

# KIC 002013754

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002013754-01	OBS	No	448.370132	363.080948	1505.4	7.426	12.7	11.8	0.74	4505	3.12	0.19
002013754-02	OBS	No	331.643411	268.147998	928.5	14.226	9.8	7.7	0.74	4505	2.25	0.28
002013754-03	OBS	No	440.850858	510.139791	1004.3	5.917	10.7	7.5	0.74	4505	2.31	0.19

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002013754-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—CENT_KIC_POS
002013754-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
002013754-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_SKYE—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST

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

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

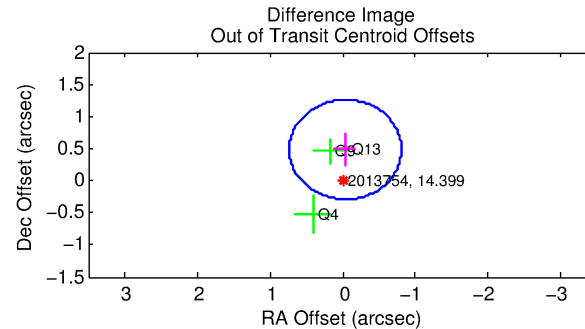
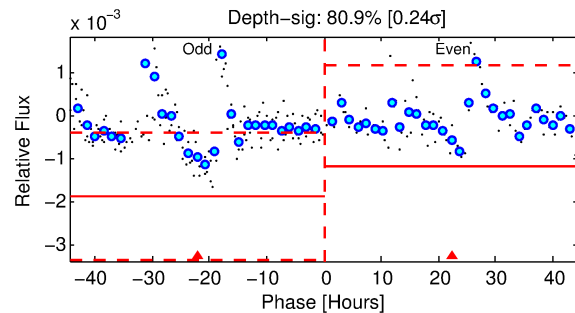
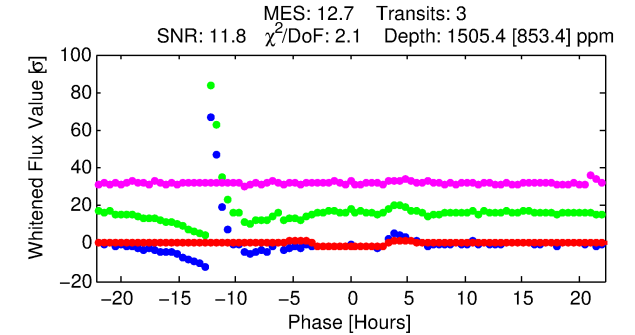
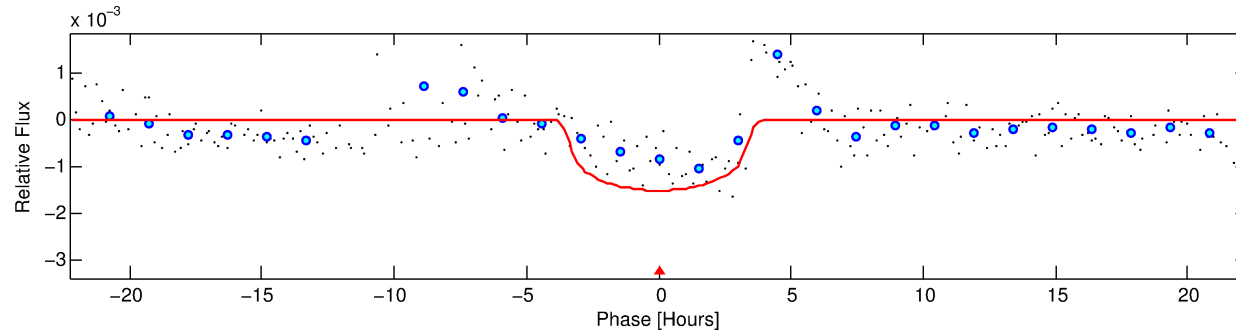
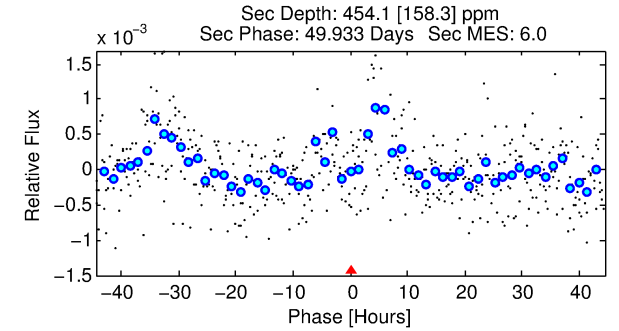
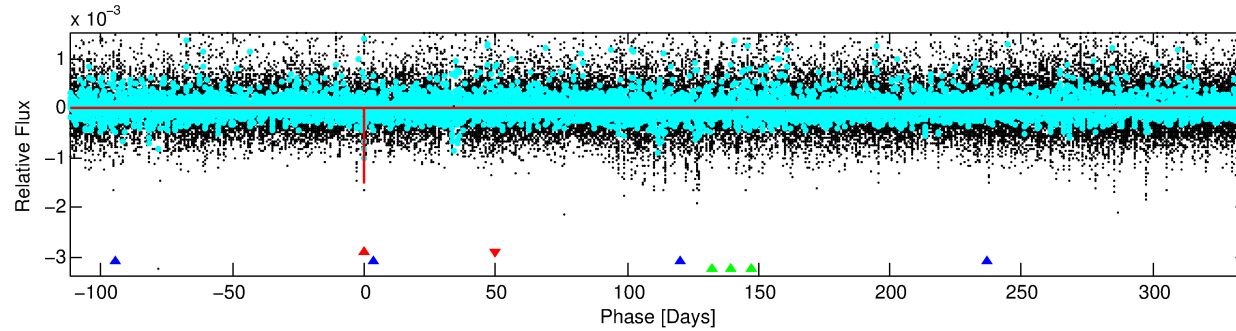
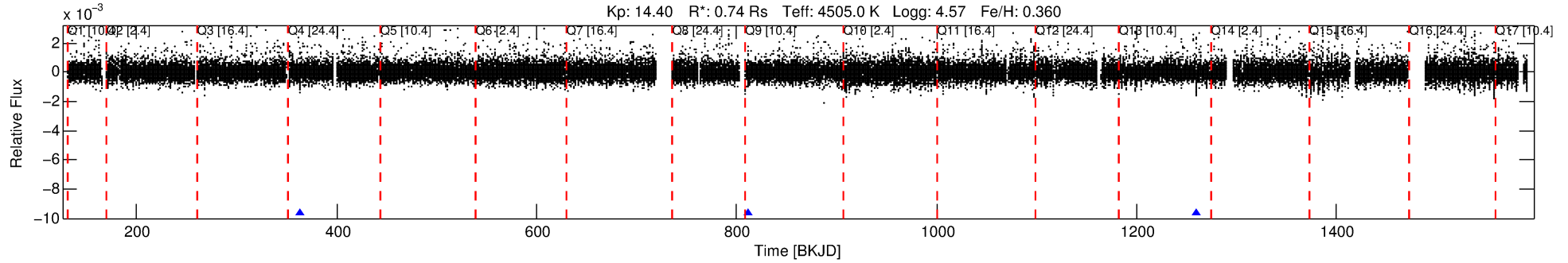
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 002013754-01

No Significant Match Found

# DV One-Page Summary

KIC: 2013754 Candidate: 1 of 3 Period: 448.370 d



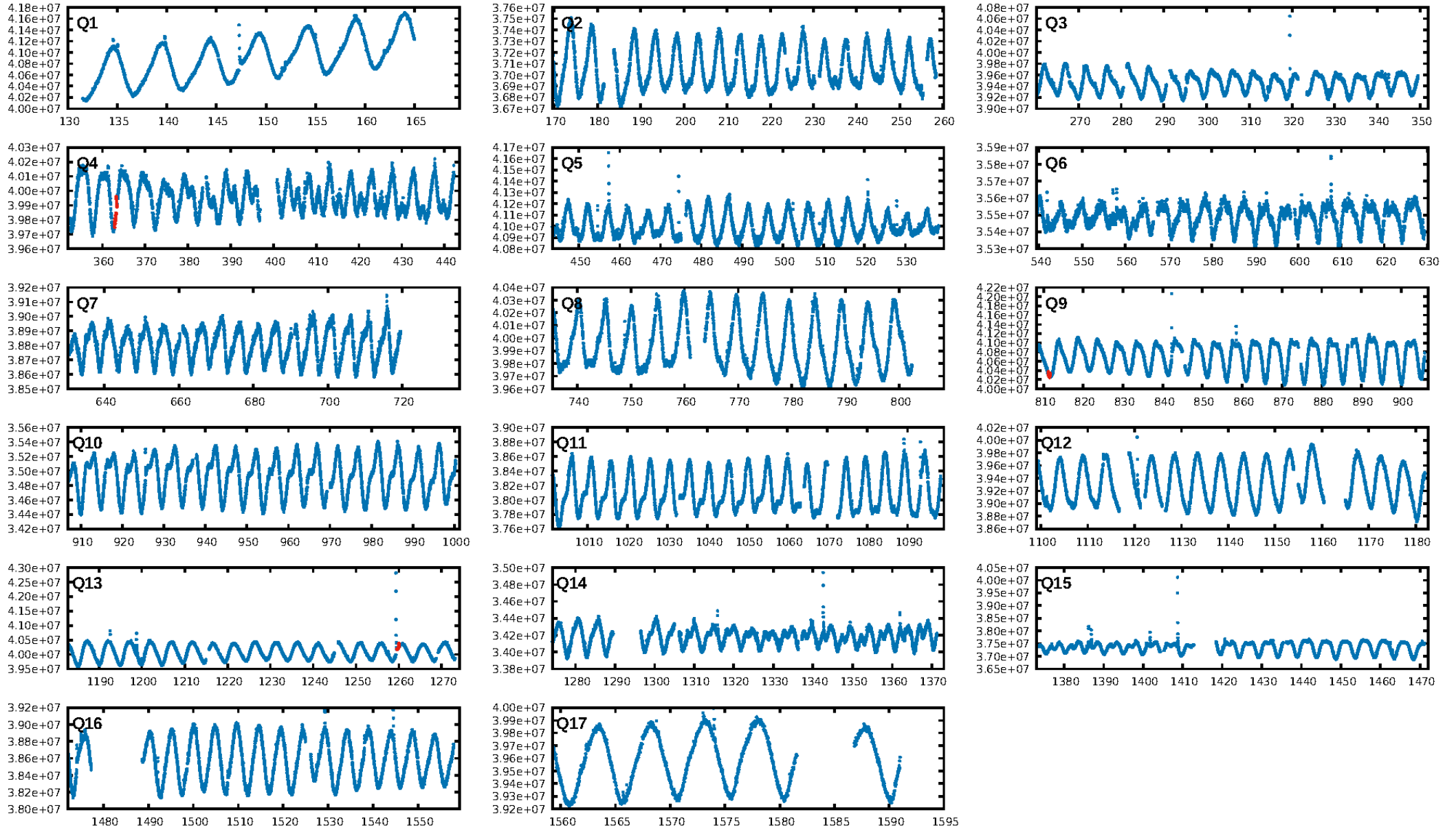
## DV Fit Results:

Period = 448.37013 [0.03163] d  
Epoch = 363.0809 [0.0422] BKJD  
Rp/R\* = 0.0386 [0.0590]  
a/R\* = 338.54 [1522.00]  
b = 0.73 [2.89]  
Seff = 0.19 [0.03]  
Teq = 168 [6] K  
Rp = 3.12 [4.77] Re  
a = 1.0399 [0.0676] AU  
Ag = 27738.69 [85351.34] [0.32 $\sigma$ ]  
Teffp = 3347 [2576] K [1.23 $\sigma$ ]

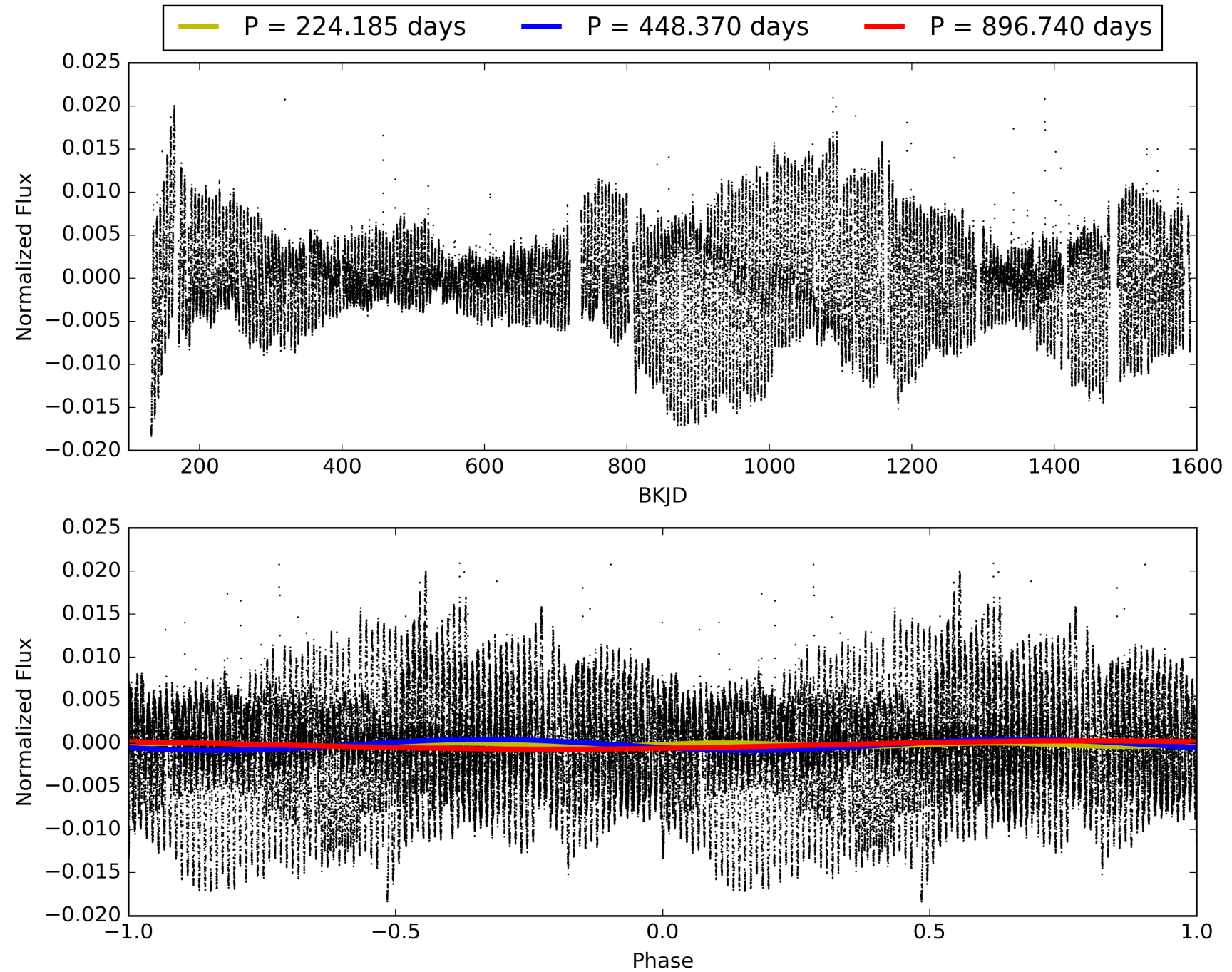
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [19.00 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.1%  
ModelChiSquareGof-sig: 10.7%  
Bootstrap-pfa: 8.92e-15  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 41.31  
Centroid-sig: 1.4%  
Centroid-so: 2.140 arcsec [3.26 $\sigma$ ]  
OotOffset-rm: 0.486 arcsec [1.88 $\sigma$ ]  
OotOffset-st: 0/0/1/2 [3]  
KicOffset-rm: 0.075 arcsec [0.56 $\sigma$ ]  
KicOffset-st: 0/0/1/2 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 1.00 [3/3]

