

# KIC 008776565

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008776565-01	OBS	No	397.621881	146.638498	1450.8	5.008	13.8	5.6	0.33	3502	1.34	0.03
008776565-02	OBS	No	535.306770	306.335224	2872.7	3.805	13.7	7.7	0.33	3502	1.85	0.02
008776565-03	OBS	No	540.005837	277.518058	2372.7	5.089	13.4	6.5	0.33	3502	1.61	0.02
008776565-04	OBS	No	244.687393	134.772525	991.5	5.579	11.0	4.4	0.33	3502	1.10	0.05
008776565-05	OBS	No	571.472737	278.470787	1790.2	5.433	11.7	5.5	0.33	3502	1.51	0.02
008776565-06	OBS	No	244.691881	135.488727	928.4	10.500	11.7	-1.0	0.33	3502	1.01	0.05

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008776565-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
008776565-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
008776565-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
008776565-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_MARSHALL_SKYE_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_KIC_POS—HALO_GHOST
008776565-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_TRACKER—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
008776565-06	OBS	FP	0.00	1	0	1	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—SAME_NTL_PERIOD—CENT_NOFITS—HALO_GHOST

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

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

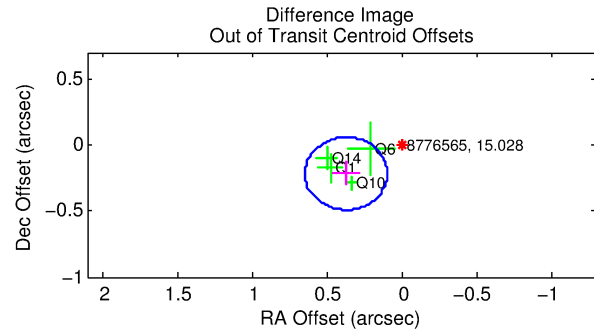
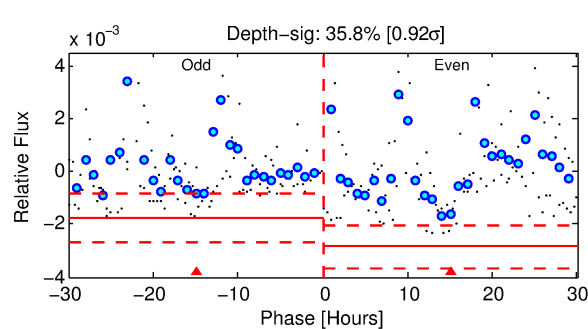
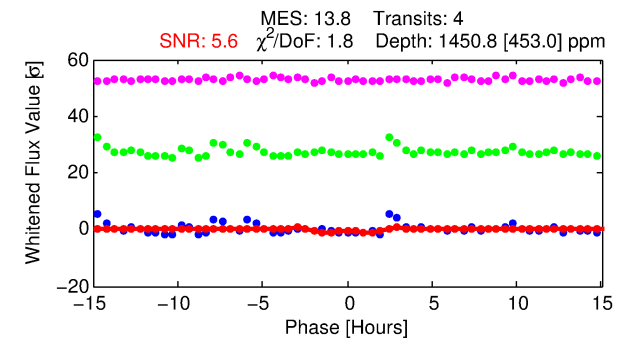
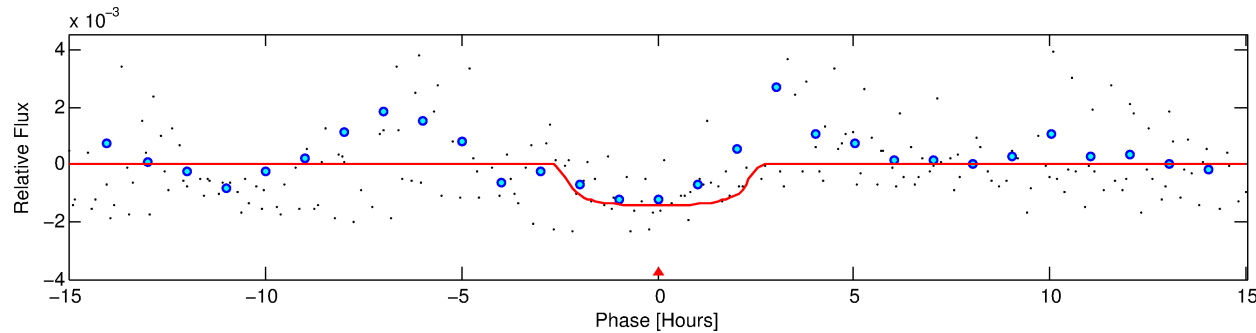
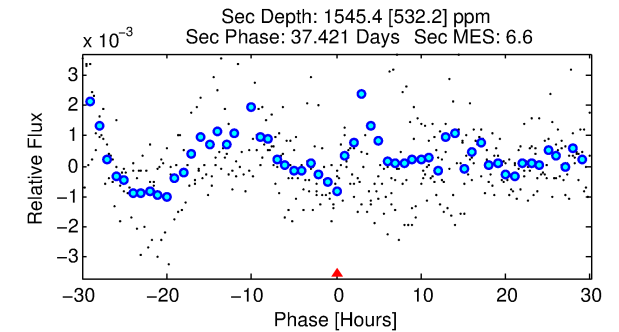
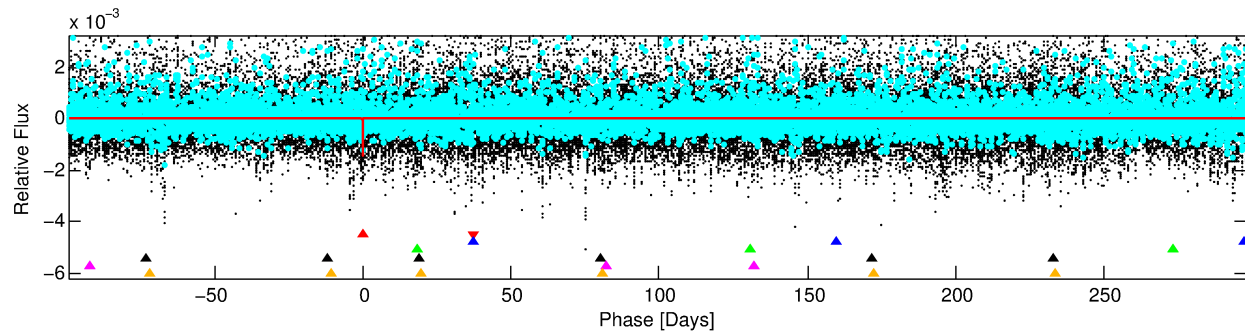
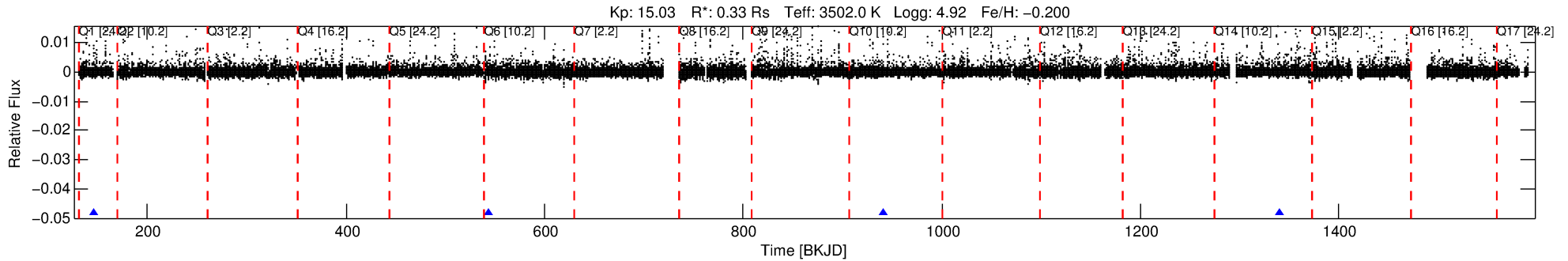
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008776565-01

No Significant Match Found

# DV One-Page Summary

KIC: 8776565 Candidate: 1 of 6 Period: 397.622 d



## DV Fit Results:

Period = 397.62188 [0.00772] d  
Epoch = 146.6385 [0.0149] BKJD  
Rp/R\* = 0.0367 [0.0308]  
a/R\* = 491.28 [1765.71]  
b = 0.65 [3.23]  
Seff = 0.03 [0.00]  
Teq = 104 [3] K  
Rp = 1.34 [1.13] Re  
a = 0.7405 [0.0552] AU  
Ag = 260875.63 [448503.88] [0.58σ]  
Teffp = 3626 [1557] K [2.26σ]

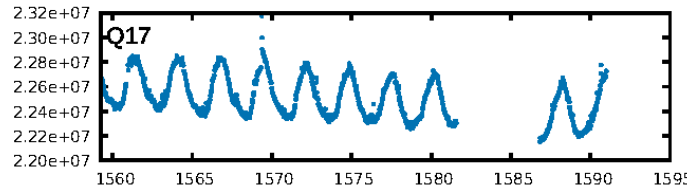
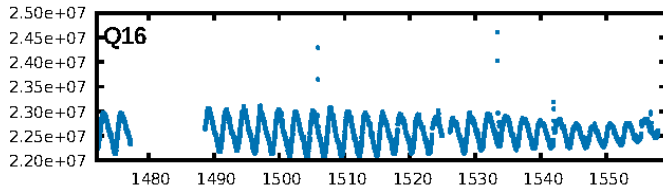
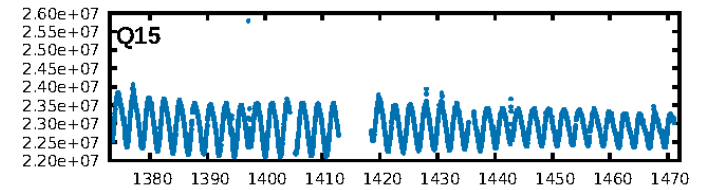
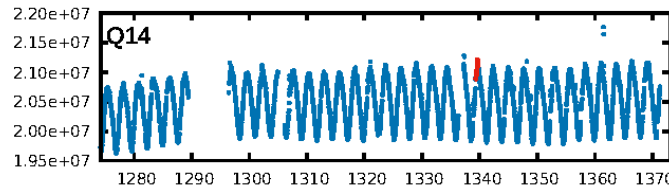
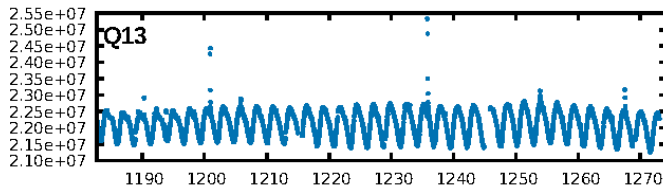
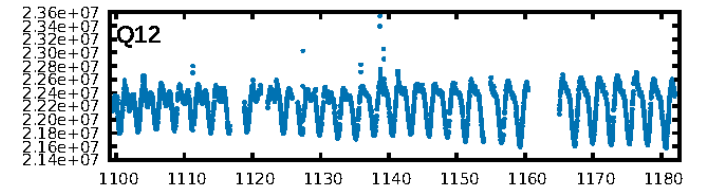
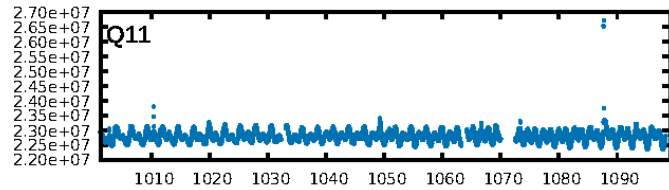
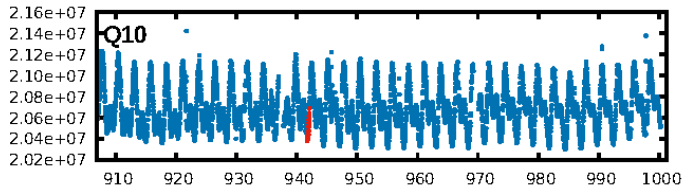
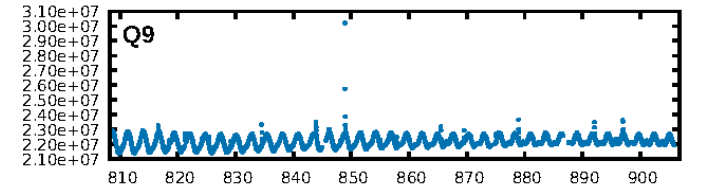
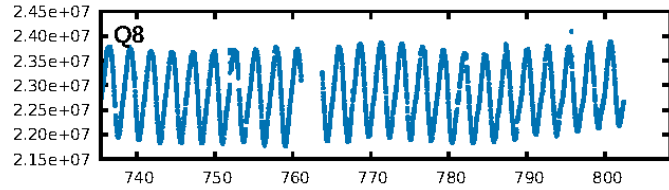
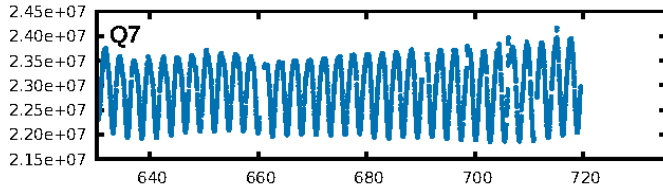
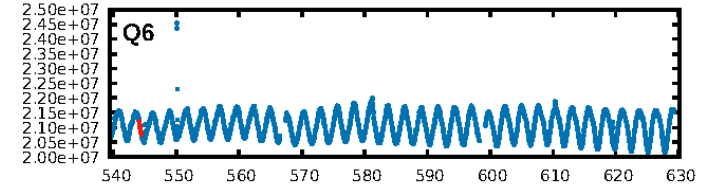
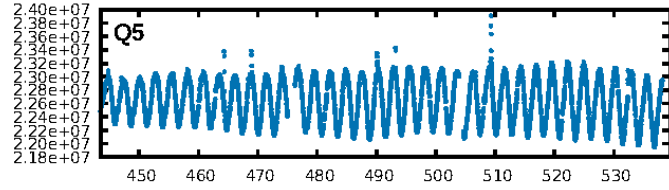
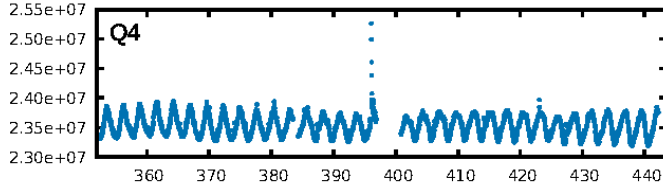
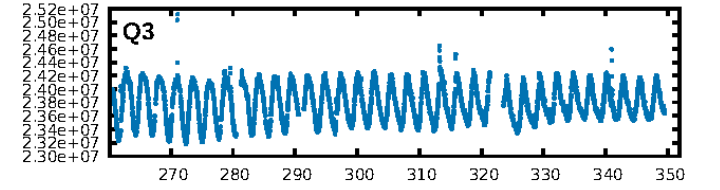
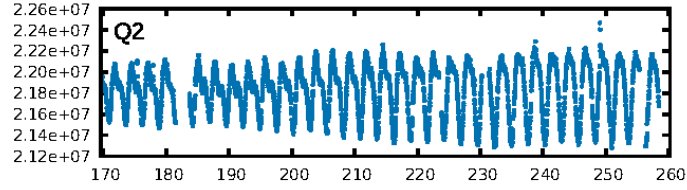
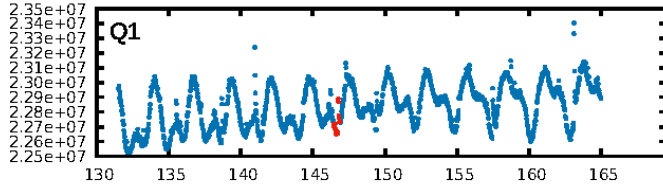
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [315.51σ]  
LongPeriod-sig: 100.0% [525.42σ]  
ModelChiSquare2-sig: 0.4%  
ModelChiSquareGof-sig: 77.5%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -6.155  
Centroid-sig: N/A  
Centroid-so: 2.599 arcsec [2.13σ]  
OotOffset-rm: 0.430 arcsec [4.69σ]  
KicOffset-rm: 0.691 arcsec [7.89σ]  
OotOffset-st: 3/0/0/1 [4]  
KicOffset-st: 3/0/0/1 [4]  
DiffImageQuality-fgm: 0.75 [3/4]  
DiffImageOverlap-fno: 1.00 [4/4]

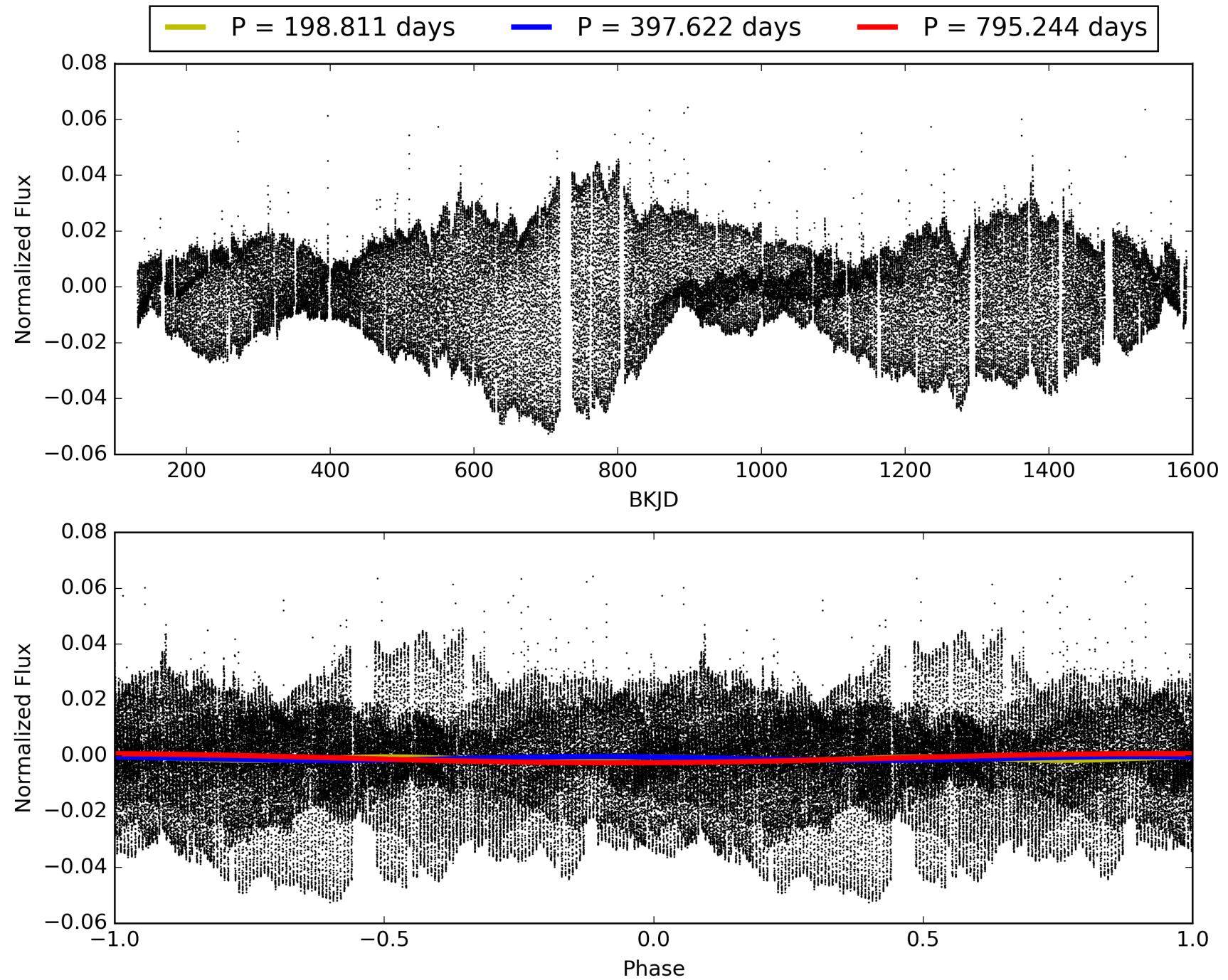
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This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 008776565-01, PDC Light Curves



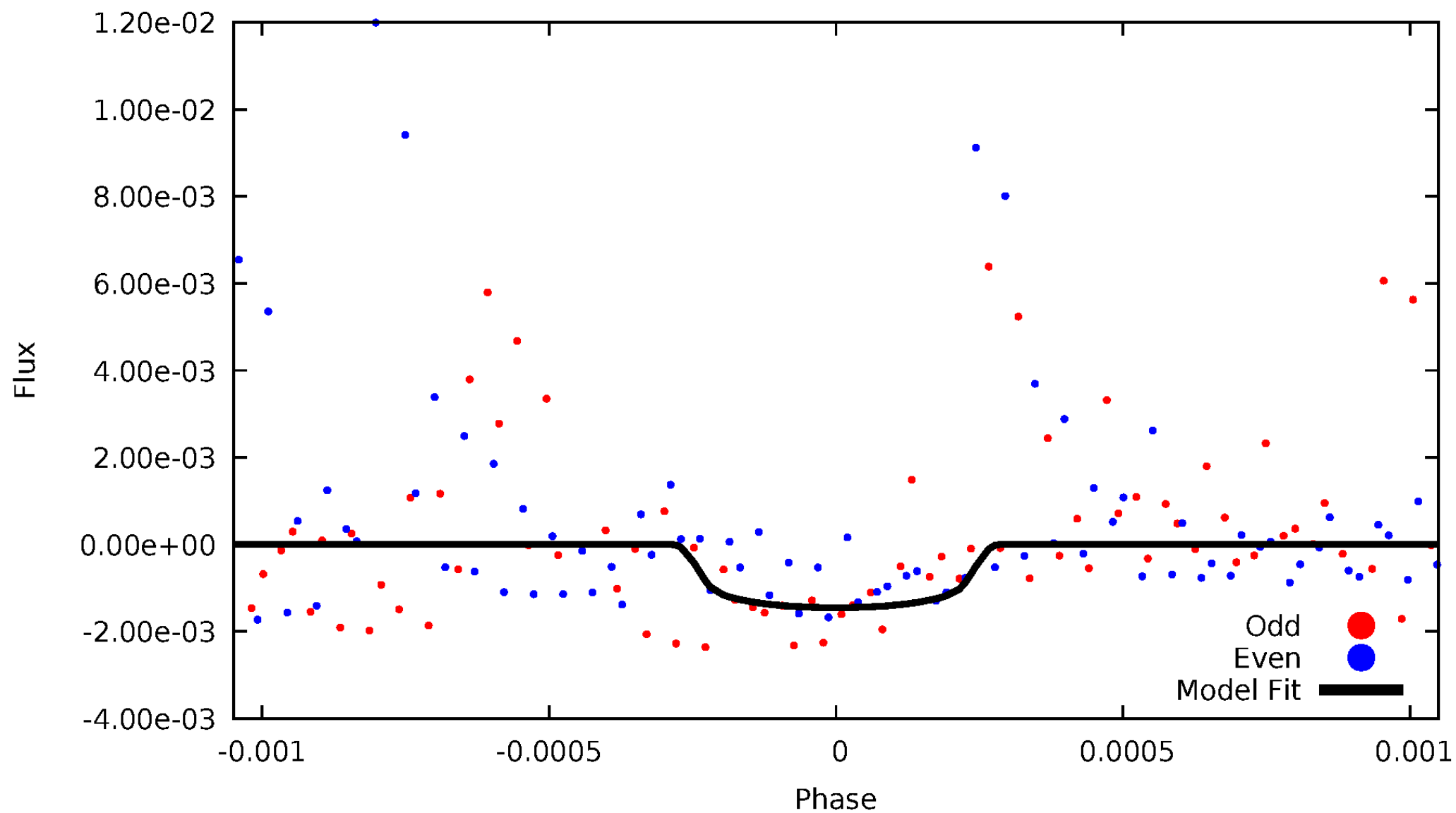
TCE 008776565-01





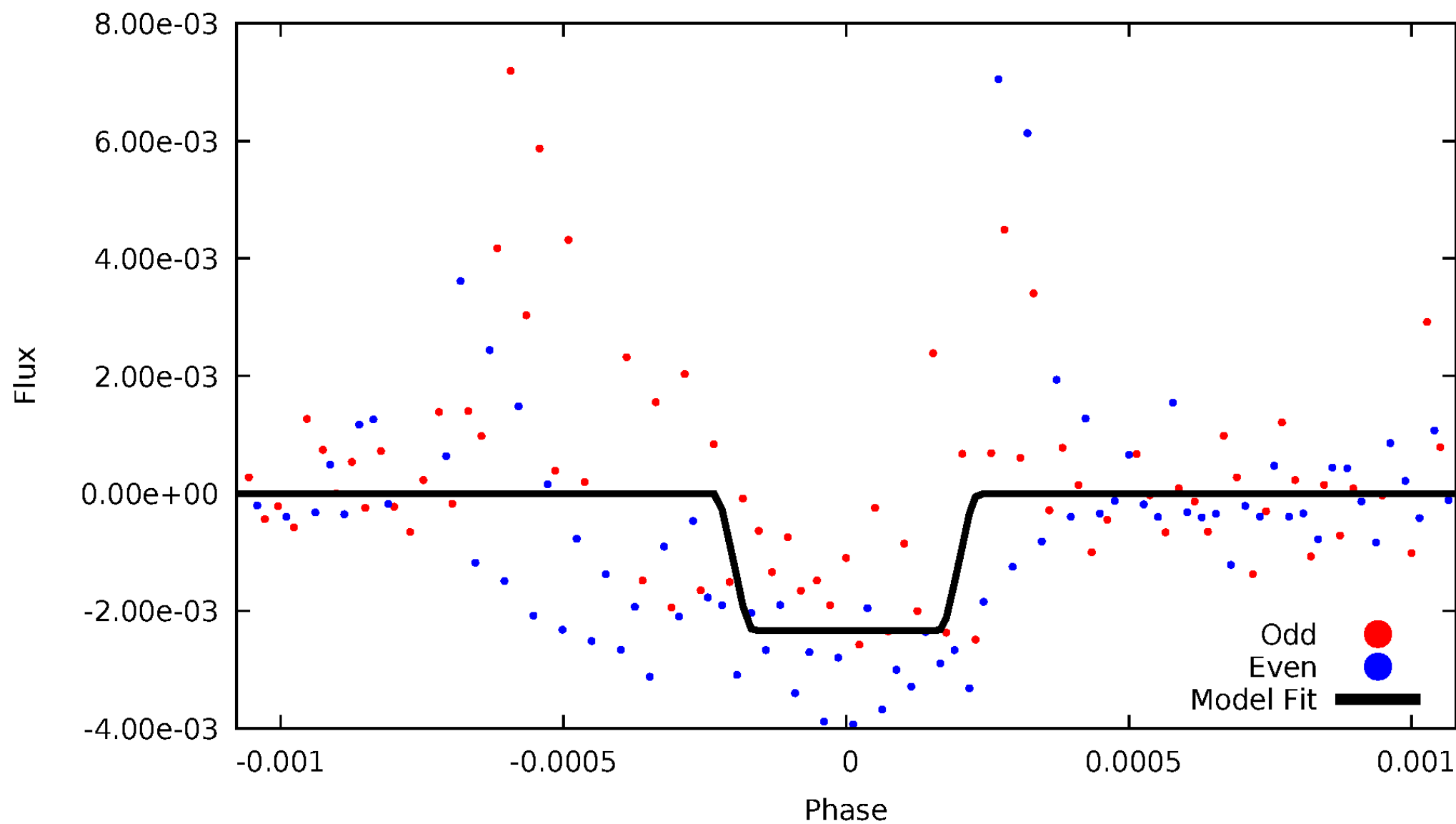
# DV Odd/Even

TCE 008776565-01



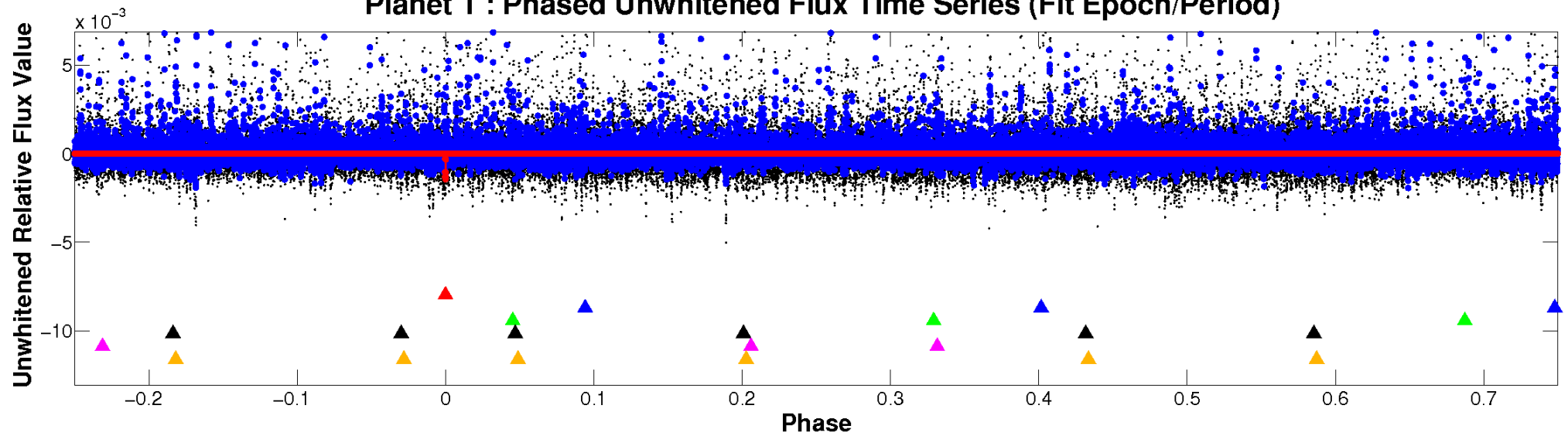
# ALT Odd/Even

TCE 008776565-01

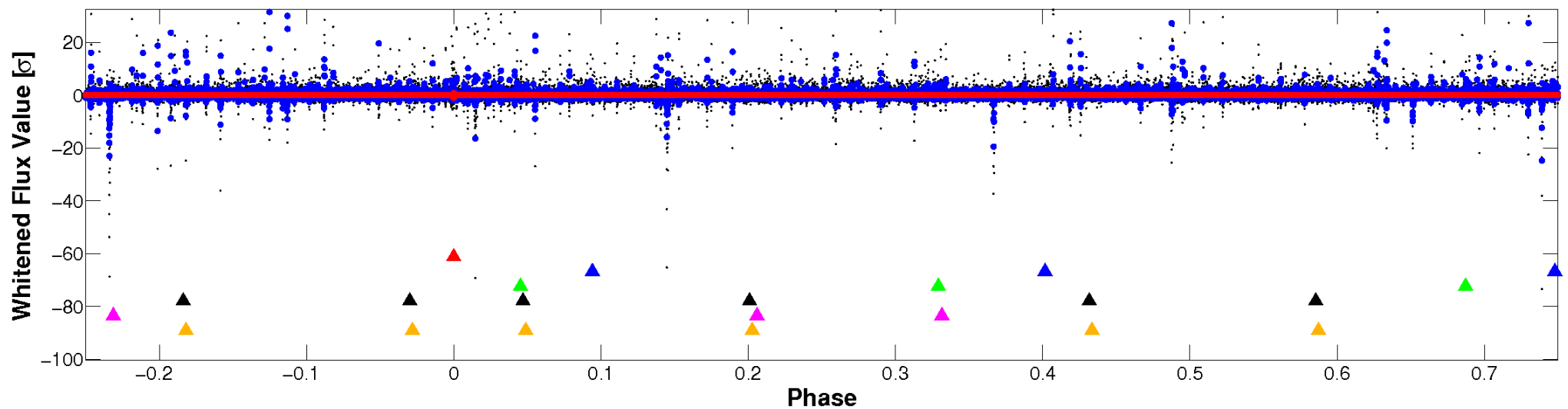


# Non-Whitened Vs. Whitened Light Curve

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

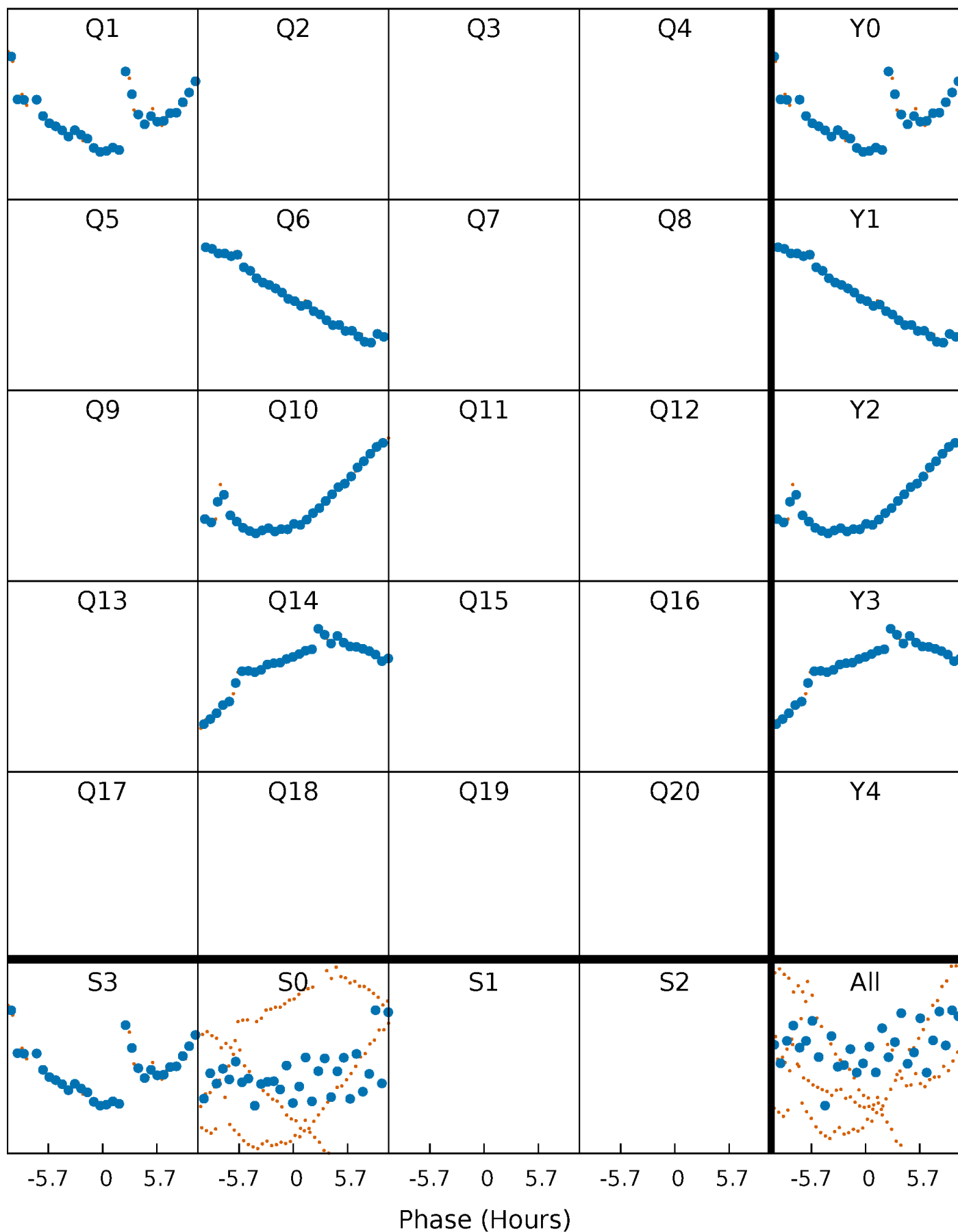


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



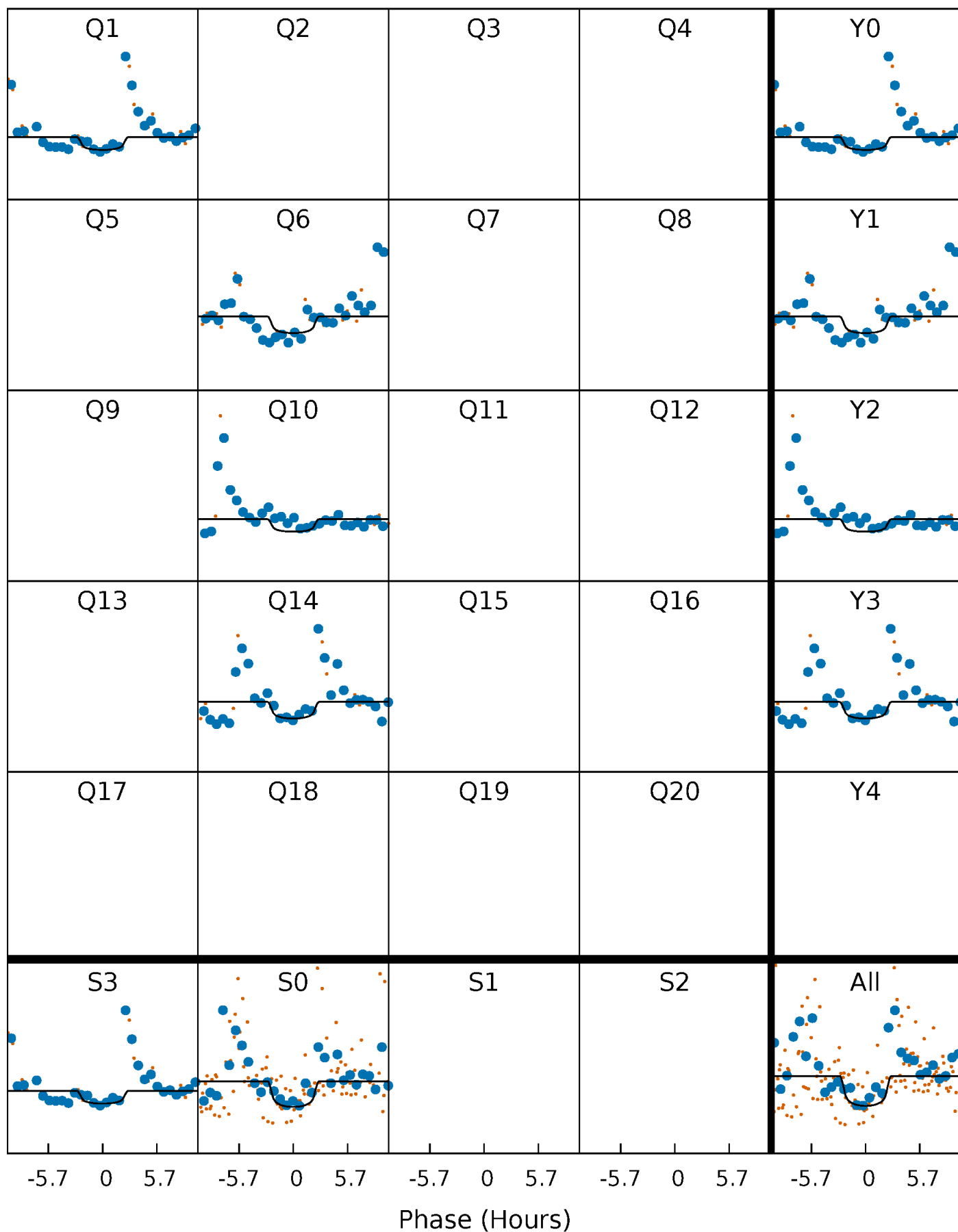
# PDC Quarter-Phased Transit Curves

TCE 008776565-01 P=397.621881 Days  $T_0=146.638498$  (BKJD)



# DV Quarter-Phased Transit Curves

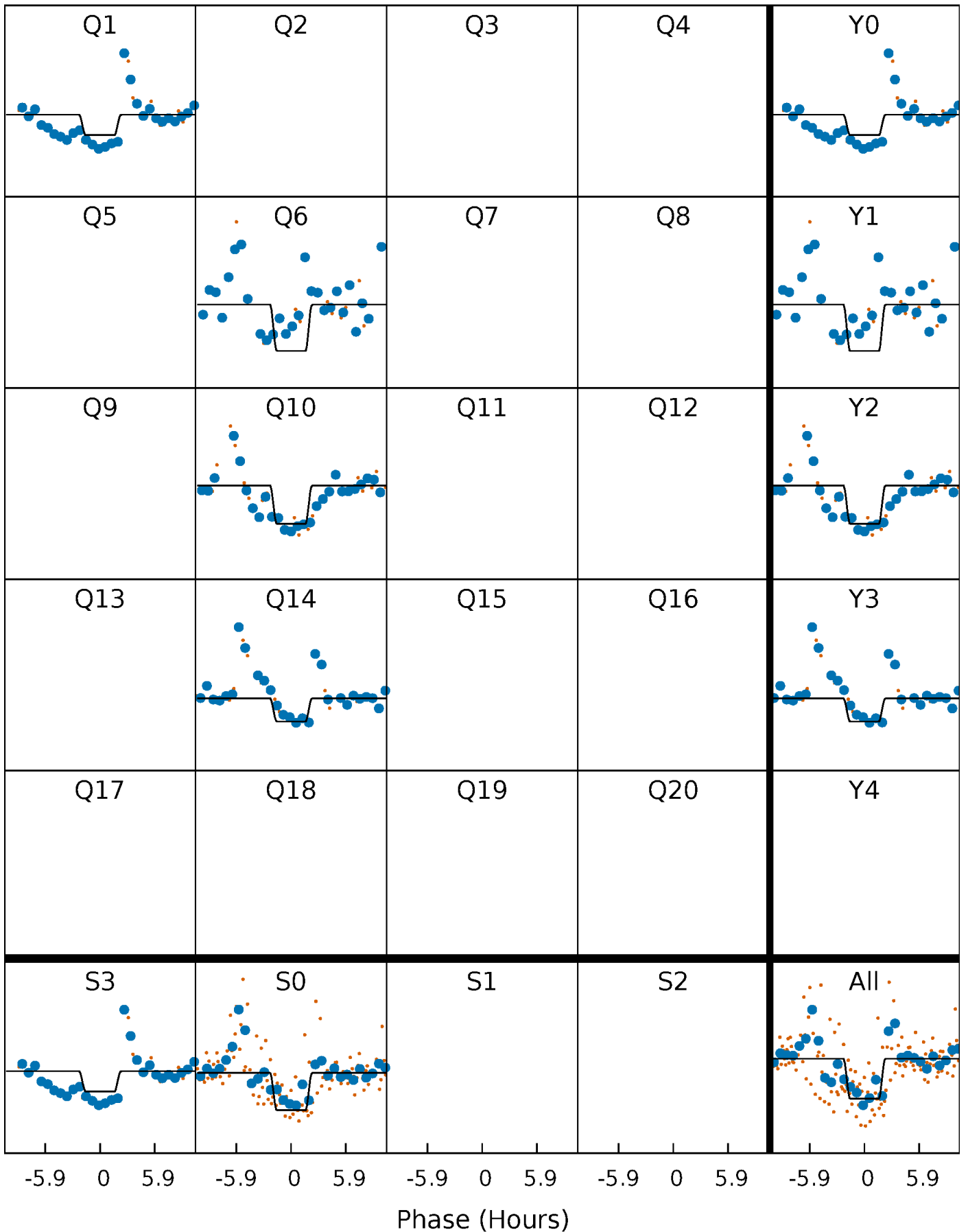
TCE 008776565-01 P=397.621881 Days  $T_0=146.638498$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

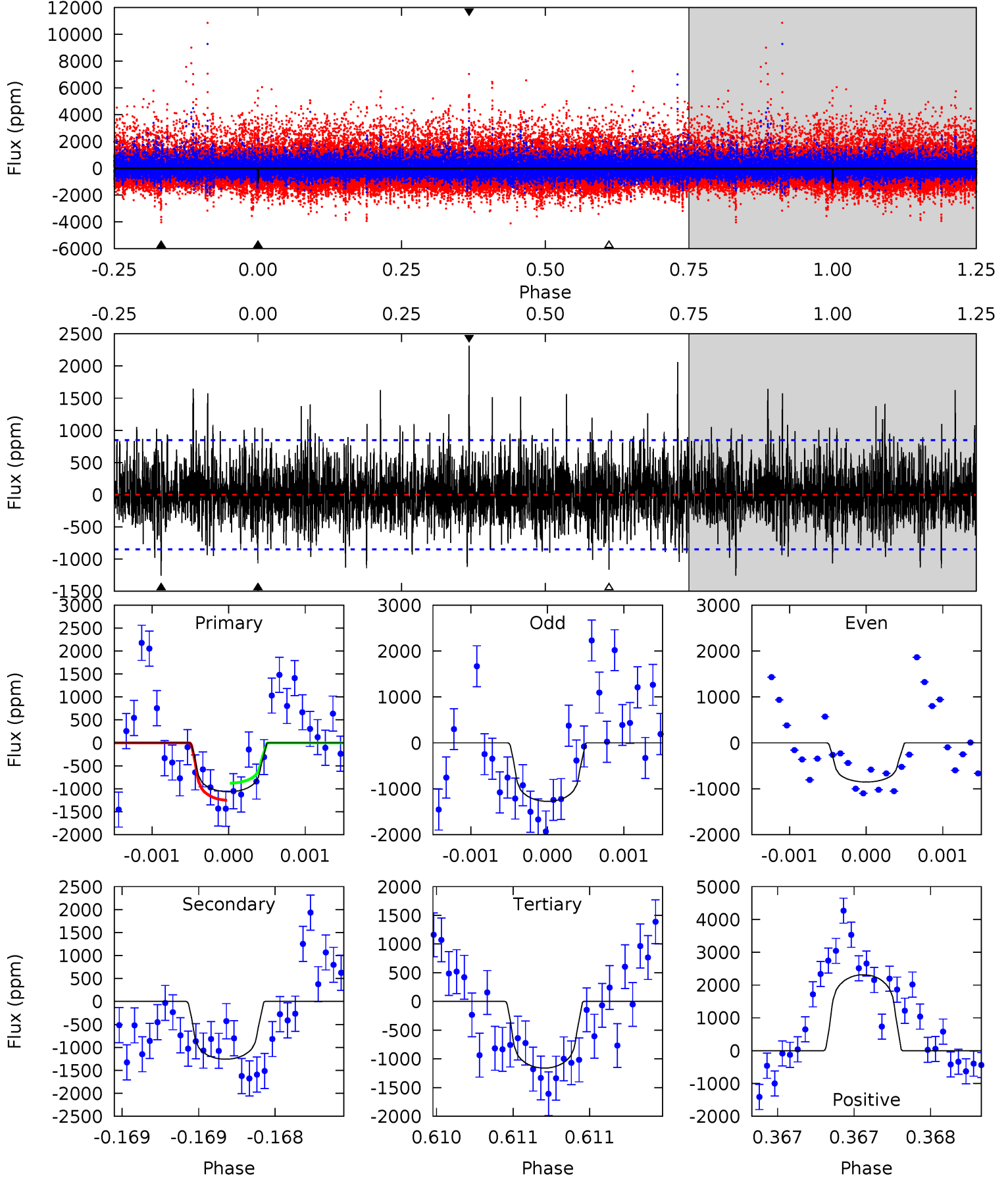
TCE 008776565-01 P=397.623455 Days  $T_0=146.628435$  (BKJD)



# DV Model-Shift Uniqueness Test

008776565-01, P = 397.621881 Days, E = 146.638498 Days

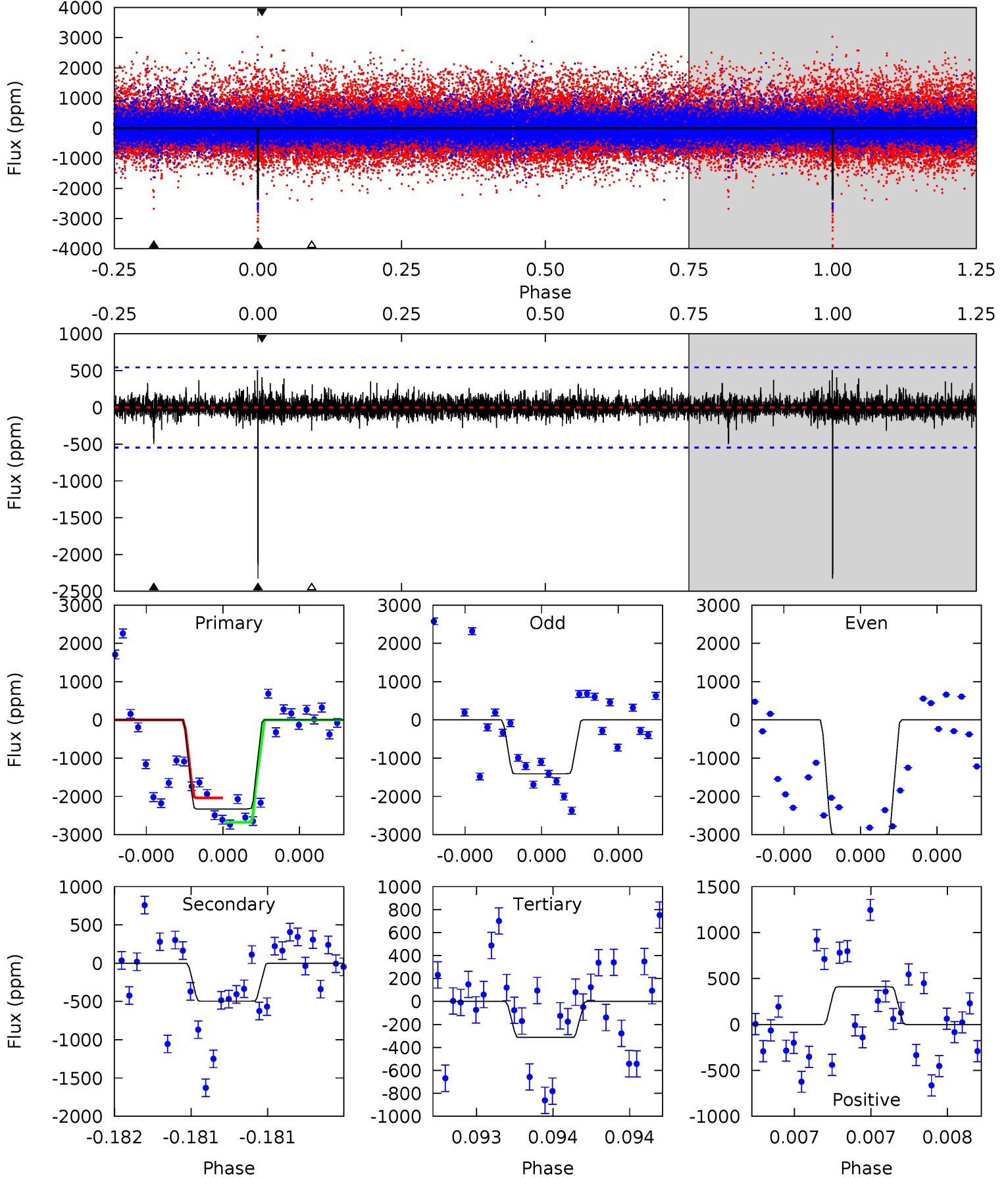
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.96	8.22	7.59	15.1	5.55	3.45	2.29	-0.63	-8.17	0.63	-6.91	0.92	1.00	0.65	1.22



# Alt Model-Shift Uniqueness Test

008776565-01, P = 397.623455 Days, E = 146.628435 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
23.9	5.09	3.22	4.19	5.59	3.51	0.76	20.7	19.7	1.87	0.90	8.03	0.95	0.18	3.25



### Stellar Parameters For KIC 008776565

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3502^{+41}_{-41}$	$4.925^{+0.040}_{-0.032}$	$-0.200^{+0.100}_{-0.100}$	$0.334^{+0.030}_{-0.034}$	$0.341^{+0.038}_{-0.041}$	$12.910^{+2.925}_{-1.990}$
	+1%/-1%	+1%/-1%	+50%/-50%	+9%/-10%	+11%/-12%	+23%/-15%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 008776565-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-1257 \pm 153$	$1.51^{+1.06}_{-0.90}$	$145^{+3}_{-3}$	$3346^{+1223}_{-488}$	$165682^{+851806}_{-108860}$
Alt.	$-496 \pm 98$	$1.87^{+1.02}_{-0.97}$	$145^{+3}_{-3}$	$2752^{+616}_{-304}$	$42995^{+138958}_{-25643}$

$T_{\text{max}}$  = 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

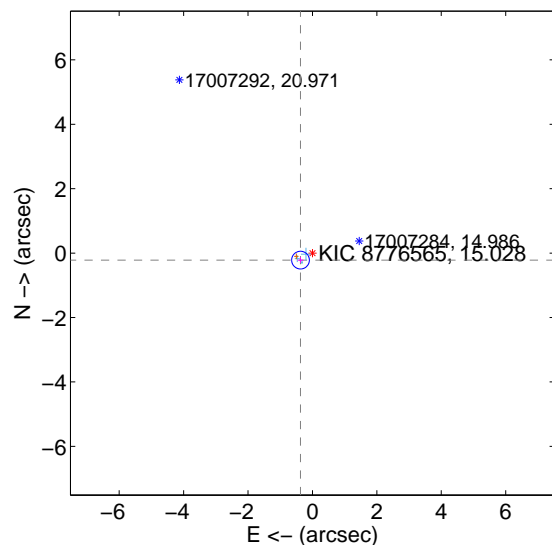
Supplemental centroid analysis for 008776565-01. Kepler magnitude: 15.03. Transit SNR 5.58

There are 3 quarters with good PRF difference image offsets

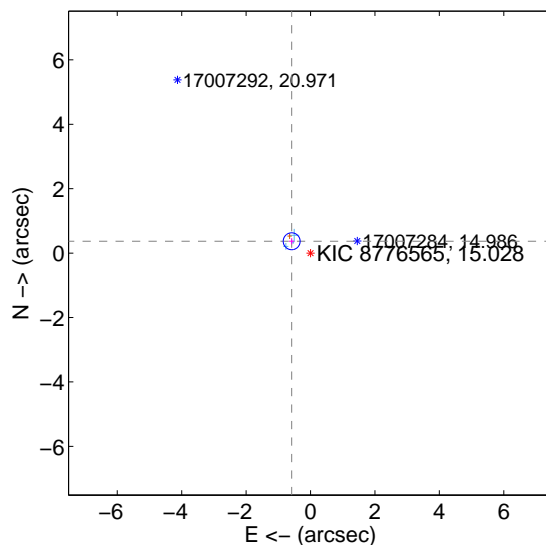
The direct PRF centroid is offset from the target star catalog position by about 0.64 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.430 \pm 0.092$	4.69	$0.370 \pm 0.087$	$-0.218 \pm 0.087$
PRF-fit source offset from KIC position	$0.691 \pm 0.088$	7.89	$0.585 \pm 0.084$	$0.367 \pm 0.096$
photometric centroid source offset	$2.60 \pm 1.22$	2.13	$2.01 \pm 1.08$	$1.65 \pm 1.40$

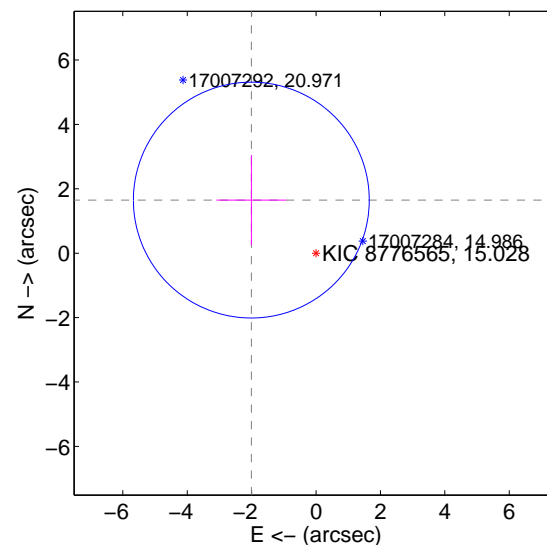
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



