

# KIC 004644174

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004644174-01	OBS	No	490.476780	592.714724	1263.6	4.663	17.3	6.0	0.66	4135	2.24	0.10
004644174-02	OBS	No	668.363143	157.719815	1472.8	7.205	15.9	7.2	0.66	4135	2.59	0.07
004644174-03	OBS	No	537.634148	391.437498	1103.9	5.141	16.5	5.6	0.66	4135	2.51	0.09
004644174-05	OBS	No	345.976604	277.685128	1243.9	5.751	12.7	7.1	0.66	4135	3.05	0.16
004644174-06	OBS	No	468.641275	315.692386	1480.8	5.761	13.3	8.1	0.66	4135	2.71	0.11
004644174-07	OBS	No	502.706443	248.411391	1131.5	3.500	14.1	-1.0	0.66	4135	2.12	0.10

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004644174-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004644174-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS
004644174-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS
004644174-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS
004644174-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
004644174-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—CENT_NOFITS

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

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

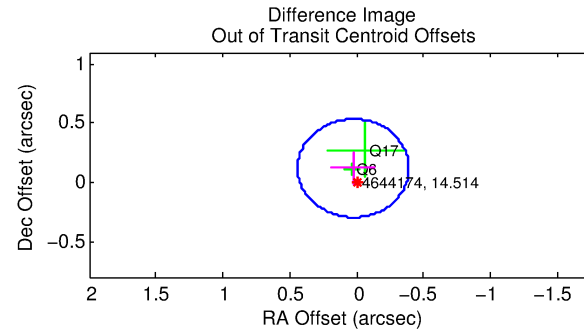
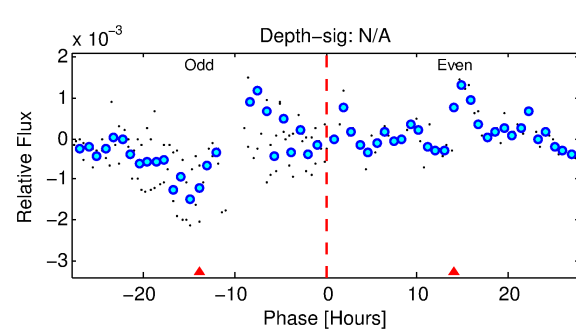
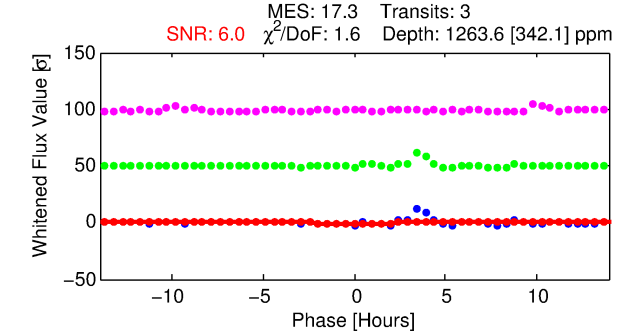
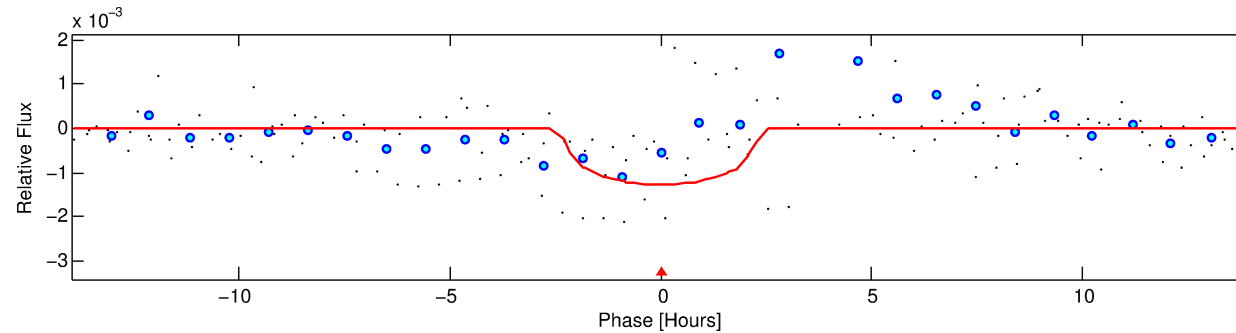
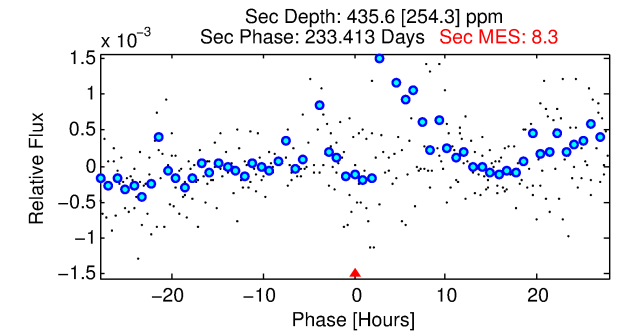
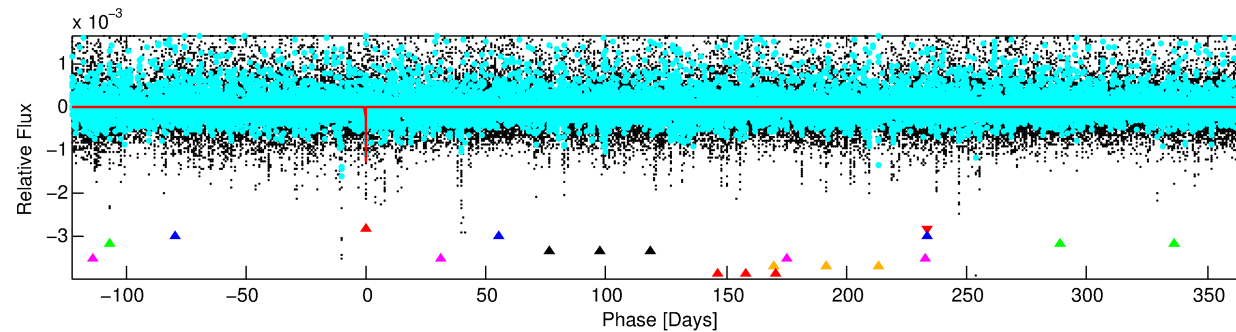
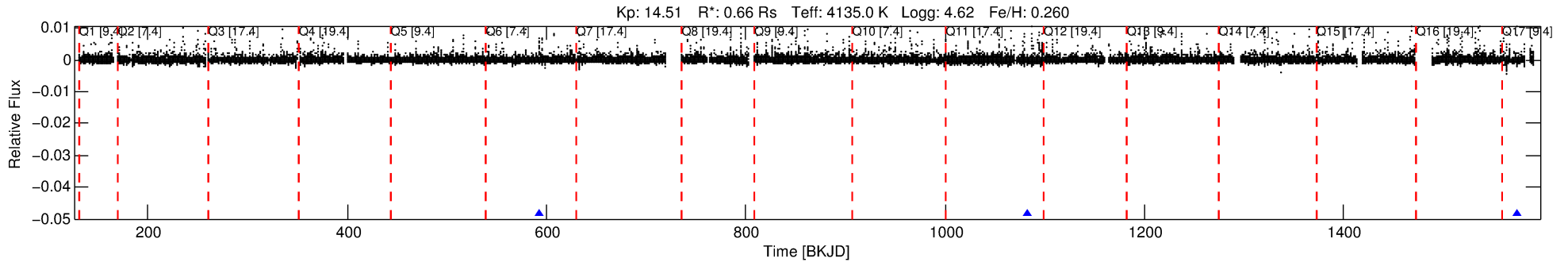
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004644174-01

No Significant Match Found

# DV One-Page Summary

KIC: 4644174 Candidate: 1 of 7 Period: 490.477 d



## DV Fit Results:

Period = 490.47678 [0.00752] d  
Epoch = 592.7147 [0.0101] BKJD  
Rp/R\* = 0.0311 [0.0537]  
a/R\* = 828.52 [4198.58]  
b = 0.01 [830.80]  
Seff = 0.10 [0.02]  
Teq = 144 [7] K  
Rp = 2.24 [3.87] Re  
a = 1.0585 [0.0787] AU  
Ag = 53616.29 [187790.18] [0.29σ]  
Teffp = 3386 [2967] K [1.09σ]

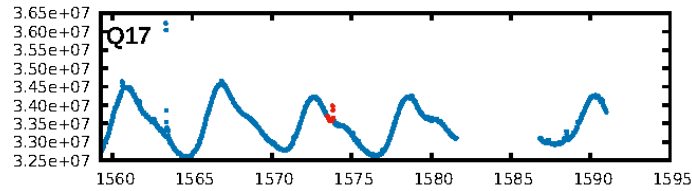
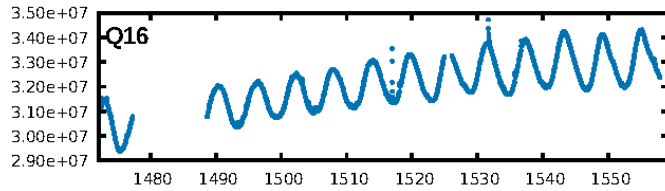
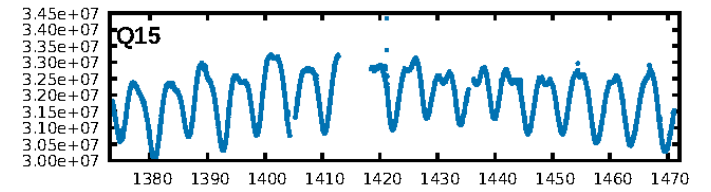
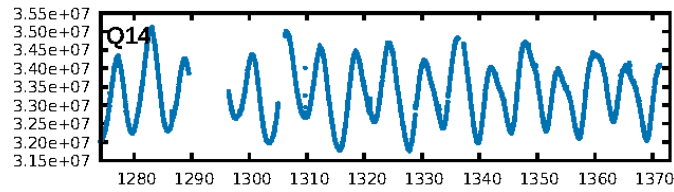
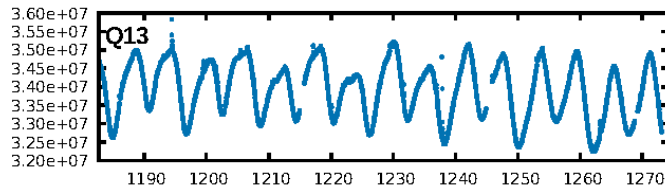
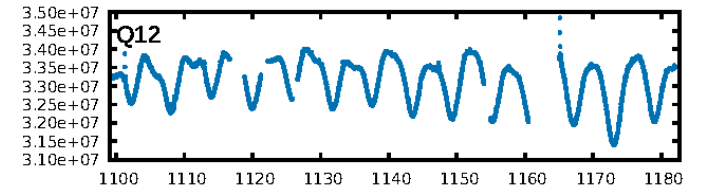
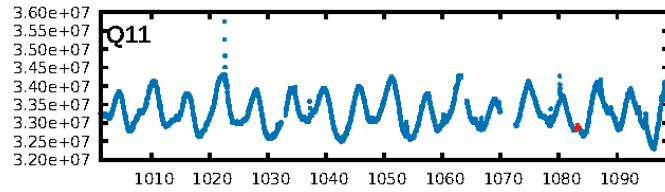
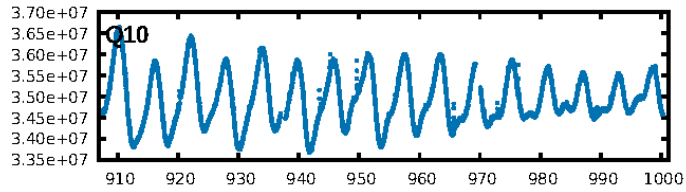
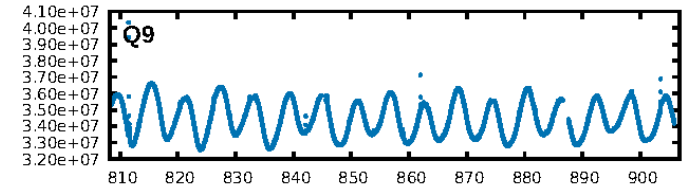
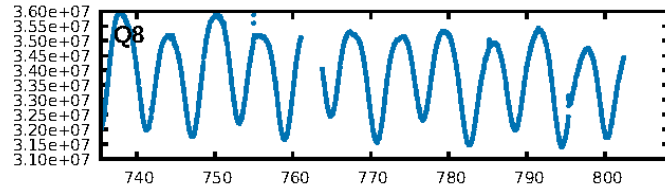
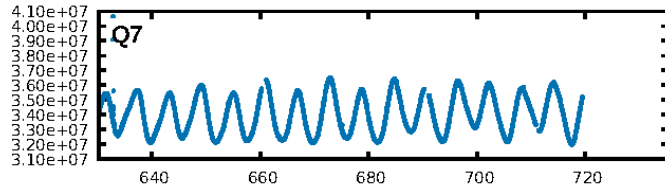
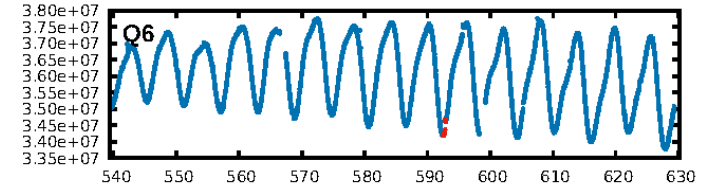
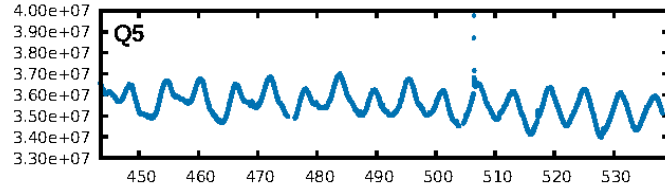
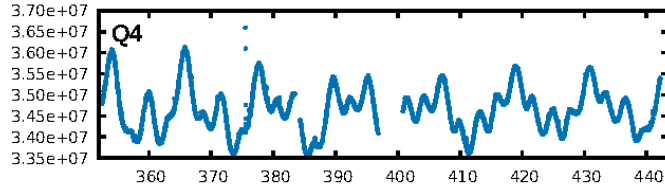
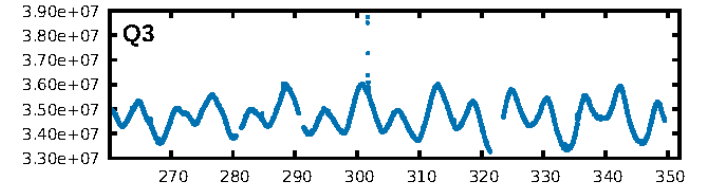
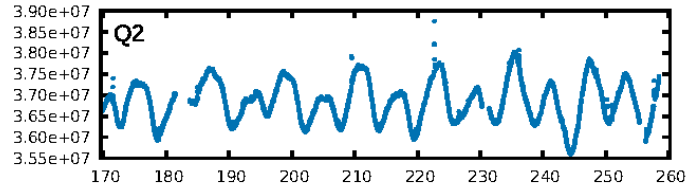
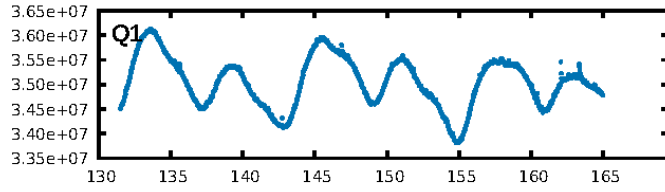
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [70.70σ]  
LongPeriod-sig: 100.0% [50.34σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 51.1%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [2/2]  
GhostDiagnostic-chr: -1.903  
Centroid-sig: 4.6%  
Centroid-so: 1.617 arcsec [1.39σ]  
OotOffset-rm: 0.123 arcsec [0.89σ]  
OotOffset-st: 1/0/0/1 [2]  
KicOffset-rm: 0.056 arcsec [0.36σ]  
KicOffset-st: 1/0/0/1 [2]  
DiffImageQuality-fgm: 1.00 [2/2]  
DiffImageOverlap-fno: 1.00 [2/2]

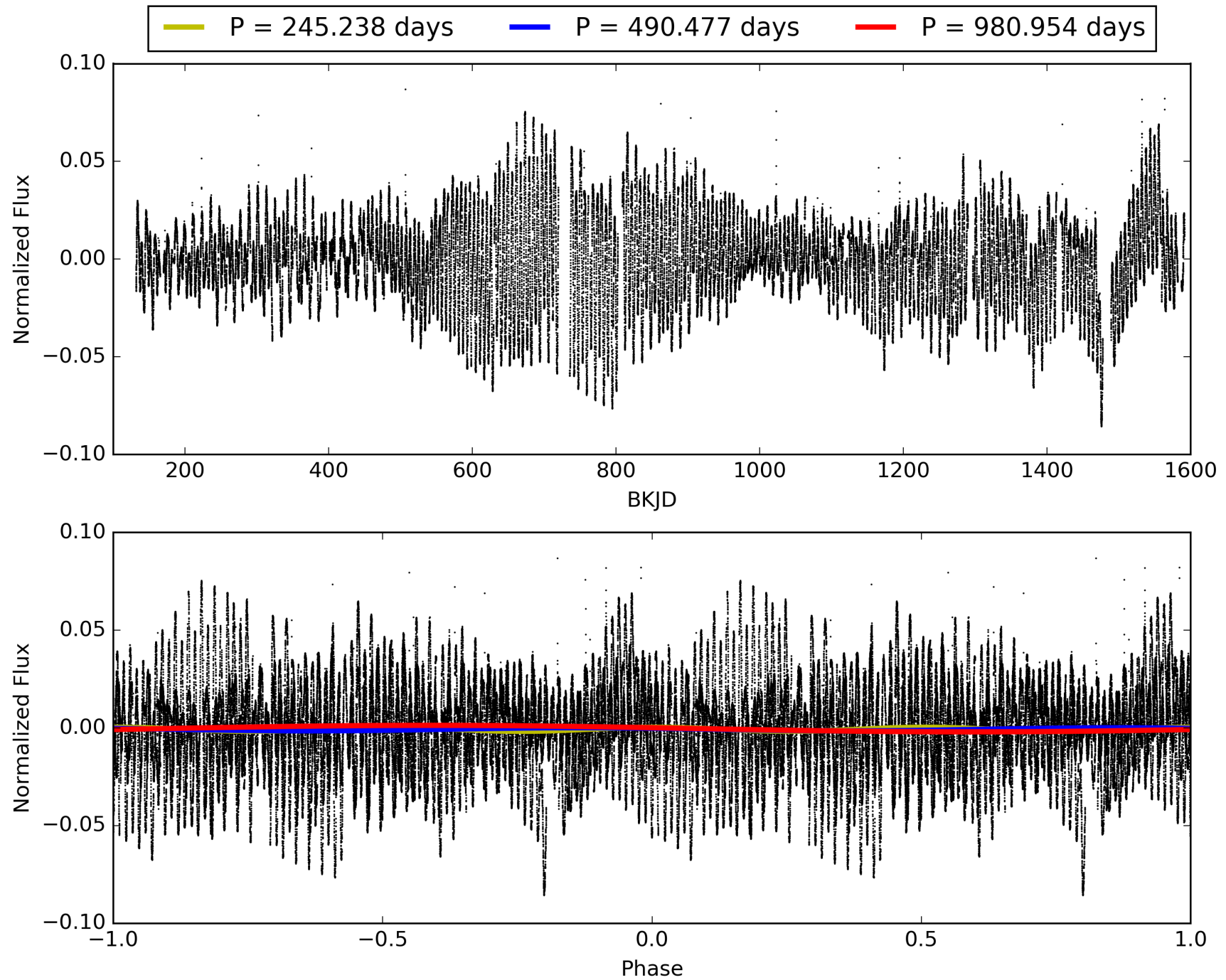
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 00:36:47 Z

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

# TCE 004644174-01, PDC Light Curves



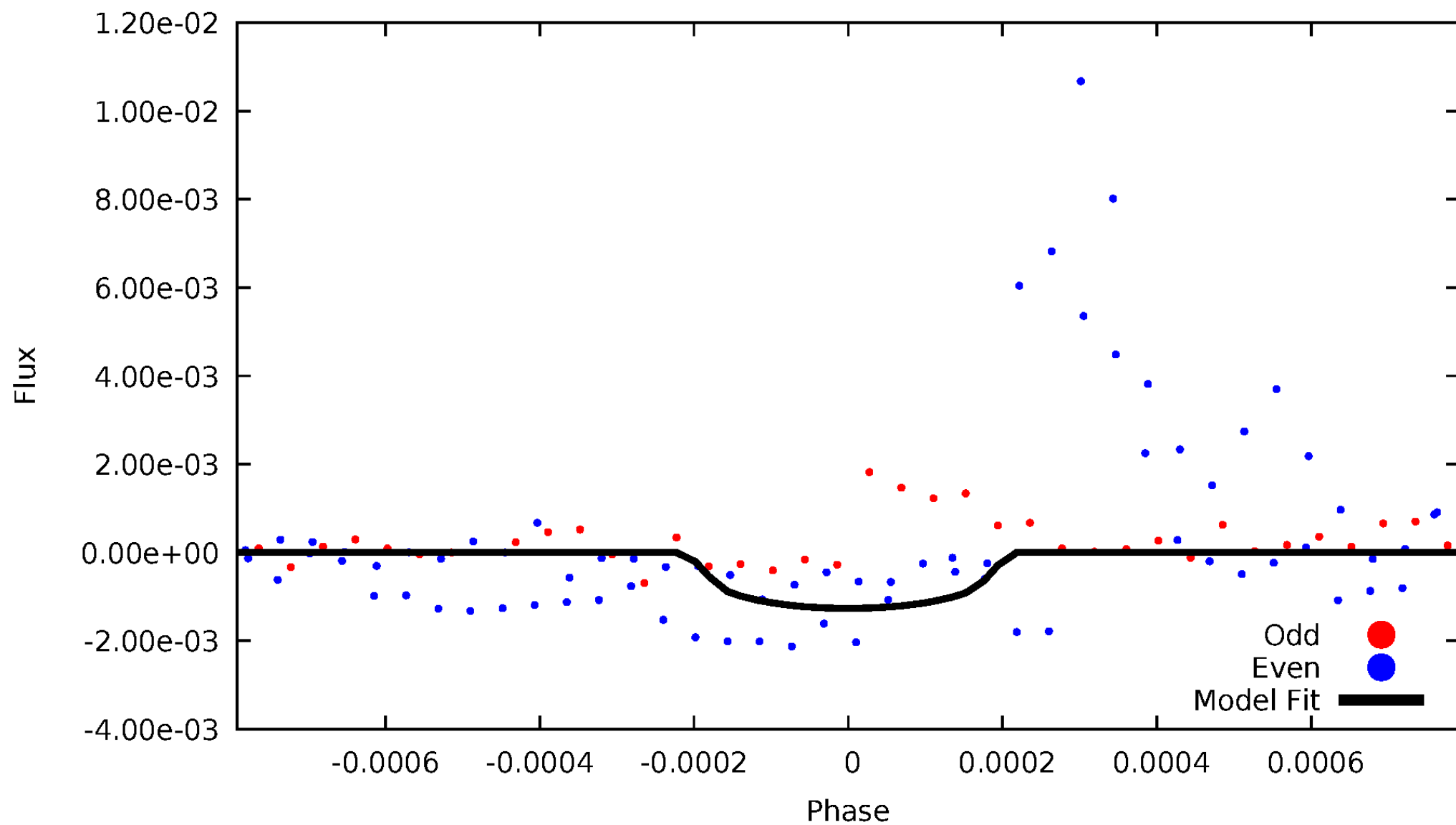
TCE 004644174-01





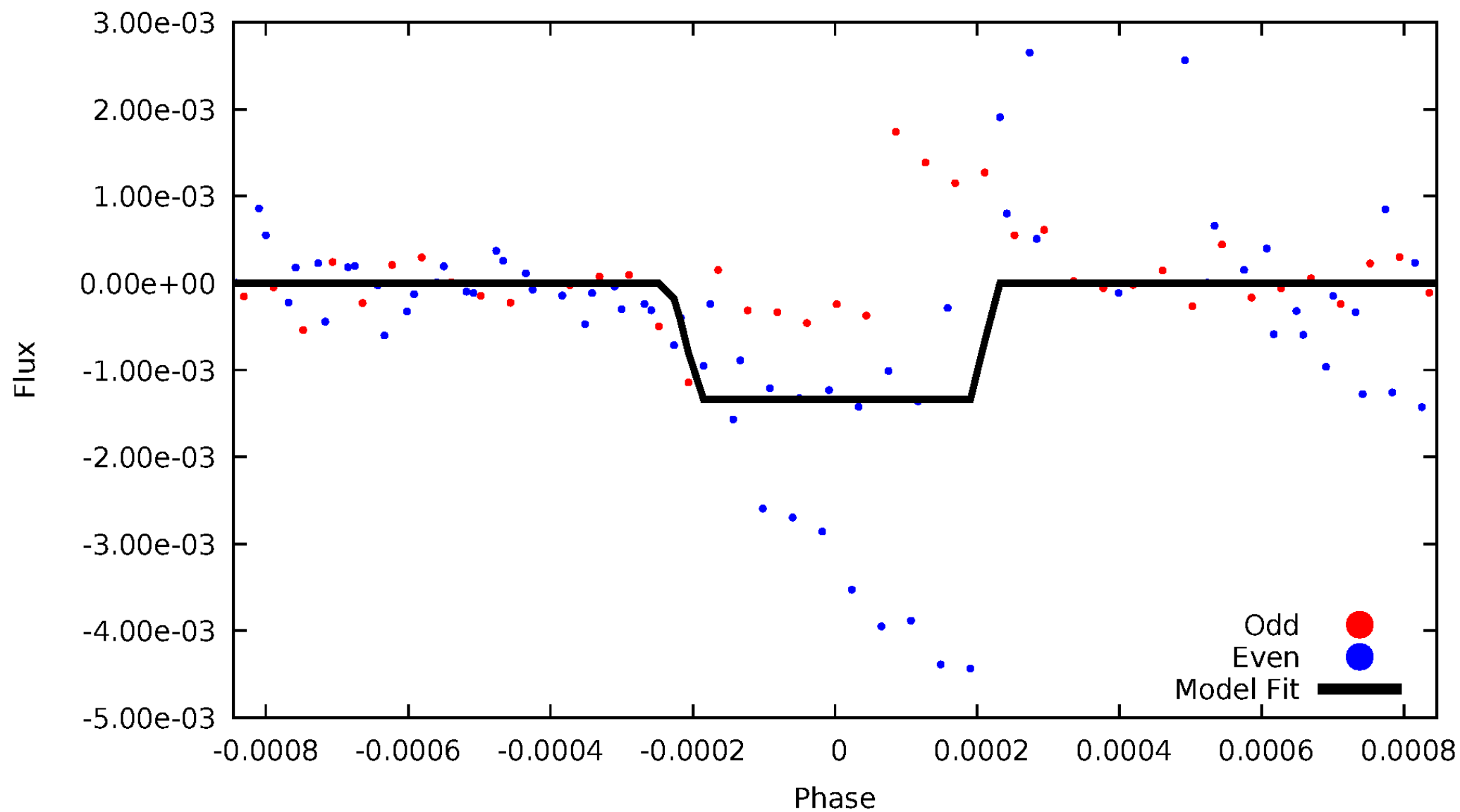
# DV Odd/Even

TCE 004644174-01



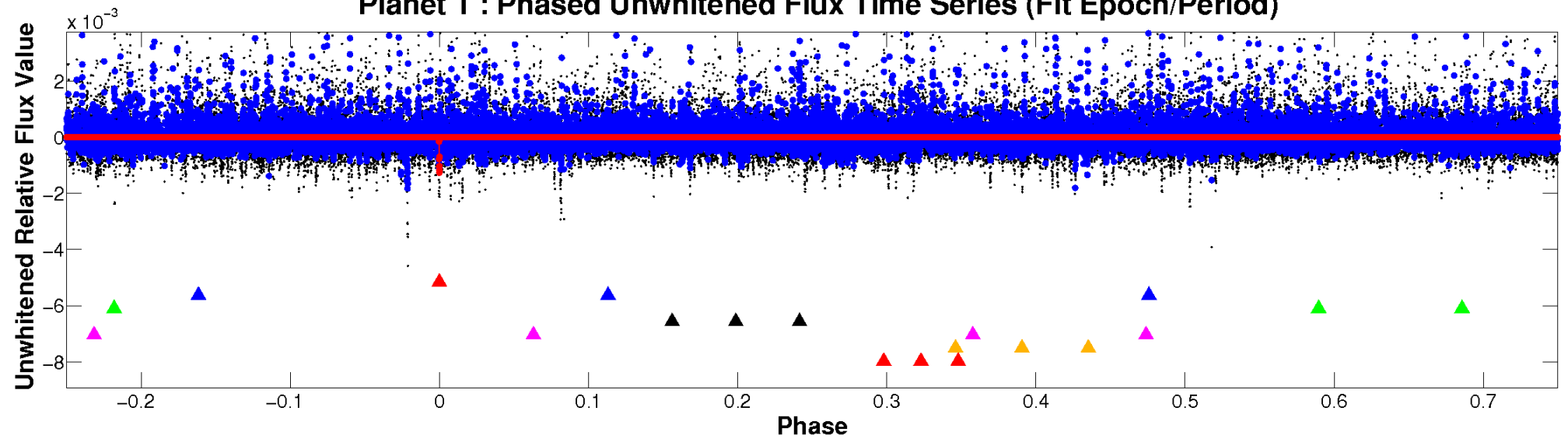
# ALT Odd/Even

TCE 004644174-01

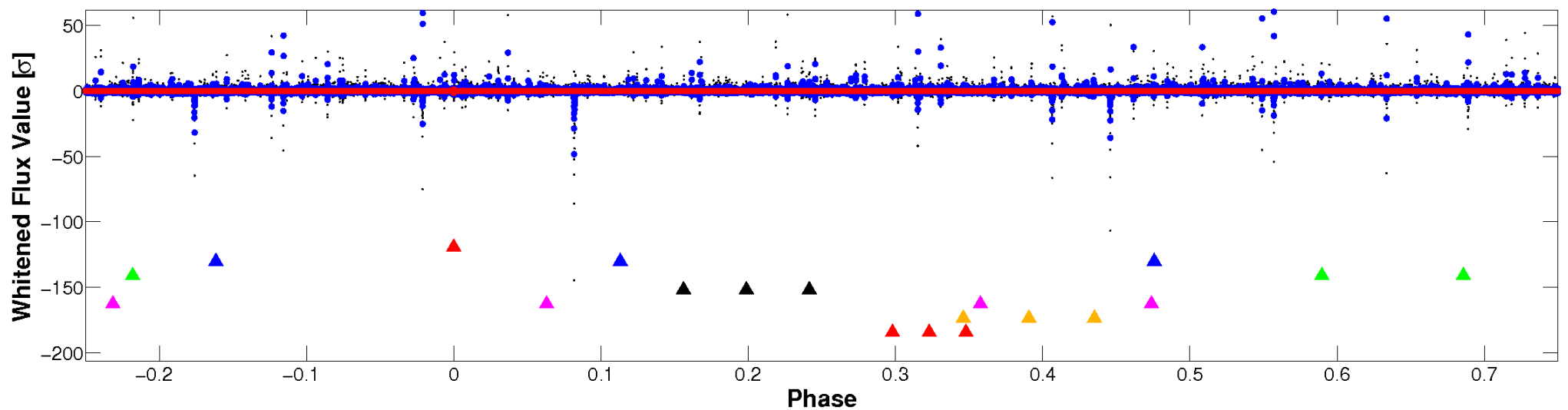


# Non-Whitened Vs. Whitened Light Curve

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

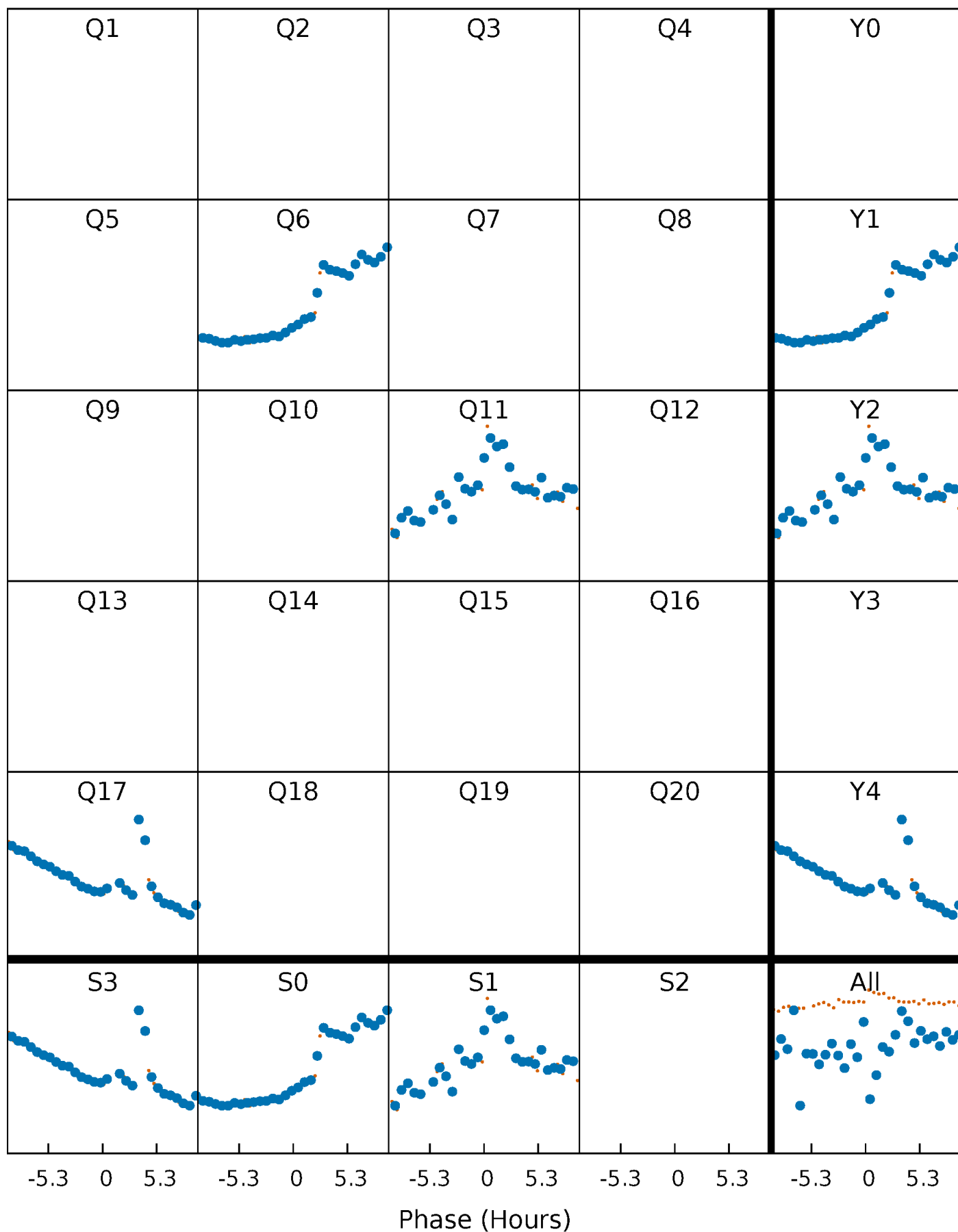


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



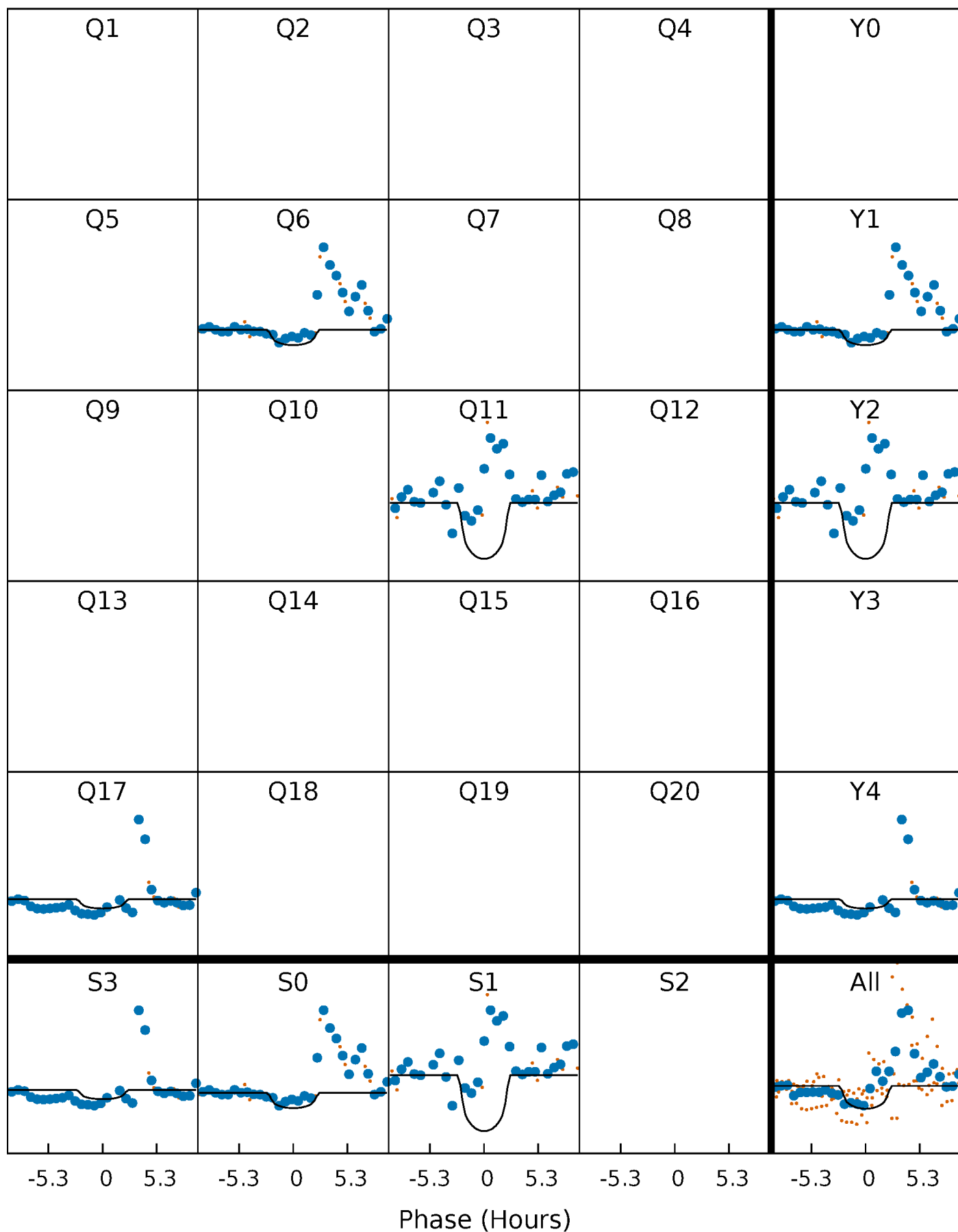
# PDC Quarter-Phased Transit Curves

TCE 004644174-01 P=490.476780 Days  $T_0=592.714724$  (BKJD)



# DV Quarter-Phased Transit Curves

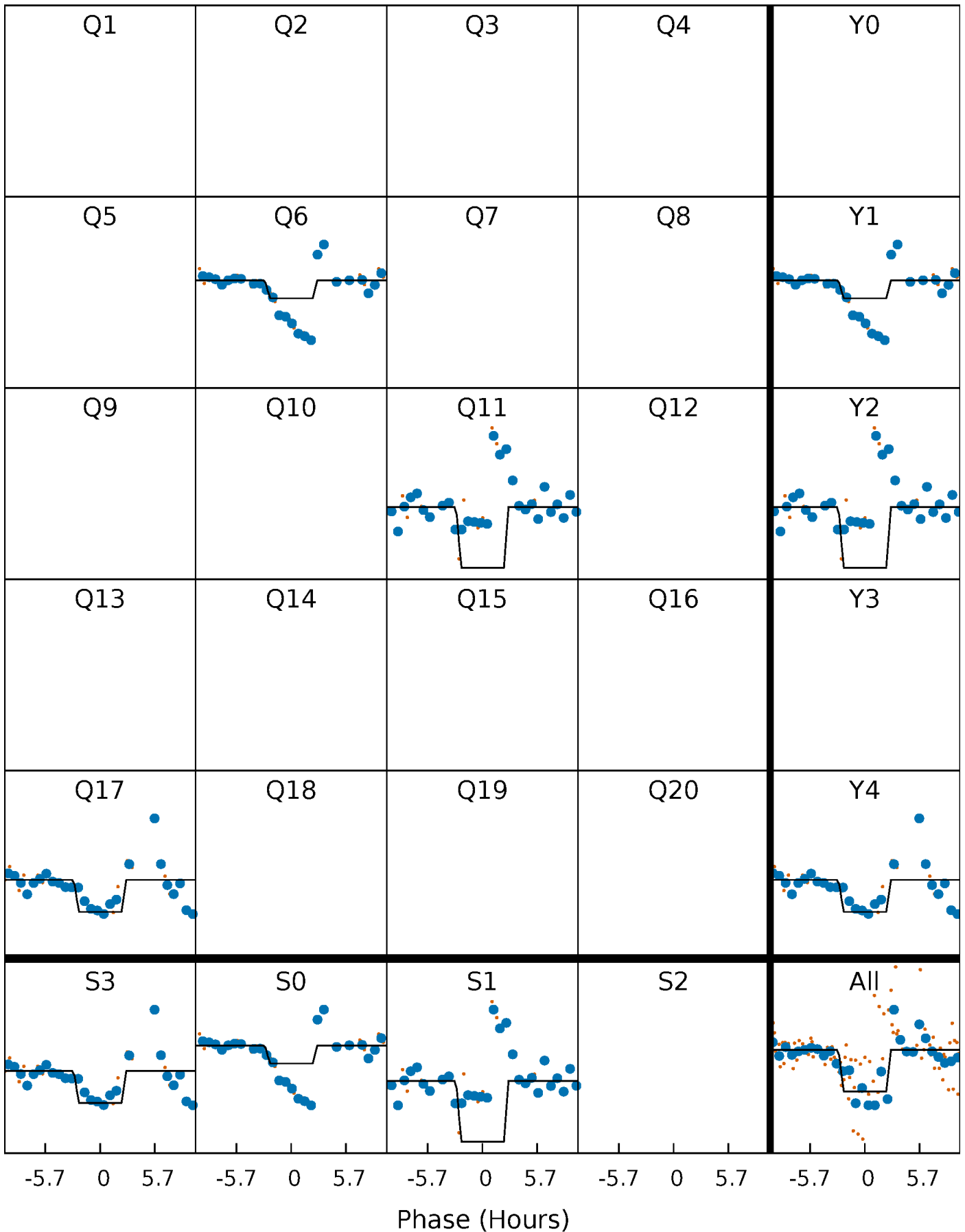
TCE 004644174-01 P=490.476780 Days  $T_0=592.714724$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

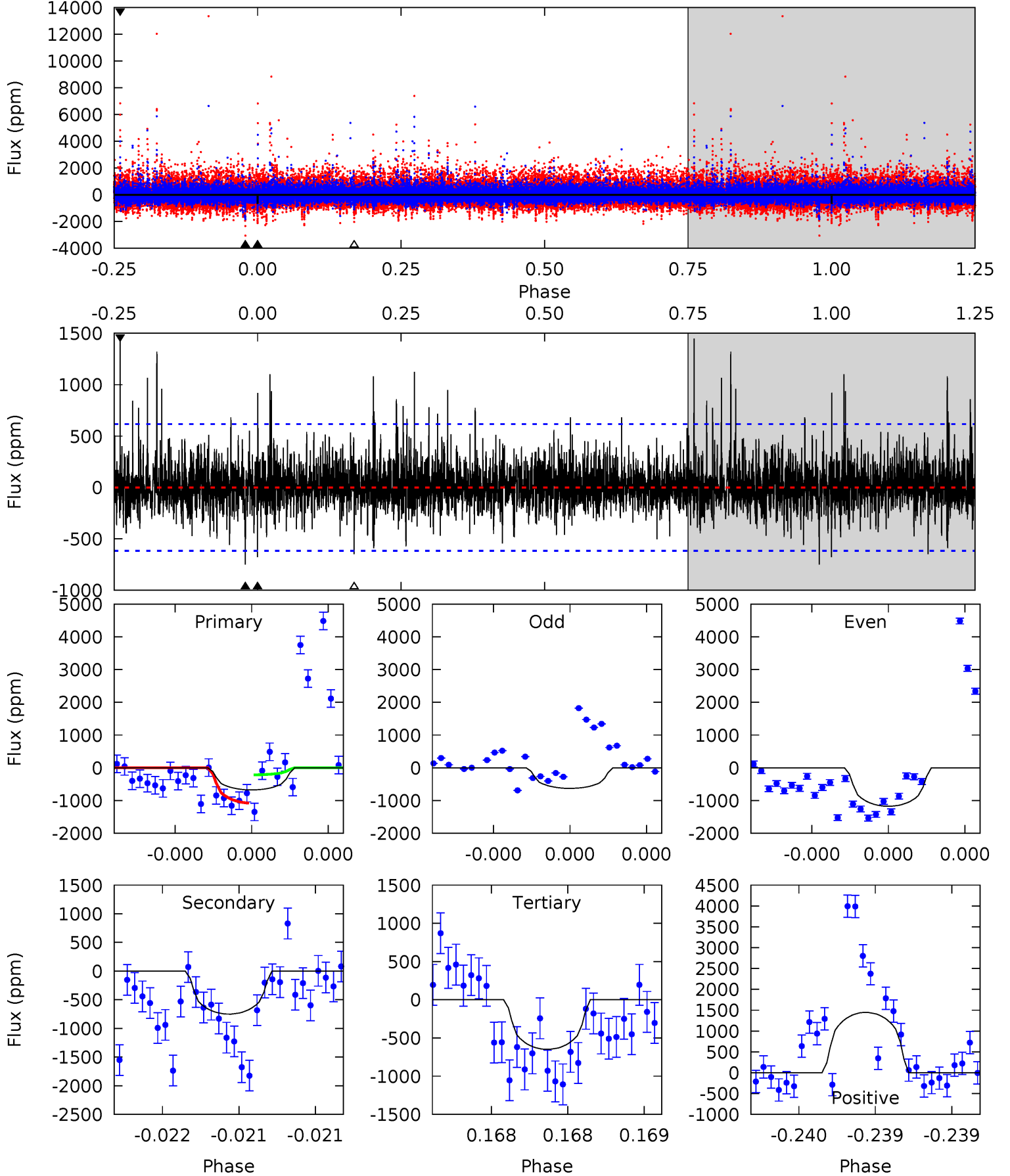
TCE 004644174-01 P=490.453118 Days  $T_0=592.709770$  (BKJD)



# DV Model-Shift Uniqueness Test

004644174-01, P = 490.476780 Days, E = 102.237944 Days

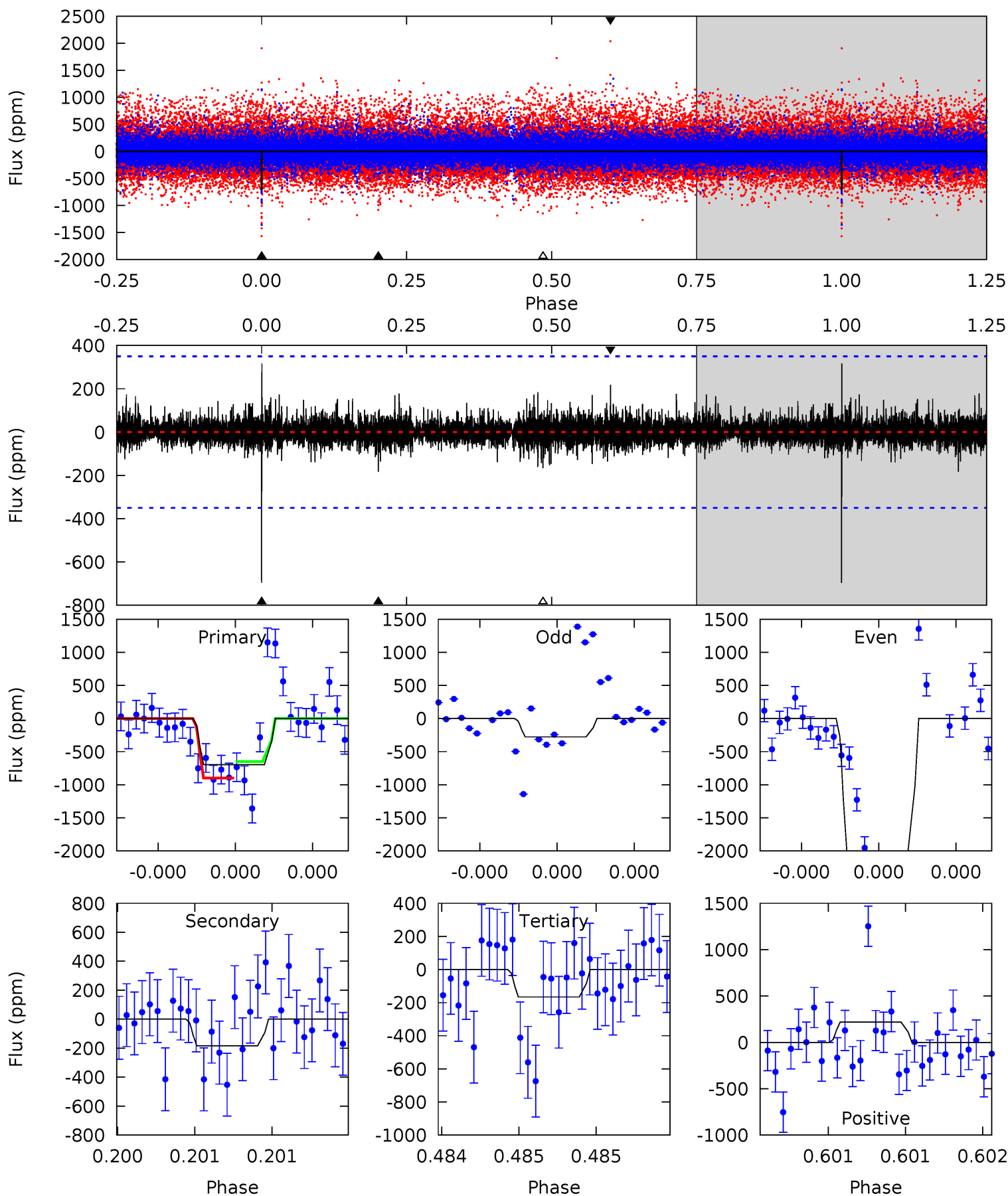
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.16	6.83	5.91	13.2	5.62	3.55	1.57	0.25	-7.02	0.92	-6.35	1.14	0.91	0.66	3.96



# Alt Model-Shift Uniqueness Test

004644174-01, P = 490.453118 Days, E = 102.256652 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
11.1	2.93	2.65	3.49	5.59	3.51	0.56	8.47	7.63	0.28	-0.56	16.0	1.27	0.31	1.91



### Stellar Parameters For KIC 004644174

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4135^{+148}_{-165}$	$4.618^{+0.052}_{-0.017}$	$0.260^{+0.150}_{-0.300}$	$0.659^{+0.027}_{-0.062}$	$0.657^{+0.044}_{-0.058}$	$3.237^{+0.756}_{-0.234}$
	+4%/-4%	+1%/-0%	+58%/-115%	+4%/-9%	+7%/-9%	+23%/-7%
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 004644174-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-750 \pm 110$	$3.67^{+3.28}_{-2.61}$	$200^{+8}_{-9}$	$3354^{+1861}_{-592}$	$33885^{+366060}_{-24365}$
Alt.	$-183 \pm 63$	$3.61^{+3.43}_{-2.28}$	$199^{+8}_{-9}$	$2728^{+926}_{-408}$	$8284^{+54996}_{-6071}$

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

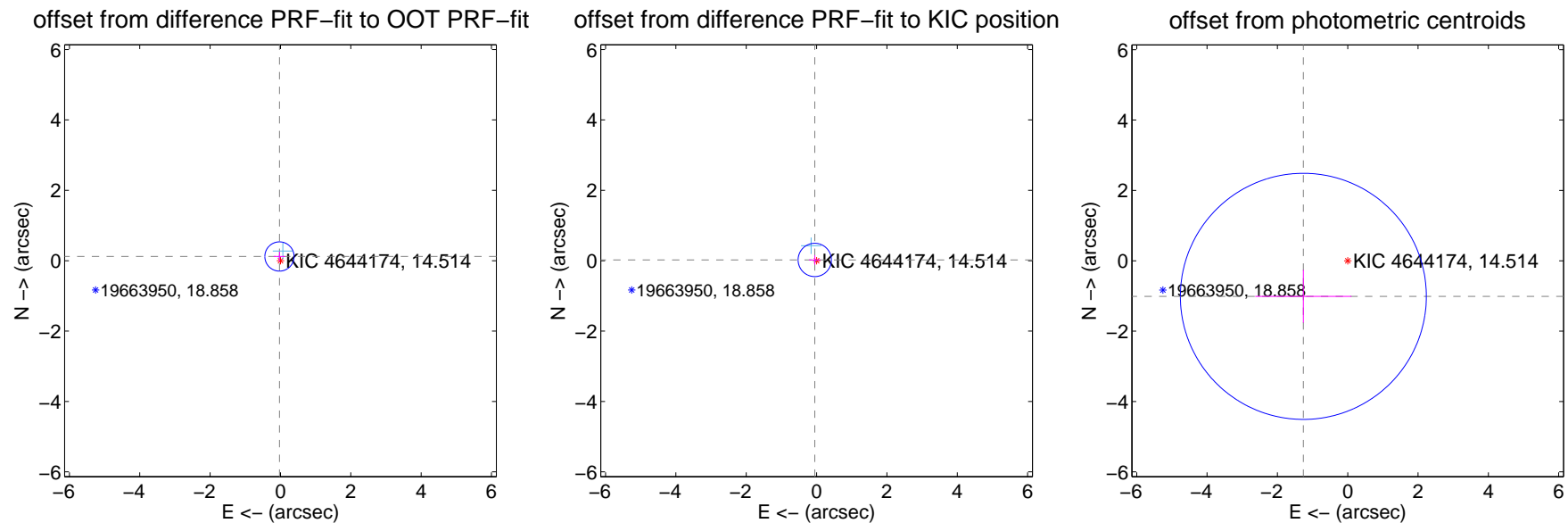
## DV Centroid Data

Supplemental centroid analysis for 004644174-01. Kepler magnitude: 14.51. Transit SNR 6.04

There are 2 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.27 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.123 \pm 0.139$	0.89	$0.028 \pm 0.161$	$0.120 \pm 0.137$
PRF-fit source offset from KIC position	$0.056 \pm 0.158$	0.36	$0.052 \pm 0.161$	$0.022 \pm 0.137$
photometric centroid source offset	$1.62 \pm 1.17$	1.39	$1.26 \pm 1.37$	$-1.01 \pm 0.75$



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.