# TCE 002013754-01, PDC Light Curves

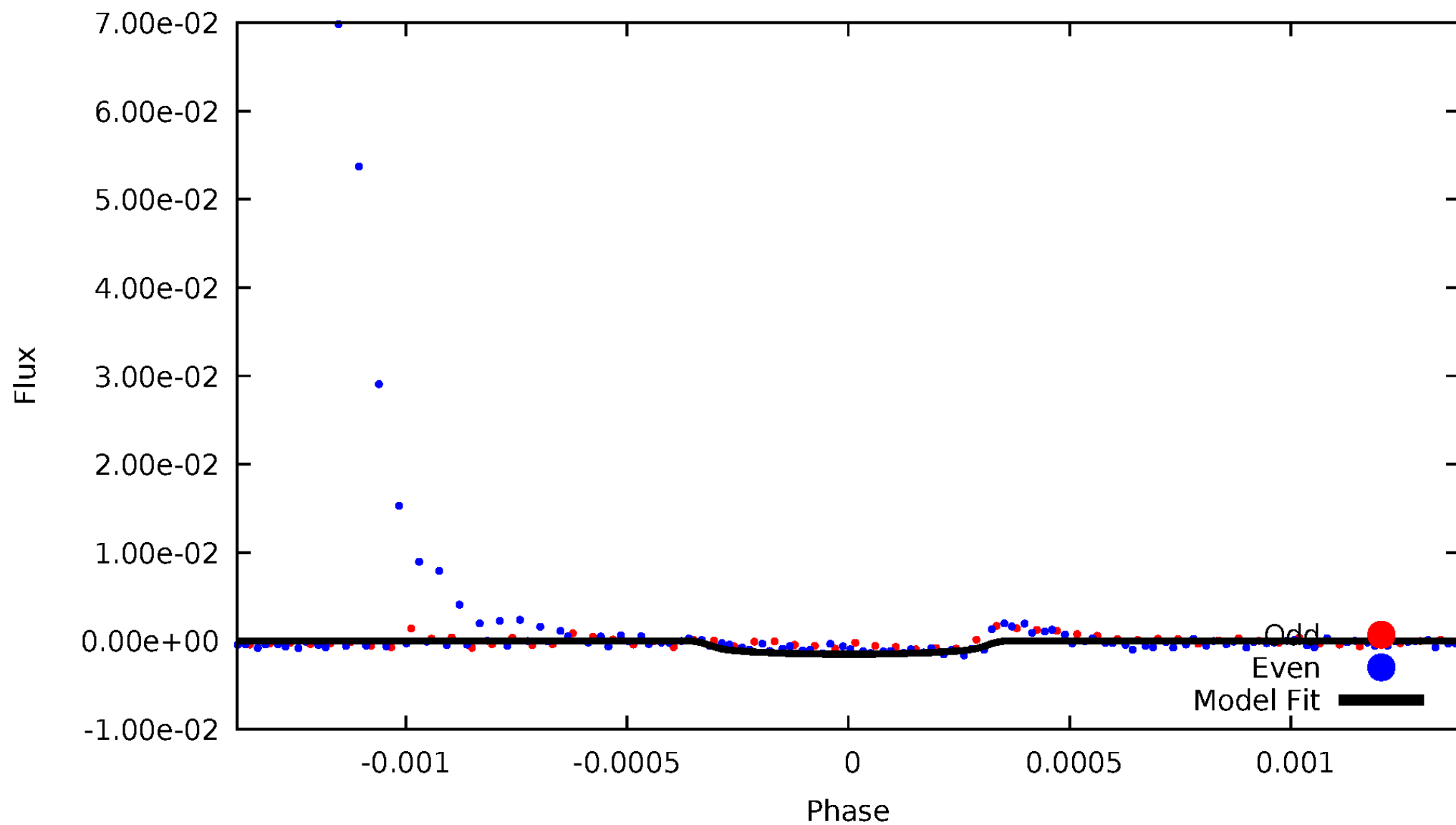


TCE 002013754-01



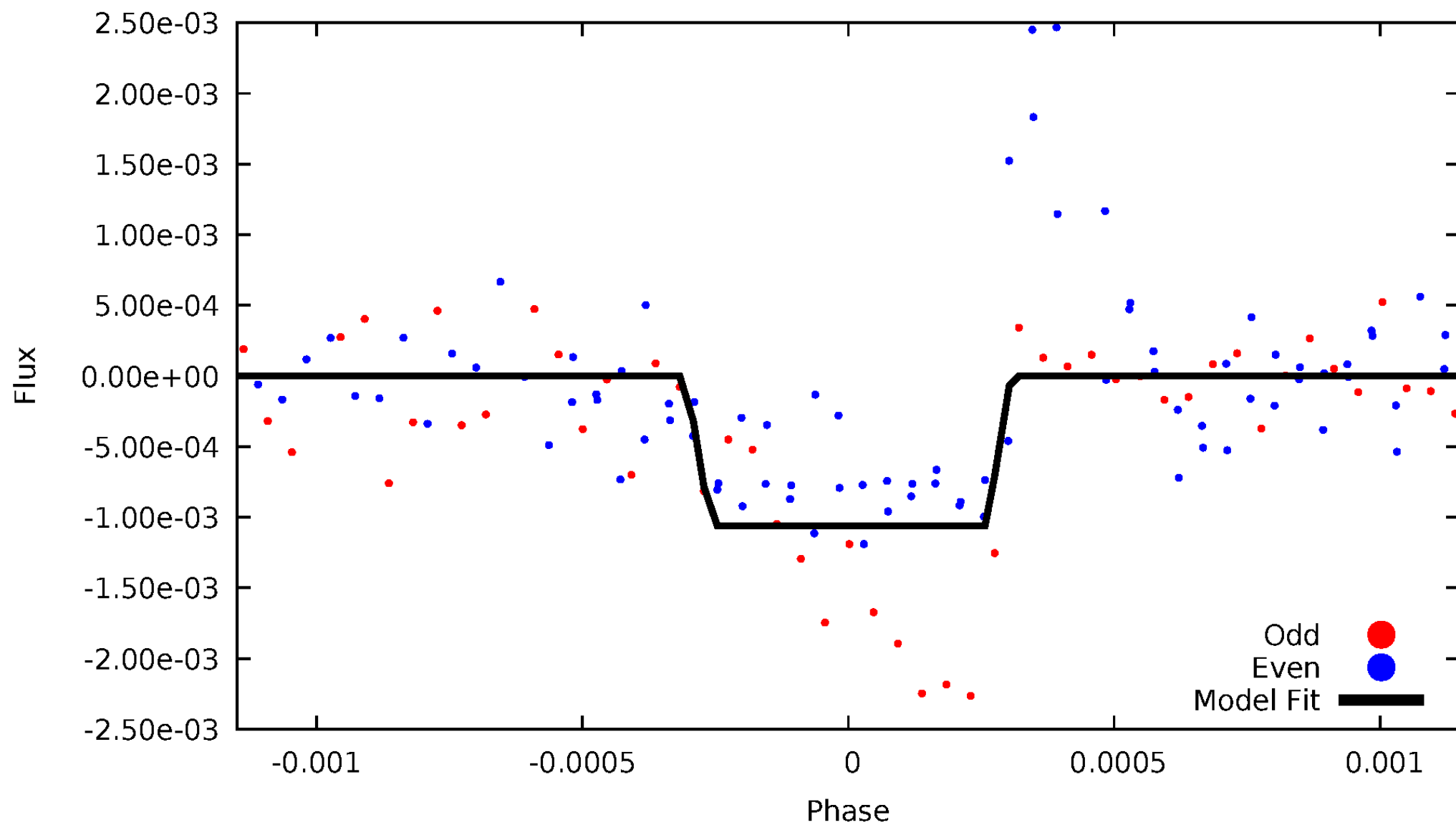
# DV Odd/Even

TCE 002013754-01



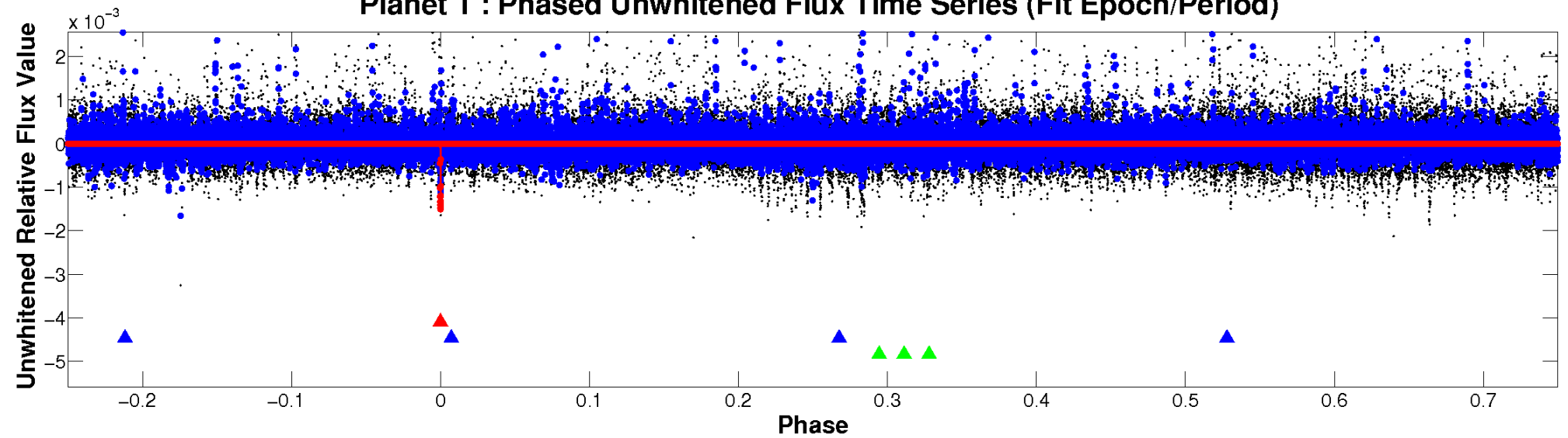
# ALT Odd/Even

TCE 002013754-01

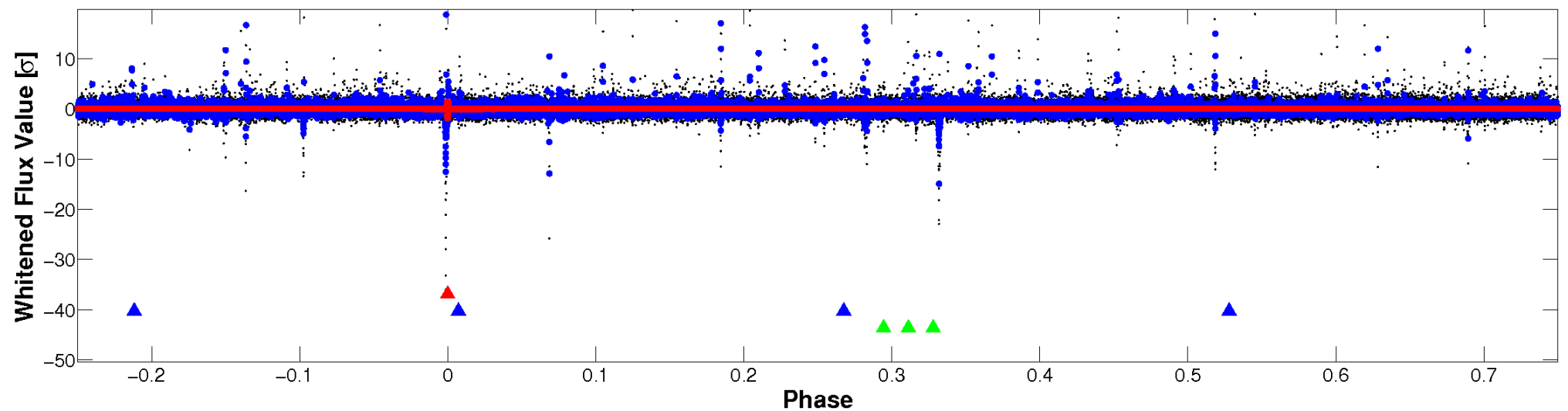


# Non-Whitened Vs. Whitened Light Curve

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

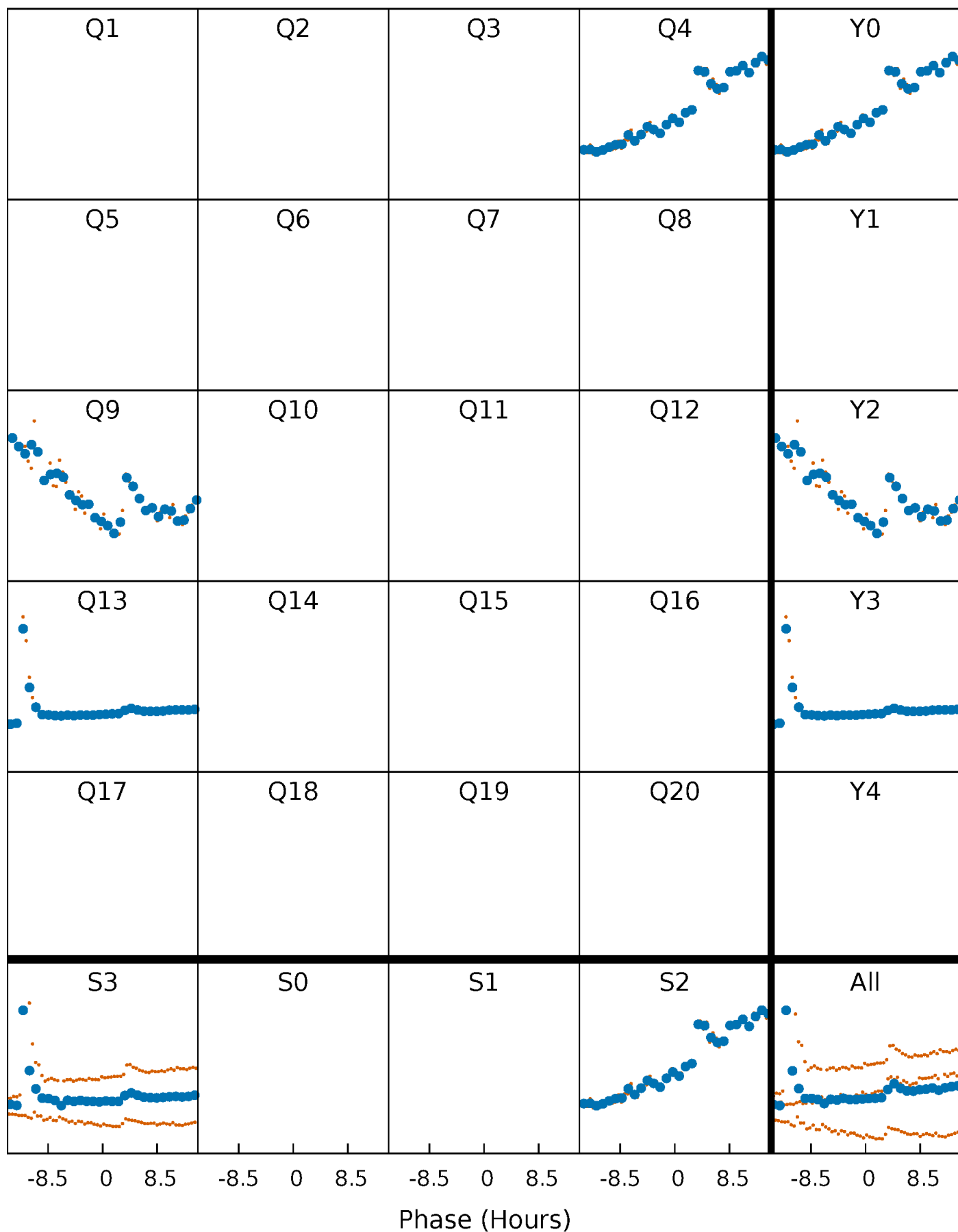


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

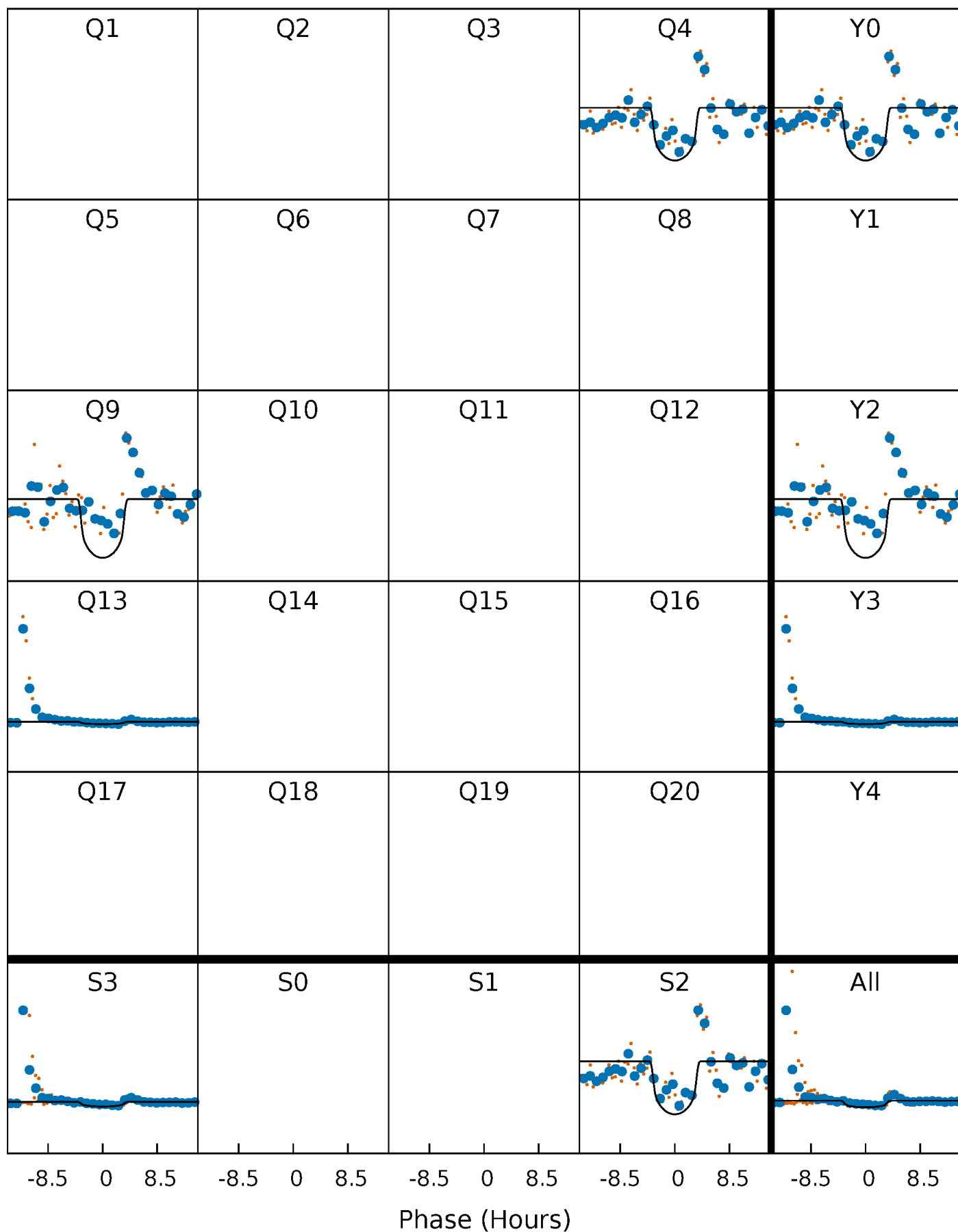
TCE 002013754-01 P=448.370132 Days  $T_0=363.080948$  (BKJD)





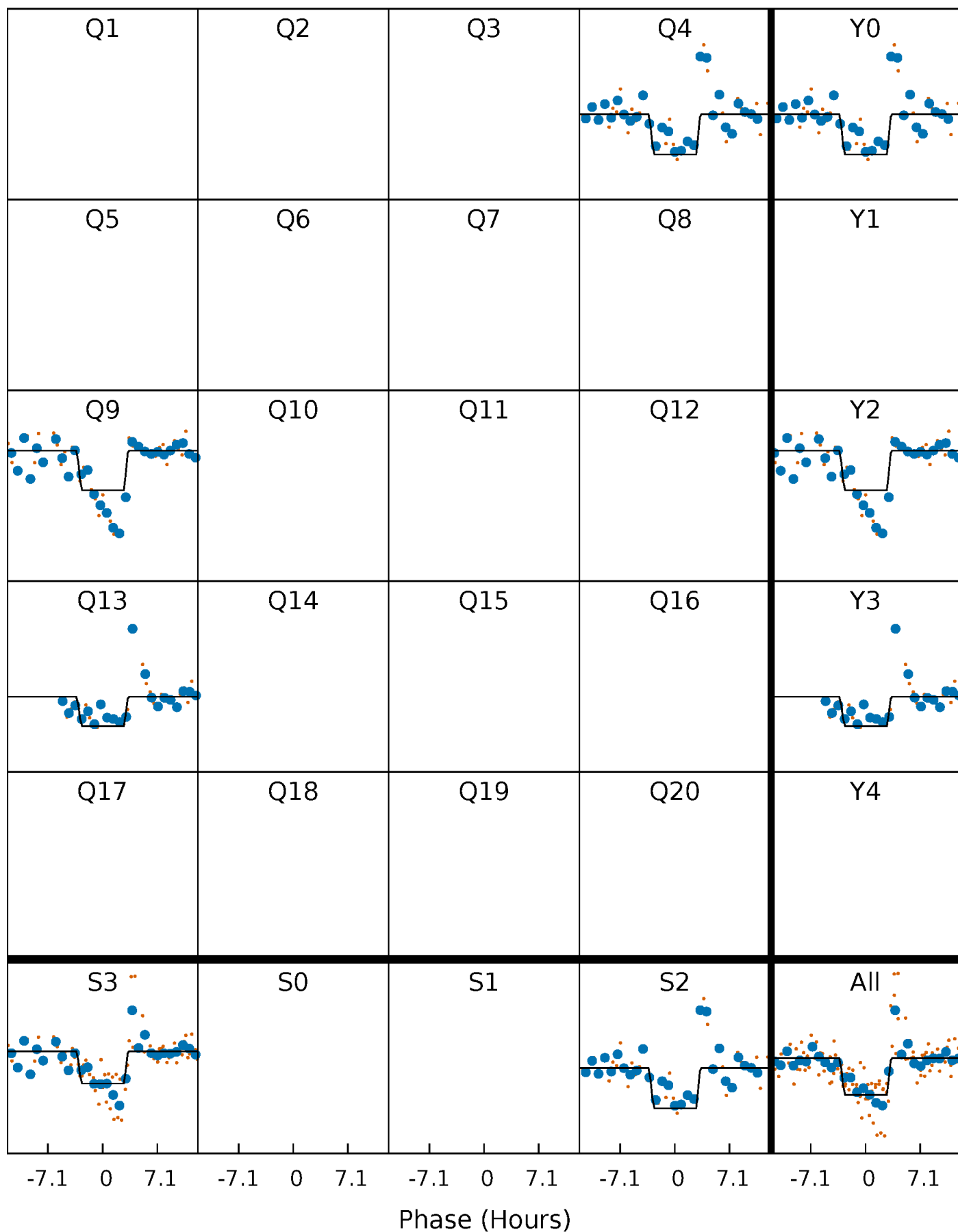
# DV Quarter-Phased Transit Curves

TCE 002013754-01 P=448.370132 Days  $T_0=363.080948$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

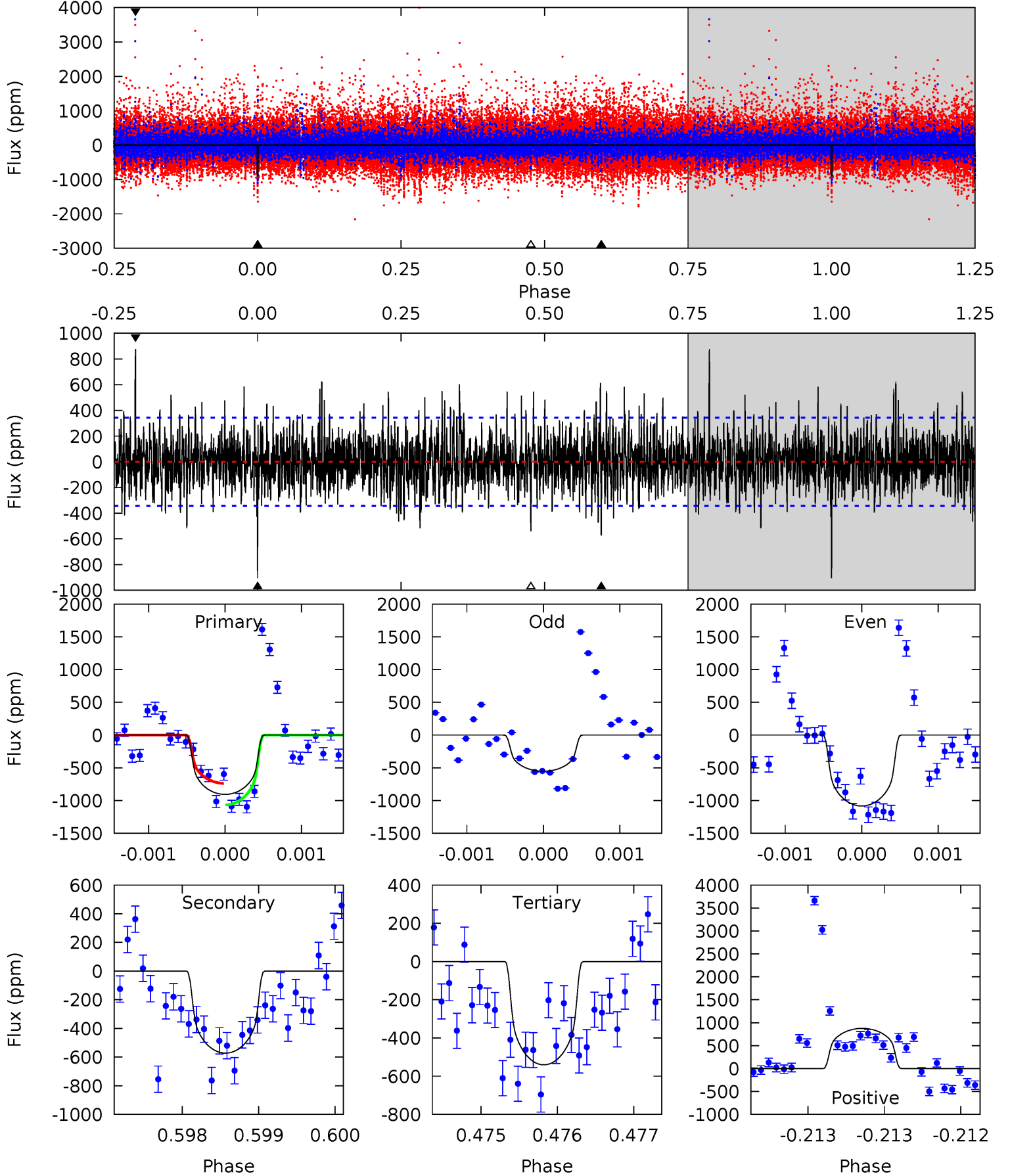
TCE 002013754-01 P=448.366796 Days  $T_0=363.090475$  (BKJD)



# DV Model-Shift Uniqueness Test

002013754-01, P = 448.370132 Days, E = 363.080948 Days

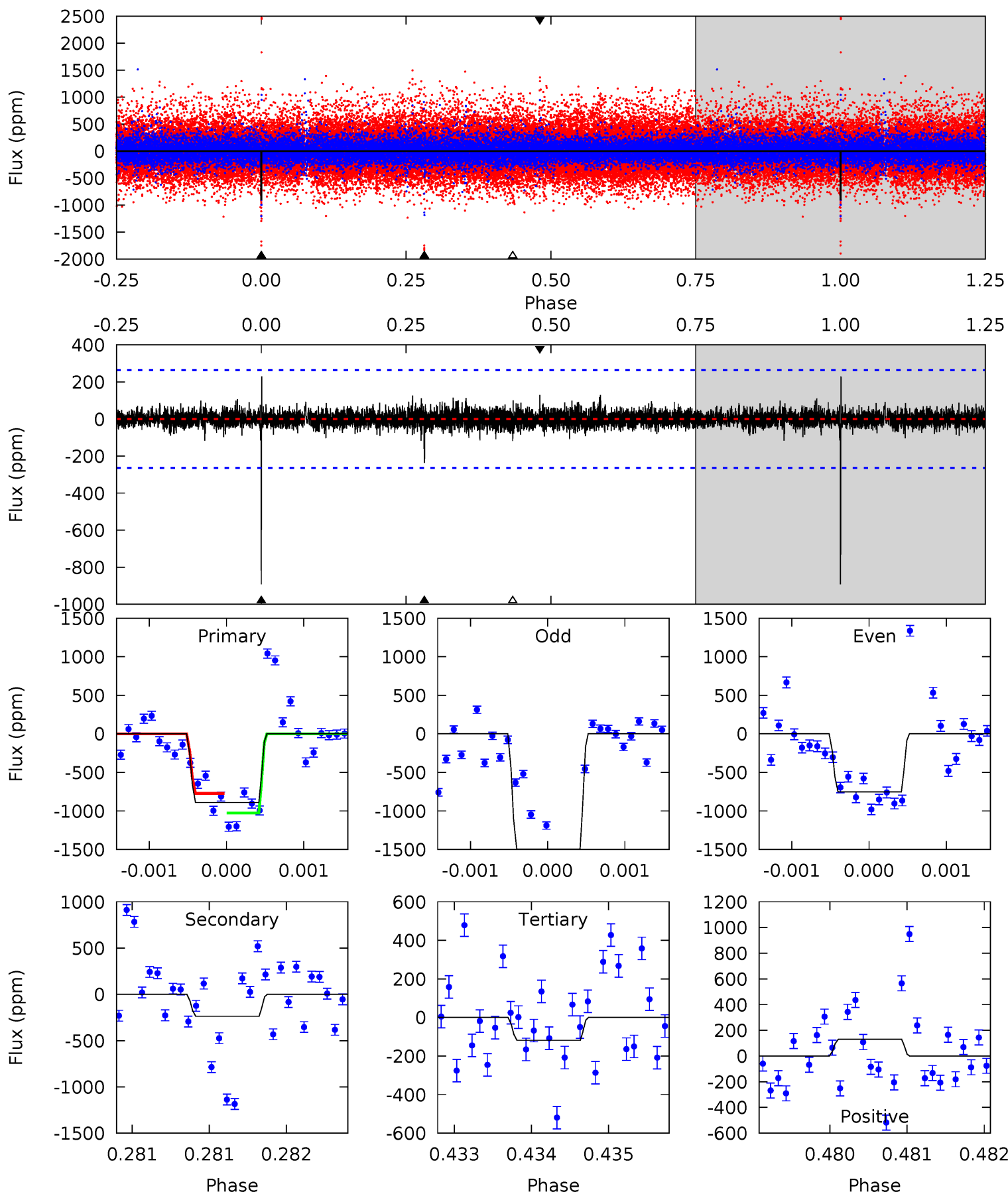
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.5	9.17	8.66	14.0	5.51	3.38	2.54	5.86	0.49	0.51	-4.87	3.61	0.92	0.49	2.64



# Alt Model-Shift Uniqueness Test

002013754-01, P = 448.366796 Days, E = 363.090475 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
18.7	4.98	2.48	2.73	5.54	3.43	0.56	16.2	16.0	2.50	2.25	7.81	1.30	0.21	2.67



### Stellar Parameters For KIC 002013754

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4505^{+137}_{-137}$	$4.571^{+0.052}_{-0.020}$	$0.360^{+0.100}_{-0.300}$	$0.741^{+0.026}_{-0.057}$	$0.747^{+0.040}_{-0.052}$	$2.580^{+0.554}_{-0.206}$
	+3%/-3%	+1%/-0%	+28%/-83%	+4%/-8%	+5%/-7%	+21%/-8%
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 002013754-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-572 \pm 62$	$4.38^{+4.05}_{-2.66}$	$233^{+8}_{-8}$	$3390^{+1345}_{-598}$	$18258^{+97083}_{-13535}$
Alt.	$-237 \pm 48$	$4.29^{+3.86}_{-2.81}$	$233^{+8}_{-7}$	$3001^{+1225}_{-494}$	$7527^{+57017}_{-5498}$

$T_{\text{max}}$  = 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

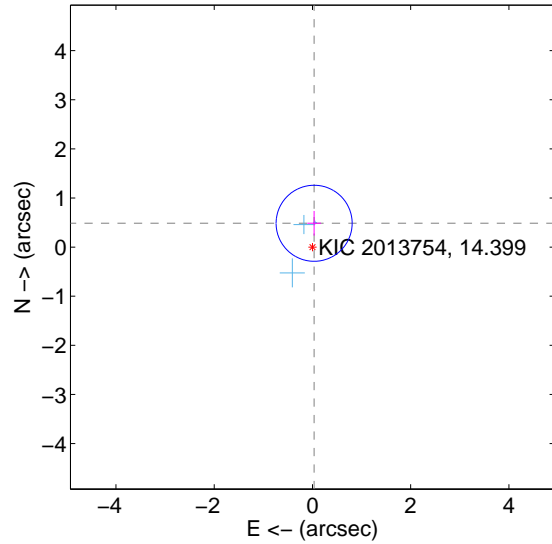
Supplemental centroid analysis for 002013754-01. Kepler magnitude: 14.40. Transit SNR 11.79