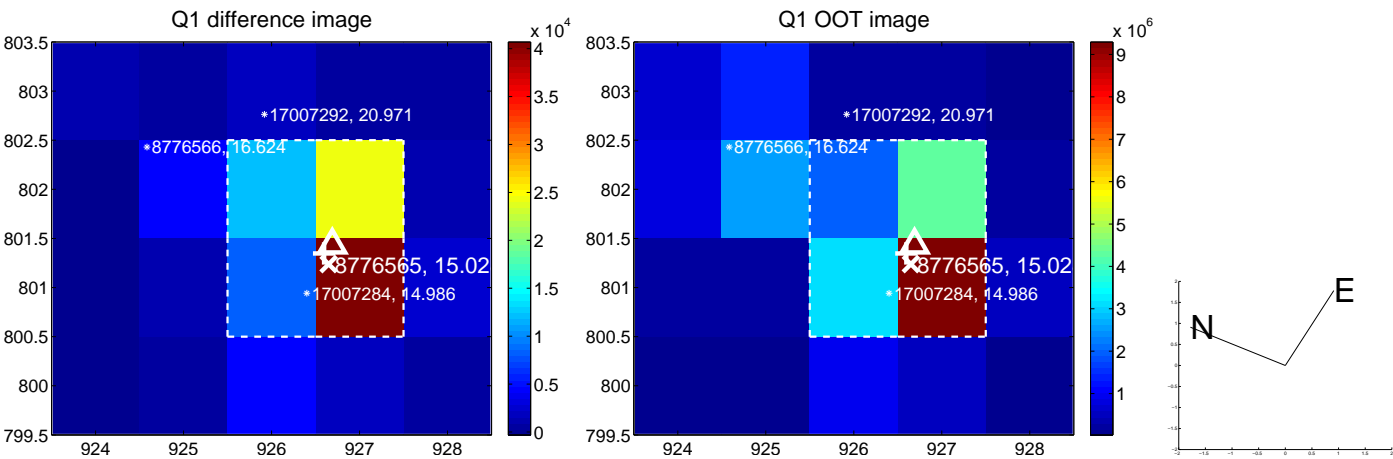
offset from photometric centroids



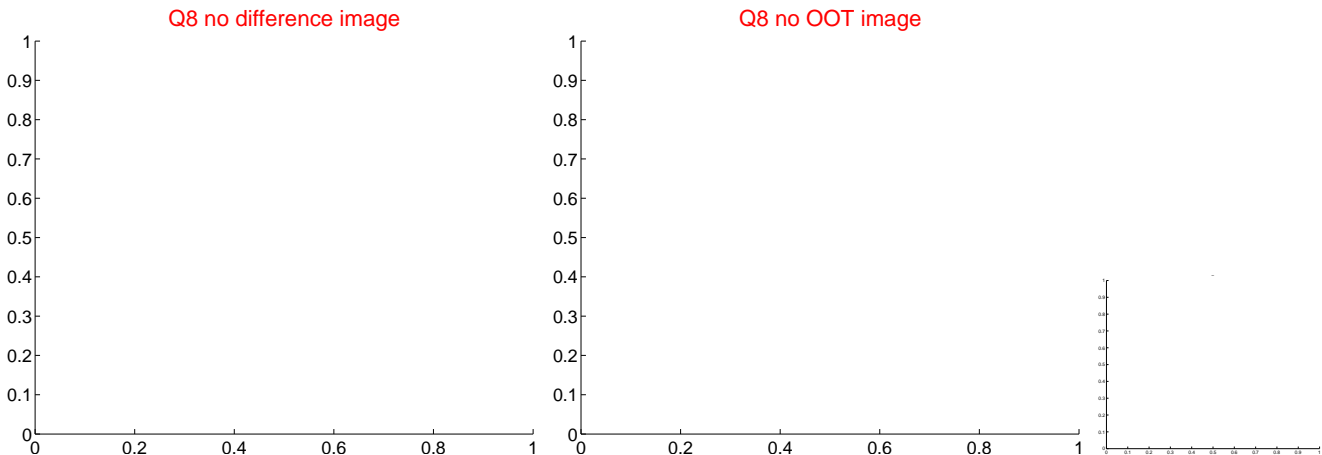
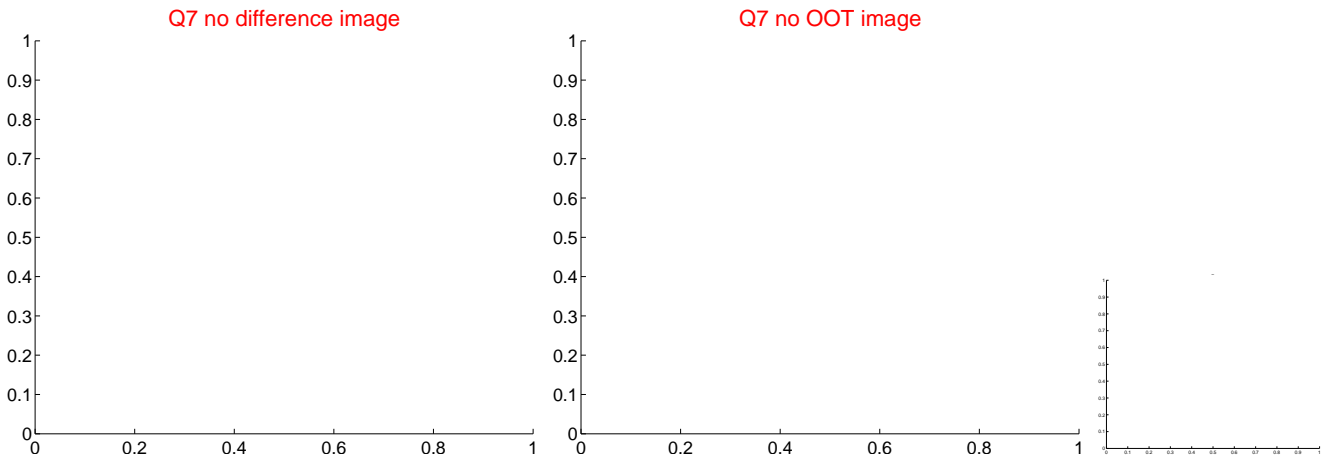
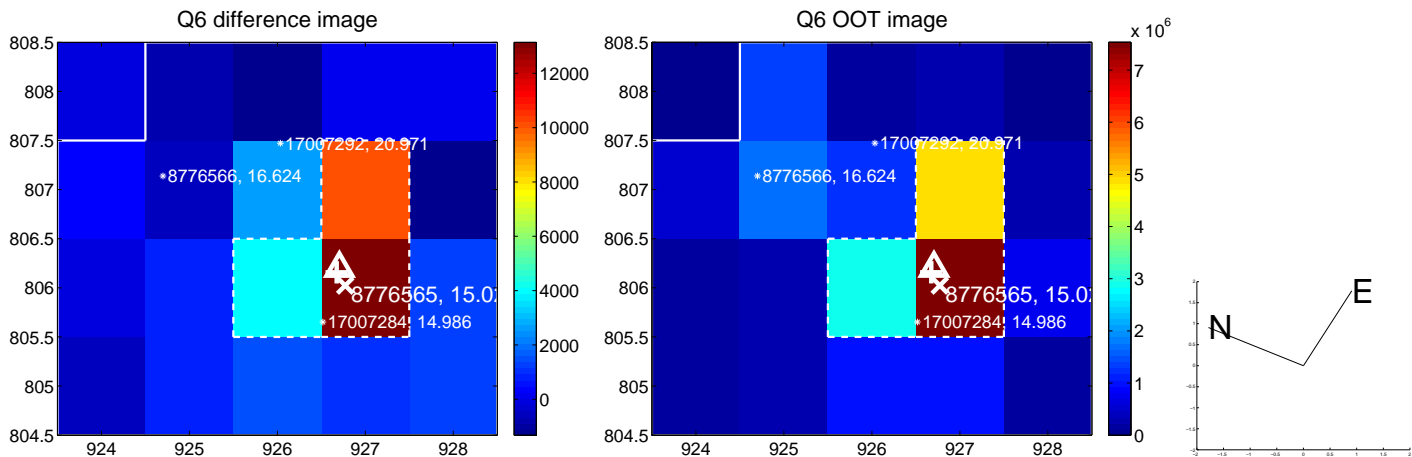
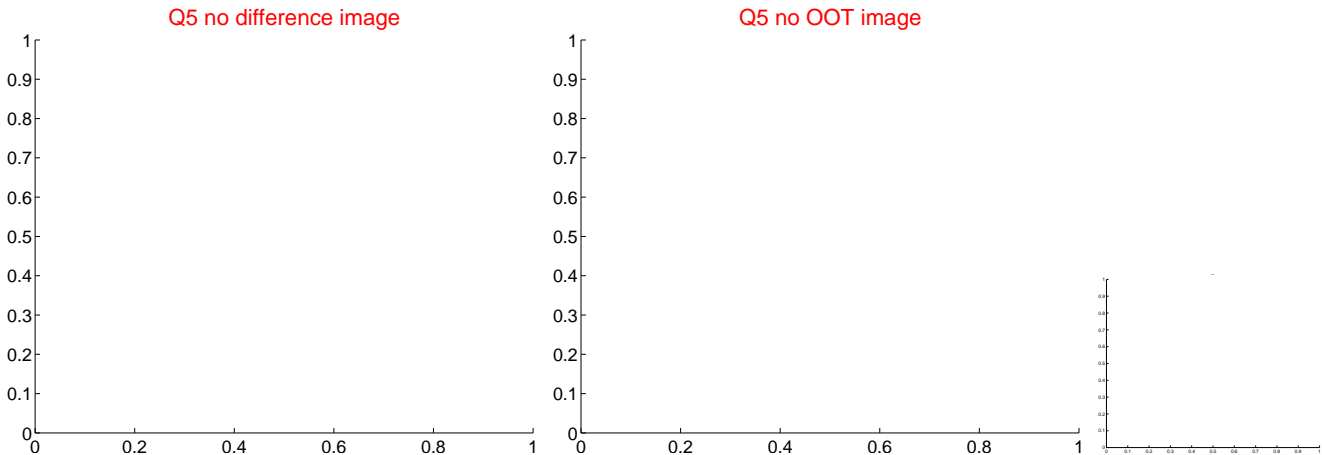
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



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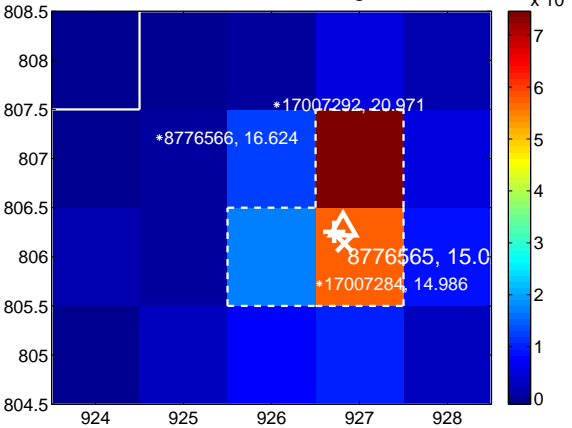
Q9 no difference image



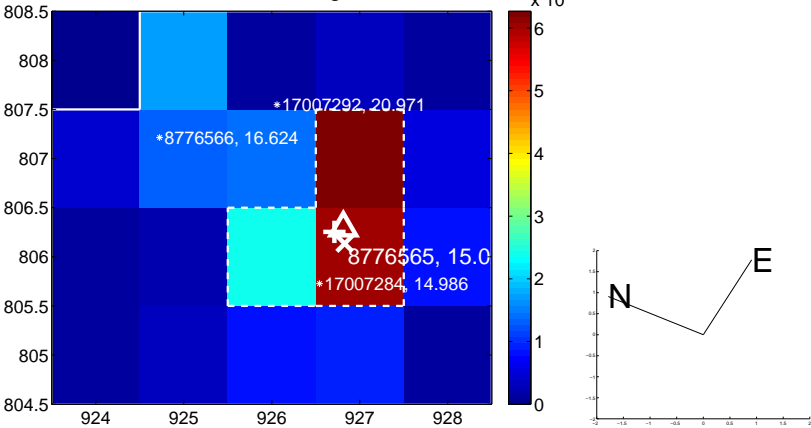
Q9 no OOT image



Q10 difference image



Q10 OOT image



Q11 no difference image



Q11 no OOT image



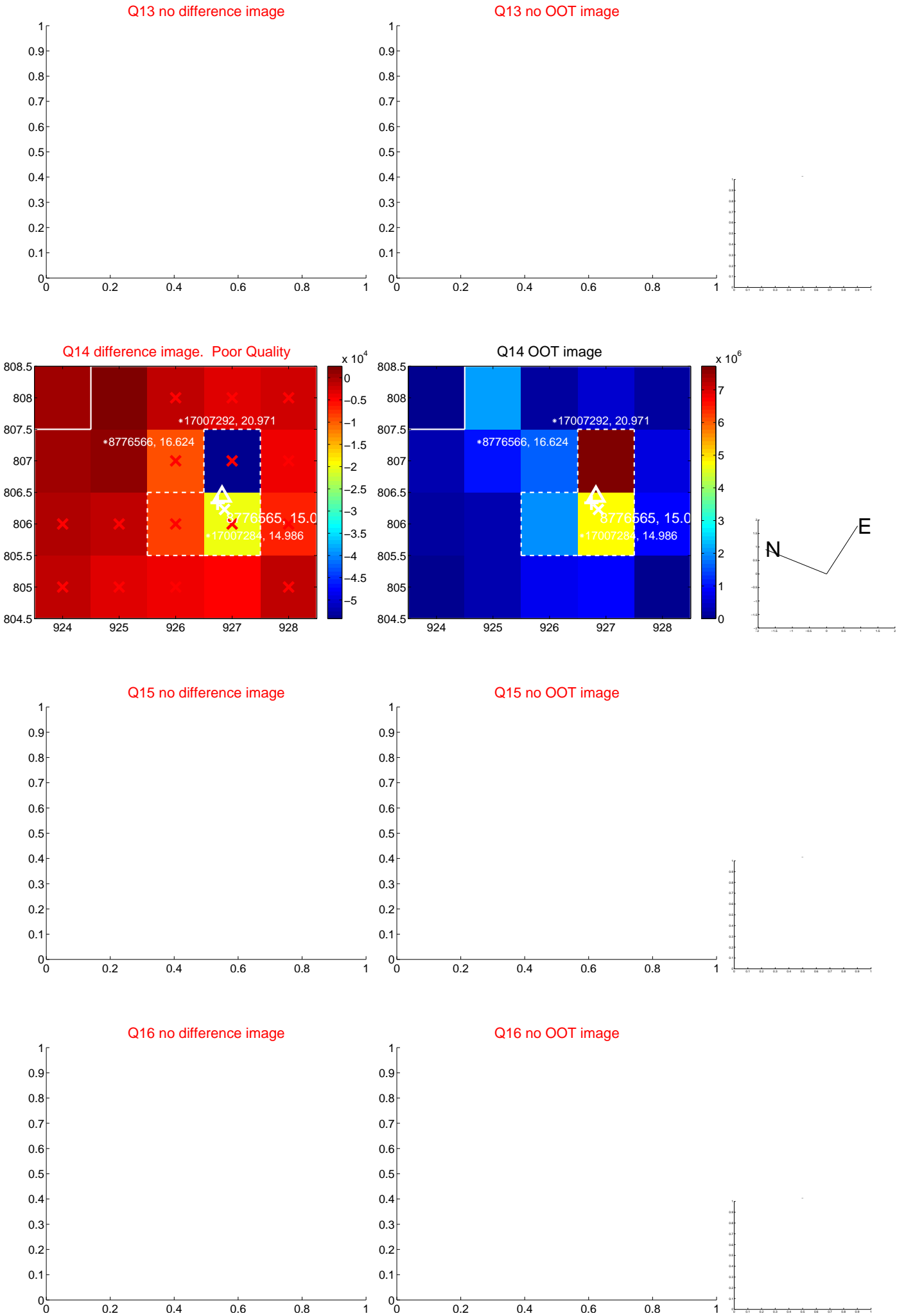
Q12 no difference image



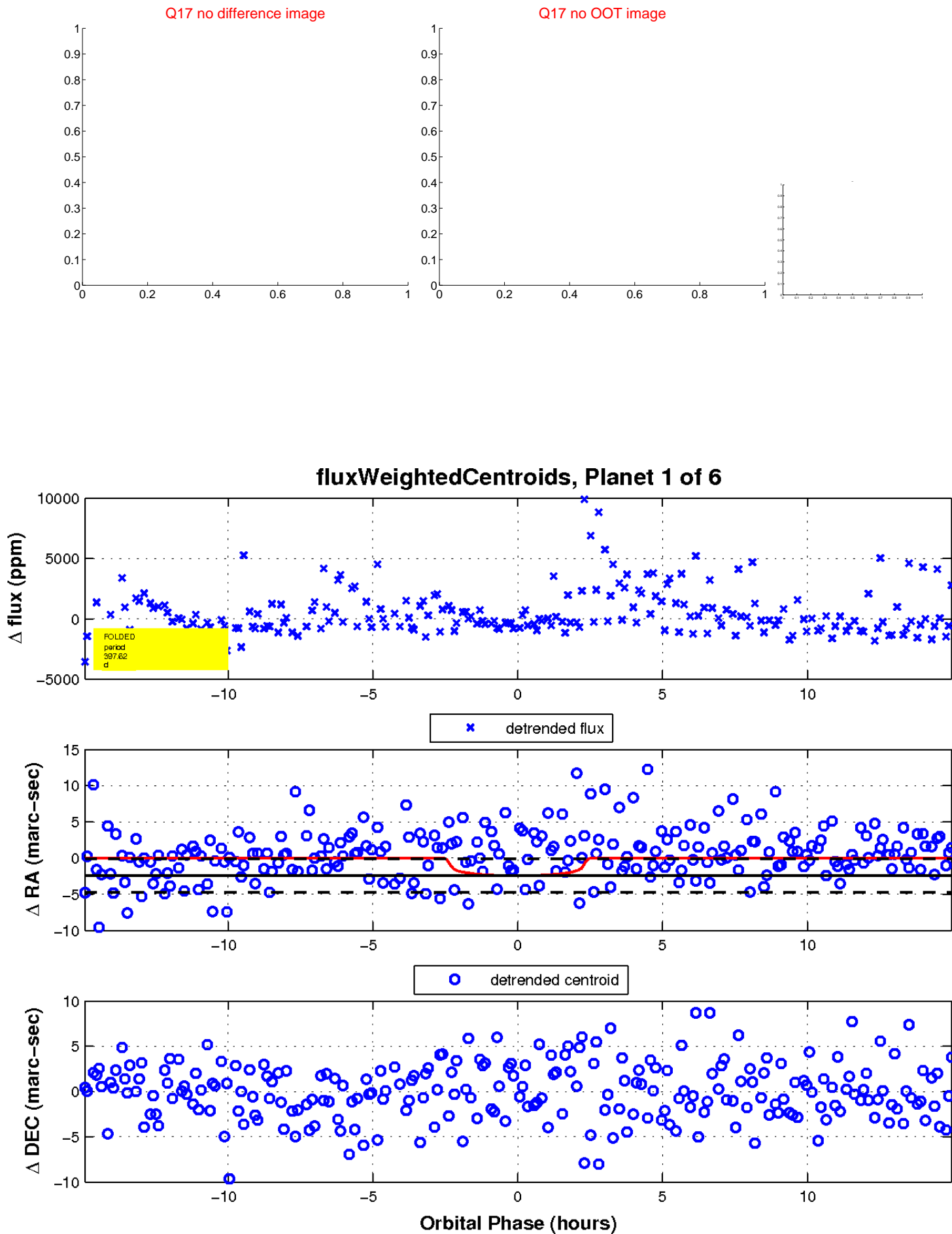
Q12 no OOT image



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



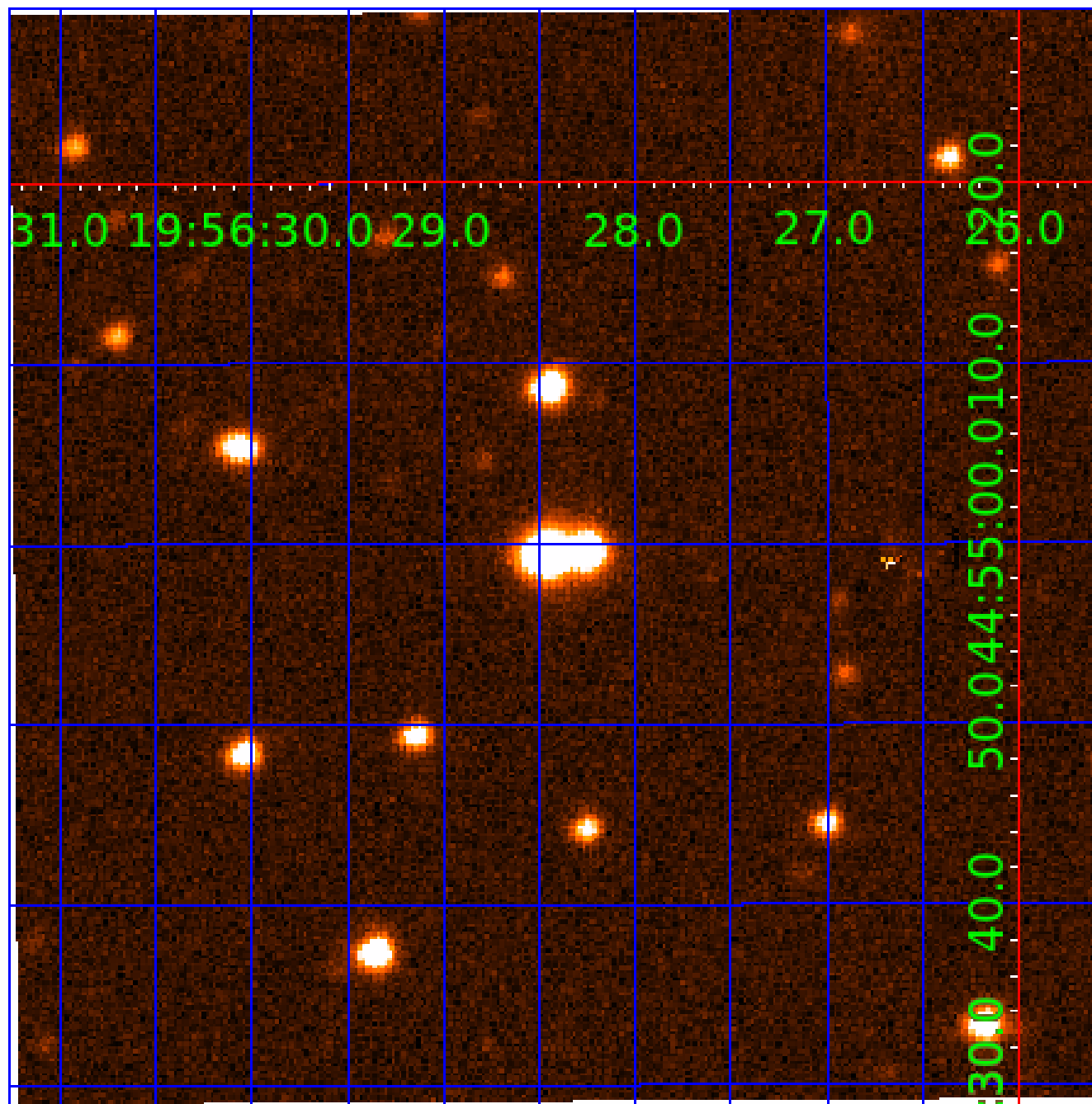
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



# KIC 008776565

## Q1-17 DR25 TCE Parameters

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## Robovetter Results

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008776565-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
008776565-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
008776565-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_MARSHALL_SKYE_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_KIC_POS—HALO_GHOST
008776565-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_TRACKER—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
008776565-06	OBS	FP	0.00	1	0	1	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—SAME_NTL_PERIOD—CENT_NOFITS—HALO_GHOST

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

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

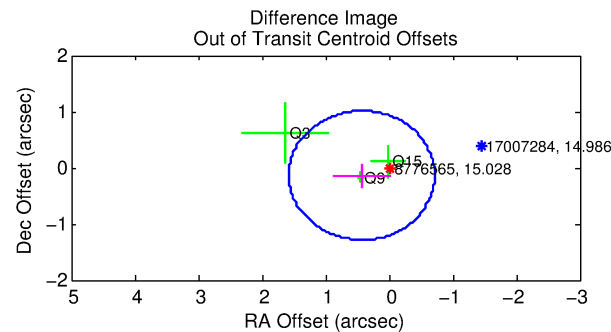
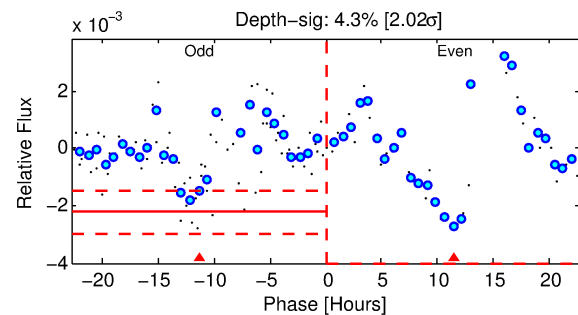
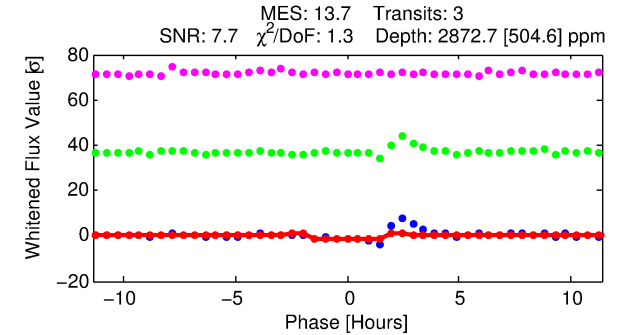
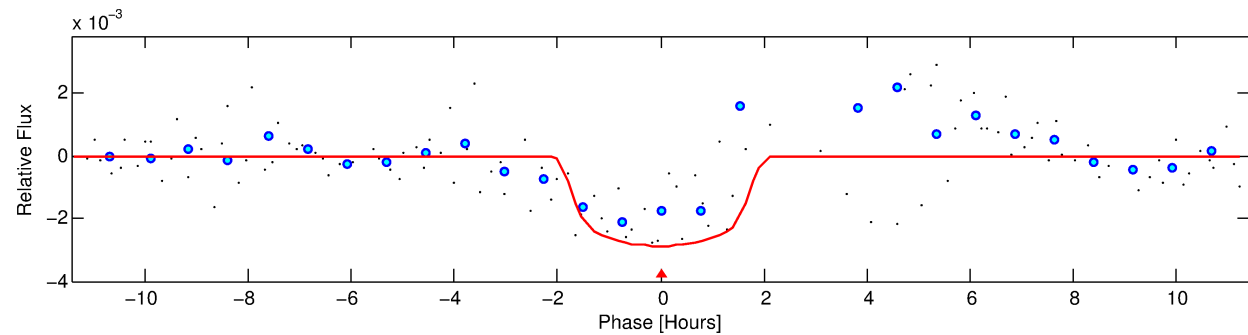
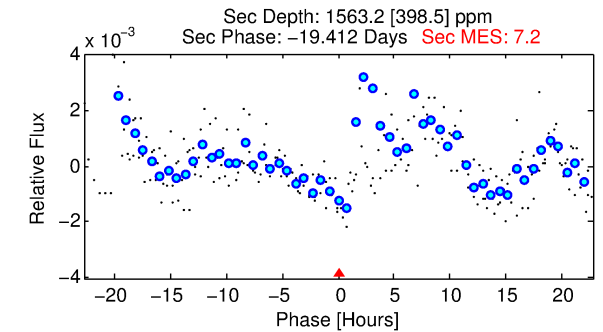
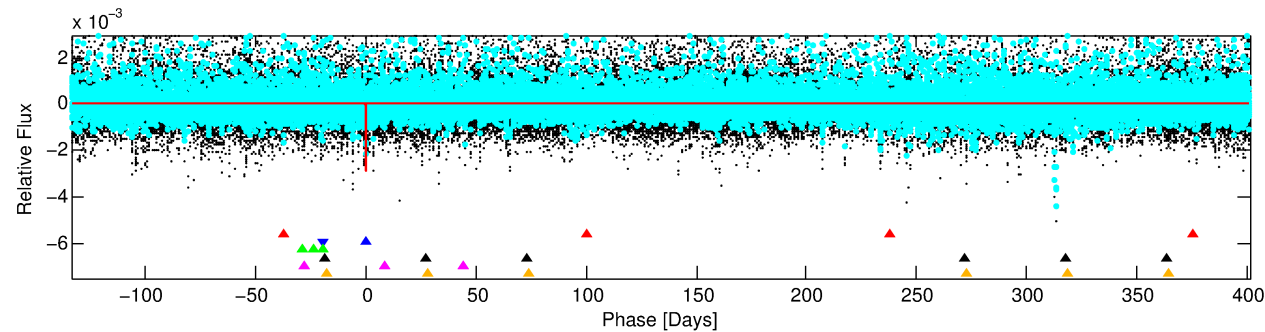
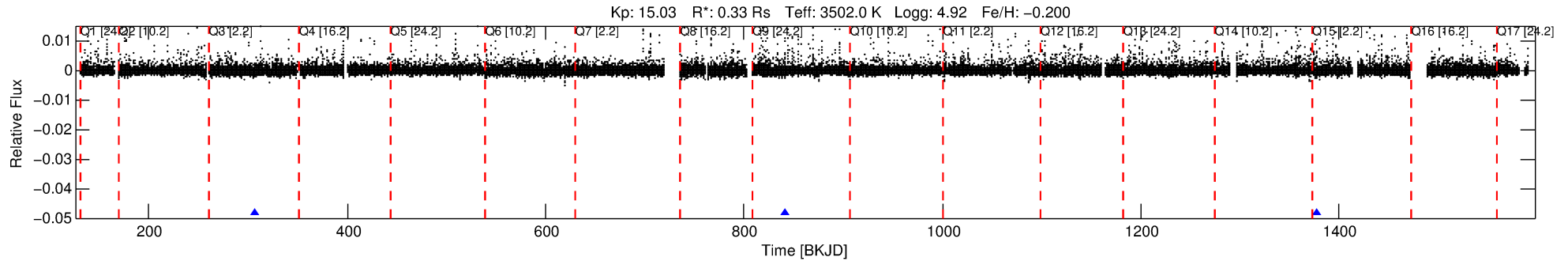
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008776565-02

No Significant Match Found

# DV One-Page Summary

KIC: 8776565 Candidate: 2 of 6 Period: 535.307 d



## DV Fit Results:

Period = 535.30677 [0.00441] d  
Epoch = 306.3352 [0.0054] BKJD  
Rp/R\* = 0.0508 [0.0280]  
a/R\* = 948.75 [2259.45]  
b = 0.57 [2.83]  
Seff = 0.02 [0.00]  
Teq = 94 [2] K  
Rp = 1.85 [1.04] Re  
a = 0.9028 [0.0672] AU  
Ag = 204466.97 [232167.93] [0.88σ]  
Teffp = 3089 [875] K [3.42σ]

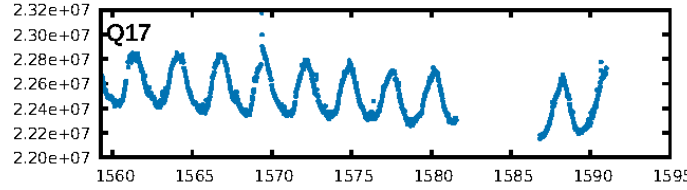
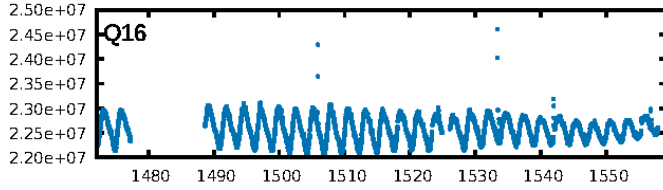
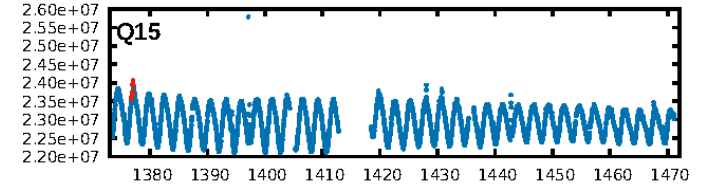
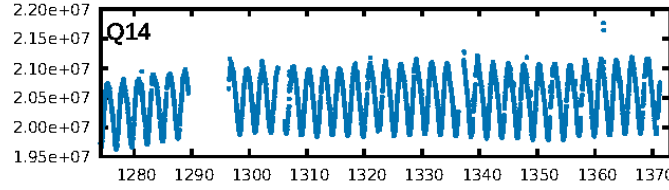
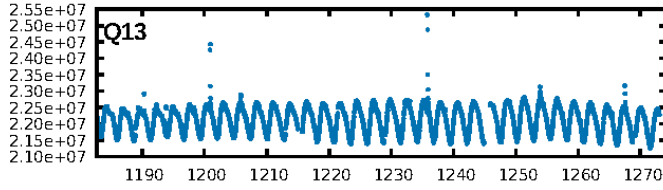
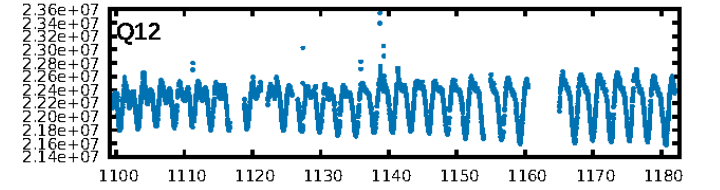
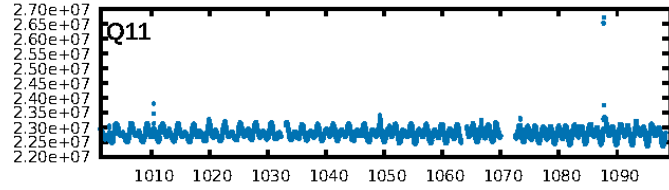
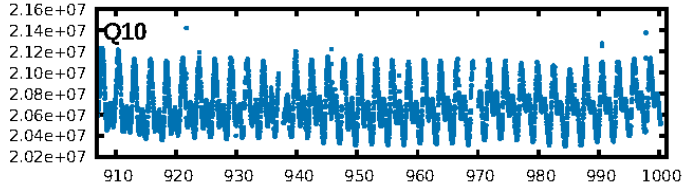
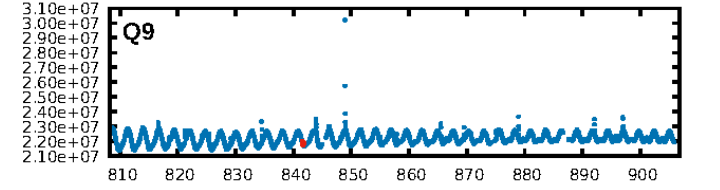
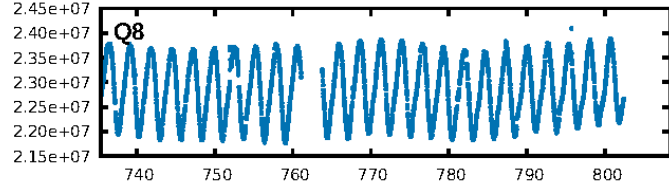
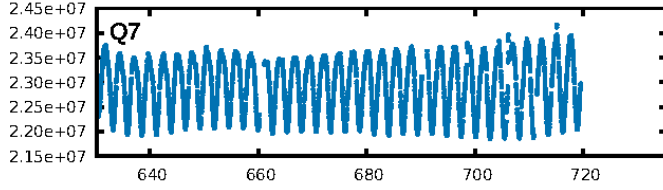
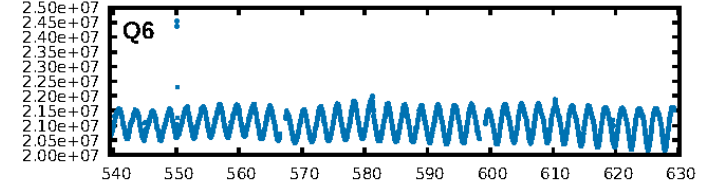
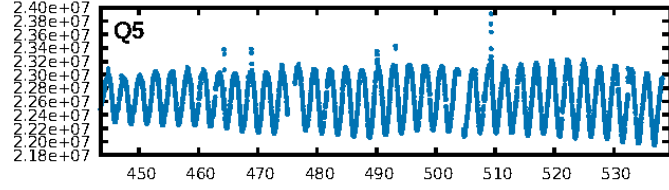
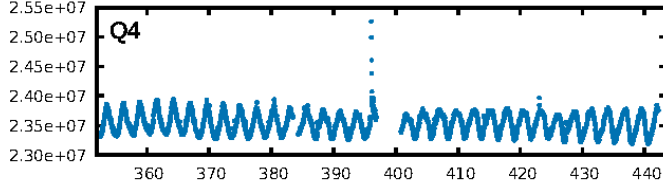
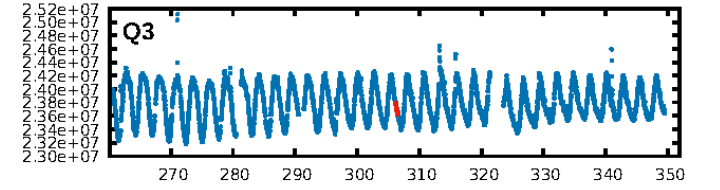
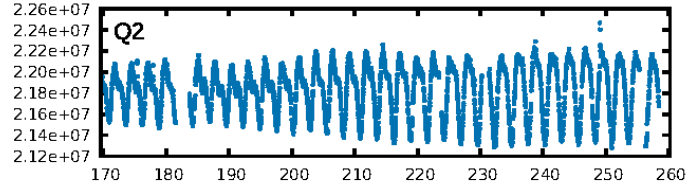
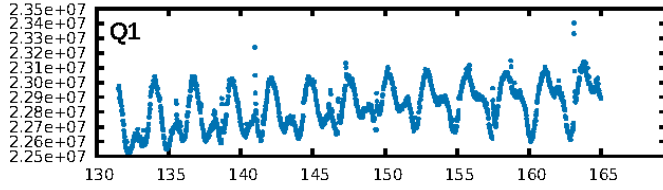
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [525.42σ]  
LongPeriod-sig: 100.0% [17.75σ]  
ModelChiSquare2-sig: 1.8%  
ModelChiSquareGof-sig: 78.4%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -0.07593  
Centroid-sig: N/A  
Centroid-so: 1.416 arcsec [1.75σ]  
OotOffset-rm: 0.454 arcsec [1.19σ]  
KicOffset-rm: 0.786 arcsec [1.64σ]  
OotOffset-st: 0/2/0/1 [3]  
KicOffset-st: 0/2/0/1 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

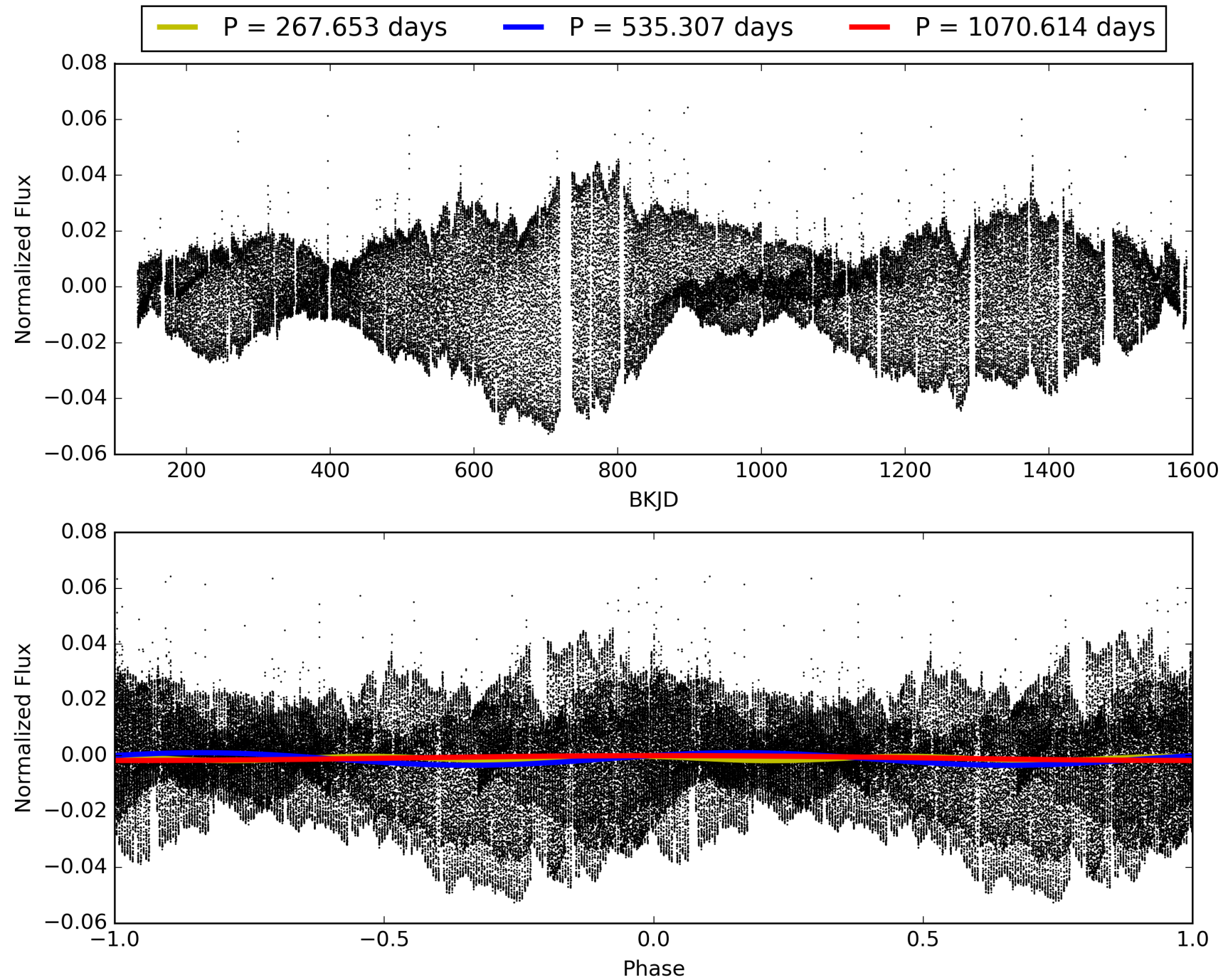
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 23:28:34 Z

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

# TCE 008776565-02, PDC Light Curves



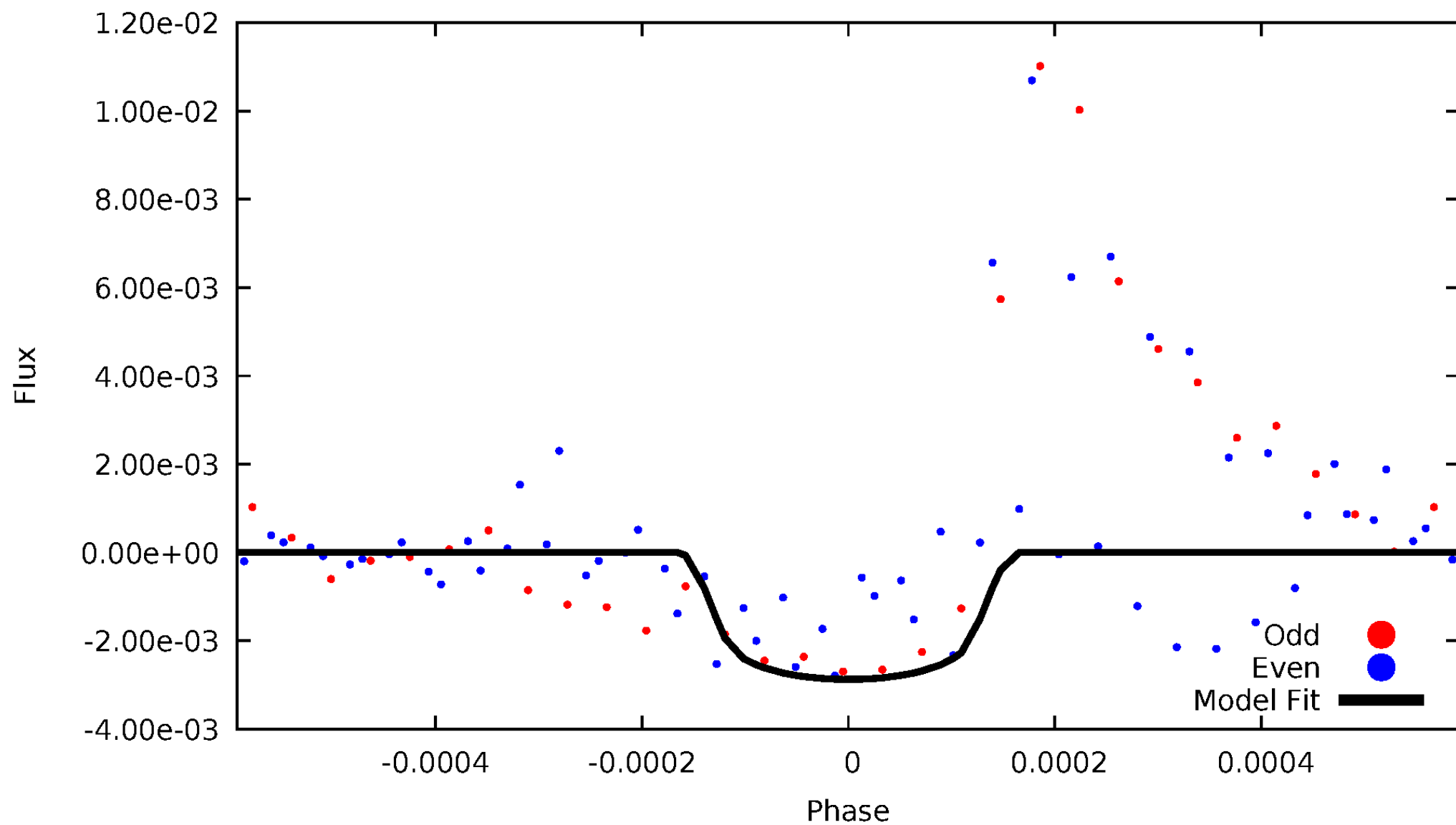
TCE 008776565-02





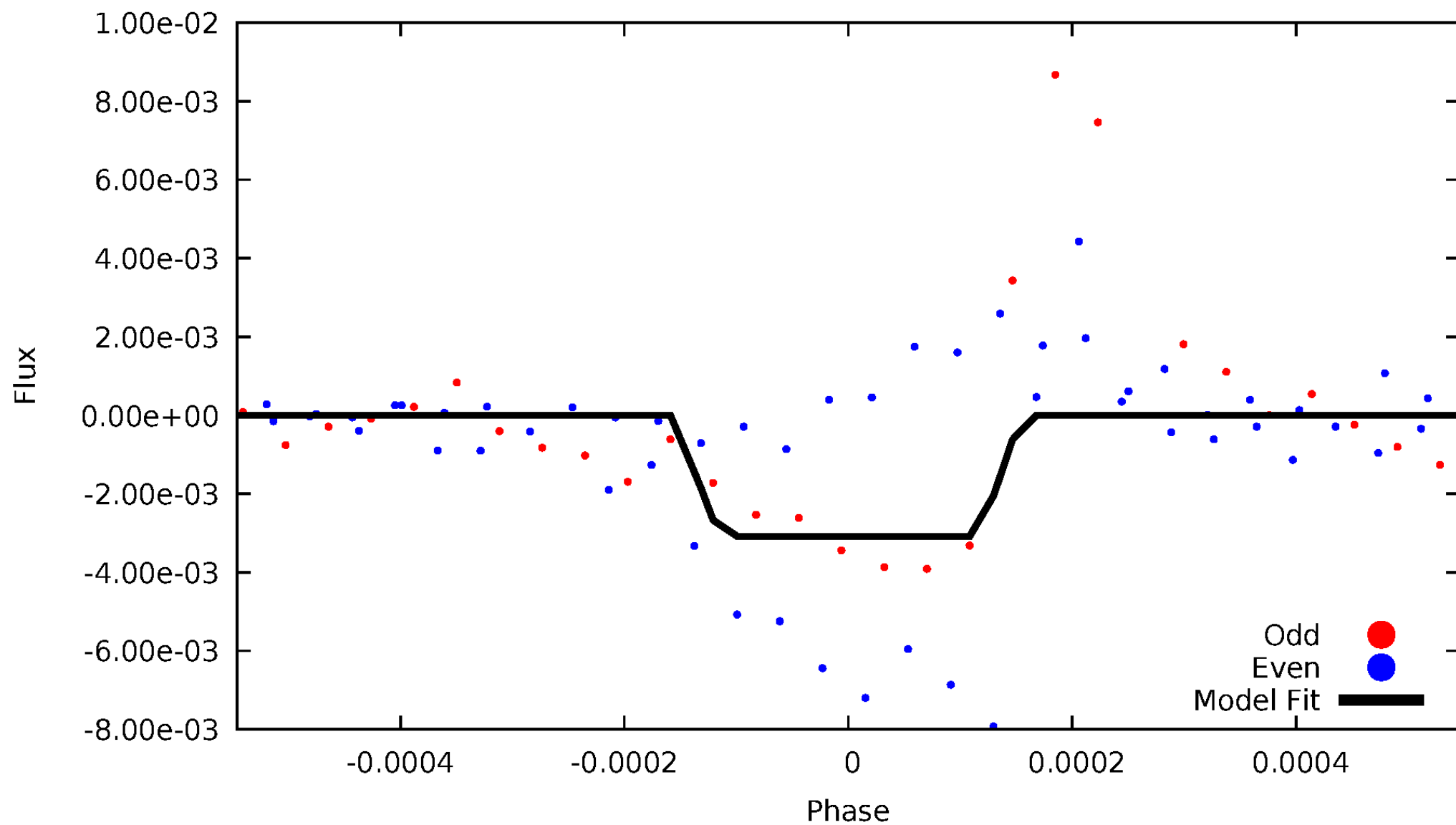
# DV Odd/Even

TCE 008776565-02



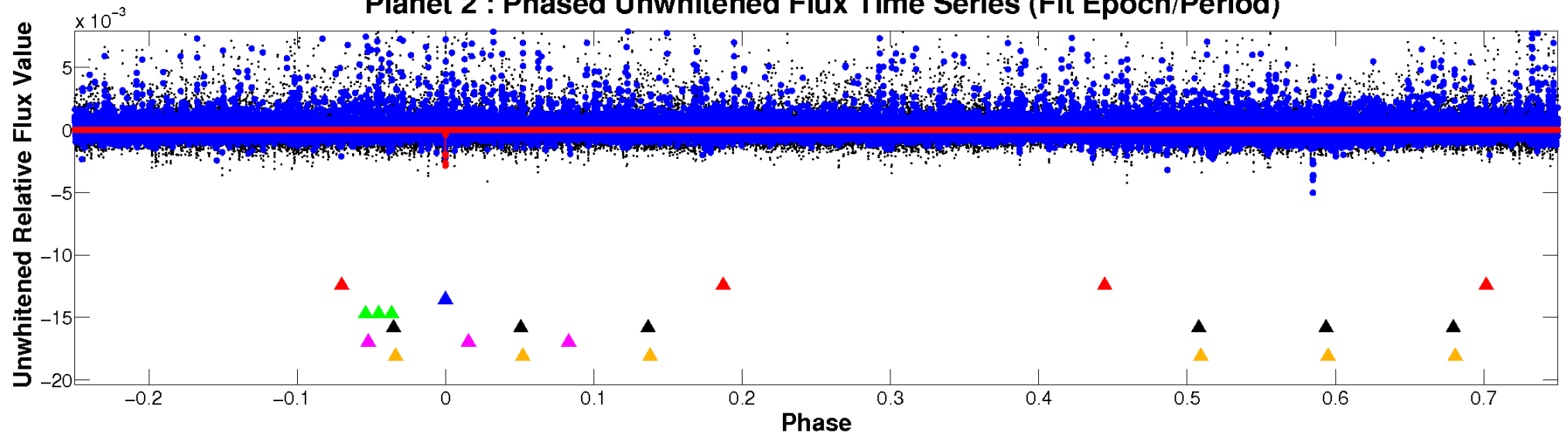
# ALT Odd/Even

TCE 008776565-02

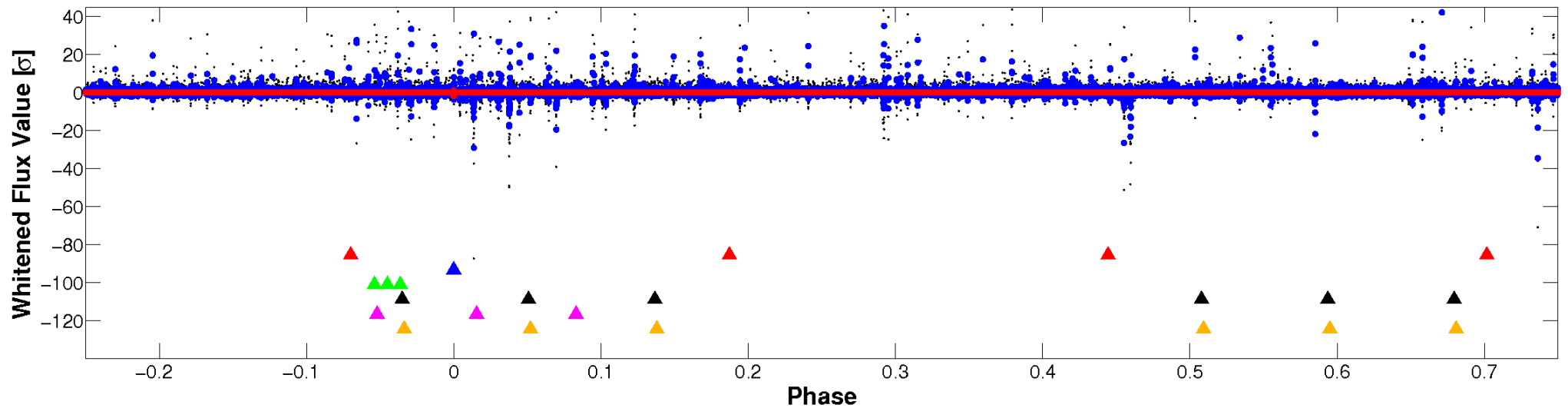


# Non-Whitened Vs. Whitened Light Curve

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

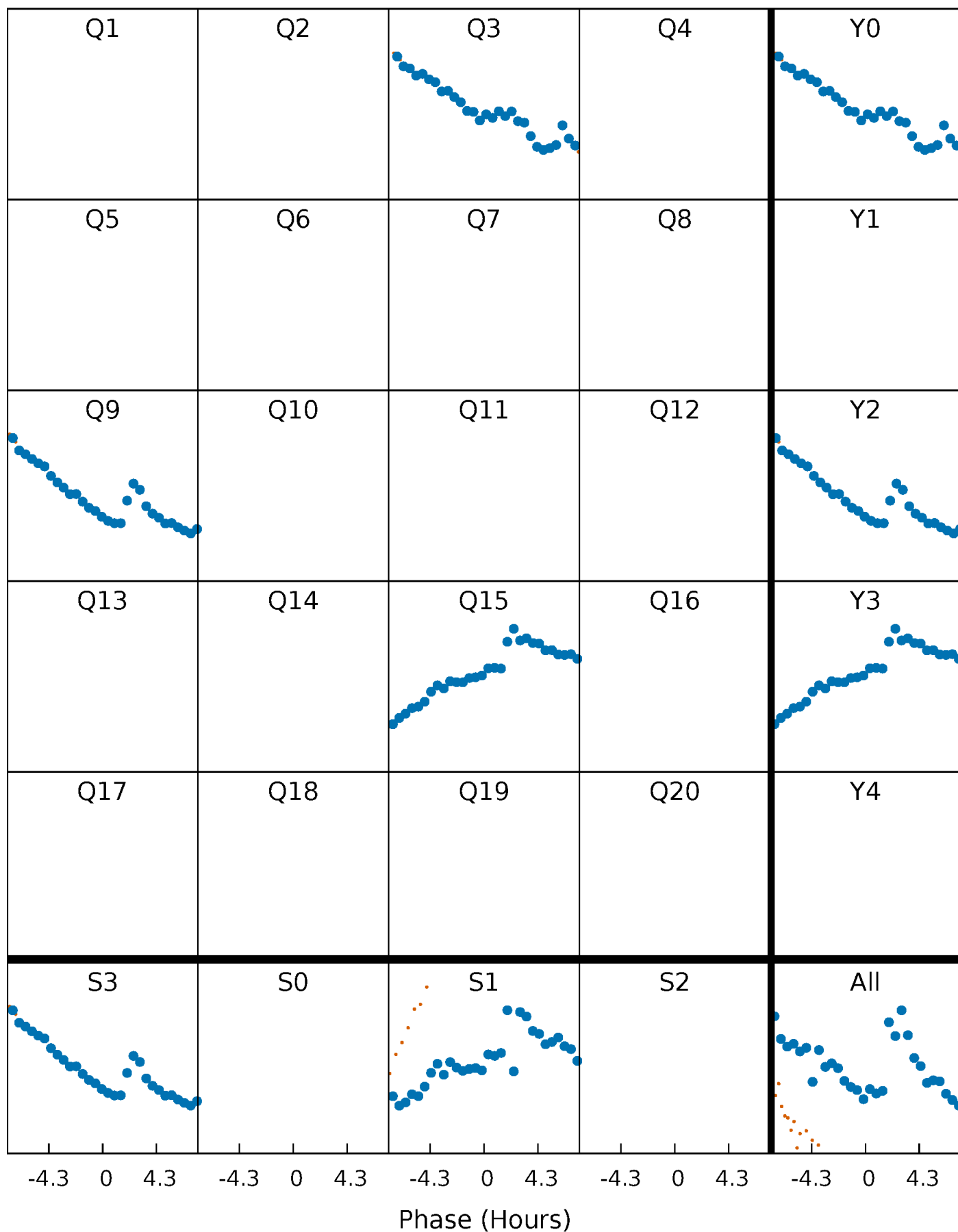


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



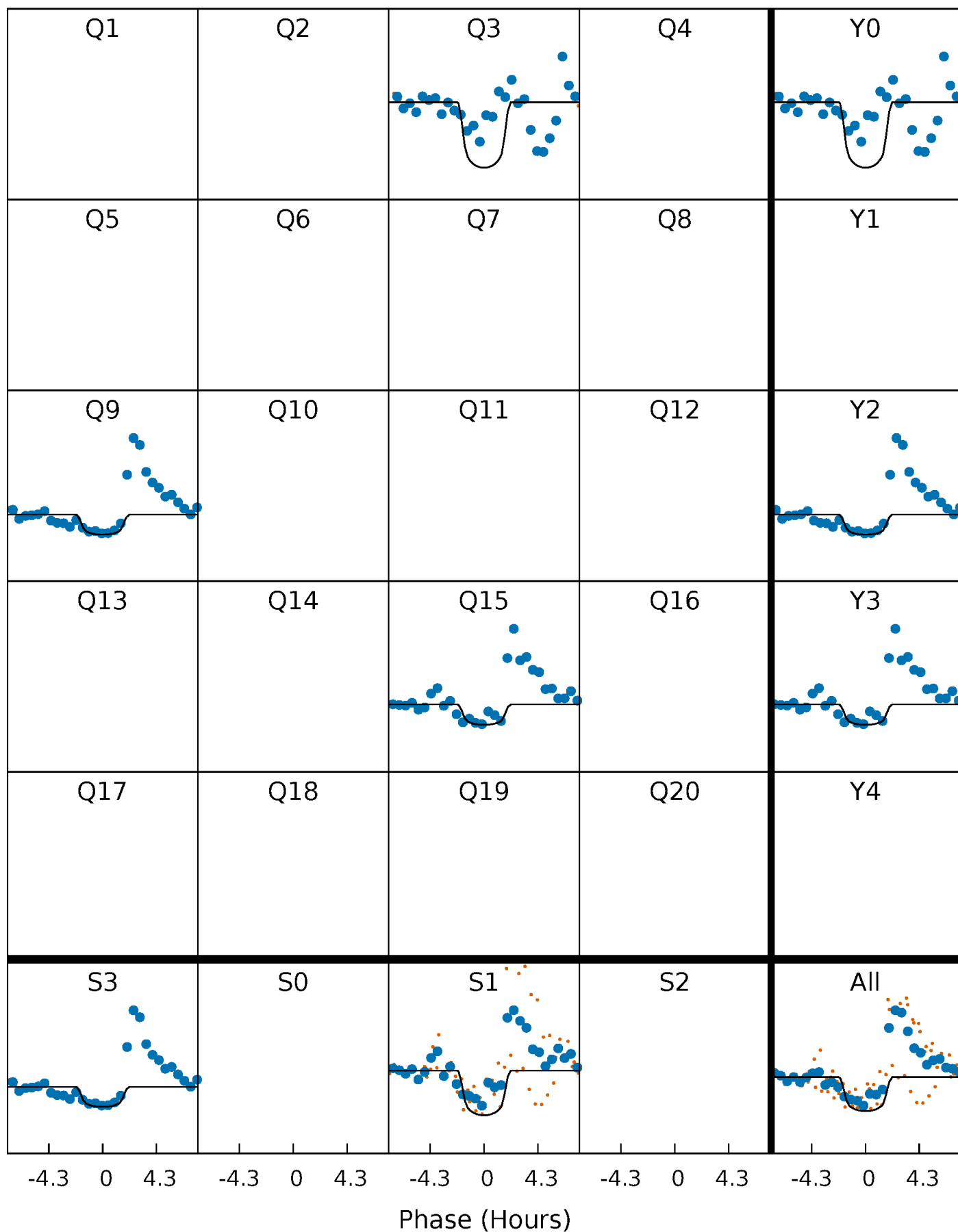
# PDC Quarter-Phased Transit Curves

TCE 008776565-02   P=535.306770 Days    $T_0=306.335224$  (BKJD)