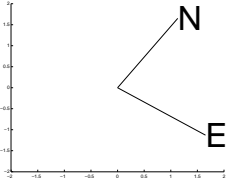
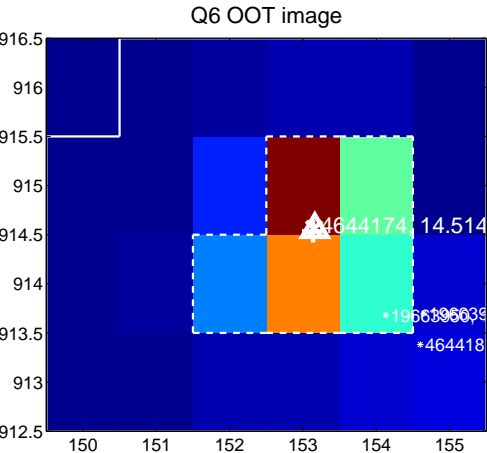
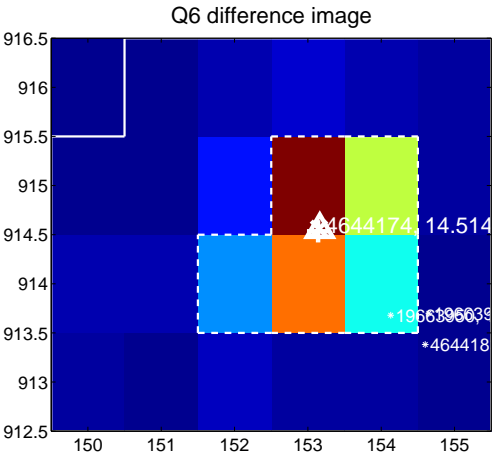


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

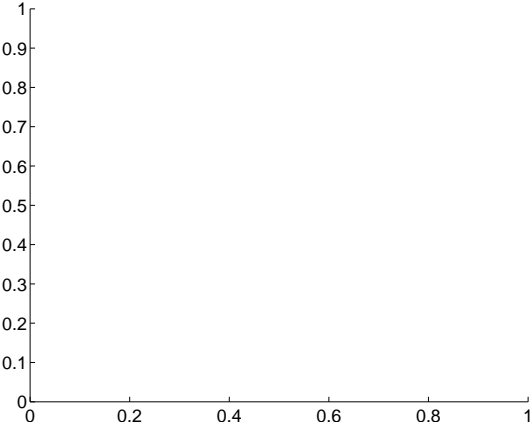
Q5 no difference image



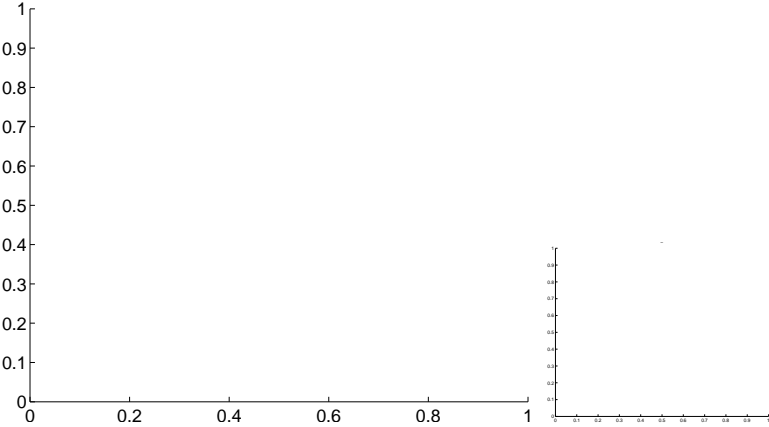
Q5 no OOT image



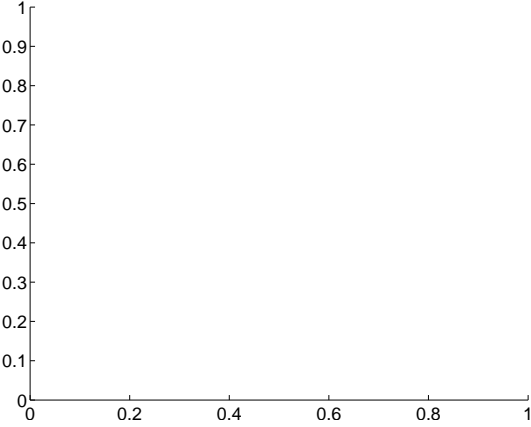
Q7 no difference image



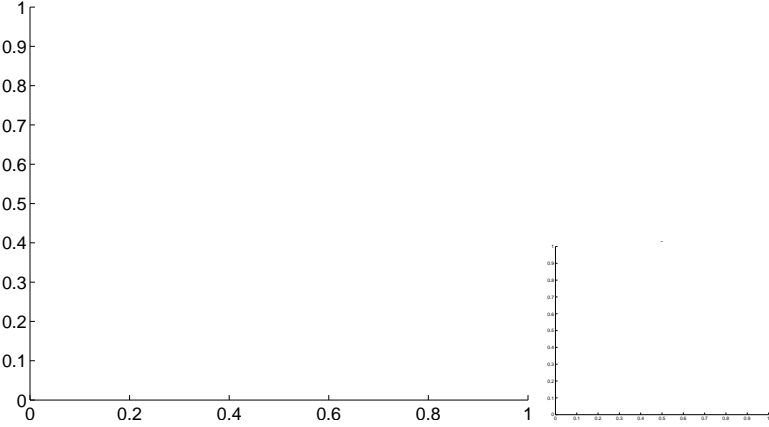
Q7 no OOT image



Q8 no difference image



Q8 no OOT image



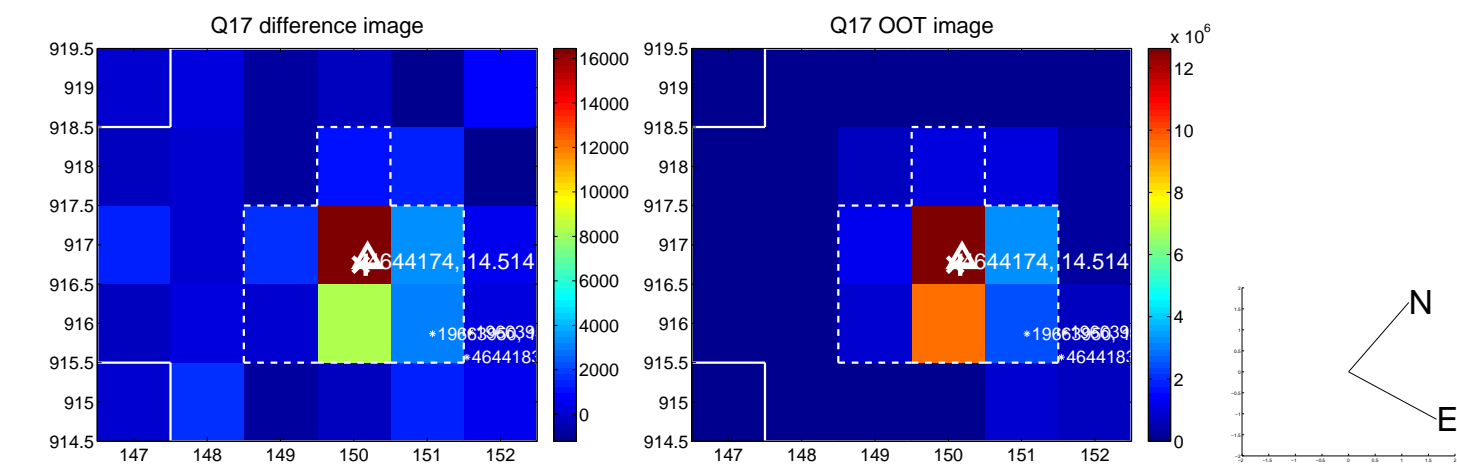
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



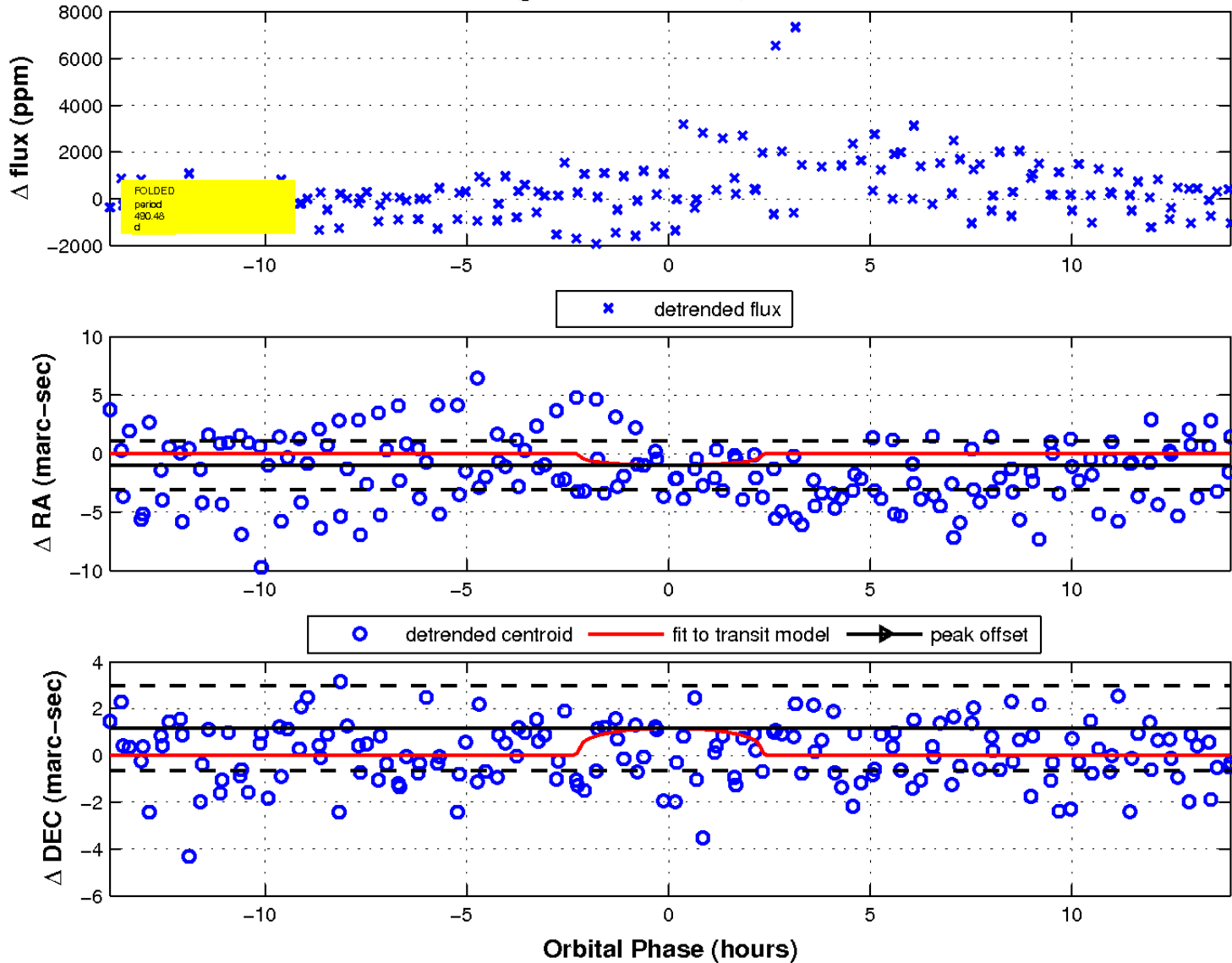
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



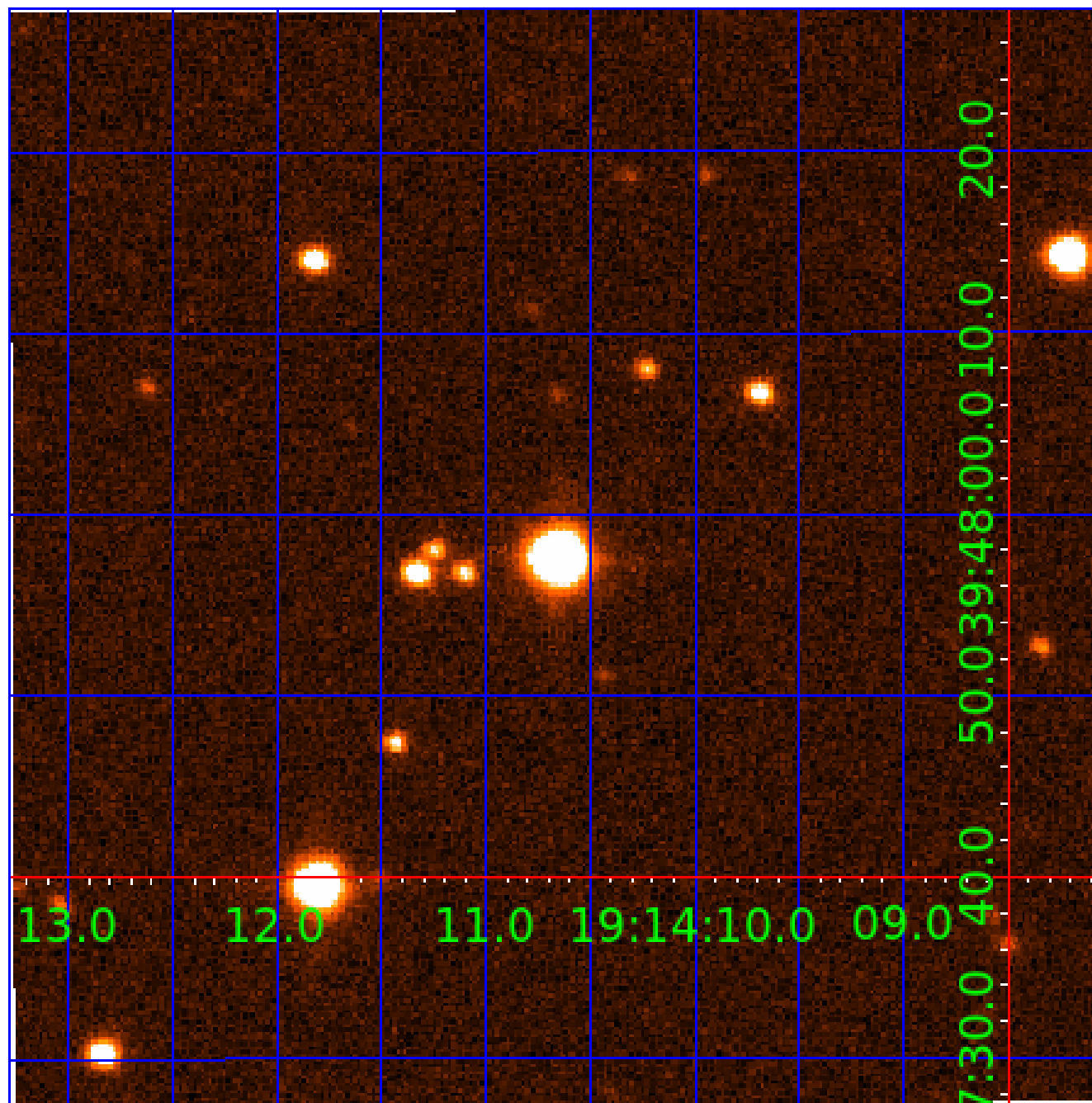
fluxWeightedCentroids, Planet 1 of 7





UKIRT Image

Declination



# KIC 004644174

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004644174-01	OBS	No	490.476780	592.714724	1263.6	4.663	17.3	6.0	0.66	4135	2.24	0.10
004644174-02	OBS	No	668.363143	157.719815	1472.8	7.205	15.9	7.2	0.66	4135	2.59	0.07
004644174-03	OBS	No	537.634148	391.437498	1103.9	5.141	16.5	5.6	0.66	4135	2.51	0.09
004644174-05	OBS	No	345.976604	277.685128	1243.9	5.751	12.7	7.1	0.66	4135	3.05	0.16
004644174-06	OBS	No	468.641275	315.692386	1480.8	5.761	13.3	8.1	0.66	4135	2.71	0.11
004644174-07	OBS	No	502.706443	248.411391	1131.5	3.500	14.1	-1.0	0.66	4135	2.12	0.10

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004644174-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004644174-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS
004644174-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS
004644174-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS
004644174-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
004644174-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—CENT_NOFITS

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

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

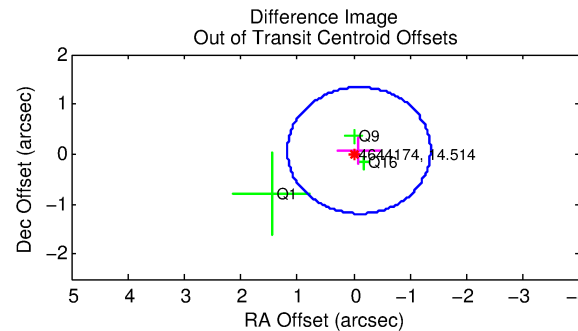
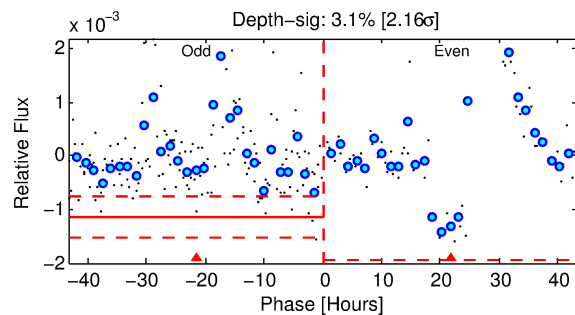
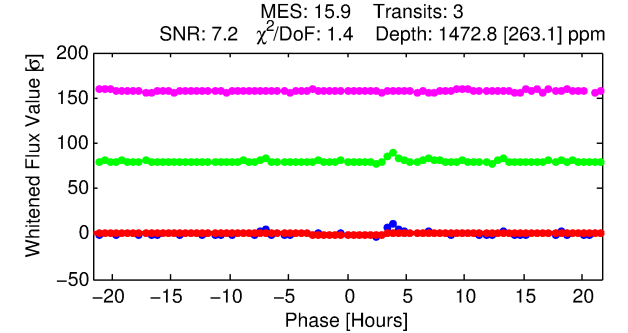
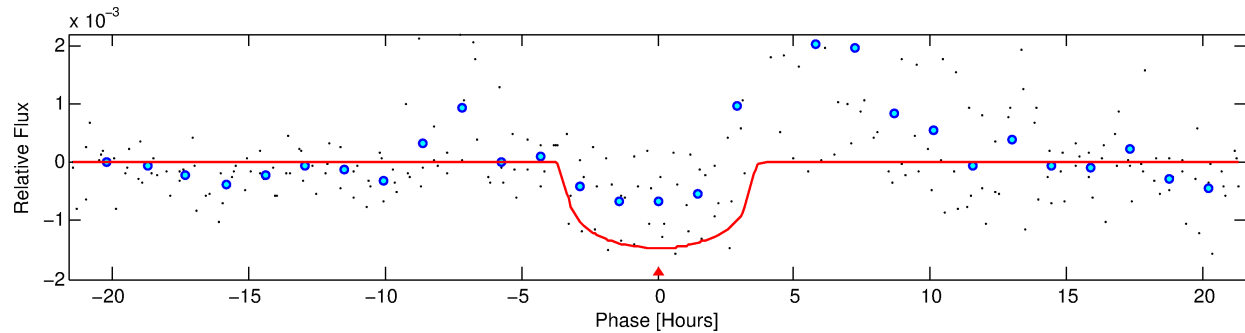
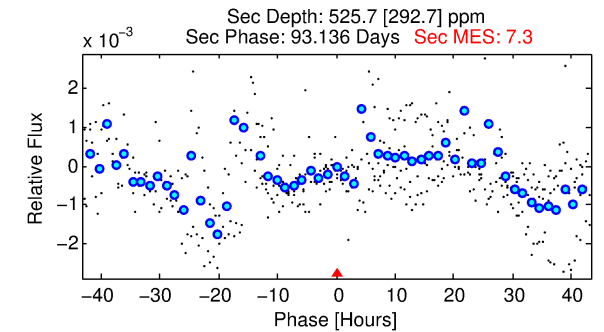
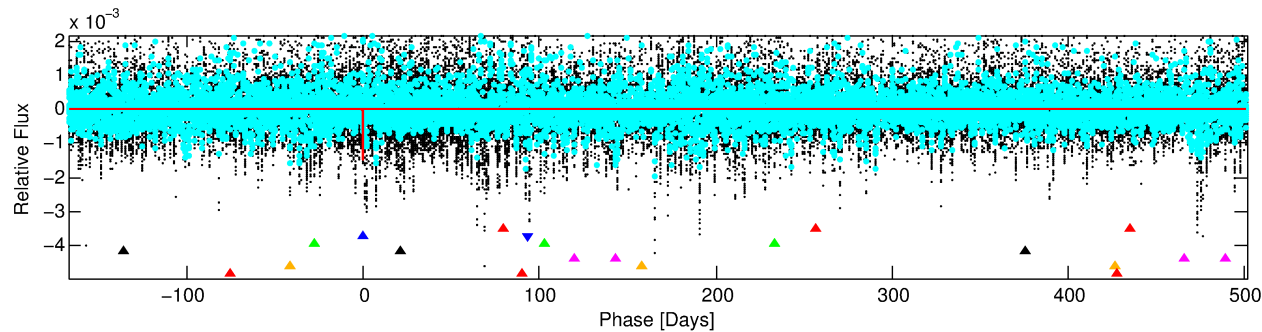
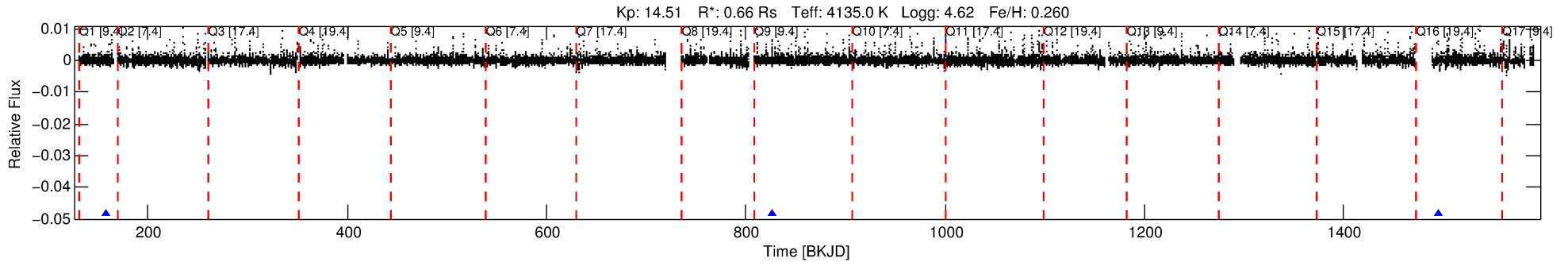
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004644174-02

No Significant Match Found

# DV One-Page Summary

KIC: 4644174 Candidate: 2 of 7 Period: 668.363 d



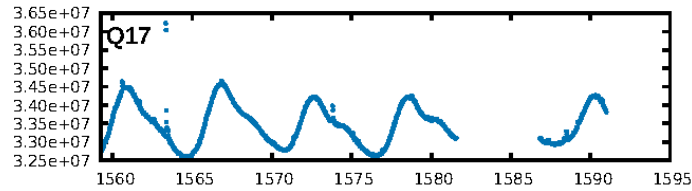
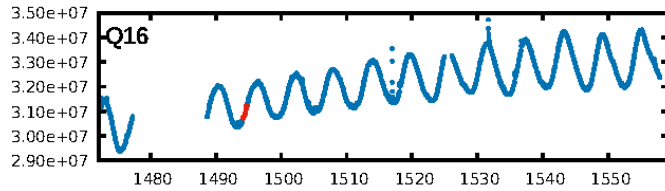
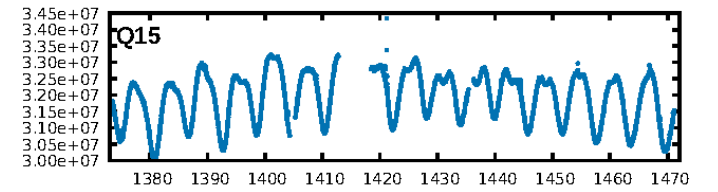
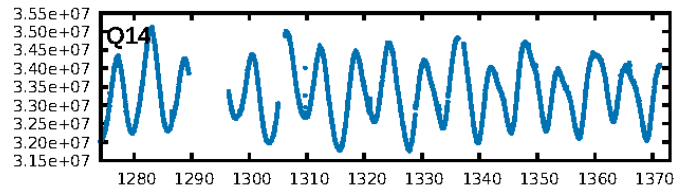
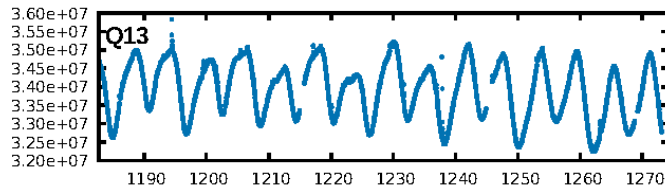
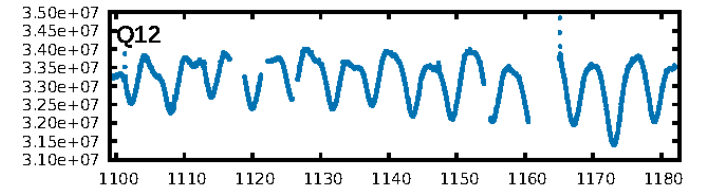
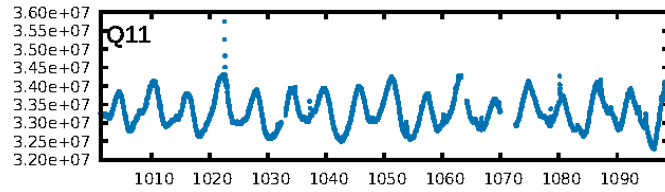
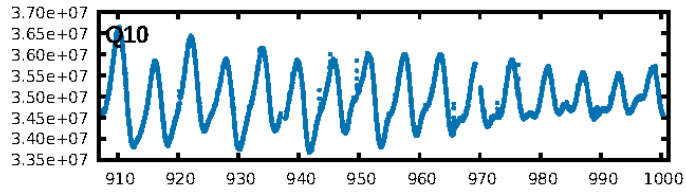
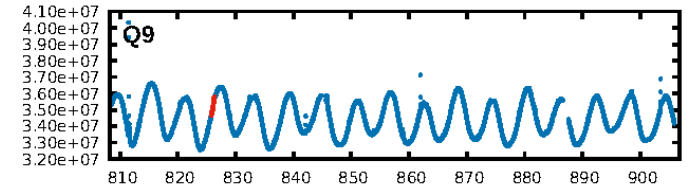
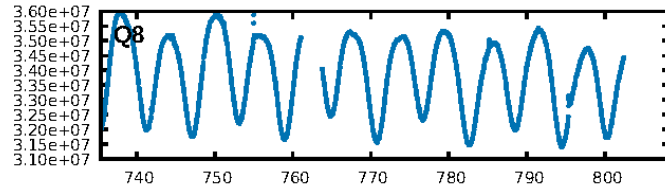
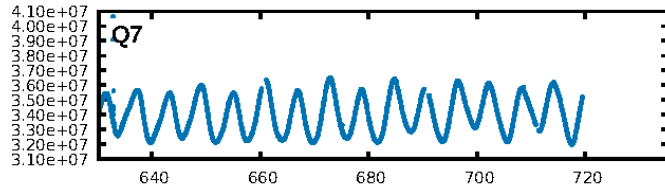
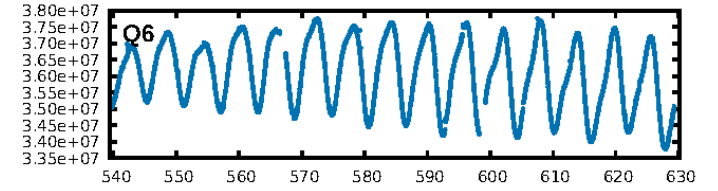
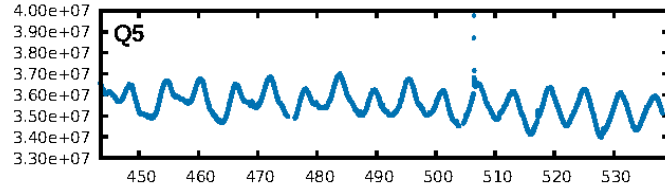
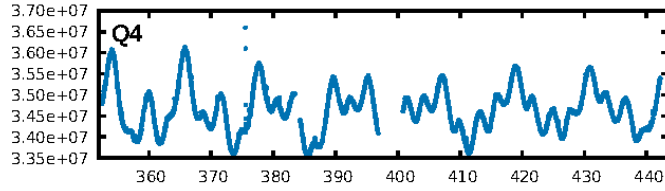
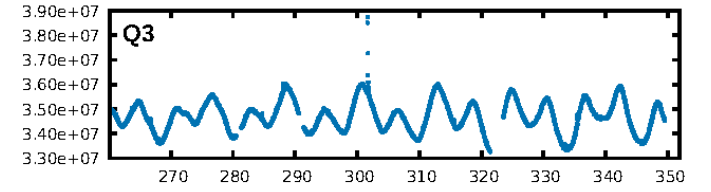
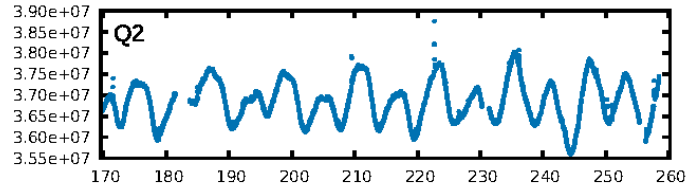
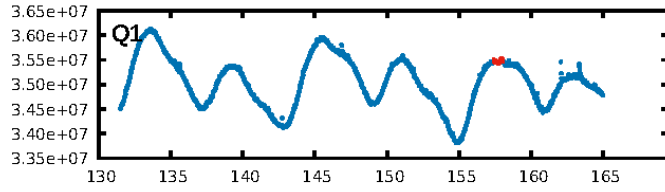
## DV Fit Results:

Period = 668.36314 [0.00817] d  
Epoch = 157.7198 [0.0114] BKJD  
Rp/R\* = 0.0360 [0.0213]  
a/R\* = 606.06 [1077.03]  
b = 0.58 [2.03]  
Seff = 0.07 [0.01]  
Teq = 130 [6] K  
Rp = 2.59 [1.55] Re  
a = 1.3011 [0.0967] AU  
Ag = 72962.48 [95568.53] [0.76σ]  
Teffp = 3299 [1085] K [2.92σ]

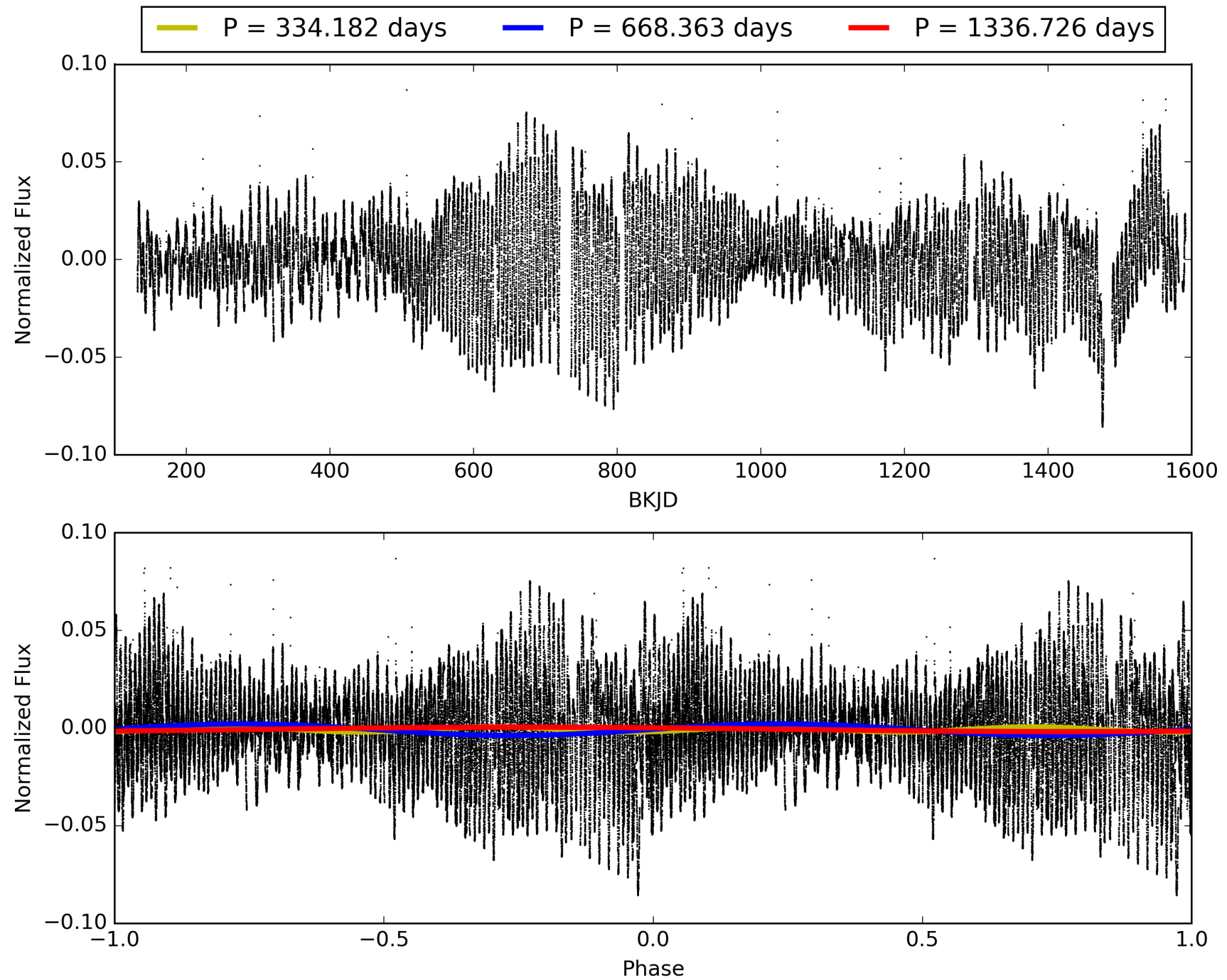
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [354.45σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 2.3%  
ModelChiSquareGof-sig: 88.6%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [2/2]  
GhostDiagnostic-chr: 3.709  
Centroid-sig: 0.2%  
Centroid-so: 1.405 arcsec [1.48σ]  
OotOffset-rm: 0.119 arcsec [0.28σ]  
KicOffset-rm: 0.163 arcsec [0.56σ]  
OotOffset-st: 0/0/1/2 [3]  
KicOffset-st: 0/0/1/2 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 1.00 [3/3]

# TCE 004644174-02, PDC Light Curves



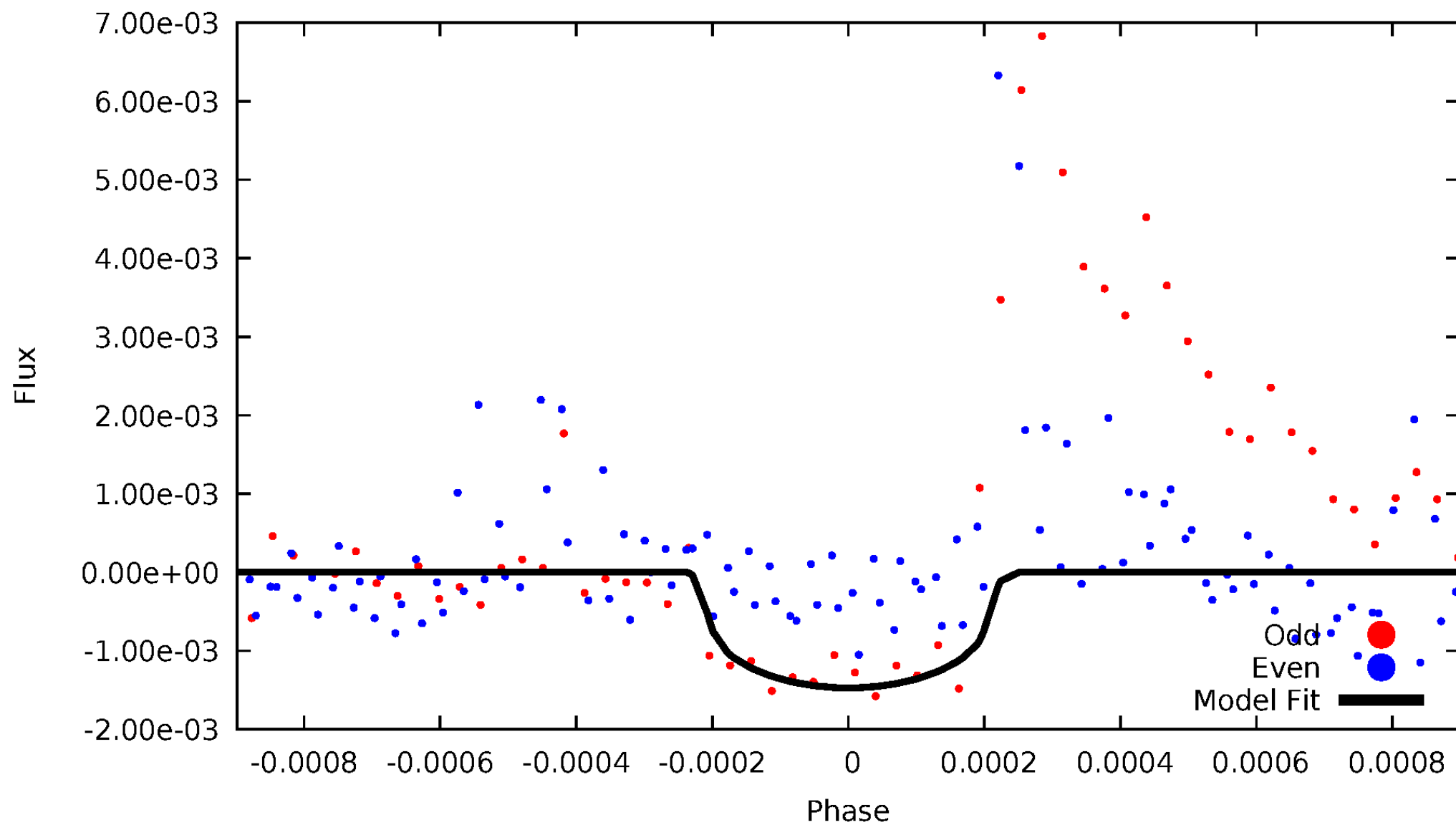
TCE 004644174-02





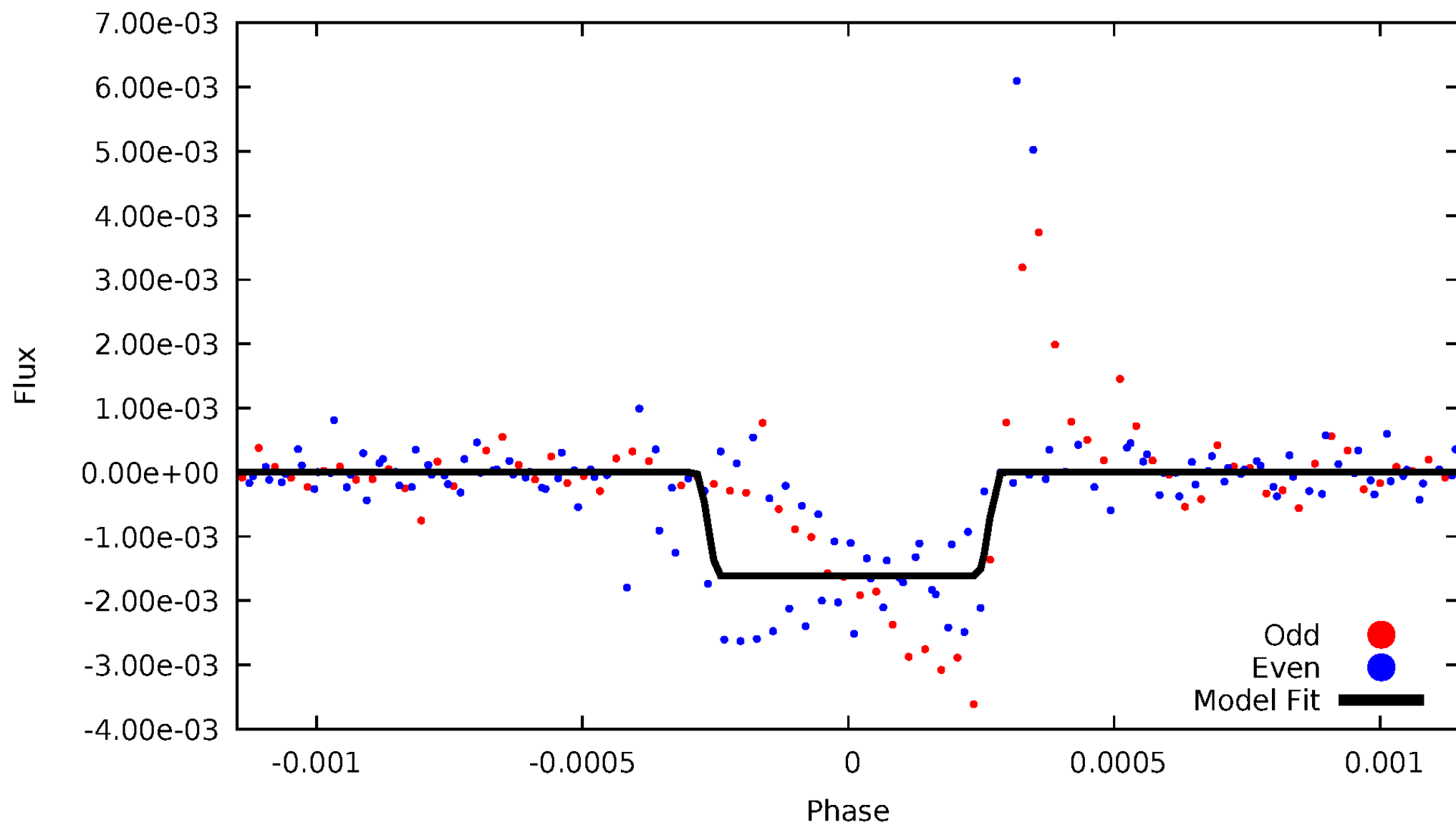
# DV Odd/Even

TCE 004644174-02



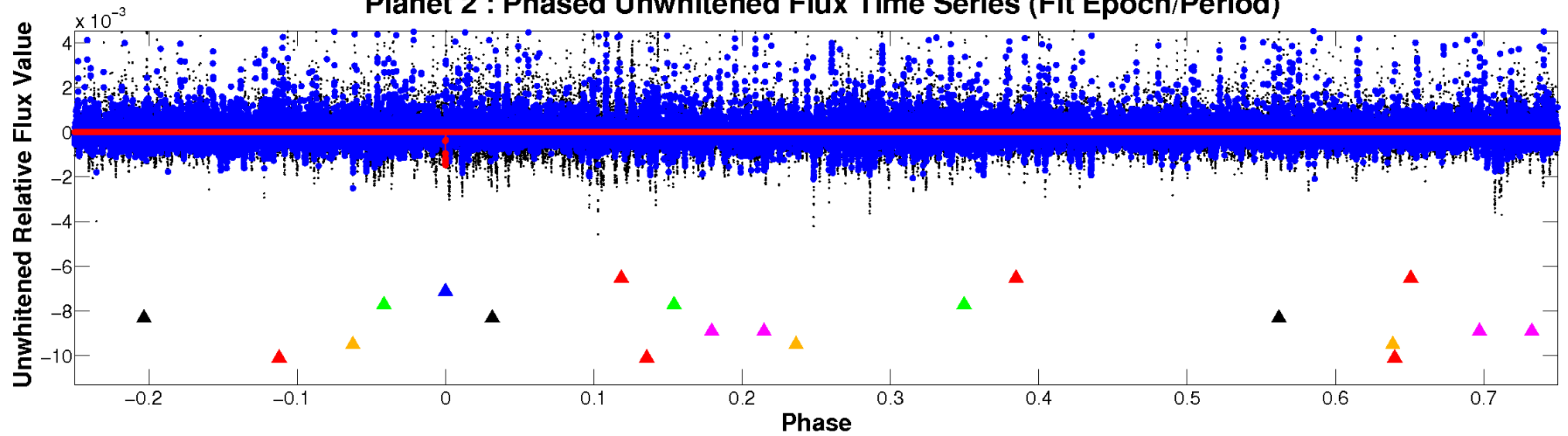
# ALT Odd/Even

TCE 004644174-02

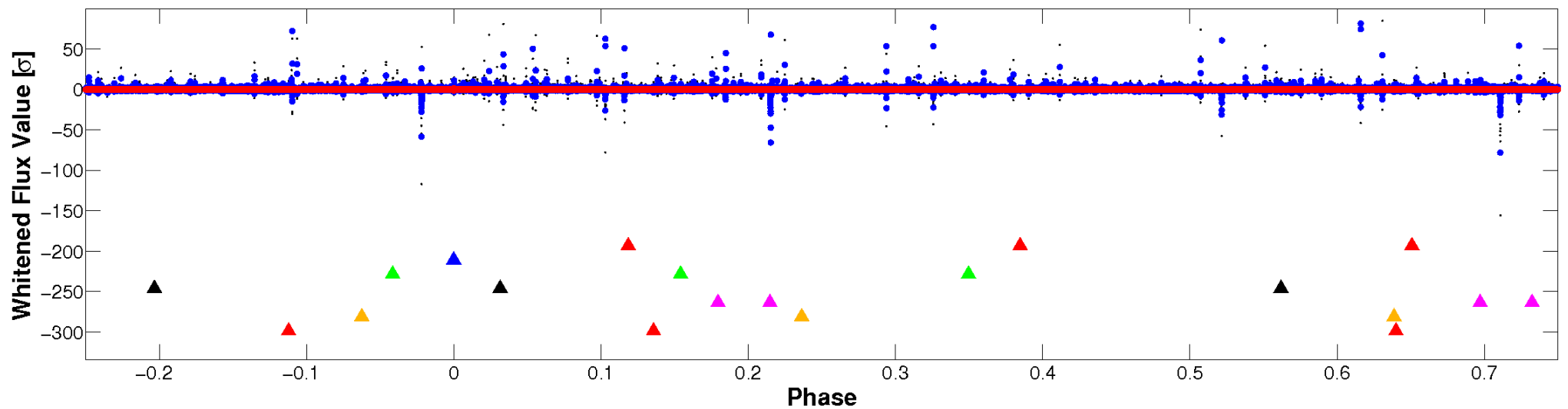


# Non-Whitened Vs. Whitened Light Curve

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

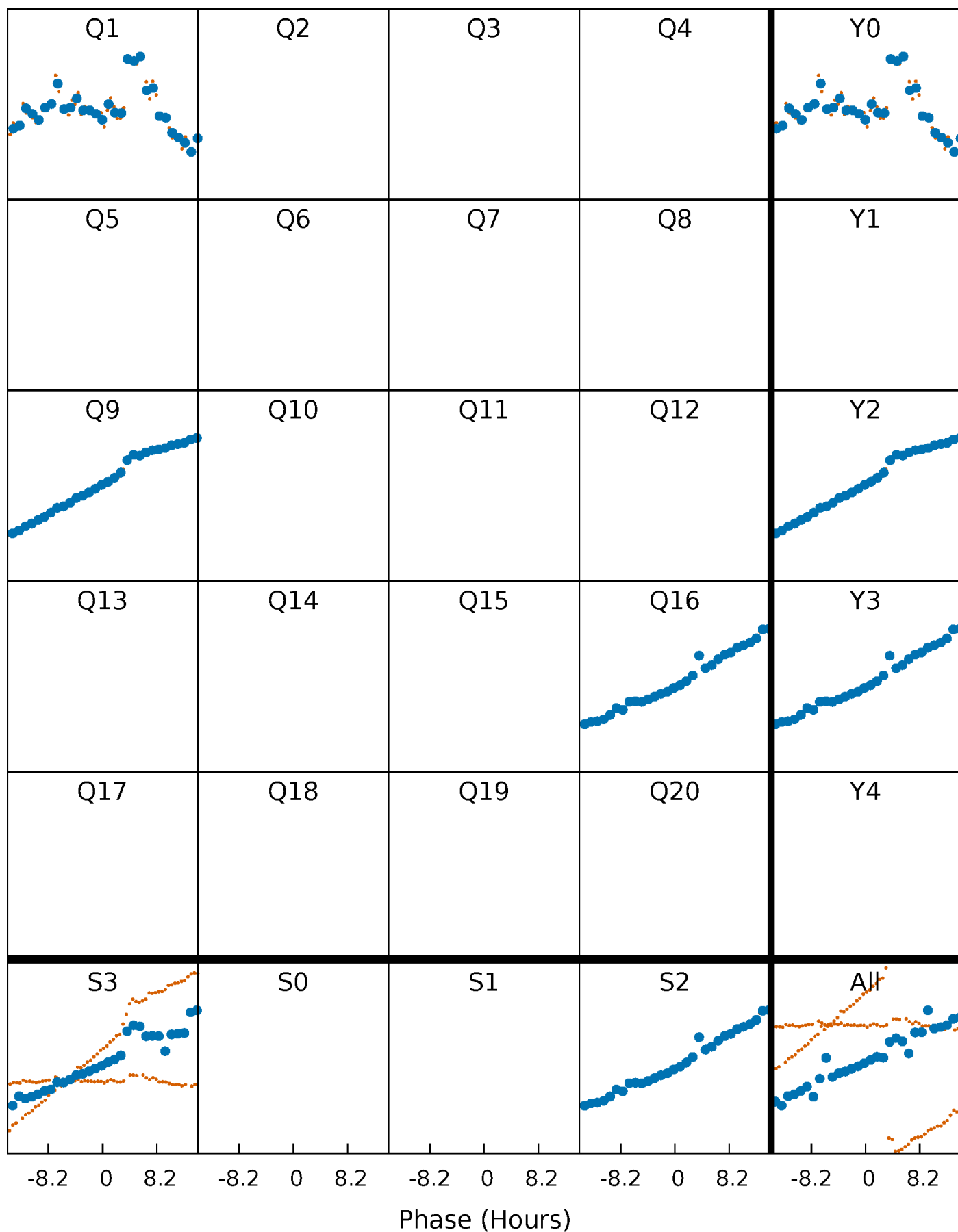


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



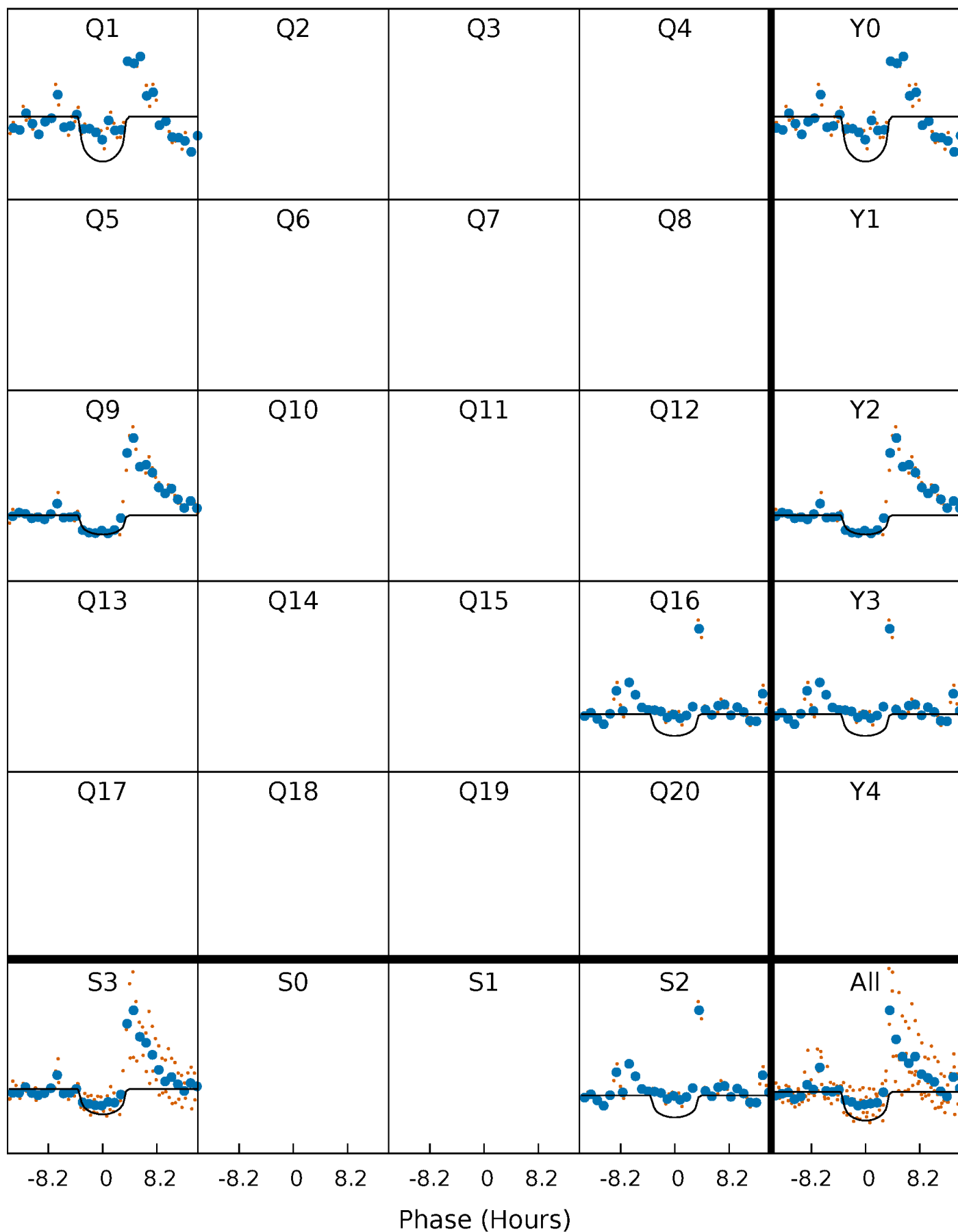
# PDC Quarter-Phased Transit Curves

TCE 004644174-02 P=668.363143 Days  $T_0=157.719815$  (BKJD)