There are 3 quarters with good PRF difference image offsets

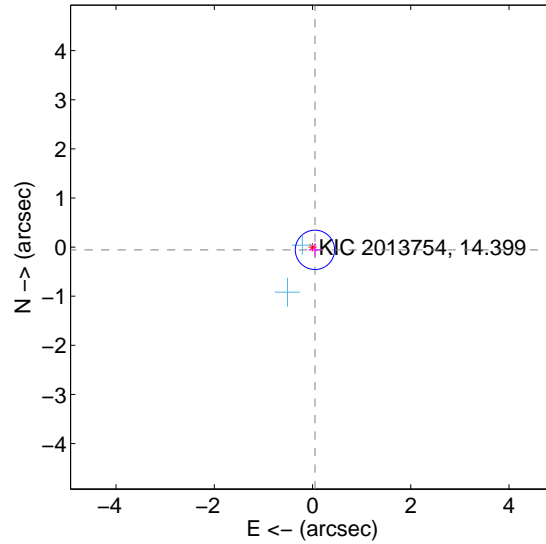
The direct PRF centroid is offset from the target star catalog position by about 0.56 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.486 \pm 0.258$	1.88	$-0.034 \pm 0.138$	$0.485 \pm 0.251$
PRF-fit source offset from KIC position	$0.075 \pm 0.133$	0.56	$-0.049 \pm 0.130$	$-0.056 \pm 0.136$
photometric centroid source offset	$2.14 \pm 0.66$	3.26	$-0.41 \pm 0.54$	$-2.10 \pm 0.66$

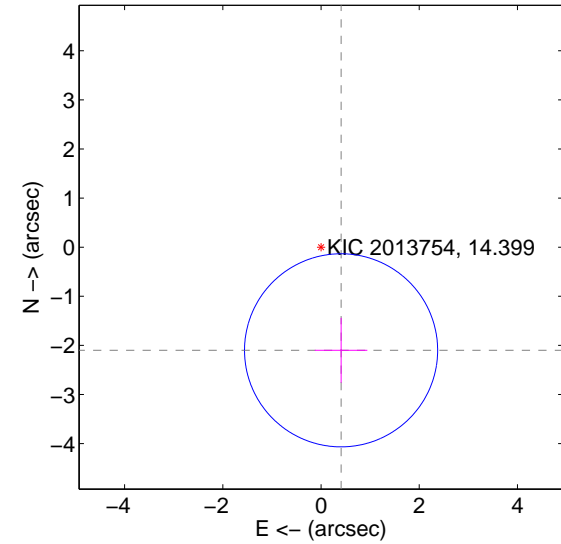
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

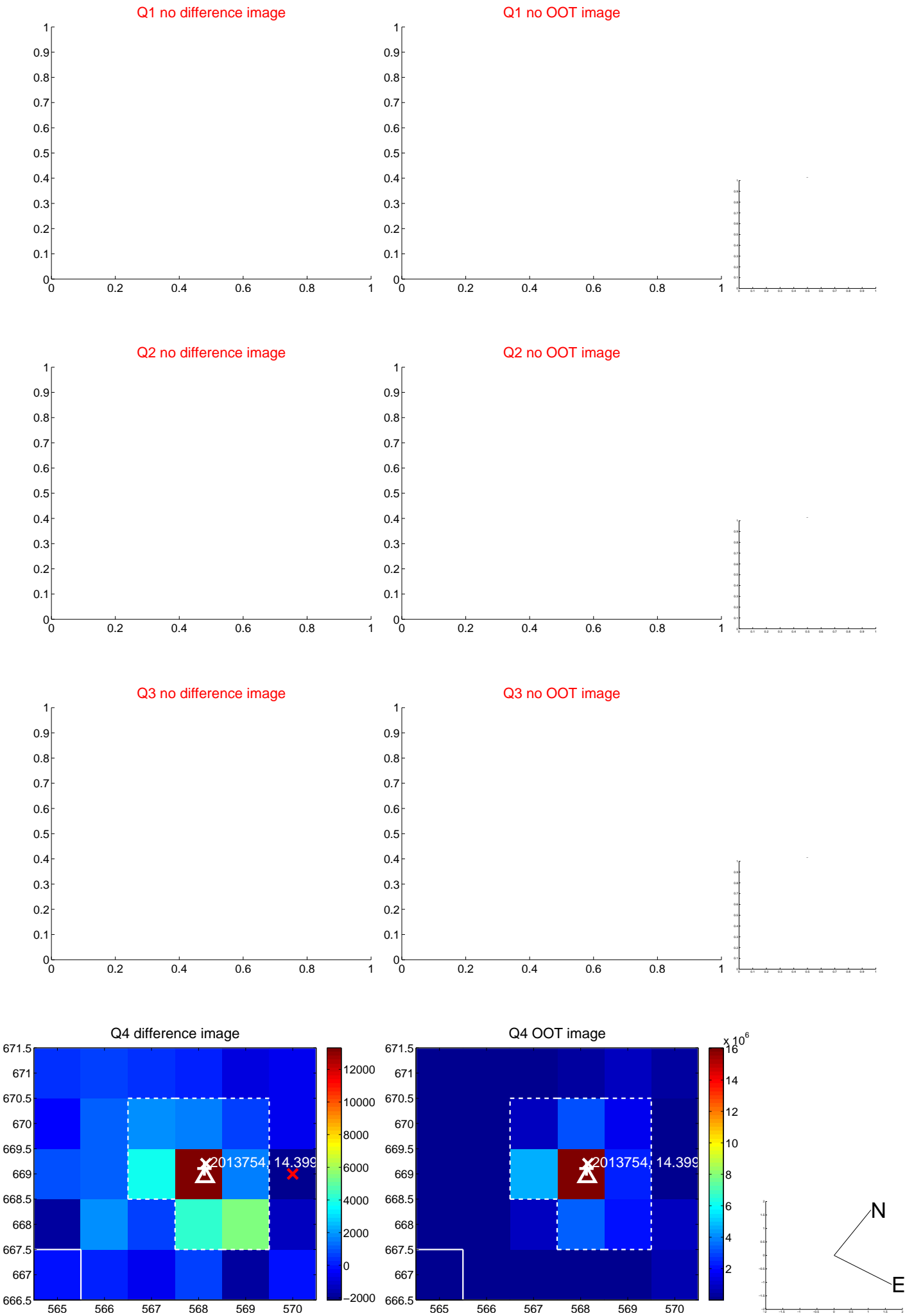


offset from photometric centroids



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

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

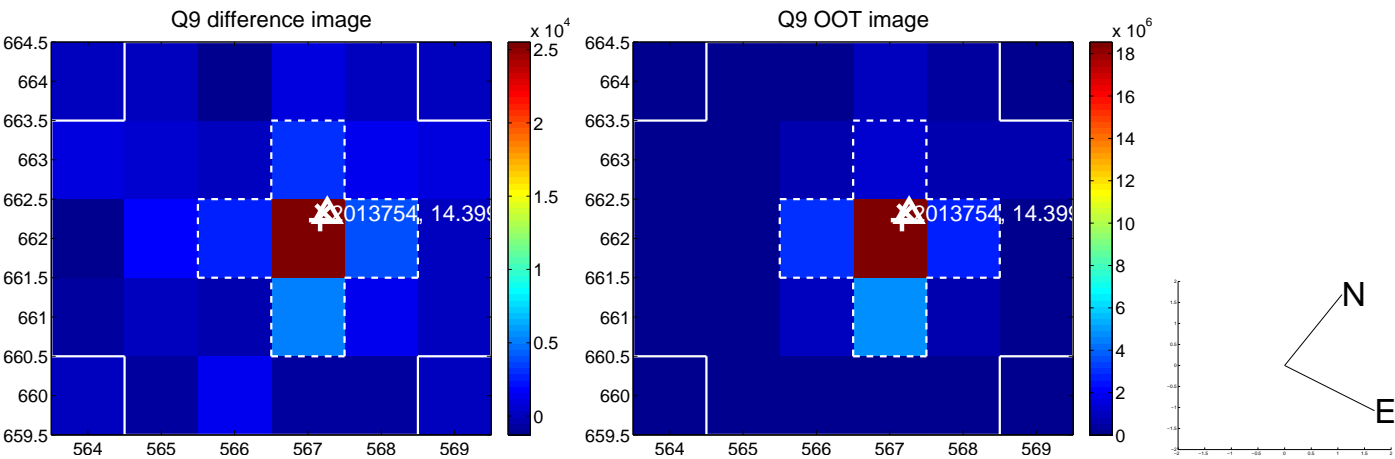


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

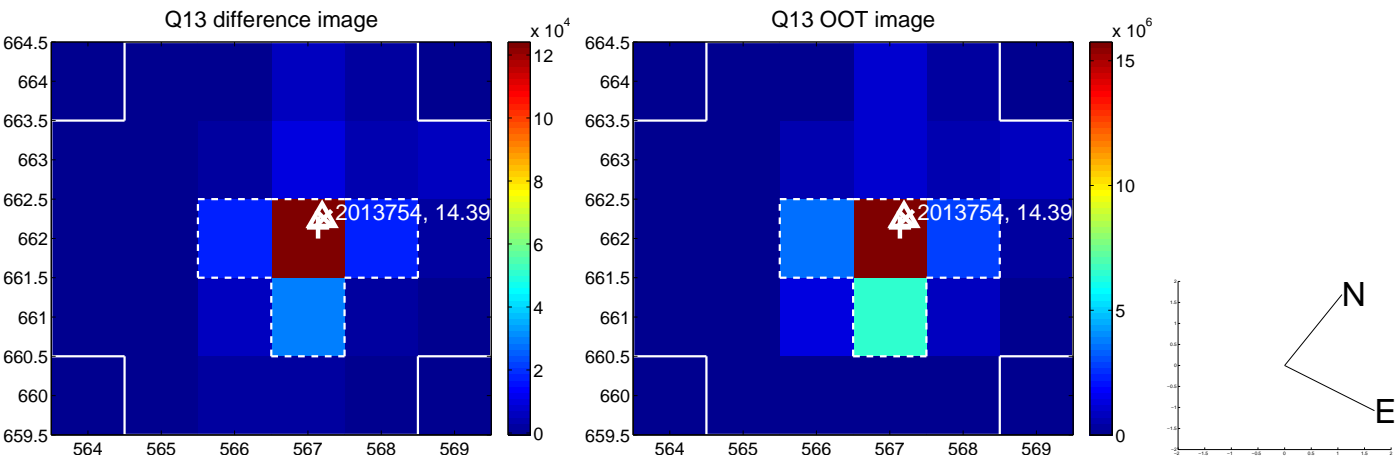




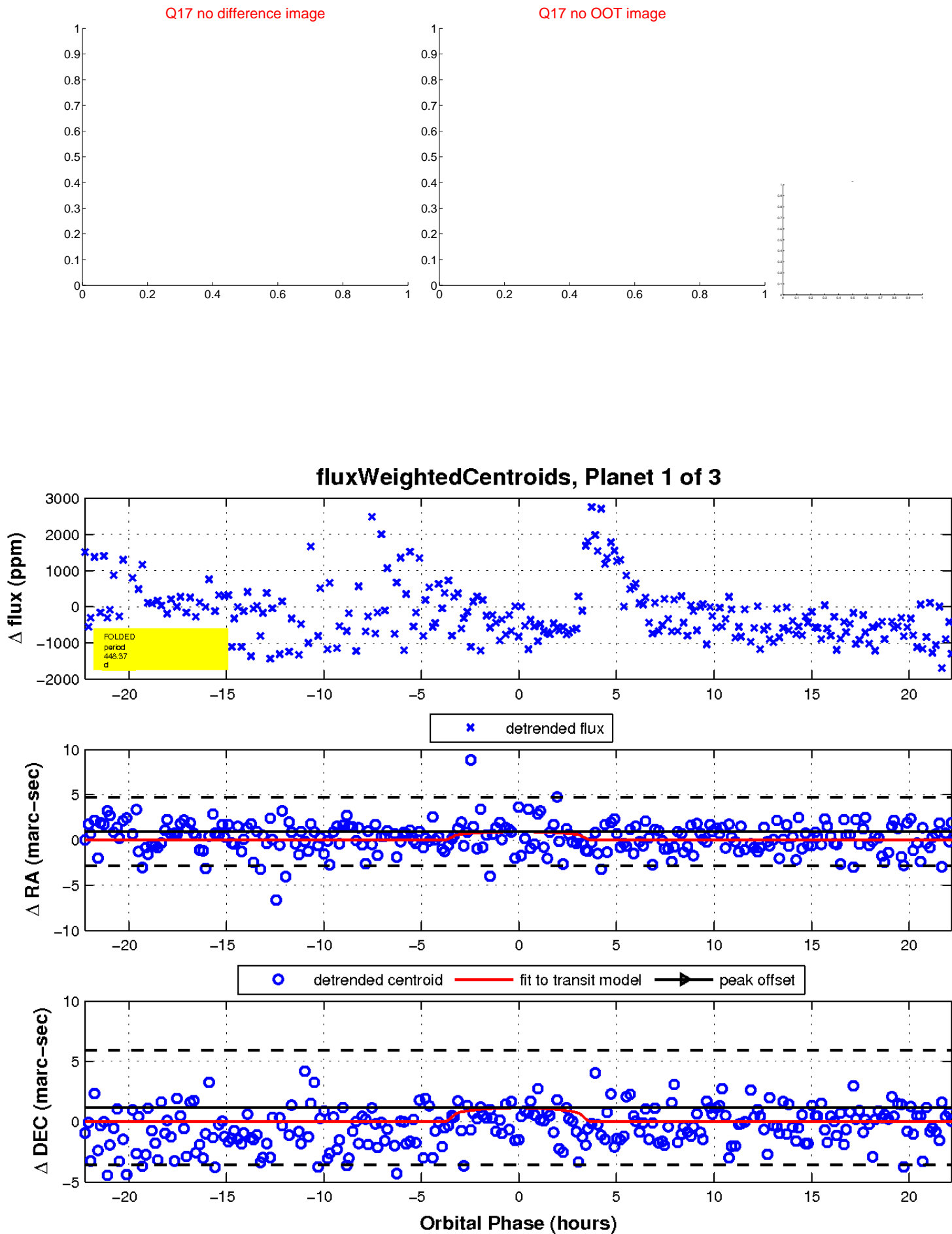
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

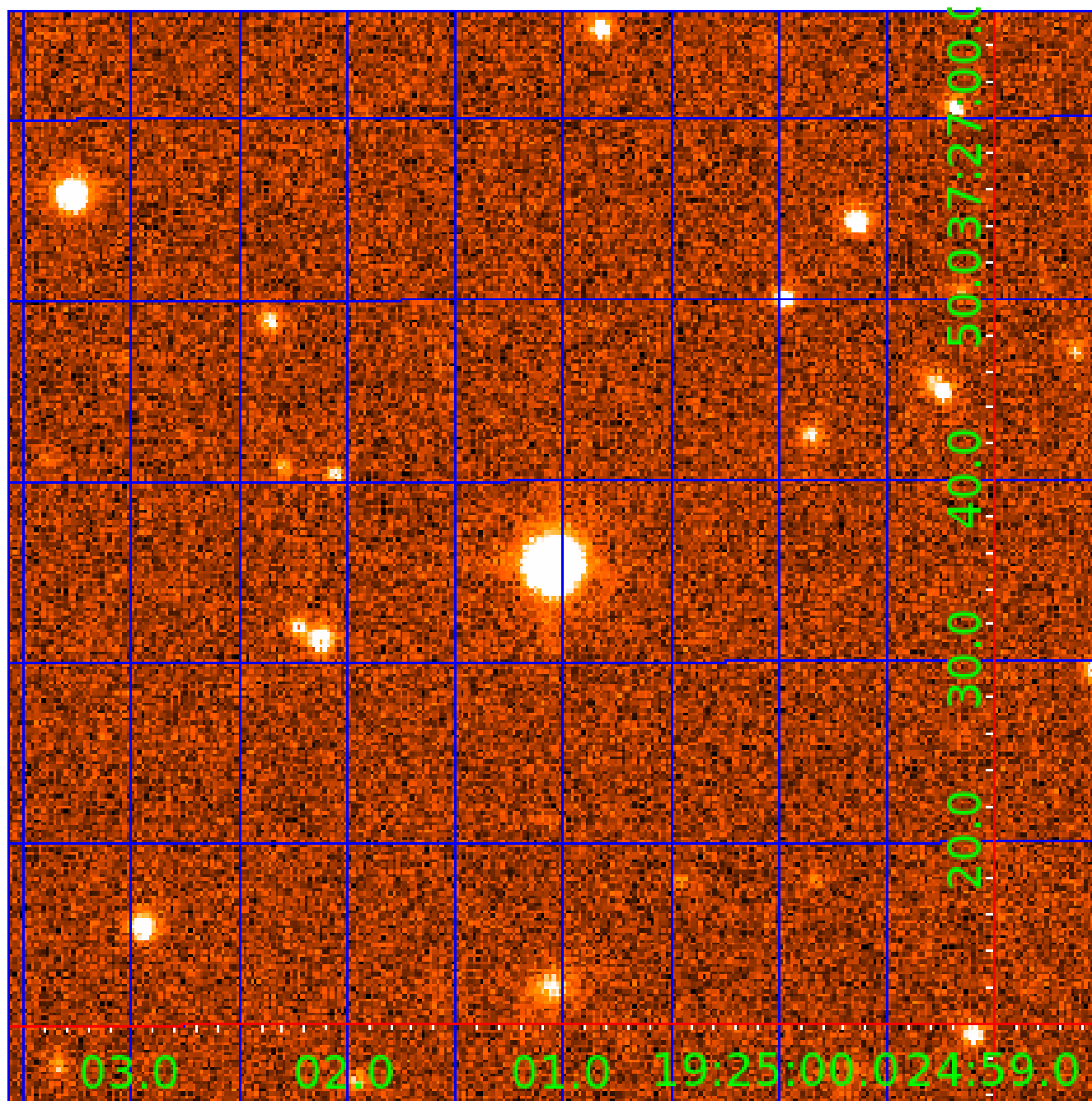


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 002013754

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002013754-01	OBS	No	448.370132	363.080948	1505.4	7.426	12.7	11.8	0.74	4505	3.12	0.19
002013754-02	OBS	No	331.643411	268.147998	928.5	14.226	9.8	7.7	0.74	4505	2.25	0.28
002013754-03	OBS	No	440.850858	510.139791	1004.3	5.917	10.7	7.5	0.74	4505	2.31	0.19

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002013754-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—CENT_KIC_POS
002013754-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
002013754-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_SKYE—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST

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

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

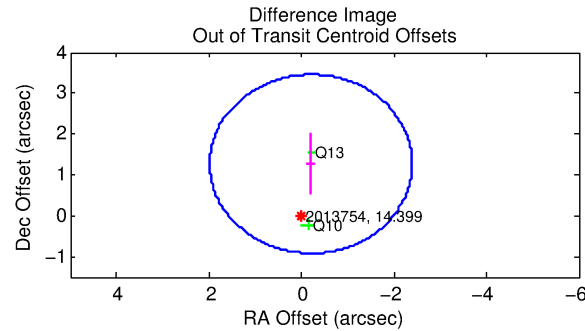
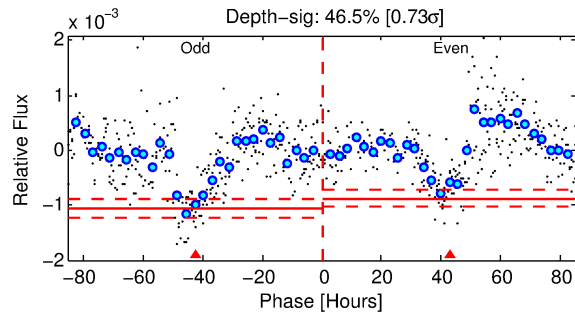
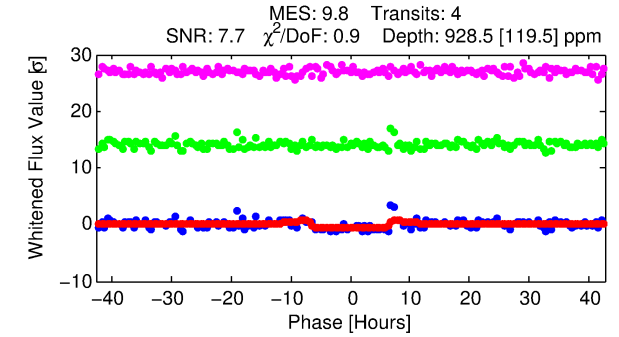
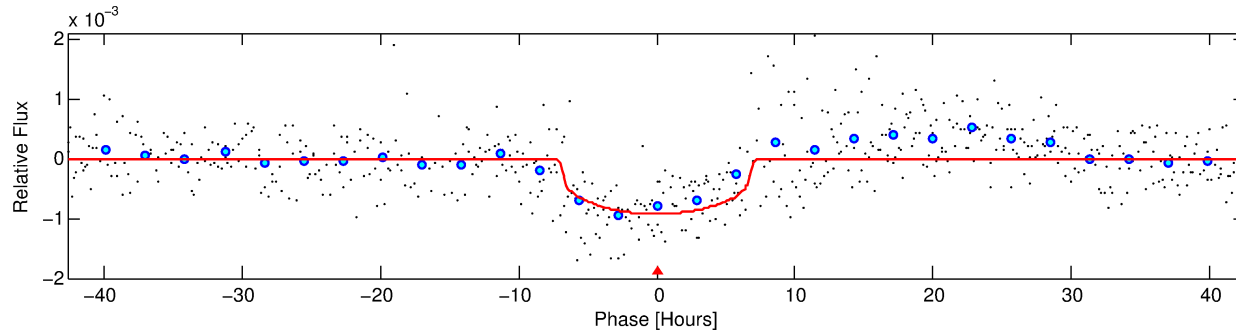
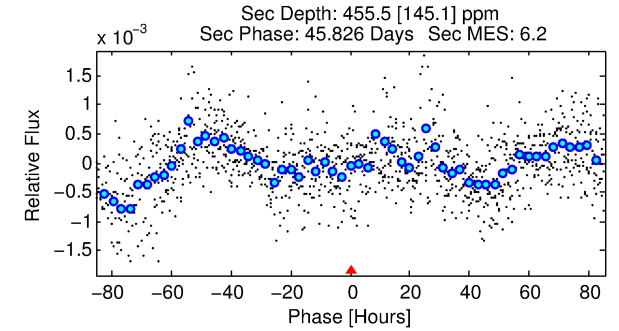
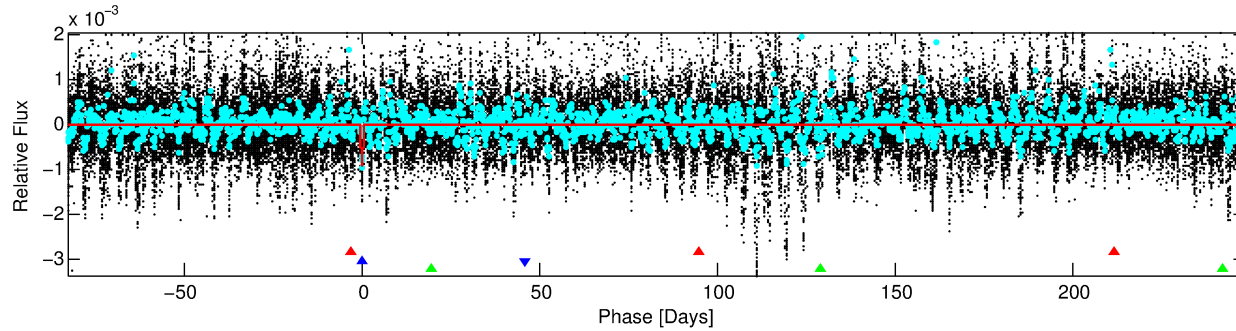
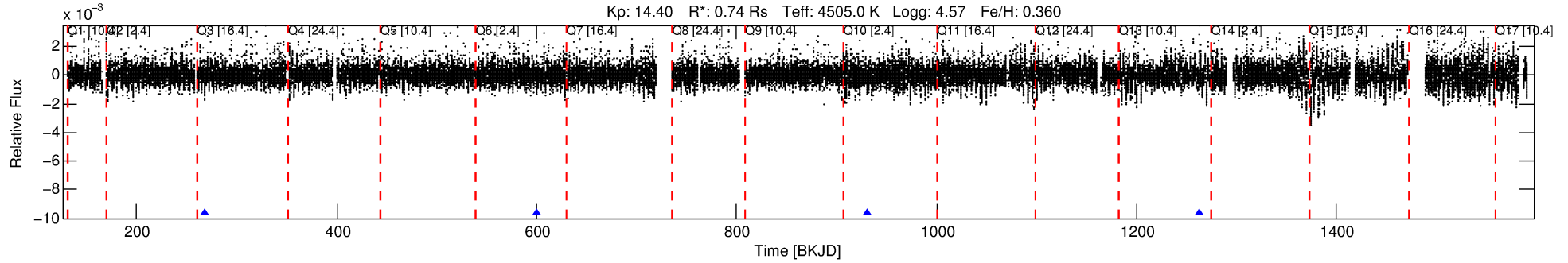
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 002013754-02

No Significant Match Found

# DV One-Page Summary

KIC: 2013754 Candidate: 2 of 3 Period: 331.643 d



## DV Fit Results:

Period = 331.64341 [0.00571] d  
Epoch = 268.1480 [0.0112] BKJD  
Rp/R\* = 0.0279 [0.0102]  
a/R\* = 160.07 [168.67]  
b = 0.50 [1.61]  
Seff = 0.28 [0.04]  
Teq = 186 [7] K  
Rp = 2.25 [0.84] Re  
a = 0.8505 [0.0553] AU  
Ag = 35653.82 [28687.89] [1.24 $\sigma$ ]  
Teffp = 3941 [796] K [4.72 $\sigma$ ]