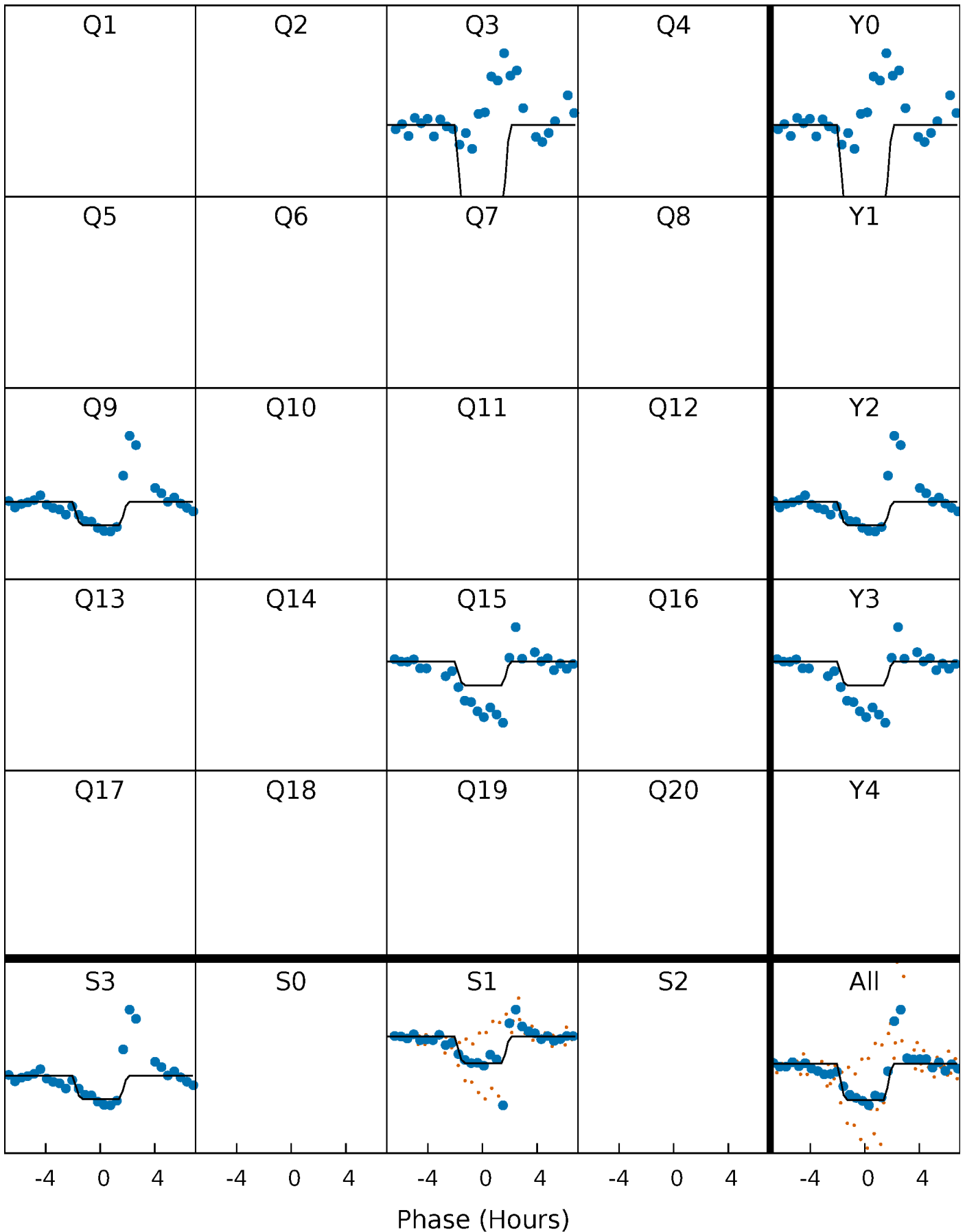
# DV Quarter-Phased Transit Curves

TCE 008776565-02     $P=535.306770$  Days     $T_0=306.335224$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

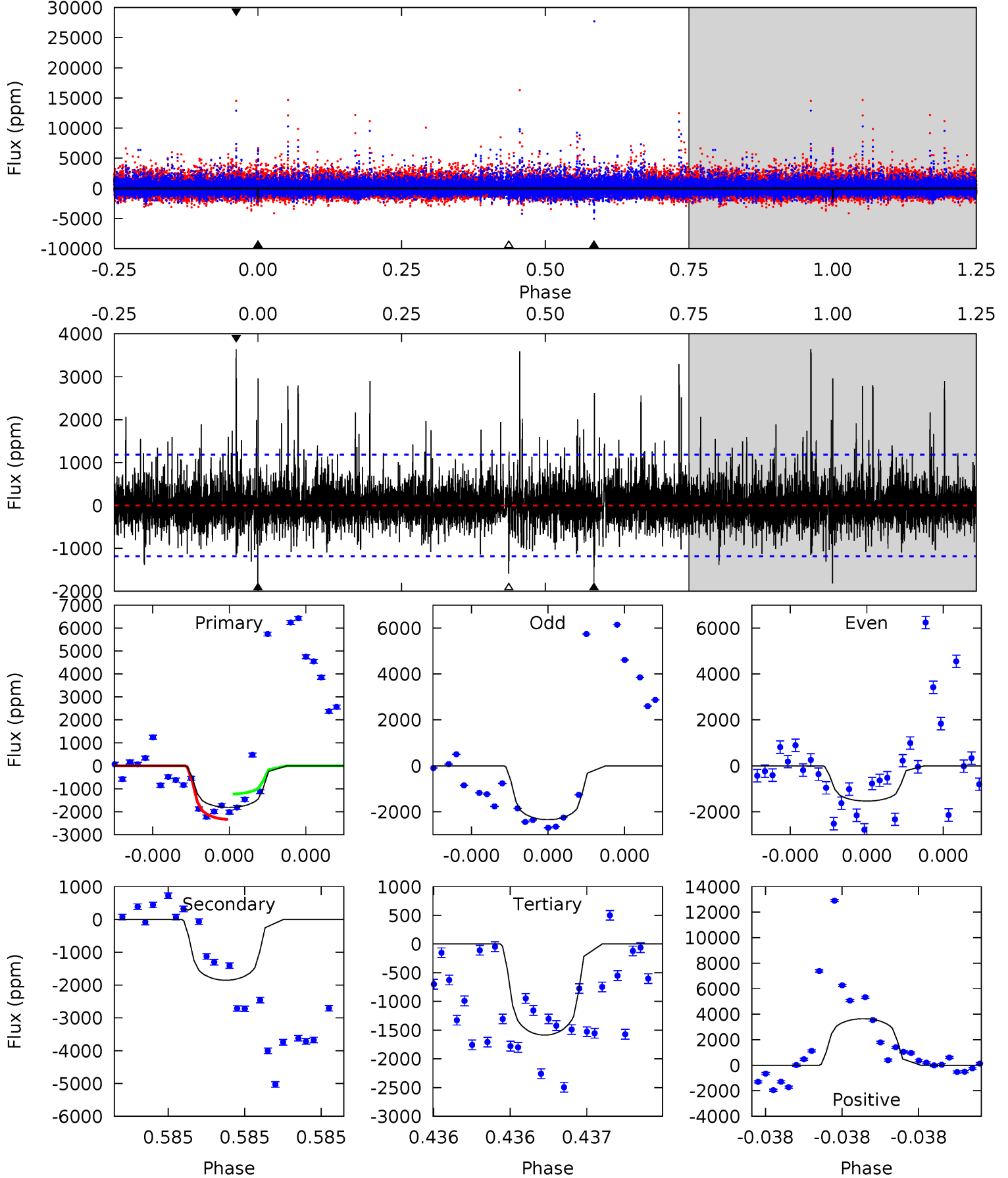
TCE 008776565-02 P=535.291160 Days  $T_0=306.351396$  (BKJD)



# DV Model-Shift Uniqueness Test

008776565-02, P = 535.306770 Days, E = 306.335224 Days

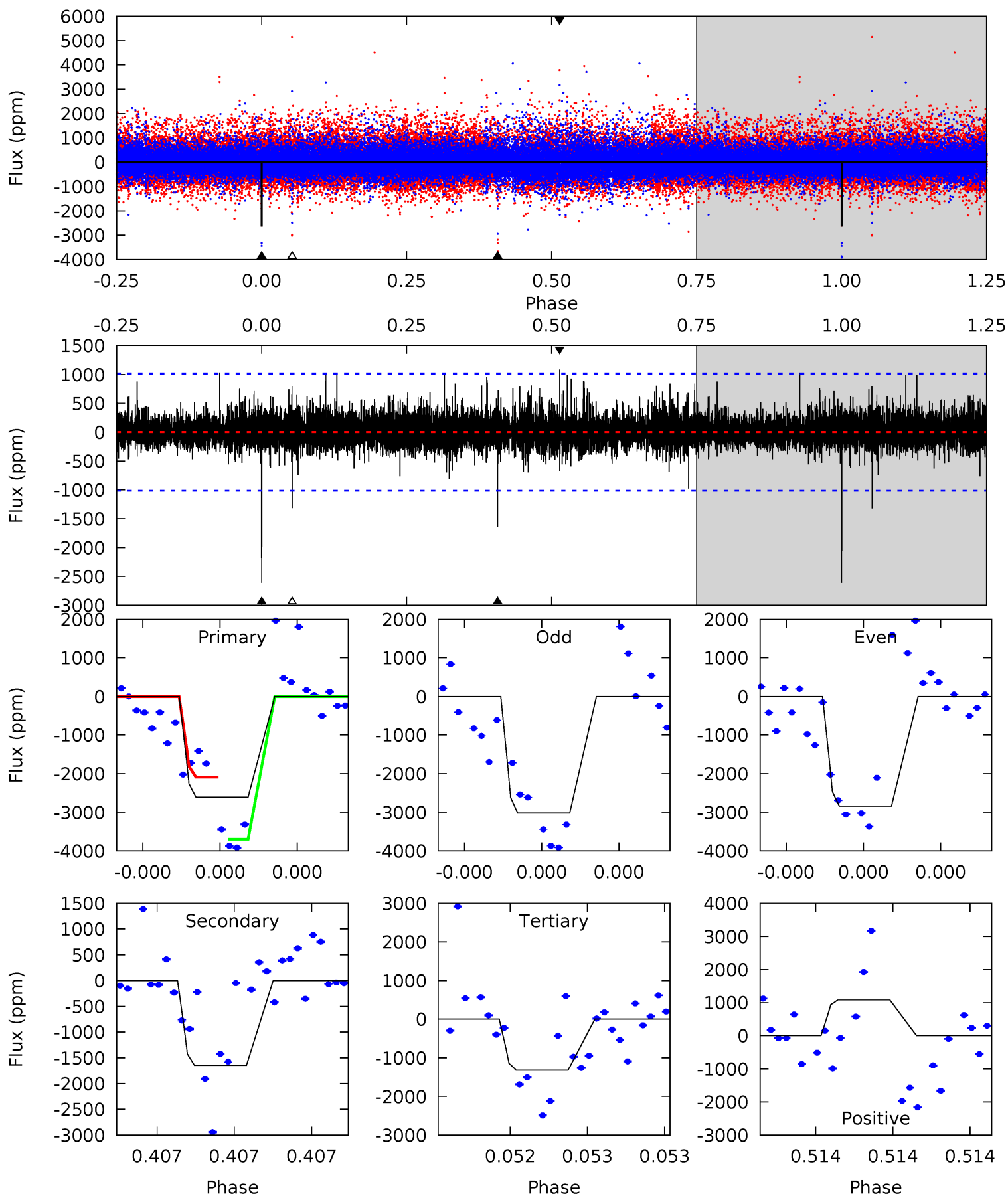
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.69	8.90	7.62	17.5	5.67	3.63	1.91	1.08	-8.81	1.28	-8.61	0.87	0.88	0.66	2.69



# Alt Model-Shift Uniqueness Test

008776565-02, P = 535.291160 Days, E = 306.351396 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	9.16	7.34	6.02	5.66	3.62	0.94	7.19	8.51	1.82	3.14	0.67	0.99	0.29	4.24





### Stellar Parameters For KIC 008776565

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3502^{+41}_{-41}$	$4.925^{+0.040}_{-0.032}$	$-0.200^{+0.100}_{-0.100}$	$0.334^{+0.030}_{-0.034}$	$0.341^{+0.038}_{-0.041}$	$12.910^{+2.925}_{-1.990}$
	+1%/-1%	+1%/-1%	+50%/-50%	+9%/-10%	+11%/-12%	+23%/-15%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 008776565-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1852 \pm 208$	$1.85^{+1.04}_{-0.92}$	$131^{+3}_{-3}$	$3323^{+809}_{-401}$	$245037^{+665554}_{-145364}$
Alt.	$-1644 \pm 180$	$2.05^{+1.10}_{-0.91}$	$131^{+3}_{-2}$	$3164^{+647}_{-356}$	$176360^{+377627}_{-100865}$

$T_{max}$  = 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

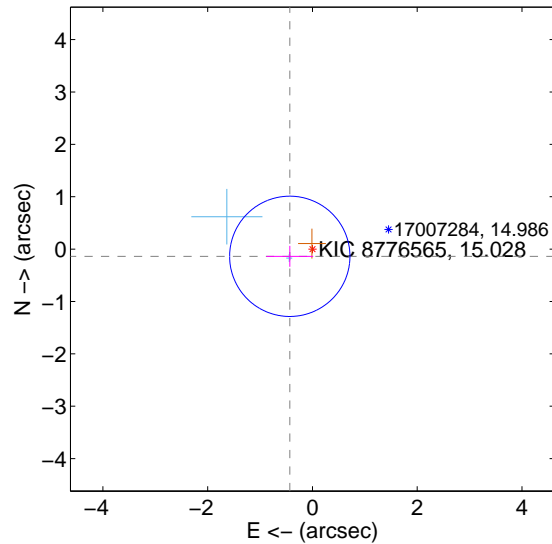
Supplemental centroid analysis for 008776565-02. Kepler magnitude: 15.03. Transit SNR 7.68

There are 2 quarters with good PRF difference image offsets

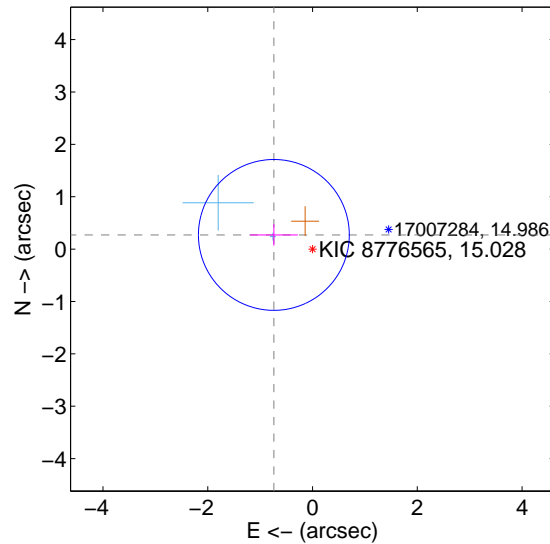
The direct PRF centroid is offset from the target star catalog position by about 0.45 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.454 \pm 0.383$	1.19	$0.433 \pm 0.447$	$-0.138 \pm 0.200$
PRF-fit source offset from KIC position	$0.786 \pm 0.480$	1.64	$0.738 \pm 0.456$	$0.271 \pm 0.204$
photometric centroid source offset	$1.42 \pm 0.81$	1.75	$1.26 \pm 0.77$	$0.65 \pm 0.95$

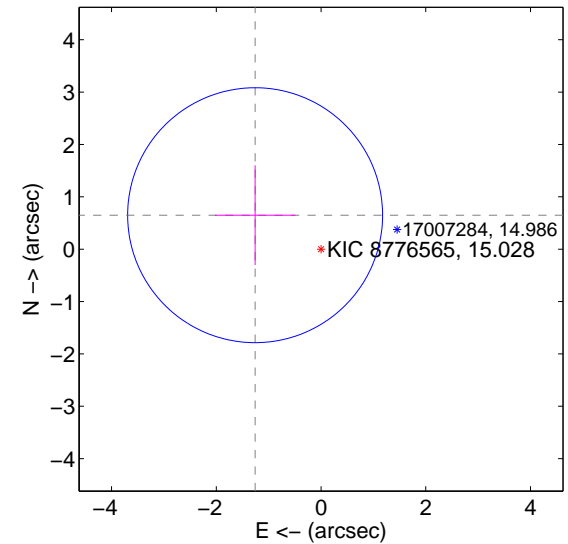
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

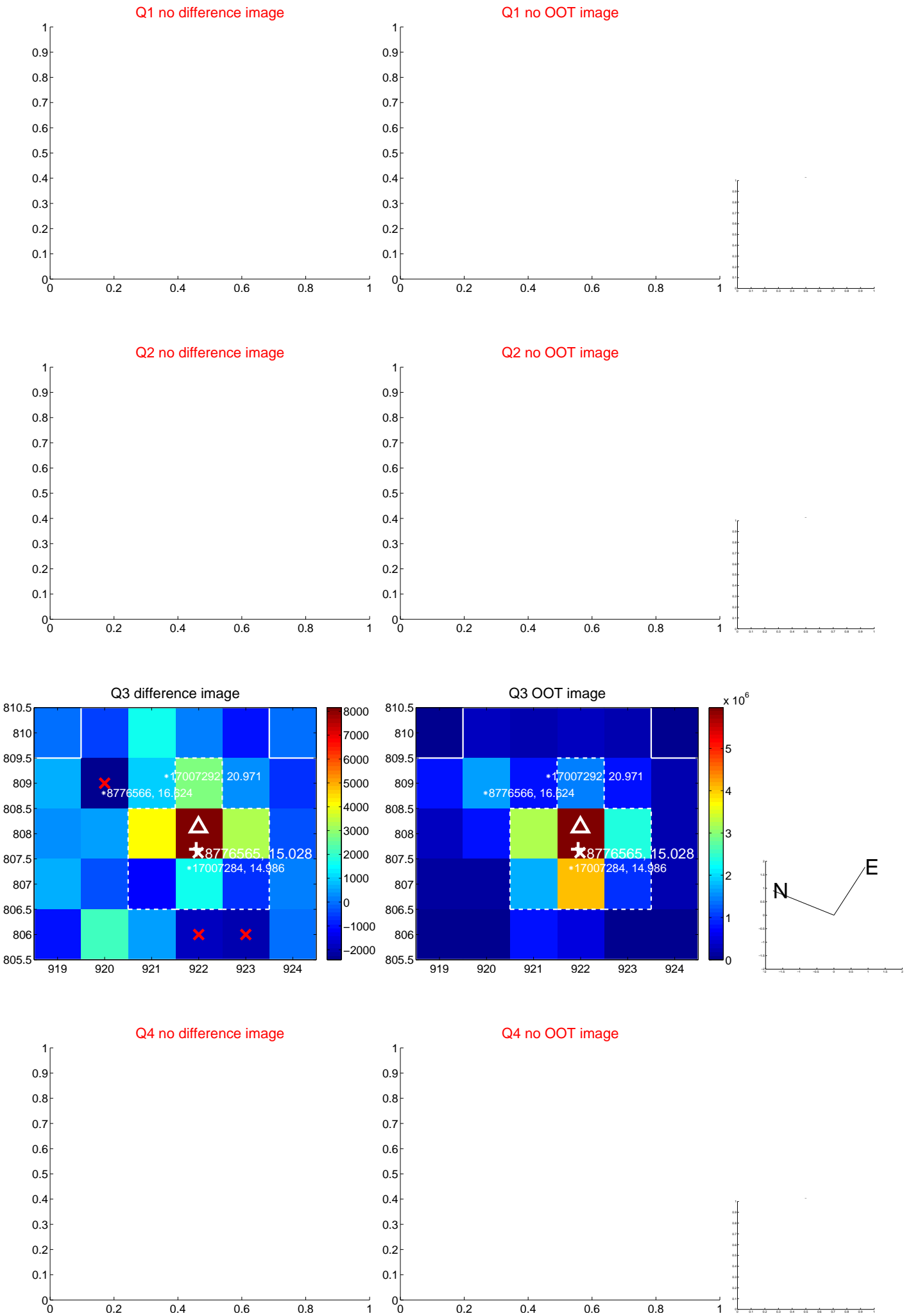


offset from photometric centroids



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.

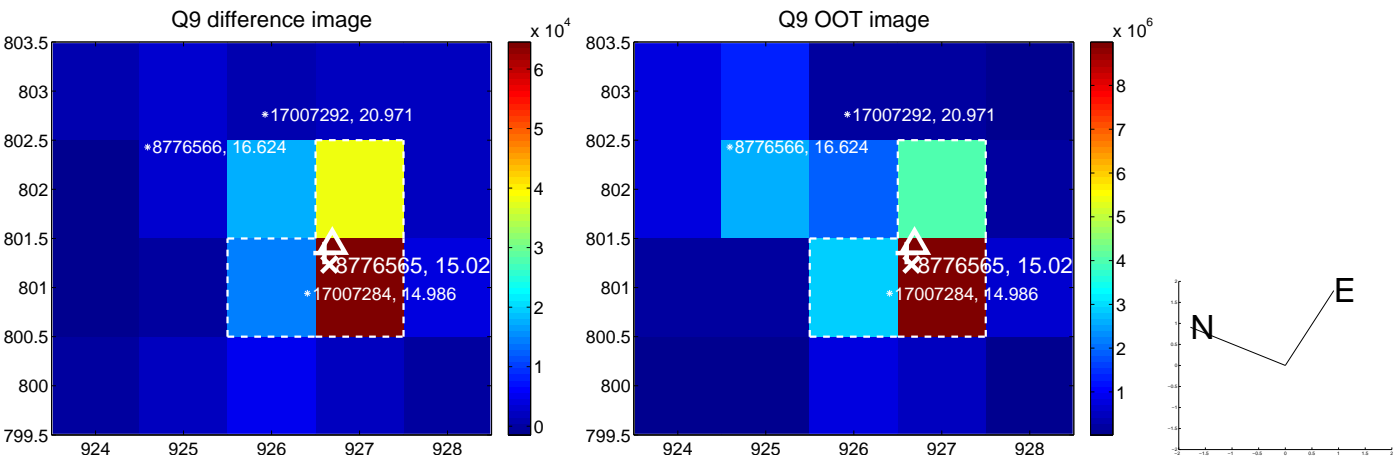
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



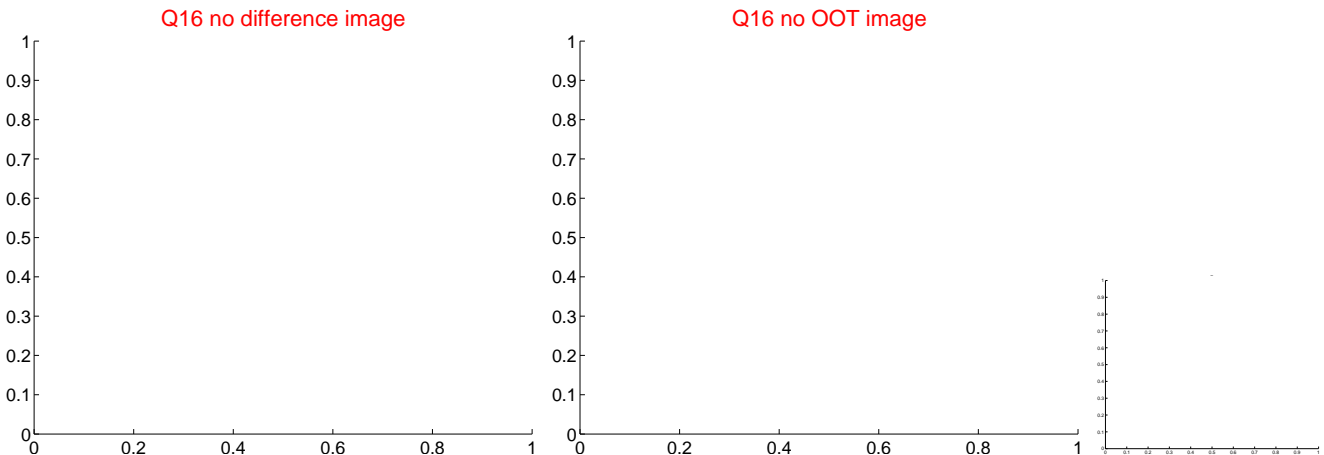
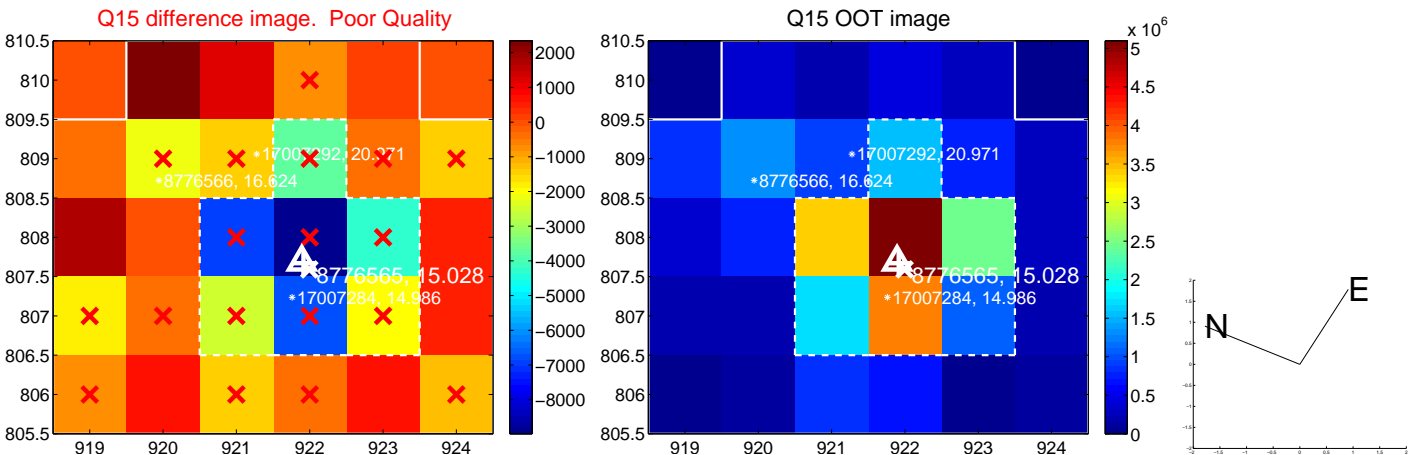
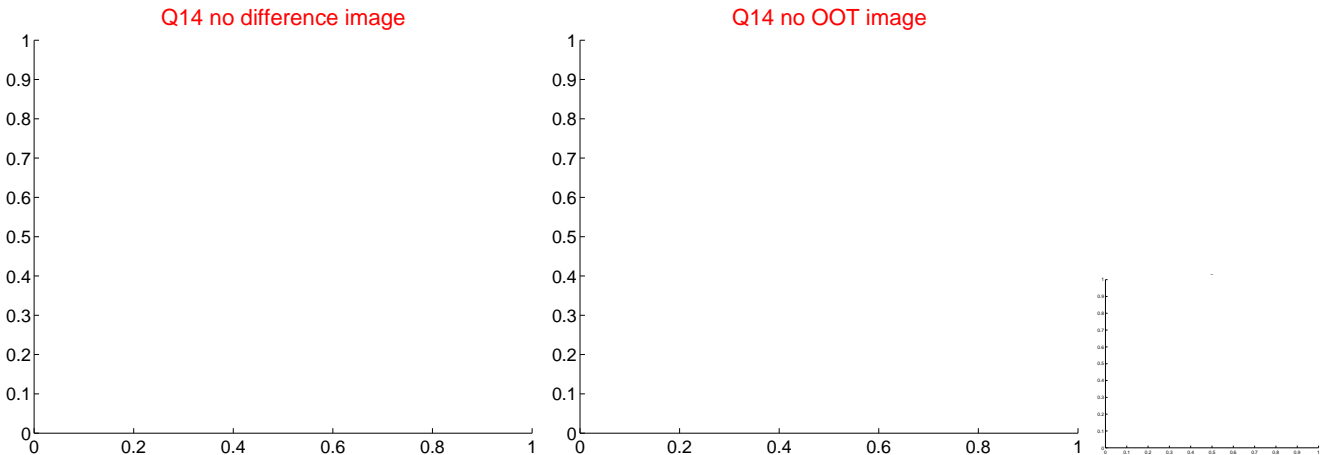
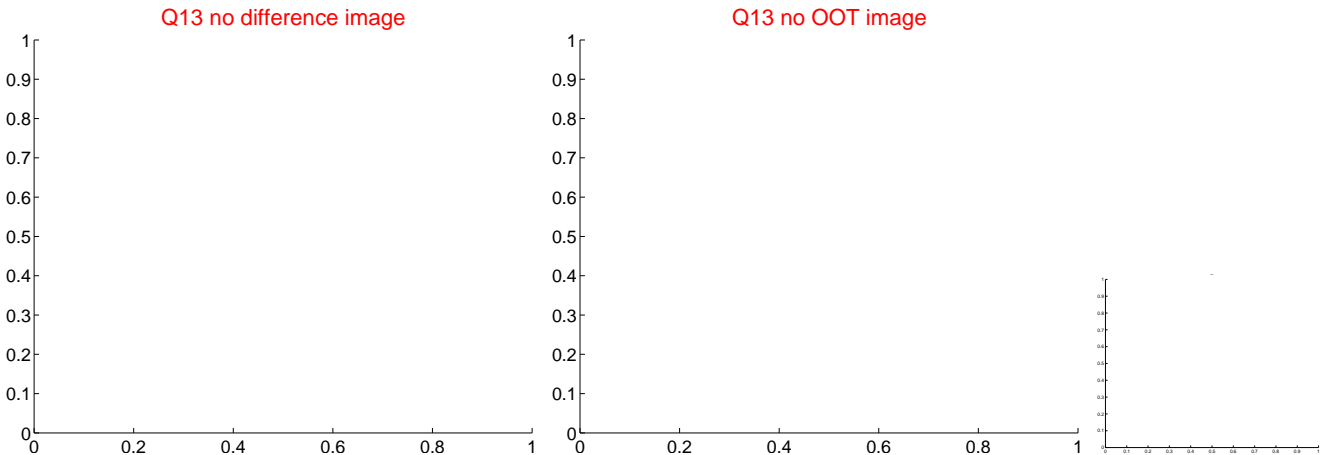
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



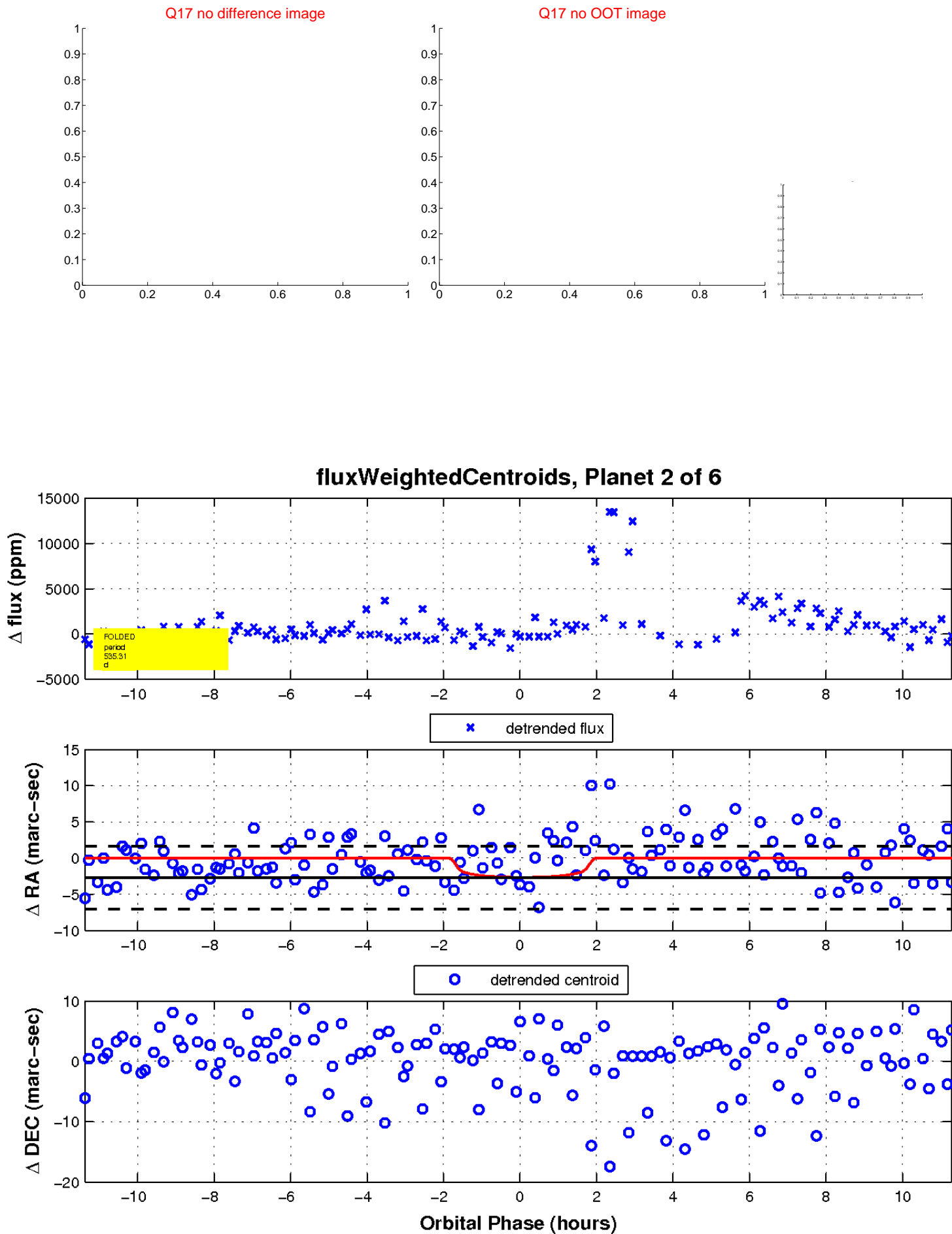
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

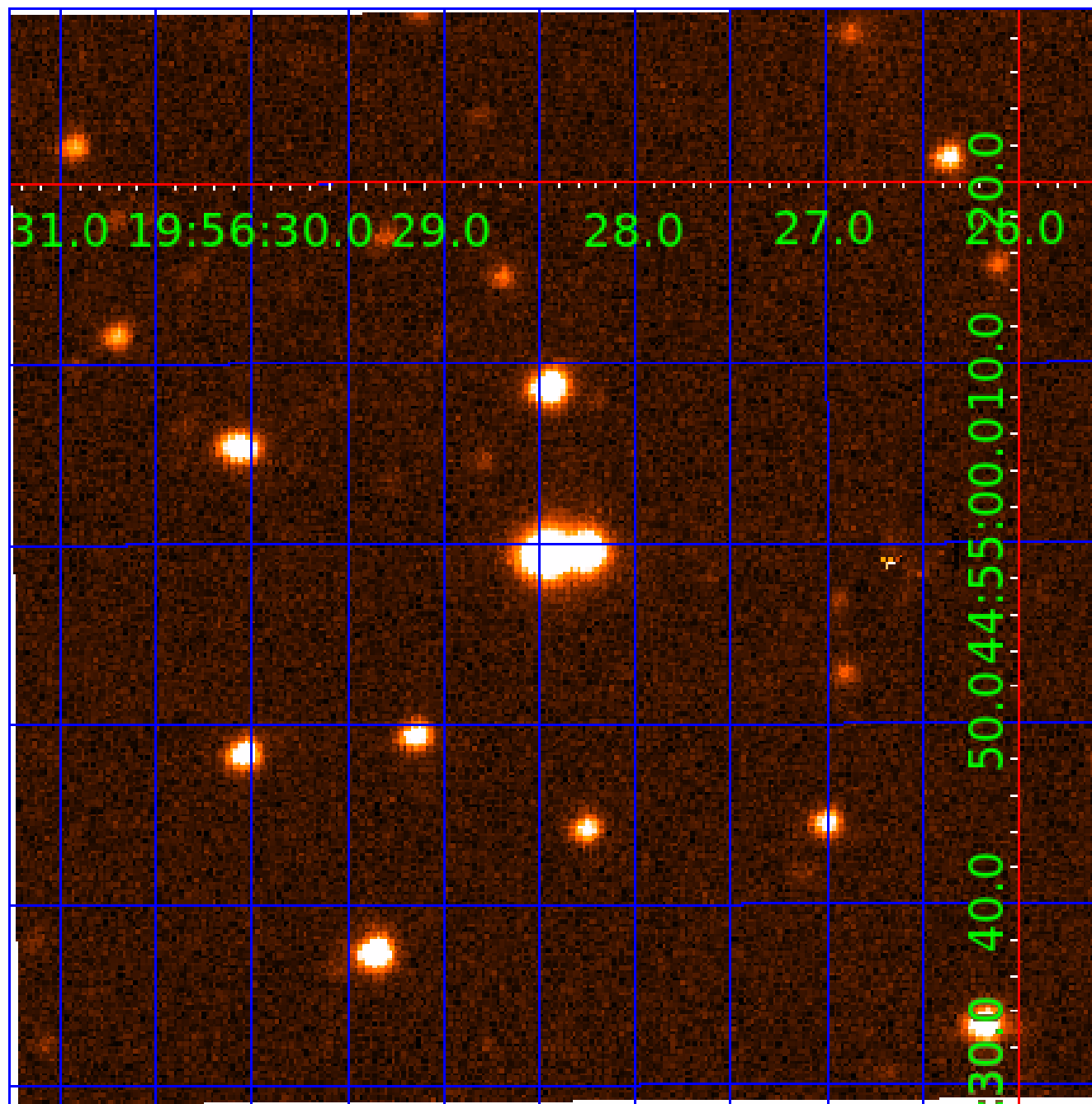


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 008776565

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008776565-01	OBS	No	397.621881	146.638498	1450.8	5.008	13.8	5.6	0.33	3502	1.34	0.03
008776565-02	OBS	No	535.306770	306.335224	2872.7	3.805	13.7	7.7	0.33	3502	1.85	0.02
008776565-03	OBS	No	540.005837	277.518058	2372.7	5.089	13.4	6.5	0.33	3502	1.61	0.02
008776565-04	OBS	No	244.687393	134.772525	991.5	5.579	11.0	4.4	0.33	3502	1.10	0.05
008776565-05	OBS	No	571.472737	278.470787	1790.2	5.433	11.7	5.5	0.33	3502	1.51	0.02
008776565-06	OBS	No	244.691881	135.488727	928.4	10.500	11.7	-1.0	0.33	3502	1.01	0.05

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008776565-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
008776565-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
008776565-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
008776565-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_MARSHALL_SKYE_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_KIC_POS—HALO_GHOST
008776565-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_TRACKER—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
008776565-06	OBS	FP	0.00	1	0	1	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—SAME_NTL_PERIOD—CENT_NOFITS—HALO_GHOST

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

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

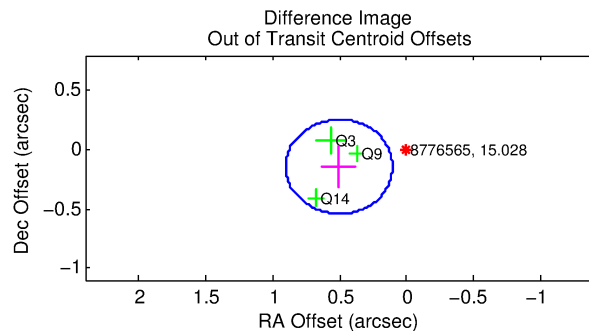
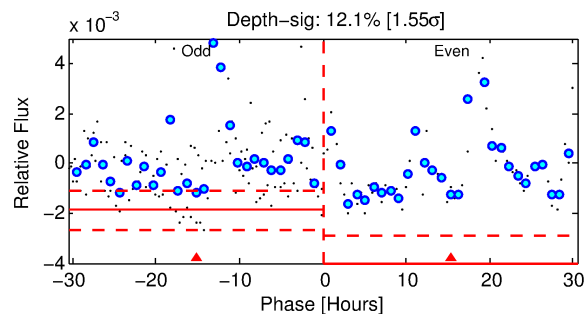
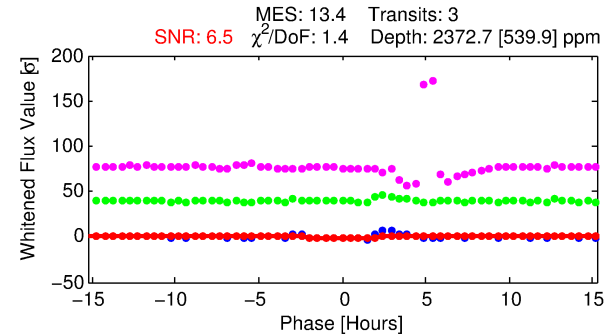
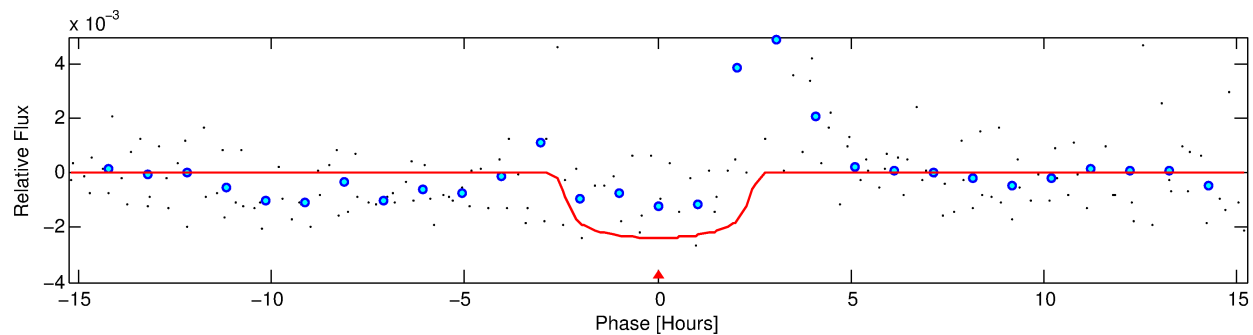
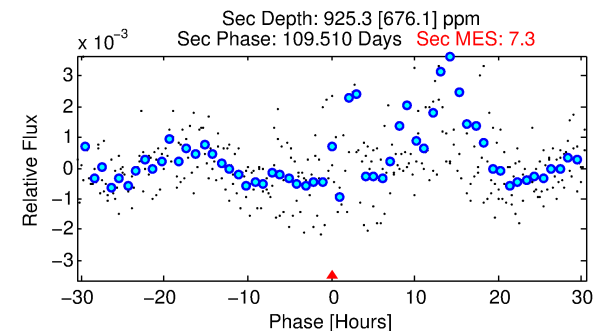
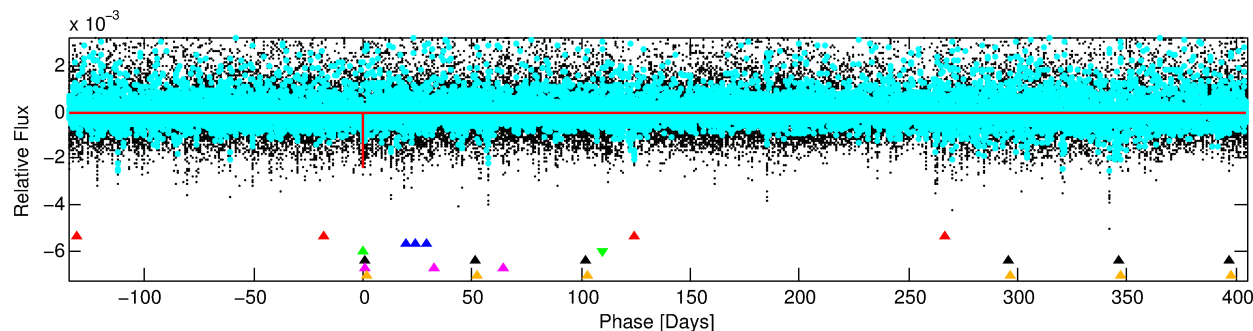
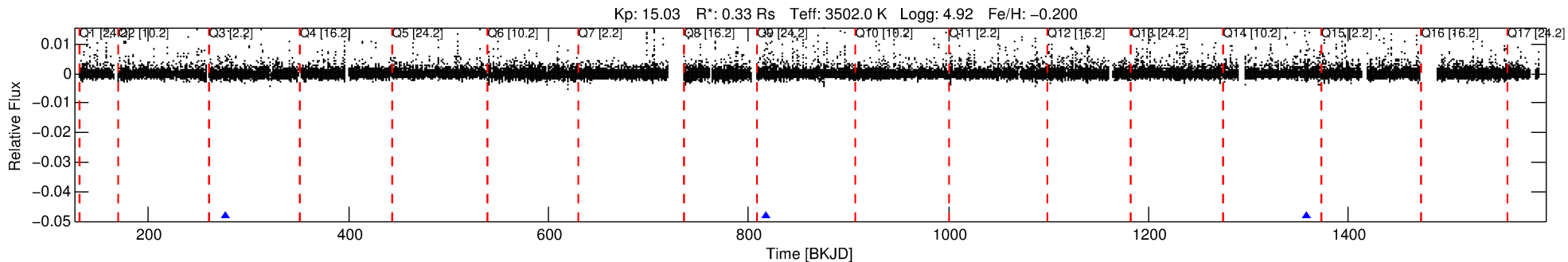
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008776565-03

No Significant Match Found

# DV One-Page Summary

KIC: 8776565 Candidate: 3 of 6 Period: 540.006 d



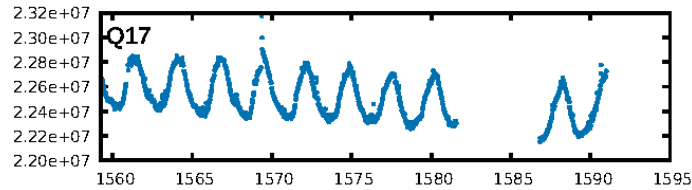
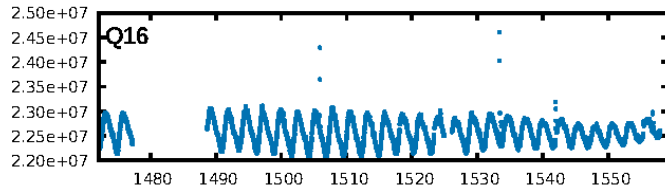
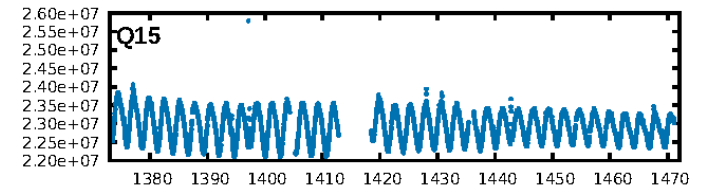
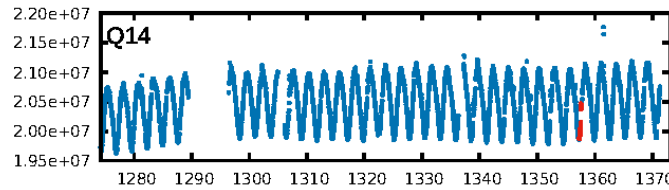
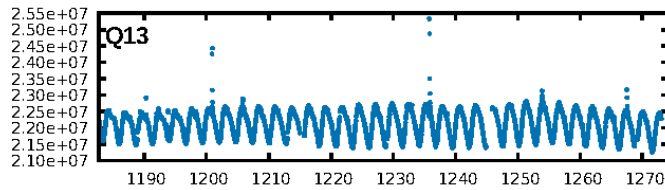
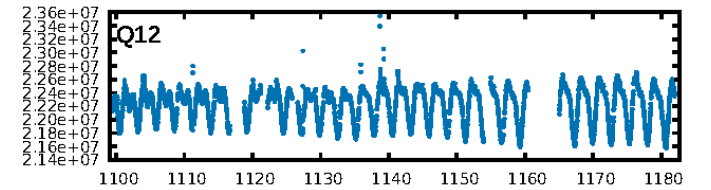
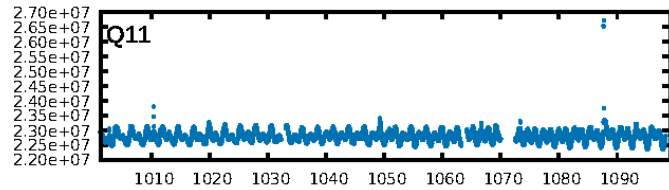
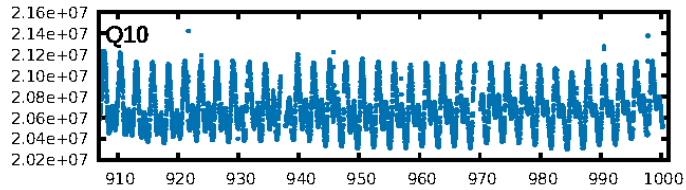
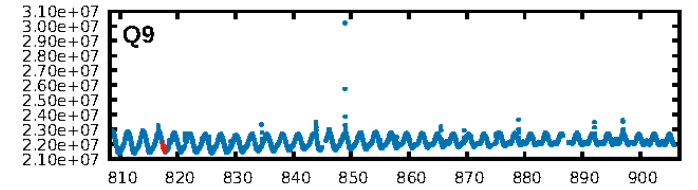
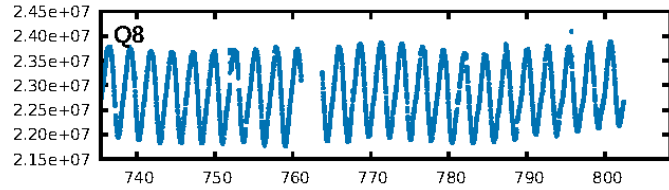
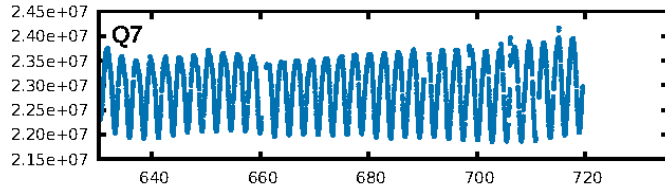
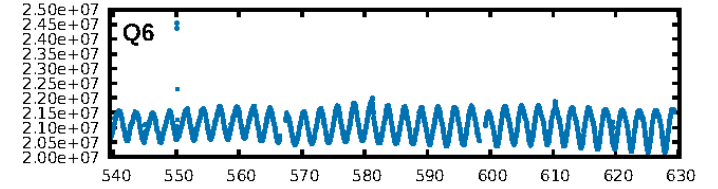
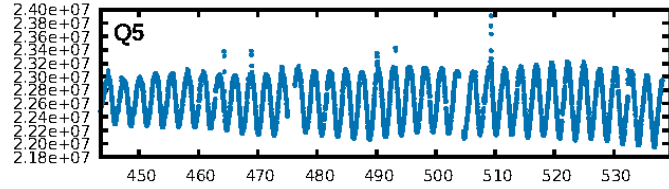
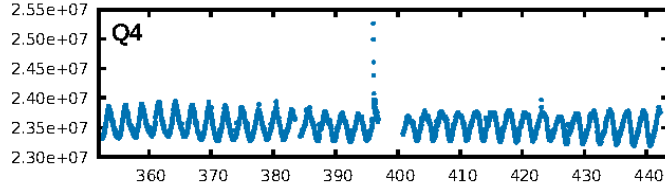
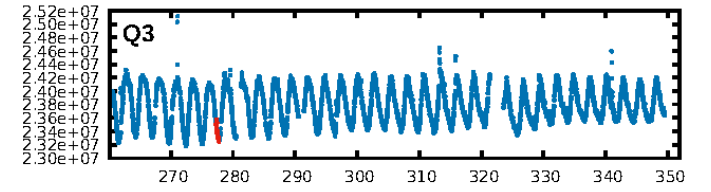
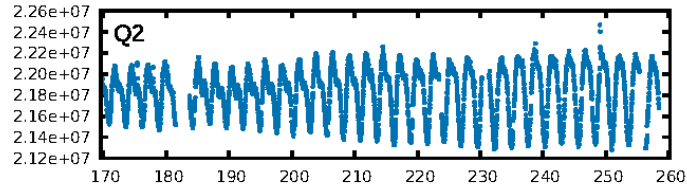
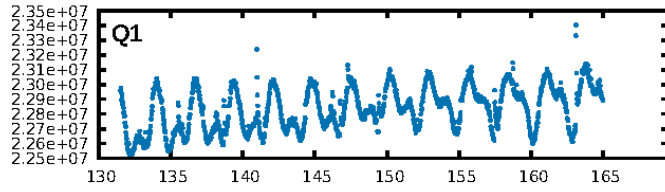
## DV Fit Results:

Period = 540.00584 [0.00681] d  
Epoch = 277.5181 [0.0101] BKJD  
Rp/R\* = 0.0442 [0.0696]  
a/R\* = 846.26 [6020.54]  
b = 0.02 [304.17]  
Seff = 0.02 [0.00]  
Teq = 94 [2] K  
Rp = 1.61 [2.54] Re  
a = 0.9081 [0.0676] AU  
Ag = 161533.56 [522387.65] [0.31σ]  
Teffp = 2904 [2347] K [1.20σ]

