

# KIC 009540467

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009540467-01	OBS	No	525.337604	265.984740	518.3	9.332	17.4	4.7	0.57	3919	1.47	0.06
009540467-02	OBS	No	270.386745	360.361405	854.9	4.035	17.7	7.2	0.57	3919	1.75	0.15
009540467-03	OBS	No	360.937549	197.248197	1097.8	2.782	13.7	10.6	0.57	3919	2.07	0.10
009540467-05	OBS	No	418.686753	432.378155	794.3	6.491	15.0	6.7	0.57	3919	1.61	0.08
009540467-06	OBS	No	320.975460	210.598826	530.3	9.030	13.8	6.2	0.57	3919	1.32	0.12
009540467-08	OBS	No	679.085465	141.867271	741.8	3.869	15.2	7.9	0.57	3919	1.55	0.04
009540467-10	OBS	No	274.537158	346.932388	550.2	2.569	13.8	5.5	0.57	3919	1.50	0.15

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009540467-01	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—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009540467-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS
009540467-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS
009540467-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS
009540467-06	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
009540467-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009540467-10	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS—HALO_GHOST

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

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

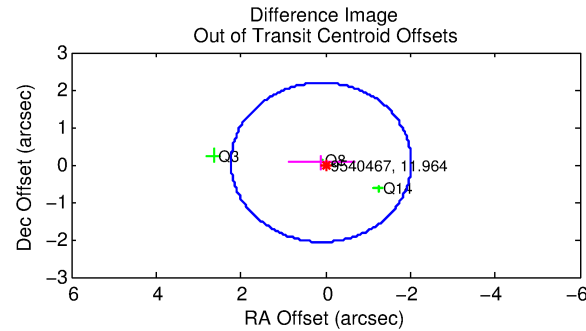
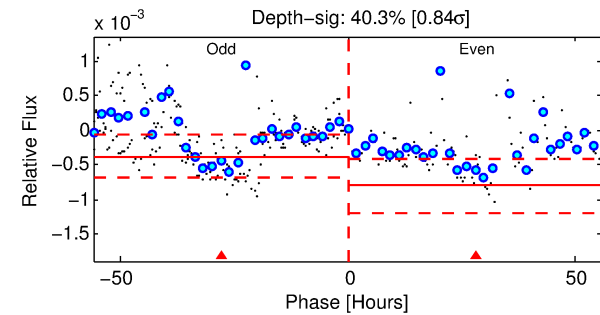
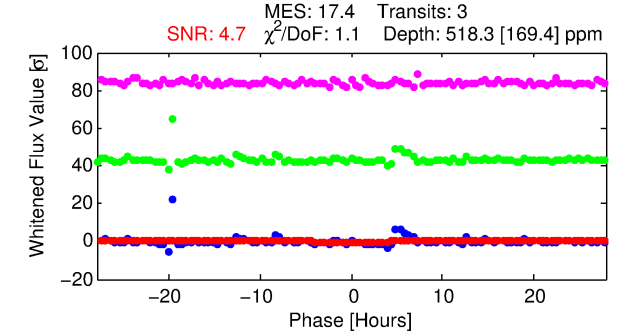
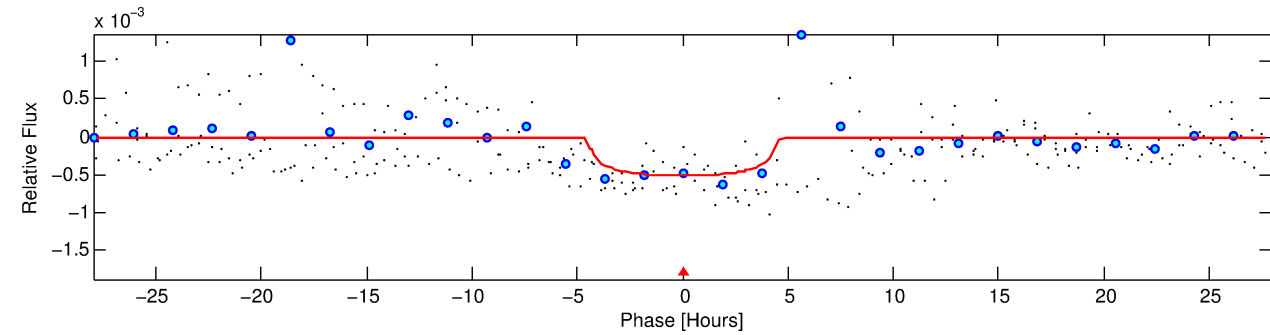
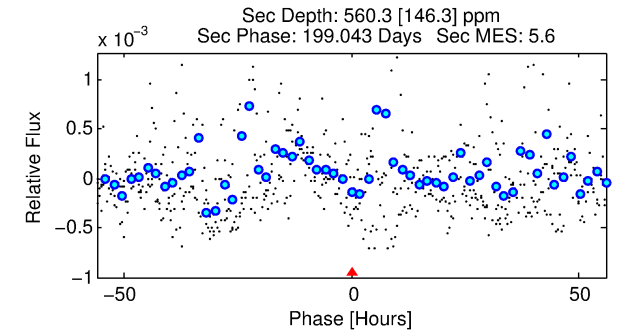
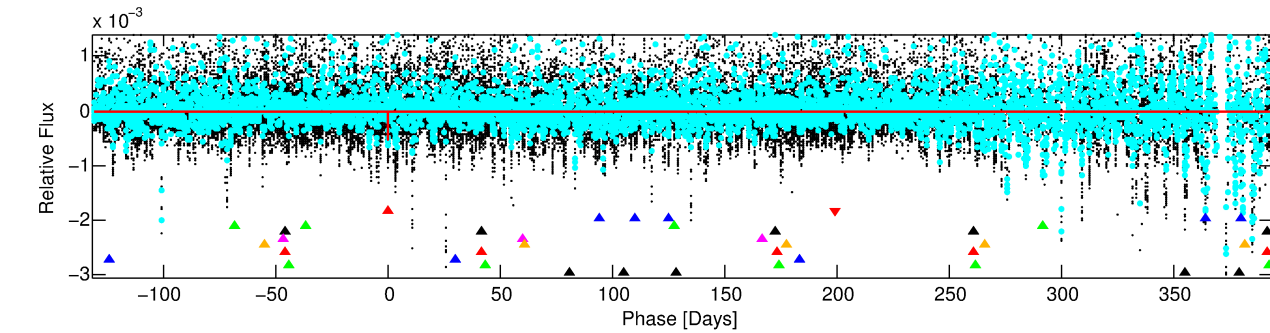
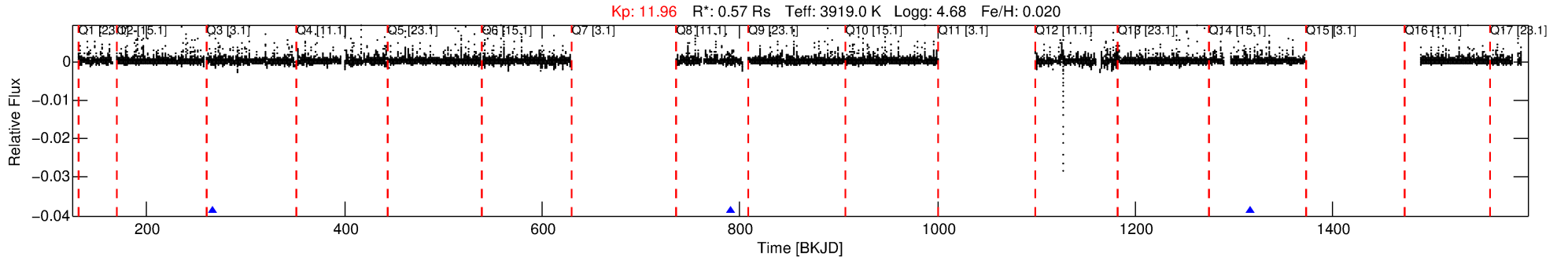
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009540467-01

No Significant Match Found

# DV One-Page Summary

KIC: 9540467 Candidate: 1 of 10 Period: 525.338 d



## DV Fit Results:

Period = 525.33760 [0.01227] d  
Epoch = 265.9847 [0.0174] BKJD  
Rp/R\* = 0.0235 [0.0077]  
a/R\* = 264.84 [275.95]  
b = 0.82 [0.43]  
Seff = 0.06 [0.01]  
Teq = 127 [7] K  
Rp = 1.46 [0.52] Re  
a = 1.0566 [0.1126] AU  
Ag = 160411.30 [115992.92] [1.38σ]  
Teffp = 3936 [713] K [5.34σ]

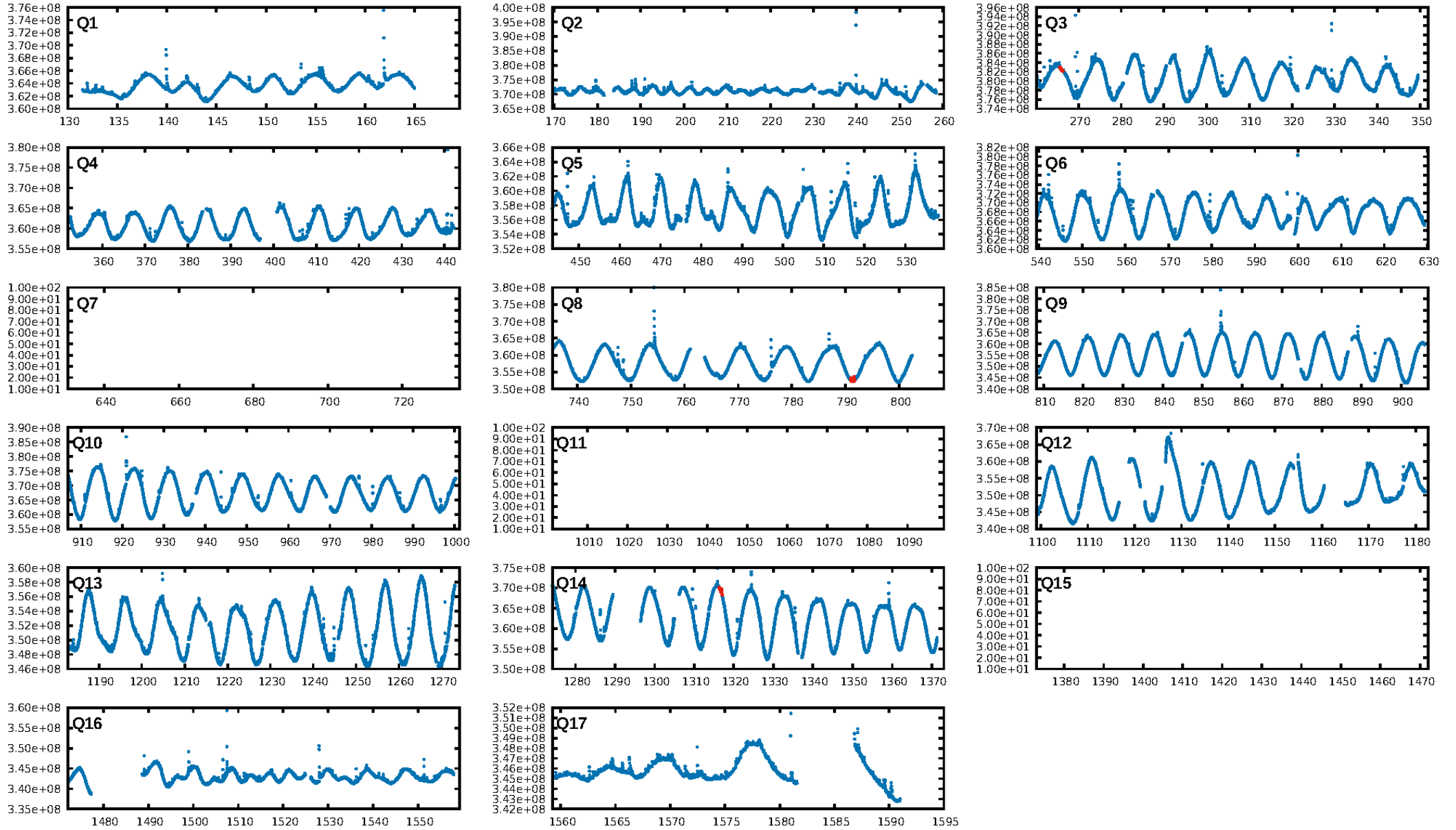
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [225.18σ]  
LongPeriod-sig: 100.0% [365.27σ]  
ModelChiSquare2-sig: 9.6%  
ModelChiSquareGof-sig: 92.7%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 0.3791  
Centroid-sig: 61.1%  
Centroid-so: 0.688 arcsec [1.61σ]  
OotOffset-rm: 0.119 arcsec [0.17σ]  
OotOffset-st: 1/1/1/0 [3]  
KicOffset-rm: 0.641 arcsec [0.73σ]  
KicOffset-st: 1/1/1/0 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

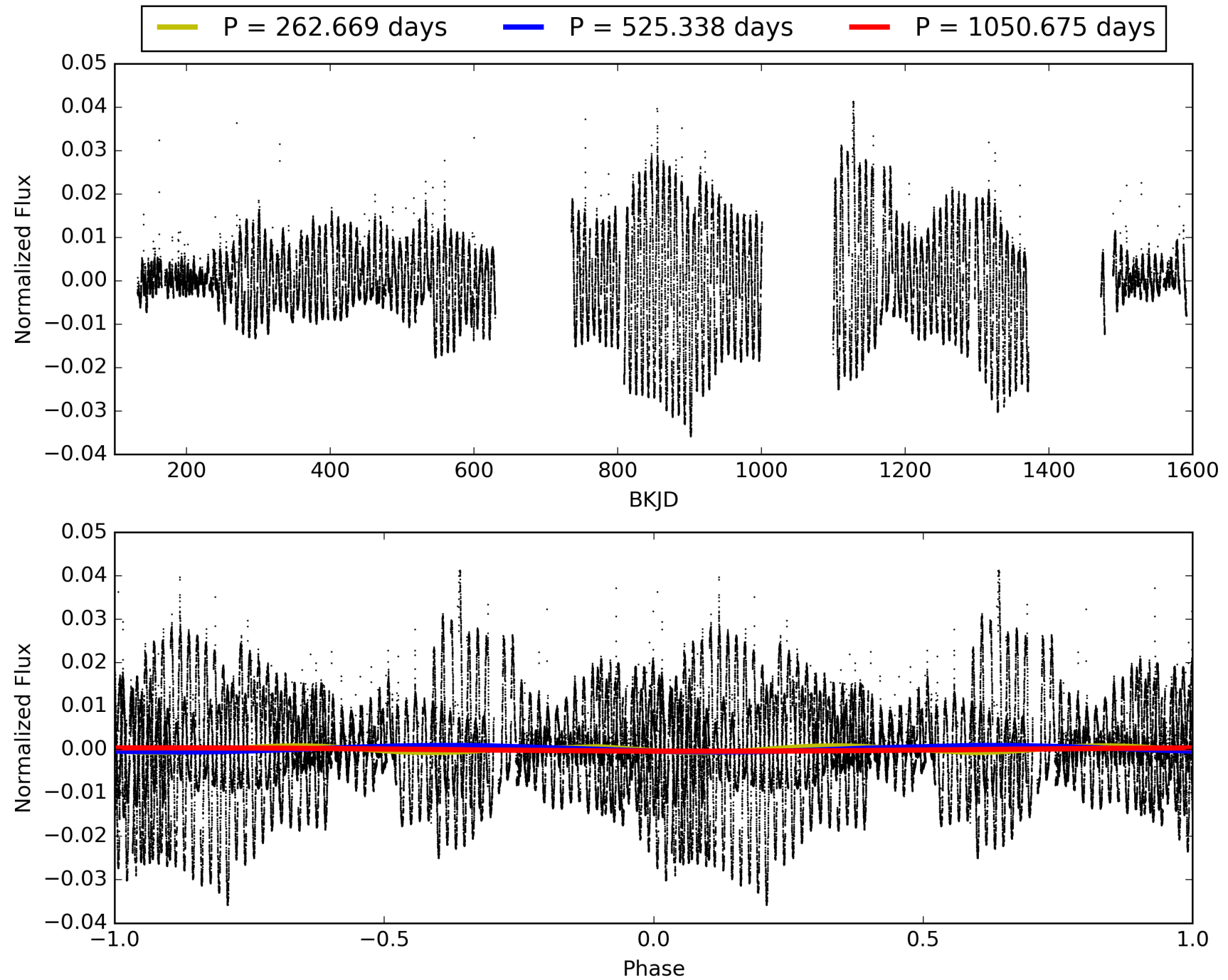
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 16:19:26 Z

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

# TCE 009540467-01, PDC Light Curves

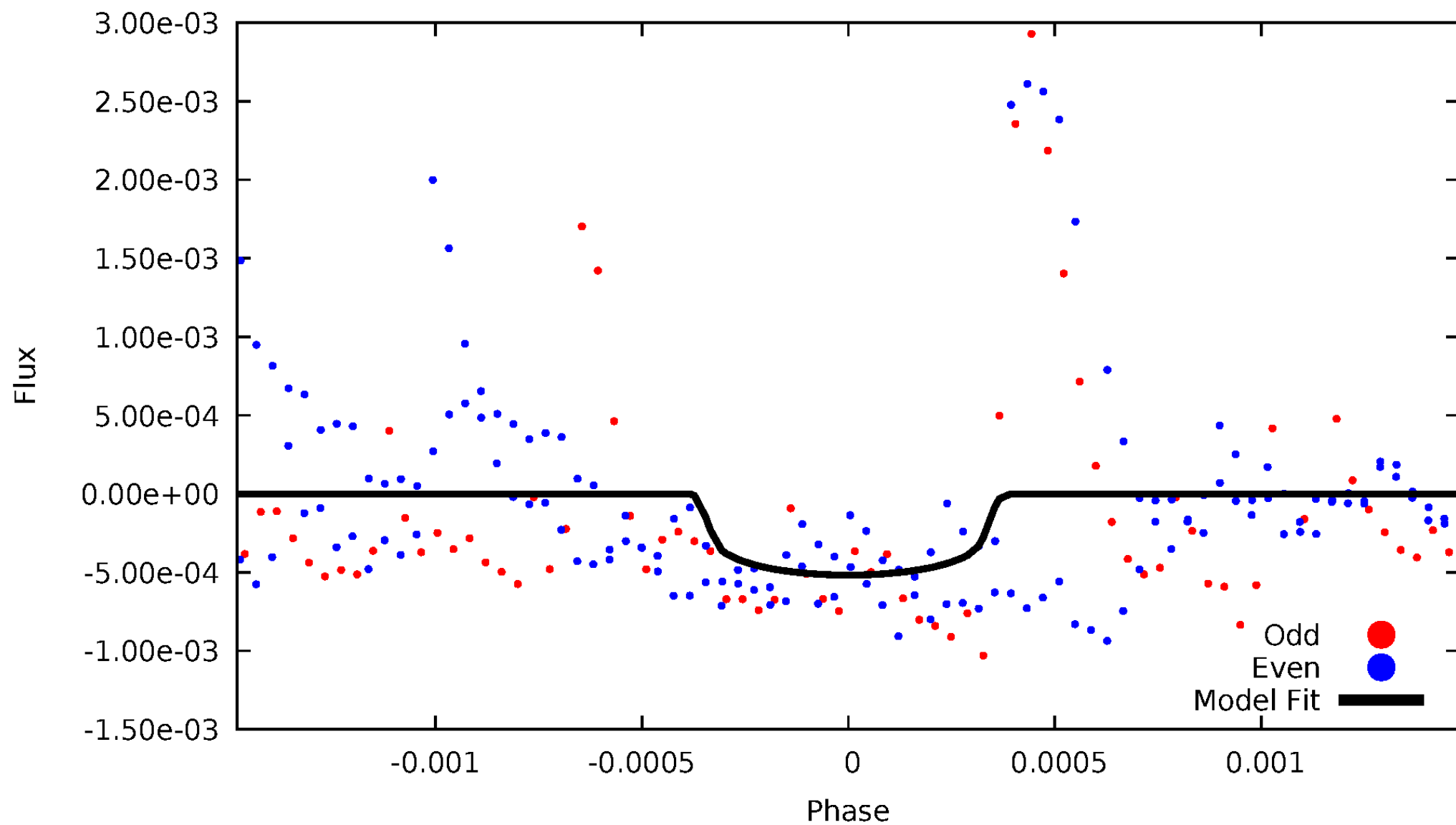


TCE 009540467-01



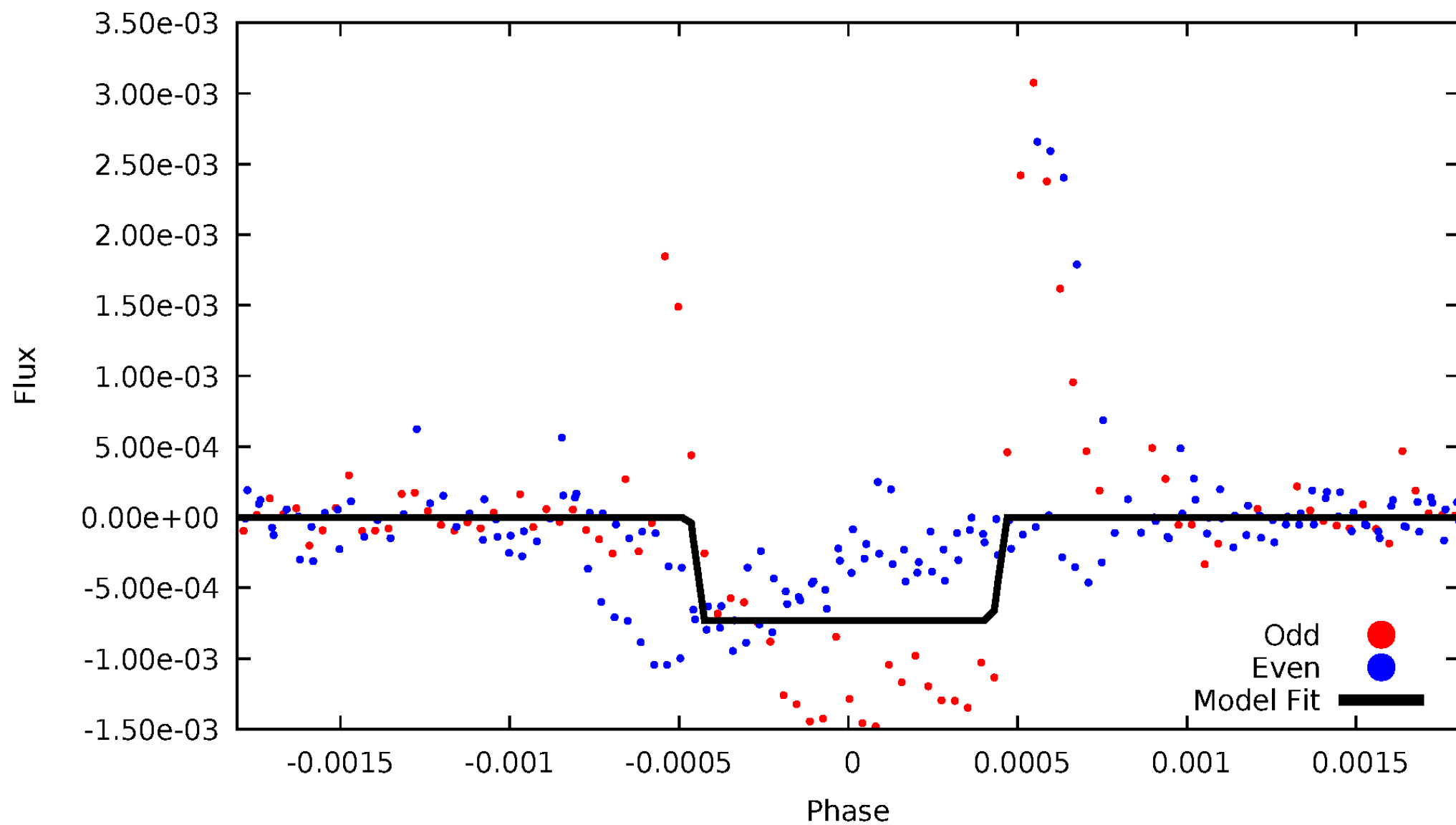
# DV Odd/Even

TCE 009540467-01



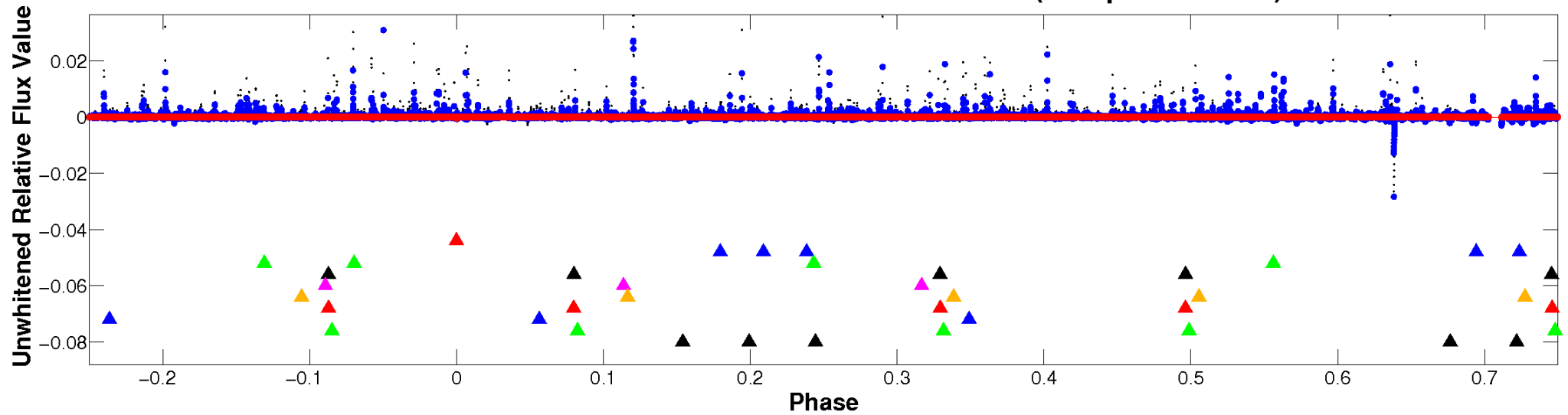
# ALT Odd/Even

TCE 009540467-01

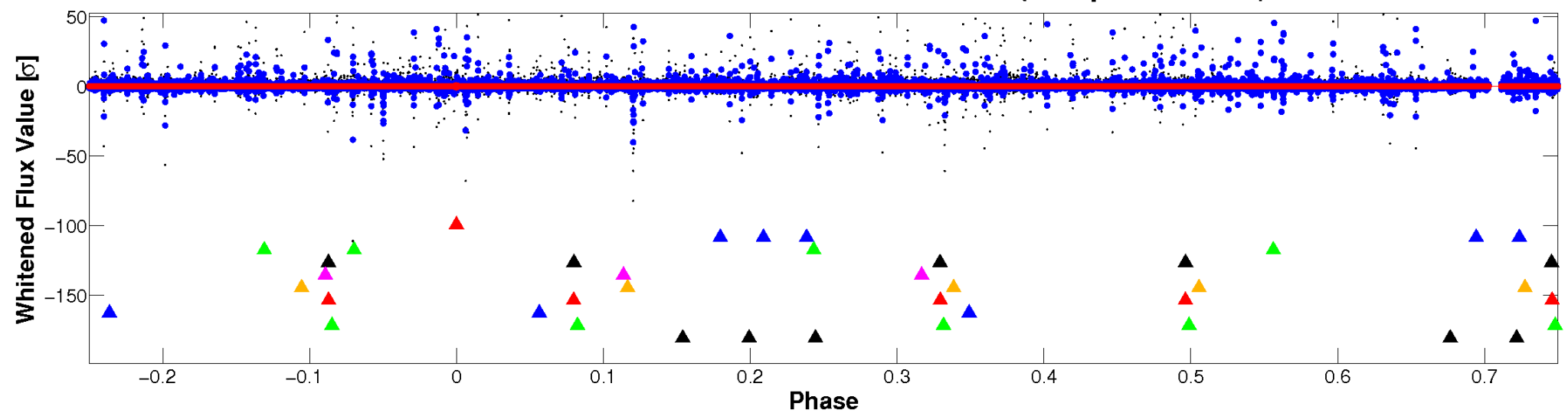


# Non-Whitened Vs. Whitened Light Curve

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

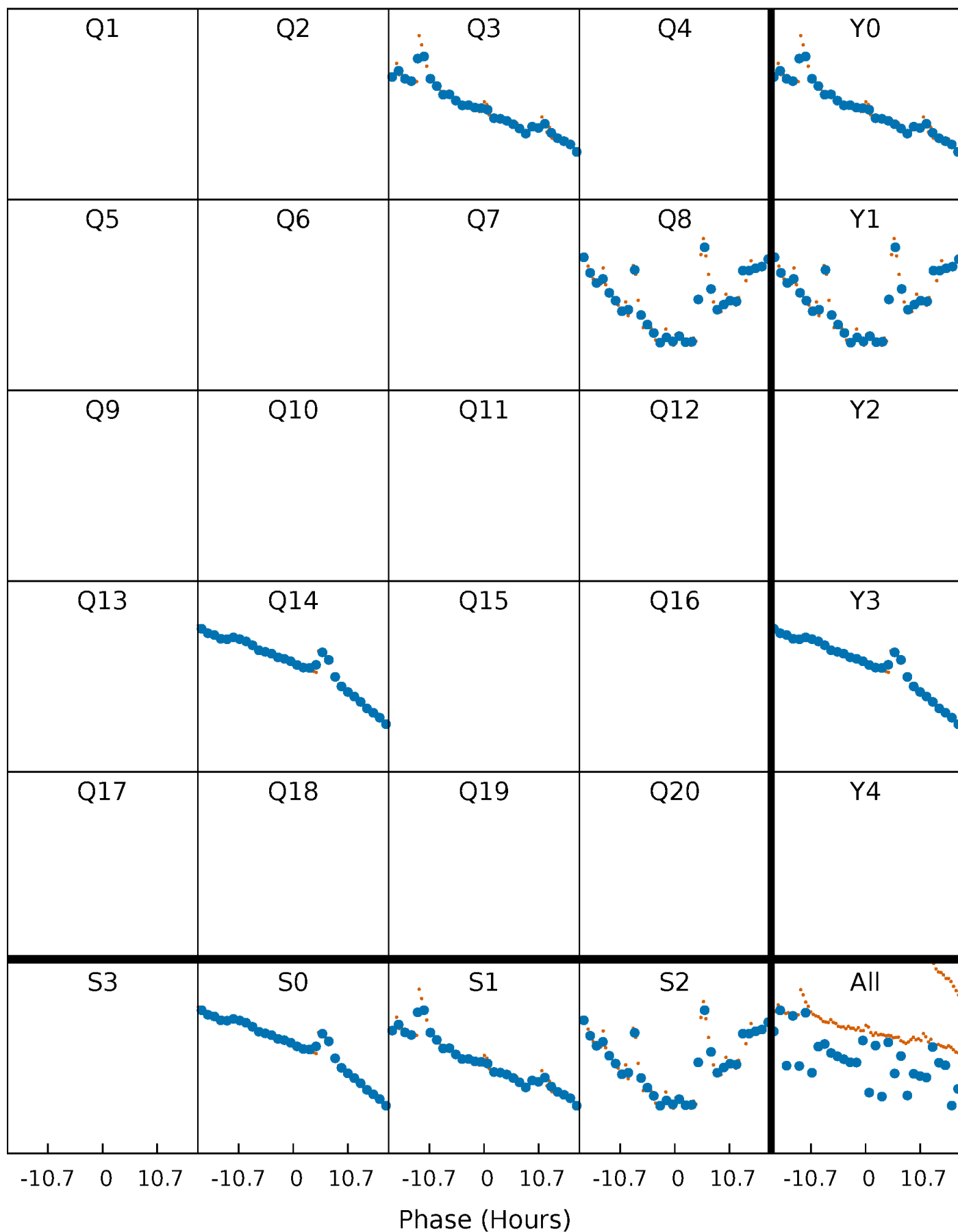


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



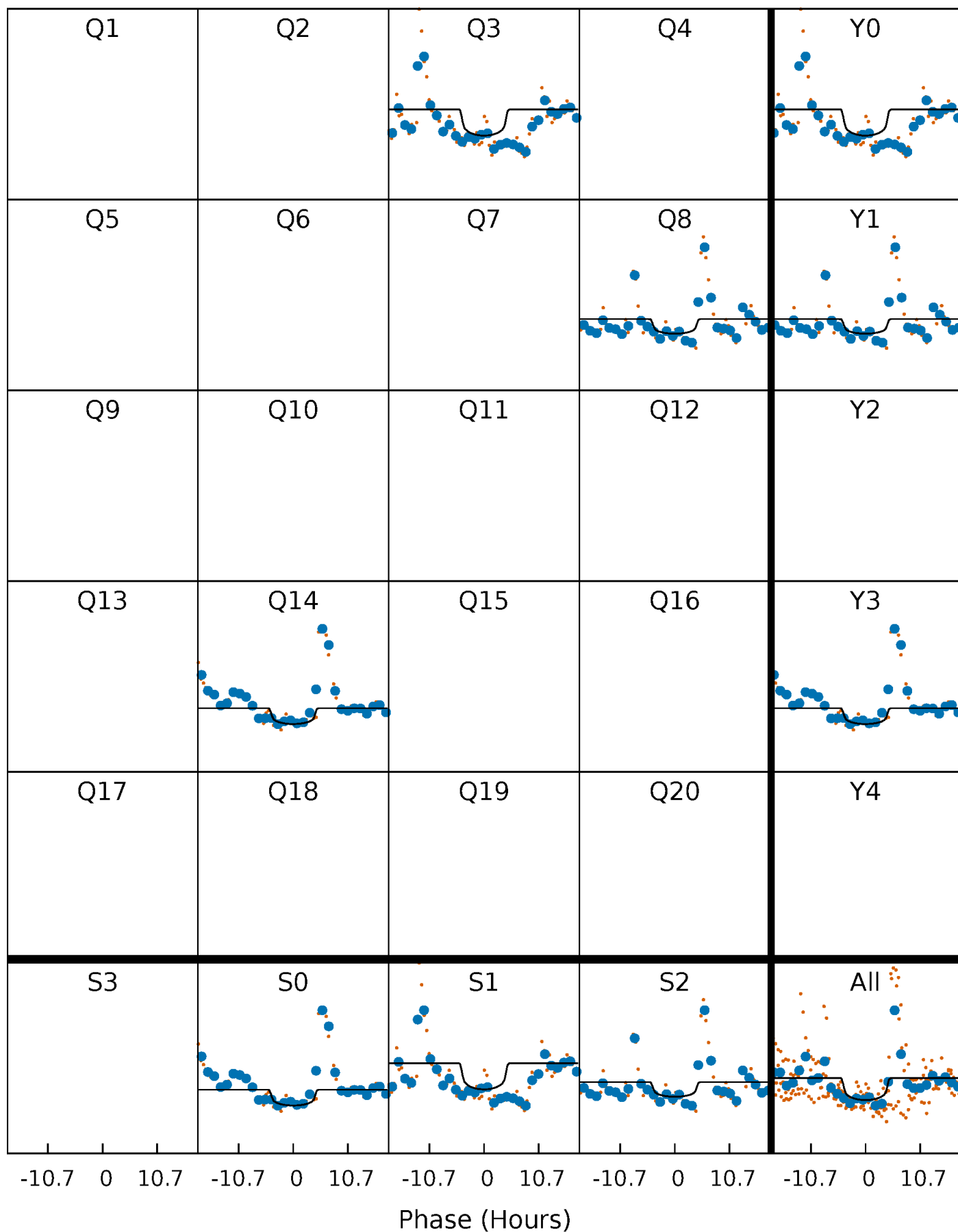
# PDC Quarter-Phased Transit Curves

TCE 009540467-01 P=525.337604 Days  $T_0=265.984740$  (BKJD)



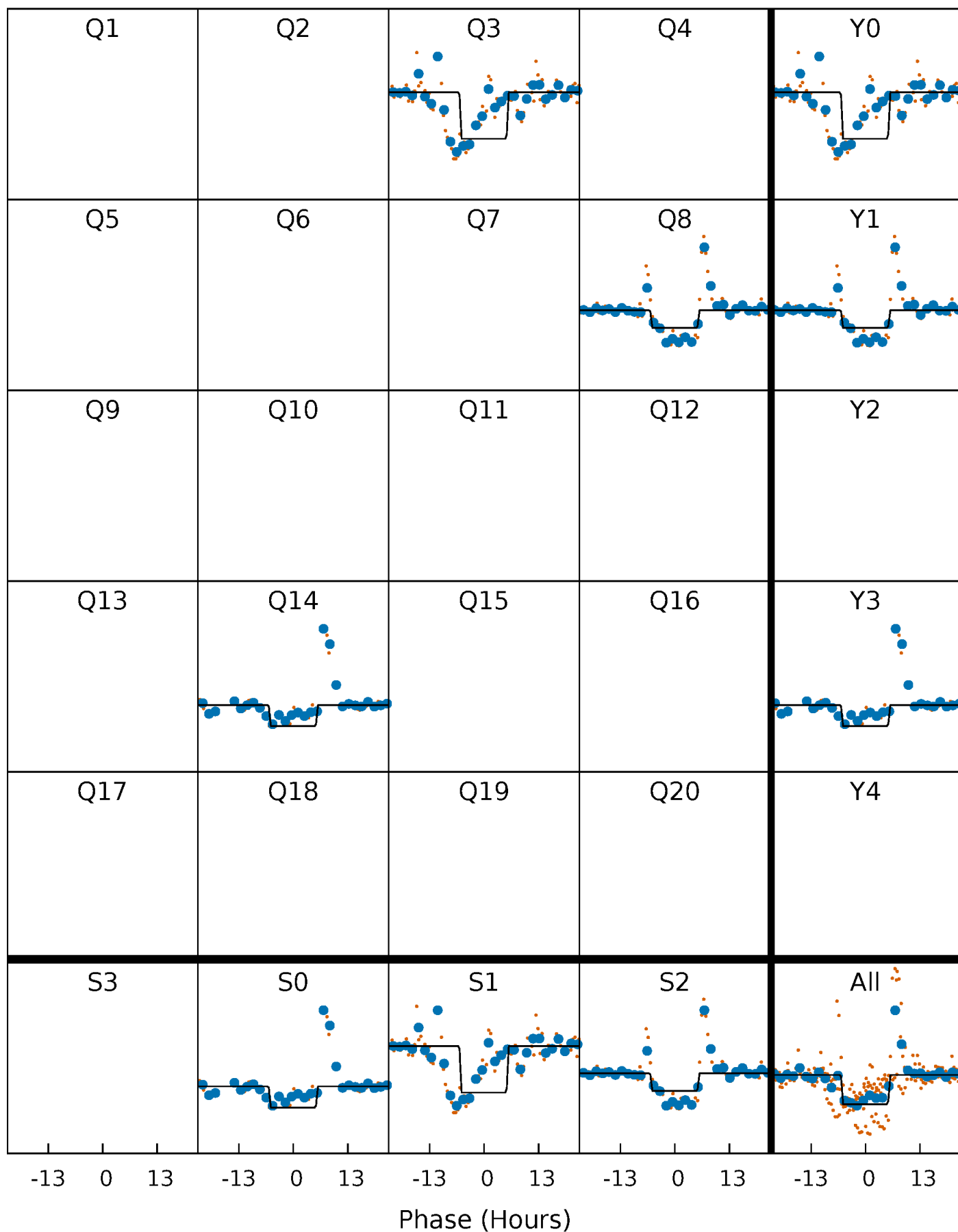
# DV Quarter-Phased Transit Curves

TCE 009540467-01     $P=525.337604$  Days     $T_0=265.984740$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

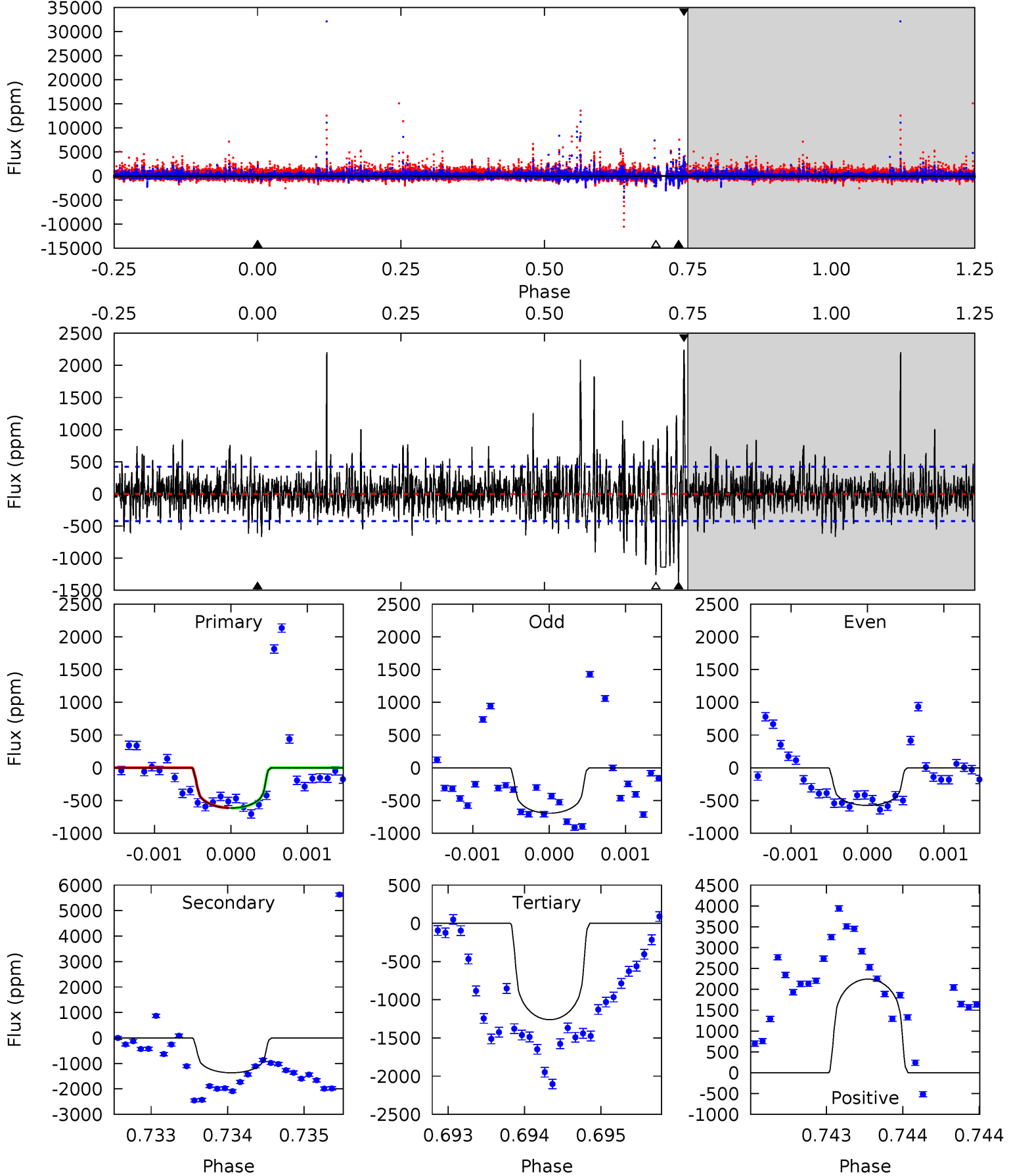
TCE 009540467-01 P=525.326394 Days  $T_0=265.941464$  (BKJD)



# DV Model-Shift Uniqueness Test

009540467-01, P = 525.337604 Days, E = 265.984740 Days

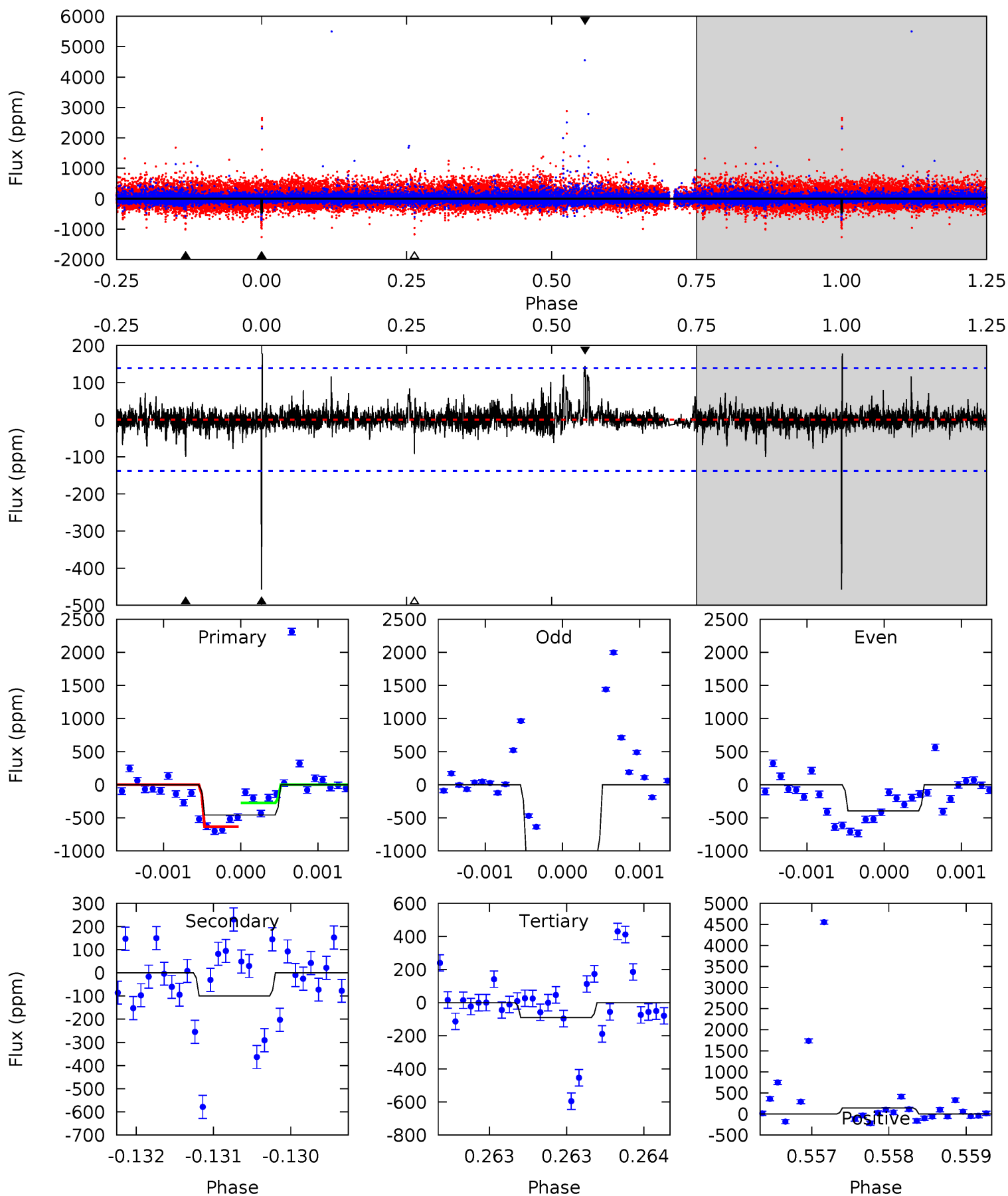
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.99	17.8	16.4	29.2	5.50	3.37	3.46	-8.40	-21.2	1.38	-11.4	0.49	0.90	0.62	0.04



