

# KIC 006590363

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006590363-01	OBS	No	363.047371	271.267098	480.9	14.804	26.7	16.8	16.09	4659	45.25	63.45
006590363-02	OBS	No	311.457401	159.123965	12.0	52.747	78.0	0.1	16.09	4659	5.63	77.84
006590363-03	OBS	No	210.107631	275.335026	161.6	12.760	9.5	7.9	16.09	4659	24.63	131.57
006590363-04	OBS	No	406.682333	194.882275	152.1	12.500	21.6	-1.0	16.09	4659	19.01	54.54

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006590363-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED
006590363-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
006590363-03	OBS	FP	0.00	1	0	0	0	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_SATURATED
006590363-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—CENT_SATURATED

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

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

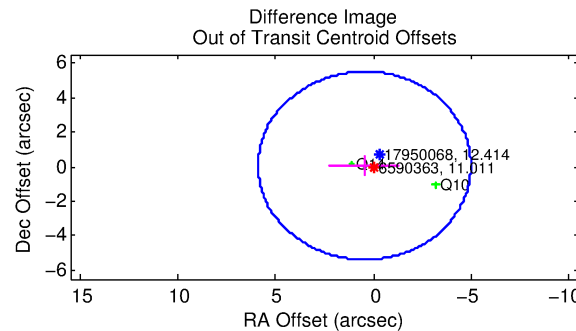
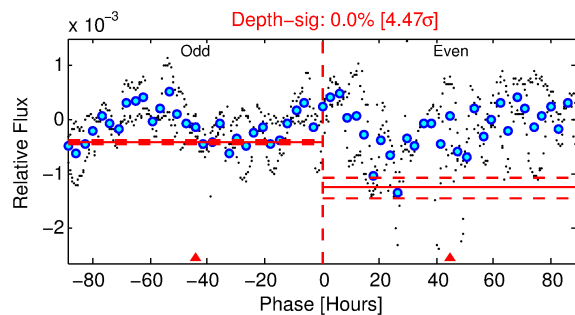
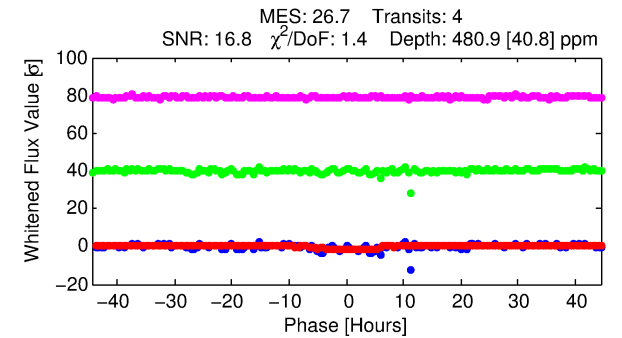
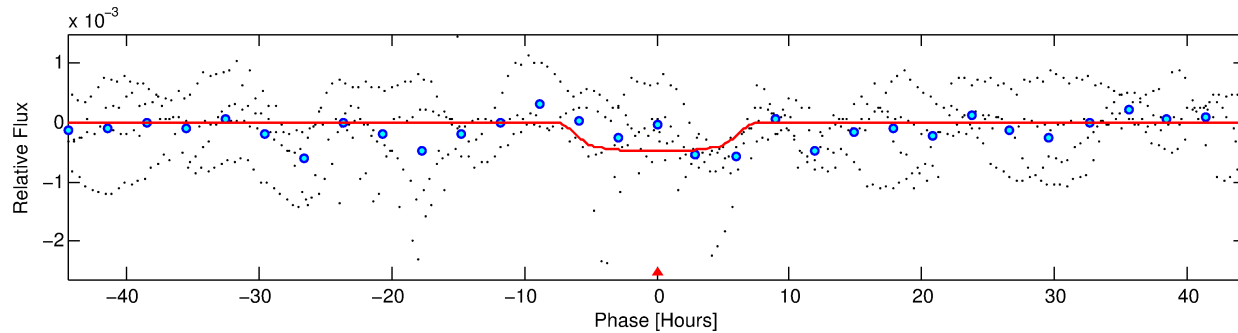
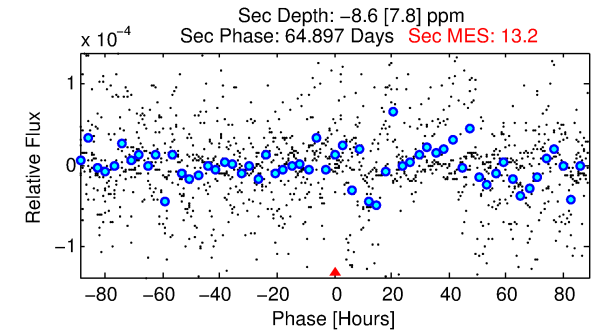
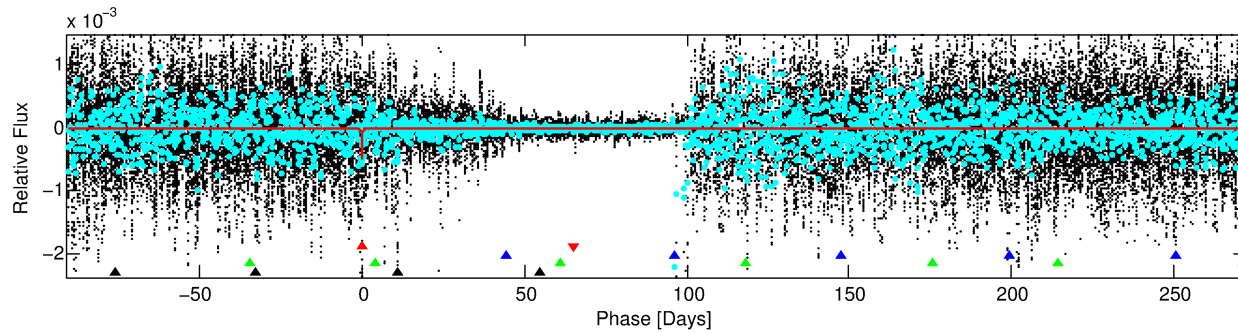
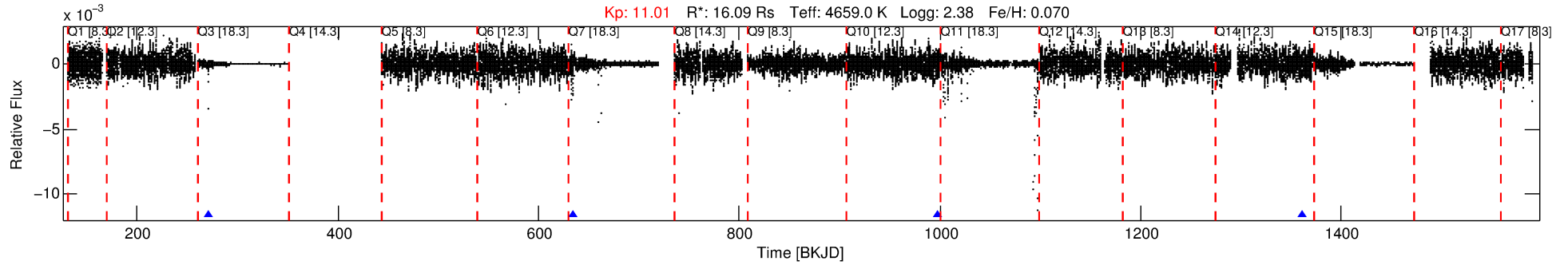
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006590363-01

No Significant Match Found

# DV One-Page Summary

KIC: 6590363 Candidate: 1 of 4 Period: 363.047 d



## DV Fit Results:

Period = 363.04737 [0.01293] d  
Epoch = 271.2671 [0.0165] BKJD  
Rp/R\* = 0.0258 [0.0016]  
a/R\* = 81.63 [13.96]  
b = 0.93 [0.03]  
Seff = 63.45 [11.48]  
Teq = 720 [33] K  
Rp = 45.25 [10.41] Re  
a = 1.3122 [0.1957] AU  
Ag = N/A  
Teffp = N/A

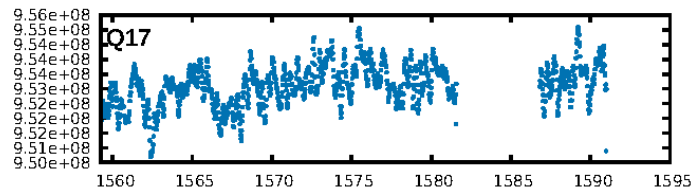
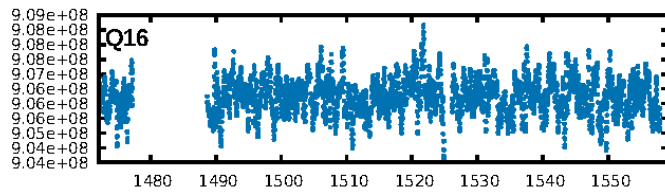
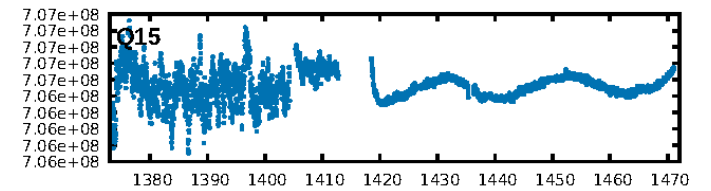
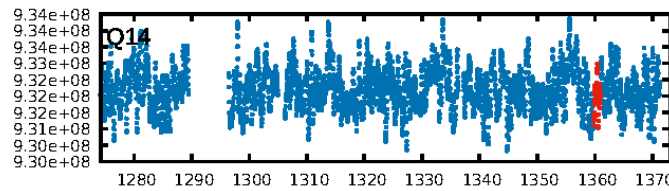
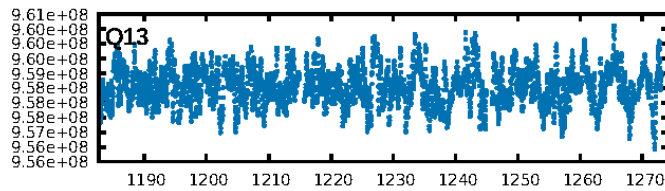
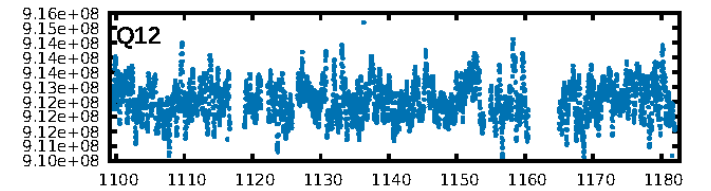
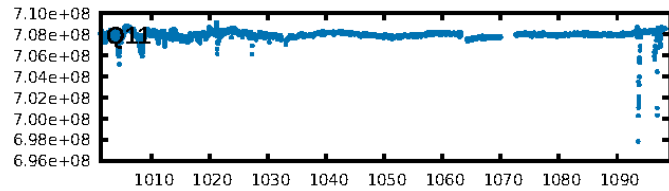
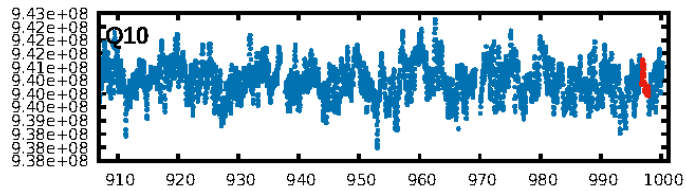
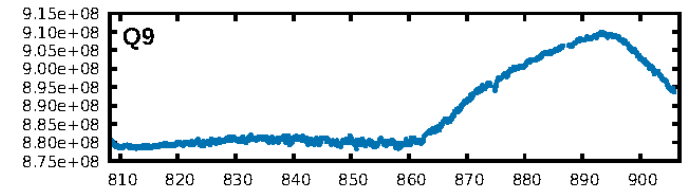
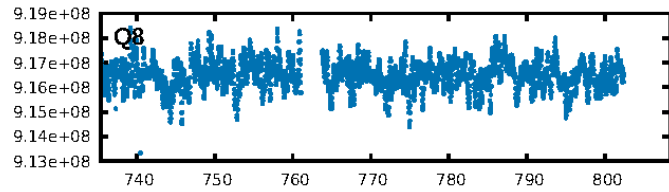
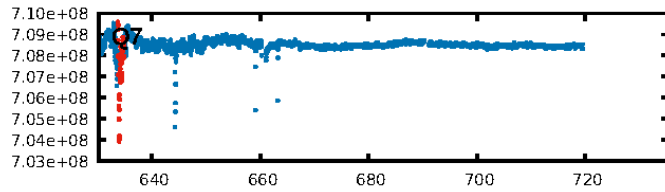
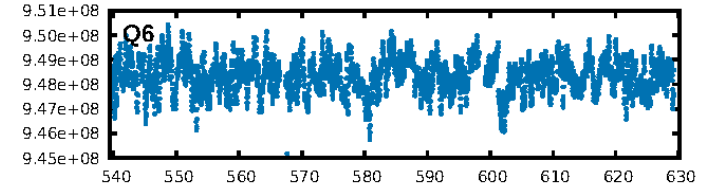
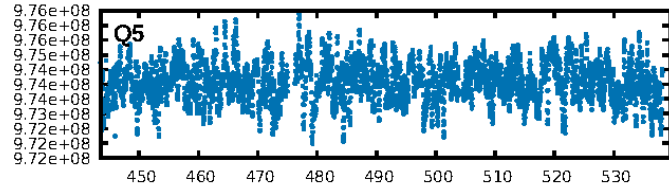
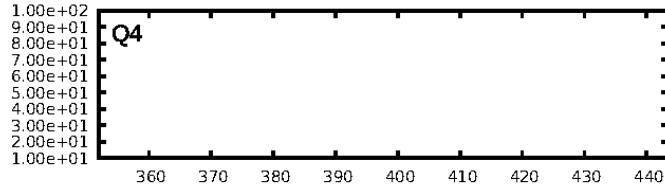
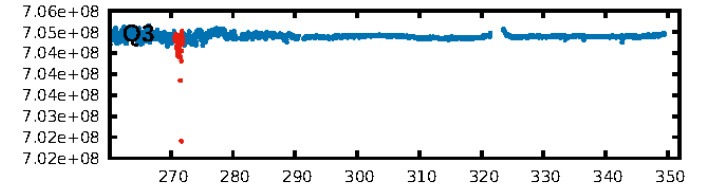
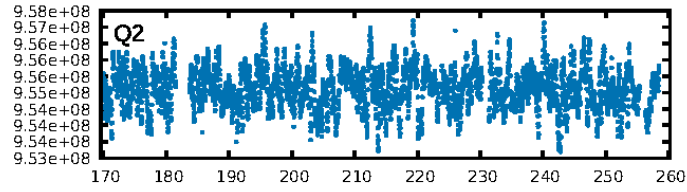
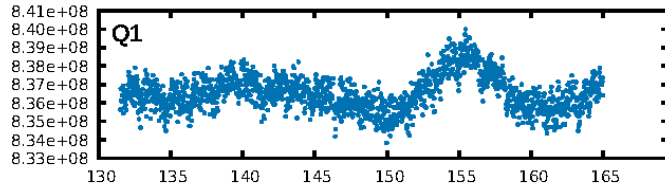
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [22.60 $\sigma$ ]  
LongPeriod-sig: 100.0% [54.05 $\sigma$ ]  
ModelChiSquare2-sig: 16.2%  
ModelChiSquareGof-sig: 98.6%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -2.791  
Centroid-sig: 39.3%  
Centroid-so: 0.532 arcsec [1.14 $\sigma$ ]  
OotOffset-rm: 0.467 arcsec [0.26 $\sigma$ ]  
KicOffset-rm: 0.692 arcsec [0.39 $\sigma$ ]  
OotOffset-st: 2/0/0/0 [2]  
KicOffset-st: 2/0/0/0 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 1.00 [2/2]

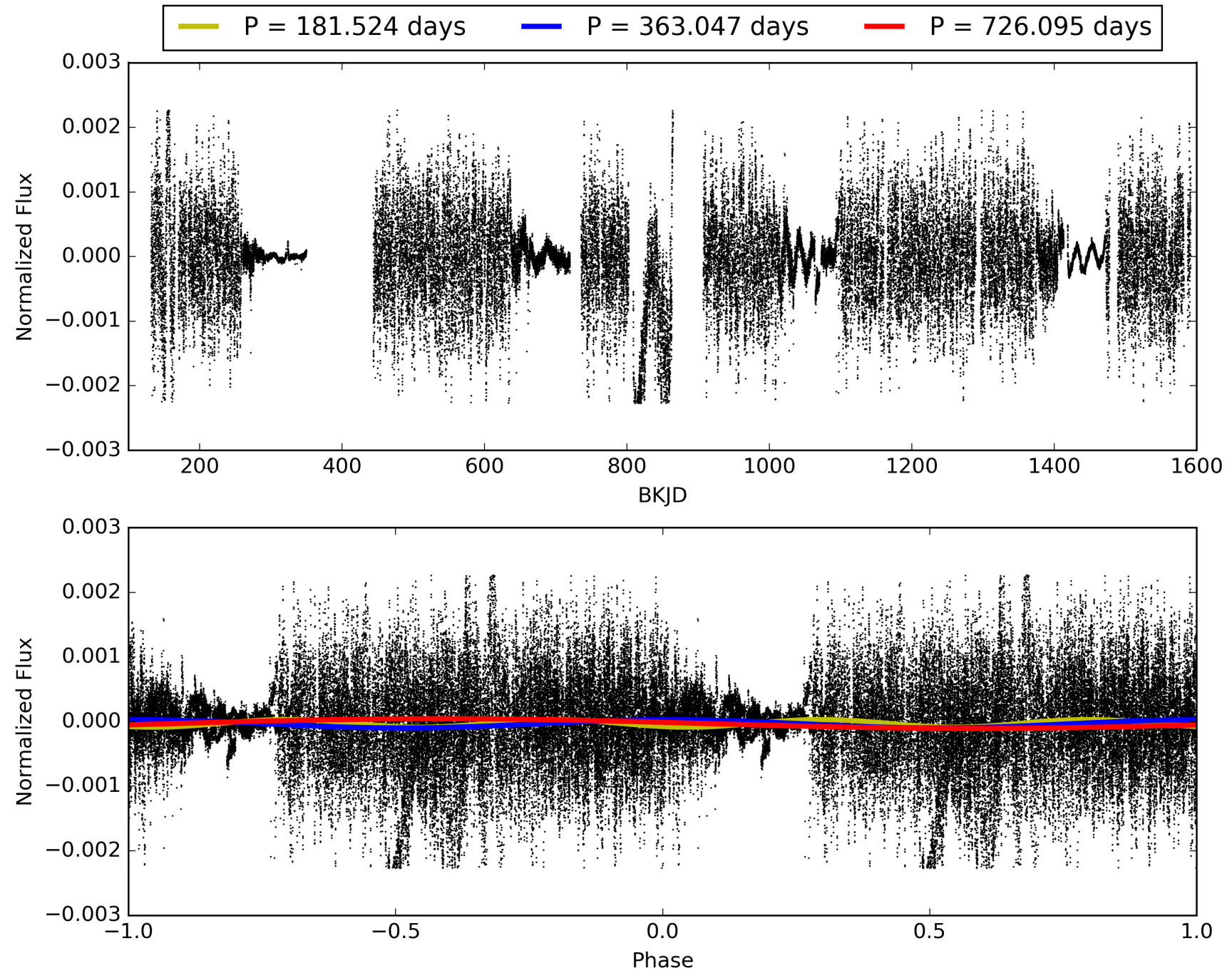
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 01:02:18 Z

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

# TCE 006590363-01, PDC Light Curves



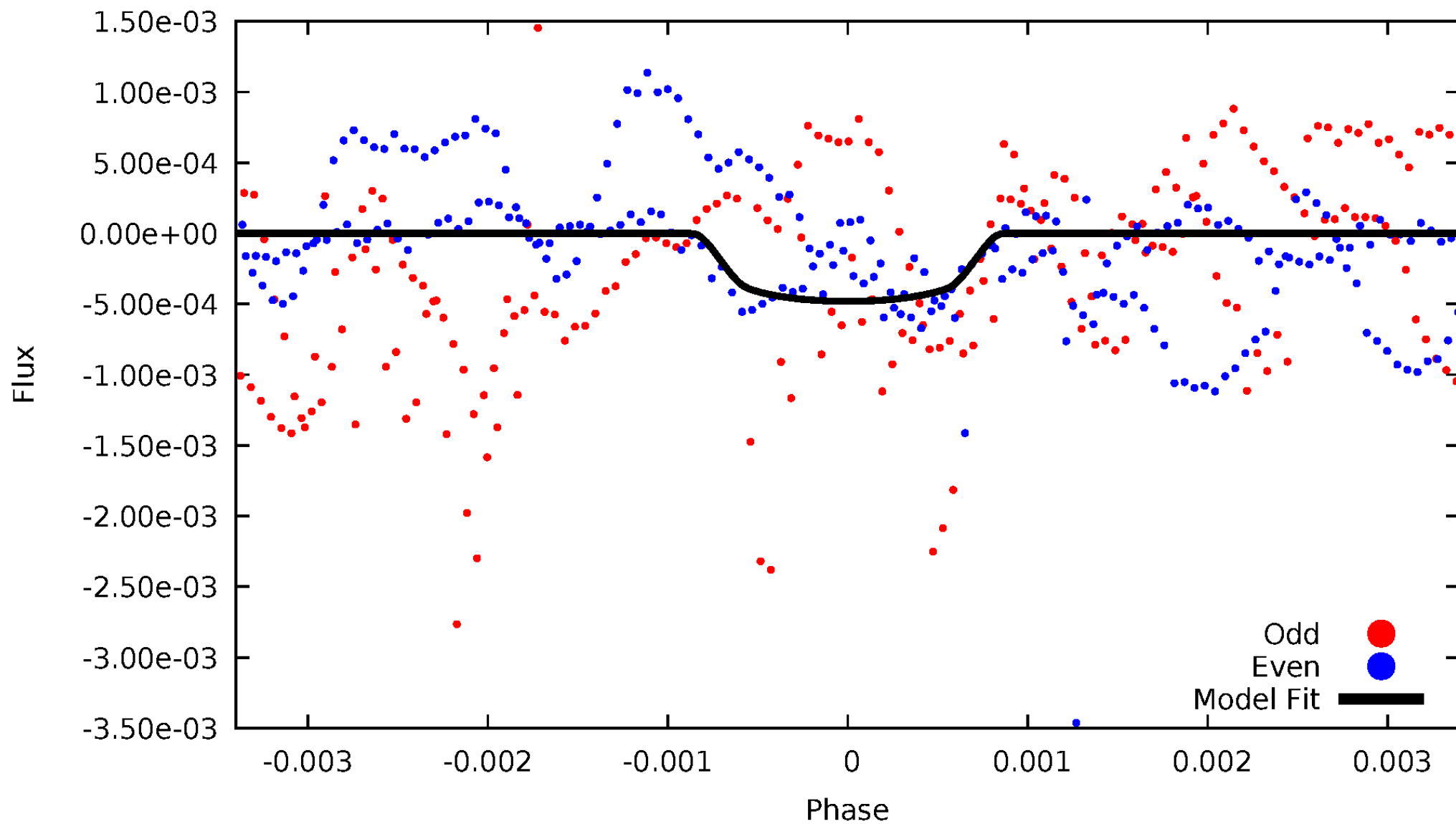
TCE 006590363-01





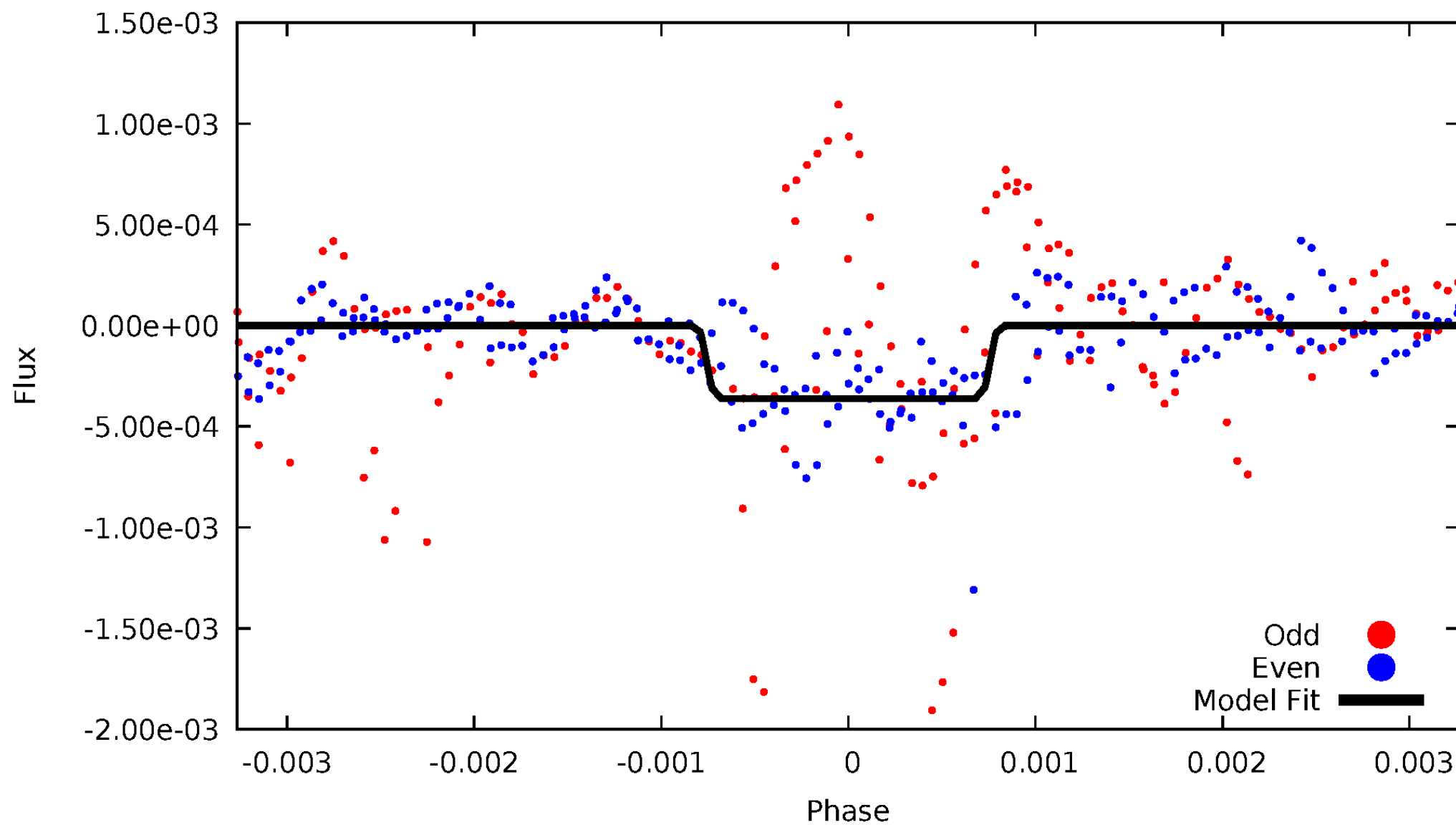
# DV Odd/Even

TCE 006590363-01

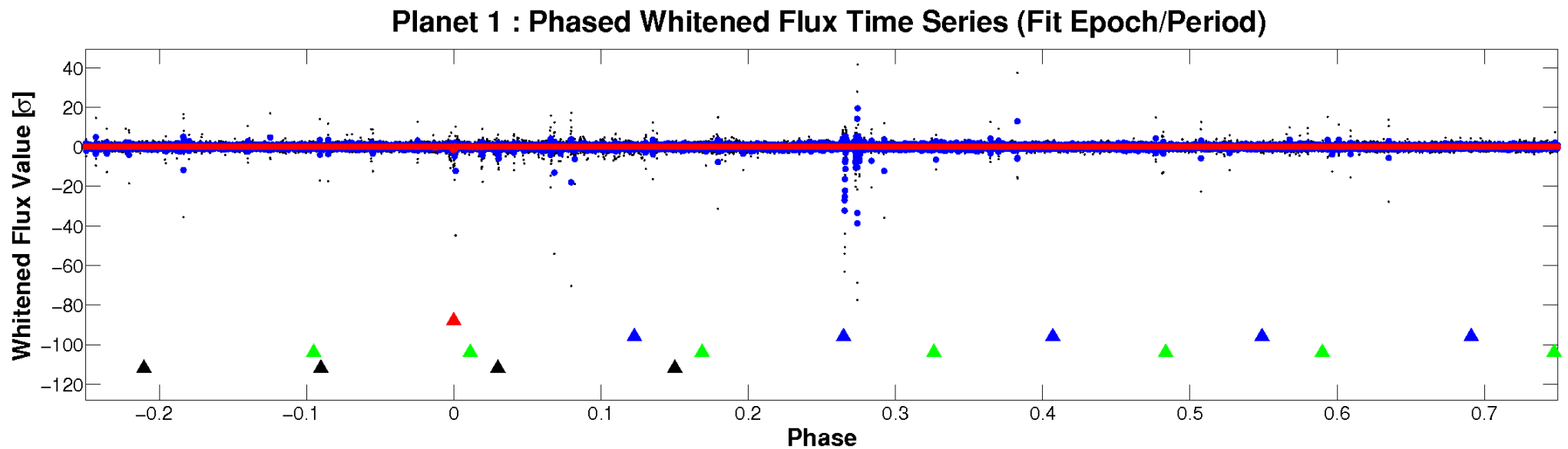
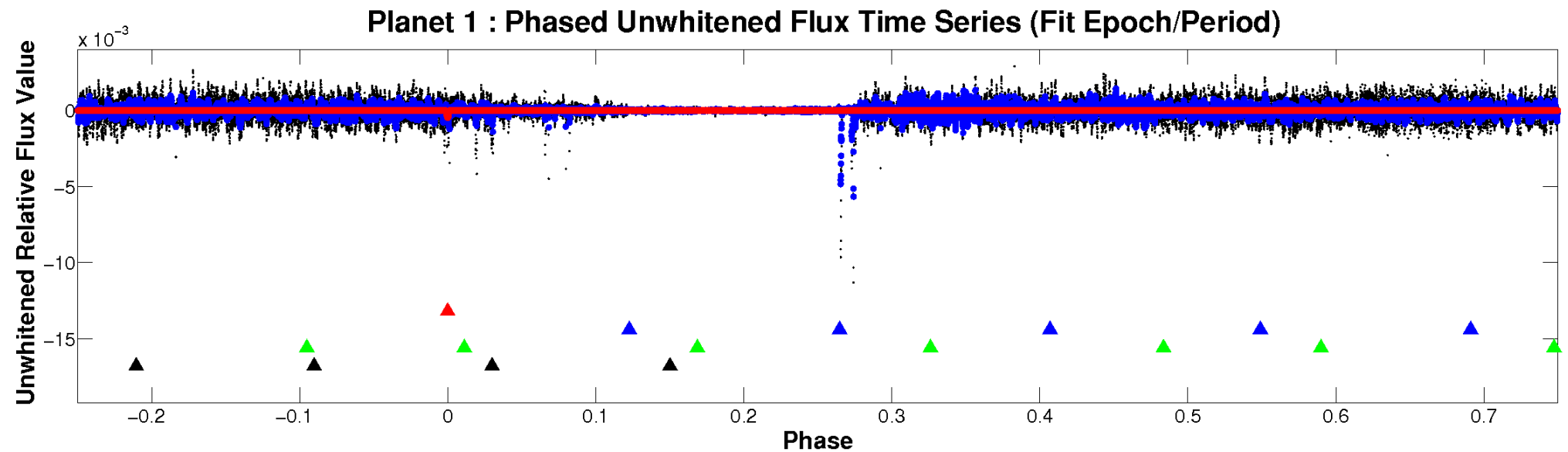


# ALT Odd/Even

TCE 006590363-01



# Non-Whitened Vs. Whitened Light Curve



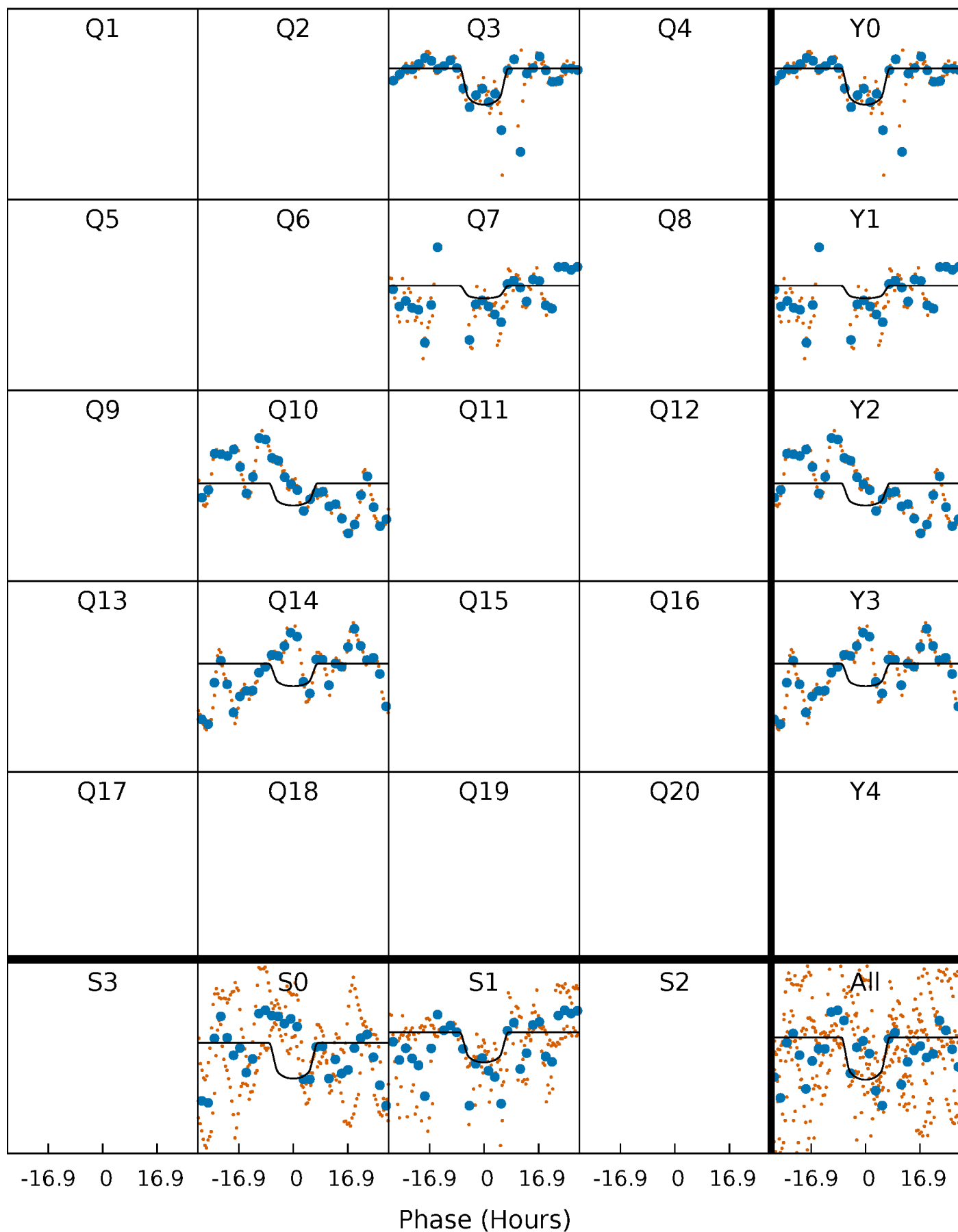
# PDC Quarter-Phased Transit Curves

TCE 006590363-01 P=363.047371 Days  $T_0=271.267098$  (BKJD)



