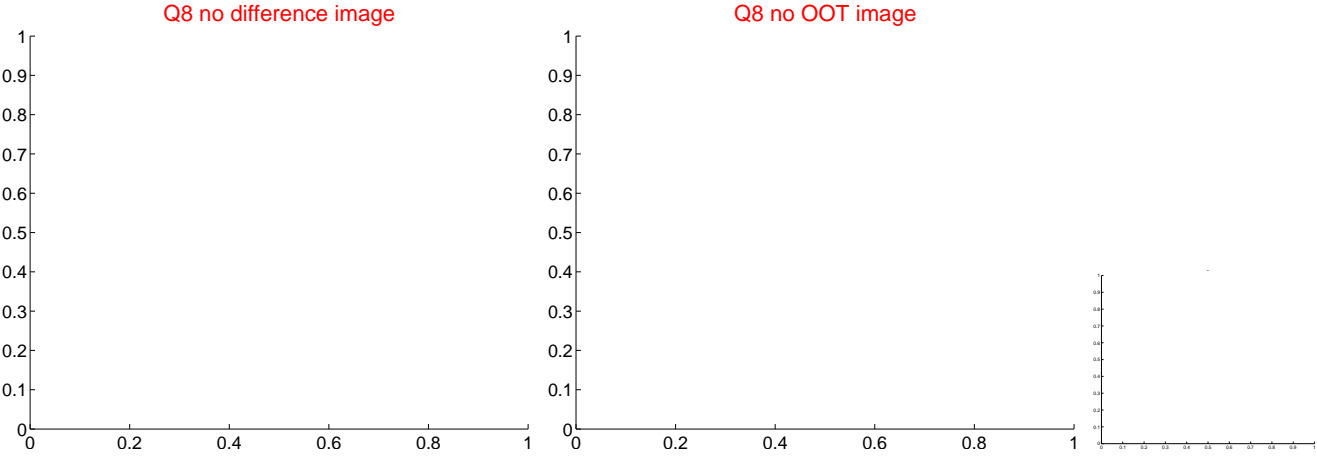
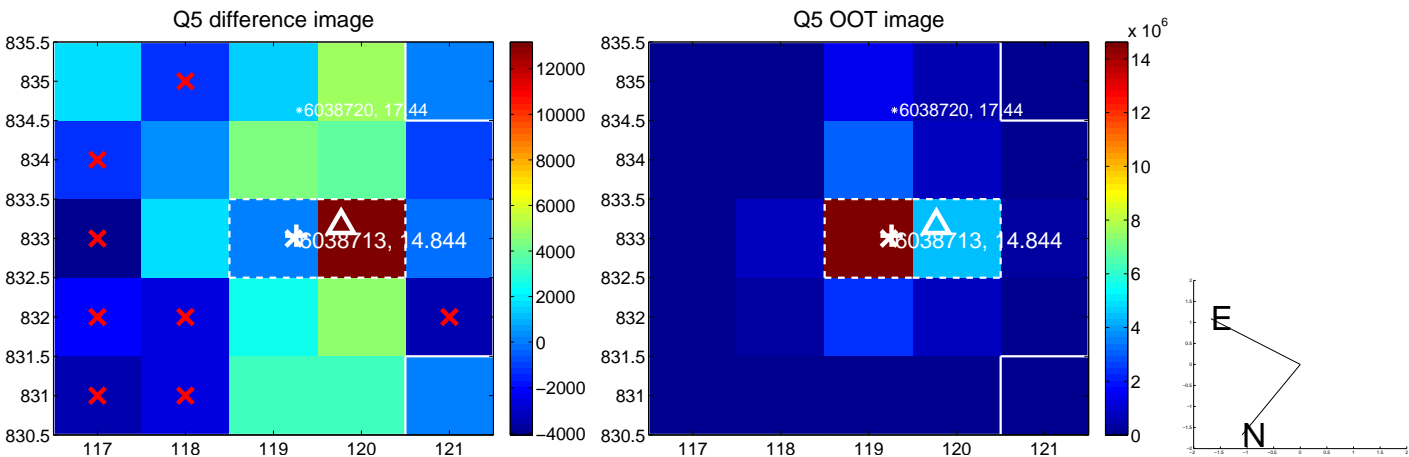
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