# Alt Model-Shift Uniqueness Test

009540467-01, P = 525.326394 Days, E = 265.941464 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
18.1	3.94	3.56	5.72	5.47	3.32	0.71	14.5	12.3	0.37	-1.78	12.2	1.56	0.28	7.10



### Stellar Parameters For KIC 009540467

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3919^{+121}_{-148}$	$4.679^{+0.070}_{-0.025}$	$0.020^{+0.250}_{-0.300}$	$0.572^{+0.042}_{-0.079}$	$0.570^{+0.051}_{-0.070}$	$4.295^{+1.555}_{-0.534}$
	+3%/-4%	+1%/-1%	+1250%/-1500%	+7%/-14%	+9%/-12%	+36%/-12%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 009540467-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-1367 \pm 77$	$1.41^{+0.53}_{-0.44}$	$176^{+6}_{-7}$	$4642^{+819}_{-521}$	$422240^{+466482}_{-198005}$
Alt.	$-100 \pm 25$	$1.67^{+0.50}_{-0.49}$	$175^{+7}_{-8}$	$2871^{+323}_{-225}$	$22260^{+23861}_{-10169}$

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

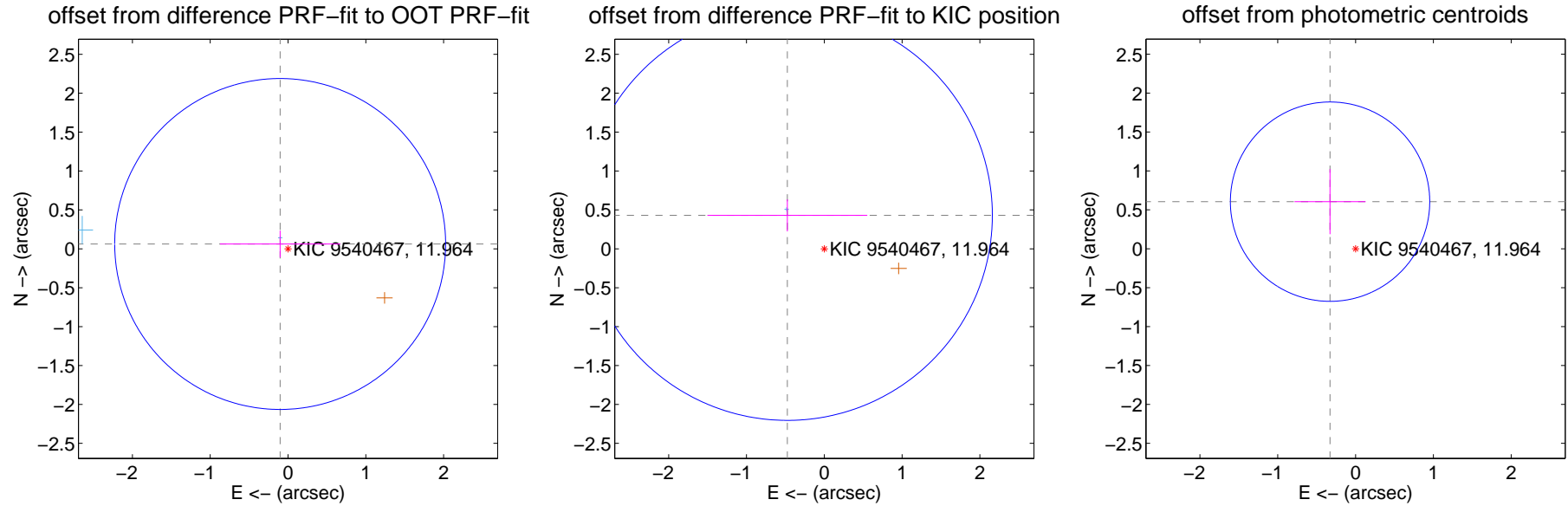
## DV Centroid Data

Supplemental centroid analysis for 009540467-01. **Kepler magnitude: 11.96.** Transit SNR 4.66

**There are 2 quarters with good PRF difference image offsets**

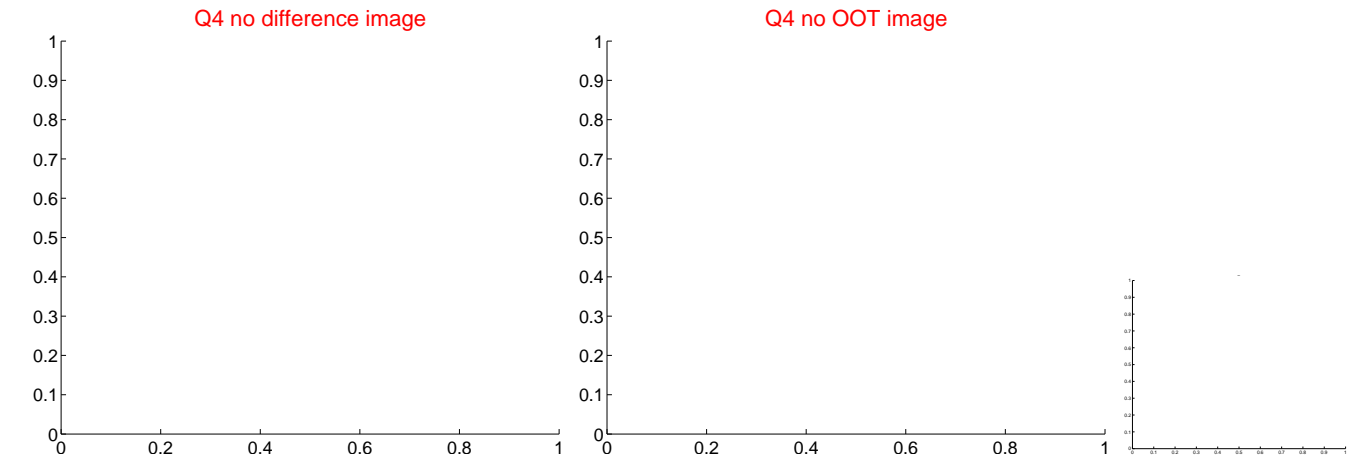
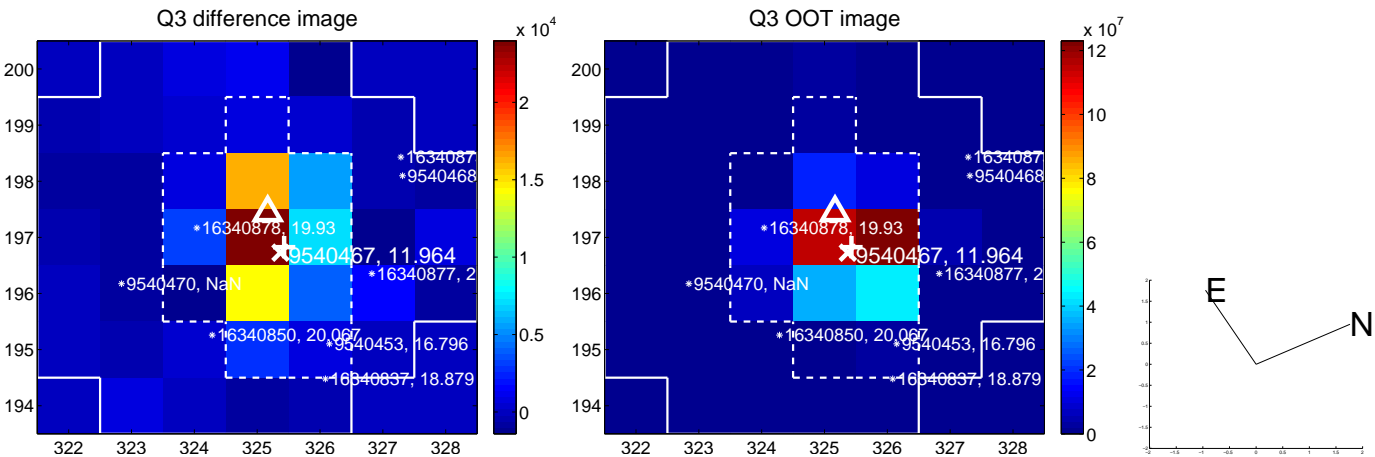
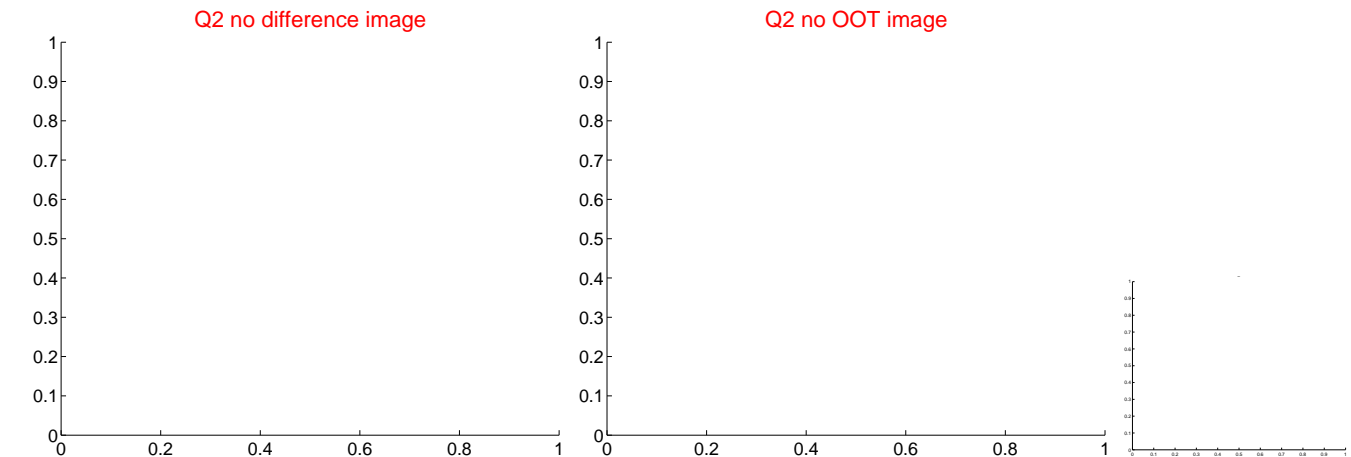
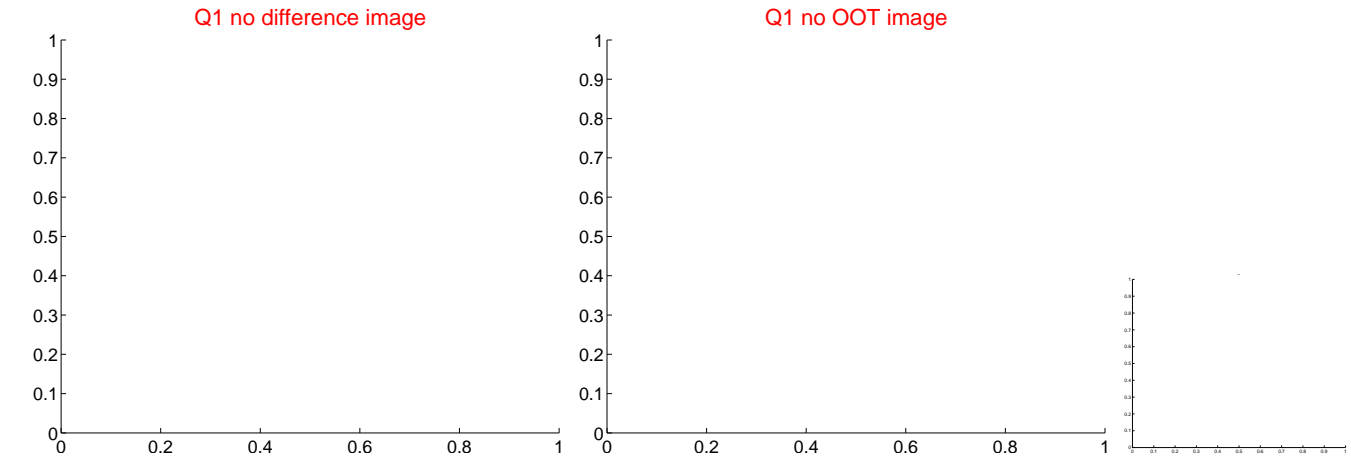
The direct PRF centroid is offset from the target star catalog position by about 0.47 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.119 \pm 0.709$	0.17	$0.101 \pm 0.773$	$0.062 \pm 0.172$
PRF-fit source offset from KIC position	$0.641 \pm 0.879$	0.73	$0.475 \pm 1.028$	$0.430 \pm 0.206$
photometric centroid source offset	$0.69 \pm 0.43$	1.61	$0.33 \pm 0.46$	$0.61 \pm 0.42$

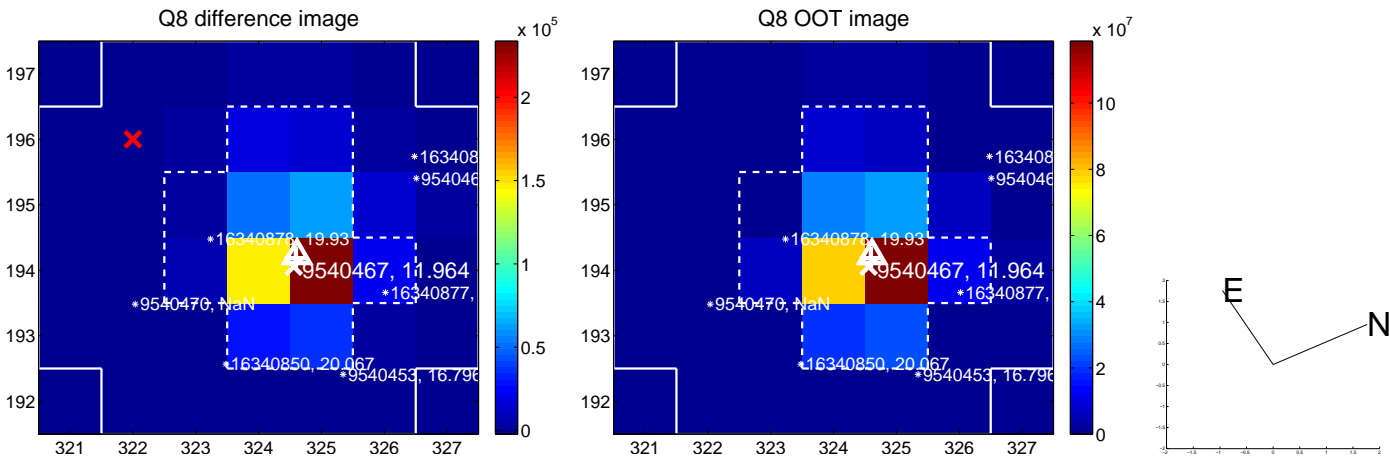
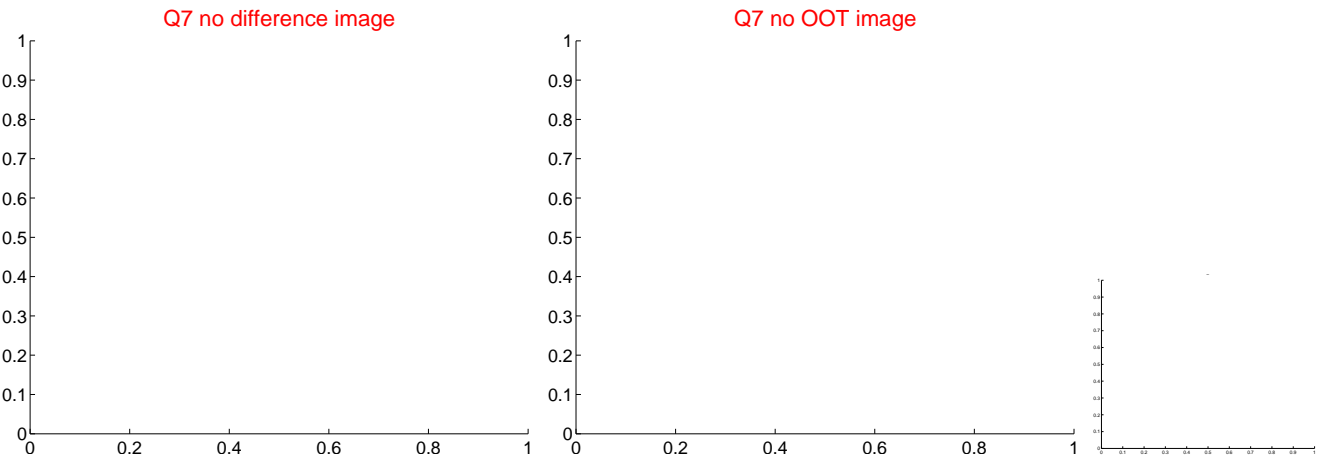
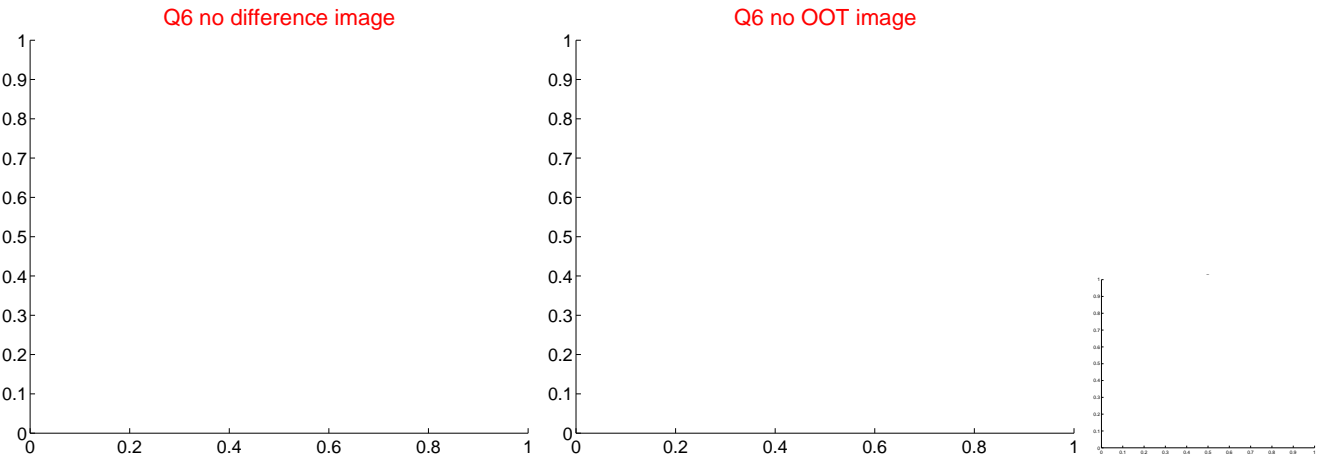
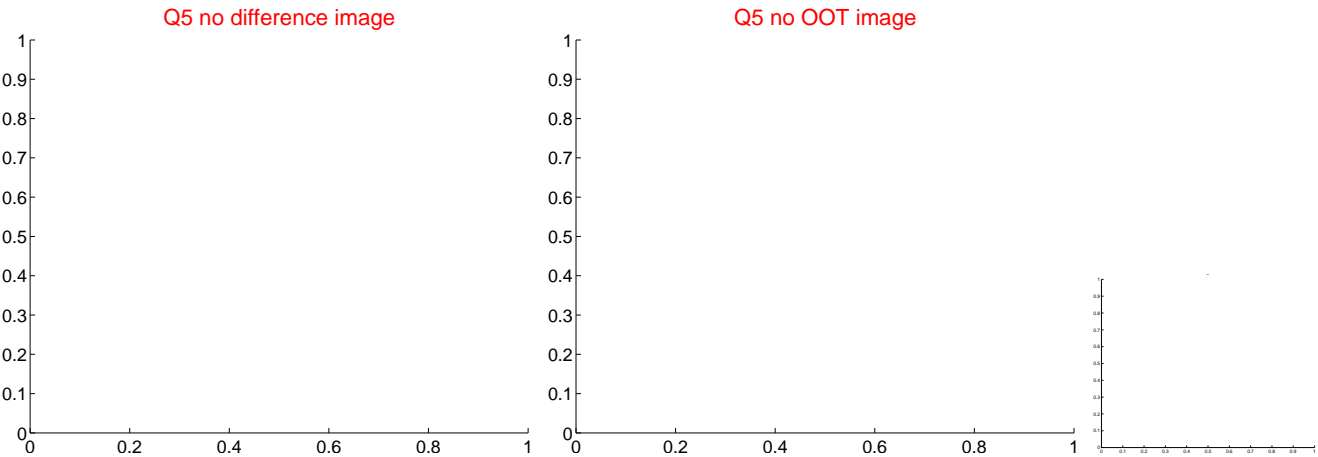


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



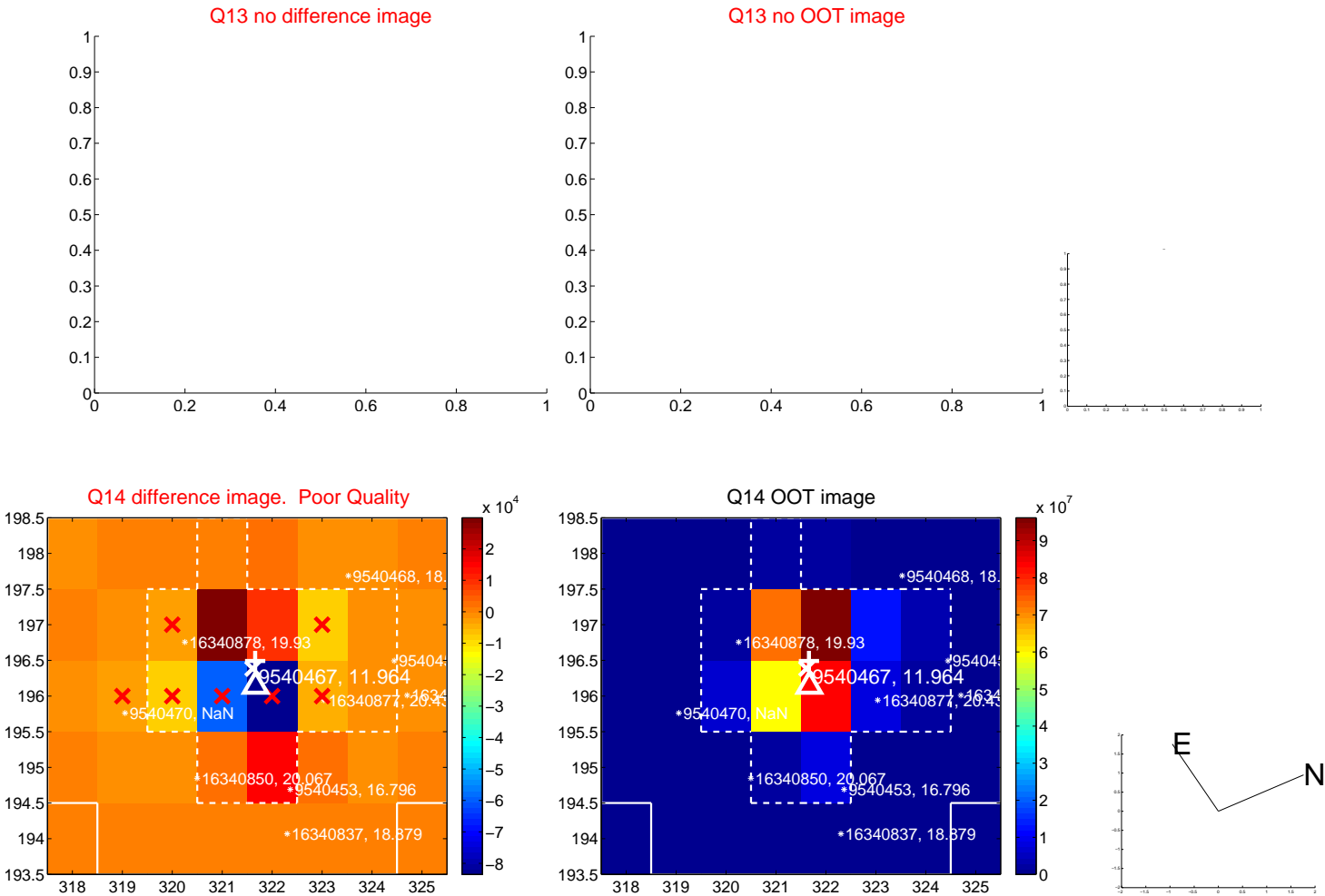
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



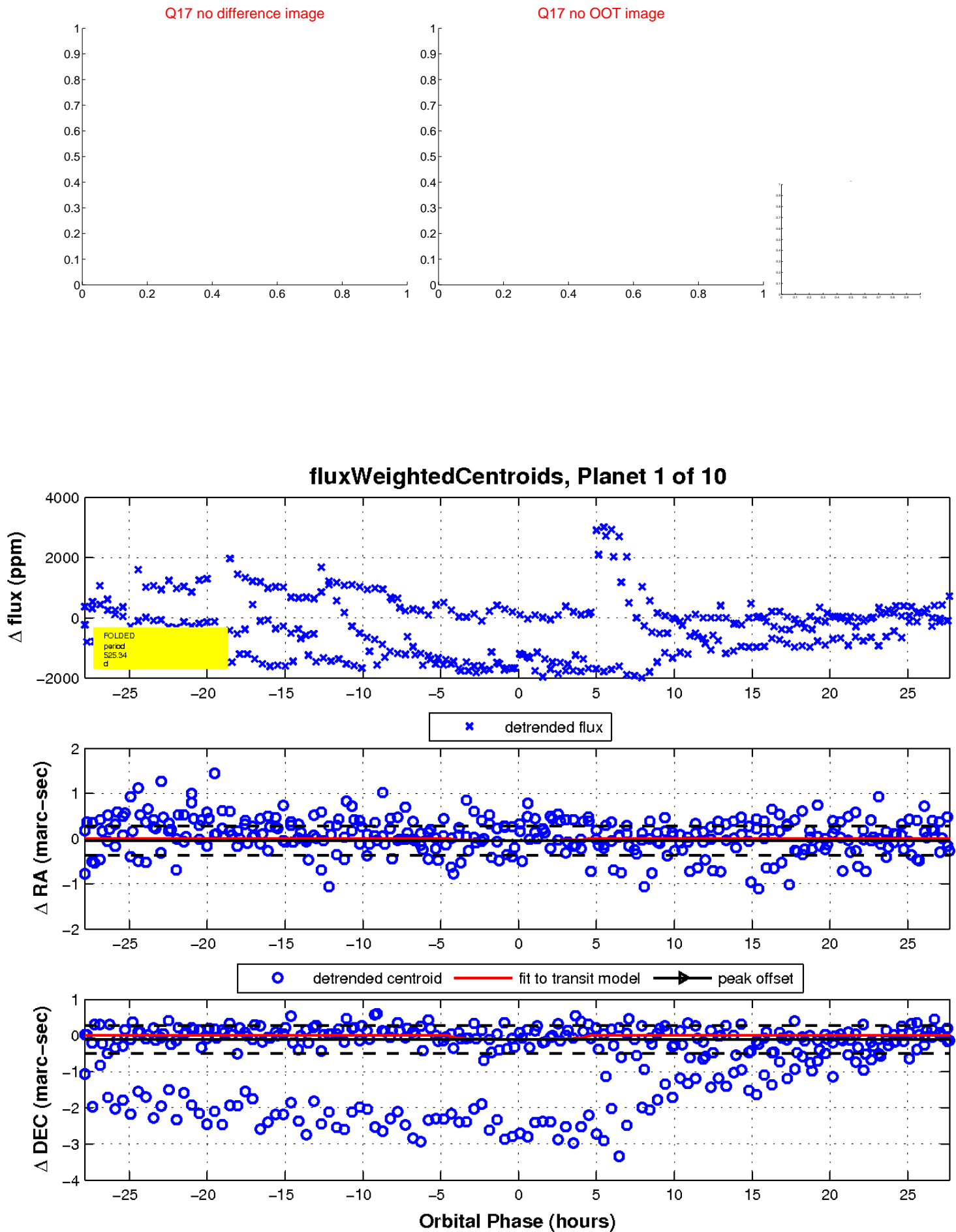
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



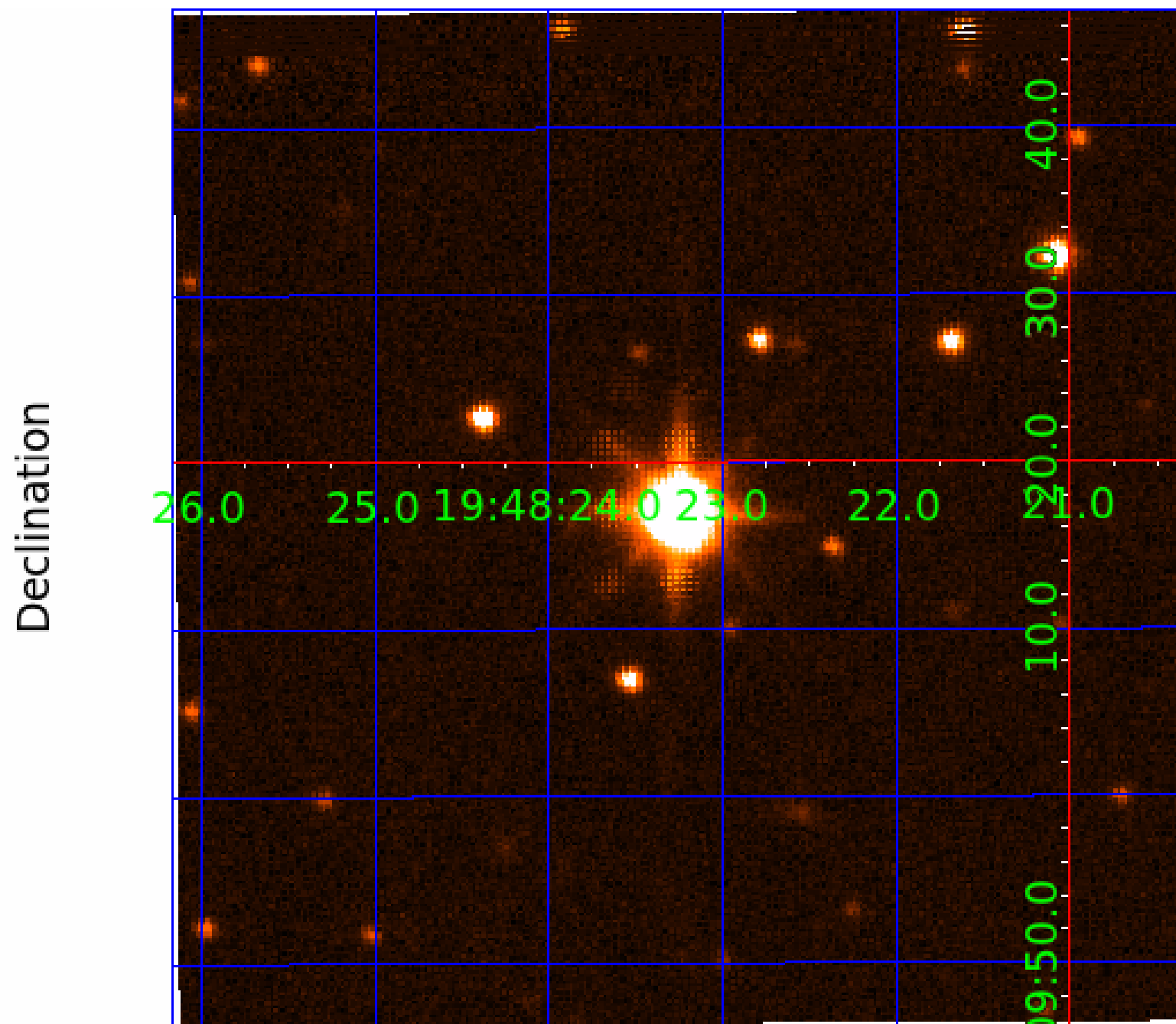
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image



# KIC 009540467

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009540467-01	OBS	No	525.337604	265.984740	518.3	9.332	17.4	4.7	0.57	3919	1.47	0.06
009540467-02	OBS	No	270.386745	360.361405	854.9	4.035	17.7	7.2	0.57	3919	1.75	0.15
009540467-03	OBS	No	360.937549	197.248197	1097.8	2.782	13.7	10.6	0.57	3919	2.07	0.10
009540467-05	OBS	No	418.686753	432.378155	794.3	6.491	15.0	6.7	0.57	3919	1.61	0.08
009540467-06	OBS	No	320.975460	210.598826	530.3	9.030	13.8	6.2	0.57	3919	1.32	0.12
009540467-08	OBS	No	679.085465	141.867271	741.8	3.869	15.2	7.9	0.57	3919	1.55	0.04
009540467-10	OBS	No	274.537158	346.932388	550.2	2.569	13.8	5.5	0.57	3919	1.50	0.15

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009540467-01	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—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009540467-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS
009540467-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS
009540467-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS
009540467-06	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
009540467-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009540467-10	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS—HALO_GHOST

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

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

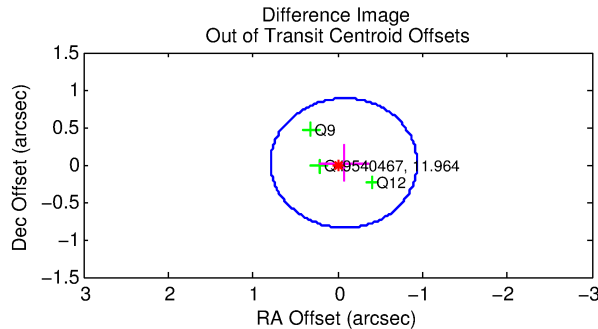
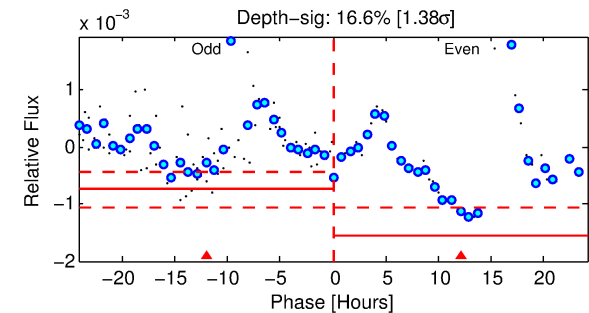
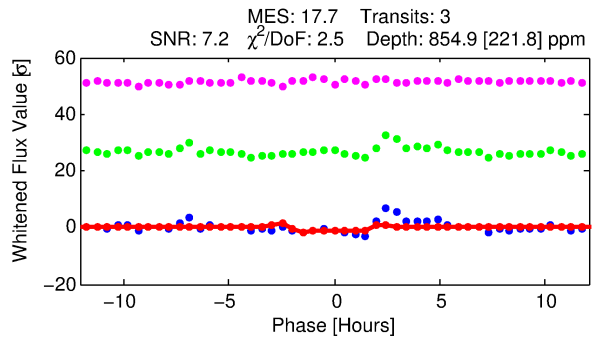
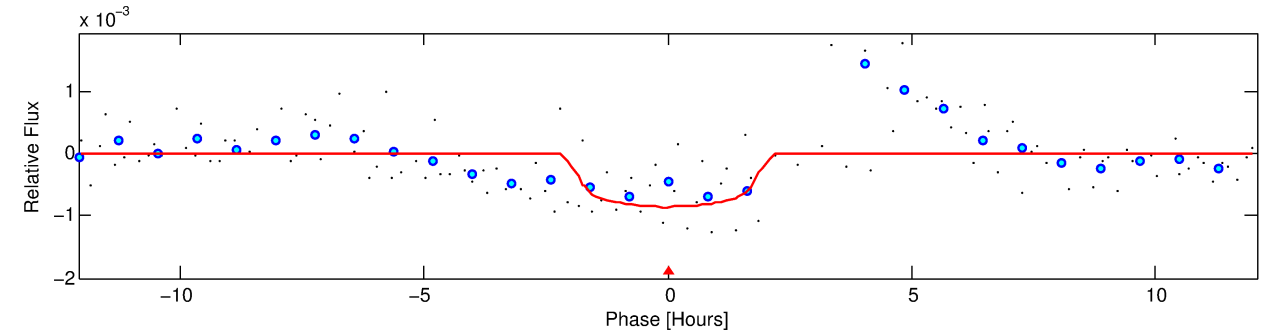
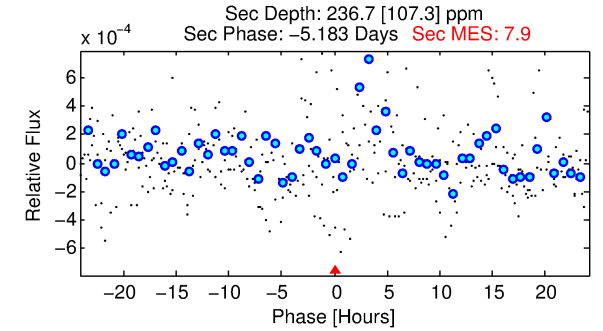
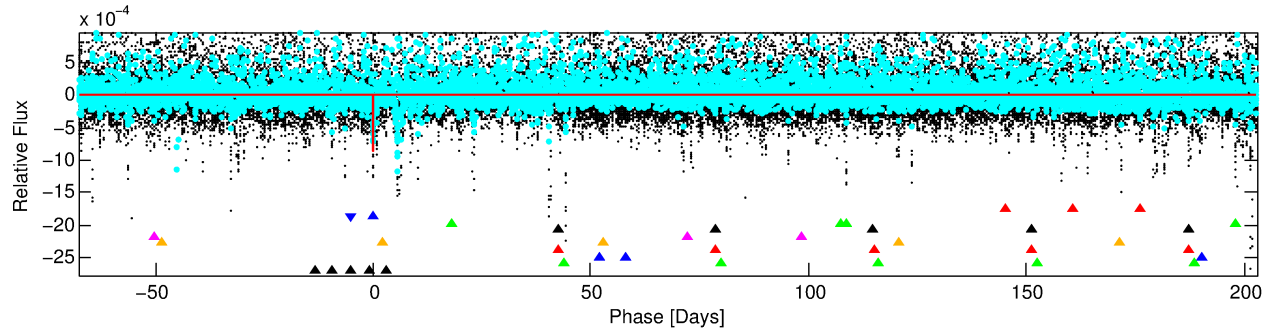
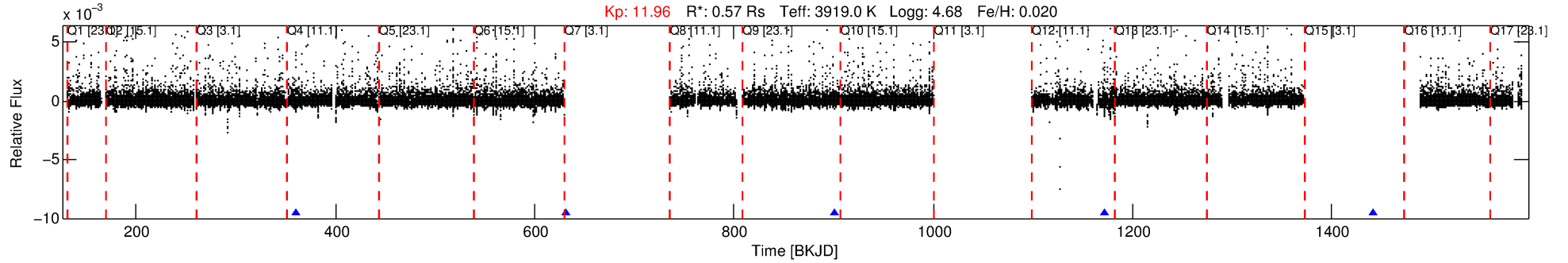
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009540467-02

No Significant Match Found

# DV One-Page Summary

KIC: 9540467 Candidate: 2 of 10 Period: 270.387 d



## DV Fit Results:

Period = 270.38674 [0.00421] d  
Epoch = 360.3614 [0.0083] BKJD  
Rp/R\* = 0.0281 [0.0339]  
a/R\* = 411.81 [1920.21]  
b = 0.64 [4.33]  
Seff = 0.15 [0.03]  
Teq = 159 [8] K  
Rp = 1.75 [2.13] Re  
a = 0.6786 [0.0723] AU  
Ag = 19555.76 [48125.46] [0.41] $\sigma$   
Teffp = 2902 [1786] K [1.54] $\sigma$

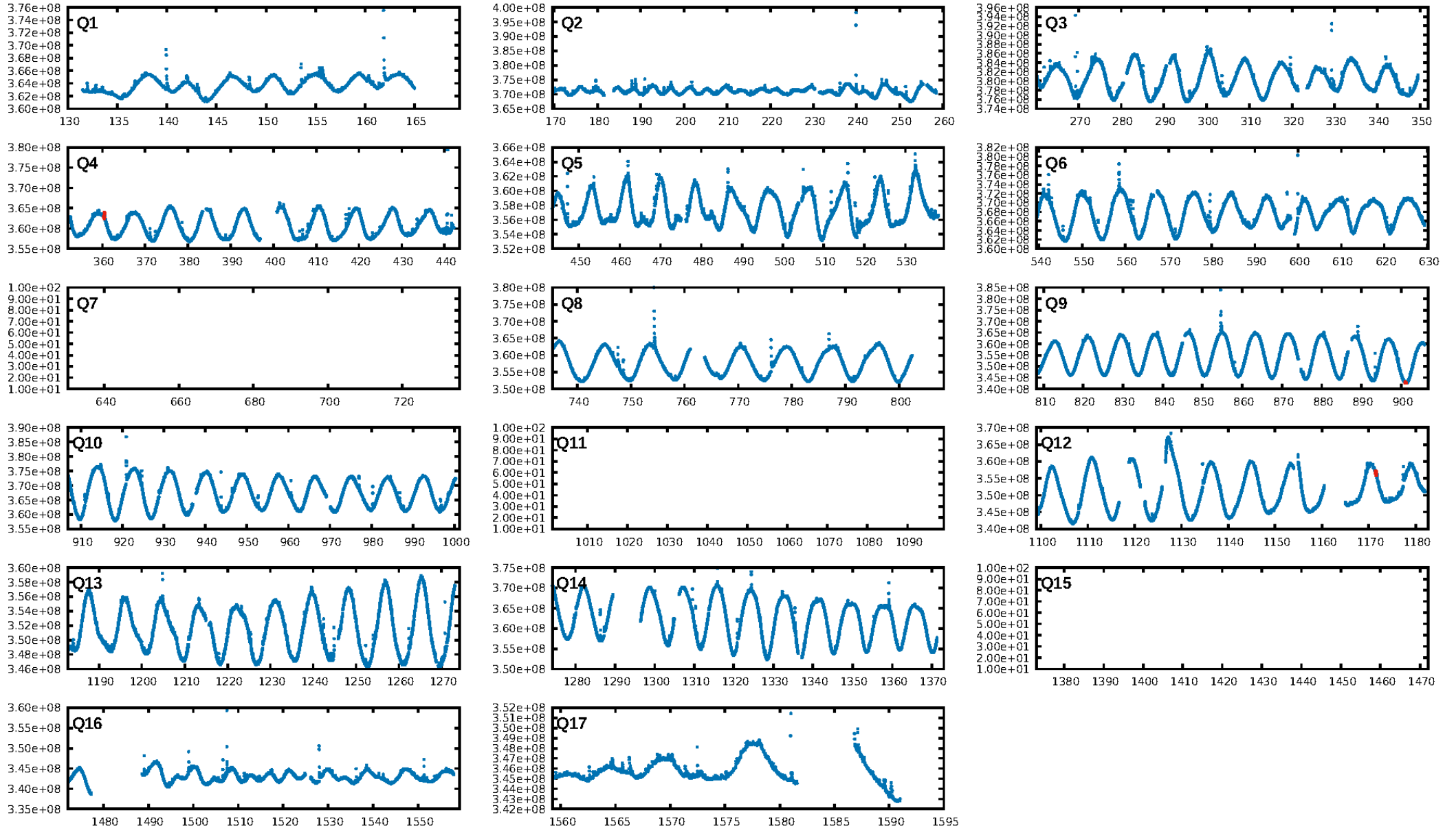
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [20.82] $\sigma$   
ModelChiSquare2-sig: 0.4%  
ModelChiSquareGof-sig: 2.2%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 9.045  
Centroid-sig: 21.2%  
Centroid-so: 0.175 arcsec [0.54] $\sigma$   
OotOffset-rm: 0.077 arcsec [0.27] $\sigma$   
OotOffset-st: 0/0/2/1 [3]  
KicOffset-rm: 0.470 arcsec [1.60] $\sigma$   
KicOffset-st: 0/0/2/1 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 1.00 [3/3]

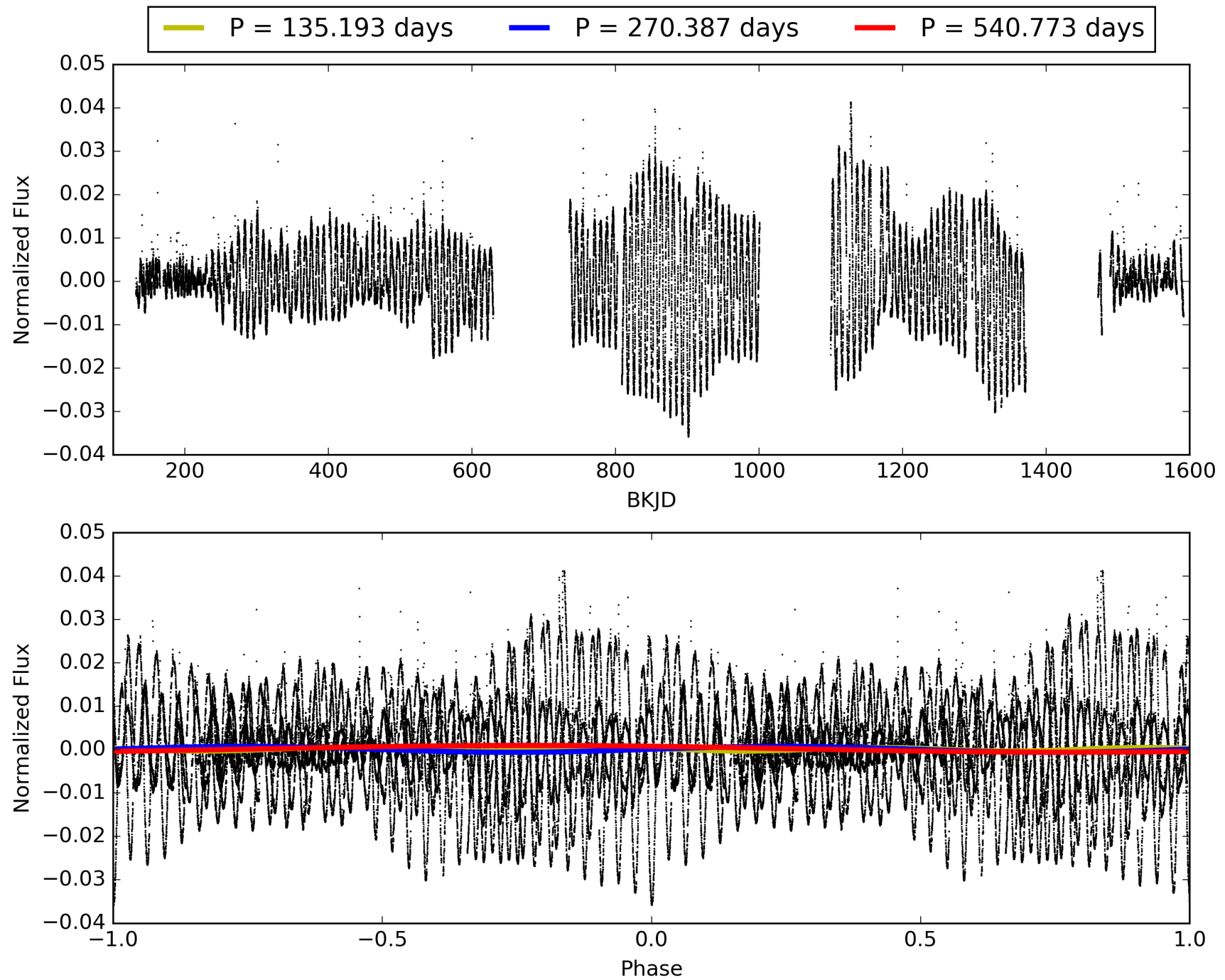
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 16:19:36 Z