# DV Quarter-Phased Transit Curves

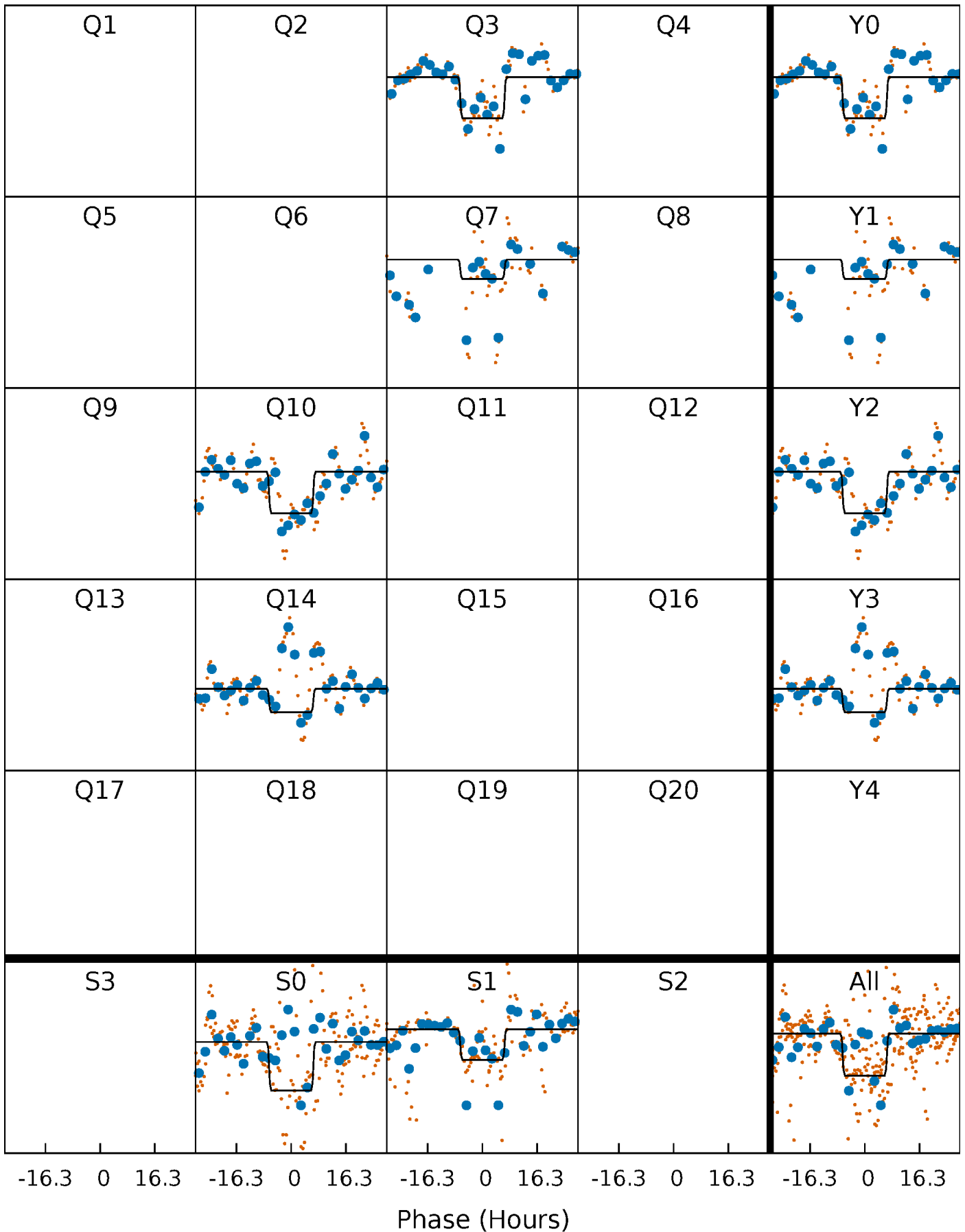
TCE 006590363-01 P=363.047371 Days  $T_0=271.267098$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

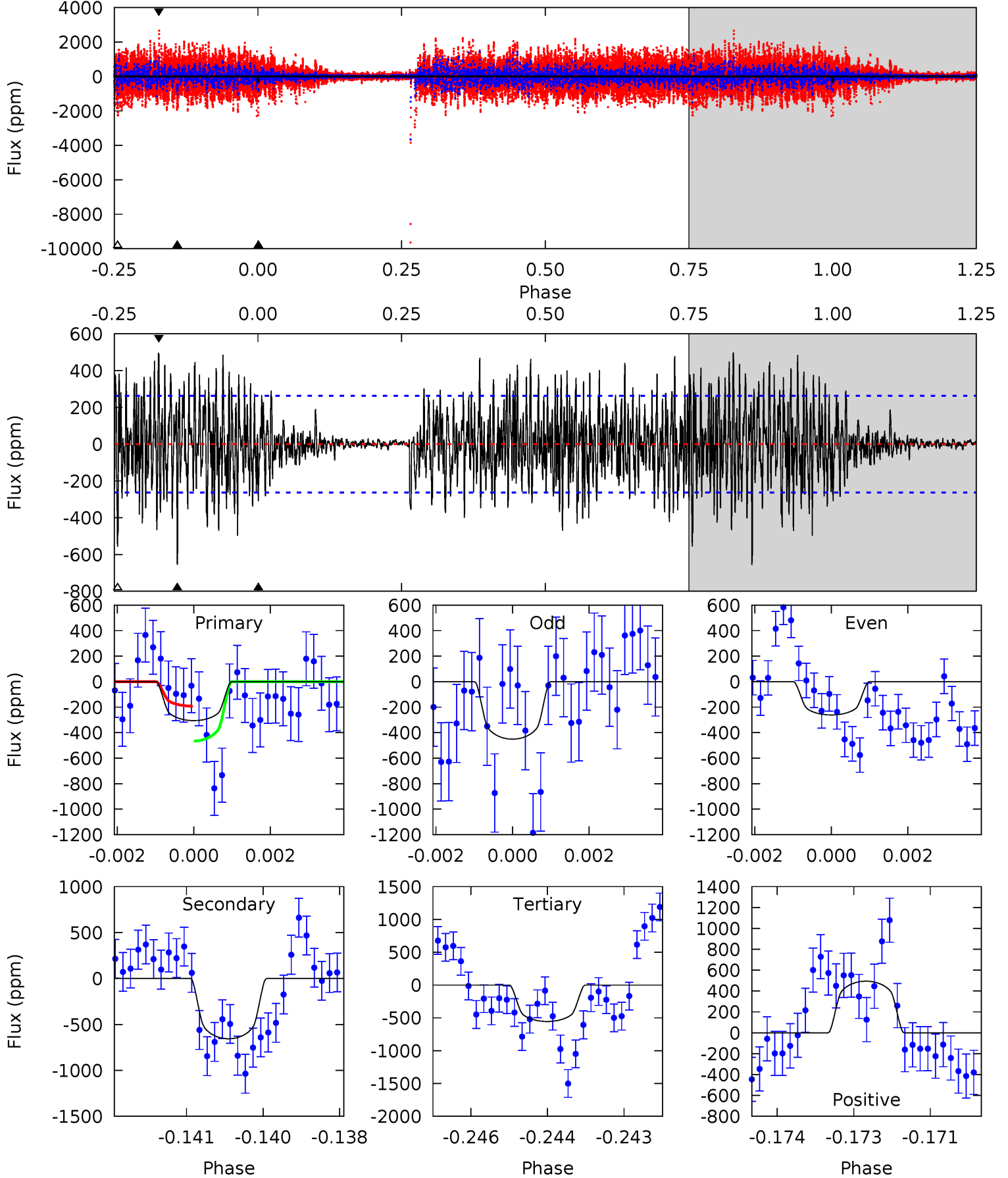
TCE 006590363-01 P=363.063494 Days  $T_0=271.260041$  (BKJD)



# DV Model-Shift Uniqueness Test

006590363-01, P = 363.047371 Days, E = 271.267098 Days

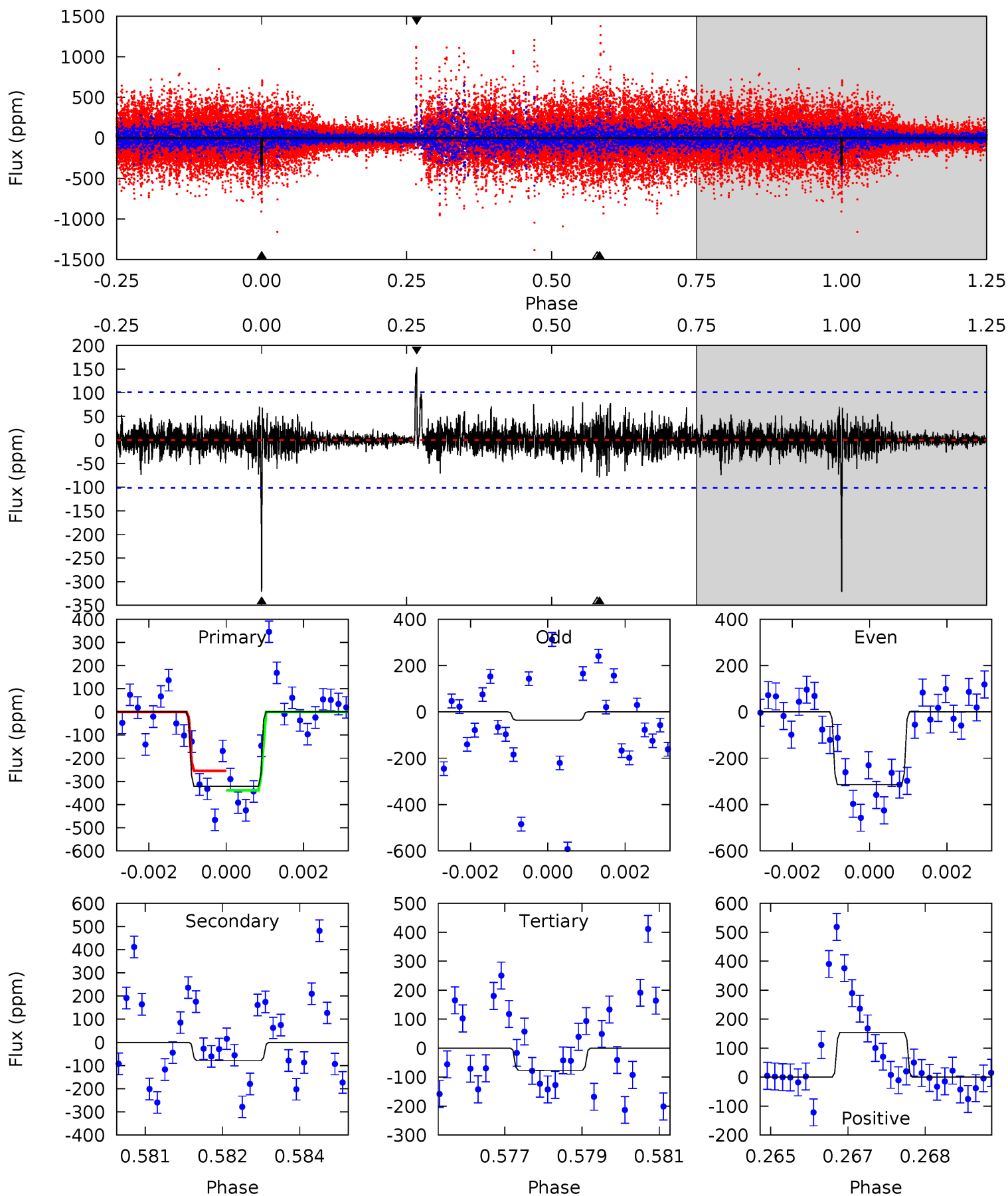
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.21	13.3	11.3	10.0	5.35	3.13	3.14	-5.08	-3.83	2.05	3.30	1.90	1.41	0.43	2.87



# Alt Model-Shift Uniqueness Test

006590363-01, P = 363.063494 Days, E = 271.260041 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
17.0	4.18	4.04	8.17	5.36	3.15	0.97	13.0	8.88	0.14	-3.99	6.98	0.85	0.32	2.17



### Stellar Parameters For KIC 006590363

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4659^{+64}_{-110}$	$2.384^{+0.027}_{-0.030}$	$0.070^{+0.150}_{-0.200}$	$16.088^{+2.909}_{-3.556}$	$2.287^{+0.786}_{-0.960}$	$0.001^{+0.000}_{-0.000}$
	+1%/-2%	+1%/-1%	+214%/-286%	+18%/-22%	+34%/-42%	+35%/-15%
Source	PHO55	AST55	SPE55	DSEP		

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

### Secondary Eclipse Parameters for KIC 006590363-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-656 \pm 49$	$46.37^{+5.87}_{-6.64}$	$1006^{+29}_{-34}$	$4634^{+174}_{-160}$	$302^{+57}_{-46}$
Alt.	$-79 \pm 19$	$34.39^{+5.32}_{-5.67}$	$1008^{+29}_{-34}$	$3533^{+185}_{-189}$	$66^{+24}_{-20}$

$T_{max}$  = 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

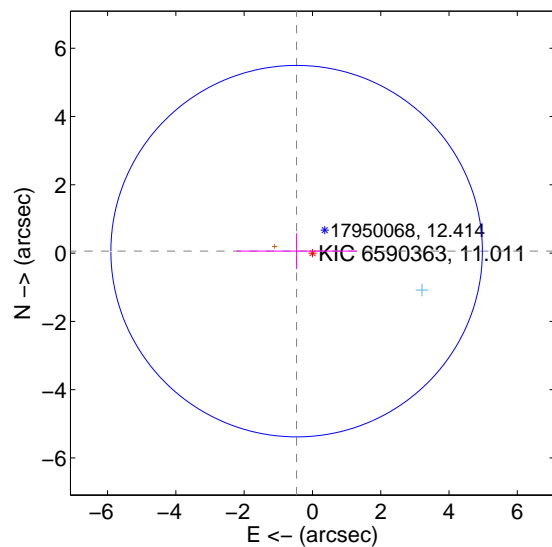
Supplemental centroid analysis for 006590363-01. **Kepler magnitude: 11.01.** Transit SNR 16.78

**There are 1 quarters with good PRF difference image offsets**

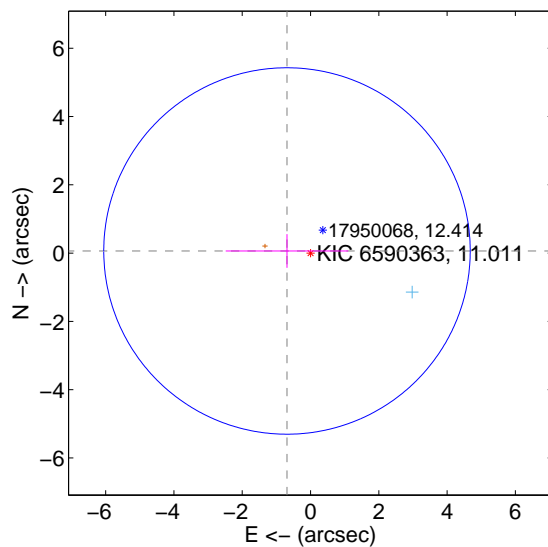
The direct PRF centroid is offset from the target star catalog position by about 0.23 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.467 \pm 1.814$	0.26	$0.463 \pm 1.763$	$0.057 \pm 0.525$
PRF-fit source offset from KIC position	$0.692 \pm 1.789$	0.39	$0.689 \pm 1.796$	$0.062 \pm 0.493$
photometric centroid source offset	$0.53 \pm 0.47$	1.14	$-0.12 \pm 0.47$	$0.52 \pm 0.47$

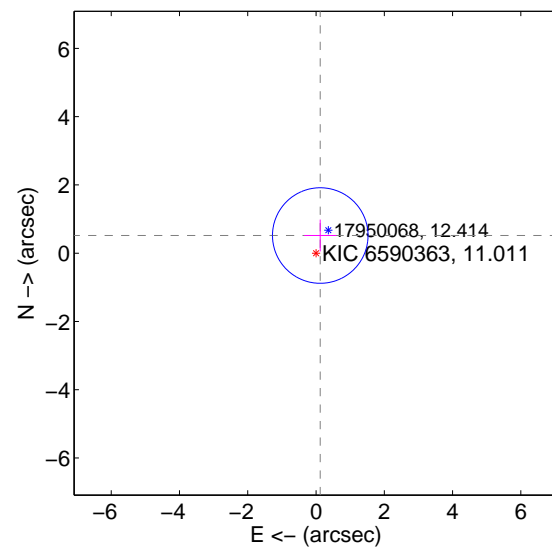
offset from difference PRF-fit to OOT PRF-fit



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.



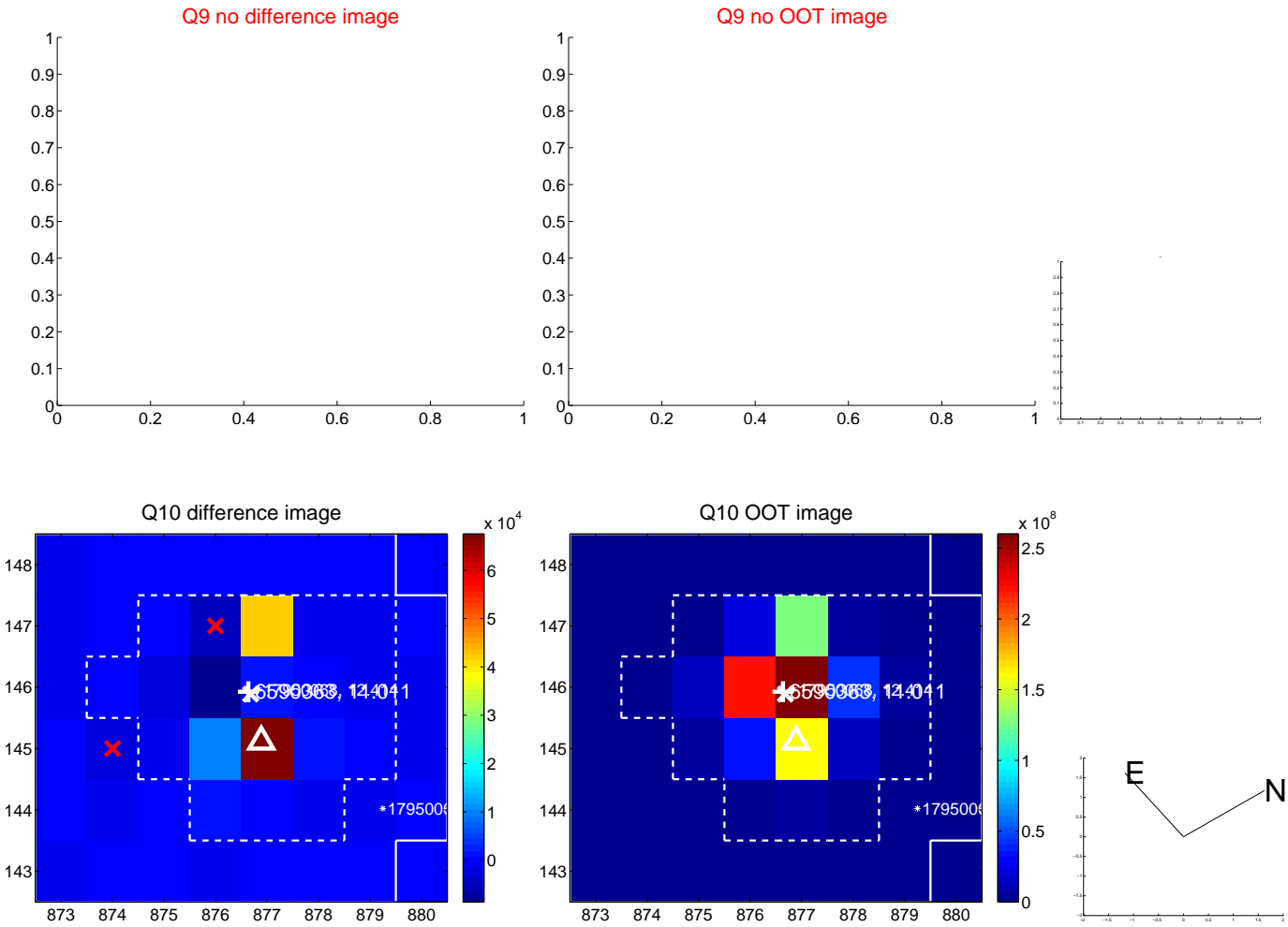
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



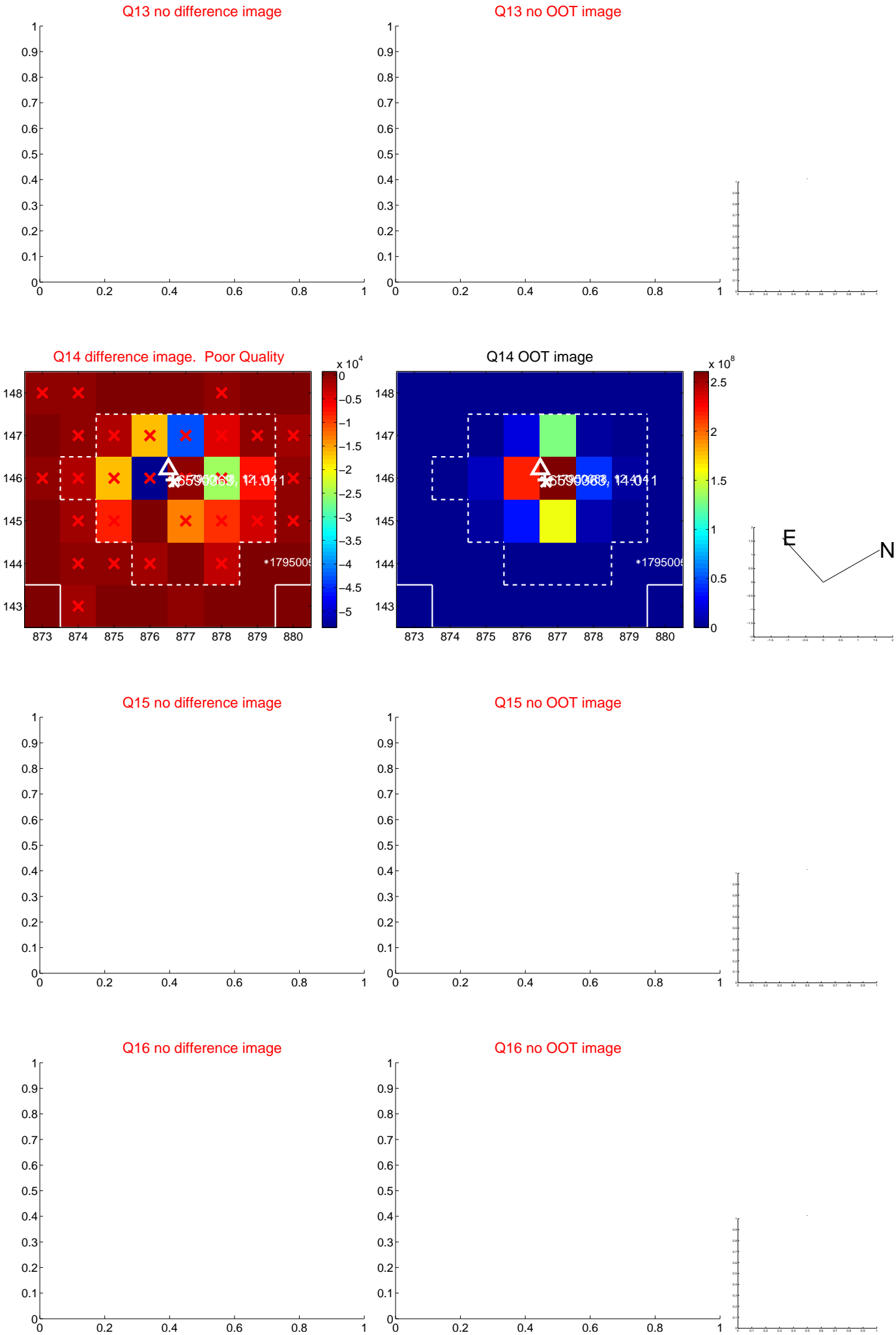
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



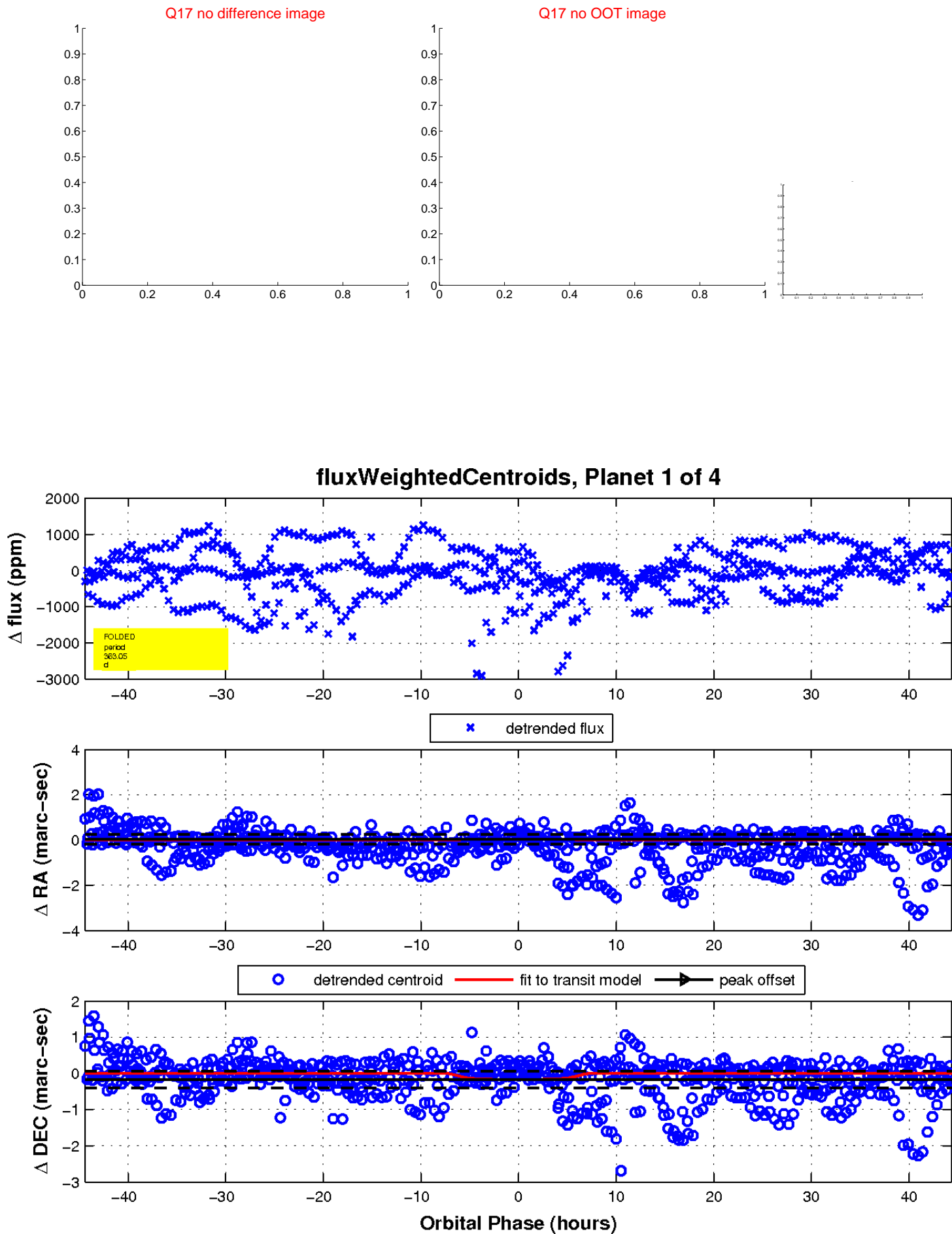
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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



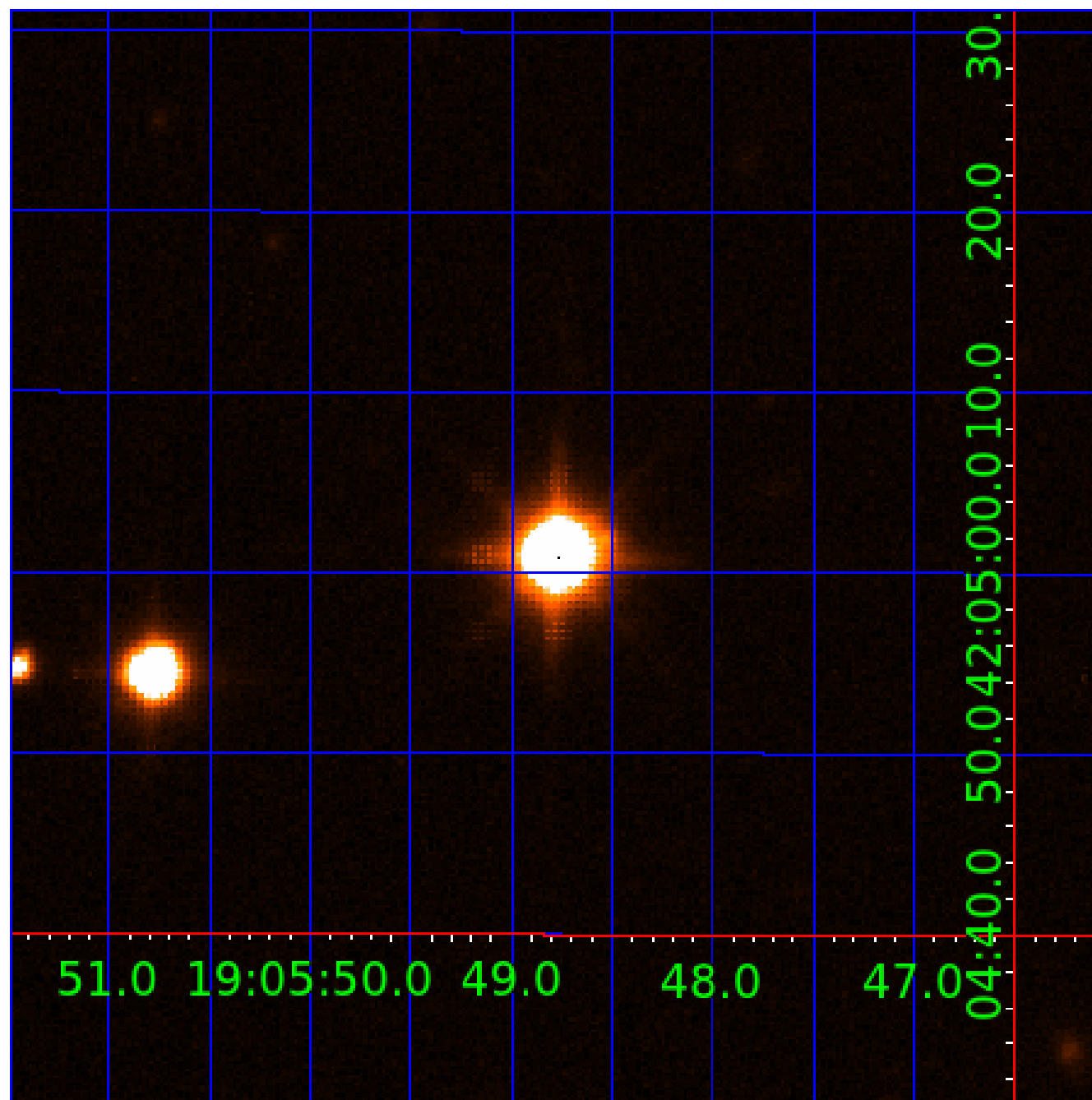
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



# KIC 006590363

## 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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006590363-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
006590363-03	OBS	FP	0.00	1	0	0	0	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_SATURATED
006590363-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—CENT_SATURATED

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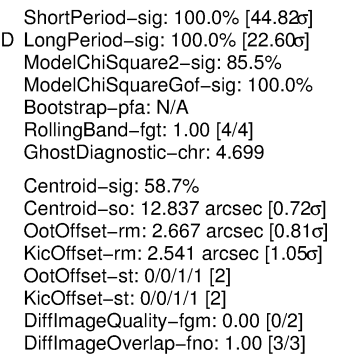
N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