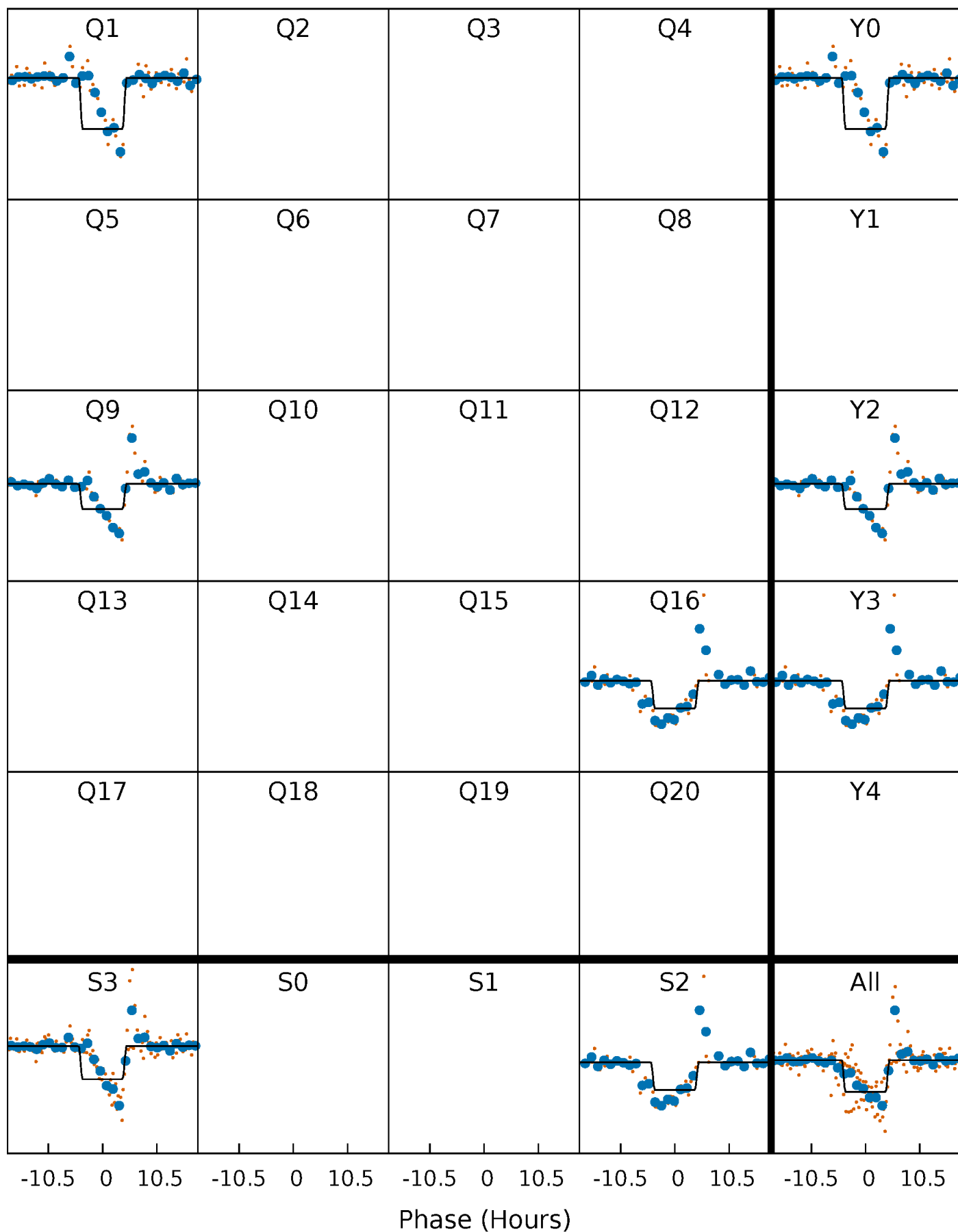
# DV Quarter-Phased Transit Curves

TCE 004644174-02     $P=668.363143$  Days     $T_0=157.719815$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

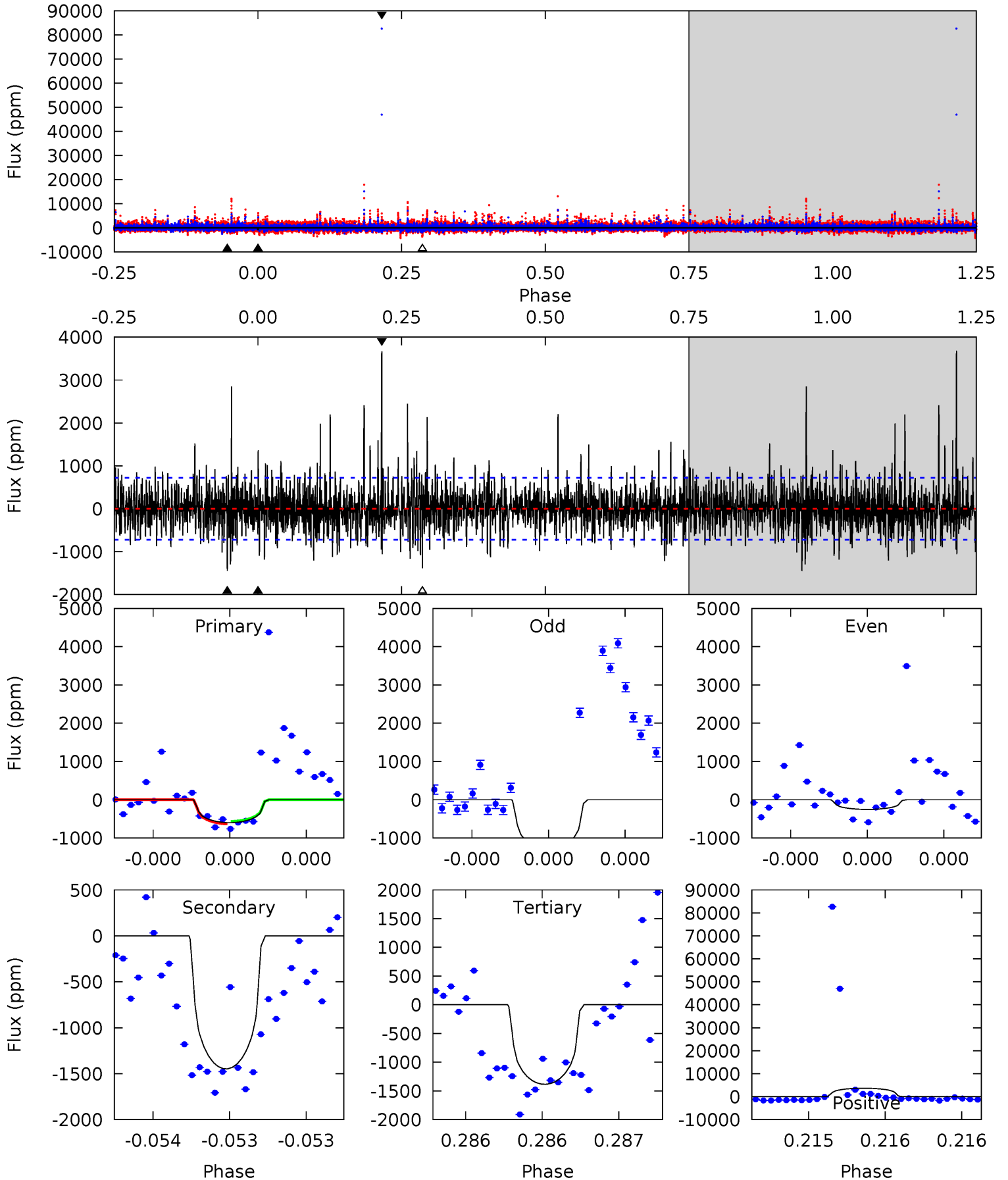
TCE 004644174-02 P=668.347692 Days  $T_0=157.686250$  (BKJD)



# DV Model-Shift Uniqueness Test

004644174-02, P = 668.363143 Days, E = 157.719815 Days

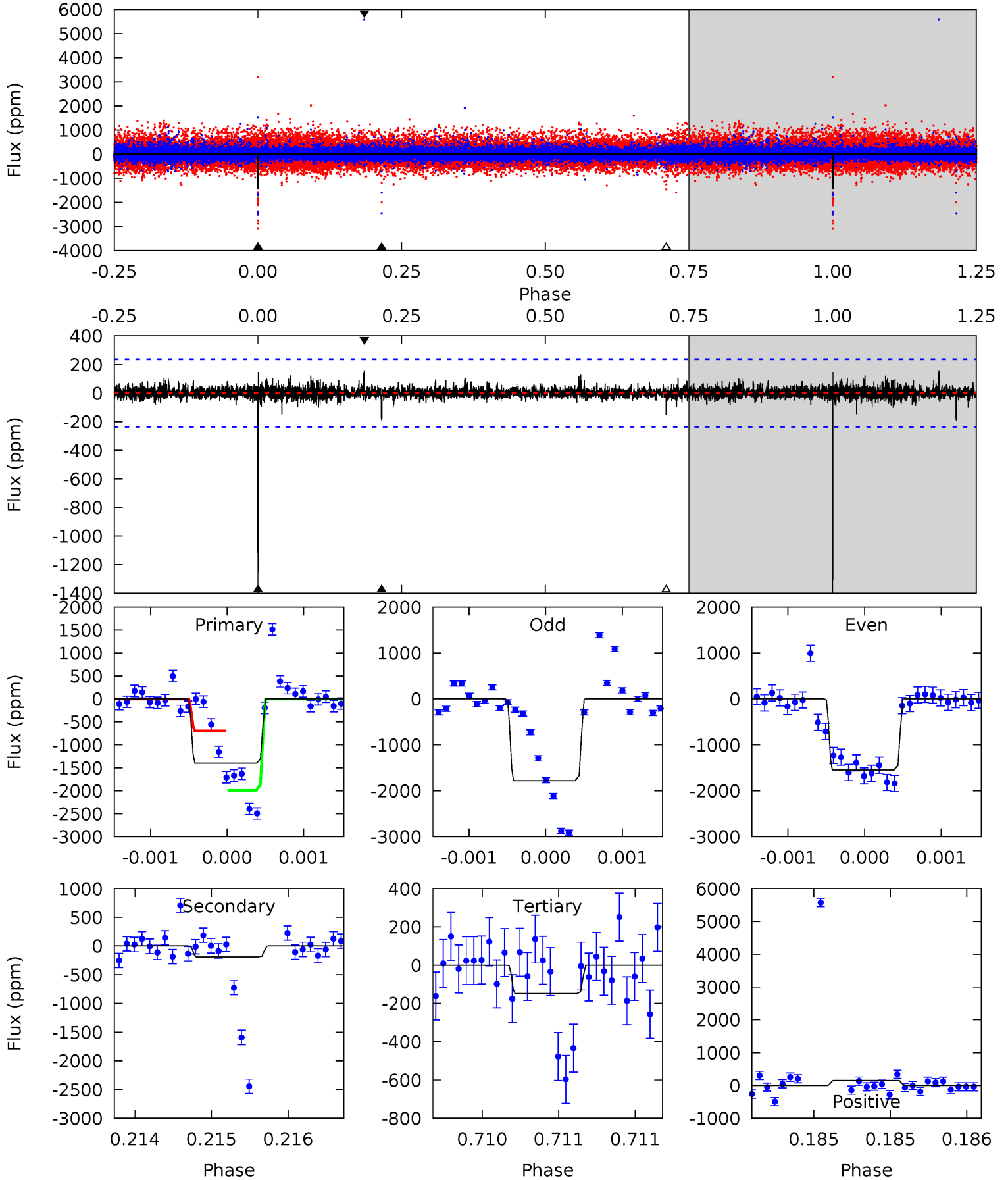
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.63	11.2	10.7	28.4	5.58	3.49	3.04	-6.07	-23.7	0.48	-17.2	2.01	1.14	0.72	0.25



# Alt Model-Shift Uniqueness Test

004644174-02, P = 668.347692 Days, E = 157.686250 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
32.8	4.45	3.49	3.71	5.55	3.45	0.55	29.4	29.1	0.96	0.73	2.64	0.94	0.10	15.3





### Stellar Parameters For KIC 004644174

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4135^{+148}_{-165}$	$4.618^{+0.052}_{-0.017}$	$0.260^{+0.150}_{-0.300}$	$0.659^{+0.027}_{-0.062}$	$0.657^{+0.044}_{-0.058}$	$3.237^{+0.756}_{-0.234}$
	+4%/-4%	+1%/-0%	+58%/-115%	+4%/-9%	+7%/-9%	+23%/-7%
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 004644174-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-1447 \pm 129$	$2.62^{+1.48}_{-1.23}$	$180^{+7}_{-7}$	$4161^{+1239}_{-612}$	$201157^{+510100}_{-120316}$
Alt.	$-189 \pm 43$	$2.91^{+1.46}_{-1.47}$	$180^{+7}_{-8}$	$2923^{+667}_{-311}$	$20386^{+65179}_{-11458}$

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

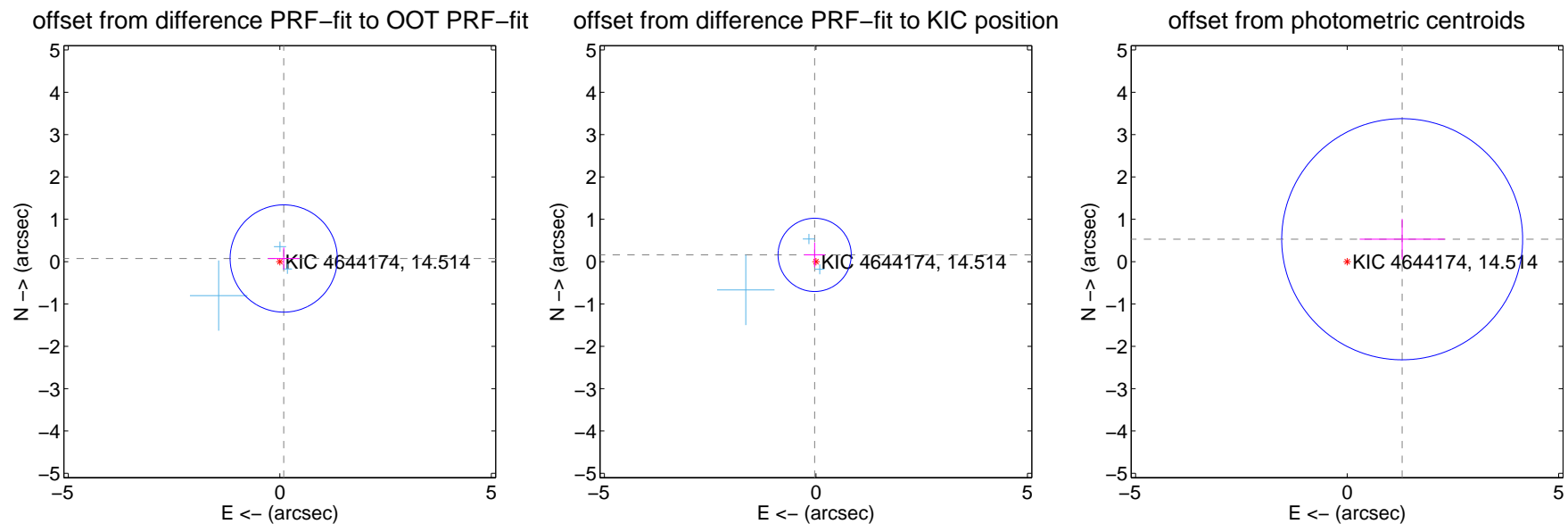
## DV Centroid Data

Supplemental centroid analysis for 004644174-02. Kepler magnitude: 14.51. Transit SNR 7.22

There are 3 quarters with good PRF difference image offsets

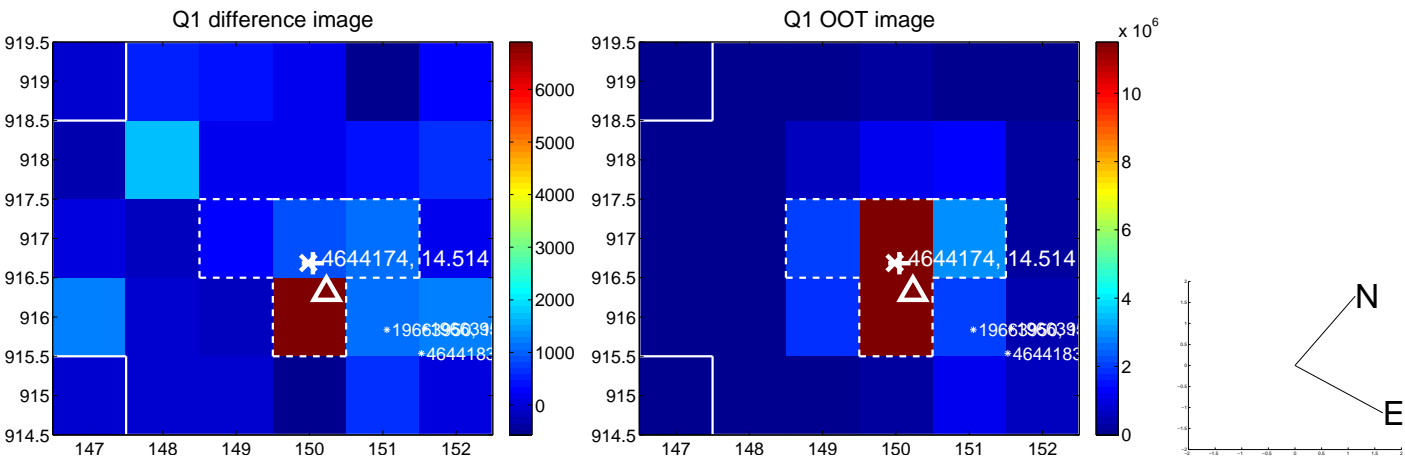
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.119 \pm 0.422$	0.28	$-0.093 \pm 0.371$	$0.074 \pm 0.257$
PRF-fit source offset from KIC position	$0.163 \pm 0.288$	0.56	$0.030 \pm 0.244$	$0.160 \pm 0.290$
photometric centroid source offset	$1.40 \pm 0.95$	1.48	$-1.30 \pm 1.01$	$0.53 \pm 0.48$



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.

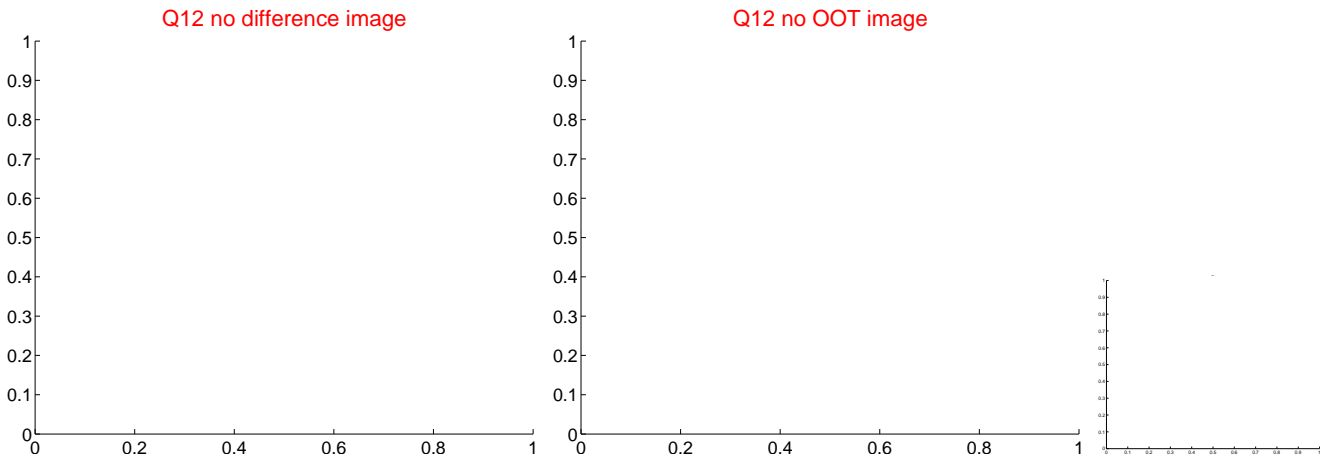
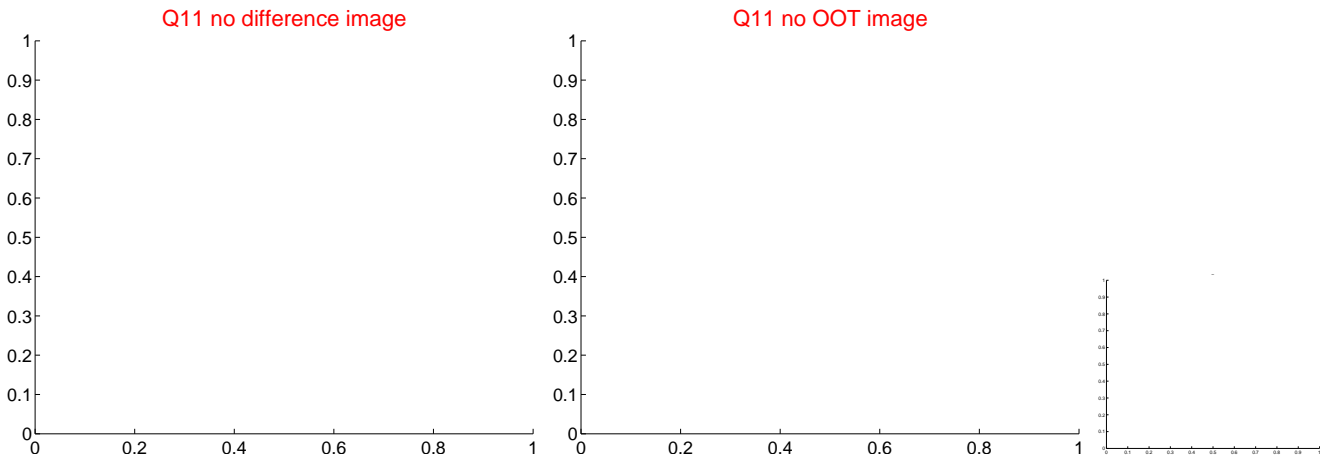
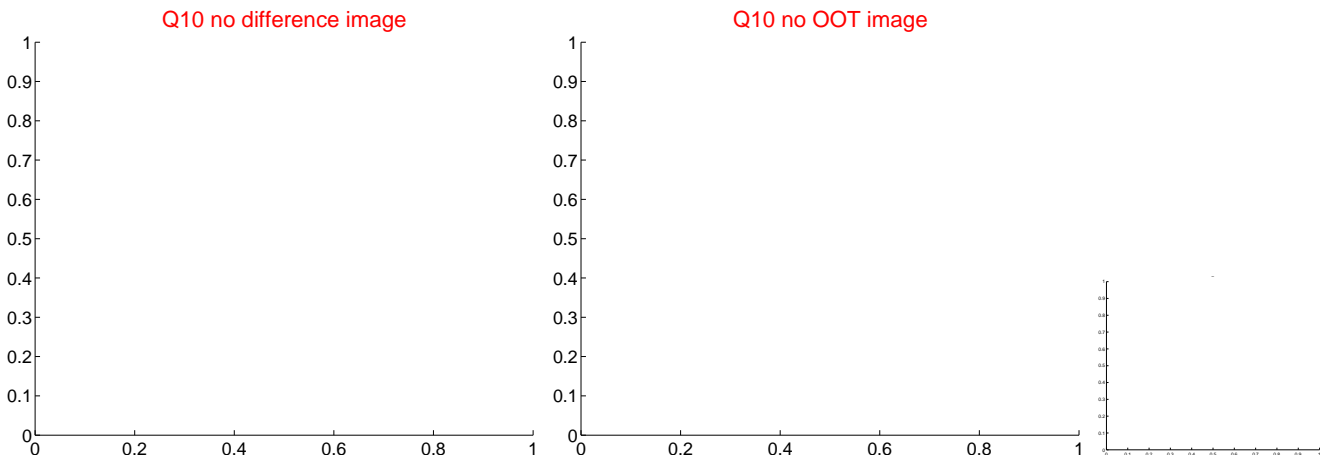
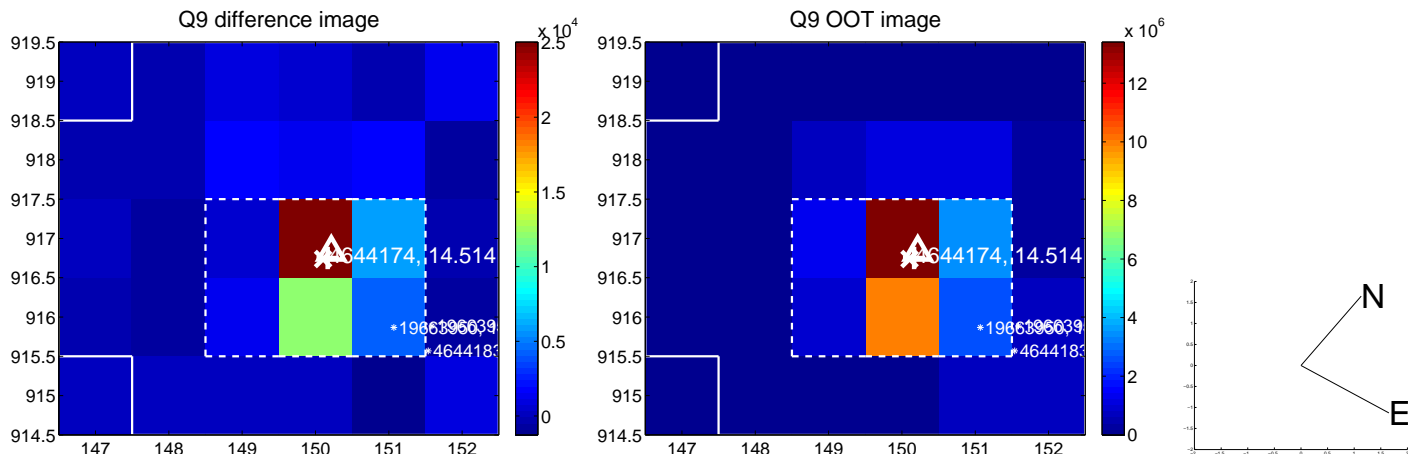
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

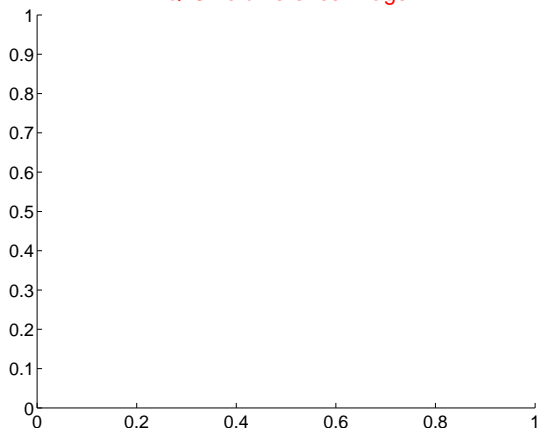


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value

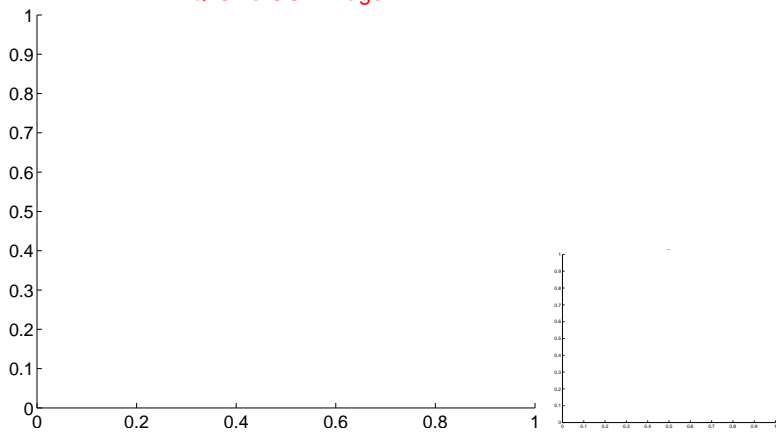


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

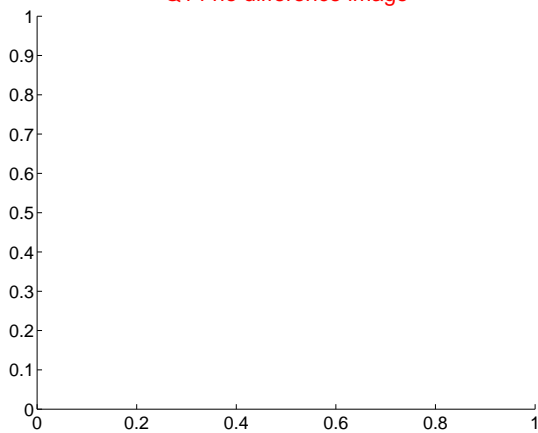
Q13 no difference image



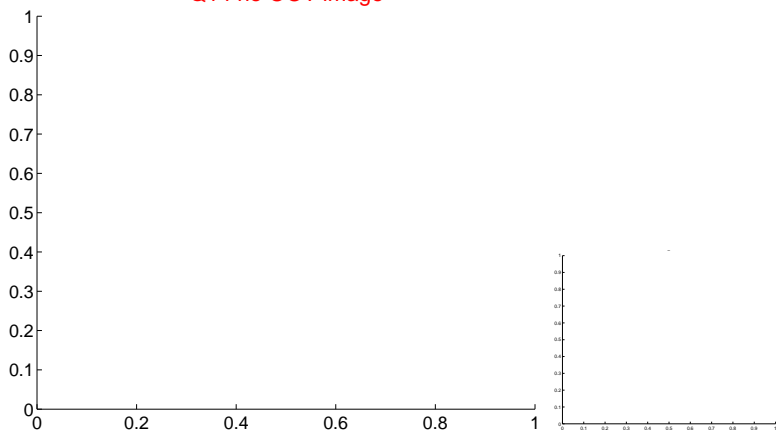
Q13 no OOT image



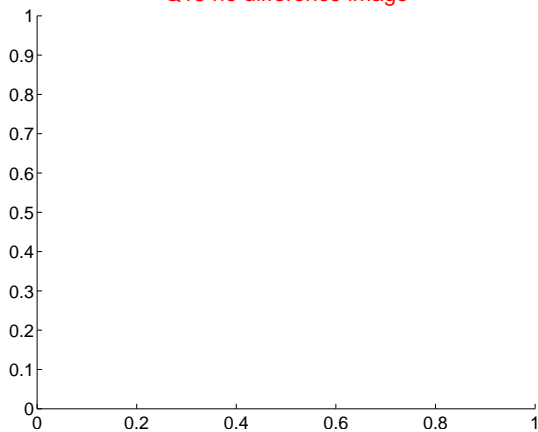
Q14 no difference image



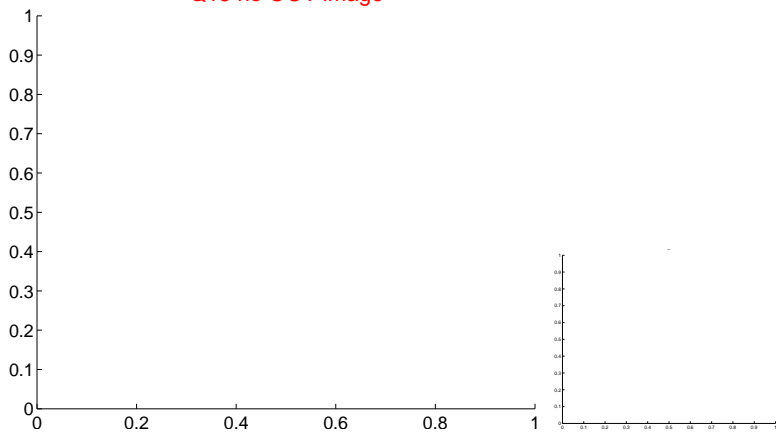
Q14 no OOT image



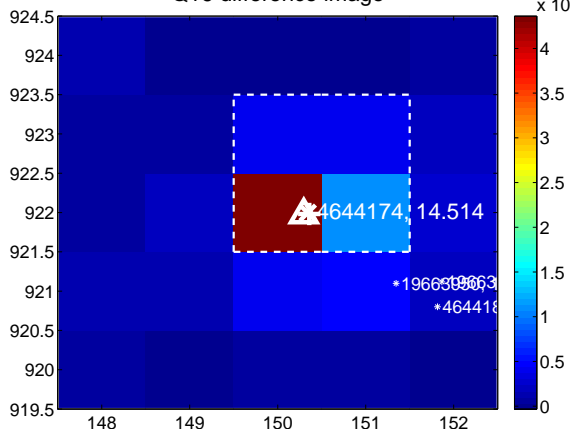
Q15 no difference image



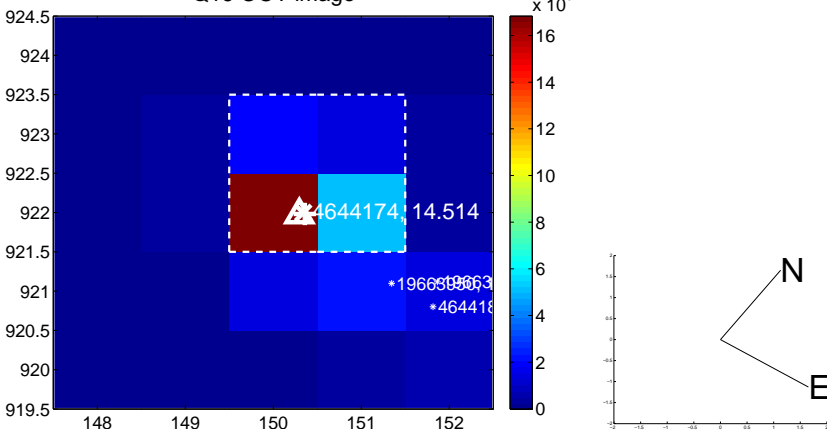
Q15 no OOT image



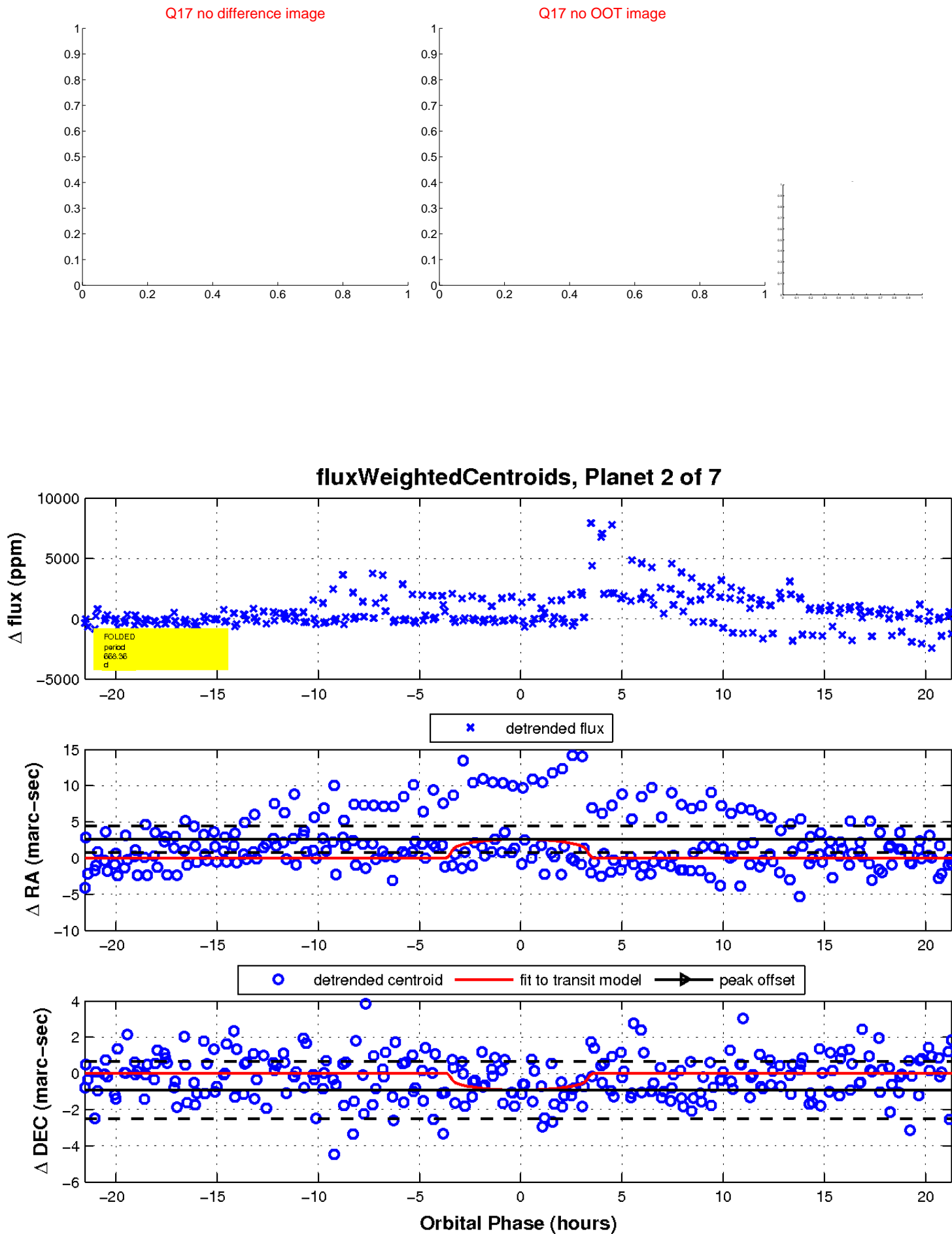
Q16 difference image



Q16 OOT image

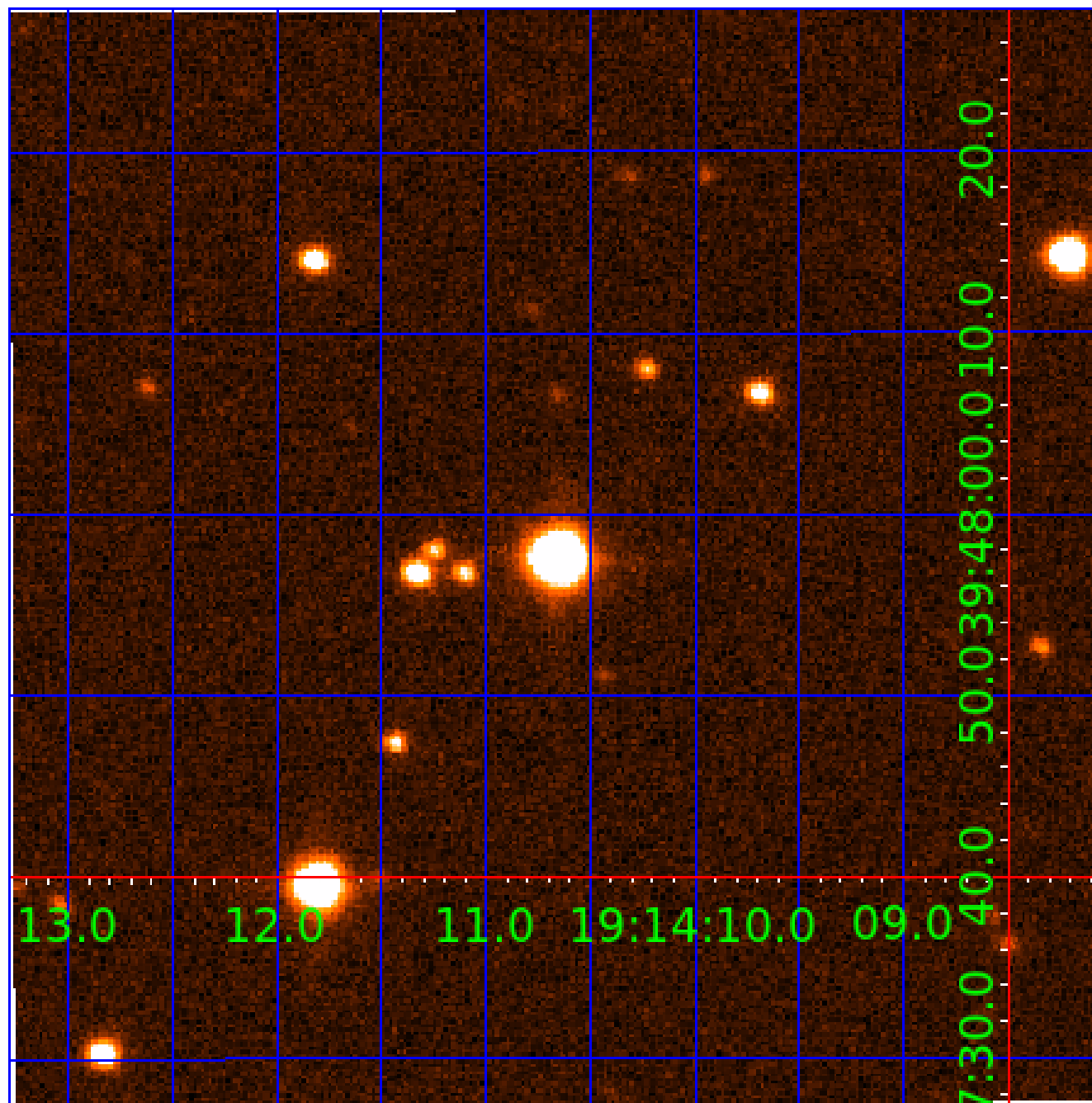


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 004644174

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004644174-01	OBS	No	490.476780	592.714724	1263.6	4.663	17.3	6.0	0.66	4135	2.24	0.10
004644174-02	OBS	No	668.363143	157.719815	1472.8	7.205	15.9	7.2	0.66	4135	2.59	0.07
004644174-03	OBS	No	537.634148	391.437498	1103.9	5.141	16.5	5.6	0.66	4135	2.51	0.09
004644174-05	OBS	No	345.976604	277.685128	1243.9	5.751	12.7	7.1	0.66	4135	3.05	0.16
004644174-06	OBS	No	468.641275	315.692386	1480.8	5.761	13.3	8.1	0.66	4135	2.71	0.11
004644174-07	OBS	No	502.706443	248.411391	1131.5	3.500	14.1	-1.0	0.66	4135	2.12	0.10

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004644174-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004644174-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS
004644174-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS
004644174-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS
004644174-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
004644174-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—CENT_NOFITS

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

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

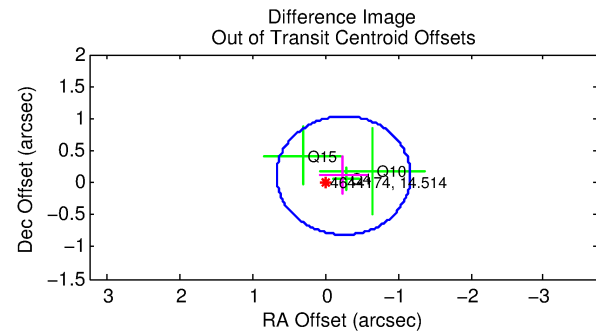
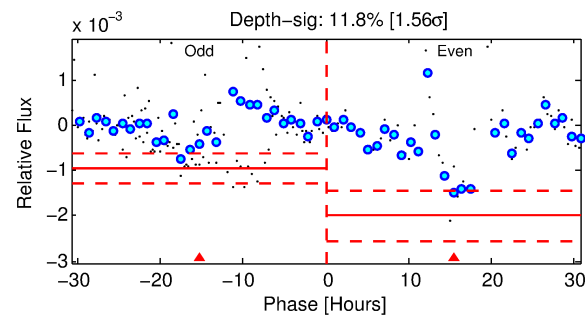
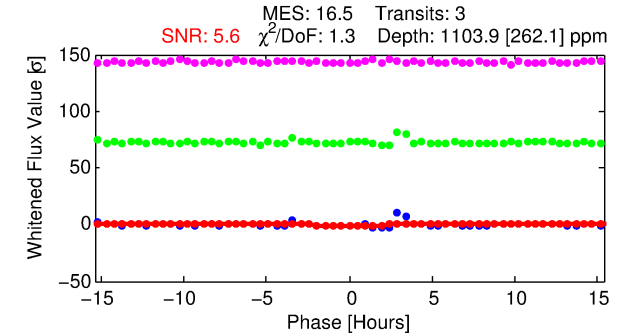
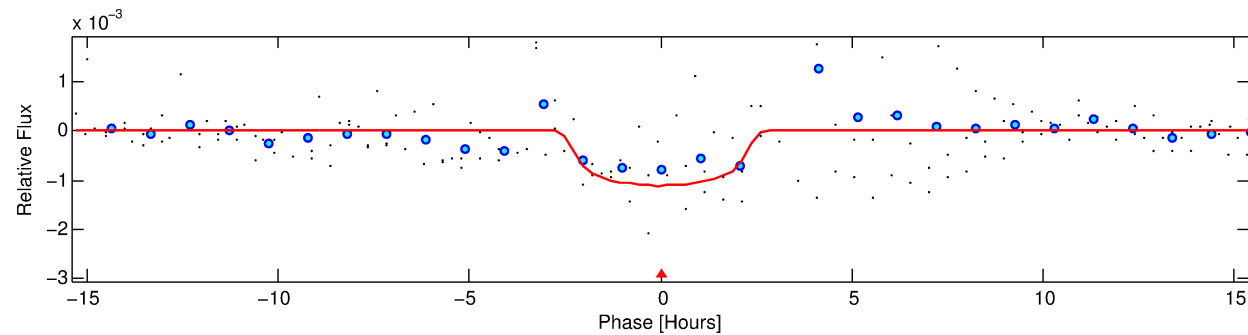
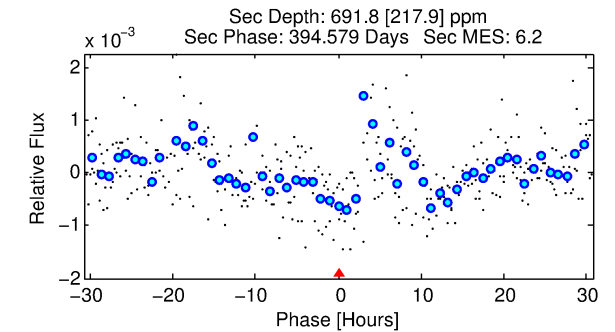
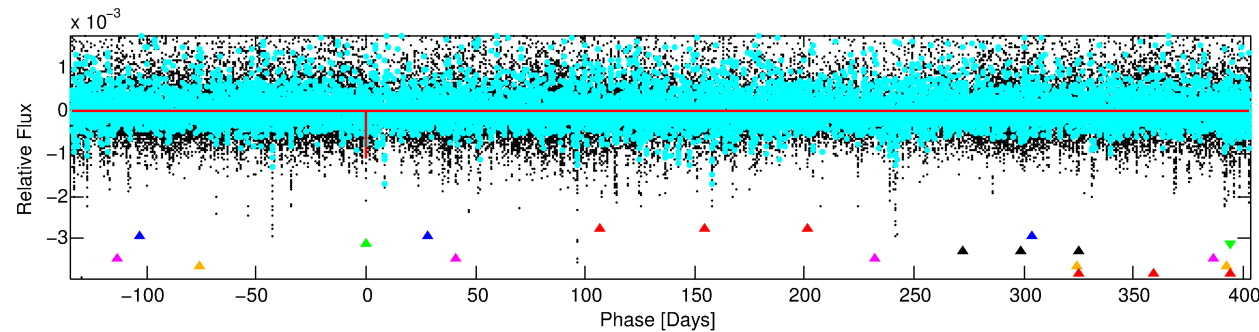
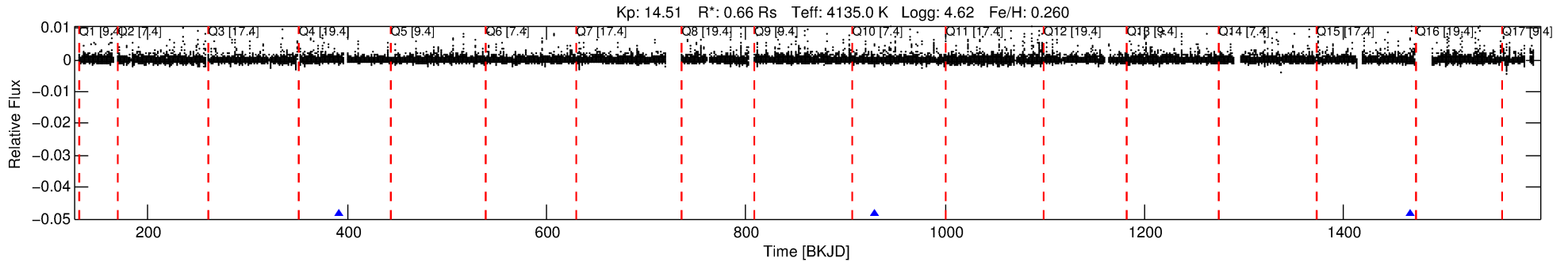
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004644174-03

No Significant Match Found

# DV One-Page Summary

KIC: 4644174 Candidate: 3 of 7 Period: 537.634 d



## DV Fit Results:

Period = 537.63415 [0.00786] d  
Epoch = 391.4375 [0.0106] BKJD  
Rp/R\* = 0.0349 [0.0130]  
a/R\* = 497.83 [560.79]  
b = 0.83 [0.44]  
Seff = 0.09 [0.02]  
Teq = 140 [7] K  
Rp = 2.51 [0.97] Re  
a = 1.1253 [0.0837] AU  
Ag = 76365.77 [62394.50] [1.22σ]  
Teffp = 3588 [741] K [4.65σ]

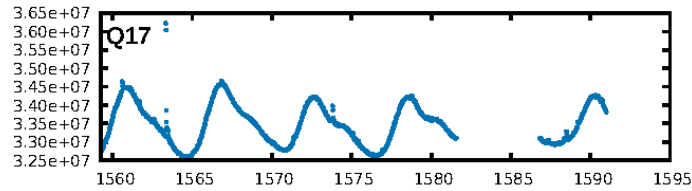
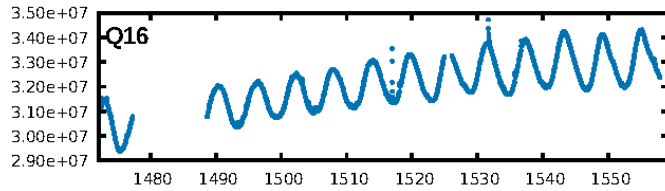
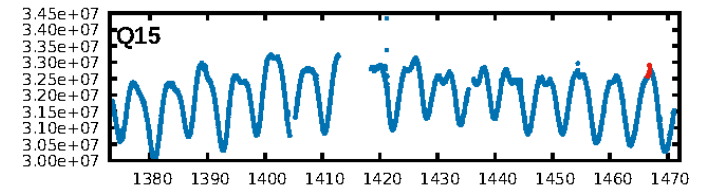
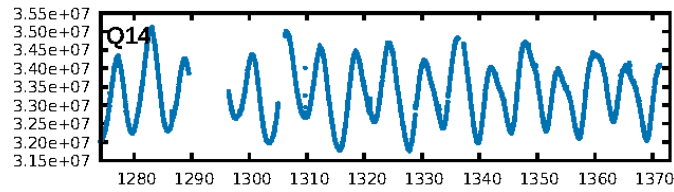
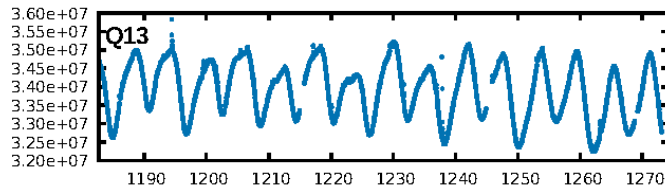
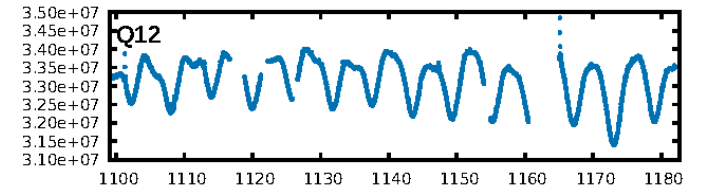
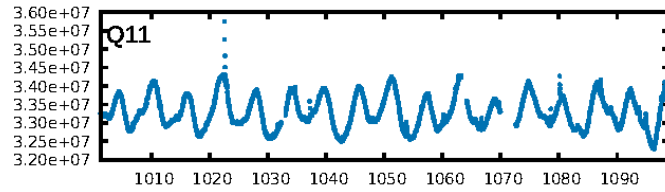
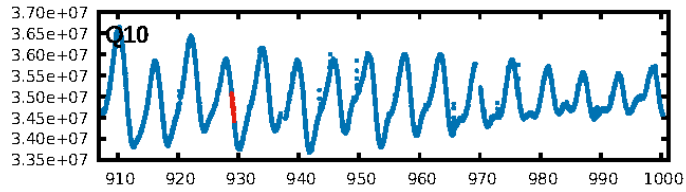
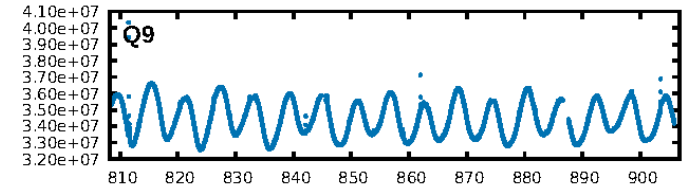
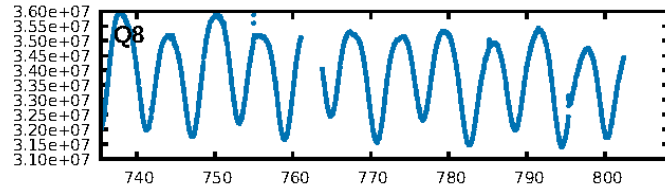
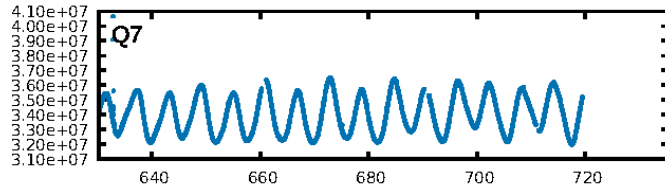
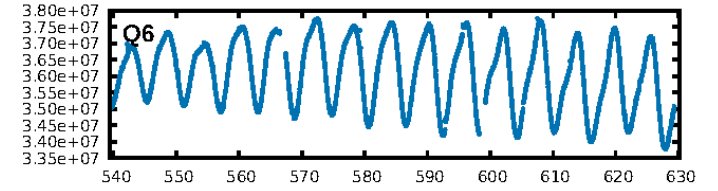
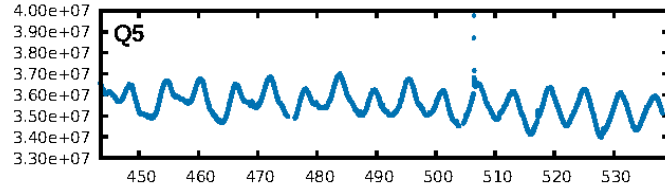
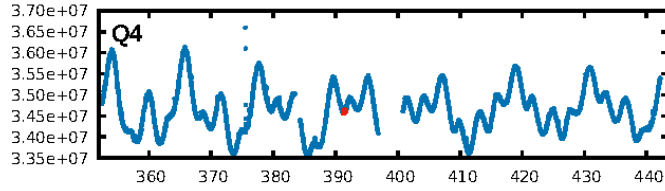
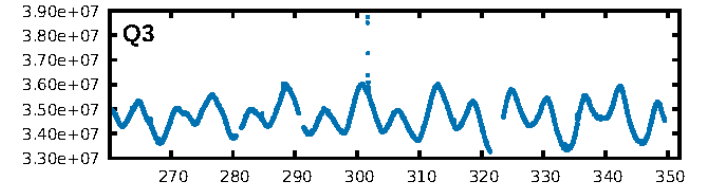
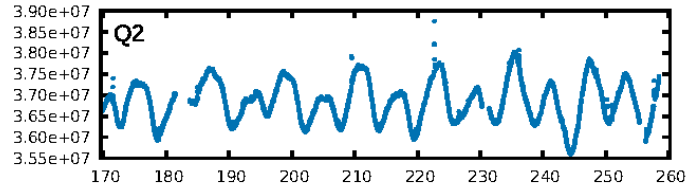
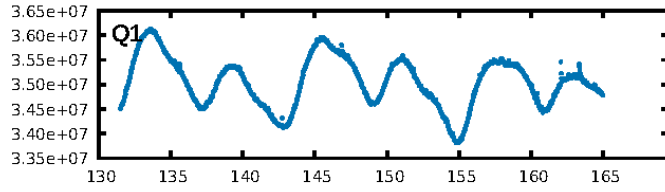
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [92.51σ]  
LongPeriod-sig: 100.0% [354.45σ]  
ModelChiSquare2-sig: 48.2%  
ModelChiSquareGof-sig: 54.3%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -0.5948  
Centroid-sig: 0.2%  
Centroid-so: 2.428 arcsec [2.07σ]  
OotOffset-rm: 0.273 arcsec [0.89σ]  
KicOffset-rm: 0.373 arcsec [1.22σ]  
OotOffset-st: 1/1/1/0 [3]  
KicOffset-st: 1/1/1/0 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 1.00 [3/3]