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

# TCE 009540467-02, PDC Light Curves

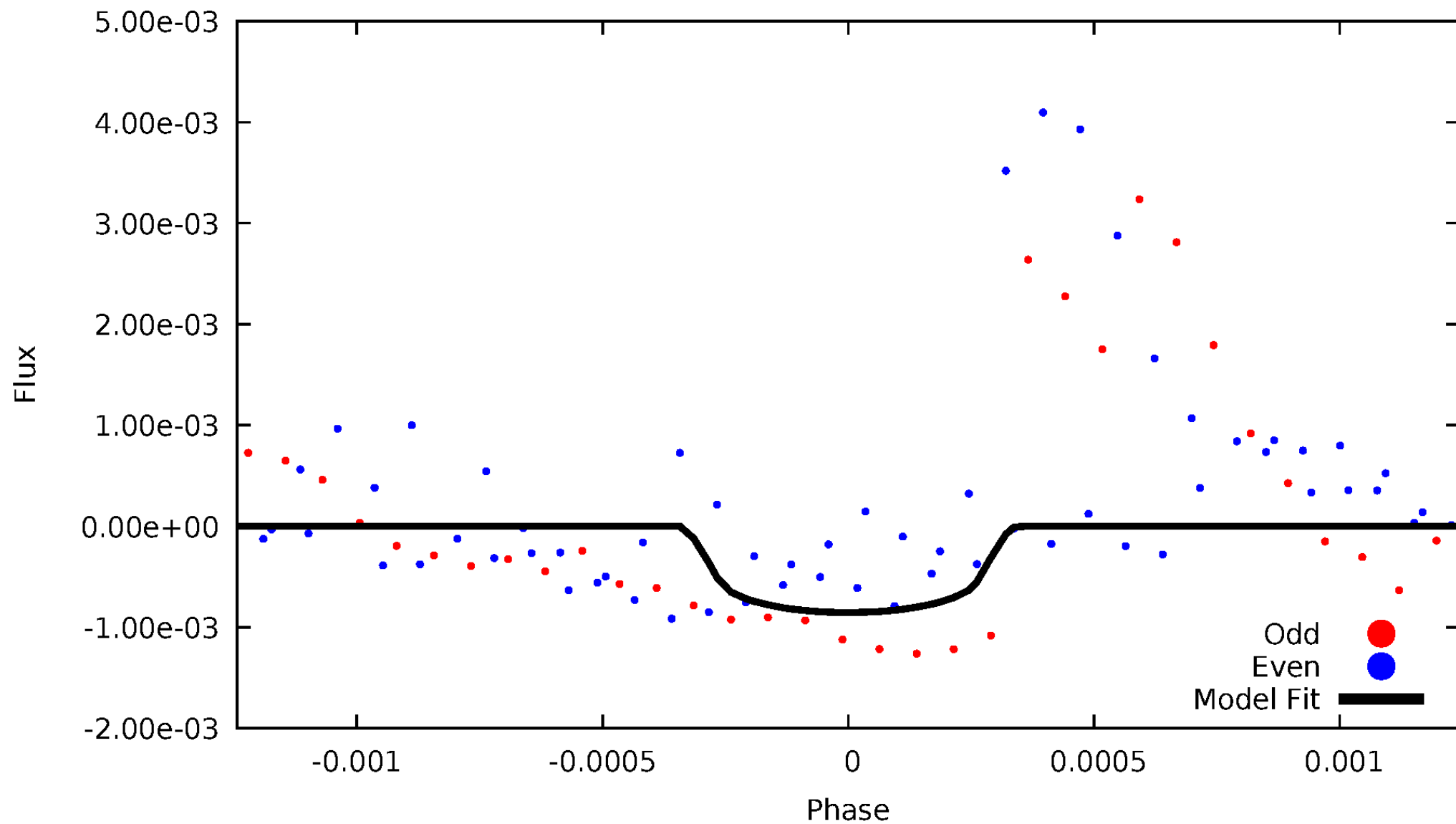


TCE 009540467-02



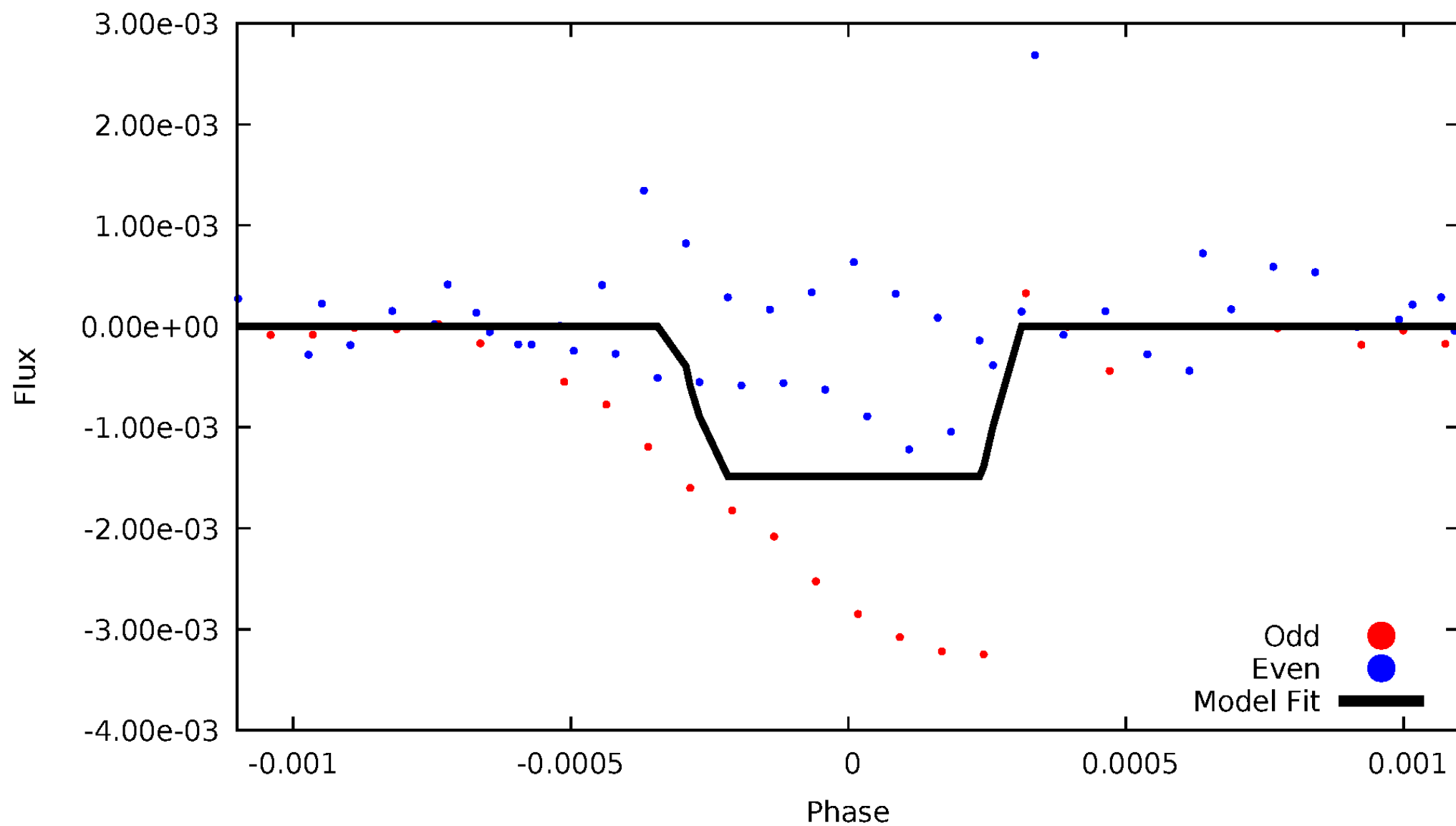
# DV Odd/Even

TCE 009540467-02



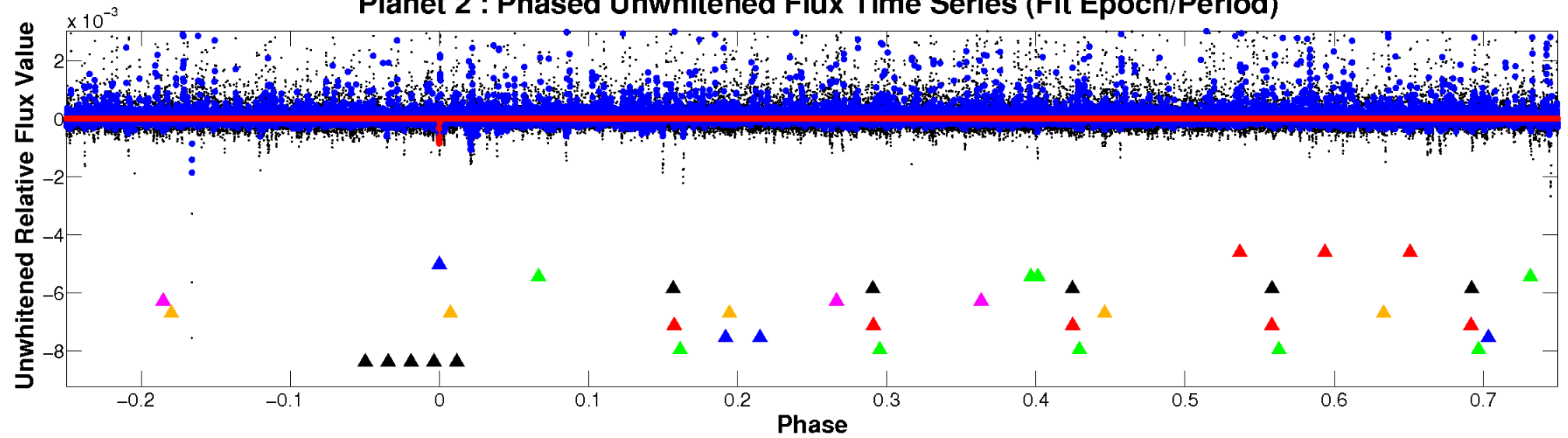
# ALT Odd/Even

TCE 009540467-02

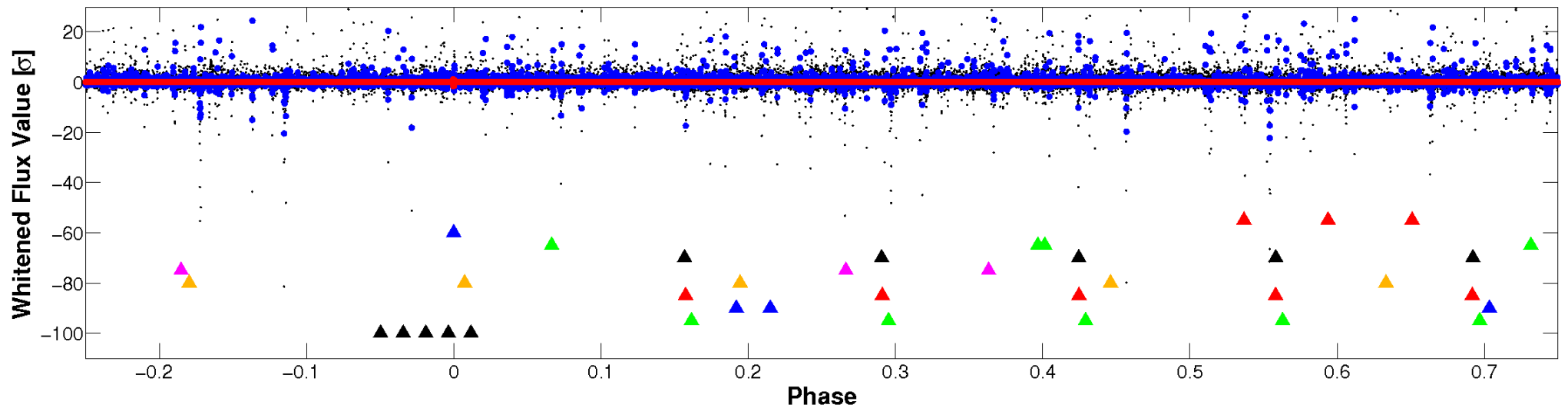


# Non-Whitened Vs. Whitened Light Curve

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

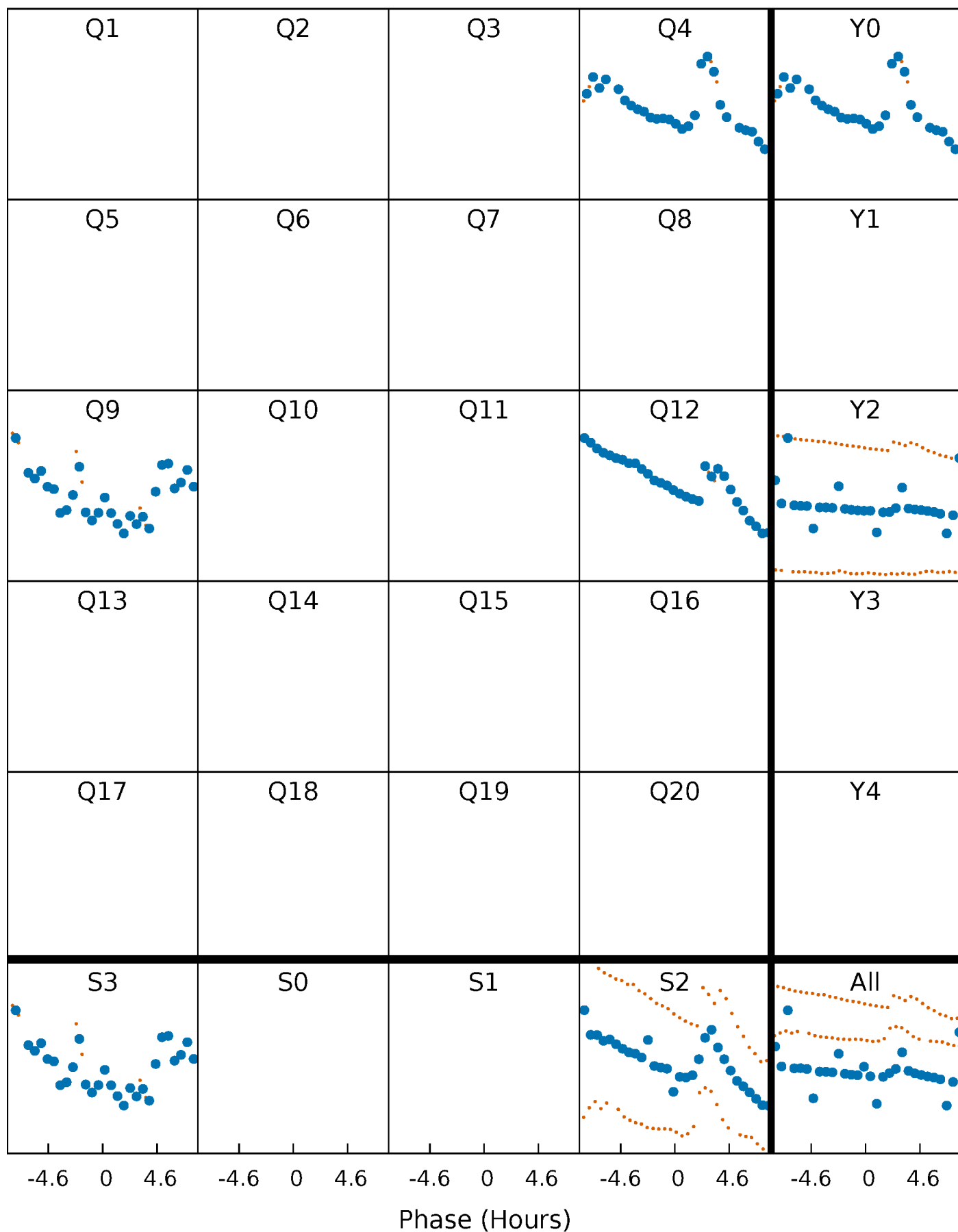


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



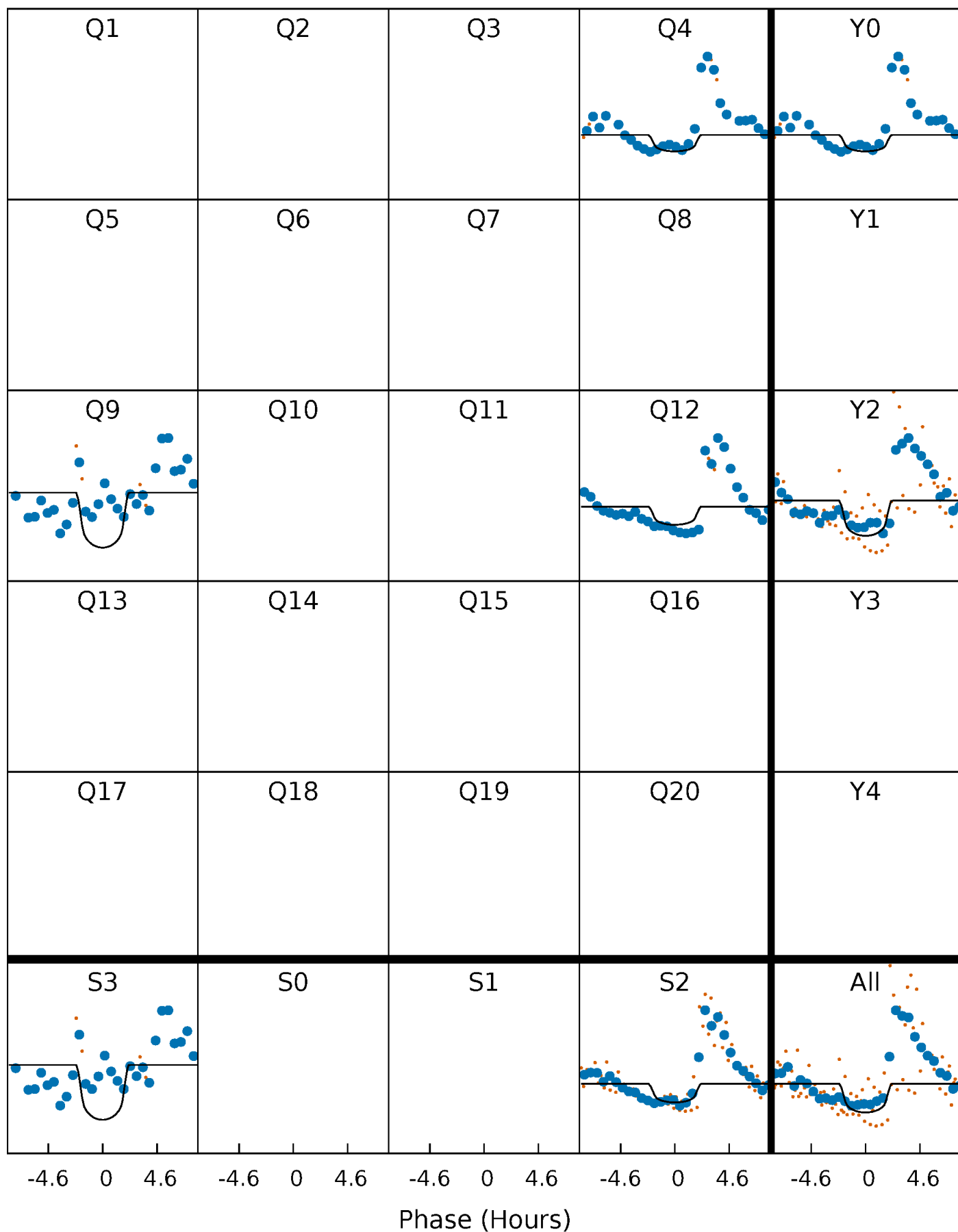
# PDC Quarter-Phased Transit Curves

TCE 009540467-02     $P=270.386745$  Days     $T_0=360.361405$  (BKJD)



# DV Quarter-Phased Transit Curves

TCE 009540467-02     $P=270.386745$  Days     $T_0=360.361405$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

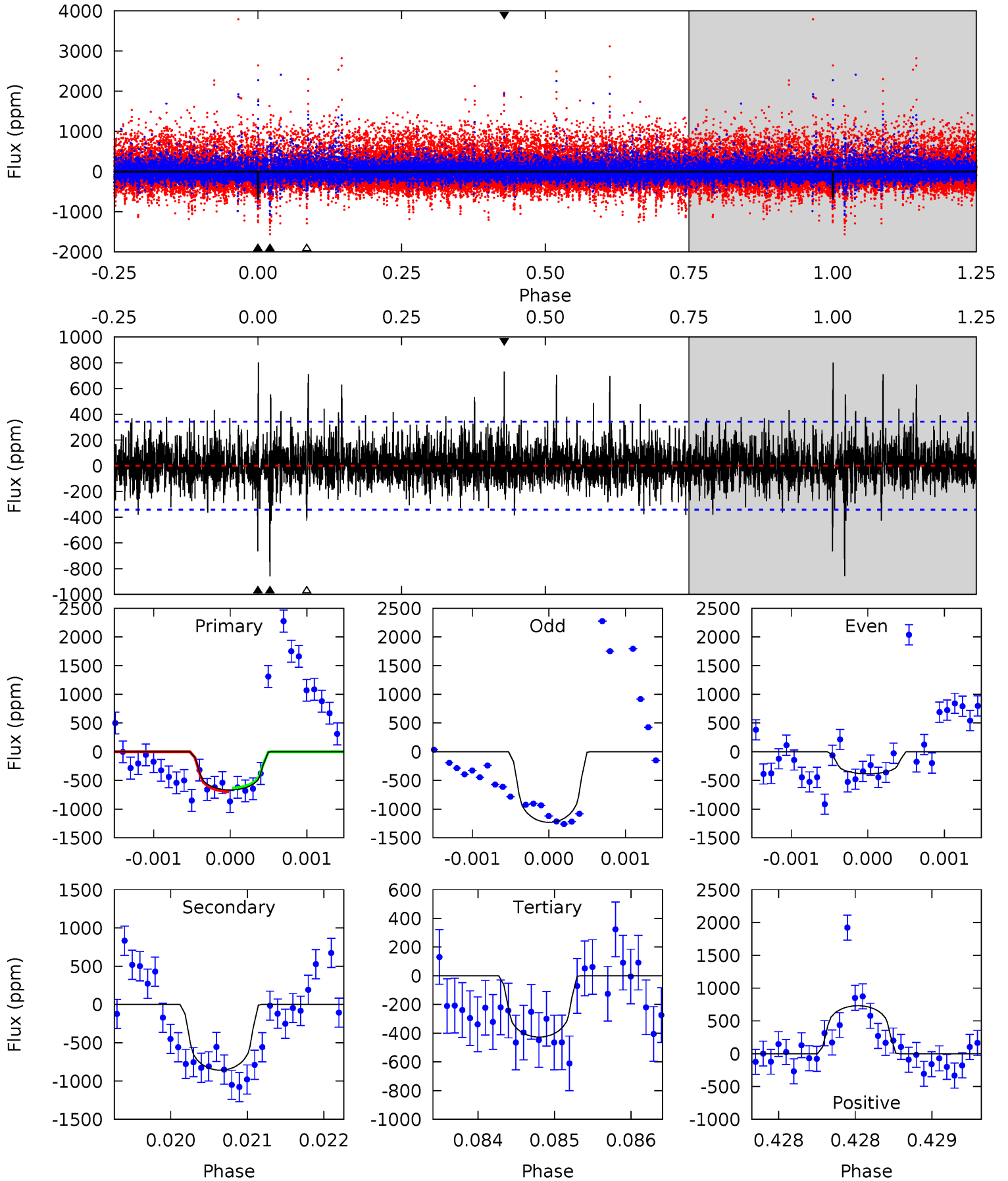
TCE 009540467-02 P=270.392300 Days  $T_0=360.357175$  (BKJD)



# DV Model-Shift Uniqueness Test

009540467-02, P = 270.386745 Days, E = 89.974660 Days

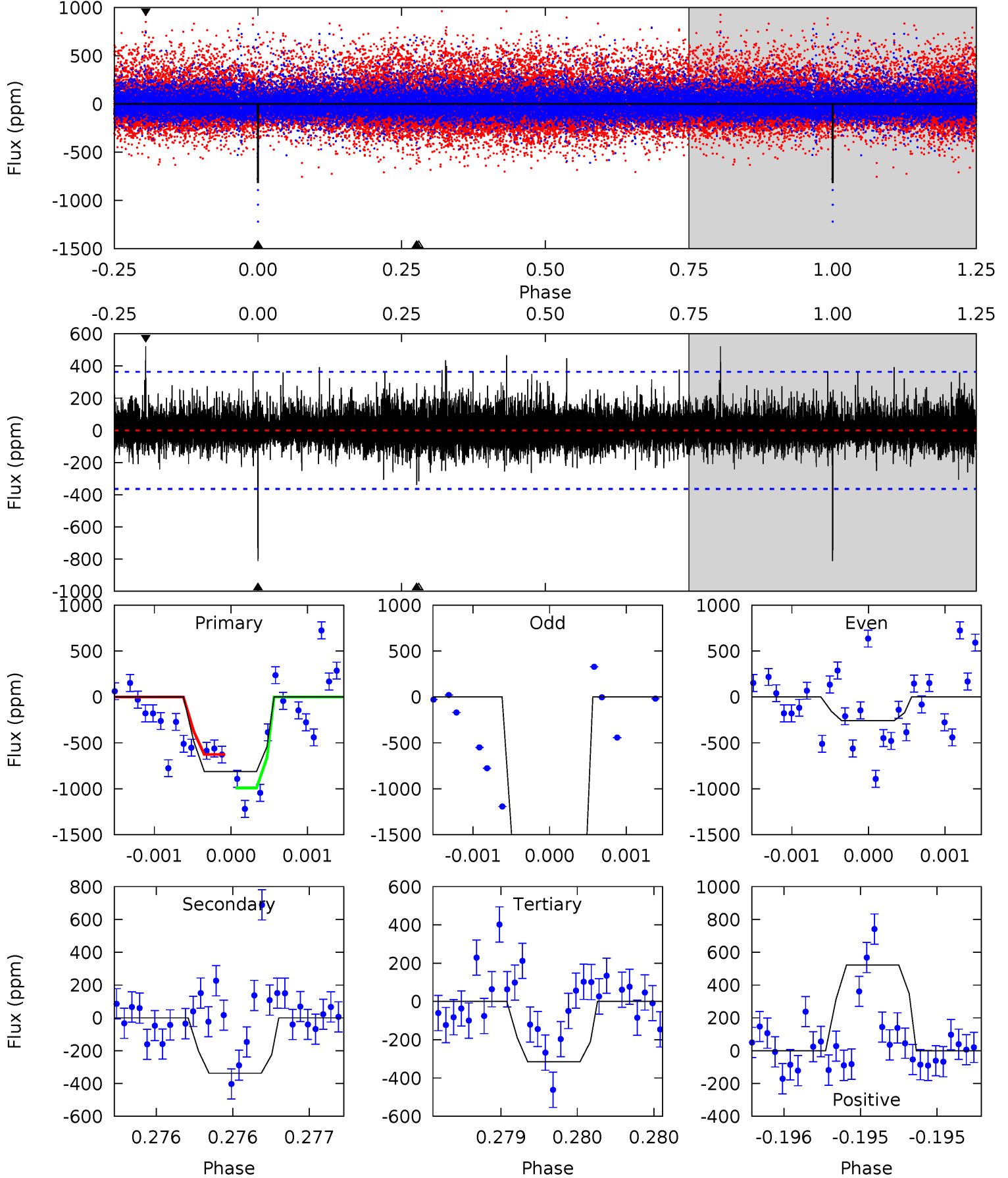
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.8	13.9	6.89	11.8	5.52	3.40	1.89	3.86	-1.06	6.96	2.05	4.46	1.20	0.48	0.51



# Alt Model-Shift Uniqueness Test

009540467-02, P = 270.392300 Days, E = 89.964875 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.4	5.14	4.81	7.96	5.56	3.45	1.13	7.56	4.41	0.34	-2.82	29.9	1.35	0.39	2.76



### Stellar Parameters For KIC 009540467

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3919^{+121}_{-148}$	$4.679^{+0.070}_{-0.025}$	$0.020^{+0.250}_{-0.300}$	$0.572^{+0.042}_{-0.079}$	$0.570^{+0.051}_{-0.070}$	$4.295^{+1.555}_{-0.534}$
	+3%/-4%	+1%/-1%	+1250%/-1500%	+7%/-14%	+9%/-12%	+36%/-12%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 009540467-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-858 \pm 62$	$2.36^{+1.81}_{-1.58}$	$219^{+8}_{-9}$	$3571^{+1884}_{-582}$	$39845^{+315456}_{-27332}$
Alt.	$-337 \pm 66$	$2.72^{+2.15}_{-1.57}$	$219^{+8}_{-9}$	$2966^{+882}_{-425}$	$11372^{+51488}_{-7777}$

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

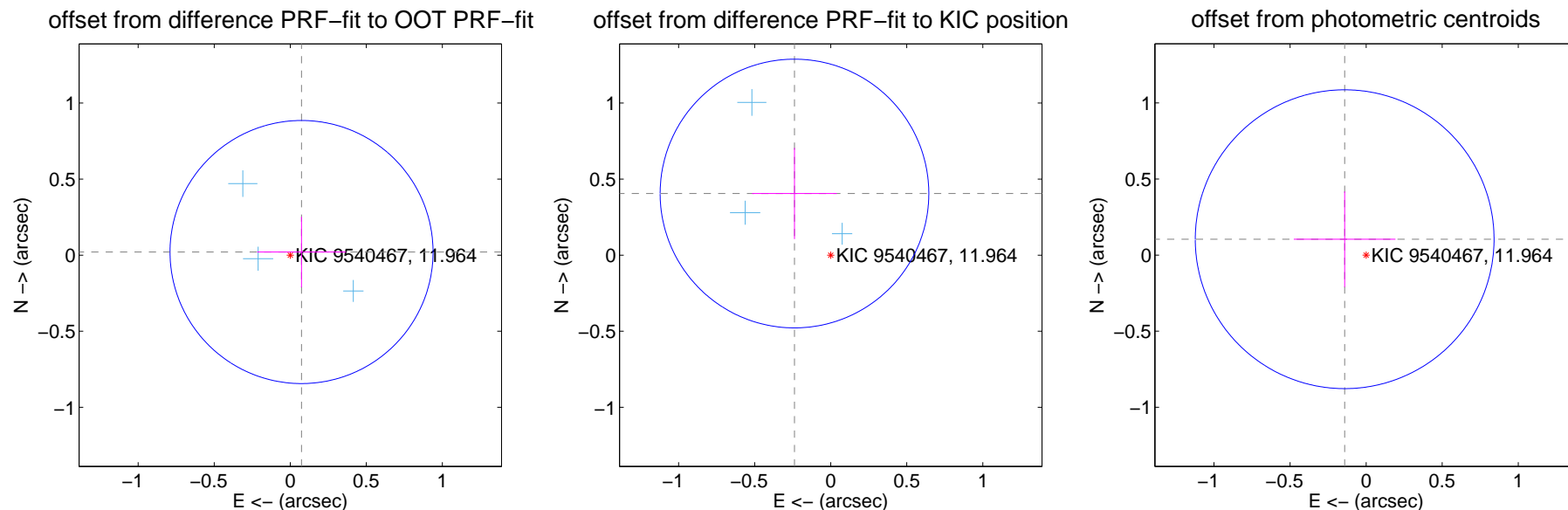
## DV Centroid Data

Supplemental centroid analysis for 009540467-02. **Kepler magnitude: 11.96.** Transit SNR 7.20

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

The direct PRF centroid is offset from the target star catalog position by about 0.51 arcsec

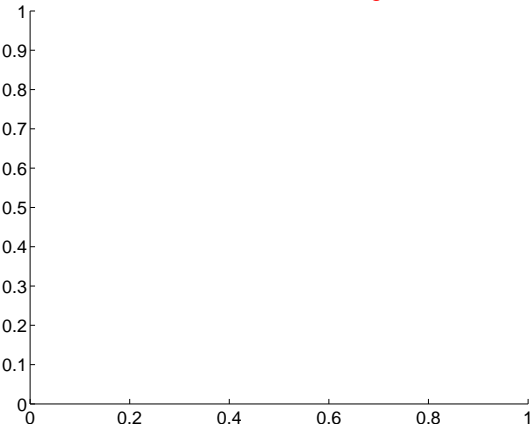
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.077 \pm 0.288$	0.27	$-0.074 \pm 0.292$	$0.020 \pm 0.232$
PRF-fit source offset from KIC position	$0.470 \pm 0.294$	1.60	$0.238 \pm 0.278$	$0.405 \pm 0.300$
photometric centroid source offset	$0.18 \pm 0.33$	0.54	$0.14 \pm 0.33$	$0.10 \pm 0.31$



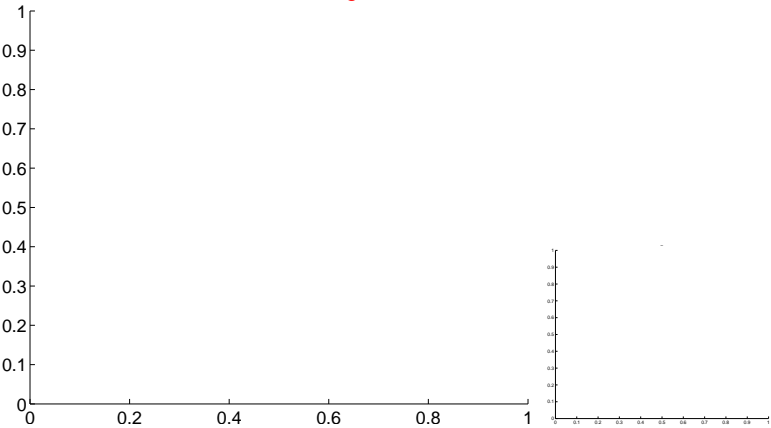
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

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

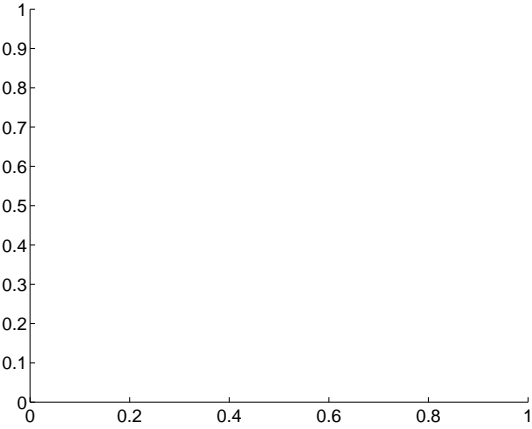
Q1 no difference image



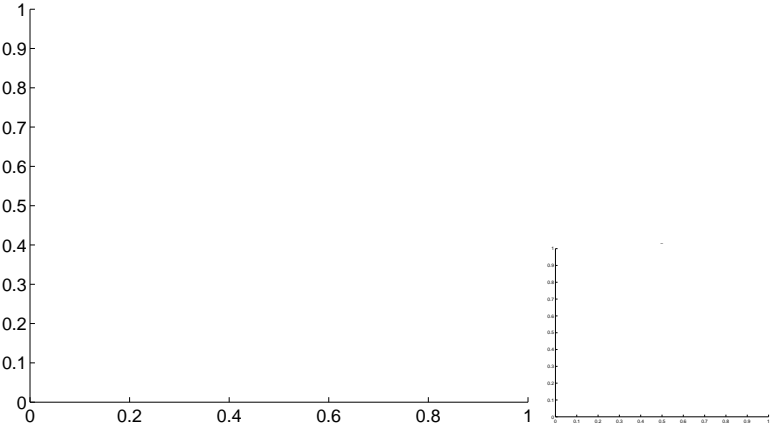
Q1 no OOT image



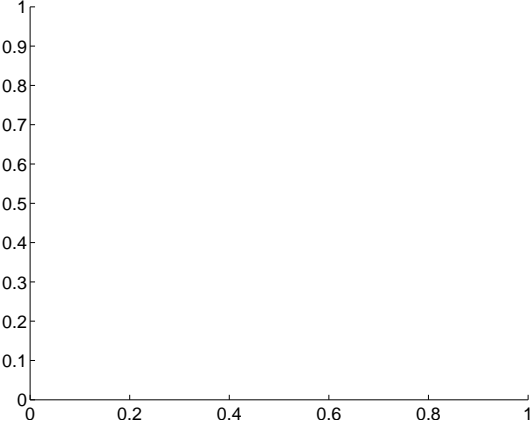
Q2 no difference image



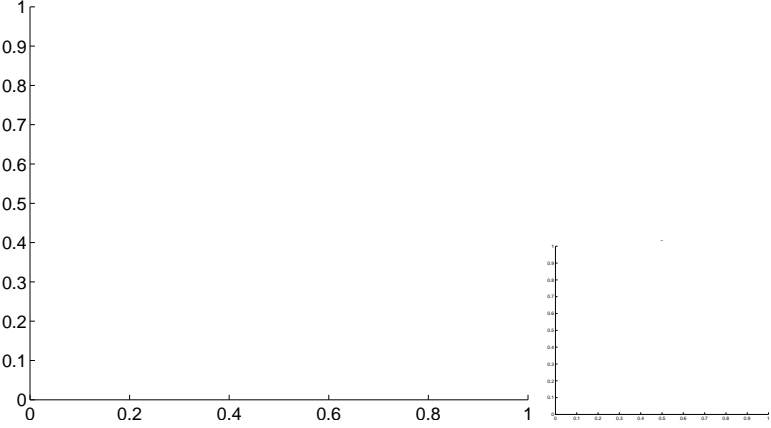
Q2 no OOT image



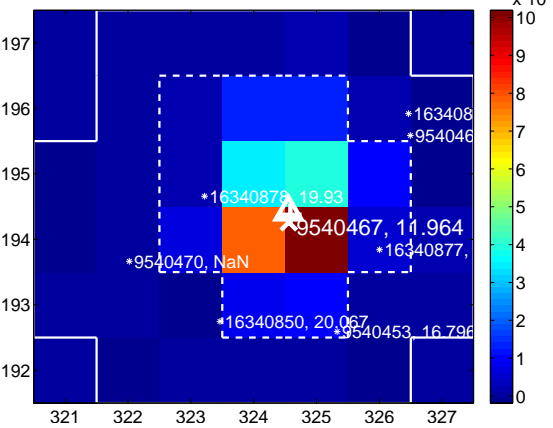
Q3 no difference image



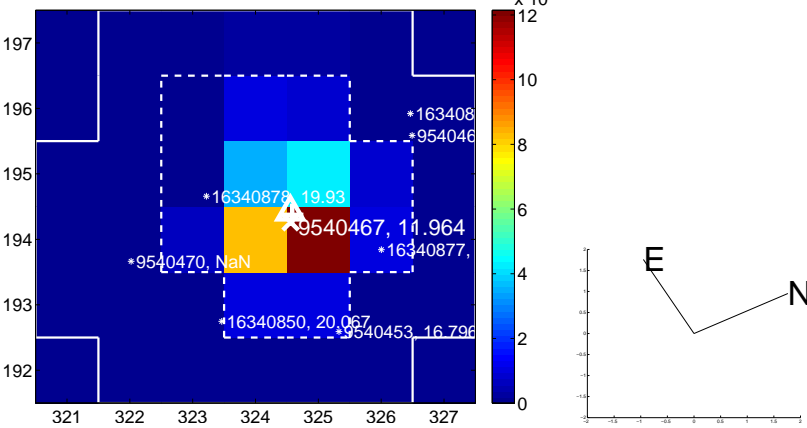
Q3 no OOT image



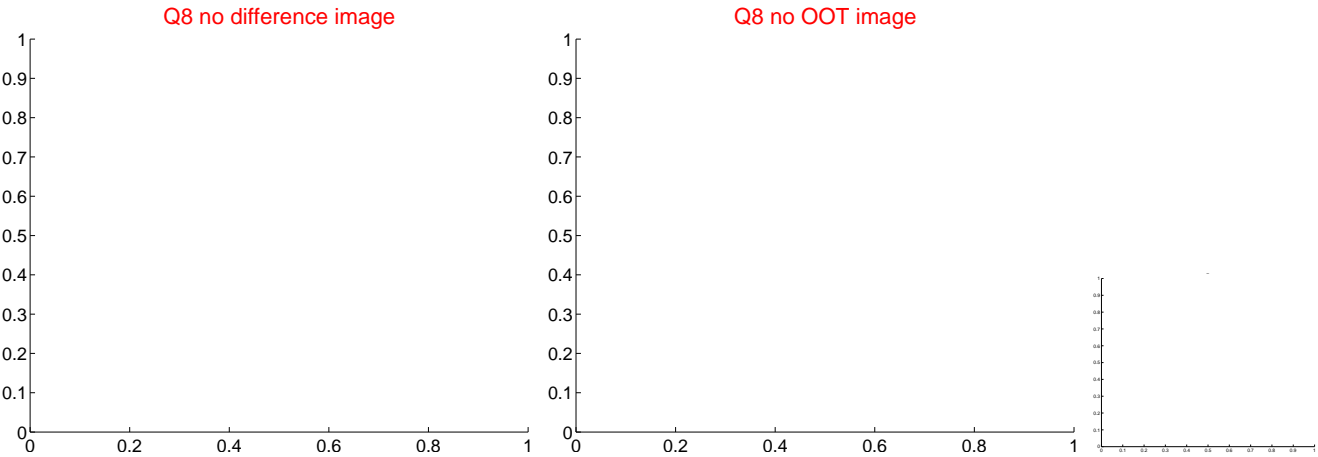
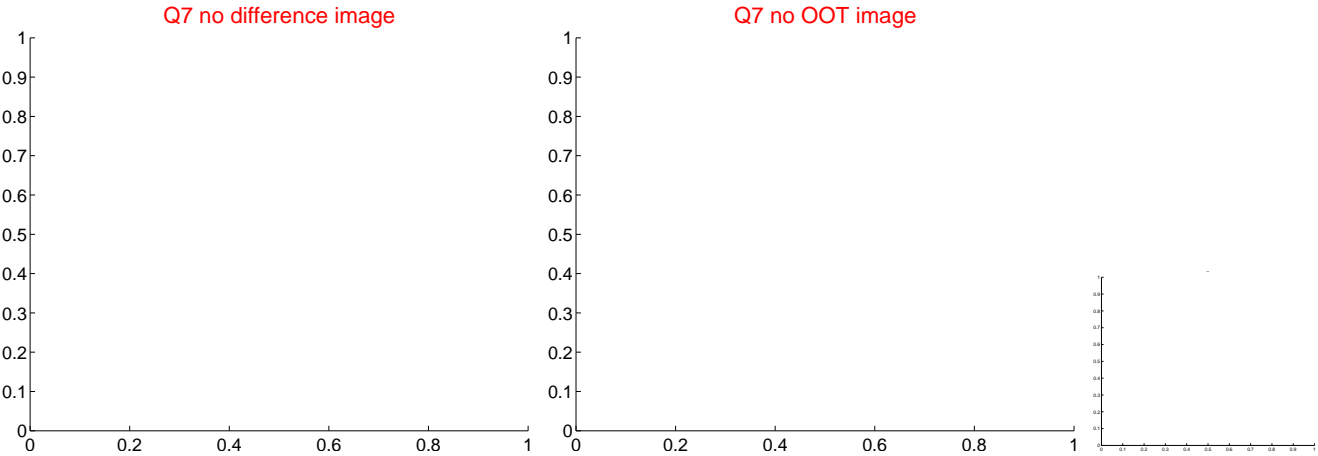
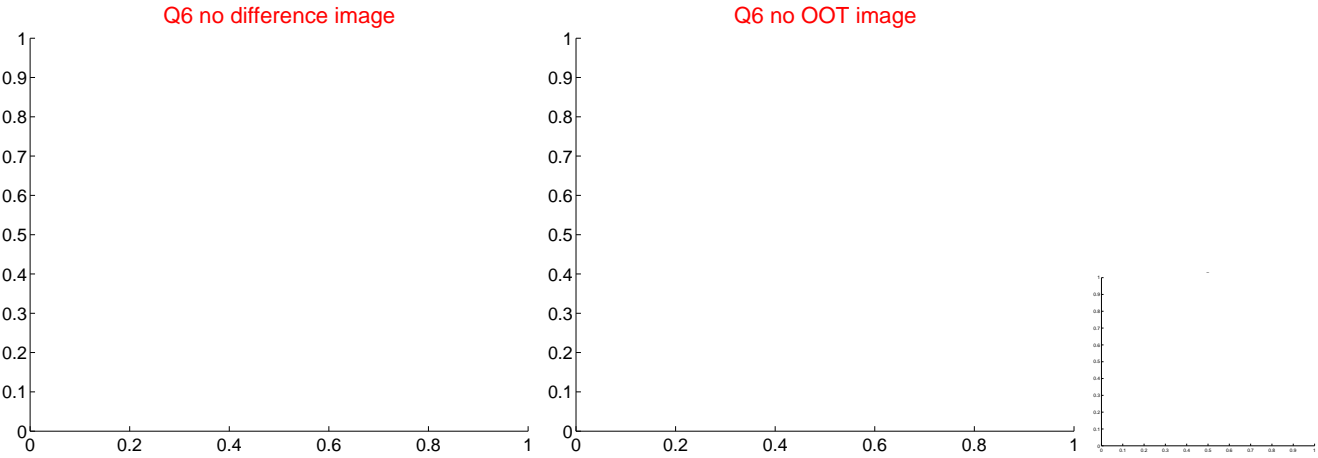
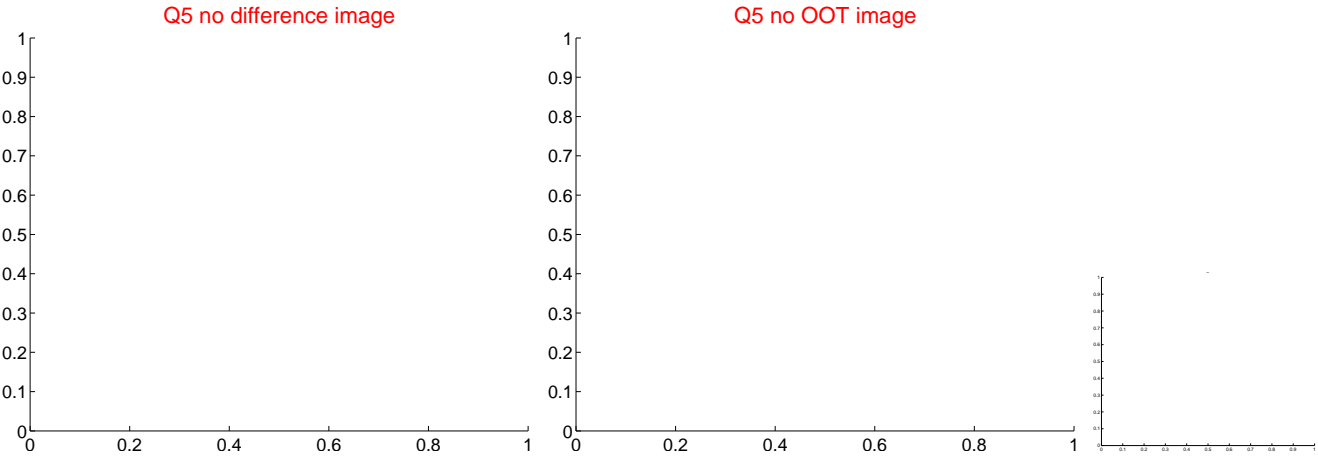
Q4 difference image