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 006590363-02

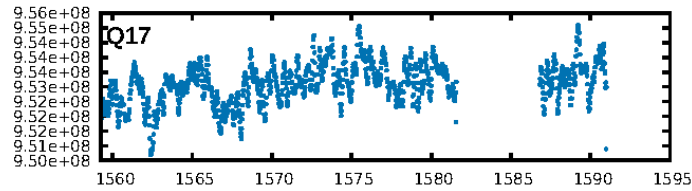
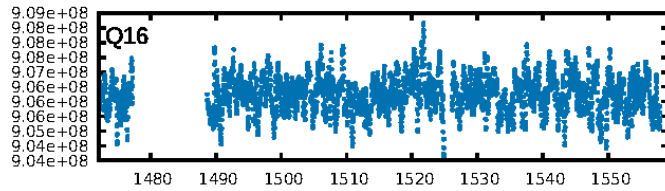
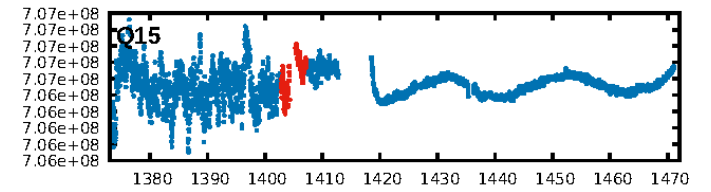
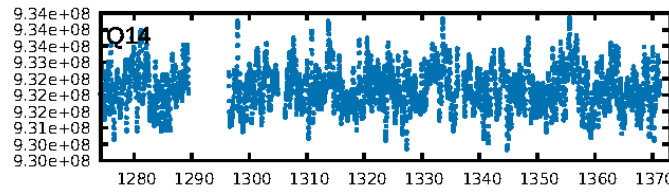
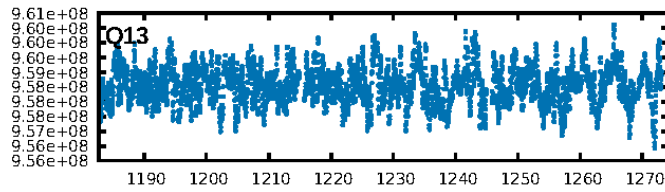
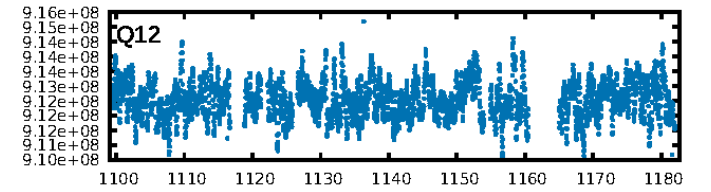
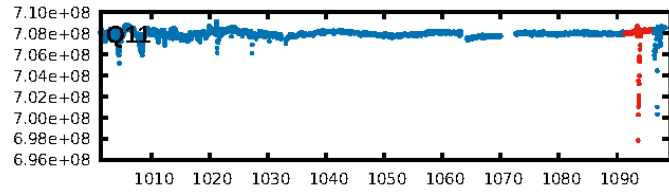
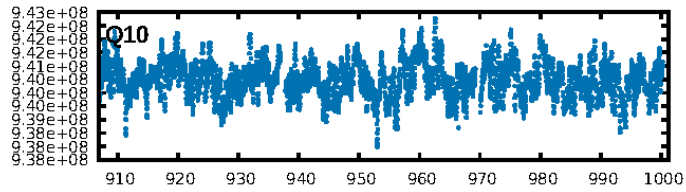
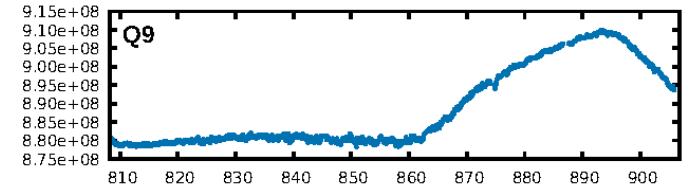
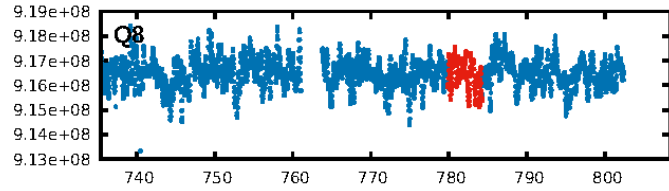
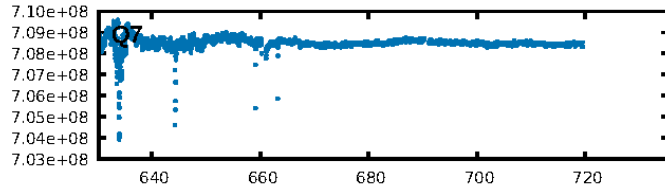
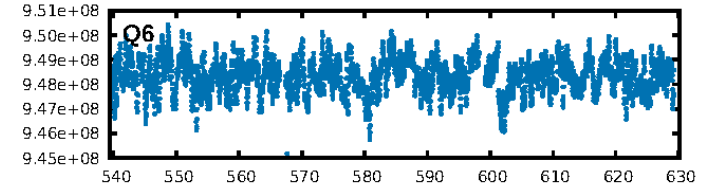
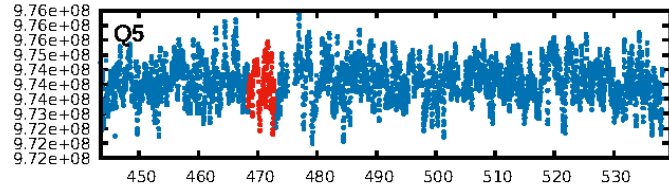
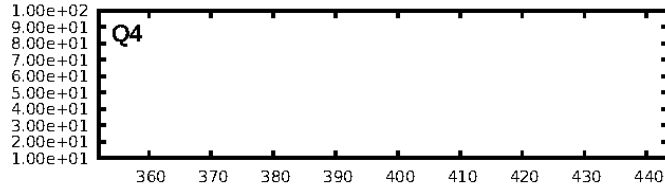
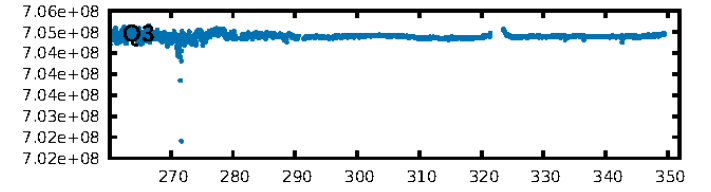
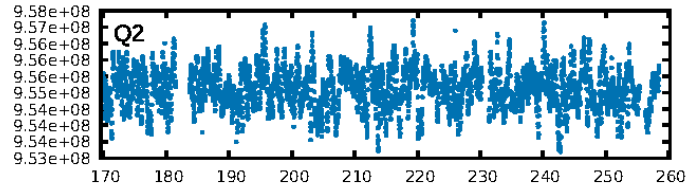
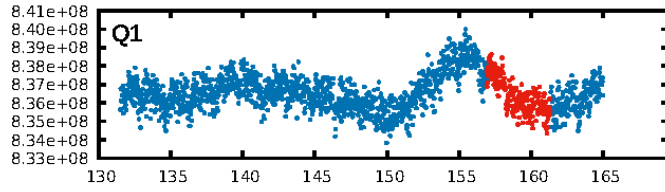
No Significant Match Found

## KIC: 6590363    Candidate: 2 of 4    Period: 311.457 d

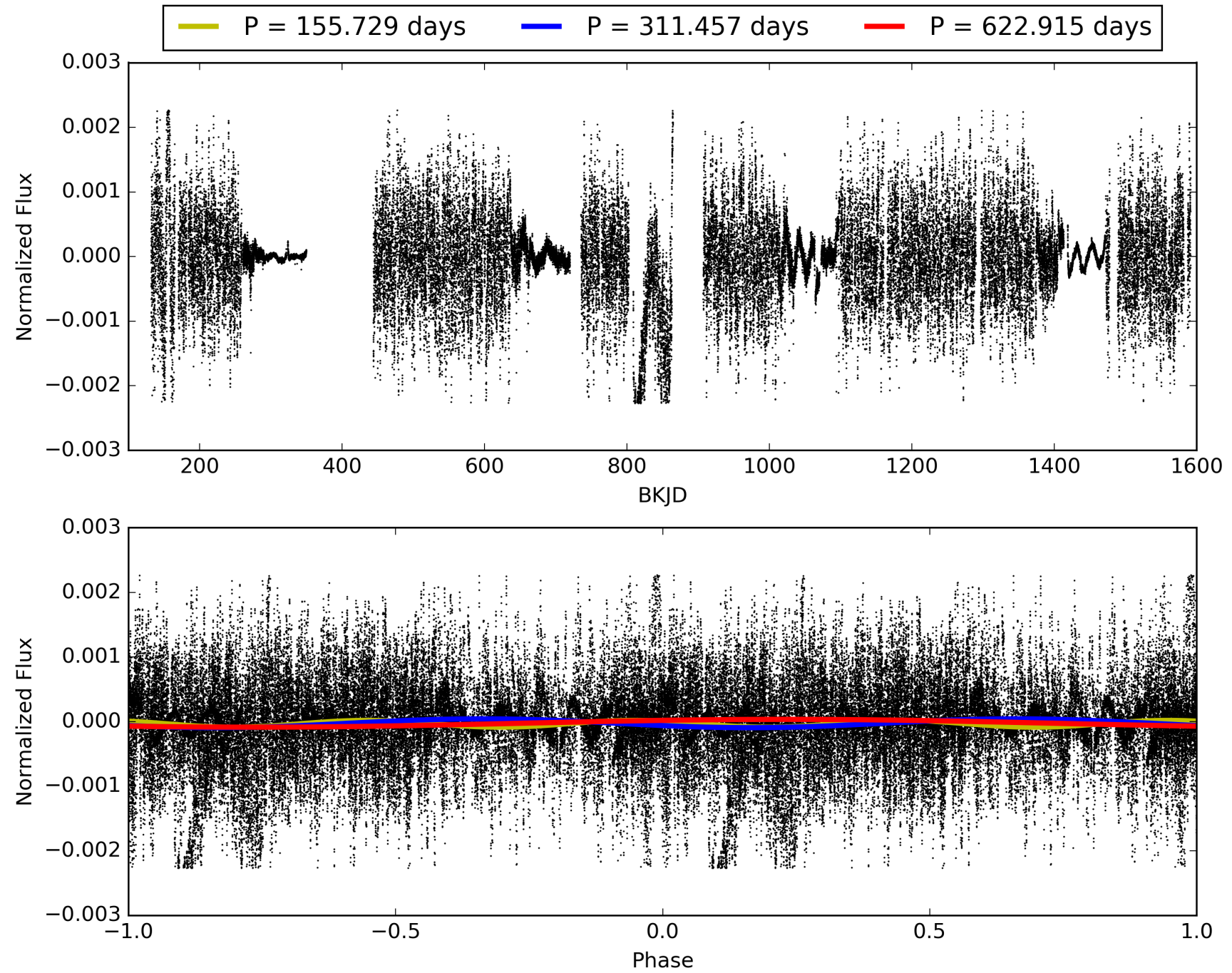


This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 006590363-02, PDC Light Curves



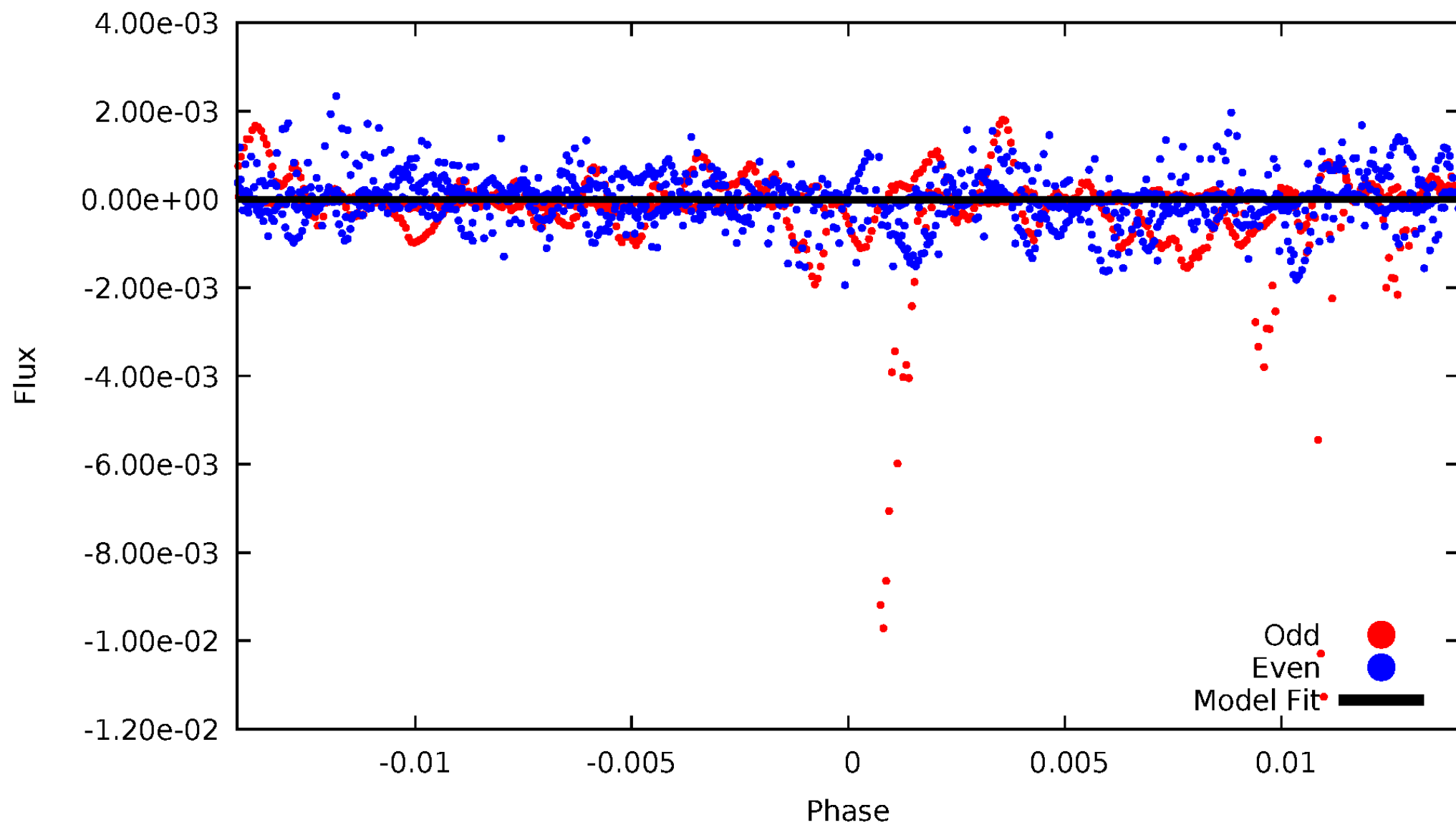
TCE 006590363-02





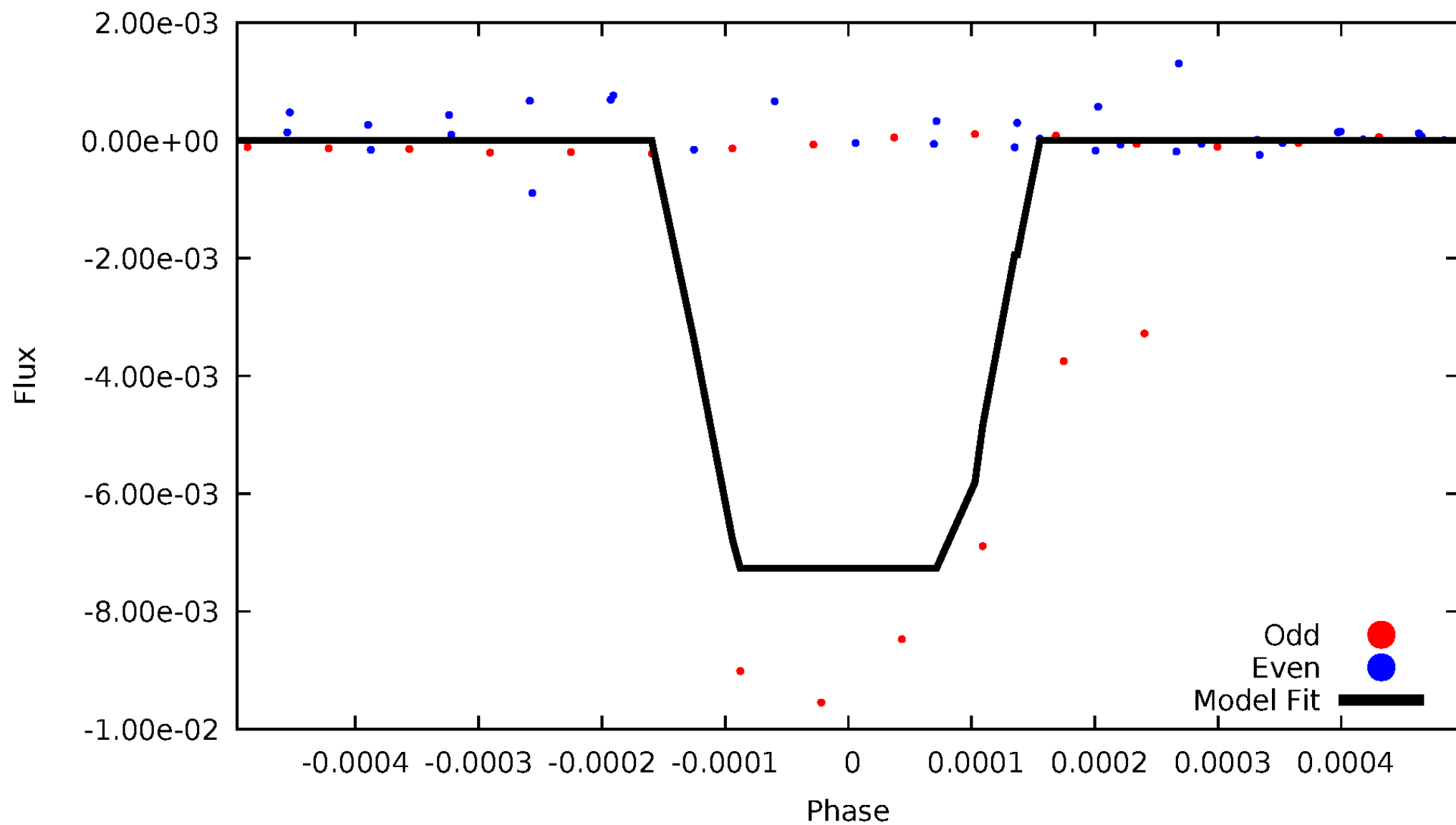
# DV Odd/Even

TCE 006590363-02



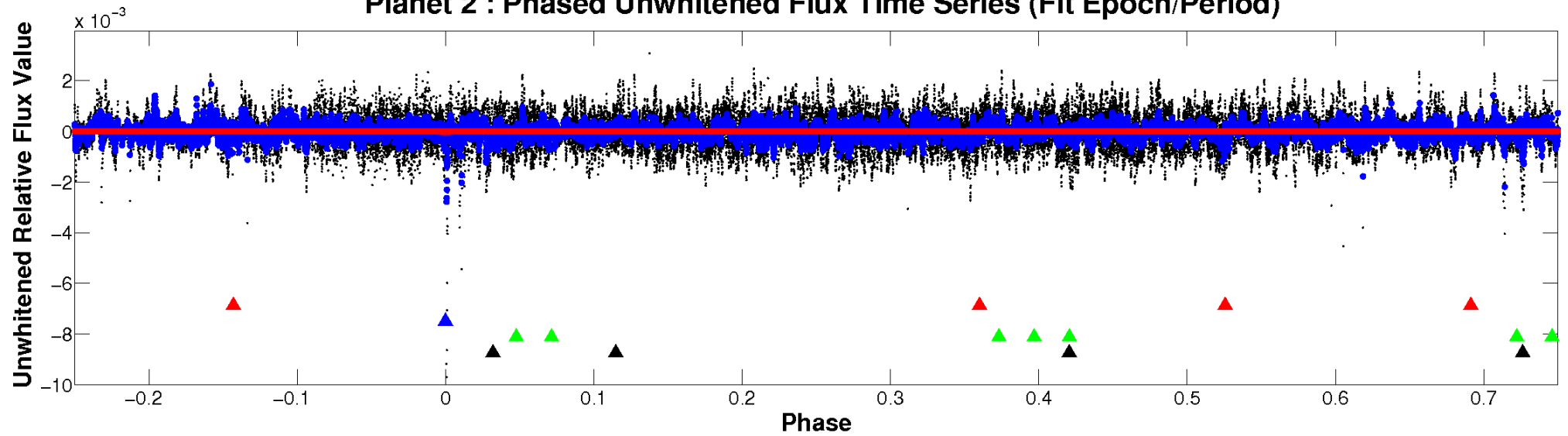
# ALT Odd/Even

TCE 006590363-02

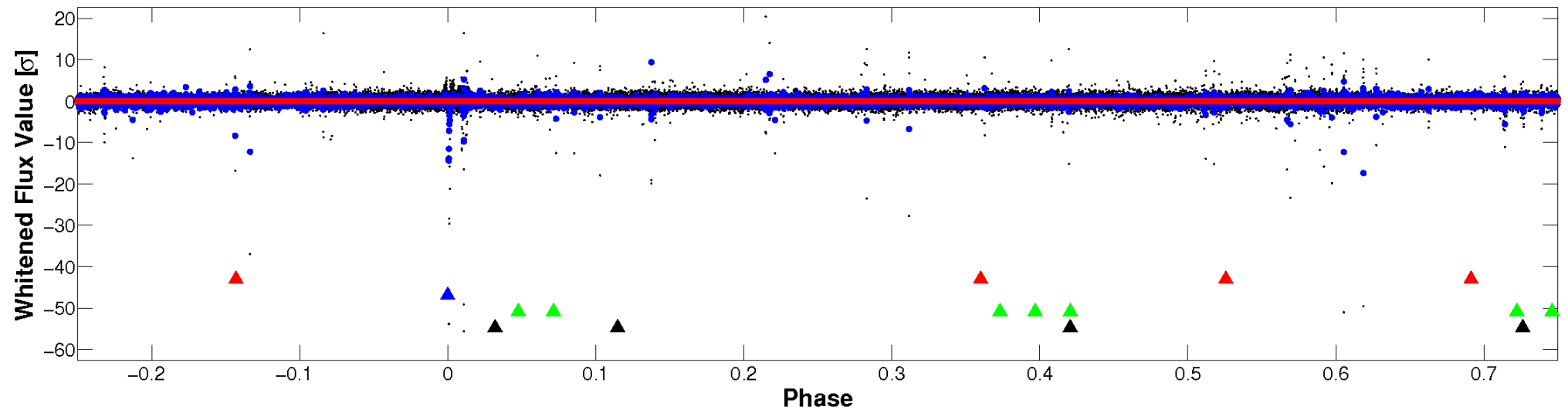


# Non-Whitened Vs. Whitened Light Curve

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



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



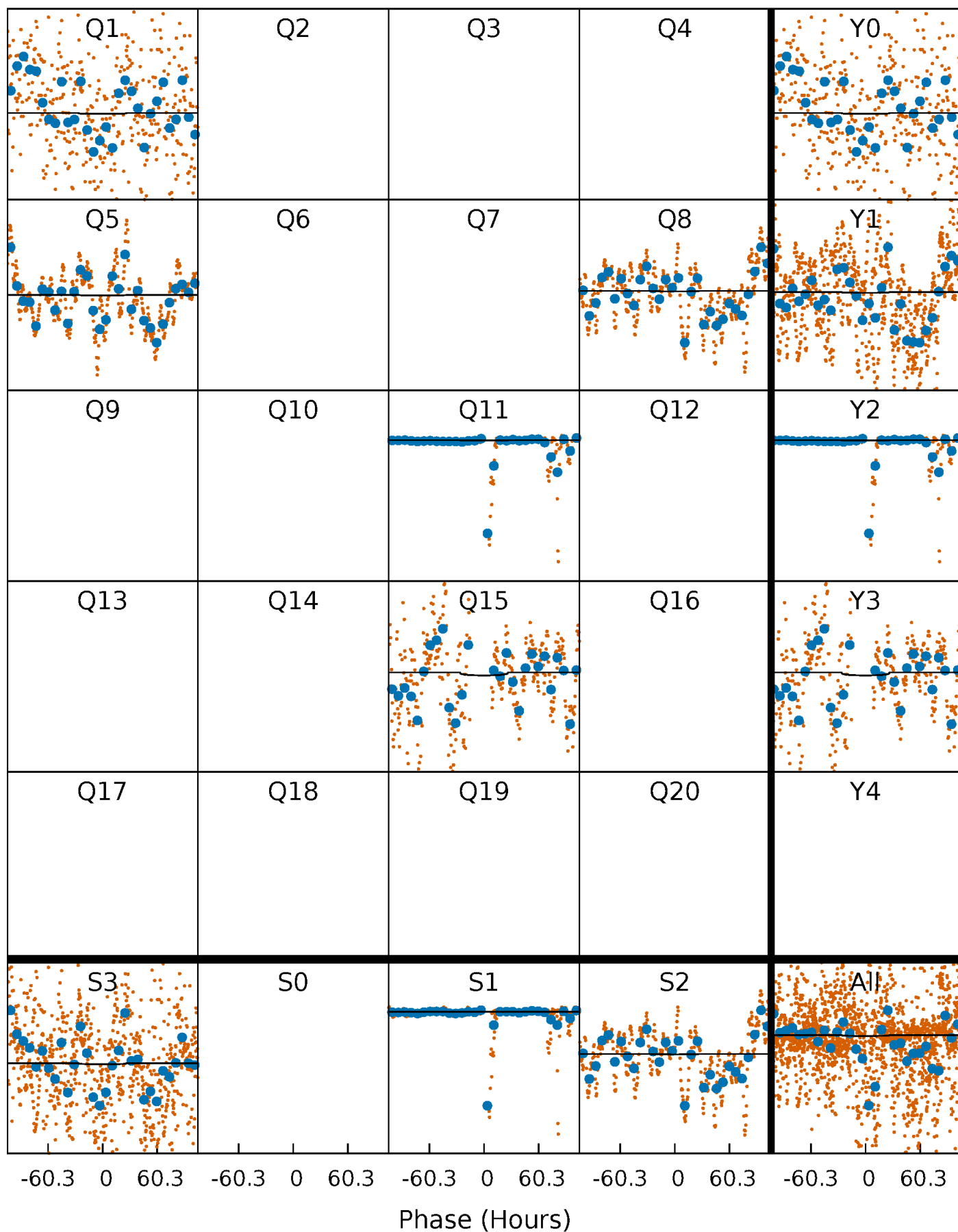
# PDC Quarter-Phased Transit Curves

TCE 006590363-02     $P=311.457401$  Days     $T_0=159.123965$  (BKJD)



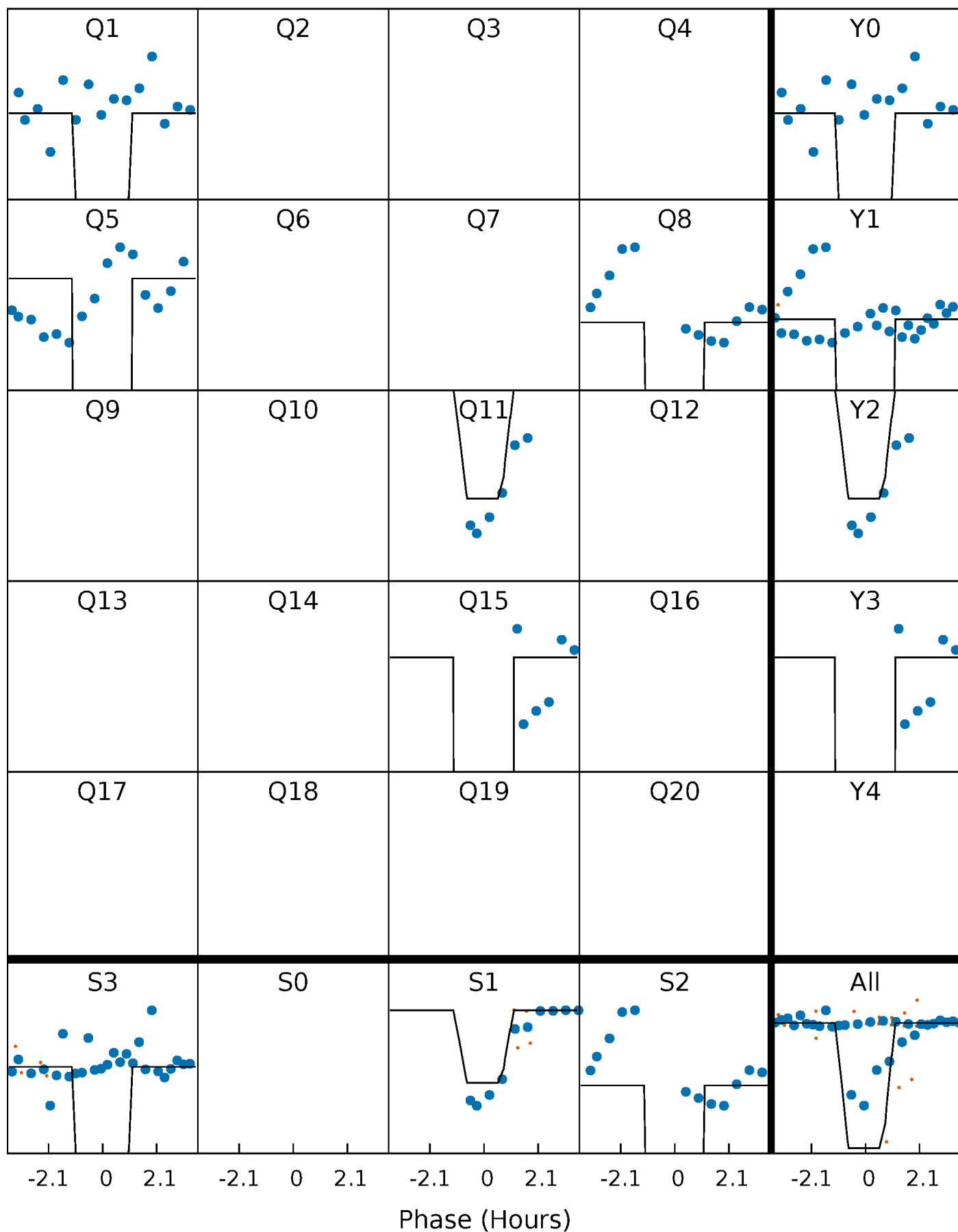
# DV Quarter-Phased Transit Curves

TCE 006590363-02     $P=311.457401$  Days     $T_0=159.123965$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

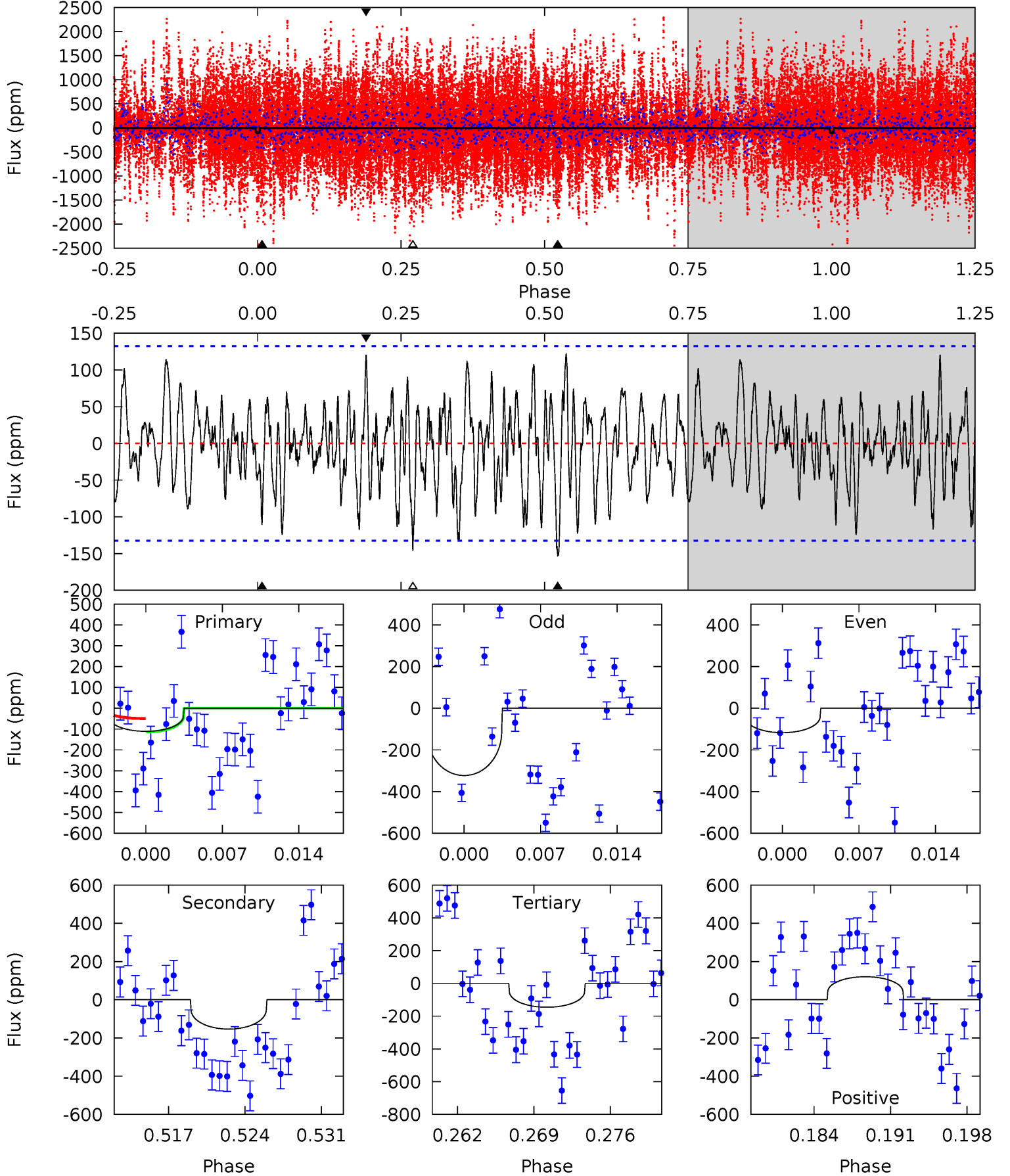
TCE 006590363-02 P=311.498174 Days  $T_0=159.260692$  (BKJD)