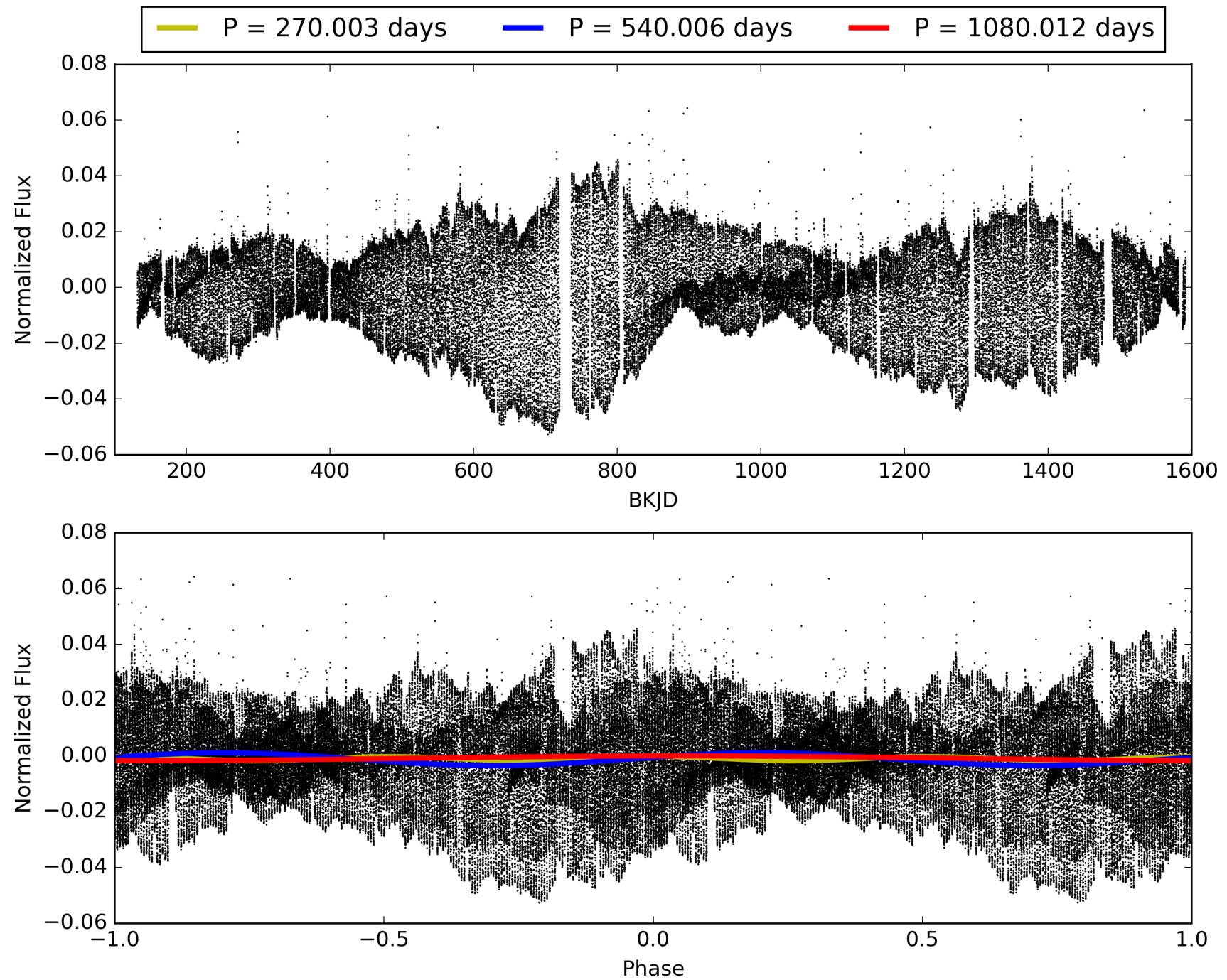
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [17.75σ]  
LongPeriod-sig: 100.0% [101.45σ]  
ModelChiSquare2-sig: 1.5%  
ModelChiSquareGof-sig: 87.6%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 1.122  
Centroid-sig: N/A  
Centroid-so: 1.643 arcsec [1.84σ]  
OotOffset-rm: 0.523 arcsec [3.94σ]  
KicOffset-rm: 0.773 arcsec [9.65σ]  
OotOffset-st: 1/1/0/1 [3]  
KicOffset-st: 1/1/0/1 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 1.00 [3/3]

# TCE 008776565-03, PDC Light Curves

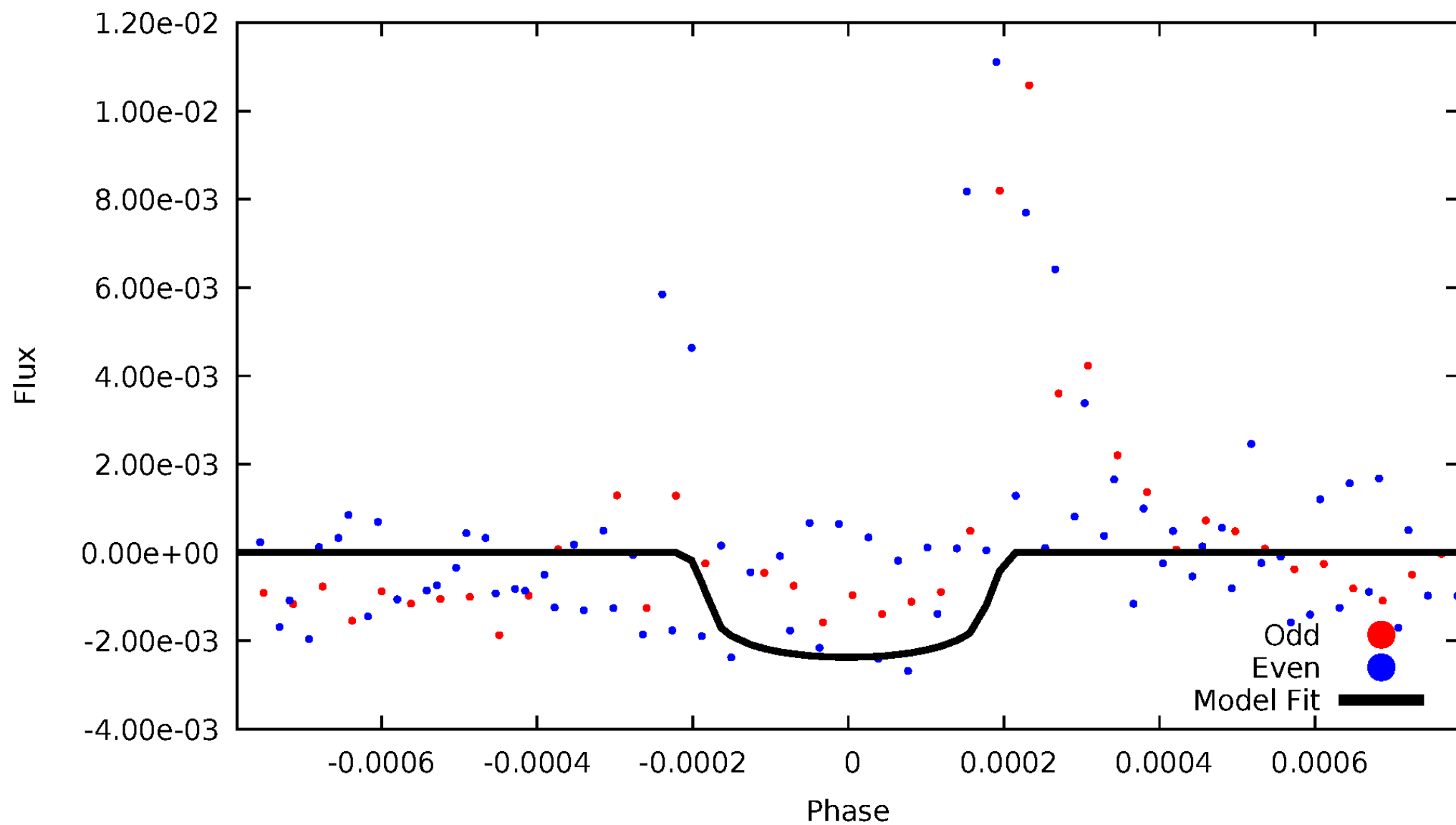


TCE 008776565-03



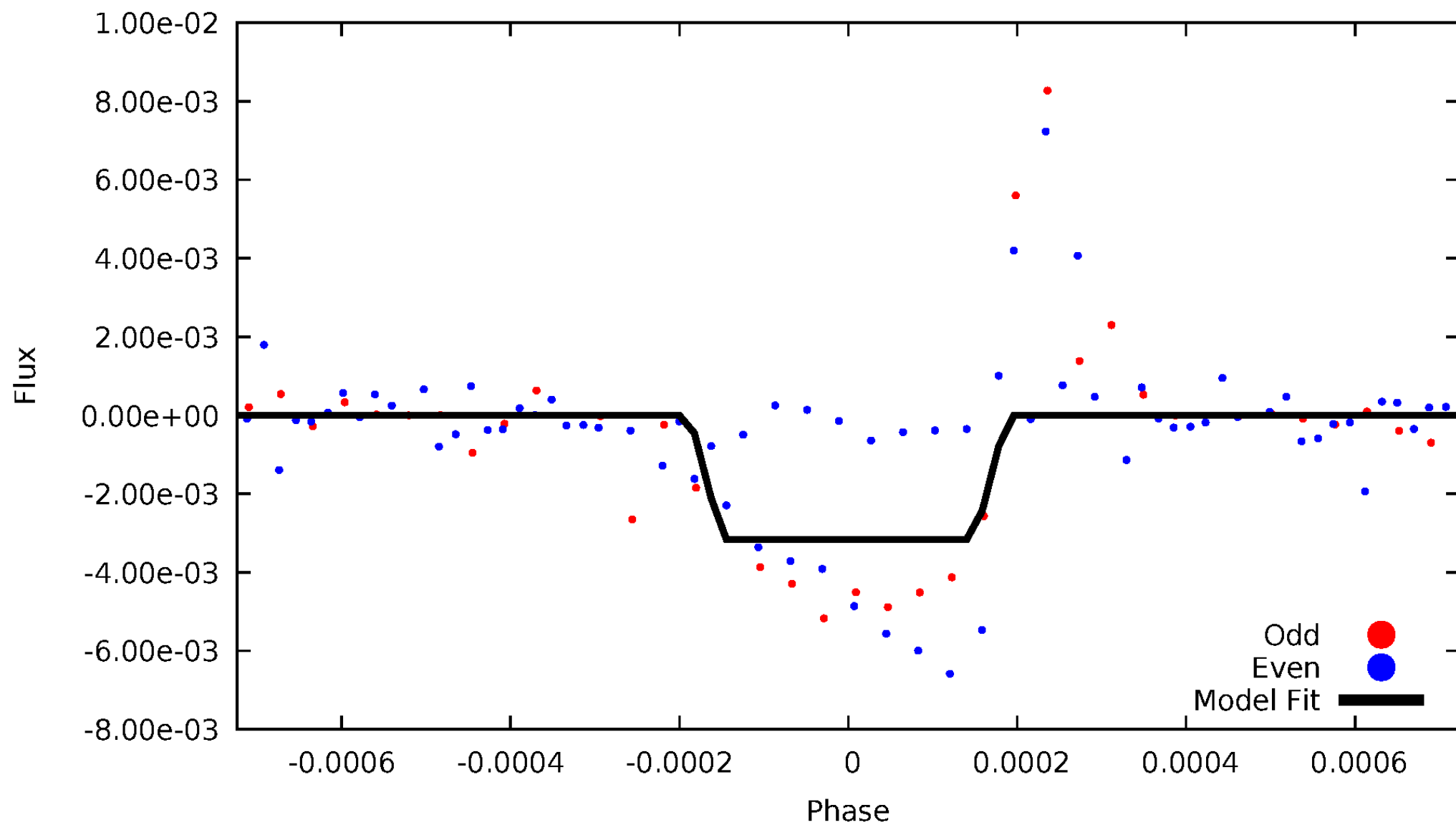
# DV Odd/Even

TCE 008776565-03



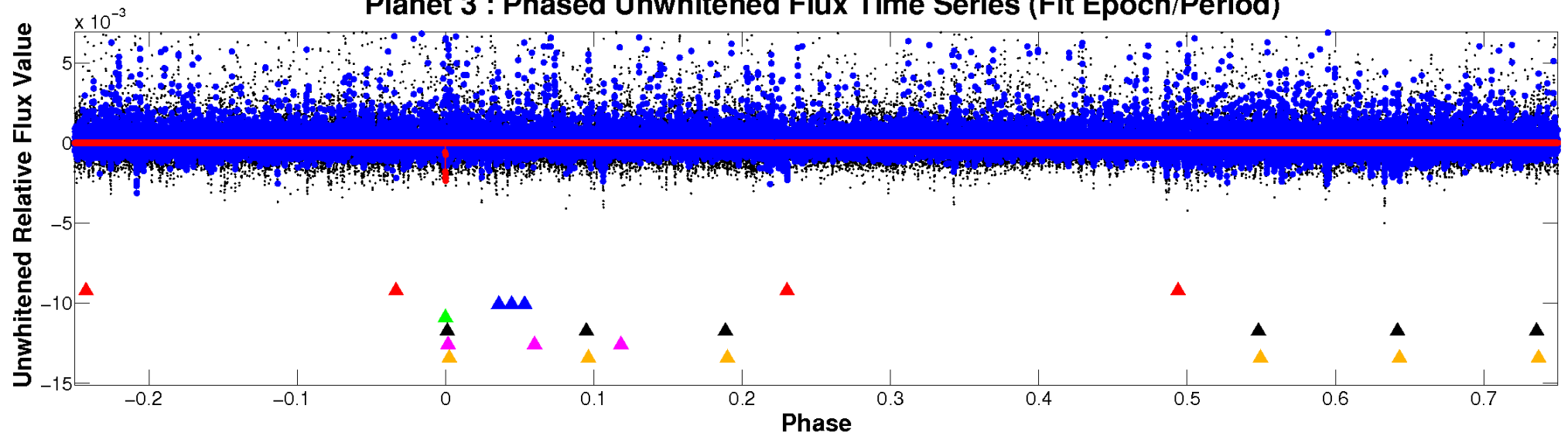
# ALT Odd/Even

TCE 008776565-03

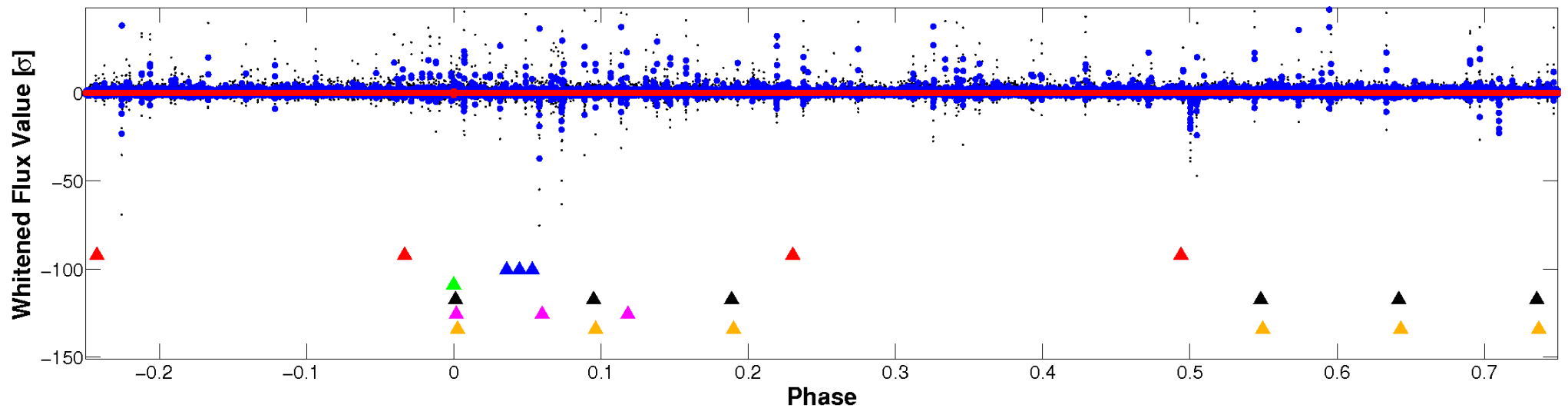


# Non-Whitened Vs. Whitened Light Curve

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

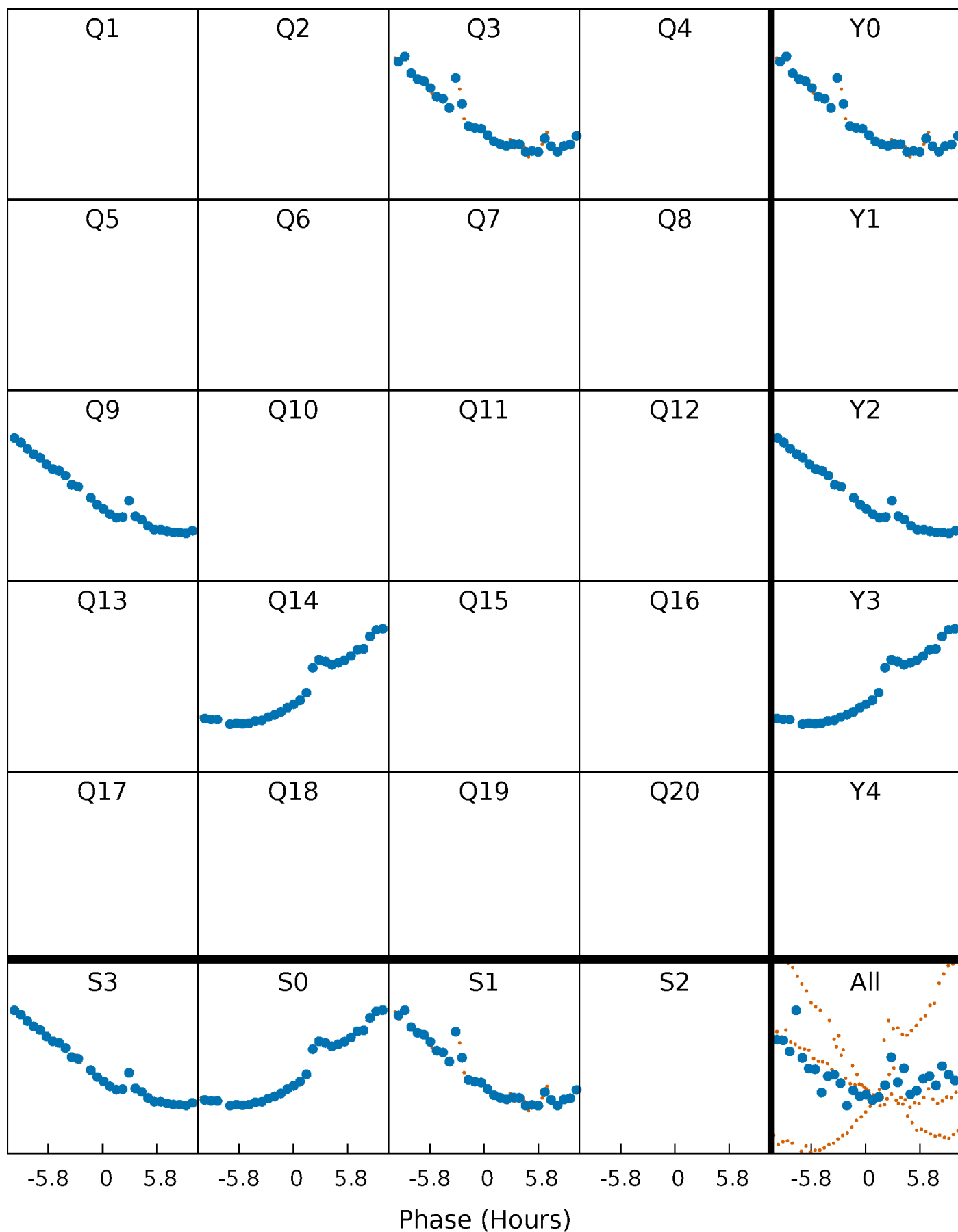


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

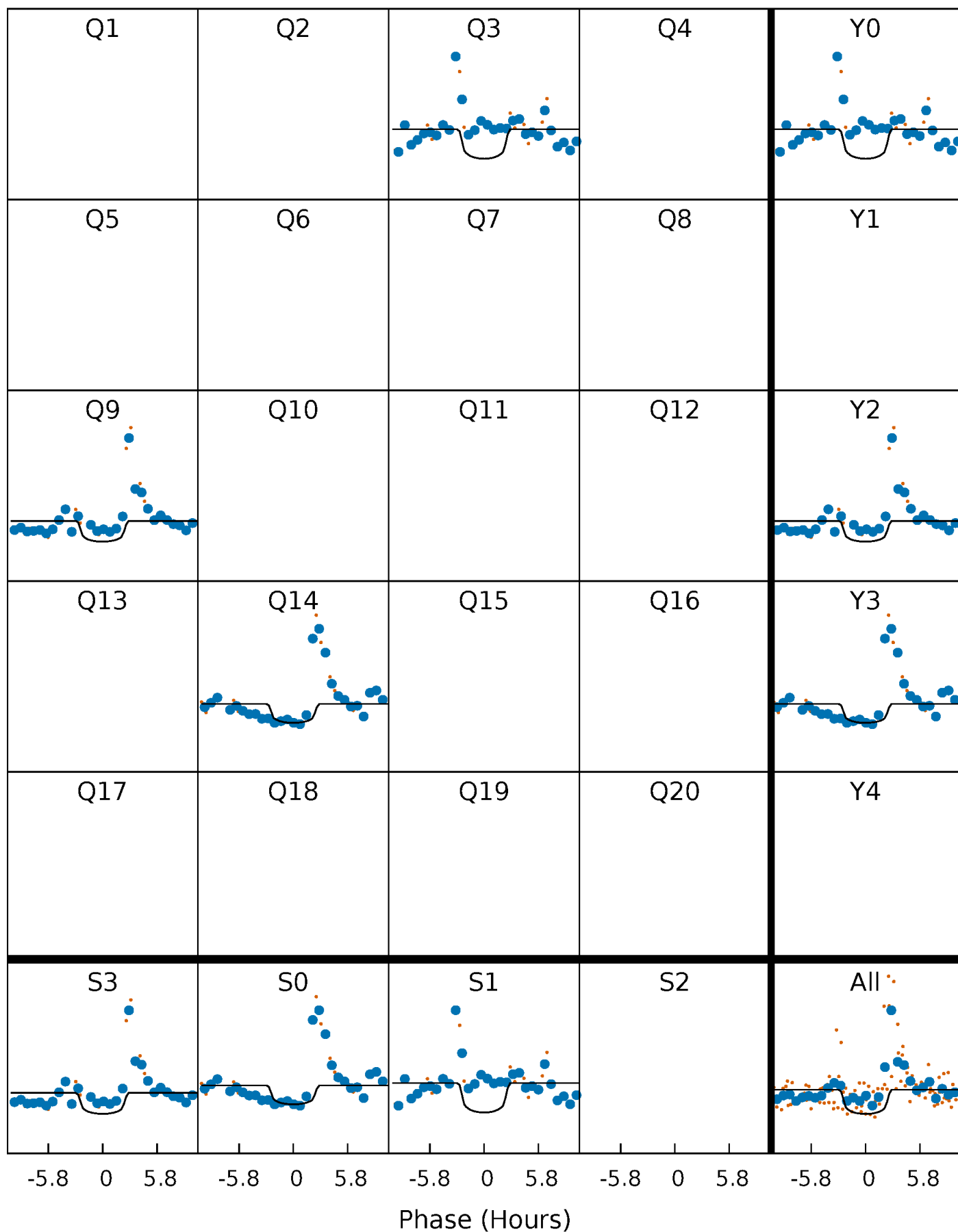
TCE 008776565-03     $P=540.005836$  Days     $T_0=277.518058$  (BKJD)





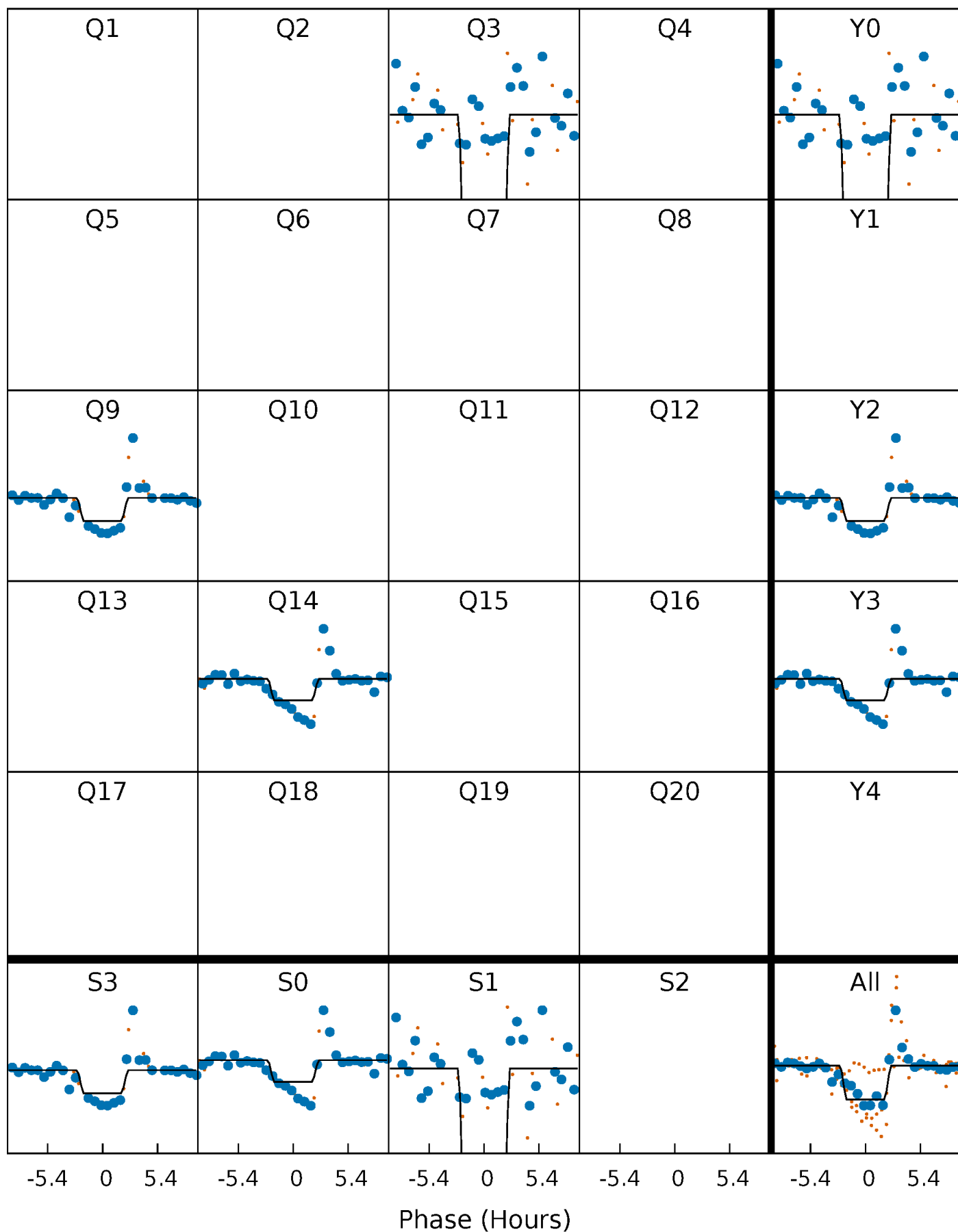
# DV Quarter-Phased Transit Curves

TCE 008776565-03     $P=540.005836$  Days     $T_0=277.518058$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

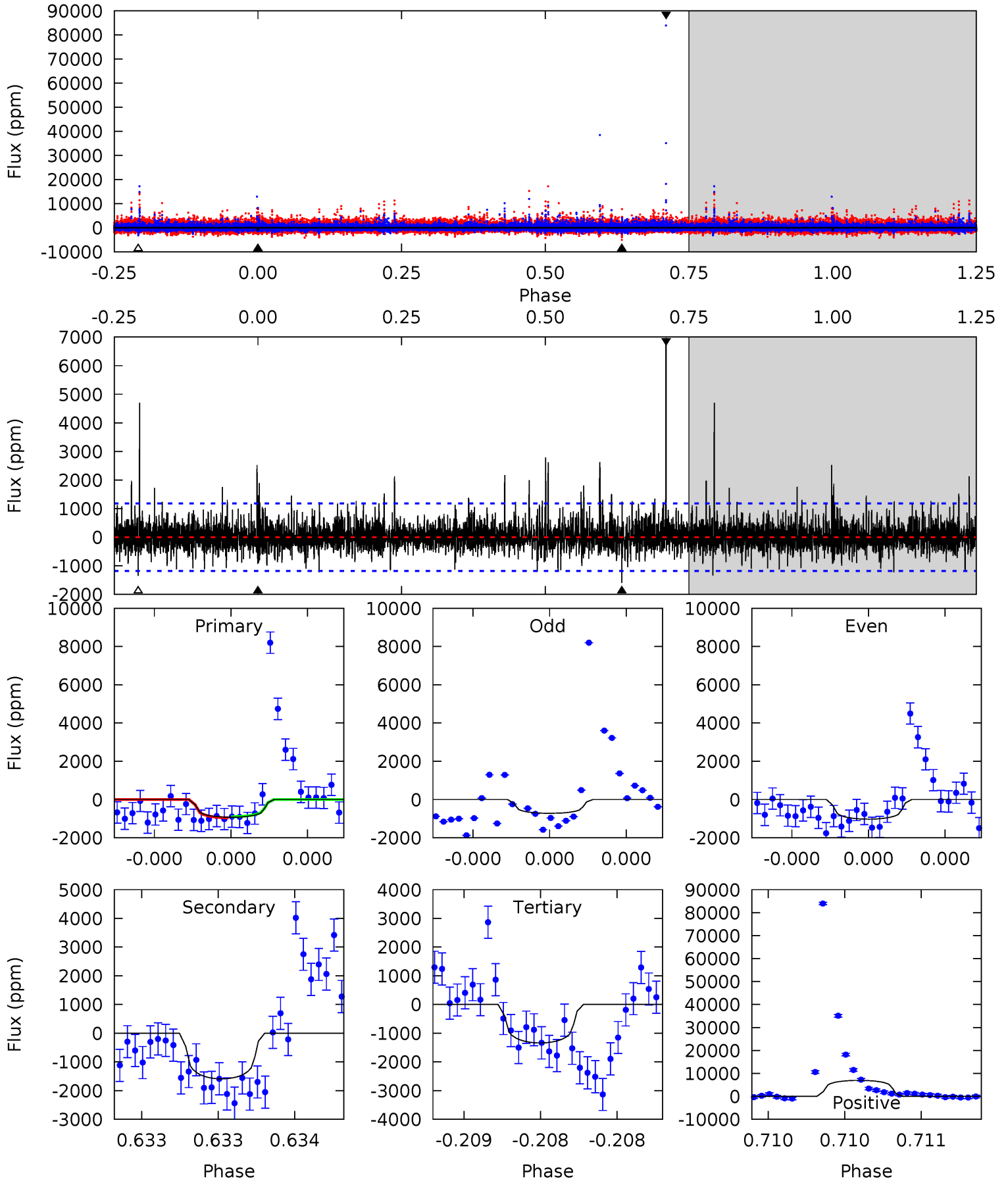
TCE 008776565-03 P=539.984068 Days  $T_0=277.537946$  (BKJD)



# DV Model-Shift Uniqueness Test

008776565-03, P = 540.005836 Days, E = 277.518058 Days

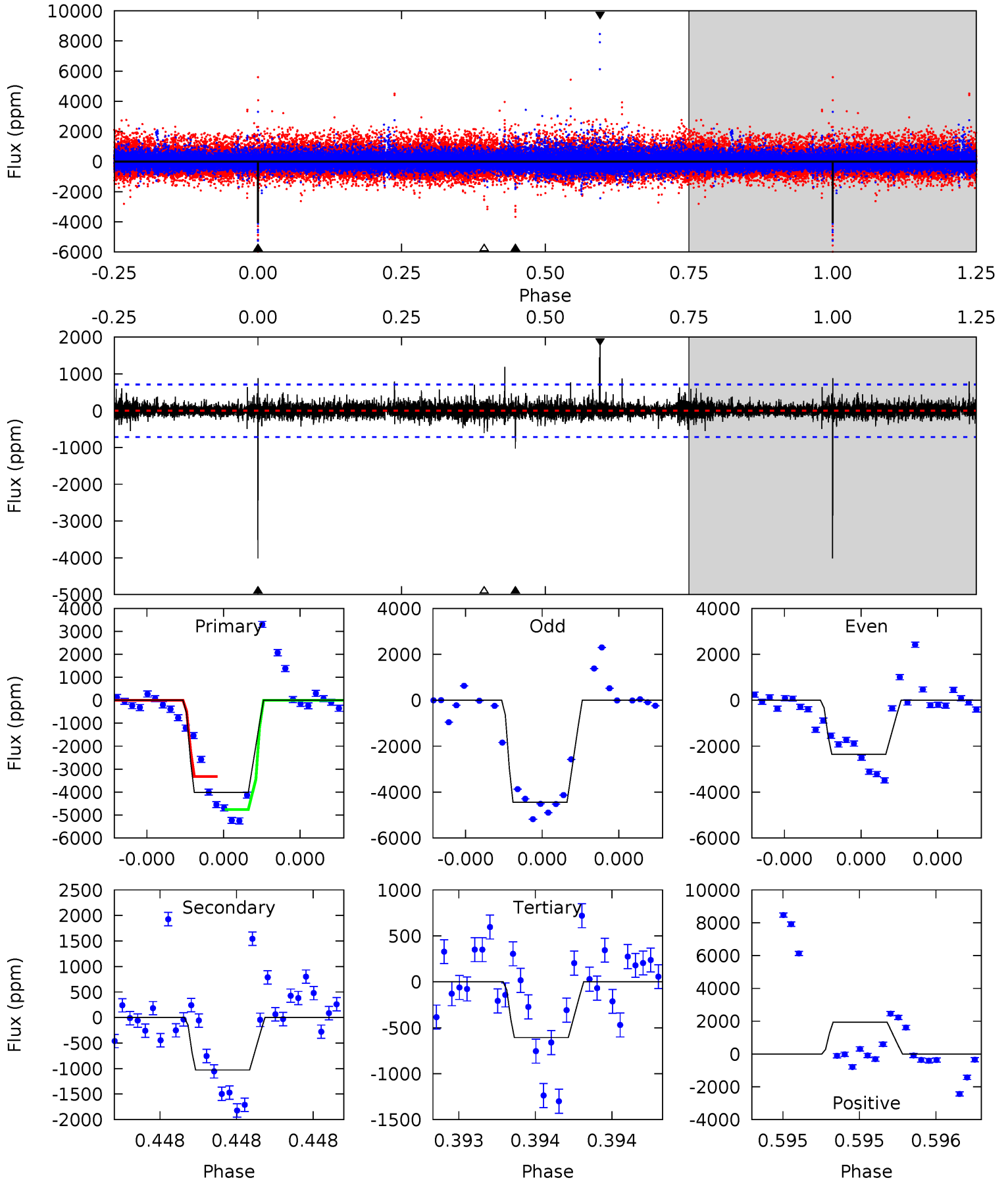
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.42	7.57	6.38	33.2	5.61	3.54	1.90	-1.96	-28.8	1.19	-25.6	0.37	0.68	0.81	0.14



# Alt Model-Shift Uniqueness Test

008776565-03, P = 539.984068 Days, E = 277.537946 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
31.5	8.08	4.76	15.2	5.62	3.55	0.90	26.8	16.3	3.32	-7.14	8.02	0.71	0.33	0



### Stellar Parameters For KIC 008776565

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3502^{+41}_{-41}$	$4.925^{+0.040}_{-0.032}$	$-0.200^{+0.100}_{-0.100}$	$0.334^{+0.030}_{-0.034}$	$0.341^{+0.038}_{-0.041}$	$12.910^{+2.925}_{-1.990}$
	+1%/-1%	+1%/-1%	+50%/-50%	+9%/-10%	+11%/-12%	+23%/-15%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 008776565-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-1591 \pm 210$	$2.48^{+2.14}_{-1.58}$	$131^{+2}_{-3}$	$2981^{+1183}_{-456}$	$118209^{+843018}_{-86228}$
Alt.	$-1028 \pm 127$	$2.63^{+2.45}_{-1.68}$	$131^{+3}_{-3}$	$2776^{+976}_{-428}$	$68450^{+428188}_{-50937}$

$T_{\text{max}}$  = 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

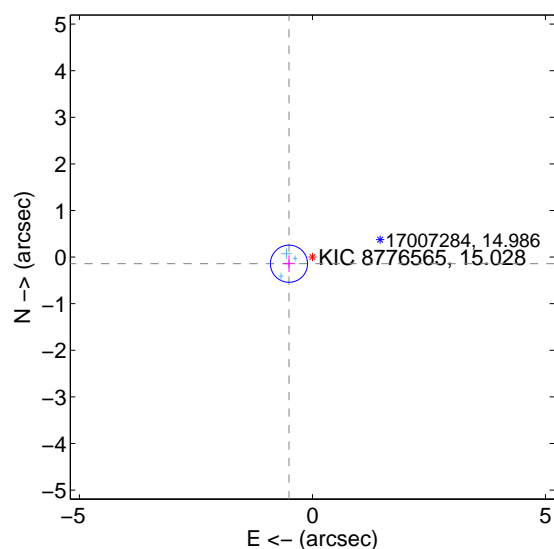
Supplemental centroid analysis for 008776565-03. Kepler magnitude: 15.03. Transit SNR 6.48

There are 3 quarters with good PRF difference image offsets

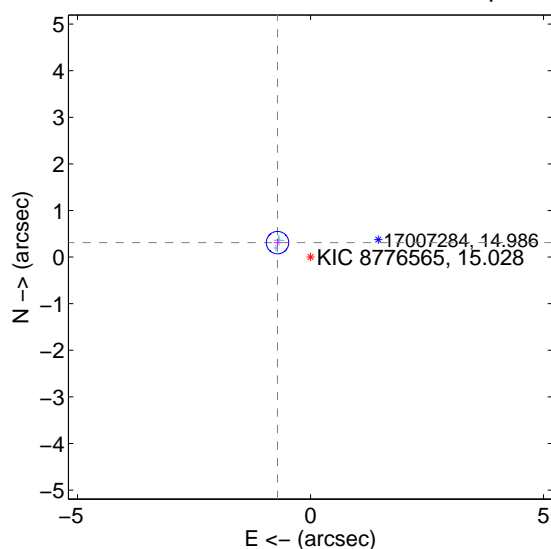
The direct PRF centroid is offset from the target star catalog position by about 0.61 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.523 \pm 0.133$	3.94	$0.503 \pm 0.128$	$-0.142 \pm 0.182$
PRF-fit source offset from KIC position	$0.773 \pm 0.080$	9.65	$0.708 \pm 0.080$	$0.311 \pm 0.083$
photometric centroid source offset	$1.64 \pm 0.89$	1.84	$1.19 \pm 0.88$	$1.14 \pm 0.91$

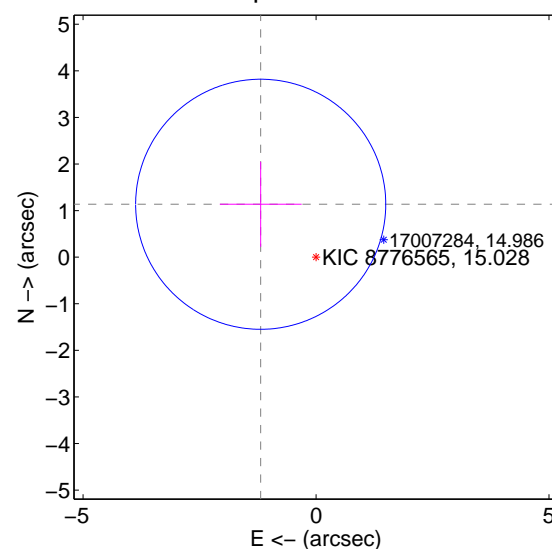
offset from difference PRF-fit to OOT PRF-fit



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



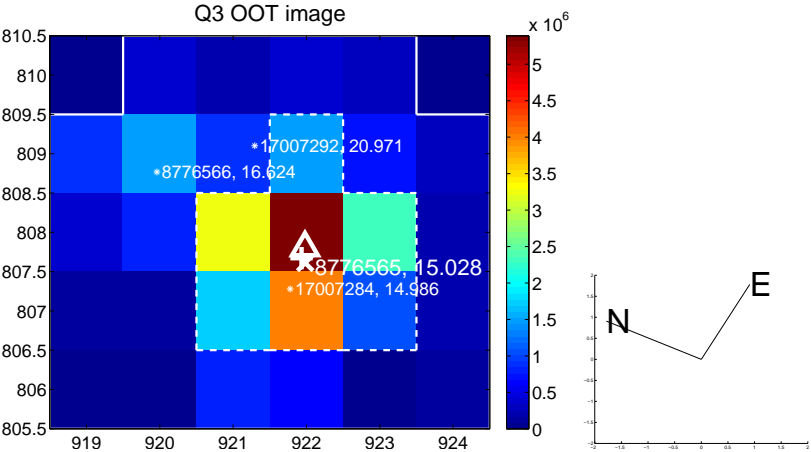
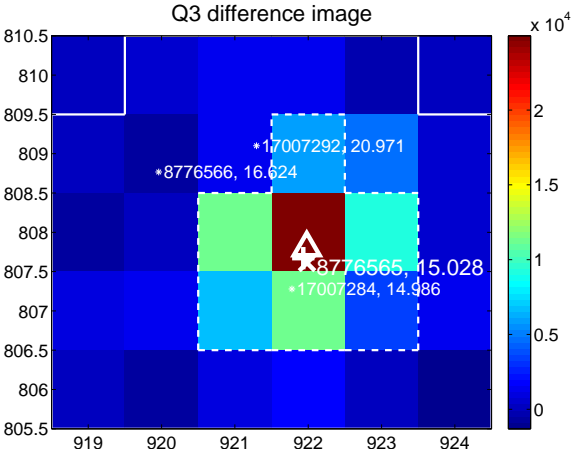
Q1 no OOT image



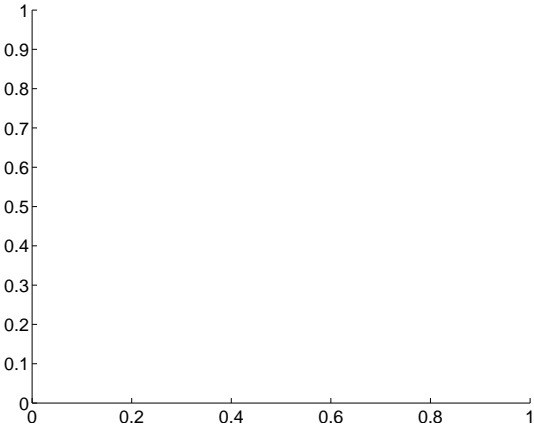
Q2 no difference image



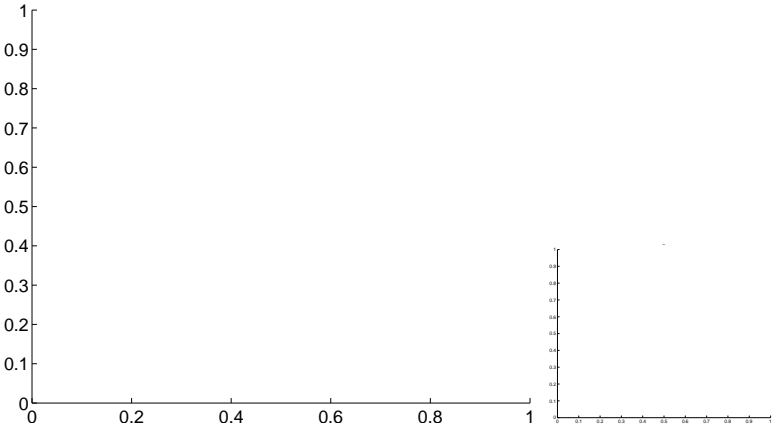
Q2 no OOT image



Q4 no difference image



Q4 no OOT image

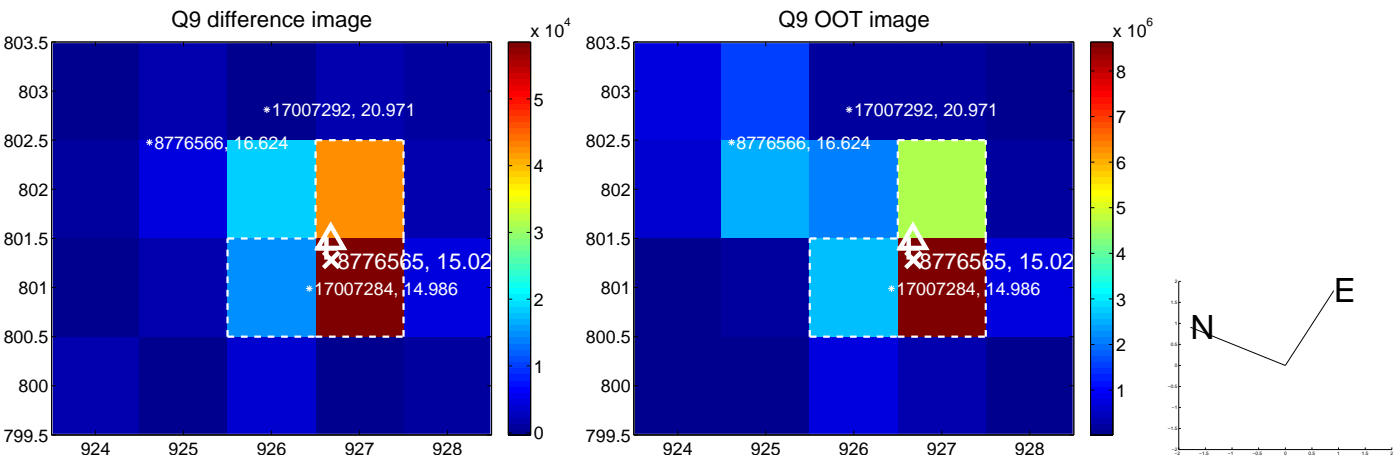


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





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



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

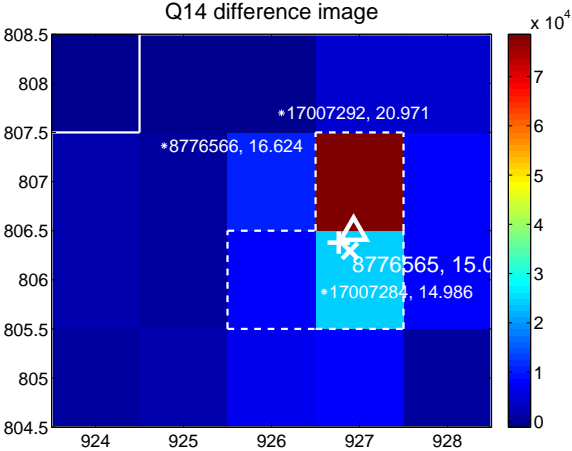
Q13 no difference image



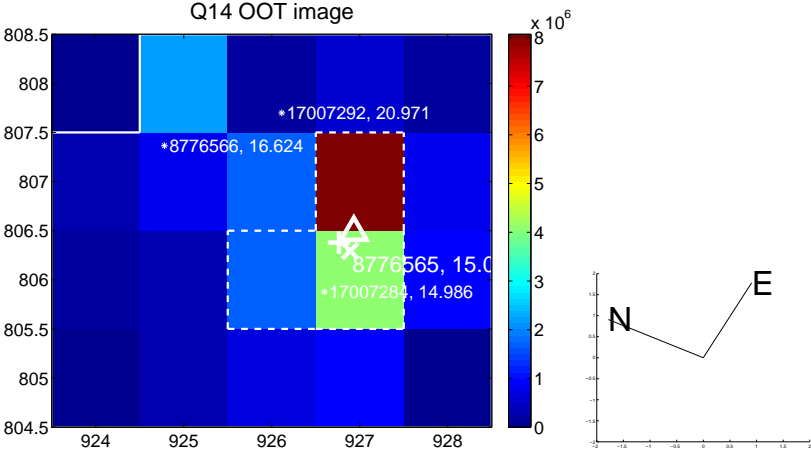
Q13 no OOT image



Q14 difference image



Q14 OOT image



Q15 no difference image



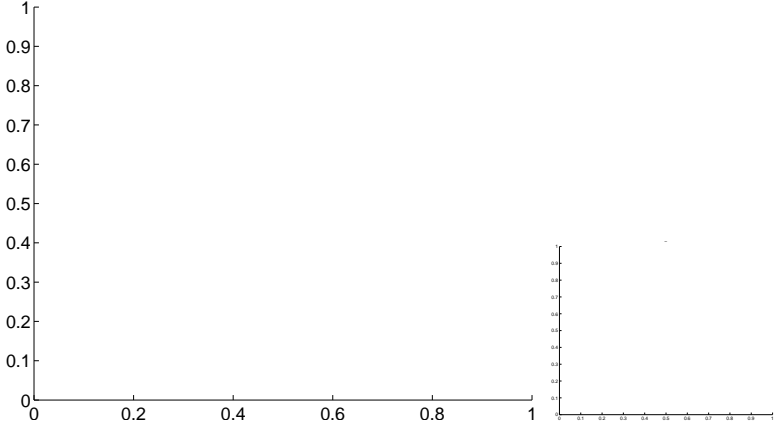
Q15 no OOT image



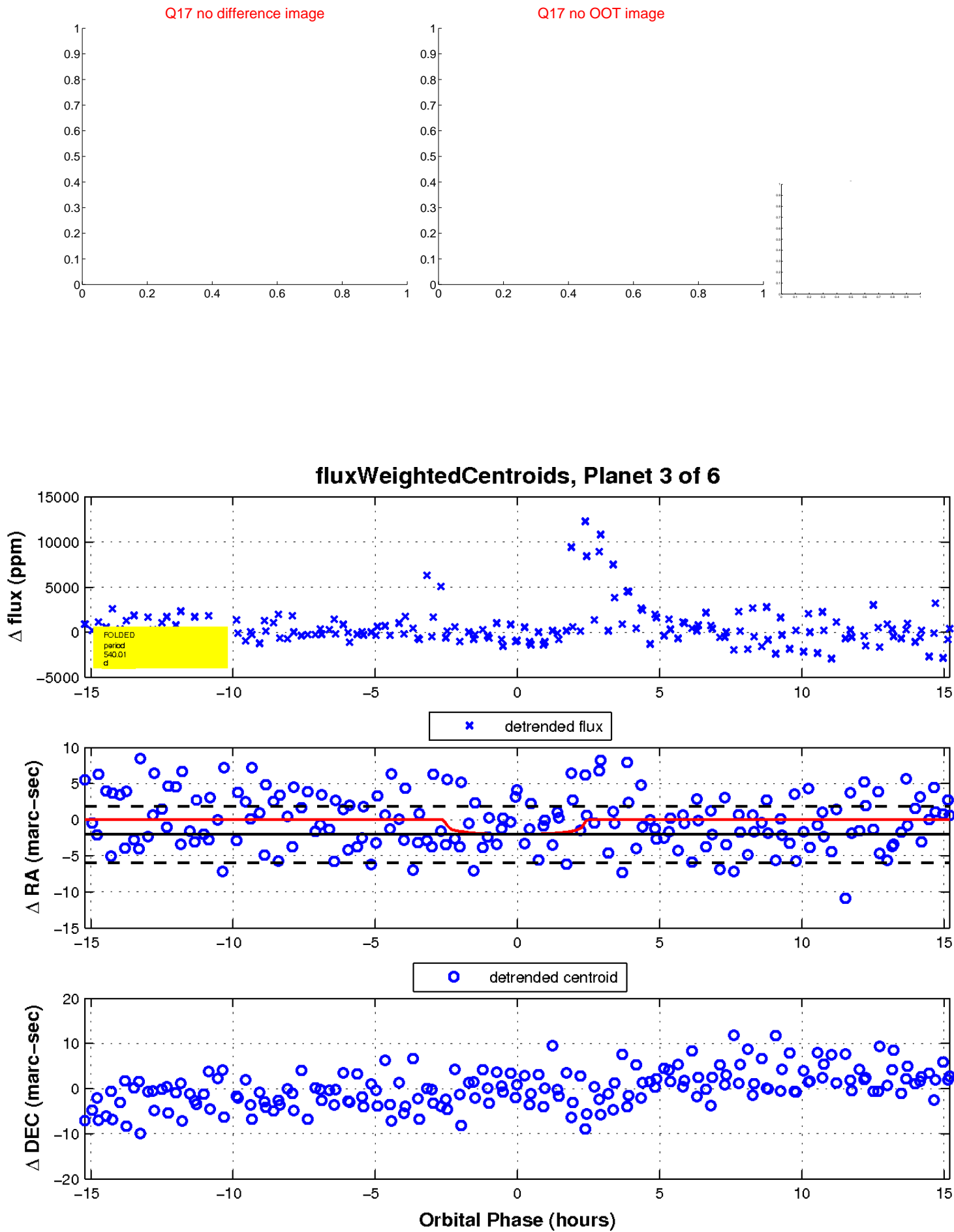
Q16 no difference image



Q16 no OOT image

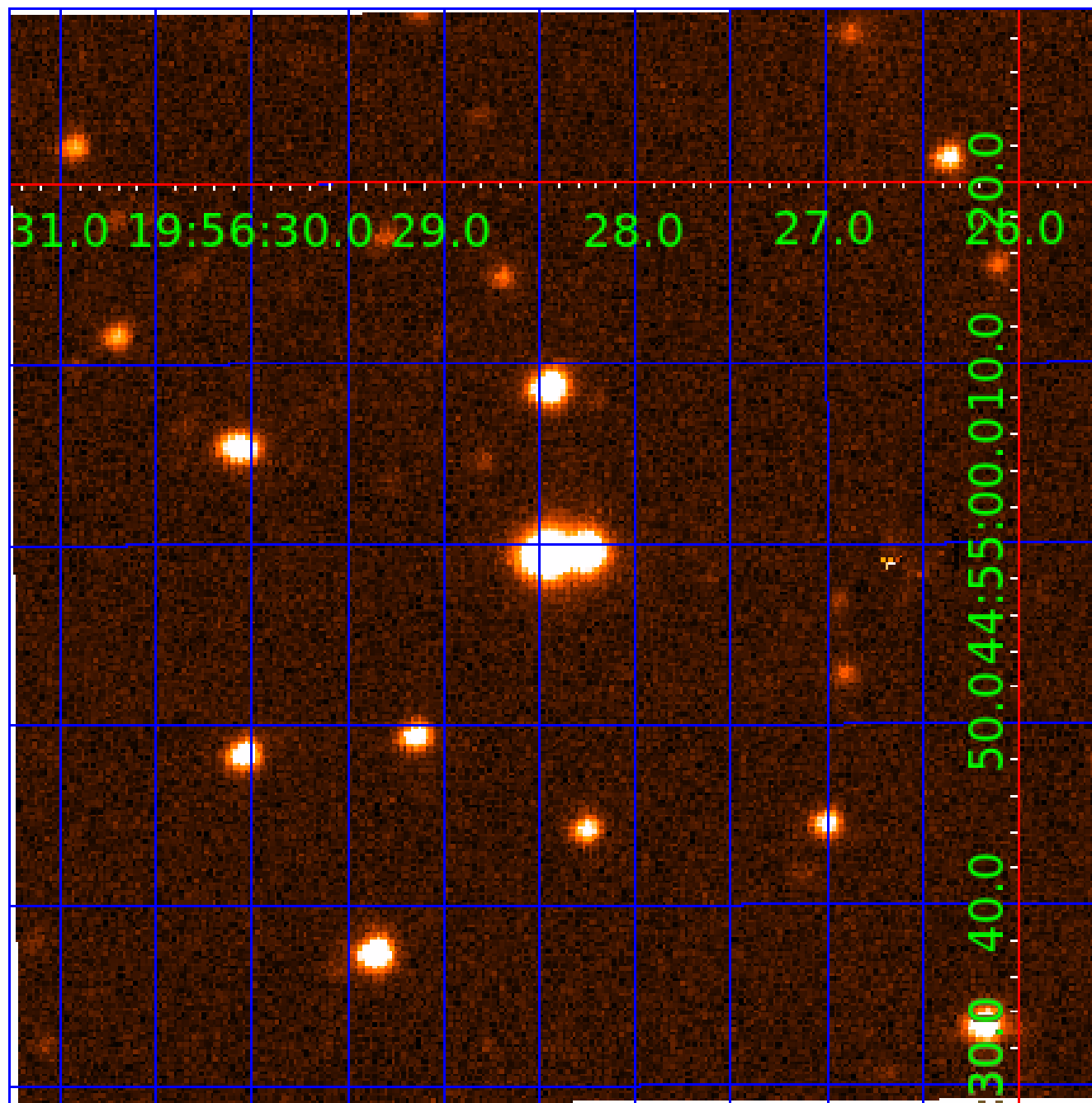


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 008776565

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008776565-01	OBS	No	397.621881	146.638498	1450.8	5.008	13.8	5.6	0.33	3502	1.34	0.03
008776565-02	OBS	No	535.306770	306.335224	2872.7	3.805	13.7	7.7	0.33	3502	1.85	0.02
008776565-03	OBS	No	540.005837	277.518058	2372.7	5.089	13.4	6.5	0.33	3502	1.61	0.02
008776565-04	OBS	No	244.687393	134.772525	991.5	5.579	11.0	4.4	0.33	3502	1.10	0.05
008776565-05	OBS	No	571.472737	278.470787	1790.2	5.433	11.7	5.5	0.33	3502	1.51	0.02
008776565-06	OBS	No	244.691881	135.488727	928.4	10.500	11.7	-1.0	0.33	3502	1.01	0.05

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008776565-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
008776565-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
008776565-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
008776565-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_MARSHALL_SKYE_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_KIC_POS—HALO_GHOST
008776565-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_TRACKER—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
008776565-06	OBS	FP	0.00	1	0	1	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—SAME_NTL_PERIOD—CENT_NOFITS—HALO_GHOST