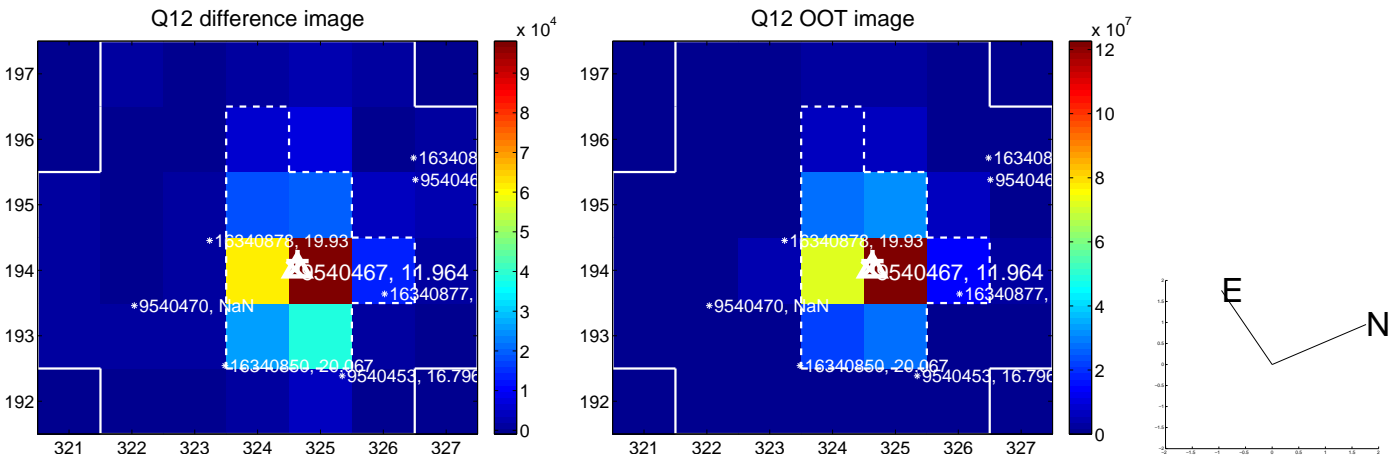
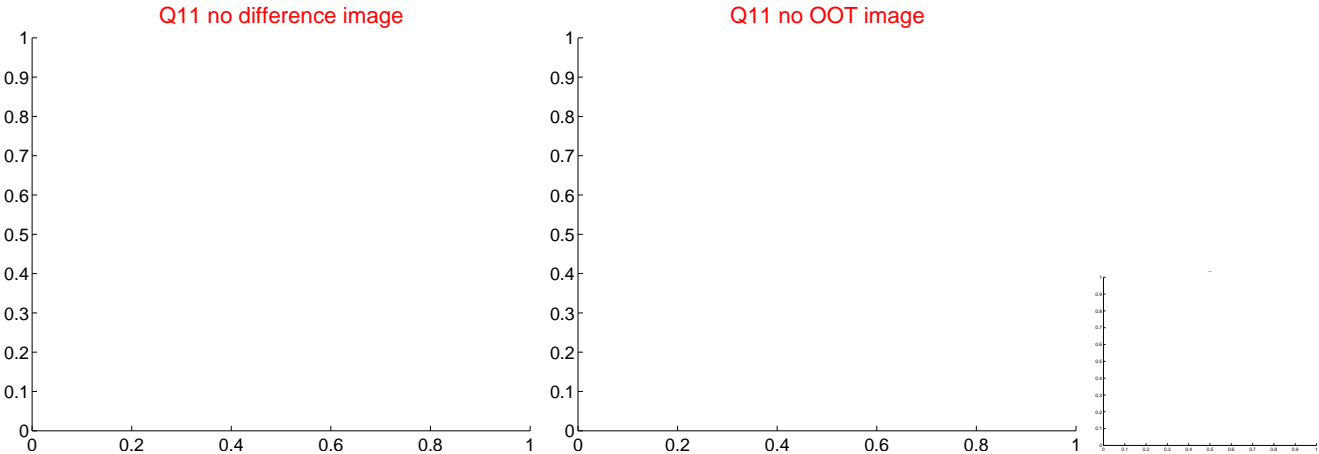
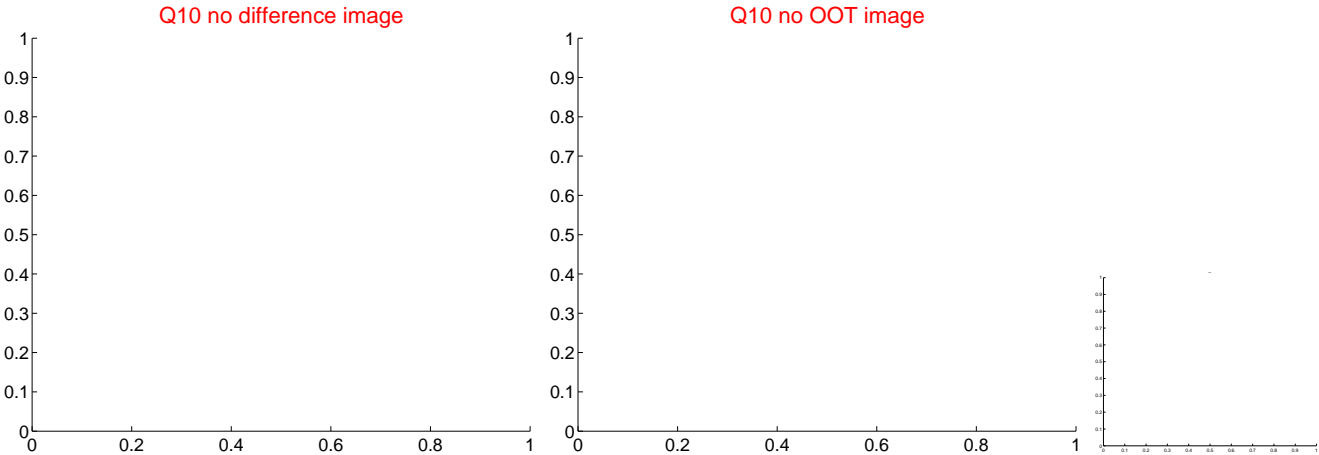
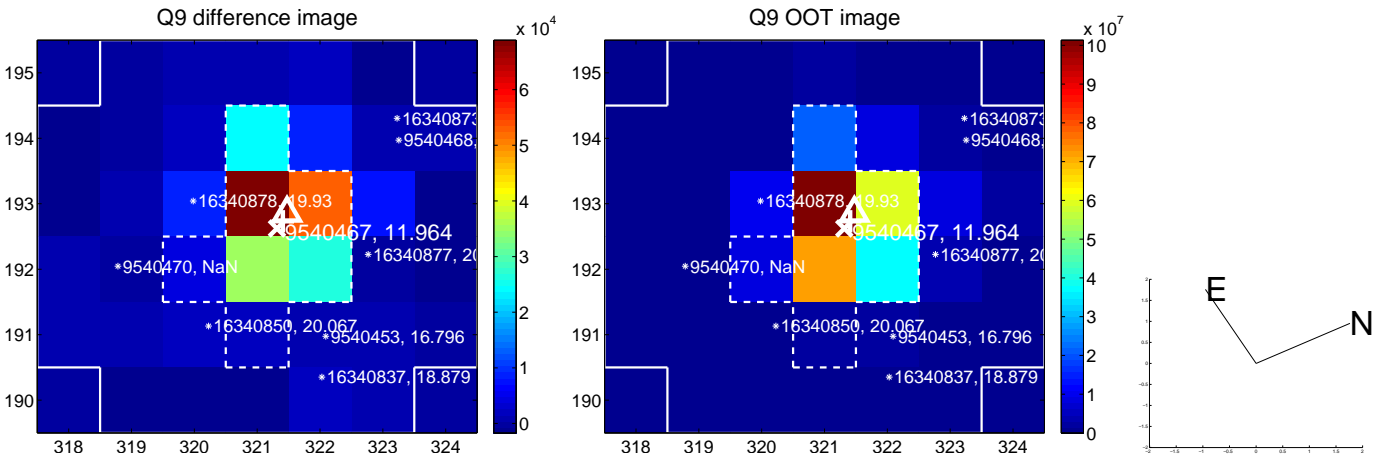
Q4 OOT image



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



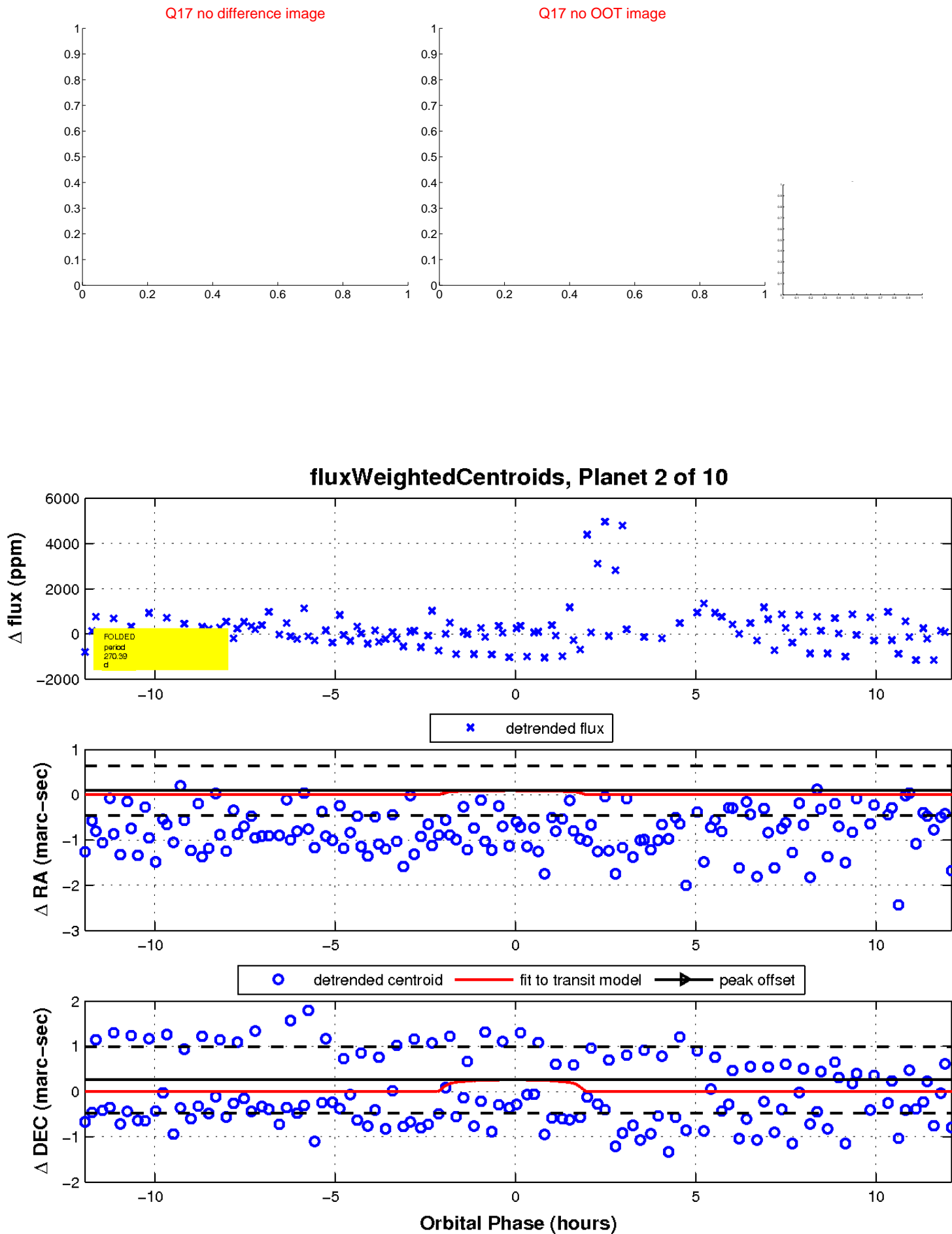
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



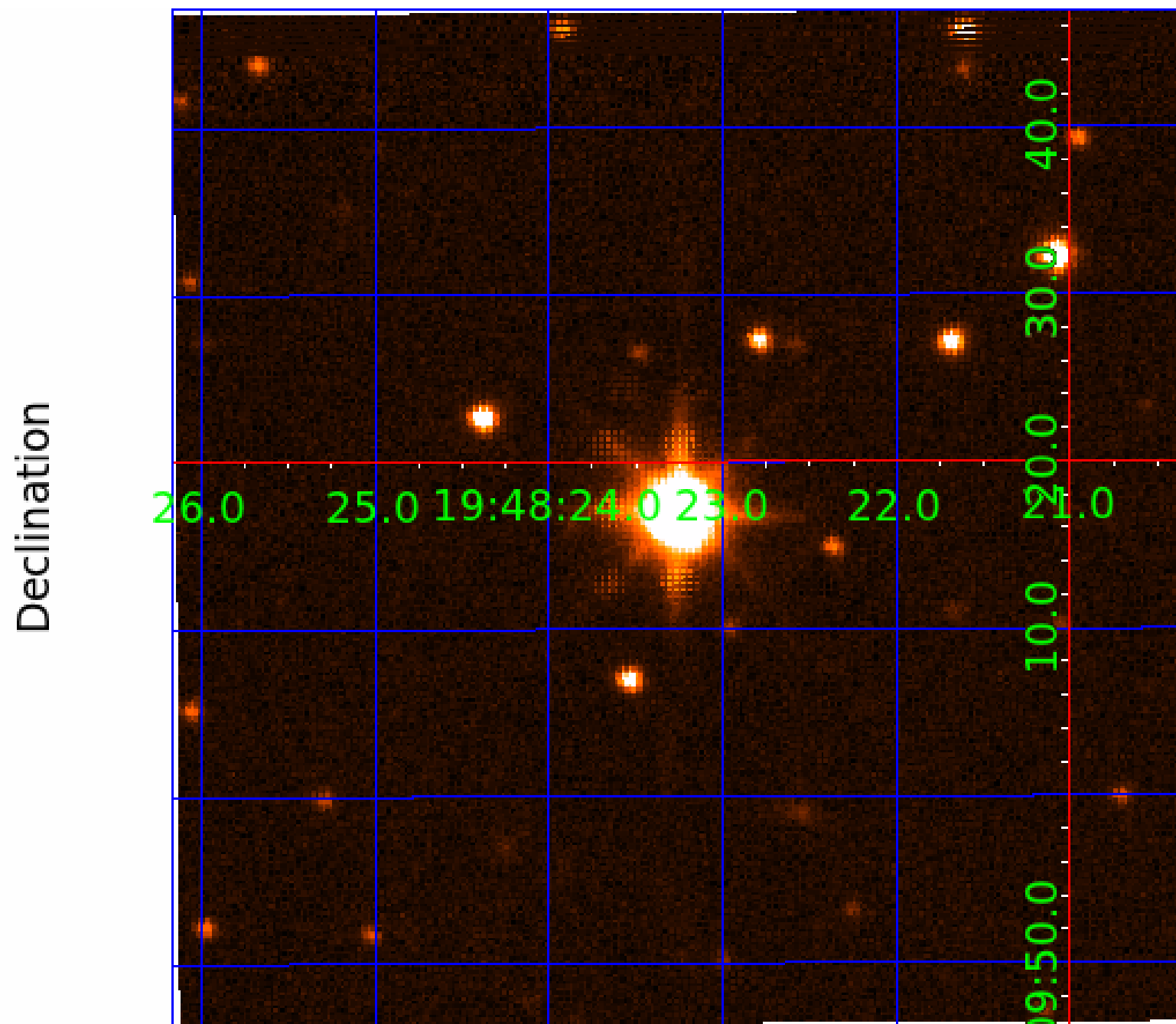
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image



# KIC 009540467

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009540467-01	OBS	No	525.337604	265.984740	518.3	9.332	17.4	4.7	0.57	3919	1.47	0.06
009540467-02	OBS	No	270.386745	360.361405	854.9	4.035	17.7	7.2	0.57	3919	1.75	0.15
009540467-03	OBS	No	360.937549	197.248197	1097.8	2.782	13.7	10.6	0.57	3919	2.07	0.10
009540467-05	OBS	No	418.686753	432.378155	794.3	6.491	15.0	6.7	0.57	3919	1.61	0.08
009540467-06	OBS	No	320.975460	210.598826	530.3	9.030	13.8	6.2	0.57	3919	1.32	0.12
009540467-08	OBS	No	679.085465	141.867271	741.8	3.869	15.2	7.9	0.57	3919	1.55	0.04
009540467-10	OBS	No	274.537158	346.932388	550.2	2.569	13.8	5.5	0.57	3919	1.50	0.15

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009540467-01	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—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009540467-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS
009540467-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS
009540467-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS
009540467-06	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
009540467-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009540467-10	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS—HALO_GHOST

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

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

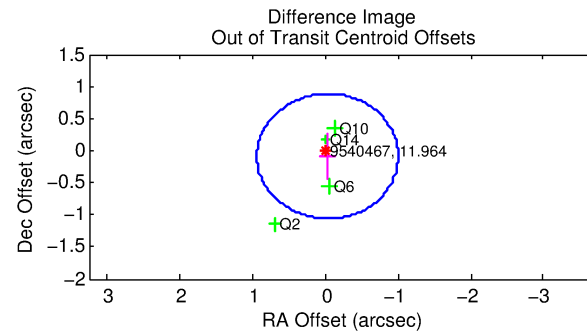
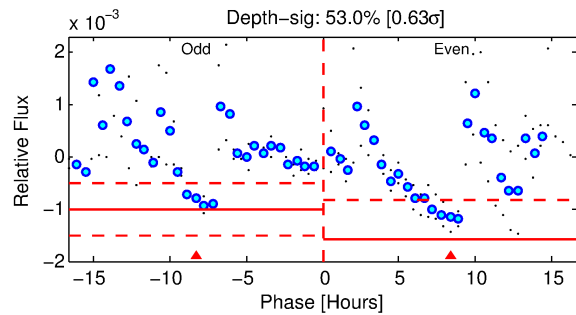
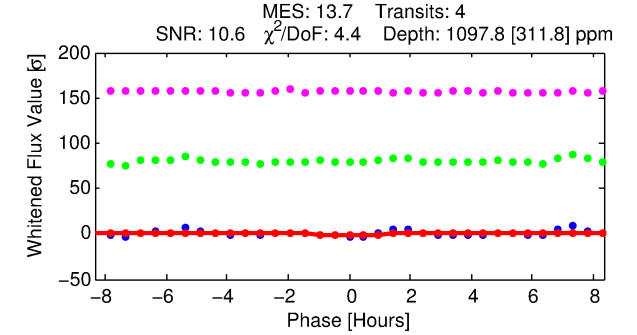
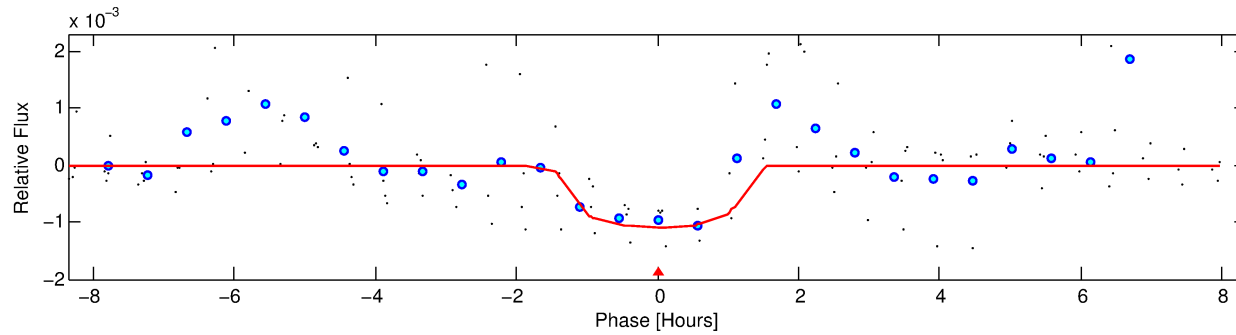
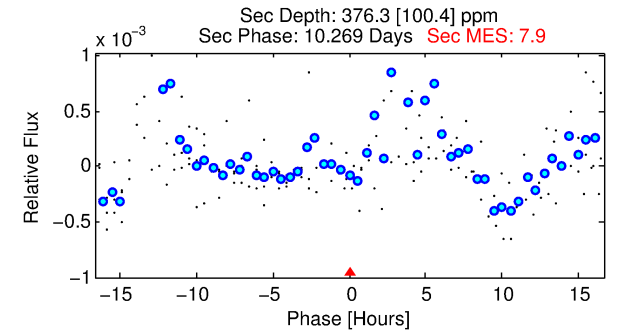
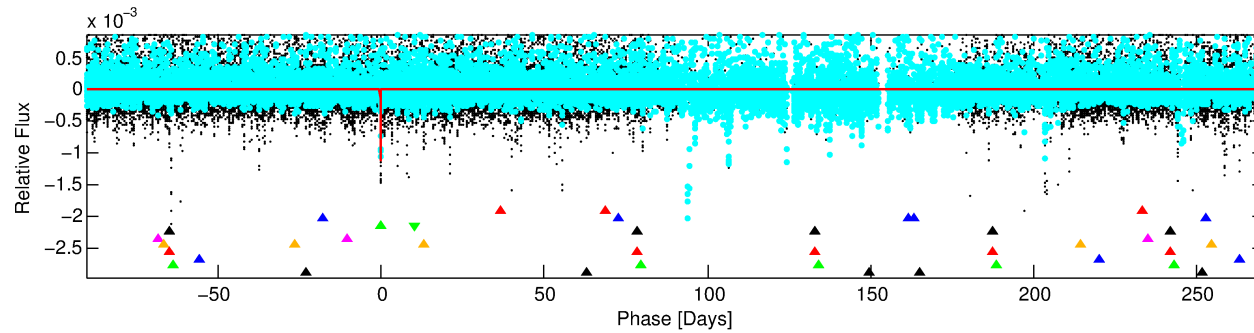
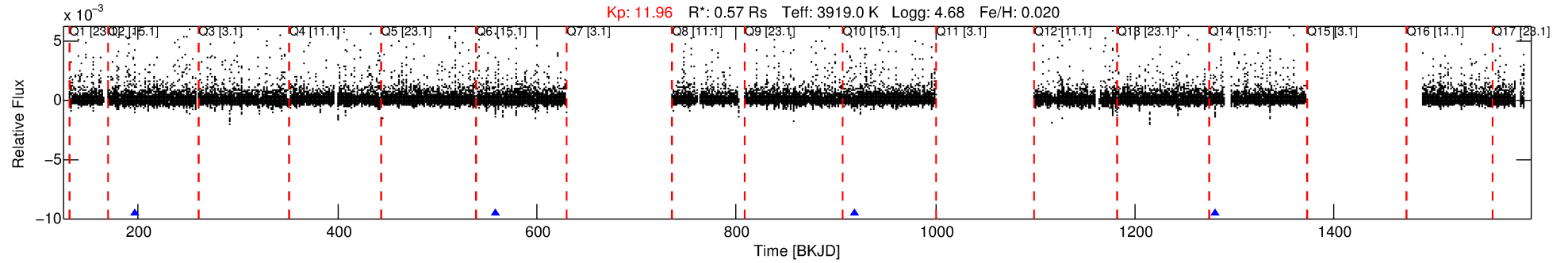
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009540467-03

No Significant Match Found

# DV One-Page Summary

KIC: 9540467 Candidate: 3 of 10 Period: 360.938 d



## DV Fit Results:

Period = 360.93755 [0.00629] d  
Epoch = 197.2482 [0.0149] BKJD  
Rp/R\* = 0.0332 [0.0457]  
a/R\* = 694.43 [3725.55]  
b = 0.76 [3.02]  
Seff = 0.10 [0.02]  
Teq = 144 [7] K  
Rp = 2.07 [2.87] Re  
a = 0.8227 [0.0877] AU  
Ag = 32652.83 [90545.56] [0.36 sigma]  
Teffp = 2996 [2077] K [1.37 sigma]

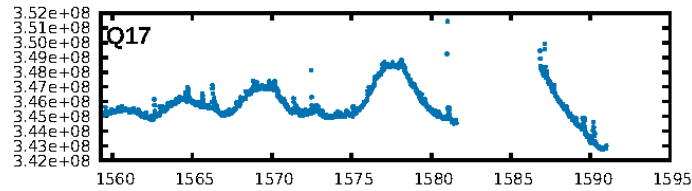
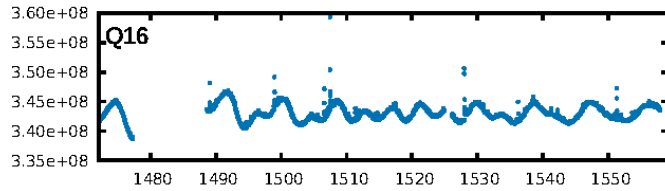
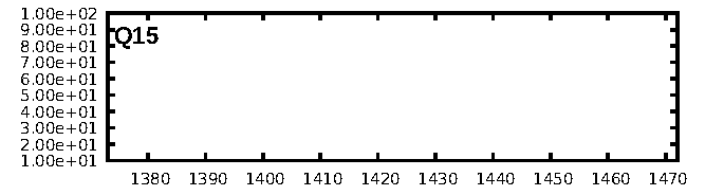
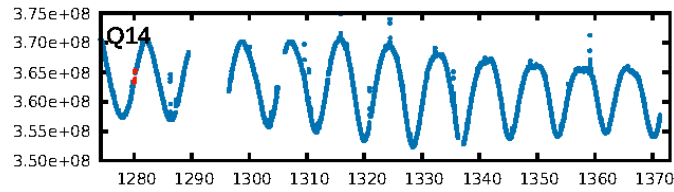
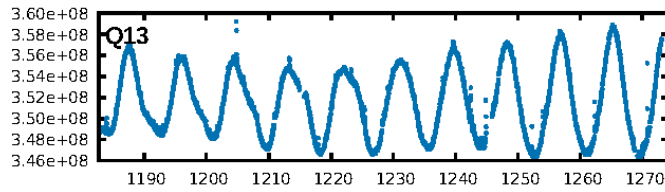
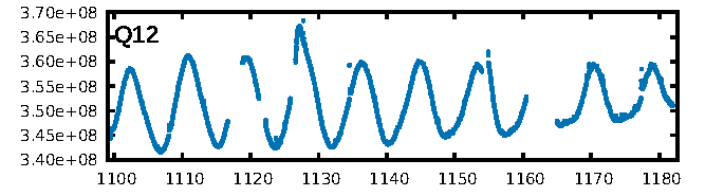
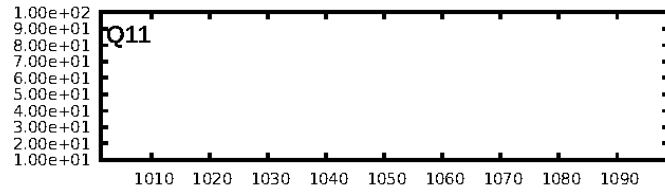
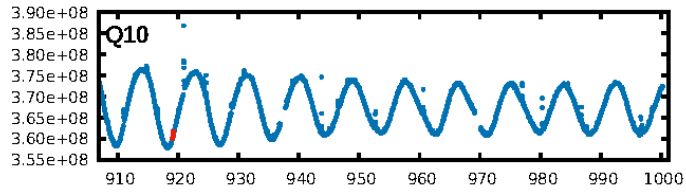
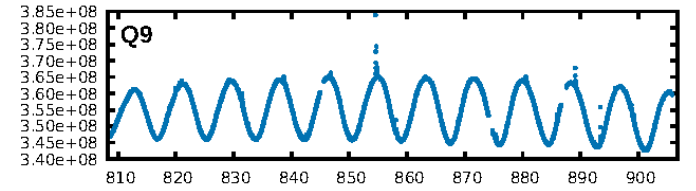
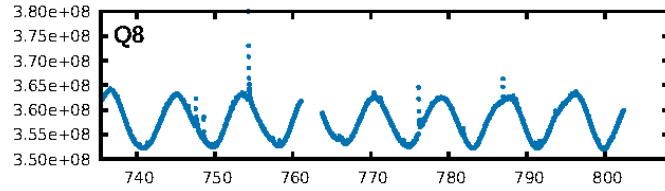
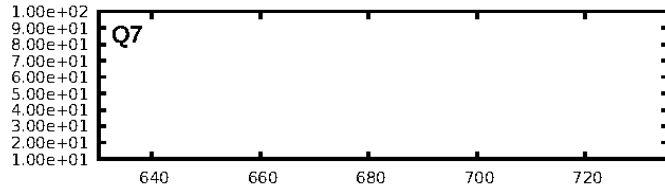
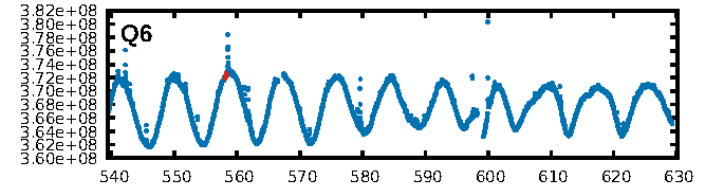
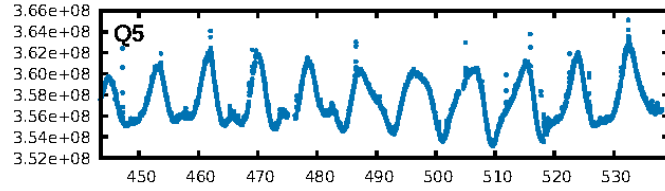
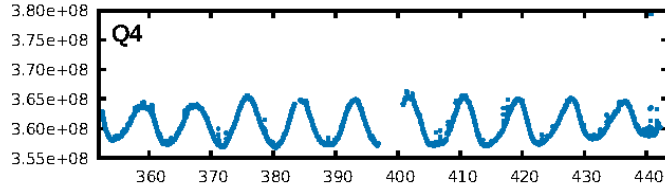
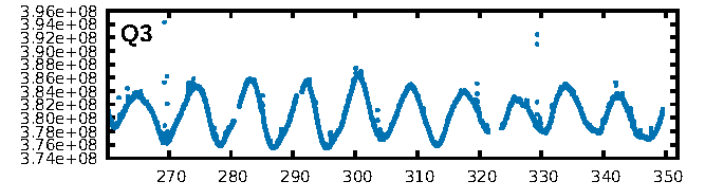
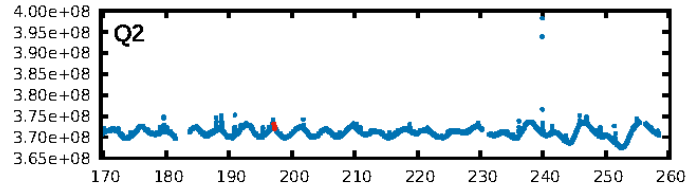
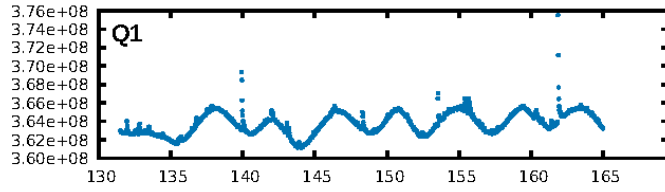
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [101.50 sigma]  
LongPeriod-sig: 100.0% [196.26 sigma]  
ModelChiSquare2-sig: 0.2%  
ModelChiSquareGof-sig: 0.1%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -3.092  
Centroid-sig: 14.9%  
Centroid-so: 0.233 arcsec [1.13 sigma]  
OotOffset-rm: 0.094 arcsec [0.29 sigma]  
KicOffset-rm: 0.340 arcsec [1.21 sigma]  
OotOffset-st: 4/0/0/0 [4]  
KicOffset-st: 4/0/0/0 [4]  
DiffImageQuality-fgm: 1.00 [4/4]  
DiffImageOverlap-fno: 1.00 [4/4]

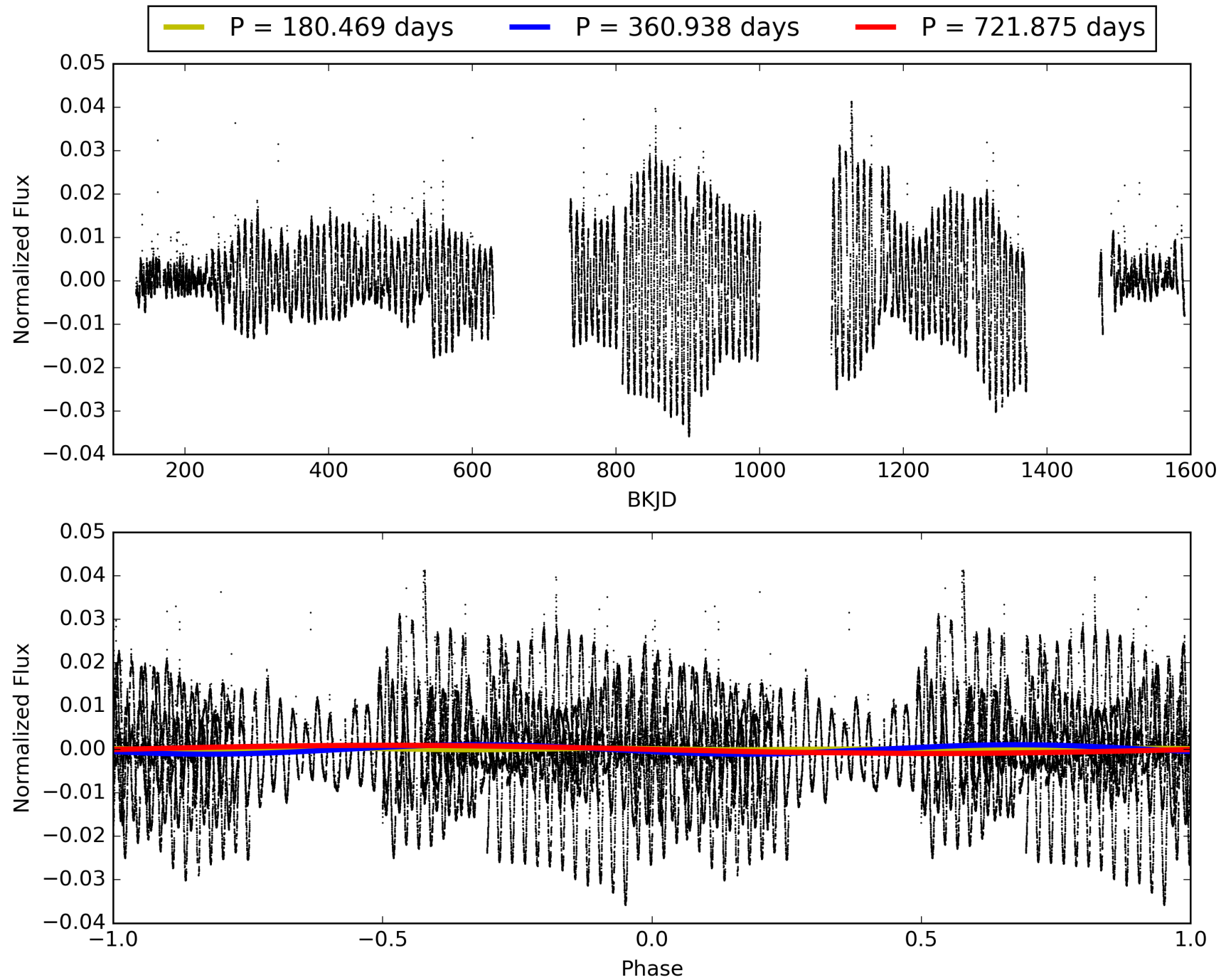
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 16:19:51 Z