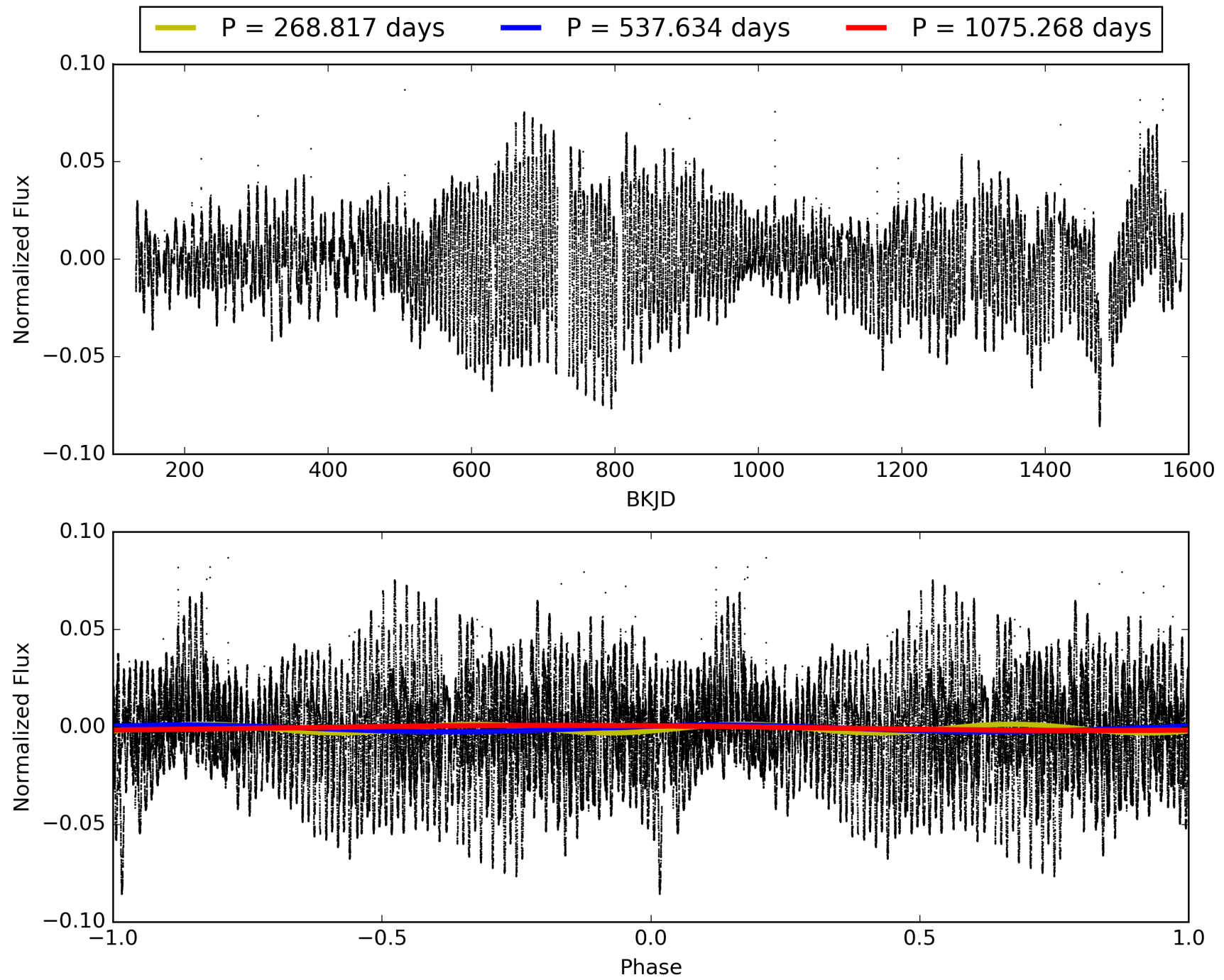
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 00:37:17 Z

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

# TCE 004644174-03, PDC Light Curves

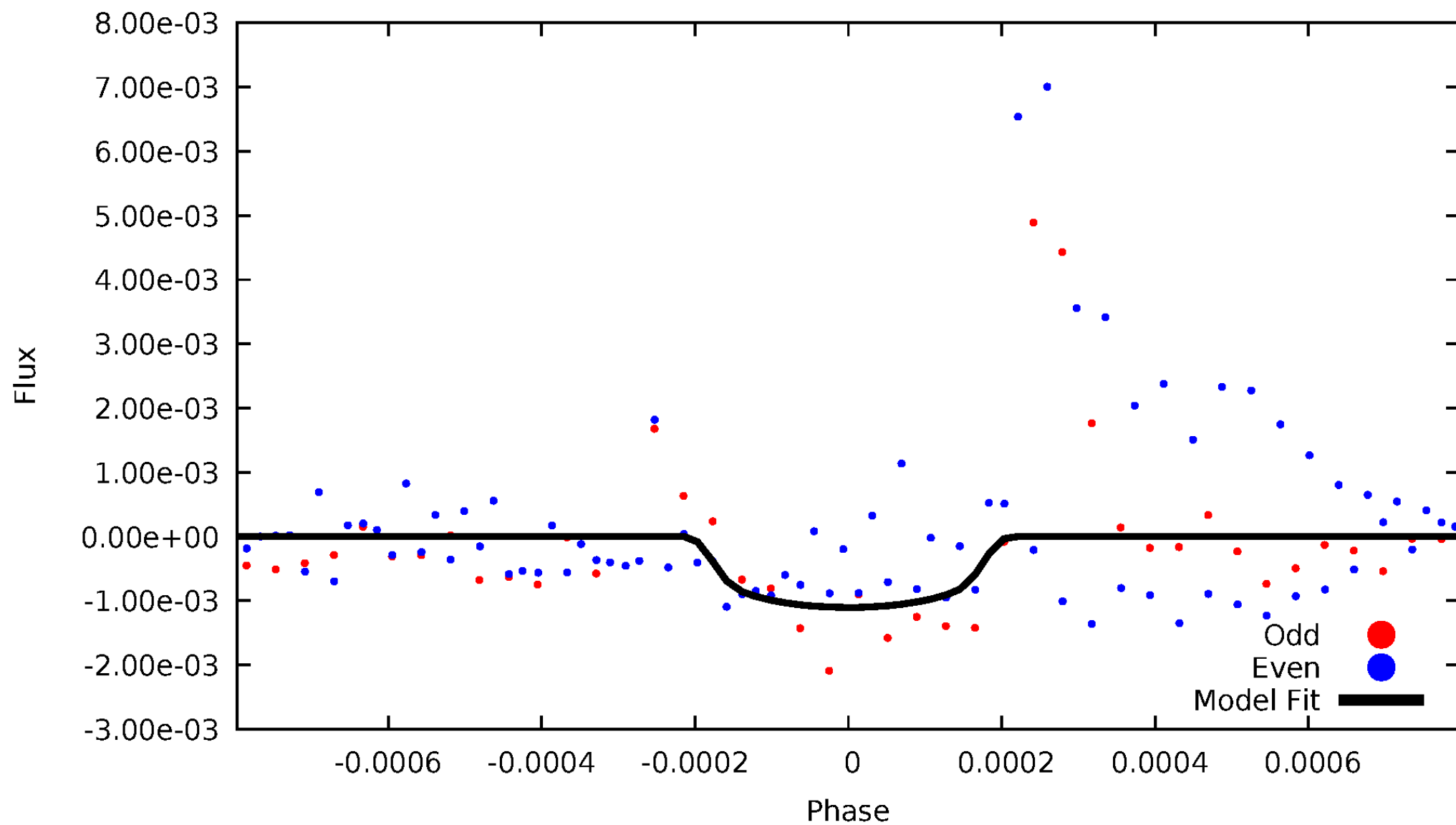


TCE 004644174-03



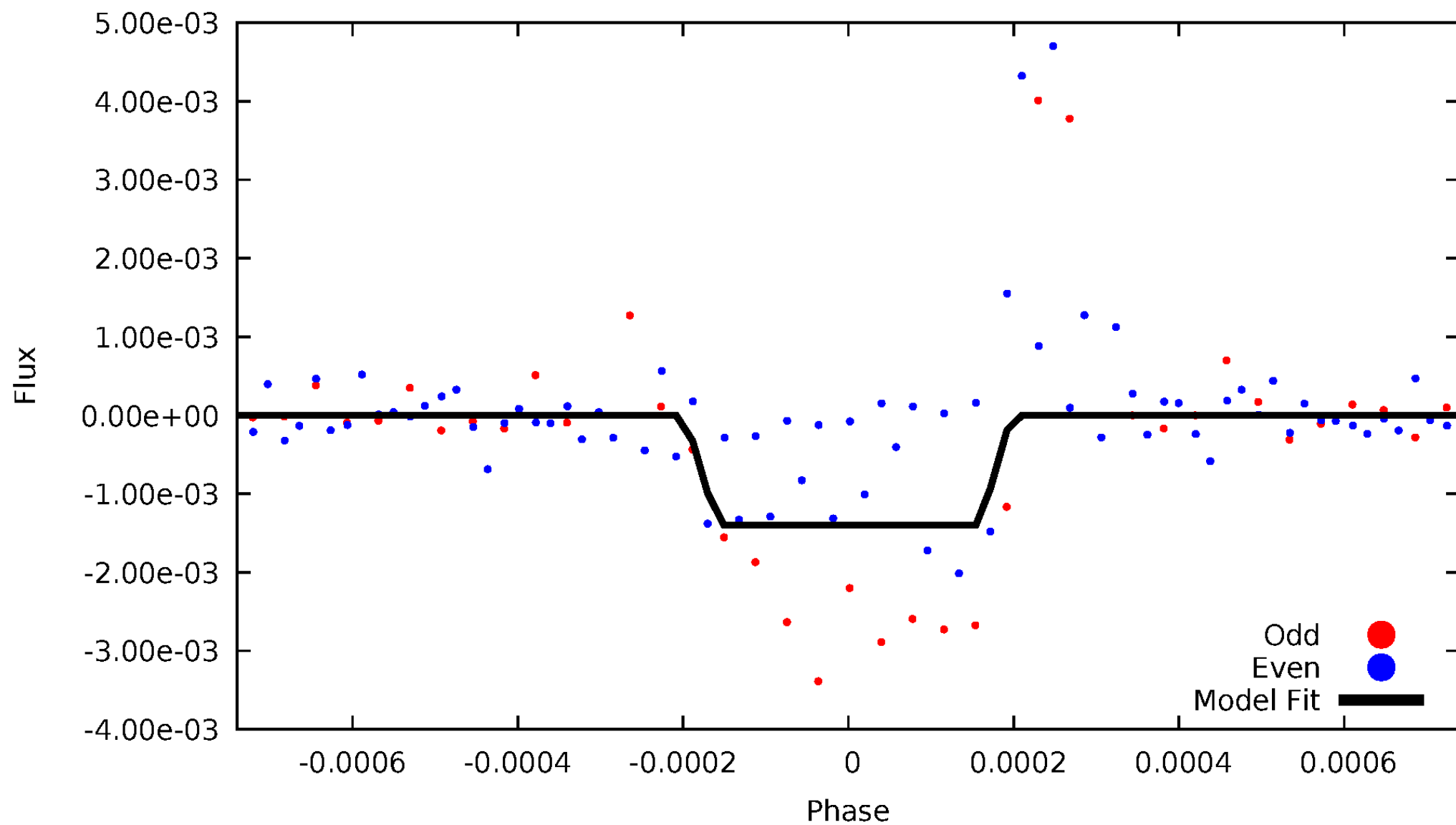
# DV Odd/Even

TCE 004644174-03



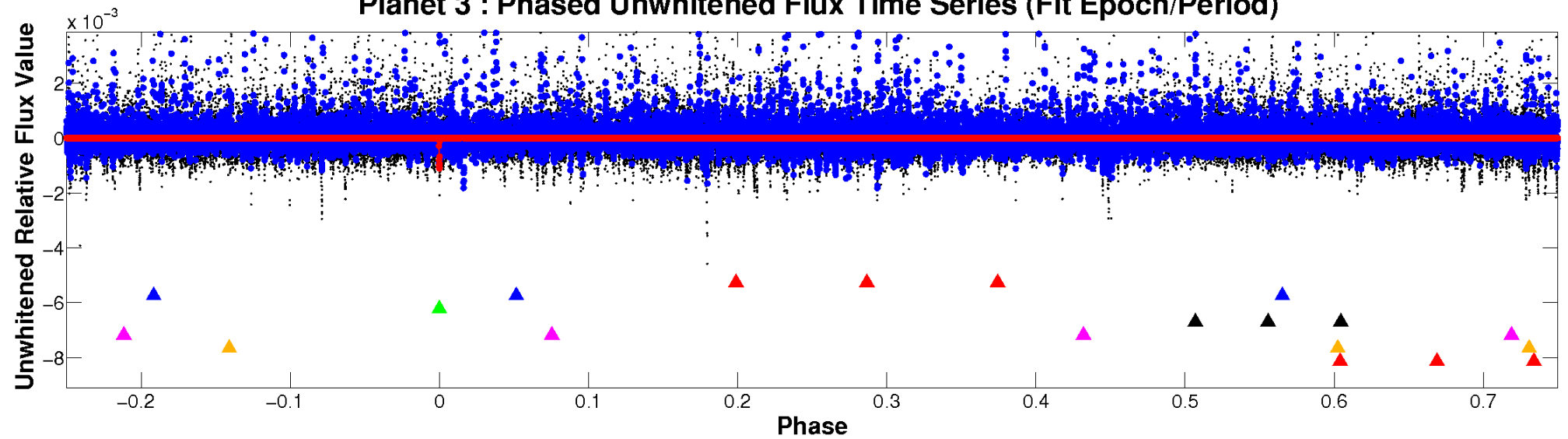
# ALT Odd/Even

TCE 004644174-03

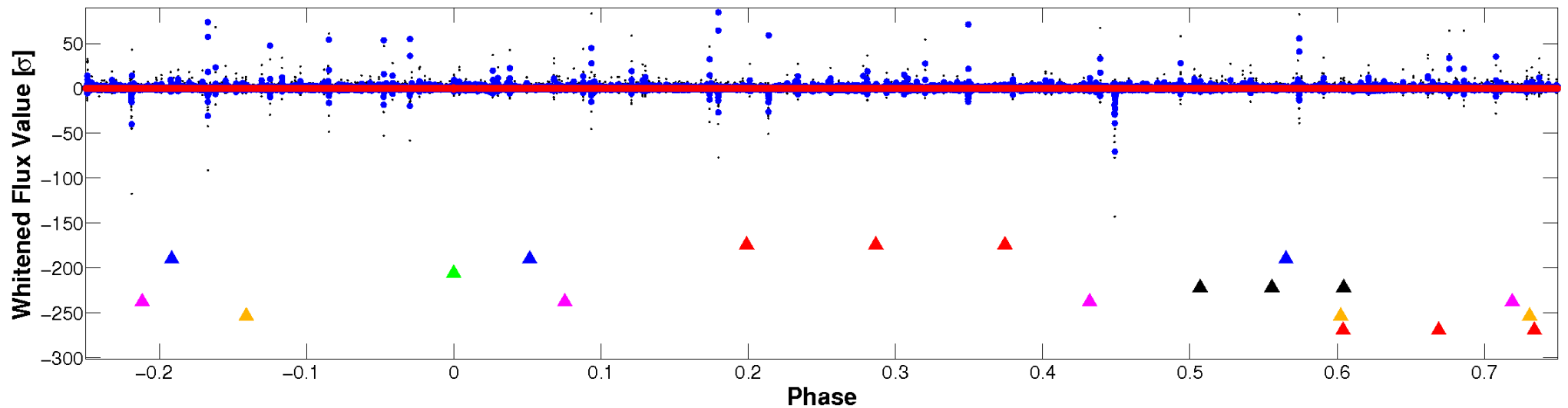


# Non-Whitened Vs. Whitened Light Curve

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

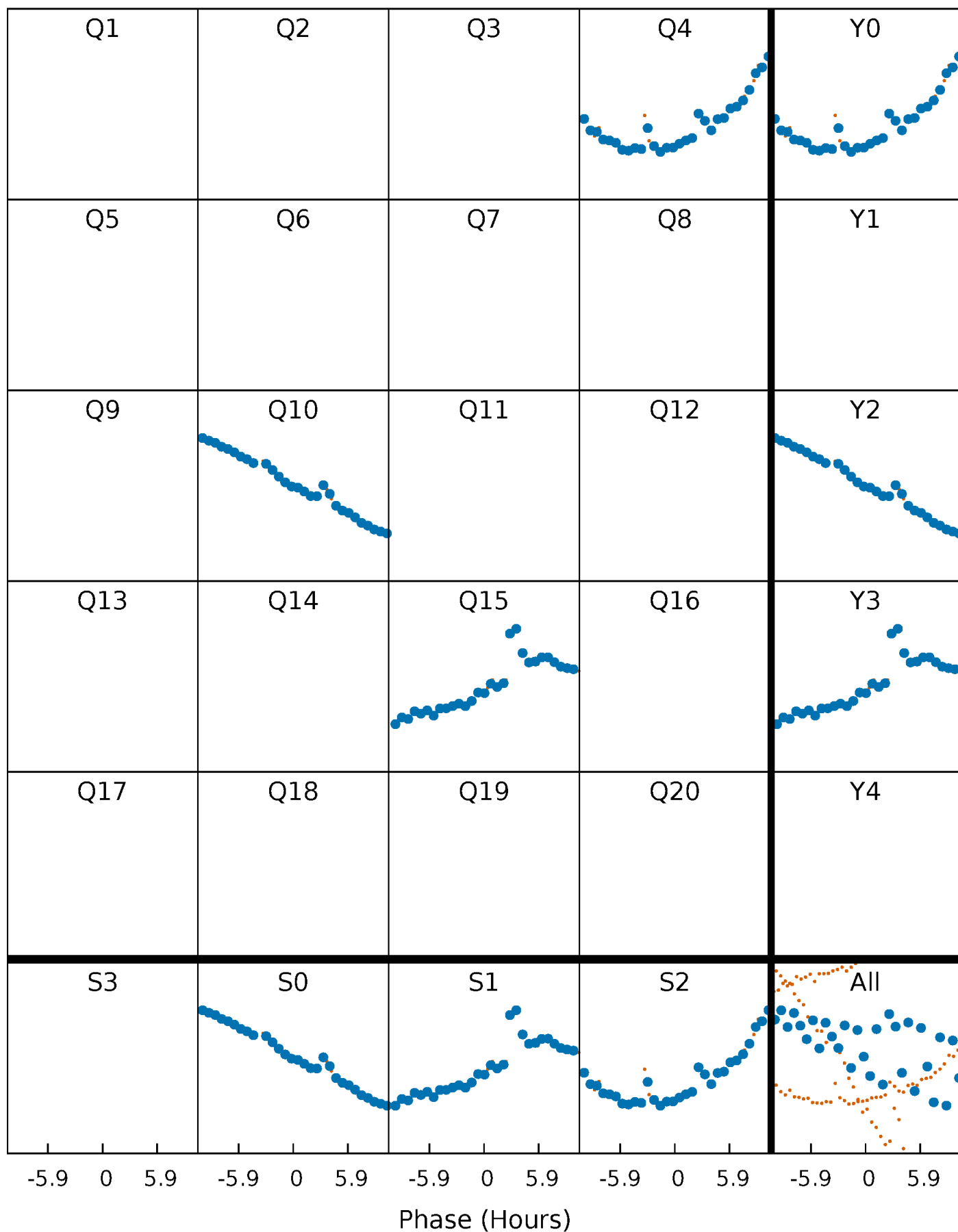


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

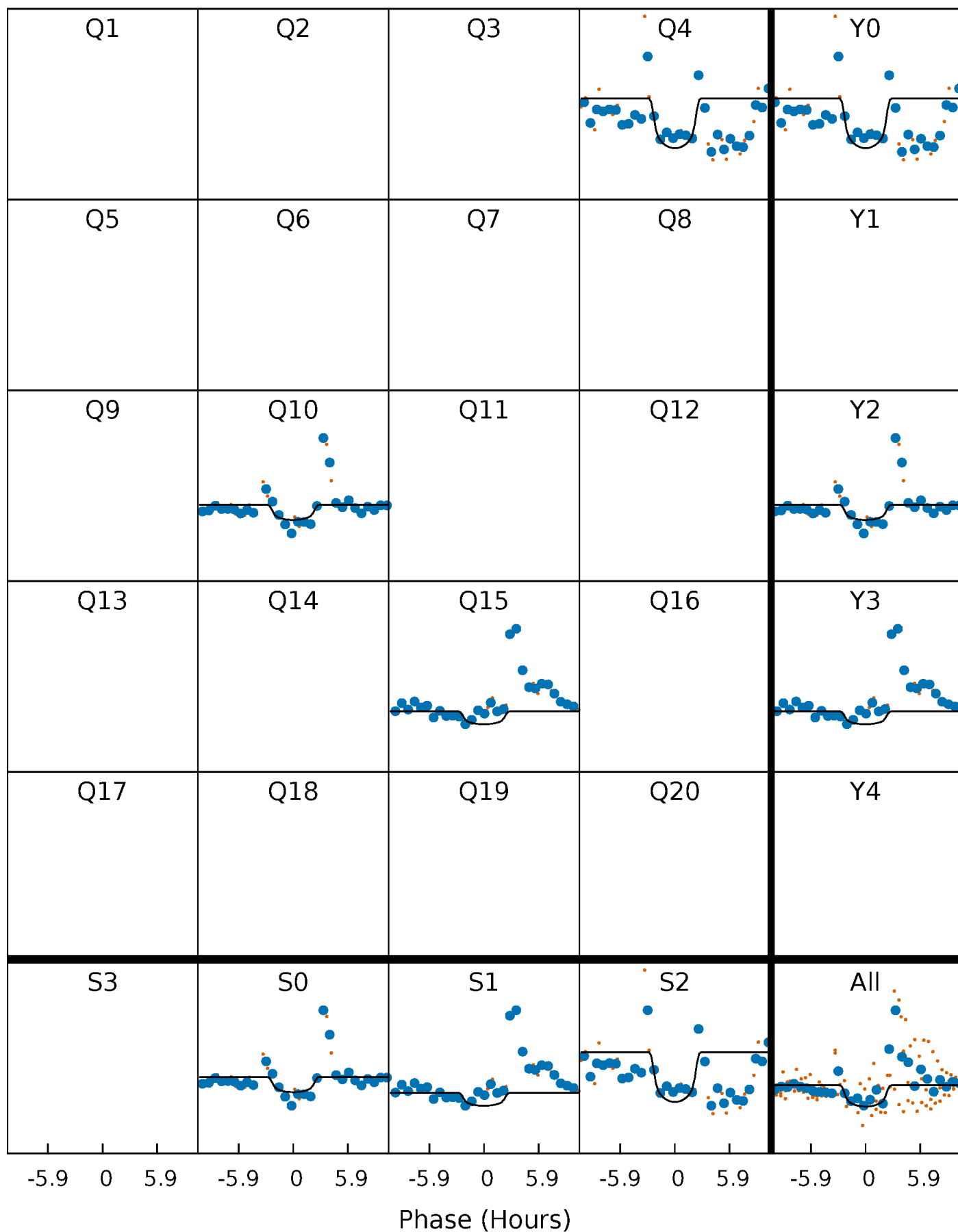
TCE 004644174-03 P=537.634148 Days  $T_0=391.437498$  (BKJD)





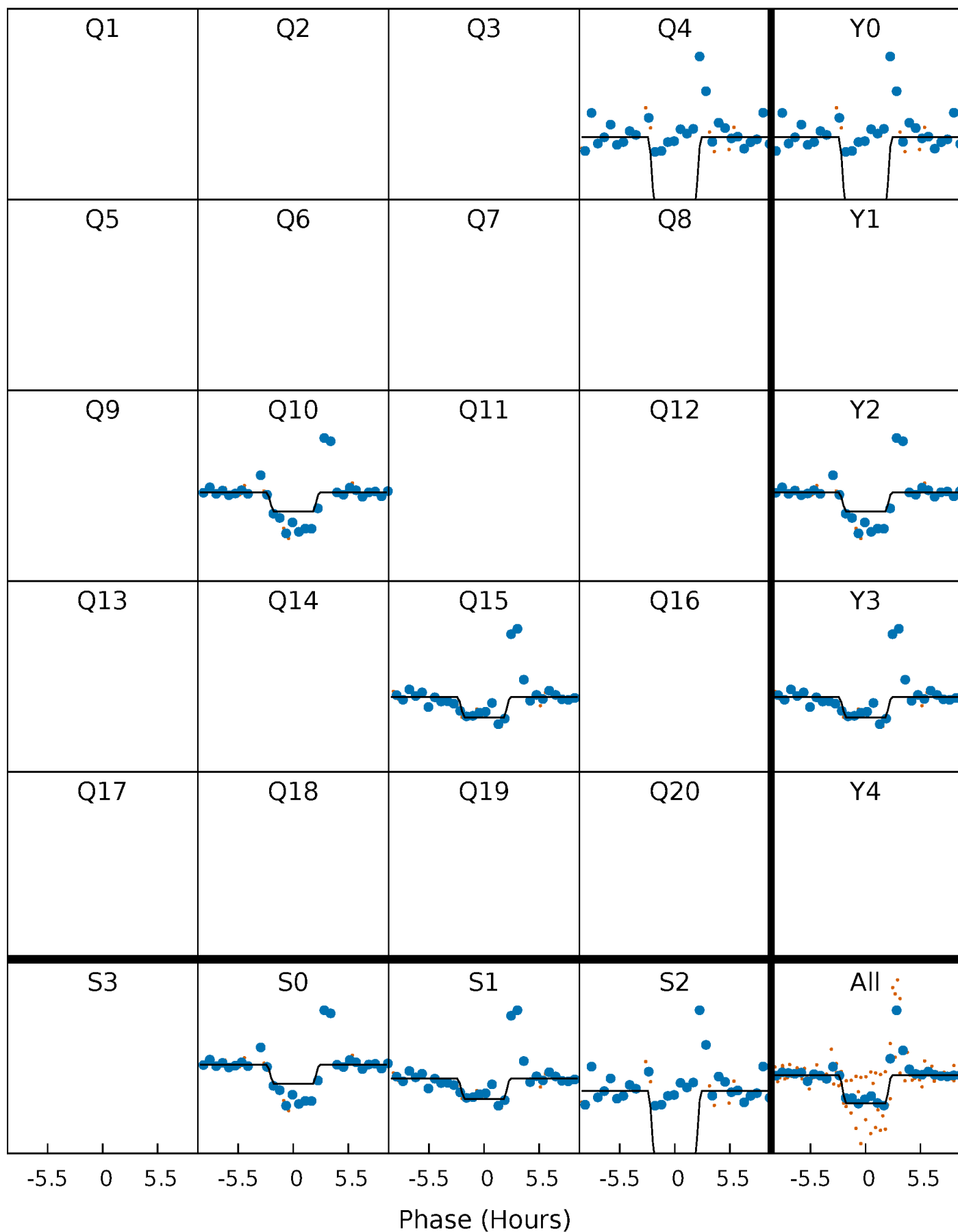
# DV Quarter-Phased Transit Curves

TCE 004644174-03 P=537.634148 Days  $T_0=391.437498$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

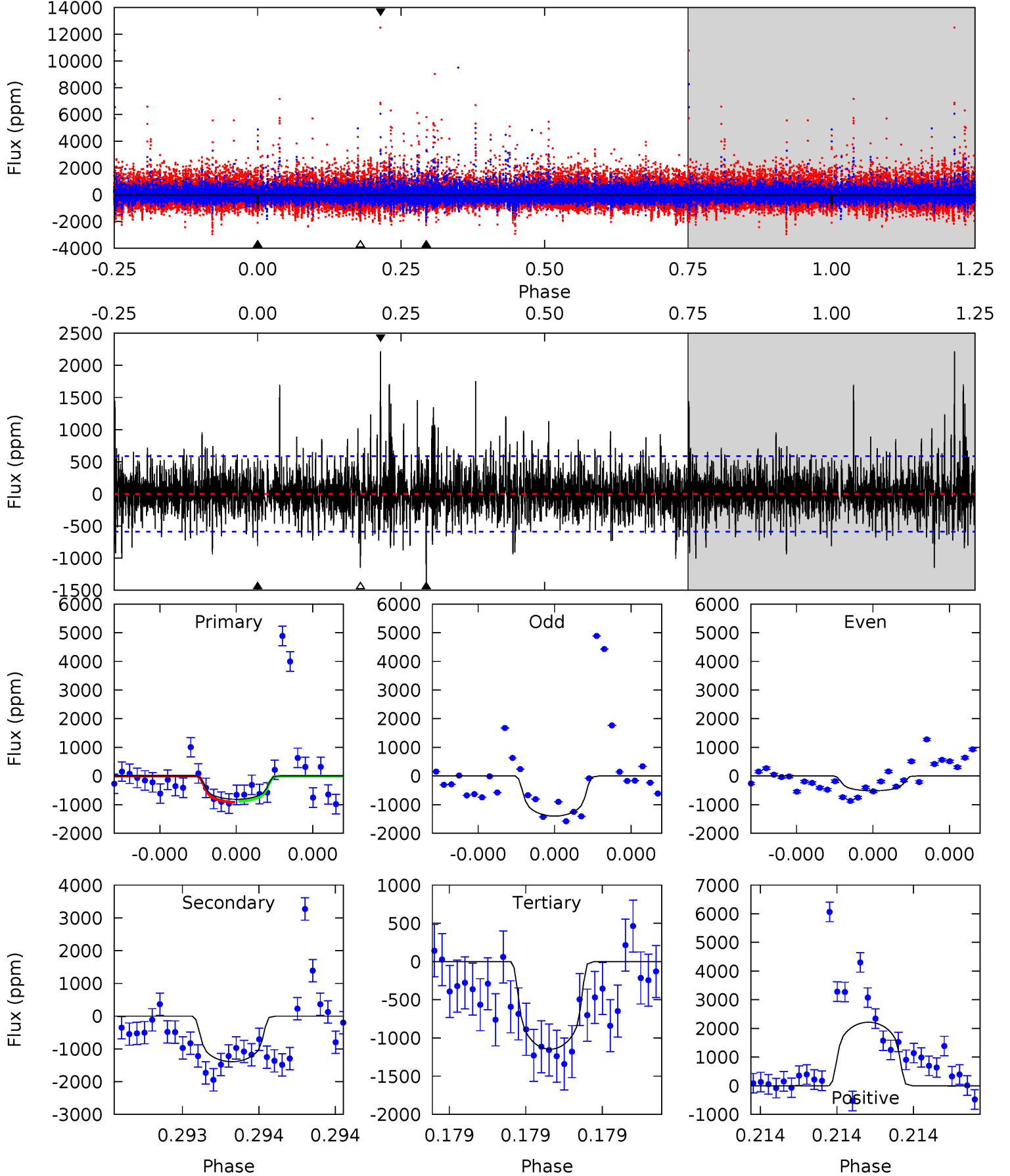
TCE 004644174-03 P=537.634208 Days  $T_0=391.443632$  (BKJD)



# DV Model-Shift Uniqueness Test

004644174-03, P = 537.634148 Days, E = 391.437498 Days

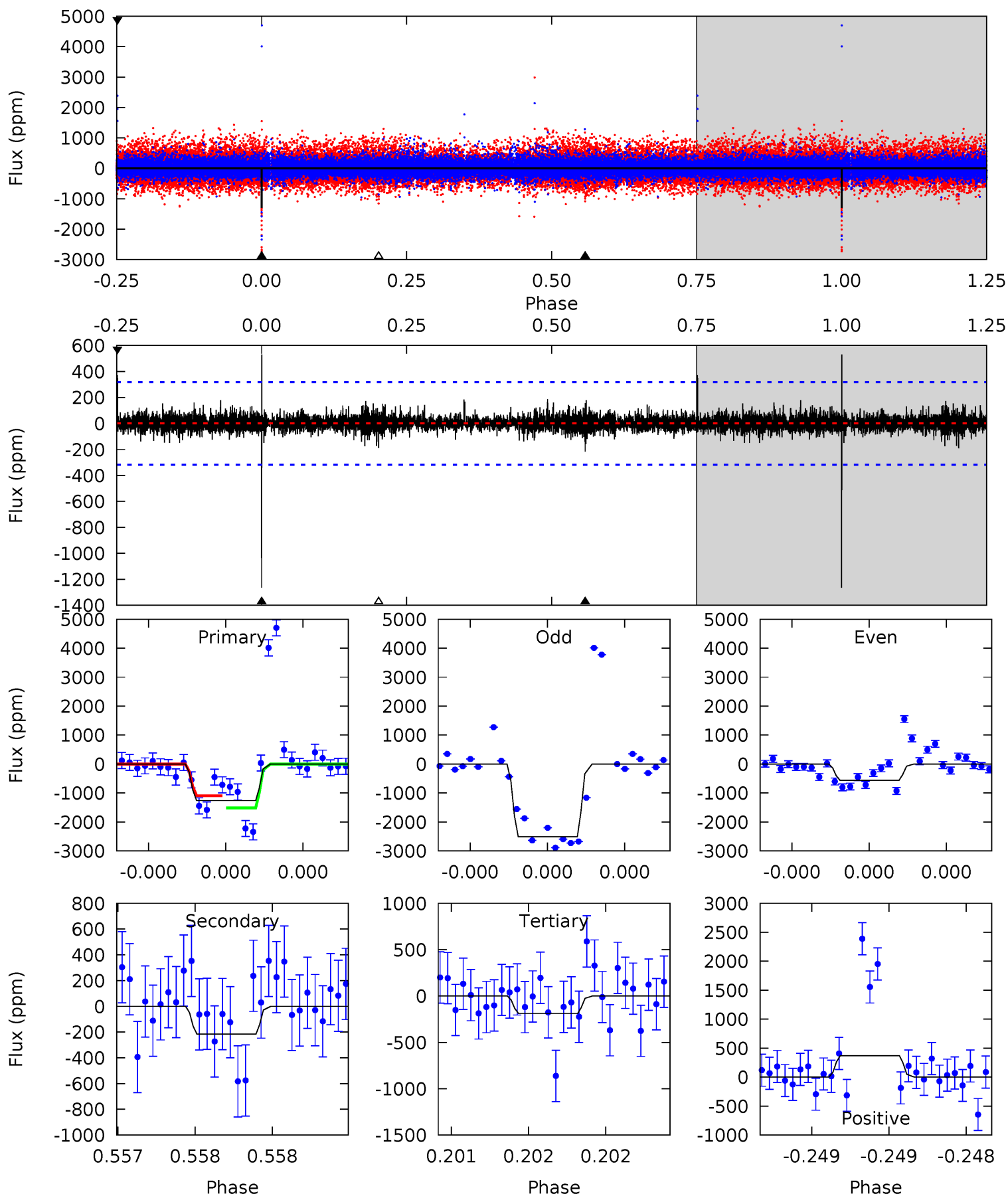
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.78	13.3	11.0	21.2	5.60	3.53	2.60	-3.19	-13.4	2.33	-7.90	1.63	0.86	0.61	0.19



# Alt Model-Shift Uniqueness Test

004644174-03, P = 537.634208 Days, E = 391.443632 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
22.3	3.81	3.33	6.53	5.61	3.54	0.63	19.0	15.8	0.47	-2.72	17.3	0.97	0.30	3.62



### Stellar Parameters For KIC 004644174

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4135^{+148}_{-165}$	$4.618^{+0.052}_{-0.017}$	$0.260^{+0.150}_{-0.300}$	$0.659^{+0.027}_{-0.062}$	$0.657^{+0.044}_{-0.058}$	$3.237^{+0.756}_{-0.234}$
	+4%/-4%	+1%/-0%	+58%/-115%	+4%/-9%	+7%/-9%	+23%/-7%
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 004644174-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-1391 \pm 105$	$2.53^{+0.92}_{-0.97}$	$193^{+7}_{-8}$	$4217^{+931}_{-463}$	$153687^{+255457}_{-72861}$
Alt.	$-216 \pm 57$	$2.62^{+0.99}_{-0.93}$	$194^{+7}_{-8}$	$3056^{+448}_{-283}$	$21023^{+31980}_{-10154}$

$T_{\text{max}}$  = 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

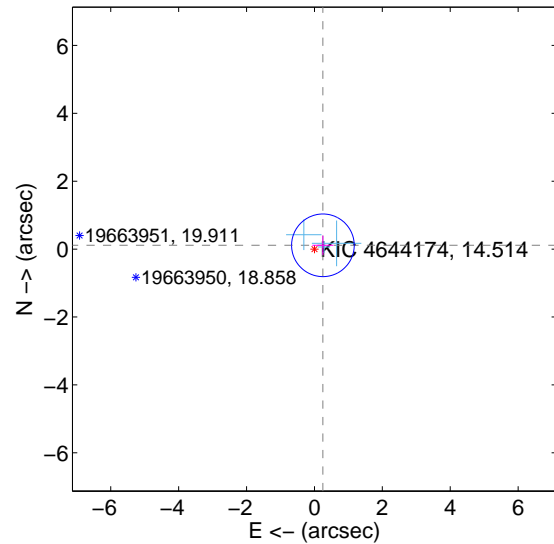
Supplemental centroid analysis for 004644174-03. Kepler magnitude: 14.51. Transit SNR 5.57

There are 3 quarters with good PRF difference image offsets

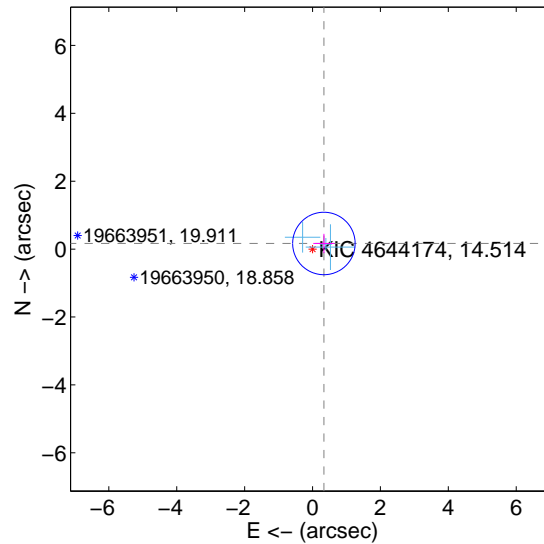
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.273 \pm 0.307$	0.89	$-0.249 \pm 0.312$	$0.112 \pm 0.284$
PRF-fit source offset from KIC position	$0.373 \pm 0.307$	1.22	$-0.335 \pm 0.312$	$0.166 \pm 0.284$
photometric centroid source offset	$2.43 \pm 1.17$	2.07	$2.02 \pm 1.29$	$1.35 \pm 0.83$

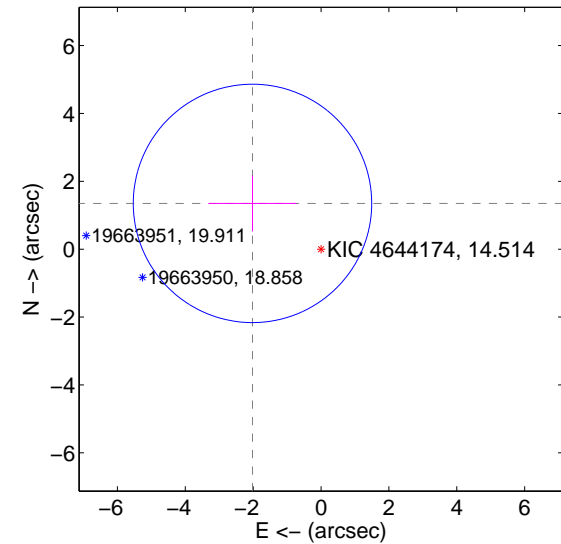
offset from difference PRF-fit to OOT PRF-fit



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.

Q1 no difference image



Q1 no OOT image



Q2 no difference image



Q2 no OOT image



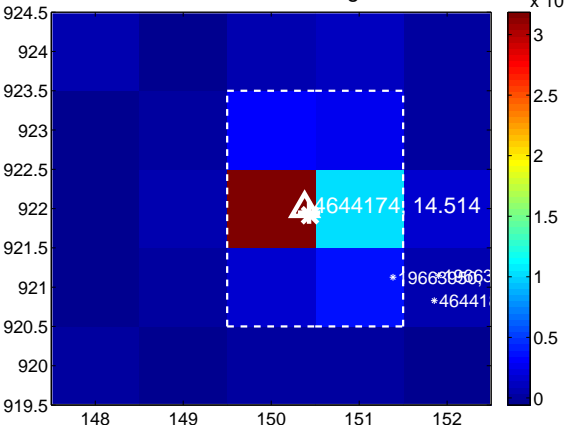
Q3 no difference image



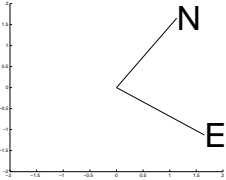
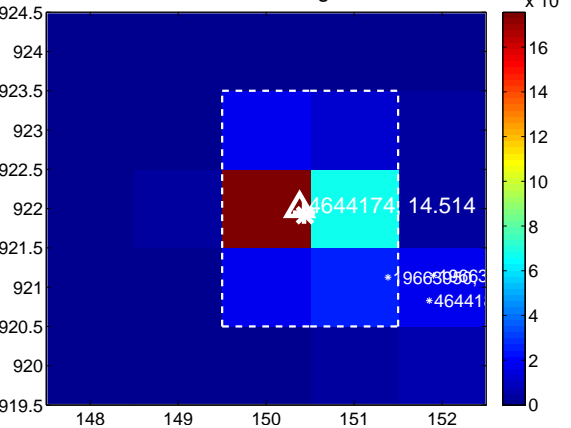
Q3 no OOT image



Q4 difference image



Q4 OOT image



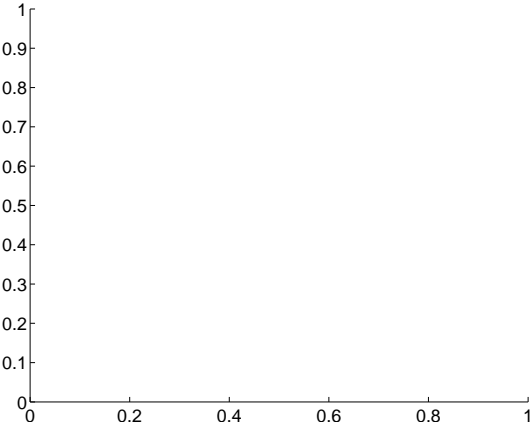
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



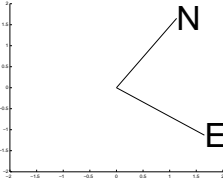
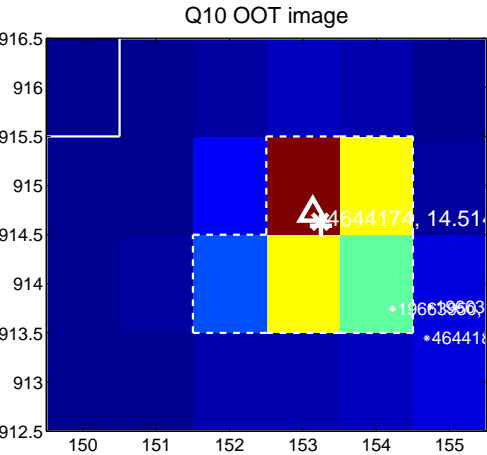
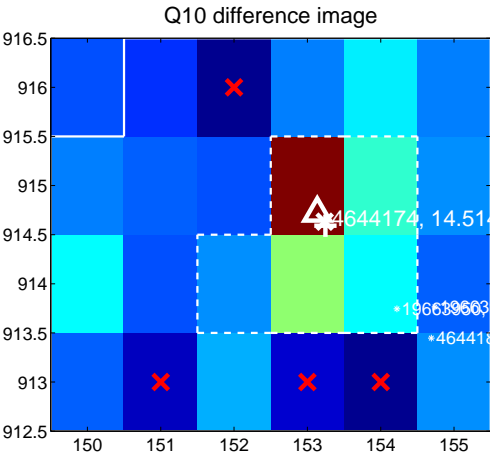
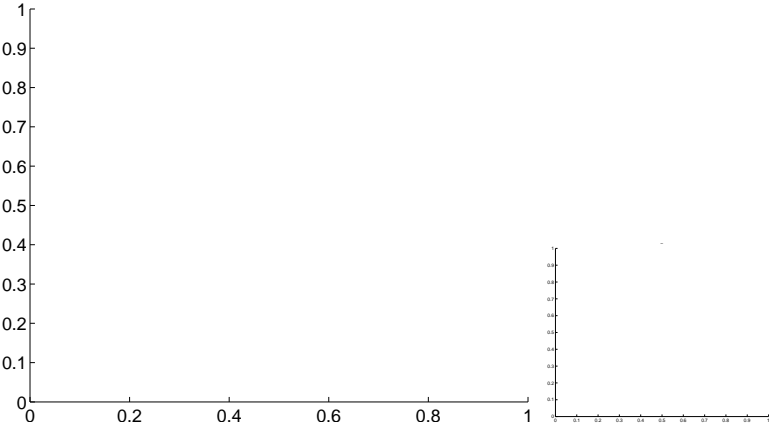


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

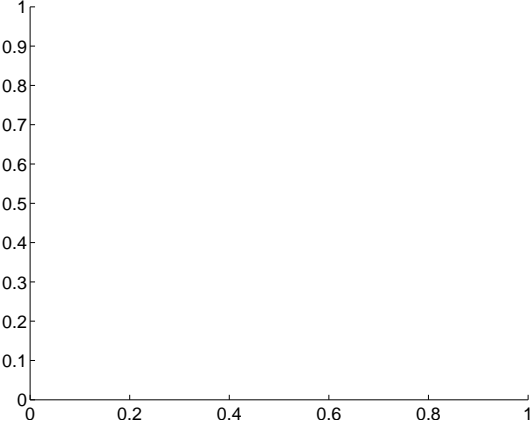
Q9 no difference image



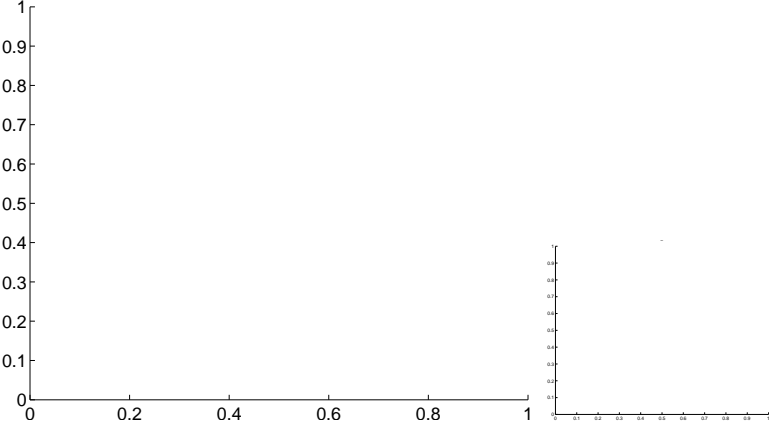
Q9 no OOT image



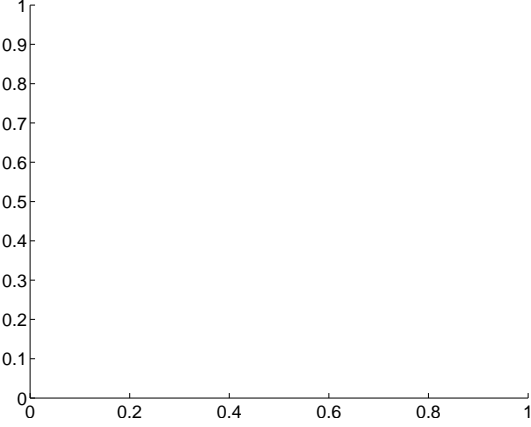
Q11 no difference image



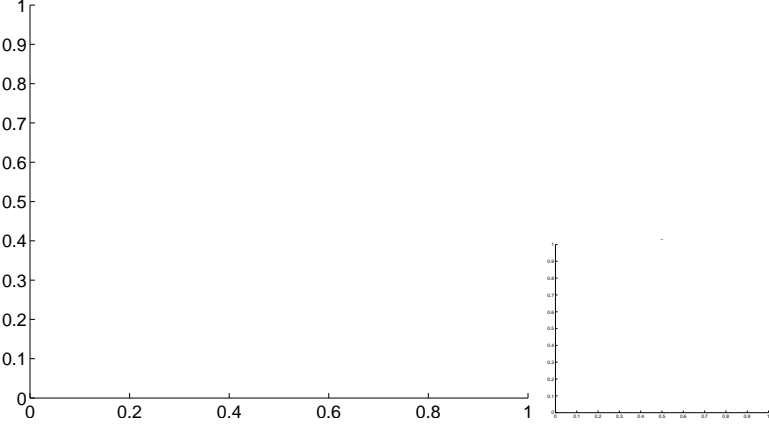
Q11 no OOT image



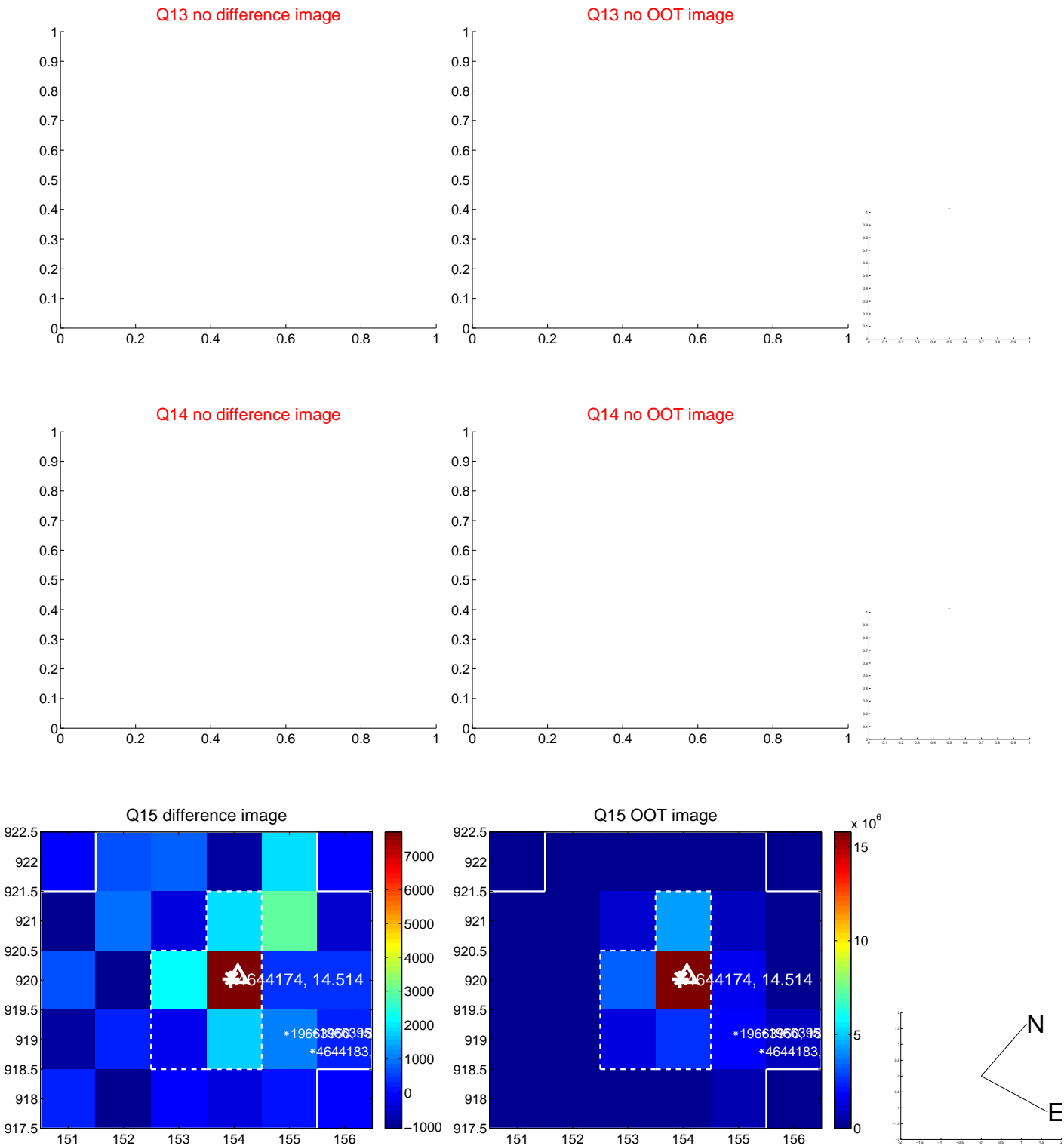
Q12 no difference image



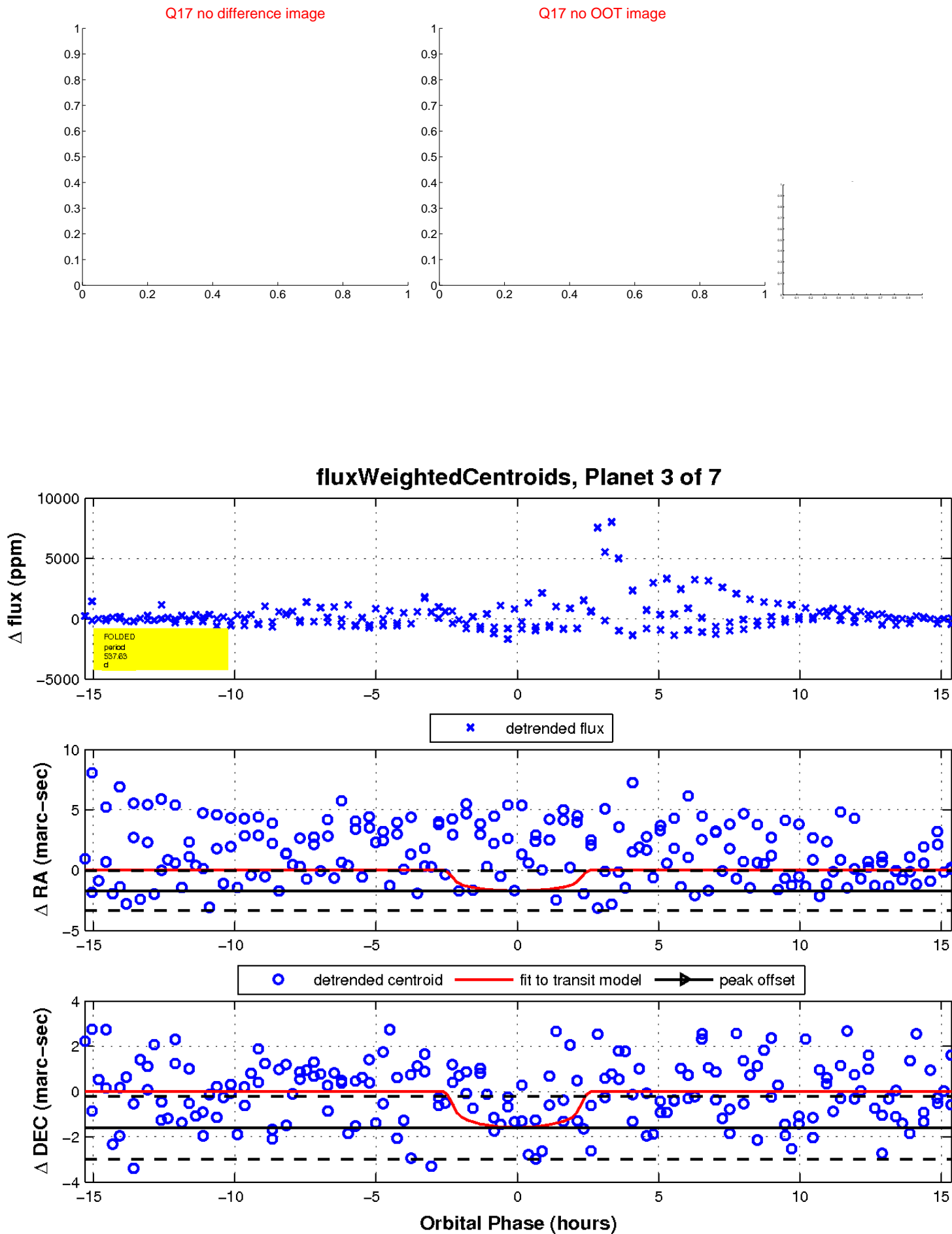
Q12 no OOT image



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

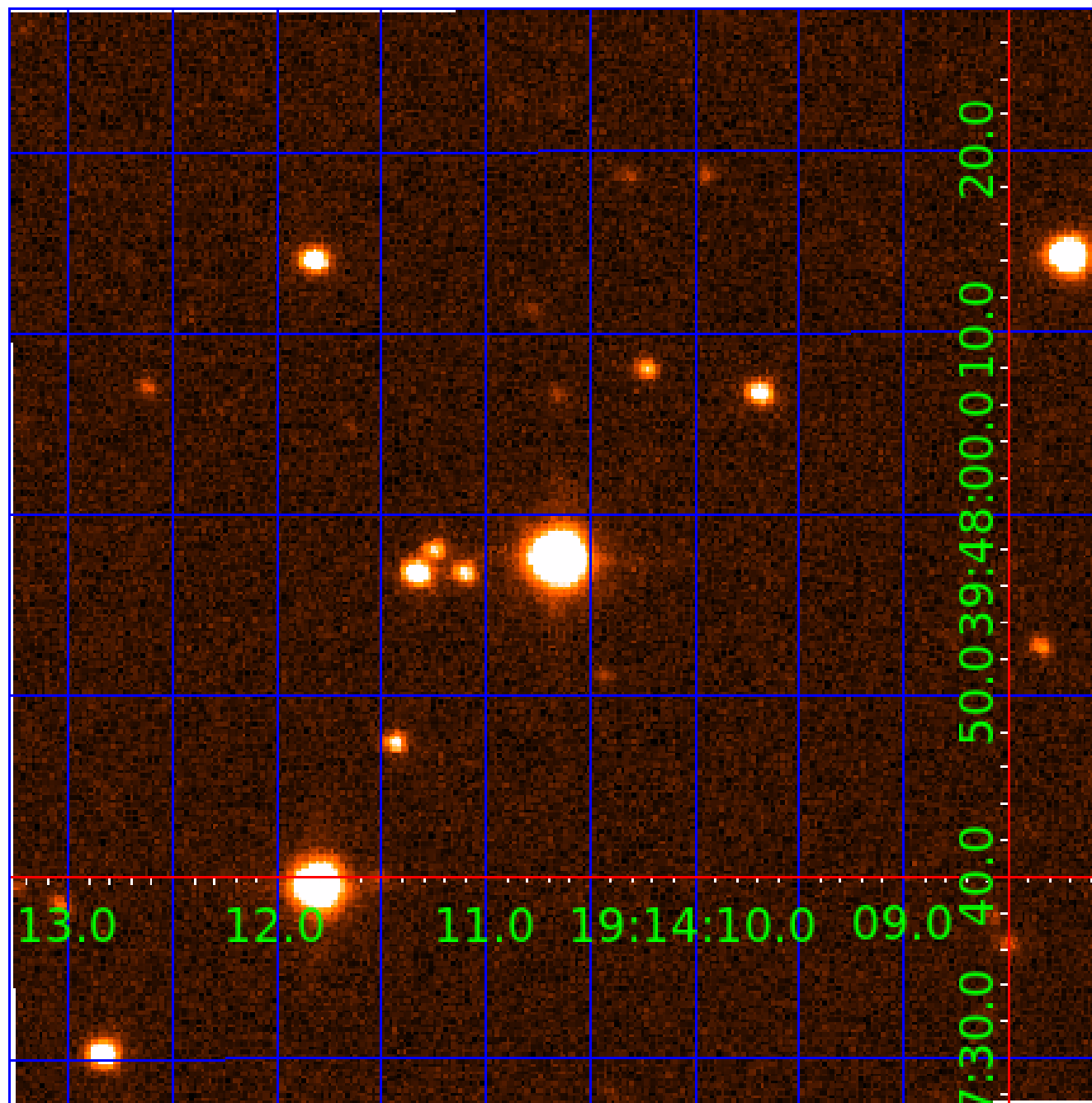


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 004644174

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004644174-01	OBS	No	490.476780	592.714724	1263.6	4.663	17.3	6.0	0.66	4135	2.24	0.10
004644174-02	OBS	No	668.363143	157.719815	1472.8	7.205	15.9	7.2	0.66	4135	2.59	0.07
004644174-03	OBS	No	537.634148	391.437498	1103.9	5.141	16.5	5.6	0.66	4135	2.51	0.09
004644174-05	OBS	No	345.976604	277.685128	1243.9	5.751	12.7	7.1	0.66	4135	3.05	0.16
004644174-06	OBS	No	468.641275	315.692386	1480.8	5.761	13.3	8.1	0.66	4135	2.71	0.11
004644174-07	OBS	No	502.706443	248.411391	1131.5	3.500	14.1	-1.0	0.66	4135	2.12	0.10