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

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

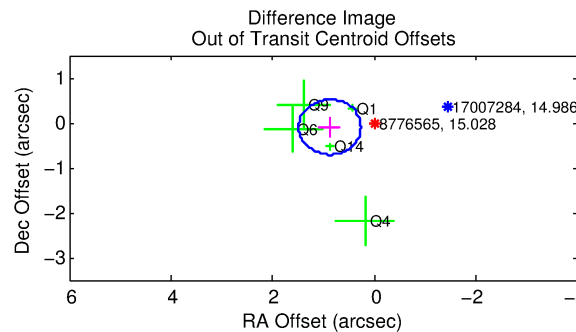
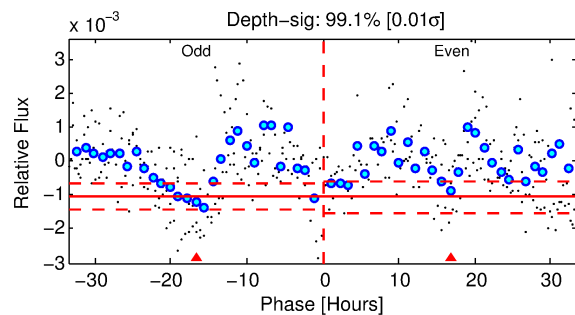
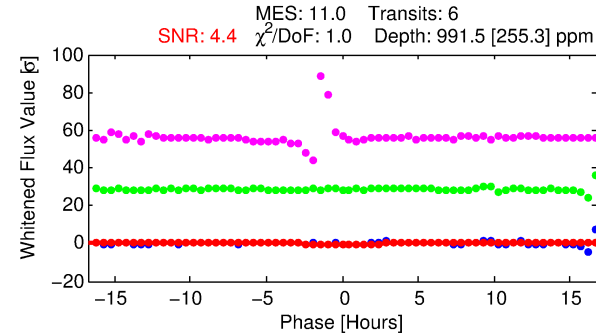
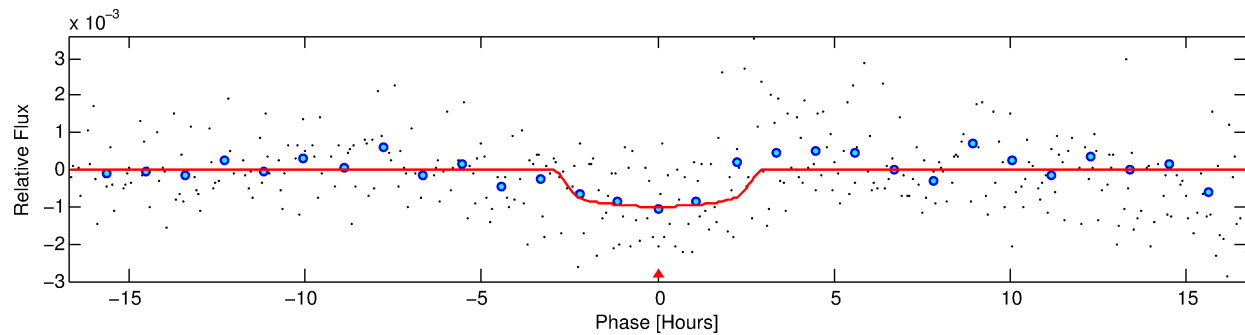
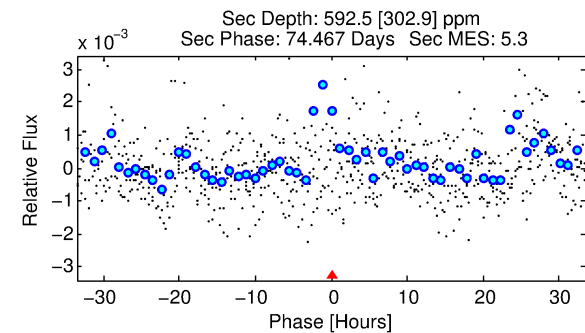
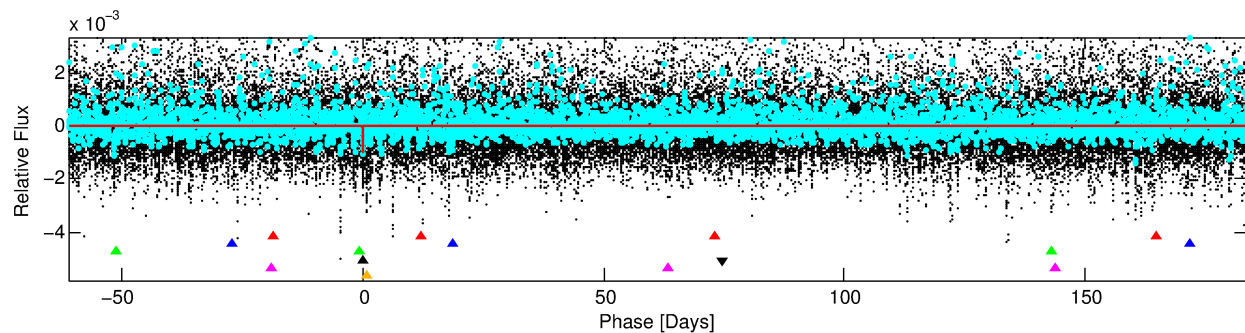
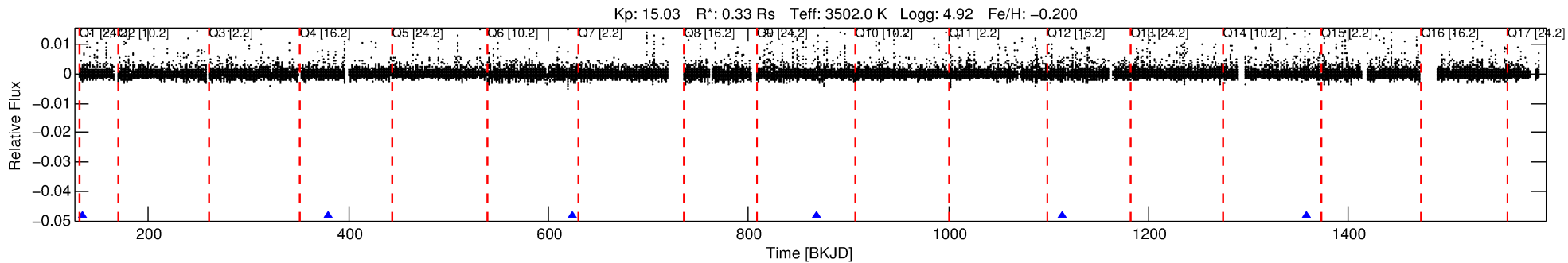
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008776565-04

No Significant Match Found

# DV One-Page Summary

KIC: 8776565 Candidate: 4 of 6 Period: 244.687 d



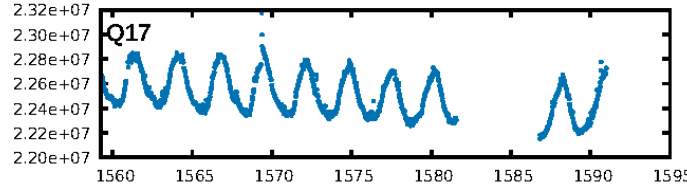
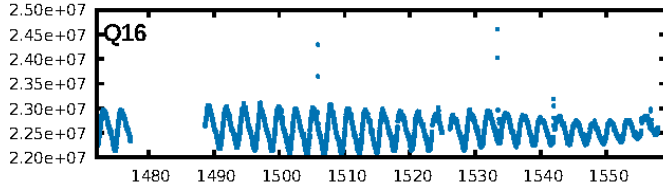
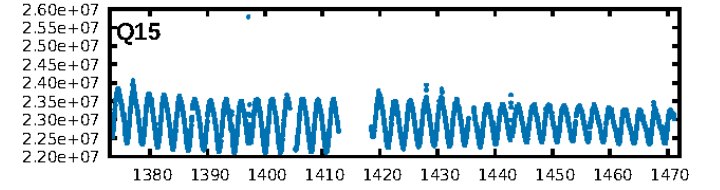
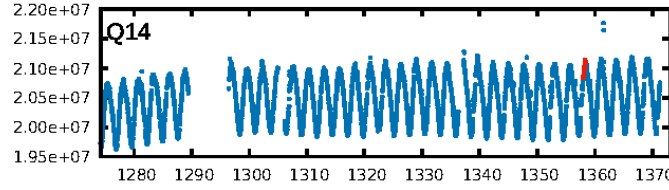
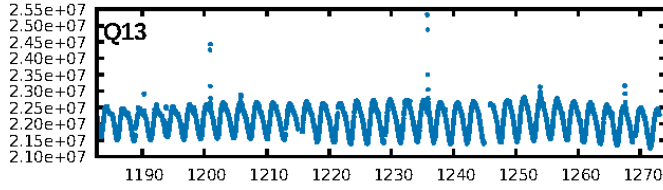
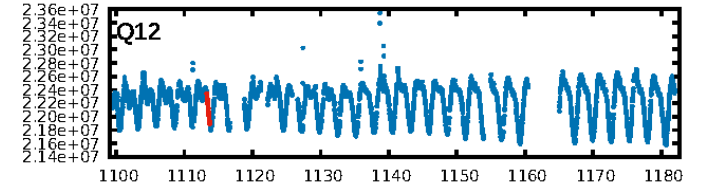
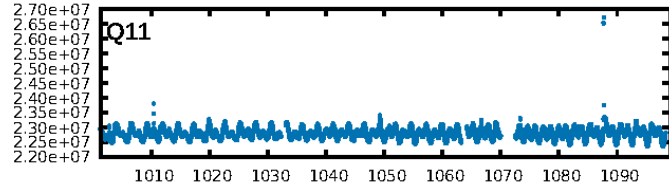
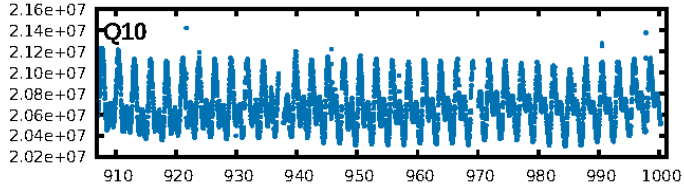
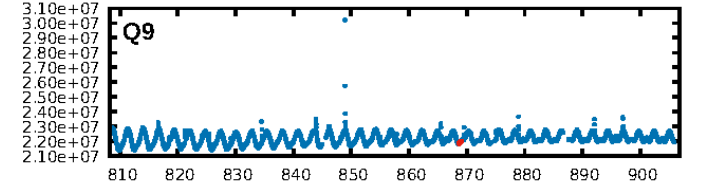
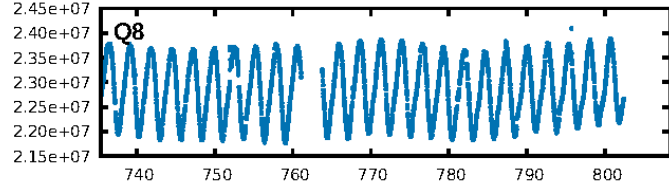
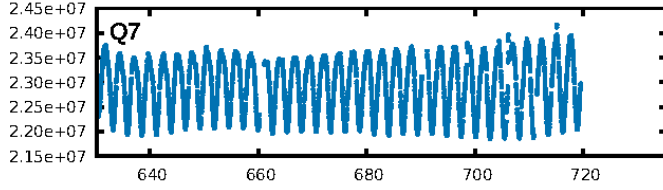
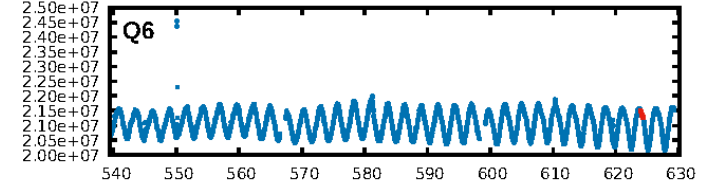
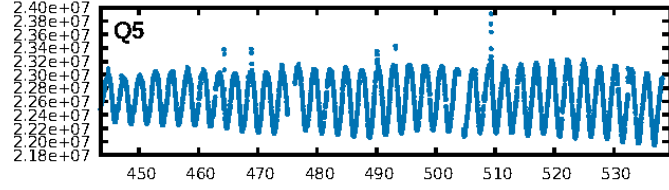
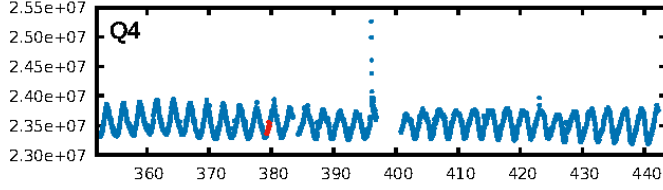
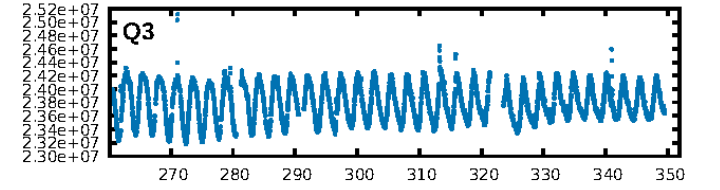
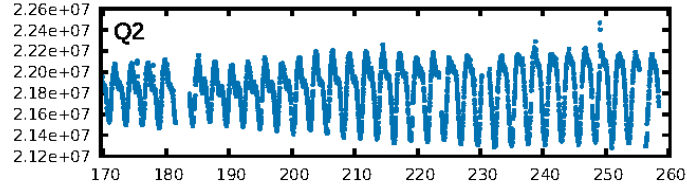
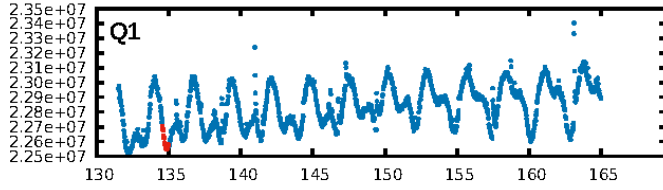
## DV Fit Results:

Period = 244.68739 [0.00365] d  
Epoch = 134.7725 [0.0105] BKJD  
Rp/R\* = 0.0301 [0.0260]  
a/R\* = 275.20 [1030.80]  
b = 0.62 [3.71]  
Seff = 0.05 [0.01]  
Teq = 122 [3] K  
Rp = 1.10 [0.95] Re  
a = 0.5357 [0.0399] AU  
Ag = 77559.46 [139562.93] [0.56σ]  
Teffp = 3148 [1415] K [2.14σ]

## DV Diagnostic Results:

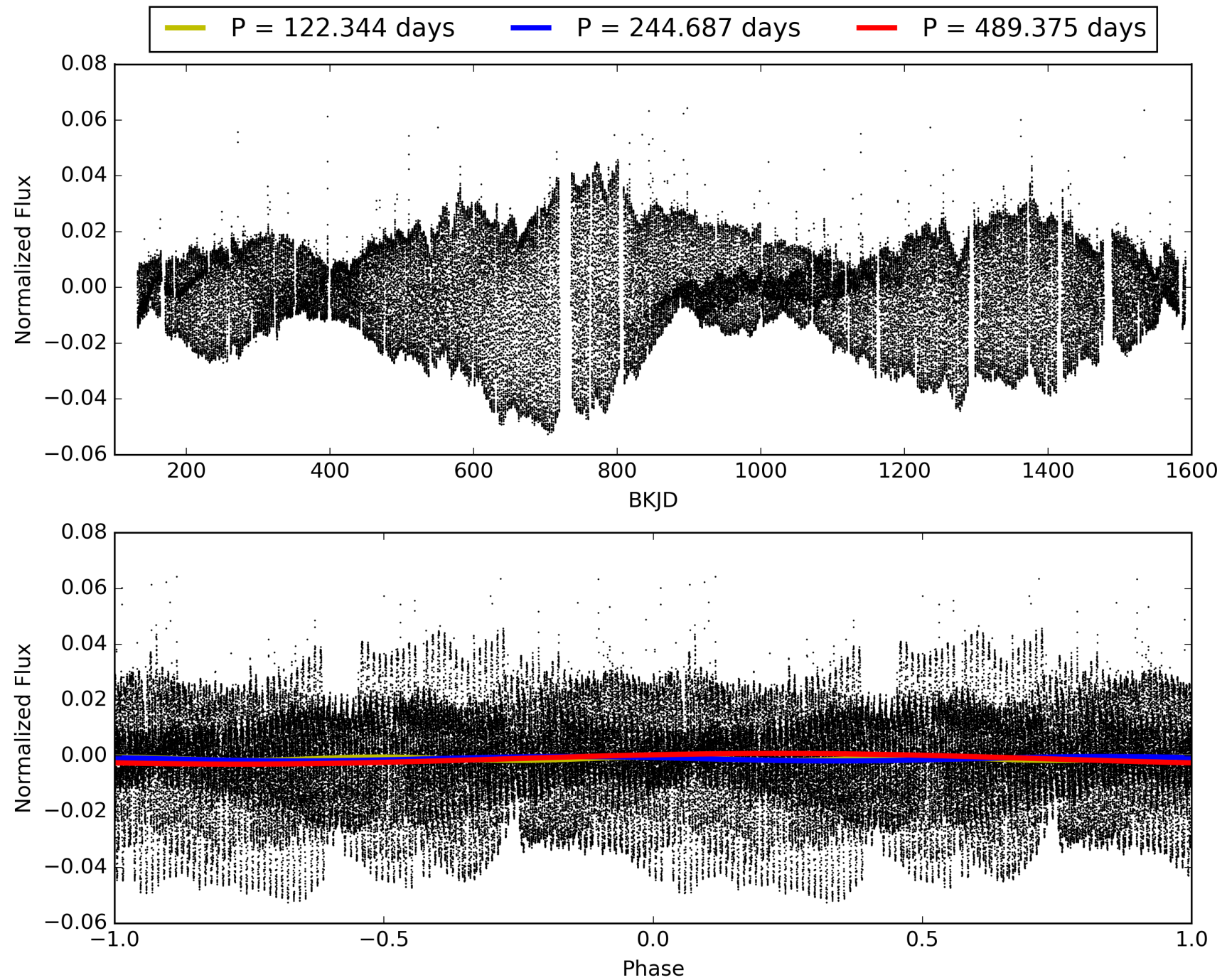
ShortPeriod-sig: N/A  
LongPeriod-sig: 0.7% [0.01σ]  
ModelChiSquare2-sig: 0.9%  
ModelChiSquareGof-sig: 99.9%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: -0.1029  
Centroid-sig: N/A  
Centroid-so: 0.340 arcsec [0.28σ]  
OotOffset-rm: 0.882 arcsec [4.32σ]  
KicOffset-rm: 0.914 arcsec [2.89σ]  
OotOffset-st: 2/0/1/2 [5]  
KicOffset-st: 2/0/1/2 [5]  
DiffImageQuality-fgm: 0.60 [3/5]  
DiffImageOverlap-fno: 1.00 [5/5]

# TCE 008776565-04, PDC Light Curves





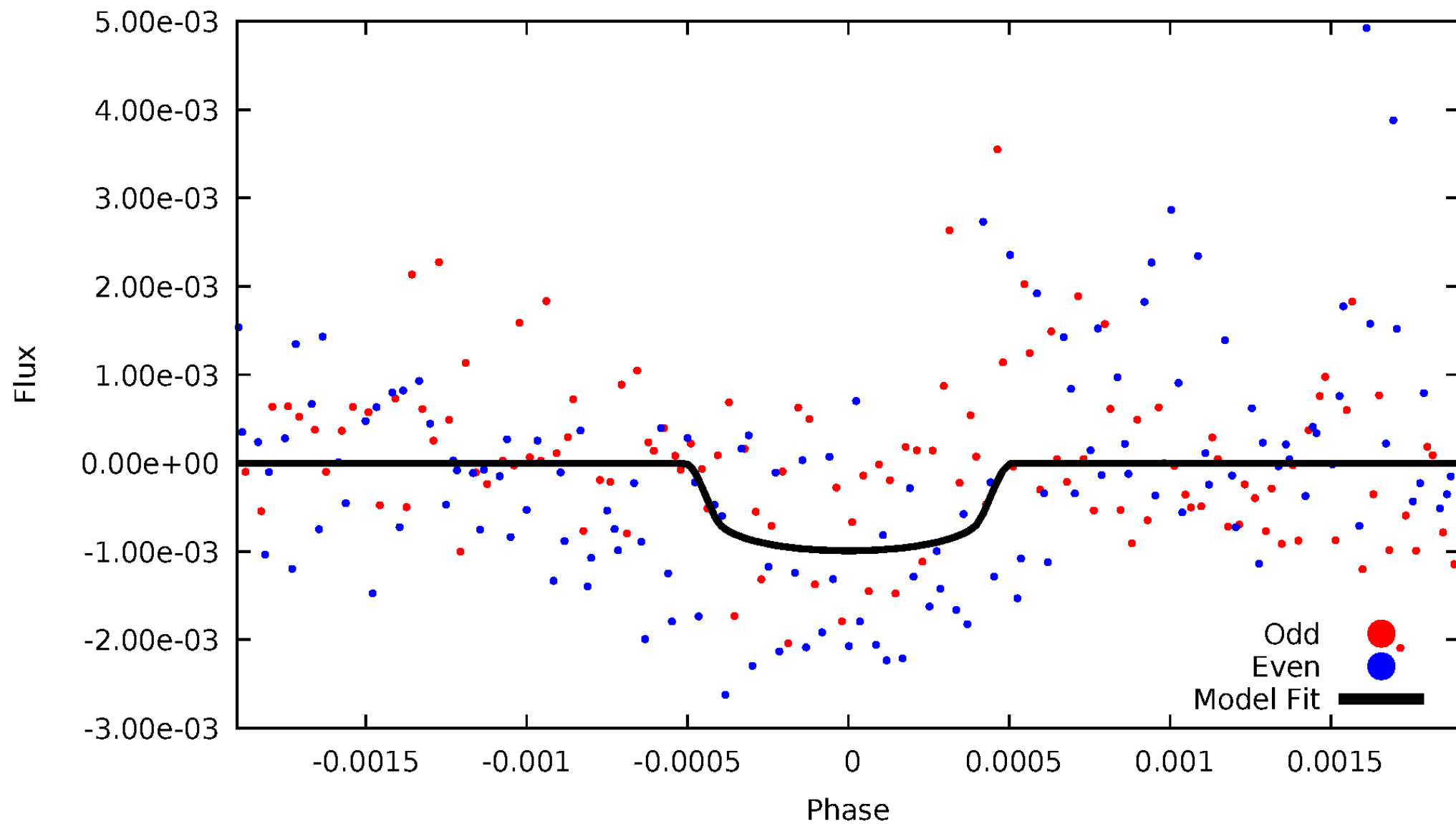
# TCE 008776565-04





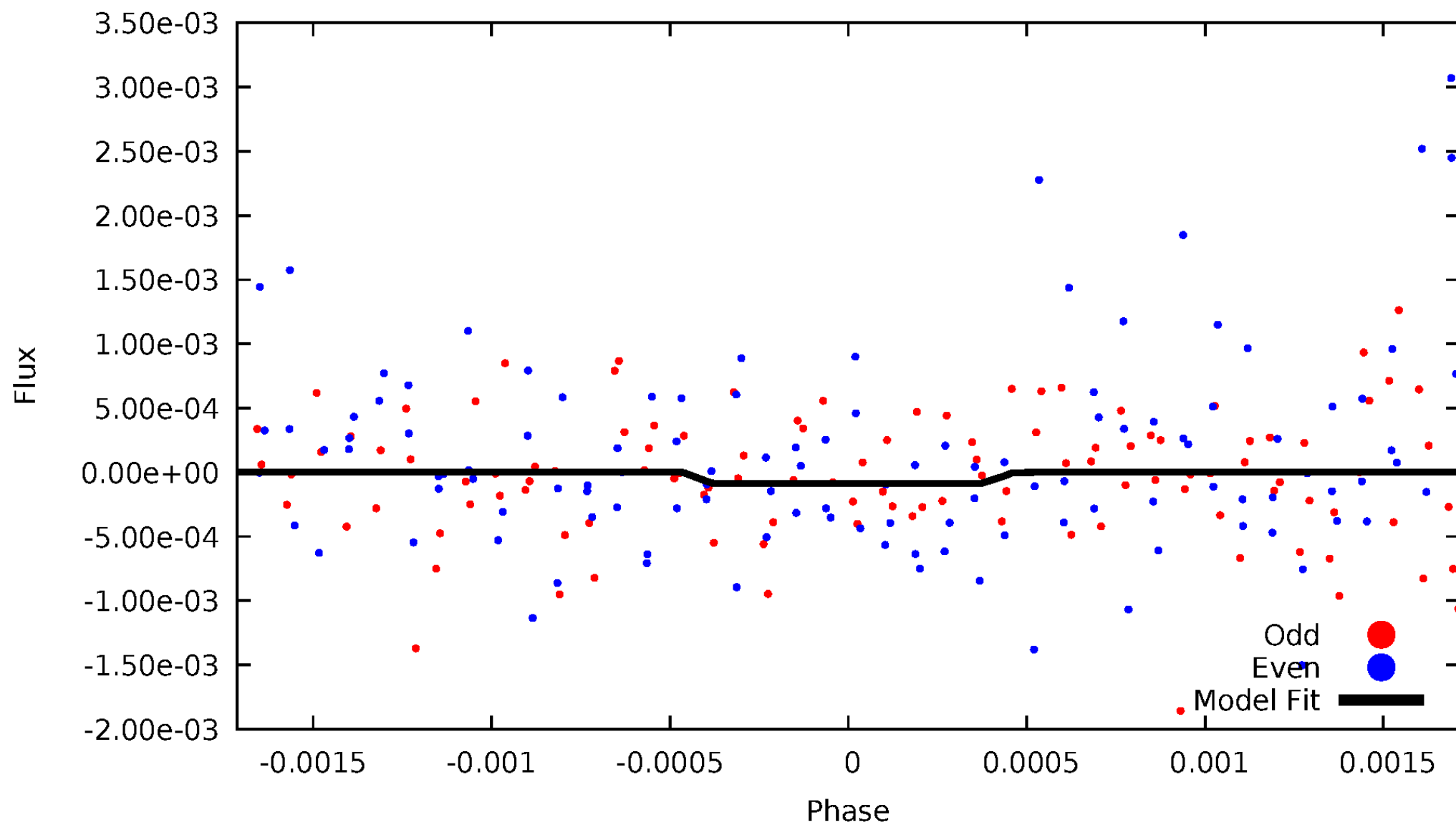
# DV Odd/Even

TCE 008776565-04



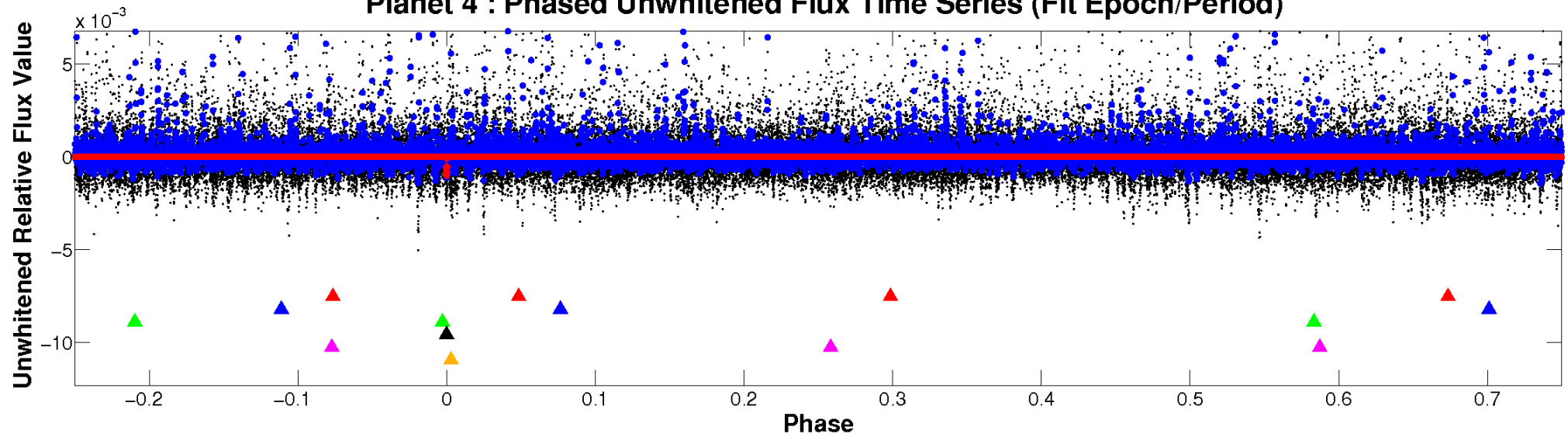
# ALT Odd/Even

TCE 008776565-04

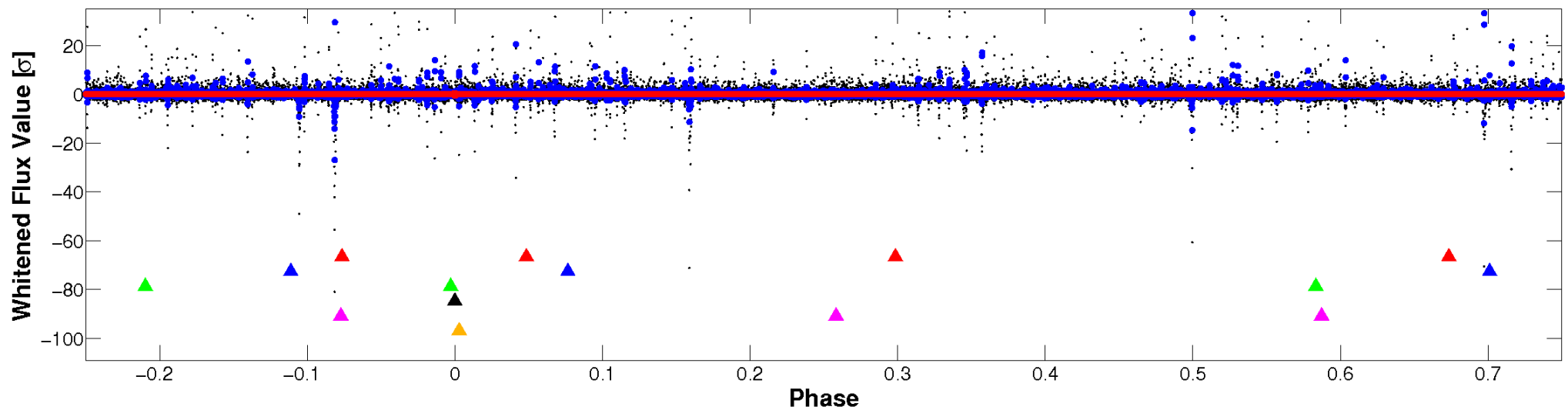


# Non-Whitened Vs. Whitened Light Curve

## Planet 4 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

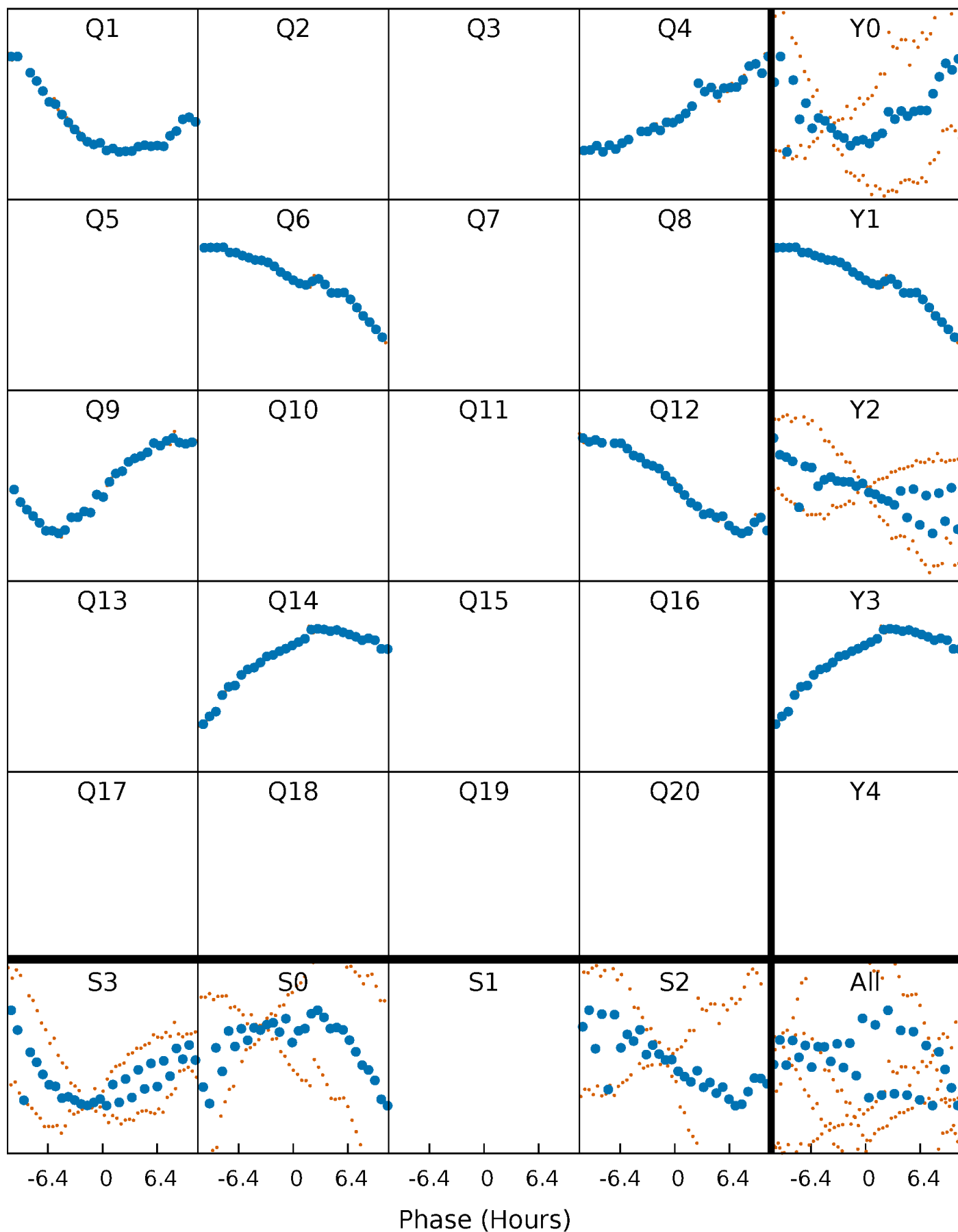


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



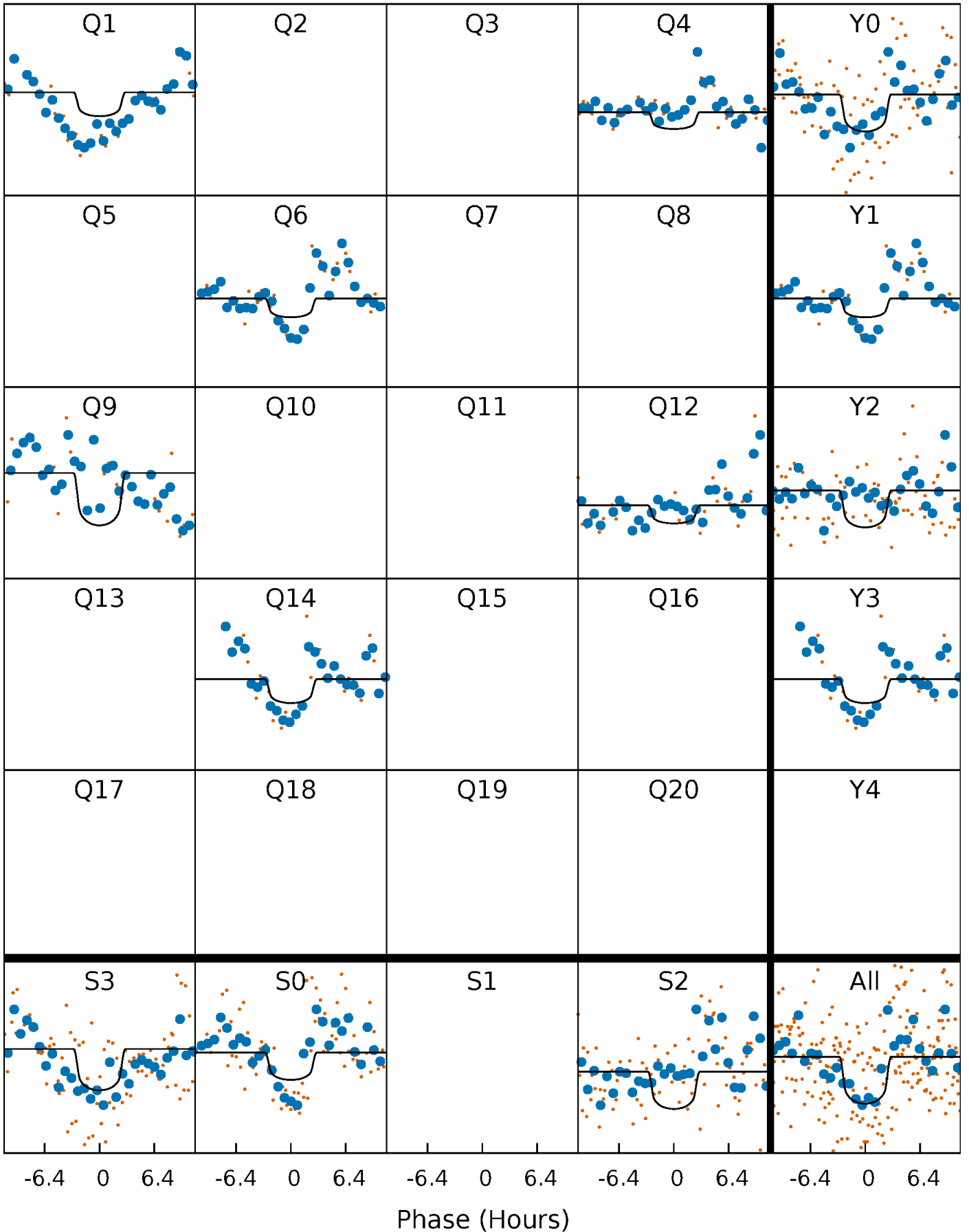
# PDC Quarter-Phased Transit Curves

TCE 008776565-04     $P=244.687394$  Days     $T_0=134.772525$  (BKJD)



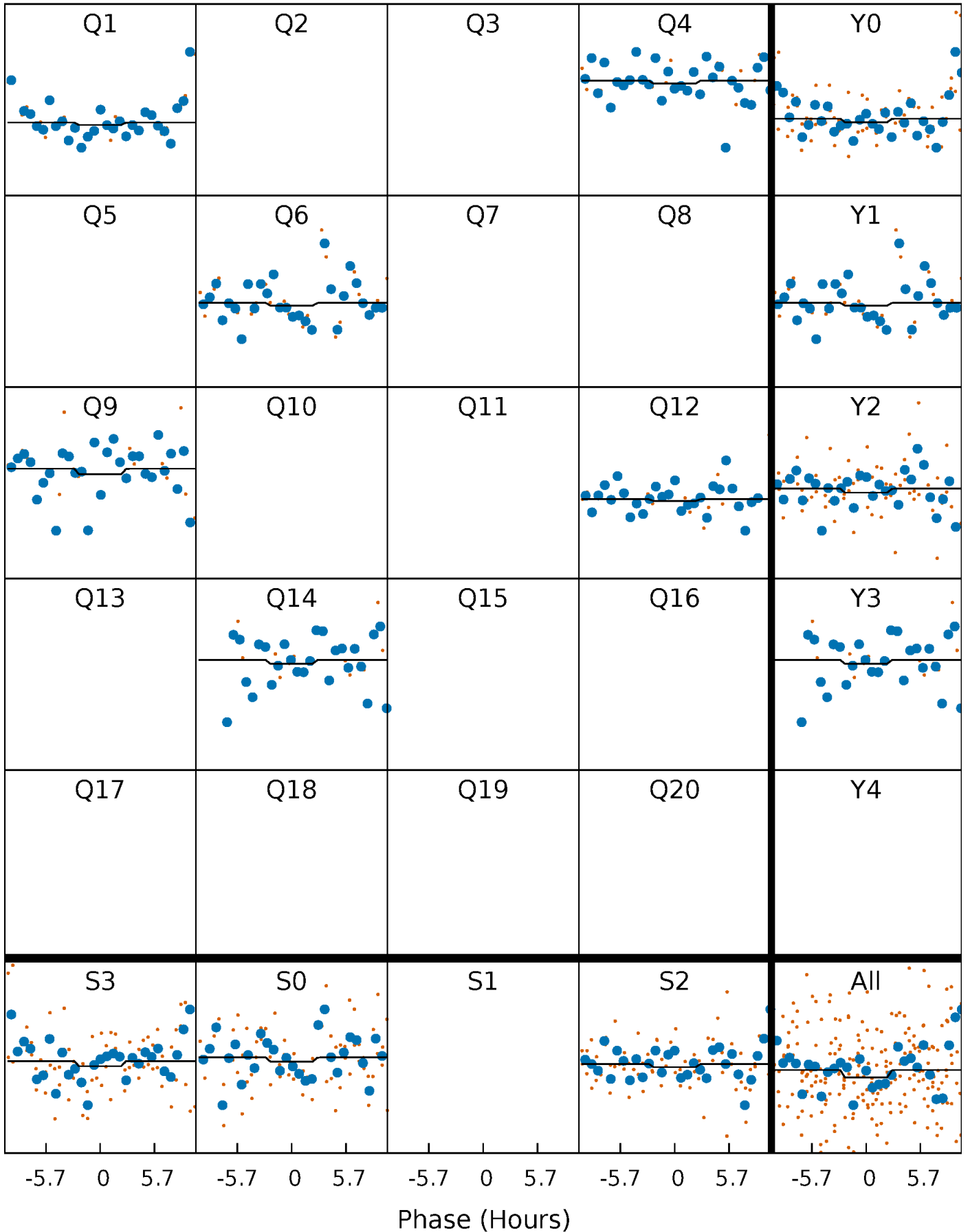
# DV Quarter-Phased Transit Curves

TCE 008776565-04     $P=244.687394$  Days     $T_0=134.772525$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

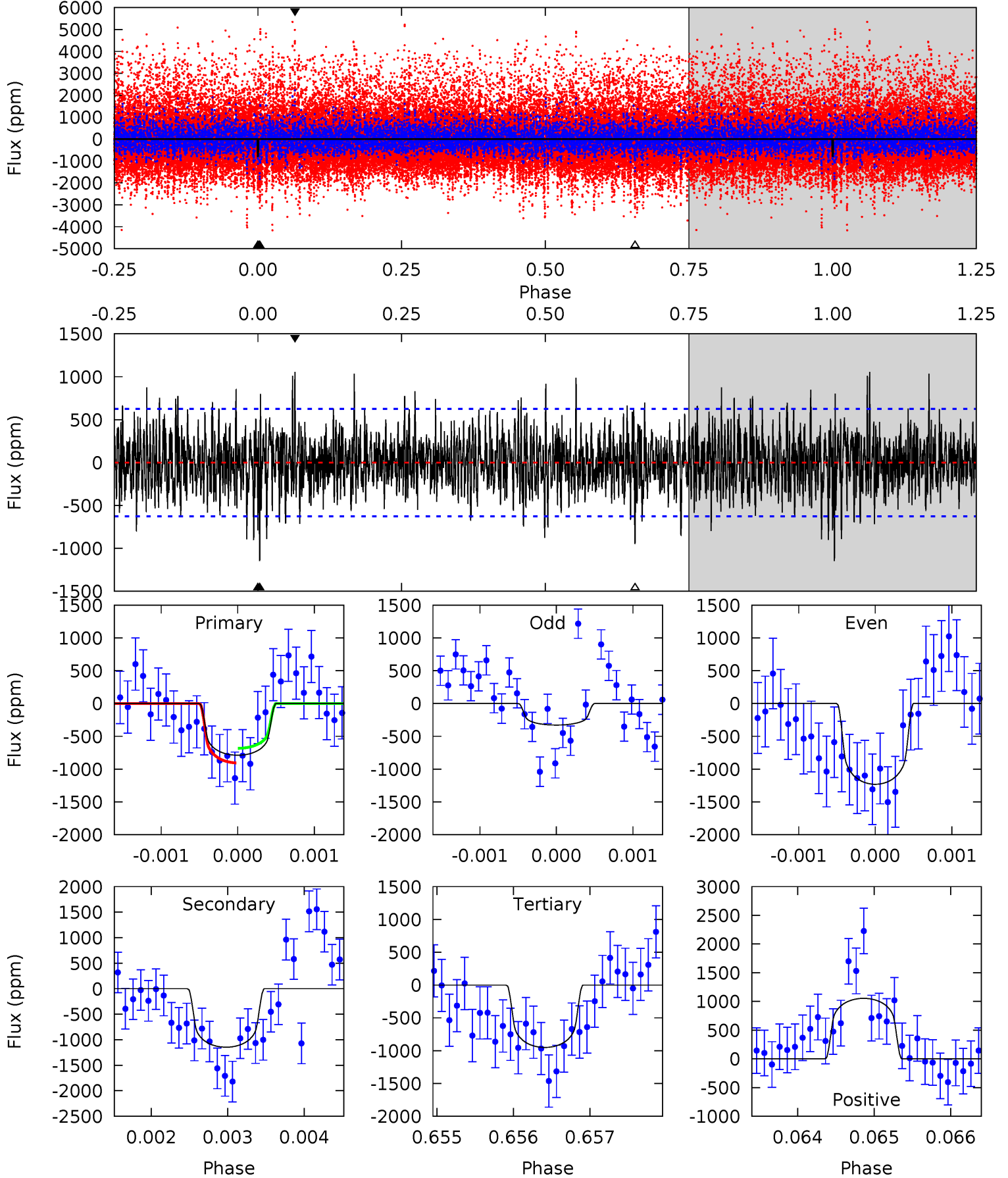
TCE 008776565-04 P=244.691881 Days  $T_0=134.755717$  (BKJD)



# DV Model-Shift Uniqueness Test

008776565-04, P = 244.687394 Days, E = 134.772525 Days

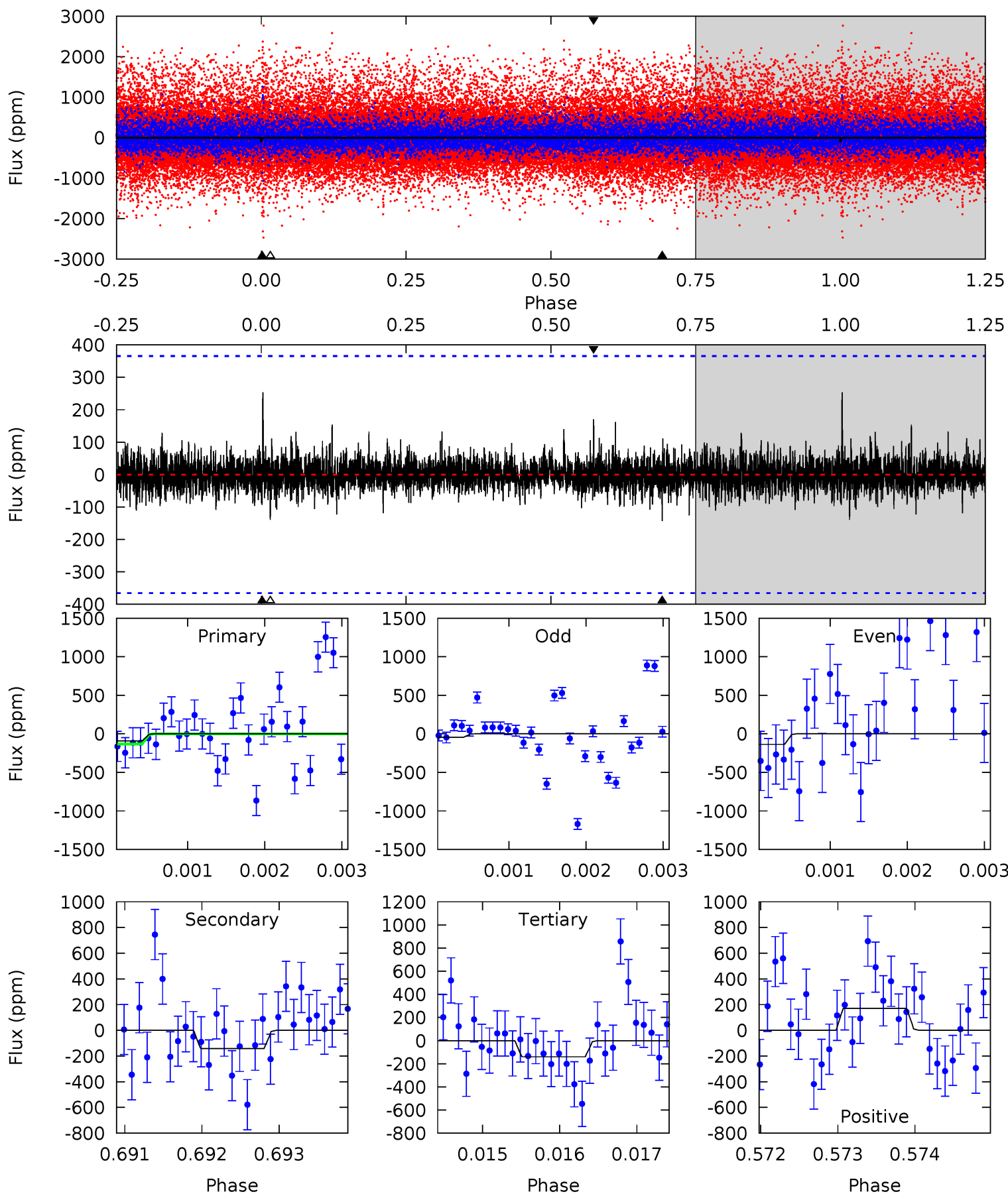
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.86	9.97	8.27	9.17	5.45	3.28	2.34	-1.41	-2.31	1.70	0.80	3.72	1.17	0.48	0.98



# Alt Model-Shift Uniqueness Test

008776565-04, P = 244.691881 Days, E = 134.755717 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1.39	2.13	2.09	2.55	5.47	3.31	0.49	-0.70	-1.16	0.04	-0.42	0.66	1.19	0.64	0.60





### Stellar Parameters For KIC 008776565

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3502^{+41}_{-41}$	$4.925^{+0.040}_{-0.032}$	$-0.200^{+0.100}_{-0.100}$	$0.334^{+0.030}_{-0.034}$	$0.341^{+0.038}_{-0.041}$	$12.910^{+2.925}_{-1.990}$
	+1%/-1%	+1%/-1%	+50%/-50%	+9%/-10%	+11%/-12%	+23%/-15%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 008776565-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-1146 \pm 115$	$1.26^{+0.87}_{-0.72}$	$170^{+4}_{-4}$	$3473^{+1254}_{-495}$	$117138^{+510540}_{-77866}$
Alt.	$-142 \pm 67$	$0.73^{+0.80}_{-0.50}$	$170^{+3}_{-3}$	$2962^{+1276}_{-562}$	$38817^{+338679}_{-31116}$

$T_{\text{max}}$  = 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

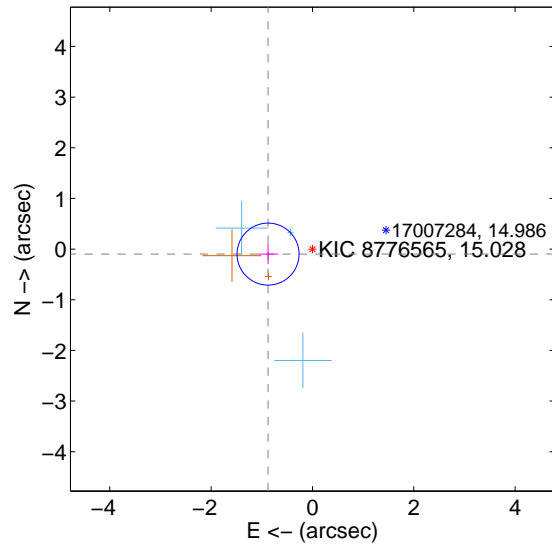
Supplemental centroid analysis for 008776565-04. Kepler magnitude: 15.03. Transit SNR 4.43

There are 3 quarters with good PRF difference image offsets

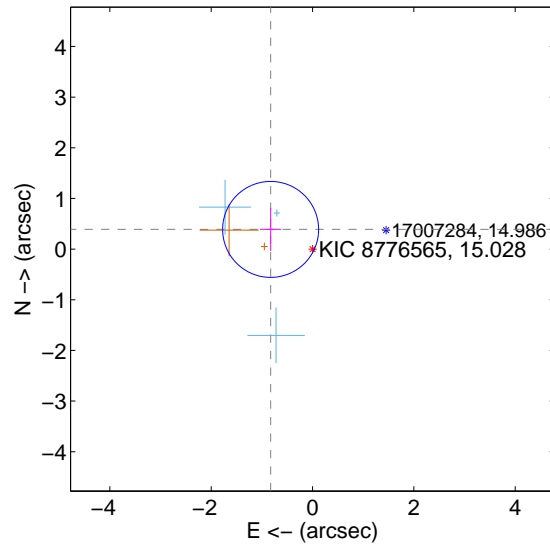
The direct PRF centroid is offset from the target star catalog position by about 0.60 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.882 \pm 0.204$	4.32	$0.876 \pm 0.204$	$-0.099 \pm 0.198$
PRF-fit source offset from KIC position	$0.914 \pm 0.316$	2.89	$0.827 \pm 0.209$	$0.389 \pm 0.427$
photometric centroid source offset	$0.34 \pm 1.21$	0.28	$-0.34 \pm 1.20$	$-0.06 \pm 1.64$

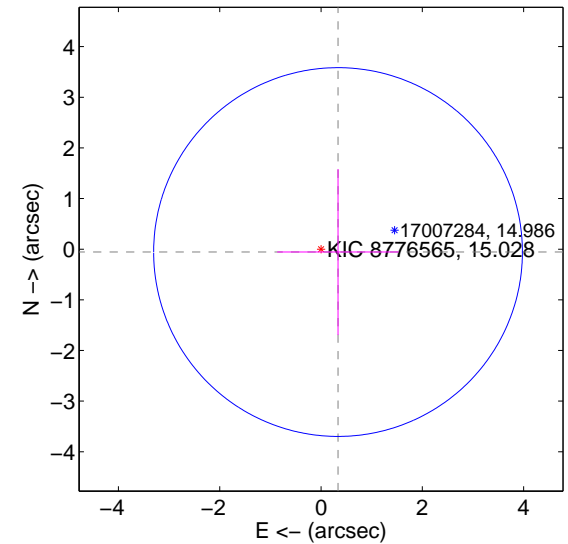
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