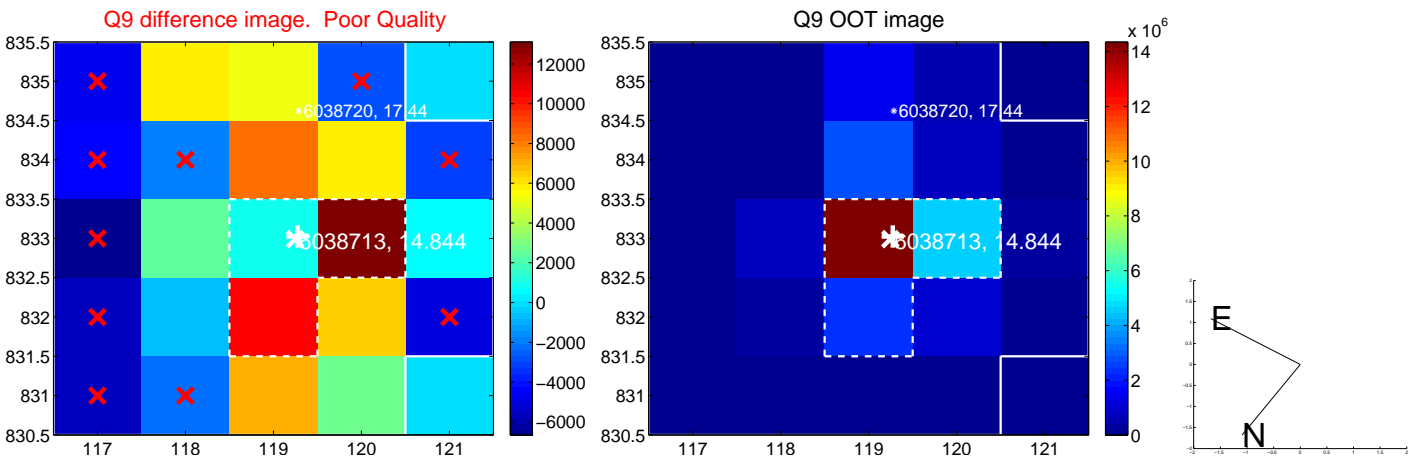
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



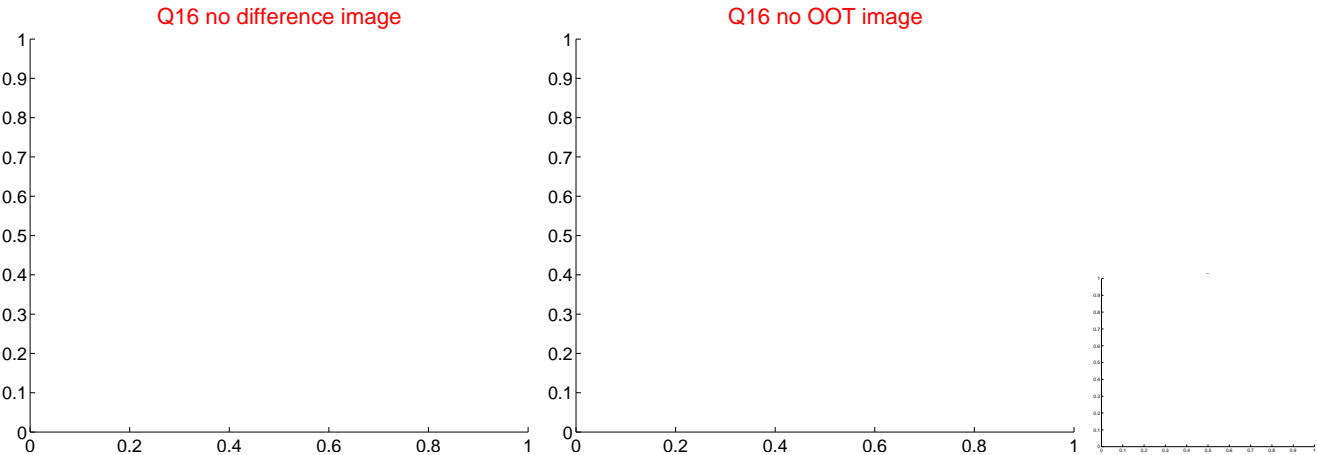