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

# TCE 009540467-03, PDC Light Curves

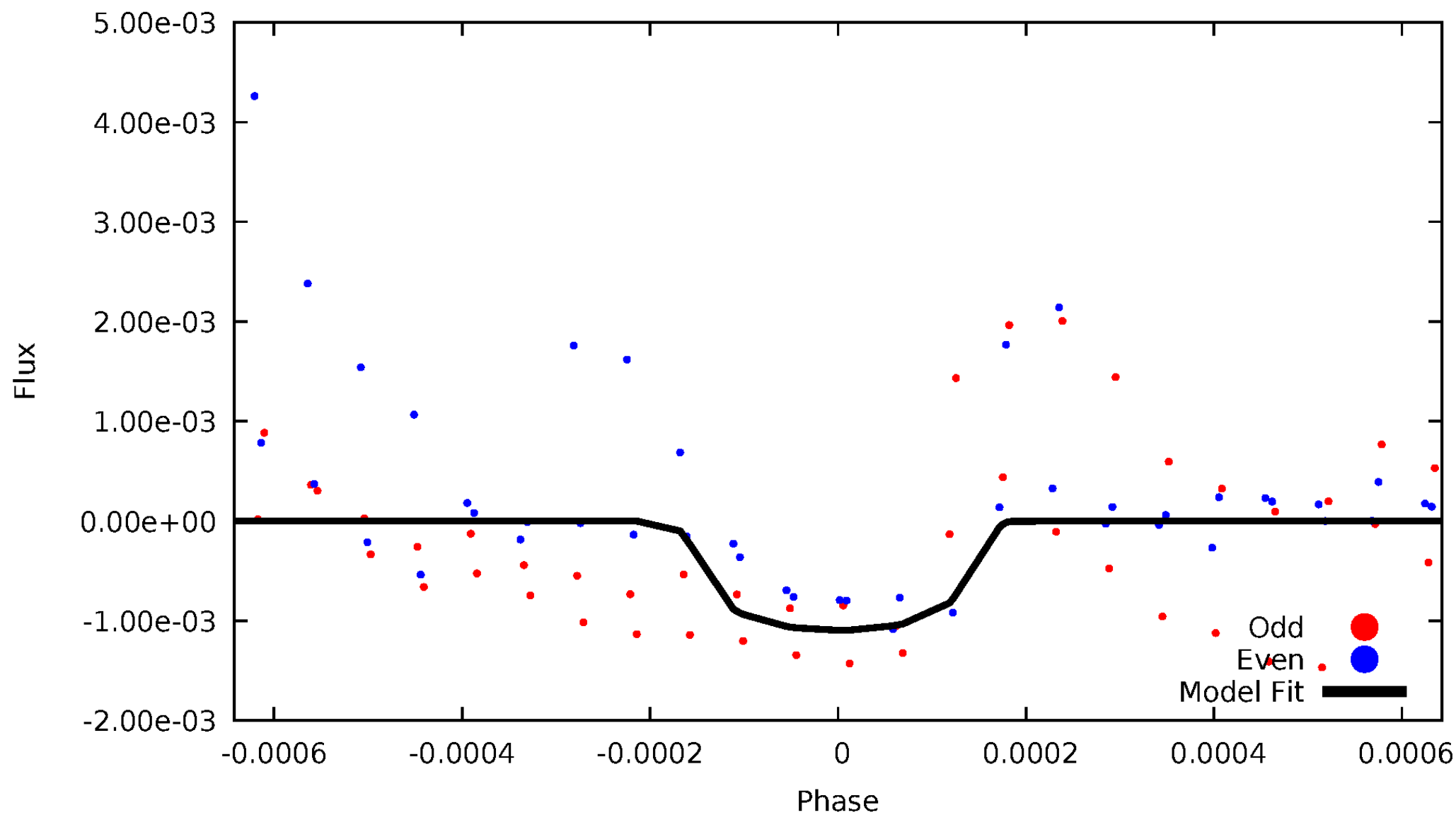


TCE 009540467-03



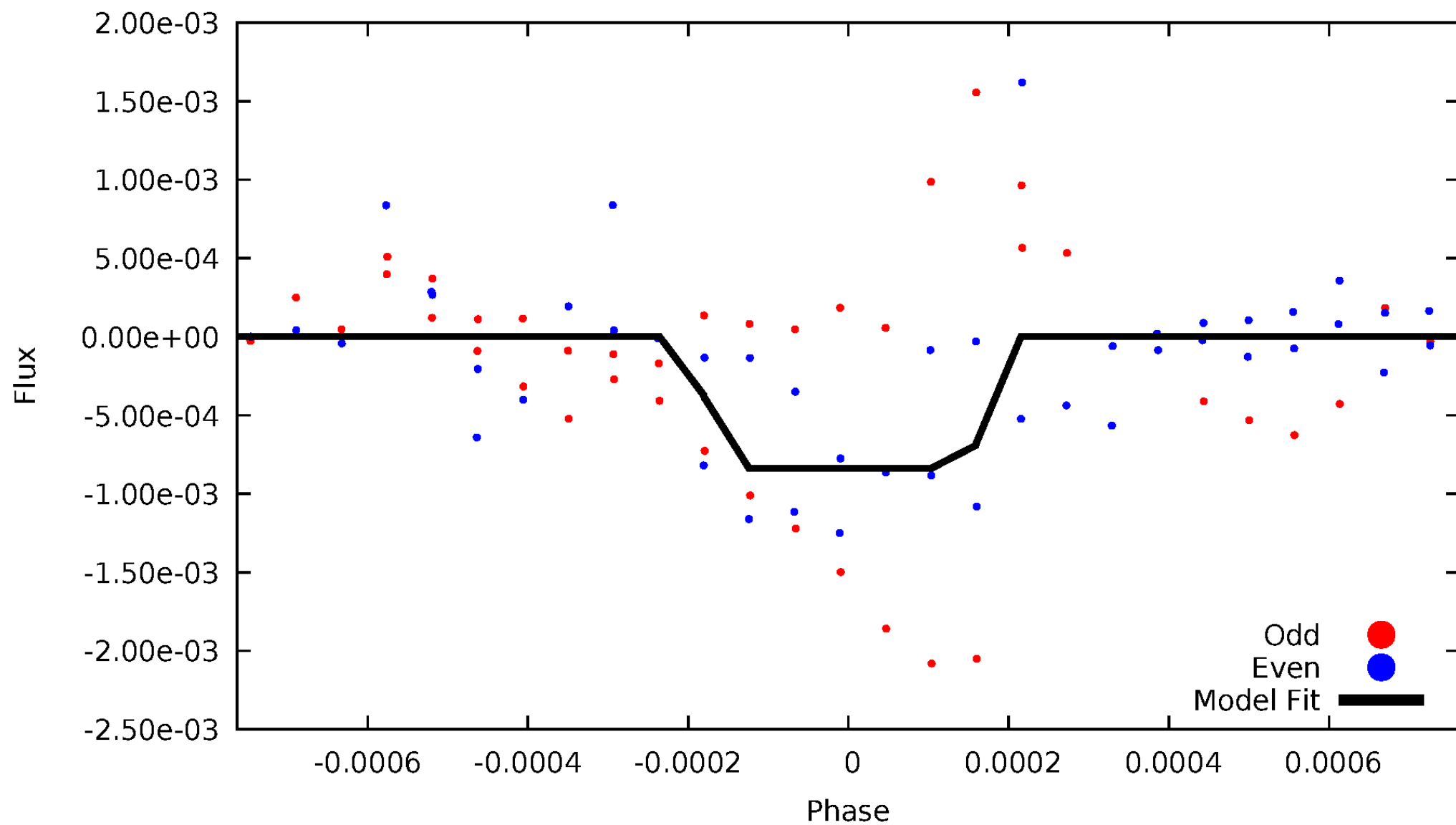
# DV Odd/Even

TCE 009540467-03



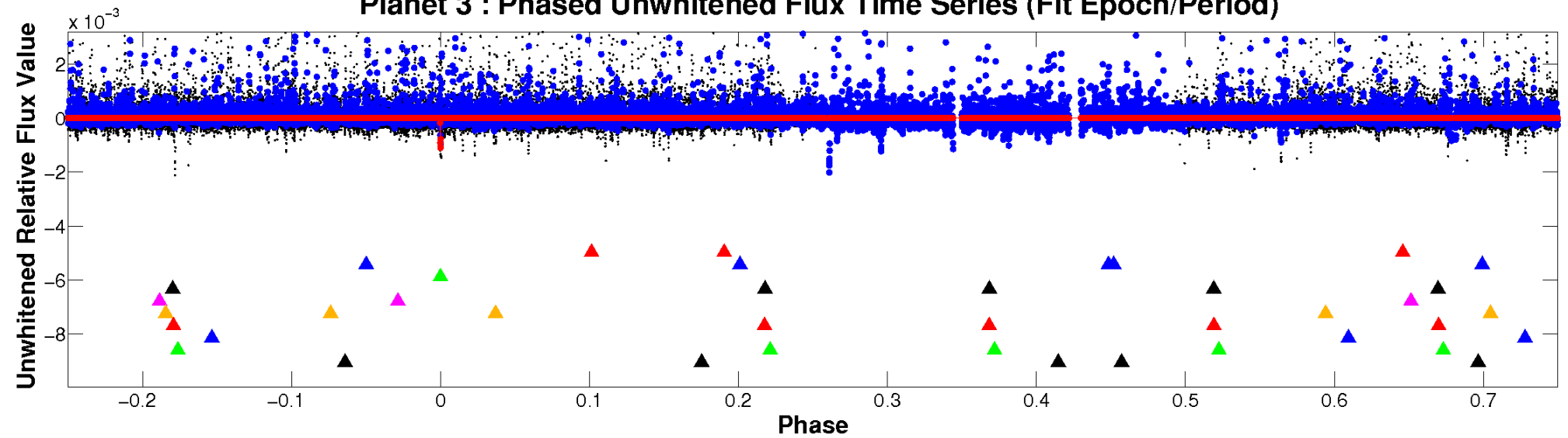
# ALT Odd/Even

TCE 009540467-03

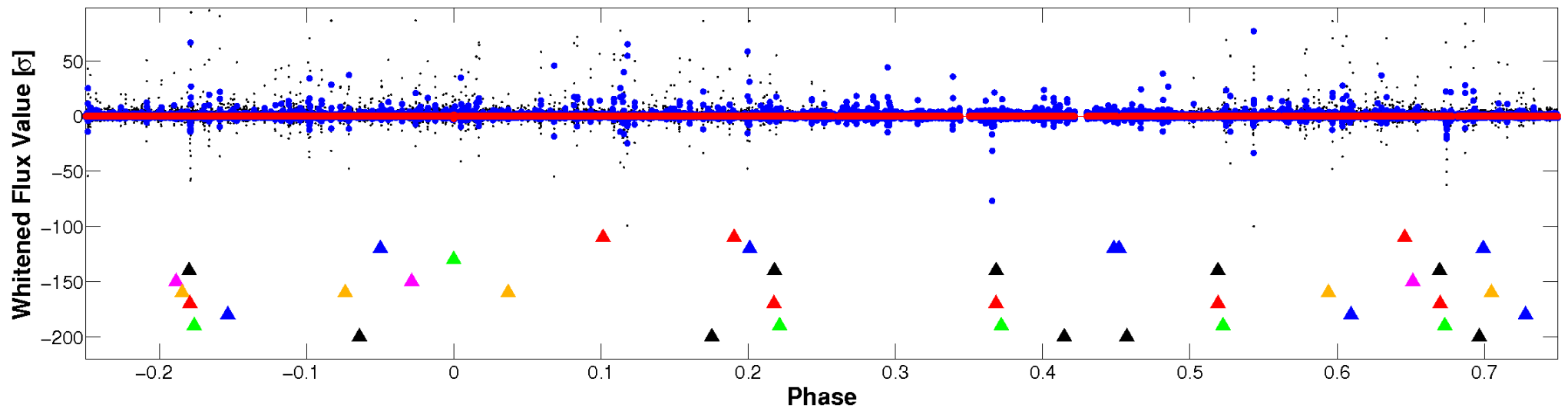


# Non-Whitened Vs. Whitened Light Curve

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

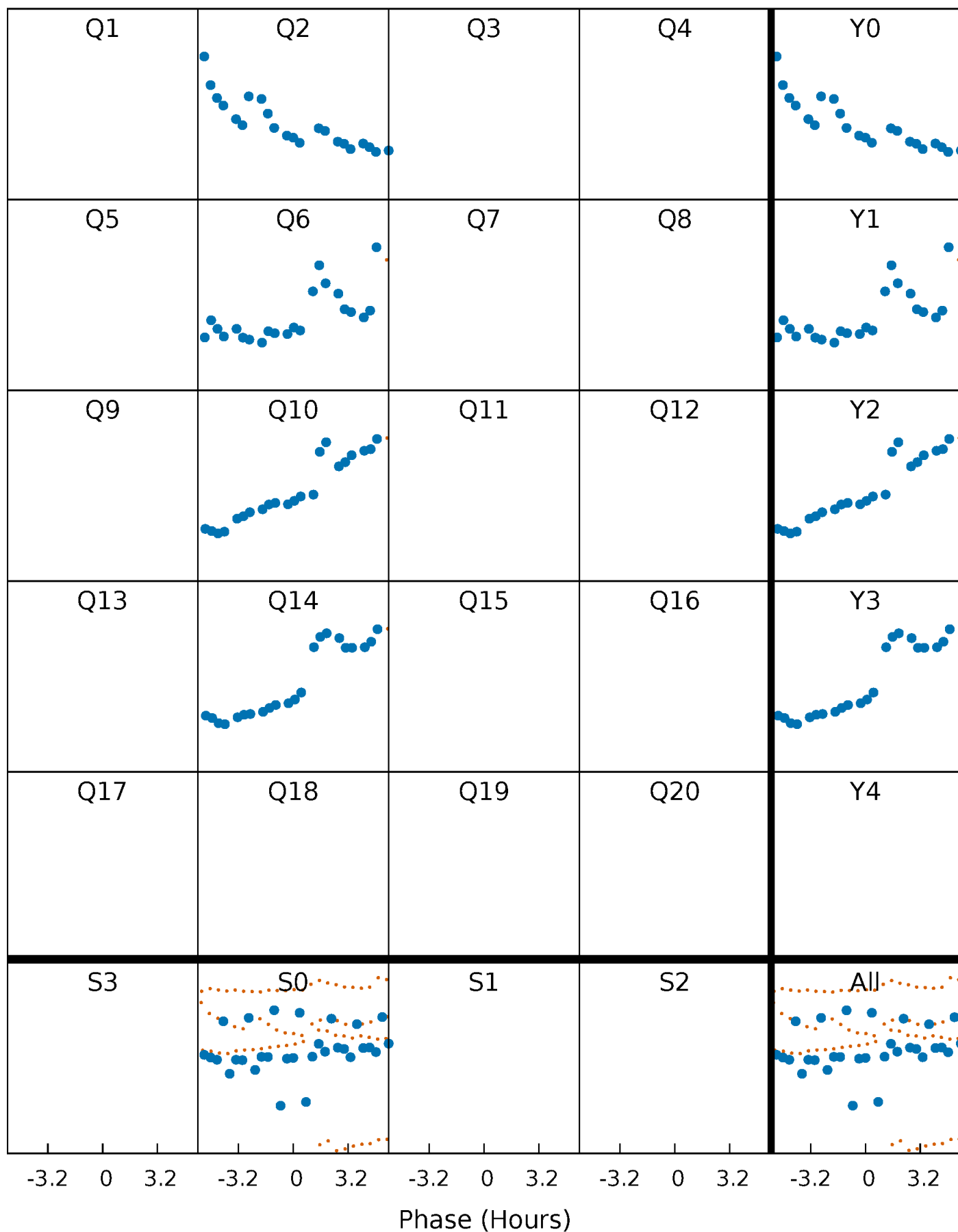


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



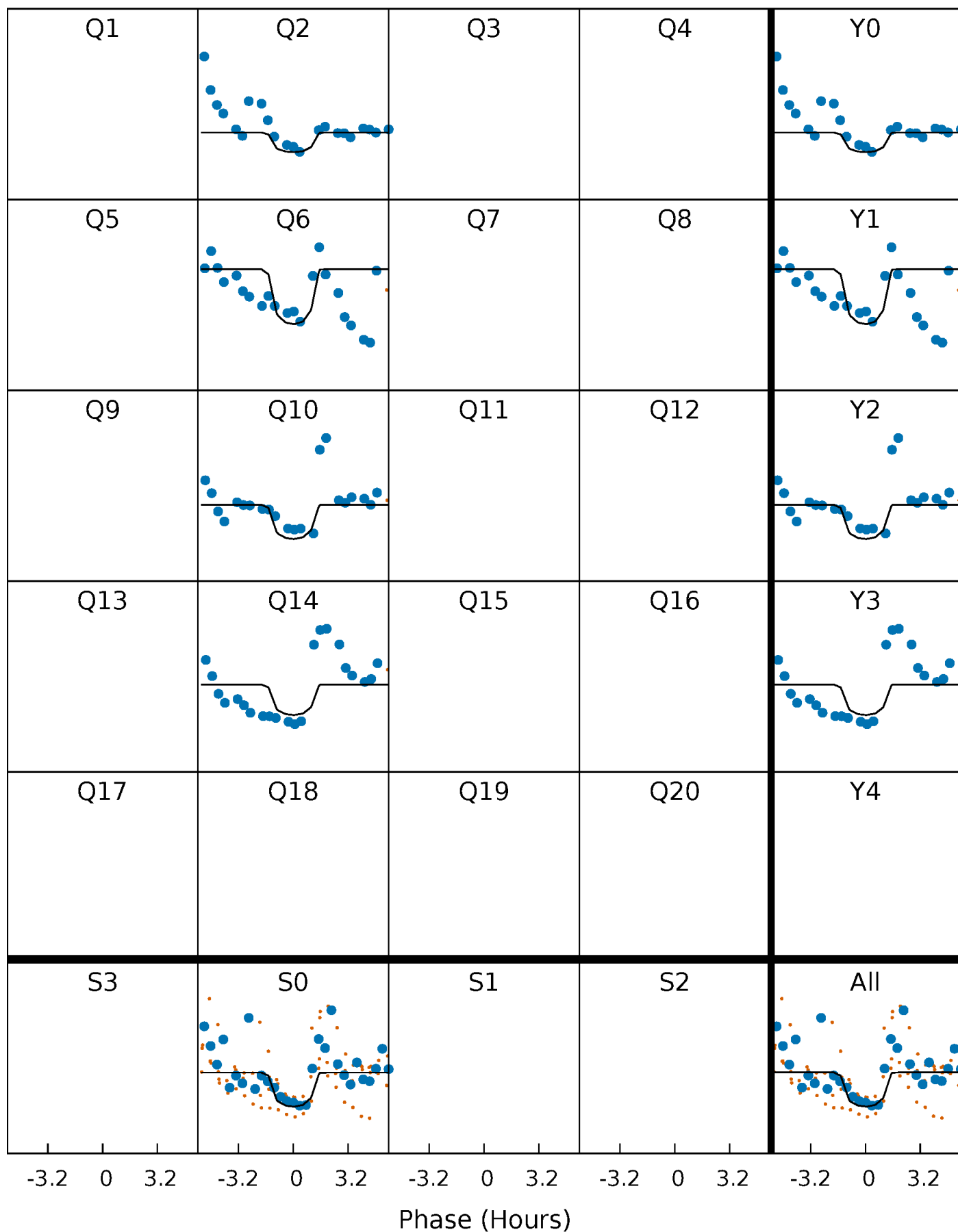
# PDC Quarter-Phased Transit Curves

TCE 009540467-03 P=360.937549 Days  $T_0=197.248197$  (BKJD)



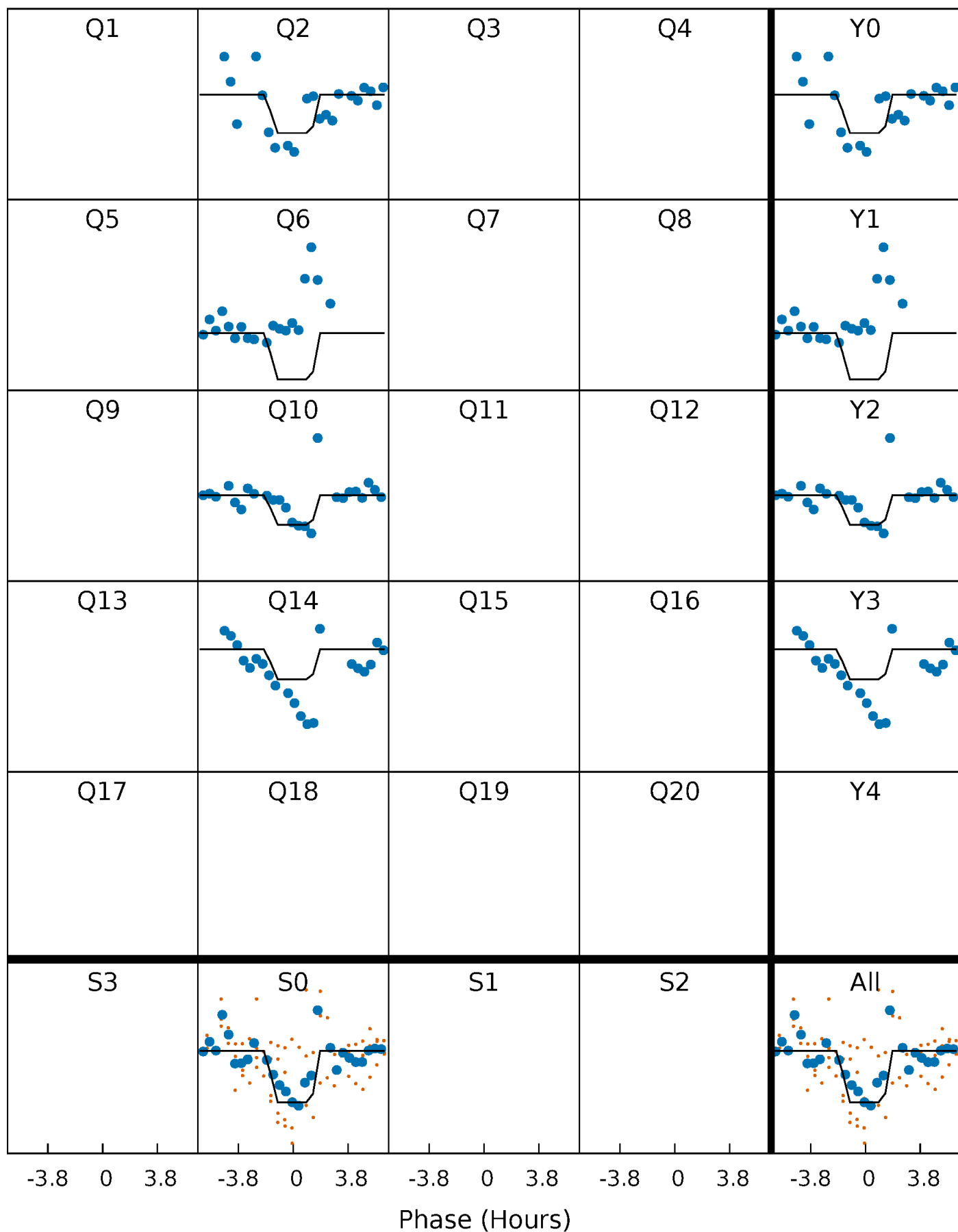
# DV Quarter-Phased Transit Curves

TCE 009540467-03 P=360.937549 Days  $T_0=197.248197$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

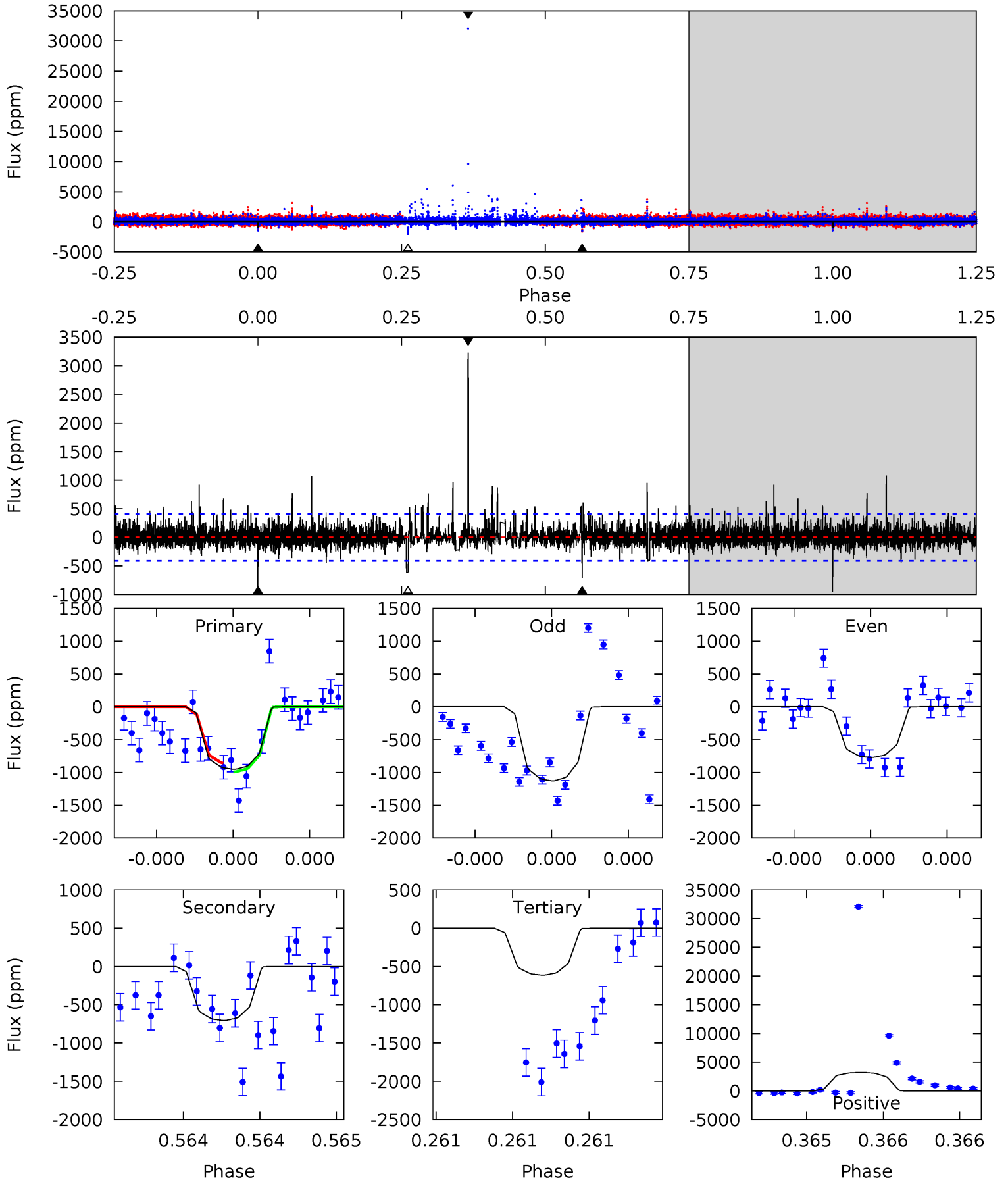
TCE 009540467-03 P=360.918186 Days  $T_0=197.273210$  (BKJD)



# DV Model-Shift Uniqueness Test

009540467-03, P = 360.937549 Days, E = 197.248197 Days

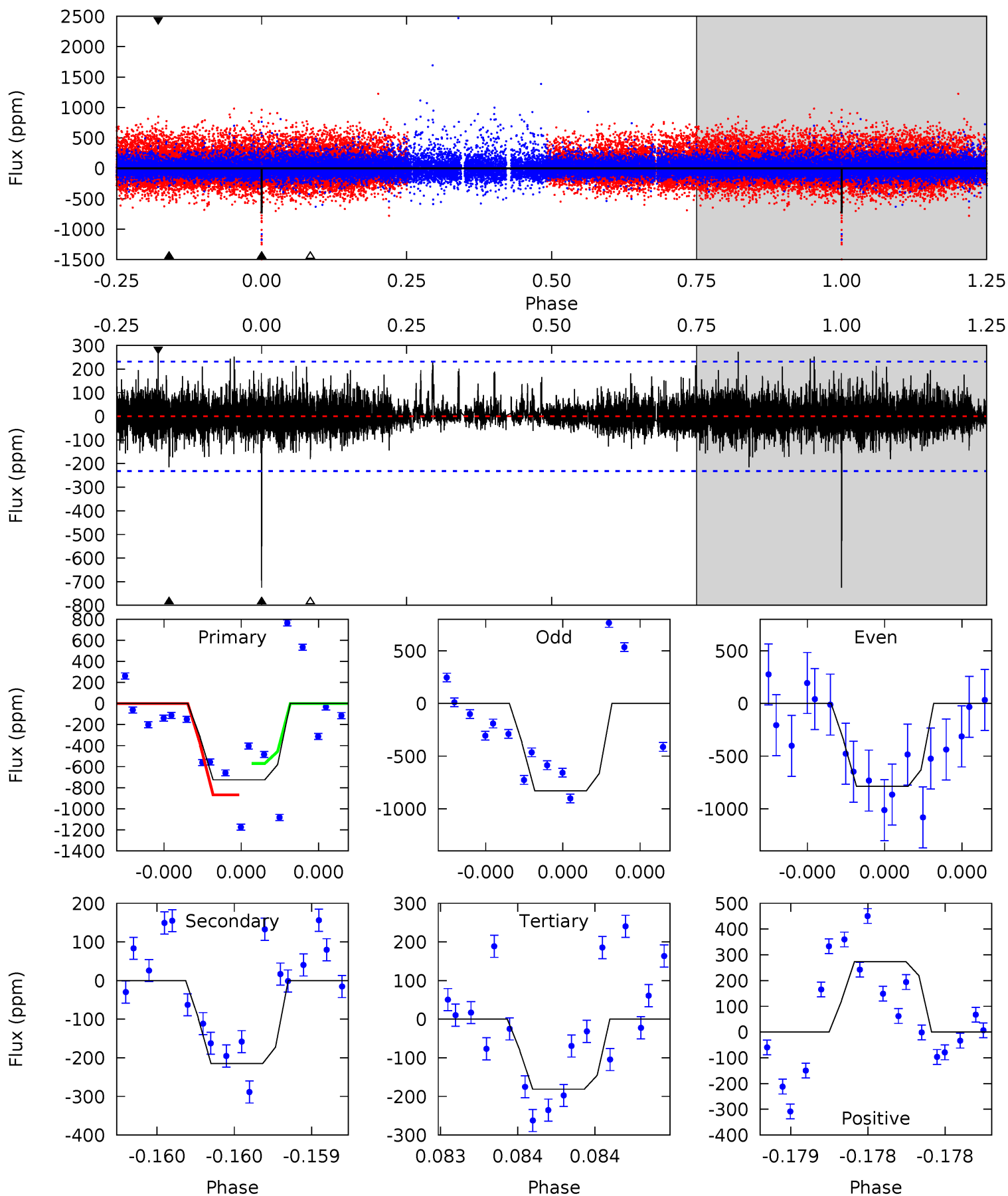
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.1	9.71	8.45	44.4	5.64	3.58	1.87	4.65	-31.3	1.26	-34.7	1.75	1.05	0.77	0.87



# Alt Model-Shift Uniqueness Test

009540467-03, P = 360.918186 Days, E = 197.273210 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
17.6	5.23	4.41	6.64	5.64	3.58	1.12	13.2	11.0	0.82	-1.41	0.53	0.90	0.27	3.15



### Stellar Parameters For KIC 009540467

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3919^{+121}_{-148}$	$4.679^{+0.070}_{-0.025}$	$0.020^{+0.250}_{-0.300}$	$0.572^{+0.042}_{-0.079}$	$0.570^{+0.051}_{-0.070}$	$4.295^{+1.555}_{-0.534}$
	+3%/-4%	+1%/-1%	+1250%/-1500%	+7%/-14%	+9%/-12%	+36%/-12%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 009540467-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-706 \pm 73$	$2.91^{+2.53}_{-1.97}$	$199^{+7}_{-8}$	$3262^{+1521}_{-551}$	$31306^{+267089}_{-22459}$
Alt.	$-215 \pm 41$	$2.69^{+2.51}_{-1.80}$	$199^{+7}_{-8}$	$2793^{+1156}_{-424}$	$10603^{+94797}_{-7731}$

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

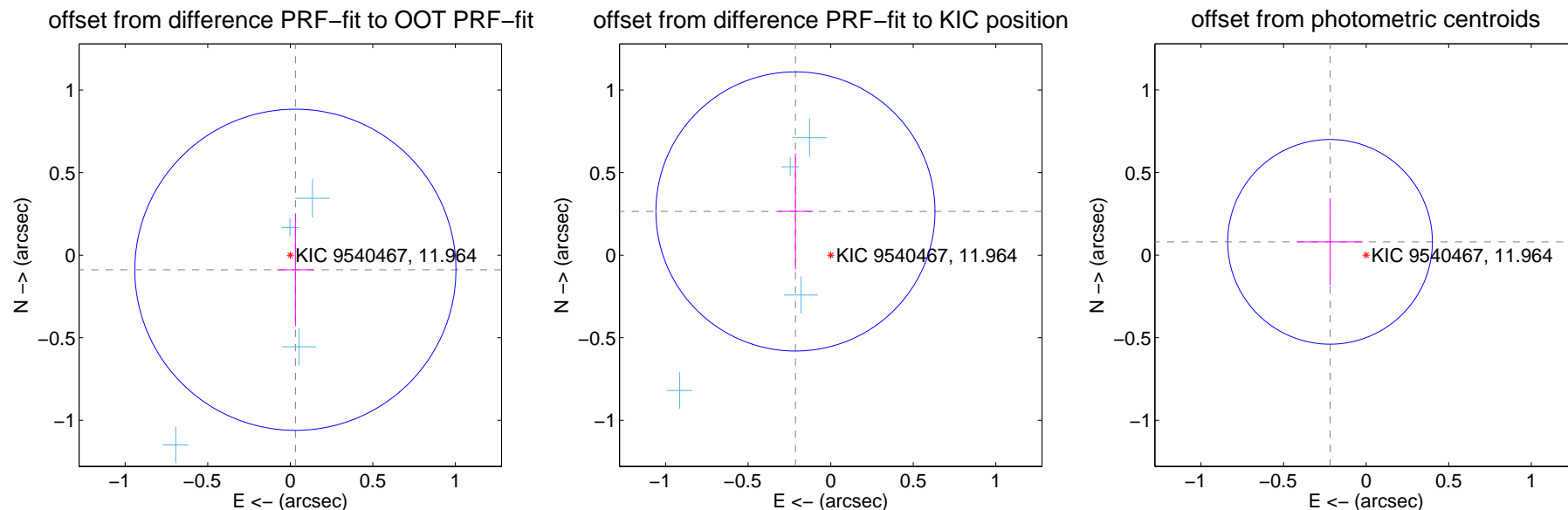
## DV Centroid Data

Supplemental centroid analysis for 009540467-03. **Kepler magnitude: 11.96.** Transit SNR 10.62

There are 4 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.44 arcsec

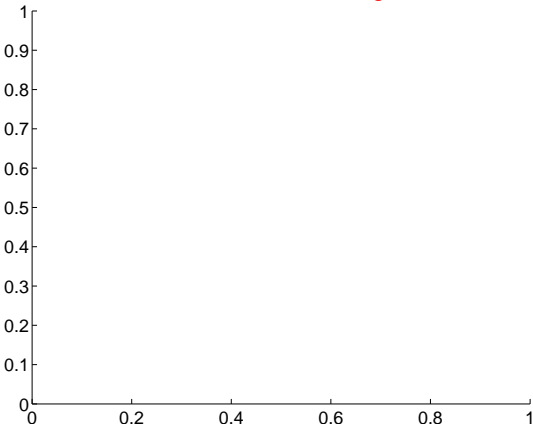
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.094 \pm 0.324$	0.29	$-0.031 \pm 0.110$	$-0.089 \pm 0.341$
PRF-fit source offset from KIC position	$0.340 \pm 0.282$	1.21	$0.214 \pm 0.107$	$0.265 \pm 0.352$
photometric centroid source offset	$0.23 \pm 0.21$	1.13	$0.22 \pm 0.20$	$0.08 \pm 0.26$



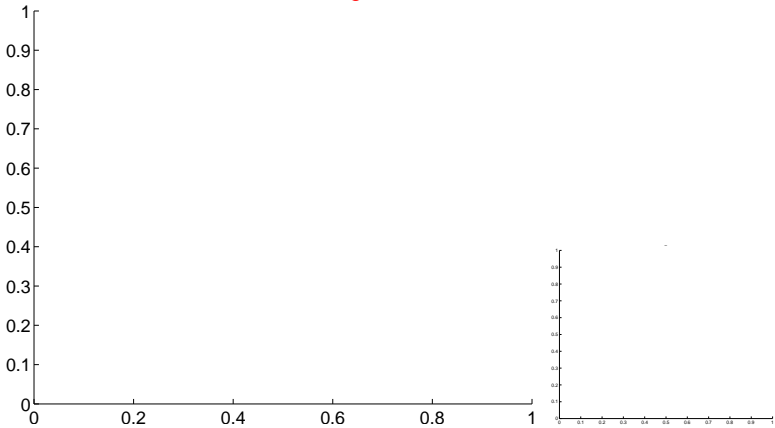
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

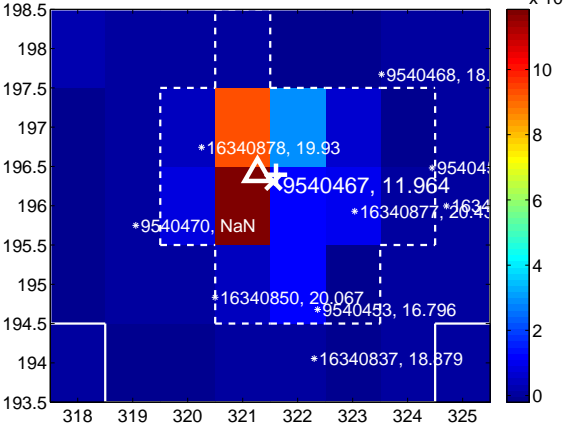
Q1 no difference image



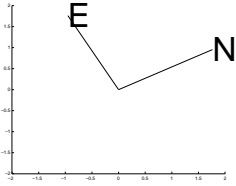
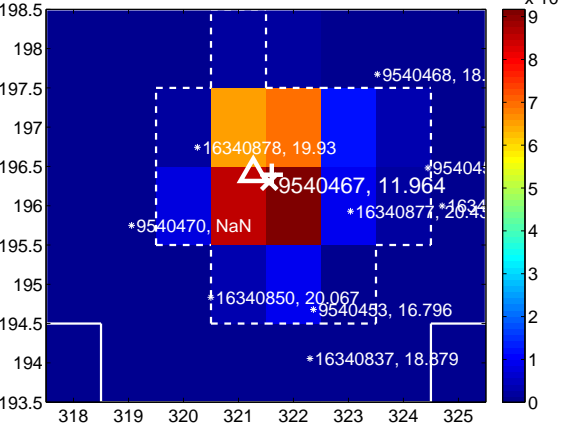
Q1 no OOT image



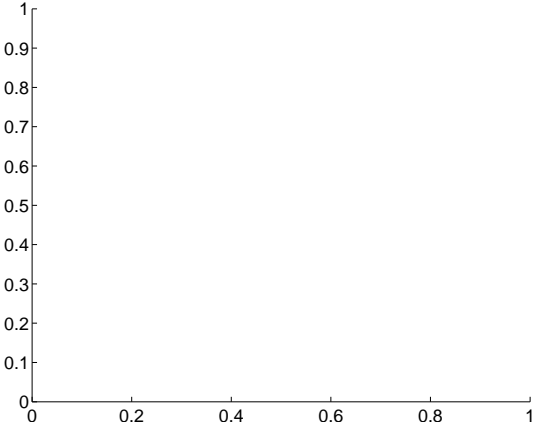
Q2 difference image



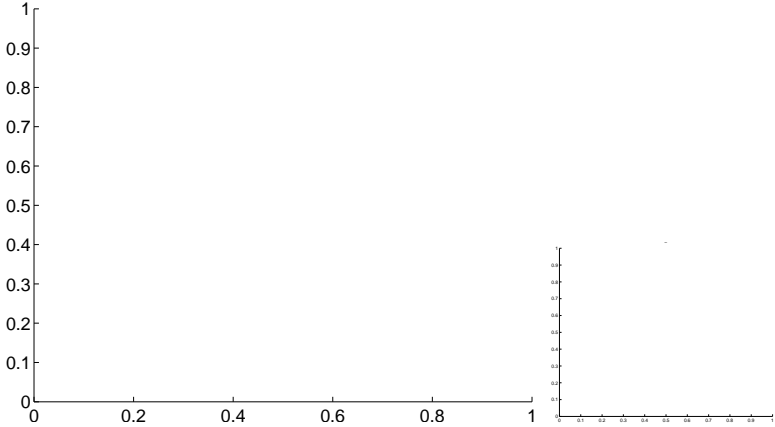
Q2 OOT image



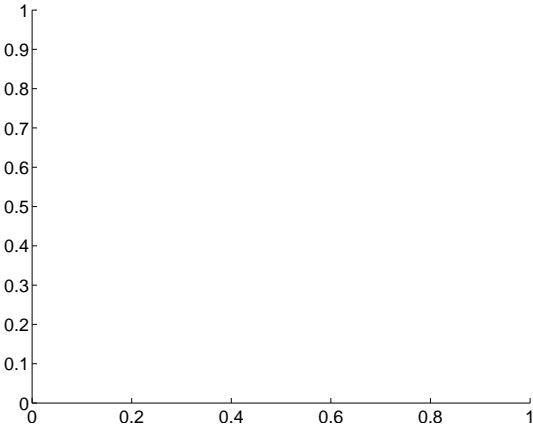
Q3 no difference image



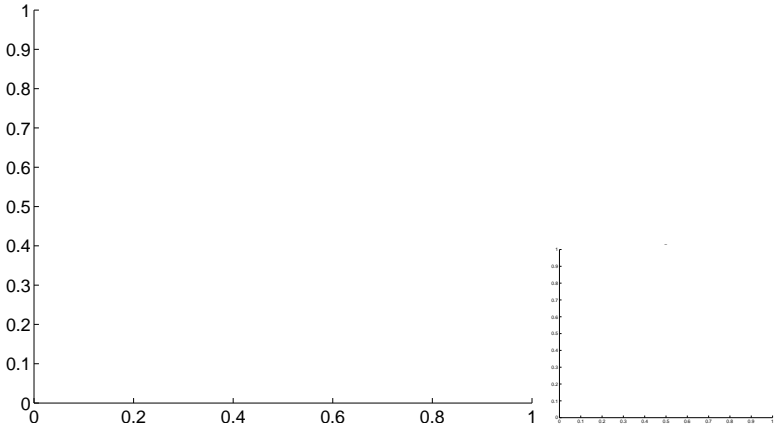
Q3 no OOT image



Q4 no difference image

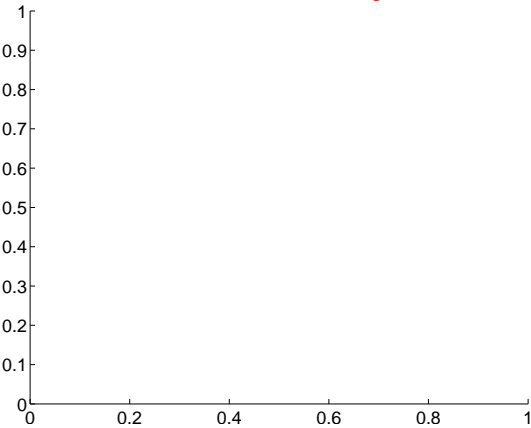


Q4 no OOT image

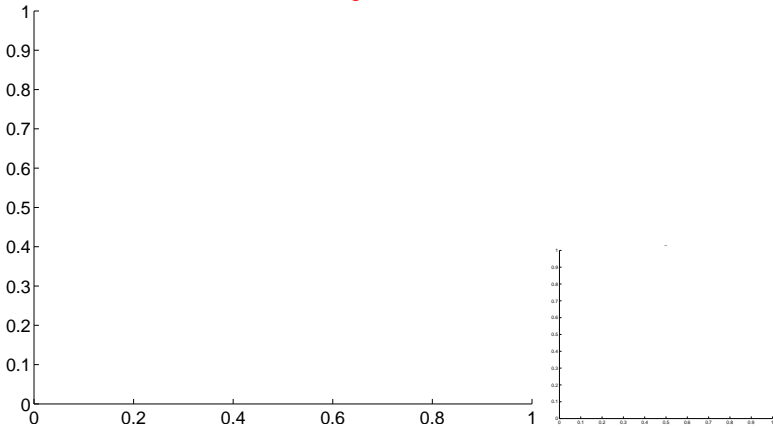


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

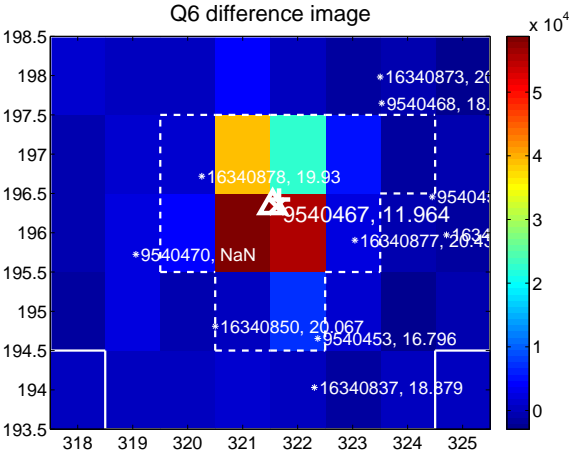
Q5 no difference image



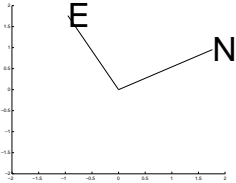
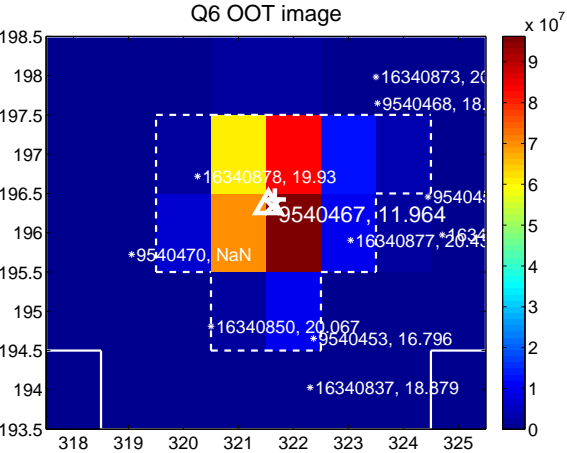
Q5 no OOT image



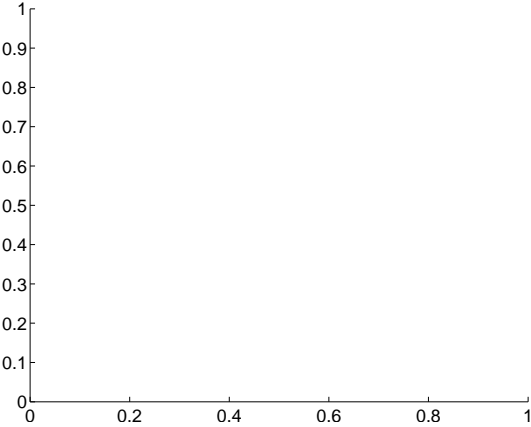
Q6 difference image



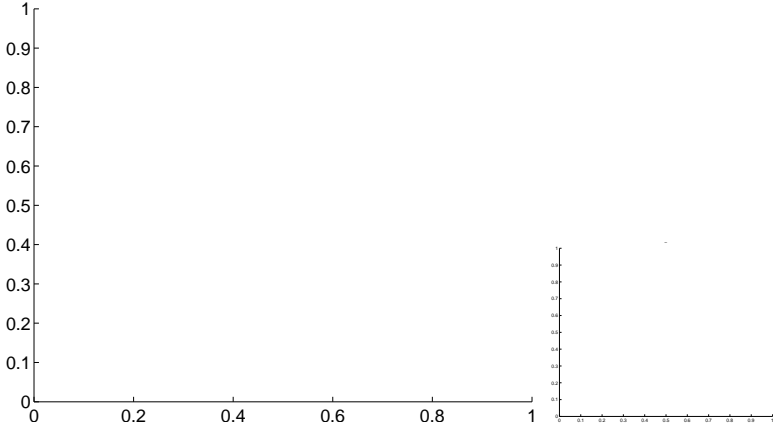
Q6 OOT image



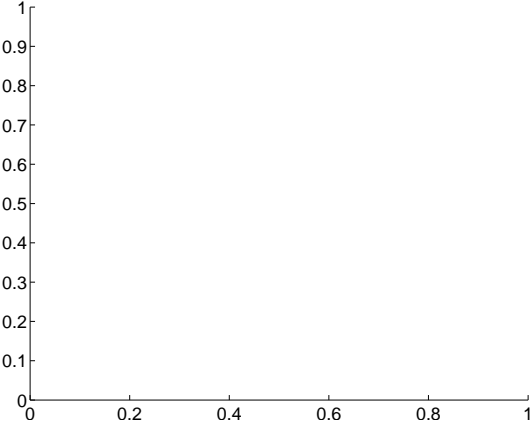
Q7 no difference image



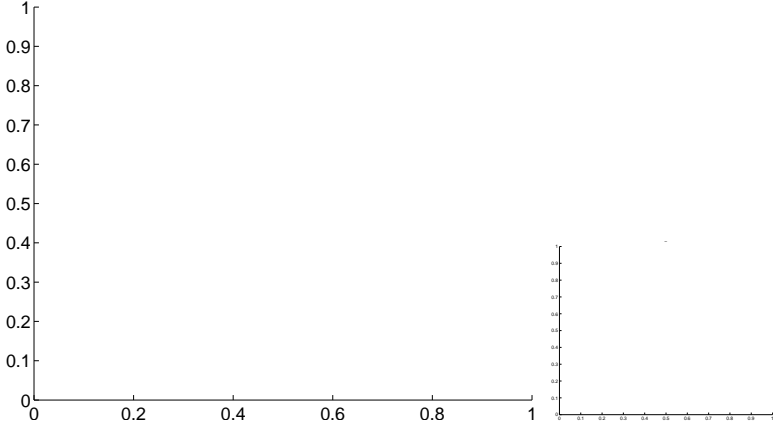
Q7 no OOT image



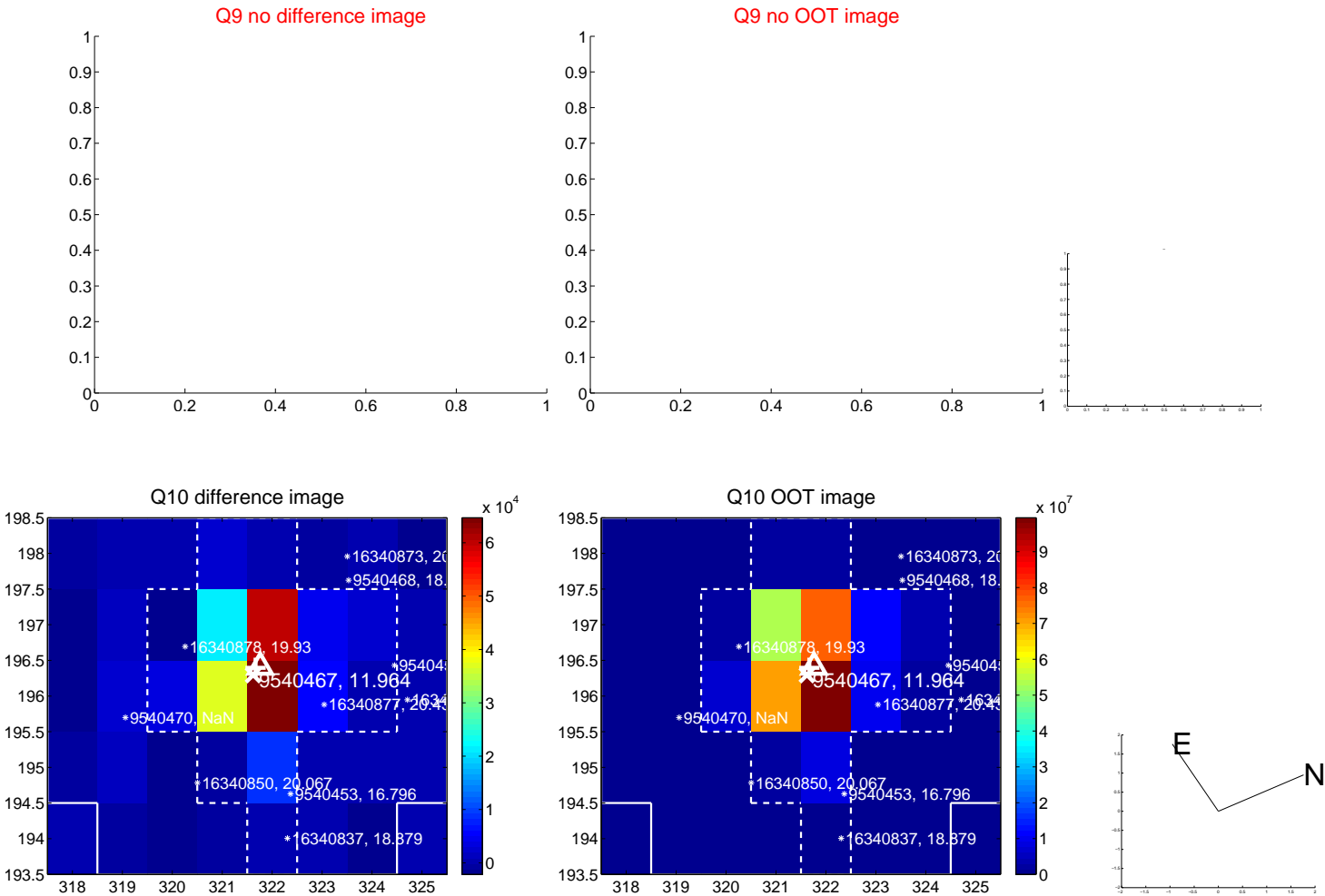
Q8 no difference image



Q8 no OOT image

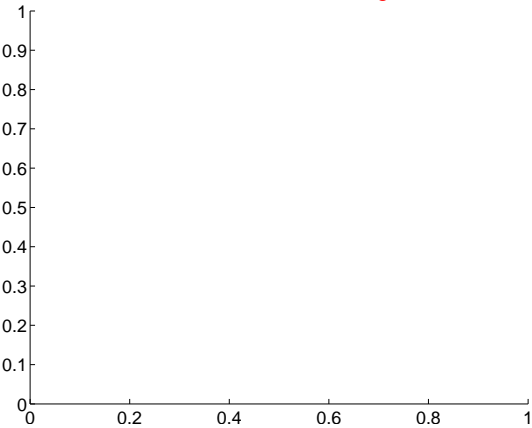


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

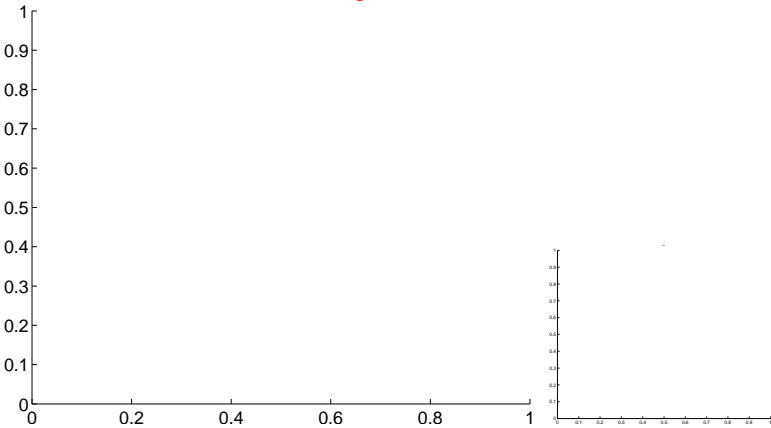


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

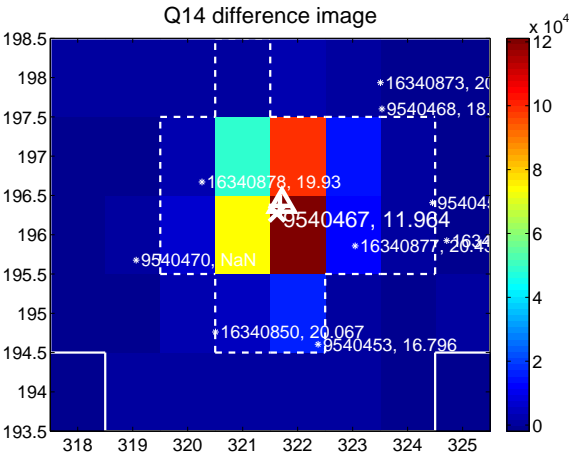
Q13 no difference image



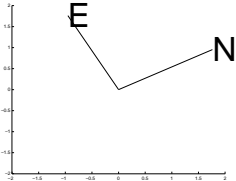
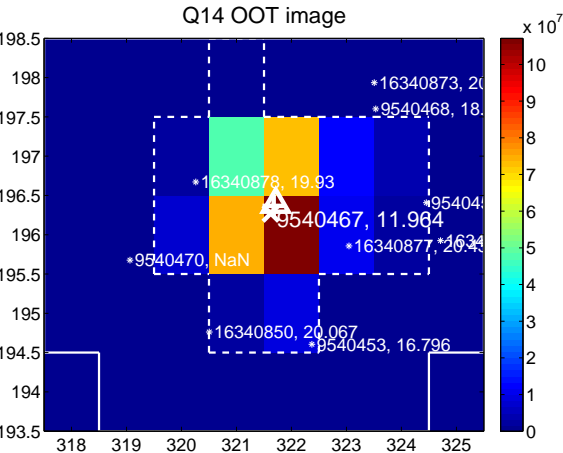
Q13 no OOT image