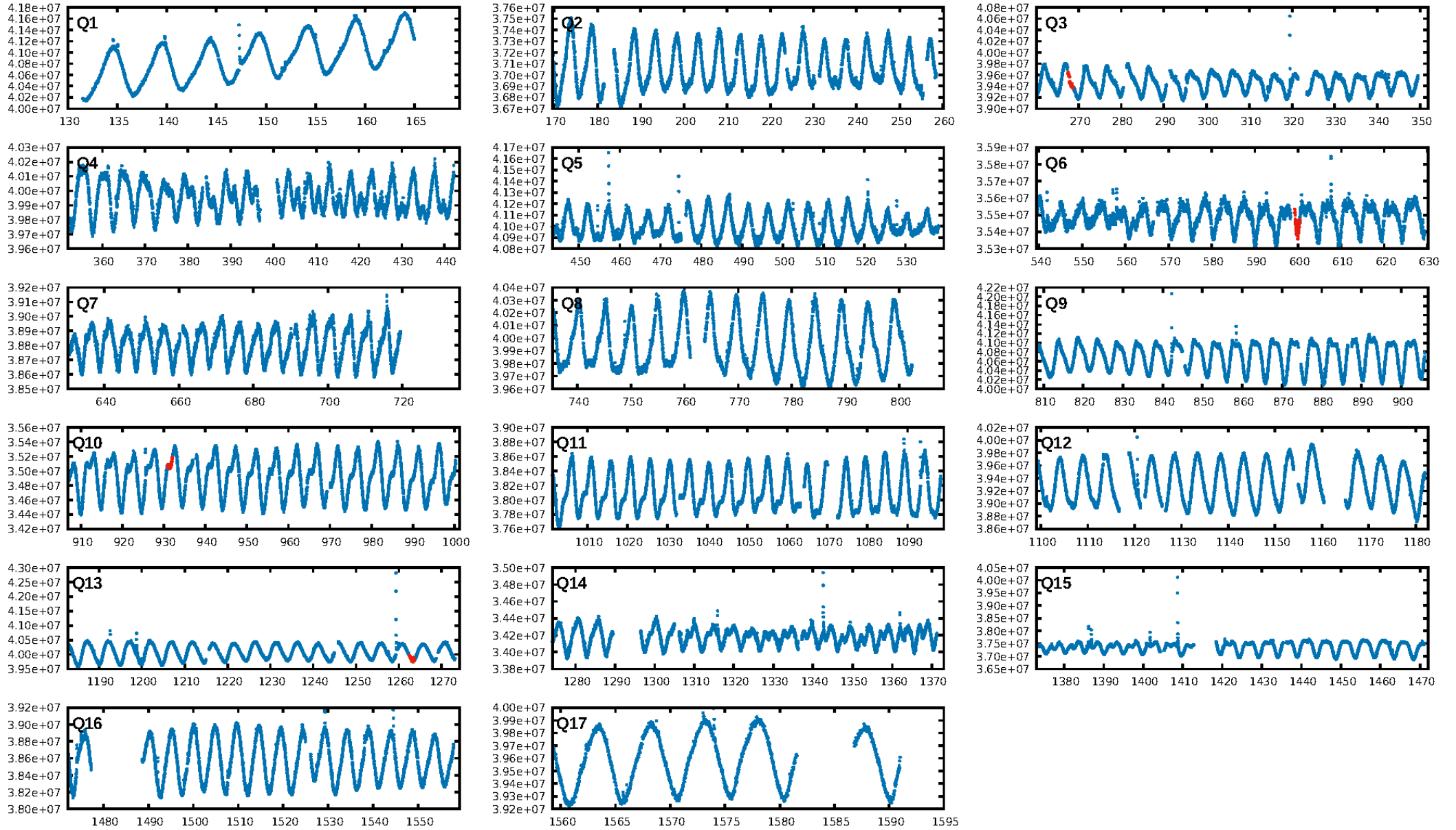
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [170.11 $\sigma$ ]  
ModelChiSquare2-sig: 55.1%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 4.53e-09**  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -3.789  
Centroid-sig: 15.4%  
Centroid-so: 1.232 arcsec [1.47 $\sigma$ ]  
OotOffset-rm: 1.284 arcsec [1.76 $\sigma$ ]  
OotOffset-st: 1/0/0/1 [2]  
KicOffset-rm: 0.731 arcsec [1.03 $\sigma$ ]  
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: 01-Feb-2016 04:54:40 Z

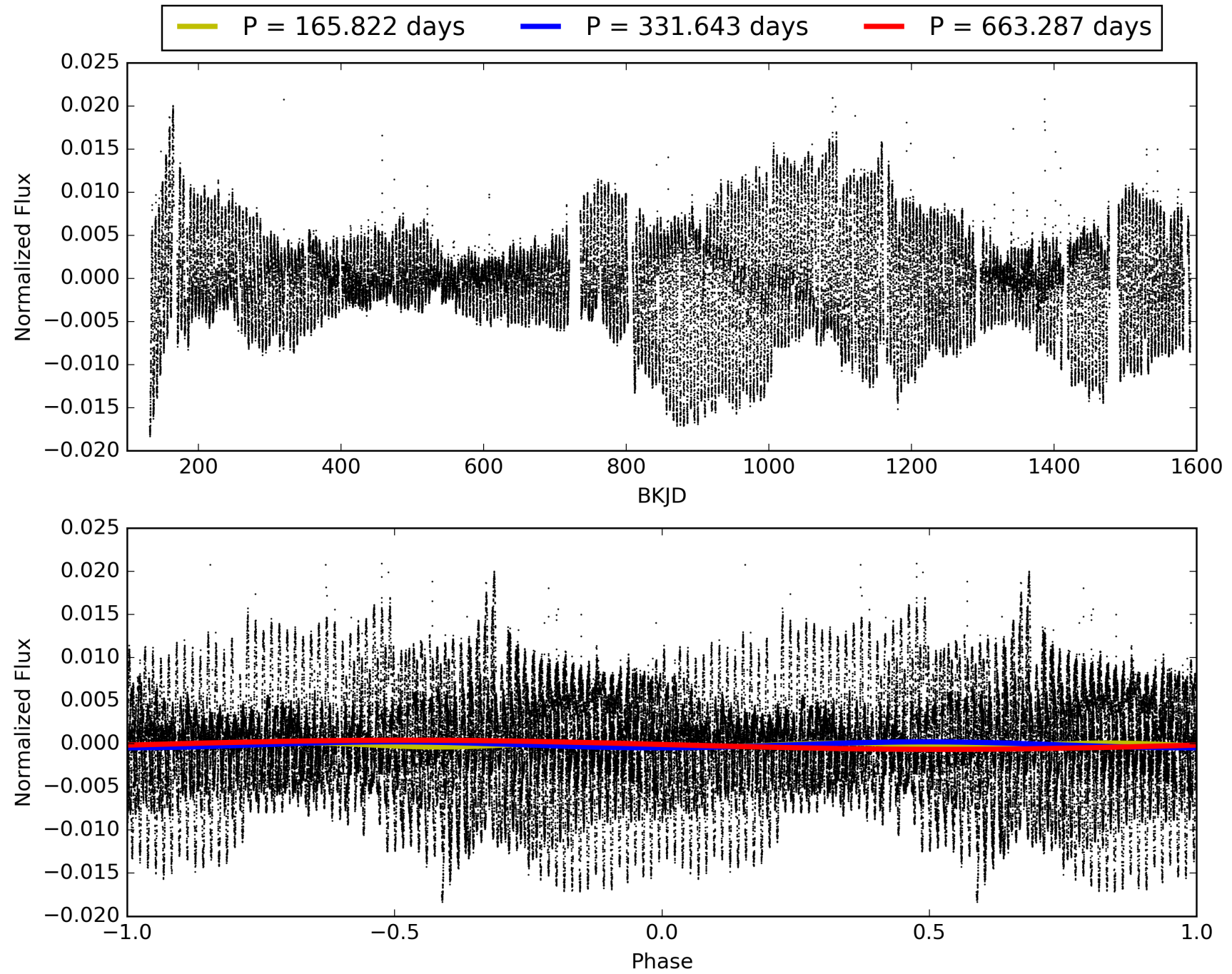
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 002013754-02, PDC Light Curves





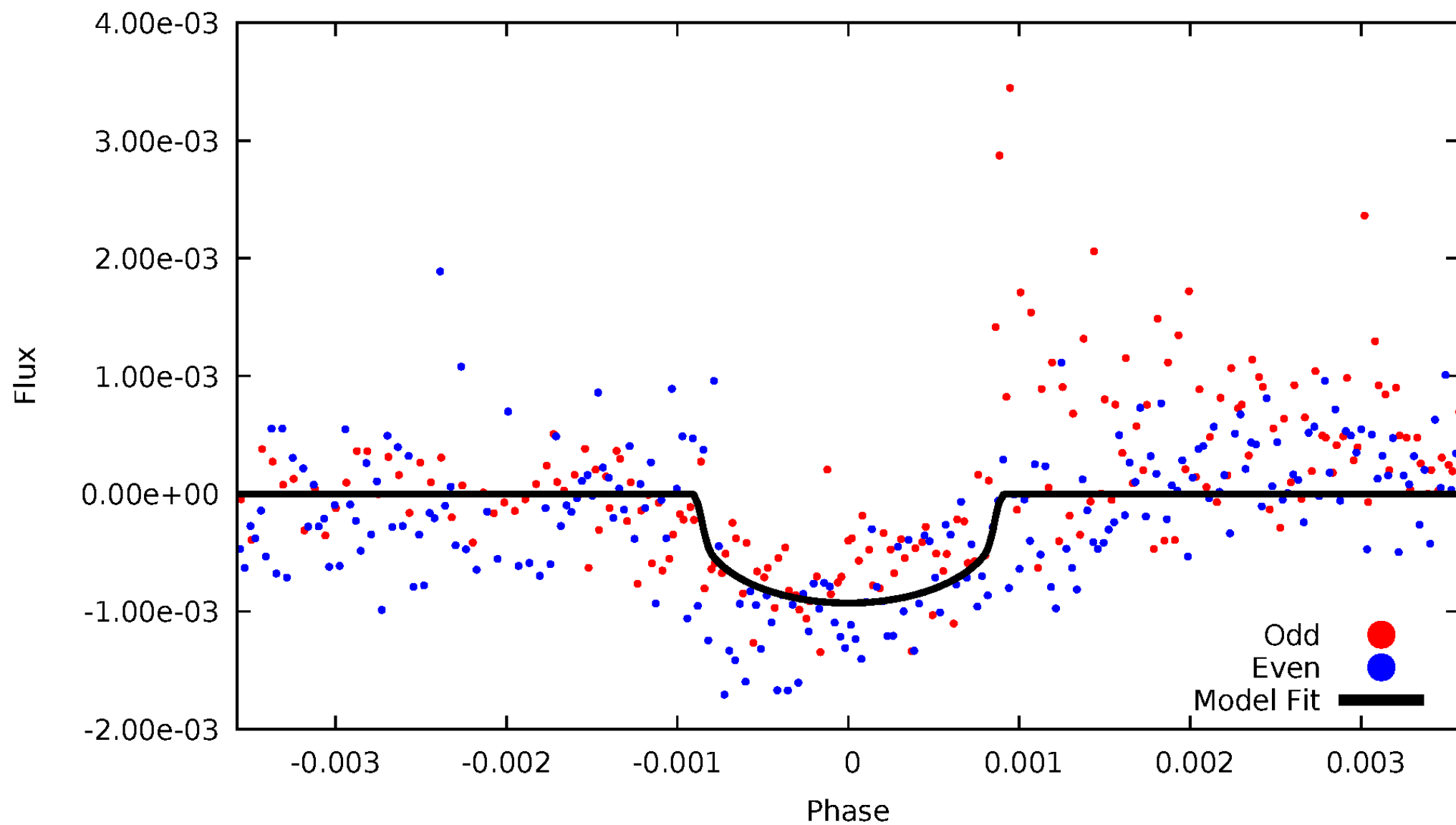
# TCE 002013754-02





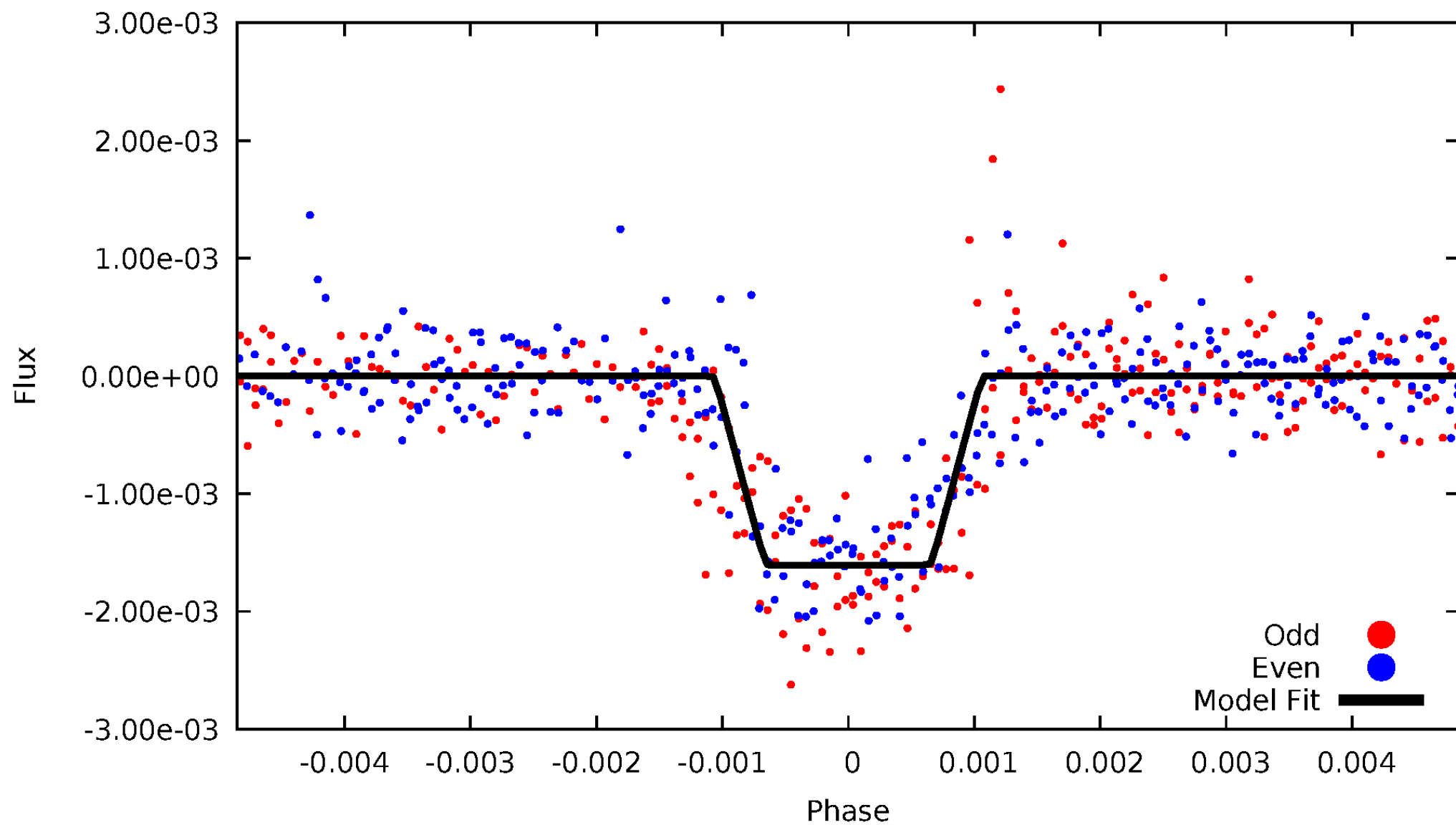
# DV Odd/Even

TCE 002013754-02



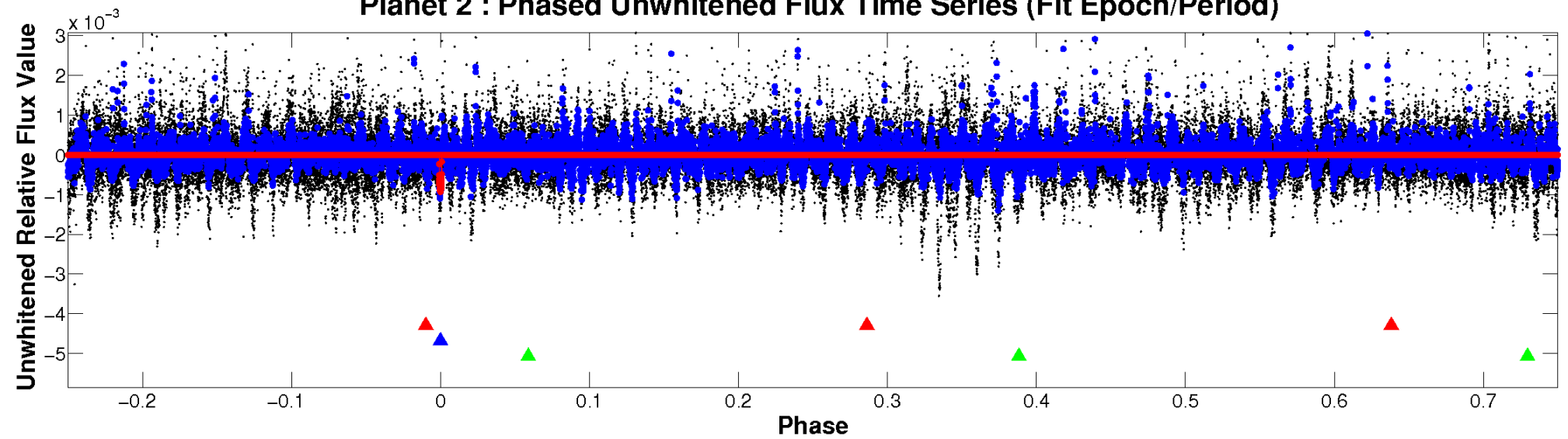
# ALT Odd/Even

TCE 002013754-02

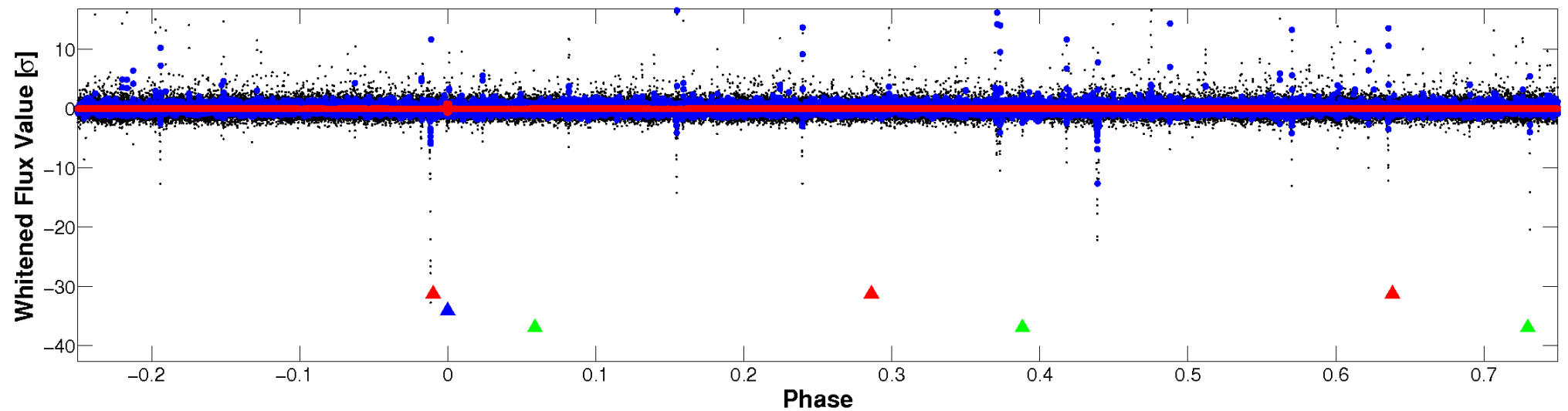


# Non-Whitened Vs. Whitened Light Curve

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

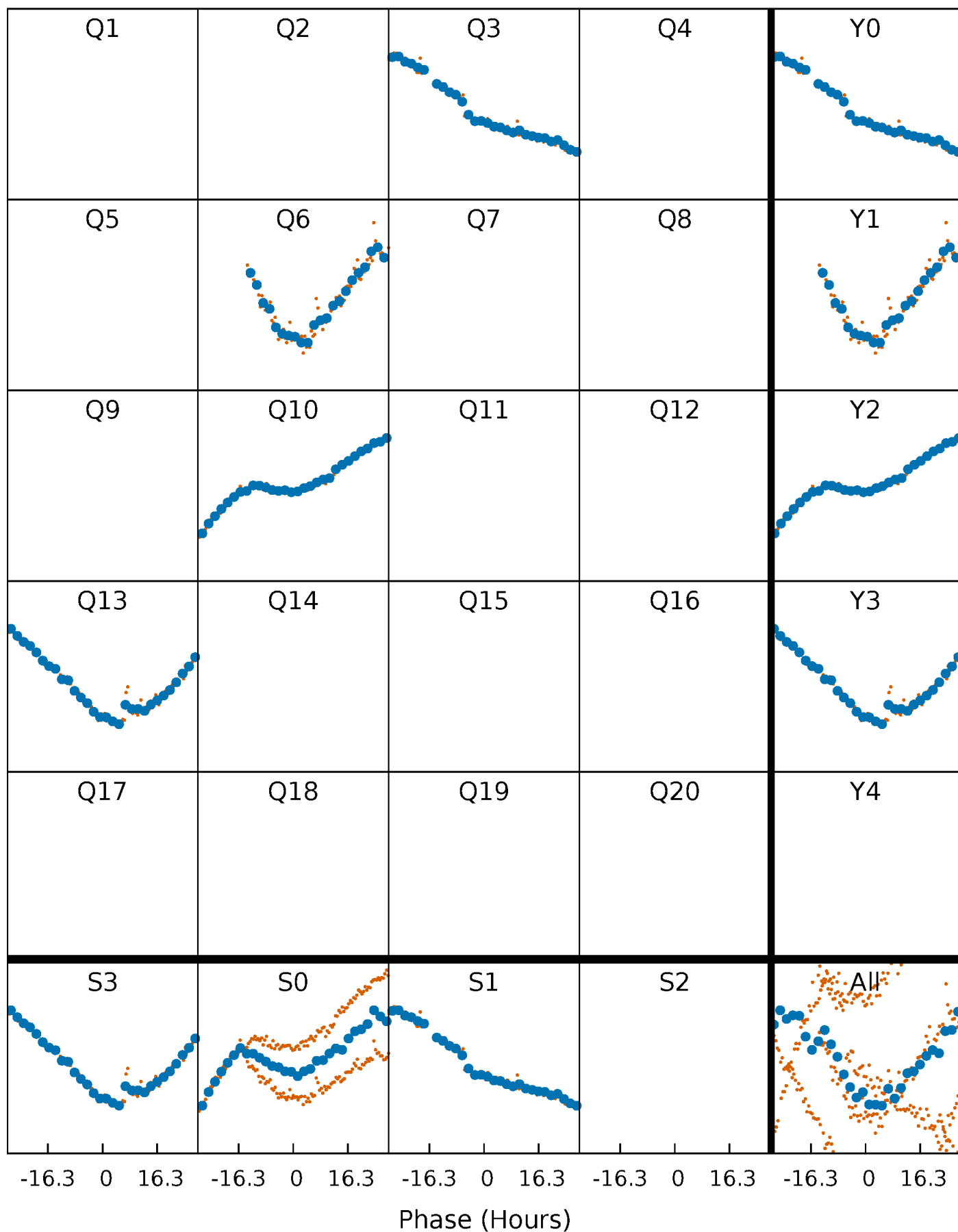


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



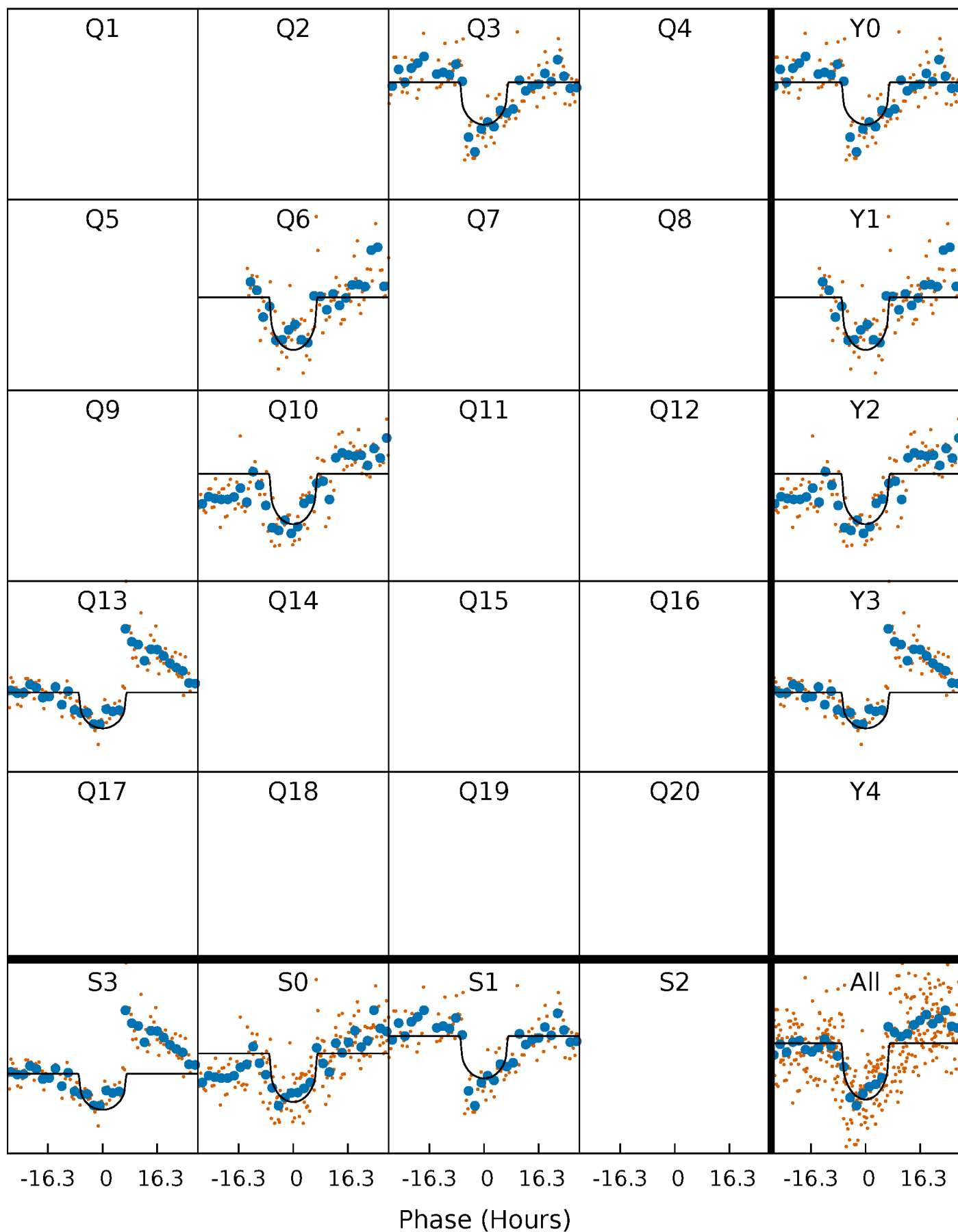
# PDC Quarter-Phased Transit Curves

TCE 002013754-02 P=331.643411 Days  $T_0=268.147998$  (BKJD)