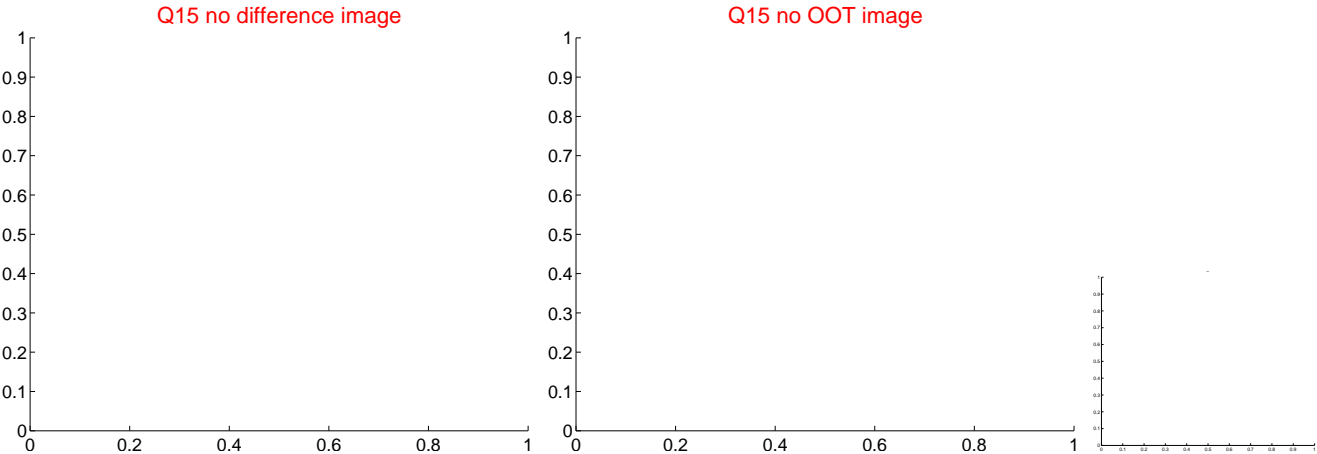
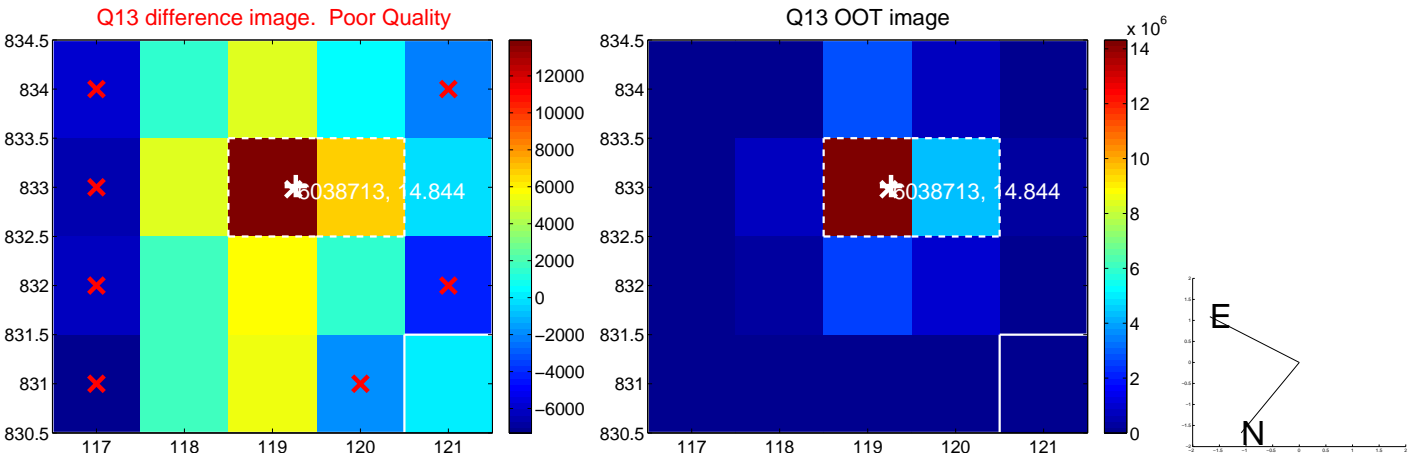
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



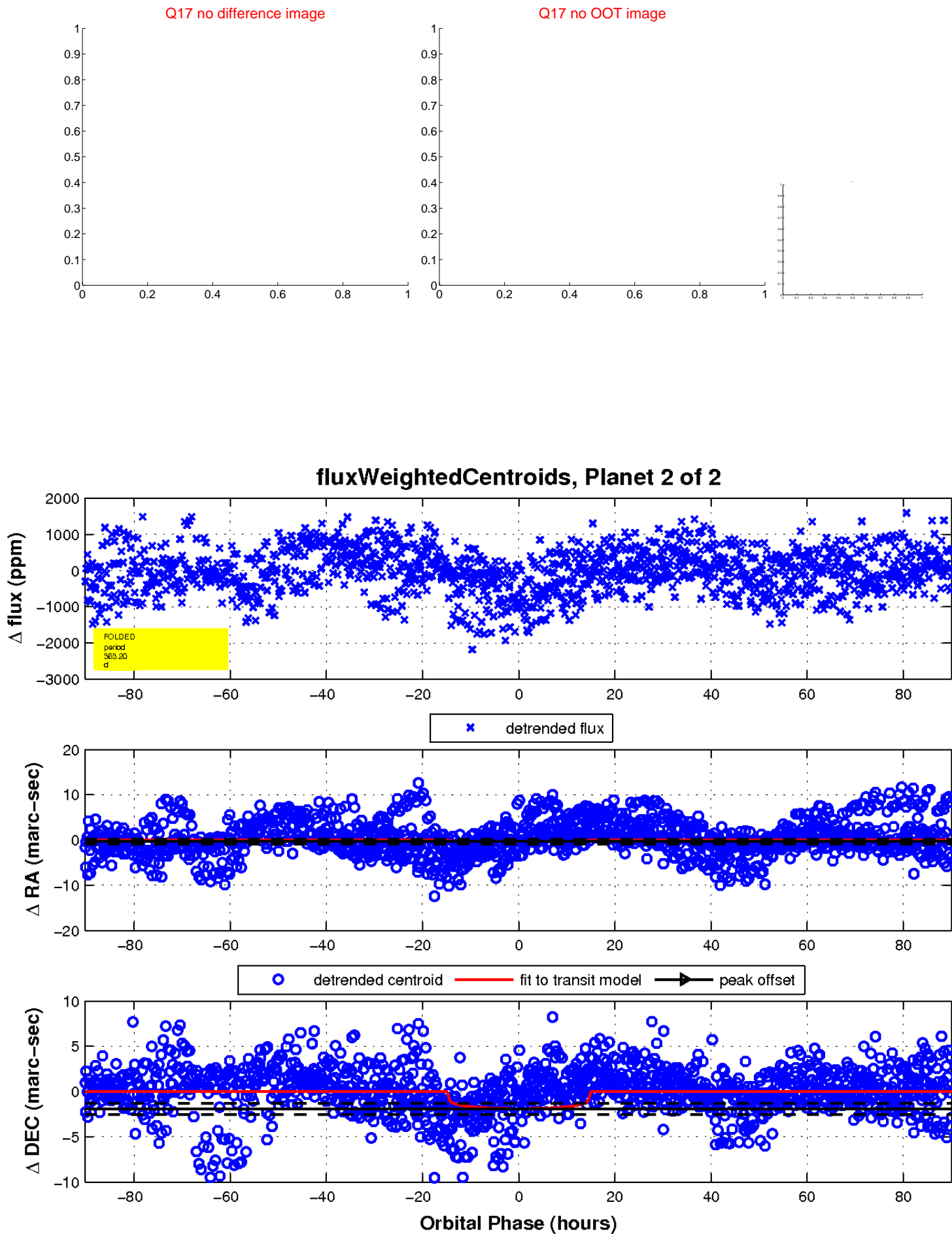
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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



UKIRT Image

Declination