# DV Model-Shift Uniqueness Test

006590363-02, P = 311.457401 Days, E = 159.123965 Days

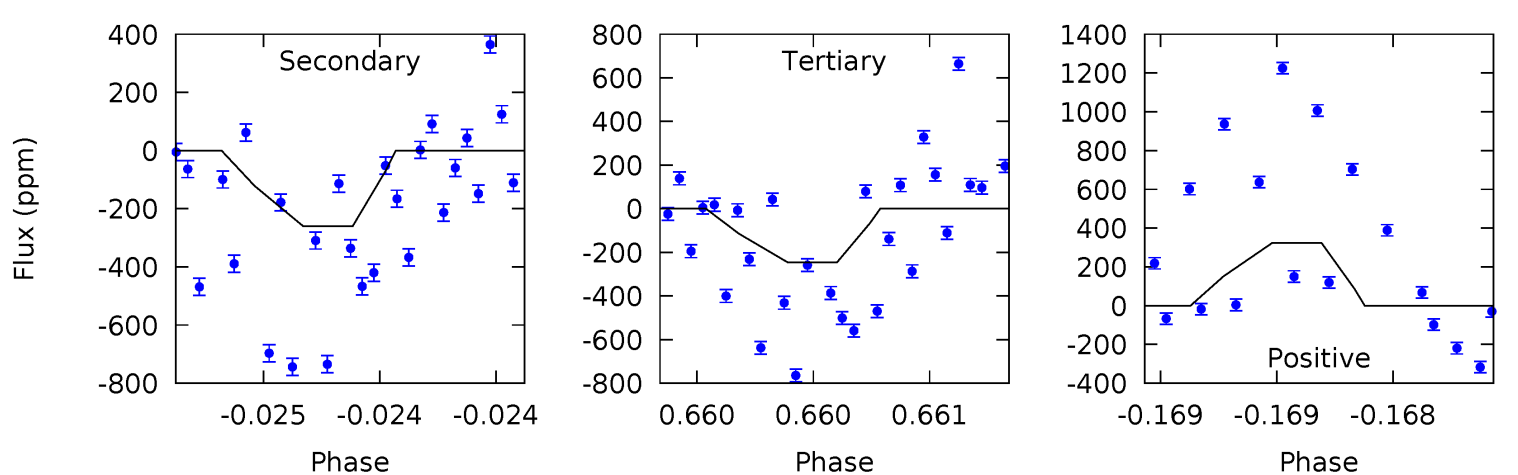
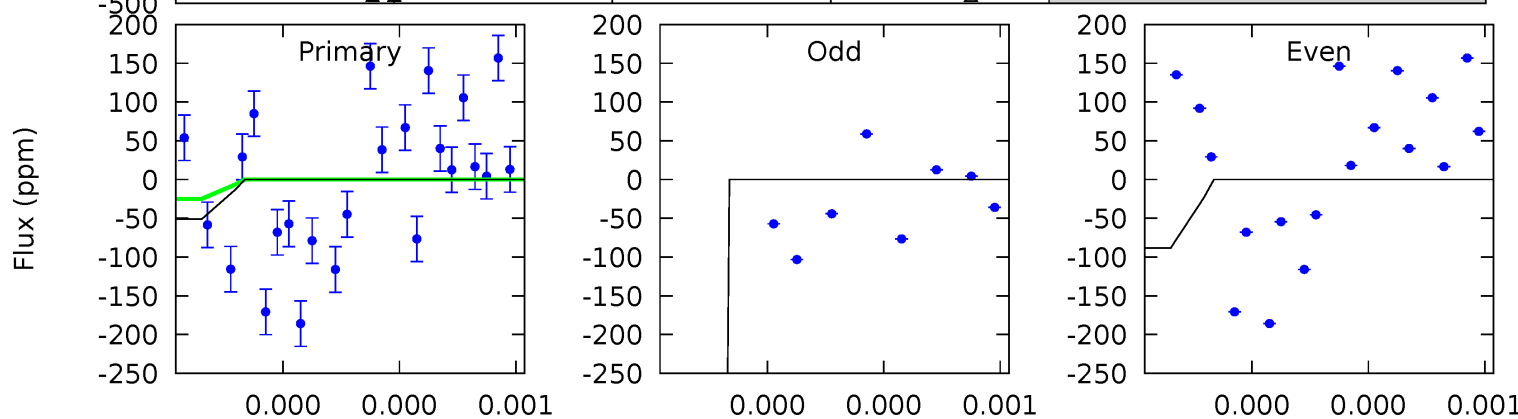
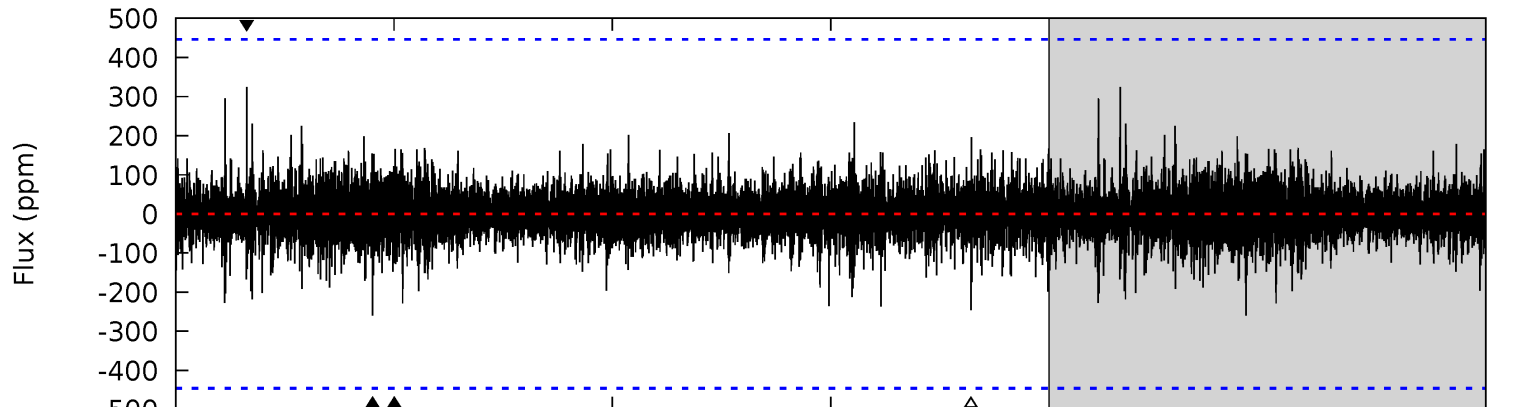
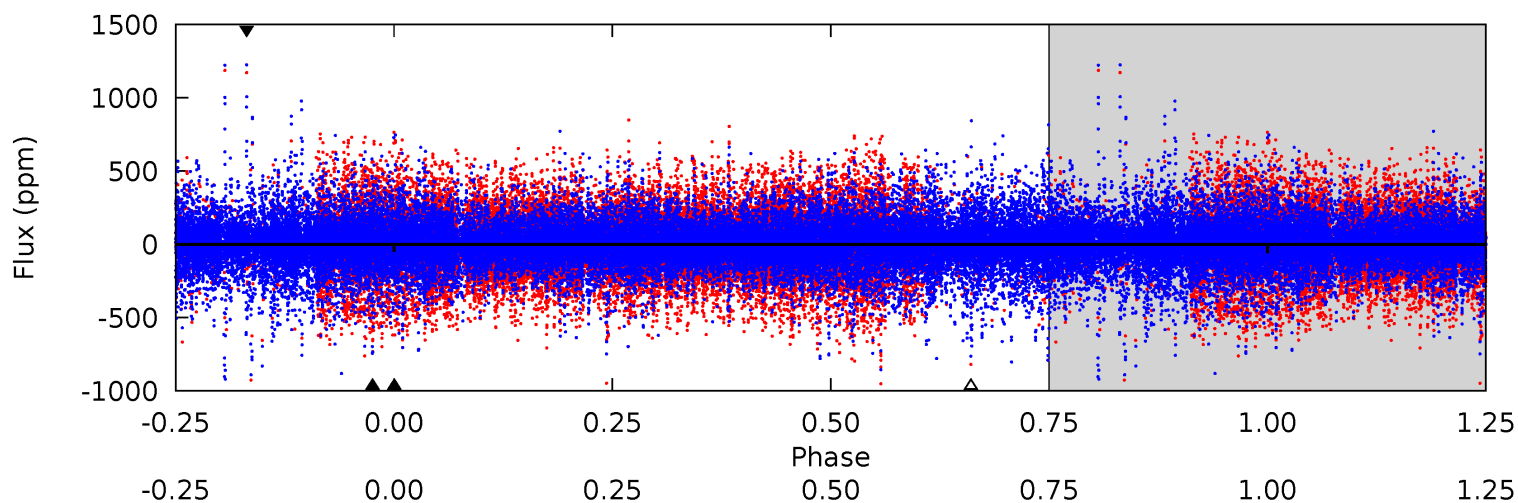
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.26	5.90	5.59	4.63	5.09	2.69	1.90	-1.34	-0.37	0.30	1.27	3.78	3.41	0.44	1.28



# Alt Model-Shift Uniqueness Test

006590363-02, P = 311.498174 Days, E = 159.260692 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0.65	3.33	3.15	4.14	5.71	3.68	0.58	-2.50	-3.49	0.18	-0.81	35.0	45.8	0.55	0





### Stellar Parameters For KIC 006590363

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4659^{+64}_{-110}$	$2.384^{+0.027}_{-0.030}$	$0.070^{+0.150}_{-0.200}$	$16.088^{+2.909}_{-3.556}$	$2.287^{+0.786}_{-0.960}$	$0.001^{+0.000}_{-0.000}$
	+1%/-2%	+1%/-1%	+214%/-286%	+18%/-22%	+34%/-42%	+35%/-15%
Source	PHO55	AST55	SPE55	DSEP		

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

### Secondary Eclipse Parameters for KIC 006590363-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-153 \pm 26$	$9054.10^{+10488.16}_{-6766.25}$	$956^{+391}_{-171}$	$-1779^{+143}_{-270}$	$0.002^{+0.028}_{-0.002}$
Alt.	$-260 \pm 78$	$9632.05^{+11975.66}_{-6634.97}$	$939^{+390}_{-170}$	$-1765^{+138}_{-274}$	$0.003^{+0.031}_{-0.002}$

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

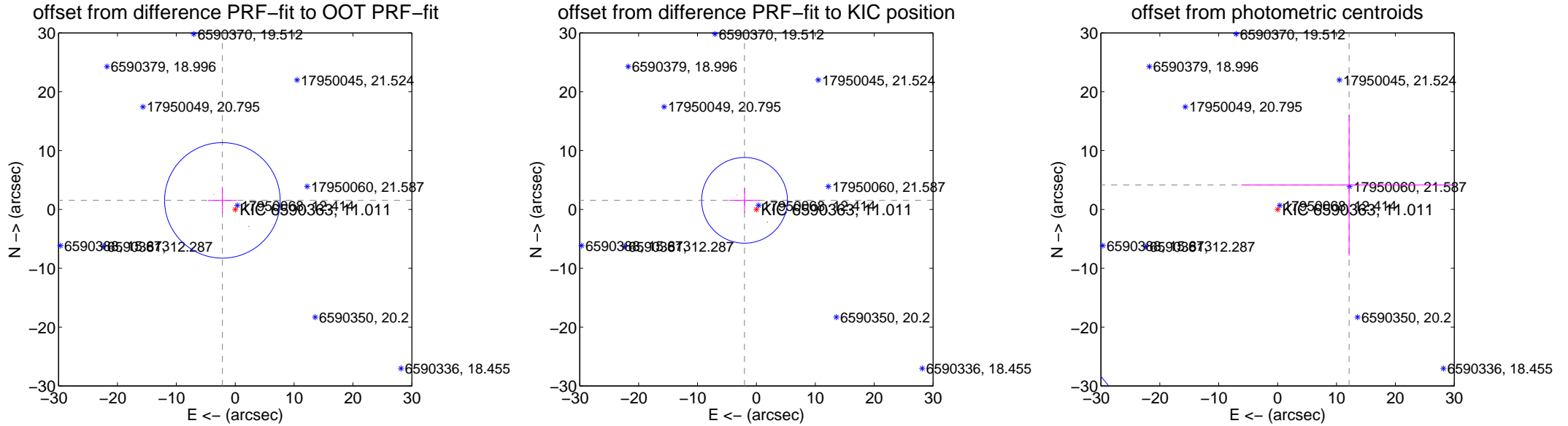
## DV Centroid Data

Supplemental centroid analysis for 006590363-02. **Kepler magnitude: 11.01.** Transit SNR 0.07

**There are 0 quarters with good PRF difference image offsets**

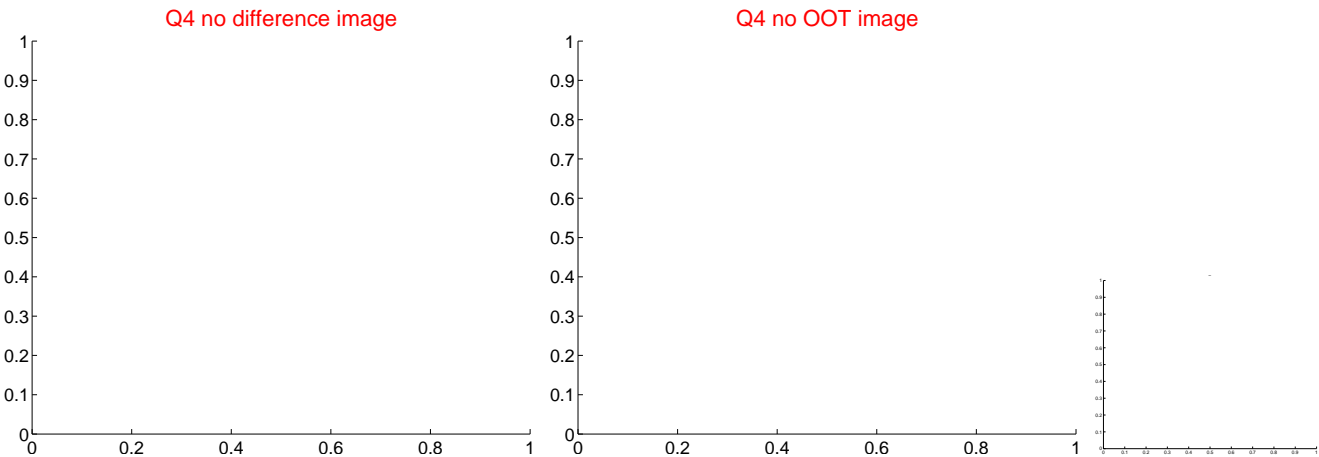
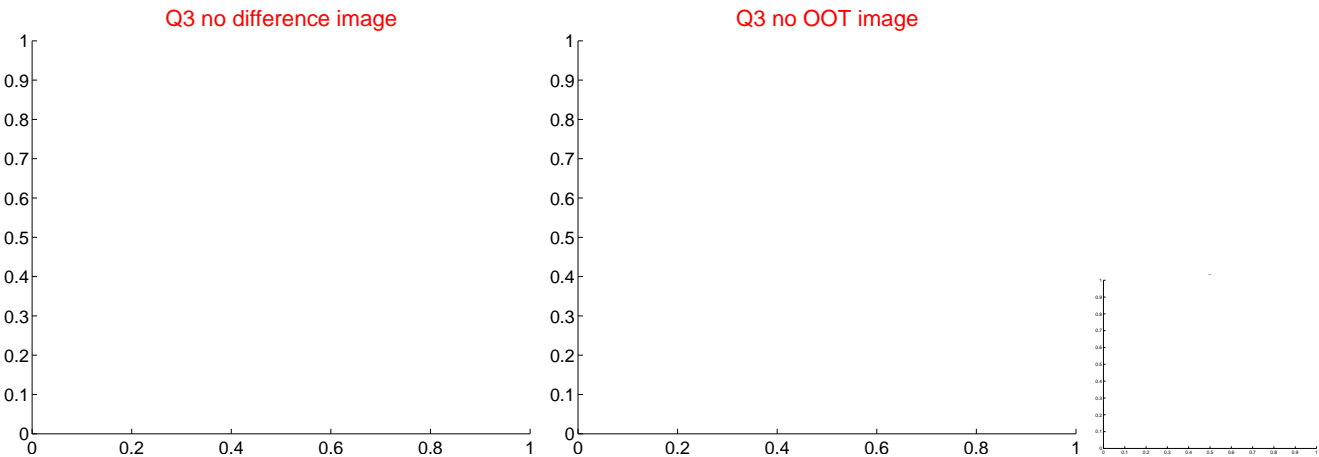
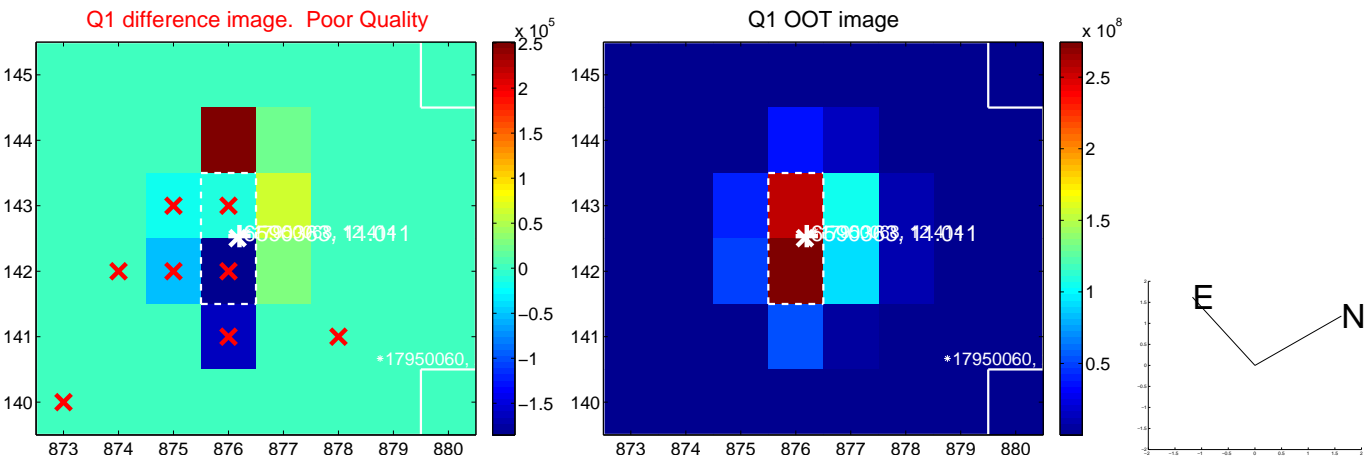
The direct PRF centroid is offset from the target star catalog position by about 0.84 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.667 \pm 3.272$	0.81	$2.179 \pm 2.433$	$1.537 \pm 2.229$
PRF-fit source offset from KIC position	$2.541 \pm 2.428$	1.05	$2.017 \pm 2.599$	$1.544 \pm 2.104$
photometric centroid source offset	$12.84 \pm 17.74$	0.72	$-12.15 \pm 18.30$	$4.16 \pm 11.98$

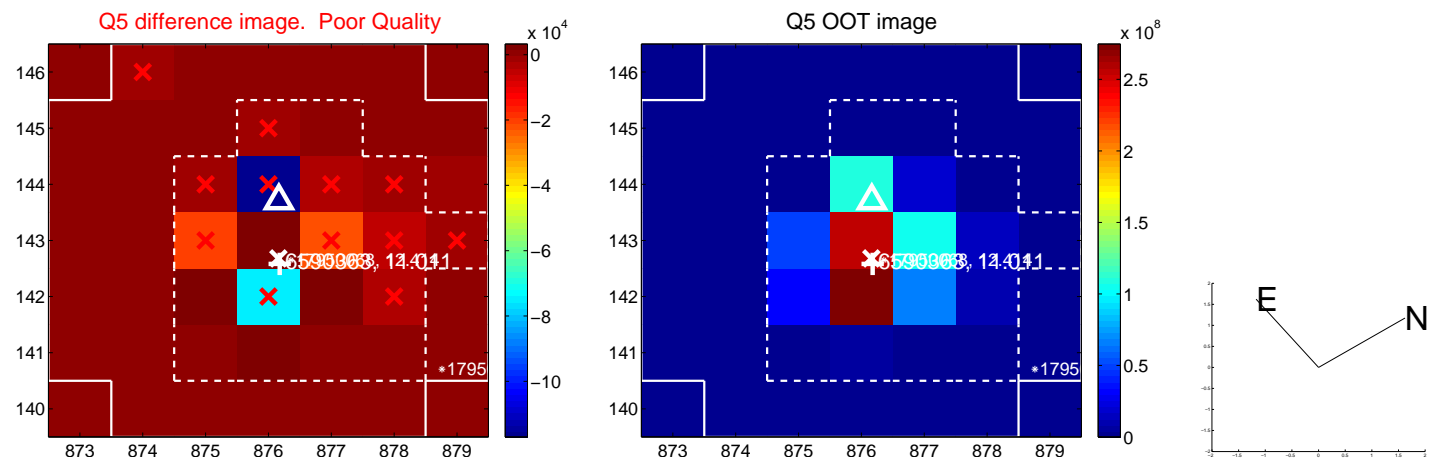


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



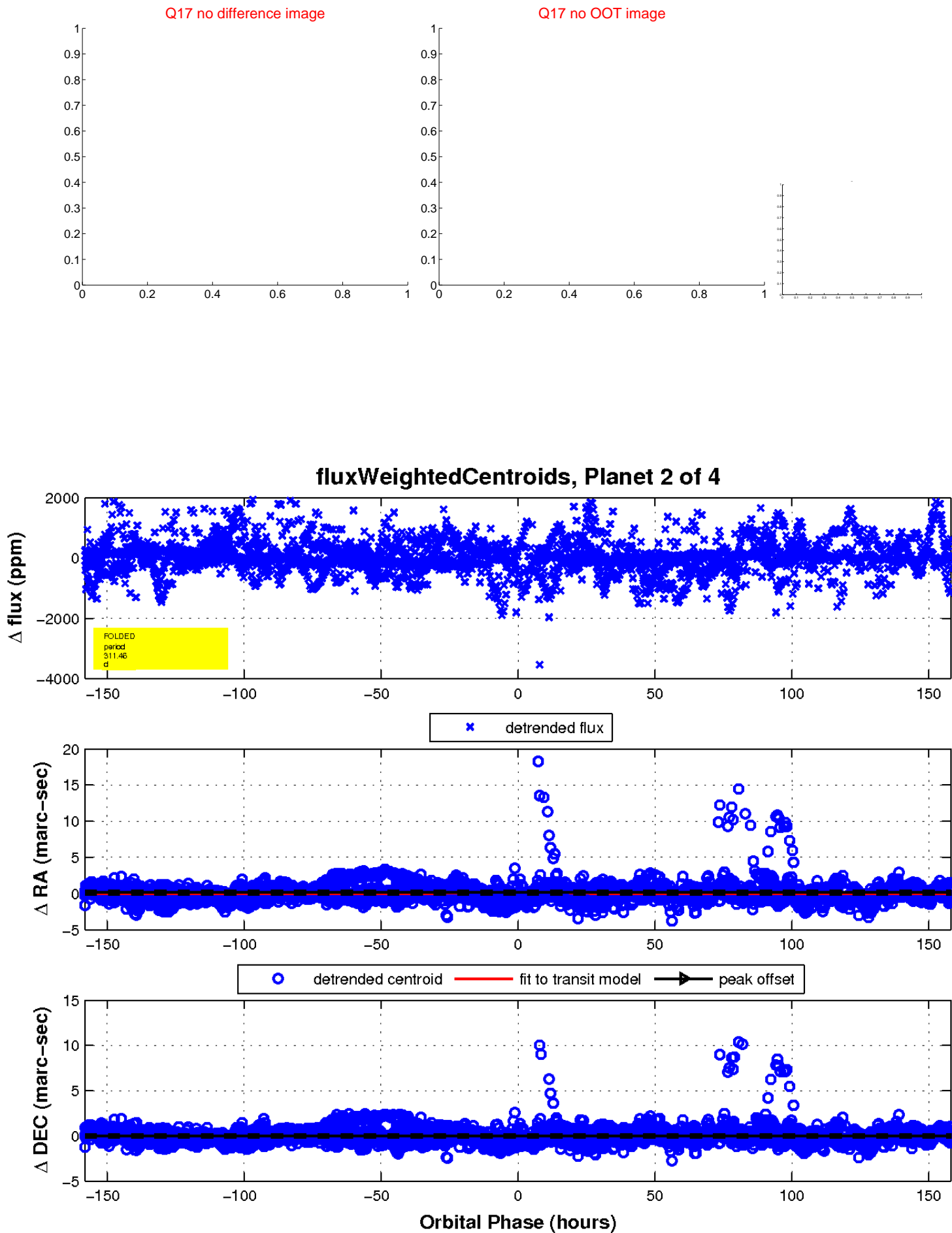
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

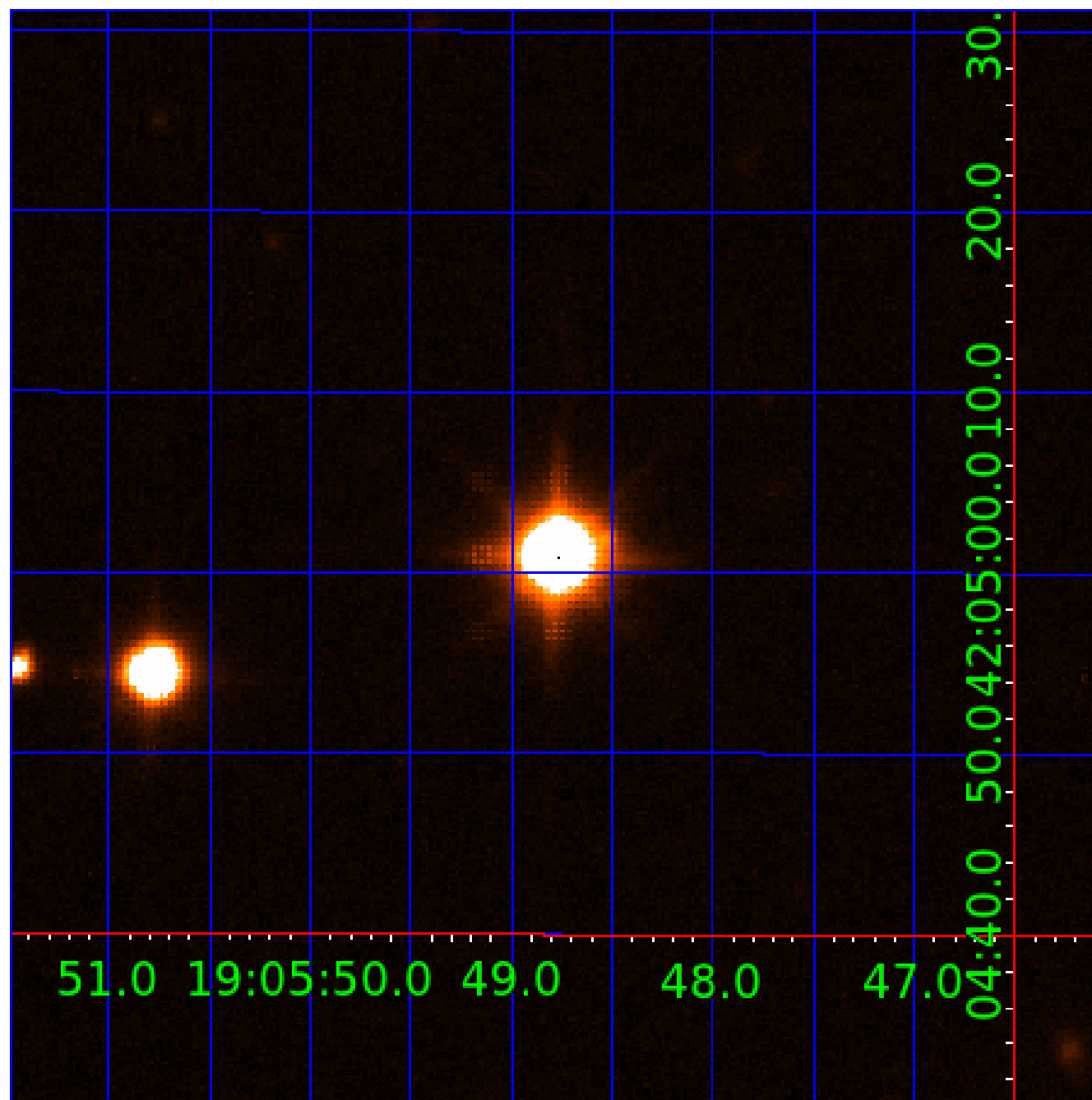


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 006590363

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006590363-01	OBS	No	363.047371	271.267098	480.9	14.804	26.7	16.8	16.09	4659	45.25	63.45
006590363-02	OBS	No	311.457401	159.123965	12.0	52.747	78.0	0.1	16.09	4659	5.63	77.84
006590363-03	OBS	No	210.107631	275.335026	161.6	12.760	9.5	7.9	16.09	4659	24.63	131.57
006590363-04	OBS	No	406.682333	194.882275	152.1	12.500	21.6	-1.0	16.09	4659	19.01	54.54

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006590363-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED
006590363-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
006590363-03	OBS	FP	0.00	1	0	0	0	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_SATURATED
006590363-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—CENT_SATURATED

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

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

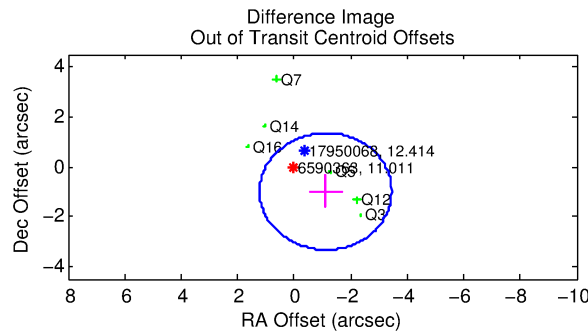
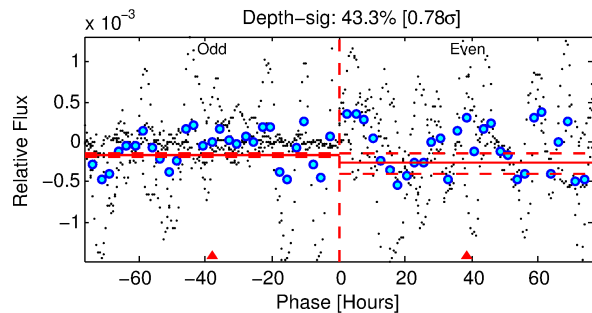
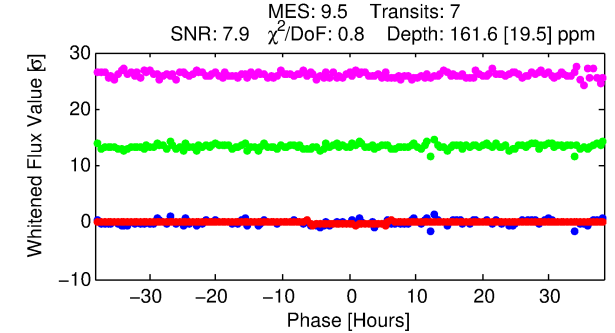
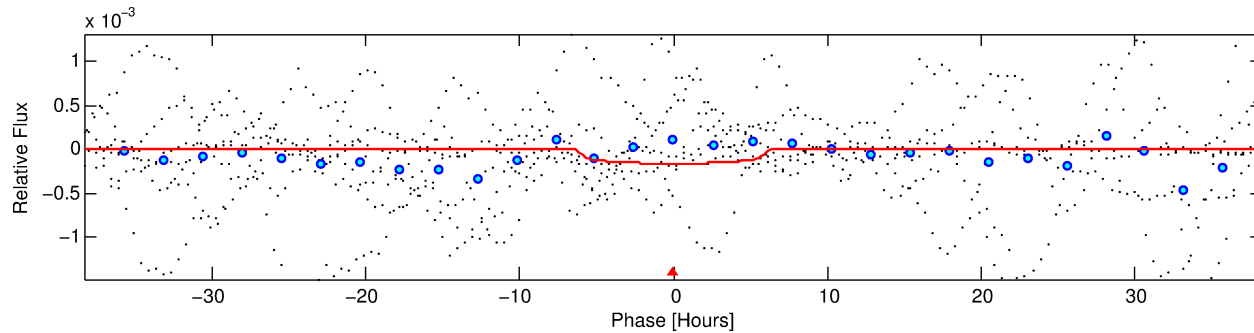
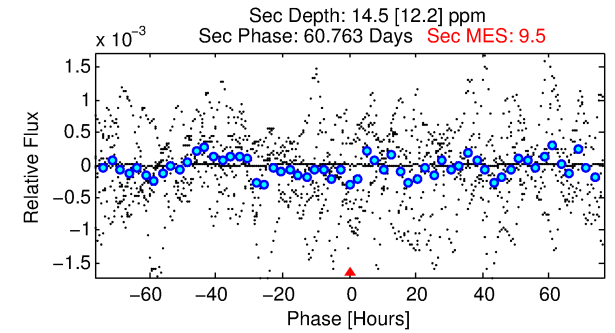
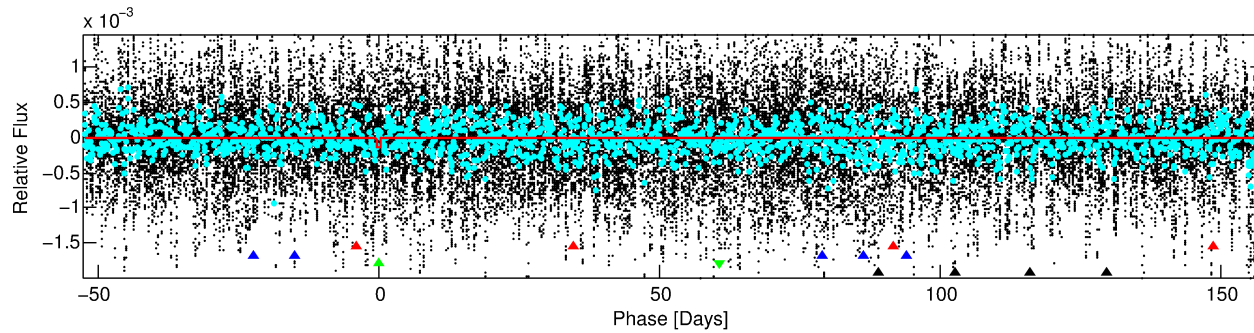
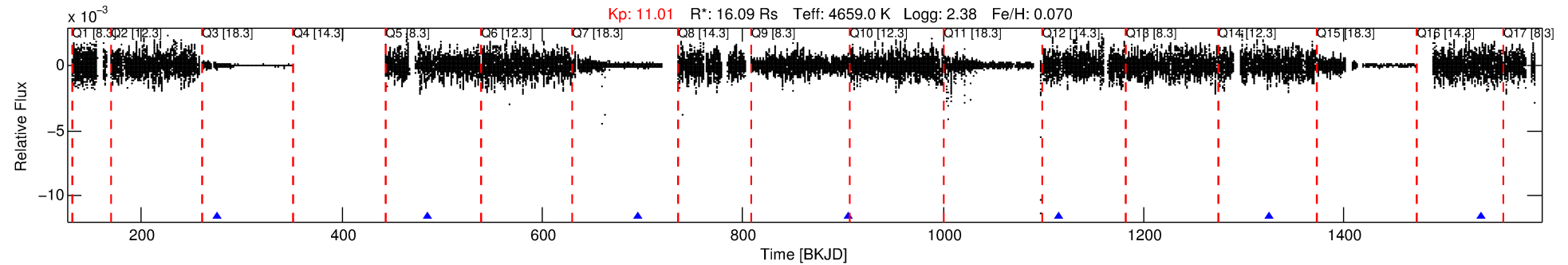
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006590363-03