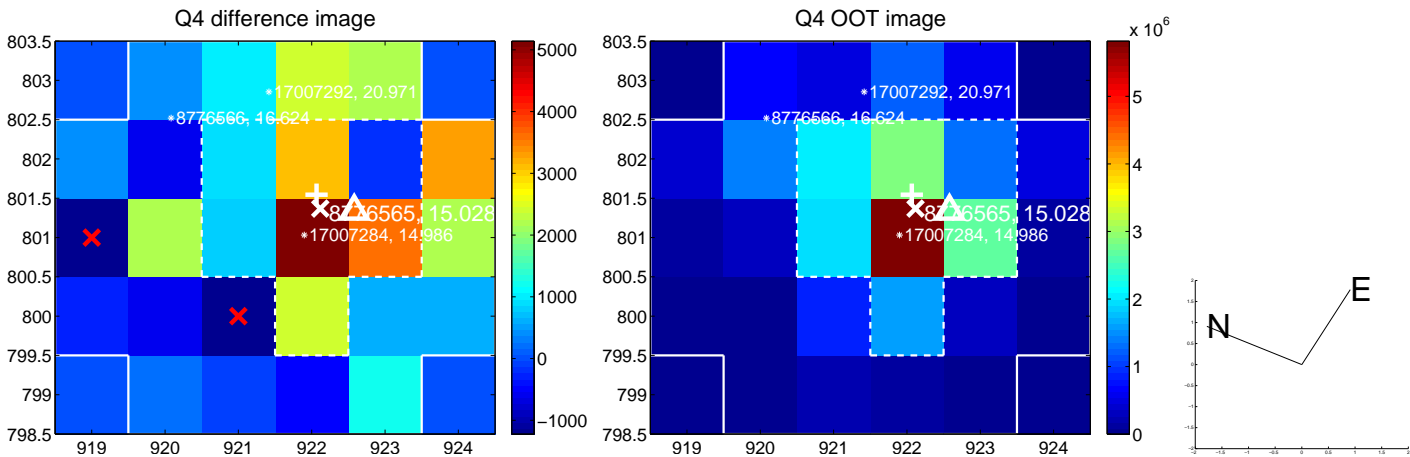
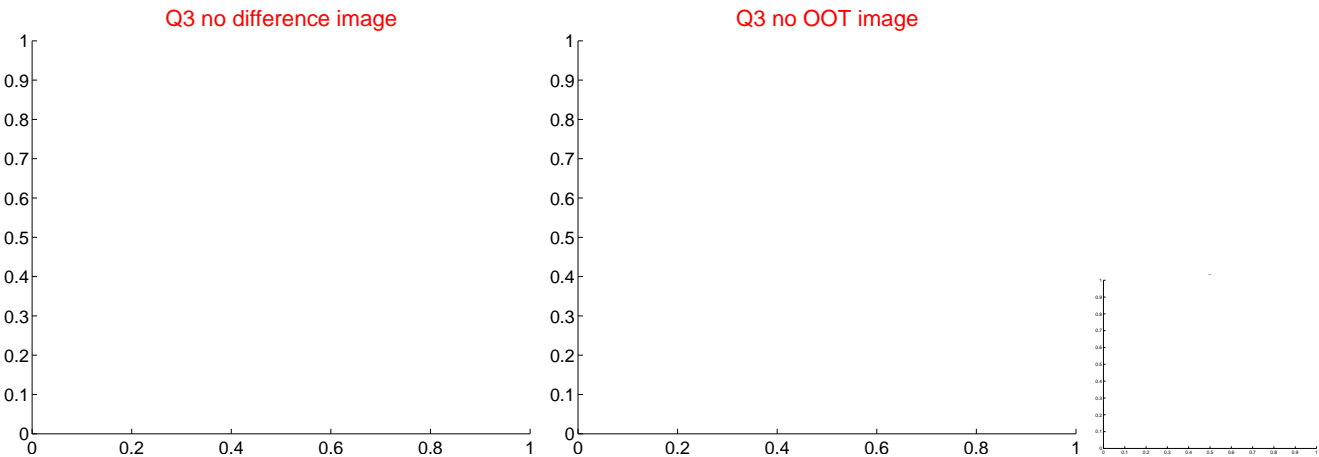
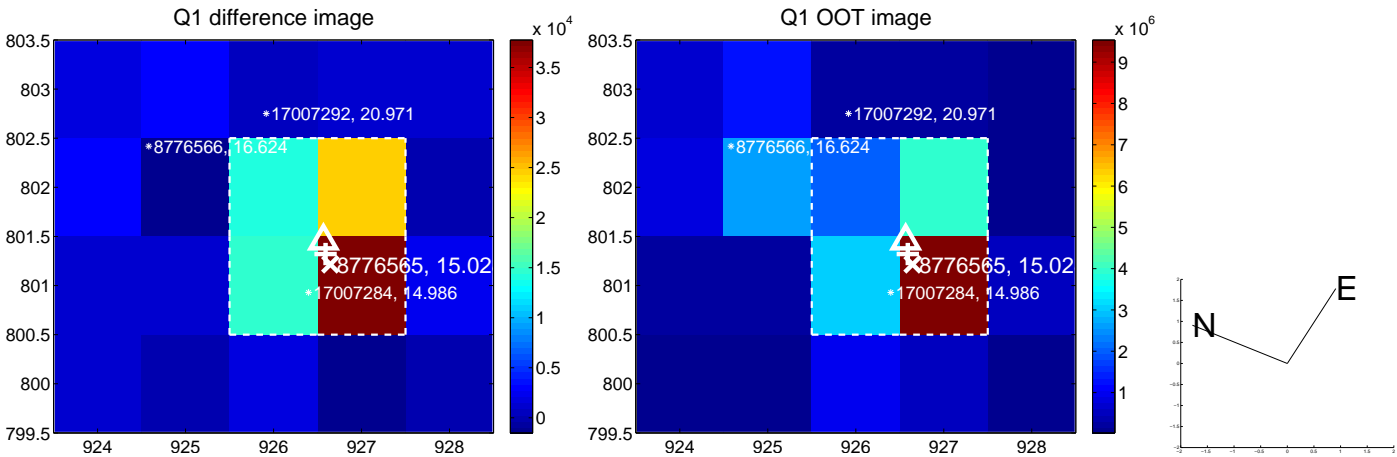


offset from photometric centroids

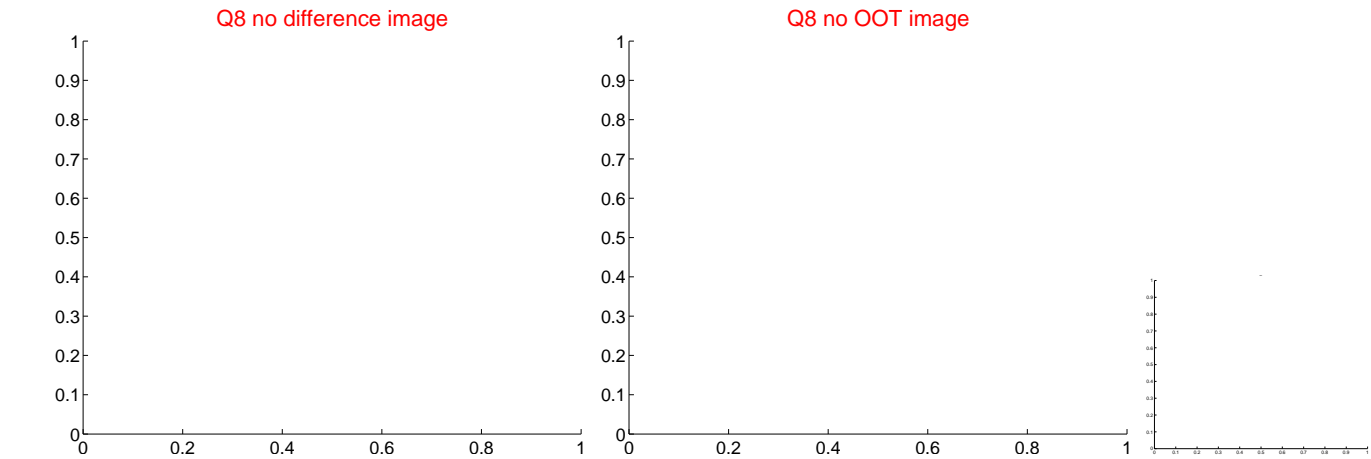
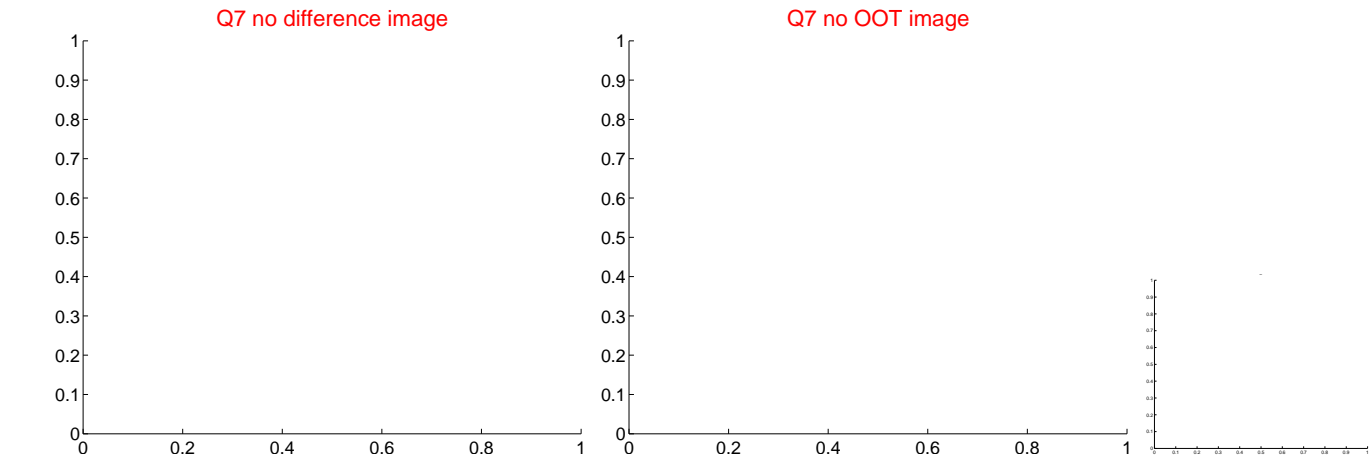
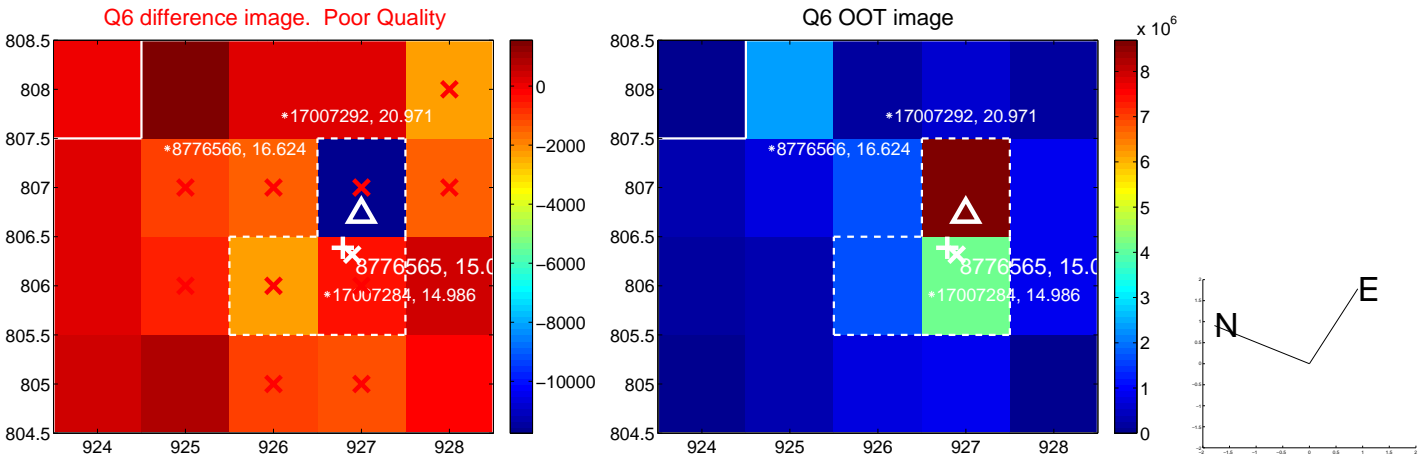
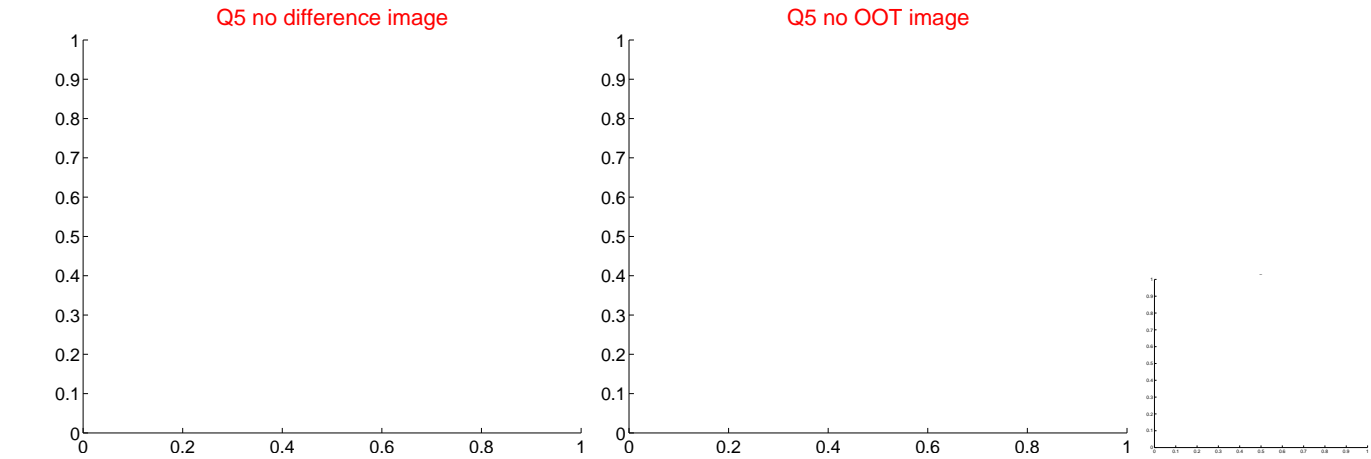


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

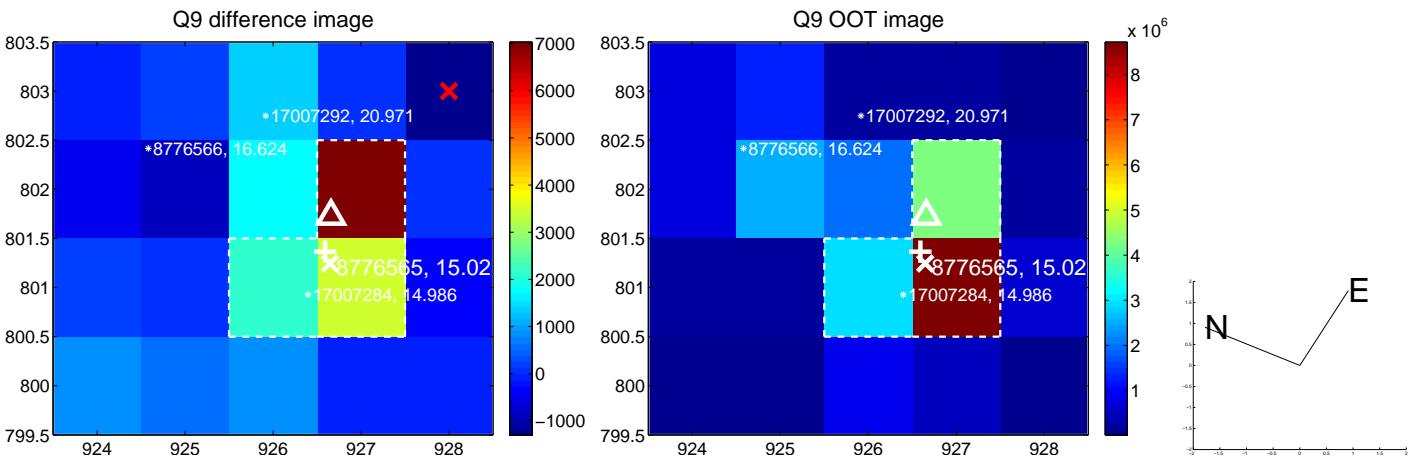
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



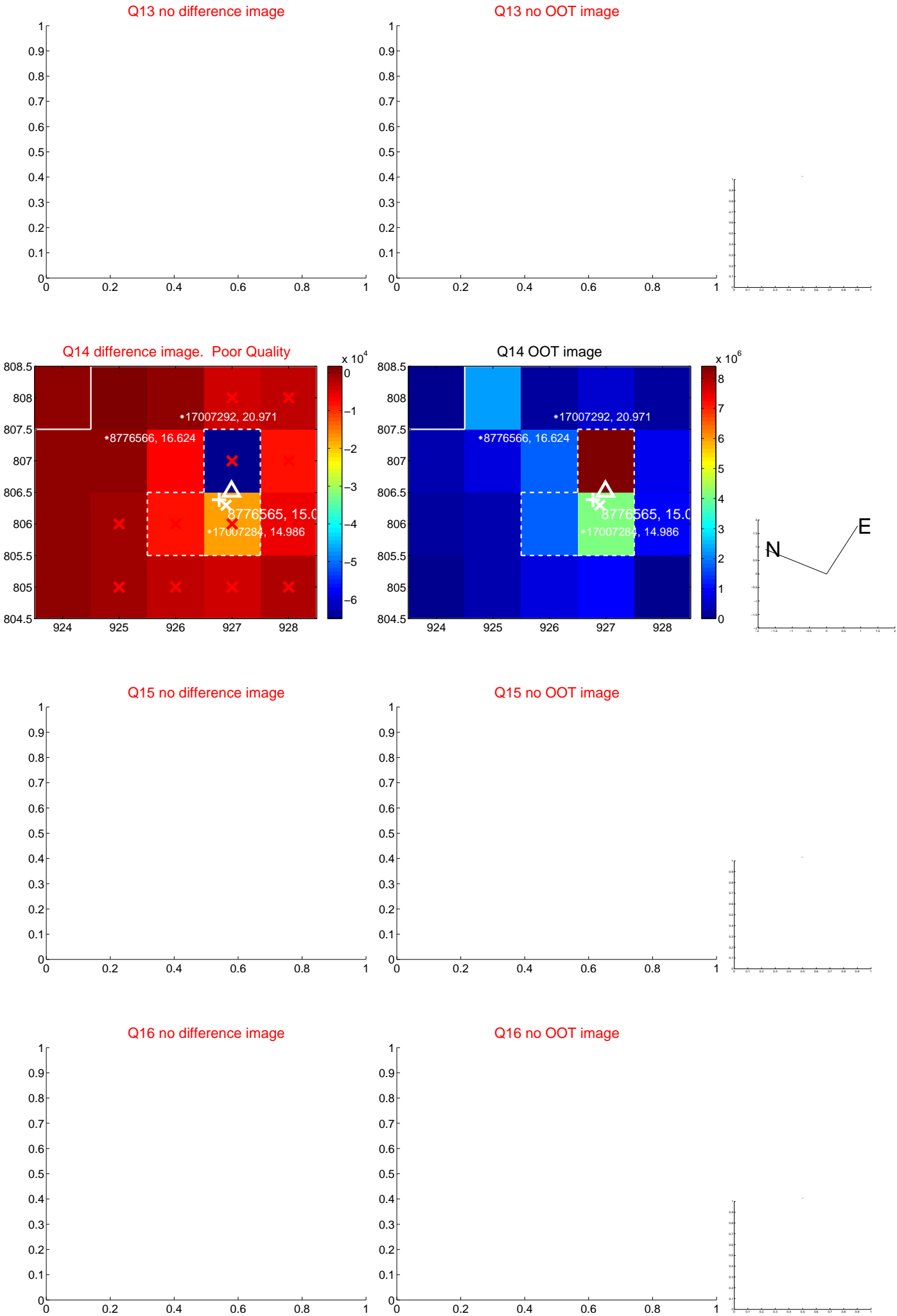
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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



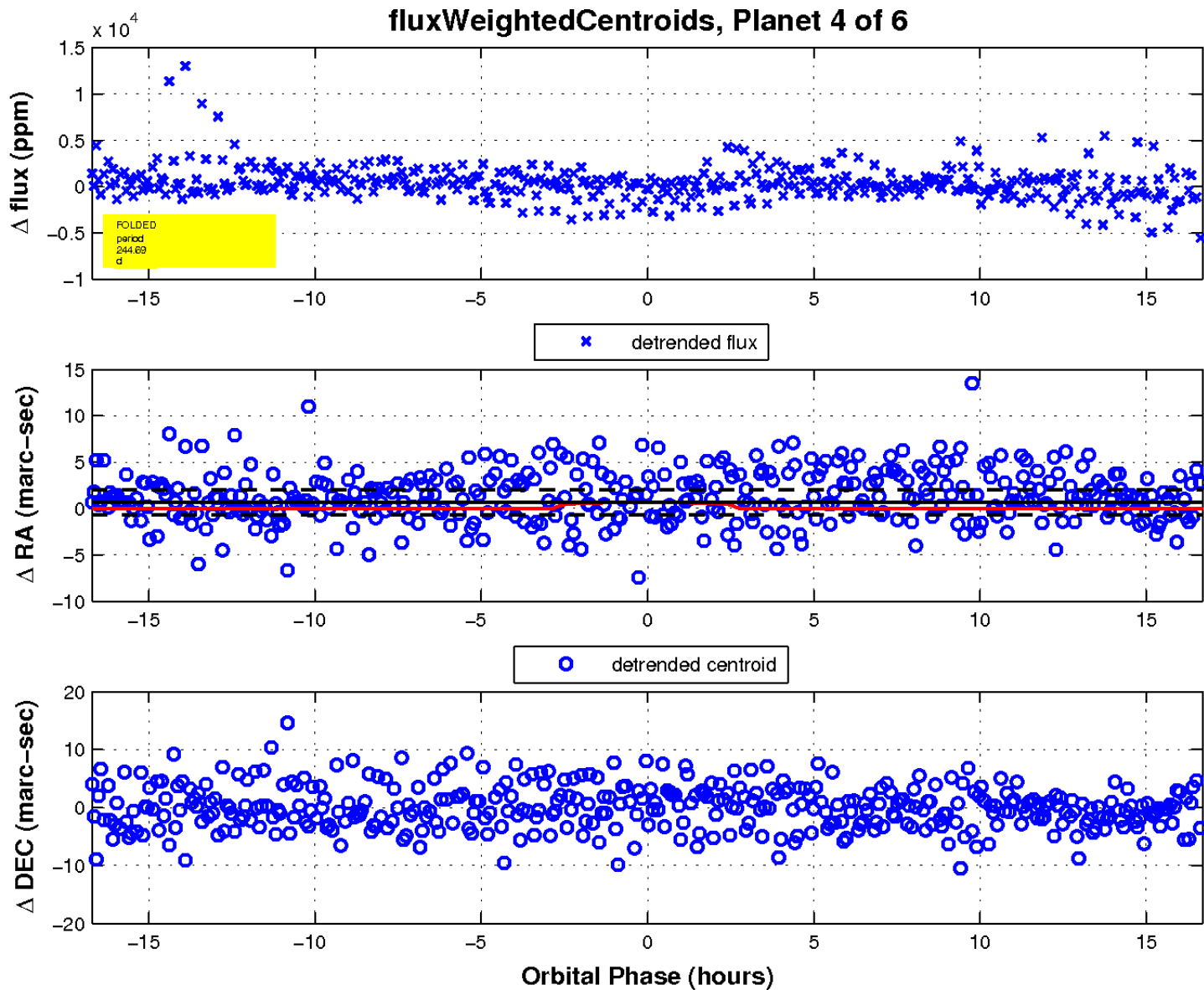
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

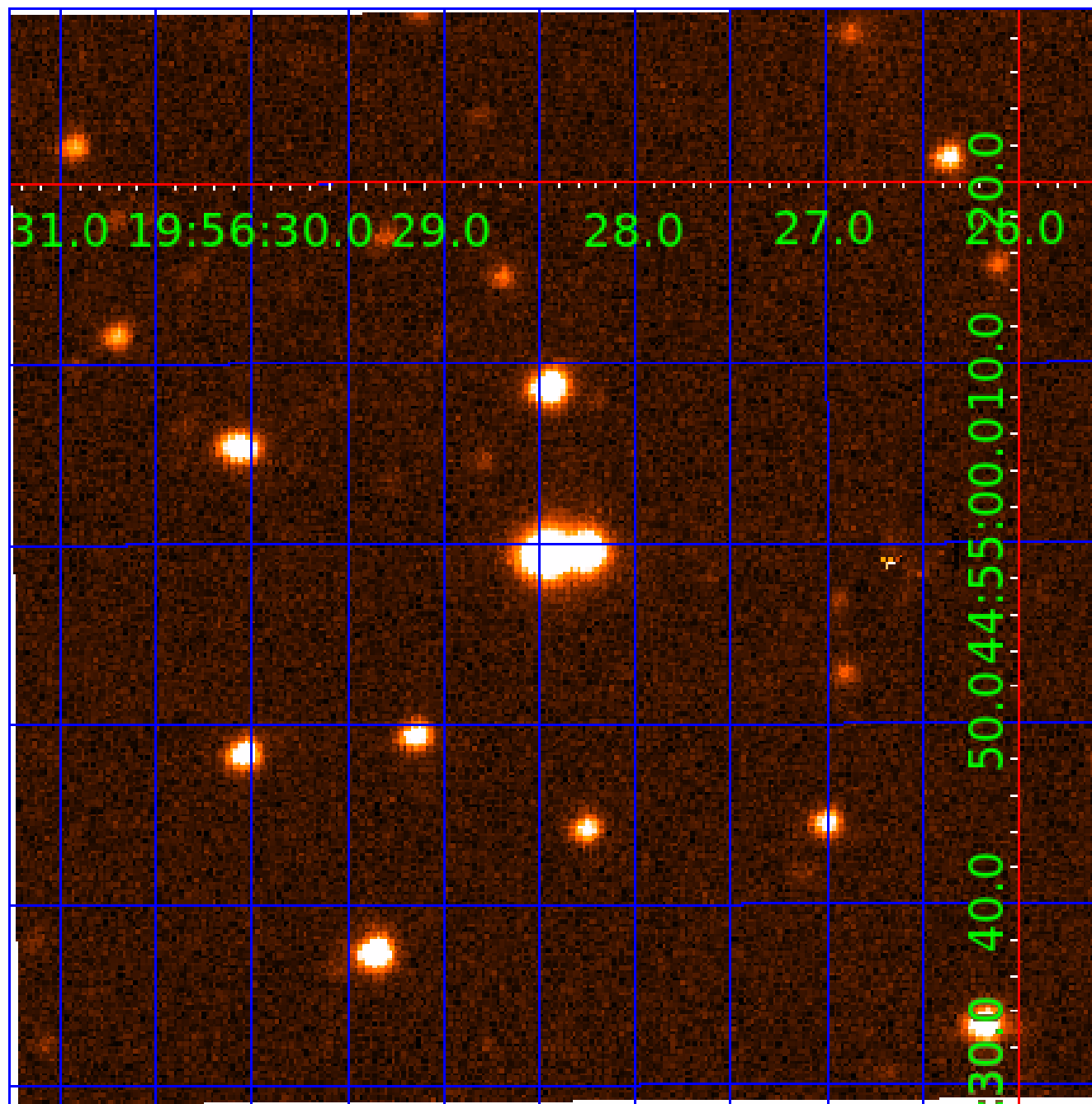
Q17 no difference image

Q17 no OOT image



UKIRT Image

Declination





# KIC 008776565

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008776565-01	OBS	No	397.621881	146.638498	1450.8	5.008	13.8	5.6	0.33	3502	1.34	0.03
008776565-02	OBS	No	535.306770	306.335224	2872.7	3.805	13.7	7.7	0.33	3502	1.85	0.02
008776565-03	OBS	No	540.005837	277.518058	2372.7	5.089	13.4	6.5	0.33	3502	1.61	0.02
008776565-04	OBS	No	244.687393	134.772525	991.5	5.579	11.0	4.4	0.33	3502	1.10	0.05
008776565-05	OBS	No	571.472737	278.470787	1790.2	5.433	11.7	5.5	0.33	3502	1.51	0.02
008776565-06	OBS	No	244.691881	135.488727	928.4	10.500	11.7	-1.0	0.33	3502	1.01	0.05

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008776565-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
008776565-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
008776565-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
008776565-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_MARSHALL_SKYE_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_KIC_POS—HALO_GHOST
008776565-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_TRACKER—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
008776565-06	OBS	FP	0.00	1	0	1	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—SAME_NTL_PERIOD—CENT_NOFITS—HALO_GHOST

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

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

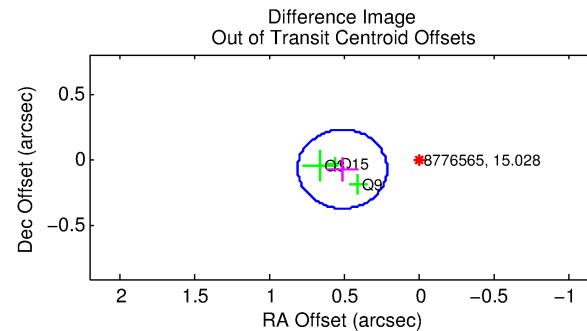
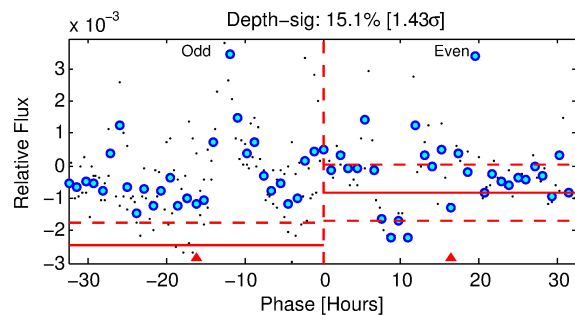
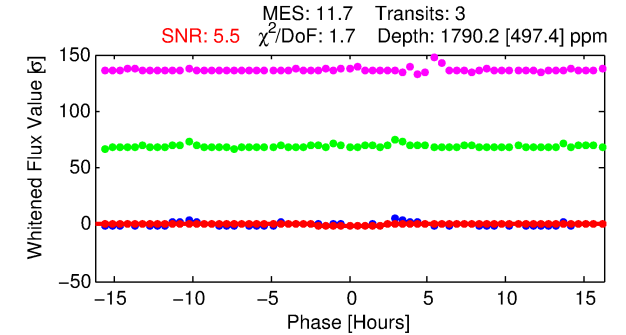
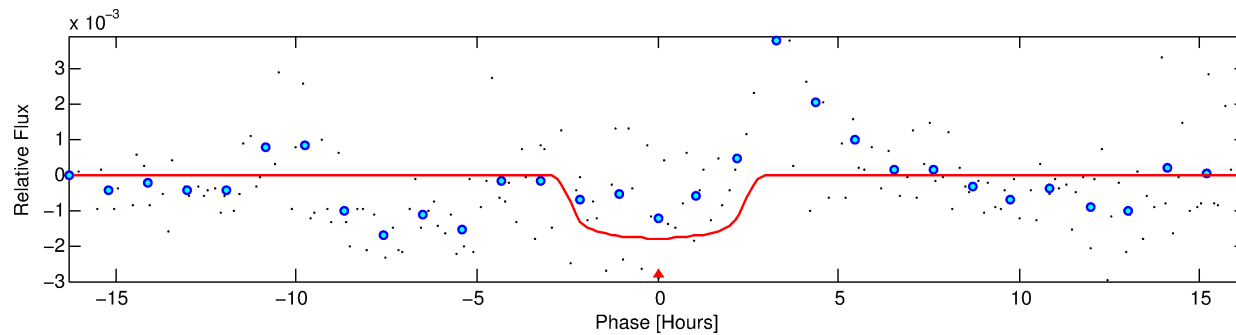
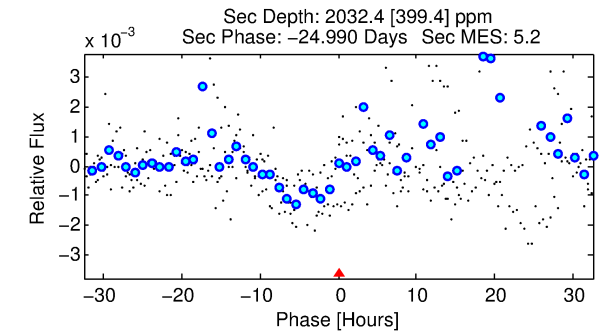
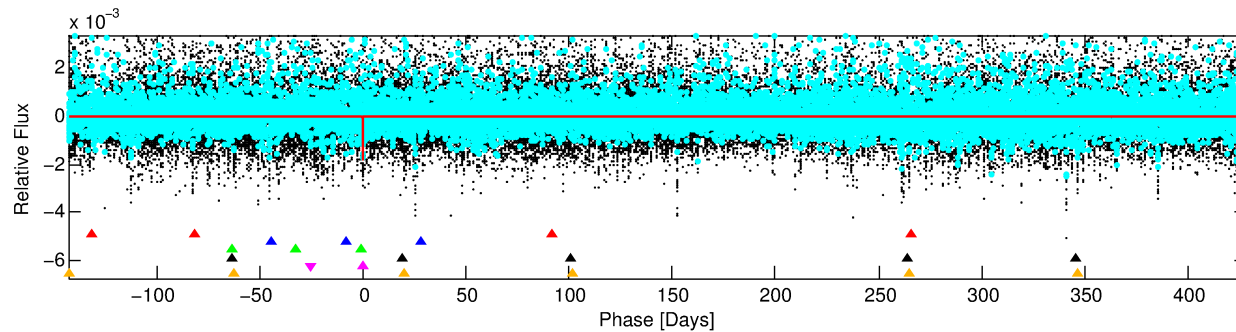
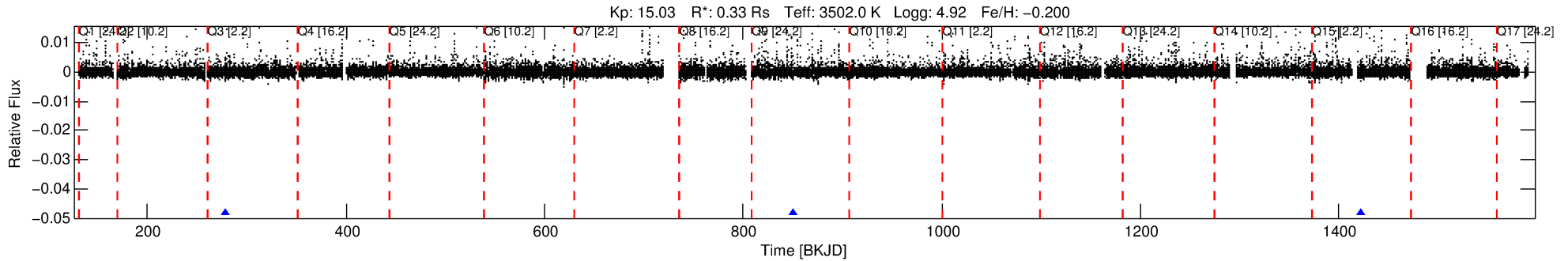
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008776565-05

No Significant Match Found

# DV One-Page Summary

KIC: 8776565 Candidate: 5 of 6 Period: 571.473 d



## DV Fit Results:

Period = 571.47274 [0.00963] d  
Epoch = 278.4708 [0.0115] BKJD  
Rp/R\* = 0.0414 [0.0175]  
a/R\* = 614.62 [1002.54]  
b = 0.71 [1.16]  
Seff = 0.02 [0.00]  
Teq = 92 [2] K  
Rp = 1.51 [0.66] Re  
a = 0.9430 [0.0702] AU  
Ag = 436620.58 [380553.22] [1.15σ]  
Teffp = 3654 [793] K [4.49σ]

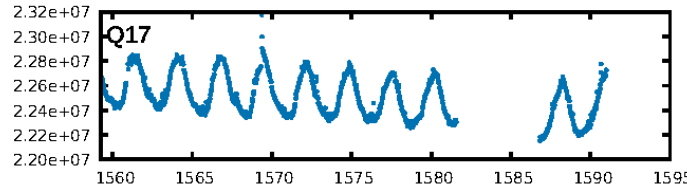
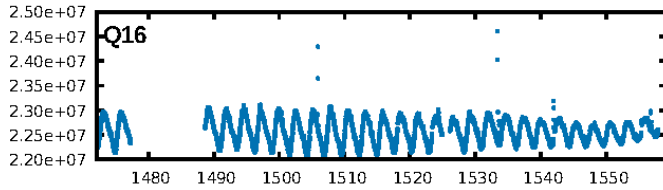
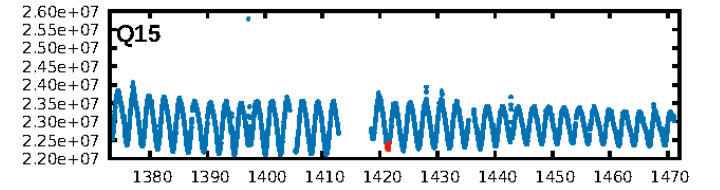
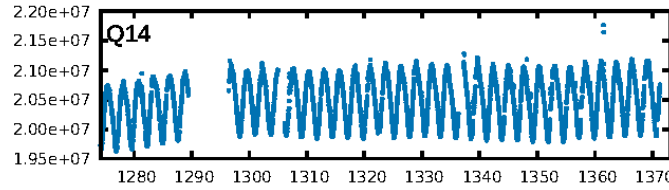
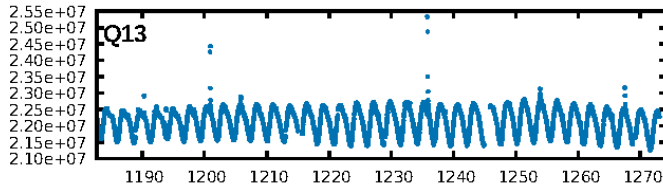
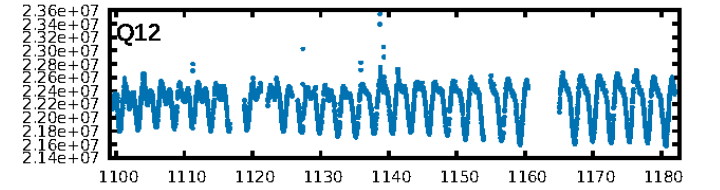
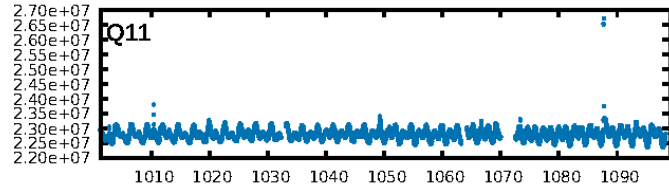
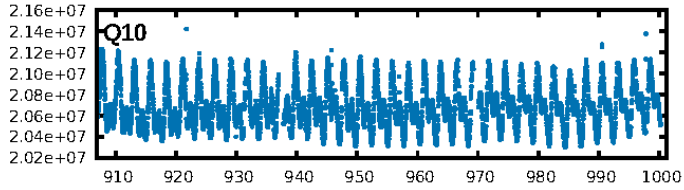
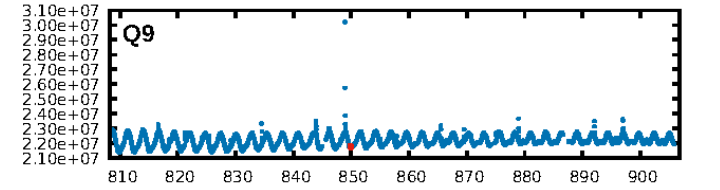
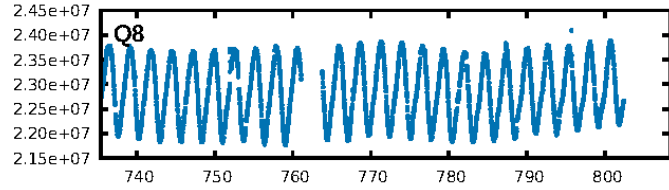
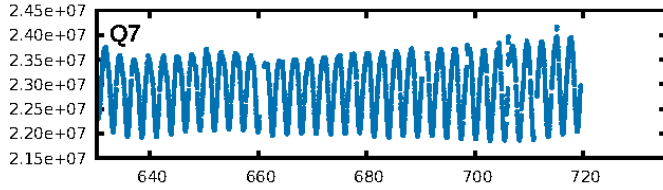
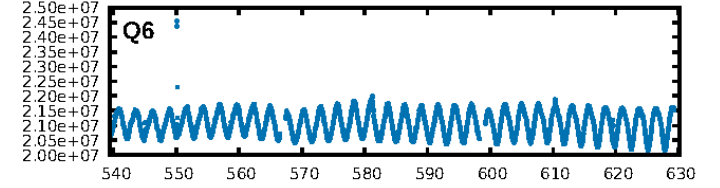
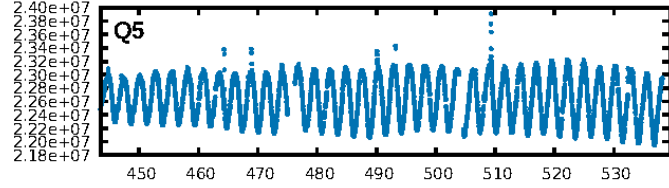
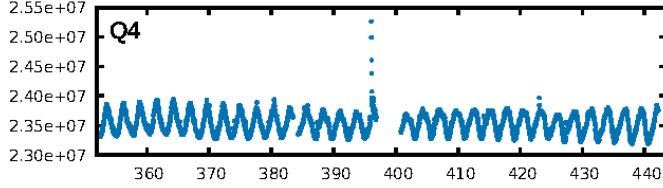
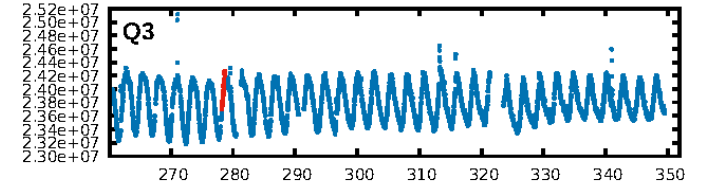
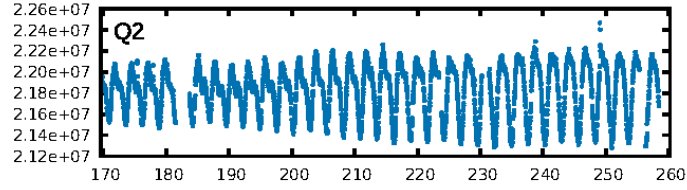
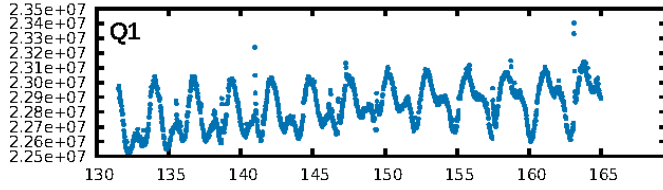
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [101.45σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 34.7%  
ModelChiSquareGof-sig: 45.2%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 0.7697  
Centroid-sig: N/A  
Centroid-so: 1.459 arcsec [1.11σ]  
OotOffset-rm: 0.513 arcsec [5.16σ]  
KicOffset-rm: 0.773 arcsec [9.58σ]  
OotOffset-st: 0/2/0/1 [3]  
KicOffset-st: 0/2/0/1 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

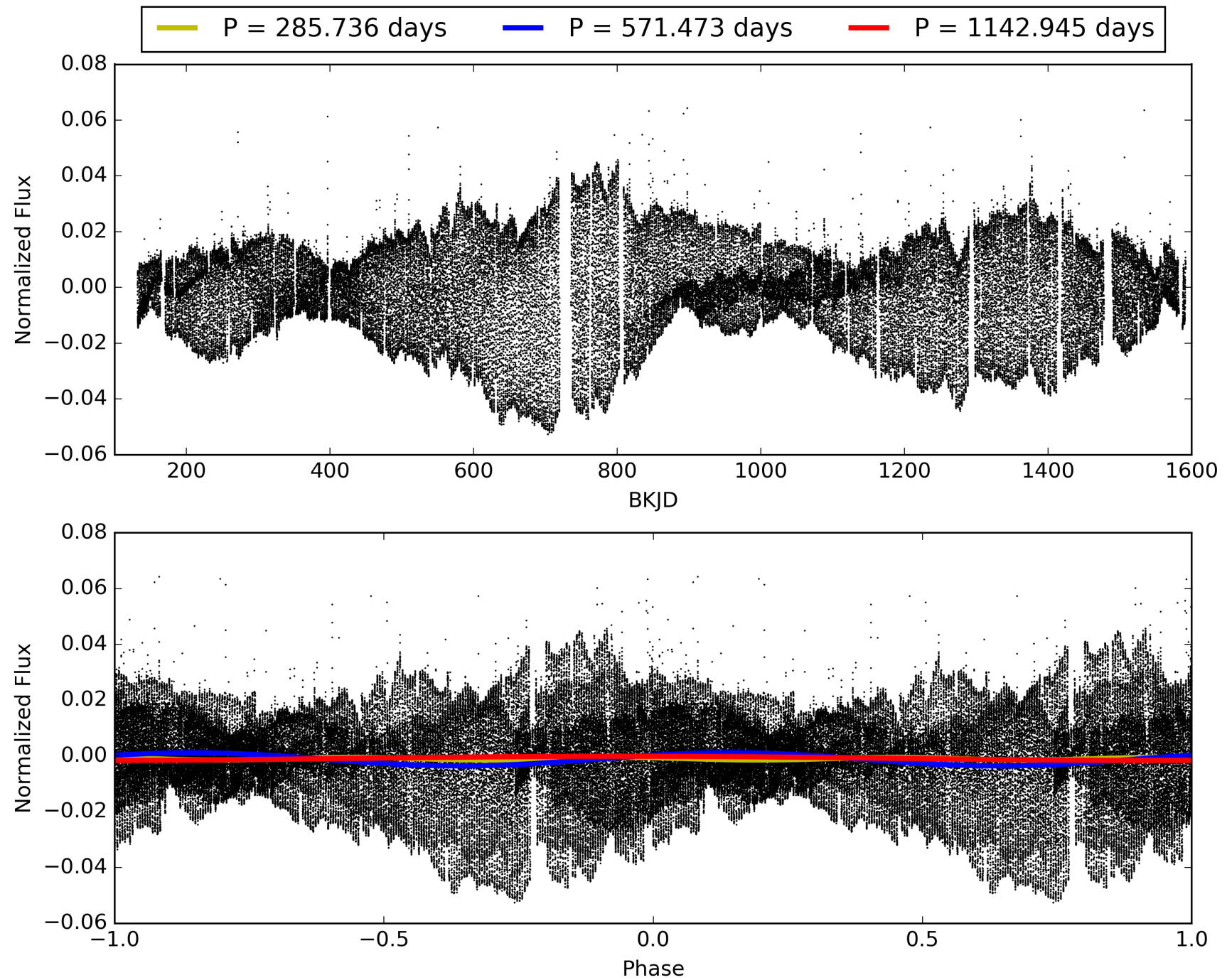
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 23:29:16 Z

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

# TCE 008776565-05, PDC Light Curves

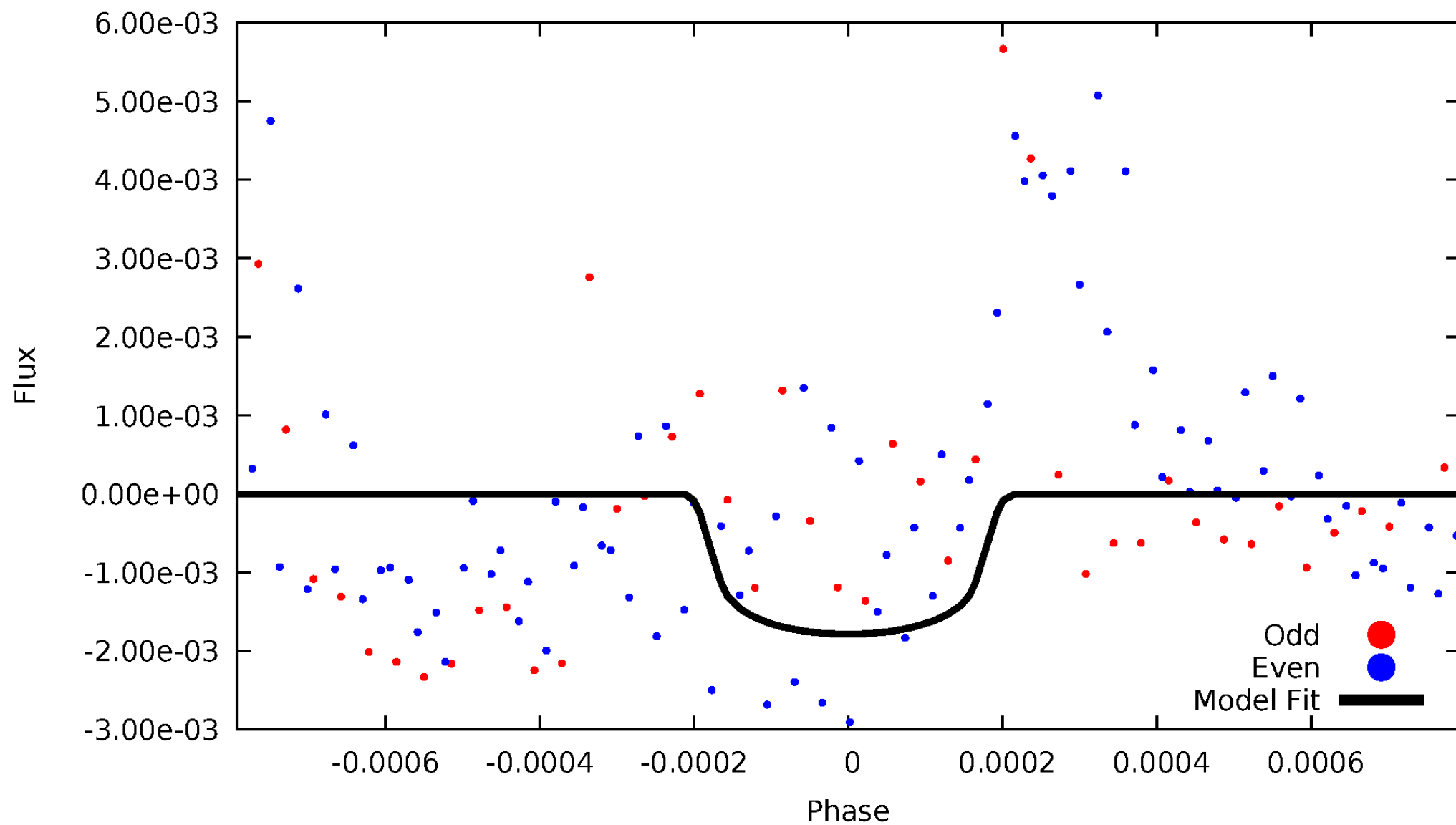


TCE 008776565-05



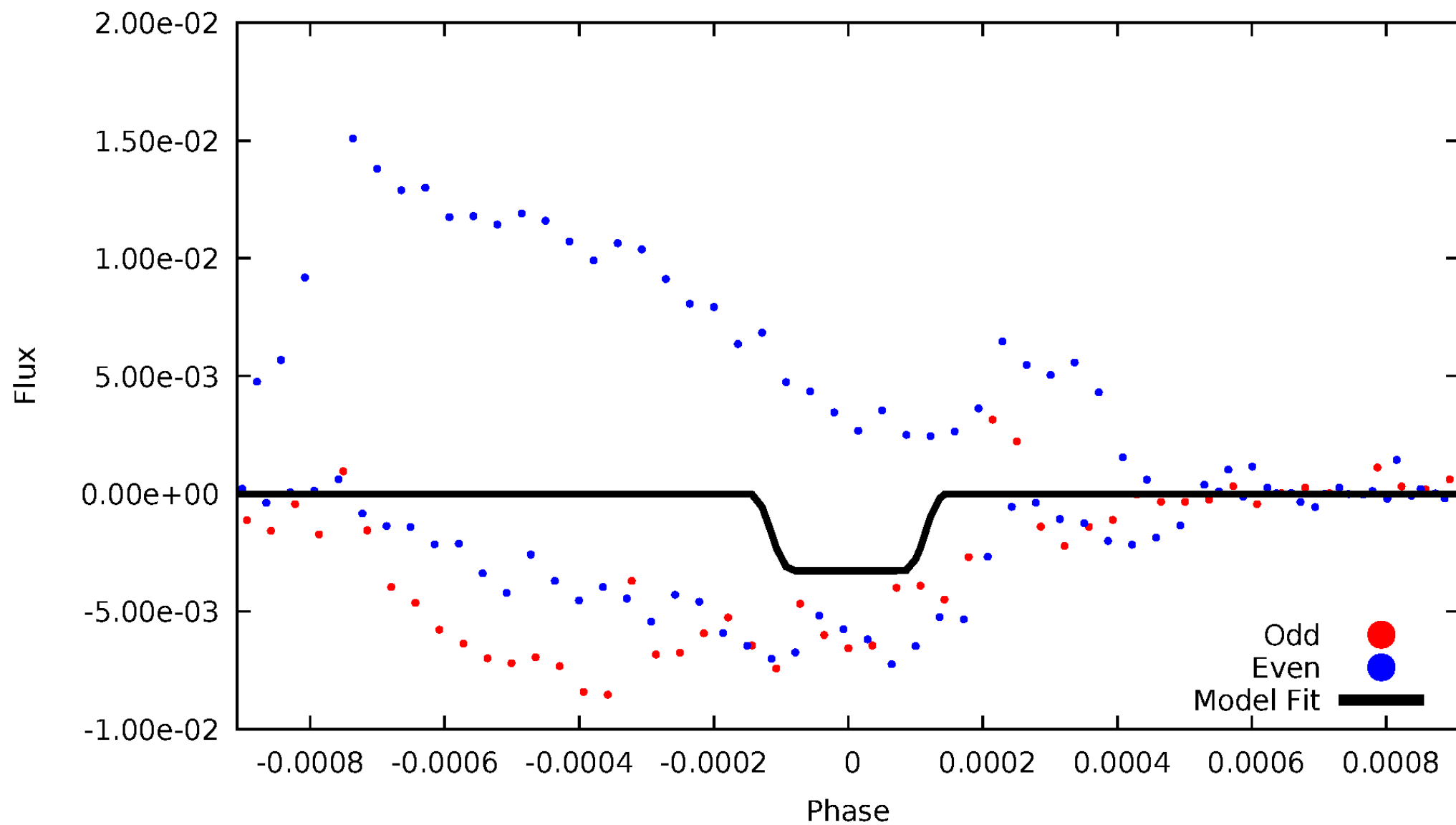
# DV Odd/Even

TCE 008776565-05



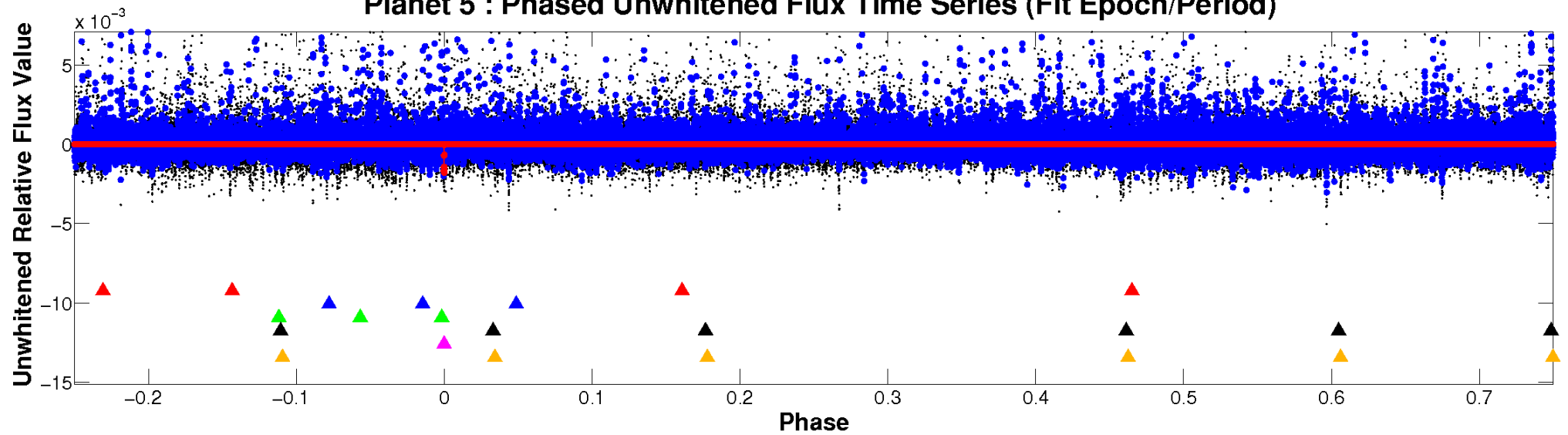
# ALT Odd/Even

TCE 008776565-05

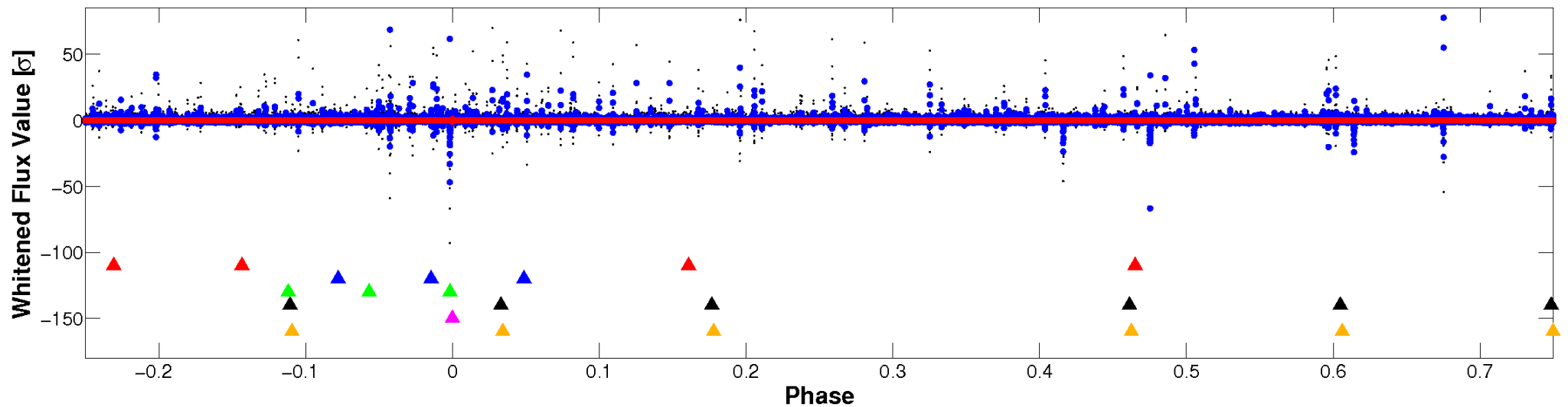


# Non-Whitened Vs. Whitened Light Curve

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

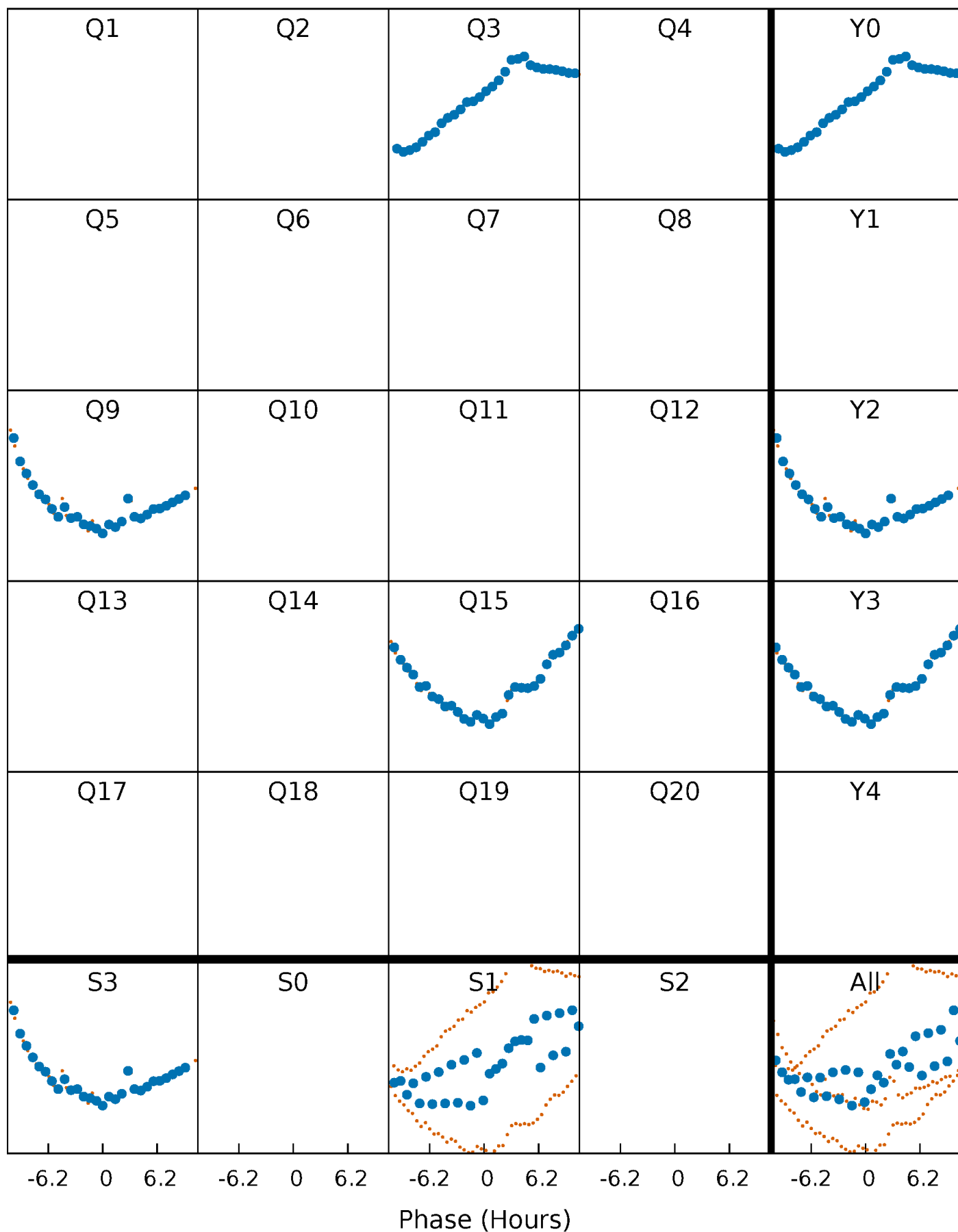


Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

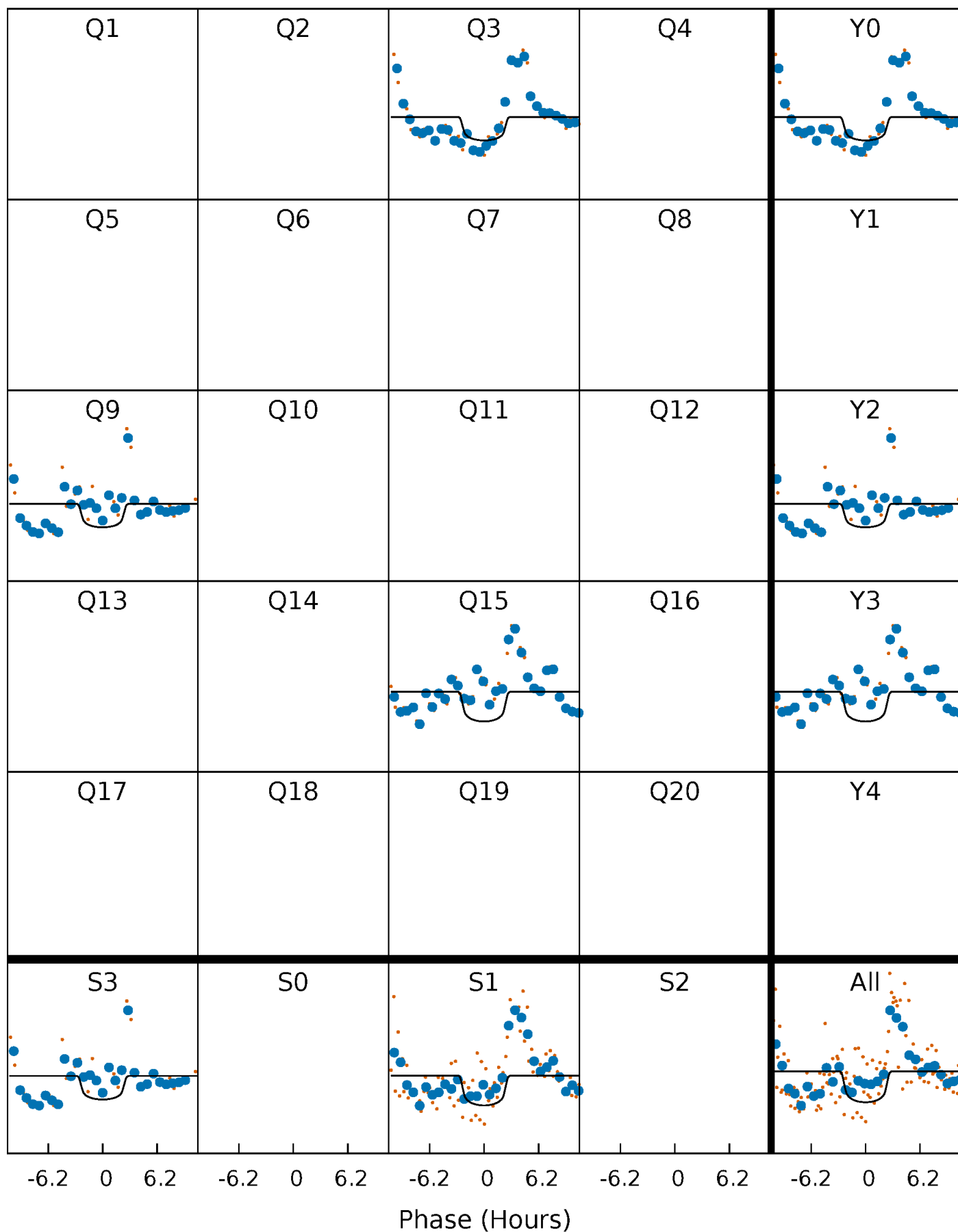
TCE 008776565-05     $P=571.472737$  Days     $T_0=278.470787$  (BKJD)