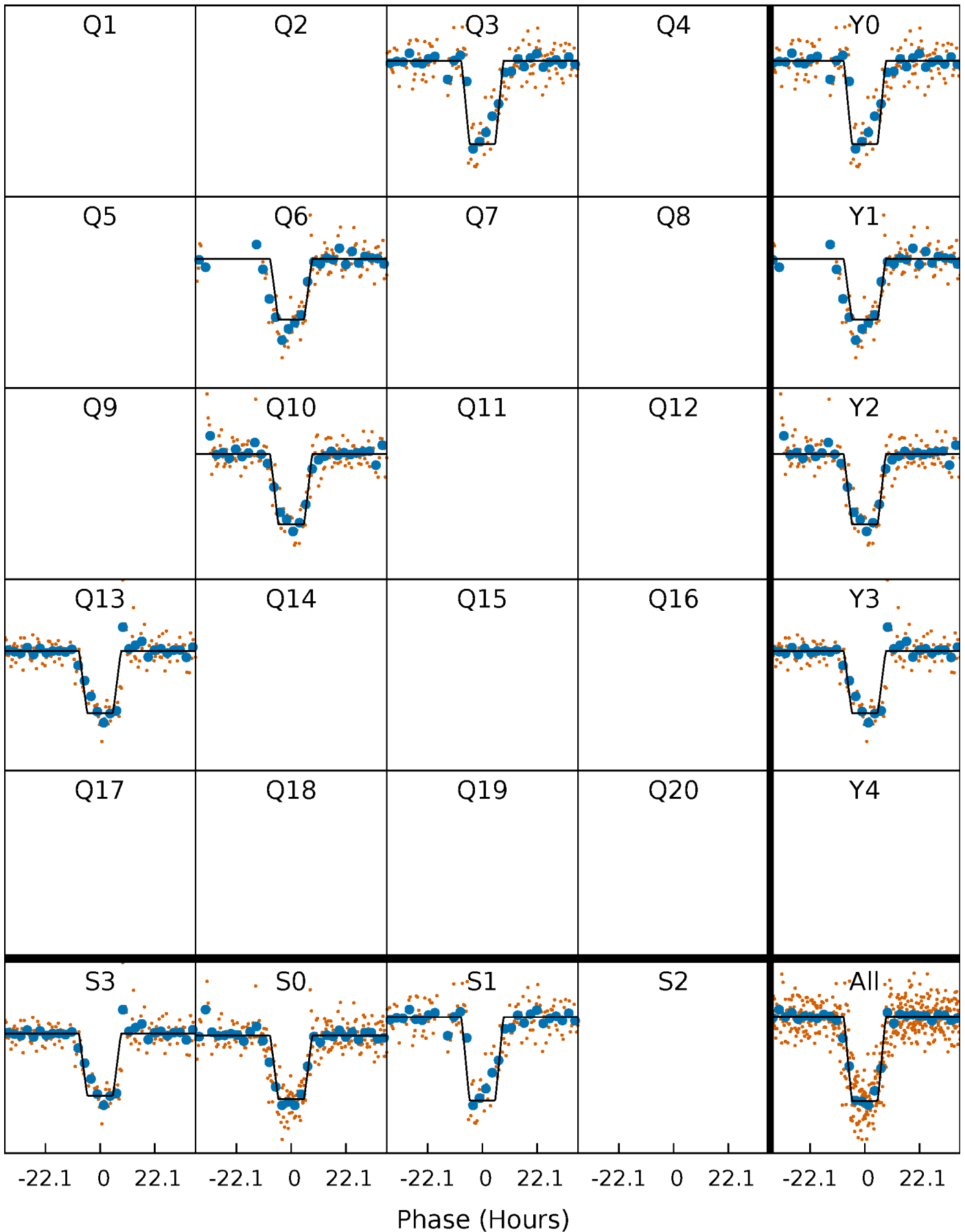
# DV Quarter-Phased Transit Curves

TCE 002013754-02 P=331.643411 Days  $T_0=268.147998$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

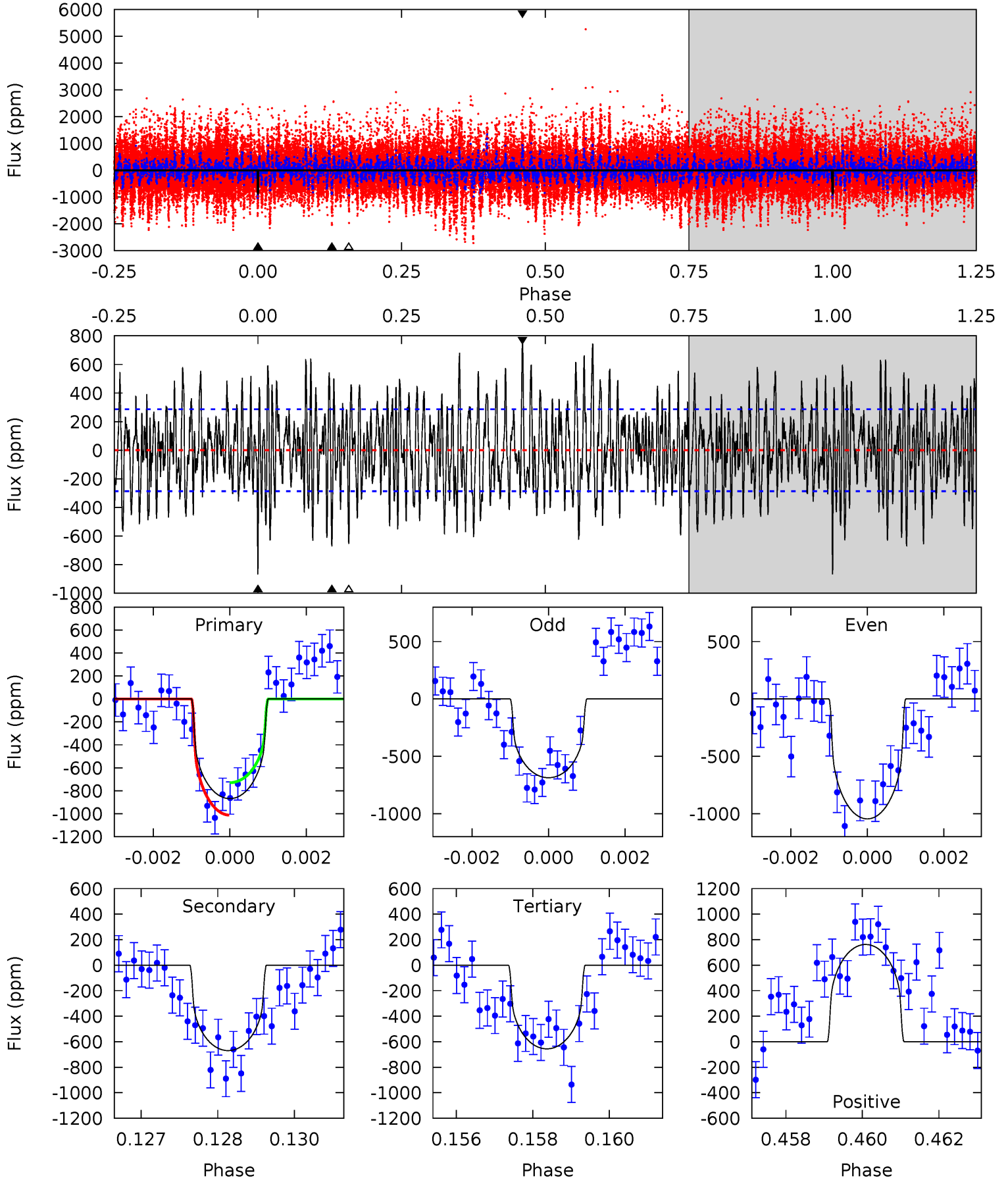
TCE 002013754-02 P=331.616245 Days  $T_0=268.142378$  (BKJD)



# DV Model-Shift Uniqueness Test

002013754-02, P = 331.643411 Days, E = 268.147998 Days

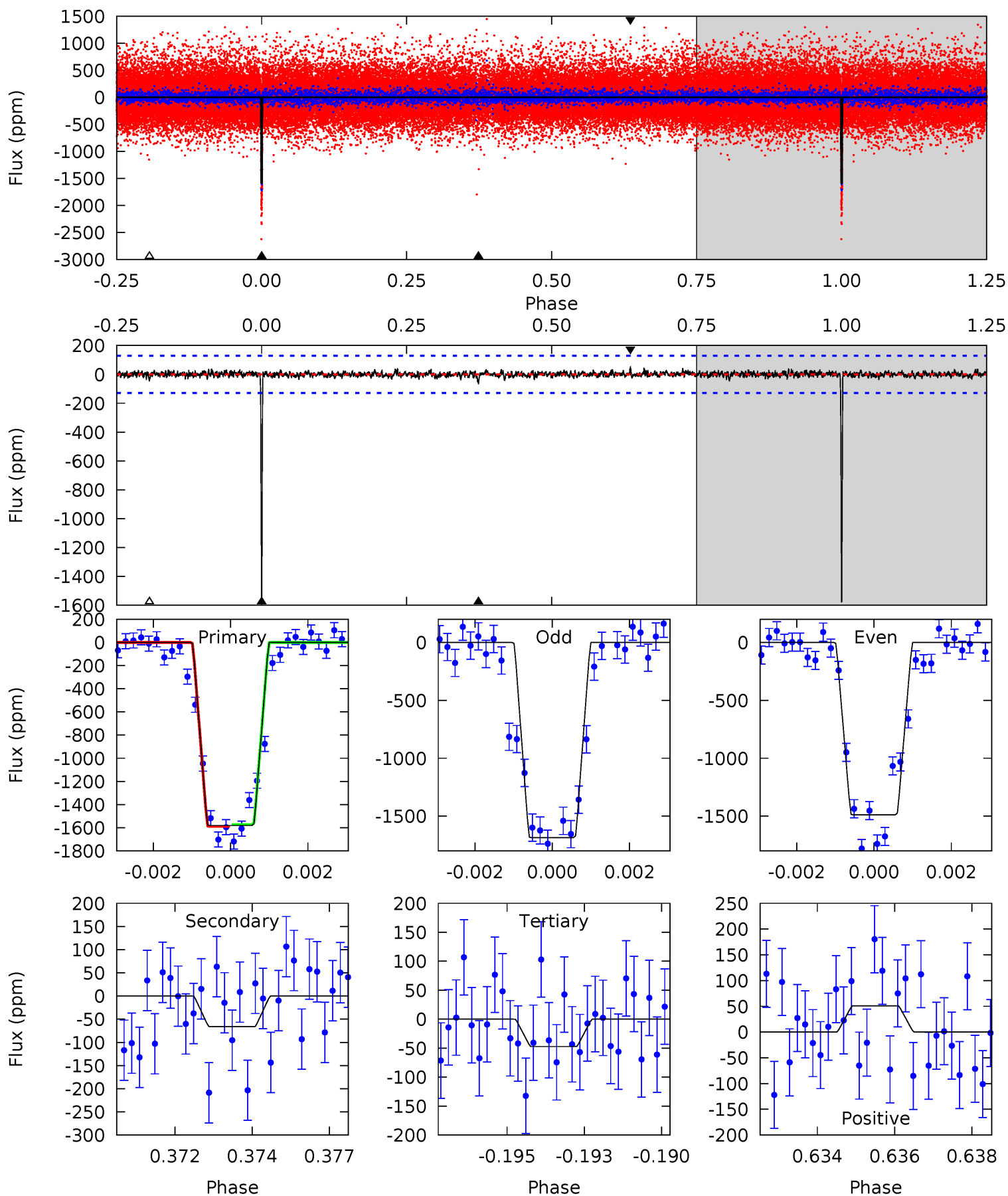
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
16.2	12.5	12.2	14.2	5.34	3.12	4.55	3.97	1.98	0.26	-1.73	3.20	1.02	0.47	2.65



# Alt Model-Shift Uniqueness Test

002013754-02, P = 331.616245 Days, E = 268.142378 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
65.3	2.74	1.95	2.11	5.31	3.07	0.47	63.3	63.1	0.78	0.63	4.03	1.01	0.03	0.31





### Stellar Parameters For KIC 002013754

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4505^{+137}_{-137}$	$4.571^{+0.052}_{-0.020}$	$0.360^{+0.100}_{-0.300}$	$0.741^{+0.026}_{-0.057}$	$0.747^{+0.040}_{-0.052}$	$2.580^{+0.554}_{-0.206}$
	+3%/-3%	+1%/-0%	+28%/-83%	+4%/-8%	+5%/-7%	+21%/-8%
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 002013754-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-670 \pm 54$	$2.21^{+0.83}_{-0.77}$	$258^{+9}_{-9}$	$4420^{+902}_{-497}$	$54987^{+74329}_{-25597}$
Alt.	$-66 \pm 24$	$3.20^{+0.86}_{-0.80}$	$257^{+9}_{-9}$	$2724^{+263}_{-233}$	$2601^{+2511}_{-1276}$

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

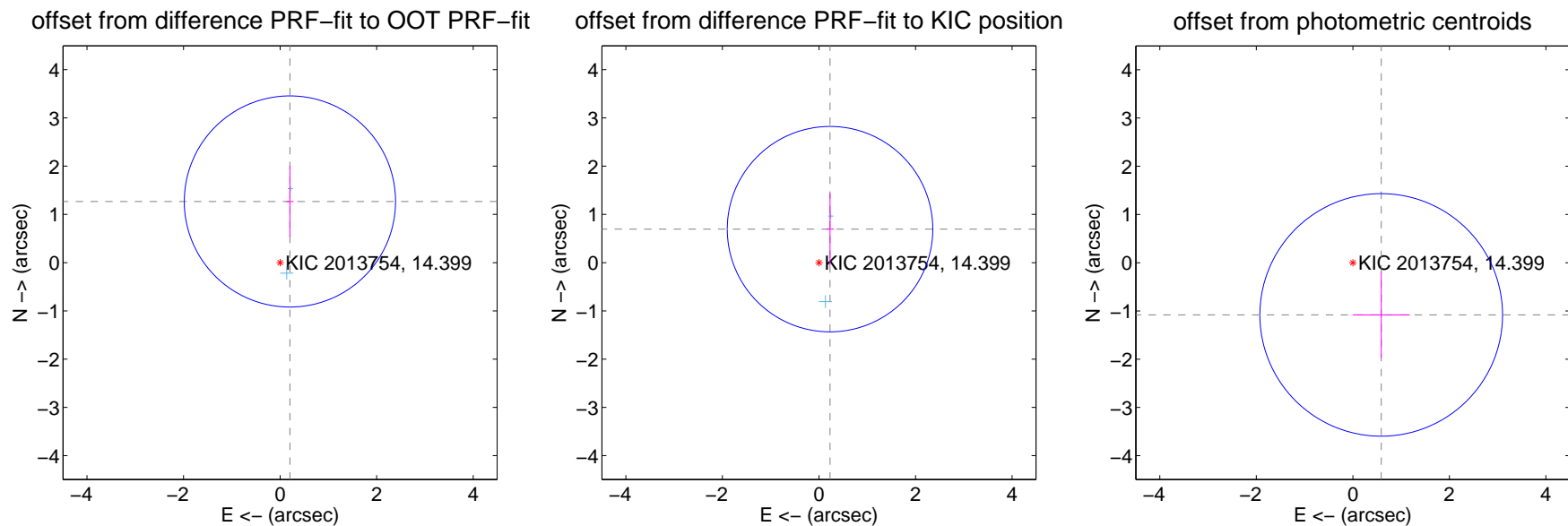
## DV Centroid Data

Supplemental centroid analysis for 002013754-02. Kepler magnitude: 14.40. Transit SNR 7.73

There are 2 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.57 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.284 \pm 0.729$	1.76	$-0.203 \pm 0.074$	$1.268 \pm 0.739$
PRF-fit source offset from KIC position	$0.731 \pm 0.710$	1.03	$-0.229 \pm 0.081$	$0.694 \pm 0.747$
photometric centroid source offset	$1.23 \pm 0.84$	1.47	$-0.59 \pm 0.59$	$-1.08 \pm 0.90$



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

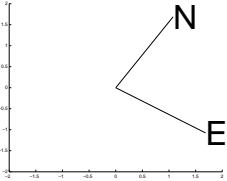
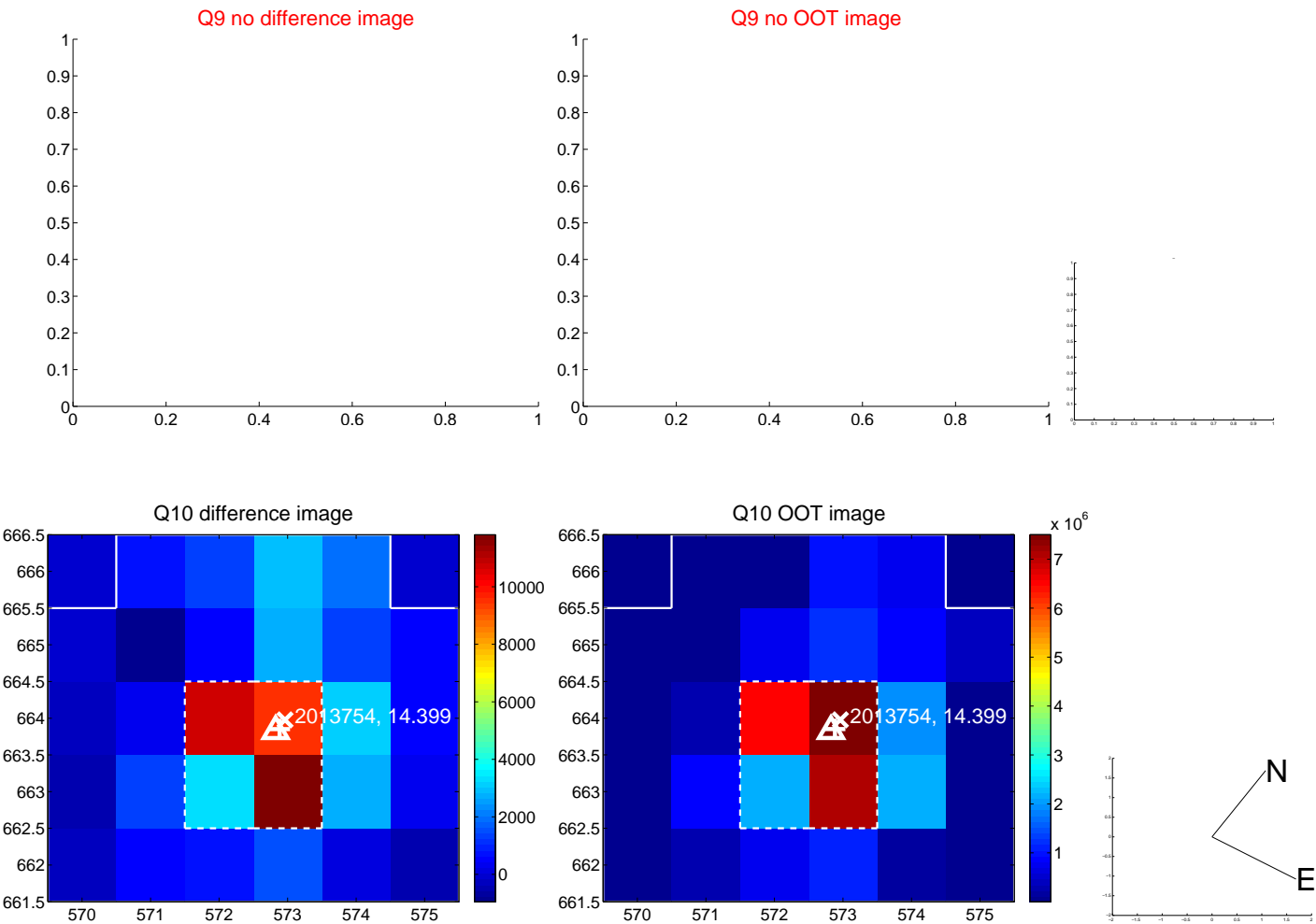
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



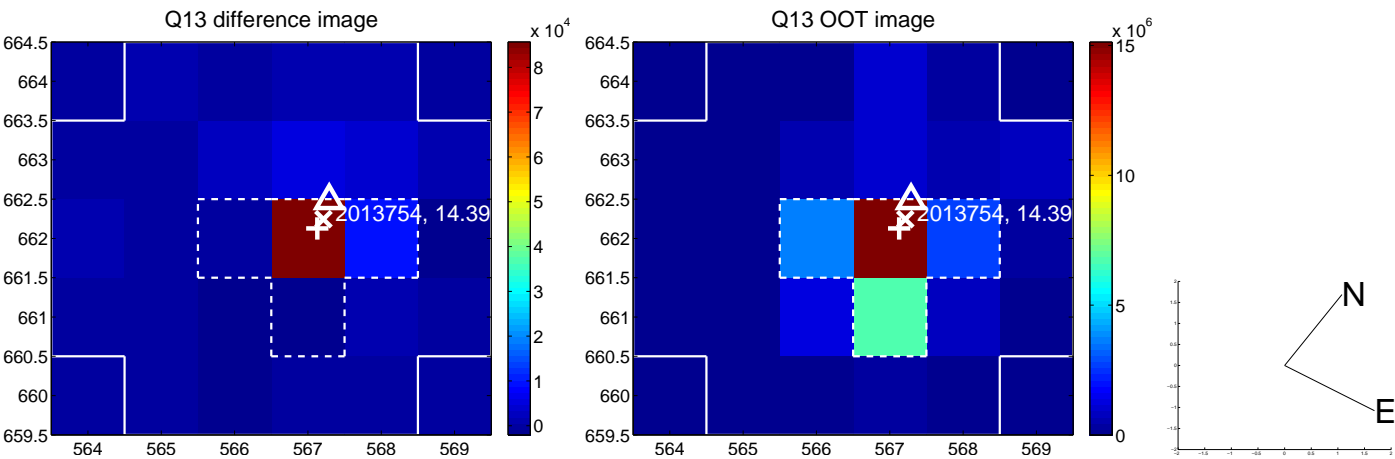
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