No Significant Match Found

# DV One-Page Summary

KIC: 6590363 Candidate: 3 of 4 Period: 210.108 d



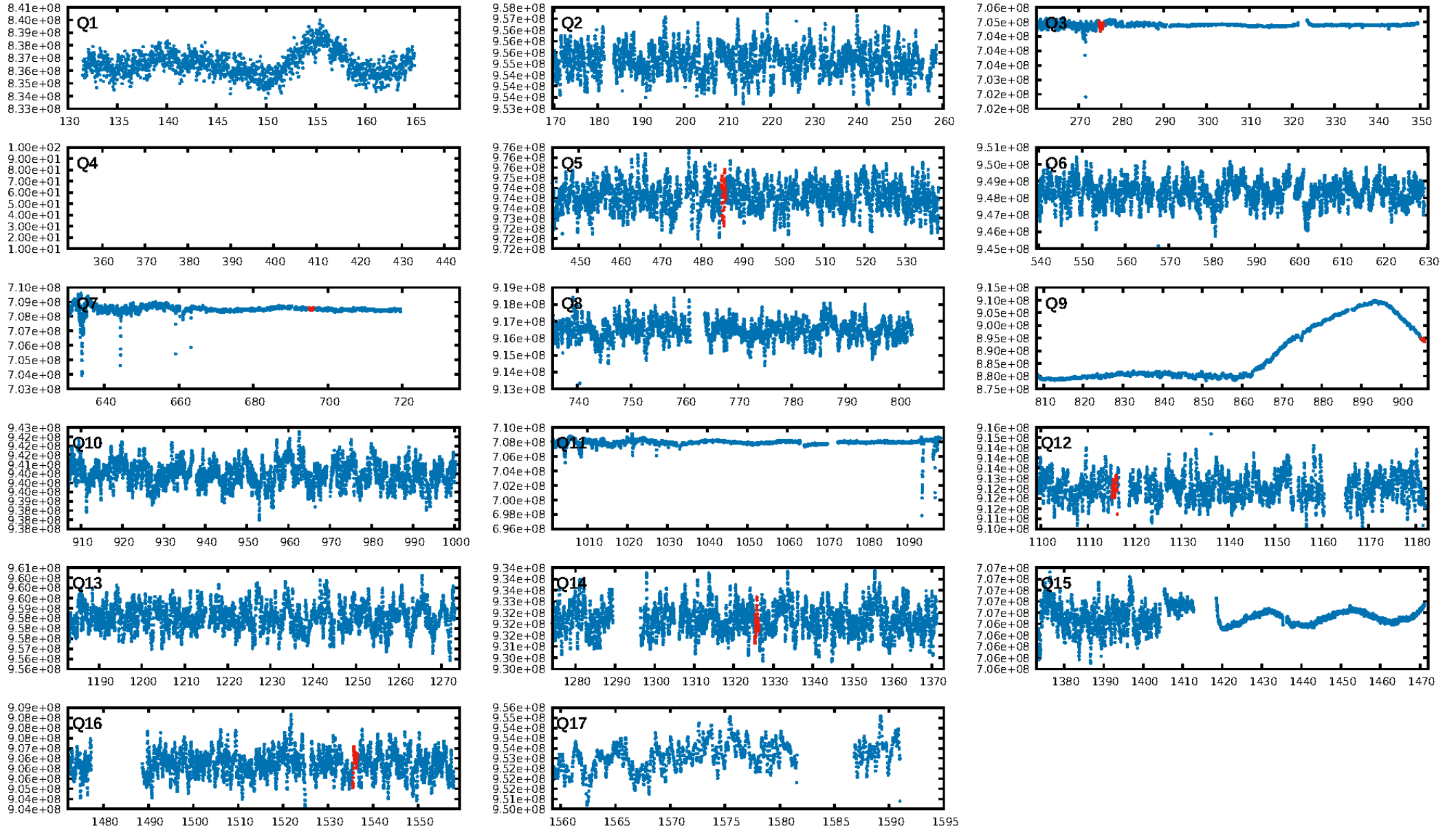
## DV Fit Results:

Period = 210.10763 [0.00306] d  
Epoch = 275.3350 [0.0085] BKJD  
Rp/R\* = 0.0140 [0.0013]  
a/R\* = 62.91 [15.50]  
b = 0.88 [0.06]  
Seff = 131.57 [23.81]  
Teq = 864 [39] K  
Rp = 24.63 [5.93] Re  
a = 0.9113 [0.1359] AU  
Ag = 10.96 [9.60] [1.04σ]  
Teffp = 2429 [527] K [2.96σ]

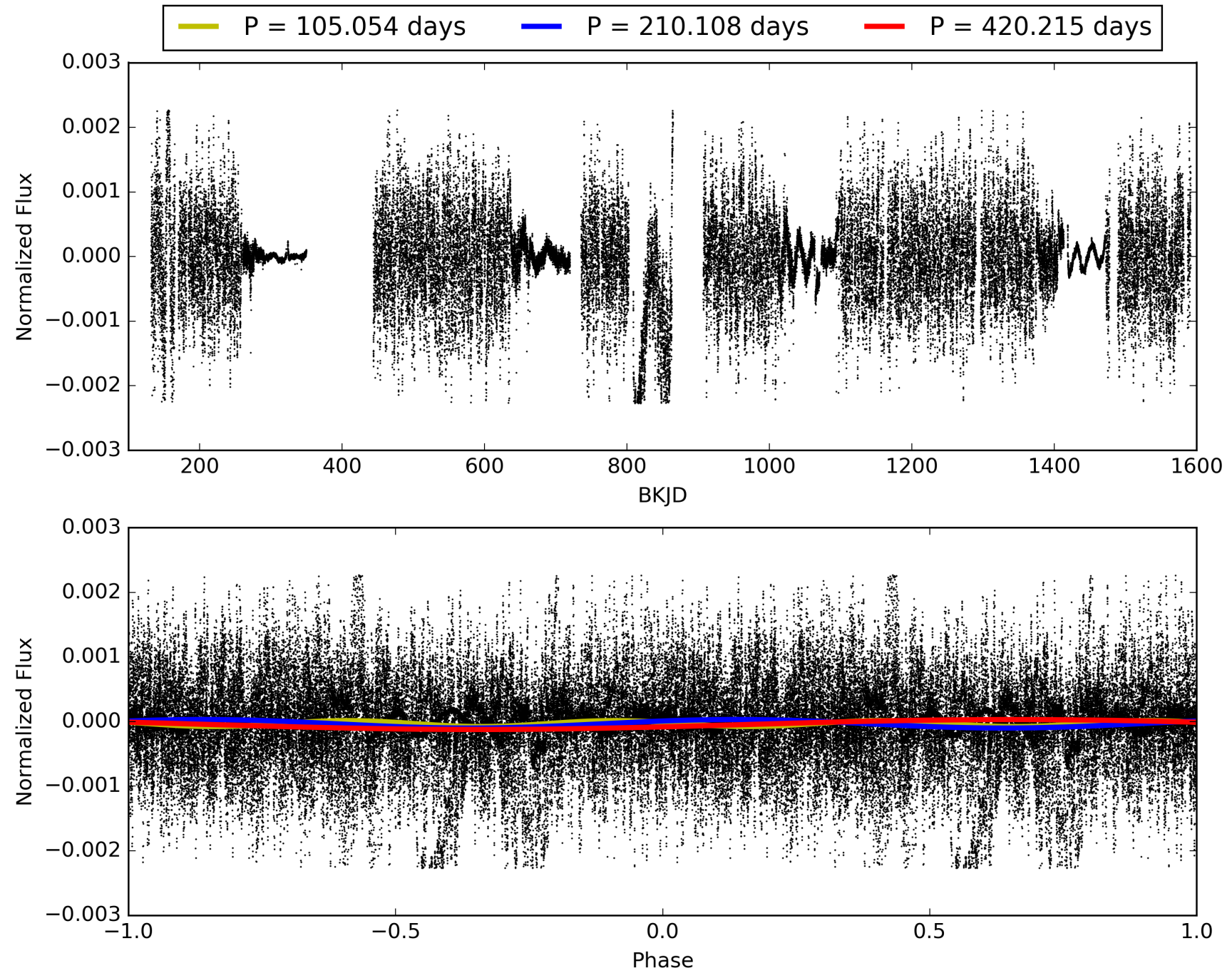
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [44.82σ]  
ModelChiSquare2-sig: 20.9%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [7/7]  
GhostDiagnostic-chr: -2.768  
Centroid-sig: 14.0%  
Centroid-so: 1.491 arcsec [1.29σ]  
OotOffset-rm: 1.494 arcsec [1.92σ]  
KicOffset-rm: 1.457 arcsec [1.66σ]  
OotOffset-st: 1/2/2/1 [6]  
KicOffset-st: 1/2/2/1 [6]  
DiffImageQuality-fgm: 0.50 [3/6]  
DiffImageOverlap-fno: 1.00 [6/6]

# TCE 006590363-03, PDC Light Curves

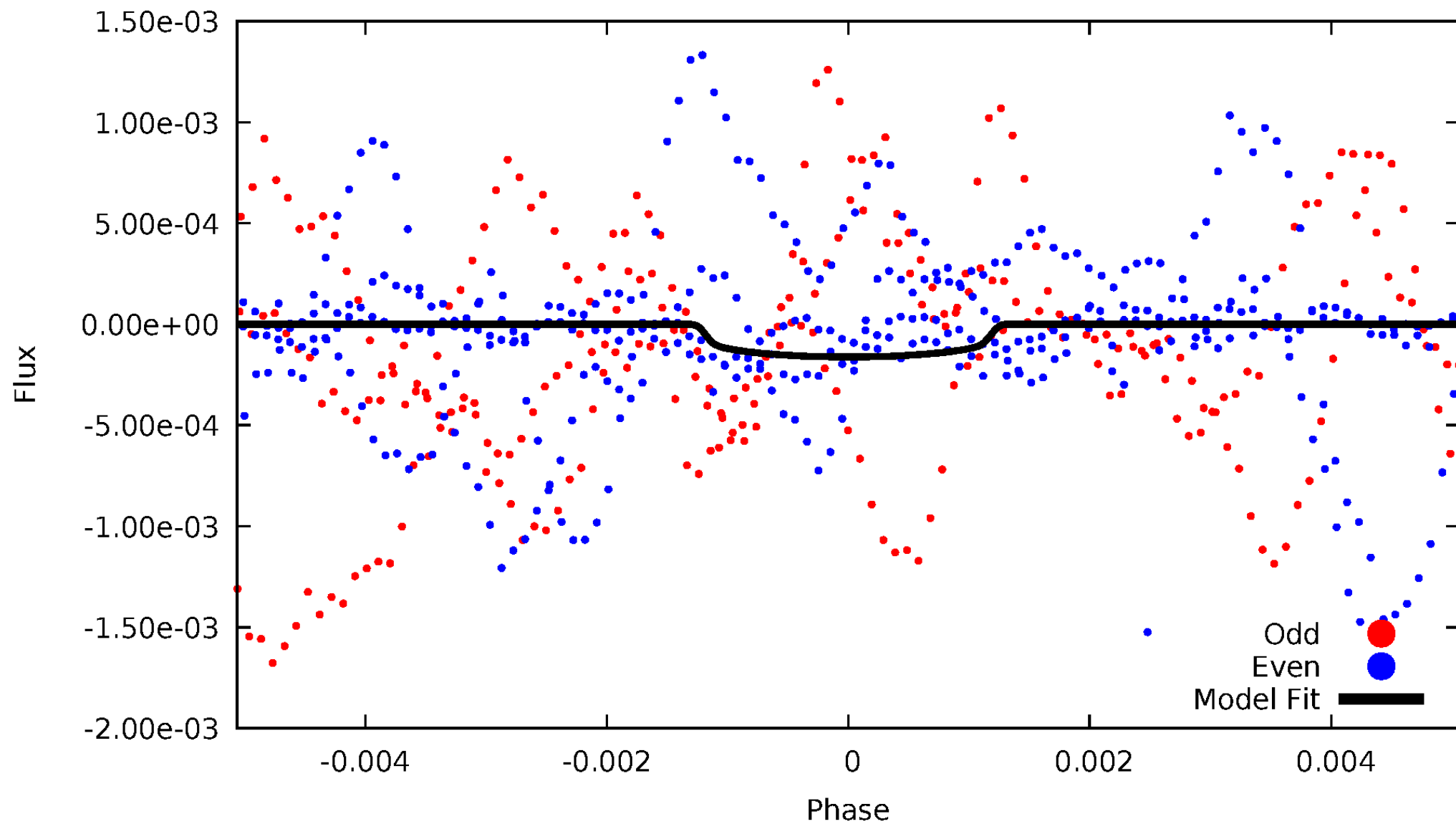


TCE 006590363-03



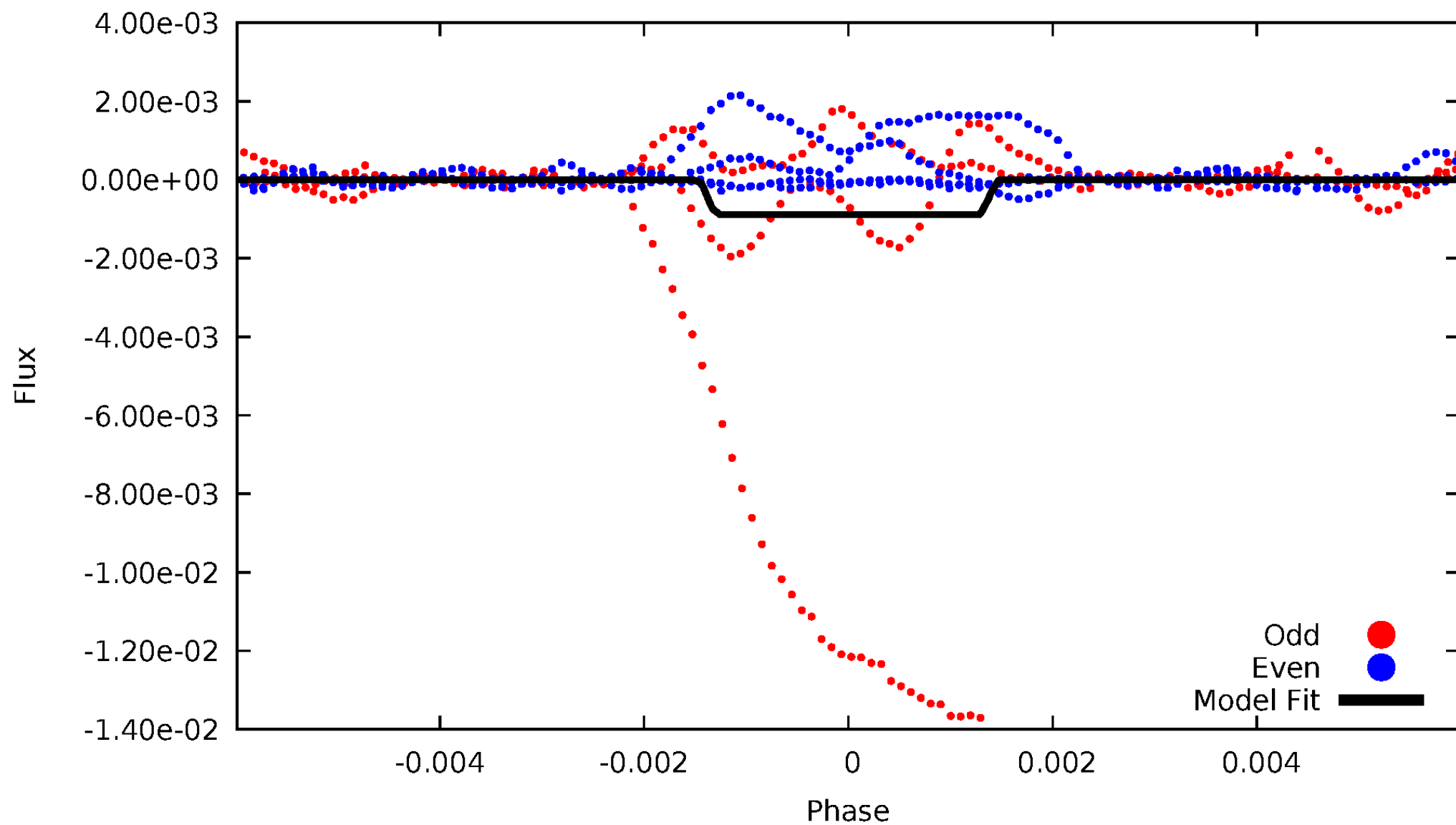
# DV Odd/Even

TCE 006590363-03



# ALT Odd/Even

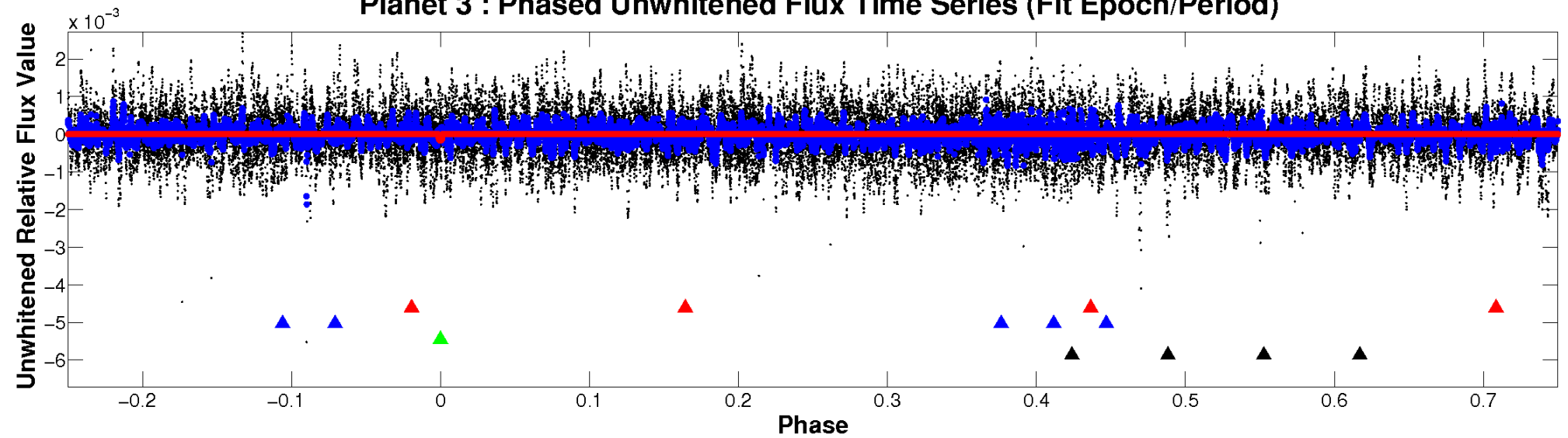
TCE 006590363-03



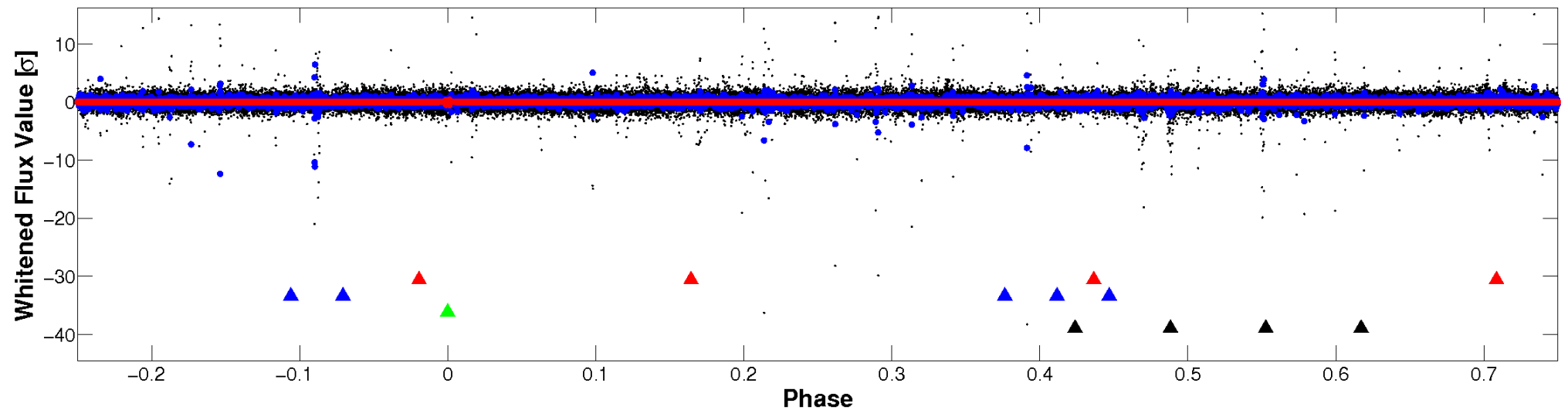


# Non-Whitened Vs. Whitened Light Curve

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

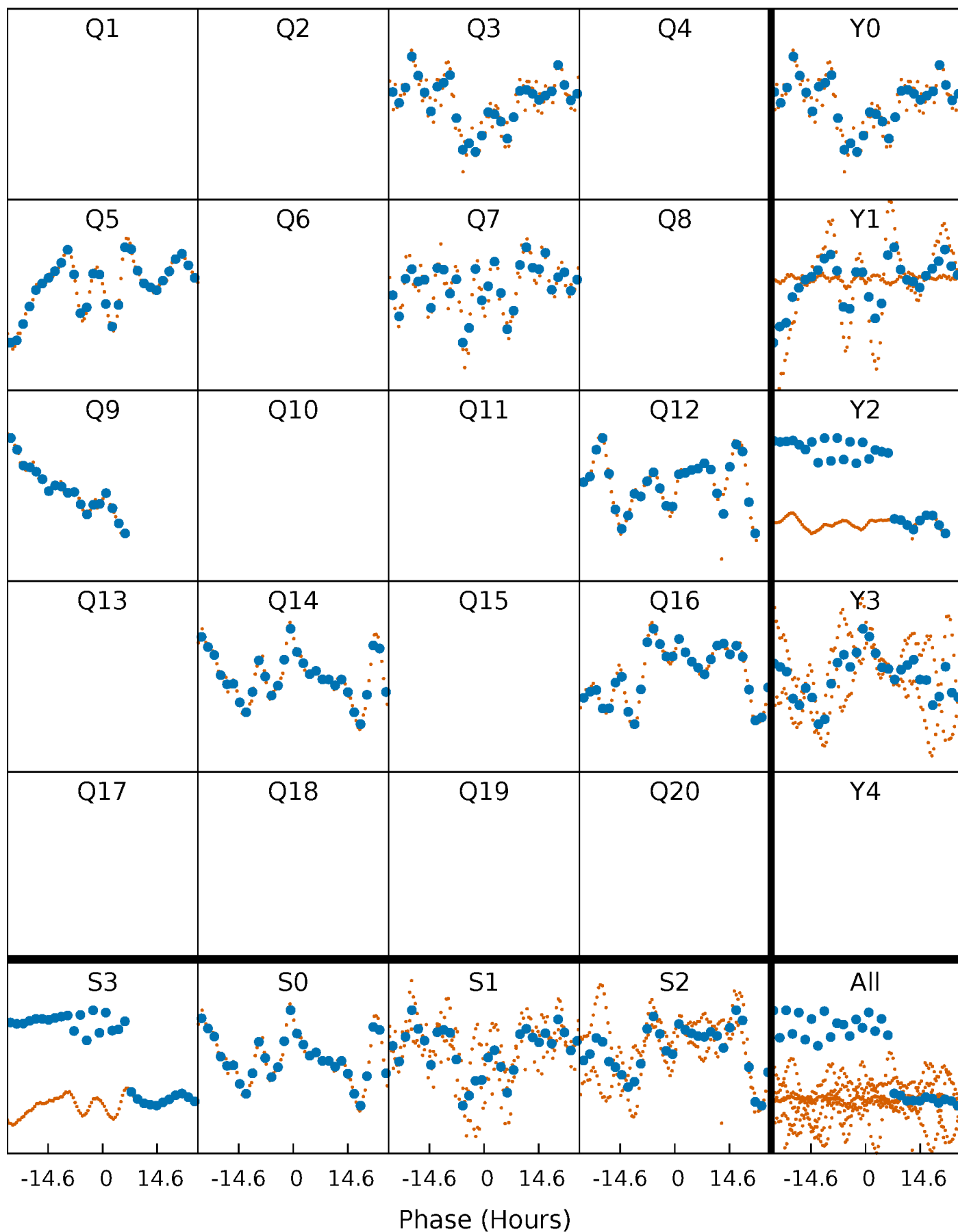


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

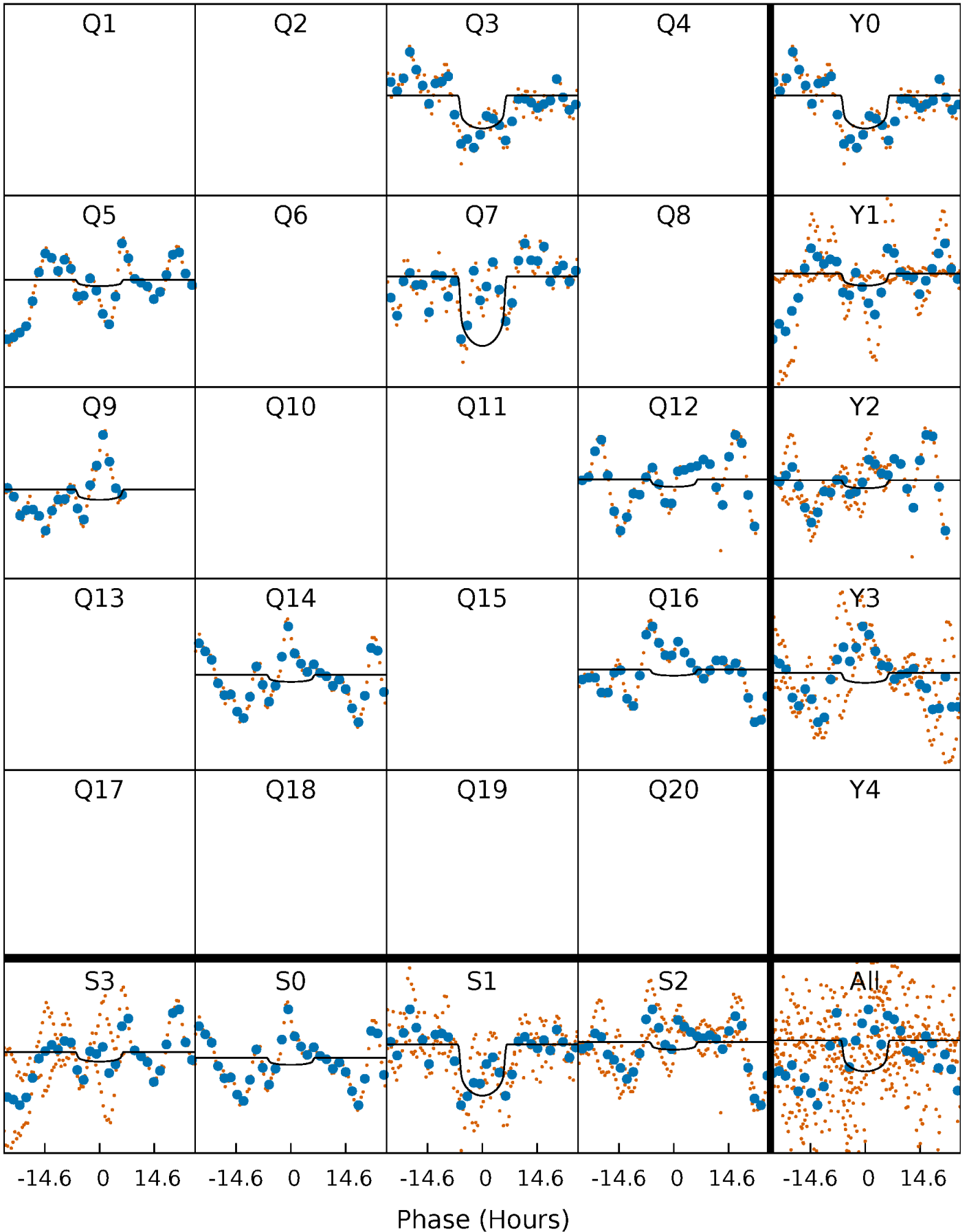
TCE 006590363-03     $P=210.107631$  Days     $T_0=275.335026$  (BKJD)





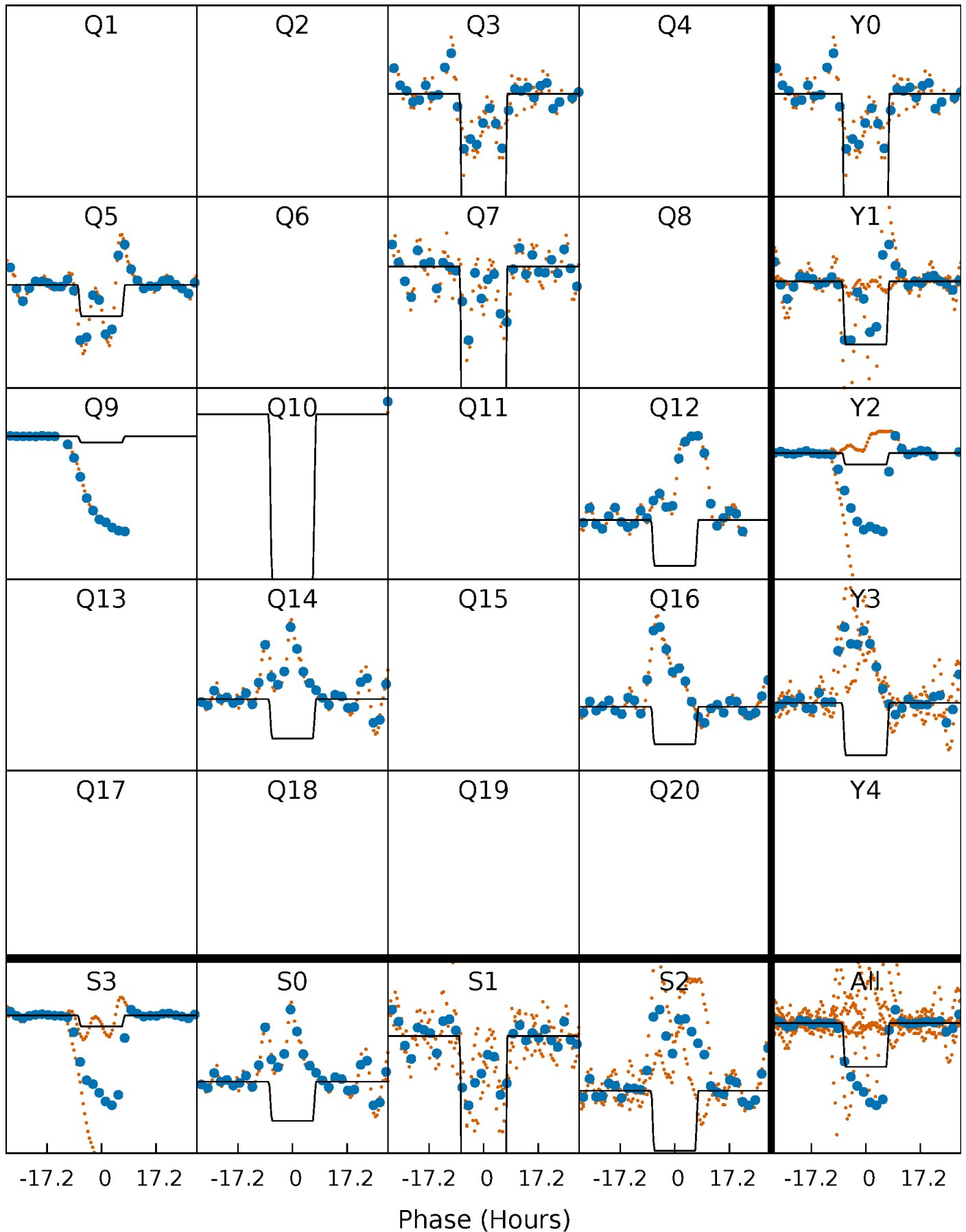
# DV Quarter-Phased Transit Curves

TCE 006590363-03     $P=210.107631$  Days     $T_0=275.335026$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