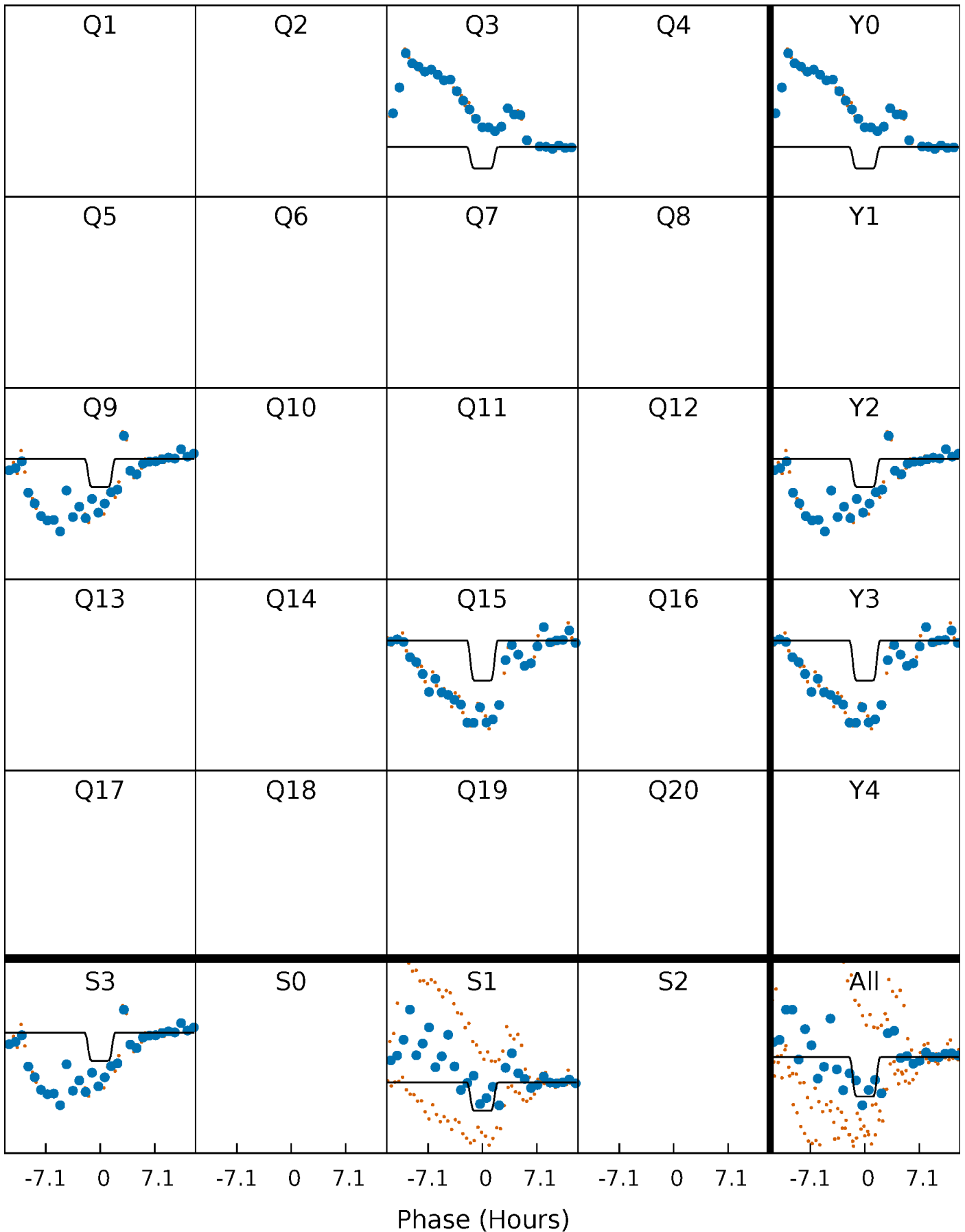
# DV Quarter-Phased Transit Curves

TCE 008776565-05     $P=571.472737$  Days     $T_0=278.470787$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

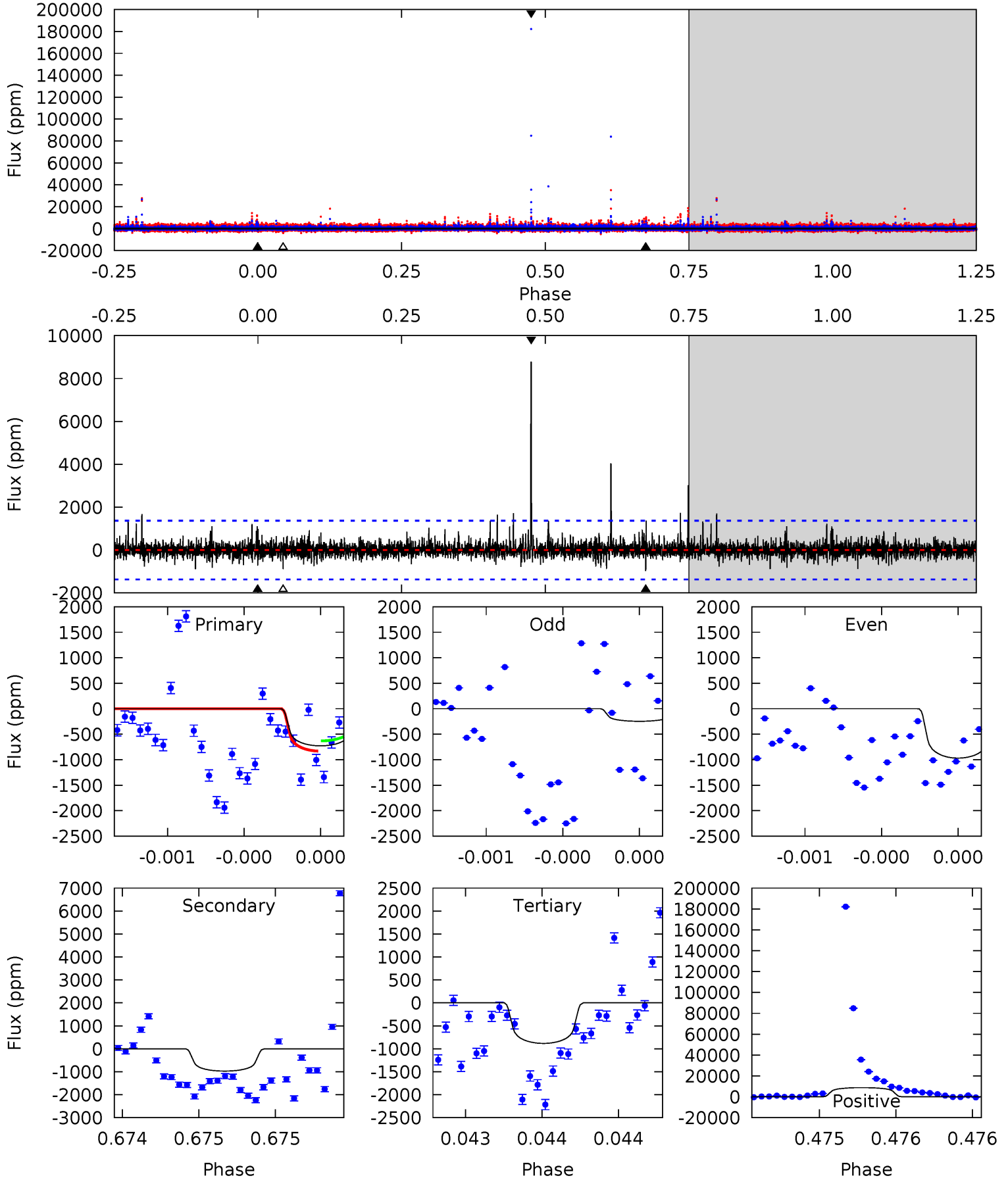
TCE 008776565-05     $P=571.472184$  Days     $T_0=278.463507$  (BKJD)



# DV Model-Shift Uniqueness Test

008776565-05, P = 571.472737 Days, E = 278.470787 Days

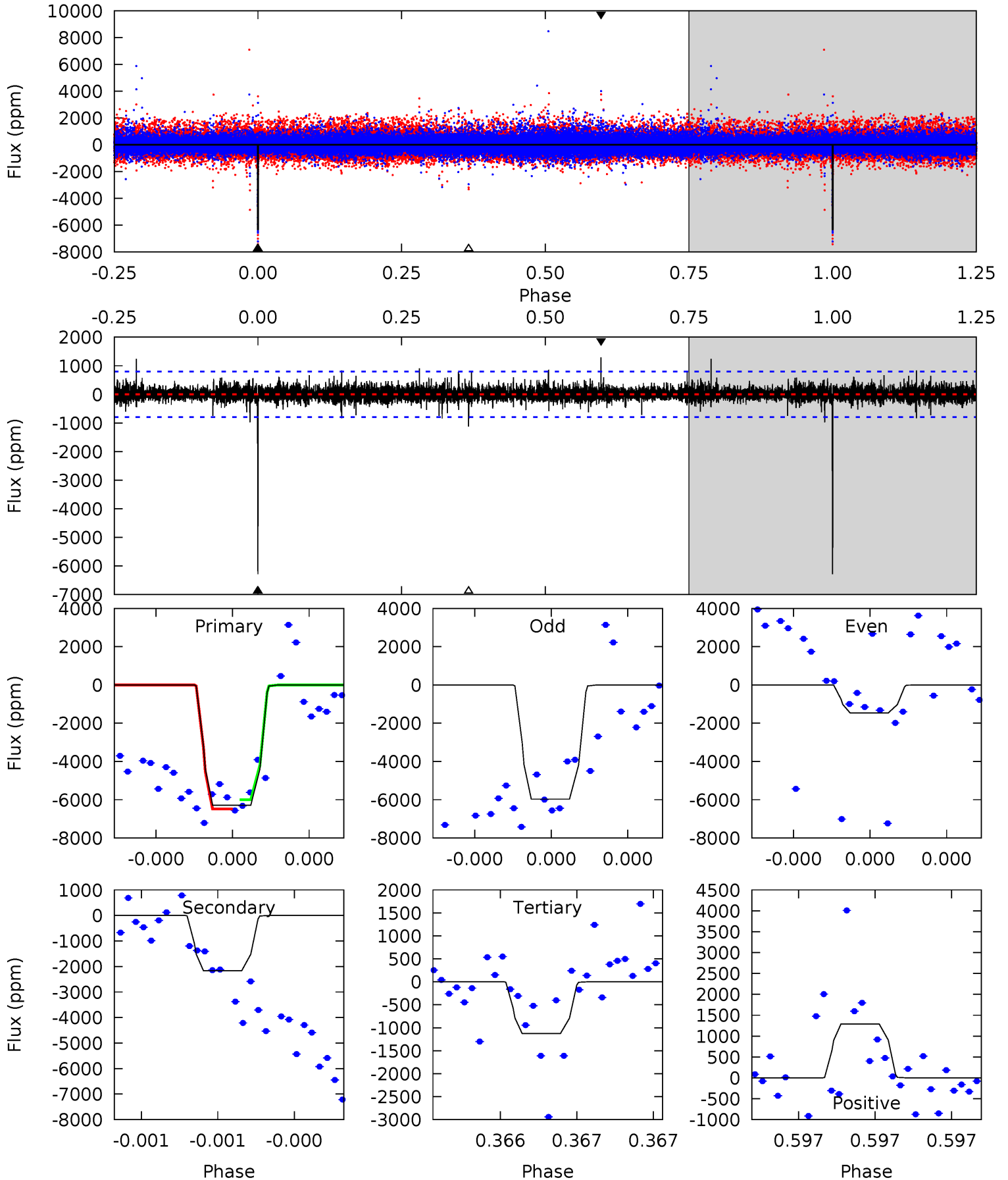
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2.97	3.97	3.60	35.8	5.60	3.53	1.28	-0.63	-32.9	0.37	-31.9	0.96	2.96	0.90	0.41



# Alt Model-Shift Uniqueness Test

008776565-05, P = 571.472184 Days, E = 278.463507 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
44.8	15.5	8.04	9.20	5.66	3.61	1.00	36.8	35.6	7.42	6.26	15.4	0.50	0.17	1.70



### Stellar Parameters For KIC 008776565

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3502^{+41}_{-41}$	$4.925^{+0.040}_{-0.032}$	$-0.200^{+0.100}_{-0.100}$	$0.334^{+0.030}_{-0.034}$	$0.341^{+0.038}_{-0.041}$	$12.910^{+2.925}_{-1.990}$
	+1%/-1%	+1%/-1%	+50%/-50%	+9%/-10%	+11%/-12%	+23%/-15%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 008776565-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-973 \pm 245$	$1.46^{+0.64}_{-0.58}$	$128^{+3}_{-3}$	$3219^{+604}_{-338}$	$218225^{+432420}_{-122012}$
Alt.	$-2168 \pm 140$	$2.08^{+0.61}_{-0.59}$	$128^{+3}_{-3}$	$3285^{+357}_{-242}$	$245580^{+217930}_{-97924}$

$T_{max}$  = 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

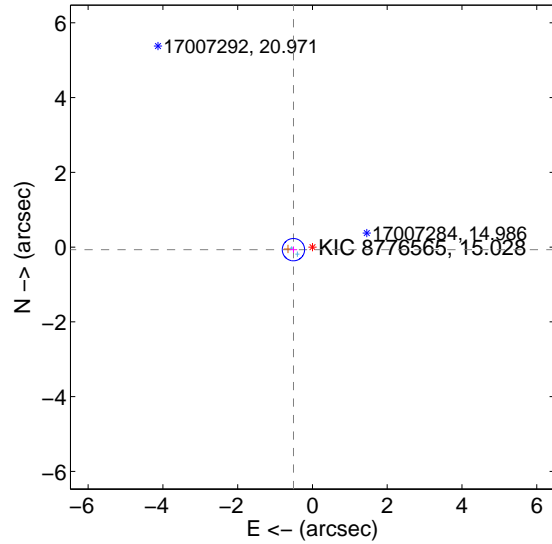
Supplemental centroid analysis for 008776565-05. Kepler magnitude: 15.03. Transit SNR 5.49

There are 2 quarters with good PRF difference image offsets

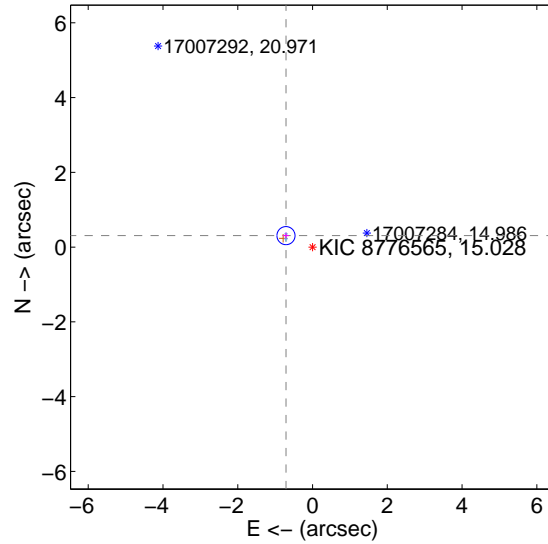
The direct PRF centroid is offset from the target star catalog position by about 0.41 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.513 \pm 0.099$	5.16	$0.508 \pm 0.100$	$-0.069 \pm 0.086$
PRF-fit source offset from KIC position	$0.773 \pm 0.081$	9.58	$0.710 \pm 0.081$	$0.307 \pm 0.082$
photometric centroid source offset	$1.46 \pm 1.31$	1.11	$0.89 \pm 1.10$	$-1.16 \pm 1.42$

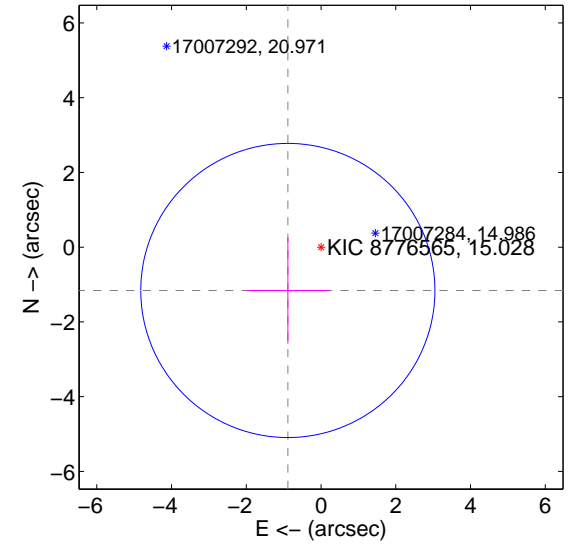
offset from difference PRF-fit to OOT PRF-fit



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



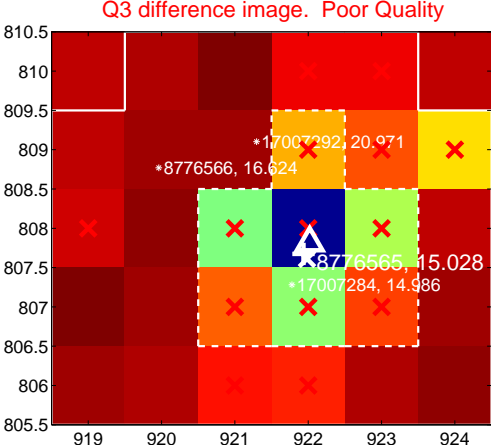
Q2 no difference image



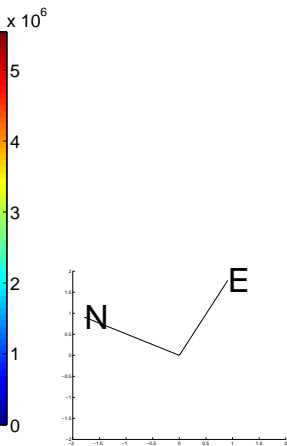
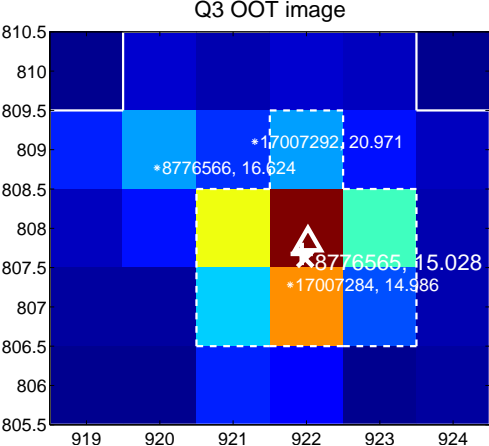
Q2 no OOT image



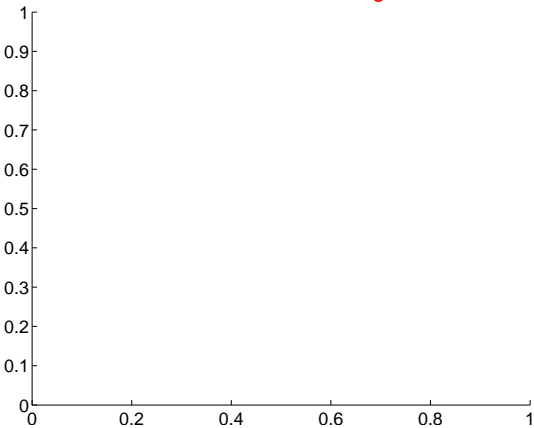
Q3 difference image. Poor Quality



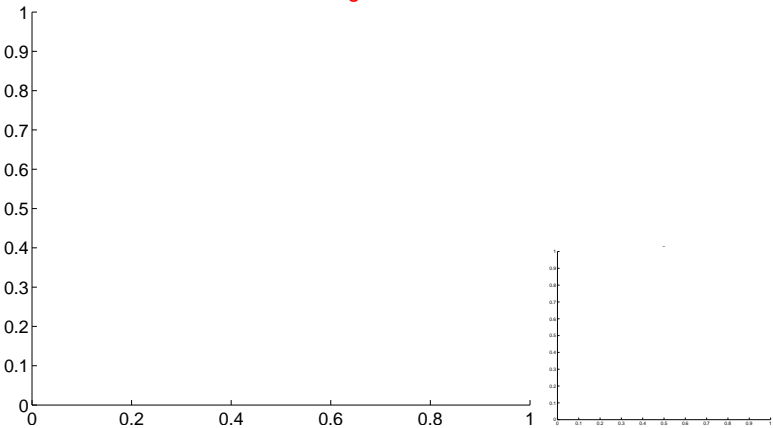
Q3 OOT image



Q4 no difference image



Q4 no OOT image

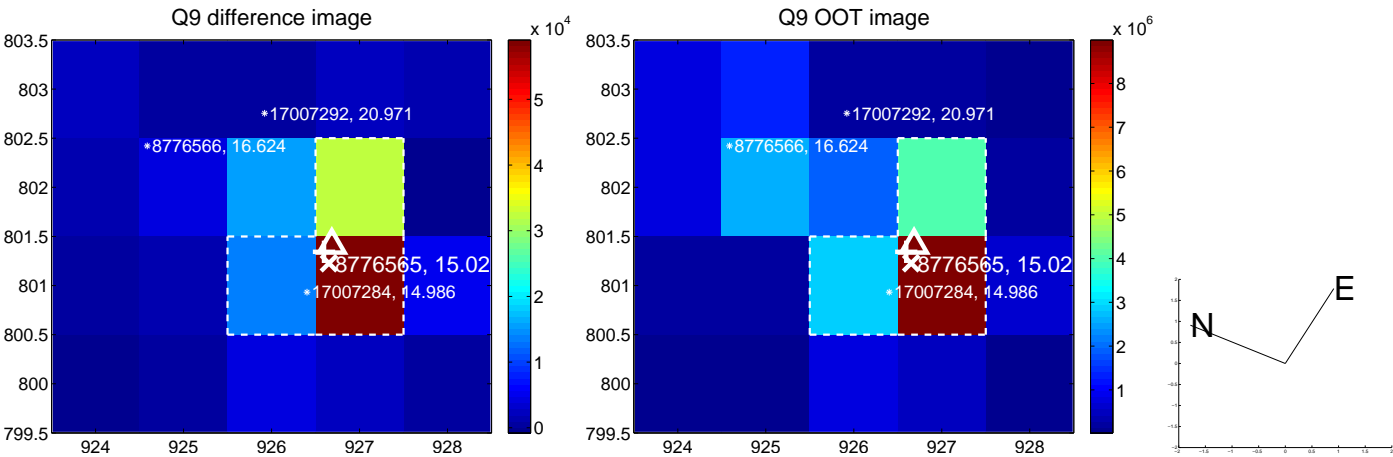


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





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



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

Q13 no difference image



Q13 no OOT image



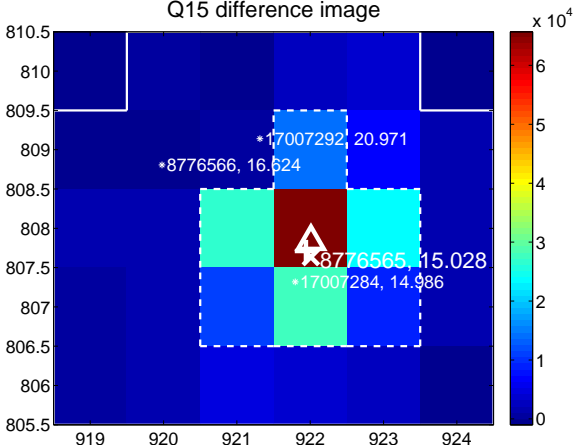
Q14 no difference image



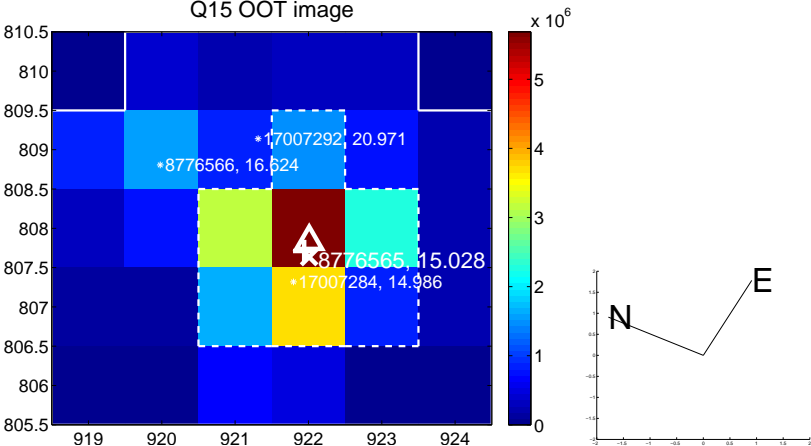
Q14 no OOT image



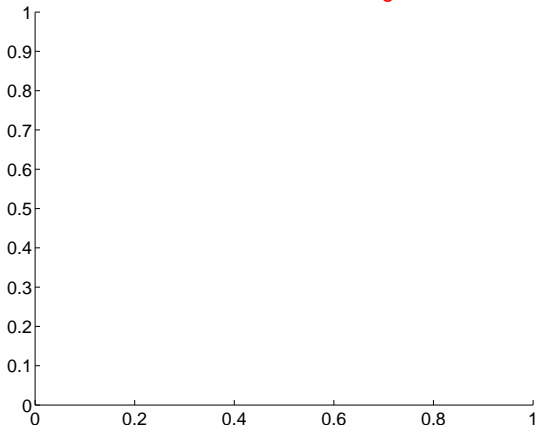
Q15 difference image



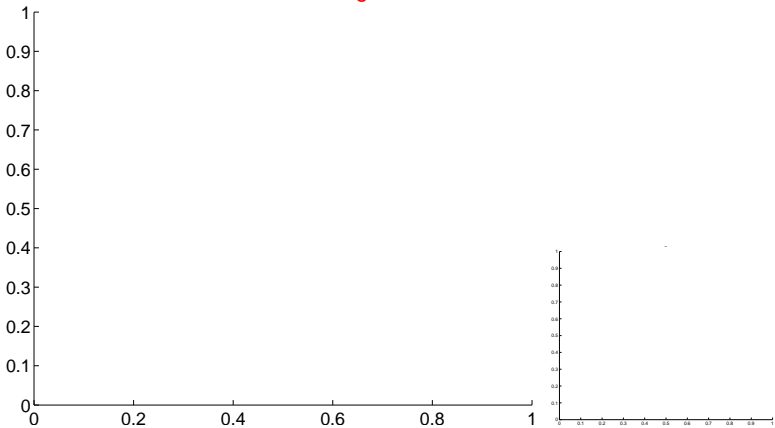
Q15 OOT image



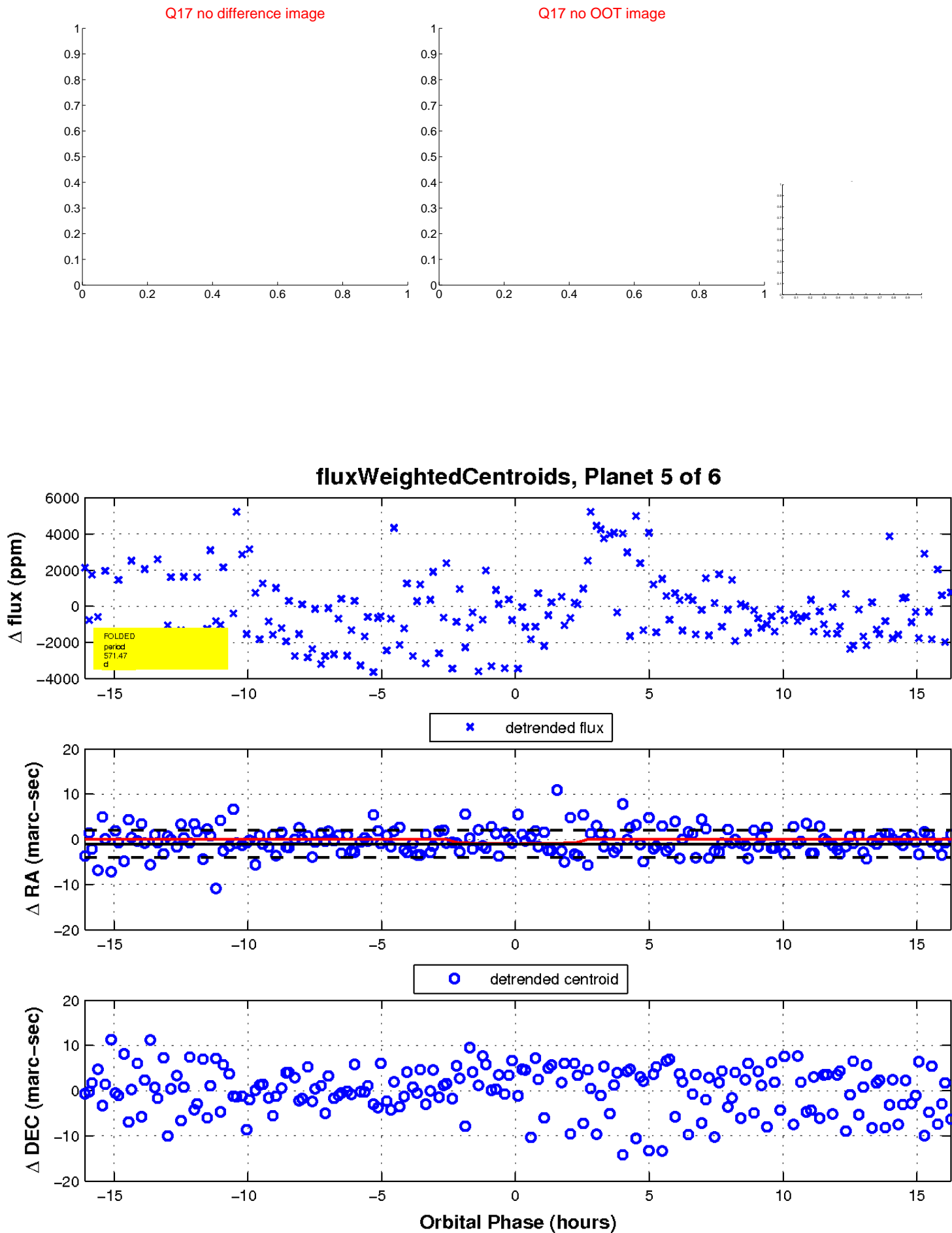
Q16 no difference image



Q16 no OOT image

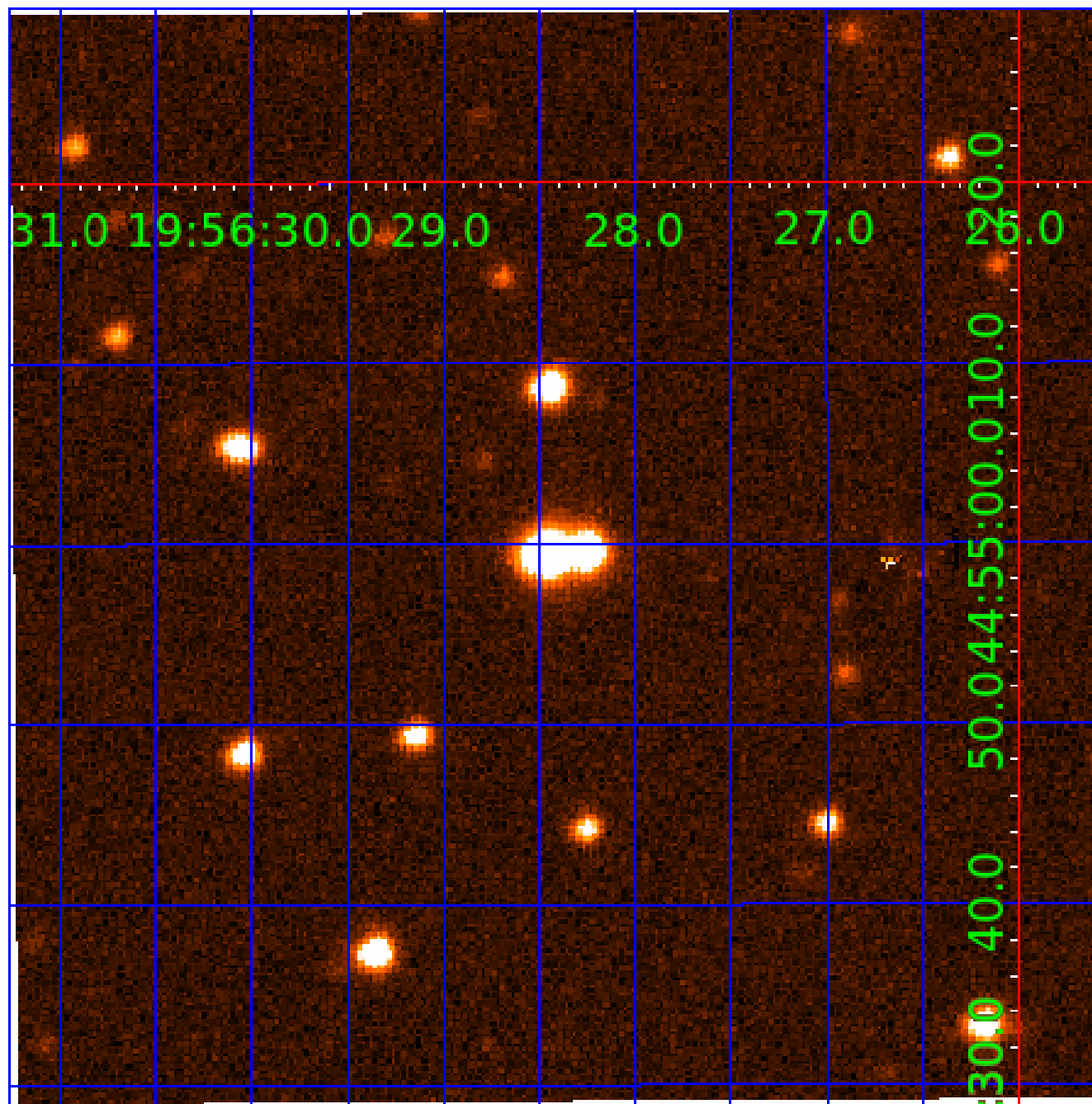


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 008776565

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008776565-01	OBS	No	397.621881	146.638498	1450.8	5.008	13.8	5.6	0.33	3502	1.34	0.03
008776565-02	OBS	No	535.306770	306.335224	2872.7	3.805	13.7	7.7	0.33	3502	1.85	0.02
008776565-03	OBS	No	540.005837	277.518058	2372.7	5.089	13.4	6.5	0.33	3502	1.61	0.02
008776565-04	OBS	No	244.687393	134.772525	991.5	5.579	11.0	4.4	0.33	3502	1.10	0.05
008776565-05	OBS	No	571.472737	278.470787	1790.2	5.433	11.7	5.5	0.33	3502	1.51	0.02
008776565-06	OBS	No	244.691881	135.488727	928.4	10.500	11.7	-1.0	0.33	3502	1.01	0.05

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008776565-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
008776565-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
008776565-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
008776565-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_MARSHALL_SKYE_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_KIC_POS—HALO_GHOST
008776565-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_TRACKER—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
008776565-06	OBS	FP	0.00	1	0	1	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—SAME_NTL_PERIOD—CENT_NOFITS—HALO_GHOST

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

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

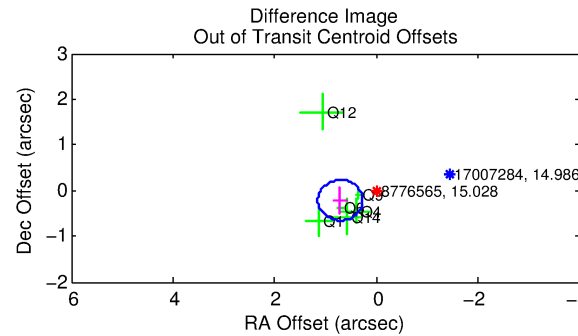
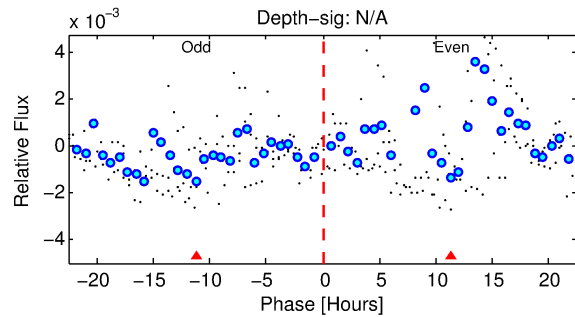
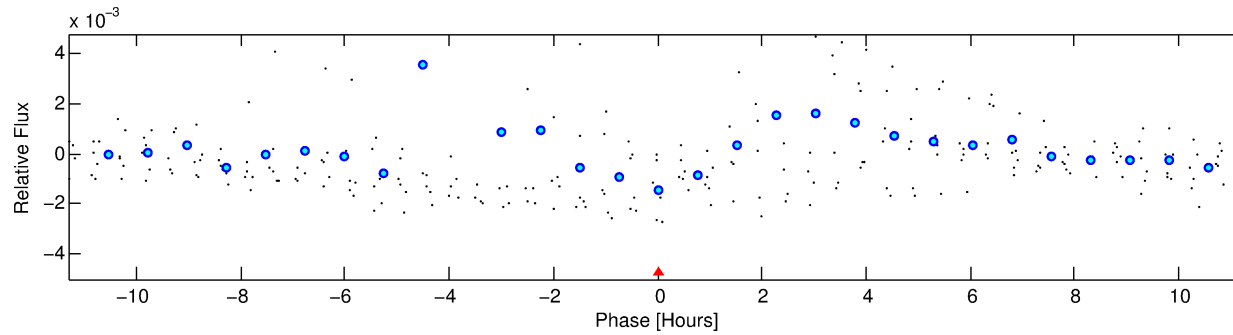
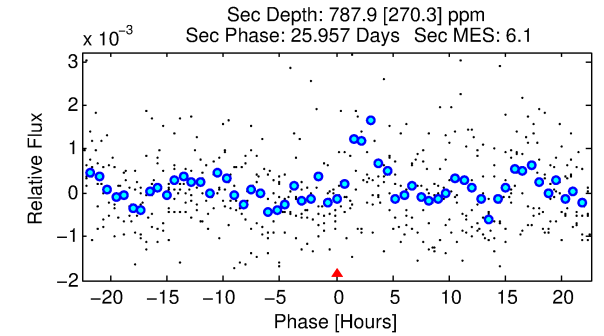
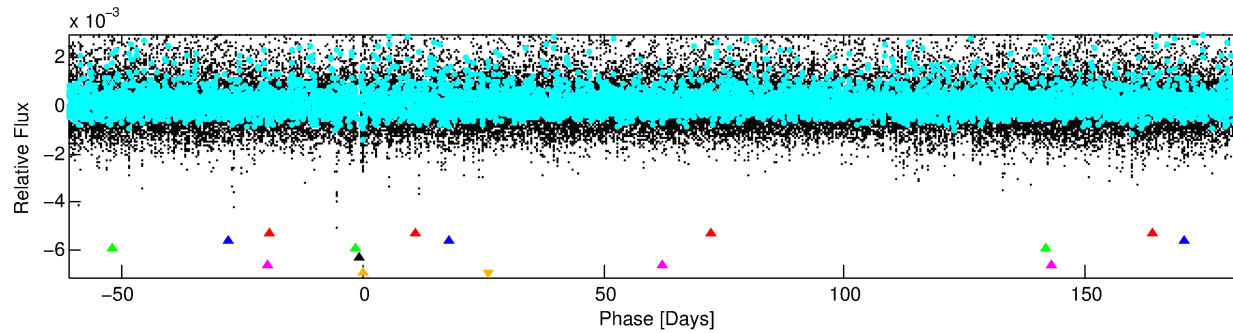
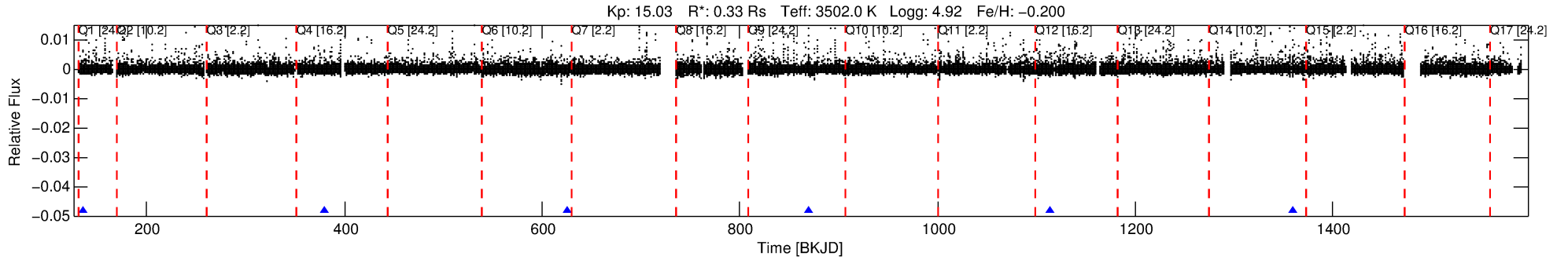
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008776565-06

No Significant Match Found

# DV One-Page Summary

KIC: 8776565 Candidate: 6 of 6 Period: 244.692 d



## TPS TCE Results:

Period = 244.69188 d  
Epoch = 135.4887 BKJD

DV fit results are unavailable

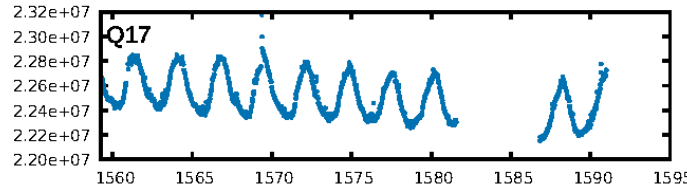
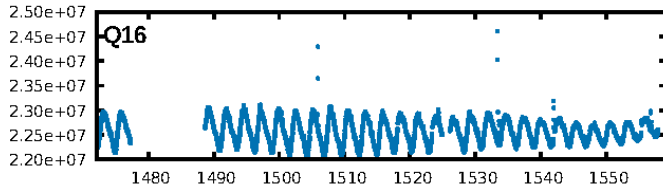
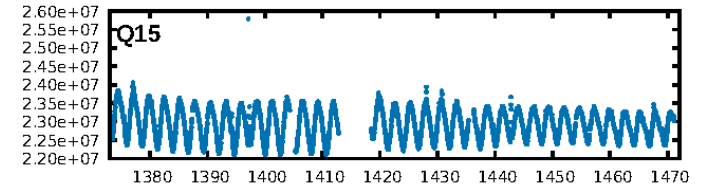
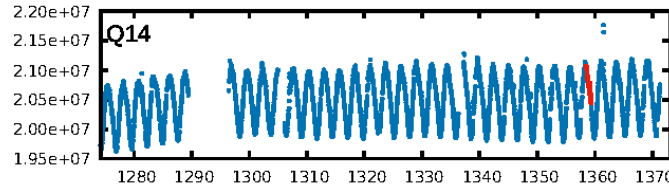
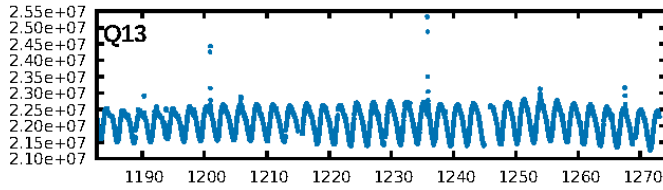
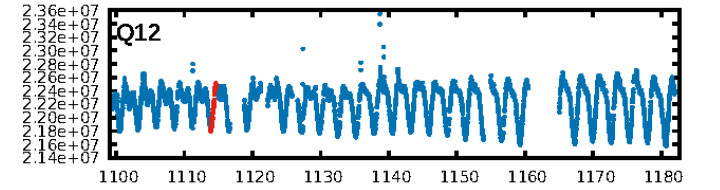
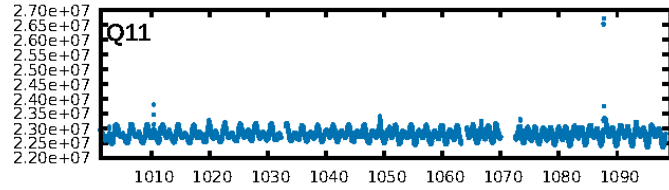
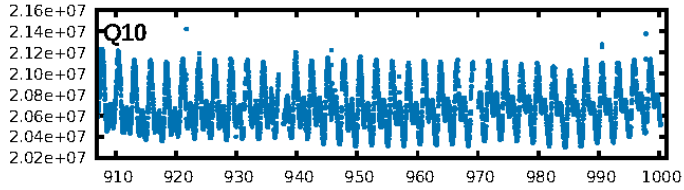
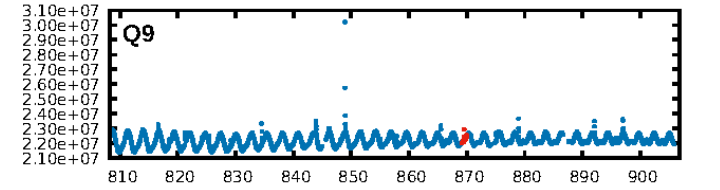
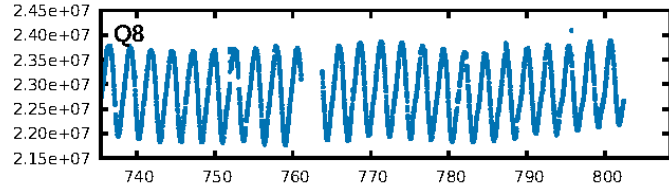
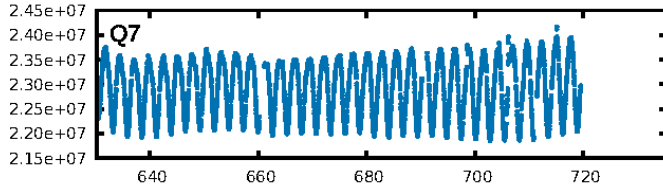
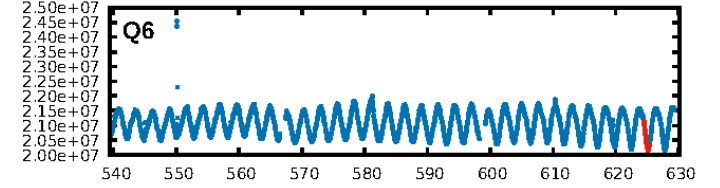
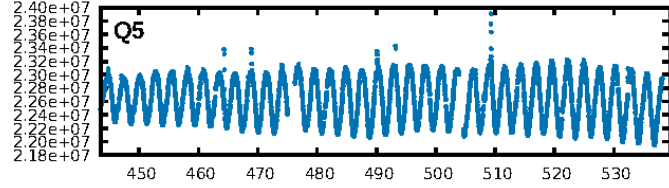
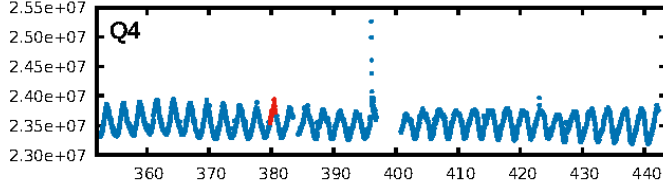
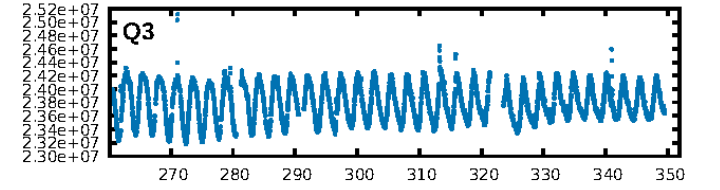
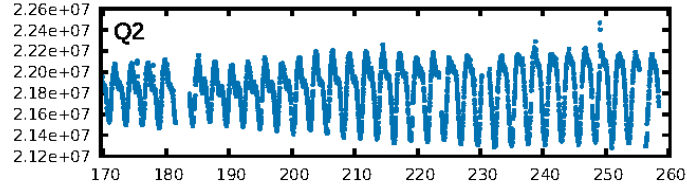
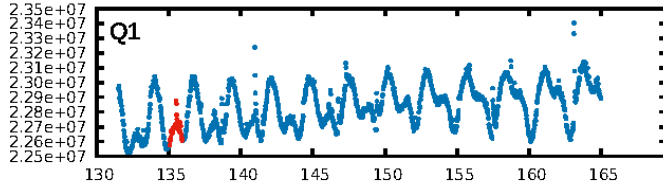
## DV Diagnostic Results:

ShortPeriod-sig: 0.7% [0.01 $\sigma$ ]  
LongPeriod-sig: 100.0% [315.51 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 0.03607  
Centroid-sig: N/A  
Centroid-so: 1.065 arcsec [1.78 $\sigma$ ]  
OotOffset-rm: 0.745 arcsec [5.05 $\sigma$ ]  
KicOffset-rm: 0.759 arcsec [3.47 $\sigma$ ]  
OotOffset-st: 2/0/2/2 [6]  
KicOffset-st: 2/0/2/2 [6]  
DiffImageQuality-fgm: 0.50 [3/6]  
DiffImageOverlap-fno: 1.00 [6/6]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 23:29:28 Z

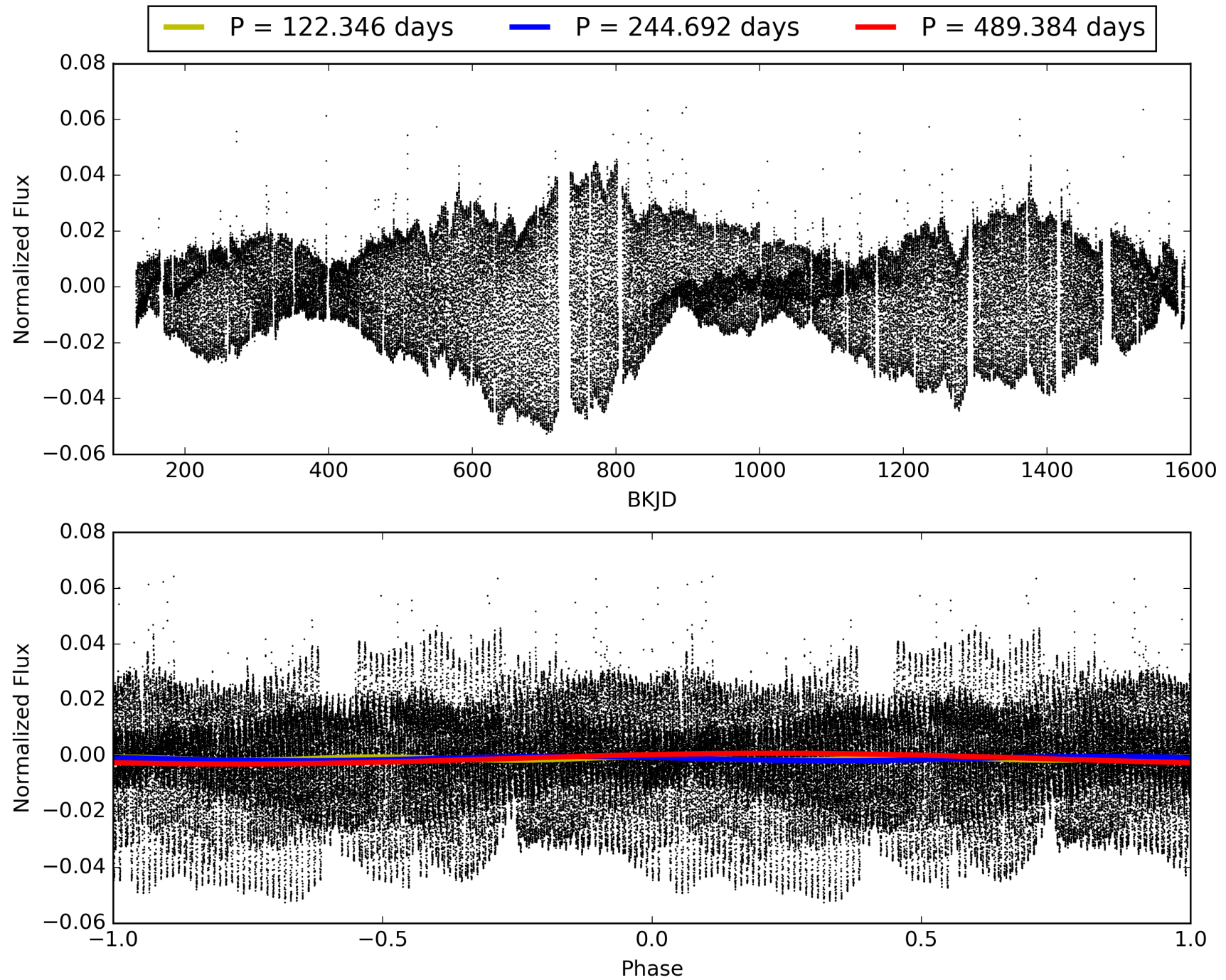
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 008776565-06, PDC Light Curves