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004644174-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004644174-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS
004644174-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS
004644174-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS
004644174-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
004644174-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—CENT_NOFITS

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

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

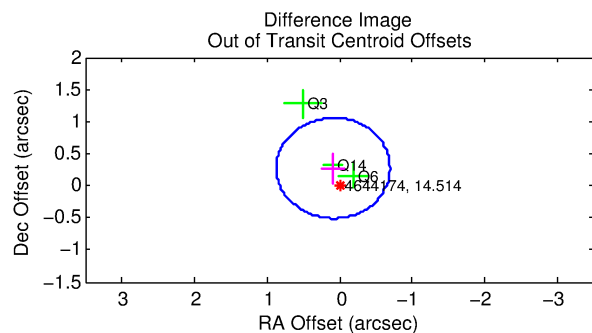
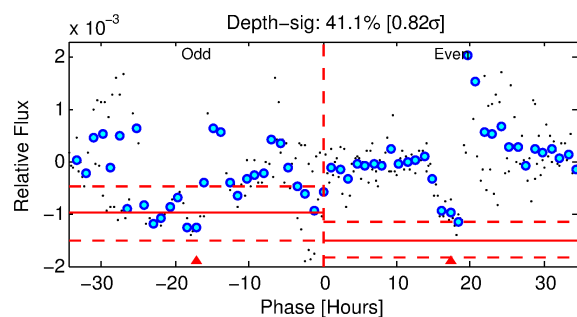
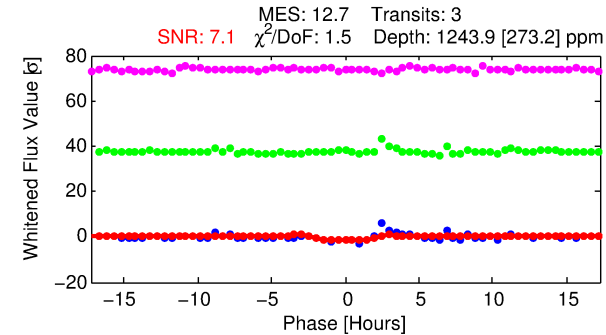
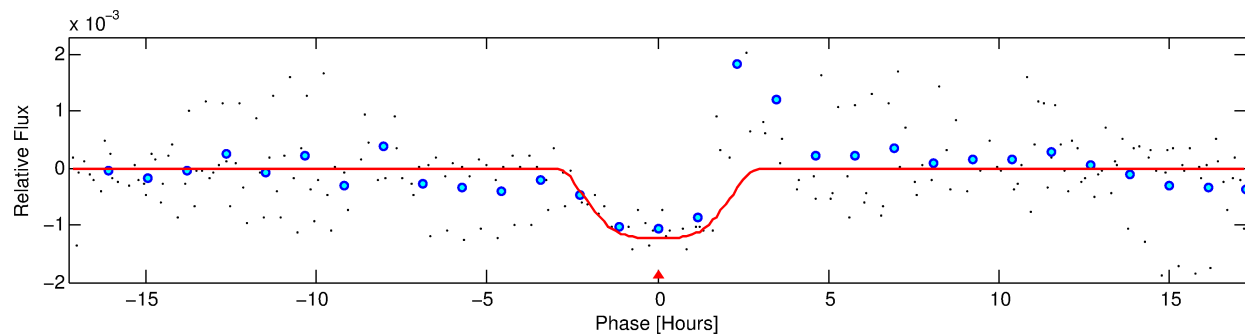
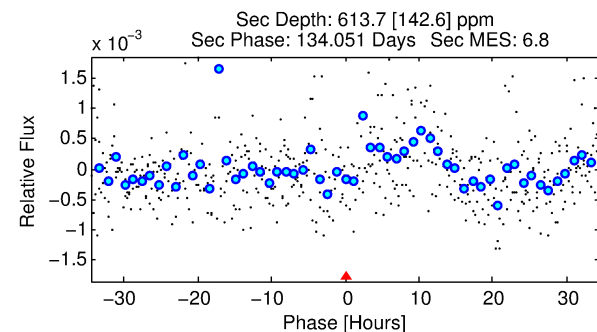
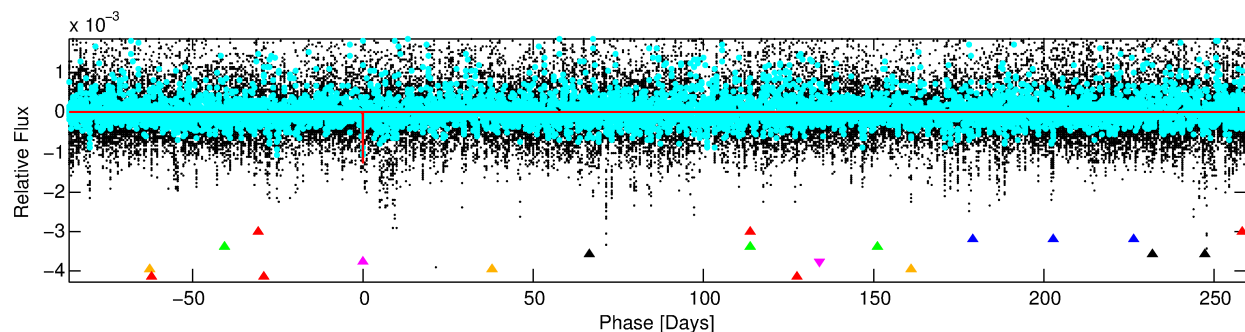
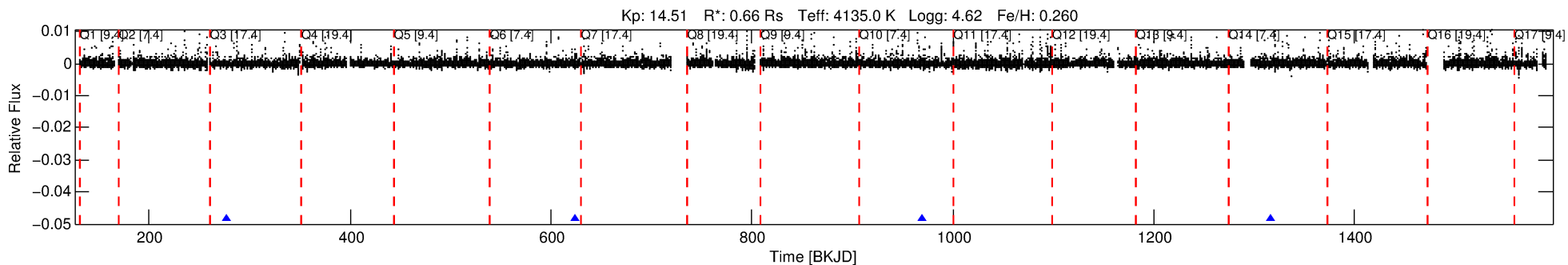
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004644174-05

No Significant Match Found

# DV One-Page Summary

KIC: 4644174 Candidate: 5 of 7 Period: 345.977 d



## DV Fit Results:

Period = 345.97660 [0.00772] d  
Epoch = 277.6851 [0.0150] BKJD  
Rp/R\* = 0.0425 [0.0063]  
a/R\* = 207.82 [55.03]  
b = 0.94 [0.04]  
Seff = 0.16 [0.03]  
Teq = 162 [8] K  
Rp = 3.05 [0.54] Re  
a = 0.8388 [0.0624] AU  
Ag = 25486.84 [9989.17] [2.55σ]  
Teffp = 3159 [324] K [9.24σ]

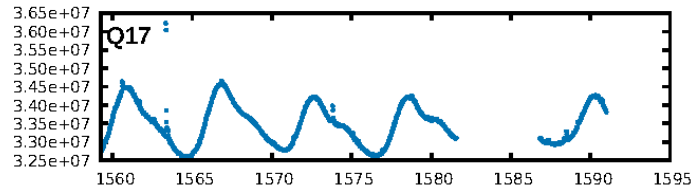
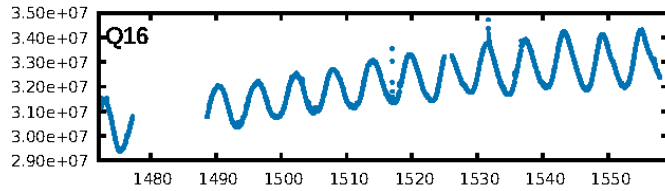
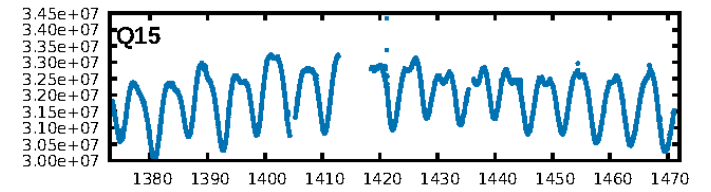
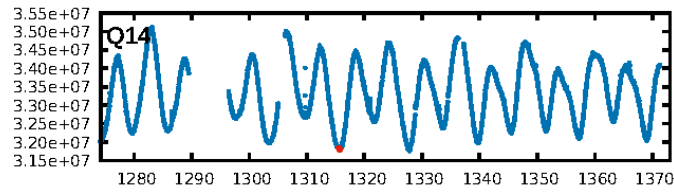
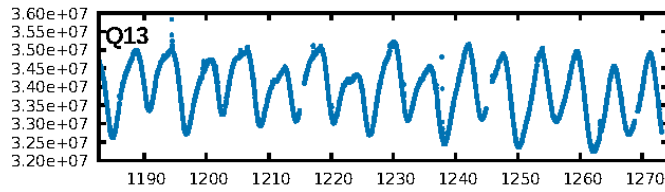
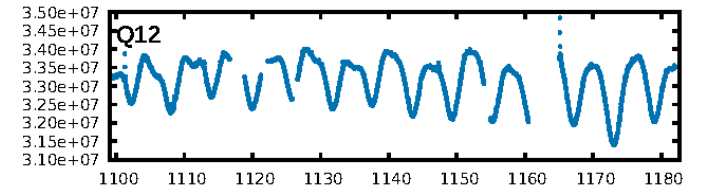
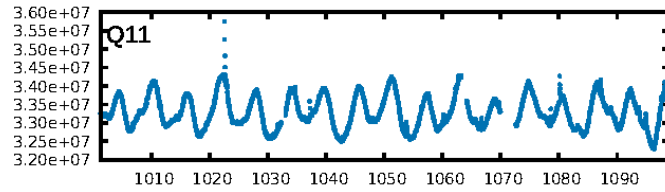
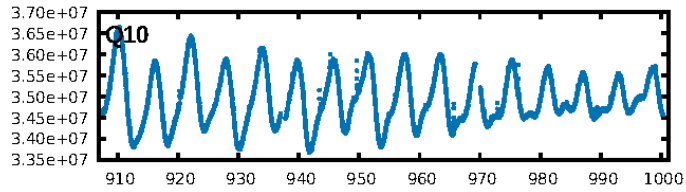
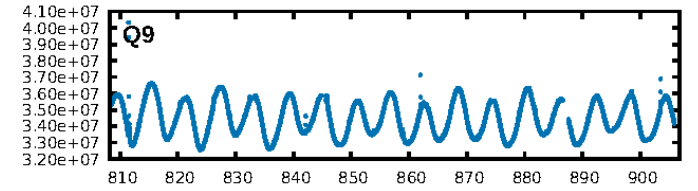
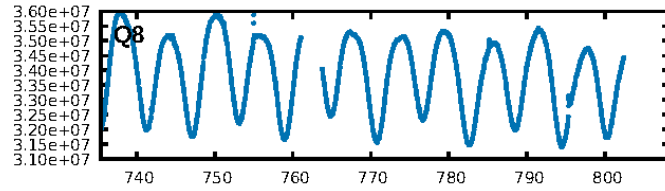
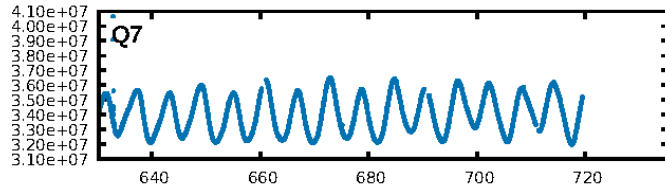
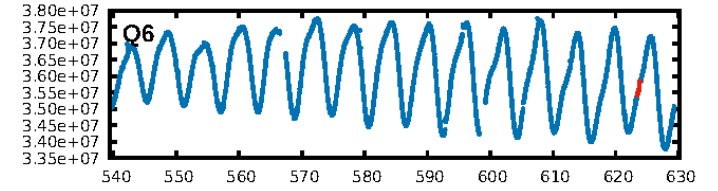
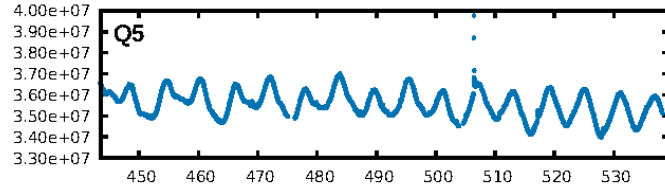
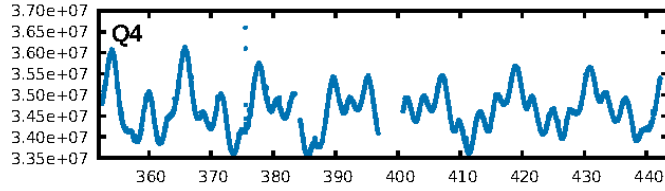
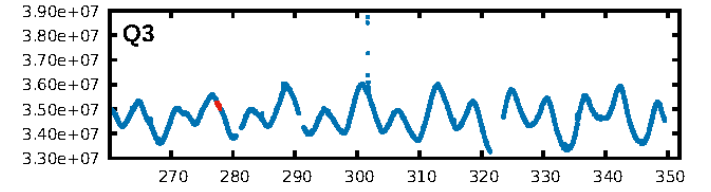
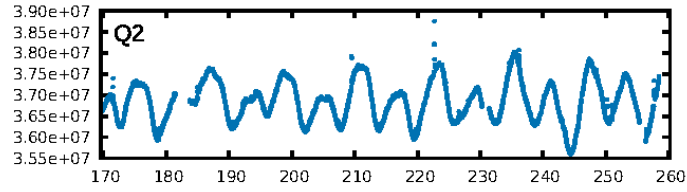
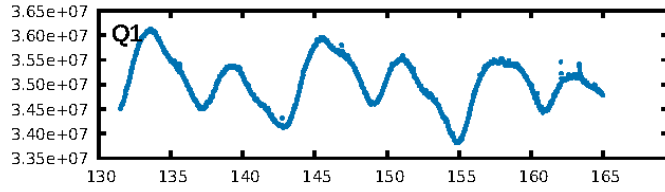
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [361.66σ]  
ModelChiSquare2-sig: 50.7%  
ModelChiSquareGof-sig: 96.4%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 2.28  
Centroid-sig: 53.9%  
Centroid-so: 0.764 arcsec [0.48σ]  
OotOffset-rm: 0.287 arcsec [1.10σ]  
KicOffset-rm: 0.254 arcsec [0.71σ]  
OotOffset-st: 2/1/0/0 [3]  
KicOffset-st: 2/1/0/0 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 1.00 [3/3]

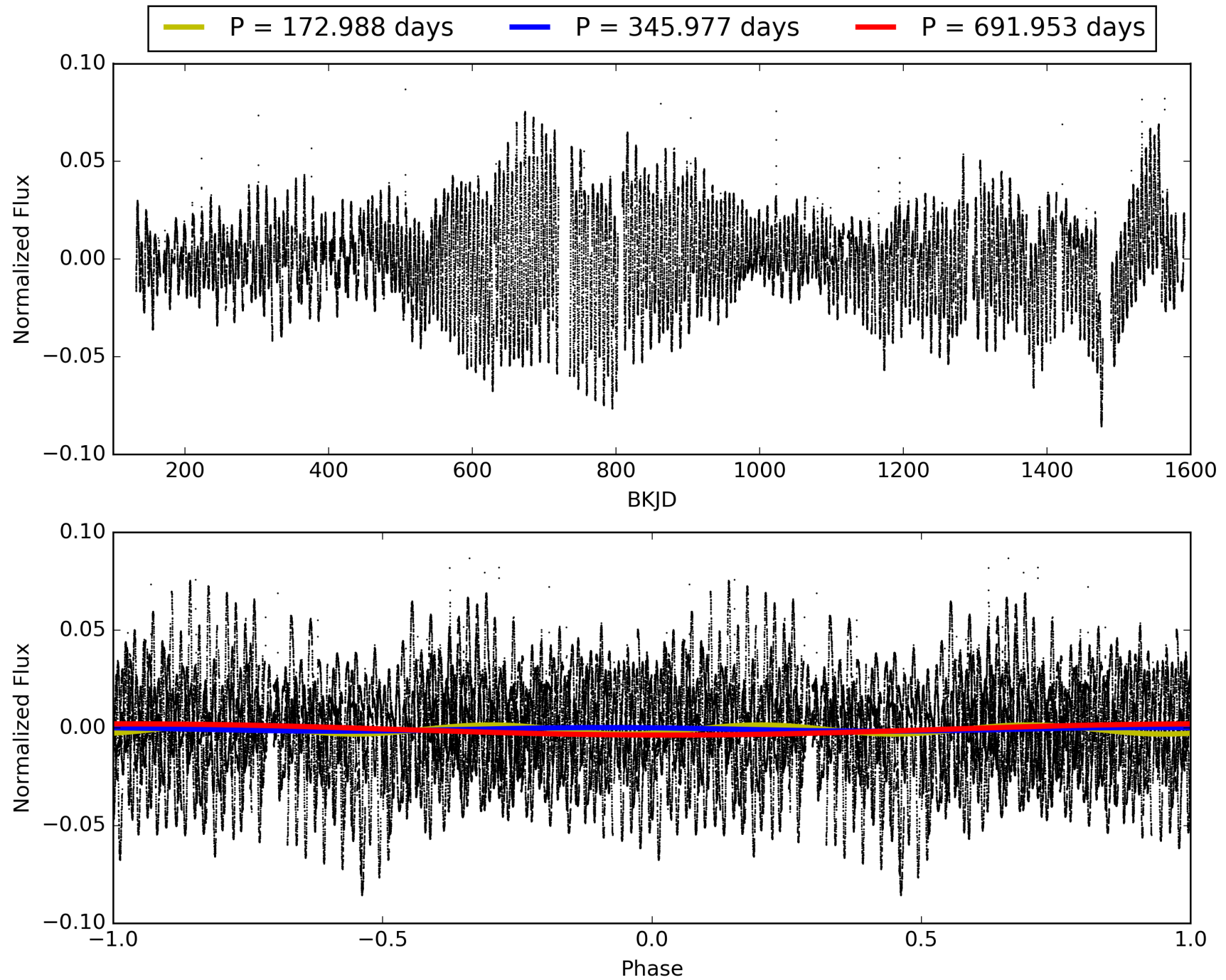
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 00:37:45 Z

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

# TCE 004644174-05, PDC Light Curves



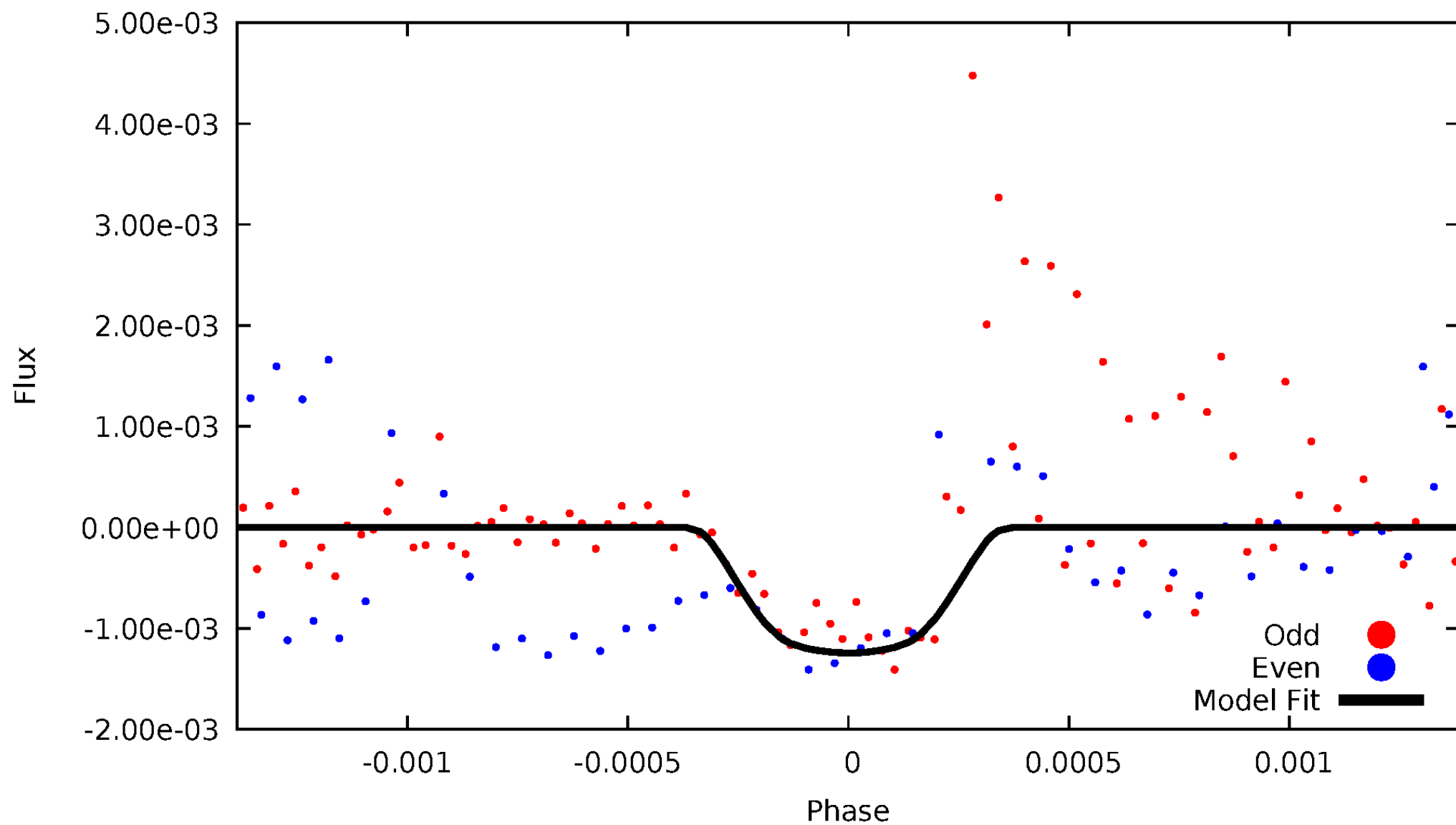
TCE 004644174-05





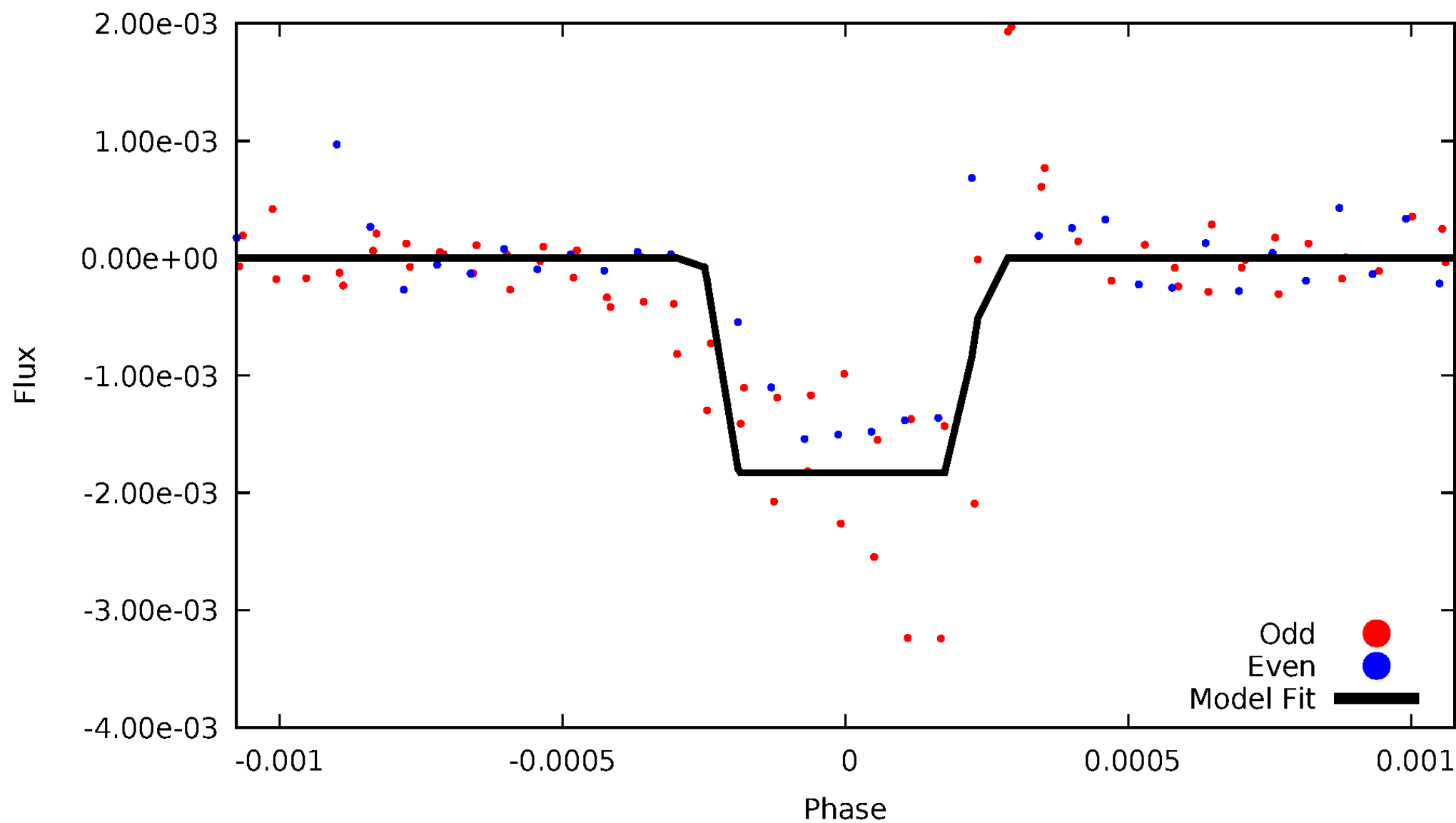
# DV Odd/Even

TCE 004644174-05



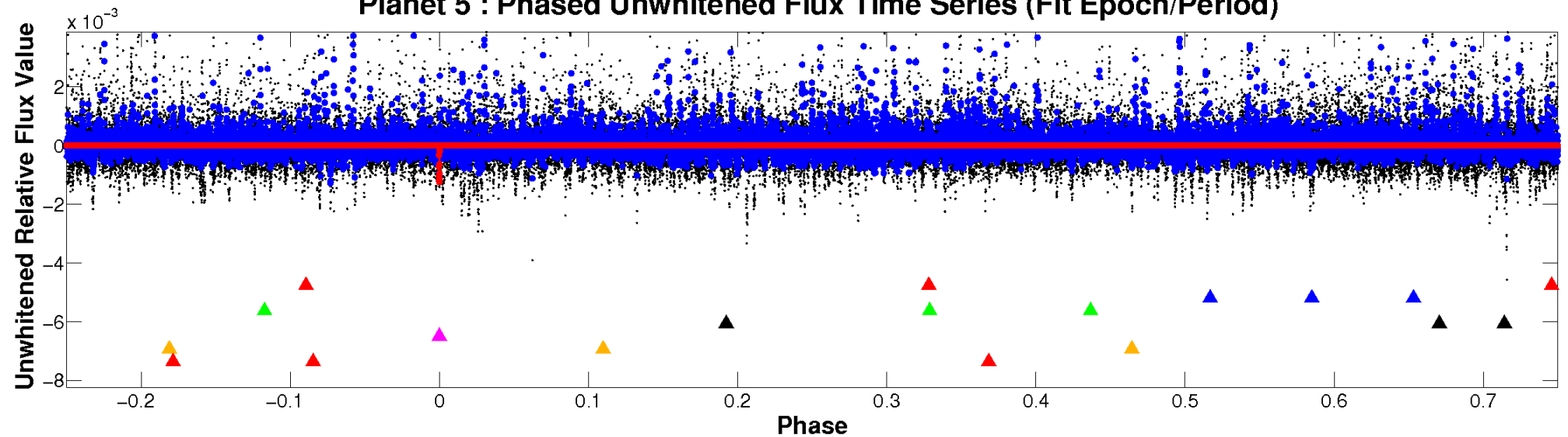
# ALT Odd/Even

TCE 004644174-05

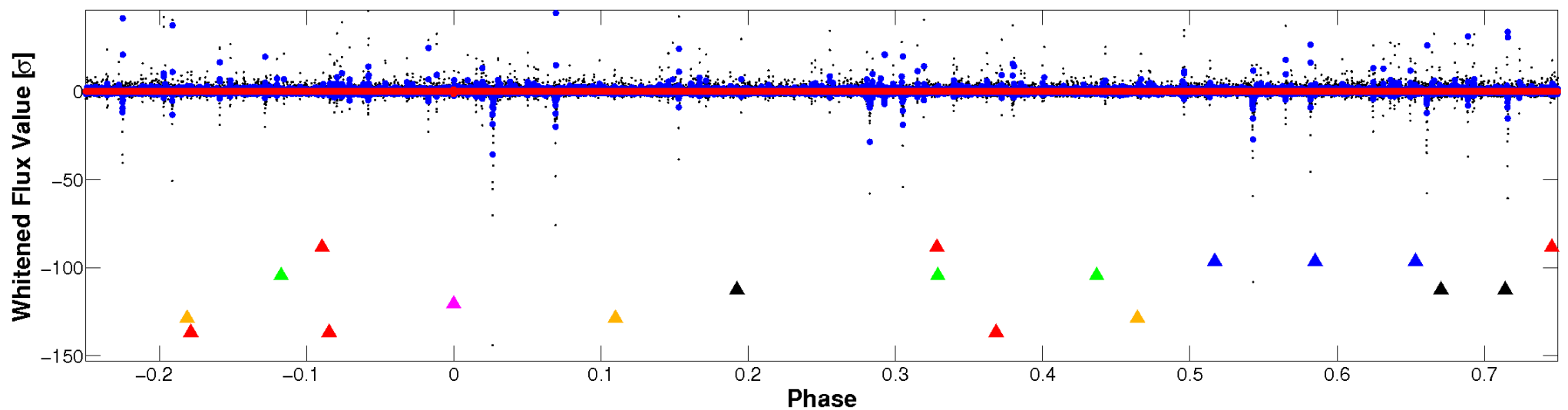


# Non-Whitened Vs. Whitened Light Curve

## Planet 5 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

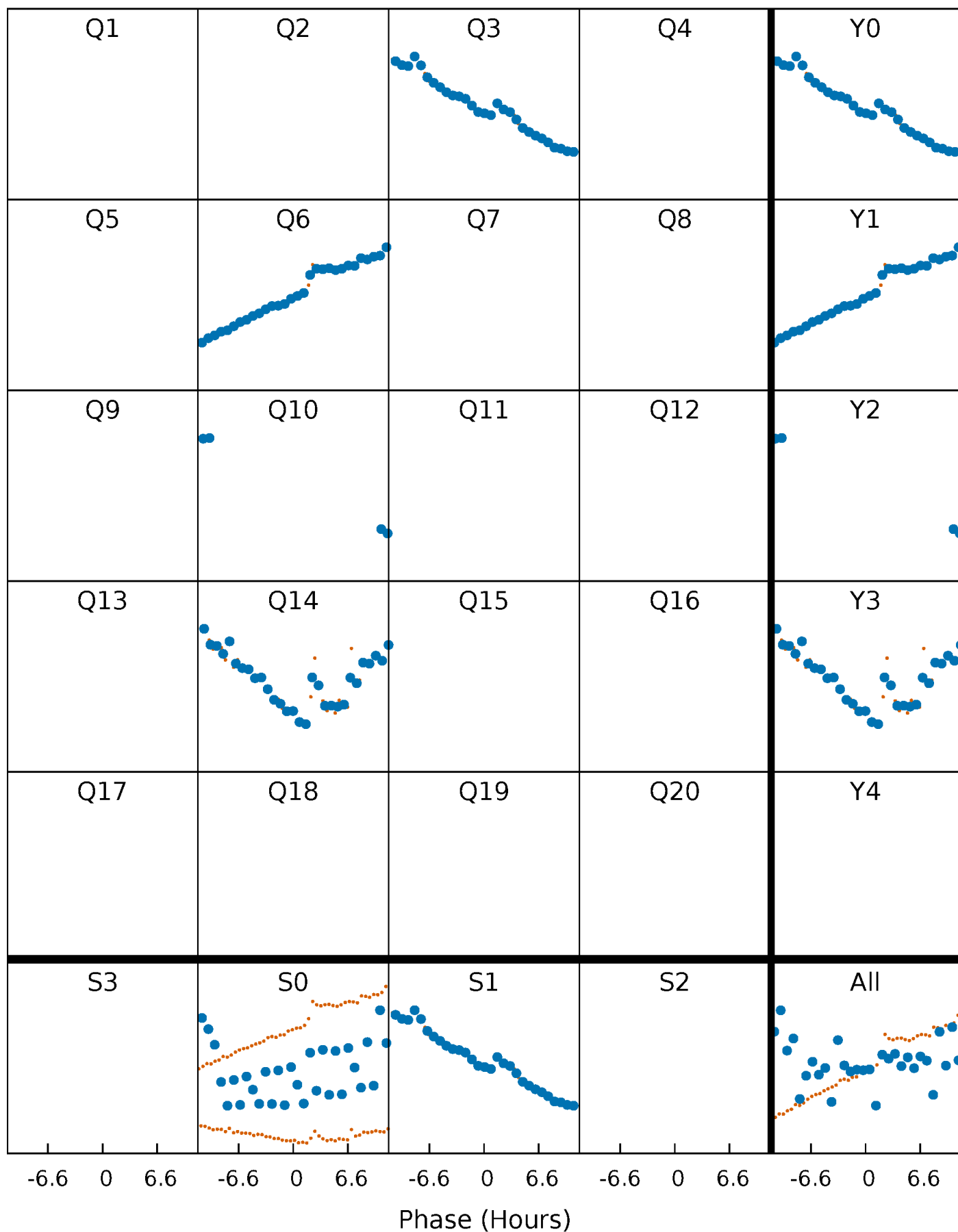


## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



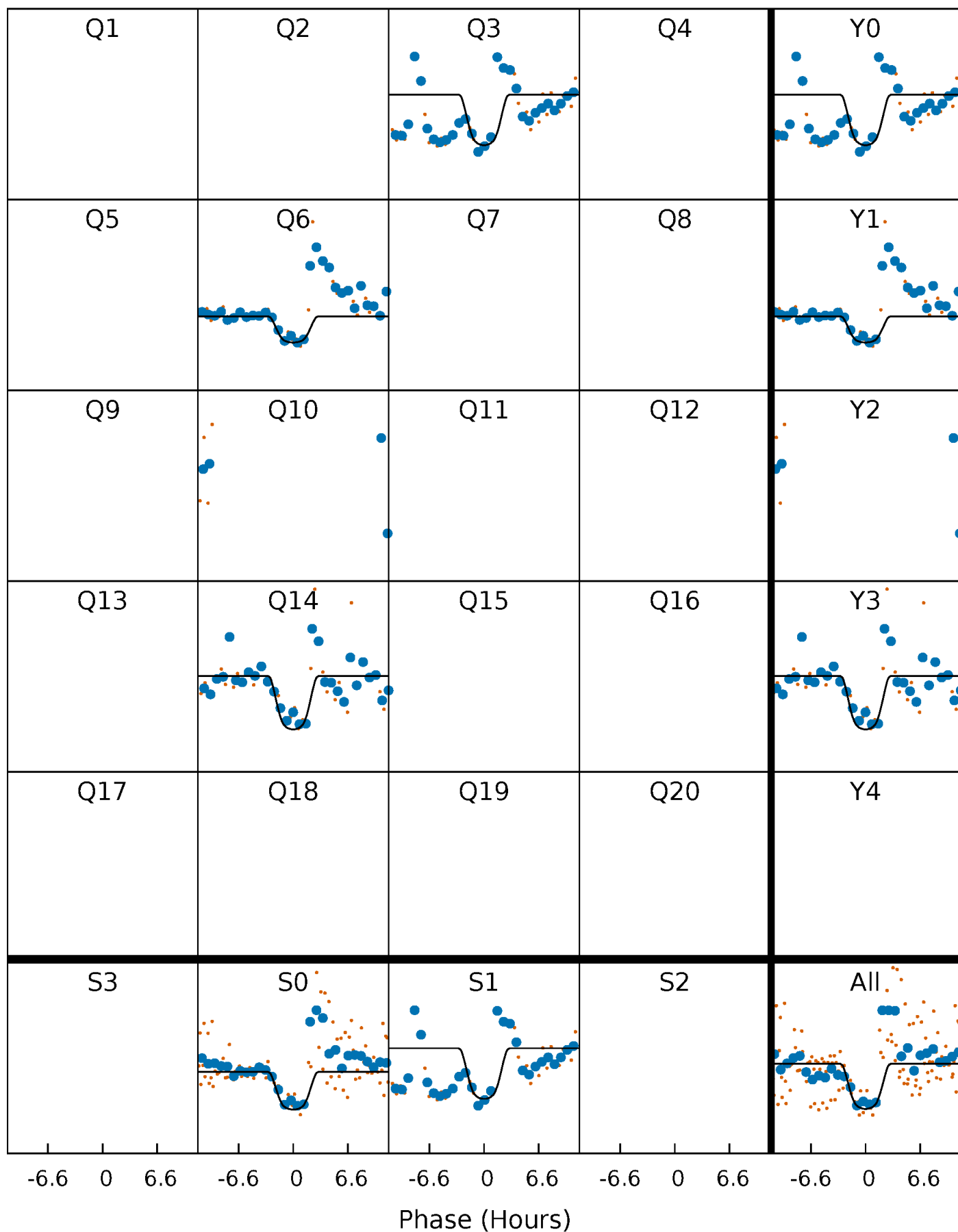
# PDC Quarter-Phased Transit Curves

TCE 004644174-05 P=345.976604 Days  $T_0=277.685128$  (BKJD)



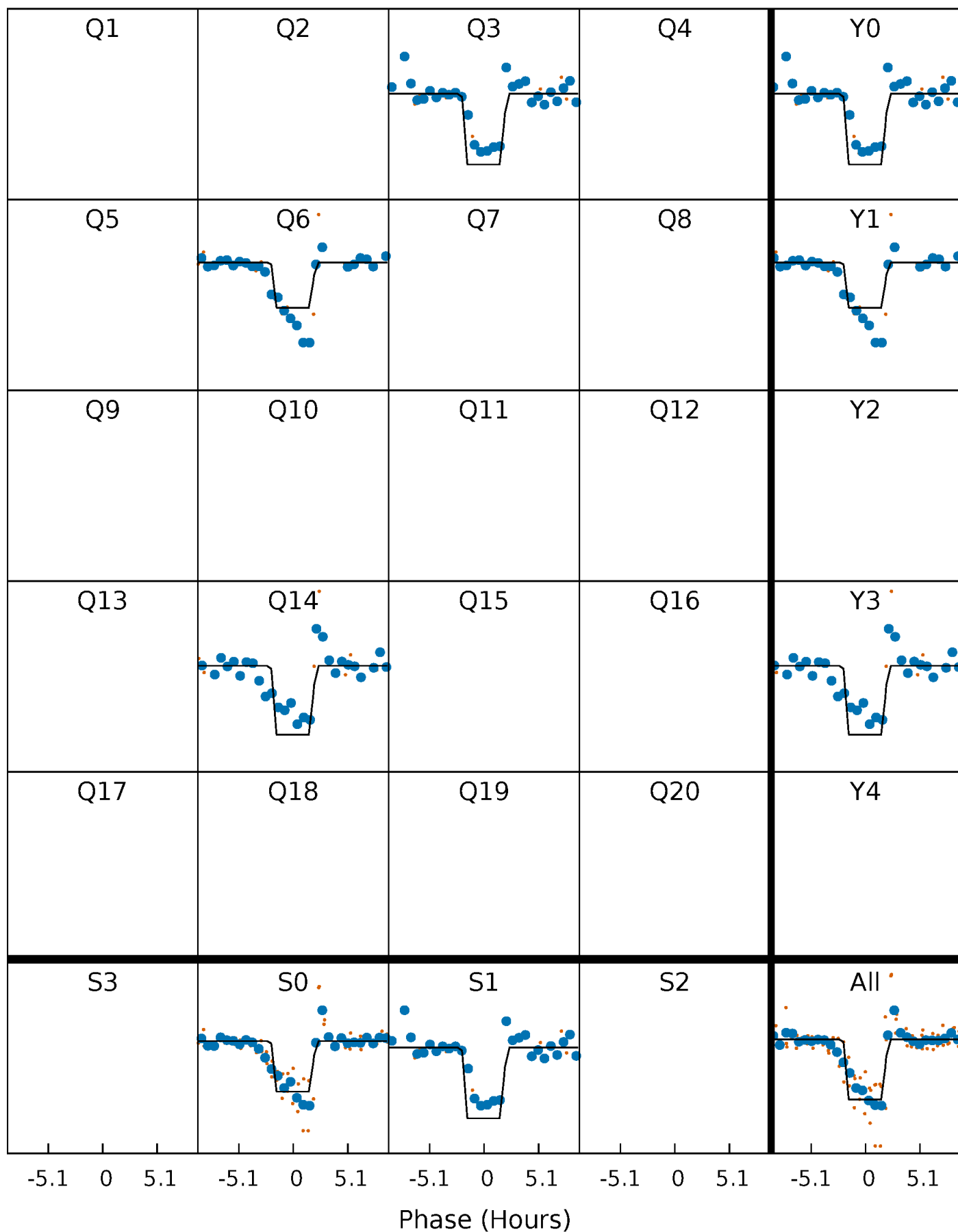
# DV Quarter-Phased Transit Curves

TCE 004644174-05     $P=345.976604$  Days     $T_0=277.685128$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

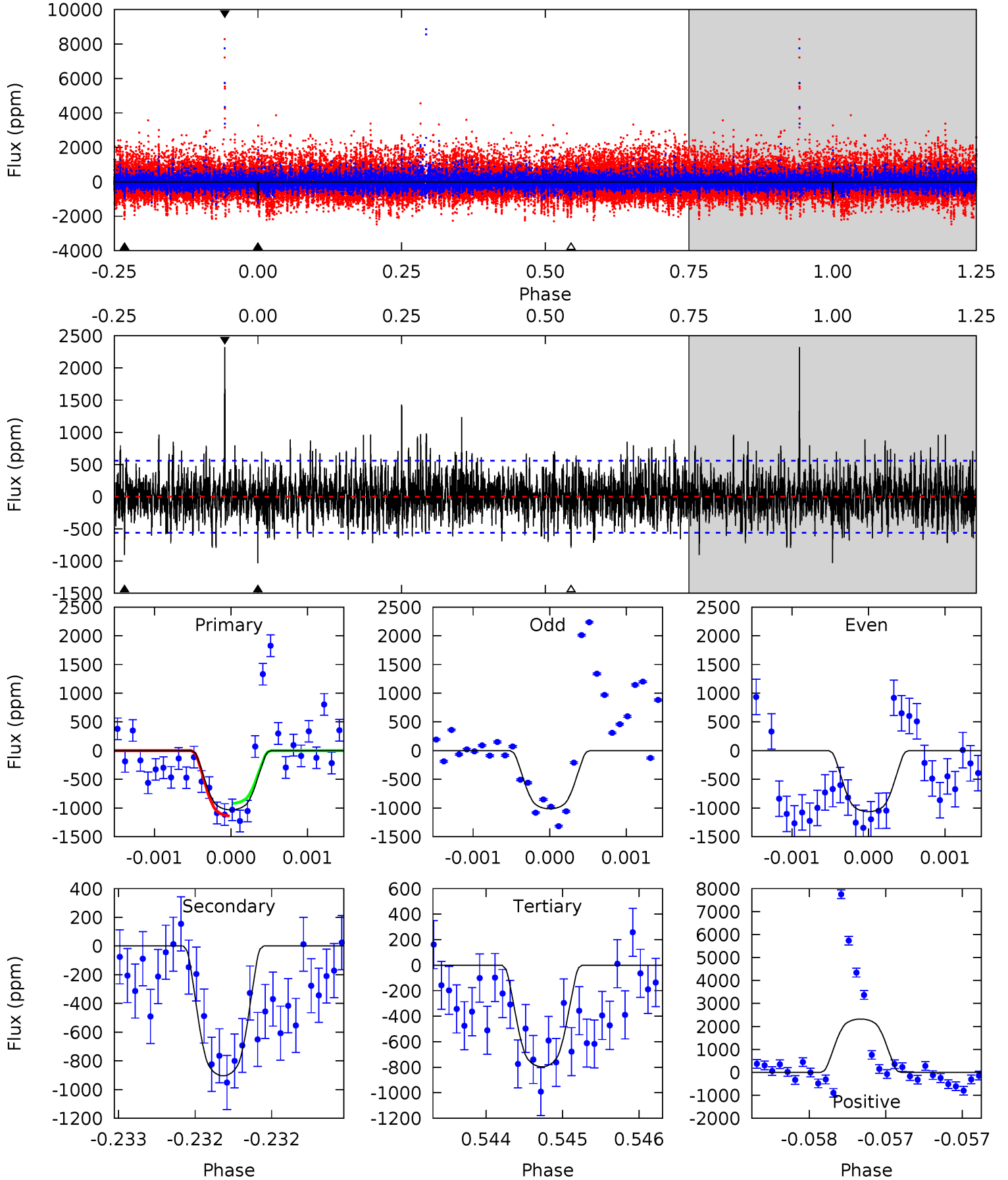
TCE 004644174-05     $P=345.981038$  Days     $T_0=277.678855$  (BKJD)



# DV Model-Shift Uniqueness Test

004644174-05, P = 345.976604 Days, E = 277.685128 Days

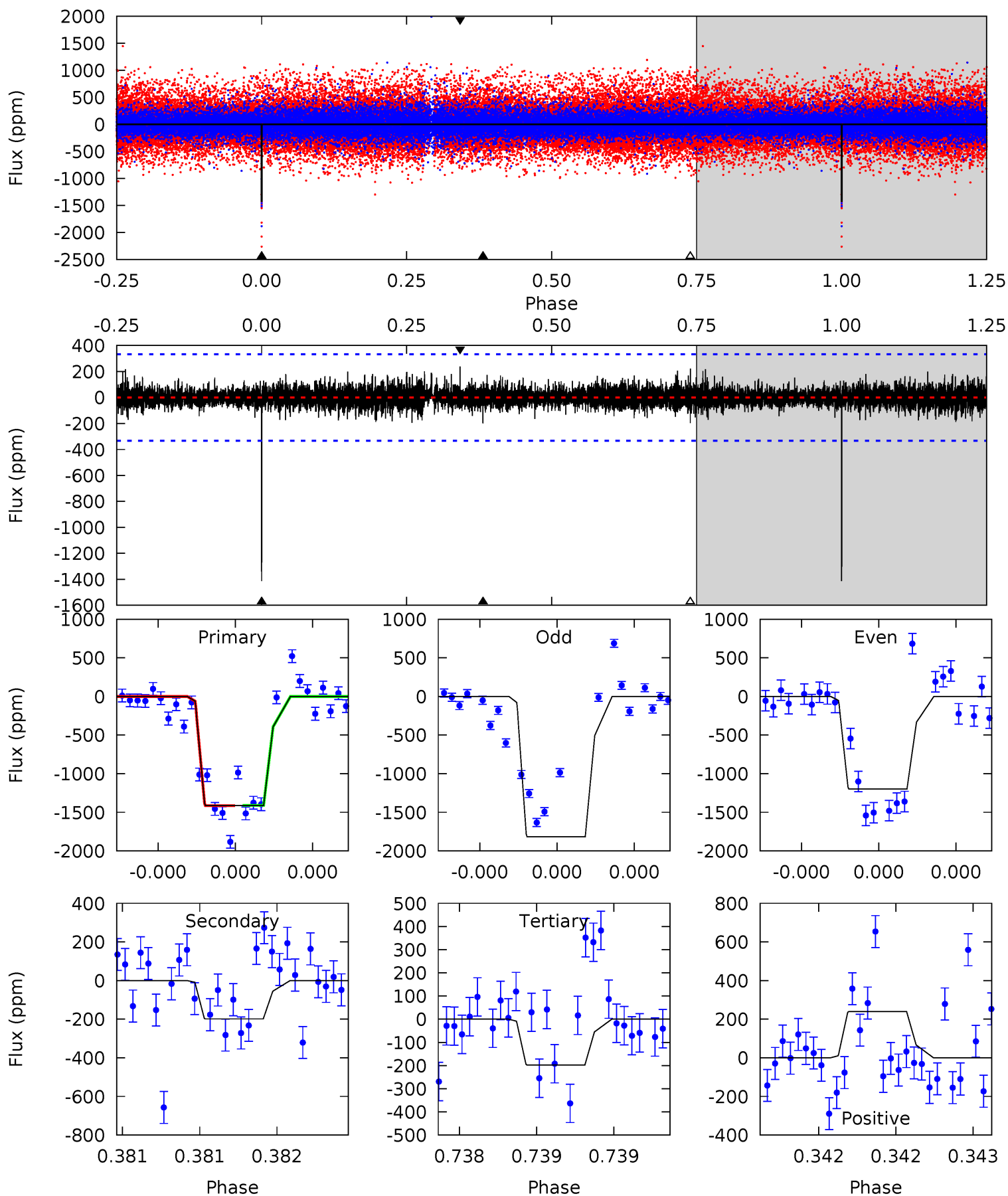
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.2	8.91	7.84	22.9	5.51	3.39	2.49	2.33	-12.7	1.07	-14.0	0.19	0.97	0.69	1.09