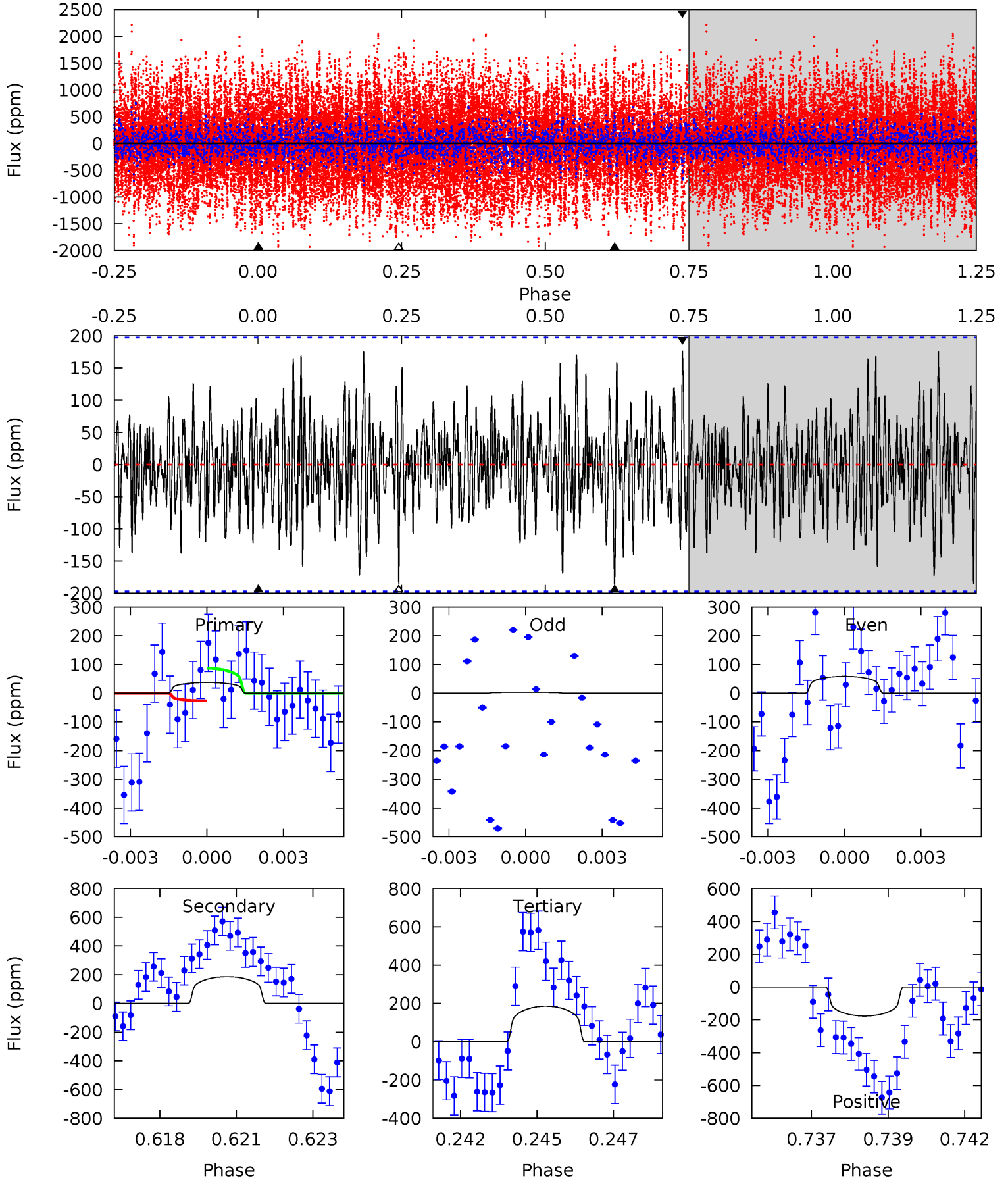
TCE 006590363-03 P=210.097864 Days  $T_0=275.361430$  (BKJD)



# DV Model-Shift Uniqueness Test

006590363-03, P = 210.107631 Days, E = 65.227395 Days

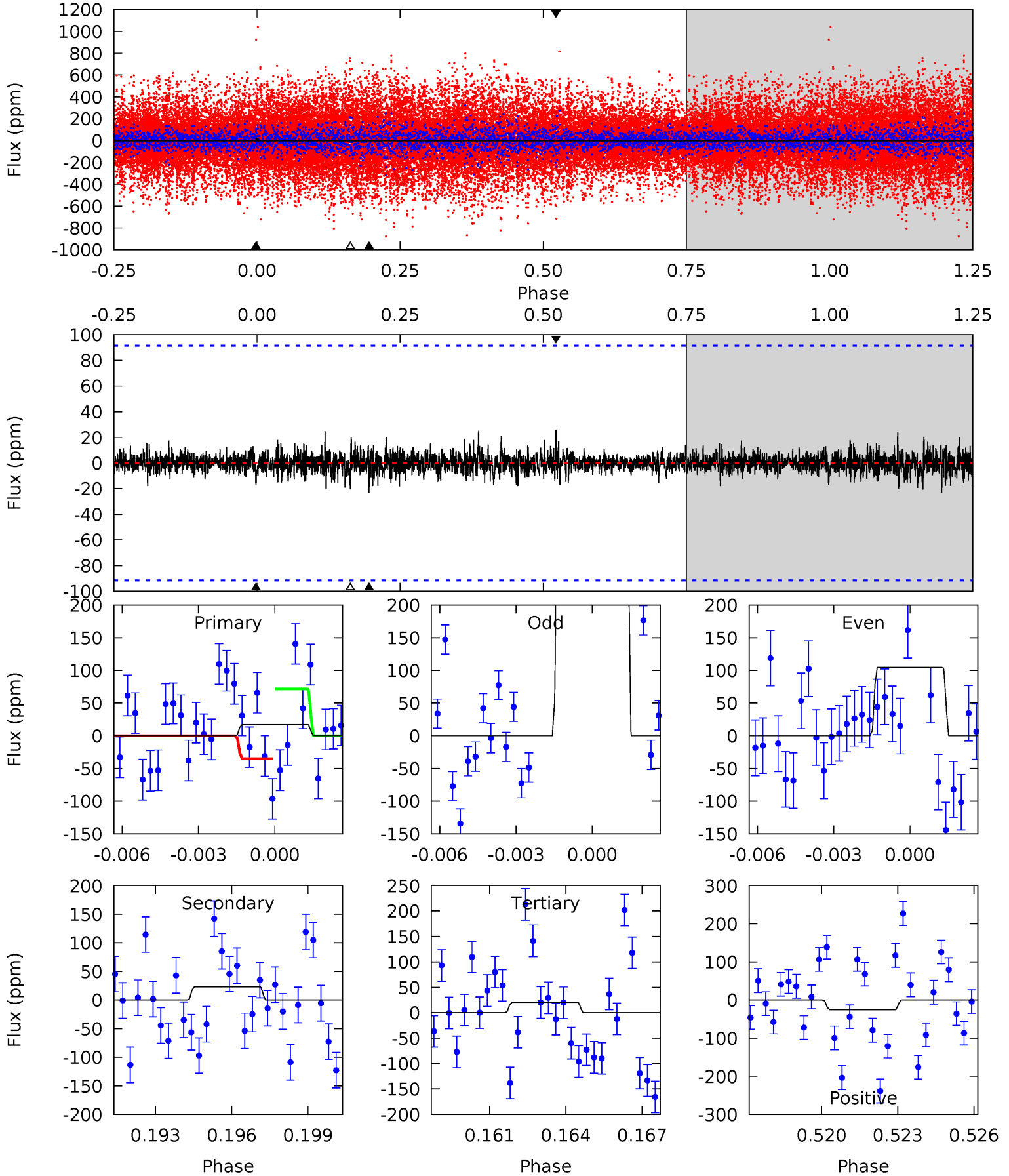
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0.99	4.99	4.97	4.73	5.28	3.01	1.55	-3.98	-3.73	0.02	0.27	0.74	-0.79	0.49	0.82



# Alt Model-Shift Uniqueness Test

006590363-03, P = 210.097864 Days, E = 65.263566 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0.98	1.32	1.18	1.46	5.26	2.98	0.30	-0.20	-0.48	0.15	-0.14	14.7	18.4	0.52	0



### Stellar Parameters For KIC 006590363

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4659^{+64}_{-110}$	$2.384^{+0.027}_{-0.030}$	$0.070^{+0.150}_{-0.200}$	$16.088^{+2.909}_{-3.556}$	$2.287^{+0.786}_{-0.960}$	$0.001^{+0.000}_{-0.000}$
	+1%/-2%	+1%/-1%	+214%/-286%	+18%/-22%	+34%/-42%	+35%/-15%
Source	PHO55	AST55	SPE55	DSEP		

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

### Secondary Eclipse Parameters for KIC 006590363-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-187 \pm 37$	$25.26^{+3.69}_{-3.90}$	$1208^{+31}_{-40}$	$4583^{+284}_{-267}$	$137^{+46}_{-35}$
Alt.	$-23 \pm 17$	$54.20^{+6.59}_{-8.16}$	$1207^{+36}_{-39}$	$2602^{+200}_{-553}$	$3.822^{+2.964}_{-3.062}$

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

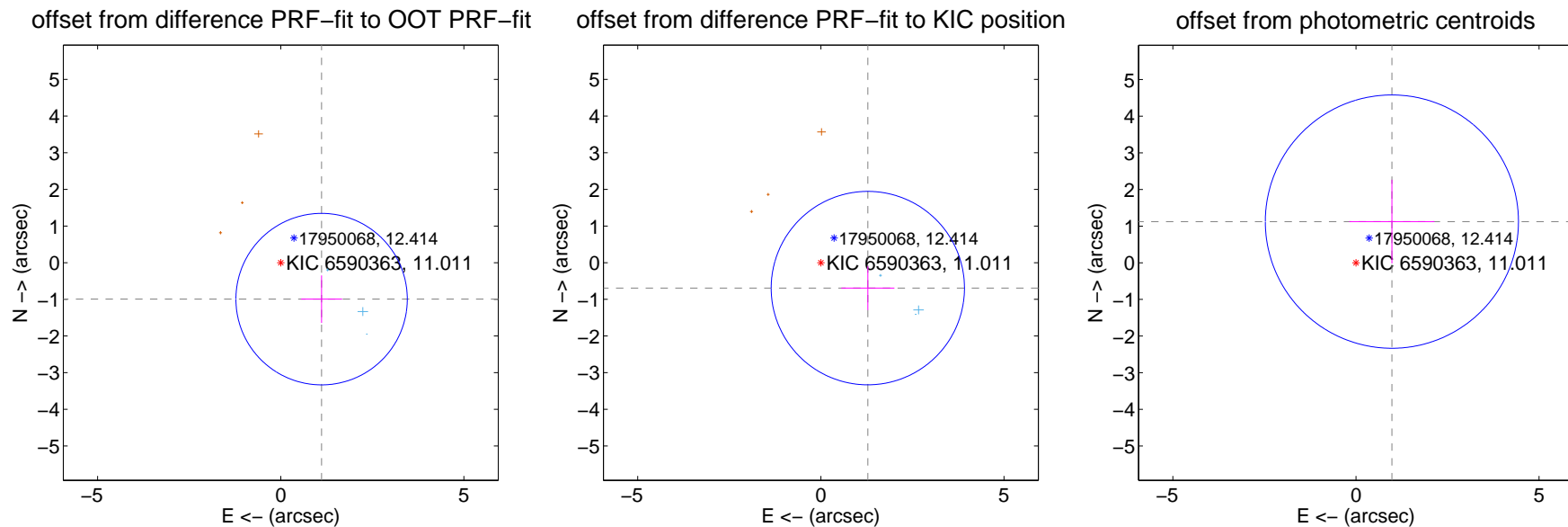
## DV Centroid Data

Supplemental centroid analysis for 006590363-03. **Kepler magnitude: 11.01.** Transit SNR 7.94

**There are 3 quarters with good PRF difference image offsets**

The direct PRF centroid is offset from the target star catalog position by about 0.63 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.494 \pm 0.780$	1.92	$-1.115 \pm 0.559$	$-0.994 \pm 0.647$
PRF-fit source offset from KIC position	$1.457 \pm 0.879$	1.66	$-1.282 \pm 0.725$	$-0.693 \pm 0.597$
photometric centroid source offset	$1.49 \pm 1.15$	1.29	$-0.98 \pm 1.16$	$1.12 \pm 1.14$



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

Q1 no difference image



Q1 no OOT image



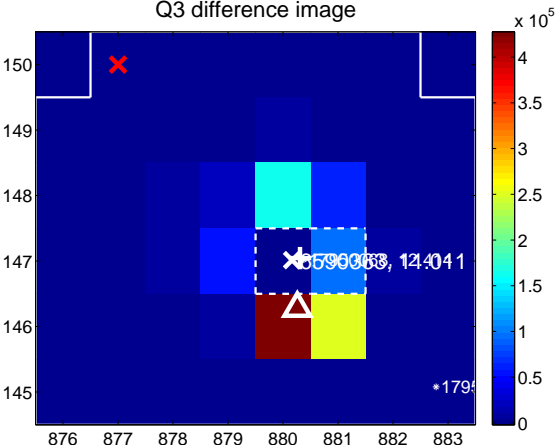
Q2 no difference image



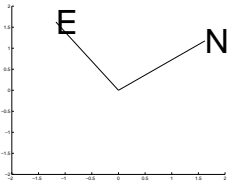
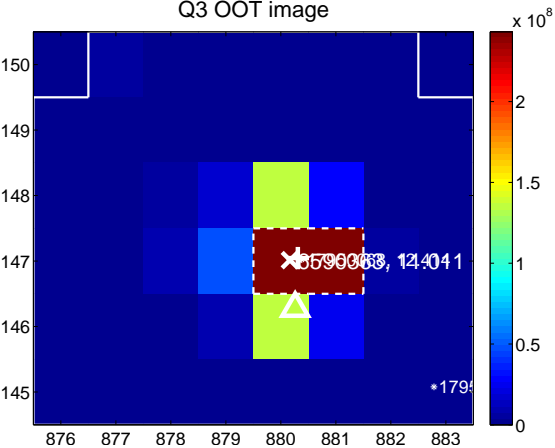
Q2 no OOT image



Q3 difference image



Q3 OOT image



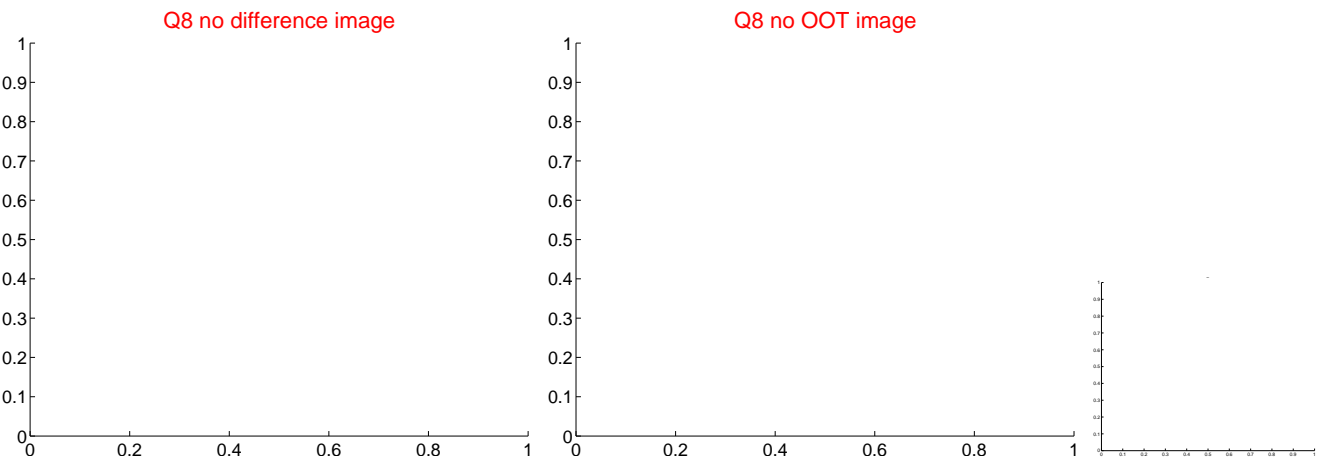
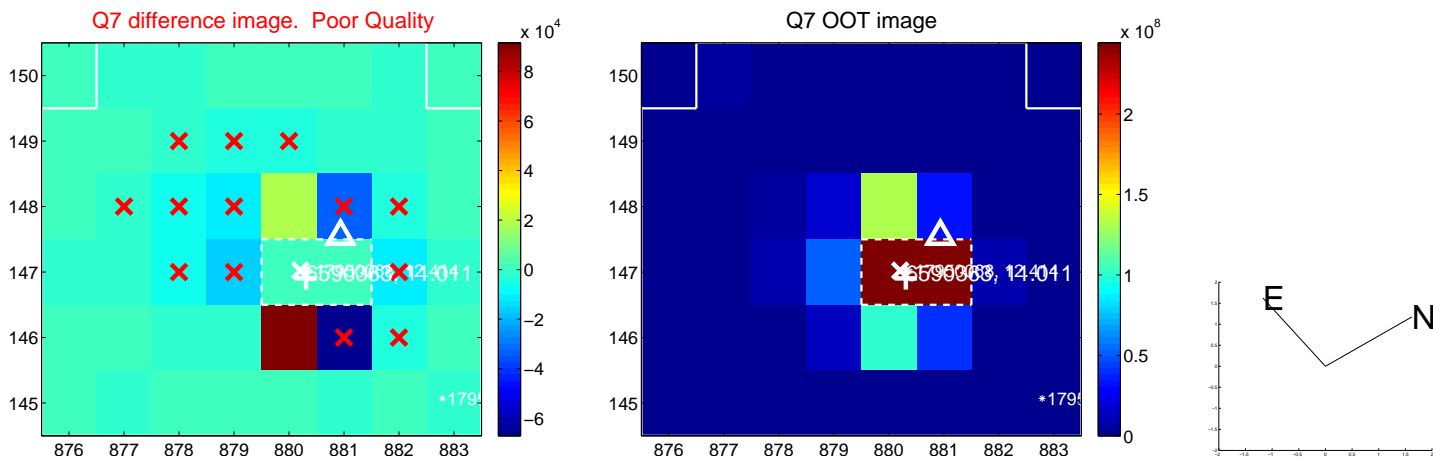
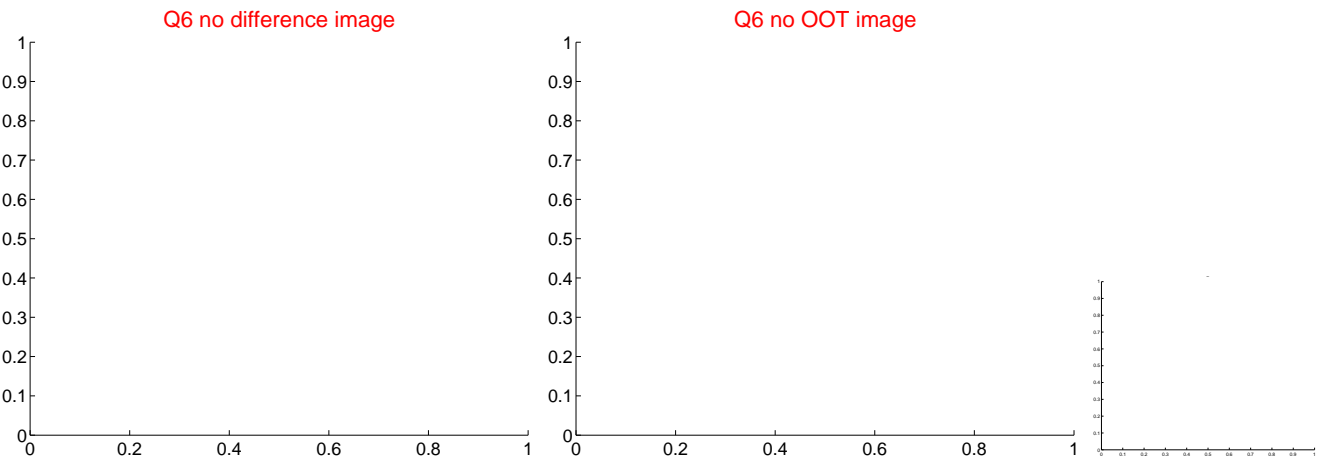
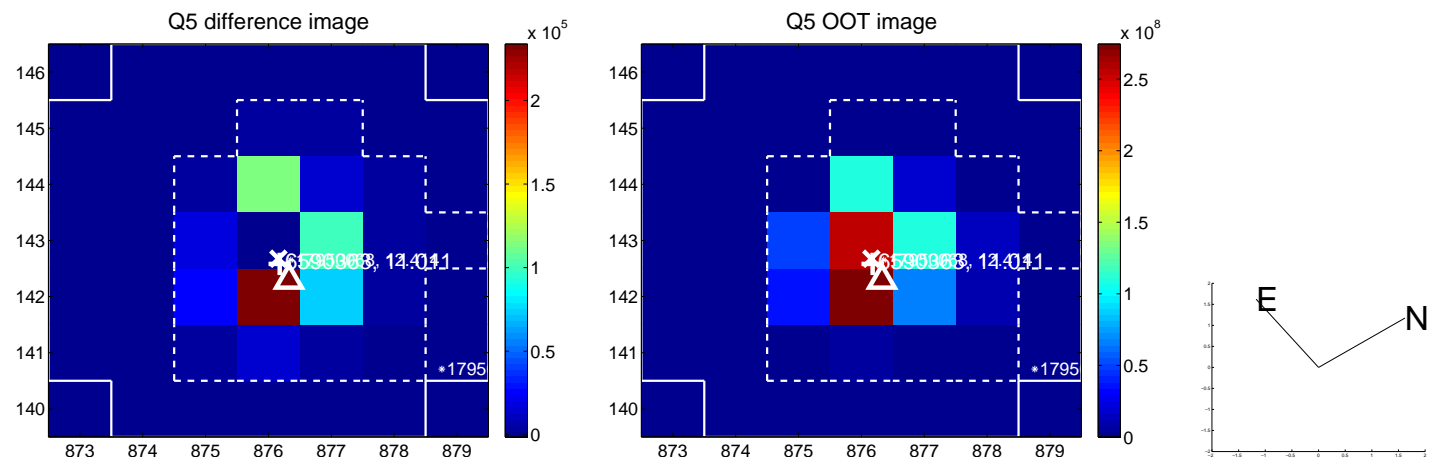
Q4 no difference image



Q4 no OOT image



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.

Q9 no difference image



Q9 no OOT image



Q10 no difference image



Q10 no OOT image



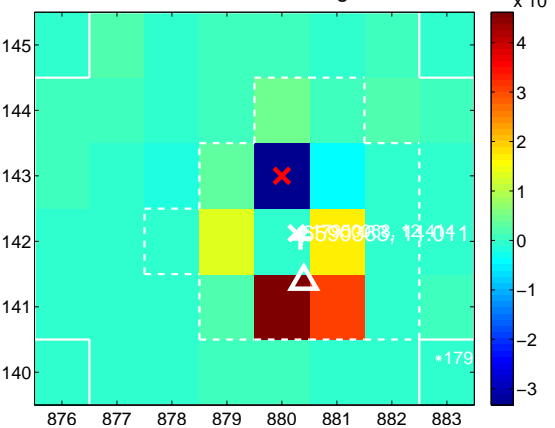
Q11 no difference image



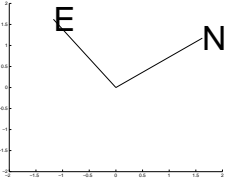
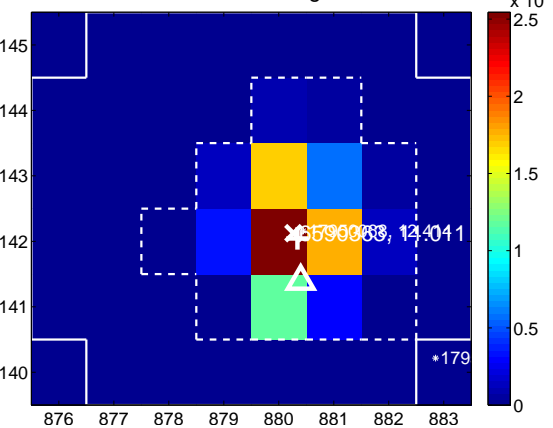
Q11 no OOT image