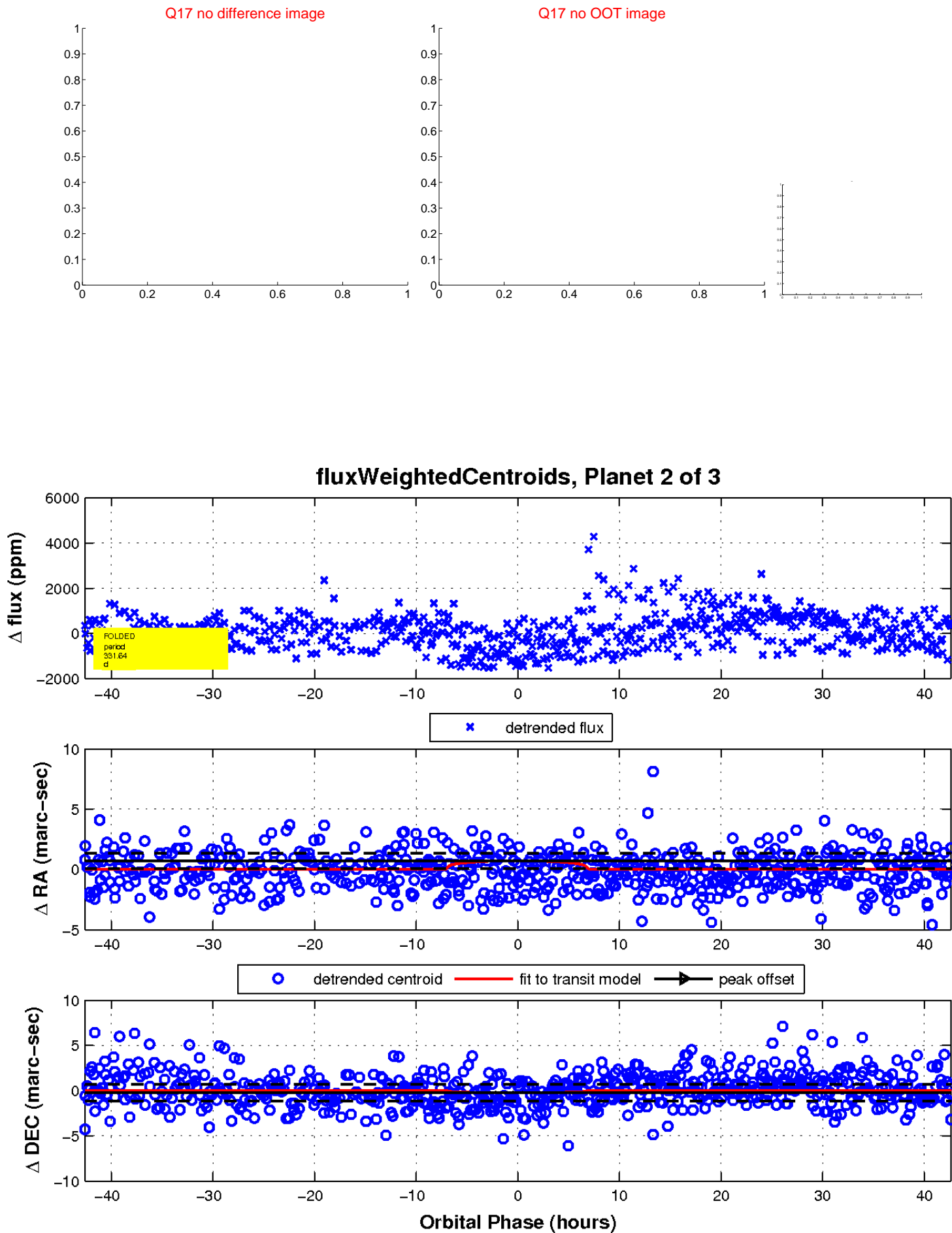
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

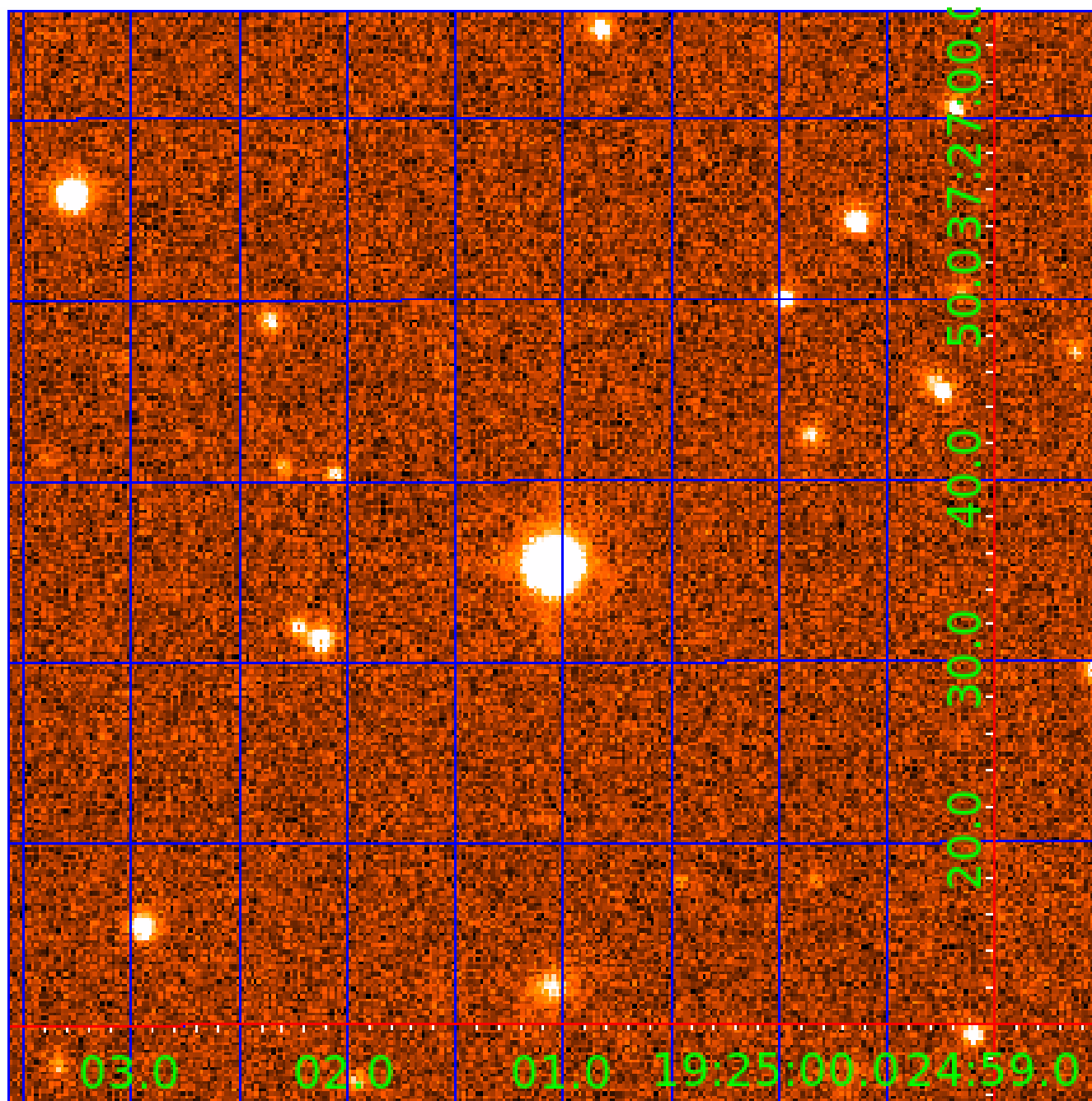


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 002013754

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002013754-01	OBS	No	448.370132	363.080948	1505.4	7.426	12.7	11.8	0.74	4505	3.12	0.19
002013754-02	OBS	No	331.643411	268.147998	928.5	14.226	9.8	7.7	0.74	4505	2.25	0.28
002013754-03	OBS	No	440.850858	510.139791	1004.3	5.917	10.7	7.5	0.74	4505	2.31	0.19

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002013754-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—CENT_KIC_POS
002013754-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
002013754-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_SKYE—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST

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

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

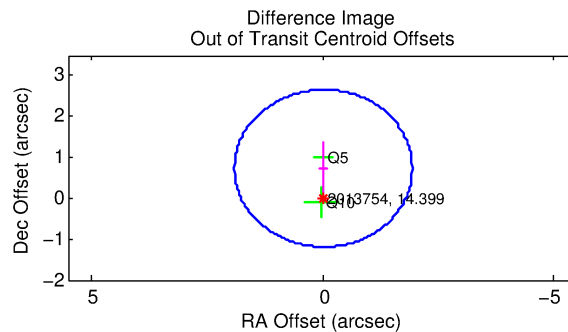
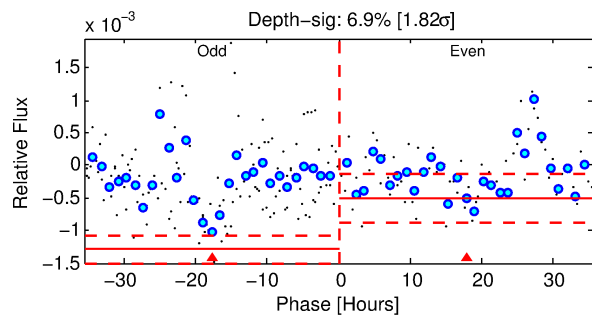
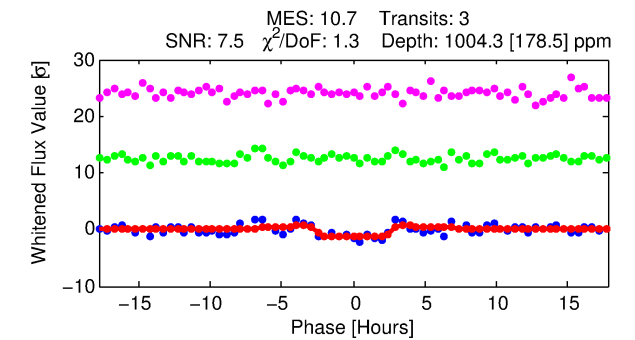
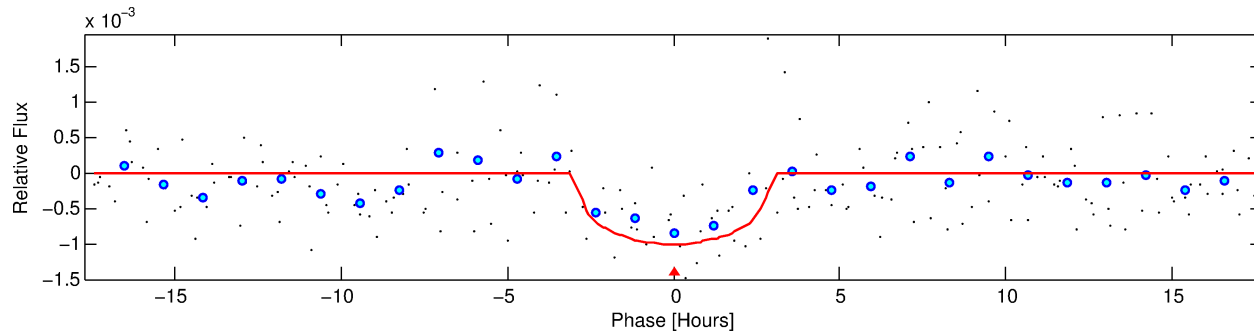
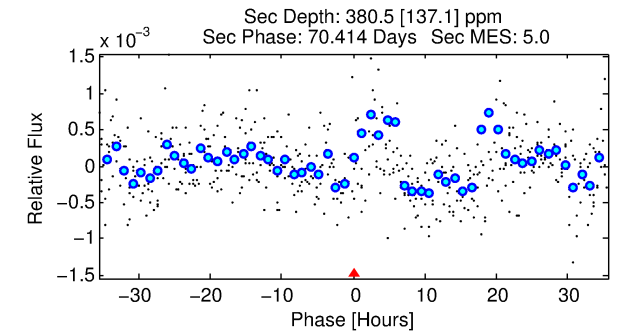
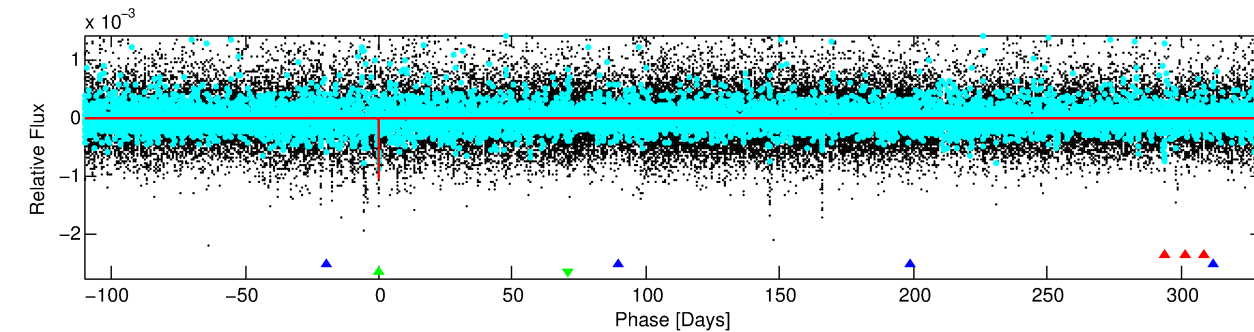
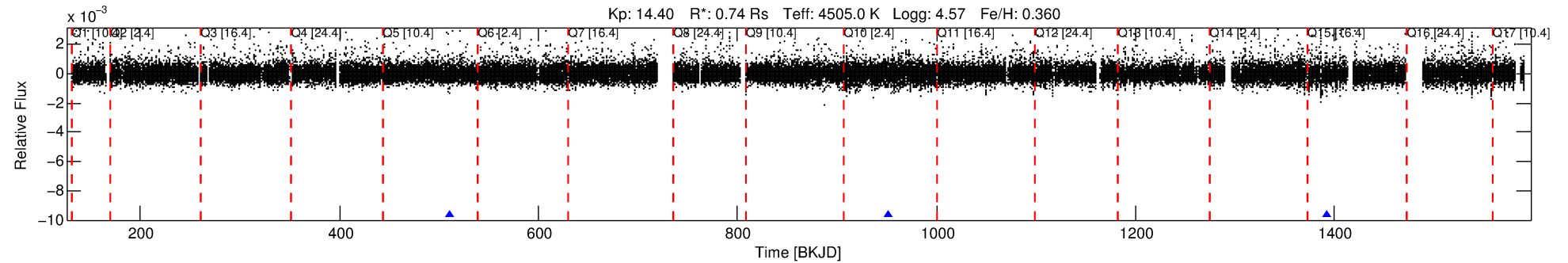
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 002013754-03

No Significant Match Found

# DV One-Page Summary

KIC: 2013754 Candidate: 3 of 3 Period: 440.851 d



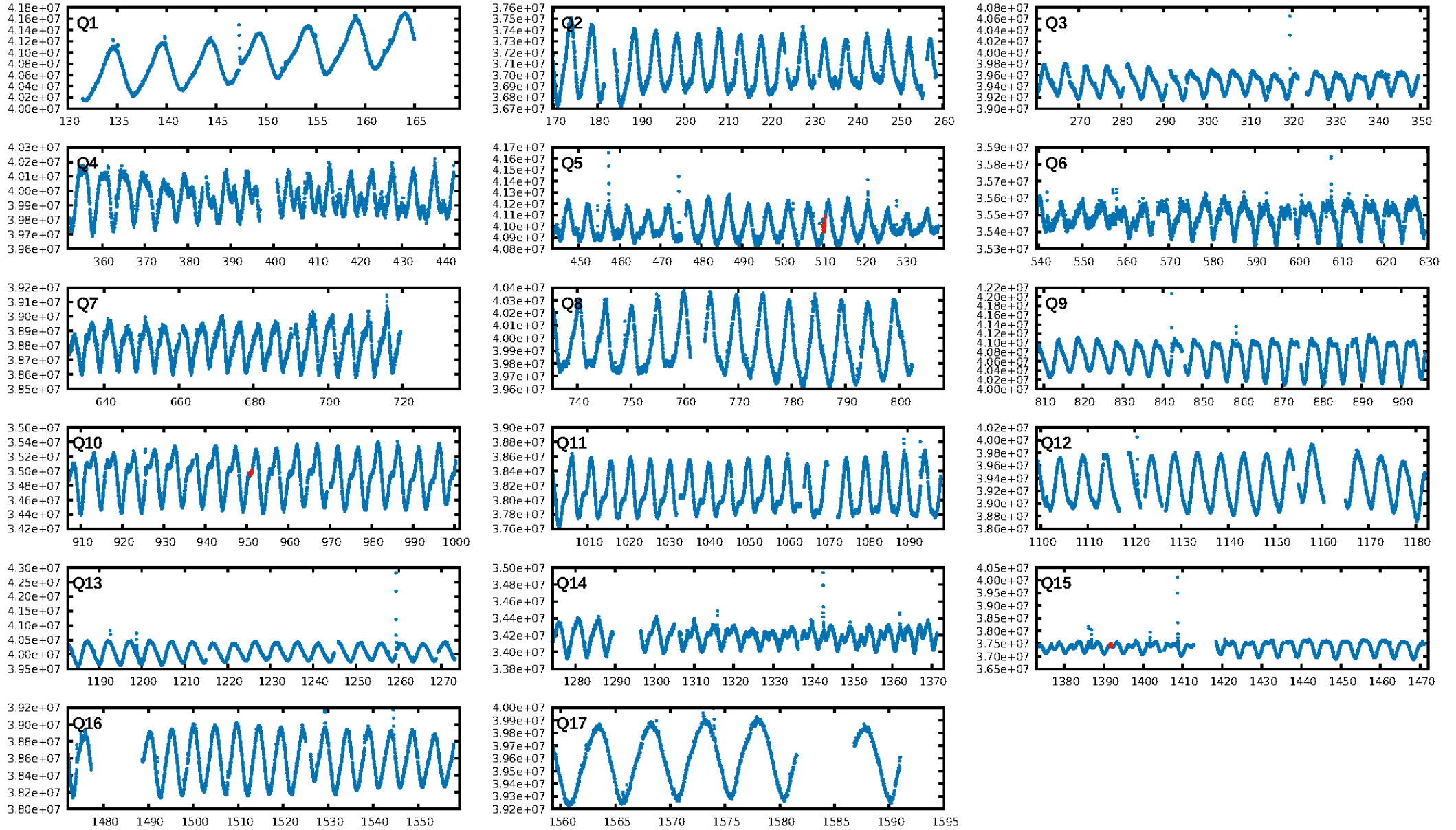
## DV Fit Results:

Period = 440.85086 [0.00870] d  
Epoch = 510.1398 [0.0106] BKJD  
Rp/R\* = 0.0285 [0.0427]  
a/R\* = 536.97 [2268.31]  
b = 0.41 [8.79]  
Seff = 0.19 [0.03]  
Teq = 169 [7] K  
Rp = 2.30 [3.46] Re  
a = 1.0283 [0.0668] AU  
Ag = 41664.61 [125727.93] [0.33σ]  
Teffp = 3727 [2812] K [1.27σ]

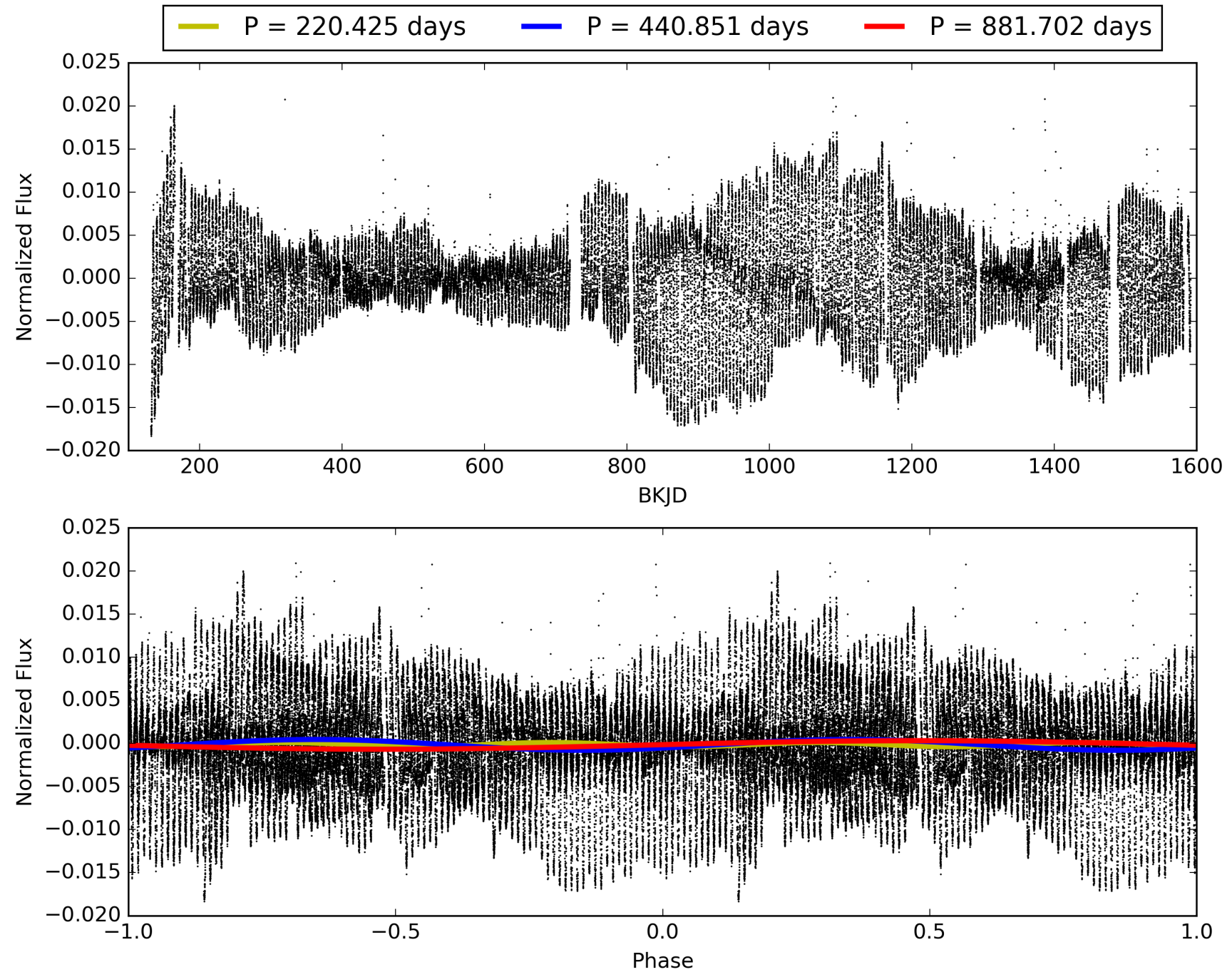
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [170.11σ]  
LongPeriod-sig: 100.0% [19.00σ]  
ModelChiSquare2-sig: 4.8%  
ModelChiSquareGof-sig: 93.7%  
**Bootstrap-pfa: 7.70e-12**  
RollingBand-fgt: 1.00 [3/3]  
**GhostDiagnostic-chr: -0.03703**  
Centroid-sig: 12.5%  
Centroid-so: 1.362 arcsec [1.36σ]  
OotOffset-rm: 0.734 arcsec [1.14σ]  
OotOffset-st: 1/0/0/1 [2]  
KicOffset-rm: 0.237 arcsec [0.37σ]  
KicOffset-st: 1/0/0/1 [2]  
DiffImageQuality-fgm: 1.00 [2/2]  
DiffImageOverlap-fno: 1.00 [3/3]