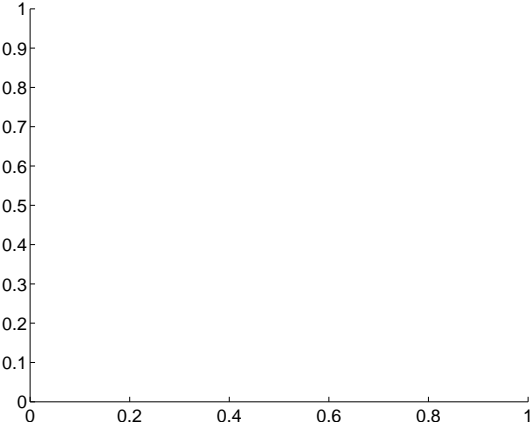
Q14 difference image



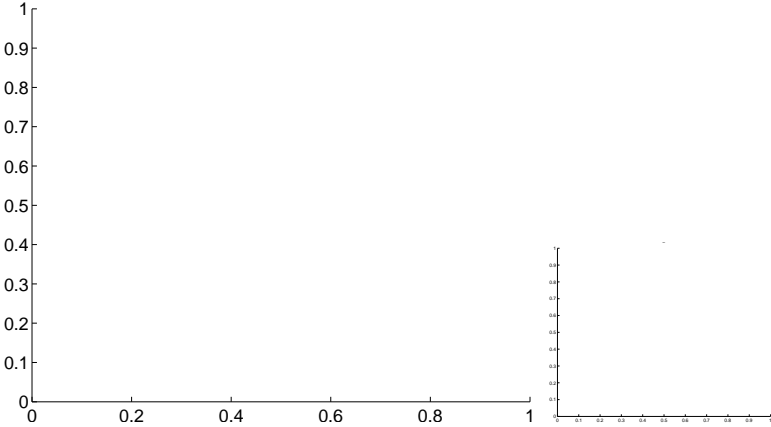
Q14 OOT image



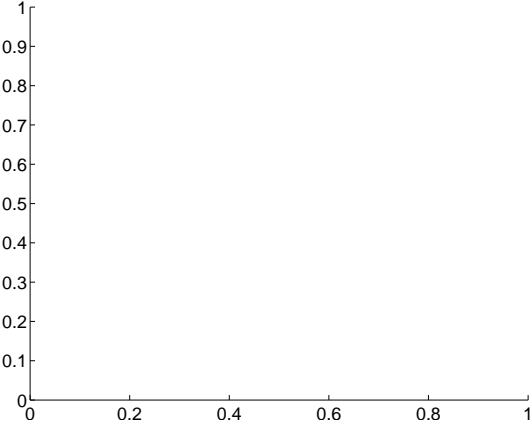
Q15 no difference image



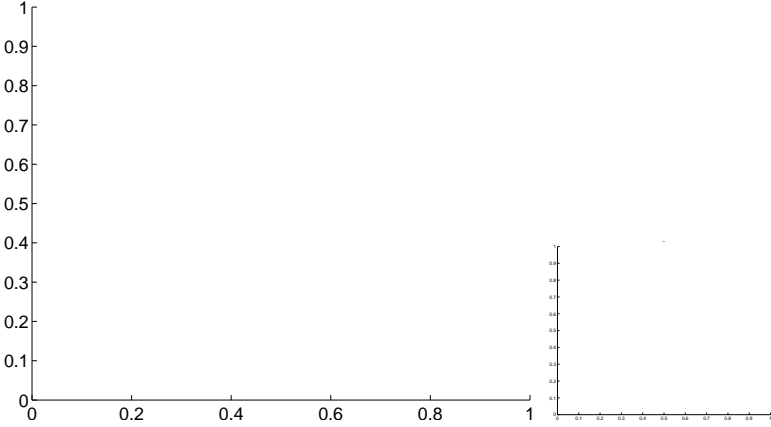
Q15 no OOT image



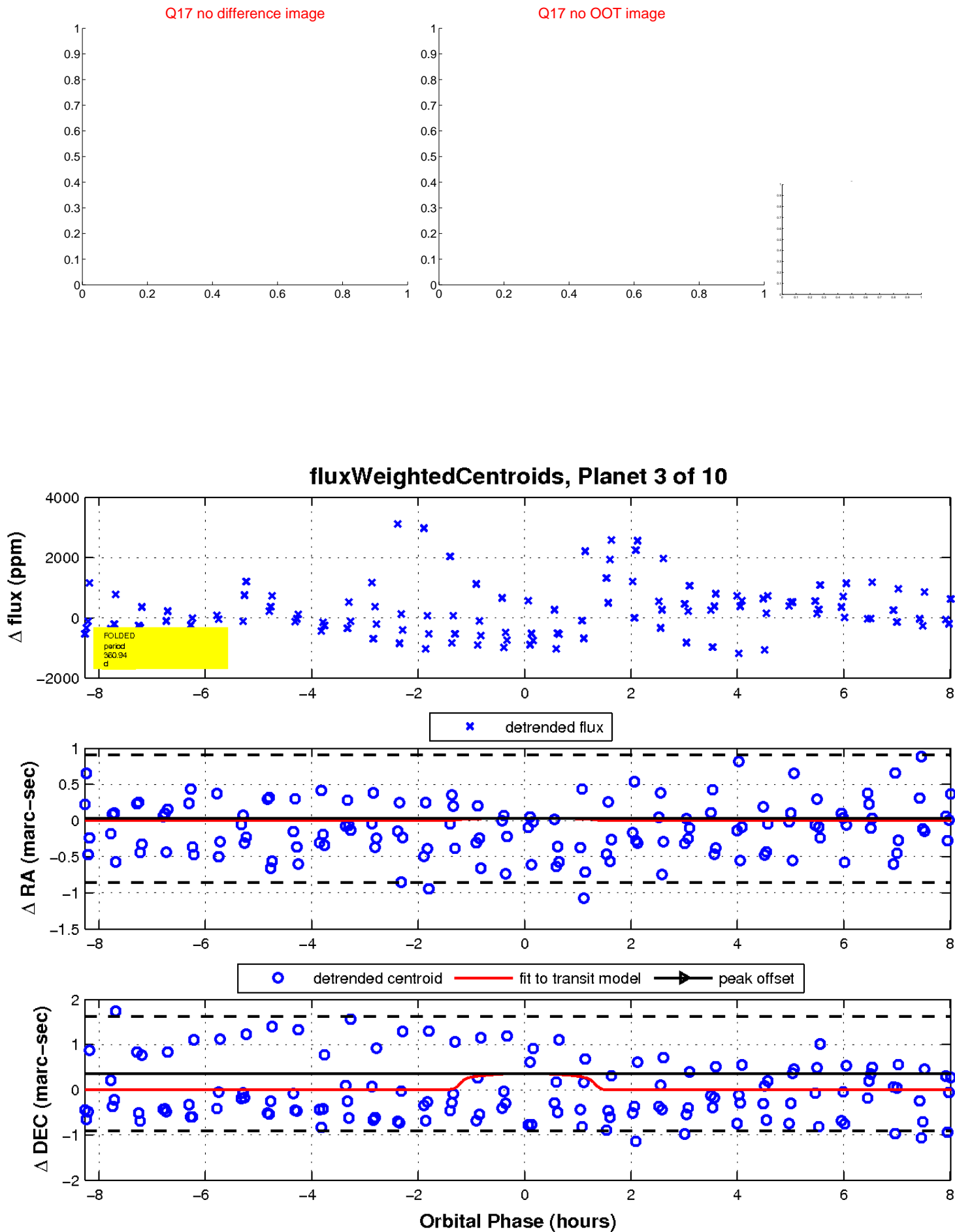
Q16 no difference image



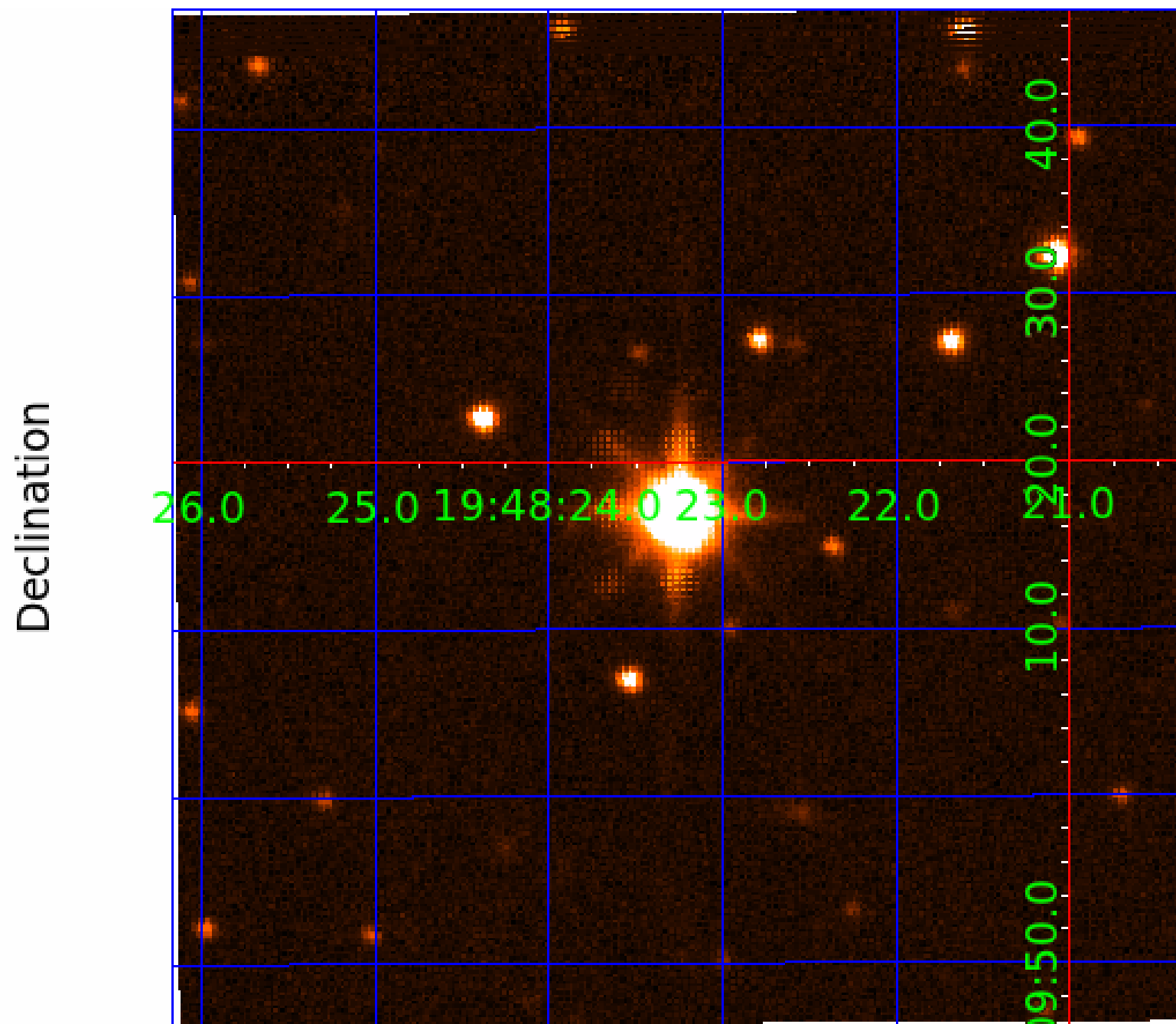
Q16 no OOT image



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



UKIRT Image



# KIC 009540467

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009540467-01	OBS	No	525.337604	265.984740	518.3	9.332	17.4	4.7	0.57	3919	1.47	0.06
009540467-02	OBS	No	270.386745	360.361405	854.9	4.035	17.7	7.2	0.57	3919	1.75	0.15
009540467-03	OBS	No	360.937549	197.248197	1097.8	2.782	13.7	10.6	0.57	3919	2.07	0.10
009540467-05	OBS	No	418.686753	432.378155	794.3	6.491	15.0	6.7	0.57	3919	1.61	0.08
009540467-06	OBS	No	320.975460	210.598826	530.3	9.030	13.8	6.2	0.57	3919	1.32	0.12
009540467-08	OBS	No	679.085465	141.867271	741.8	3.869	15.2	7.9	0.57	3919	1.55	0.04
009540467-10	OBS	No	274.537158	346.932388	550.2	2.569	13.8	5.5	0.57	3919	1.50	0.15

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009540467-01	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—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009540467-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS
009540467-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS
009540467-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS
009540467-06	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
009540467-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009540467-10	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS—HALO_GHOST

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

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

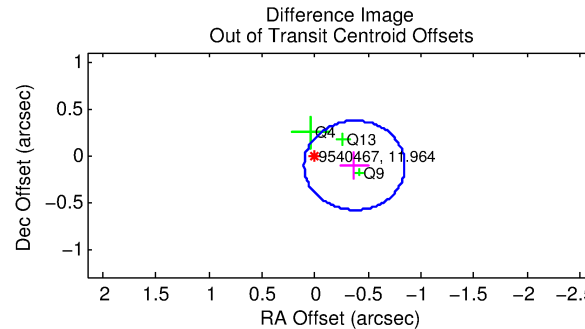
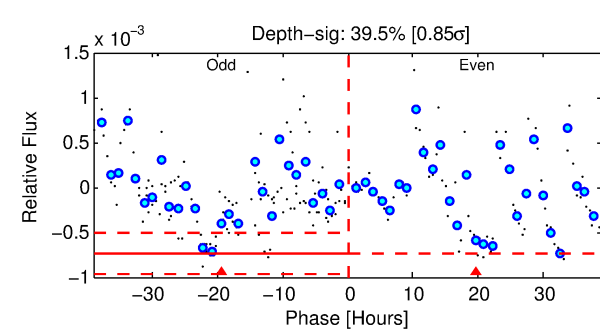
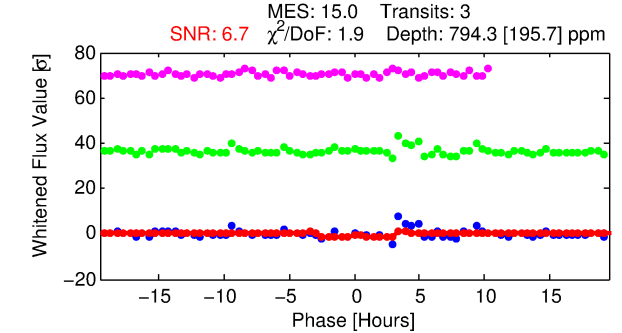
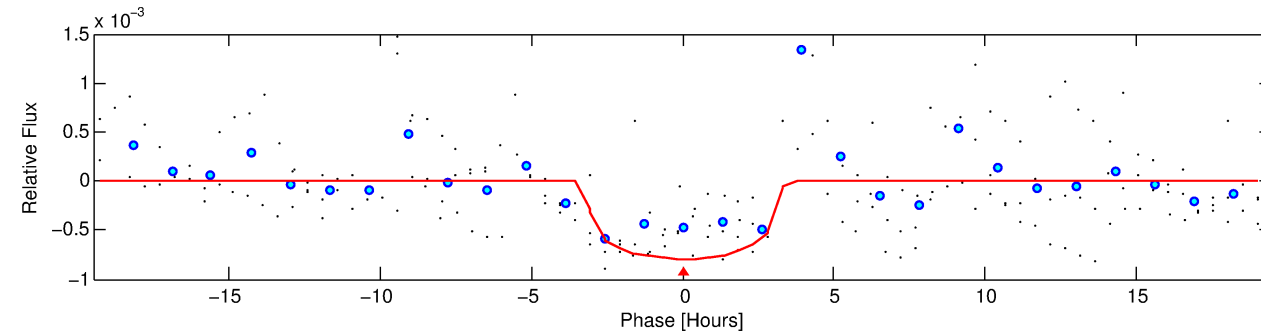
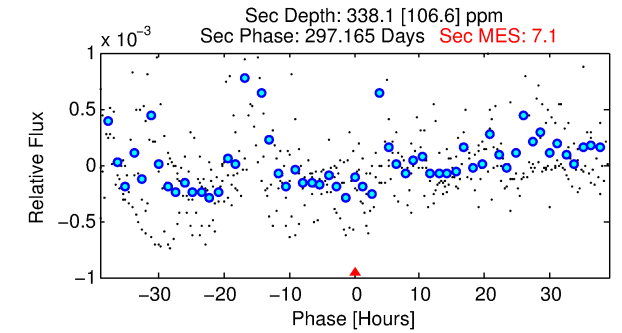
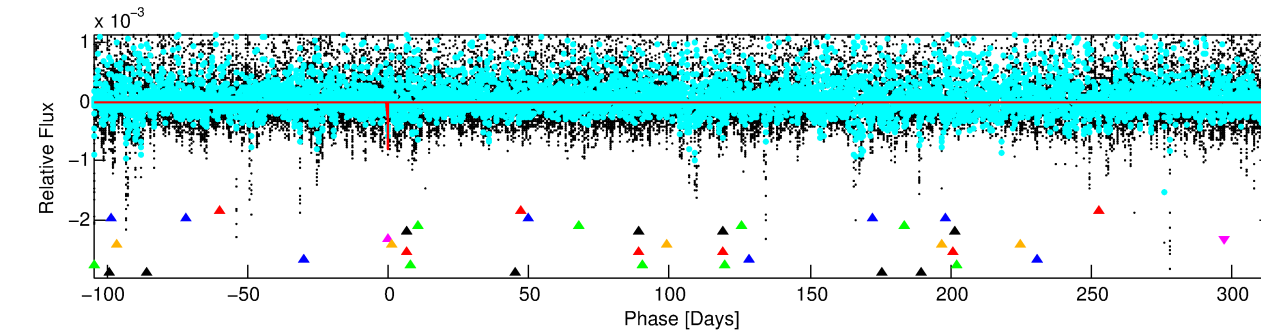
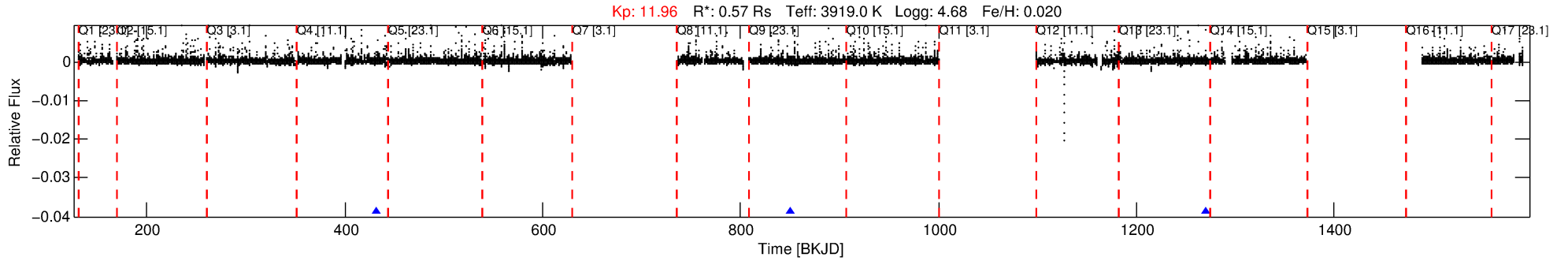
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009540467-05

No Significant Match Found

# DV One-Page Summary

KIC: 9540467 Candidate: 5 of 10 Period: 418.687 d



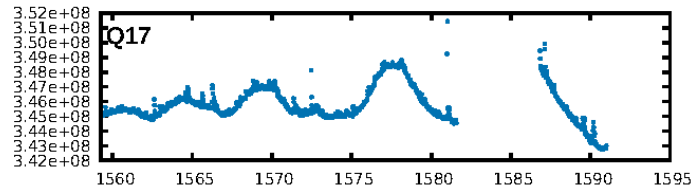
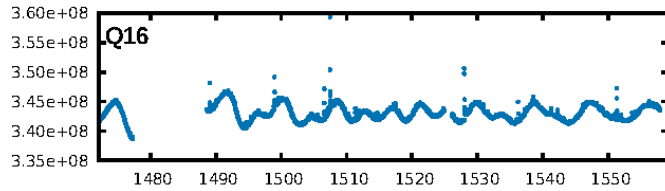
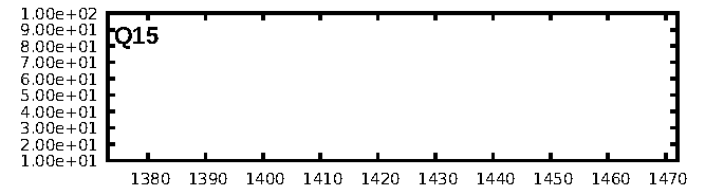
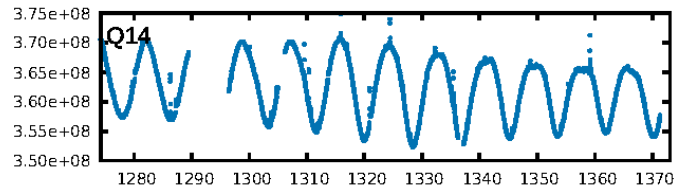
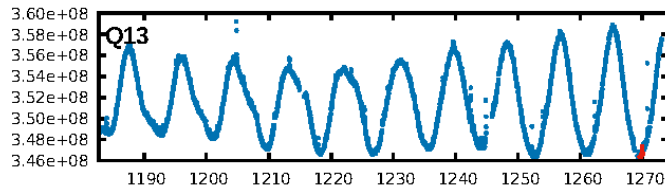
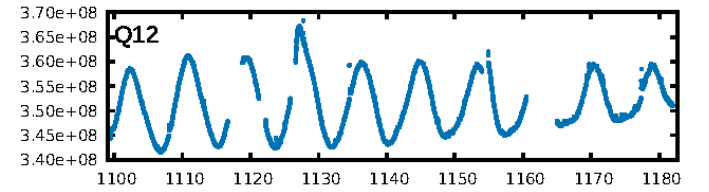
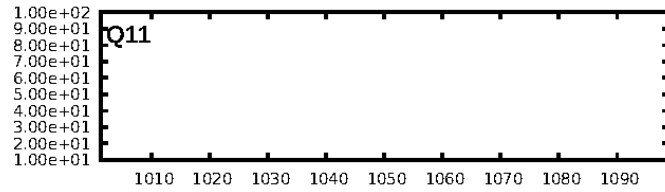
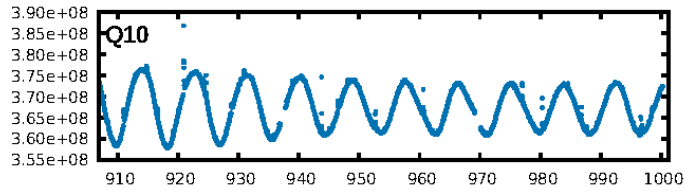
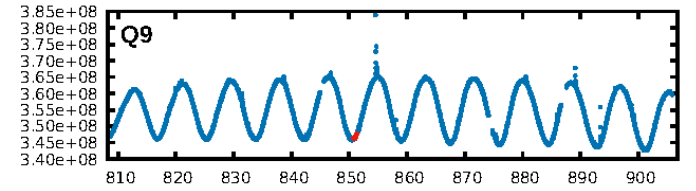
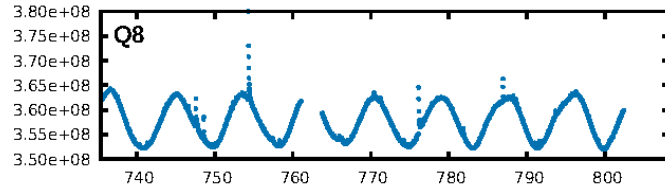
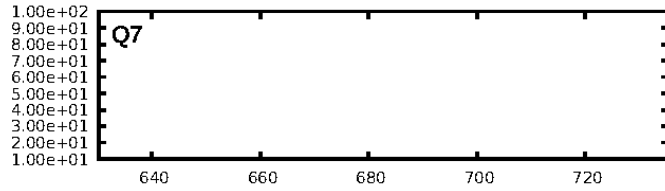
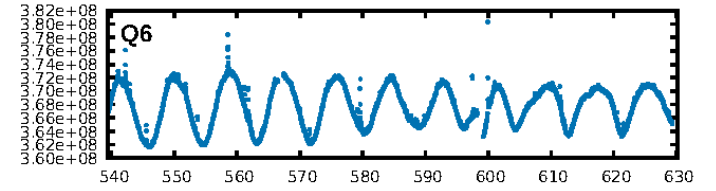
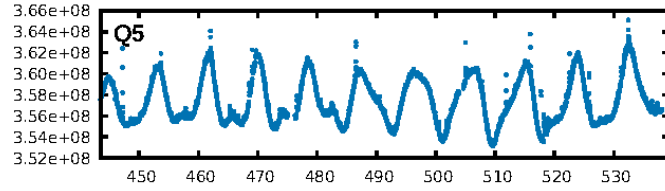
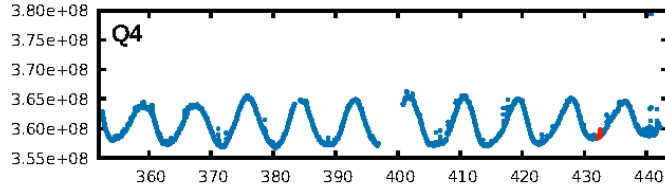
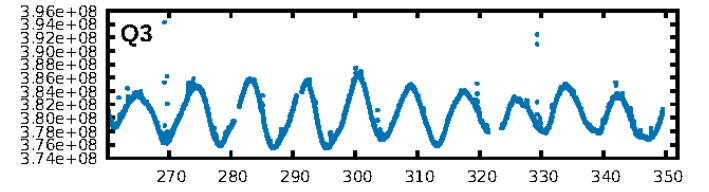
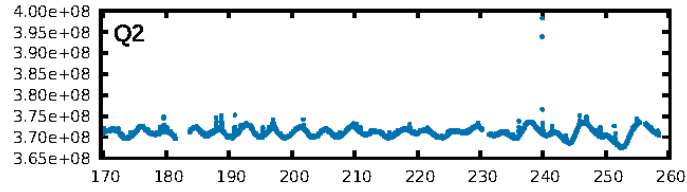
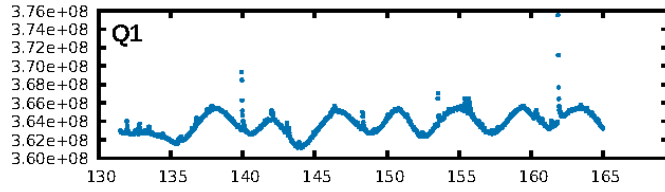
## DV Fit Results:

Period = 418.68675 [0.00669] d  
Epoch = 432.3782 [0.0086] BKJD  
Rp/R\* = 0.0258 [0.0428]  
a/R\* = 468.80 [2989.84]  
b = 0.38 [14.32]  
Seff = 0.08 [0.02]  
Teq = 137 [7] K  
Rp = 1.61 [2.68] Re  
a = 0.9083 [0.0968] AU  
Ag = 59315.06 [197886.62] [0.30σ]  
Teffp = 3310 [2761] K [1.15σ]

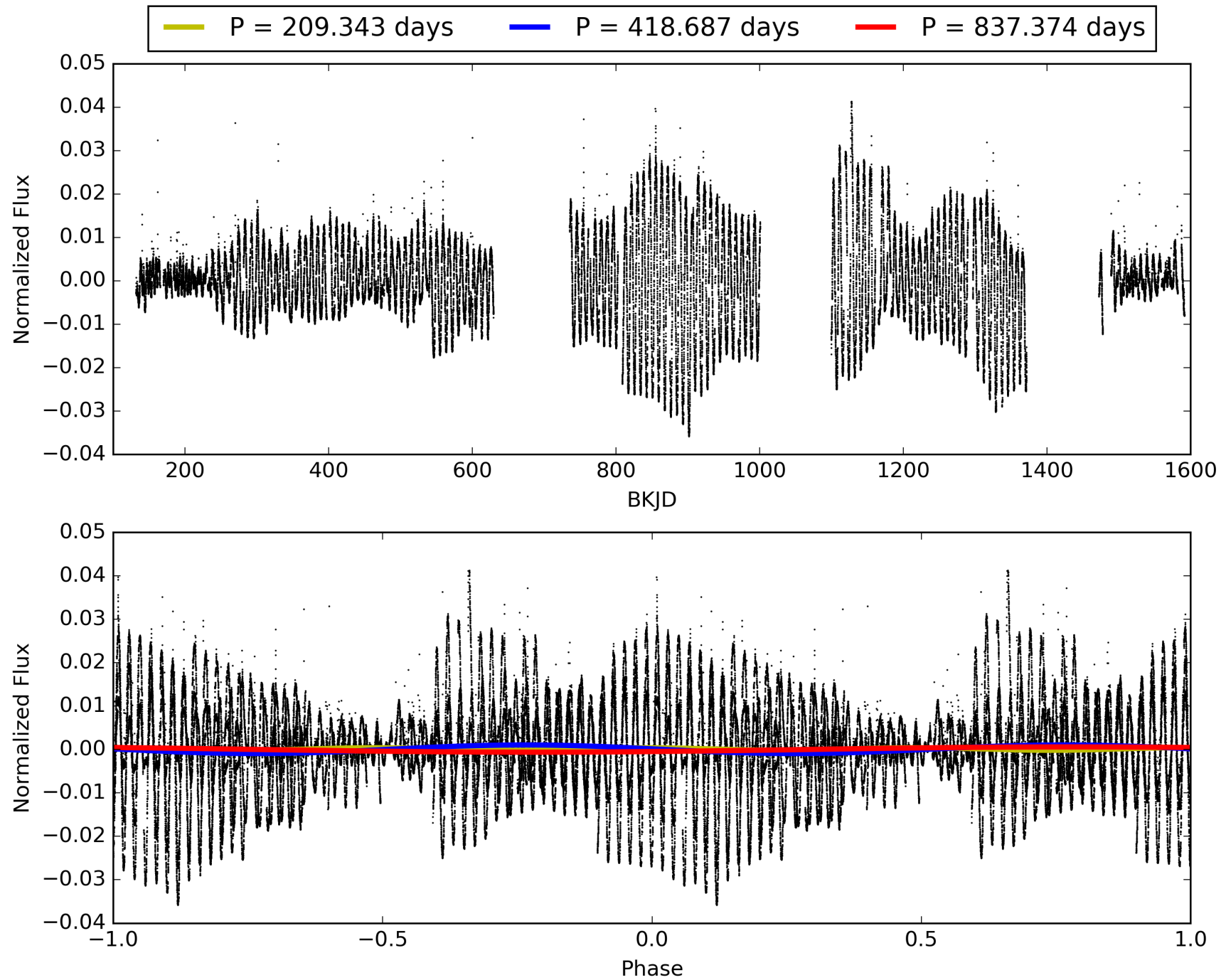
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [196.26σ]  
LongPeriod-sig: 100.0% [225.18σ]  
ModelChiSquare2-sig: 21.8%  
ModelChiSquareGof-sig: 76.3%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 1.452  
Centroid-sig: 48.6%  
Centroid-so: 0.348 arcsec [1.25σ]  
OotOffset-rm: 0.388 arcsec [2.44σ]  
KicOffset-rm: 0.286 arcsec [1.80σ]  
OotOffset-st: 0/0/1/2 [3]  
KicOffset-st: 0/0/1/2 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 1.00 [3/3]

# TCE 009540467-05, PDC Light Curves

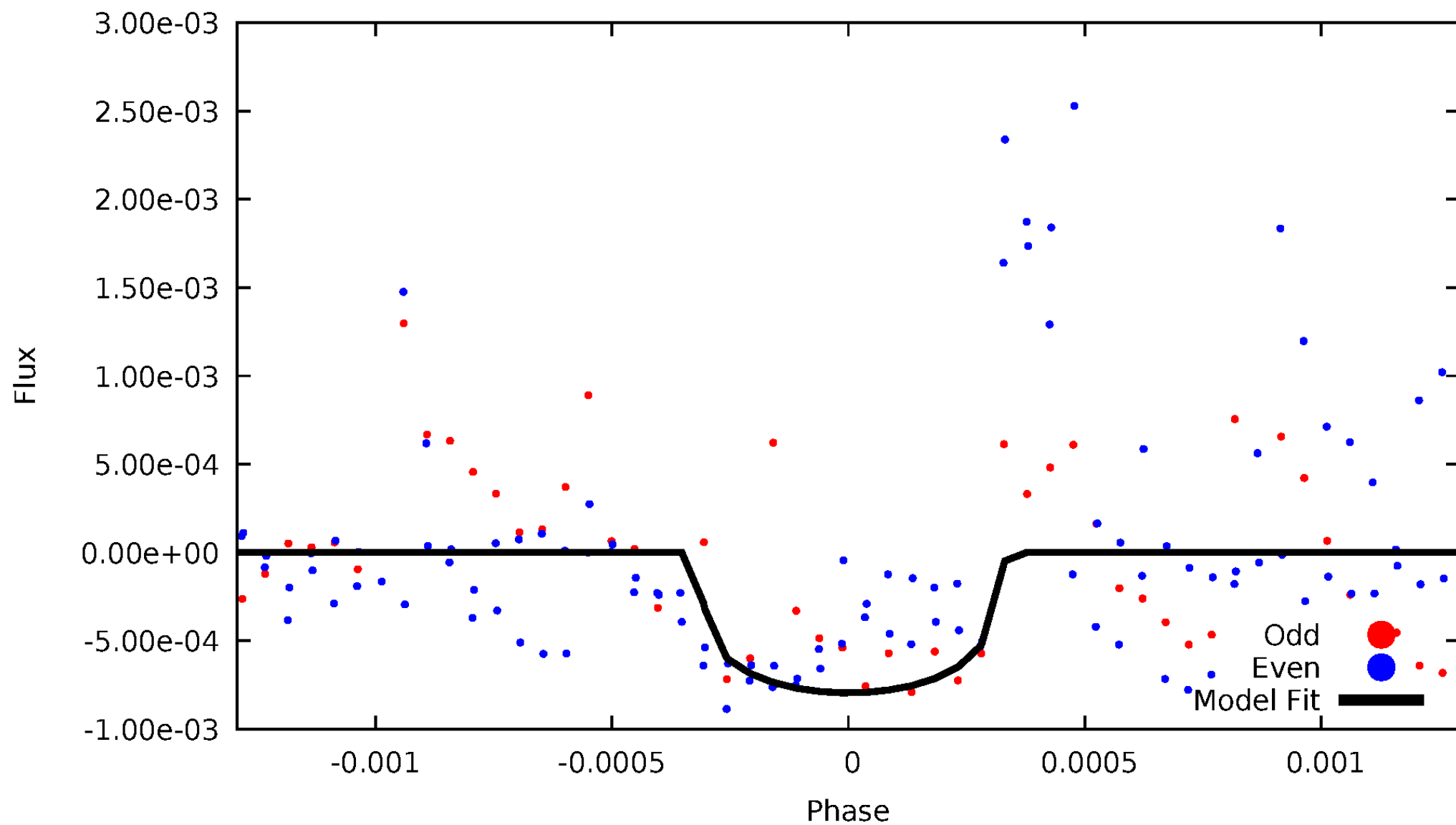


TCE 009540467-05



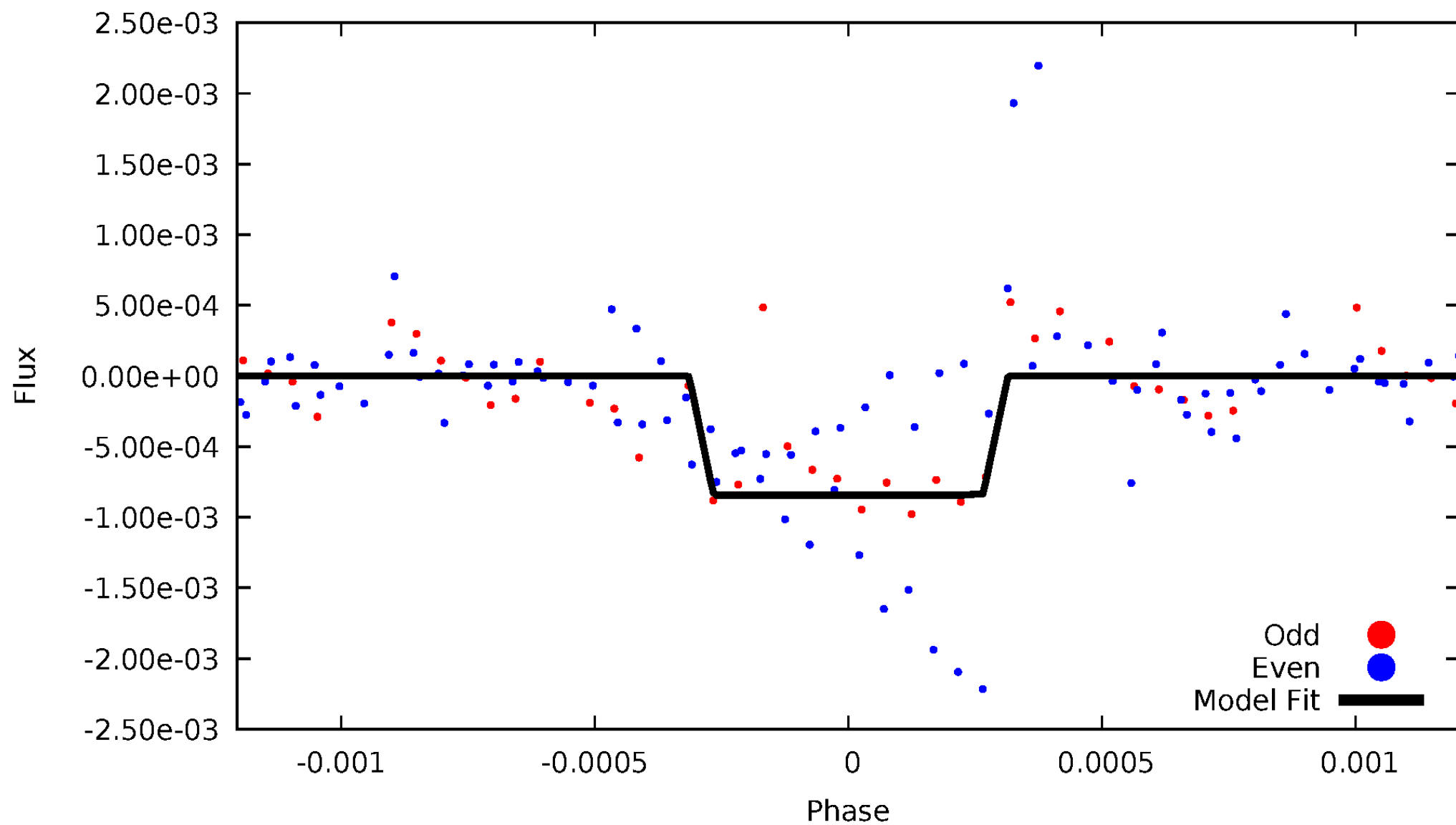
# DV Odd/Even

TCE 009540467-05



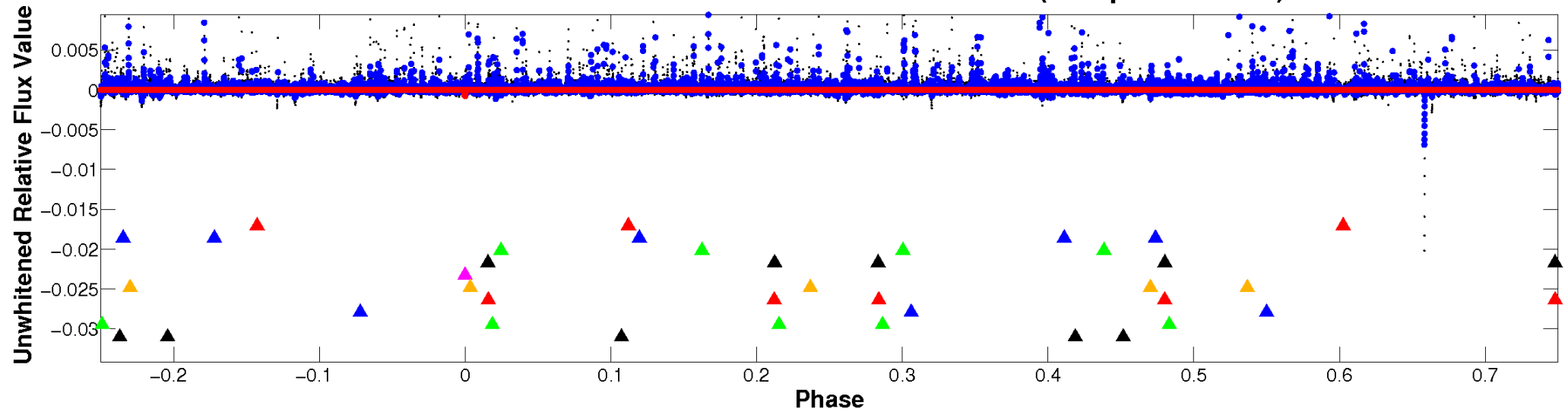
# ALT Odd/Even

TCE 009540467-05

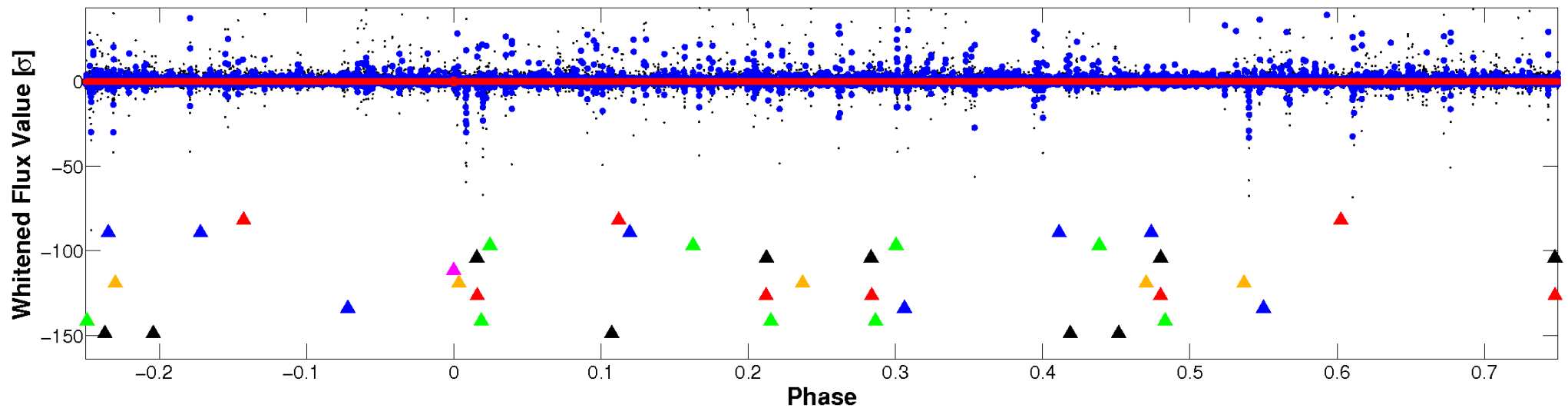


# Non-Whitened Vs. Whitened Light Curve

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

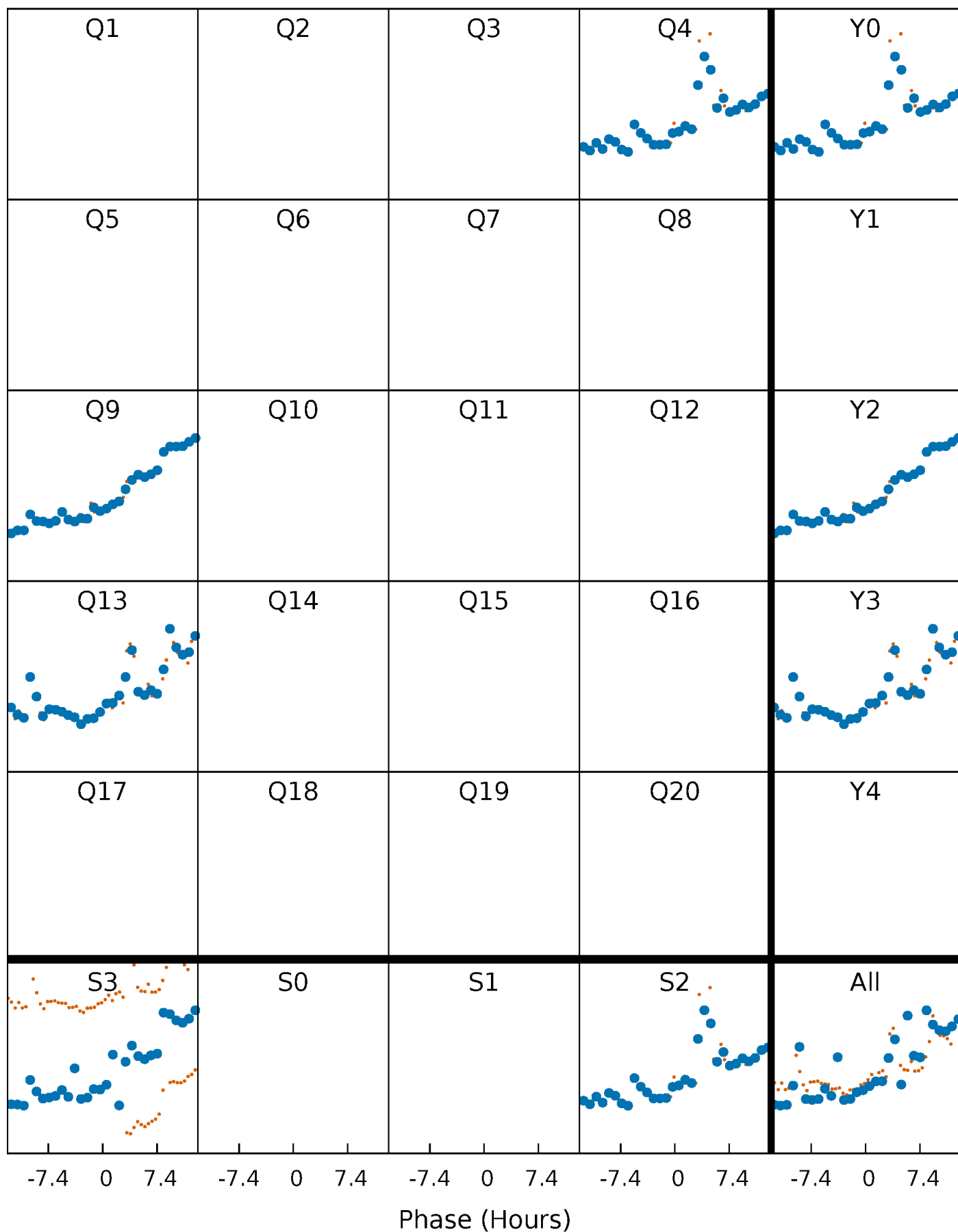


## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



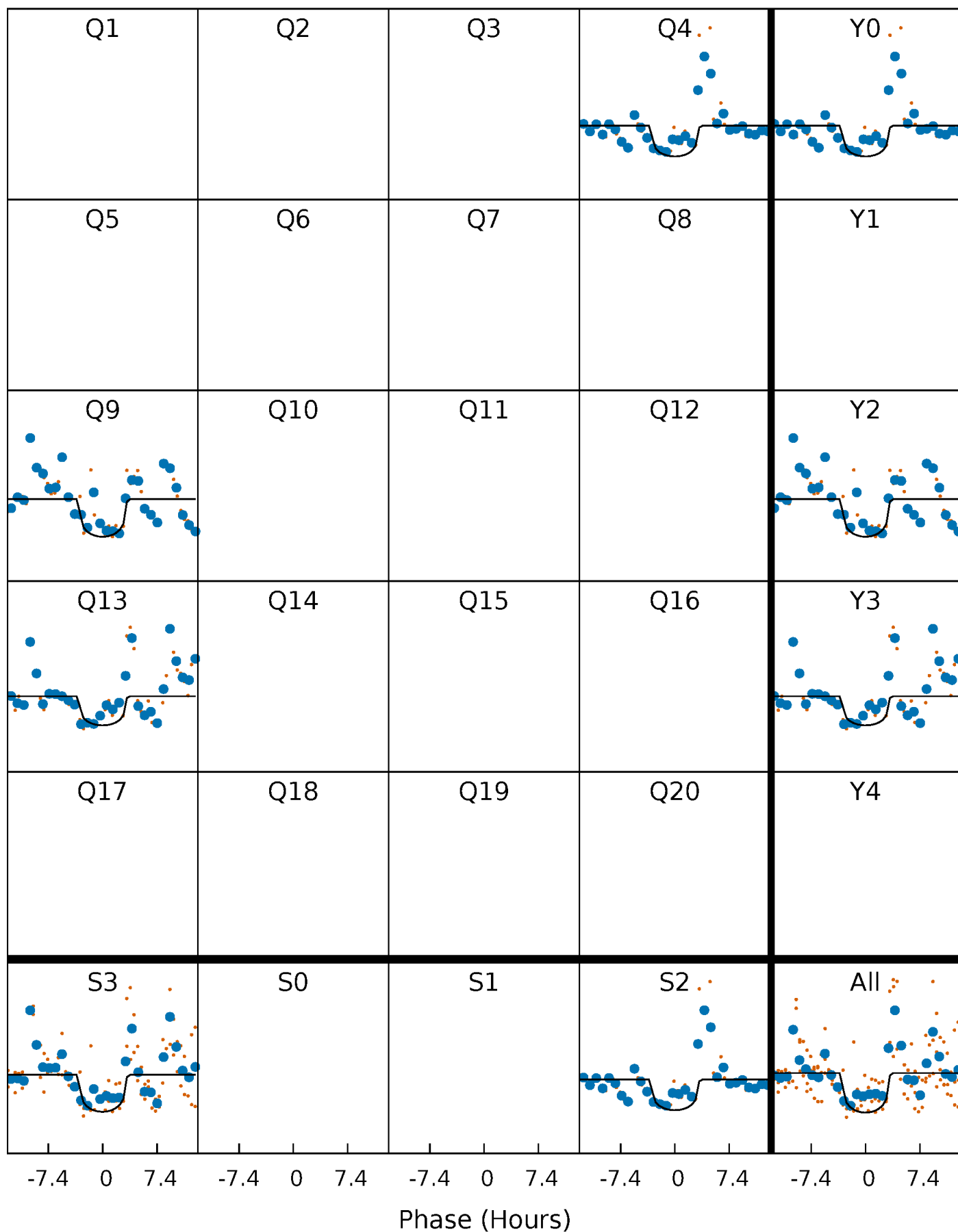
# PDC Quarter-Phased Transit Curves

TCE 009540467-05     $P=418.686753$  Days     $T_0=432.378155$  (BKJD)