Q12 difference image

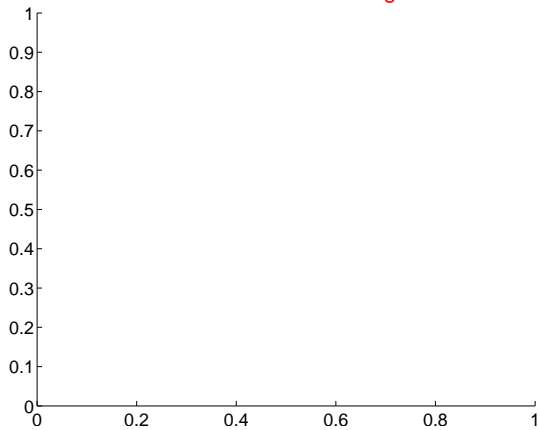


Q12 OOT image

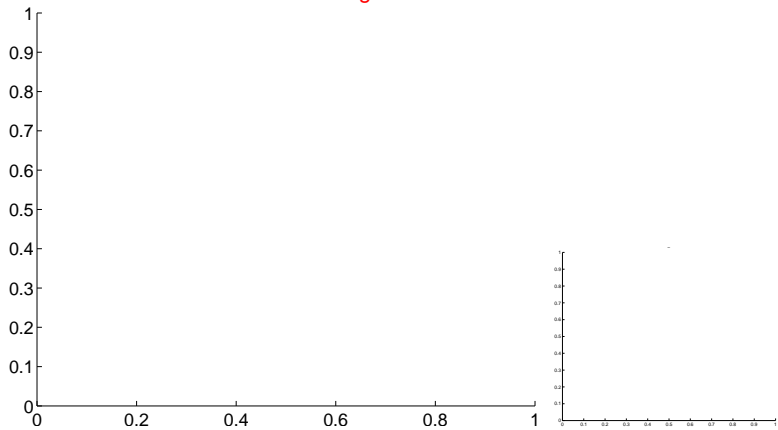


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

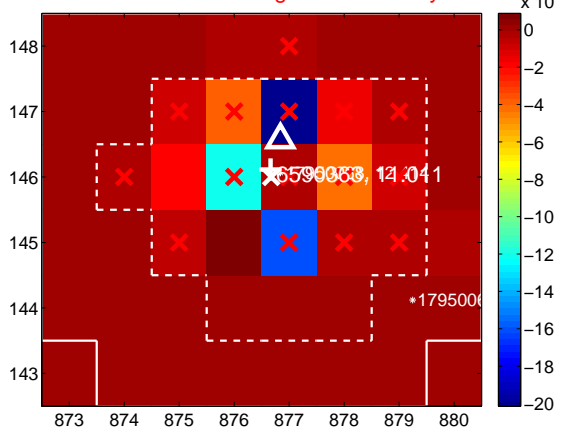
Q13 no difference image



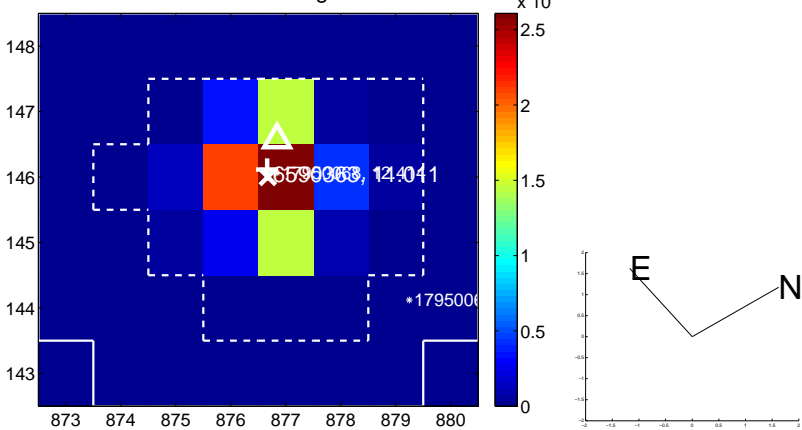
Q13 no OOT image



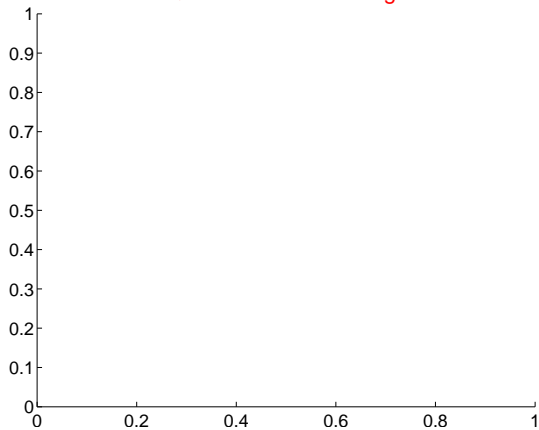
Q14 difference image. Poor Quality



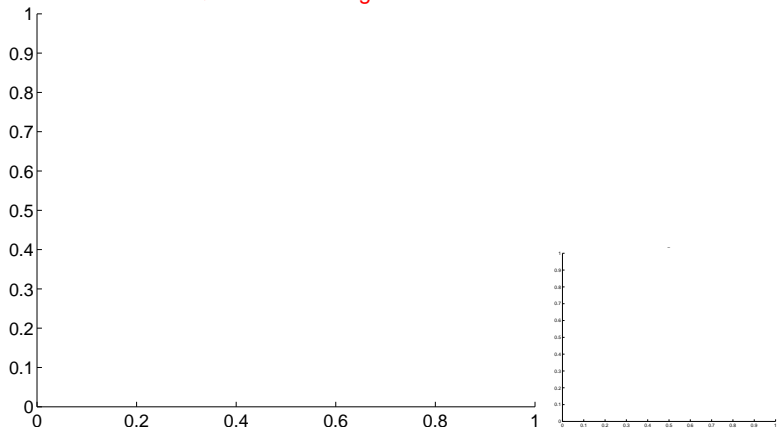
Q14 OOT image



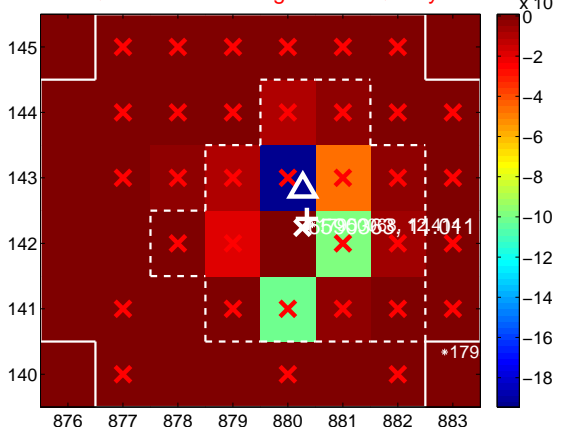
Q15 no difference image



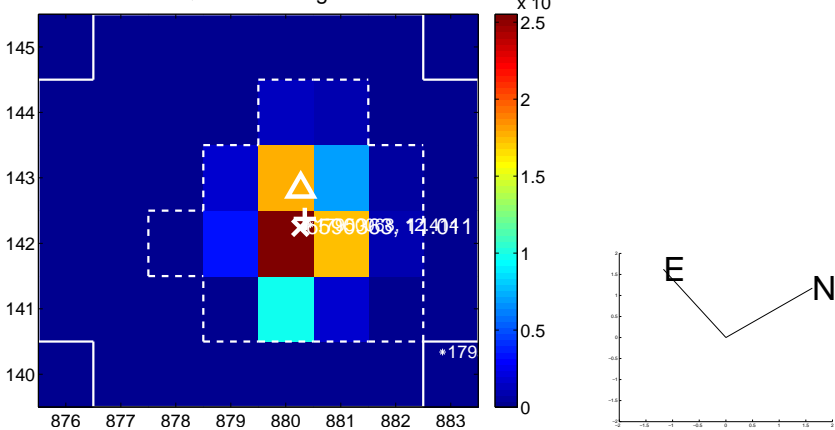
Q15 no OOT image



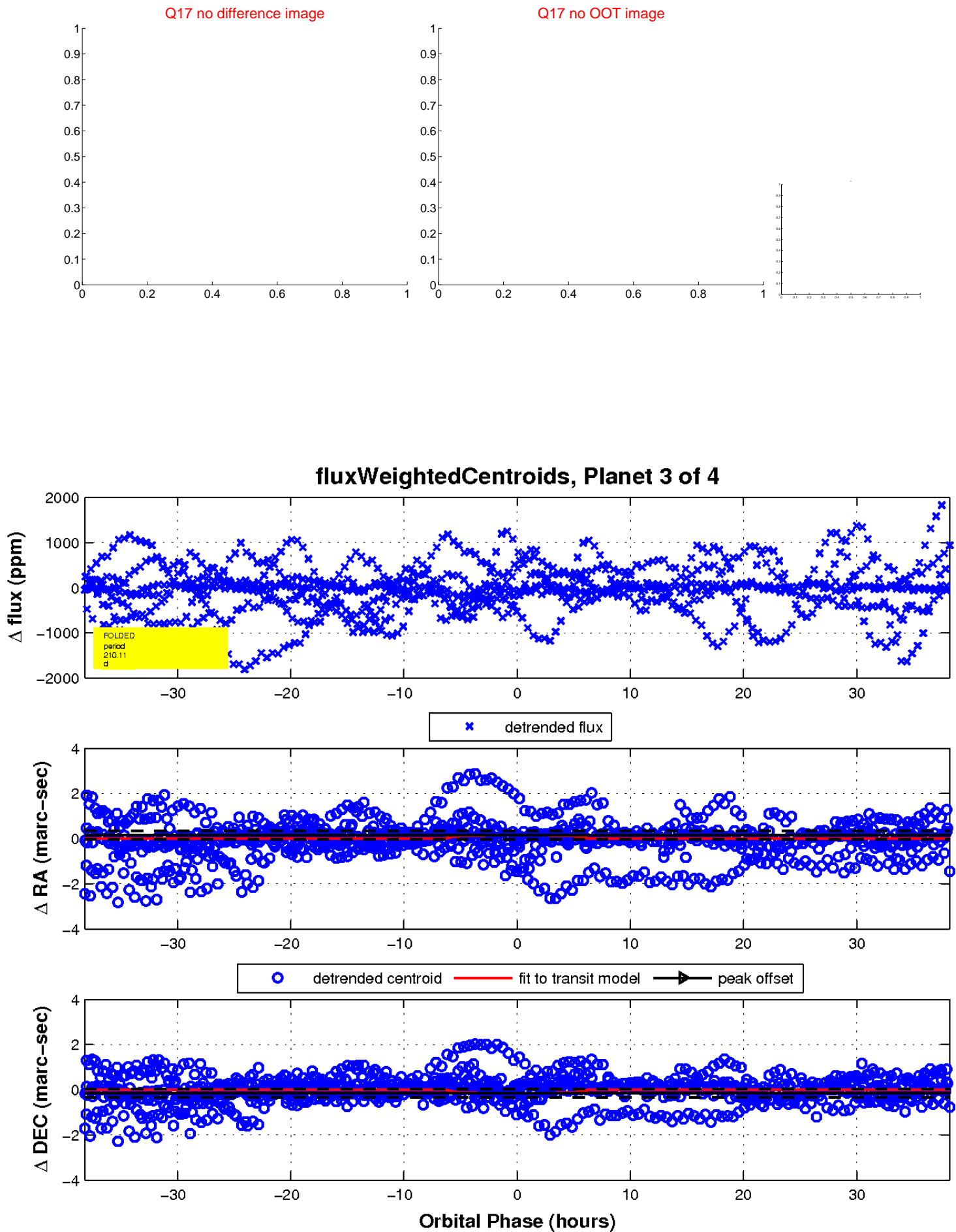
Q16 difference image. Poor Quality



Q16 OOT image

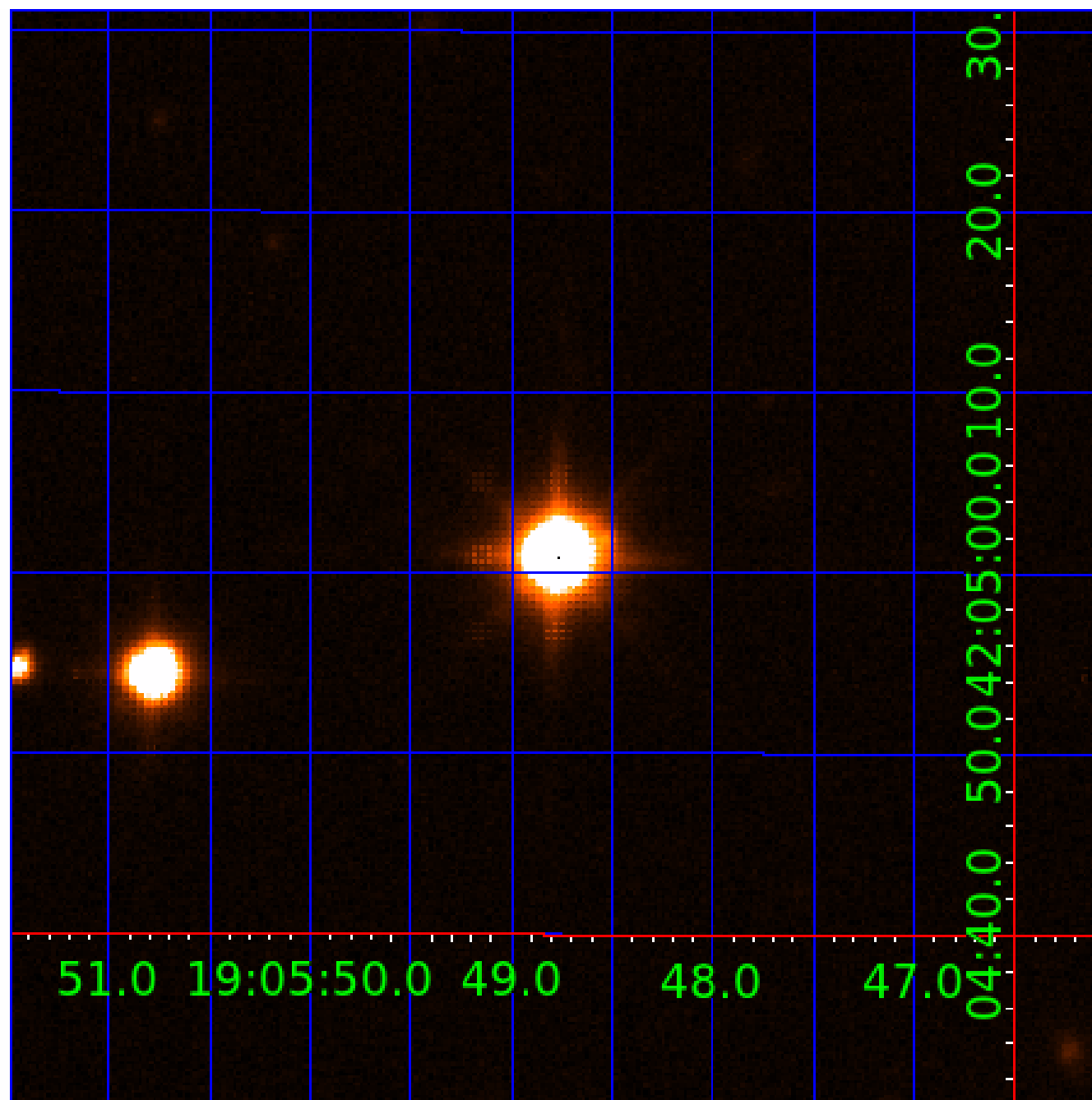


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 006590363

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006590363-01	OBS	No	363.047371	271.267098	480.9	14.804	26.7	16.8	16.09	4659	45.25	63.45
006590363-02	OBS	No	311.457401	159.123965	12.0	52.747	78.0	0.1	16.09	4659	5.63	77.84
006590363-03	OBS	No	210.107631	275.335026	161.6	12.760	9.5	7.9	16.09	4659	24.63	131.57
006590363-04	OBS	No	406.682333	194.882275	152.1	12.500	21.6	-1.0	16.09	4659	19.01	54.54

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006590363-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED
006590363-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
006590363-03	OBS	FP	0.00	1	0	0	0	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_SATURATED
006590363-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—CENT_SATURATED

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

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

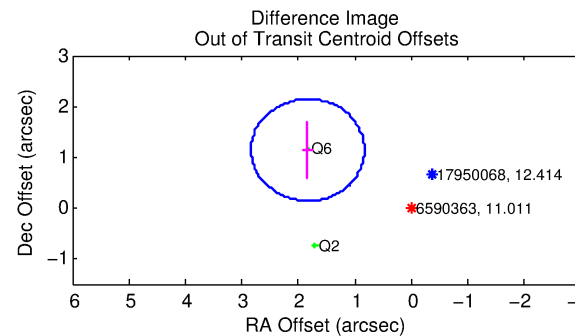
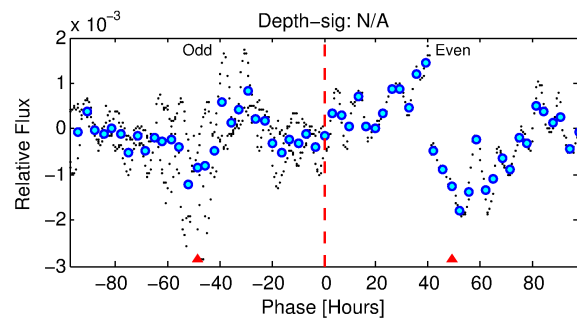
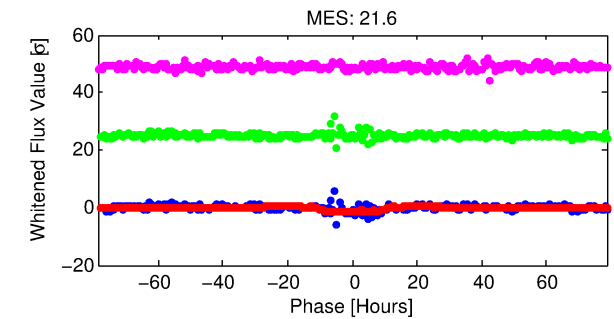
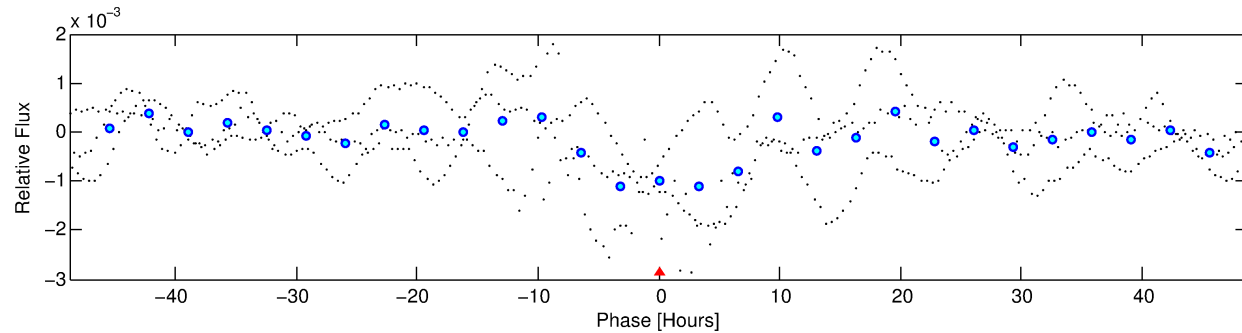
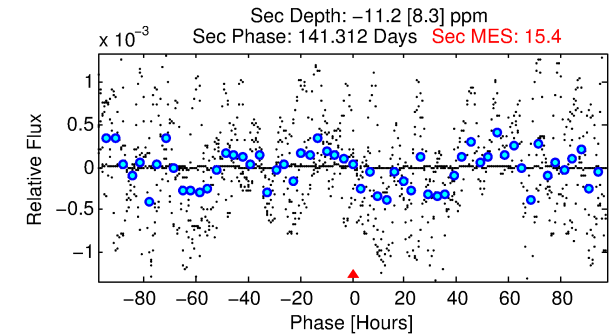
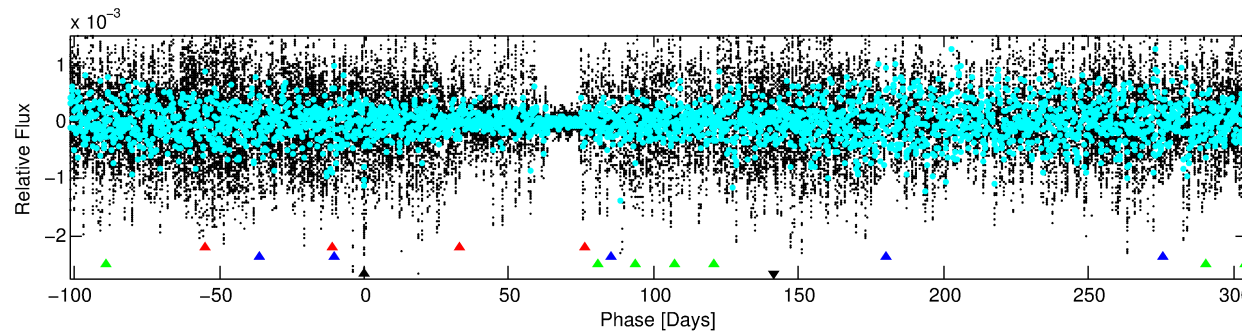
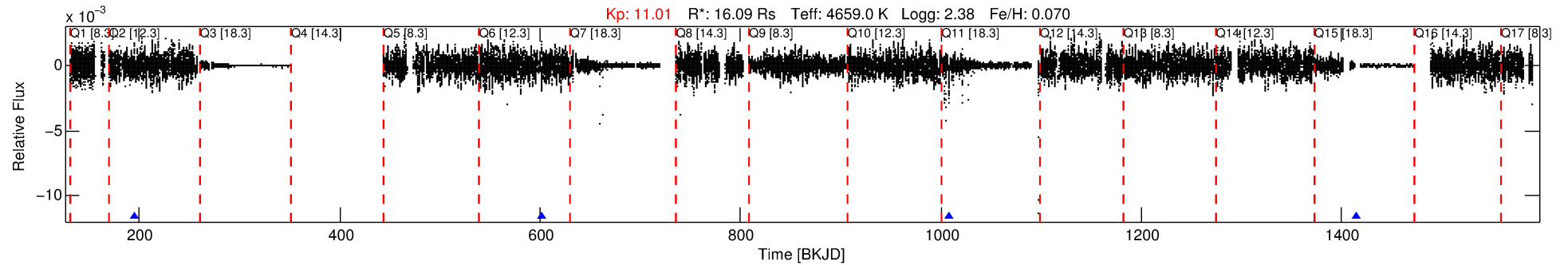
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006590363-04

No Significant Match Found

# DV One-Page Summary

KIC: 6590363 Candidate: 4 of 4 Period: 406.682 d



## TPS TCE Results:

Period = 406.68233 d  
Epoch = 194.8823 BKJD

DV fit results are unavailable

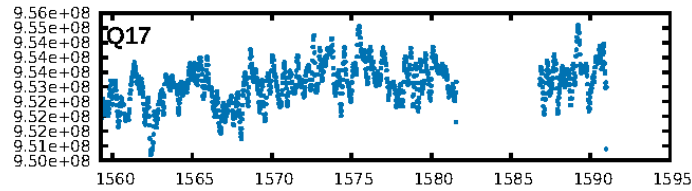
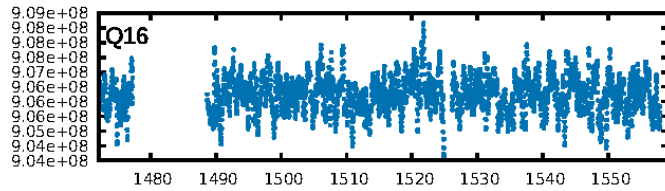
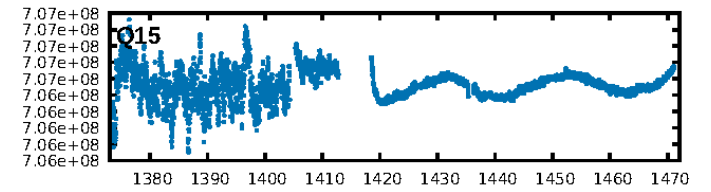
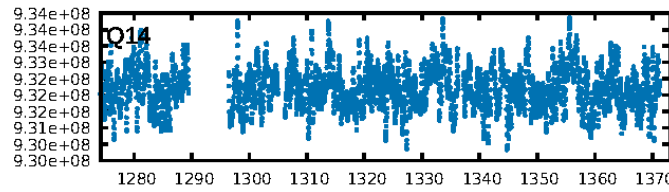
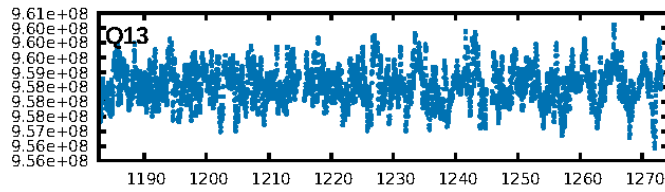
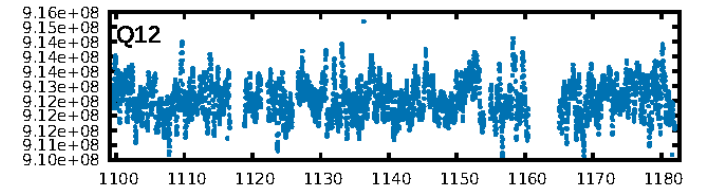
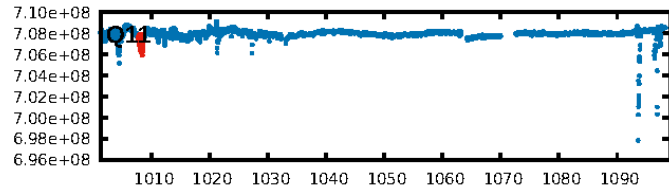
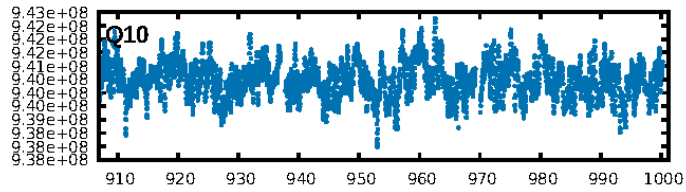
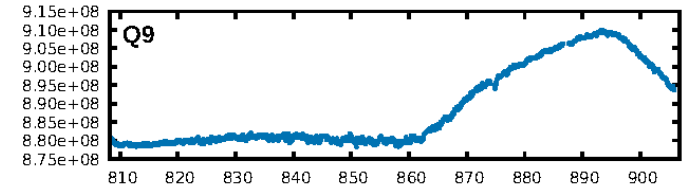
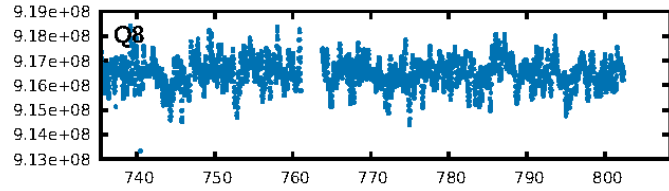
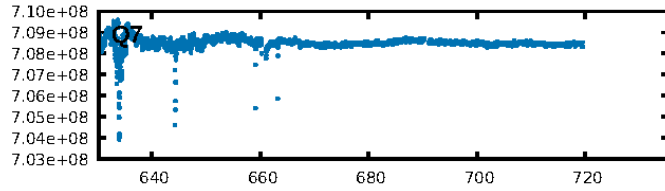
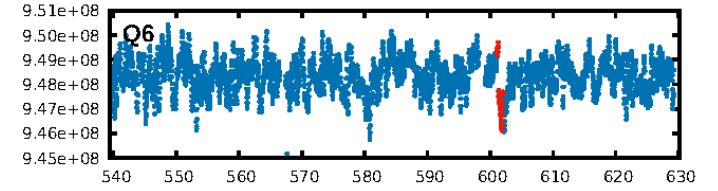
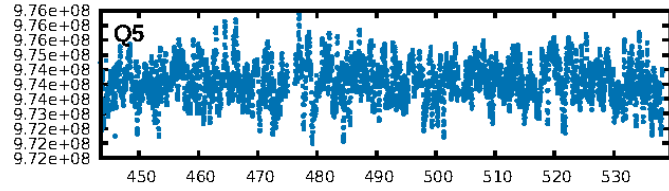
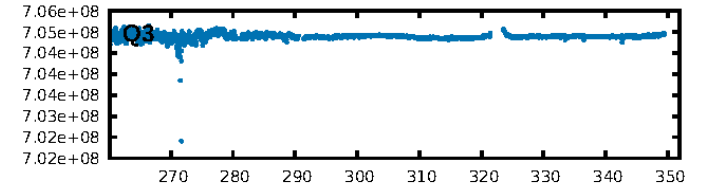
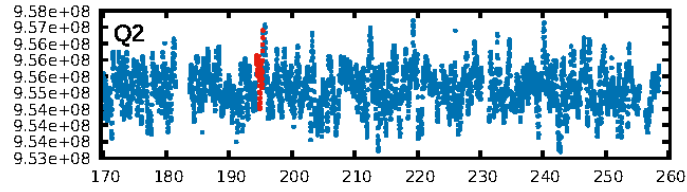
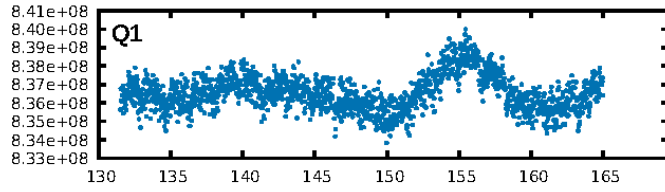
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [54.05σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -6.383  
Centroid-sig: 3.4%  
Centroid-so: 0.994 arcsec [2.59σ]  
OotOffset-rm: 2.159 arcsec [6.46σ]  
KicOffset-rm: 2.548 arcsec [7.85σ]  
OotOffset-st: 2/0/0/0 [2]  
KicOffset-st: 2/0/0/0 [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: 02-Feb-2016 01:02:40 Z

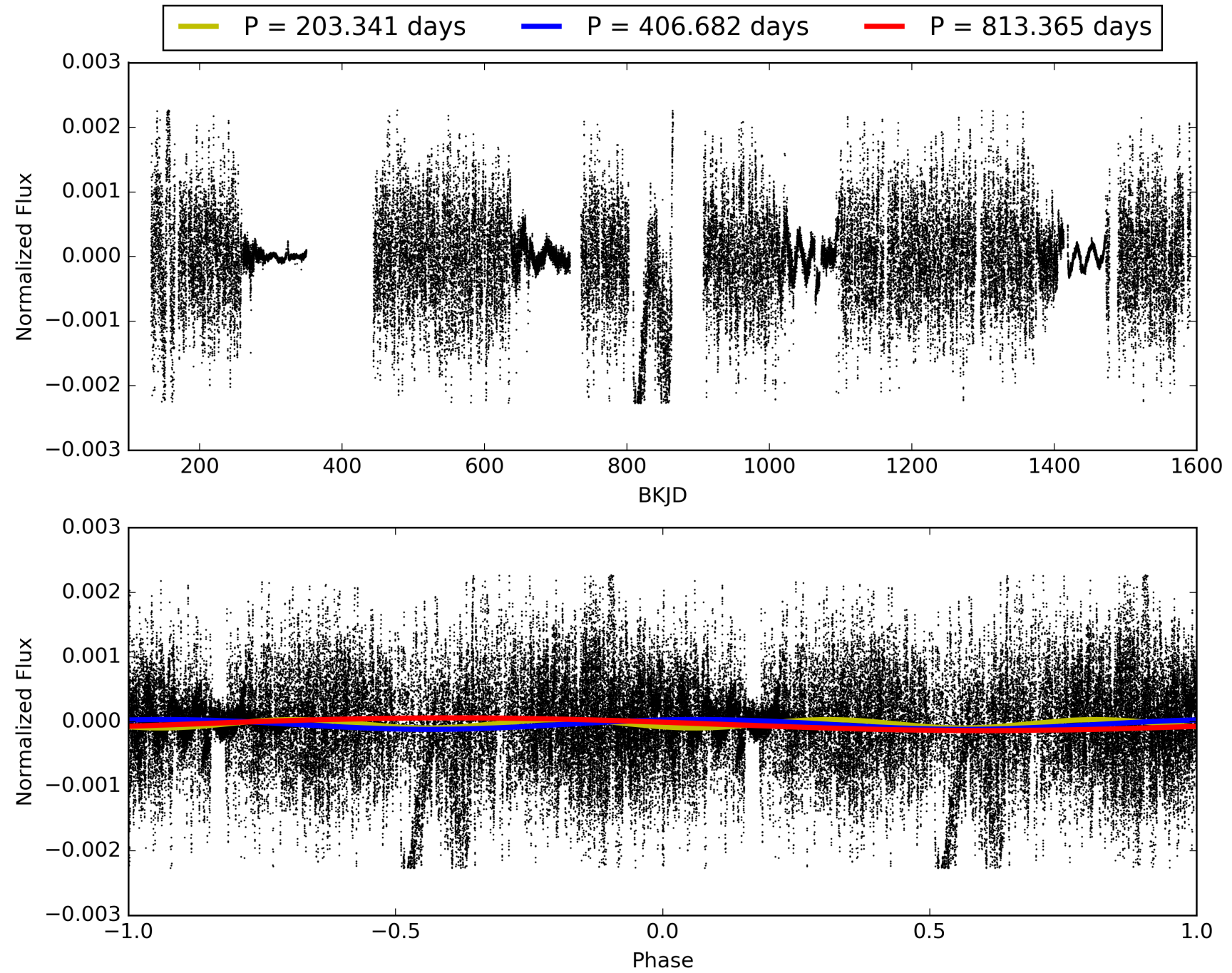
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 006590363-04, PDC Light Curves





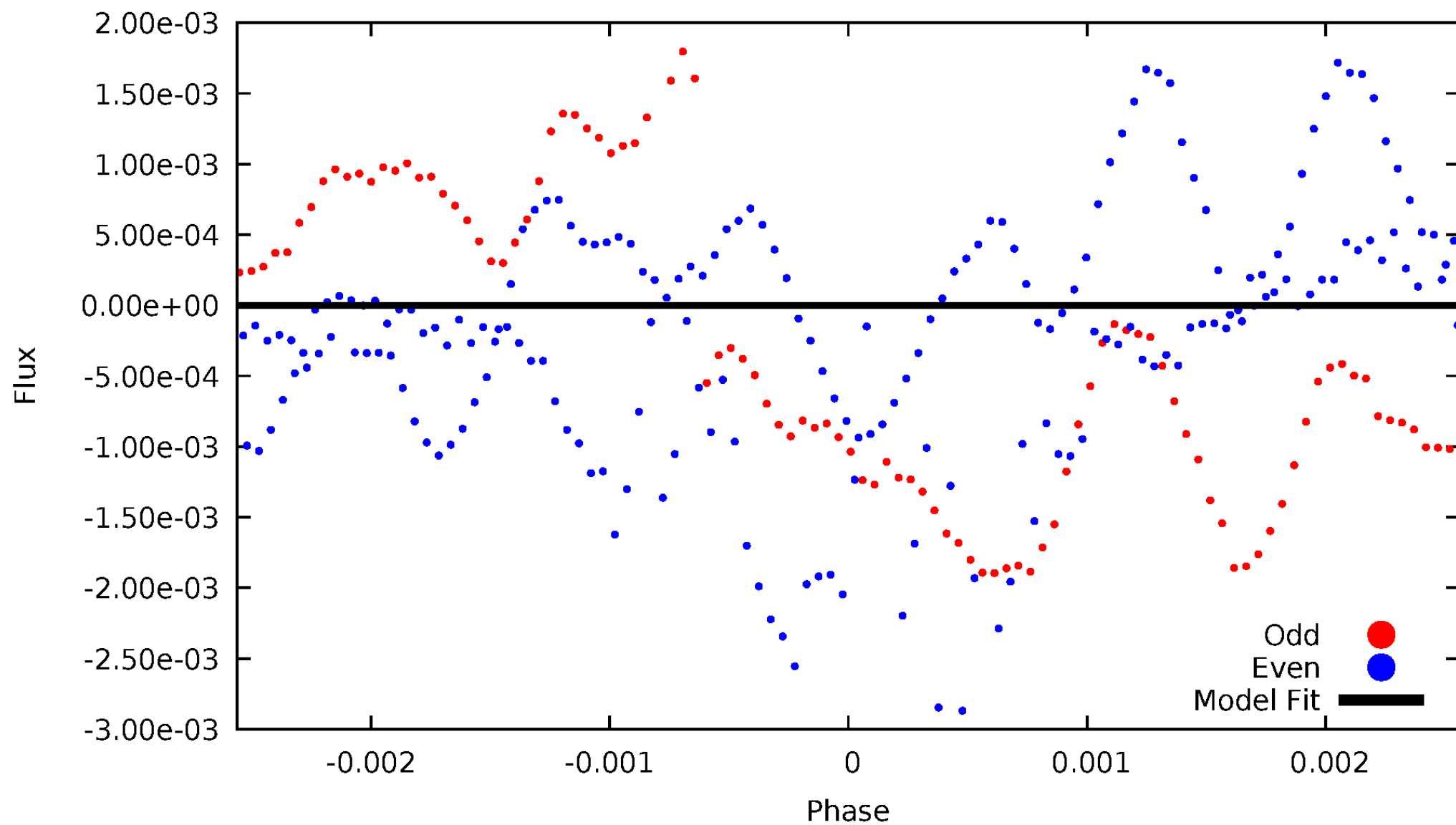
TCE 006590363-04





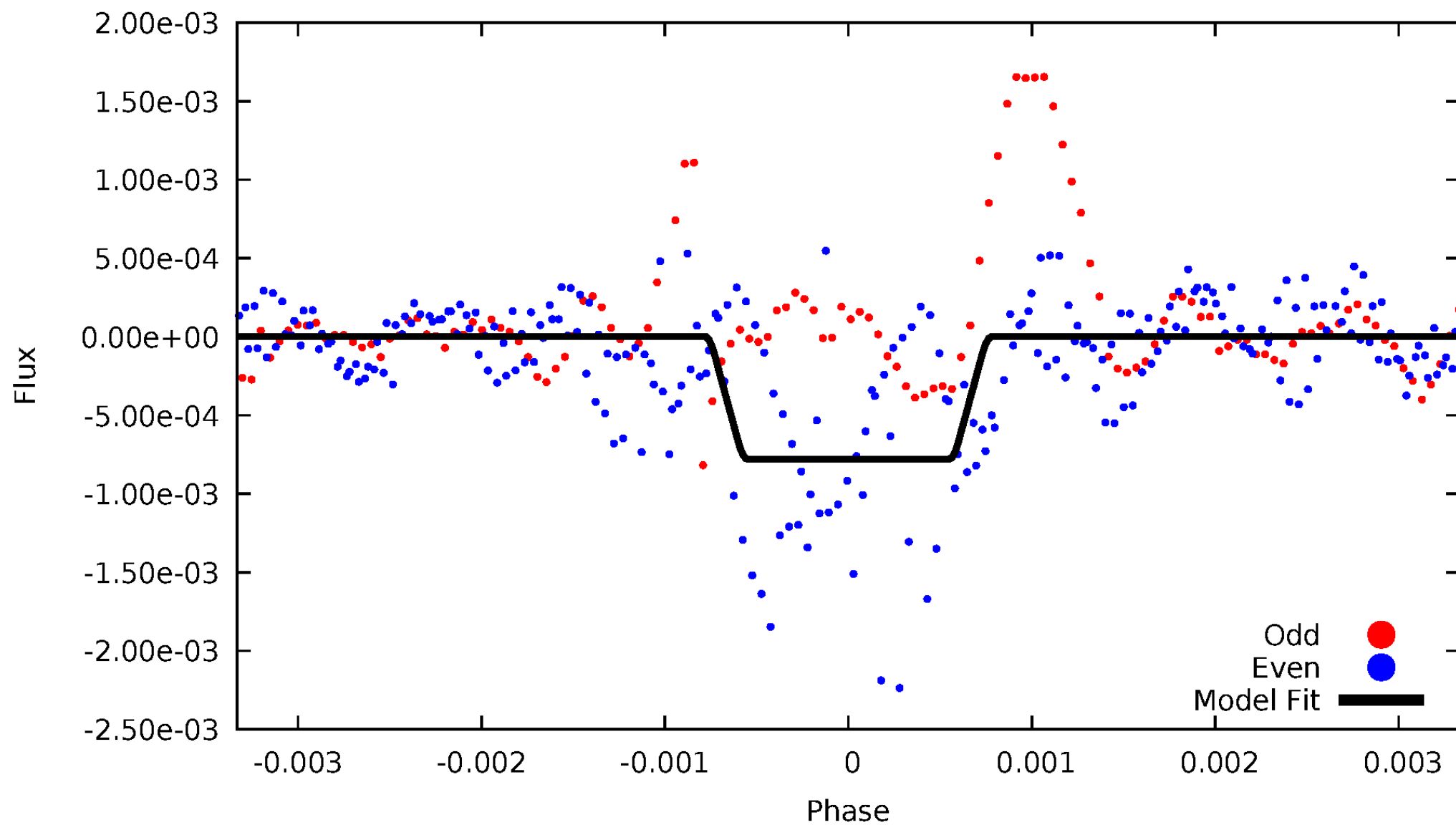
# DV Odd/Even

TCE 006590363-04



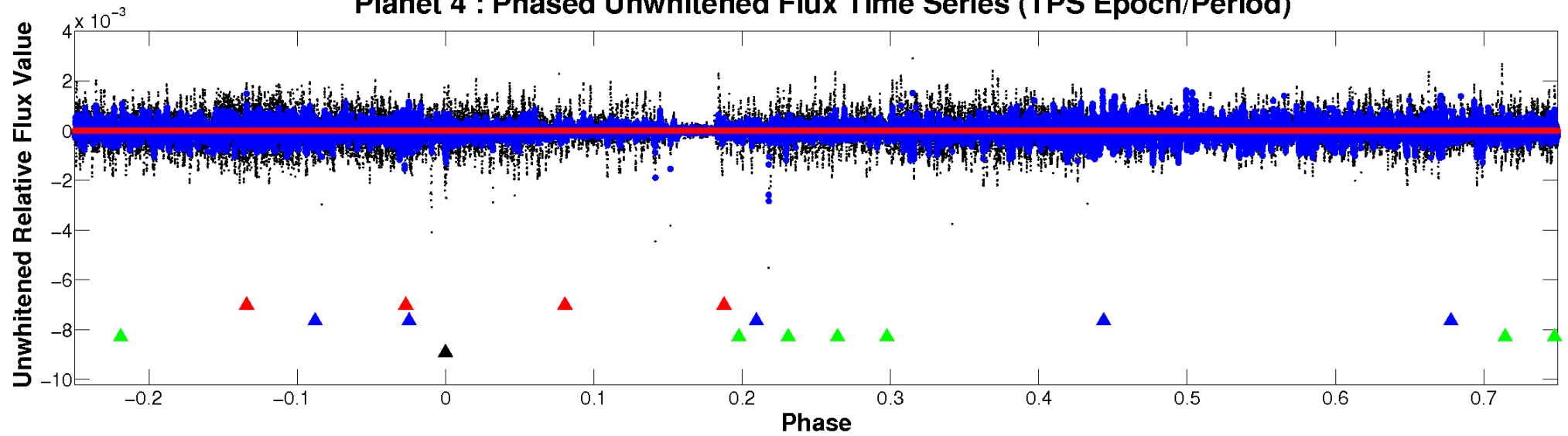
# ALT Odd/Even

TCE 006590363-04



# Non-Whitened Vs. Whitened Light Curve

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

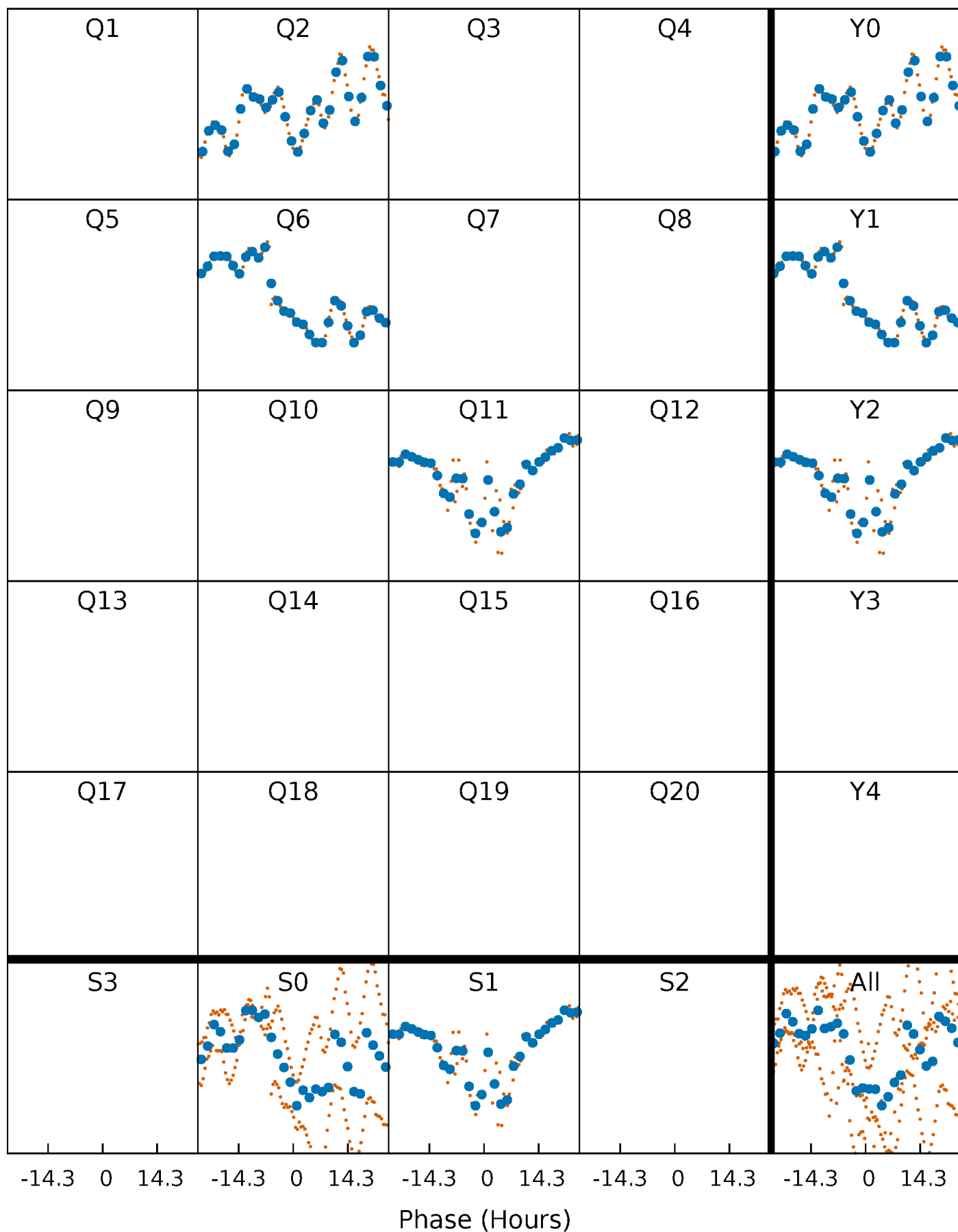


**Planet 4 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



# PDC Quarter-Phased Transit Curves

TCE 006590363-04     $P=406.682334$  Days     $T_0=194.882275$  (BKJD)