# Alt Model-Shift Uniqueness Test

004644174-05, P = 345.981038 Days, E = 277.678855 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
23.7	3.33	3.31	4.01	5.58	3.49	0.74	20.4	19.7	0.03	-0.67	5.35	1.30	0.14	0.01





### Stellar Parameters For KIC 004644174

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4135^{+148}_{-165}$	$4.618^{+0.052}_{-0.017}$	$0.260^{+0.150}_{-0.300}$	$0.659^{+0.027}_{-0.062}$	$0.657^{+0.044}_{-0.058}$	$3.237^{+0.756}_{-0.234}$
	+4%/-4%	+1%/-0%	+58%/-115%	+4%/-9%	+7%/-9%	+23%/-7%
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 004644174-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-904 \pm 101$	$3.02^{+0.46}_{-0.48}$	$225^{+9}_{-9}$	$3676^{+244}_{-225}$	$38131^{+16797}_{-10017}$
Alt.	$-199 \pm 60$	$3.04^{+0.46}_{-0.46}$	$224^{+9}_{-9}$	$2913^{+207}_{-180}$	$8371^{+4451}_{-2828}$

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

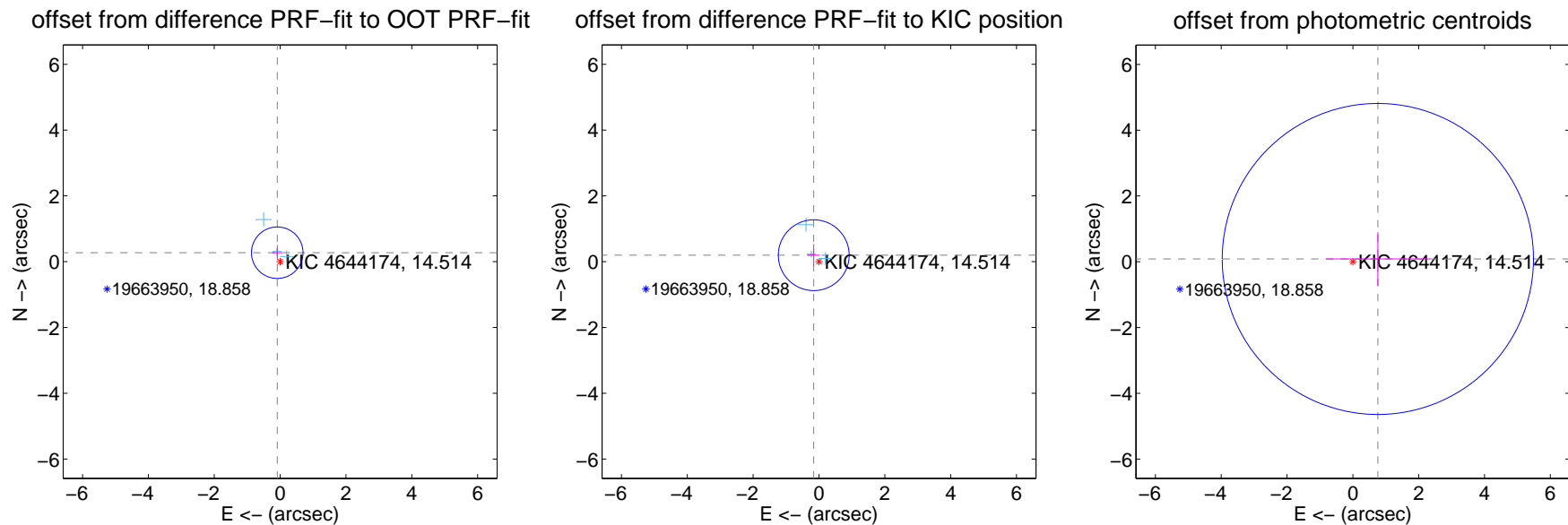
## DV Centroid Data

Supplemental centroid analysis for 004644174-05. Kepler magnitude: 14.51. Transit SNR 7.08

There are 3 quarters with good PRF difference image offsets

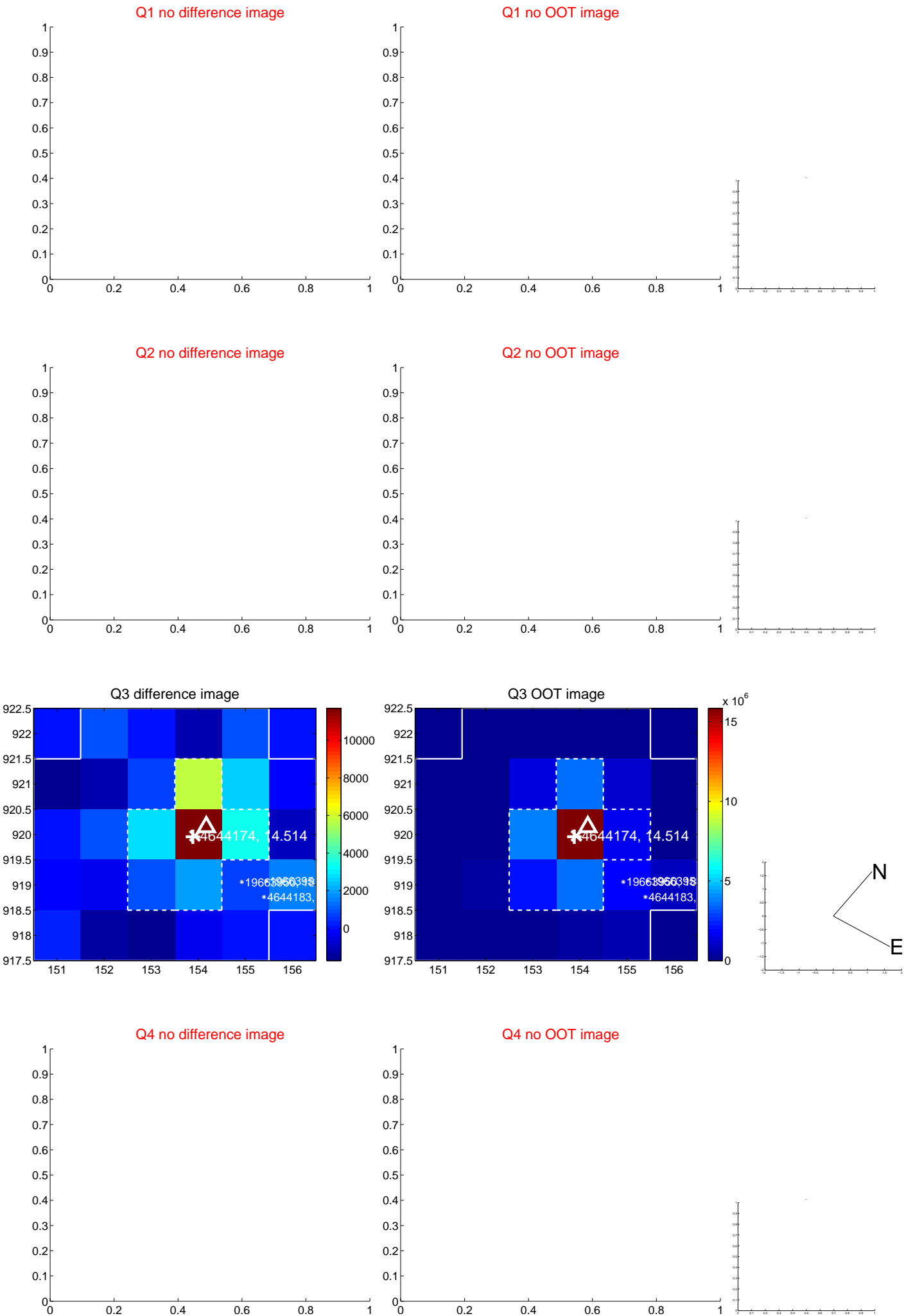
The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.287 \pm 0.261$	1.10	$0.087 \pm 0.162$	$0.273 \pm 0.230$
PRF-fit source offset from KIC position	$0.254 \pm 0.359$	0.71	$0.159 \pm 0.181$	$0.197 \pm 0.334$
photometric centroid source offset	$0.76 \pm 1.58$	0.48	$-0.76 \pm 1.58$	$0.08 \pm 0.81$



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.

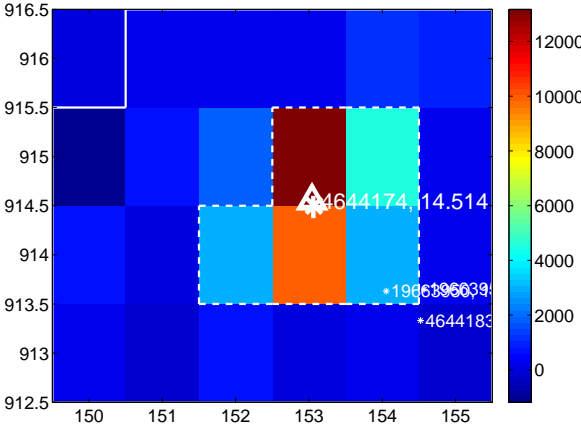
Q5 no difference image



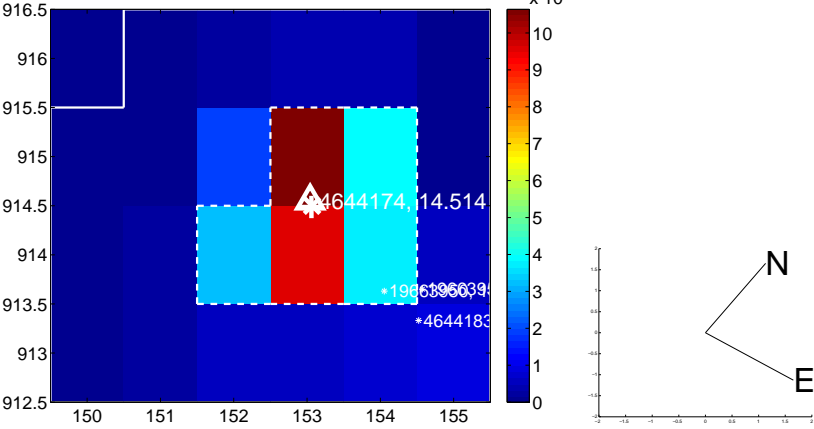
Q5 no OOT image



Q6 difference image



Q6 OOT image



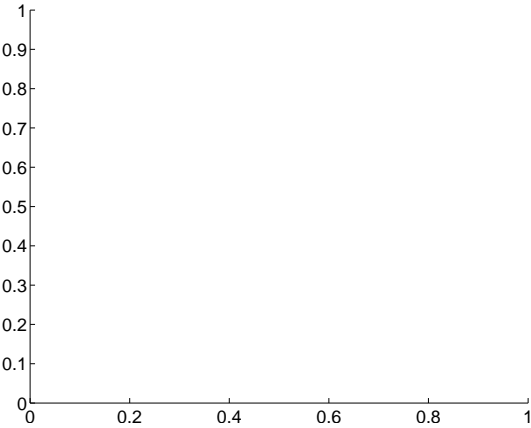
Q7 no difference image



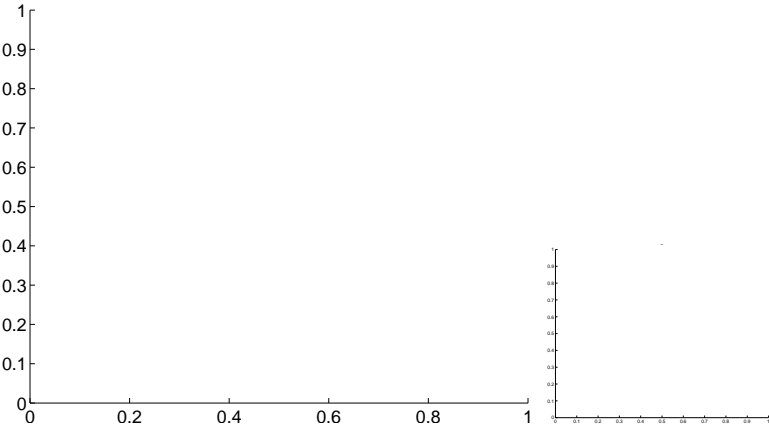
Q7 no OOT image



Q8 no difference image



Q8 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.

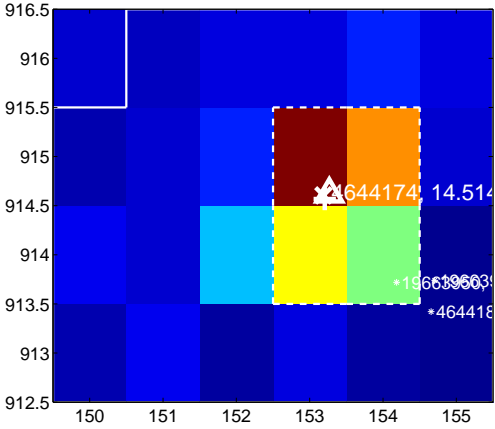
Q13 no difference image



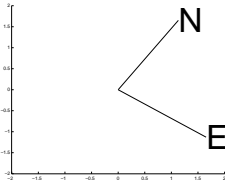
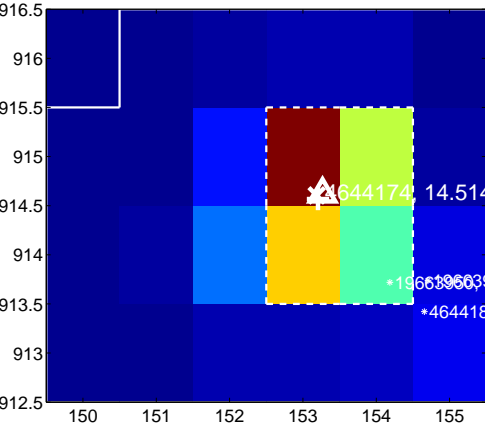
Q13 no OOT image



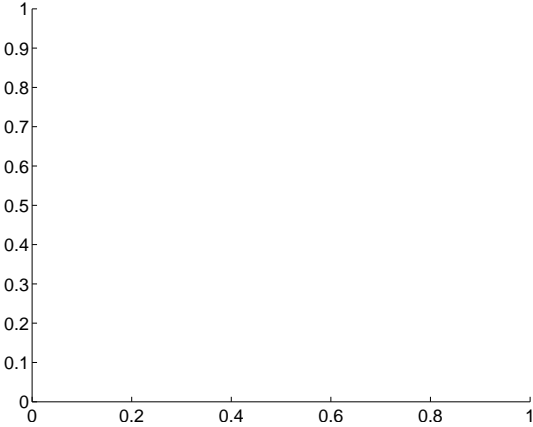
Q14 difference image



Q14 OOT image



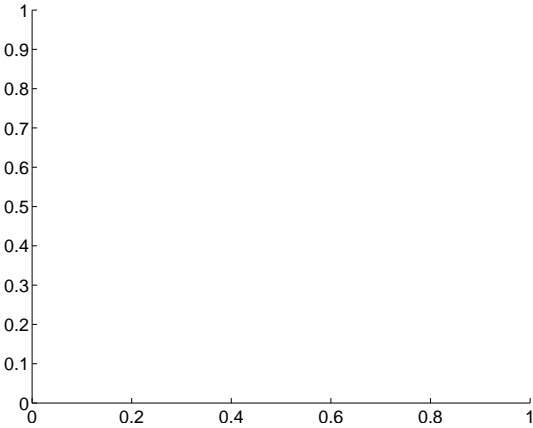
Q15 no difference image



Q15 no OOT image



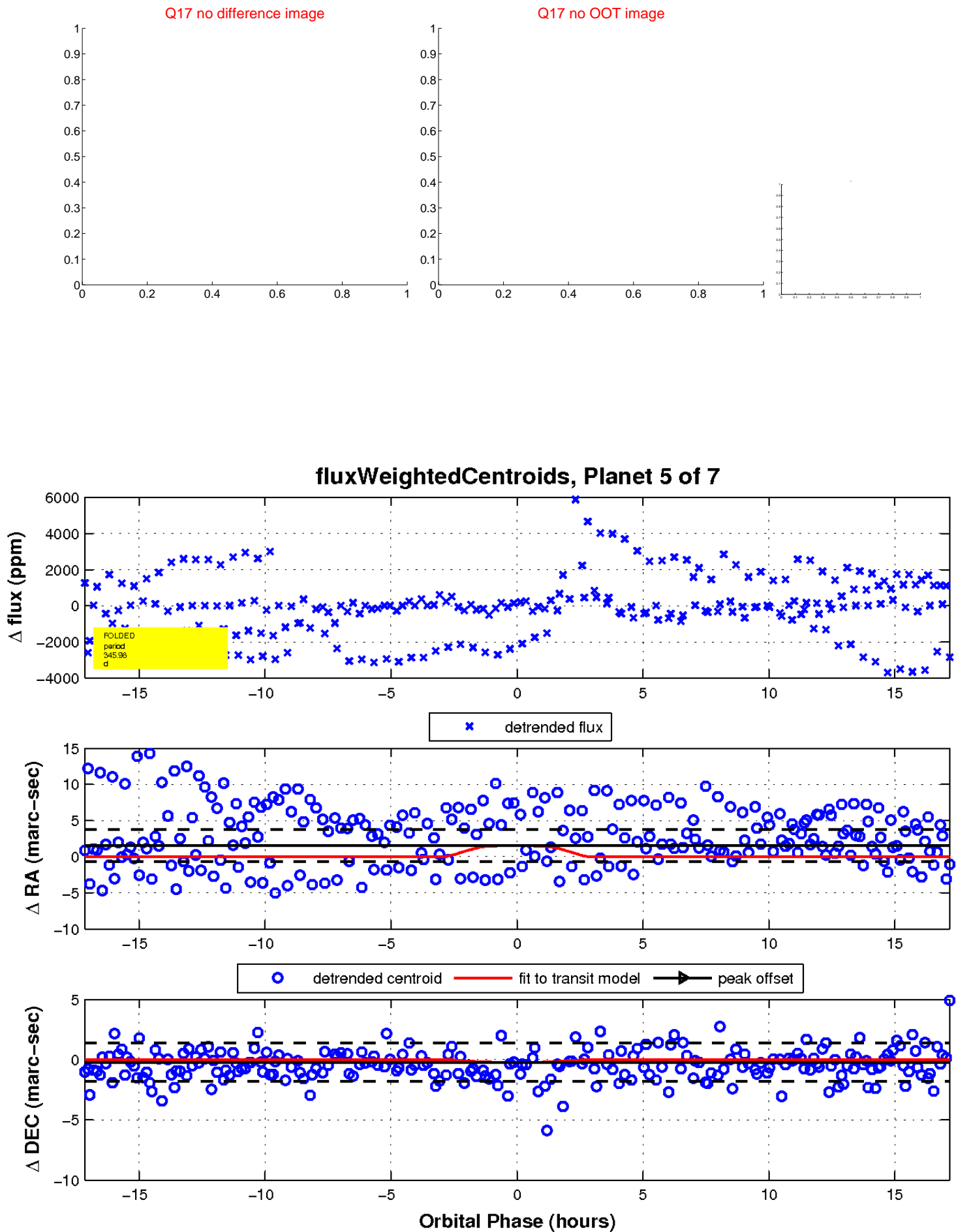
Q16 no difference image



Q16 no OOT image

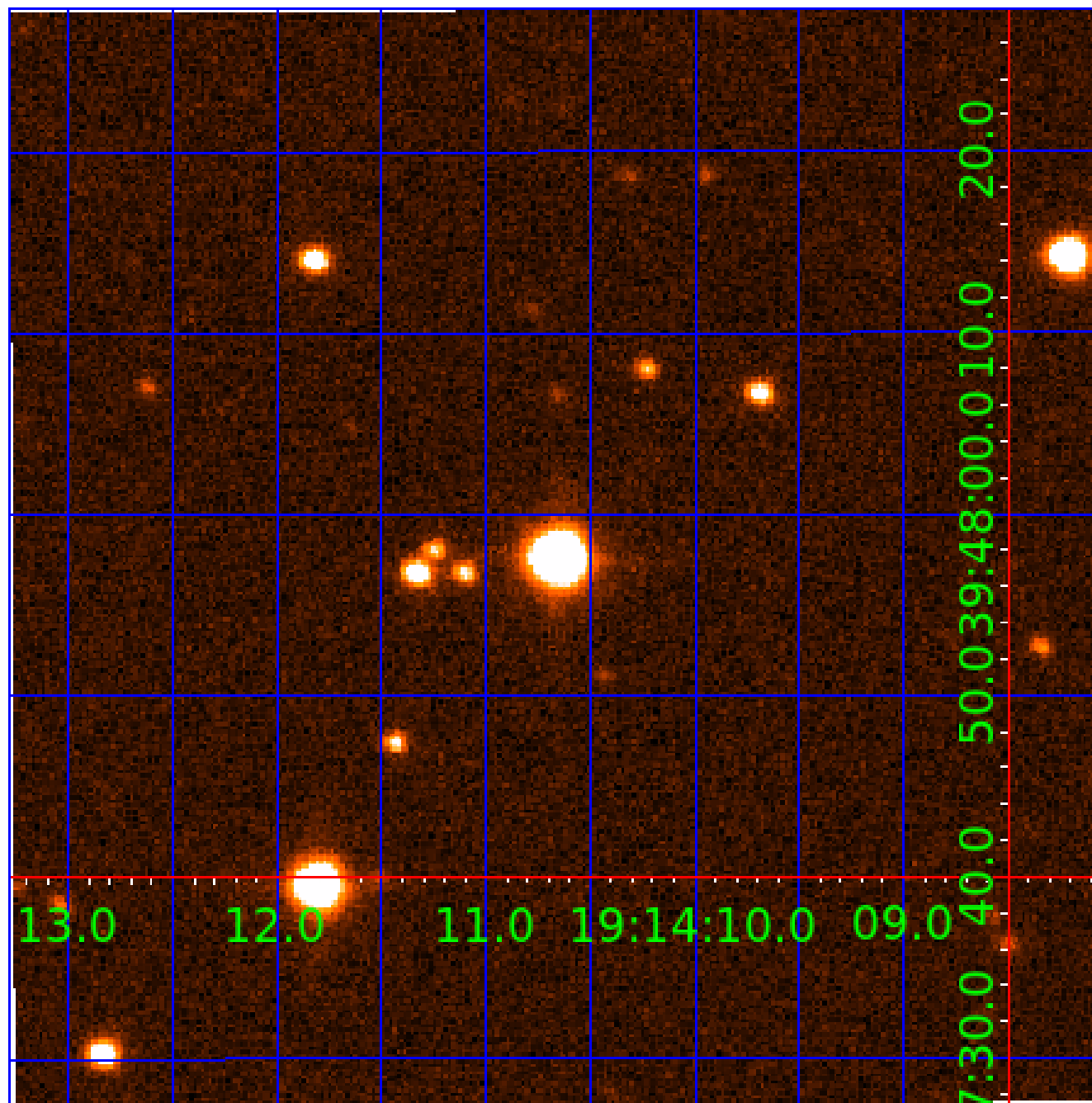


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 004644174

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004644174-01	OBS	No	490.476780	592.714724	1263.6	4.663	17.3	6.0	0.66	4135	2.24	0.10
004644174-02	OBS	No	668.363143	157.719815	1472.8	7.205	15.9	7.2	0.66	4135	2.59	0.07
004644174-03	OBS	No	537.634148	391.437498	1103.9	5.141	16.5	5.6	0.66	4135	2.51	0.09
004644174-05	OBS	No	345.976604	277.685128	1243.9	5.751	12.7	7.1	0.66	4135	3.05	0.16
004644174-06	OBS	No	468.641275	315.692386	1480.8	5.761	13.3	8.1	0.66	4135	2.71	0.11
004644174-07	OBS	No	502.706443	248.411391	1131.5	3.500	14.1	-1.0	0.66	4135	2.12	0.10

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004644174-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004644174-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS
004644174-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS
004644174-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS
004644174-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
004644174-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—CENT_NOFITS

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

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

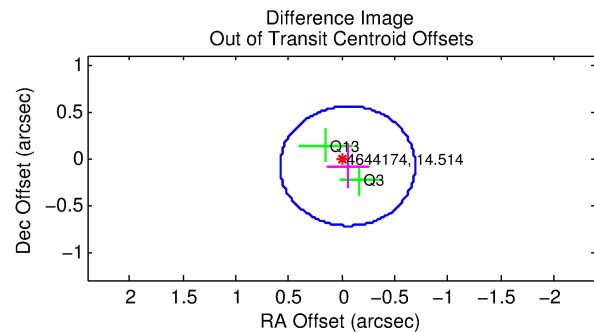
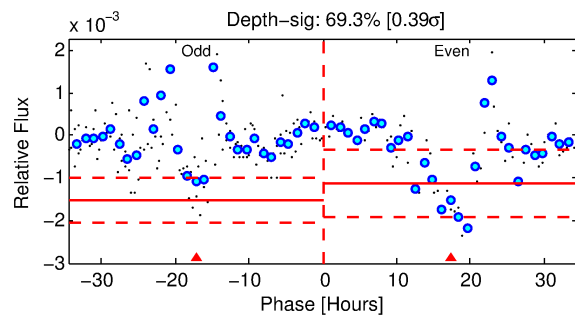
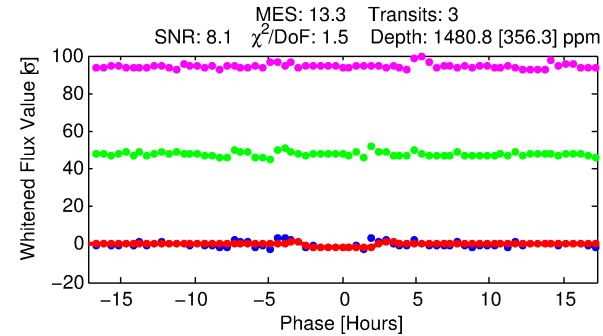
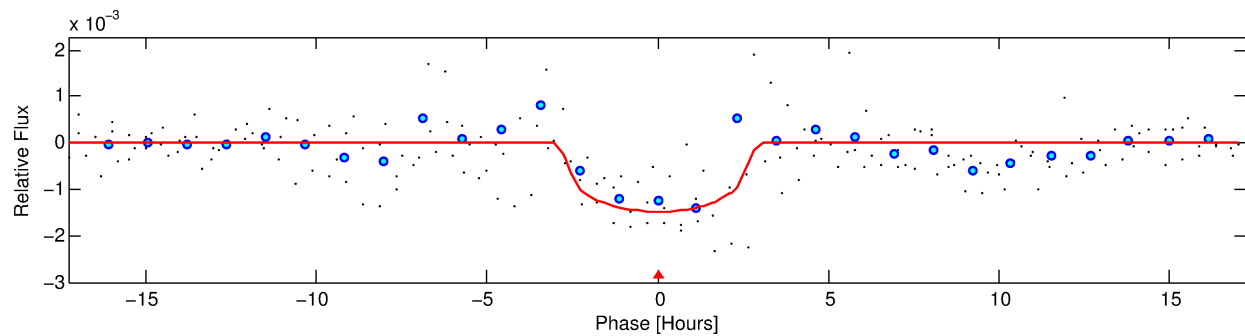
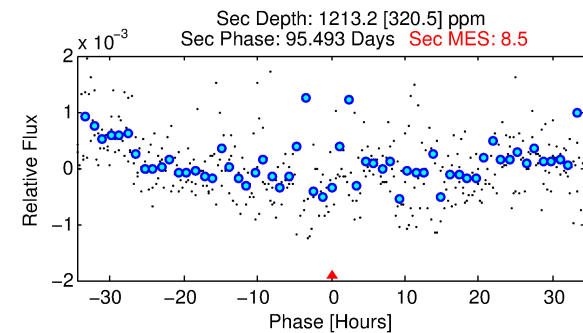
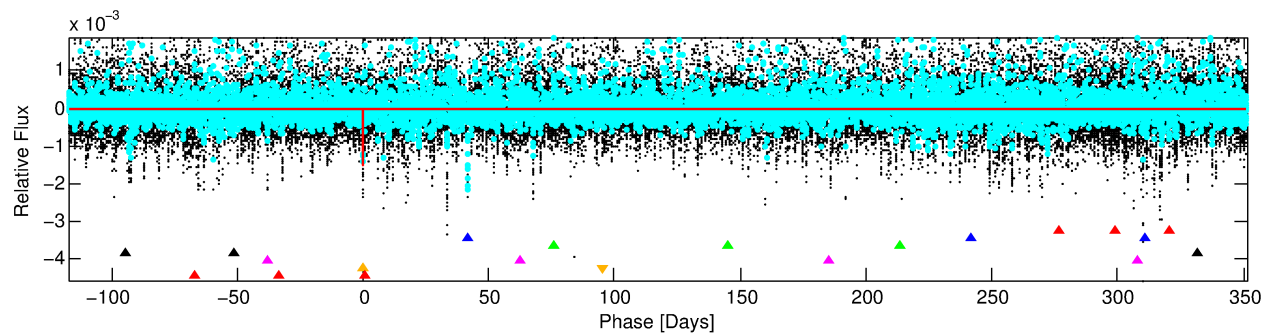
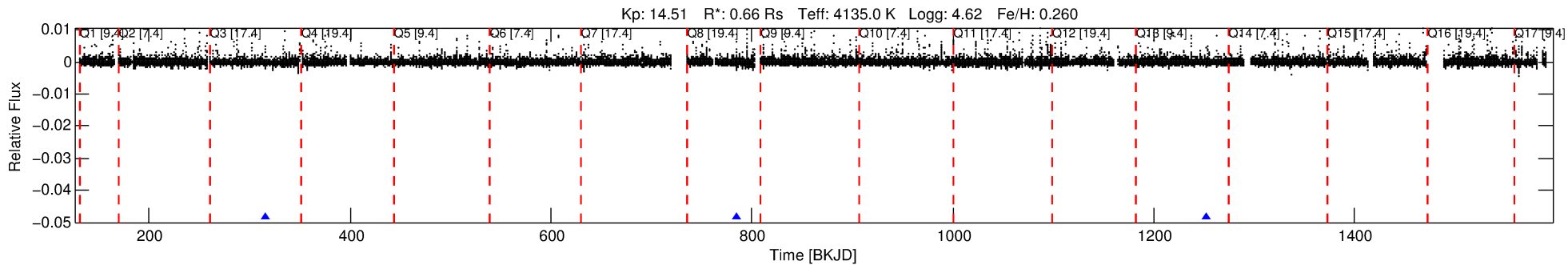
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004644174-06

No Significant Match Found

# DV One-Page Summary

KIC: 4644174 Candidate: 6 of 7 Period: 468.641 d



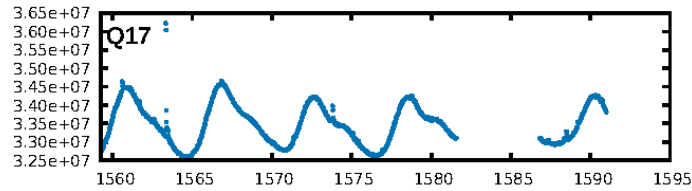
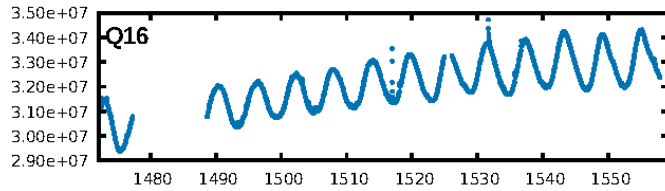
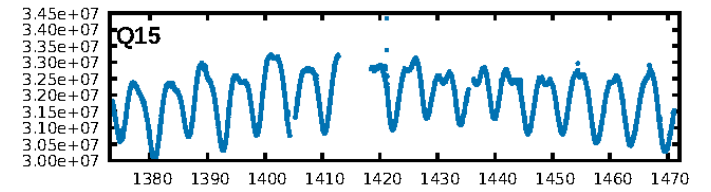
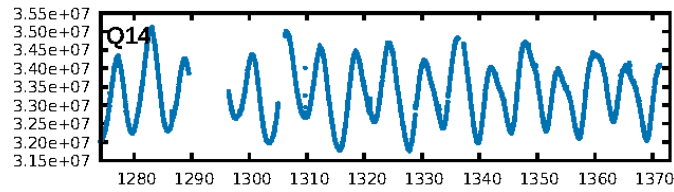
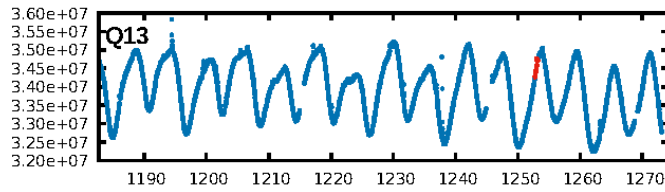
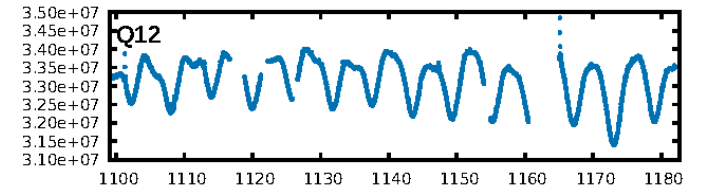
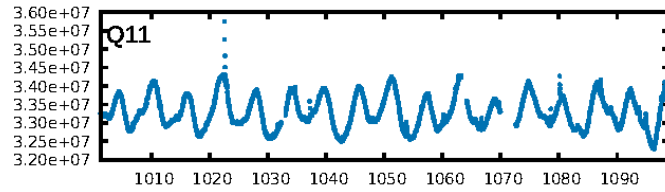
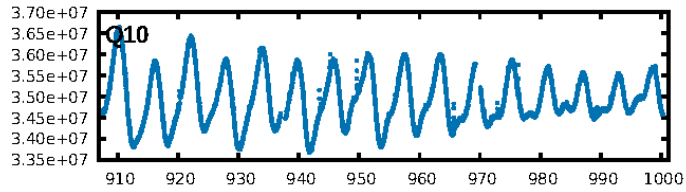
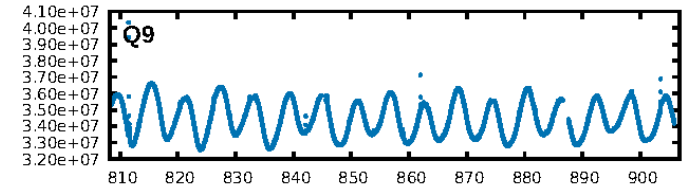
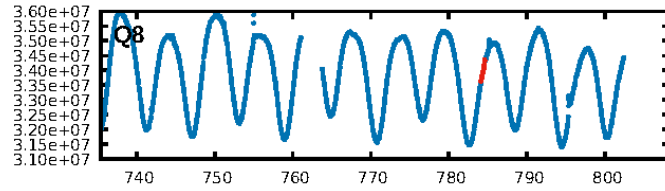
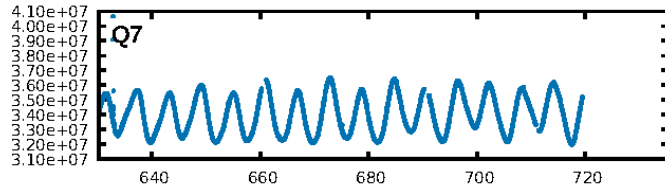
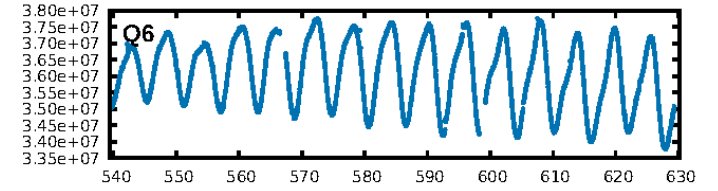
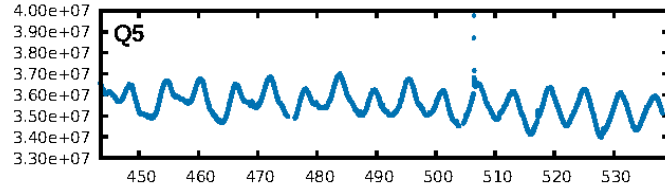
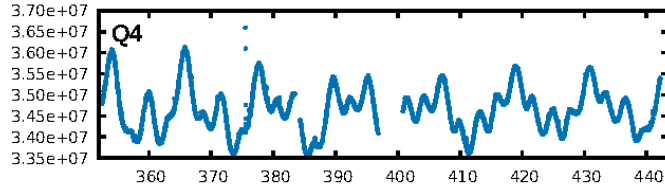
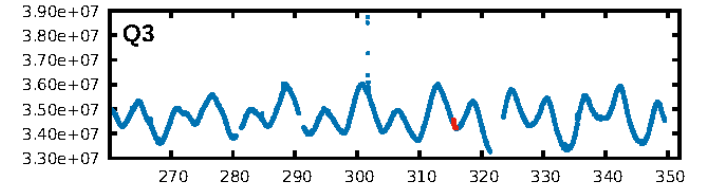
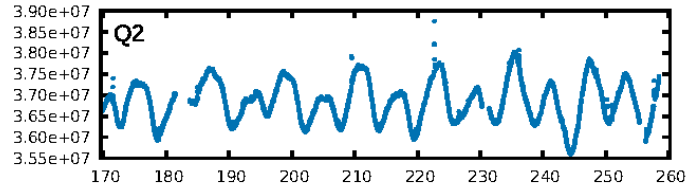
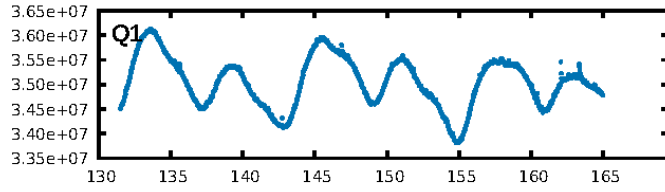
## DV Fit Results:

Period = 468.64127 [0.00990] d  
Epoch = 315.6924 [0.0121] BKJD  
Rp/R\* = 0.0377 [0.0412]  
a/R\* = 474.26 [1625.36]  
b = 0.70 [2.53]  
Seff = 0.11 [0.02]  
Teq = 146 [7] K  
Rp = 2.71 [2.97] Re  
a = 1.0269 [0.0763] AU  
Ag = 95777.61 [211183.60] [0.45σ]  
Teffp = 3975 [2194] K [1.74σ]

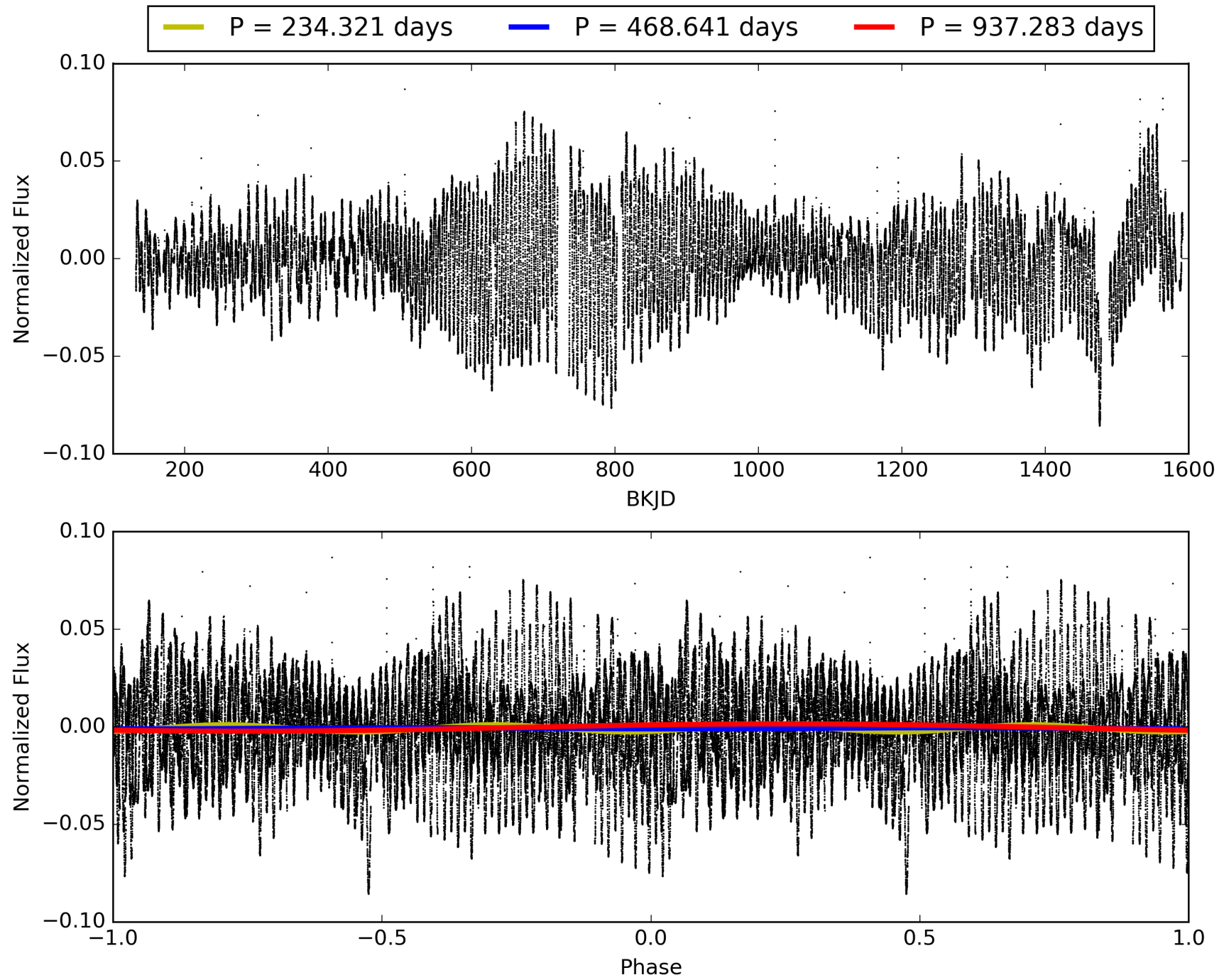
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [361.66σ]  
LongPeriod-sig: 100.0% [70.70σ]  
ModelChiSquare2-sig: 91.4%  
ModelChiSquareGof-sig: 97.8%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -1.119  
Centroid-sig: 7.6%  
Centroid-so: 0.726 arcsec [1.23σ]  
OotOffset-rm: 0.102 arcsec [0.48σ]  
KicOffset-rm: 0.116 arcsec [0.37σ]  
OotOffset-st: 0/1/0/1 [2]  
KicOffset-st: 0/1/0/1 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 1.00 [3/3]

# TCE 004644174-06, PDC Light Curves

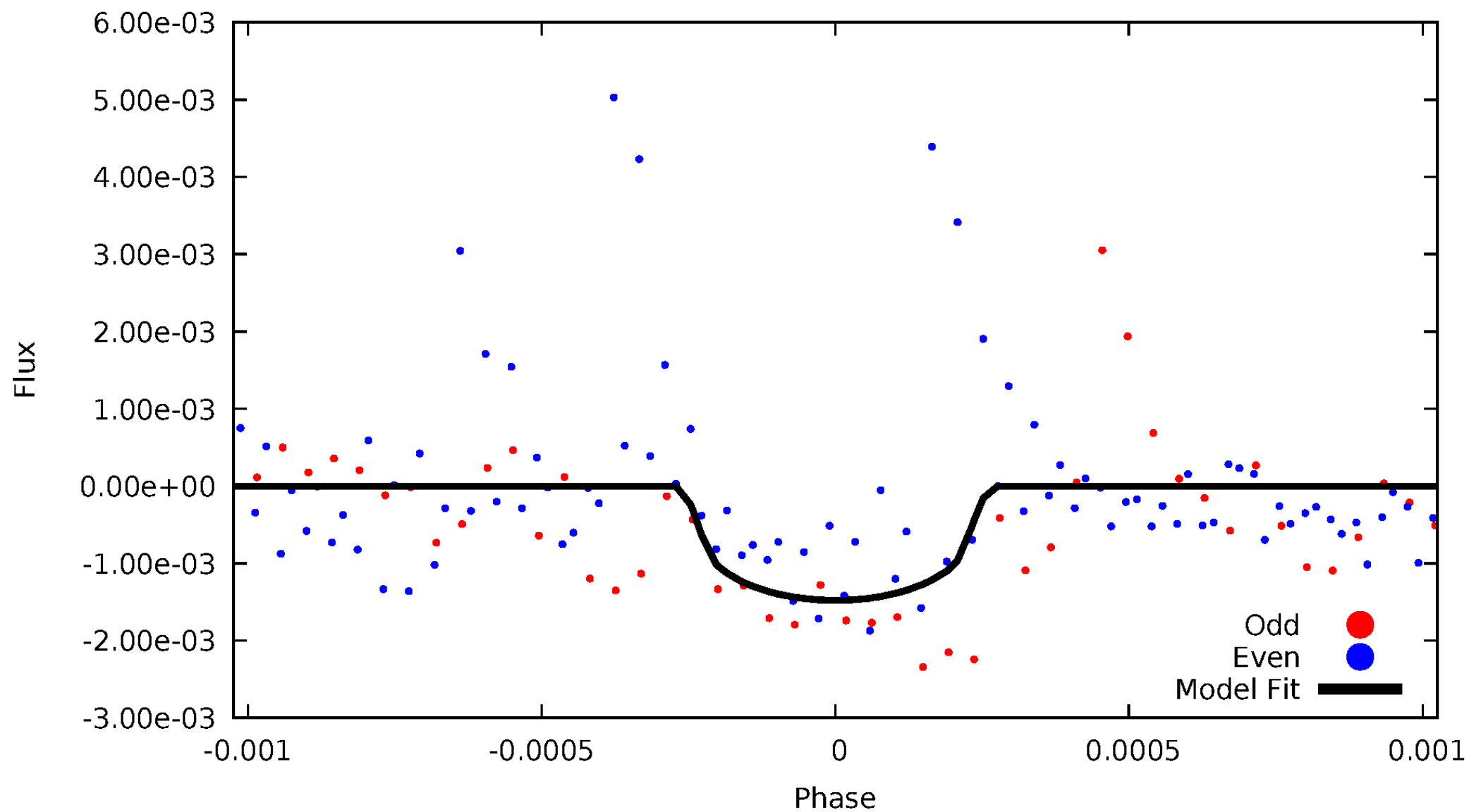


TCE 004644174-06



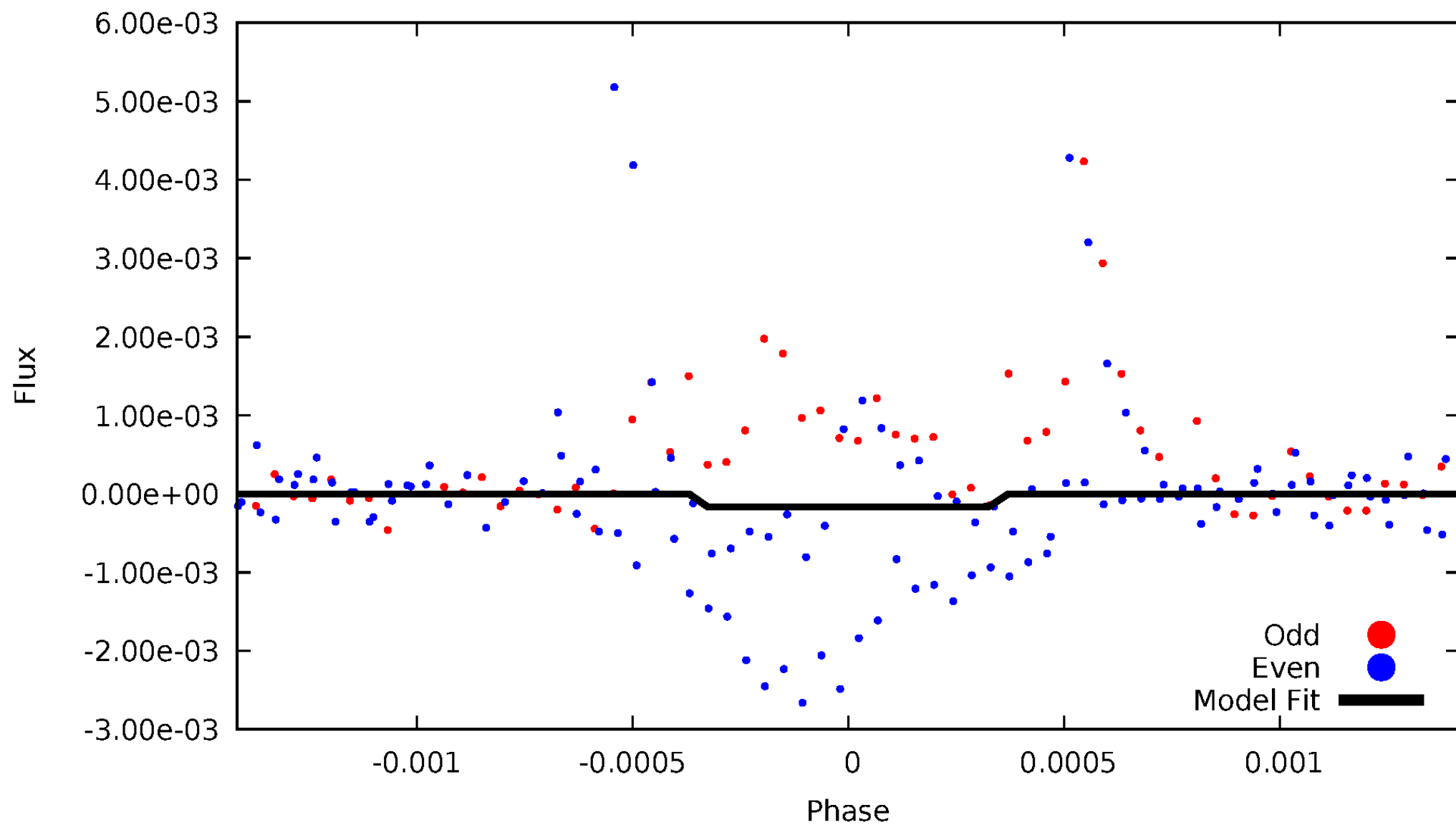
# DV Odd/Even

TCE 004644174-06



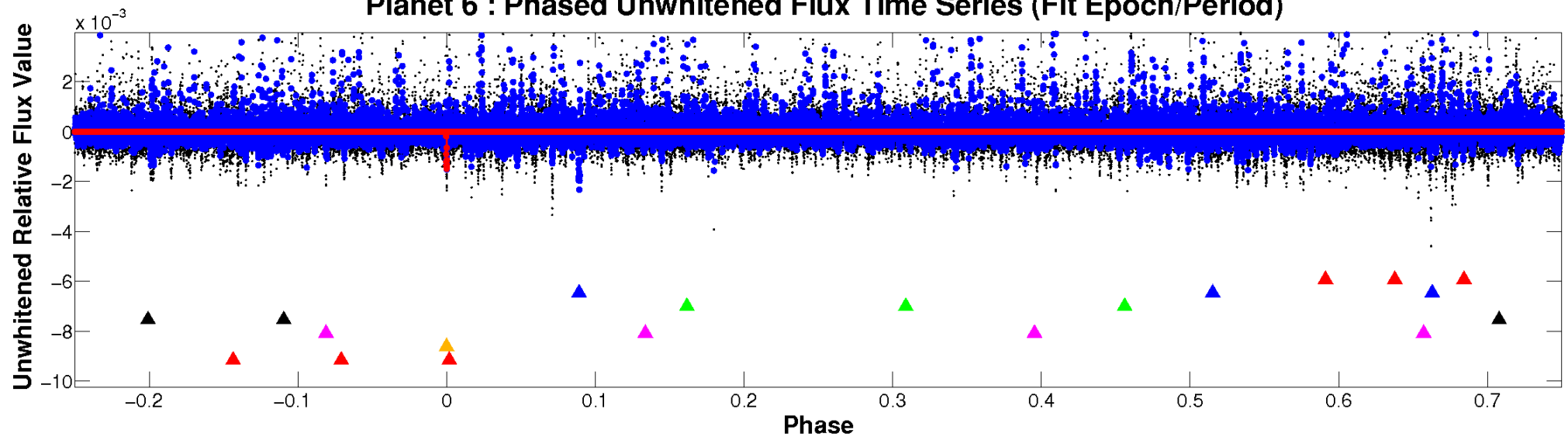
# ALT Odd/Even

TCE 004644174-06

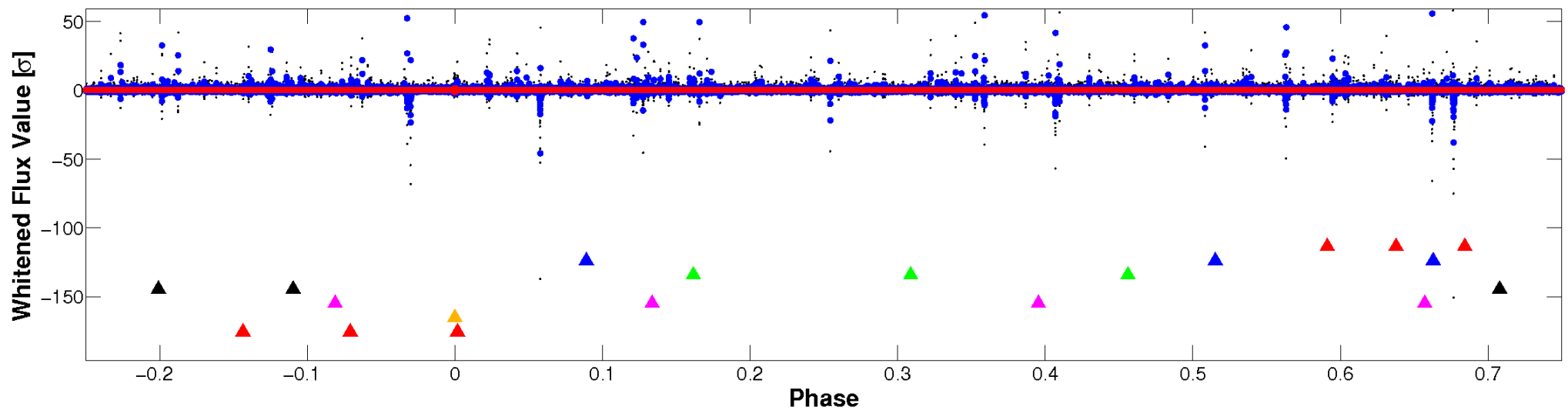


# Non-Whitened Vs. Whitened Light Curve

## Planet 6 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

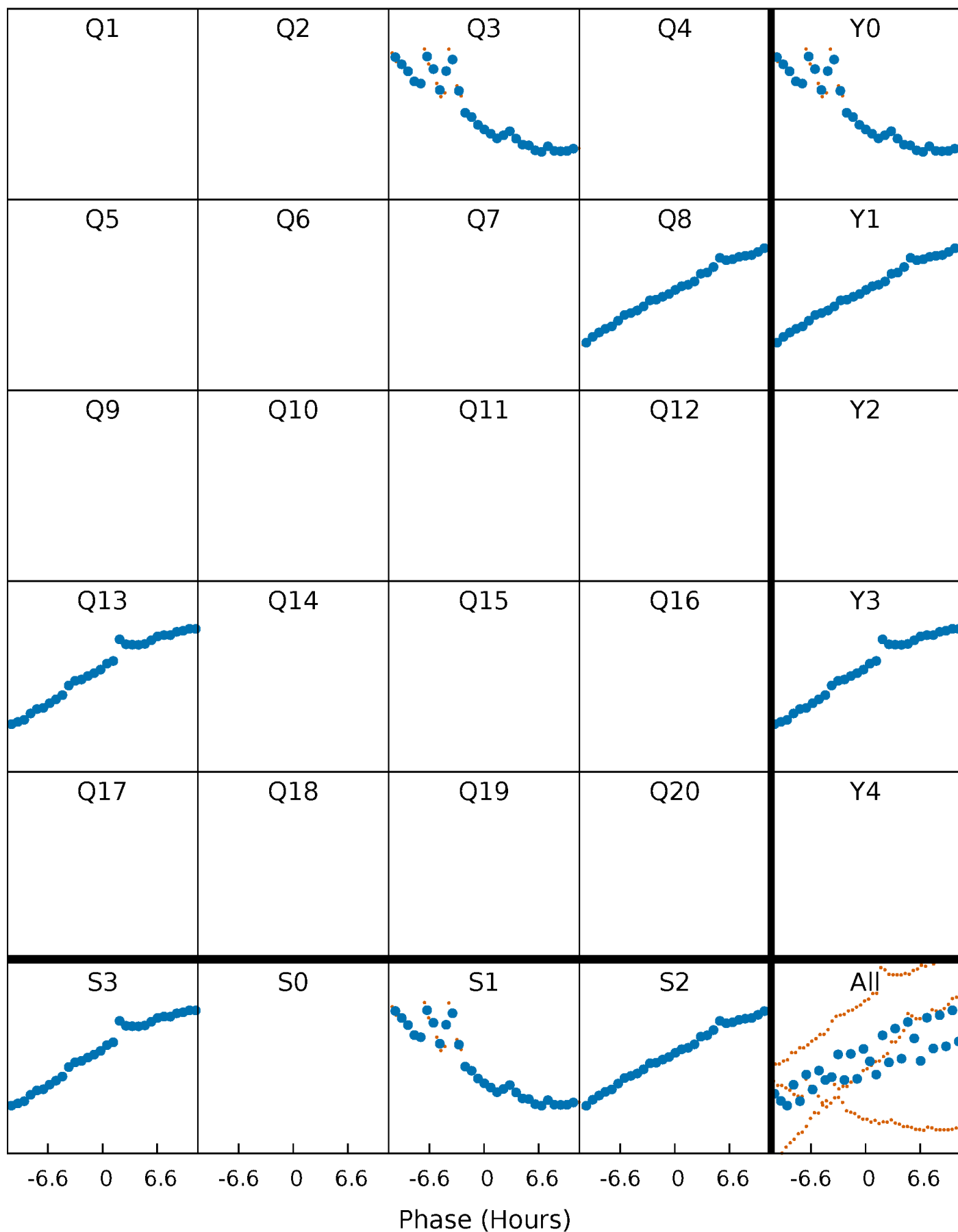


## Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

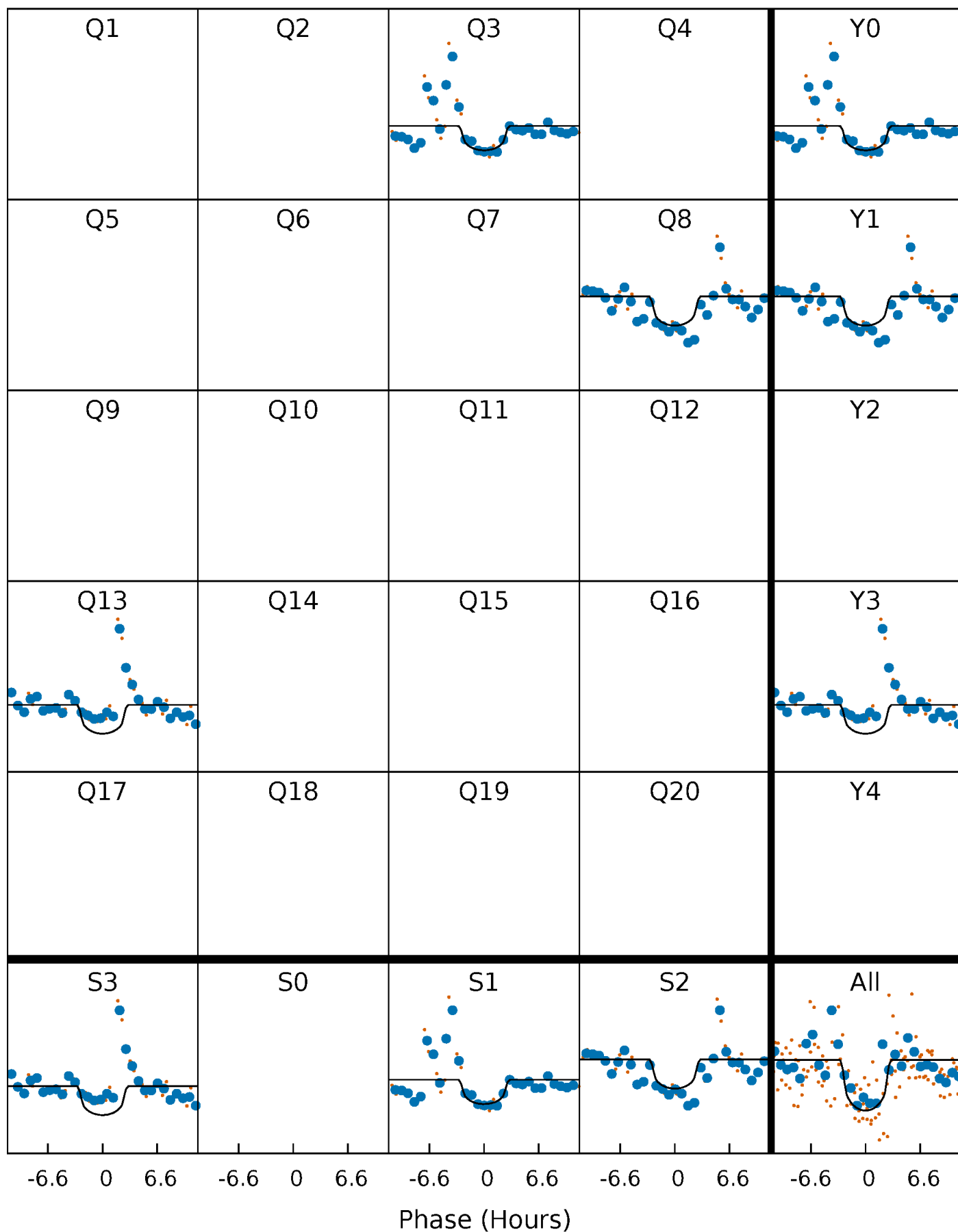
TCE 004644174-06     $P=468.641275$  Days     $T_0=315.692386$  (BKJD)