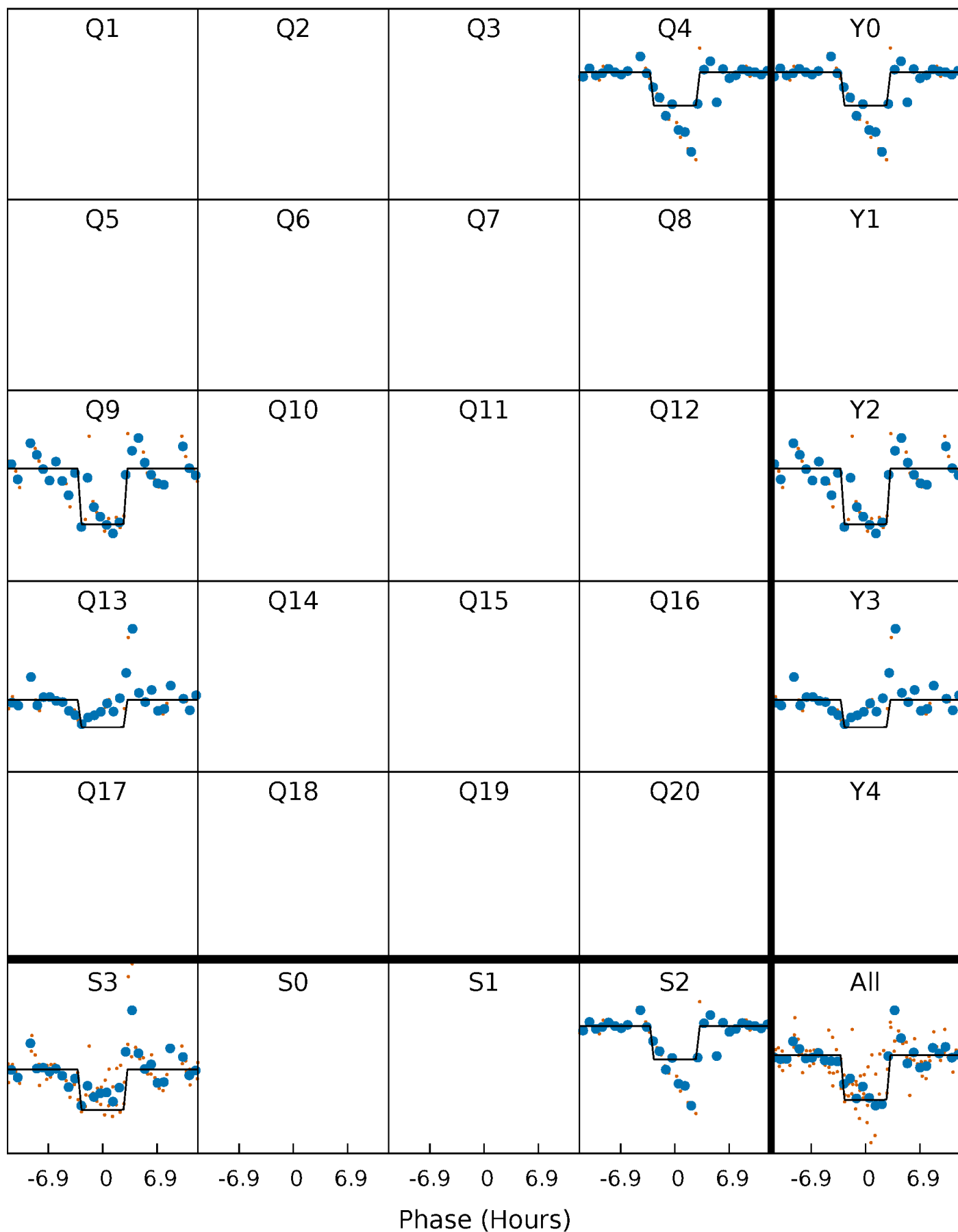
# DV Quarter-Phased Transit Curves

TCE 009540467-05     $P=418.686753$  Days     $T_0=432.378155$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

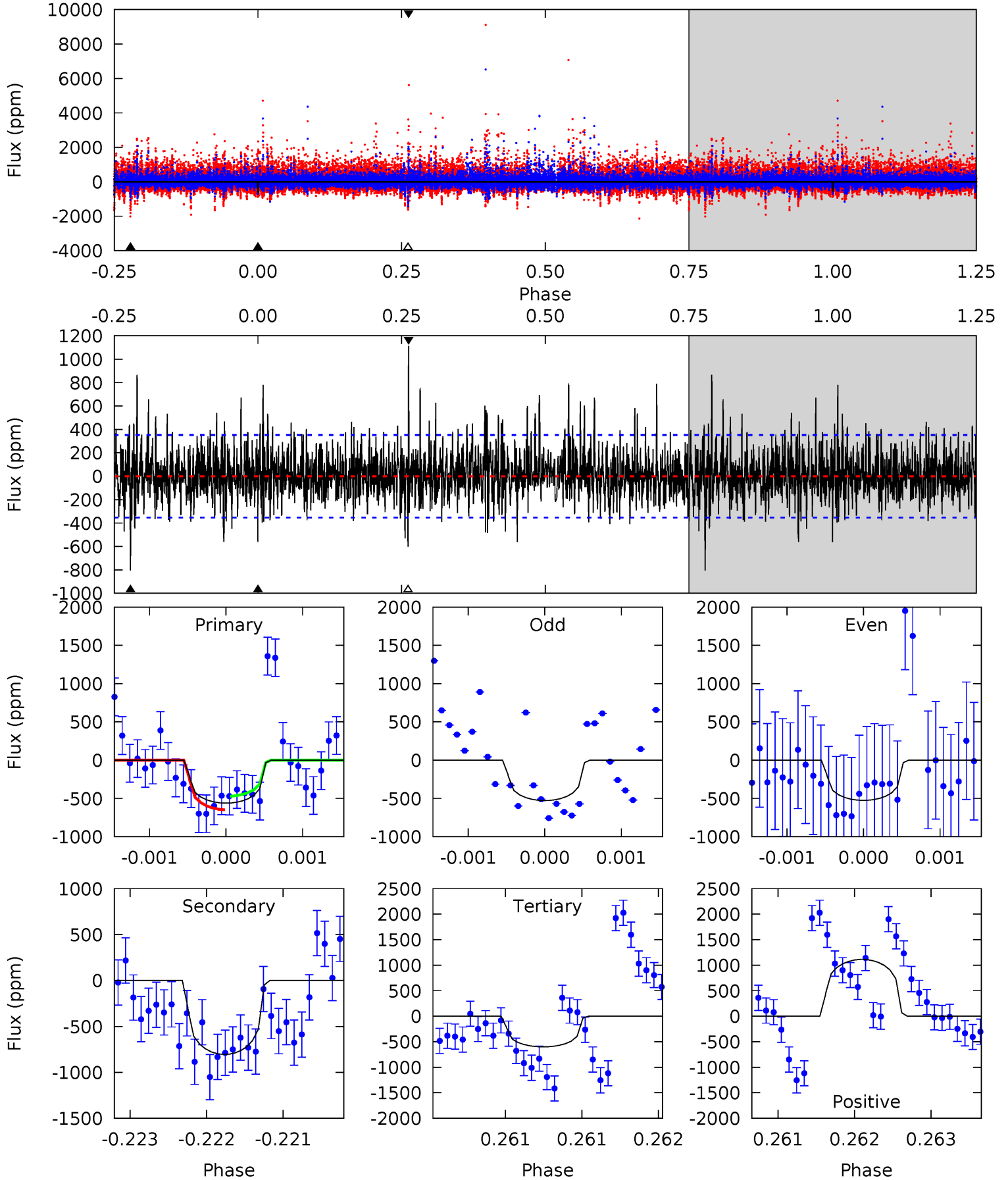
TCE 009540467-05     $P=418.683644$  Days     $T_0=432.385301$  (BKJD)



# DV Model-Shift Uniqueness Test

009540467-05,  $P = 418.686753$  Days,  $E = 13.691402$  Days

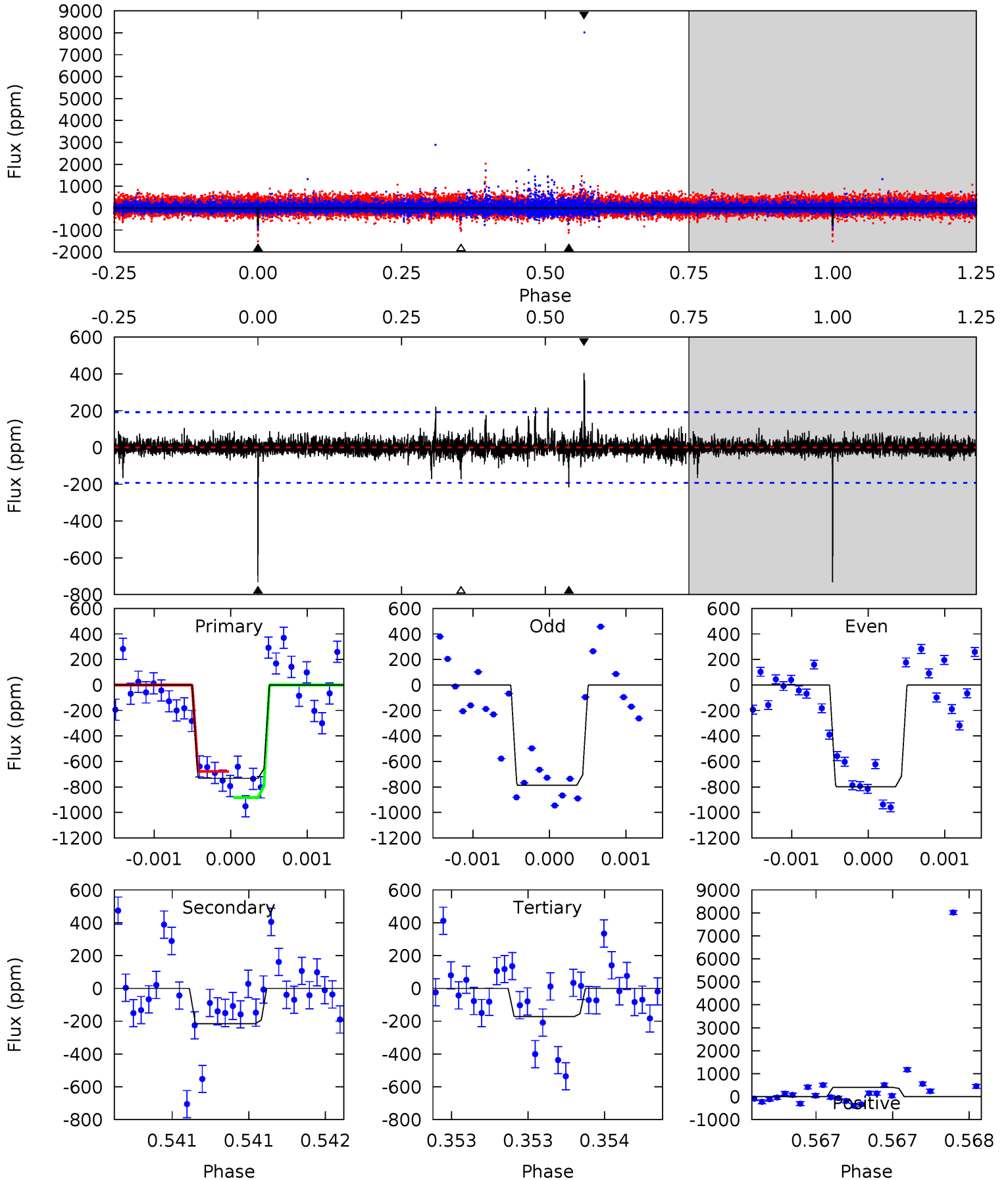
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.82	12.6	9.42	17.5	5.53	3.42	2.53	-0.61	-8.64	3.20	-4.84	0.01	1.00	0.58	1.40



# Alt Model-Shift Uniqueness Test

009540467-05, P = 418.683644 Days, E = 13.701657 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
21.1	6.20	4.96	11.6	5.53	3.42	0.81	16.1	9.46	1.24	-5.41	0.14	1.14	0.36	2.77



### Stellar Parameters For KIC 009540467

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3919^{+121}_{-148}$	$4.679^{+0.070}_{-0.025}$	$0.020^{+0.250}_{-0.300}$	$0.572^{+0.042}_{-0.079}$	$0.570^{+0.051}_{-0.070}$	$4.295^{+1.555}_{-0.534}$
	+3%/-4%	+1%/-1%	+1250%/-1500%	+7%/-14%	+9%/-12%	+36%/-12%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 009540467-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-805 \pm 64$	$2.51^{+2.06}_{-1.65}$	$190^{+7}_{-8}$	$3469^{+1758}_{-577}$	$57221^{+445422}_{-39637}$
Alt.	$-216 \pm 35$	$2.82^{+2.26}_{-1.80}$	$190^{+8}_{-8}$	$2752^{+987}_{-353}$	$12129^{+79199}_{-8354}$

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

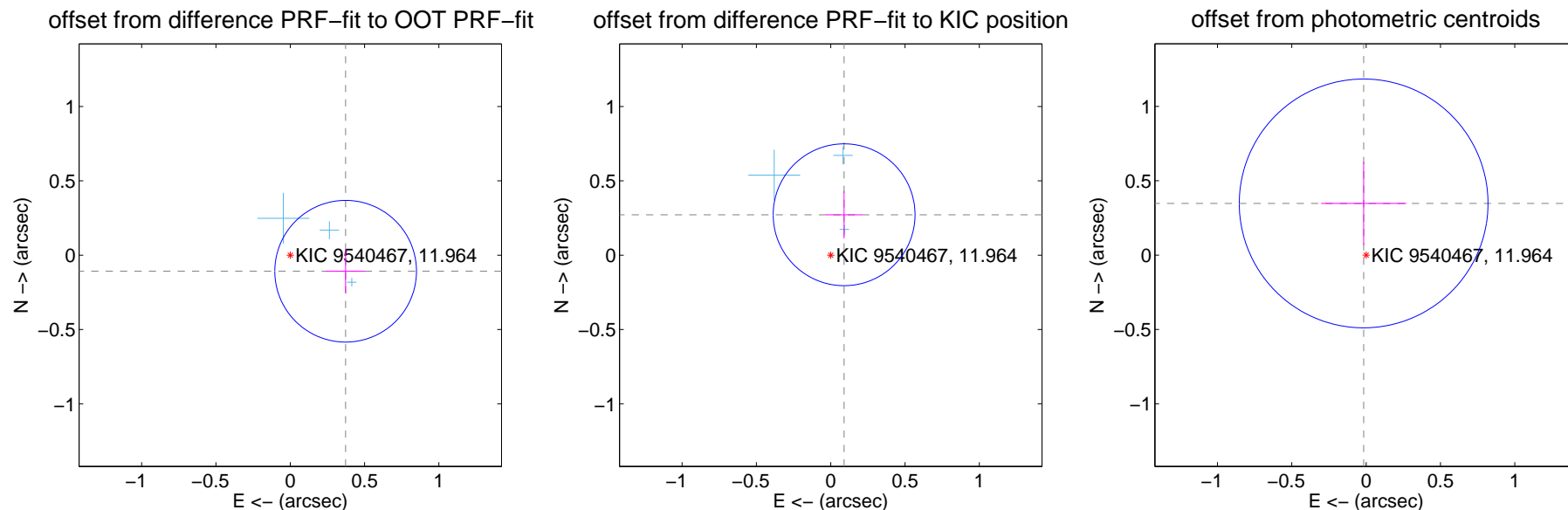
## DV Centroid Data

Supplemental centroid analysis for 009540467-05. **Kepler magnitude: 11.96.** Transit SNR 6.70

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

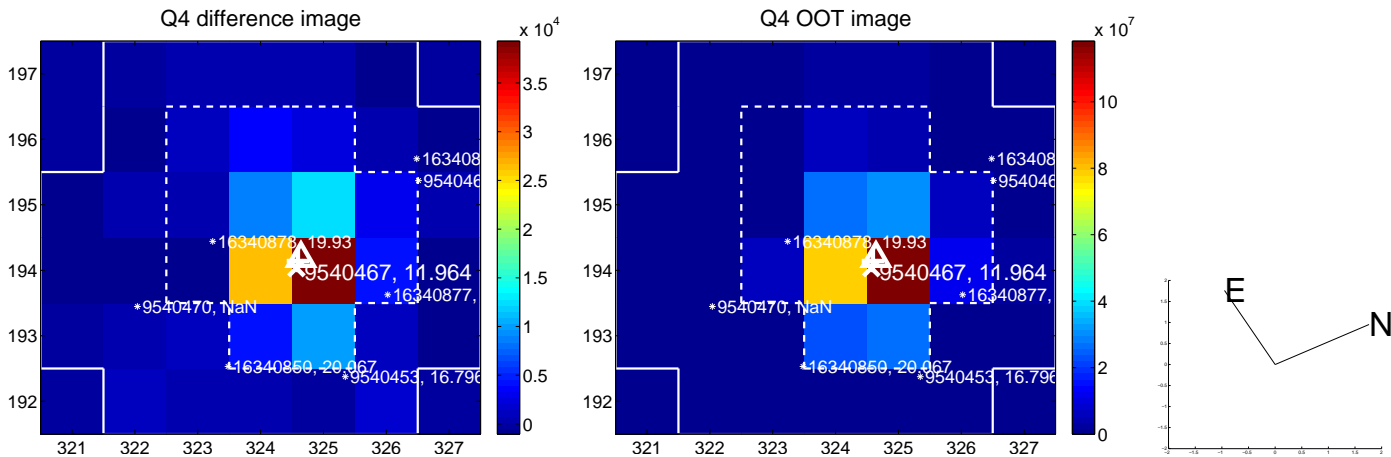
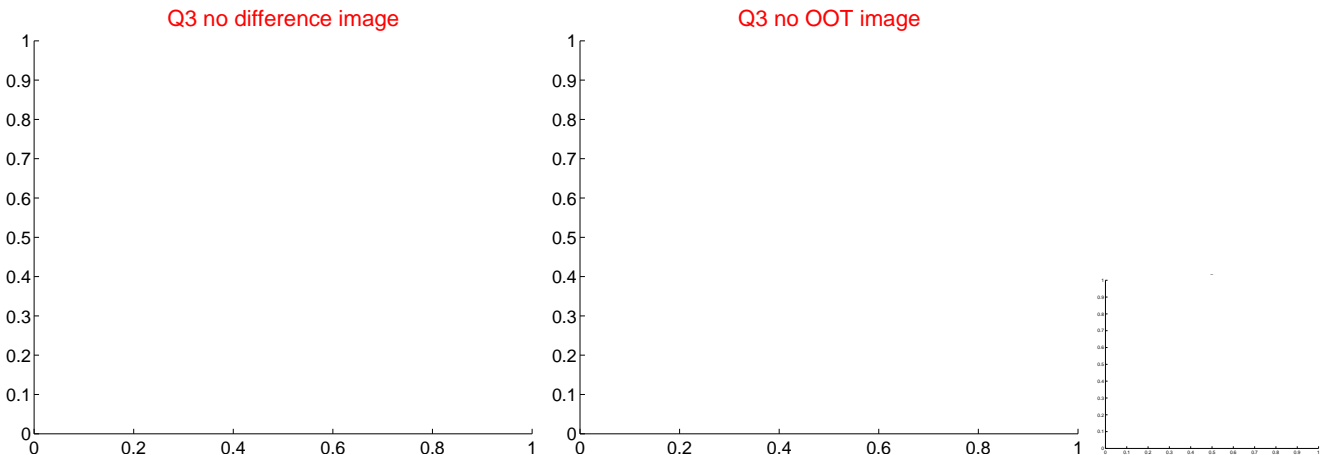
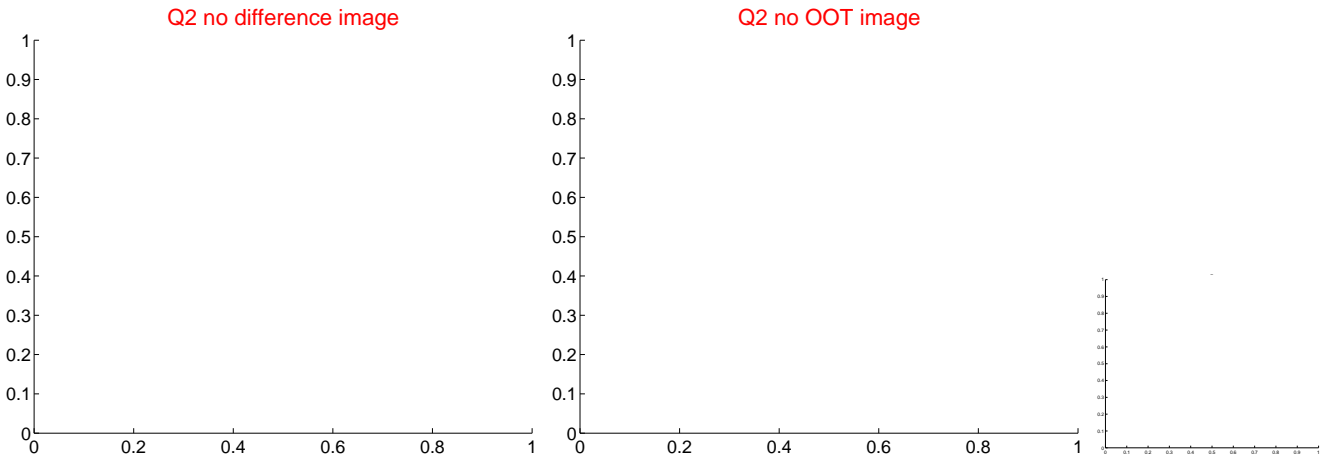
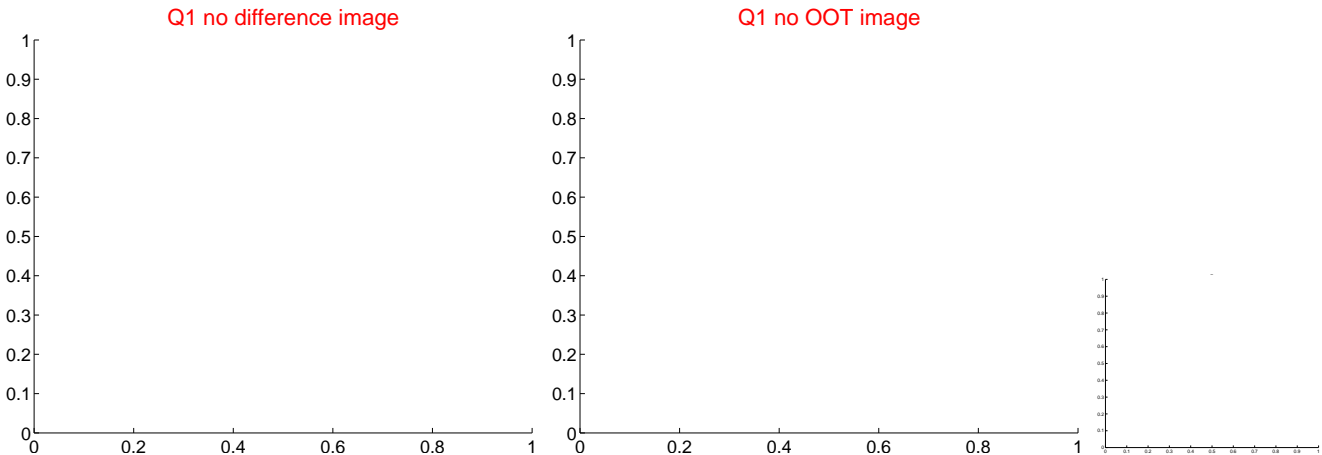
The direct PRF centroid is offset from the target star catalog position by about 0.53 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.388 \pm 0.159$	2.44	$-0.373 \pm 0.132$	$-0.108 \pm 0.147$
PRF-fit source offset from KIC position	$0.286 \pm 0.159$	1.80	$-0.090 \pm 0.123$	$0.272 \pm 0.159$
photometric centroid source offset	$0.35 \pm 0.28$	1.25	$0.02 \pm 0.29$	$0.35 \pm 0.28$

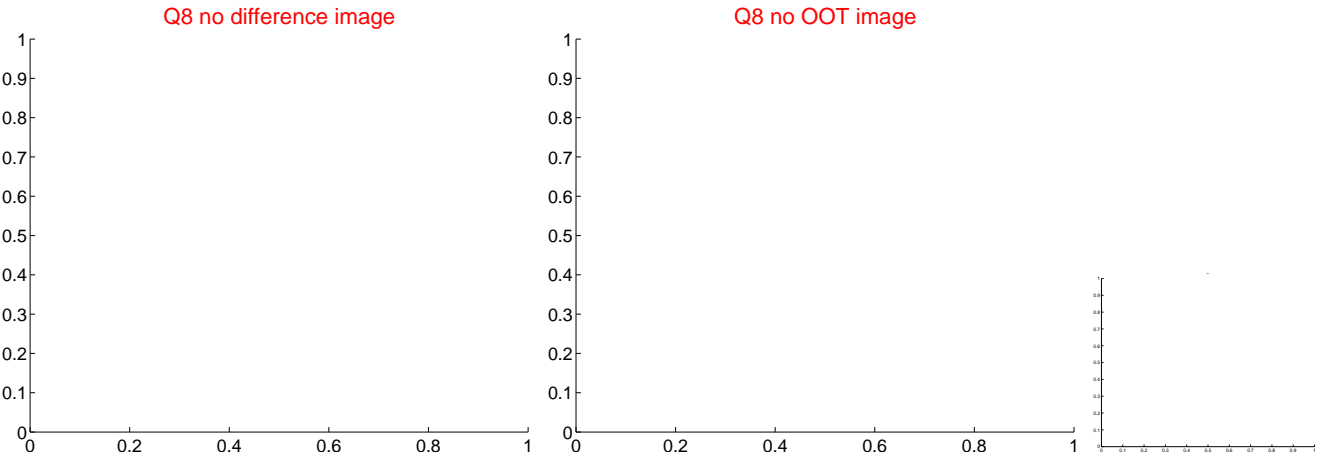
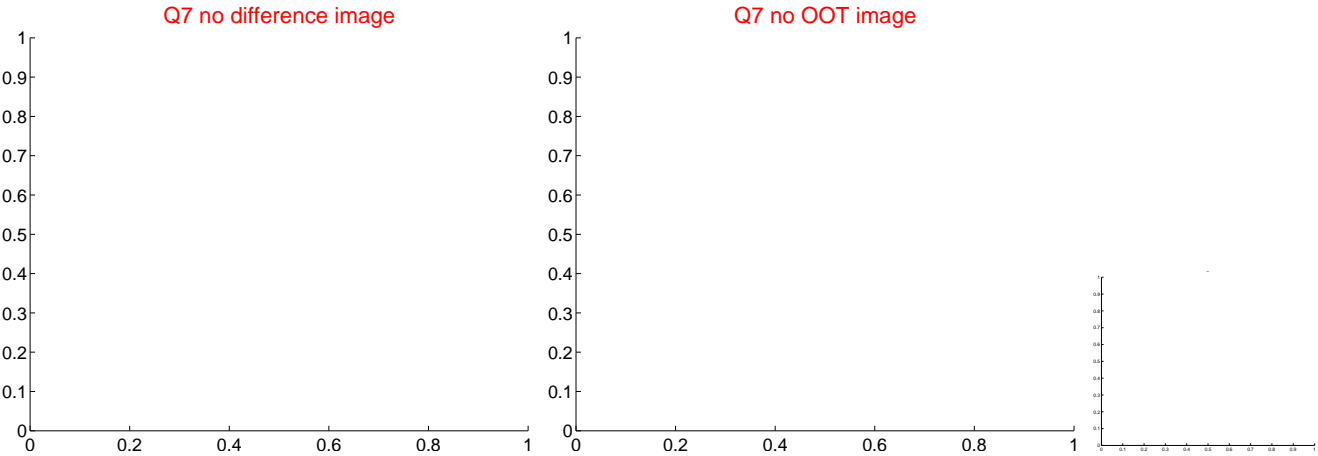
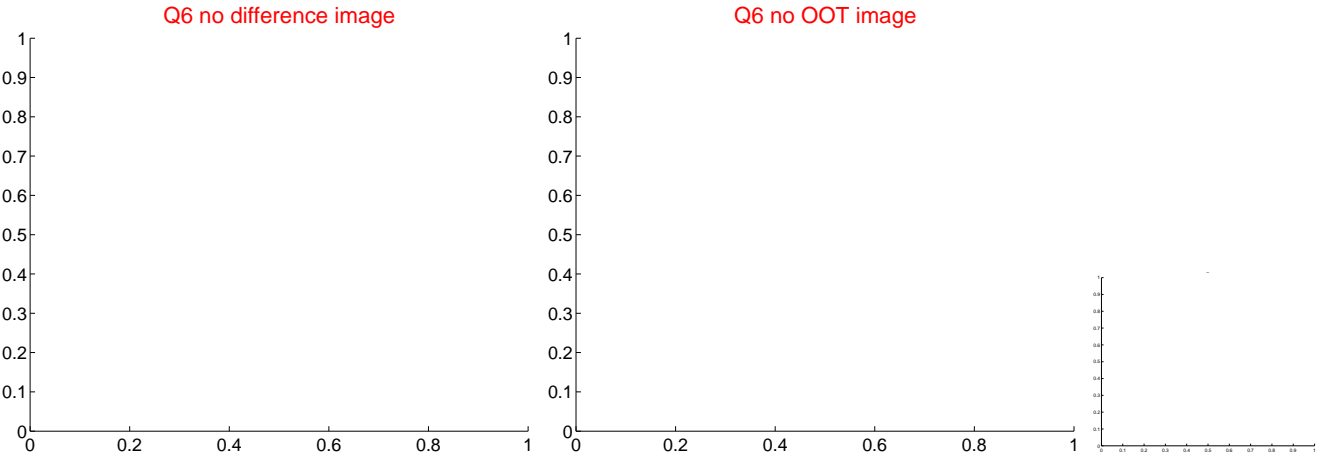
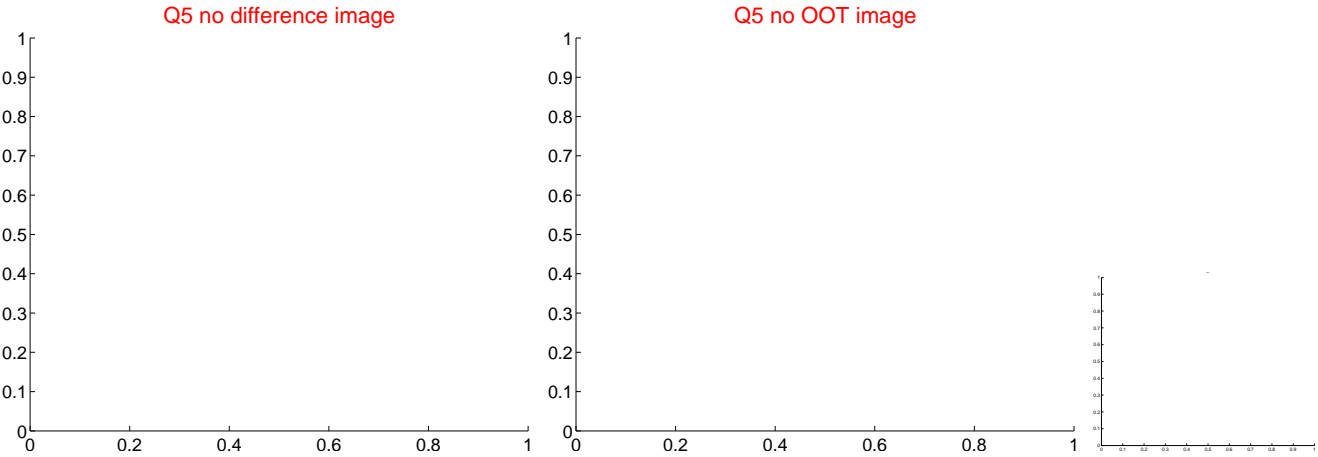


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

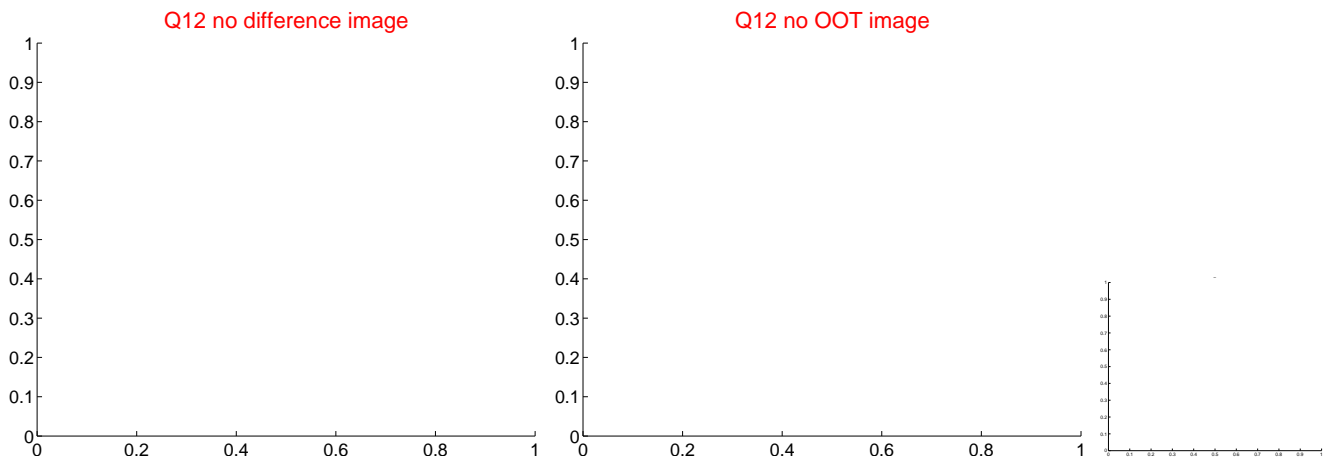
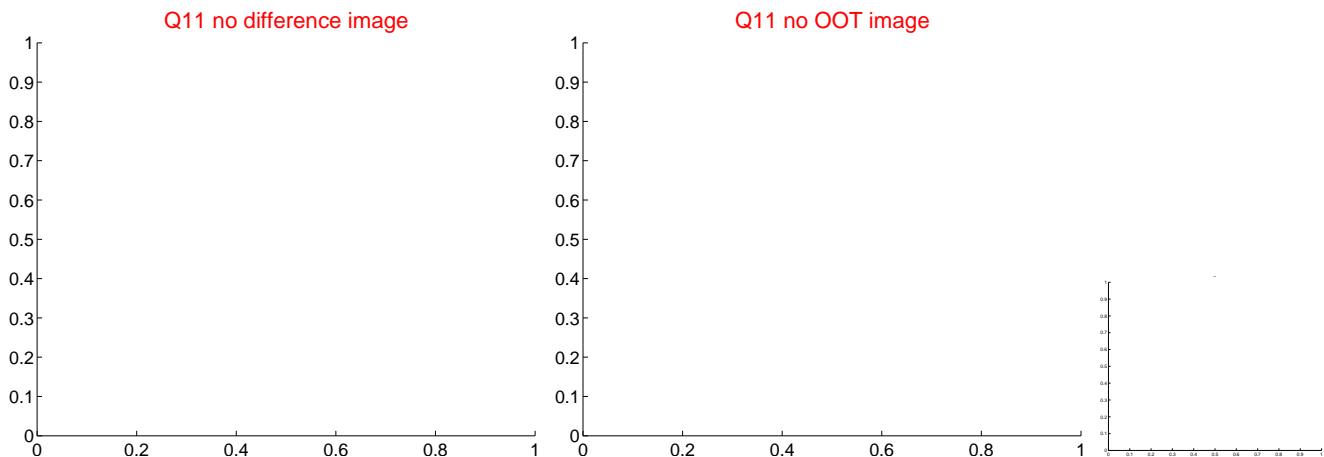
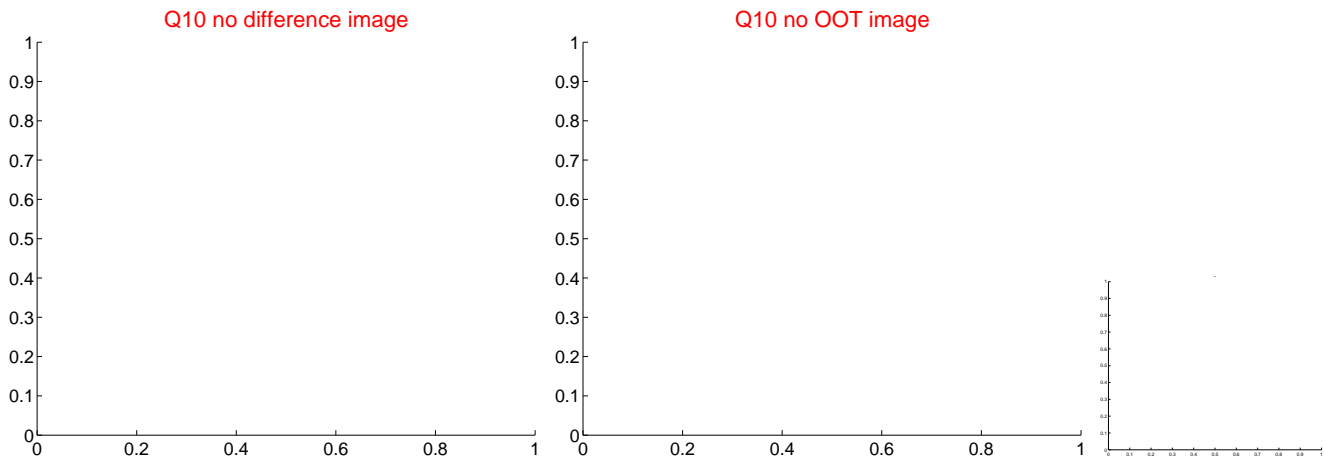
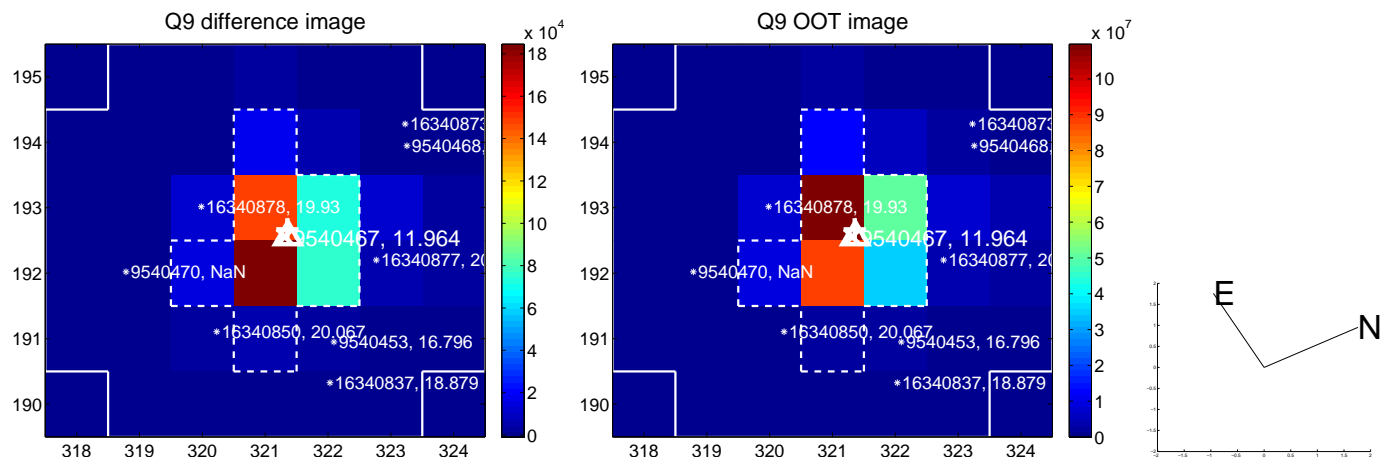
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



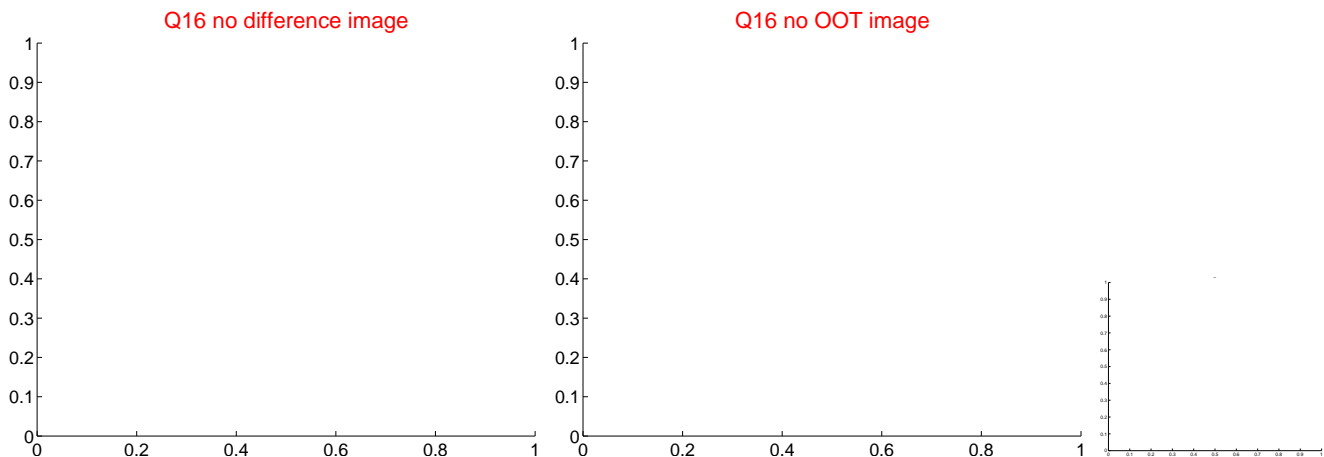
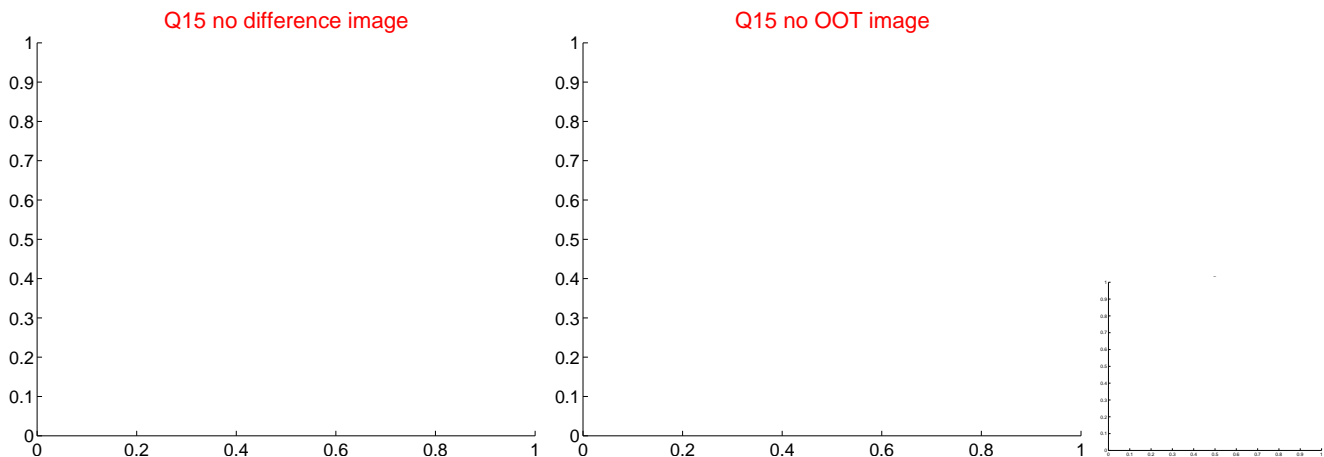
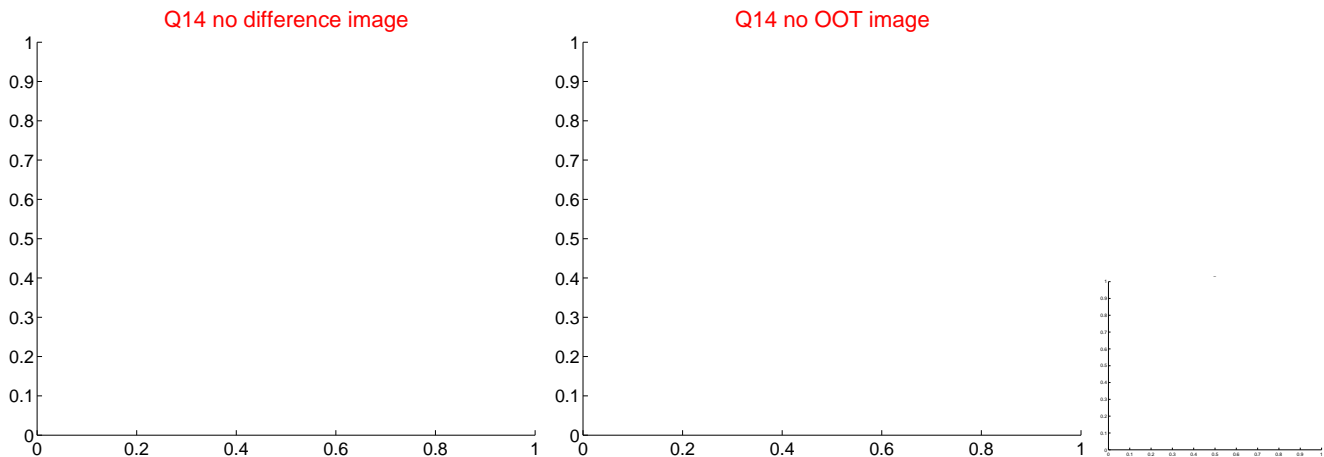
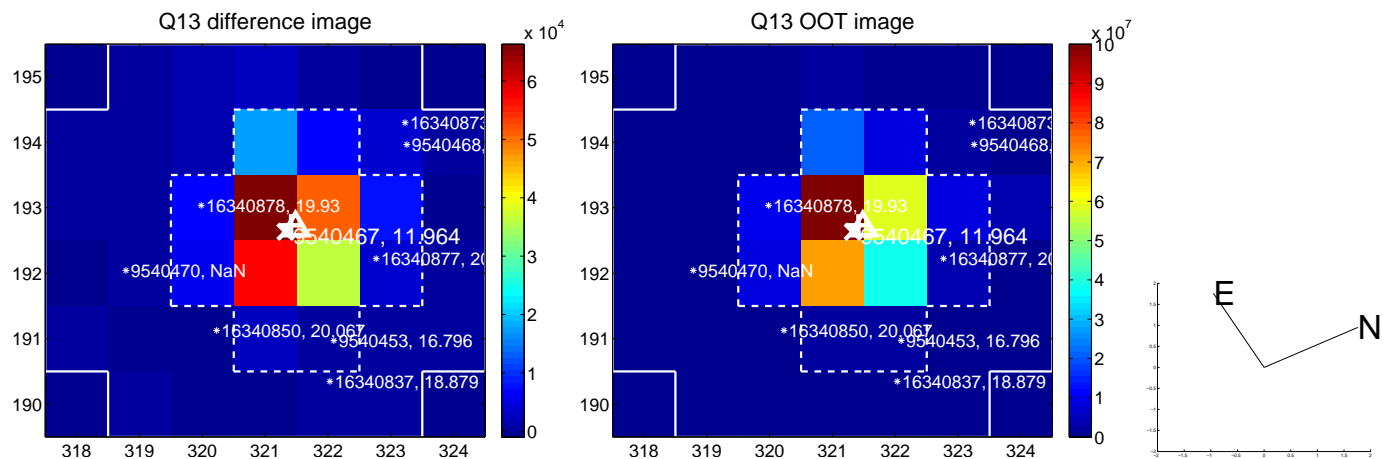
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