# TCE 002013754-03, PDC Light Curves

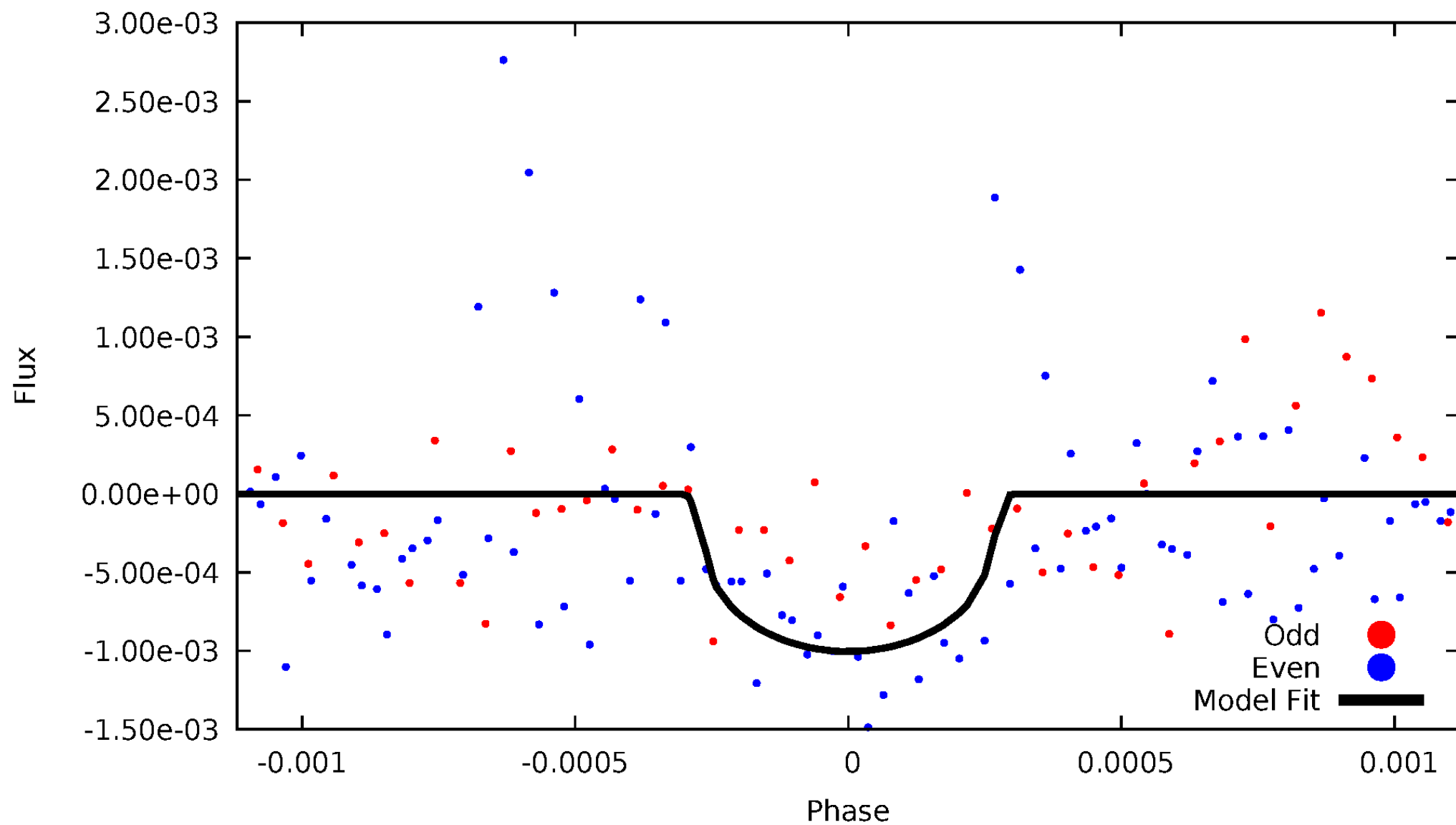


# TCE 002013754-03



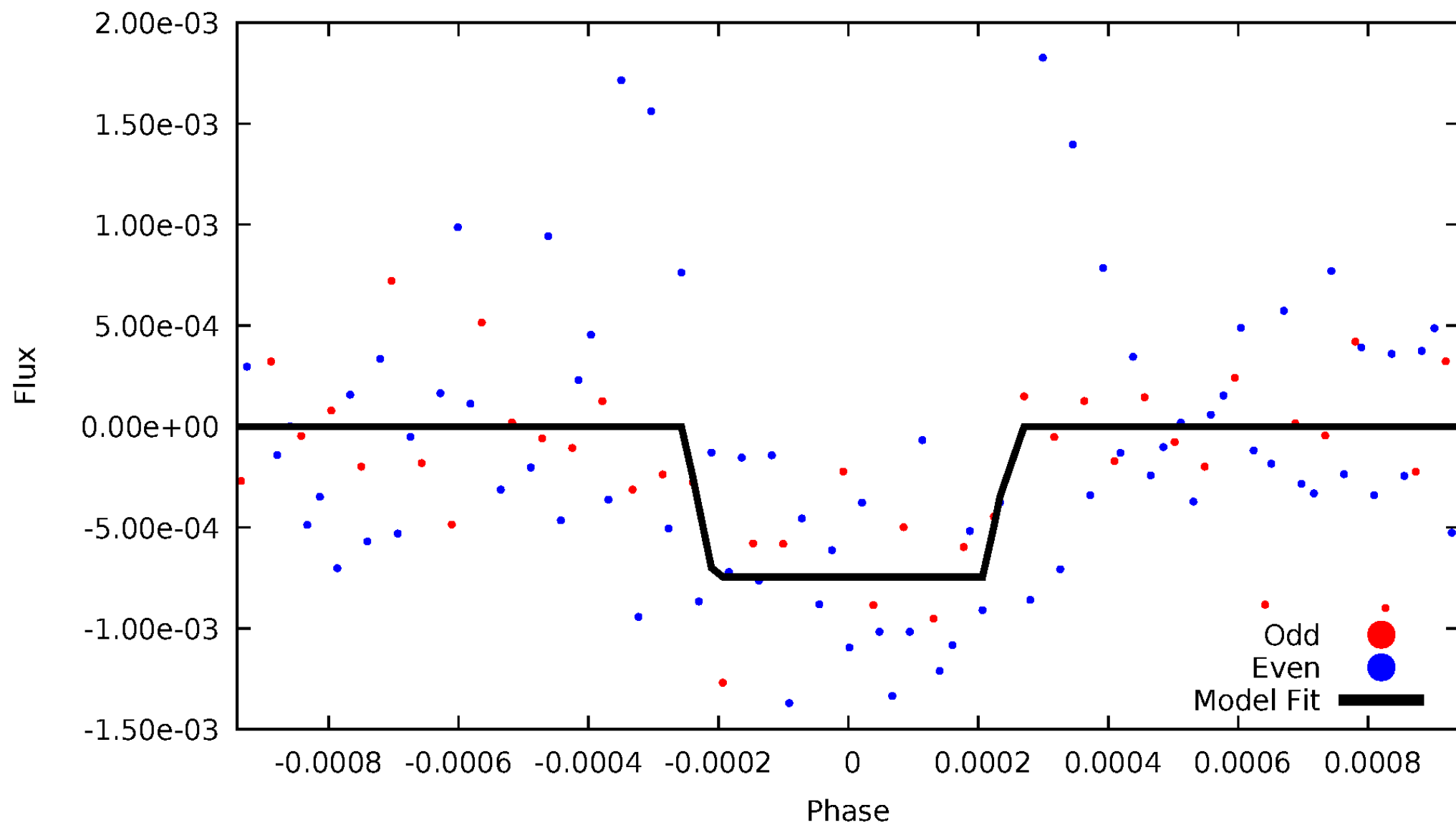
# DV Odd/Even

TCE 002013754-03



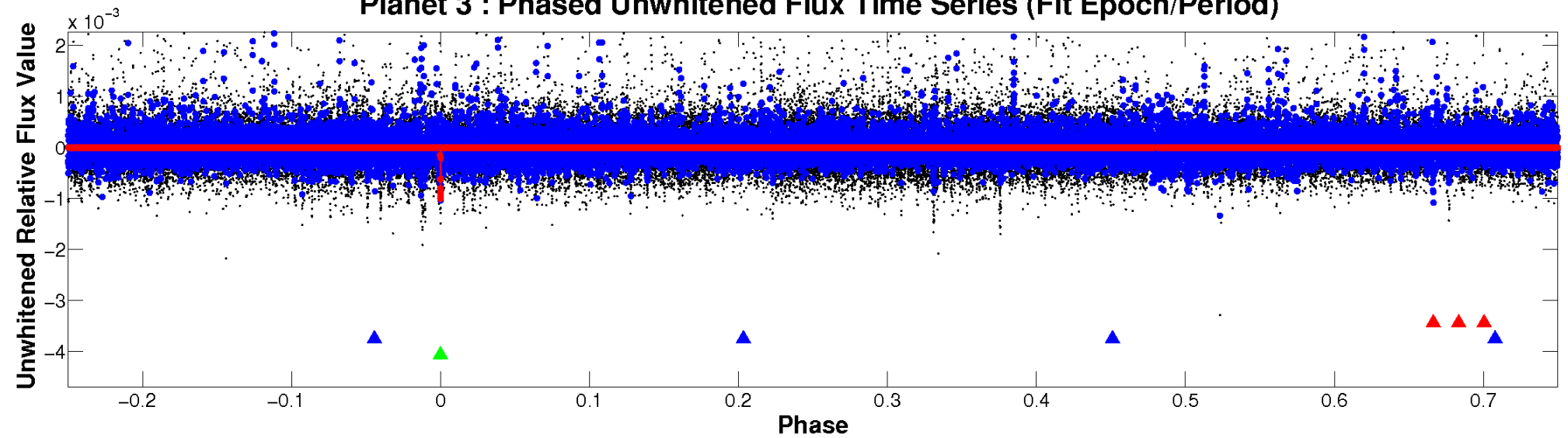
# ALT Odd/Even

TCE 002013754-03

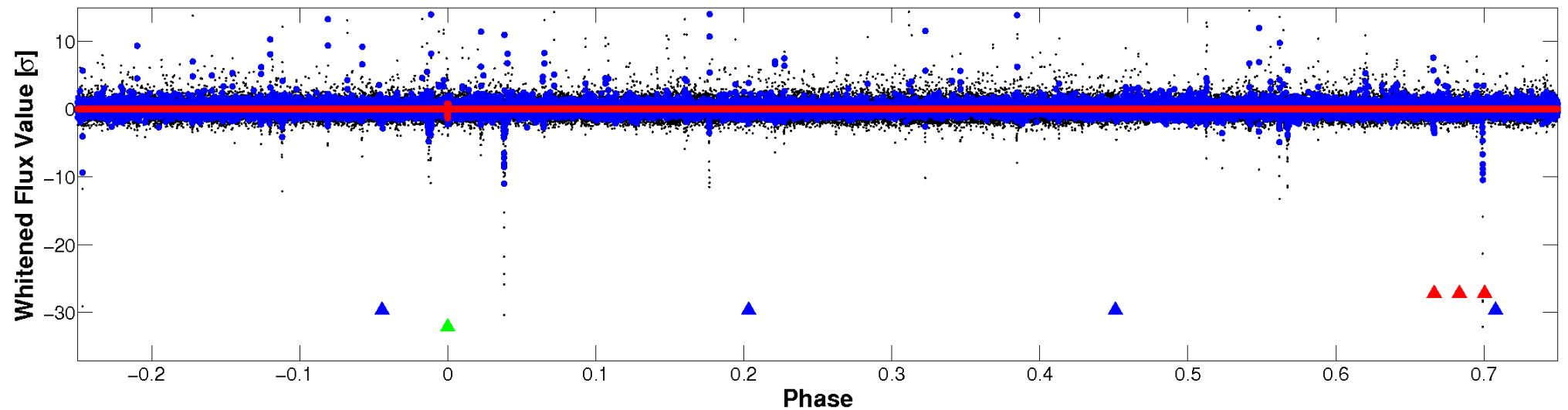


# Non-Whitened Vs. Whitened Light Curve

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

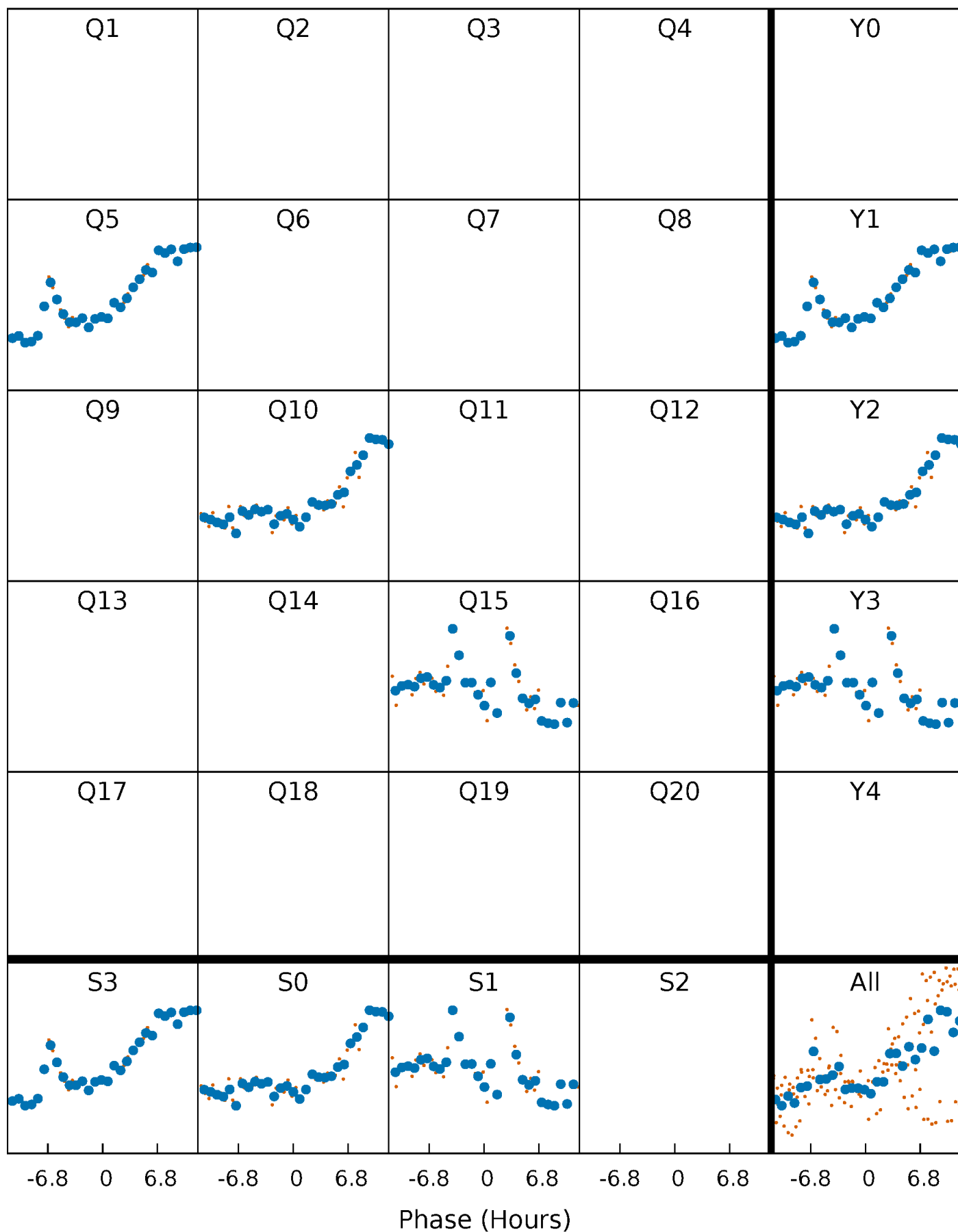


**Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

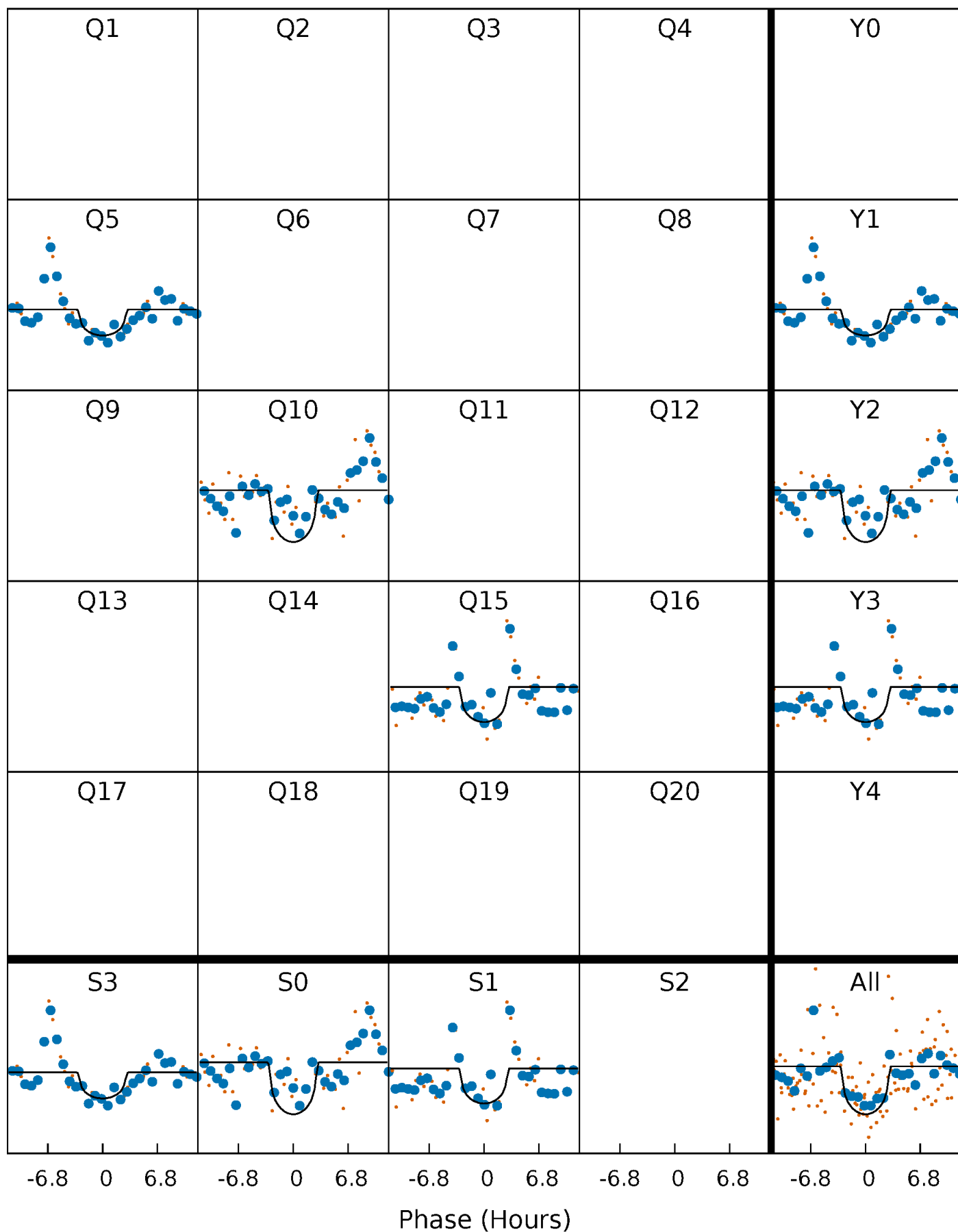
TCE 002013754-03 P=440.850858 Days  $T_0=510.139792$  (BKJD)





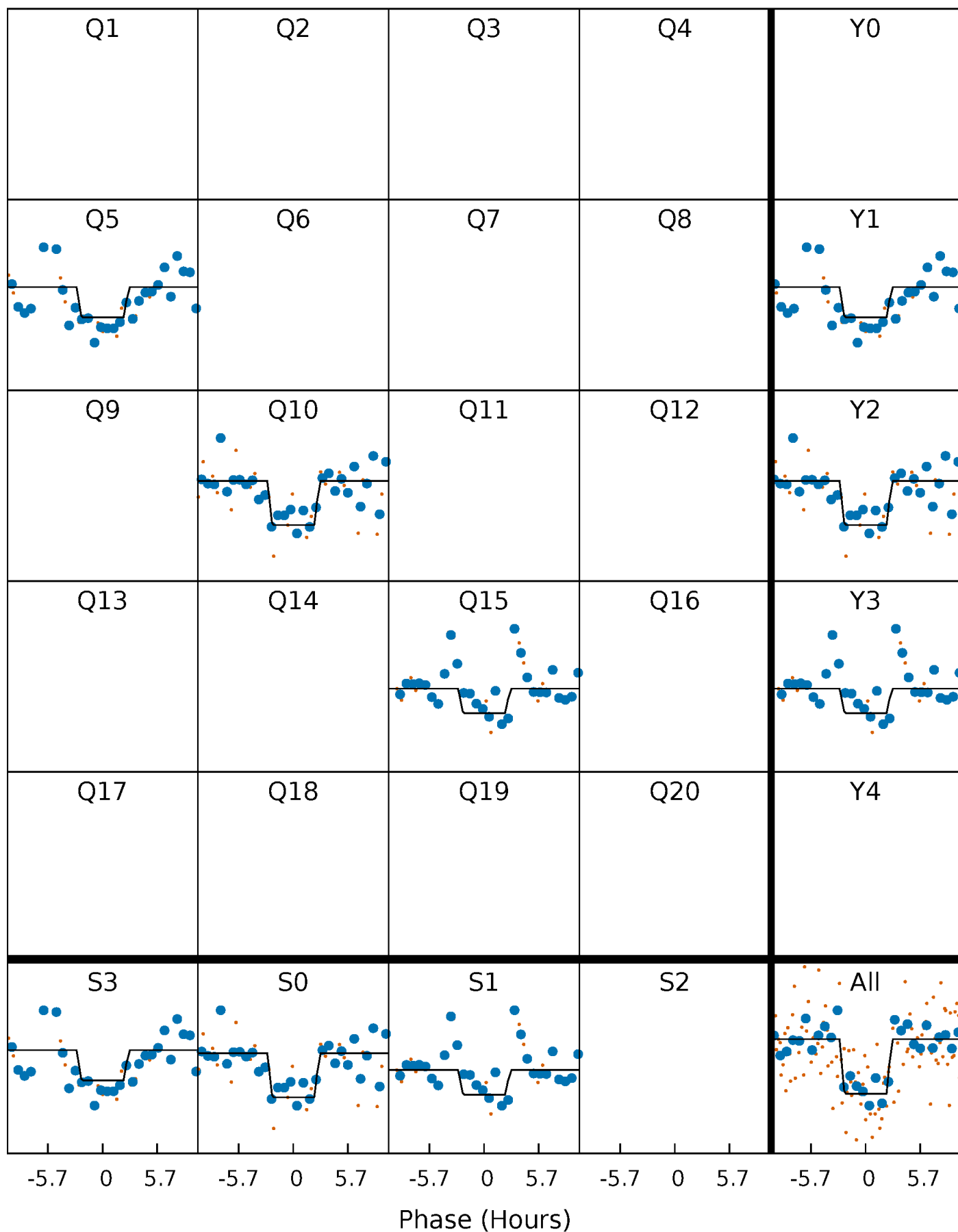
# DV Quarter-Phased Transit Curves

TCE 002013754-03 P=440.850858 Days  $T_0=510.139792$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

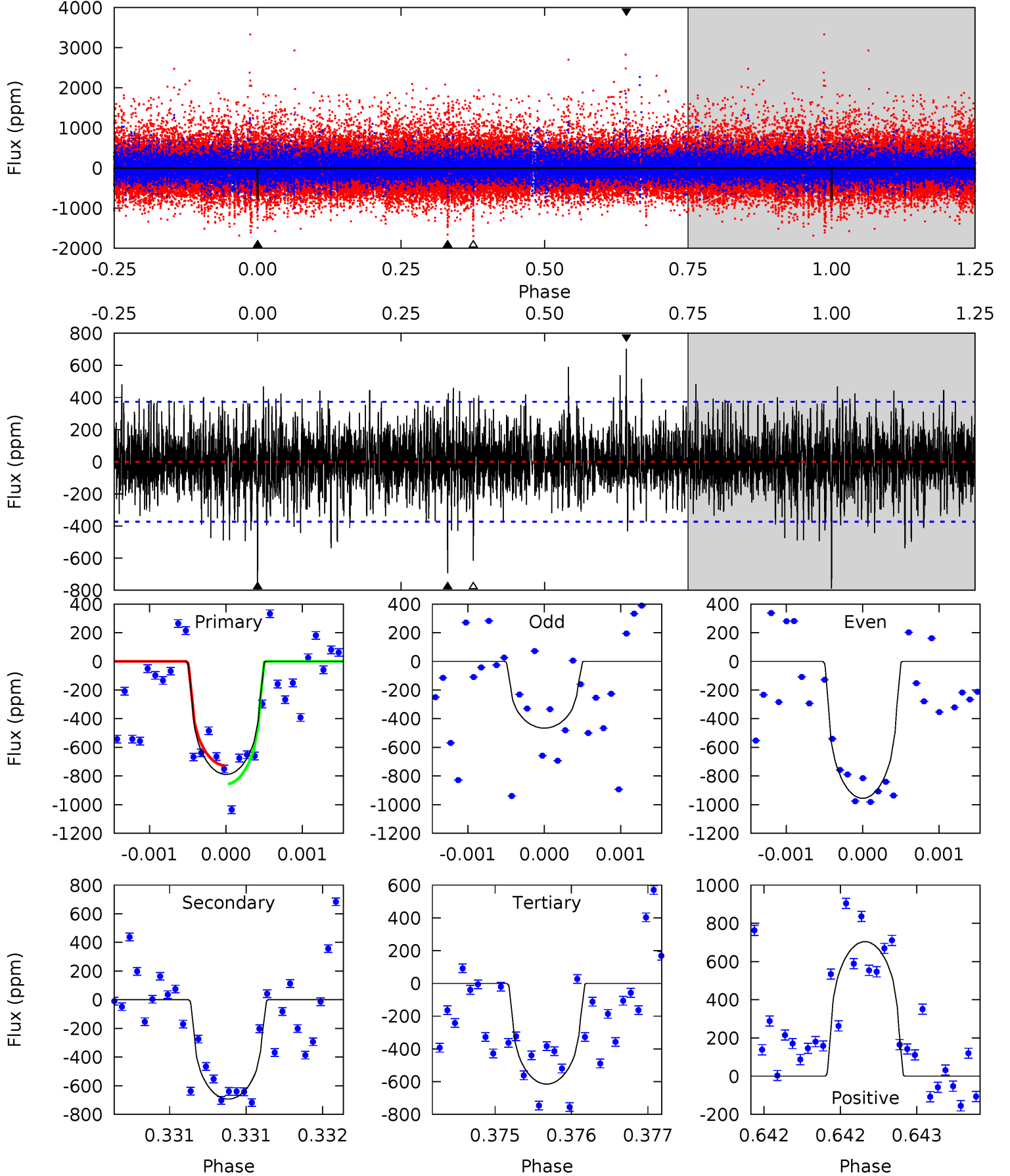
TCE 002013754-03 P=440.860868 Days  $T_0=510.106024$  (BKJD)