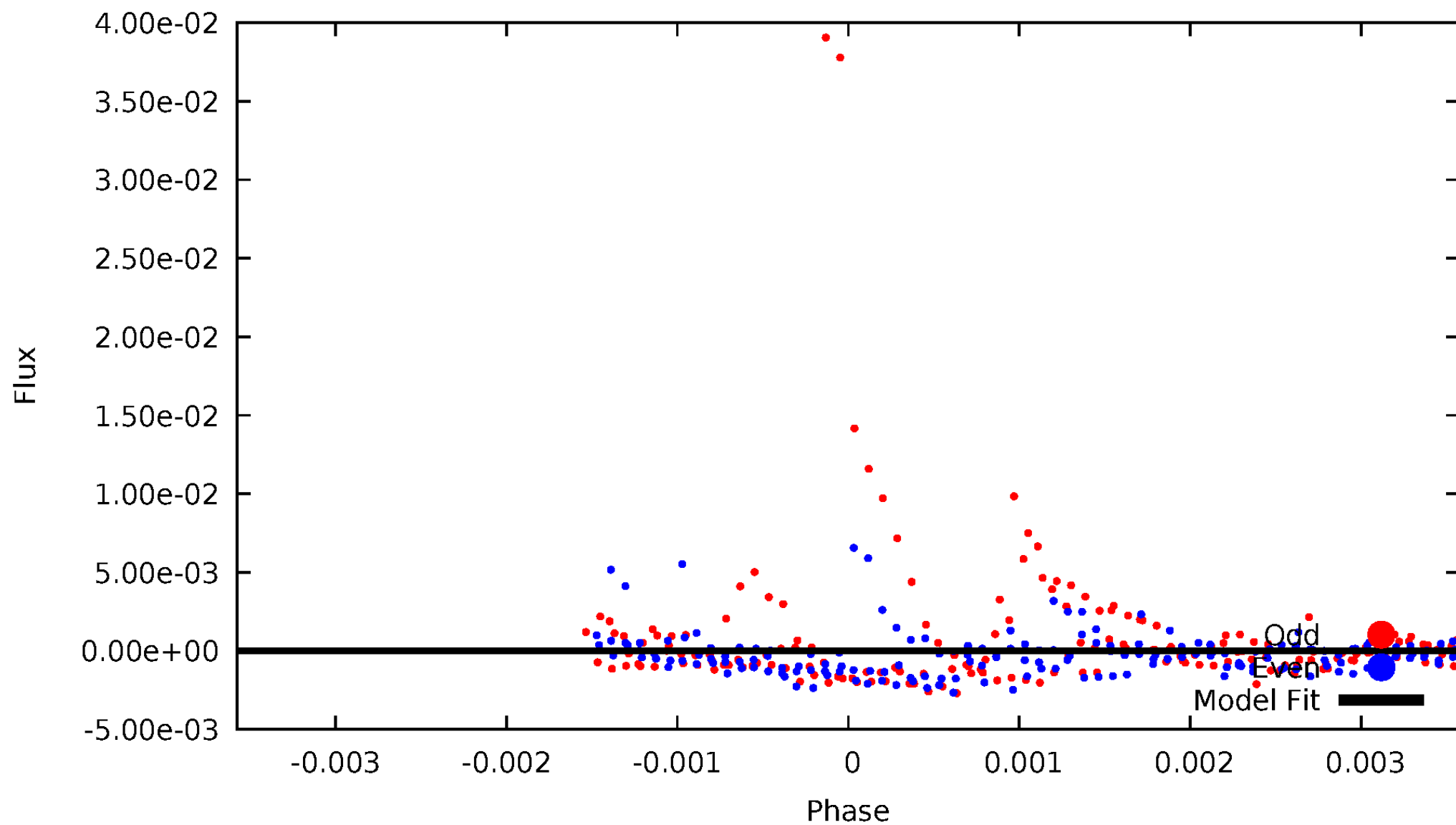
TCE 008776565-06





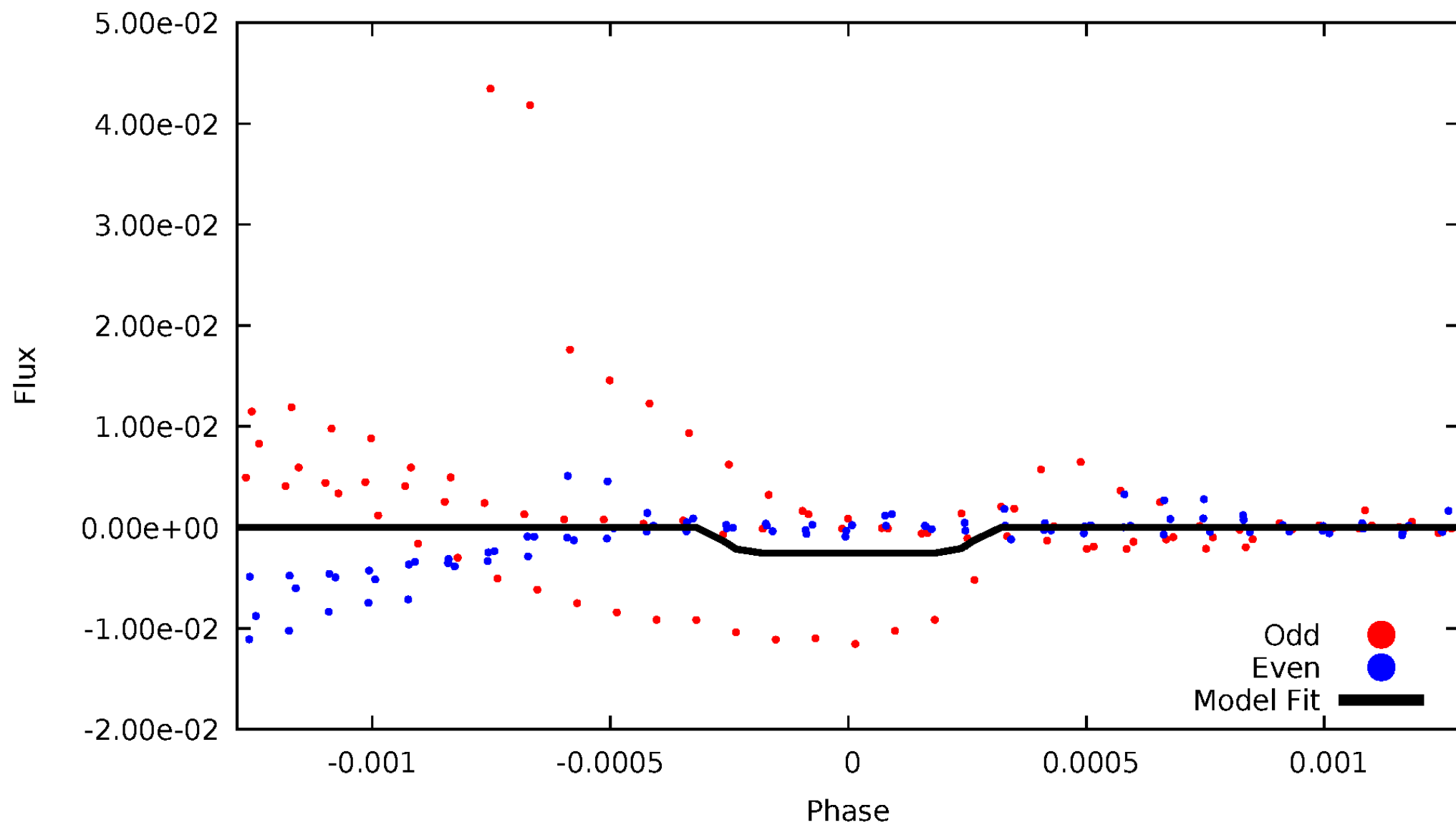
# DV Odd/Even

TCE 008776565-06



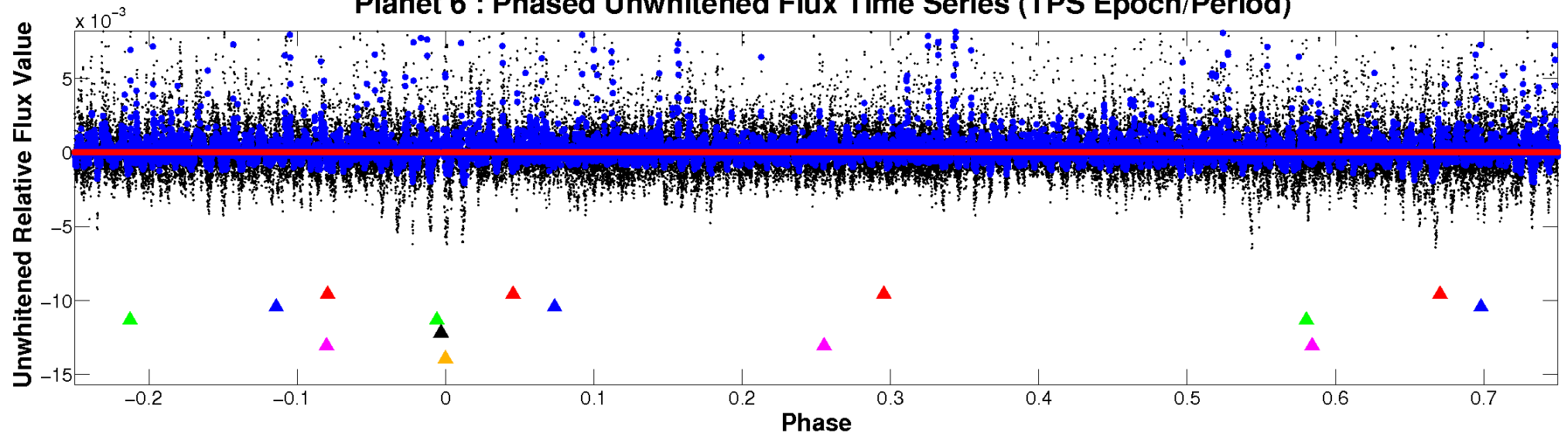
# ALT Odd/Even

TCE 008776565-06



# Non-Whitened Vs. Whitened Light Curve

**Planet 6 : Phased Unwhitened Flux Time Series (TPS Epoch/Period)**

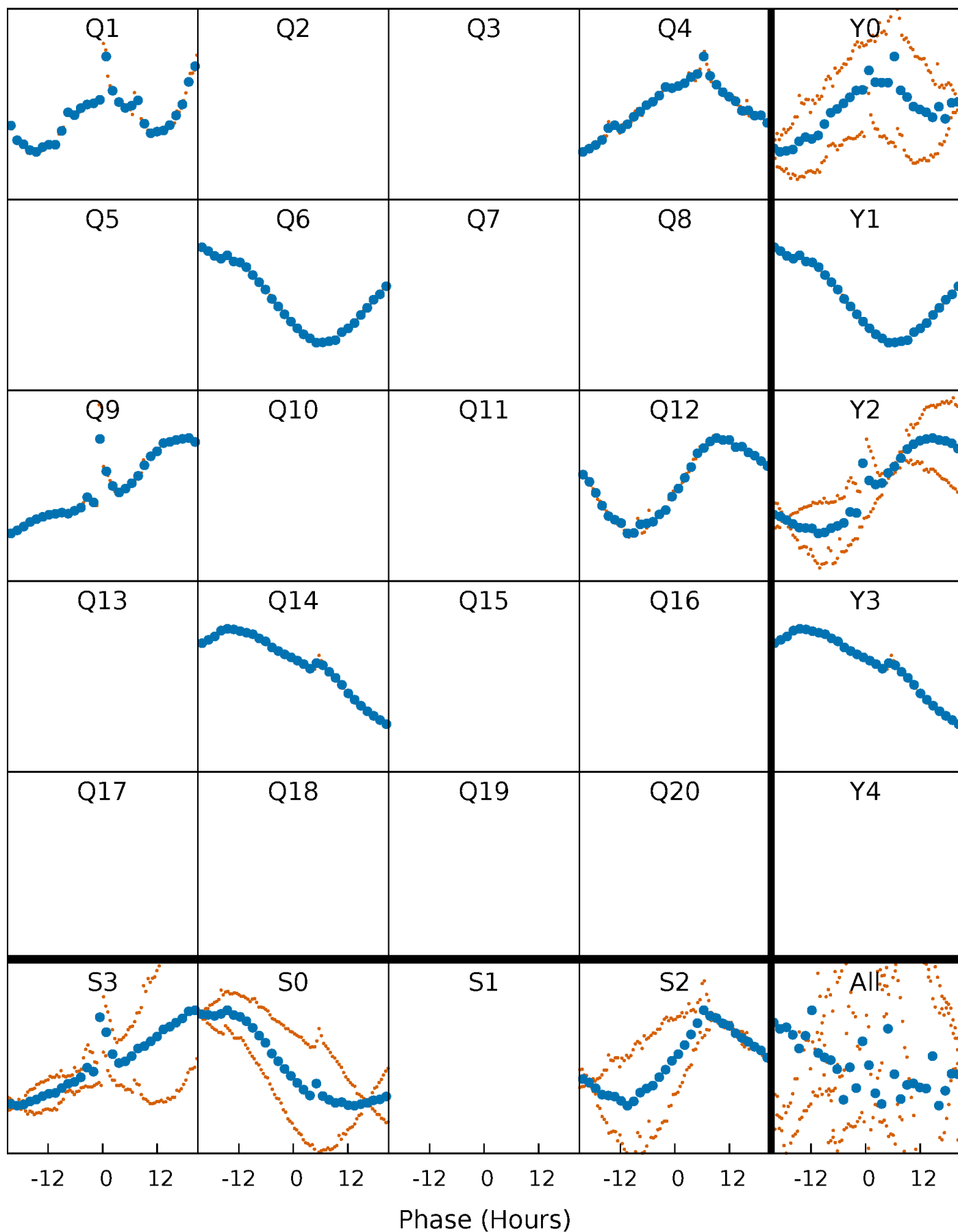


**Planet 6 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



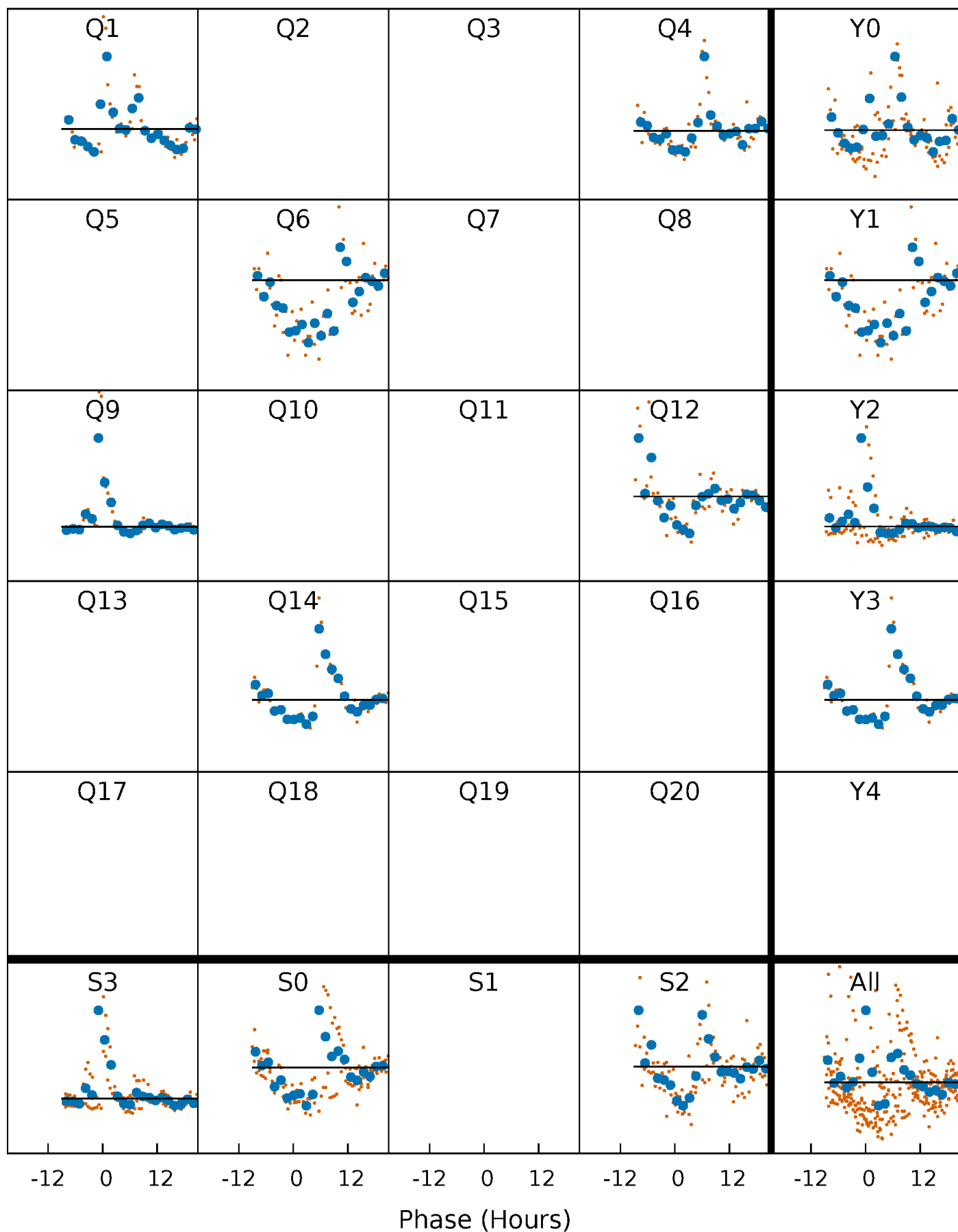
# PDC Quarter-Phased Transit Curves

TCE 008776565-06 P=244.691881 Days  $T_0=135.488727$  (BKJD)



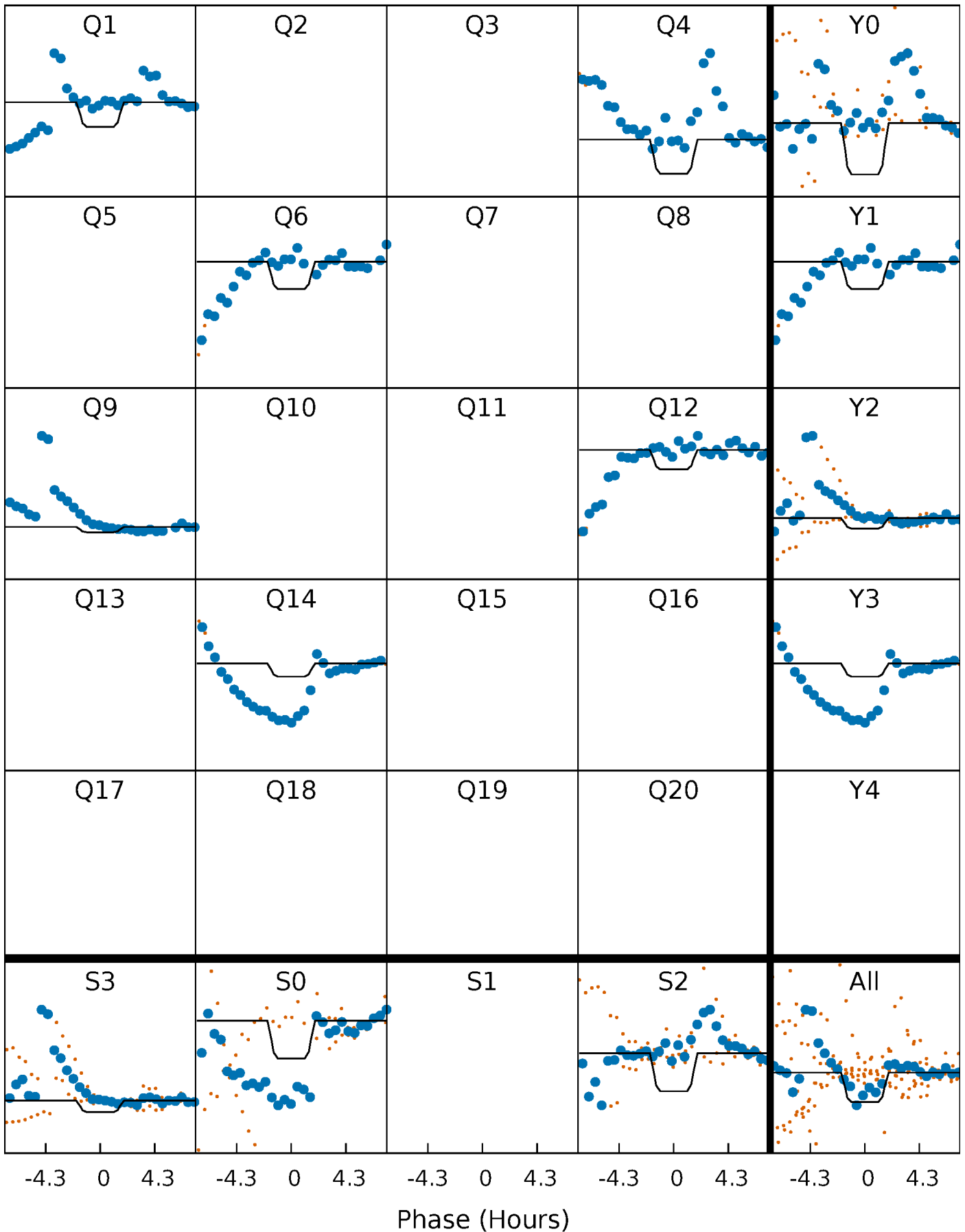
# DV Quarter-Phased Transit Curves

TCE 008776565-06   P=244.691881 Days    $T_0=135.488727$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

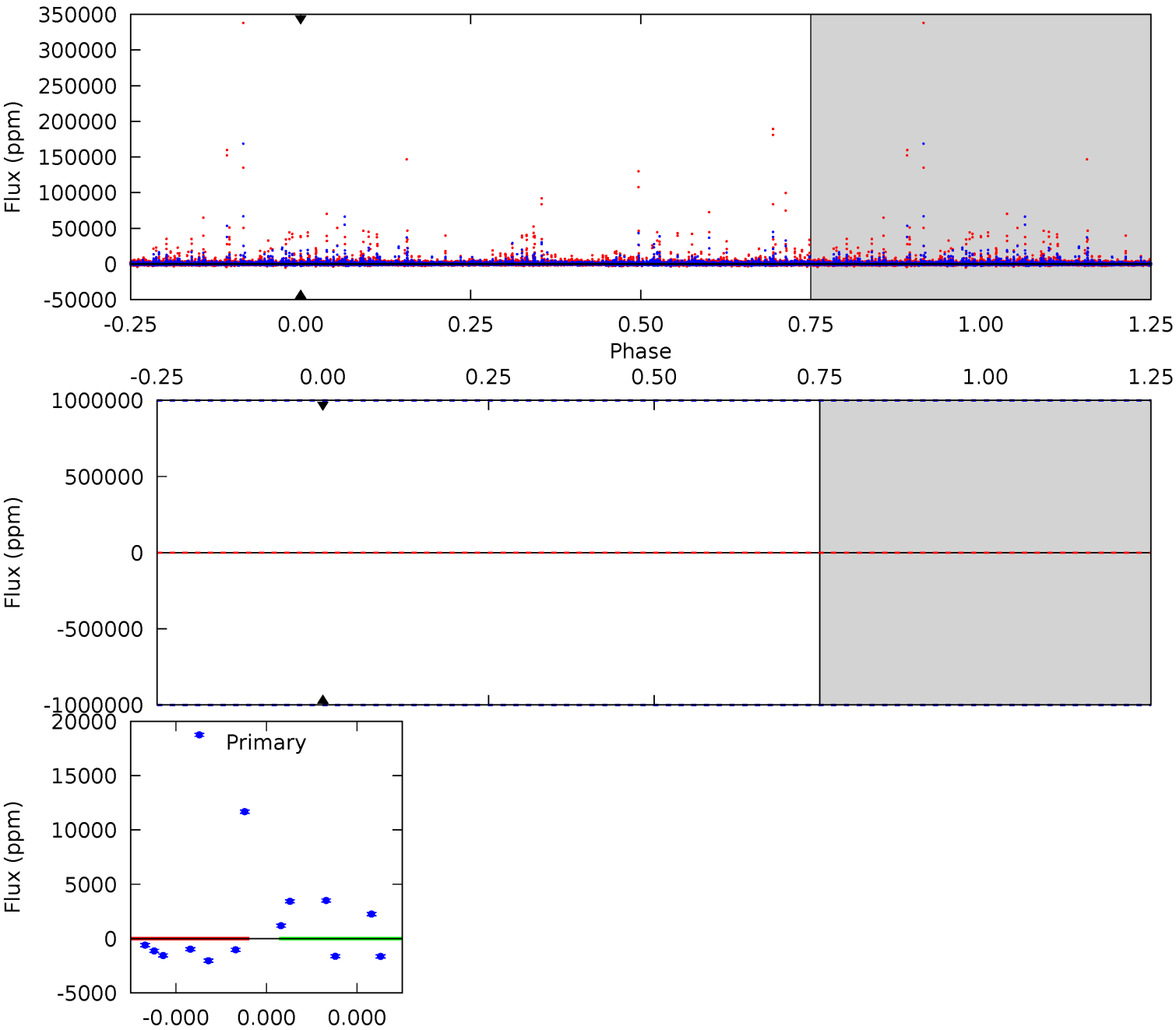
TCE 008776565-06 P=244.691881 Days  $T_0=135.640651$  (BKJD)



# DV Model-Shift Uniqueness Test

008776565-06, P = 244.691881 Days, E = 135.488727 Days

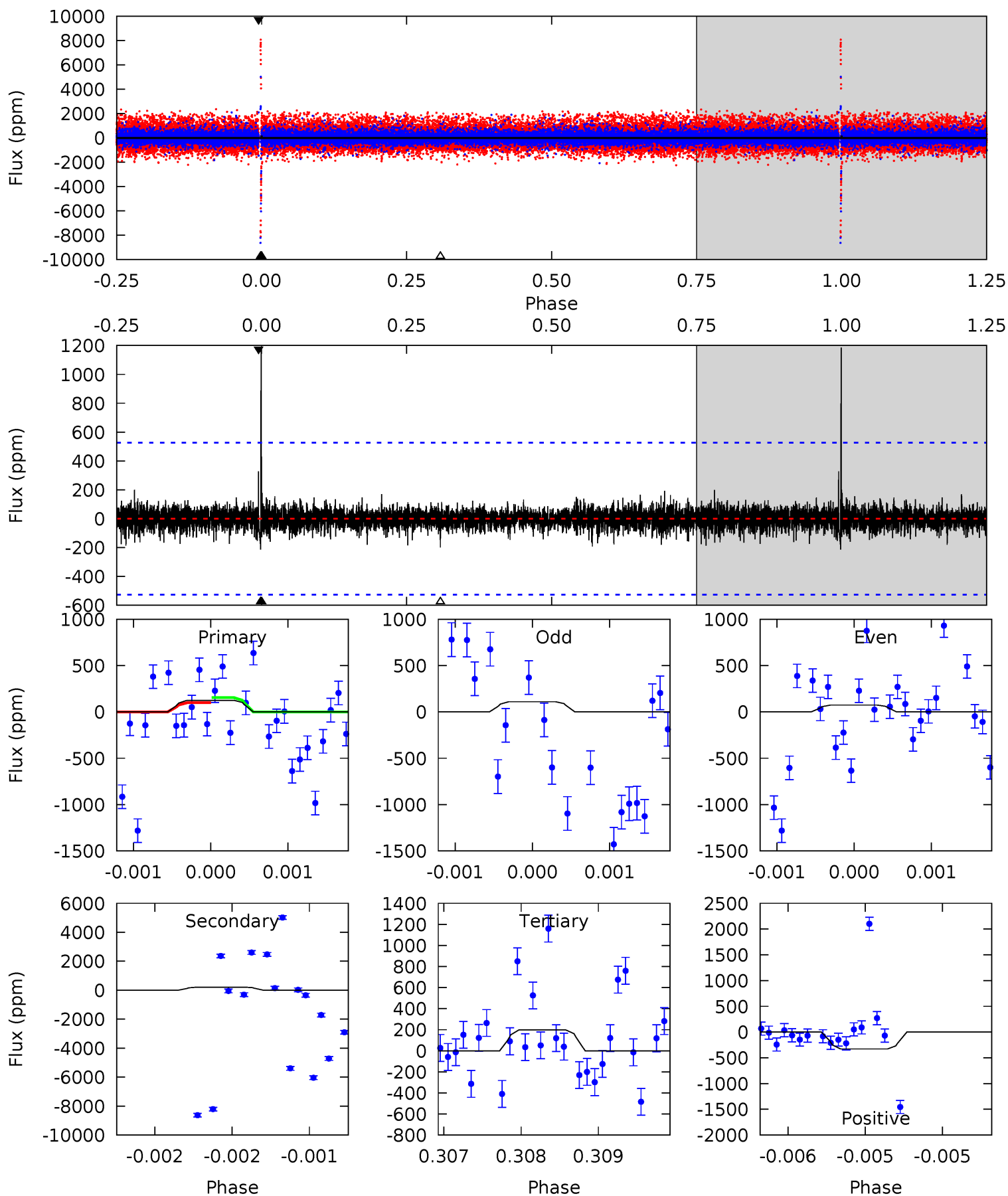
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

008776565-06, P = 244.691881 Days, E = 135.640651 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1.32	2.25	2.09	3.46	5.55	3.44	0.52	-0.77	-2.14	0.16	-1.20	0.17	-7.94	0.85	0.29





### Stellar Parameters For KIC 008776565

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3502^{+41}_{-41}$	$4.925^{+0.040}_{-0.032}$	$-0.200^{+0.100}_{-0.100}$	$0.334^{+0.030}_{-0.034}$	$0.341^{+0.038}_{-0.041}$	$12.910^{+2.925}_{-1.990}$
	+1%/-1%	+1%/-1%	+50%/-50%	+9%/-10%	+11%/-12%	+23%/-15%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 008776565-06 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$0 \pm 1000000$	$2.82^{+3.02}_{-1.86}$	$170^{+3}_{-4}$	$-2389^{+9677}_{-4649}$	$-6873.694^{+3899274.076}_{-3522718.262}$
Alt.	$-214 \pm 95$	$3.19^{+3.14}_{-2.08}$	$170^{+3}_{-3}$	$2152^{+640}_{-288}$	$2774^{+23080}_{-2071}$

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

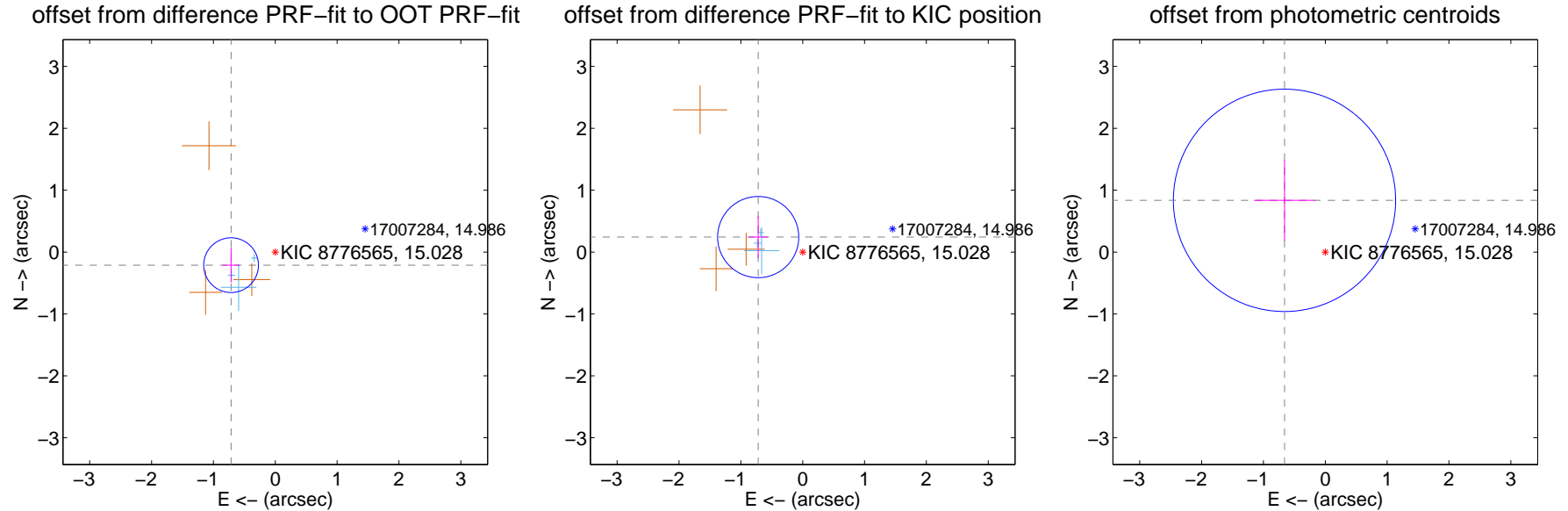
## DV Centroid Data

Supplemental centroid analysis for 008776565-06. Kepler magnitude: 15.03. Transit SNR -1.00

There are 3 quarters with good PRF difference image offsets

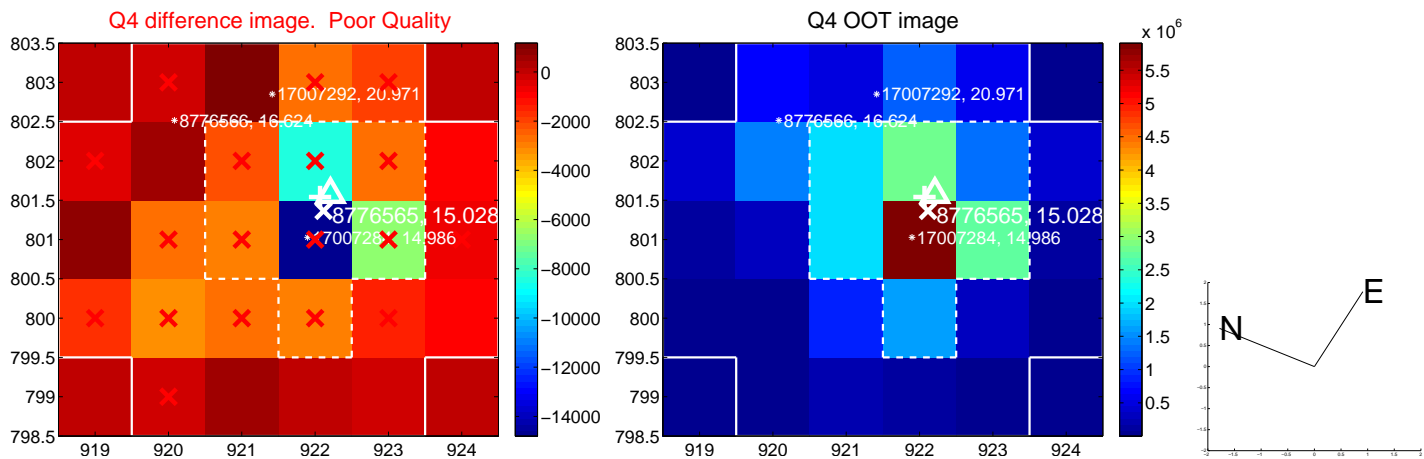
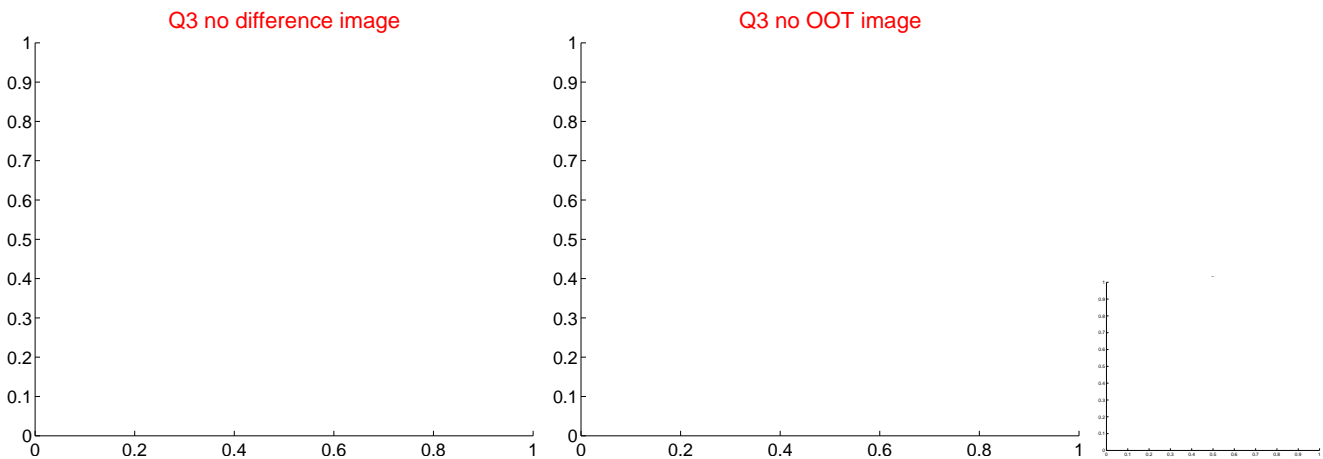
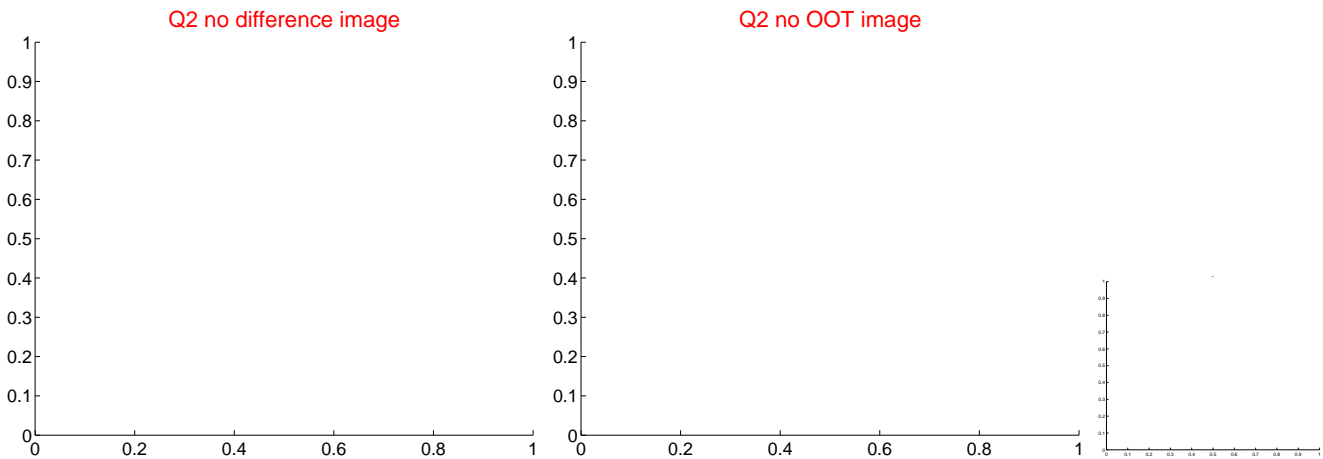
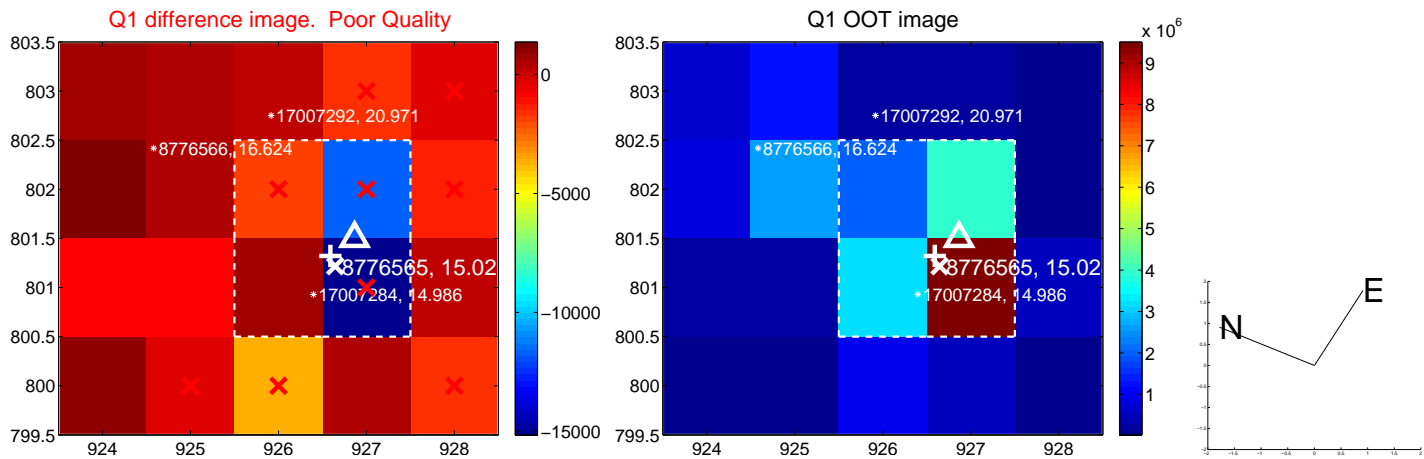
The direct PRF centroid is offset from the target star catalog position by about 0.60 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.745 \pm 0.147$	5.05	$0.714 \pm 0.136$	$-0.211 \pm 0.282$
PRF-fit source offset from KIC position	$0.759 \pm 0.219$	3.47	$0.719 \pm 0.151$	$0.242 \pm 0.336$
photometric centroid source offset	$1.06 \pm 0.60$	1.78	$0.66 \pm 0.49$	$0.84 \pm 0.66$

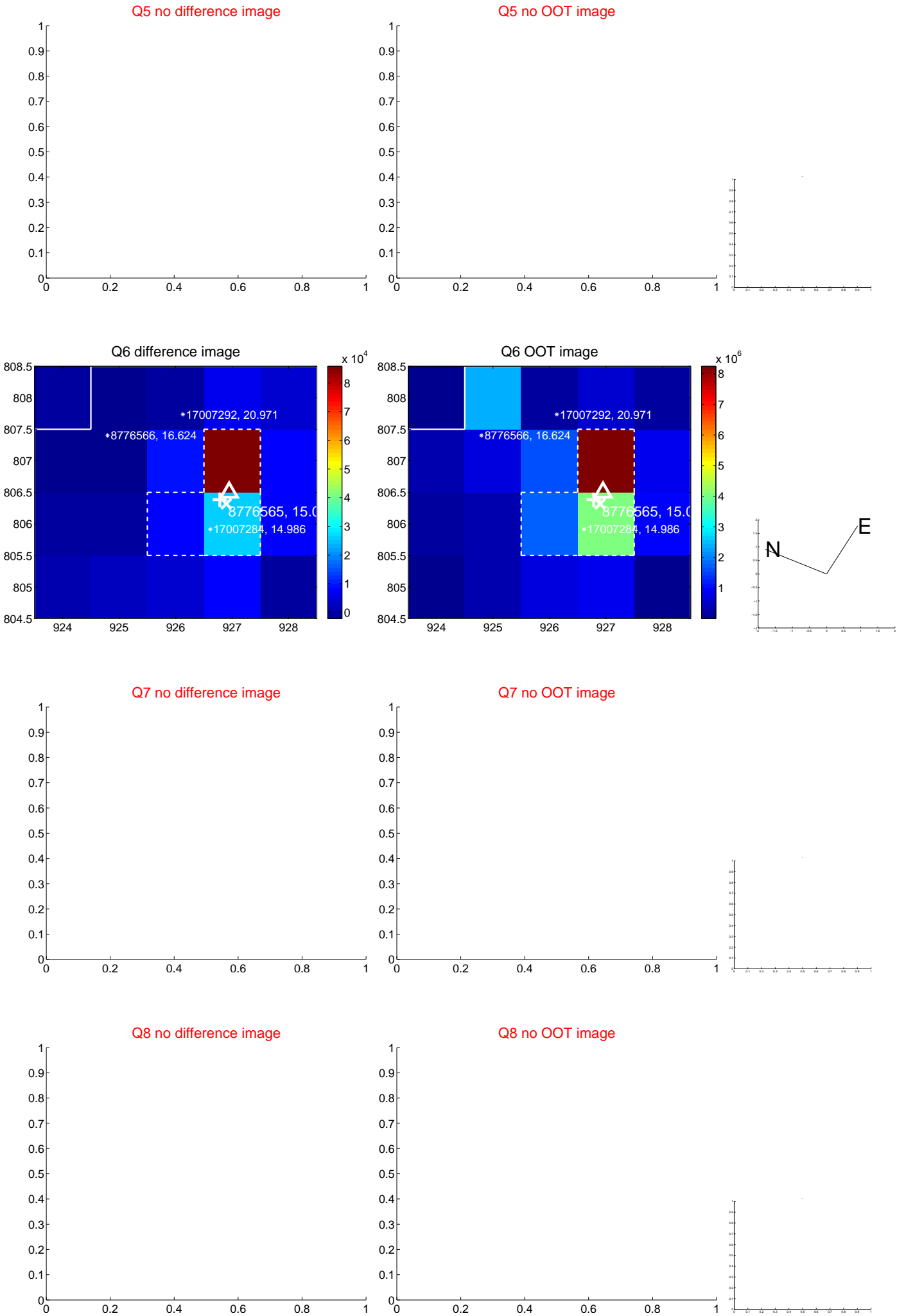


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

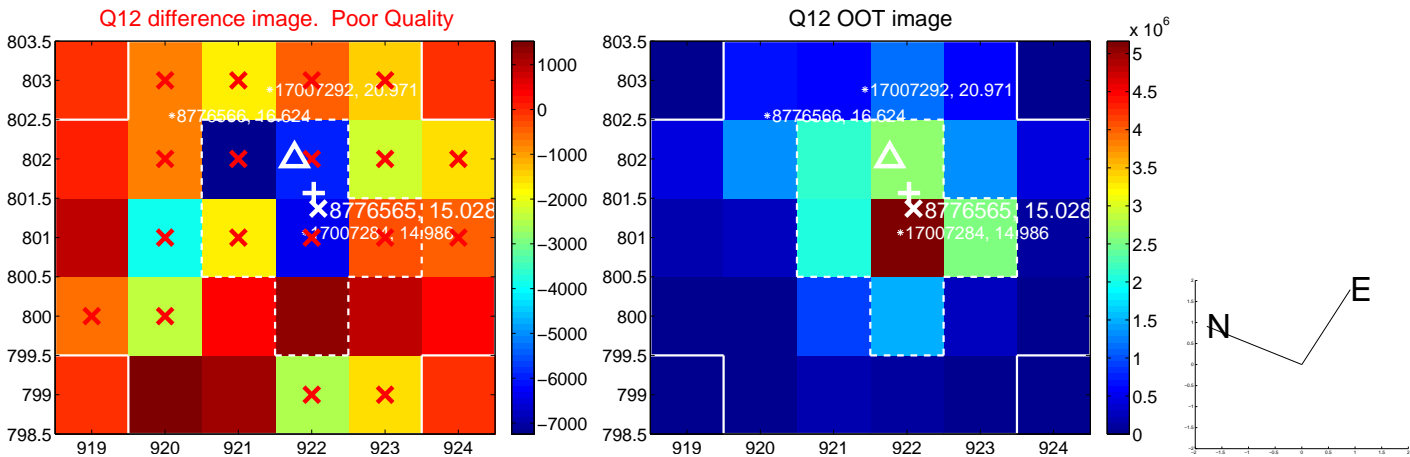
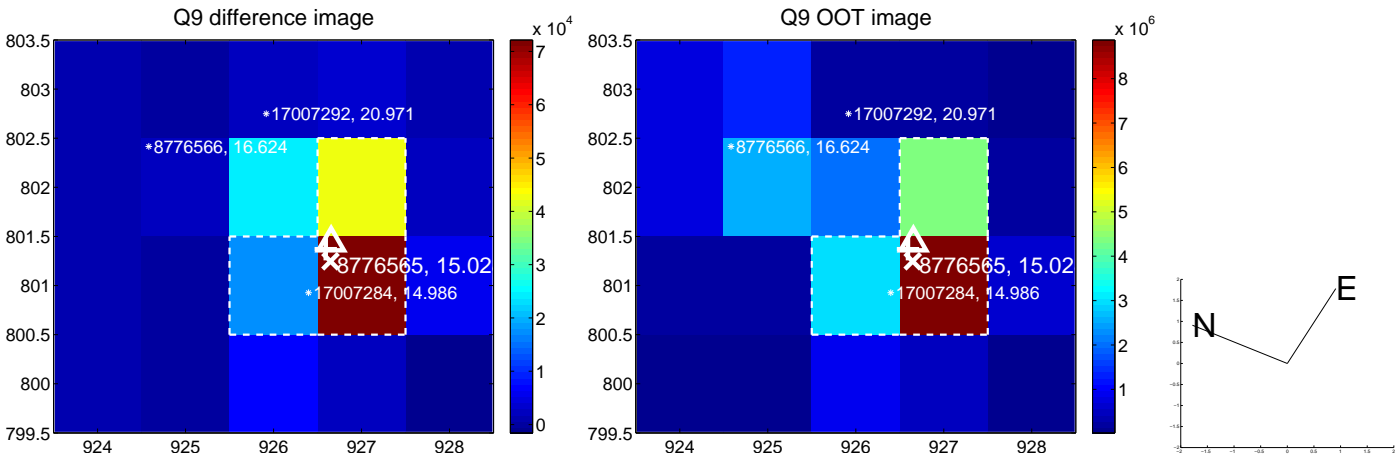
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



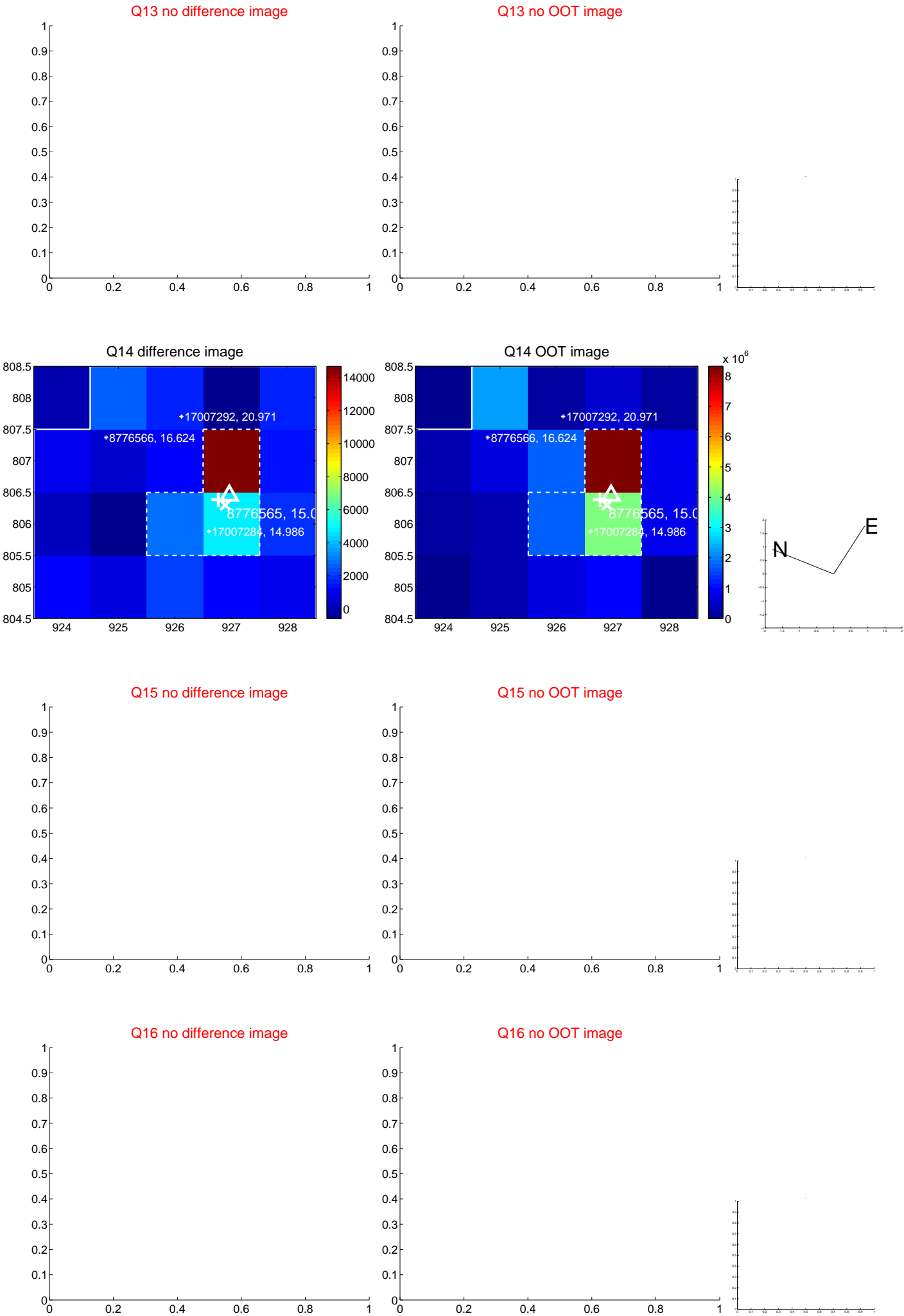
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



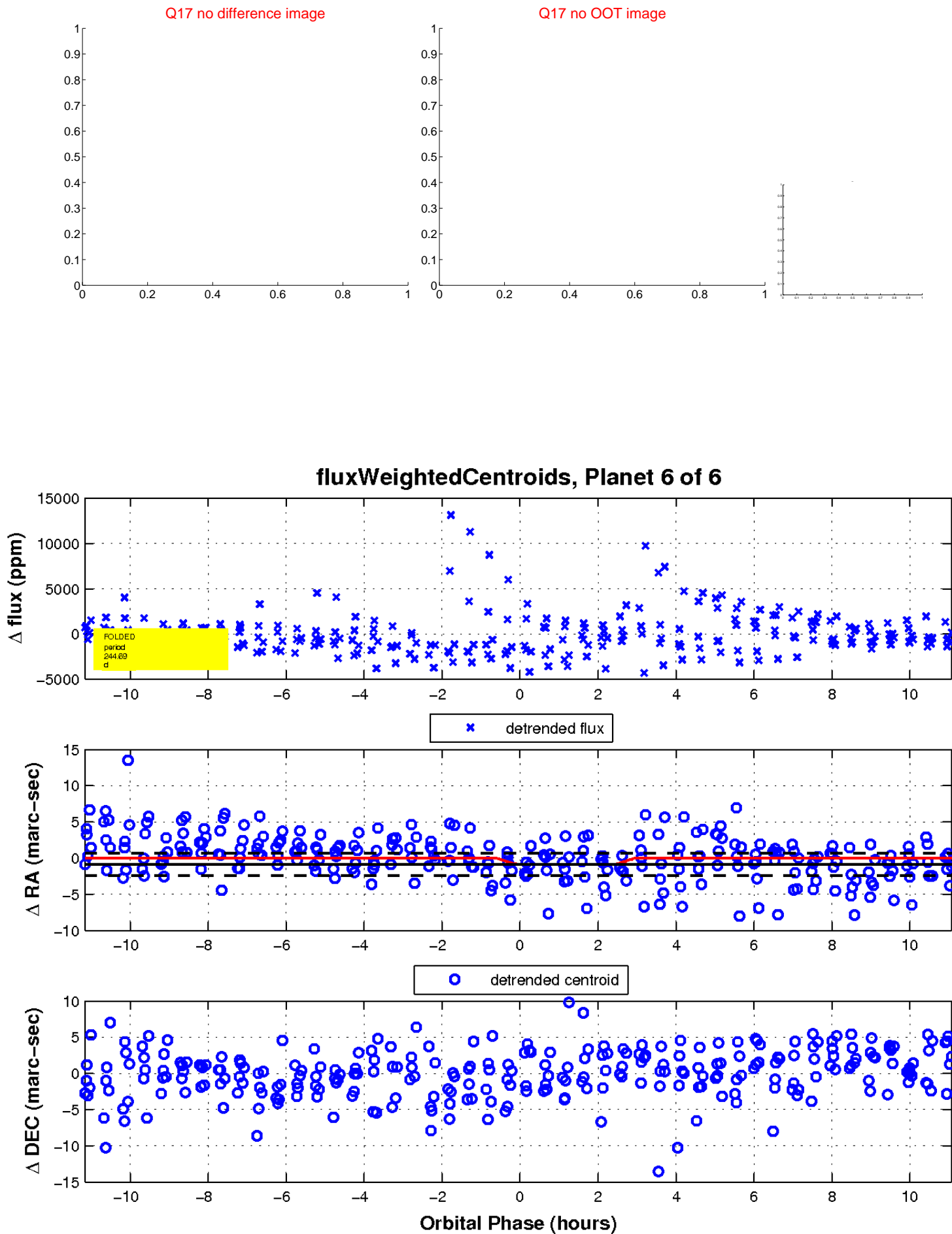
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