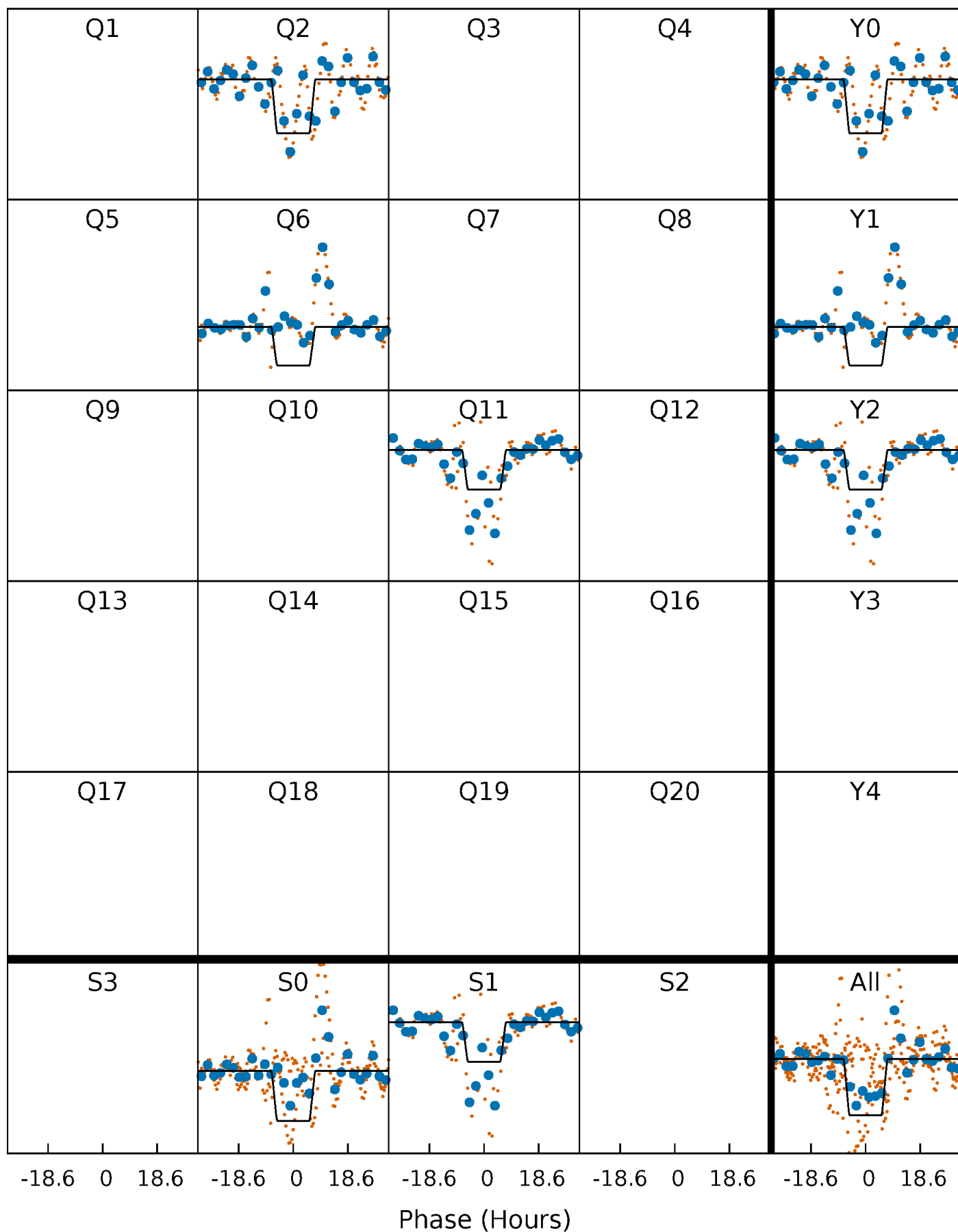
# DV Quarter-Phased Transit Curves

TCE 006590363-04 P=406.682334 Days  $T_0=194.882275$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

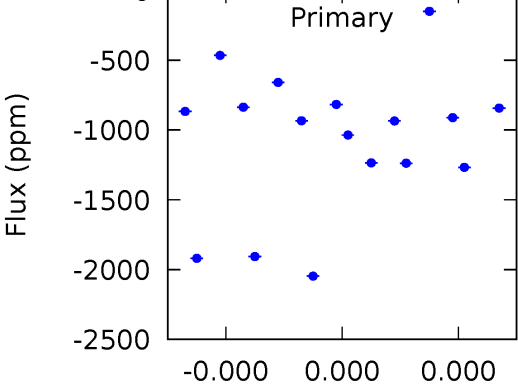
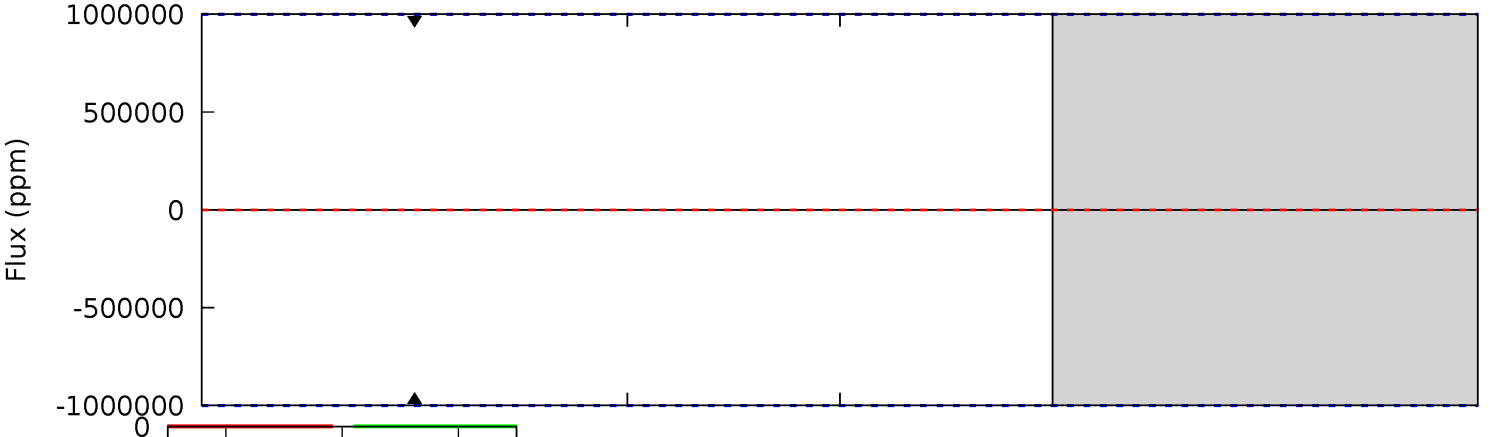
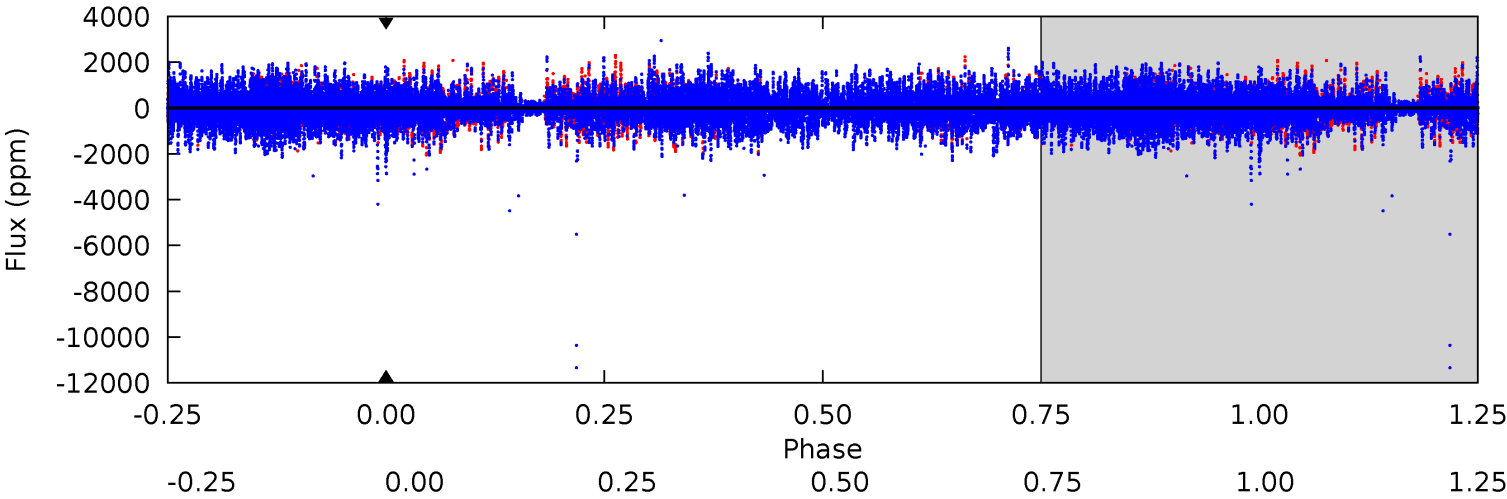
TCE 006590363-04 P=406.682334 Days  $T_0=194.963075$  (BKJD)



# DV Model-Shift Uniqueness Test

006590363-04, P = 406.682334 Days, E = 194.882275 Days

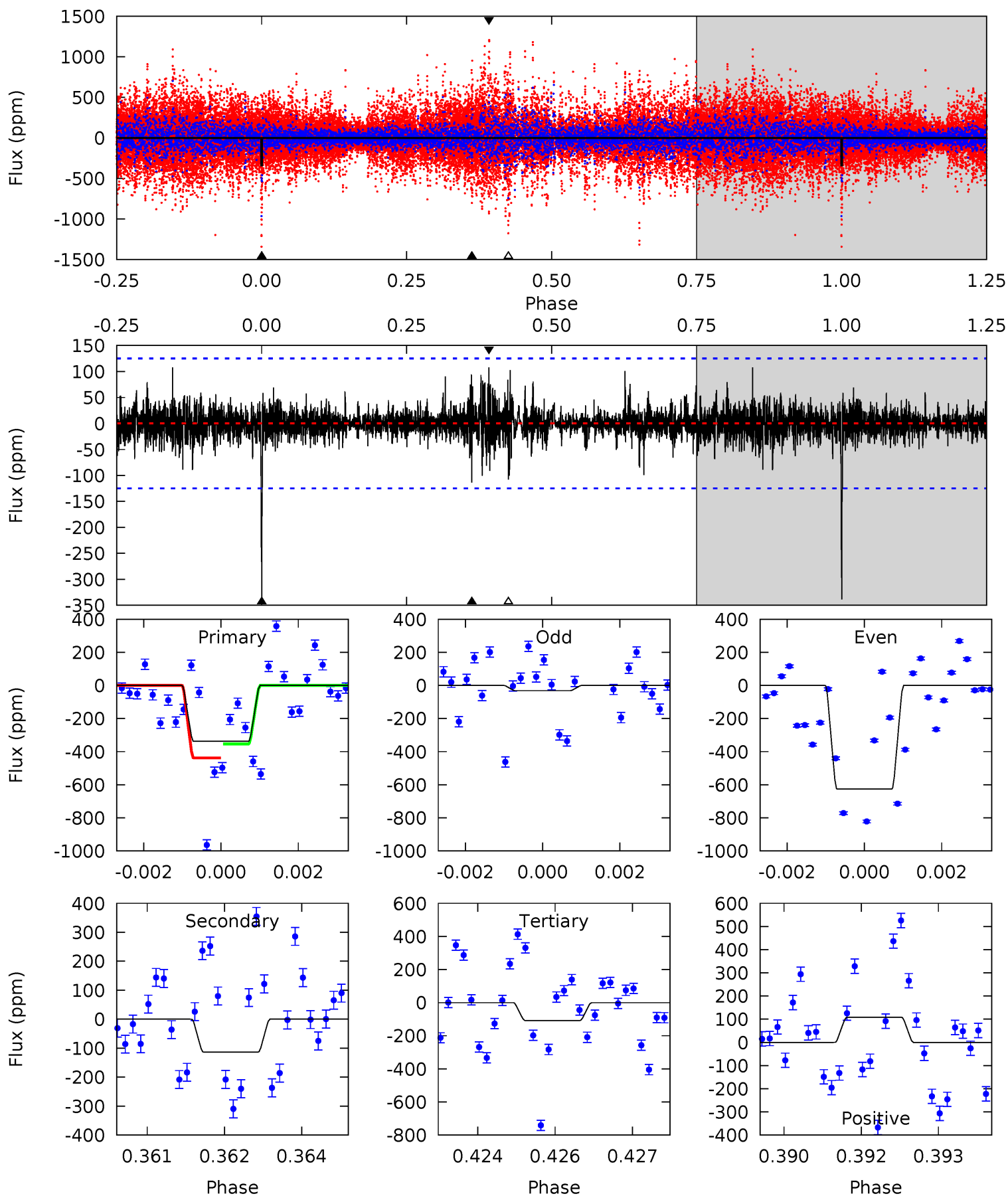
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

006590363-04, P = 406.682334 Days, E = 194.963075 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.5	4.88	4.63	4.63	5.37	3.17	0.87	9.90	9.90	0.24	0.25	12.3	1.28	0.24	1.78





### Stellar Parameters For KIC 006590363

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4659^{+64}_{-110}$	$2.384^{+0.027}_{-0.030}$	$0.070^{+0.150}_{-0.200}$	$16.088^{+2.909}_{-3.556}$	$2.287^{+0.786}_{-0.960}$	$0.001^{+0.000}_{-0.000}$
	+1%/-2%	+1%/-1%	+214%/-286%	+18%/-22%	+34%/-42%	+35%/-15%
Source	PHO55	AST55	SPE55	DSEP		

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

### Secondary Eclipse Parameters for KIC 006590363-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$0 \pm 1000000$	$129.05^{+141.00}_{-95.21}$	$970^{+26}_{-31}$	$3281^{+10998}_{-17041}$	$43^{+14497}_{-13594}$
Alt.	$-114 \pm 23$	$149.98^{+145.95}_{-107.73}$	$968^{+27}_{-29}$	$2454^{+1039}_{-401}$	$5.682^{+65.187}_{-4.285}$

$T_{max}$  = 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

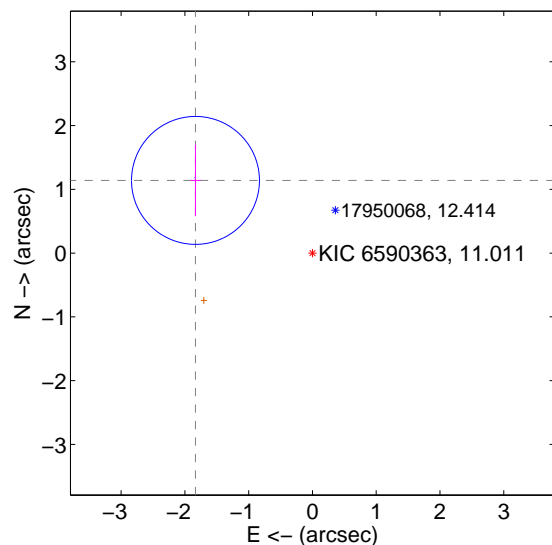
Supplemental centroid analysis for 006590363-04. **Kepler magnitude: 11.01.** Transit SNR -1.00

**There are 1 quarters with good PRF difference image offsets**

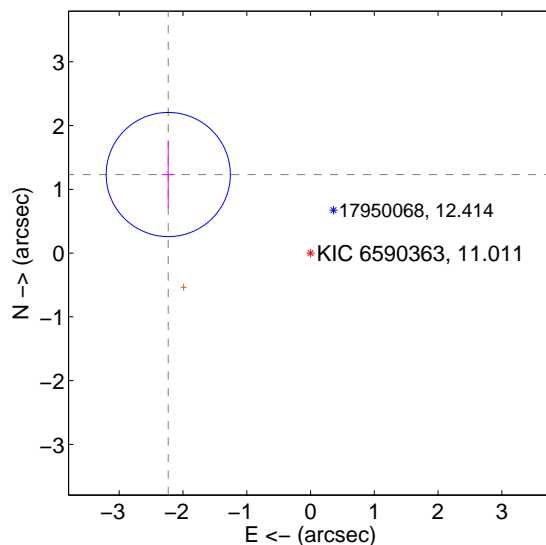
The direct PRF centroid is offset from the target star catalog position by about 0.41 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b>2.159 <math>\pm</math> 0.334</b>	<b>6.46</b>	1.834 $\pm$ 0.078	1.140 $\pm$ 0.560
PRF-fit source offset from KIC position	<b>2.548 <math>\pm</math> 0.324</b>	<b>7.85</b>	2.230 $\pm$ 0.100	1.232 $\pm$ 0.527
photometric centroid source offset	0.99 $\pm$ 0.38	2.59	0.85 $\pm$ 0.40	0.52 $\pm$ 0.33

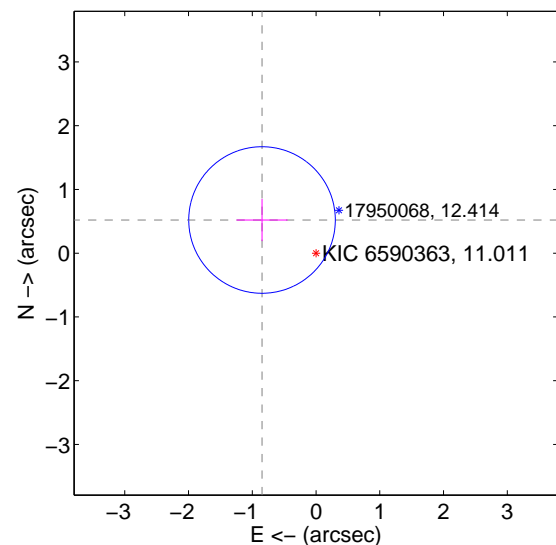
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

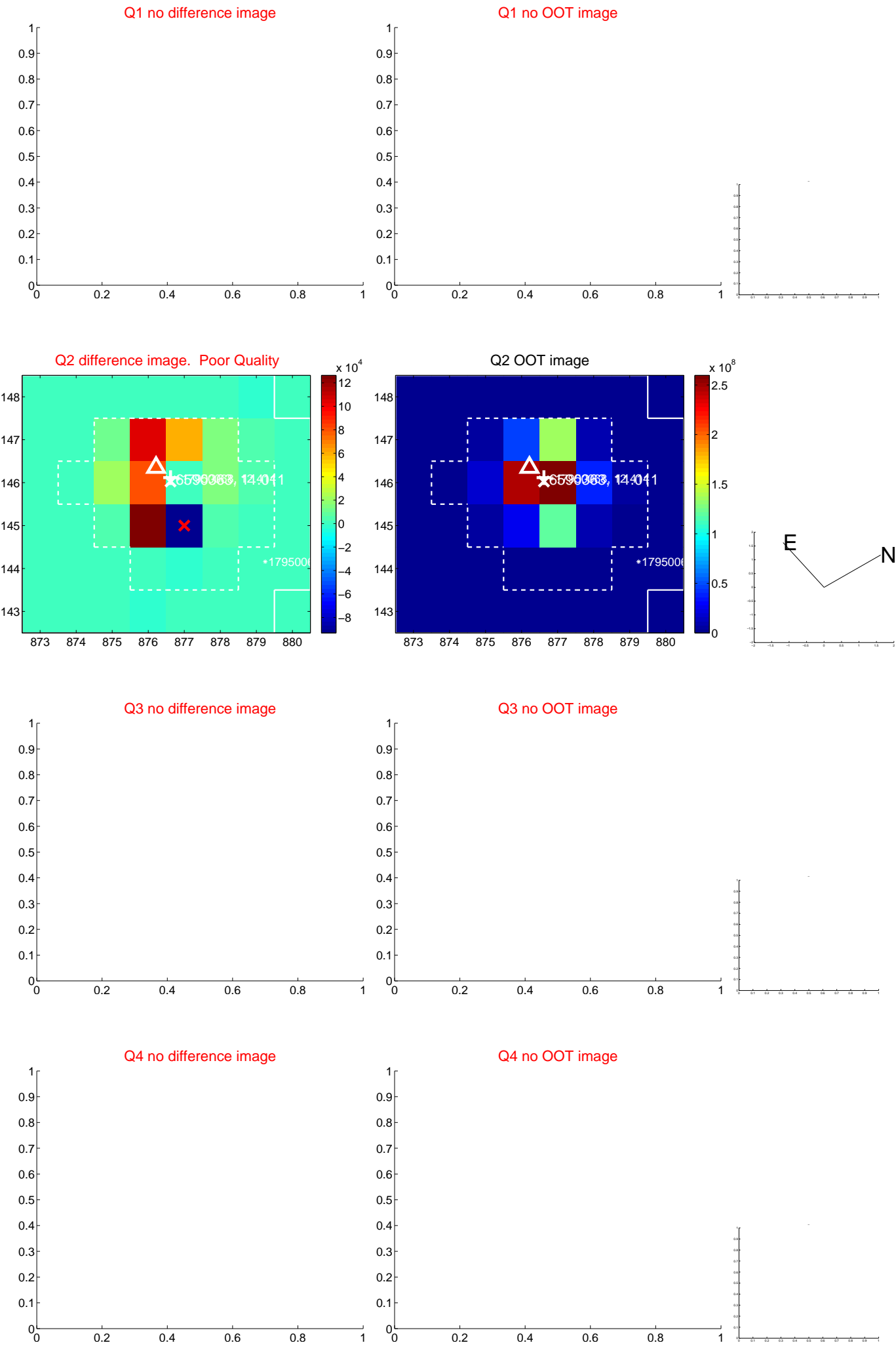


offset from photometric centroids

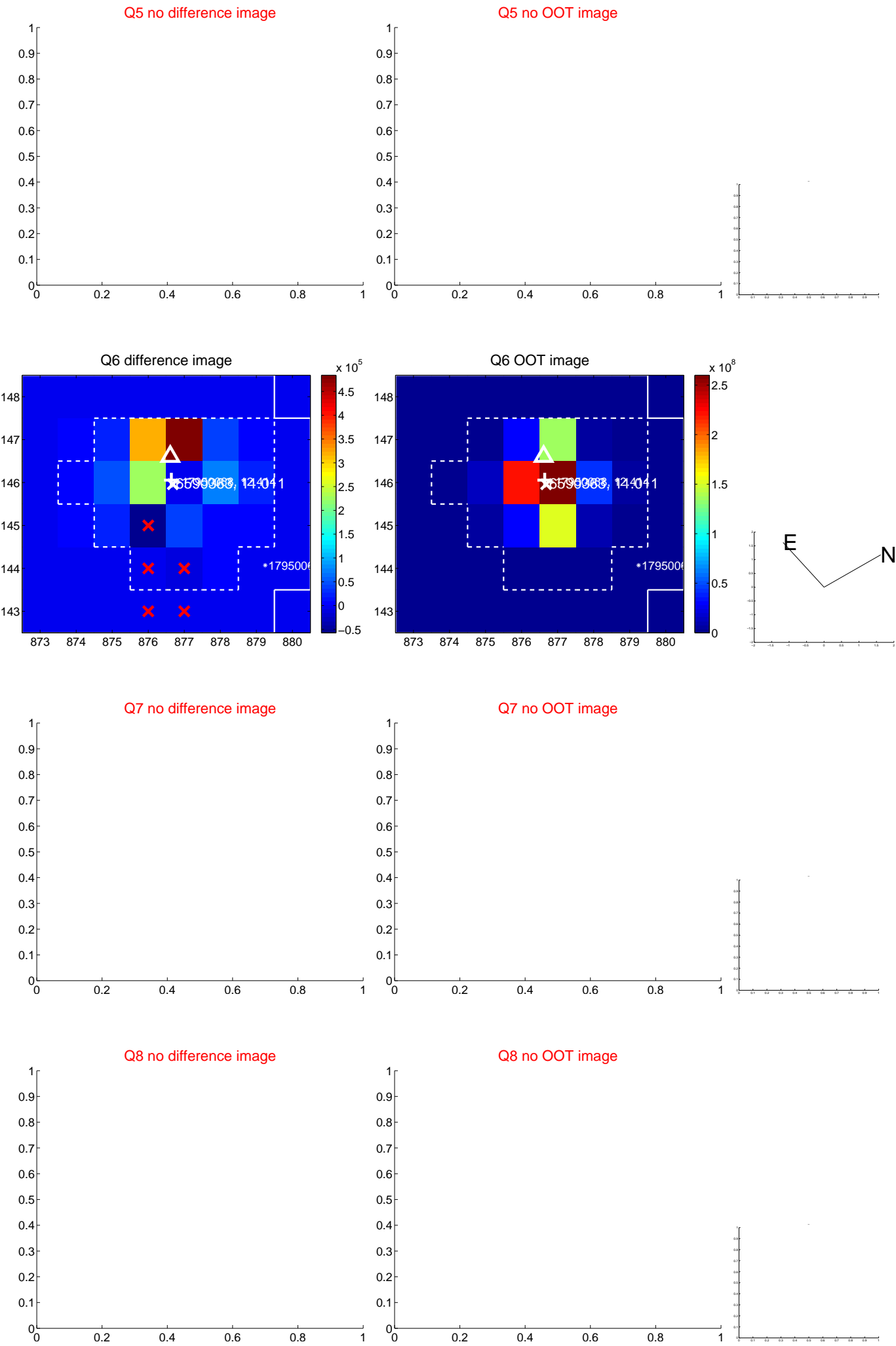


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

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



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



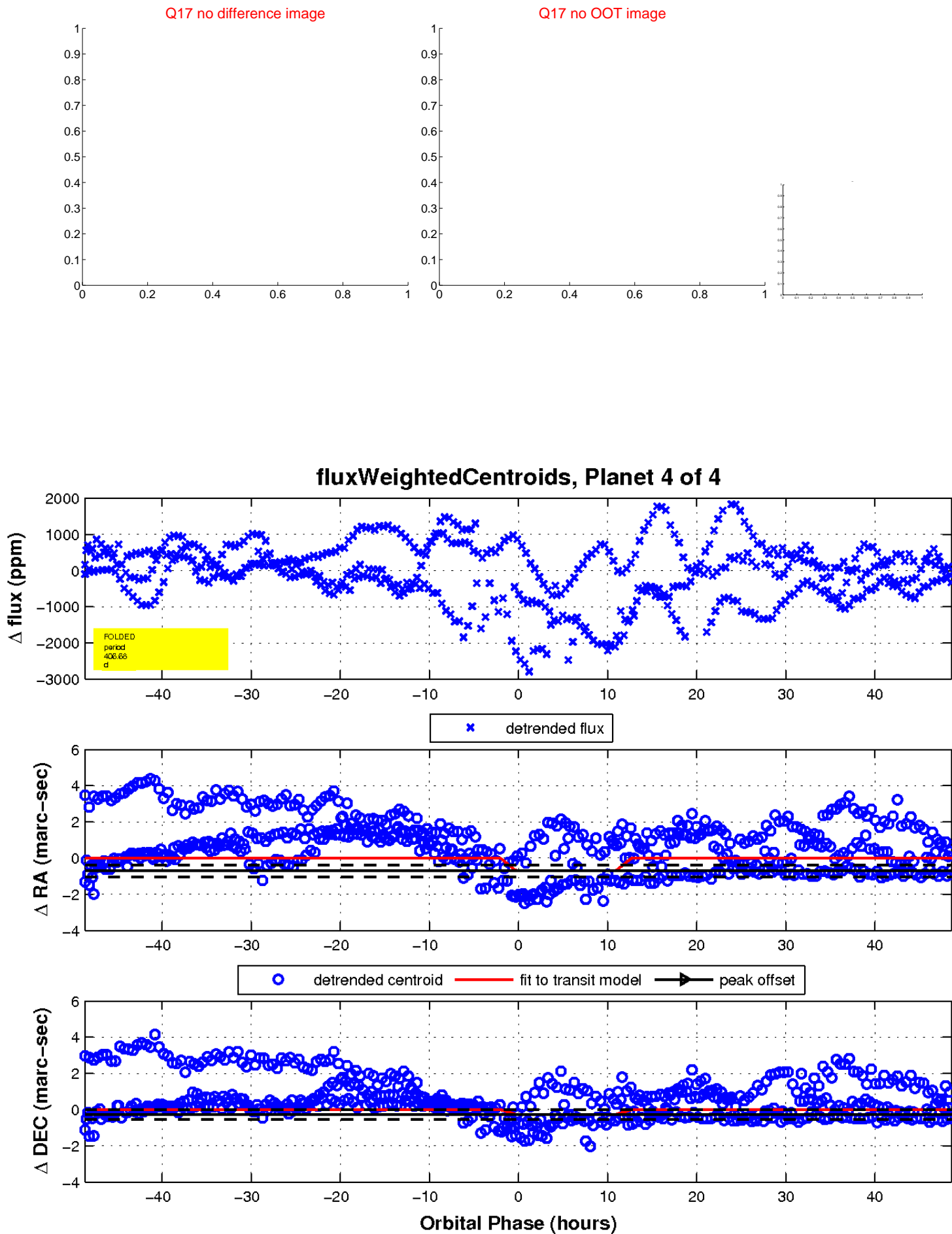
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



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



UKIRT Image

Declination