# DV Model-Shift Uniqueness Test

002013754-03, P = 440.850858 Days, E = 69.288934 Days

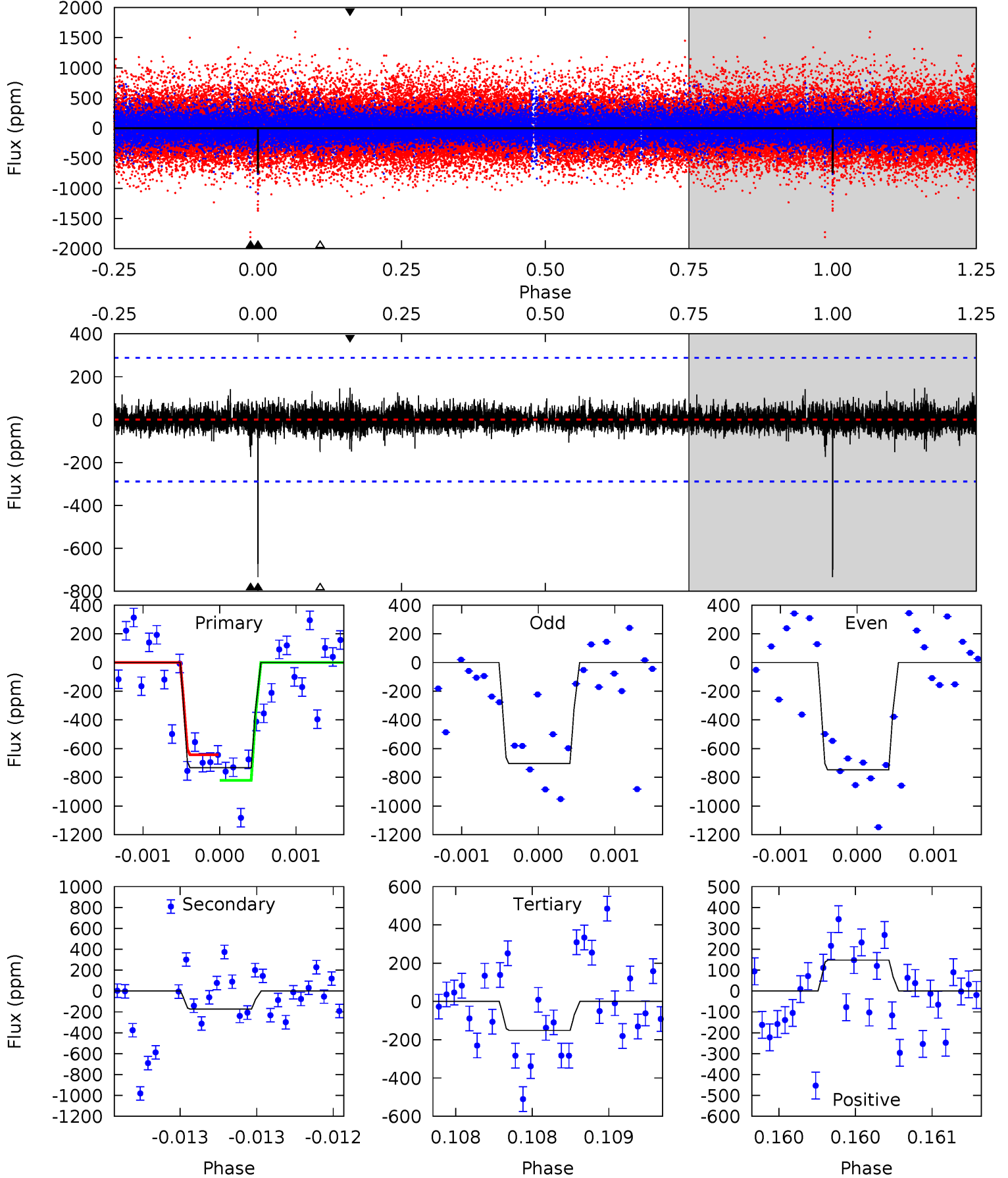
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.7	10.3	9.14	10.5	5.54	3.44	2.05	2.59	1.26	1.16	-0.16	3.17	0.96	0.47	0.95



# Alt Model-Shift Uniqueness Test

002013754-03, P = 440.860868 Days, E = 69.245156 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.2	3.36	2.93	2.86	5.57	3.48	0.57	11.3	11.3	0.44	0.50	0.41	1.05	0.17	1.73



### Stellar Parameters For KIC 002013754

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4505^{+137}_{-137}$	$4.571^{+0.052}_{-0.020}$	$0.360^{+0.100}_{-0.300}$	$0.741^{+0.026}_{-0.057}$	$0.747^{+0.040}_{-0.052}$	$2.580^{+0.554}_{-0.206}$
	+3%/-3%	+1%/-0%	+28%/-83%	+4%/-8%	+5%/-7%	+21%/-8%
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 002013754-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-693 \pm 67$	$3.46^{+3.07}_{-2.23}$	$234^{+7}_{-8}$	$3793^{+1895}_{-698}$	$33939^{+235216}_{-24452}$
Alt.	$-174 \pm 52$	$3.33^{+2.87}_{-2.16}$	$235^{+8}_{-8}$	$3058^{+1298}_{-481}$	$8804^{+67093}_{-6320}$

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

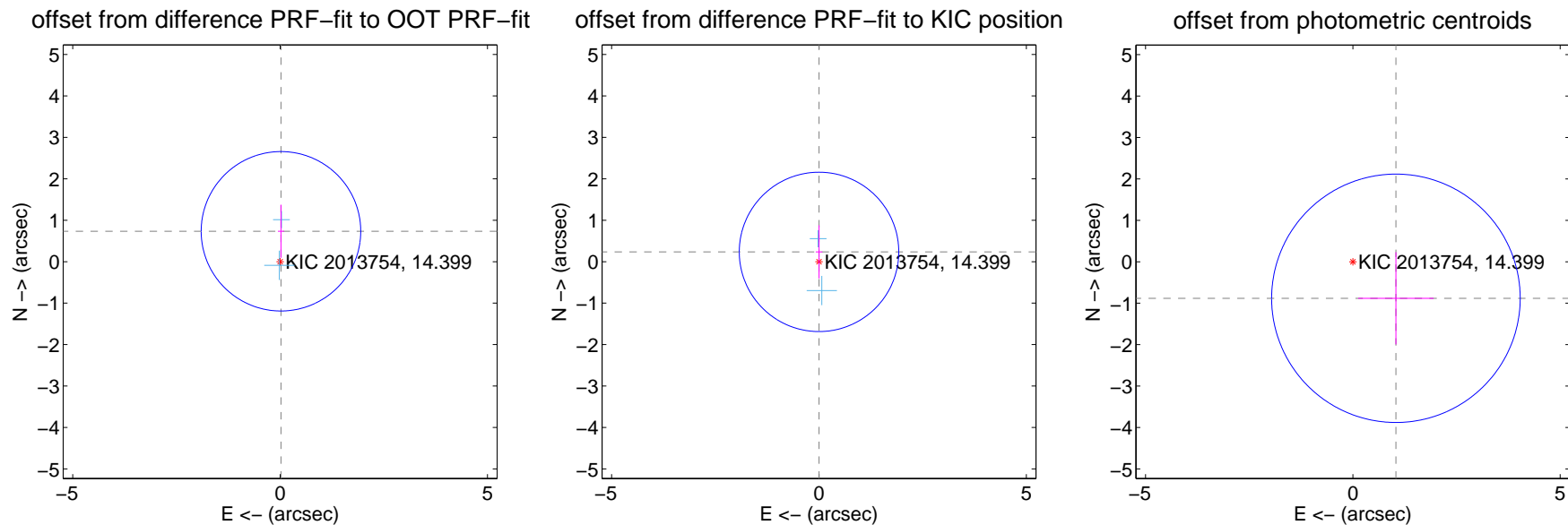
## DV Centroid Data

Supplemental centroid analysis for 002013754-03. Kepler magnitude: 14.40. Transit SNR 7.47

There are 2 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.61 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.734 \pm 0.641$	1.14	$-0.020 \pm 0.073$	$0.734 \pm 0.641$
PRF-fit source offset from KIC position	$0.237 \pm 0.641$	0.37	$-0.001 \pm 0.080$	$0.237 \pm 0.641$
photometric centroid source offset	$1.36 \pm 1.00$	1.36	$-1.04 \pm 0.91$	$-0.88 \pm 1.11$

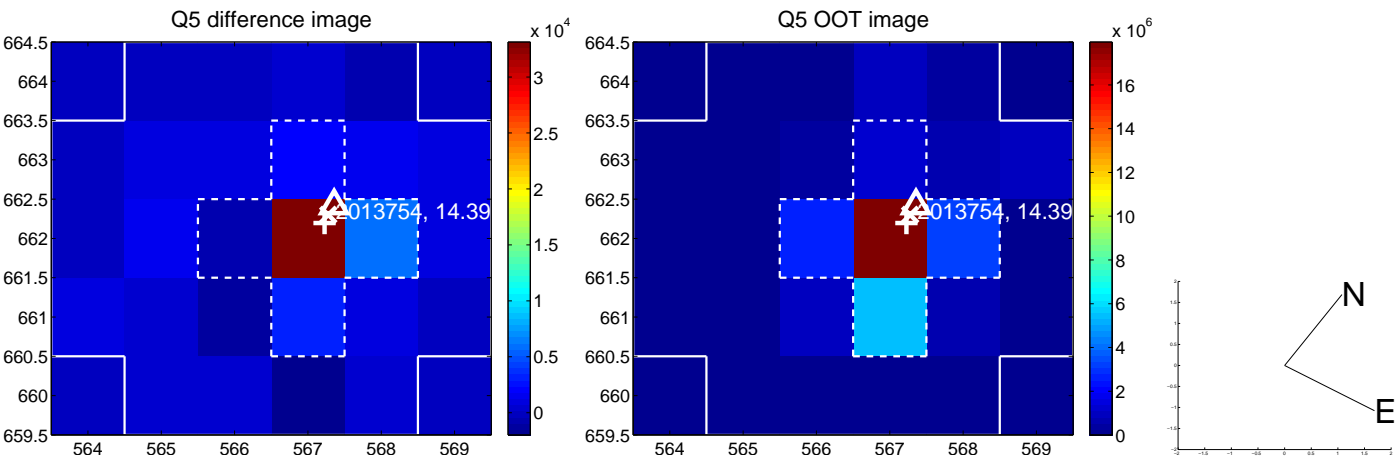


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

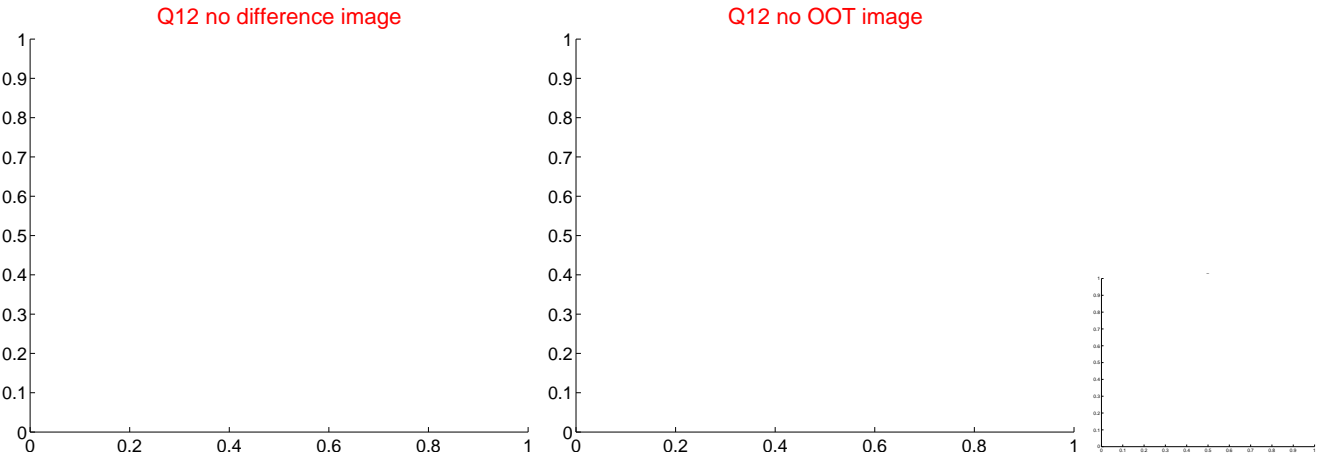
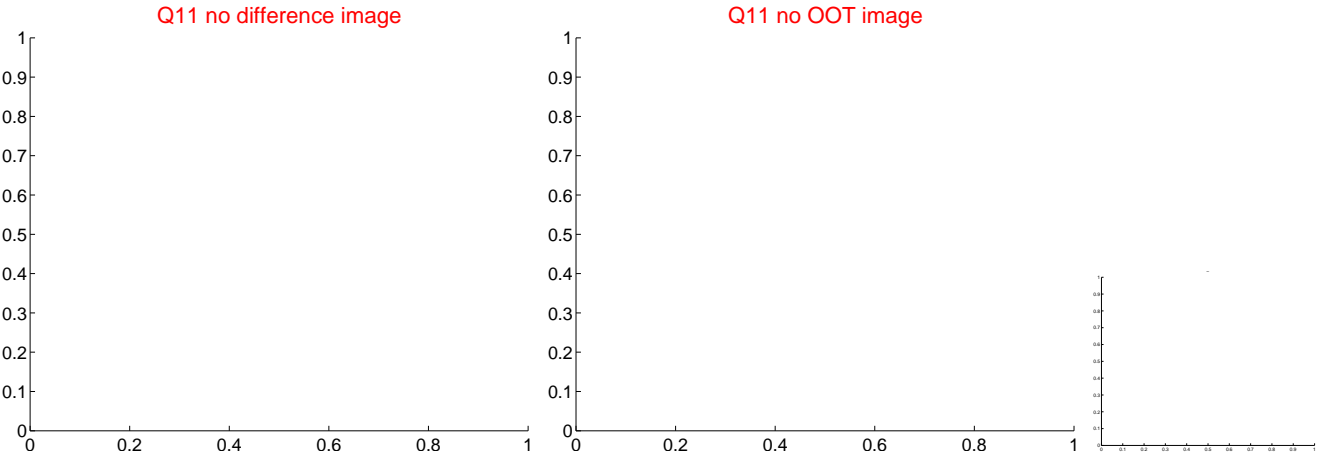
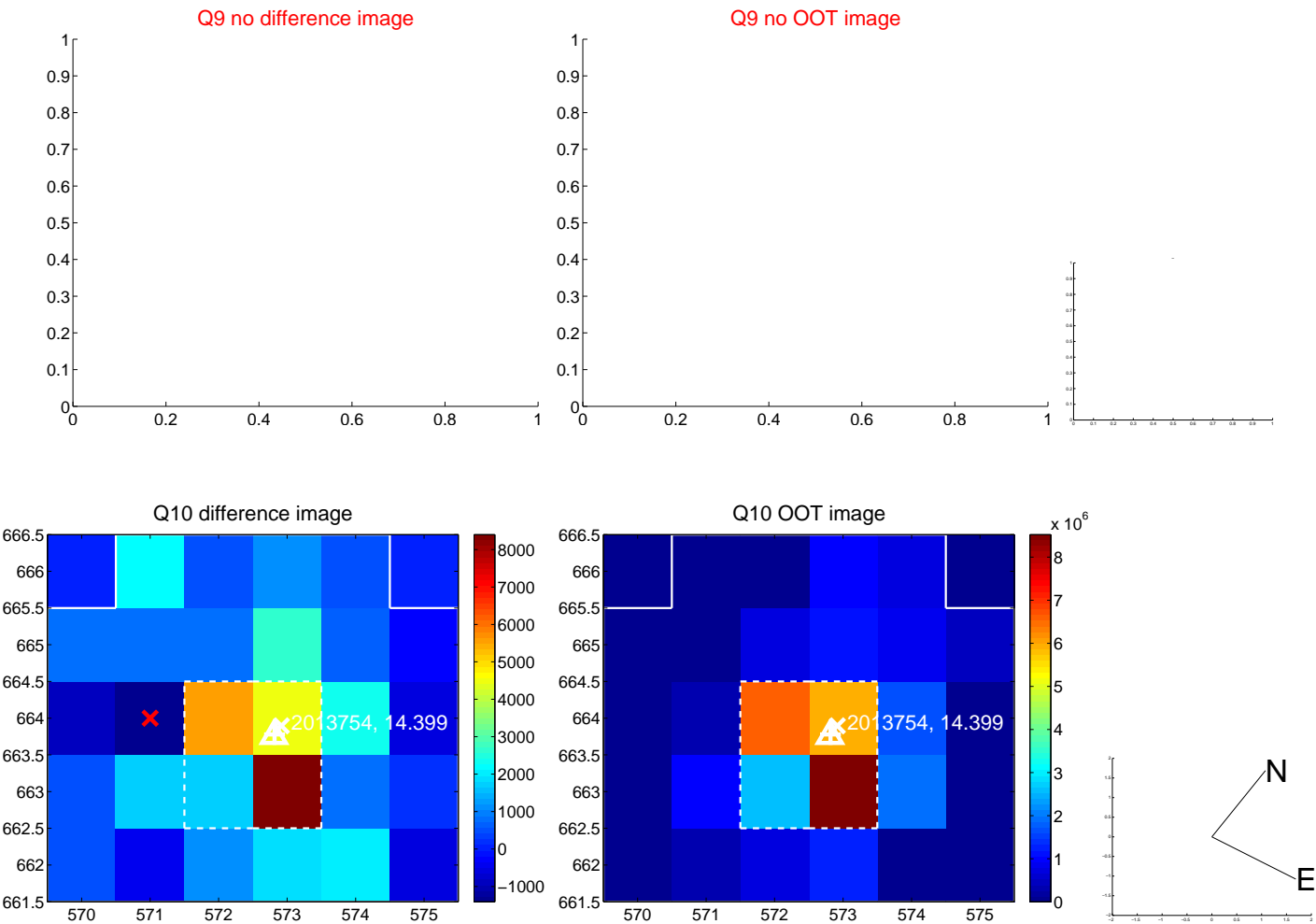


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





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



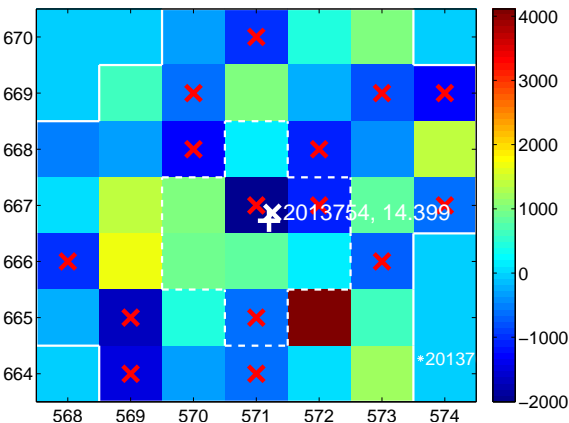
Q14 no difference image



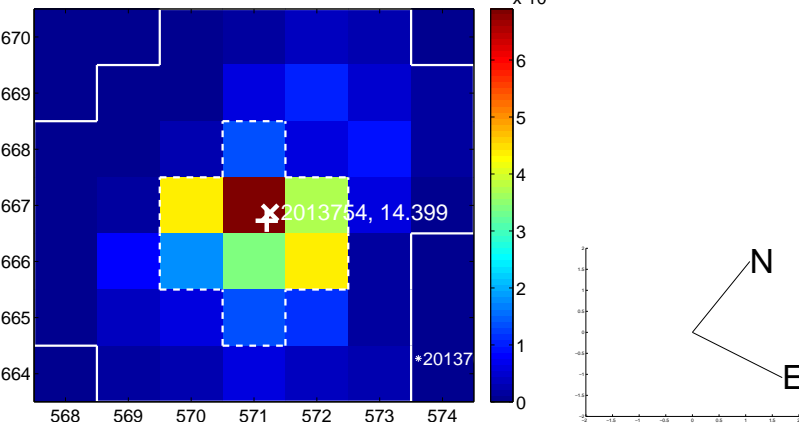
Q14 no OOT image



Q15 difference image. Poor Quality



Q15 OOT image



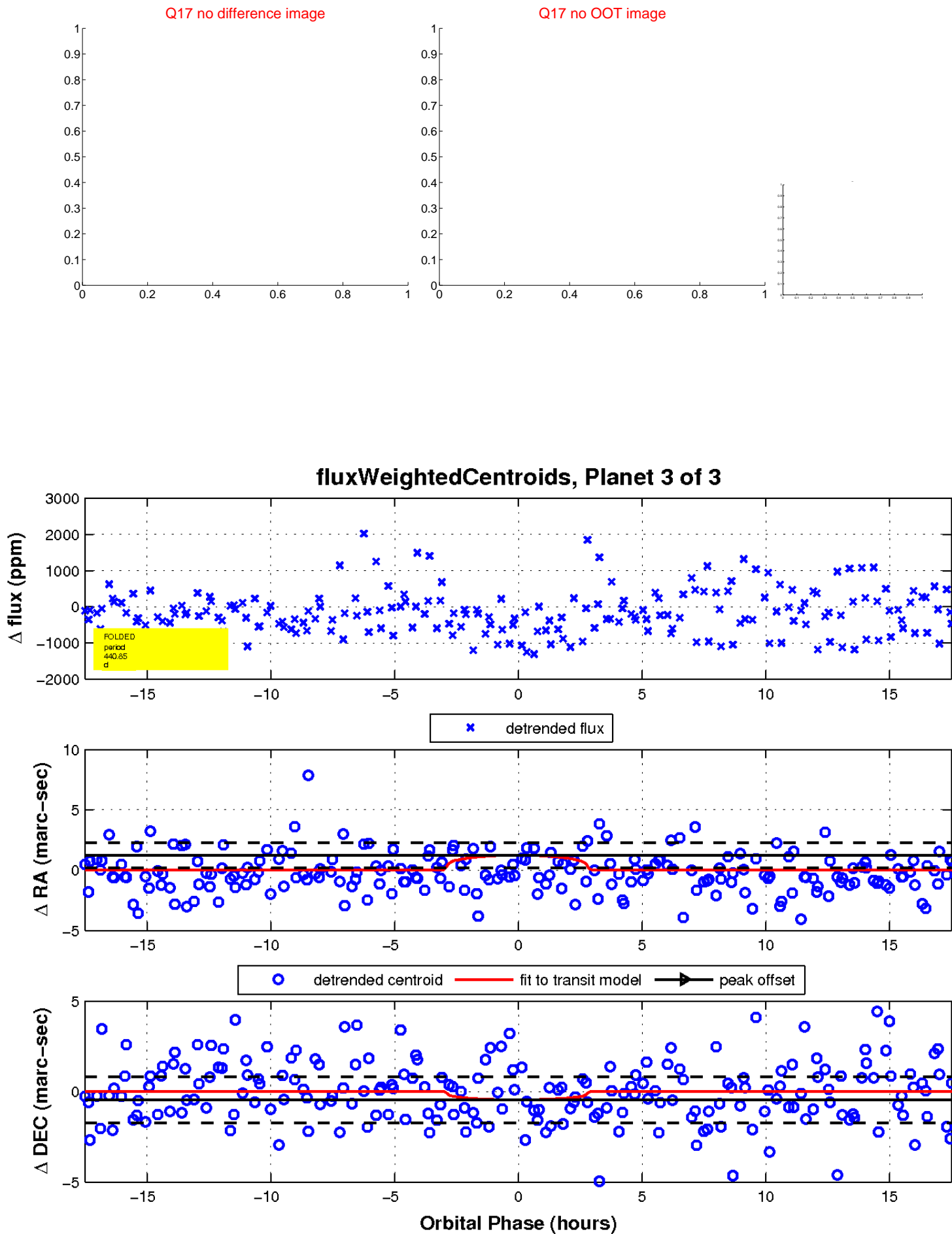
Q16 no difference image



Q16 no OOT image



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



UKIRT Image

Declination