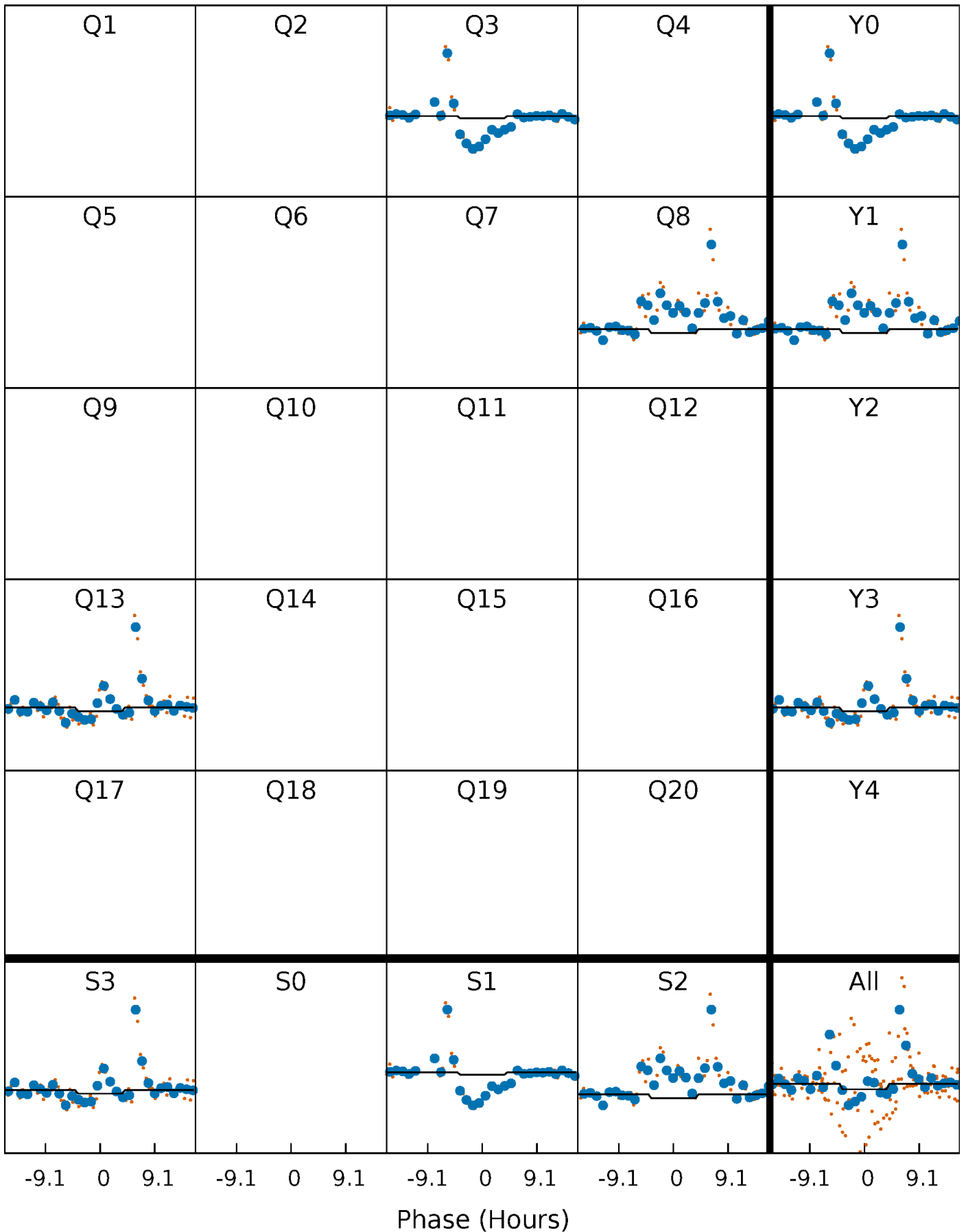
# DV Quarter-Phased Transit Curves

TCE 004644174-06     $P=468.641275$  Days     $T_0=315.692386$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

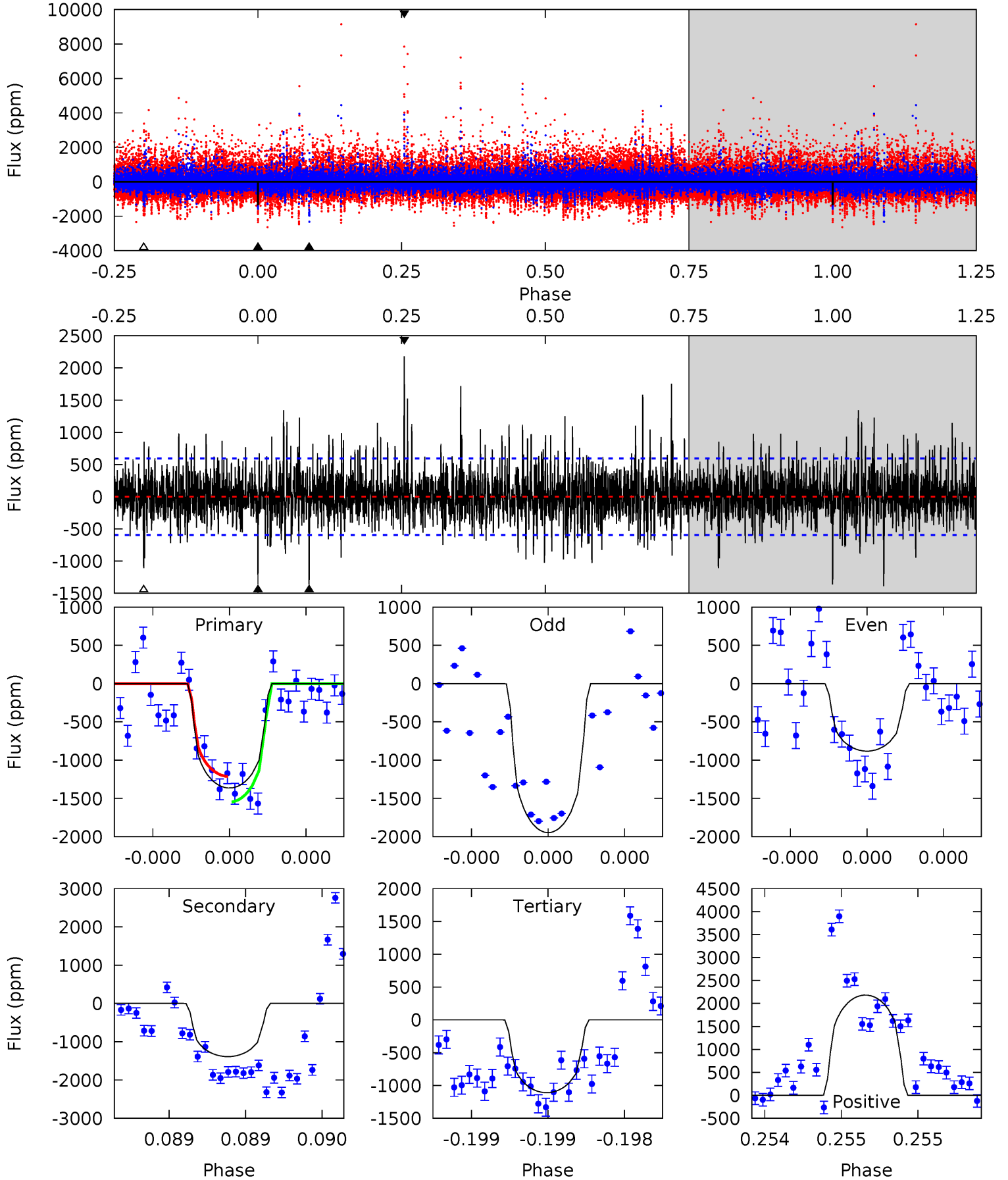
TCE 004644174-06 P=468.521097 Days  $T_0=315.769667$  (BKJD)



# DV Model-Shift Uniqueness Test

004644174-06, P = 468.641275 Days, E = 315.692386 Days

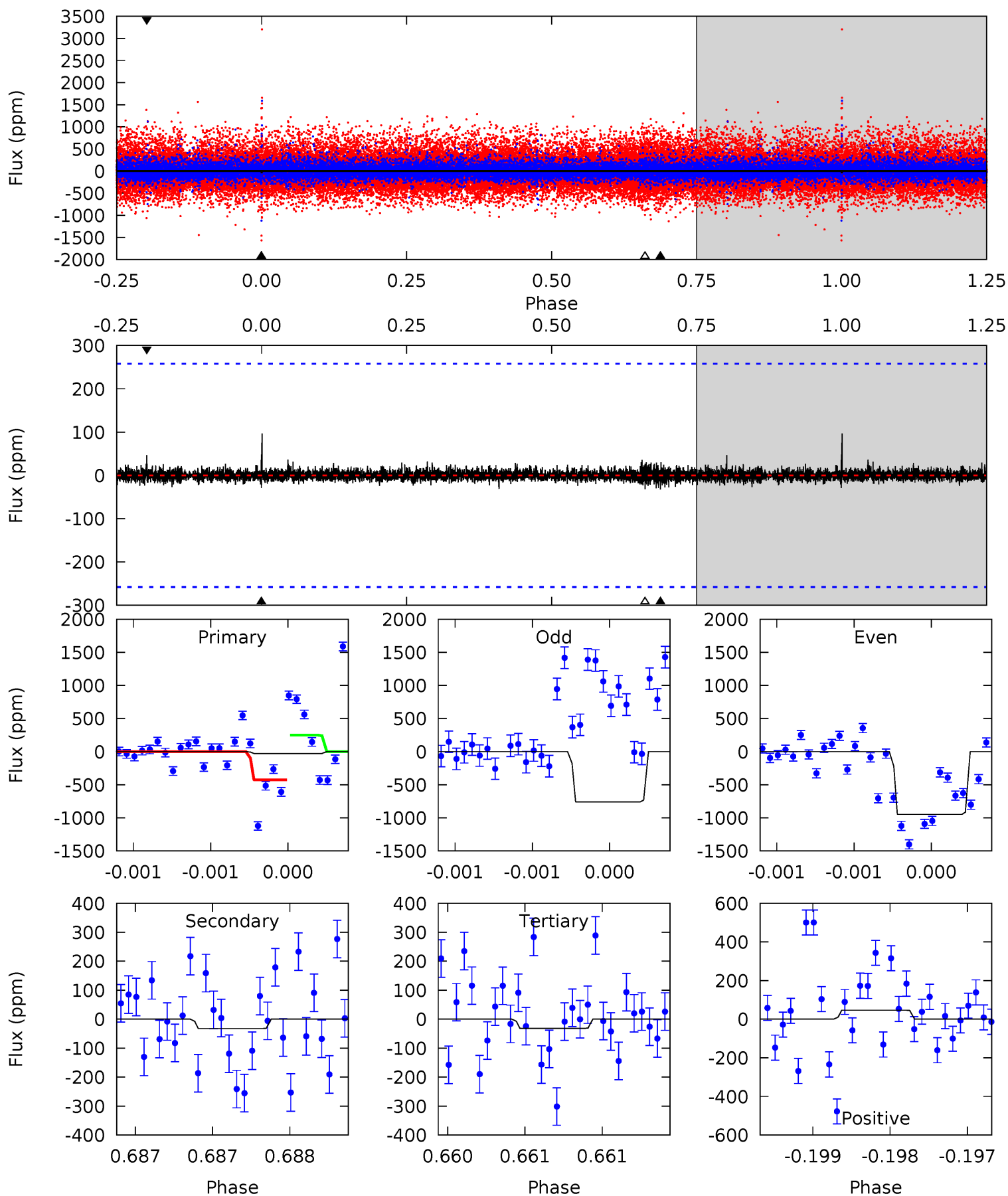
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.8	13.0	10.4	20.4	5.57	3.48	2.74	2.38	-7.66	2.61	-7.43	2.30	0.74	0.61	1.56



# Alt Model-Shift Uniqueness Test

004644174-06, P = 468.521097 Days, E = 315.769667 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
0.61	0.69	0.68	1.00	5.50	3.37	0.15	-0.07	-0.38	0.01	-0.31	2.30	5.32	0.75	1.90



### Stellar Parameters For KIC 004644174

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4135^{+148}_{-165}$	$4.618^{+0.052}_{-0.017}$	$0.260^{+0.150}_{-0.300}$	$0.659^{+0.027}_{-0.062}$	$0.657^{+0.044}_{-0.058}$	$3.237^{+0.756}_{-0.234}$
	+4%/-4%	+1%/-0%	+58%/-115%	+4%/-9%	+7%/-9%	+23%/-7%
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 004644174-06 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1388 \pm 107$	$3.38^{+2.60}_{-2.09}$	$203^{+8}_{-8}$	$3789^{+1707}_{-631}$	$72611^{+398512}_{-50138}$
Alt.	$-32 \pm 47$	$2.41^{+2.18}_{-1.61}$	$203^{+8}_{-9}$	$2356^{+809}_{-4474}$	$2379^{+19863}_{-3246}$

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

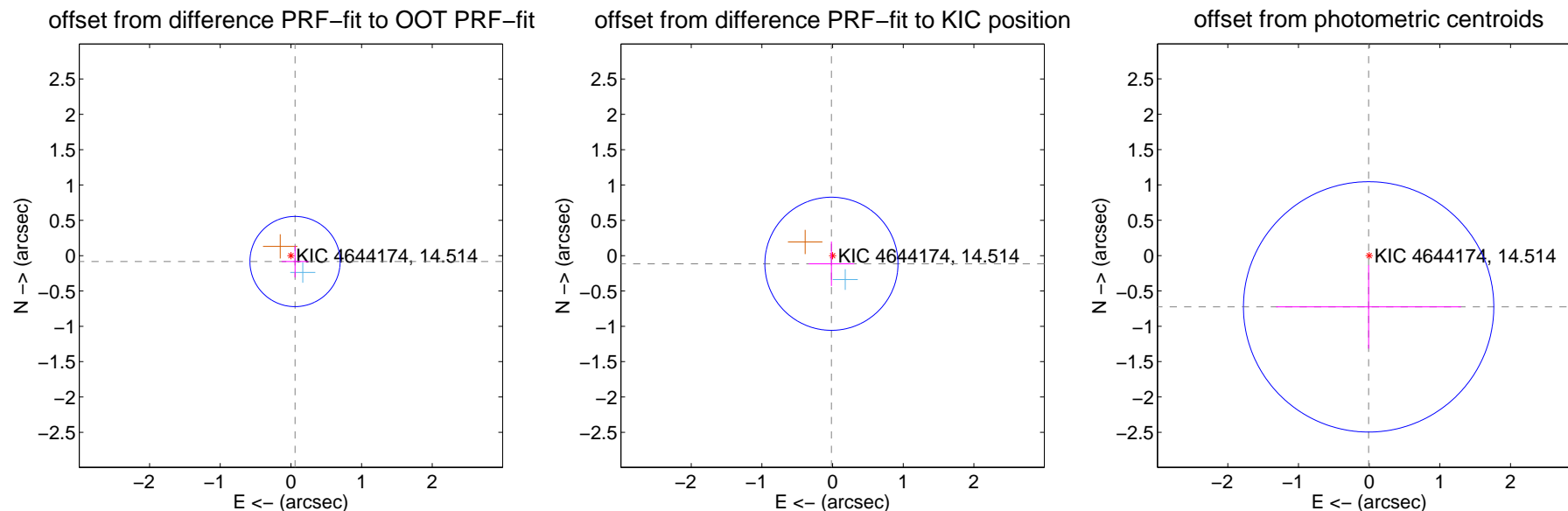
## DV Centroid Data

Supplemental centroid analysis for 004644174-06. Kepler magnitude: 14.51. Transit SNR 8.07

There are 1 quarters with good PRF difference image offsets

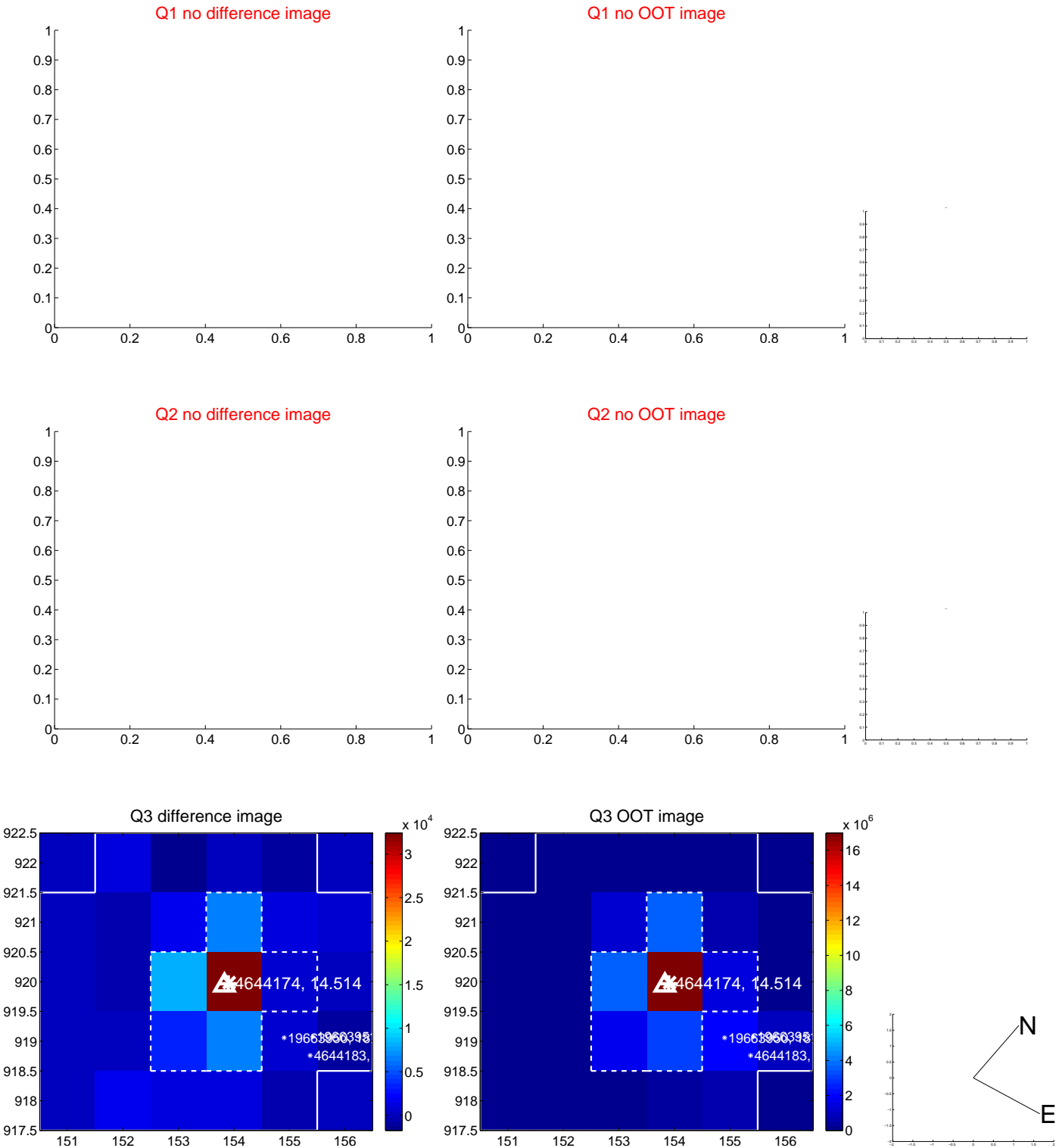
The direct PRF centroid is offset from the target star catalog position by about 0.25 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.102 \pm 0.213$	0.48	$-0.058 \pm 0.189$	$-0.083 \pm 0.223$
PRF-fit source offset from KIC position	$0.116 \pm 0.314$	0.37	$0.016 \pm 0.322$	$-0.115 \pm 0.314$
photometric centroid source offset	$0.73 \pm 0.59$	1.23	$0.01 \pm 1.31$	$-0.73 \pm 0.59$



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.



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

Q5 no difference image



Q5 no OOT image



Q6 no difference image



Q6 no OOT image



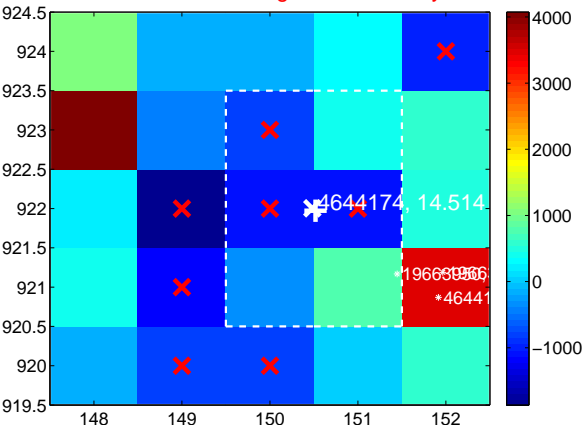
Q7 no difference image



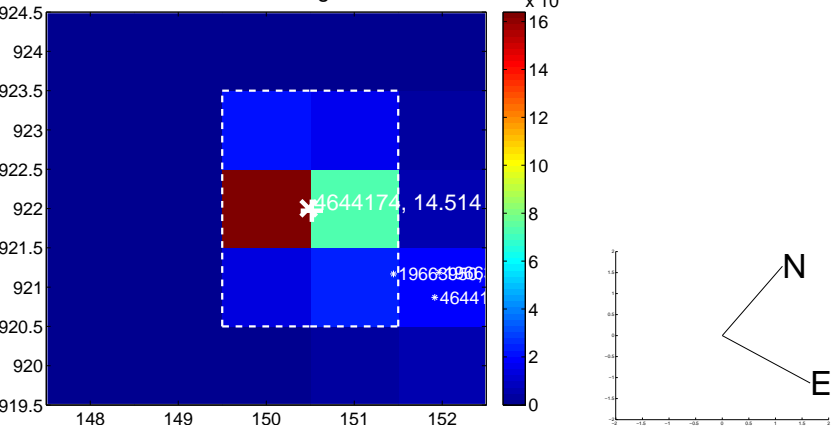
Q7 no OOT image



Q8 difference image. Poor Quality



Q8 OOT image

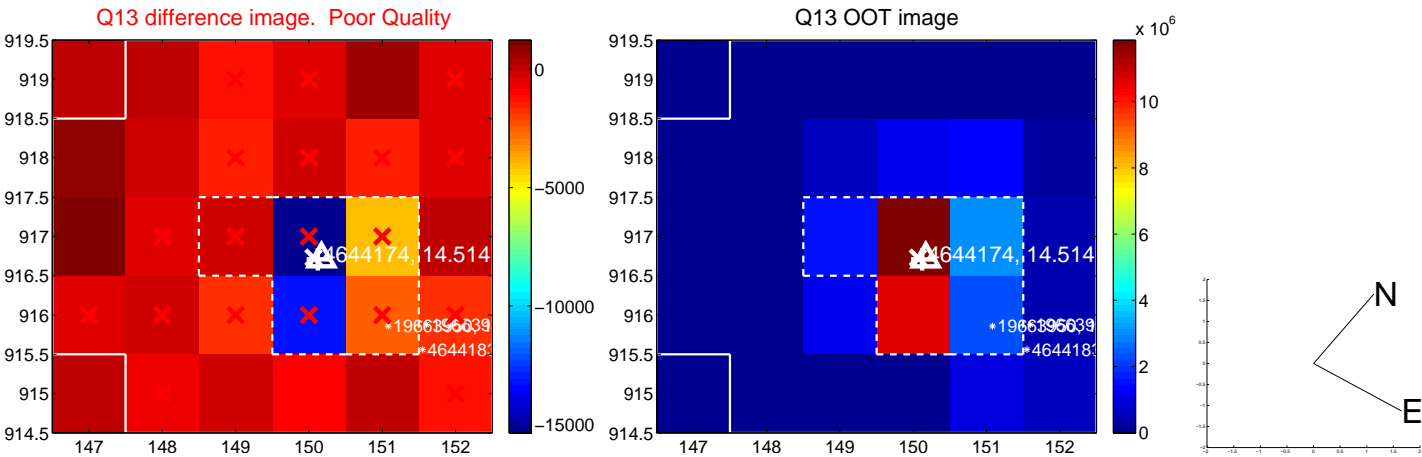




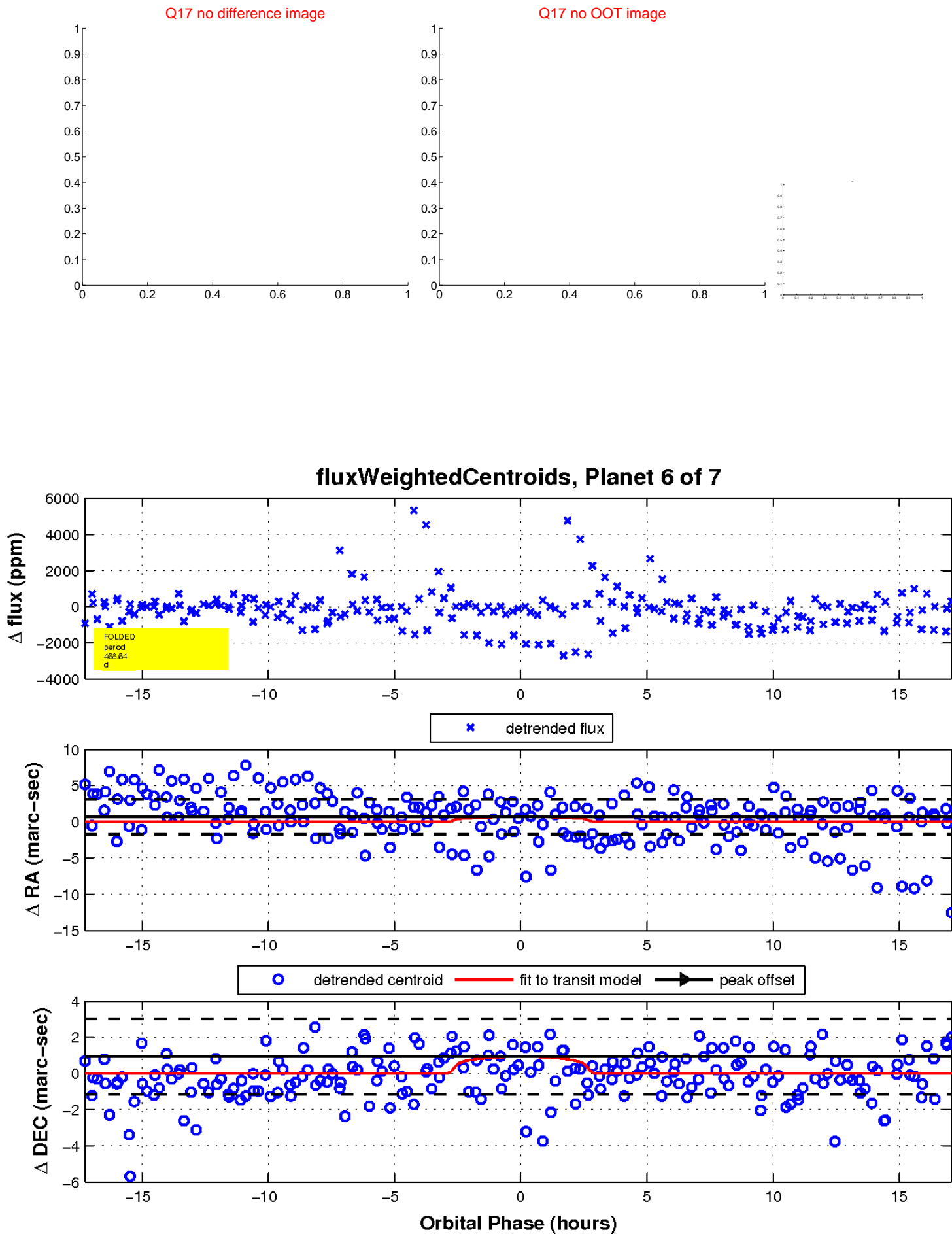
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

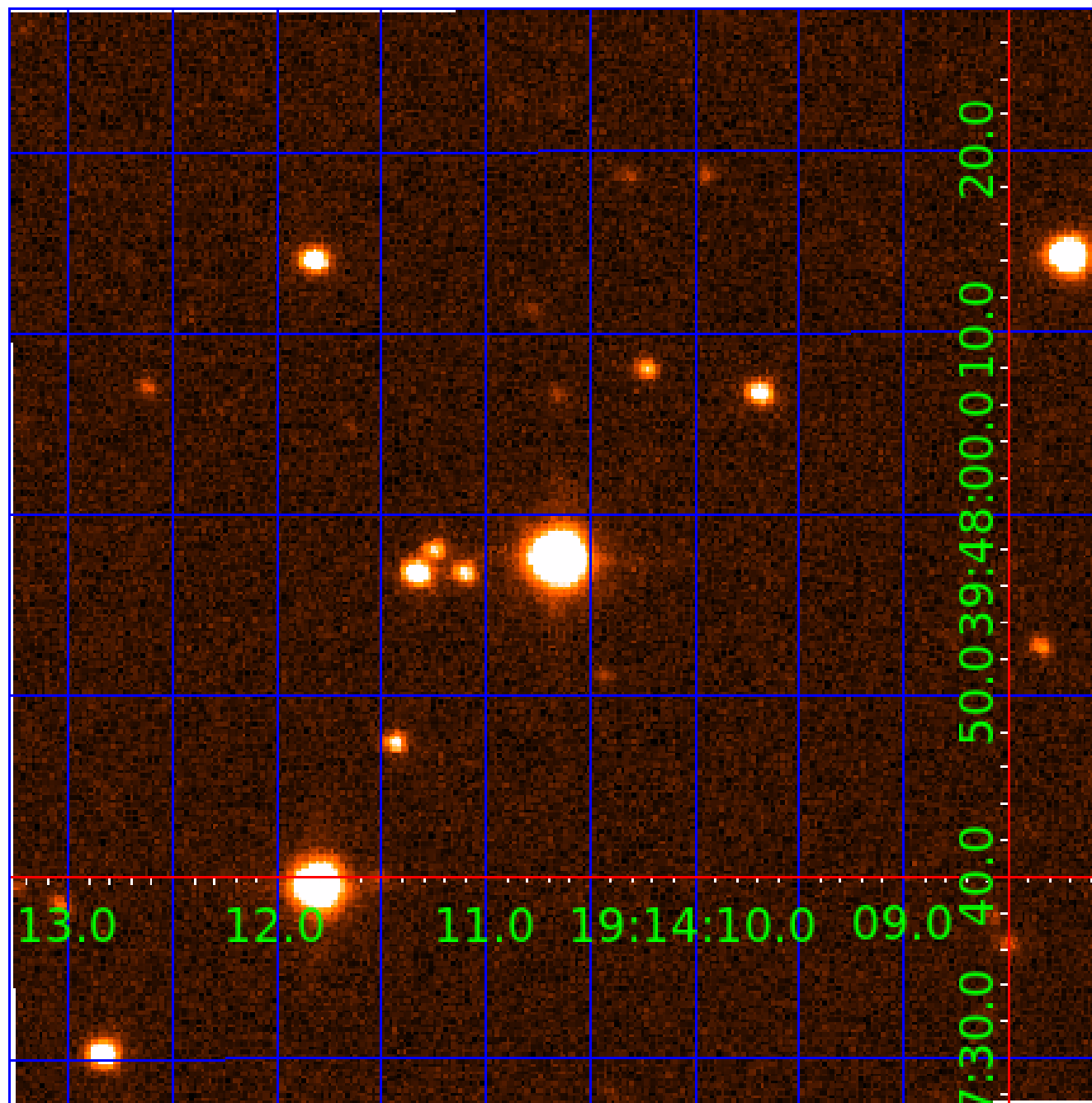


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 004644174

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004644174-01	OBS	No	490.476780	592.714724	1263.6	4.663	17.3	6.0	0.66	4135	2.24	0.10
004644174-02	OBS	No	668.363143	157.719815	1472.8	7.205	15.9	7.2	0.66	4135	2.59	0.07
004644174-03	OBS	No	537.634148	391.437498	1103.9	5.141	16.5	5.6	0.66	4135	2.51	0.09
004644174-05	OBS	No	345.976604	277.685128	1243.9	5.751	12.7	7.1	0.66	4135	3.05	0.16
004644174-06	OBS	No	468.641275	315.692386	1480.8	5.761	13.3	8.1	0.66	4135	2.71	0.11
004644174-07	OBS	No	502.706443	248.411391	1131.5	3.500	14.1	-1.0	0.66	4135	2.12	0.10

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004644174-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004644174-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS
004644174-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS
004644174-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS
004644174-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
004644174-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—CENT_NOFITS

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

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

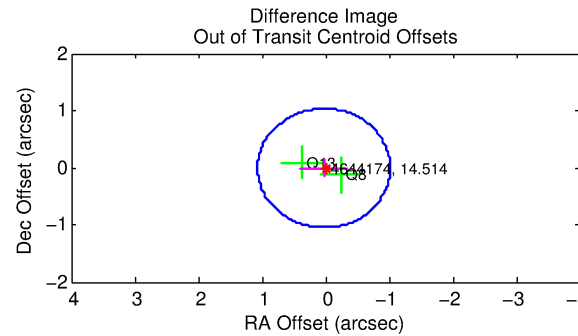
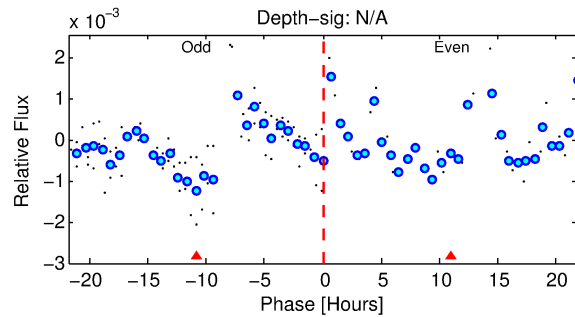
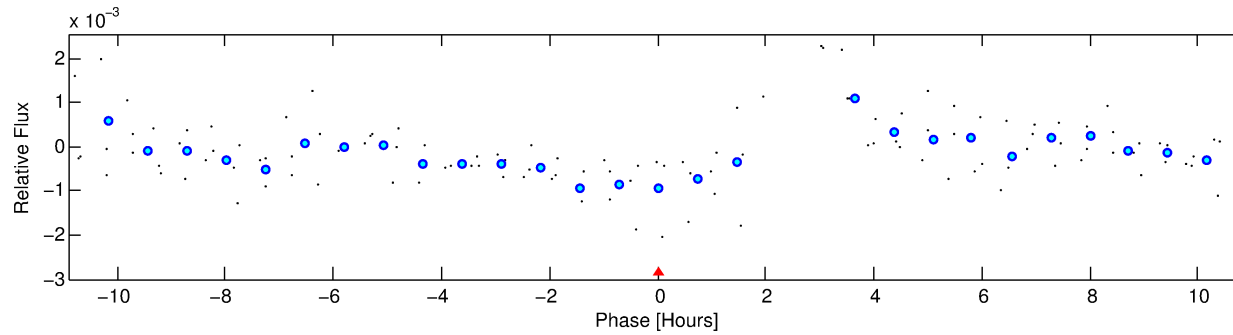
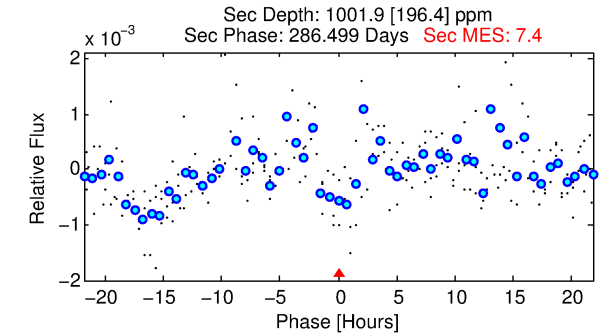
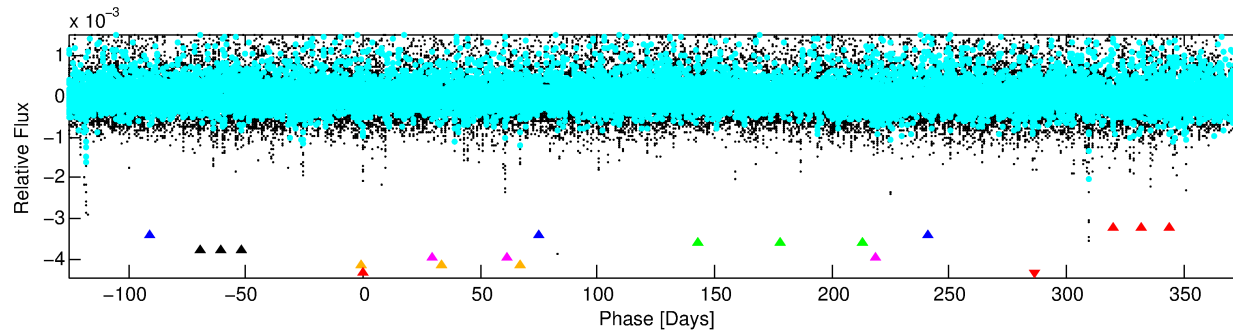
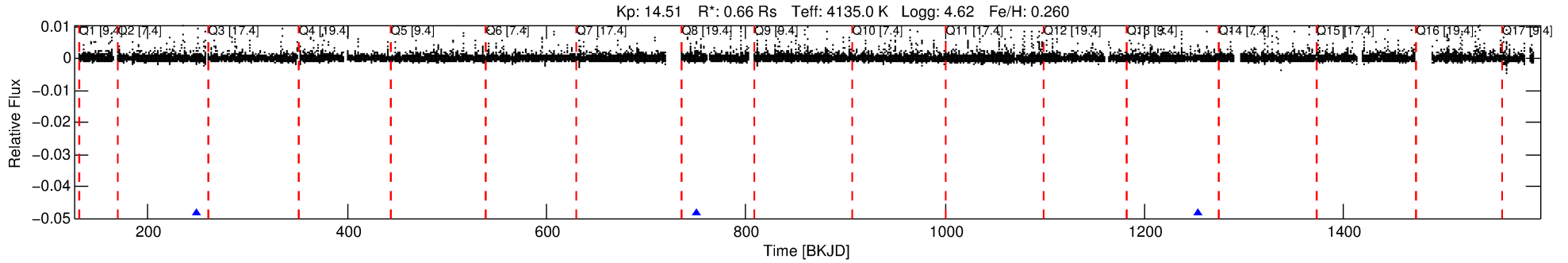
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004644174-07

No Significant Match Found

# DV One-Page Summary

KIC: 4644174 Candidate: 7 of 7 Period: 502.706 d



## TPS TCE Results:

Period = 502.70644 d  
Epoch = 248.4114 BKJD

**DV fit results are unavailable**

## DV Diagnostic Results:

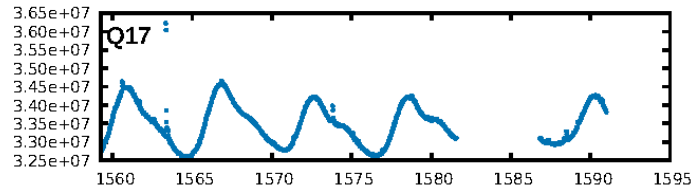
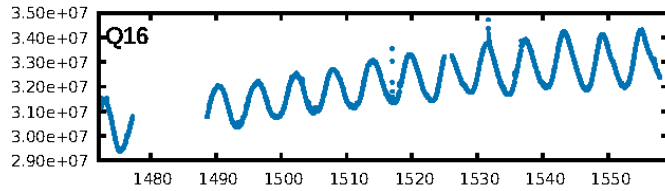
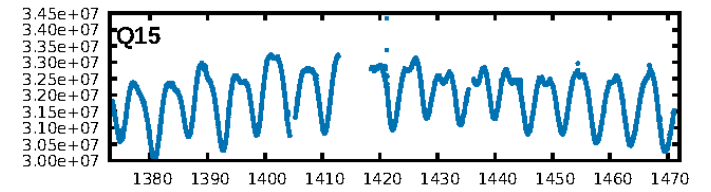
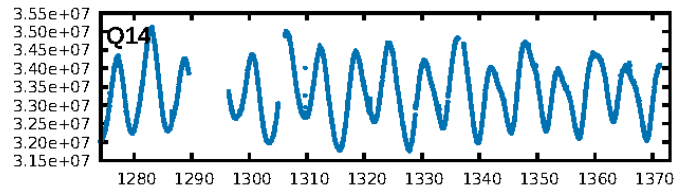
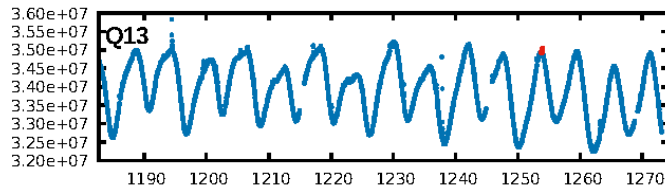
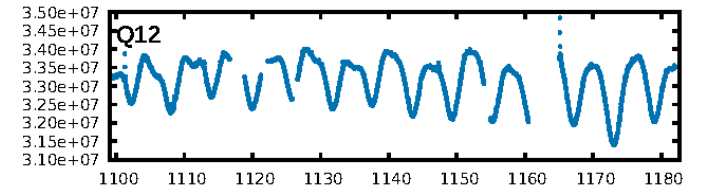
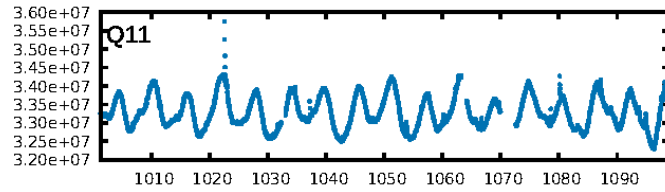
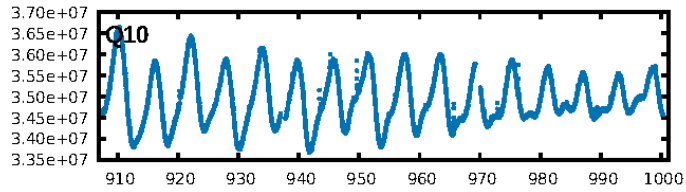
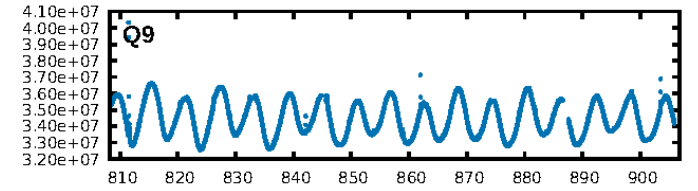
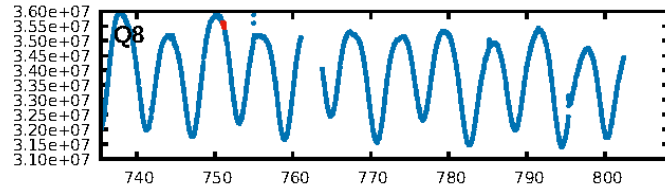
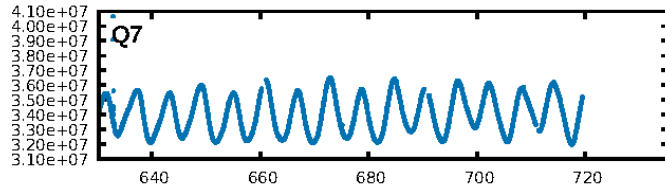
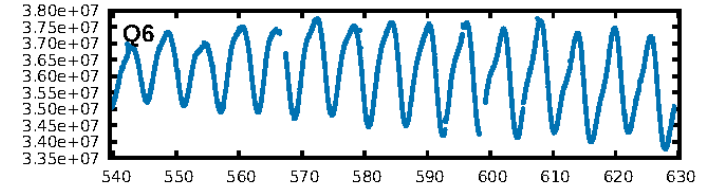
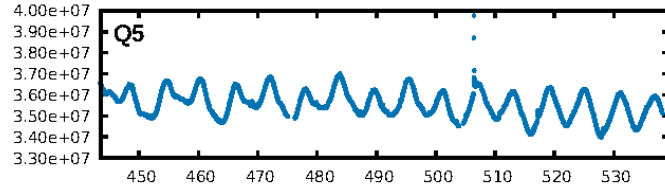
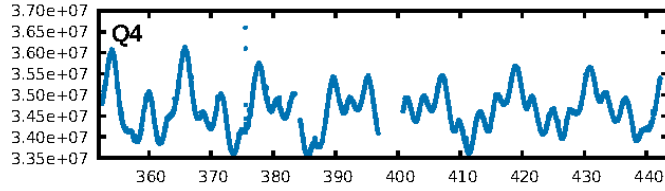
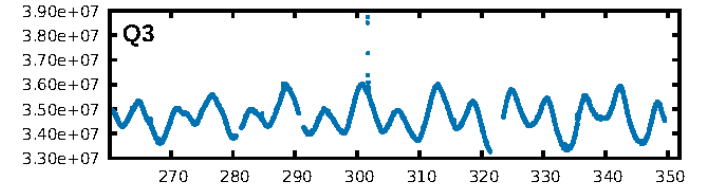
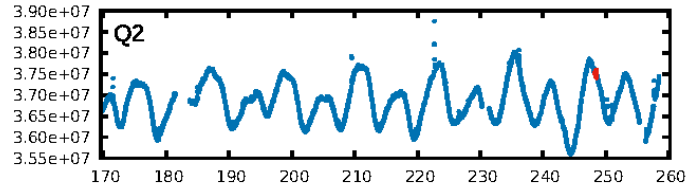
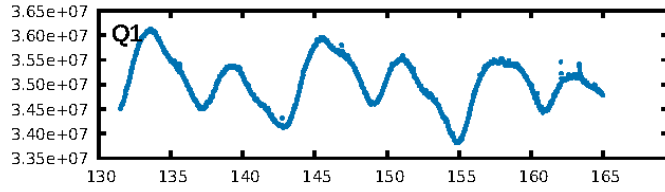
ShortPeriod-sig: 100.0% [50.34 $\sigma$ ]  
LongPeriod-sig: 100.0% [36.94 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
**GhostDiagnostic-chr: 0.461**

Centroid-sig: 9.0%  
Centroid-so: 1.100 arcsec [1.12 $\sigma$ ]  
OotOffset-rm: 0.028 arcsec [0.08 $\sigma$ ]  
KicOffset-rm: 0.154 arcsec [0.33 $\sigma$ ]  
OotOffset-st: 0/0/1/1 [2]  
KicOffset-st: 0/0/1/1 [2]  
DiffImageQuality-fgm: 0.00 [0/2]  
DiffImageOverlap-fno: 1.00 [3/3]

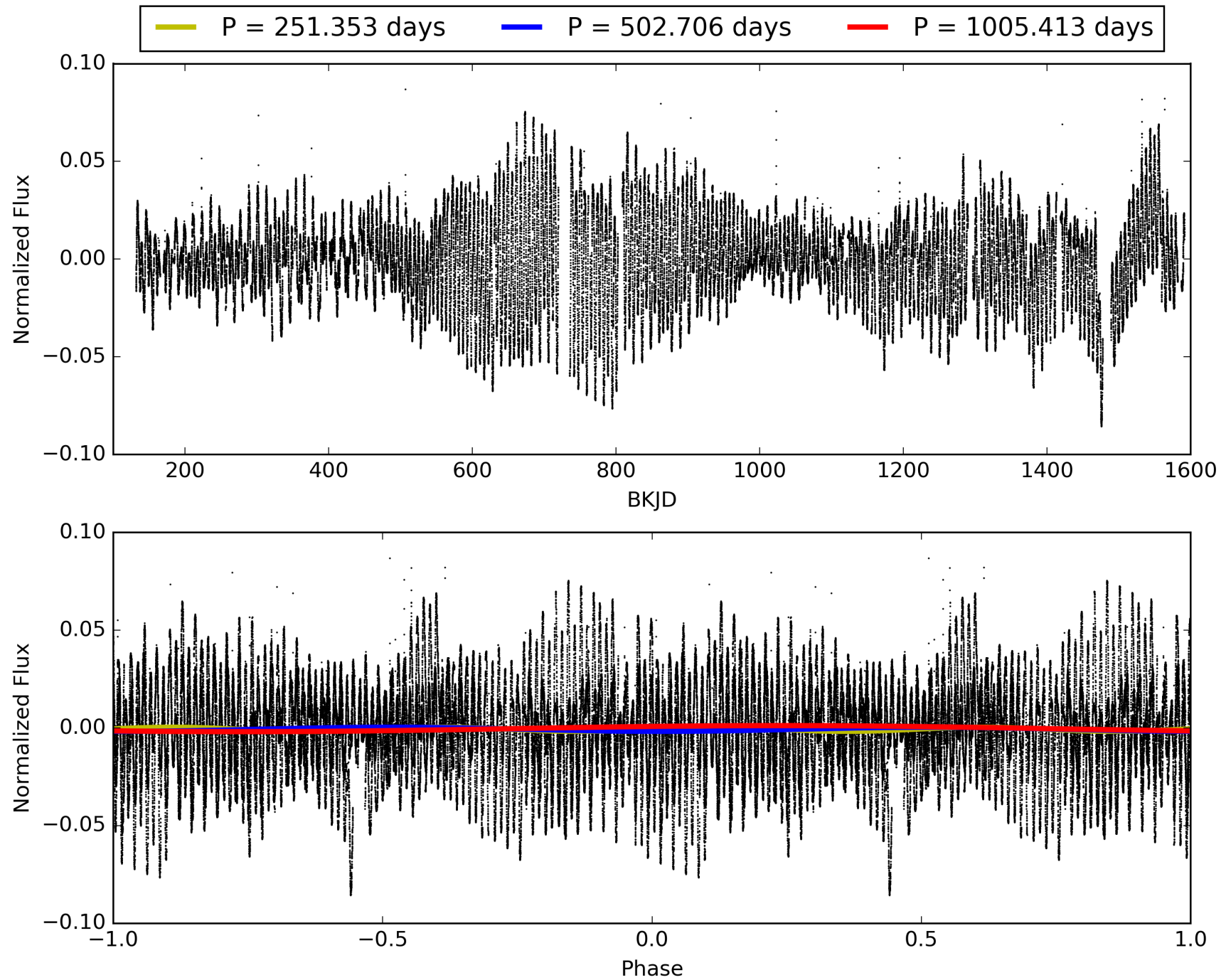
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 00:38:17 Z

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

# TCE 004644174-07, PDC Light Curves



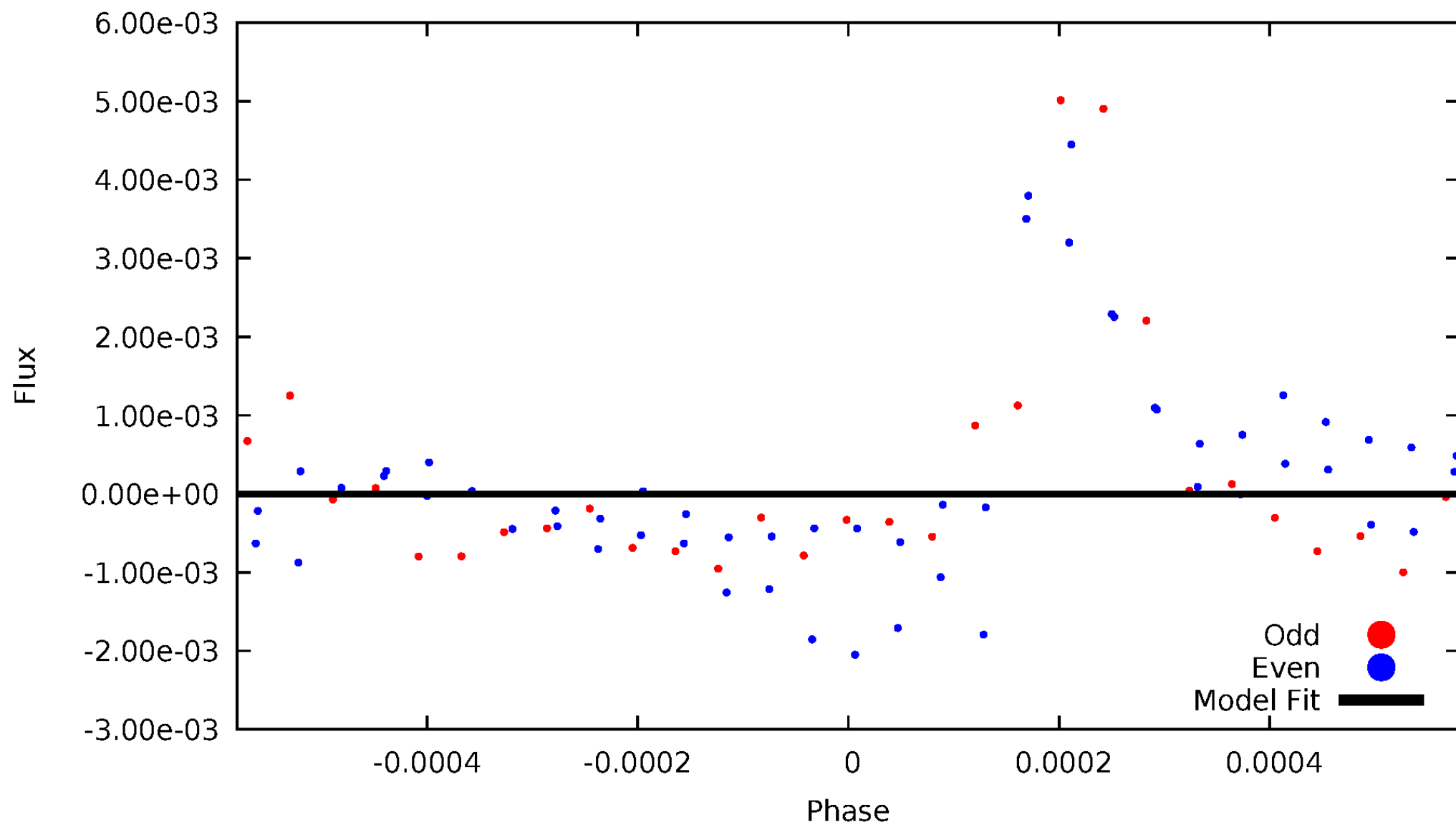
TCE 004644174-07





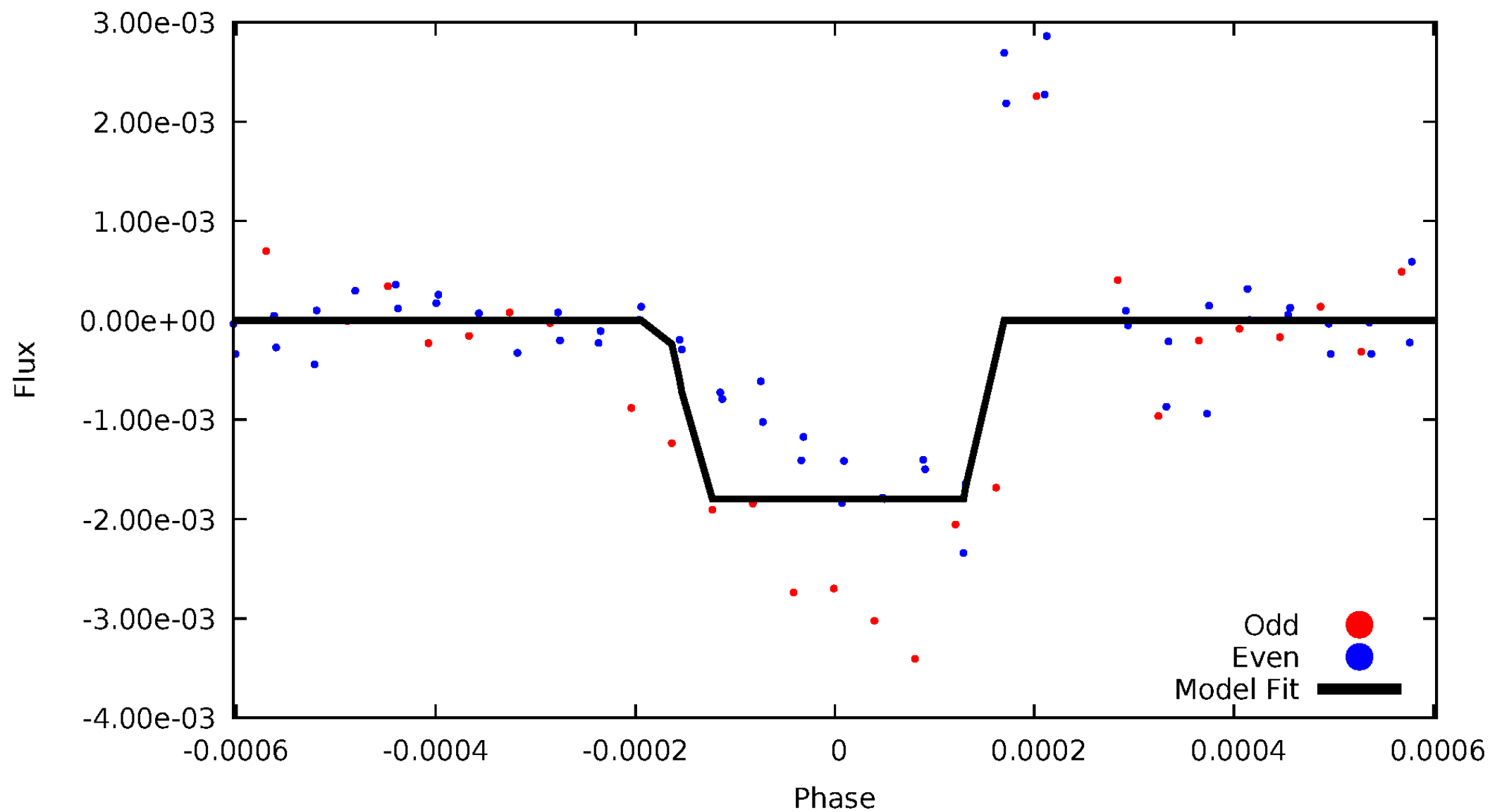
# DV Odd/Even

TCE 004644174-07

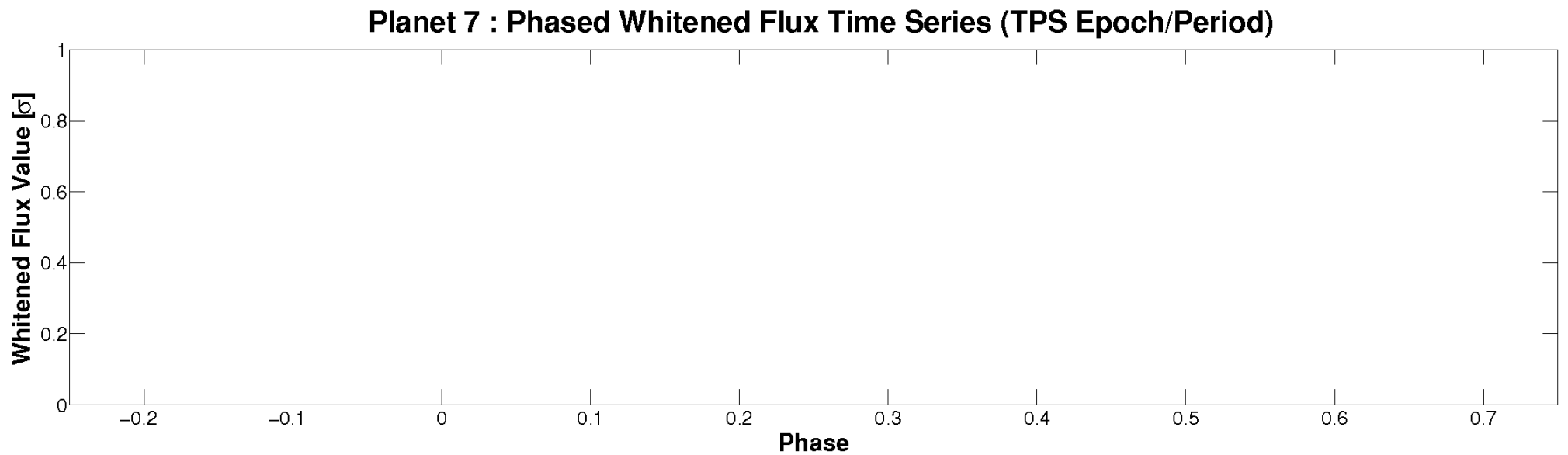
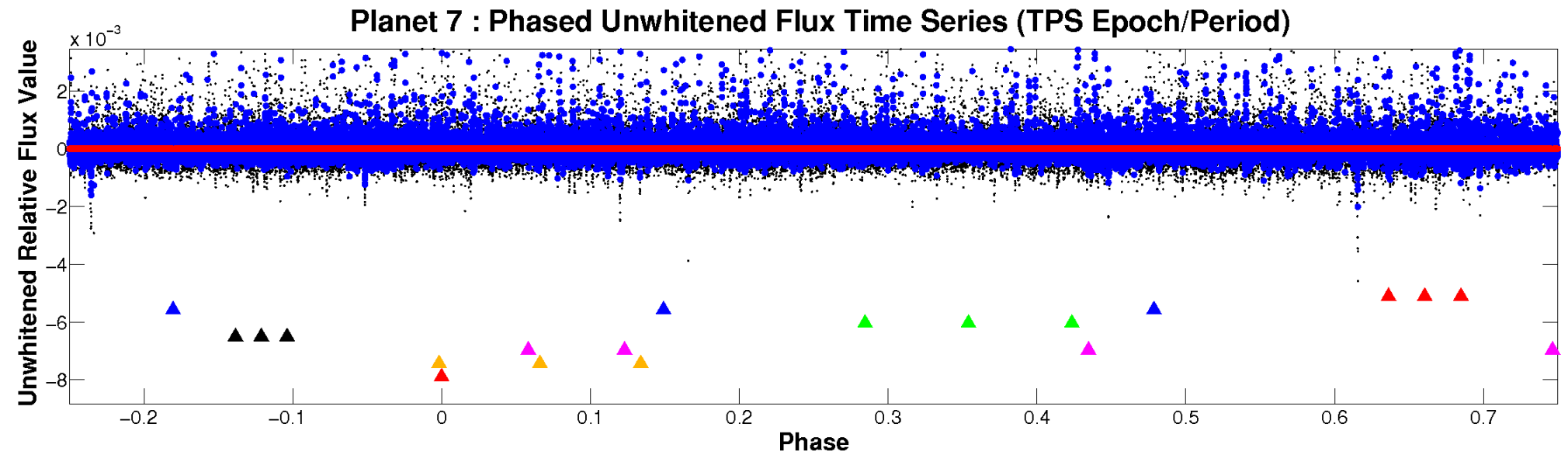


# ALT Odd/Even

TCE 004644174-07

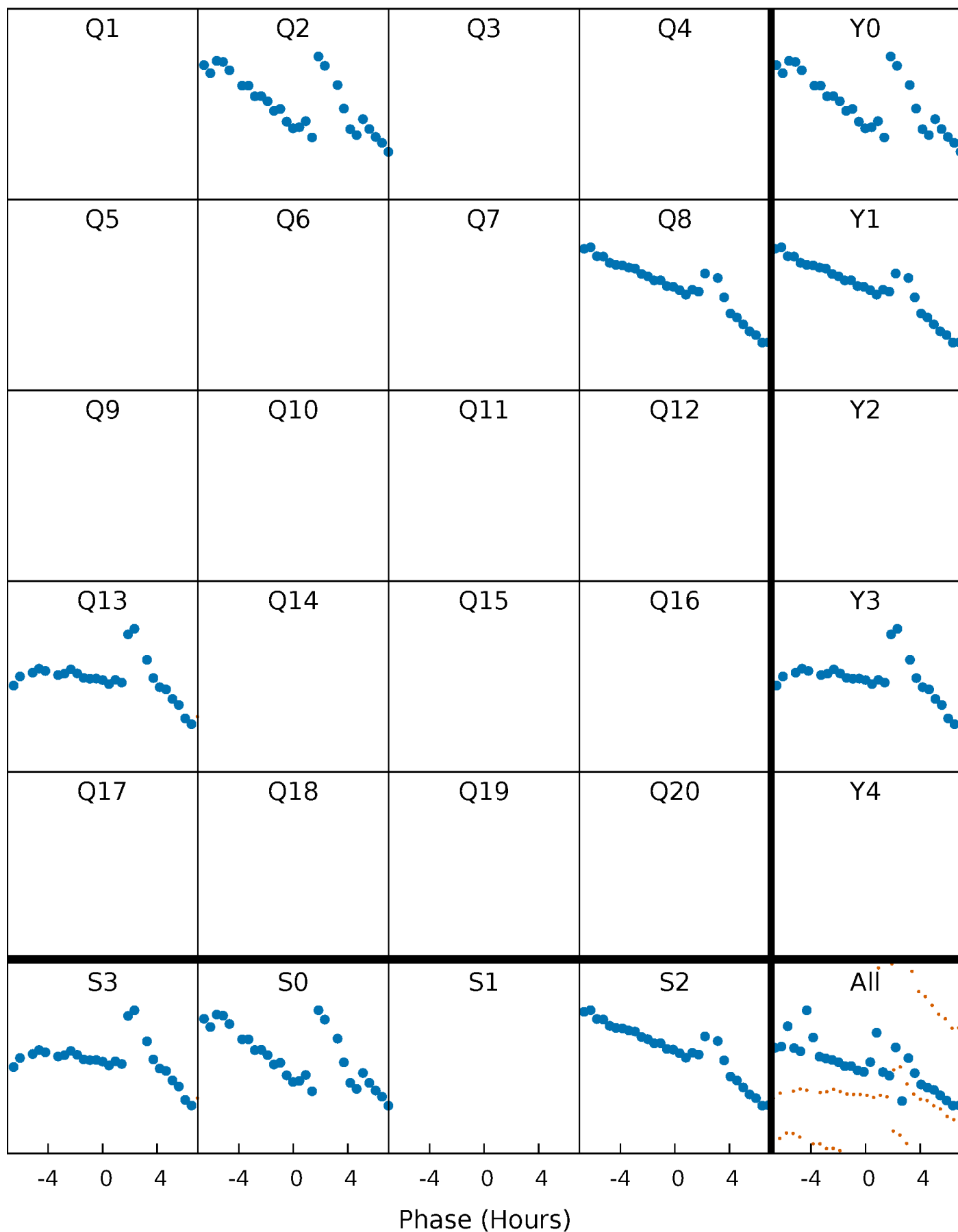


# Non-Whitened Vs. Whitened Light Curve



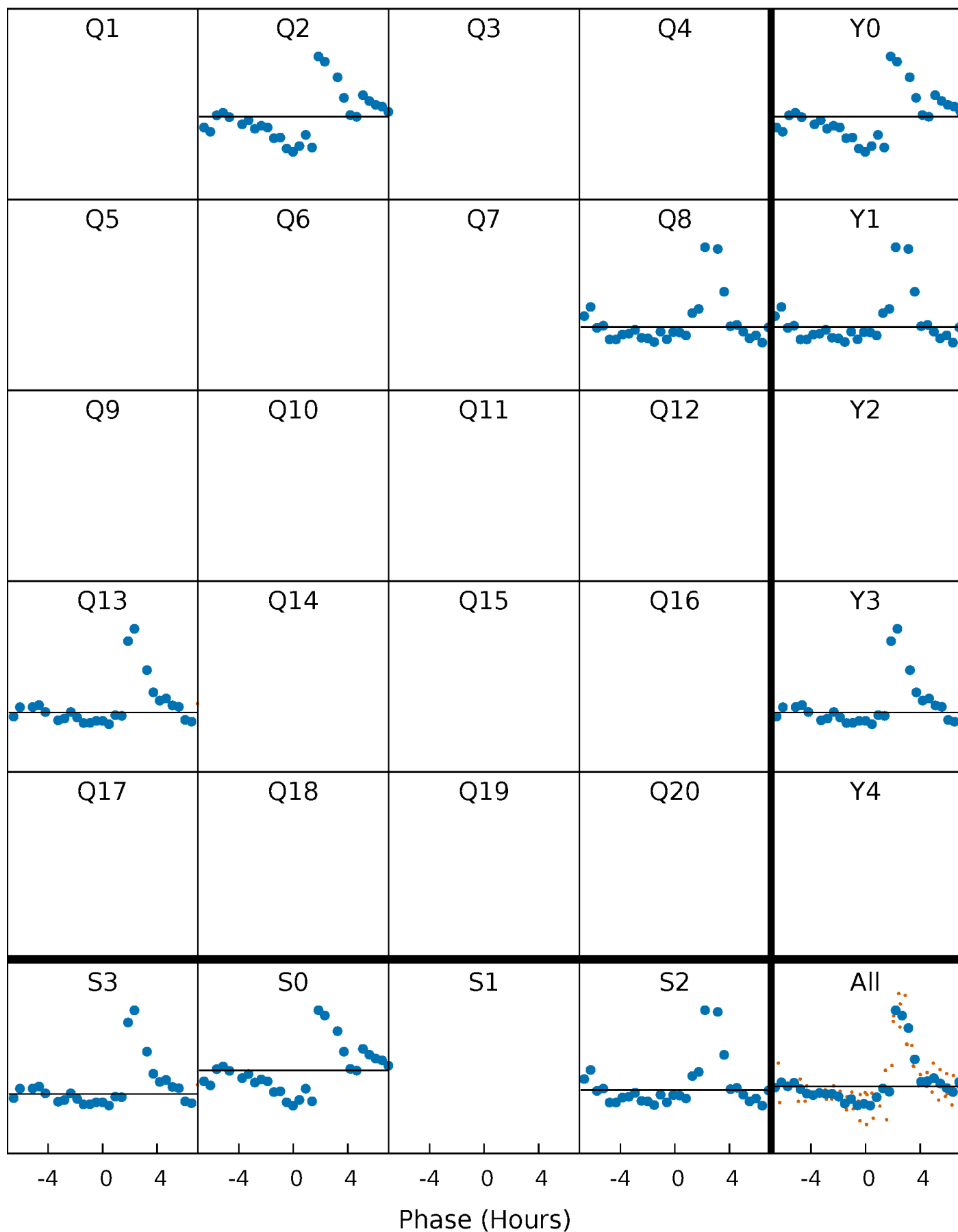
# PDC Quarter-Phased Transit Curves

TCE 004644174-07 P=502.706443 Days  $T_0=248.411391$  (BKJD)



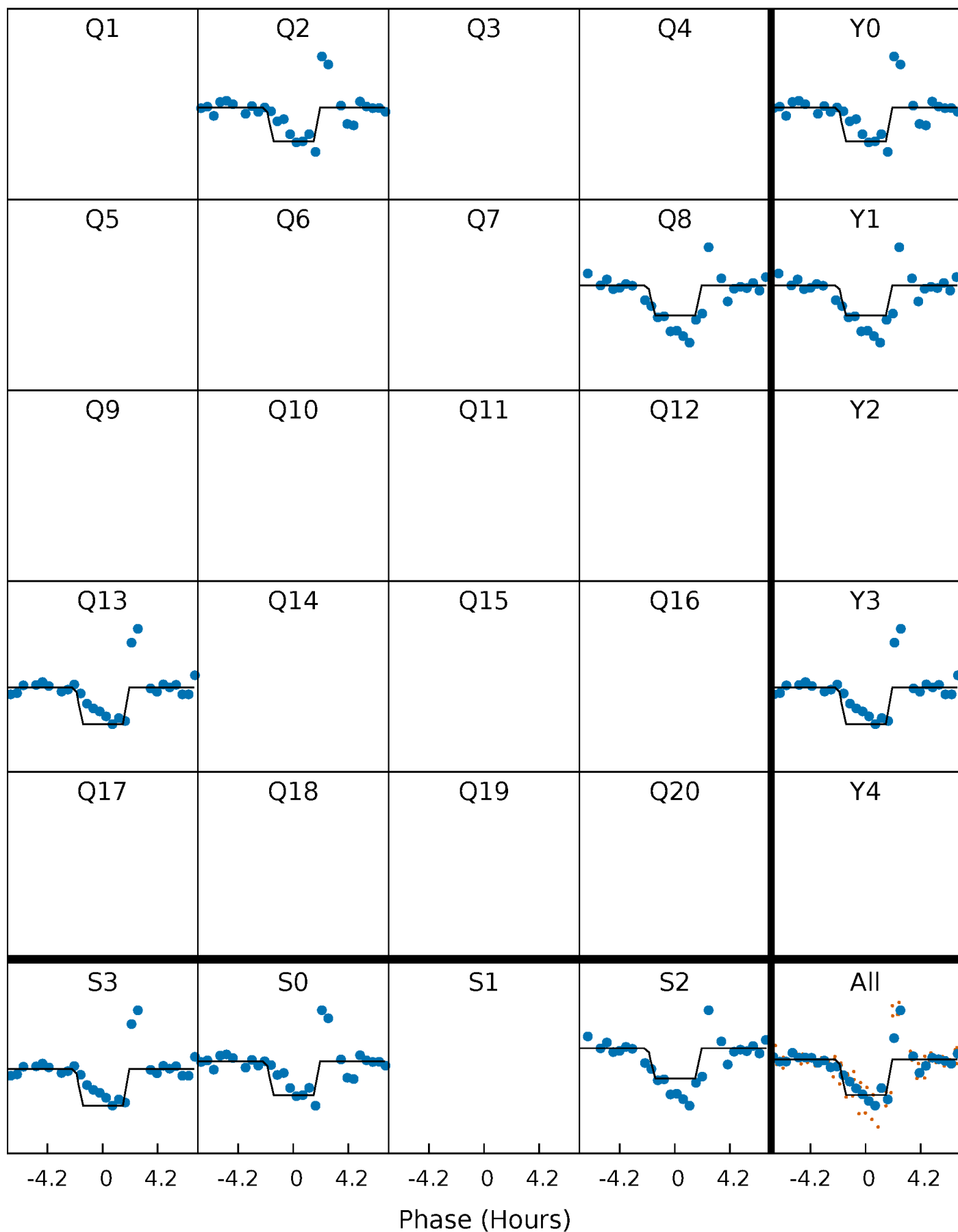
# DV Quarter-Phased Transit Curves

TCE 004644174-07 P=502.706443 Days  $T_0=248.411391$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

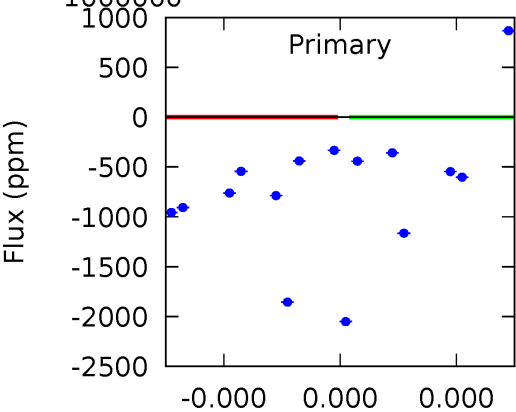
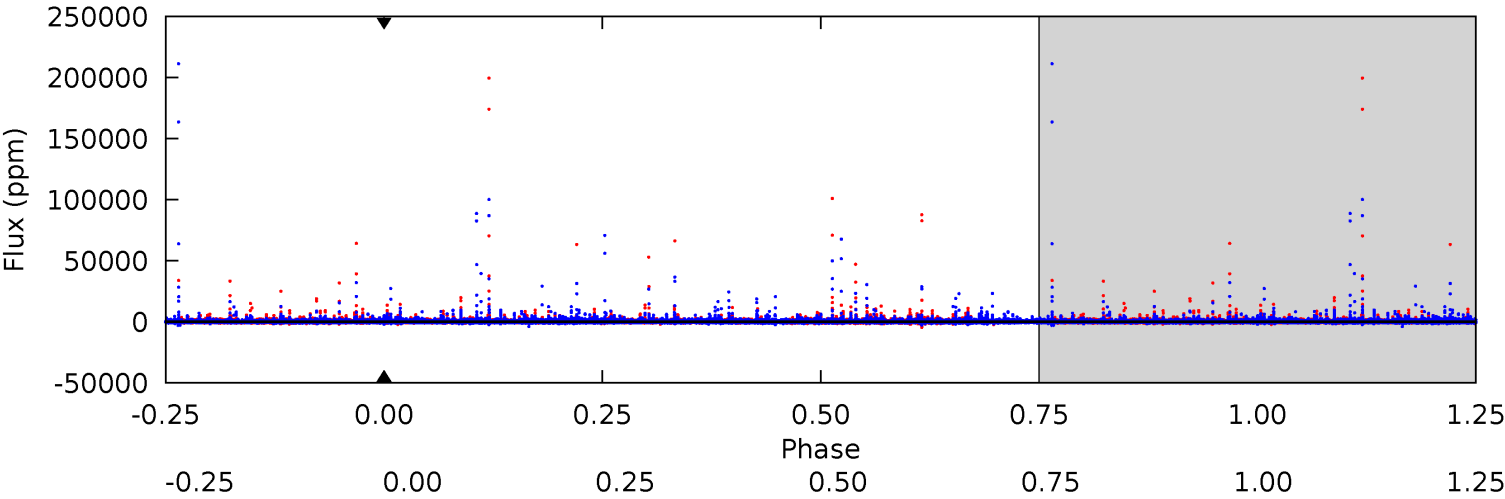
TCE 004644174-07 P=502.706443 Days  $T_0=248.411045$  (BKJD)



# DV Model-Shift Uniqueness Test

004644174-07, P = 502.706443 Days, E = 248.411391 Days

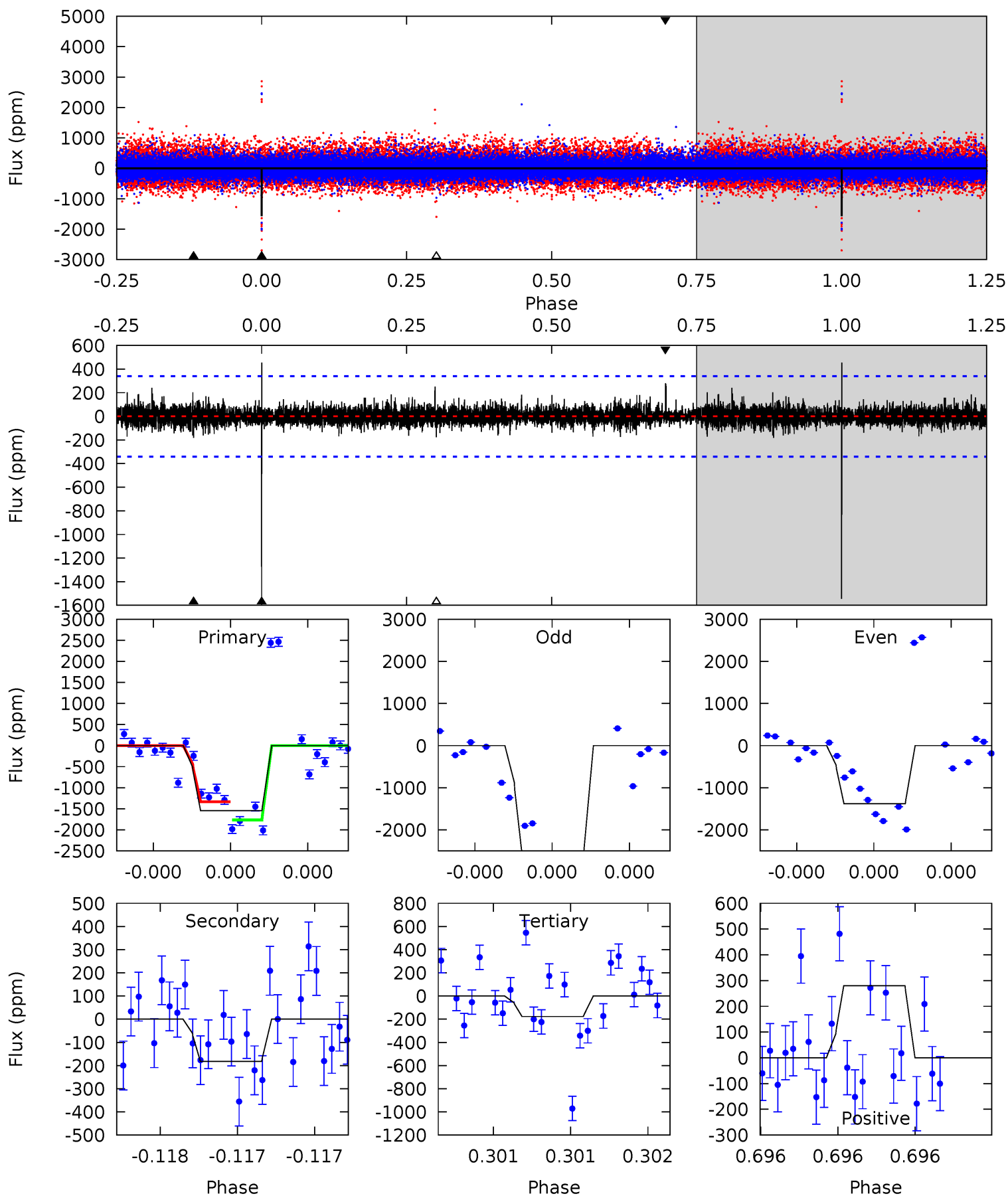
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

004644174-07, P = 502.706443 Days, E = 248.411045 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
25.6	3.02	2.94	4.64	5.65	3.60	0.66	22.7	21.0	0.08	-1.62	9.42	1.24	0.23	3.60





### Stellar Parameters For KIC 004644174

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4135^{+148}_{-165}$	$4.618^{+0.052}_{-0.017}$	$0.260^{+0.150}_{-0.300}$	$0.659^{+0.027}_{-0.062}$	$0.657^{+0.044}_{-0.058}$	$3.237^{+0.756}_{-0.234}$
	+4%/-4%	+1%/-0%	+58%/-115%	+4%/-9%	+7%/-9%	+23%/-7%
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 004644174-07 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$0 \pm 1000000$	$5.63^{+6.10}_{-3.83}$	$198^{+8}_{-9}$	$3511^{+5758}_{-12261}$	$59021^{+3609943}_{-2837910}$
Alt.	$-182 \pm 60$	$6.03^{+5.74}_{-4.19}$	$198^{+9}_{-8}$	$2409^{+912}_{-353}$	$3154^{+29229}_{-2385}$

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

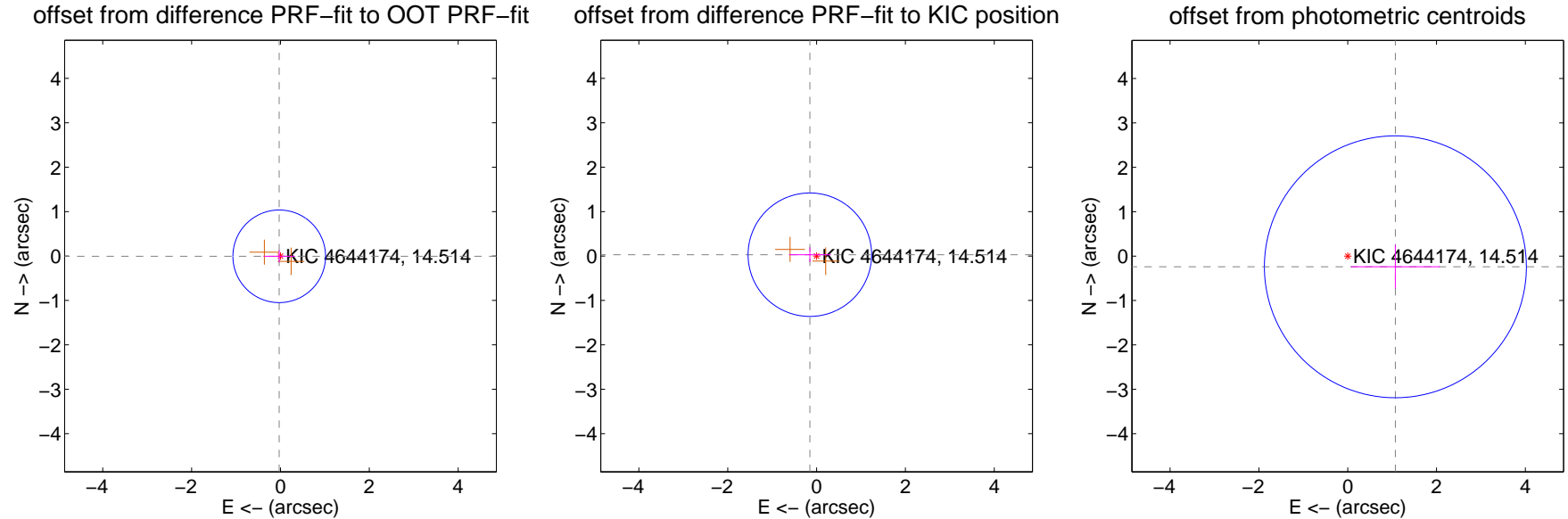
## DV Centroid Data

Supplemental centroid analysis for 004644174-07. Kepler magnitude: 14.51. Transit SNR -1.00

There are 0 quarters with good PRF difference image offsets

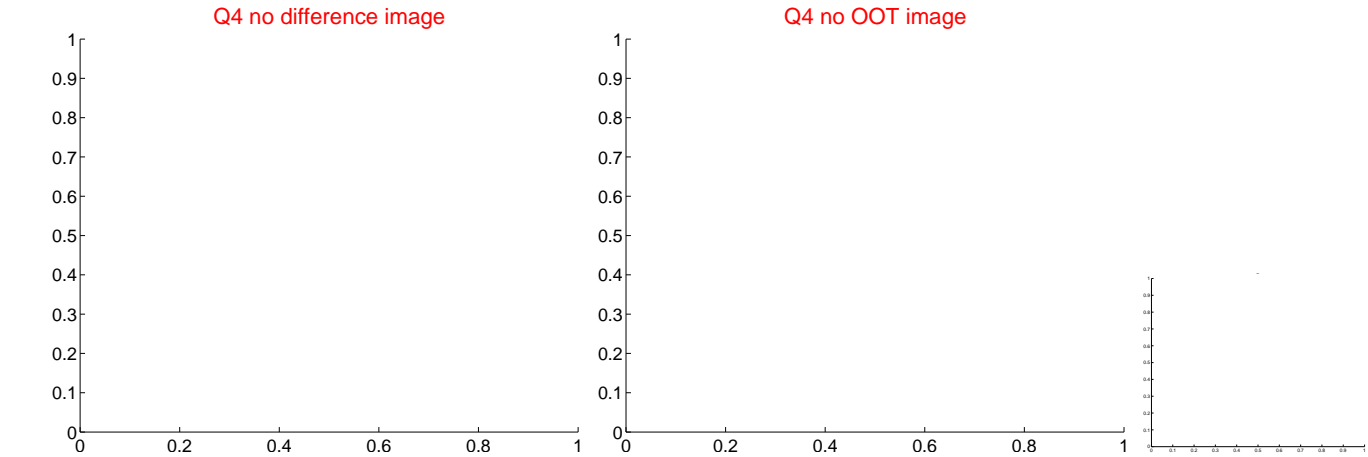
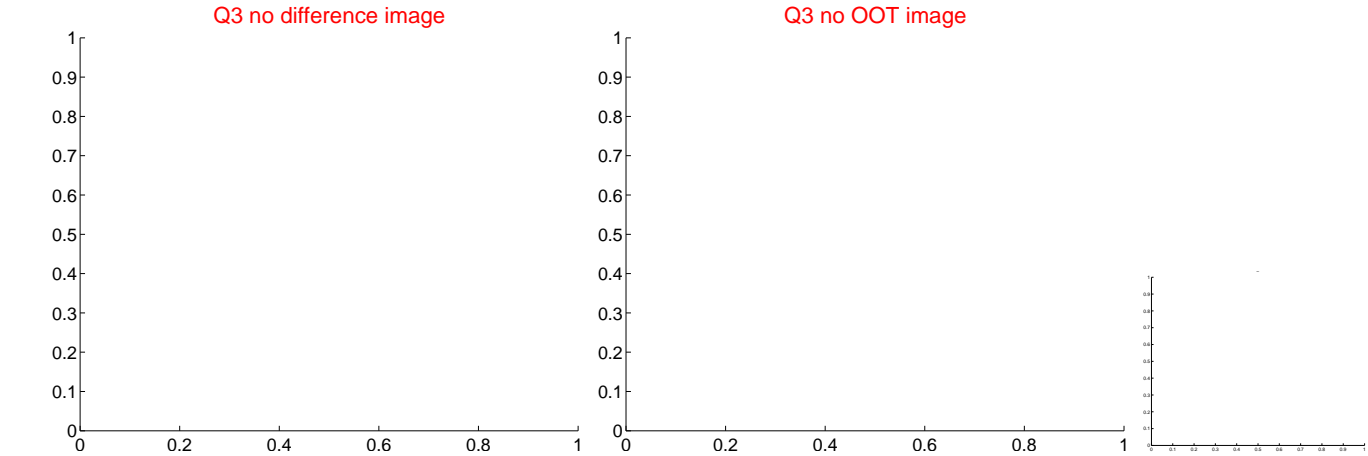
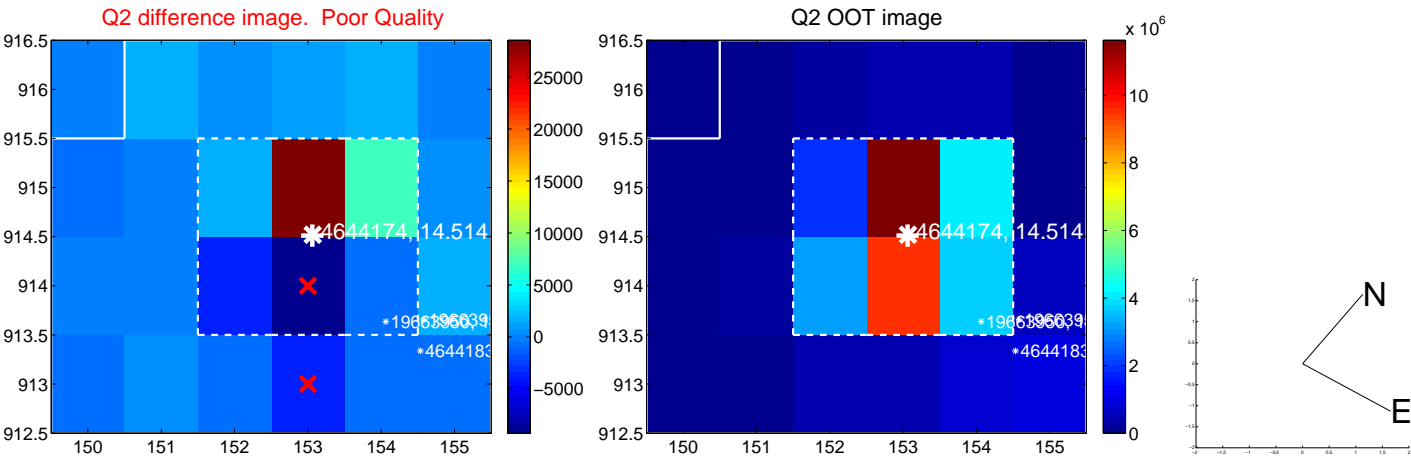
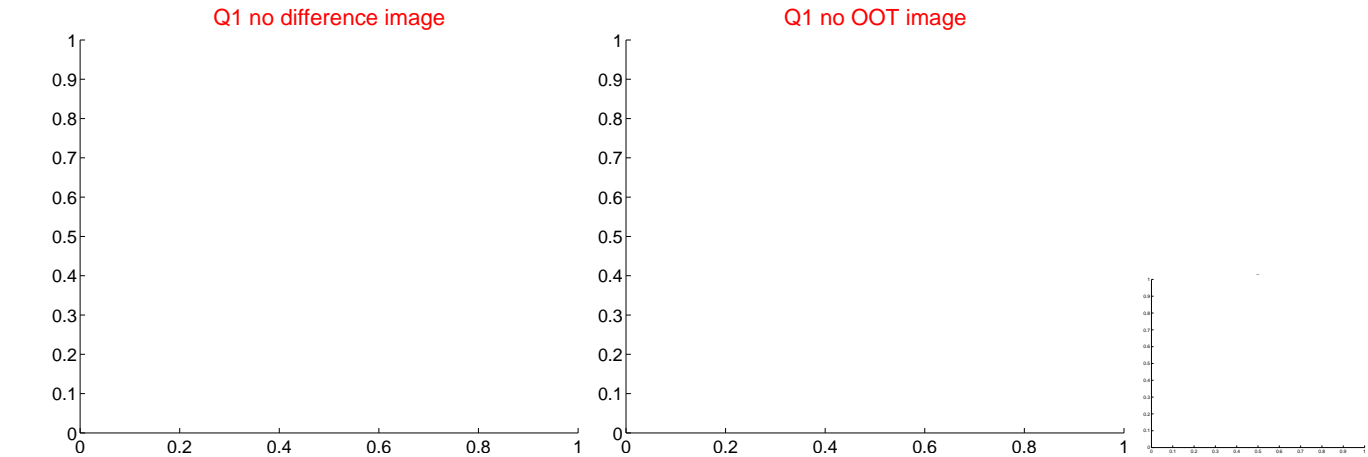
The direct PRF centroid is offset from the target star catalog position by about 0.24 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.028 \pm 0.347$	0.08	$0.028 \pm 0.355$	$-0.006 \pm 0.138$
PRF-fit source offset from KIC position	$0.154 \pm 0.463$	0.33	$0.152 \pm 0.471$	$0.030 \pm 0.167$
photometric centroid source offset	$1.10 \pm 0.98$	1.12	$-1.07 \pm 1.00$	$-0.24 \pm 0.49$



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.

Q5 no difference image



Q5 no OOT image



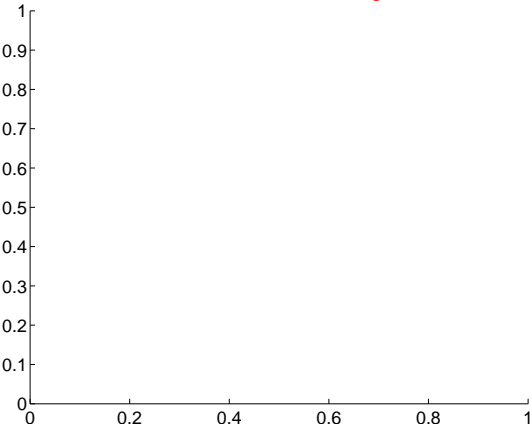
Q6 no difference image



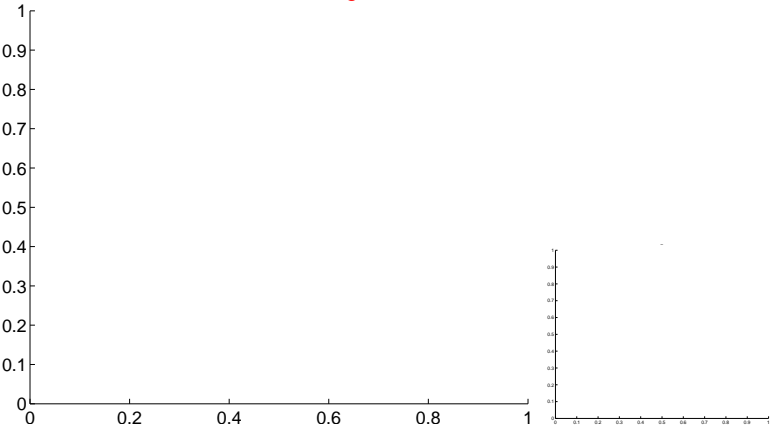
Q6 no OOT image



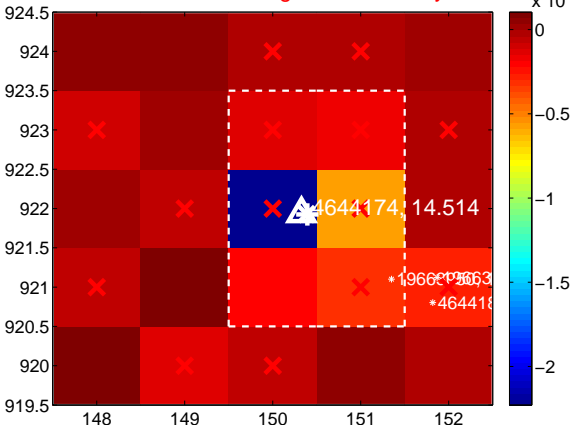
Q7 no difference image



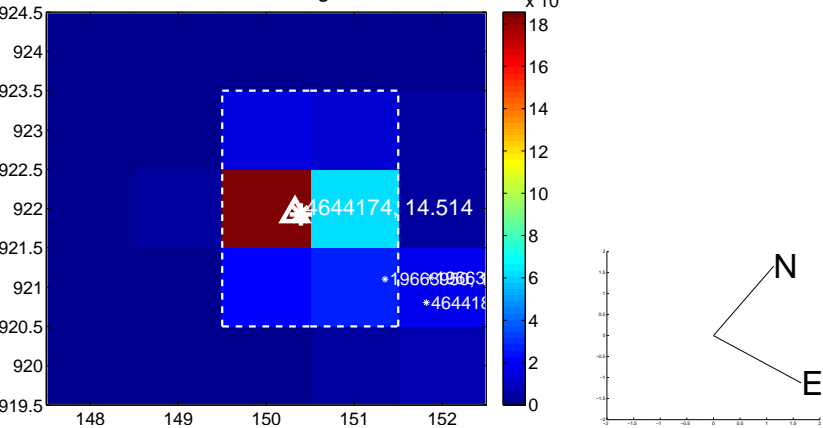
Q7 no OOT image



Q8 difference image. Poor Quality



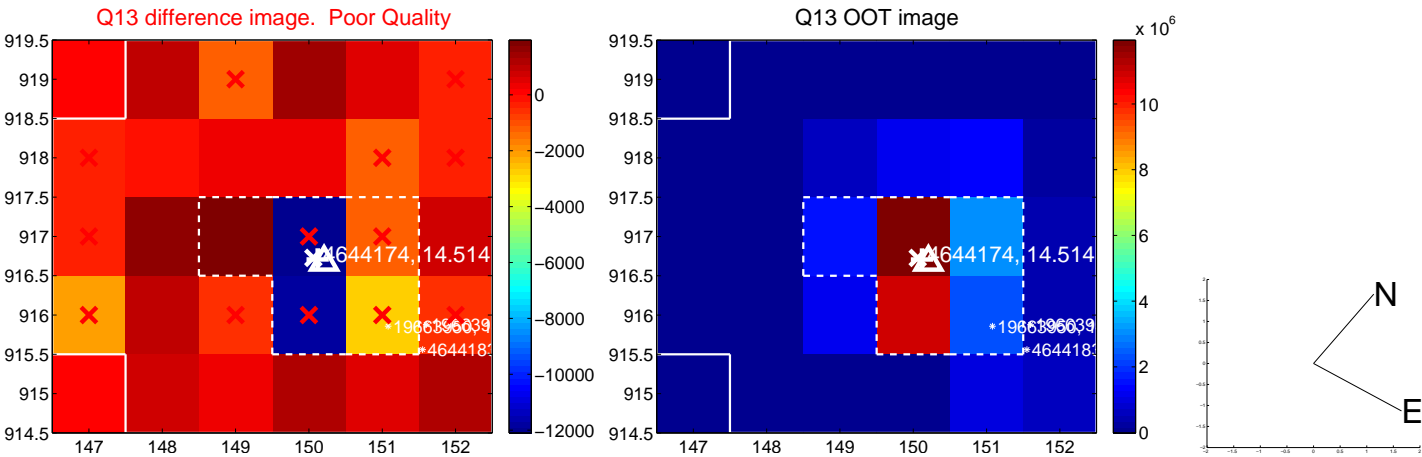
Q8 OOT image



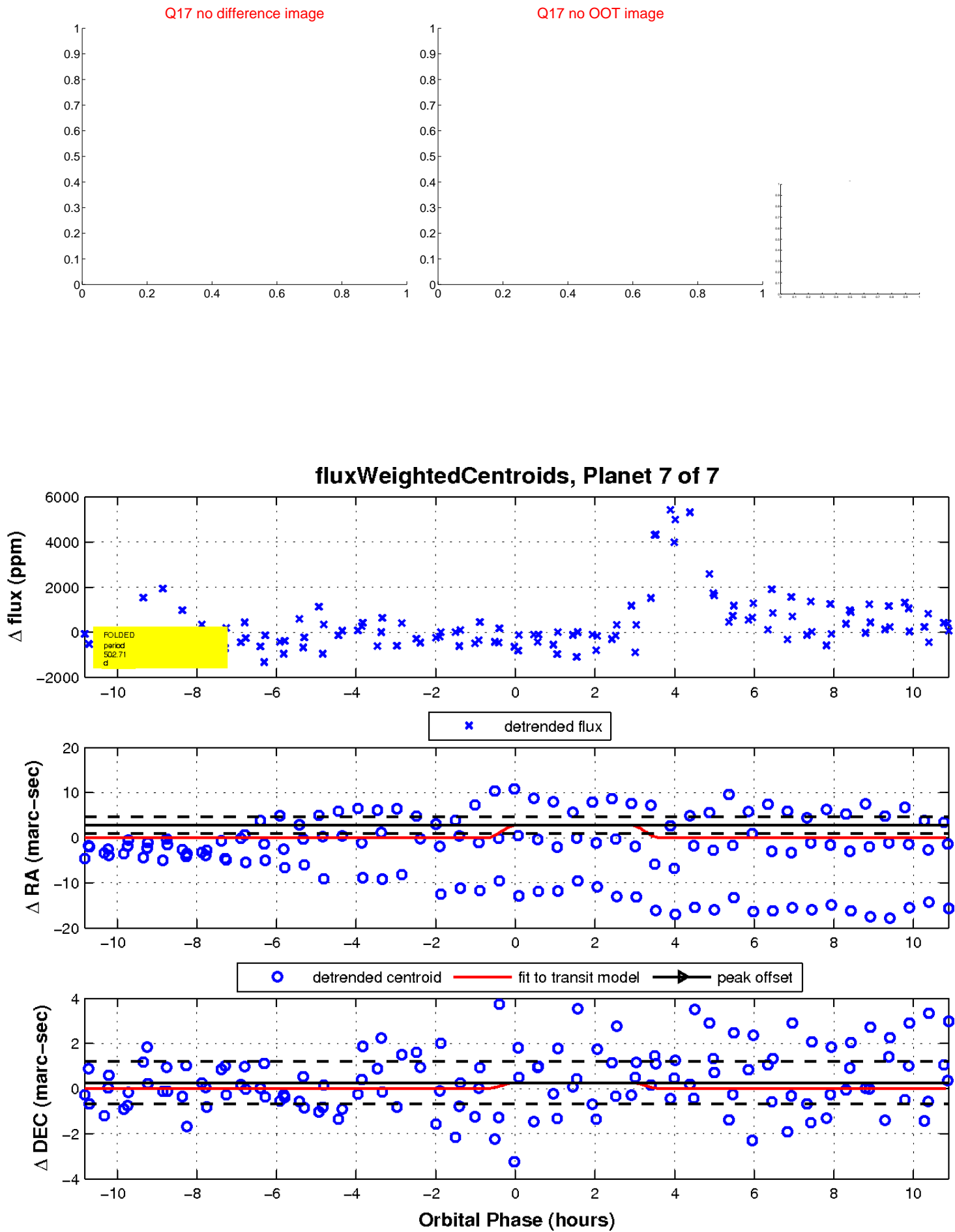
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



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



UKIRT Image

Declination