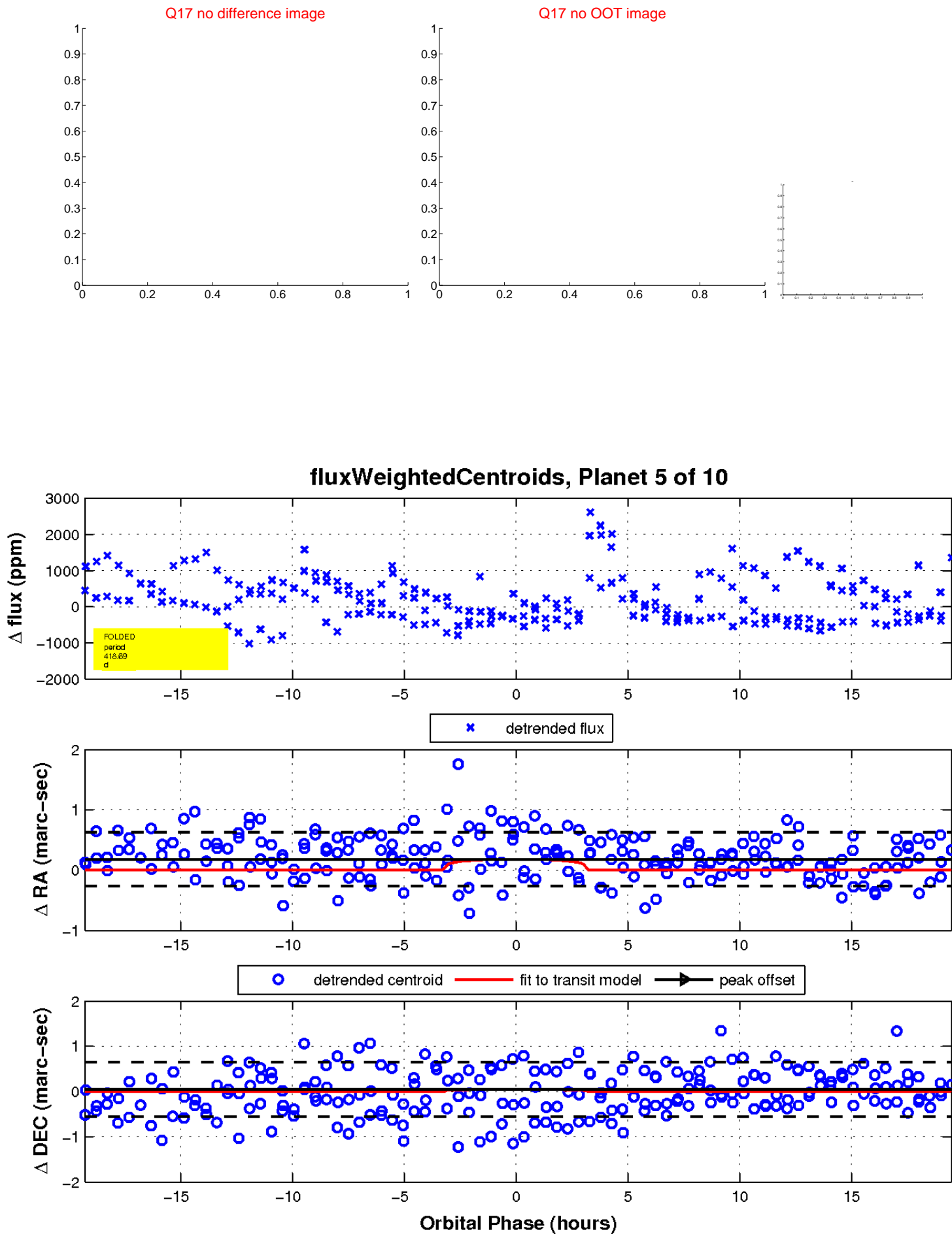
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



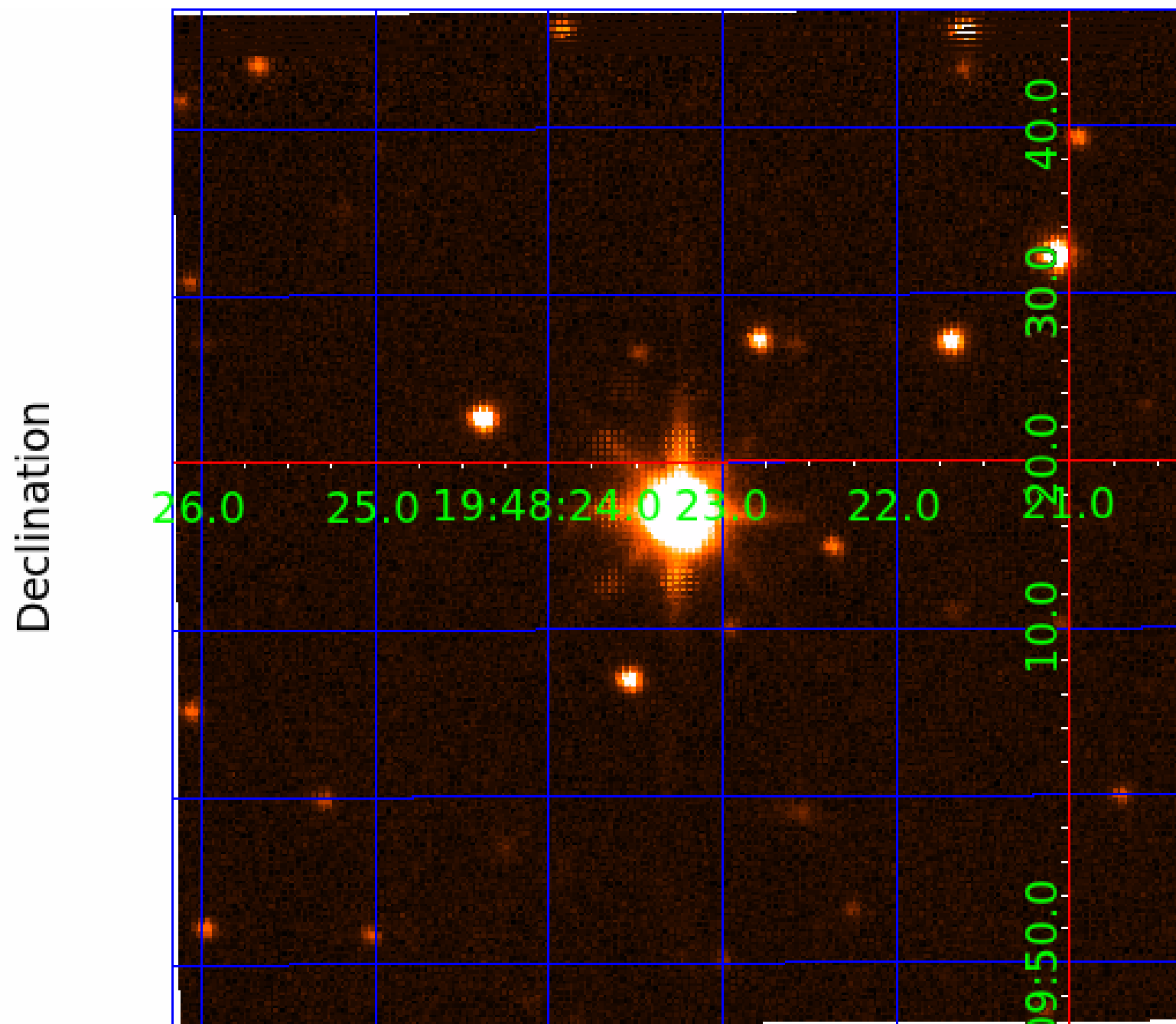
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image



# KIC 009540467

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009540467-01	OBS	No	525.337604	265.984740	518.3	9.332	17.4	4.7	0.57	3919	1.47	0.06
009540467-02	OBS	No	270.386745	360.361405	854.9	4.035	17.7	7.2	0.57	3919	1.75	0.15
009540467-03	OBS	No	360.937549	197.248197	1097.8	2.782	13.7	10.6	0.57	3919	2.07	0.10
009540467-05	OBS	No	418.686753	432.378155	794.3	6.491	15.0	6.7	0.57	3919	1.61	0.08
009540467-06	OBS	No	320.975460	210.598826	530.3	9.030	13.8	6.2	0.57	3919	1.32	0.12
009540467-08	OBS	No	679.085465	141.867271	741.8	3.869	15.2	7.9	0.57	3919	1.55	0.04
009540467-10	OBS	No	274.537158	346.932388	550.2	2.569	13.8	5.5	0.57	3919	1.50	0.15

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009540467-01	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—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009540467-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS
009540467-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS
009540467-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS
009540467-06	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
009540467-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009540467-10	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS—HALO_GHOST

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

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

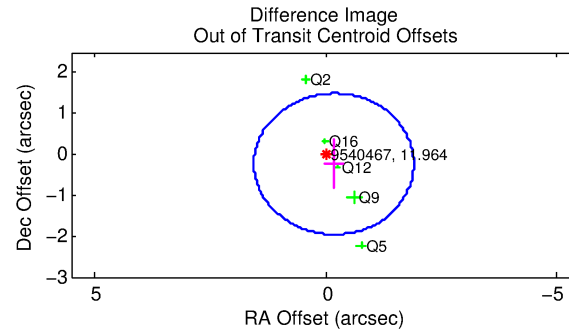
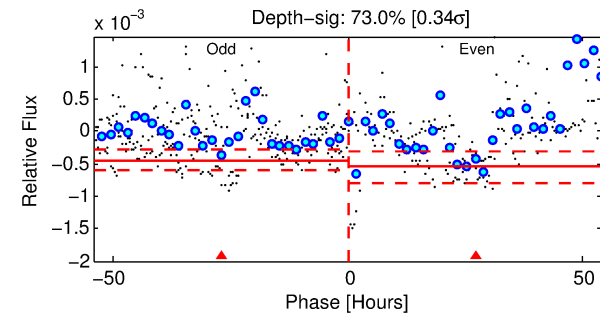
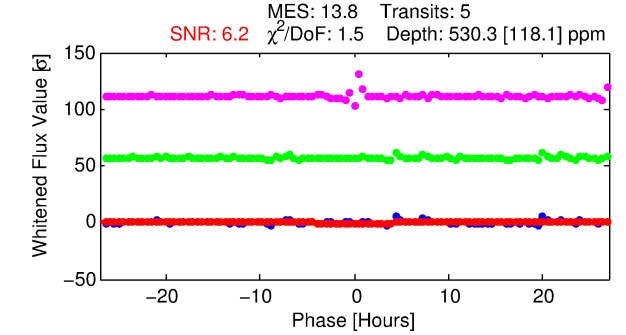
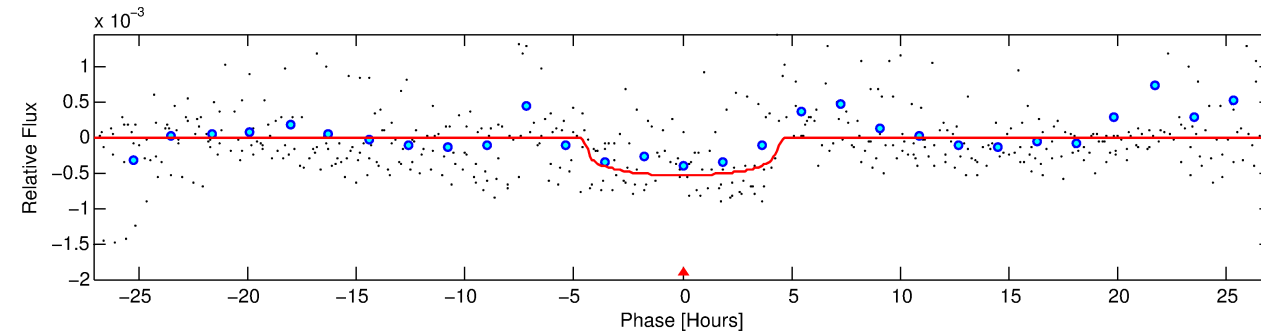
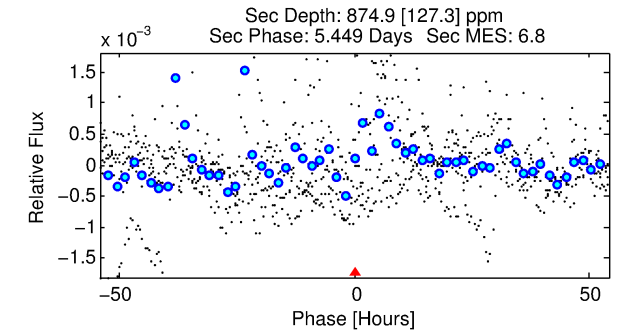
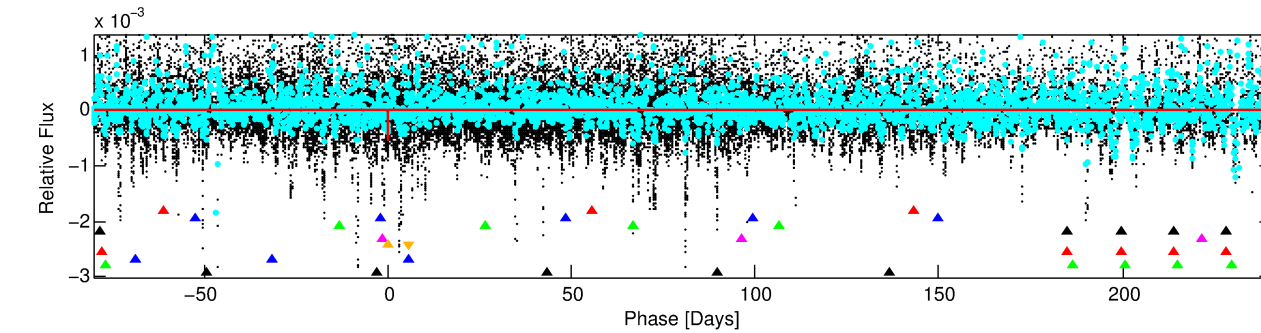
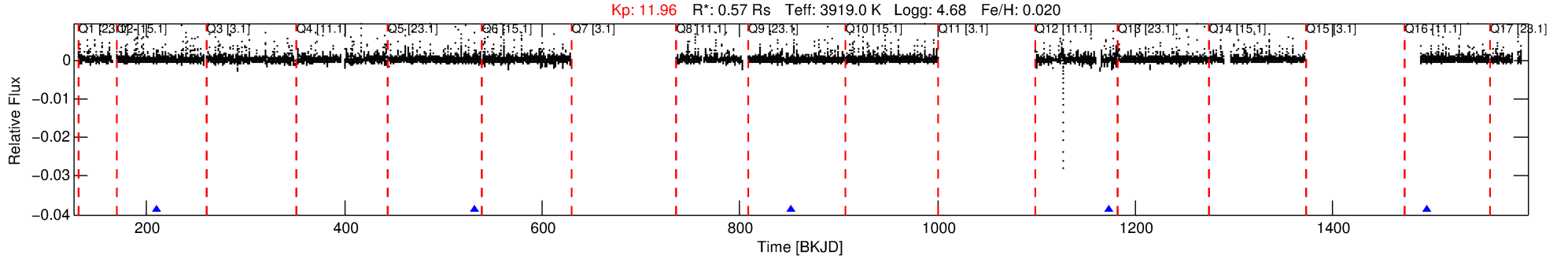
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009540467-06

No Significant Match Found

# DV One-Page Summary

KIC: 9540467 Candidate: 6 of 10 Period: 320.975 d



## DV Fit Results:

Period = 320.97546 [0.00458] d  
Epoch = 210.5988 [0.0123] BKJD  
Rp/R\* = 0.0211 [0.0192]  
a/R\* = 253.49 [878.63]  
b = 0.41 [6.98]  
Seff = 0.12 [0.02]  
Teq = 150 [8] K  
Rp = 1.32 [1.21] Re  
a = 0.7608 [0.0811] AU  
Ag = 160185.67 [292384.06] [0.55σ]  
Teffp = 4637 [2117] K [2.12σ]

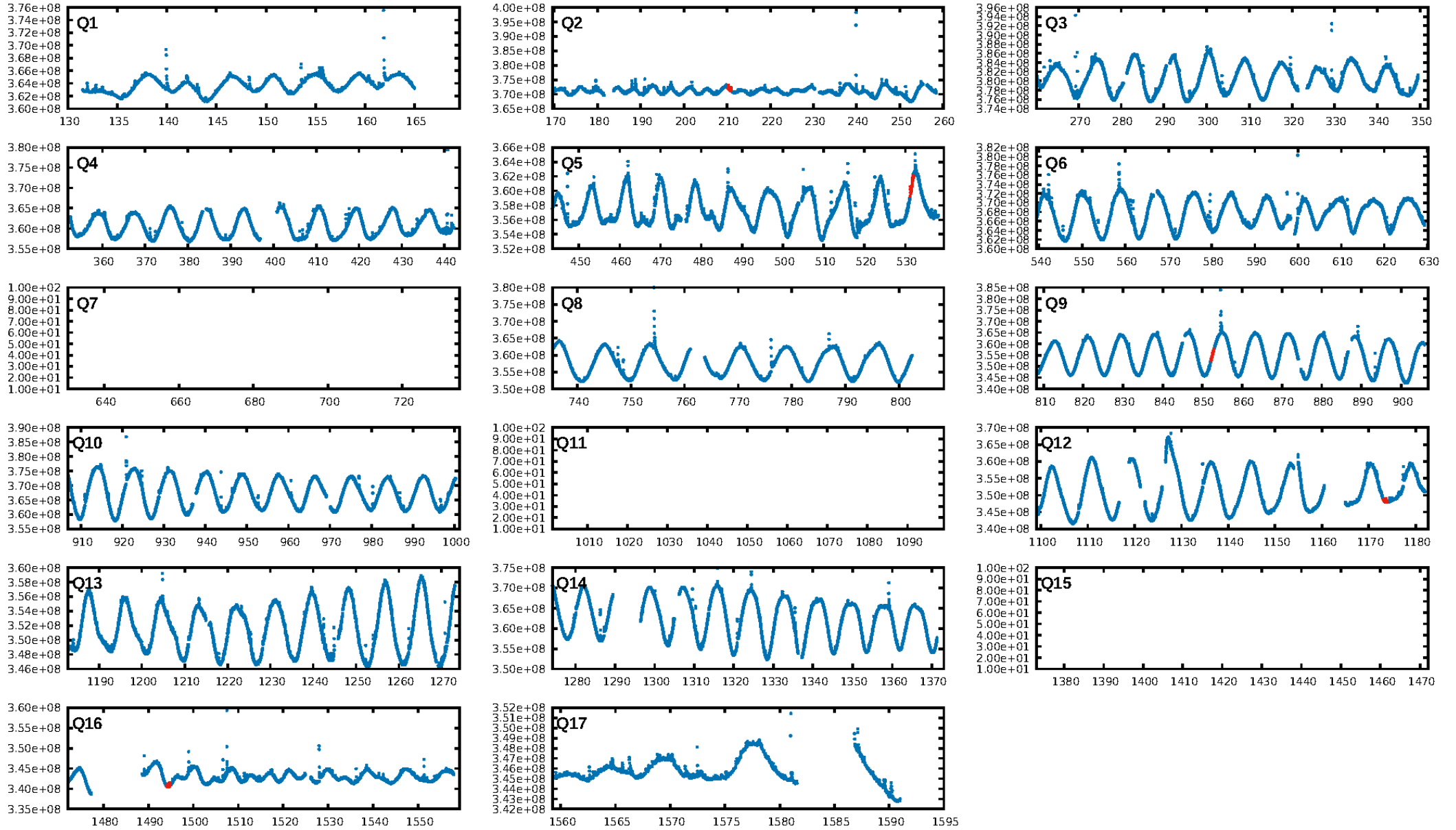
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [37.57σ]  
LongPeriod-sig: 100.0% [101.50σ]  
ModelChiSquare2-sig: 1.4%  
ModelChiSquareGof-sig: 62.2%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 1.605  
Centroid-sig: 41.4%  
Centroid-so: 0.645 arcsec [2.04σ]  
OotOffset-rm: 0.295 arcsec [0.51σ]  
OotOffset-st: 1/0/2/2 [5]  
KicOffset-rm: 0.225 arcsec [0.42σ]  
KicOffset-st: 1/0/2/2 [5]  
DiffImageQuality-fgm: 0.80 [4/5]  
DiffImageOverlap-fno: 1.00 [5/5]

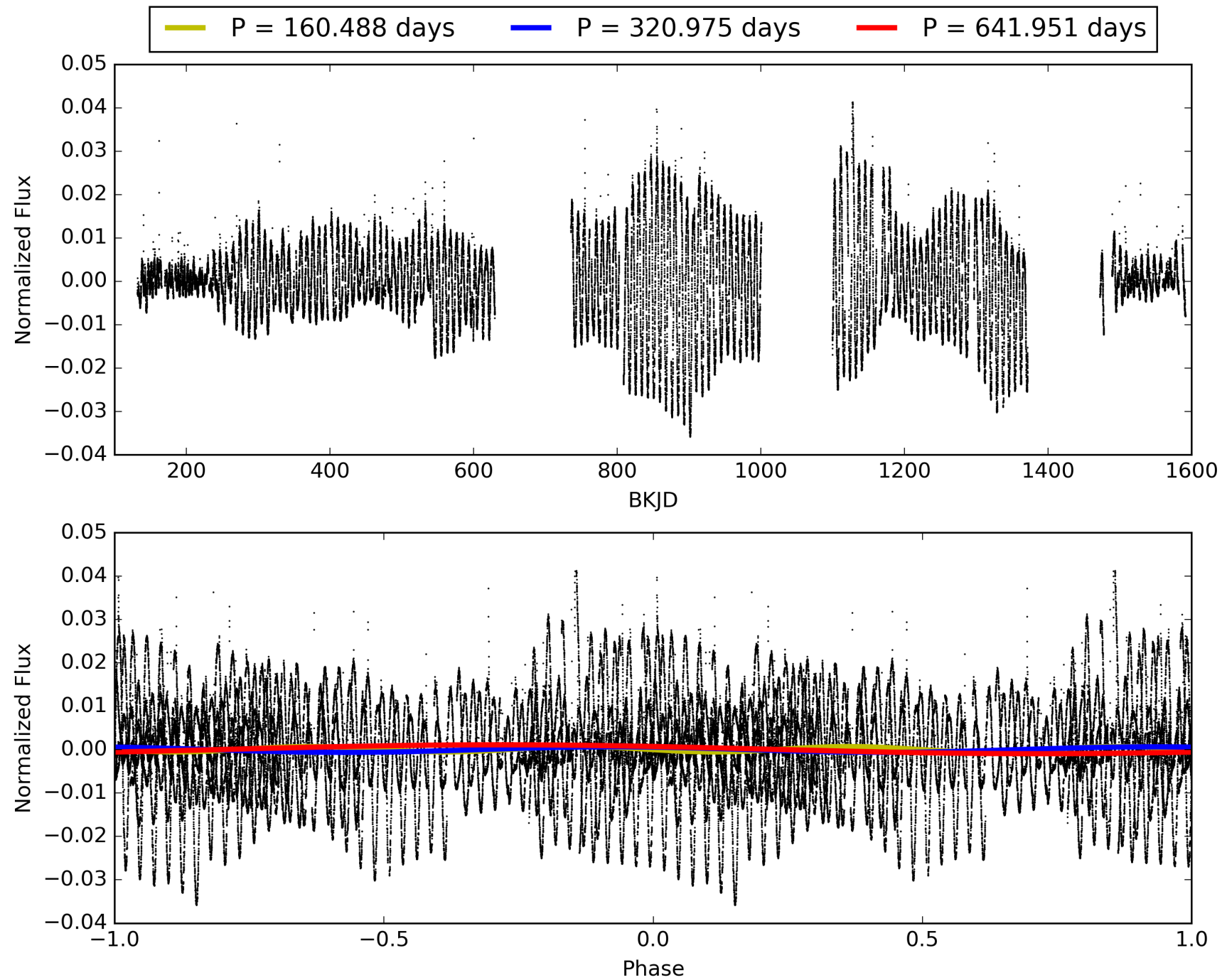
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 16:20:28 Z

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

# TCE 009540467-06, PDC Light Curves

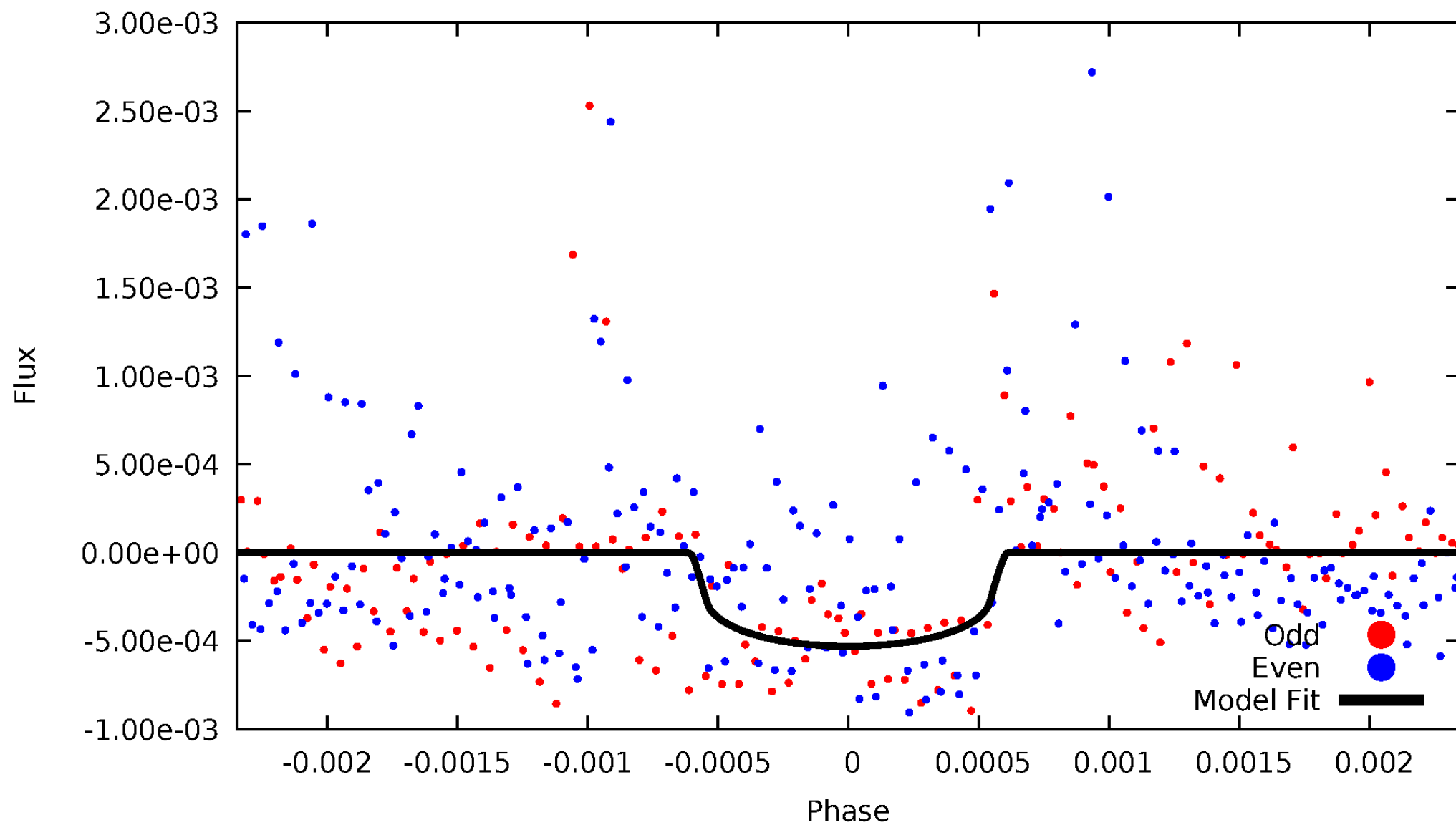


TCE 009540467-06



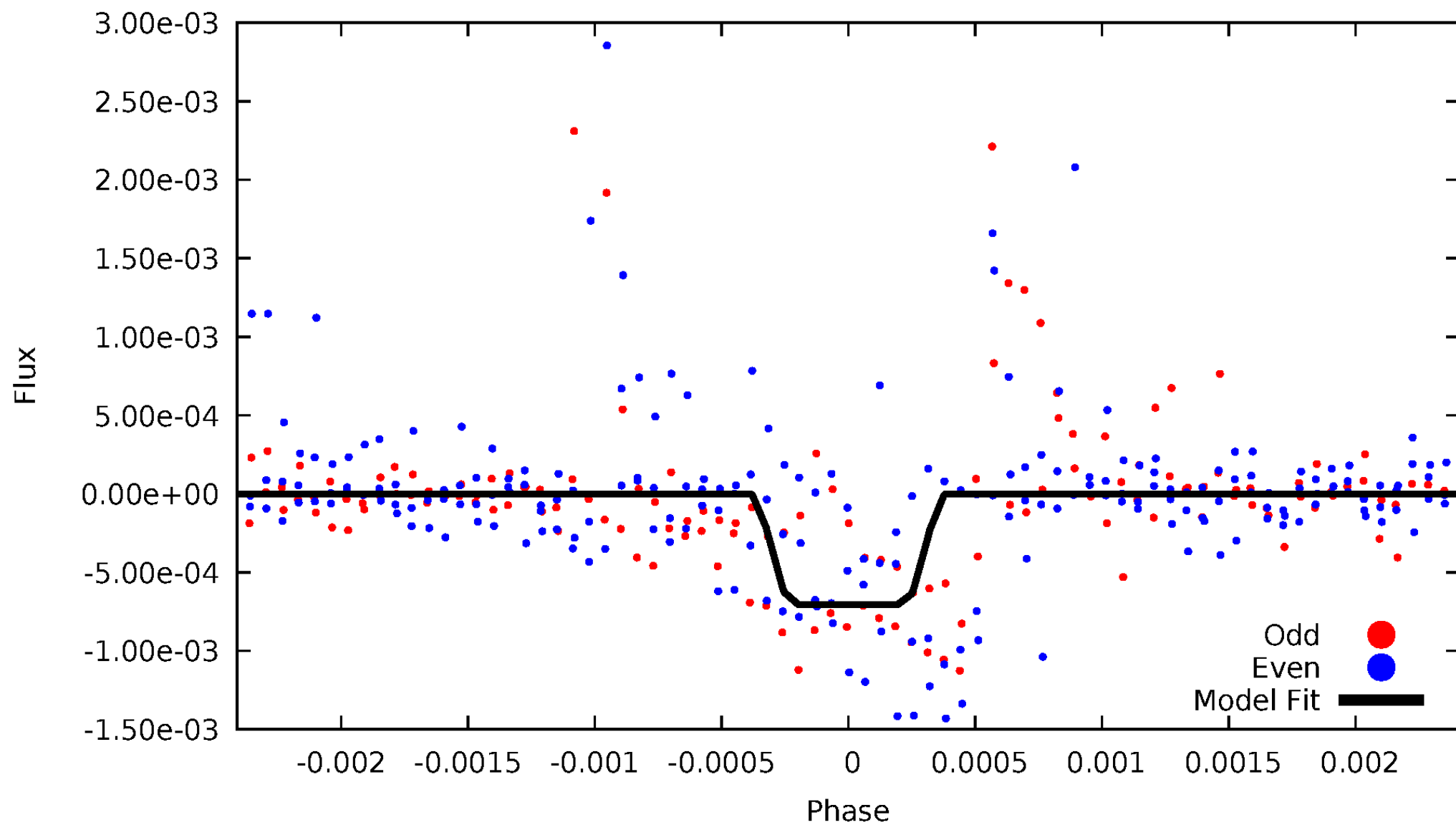
# DV Odd/Even

TCE 009540467-06



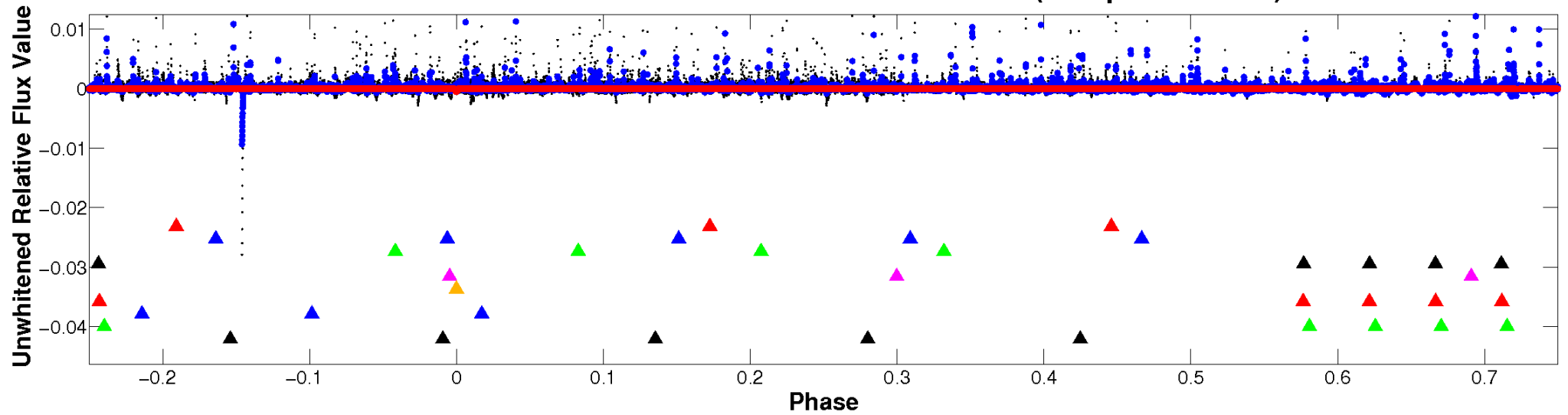
# ALT Odd/Even

TCE 009540467-06

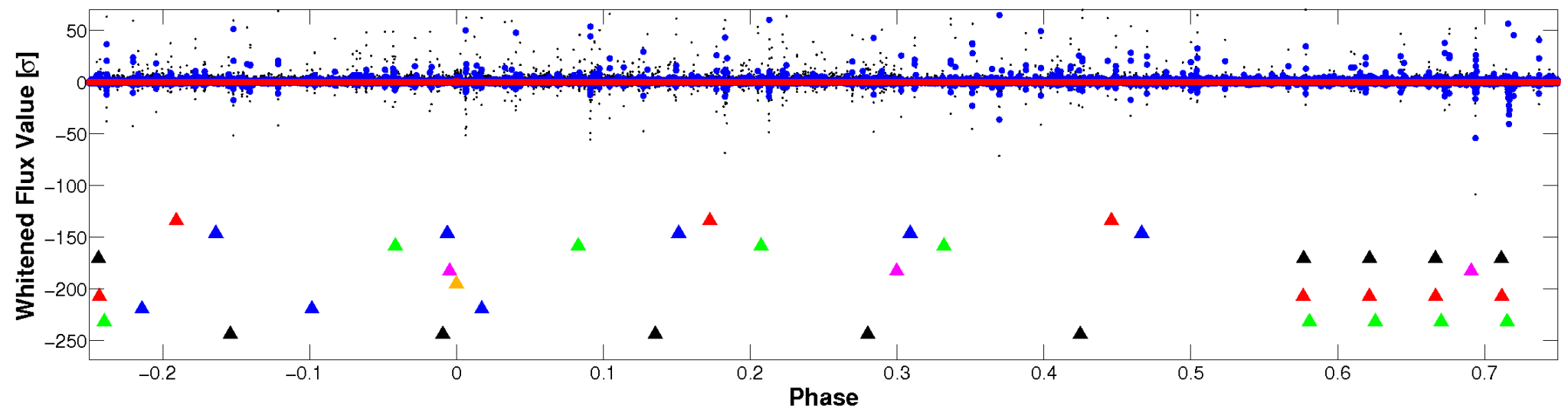


# Non-Whitened Vs. Whitened Light Curve

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

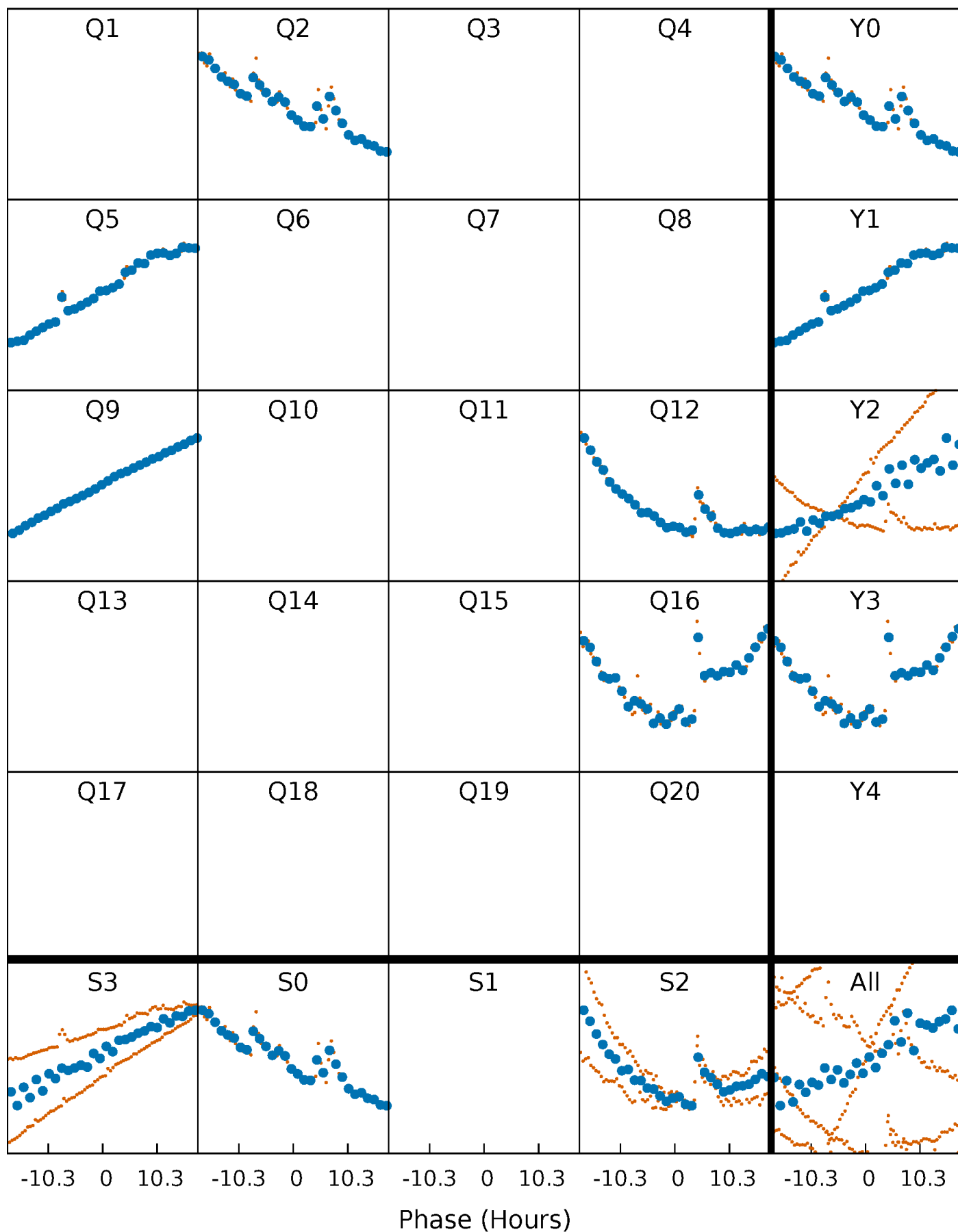


## Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)



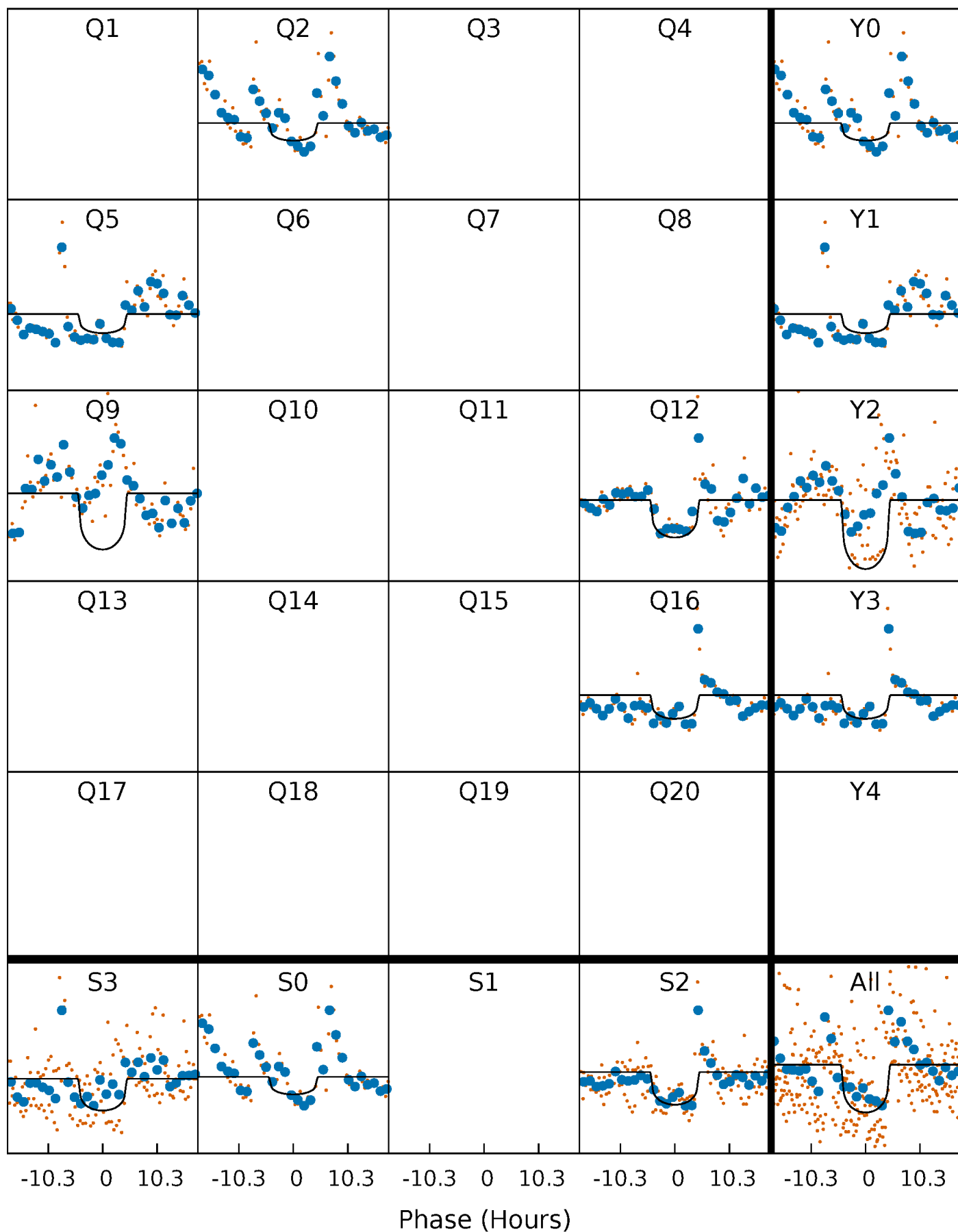
# PDC Quarter-Phased Transit Curves

TCE 009540467-06     $P=320.975459$  Days     $T_0=210.598826$  (BKJD)



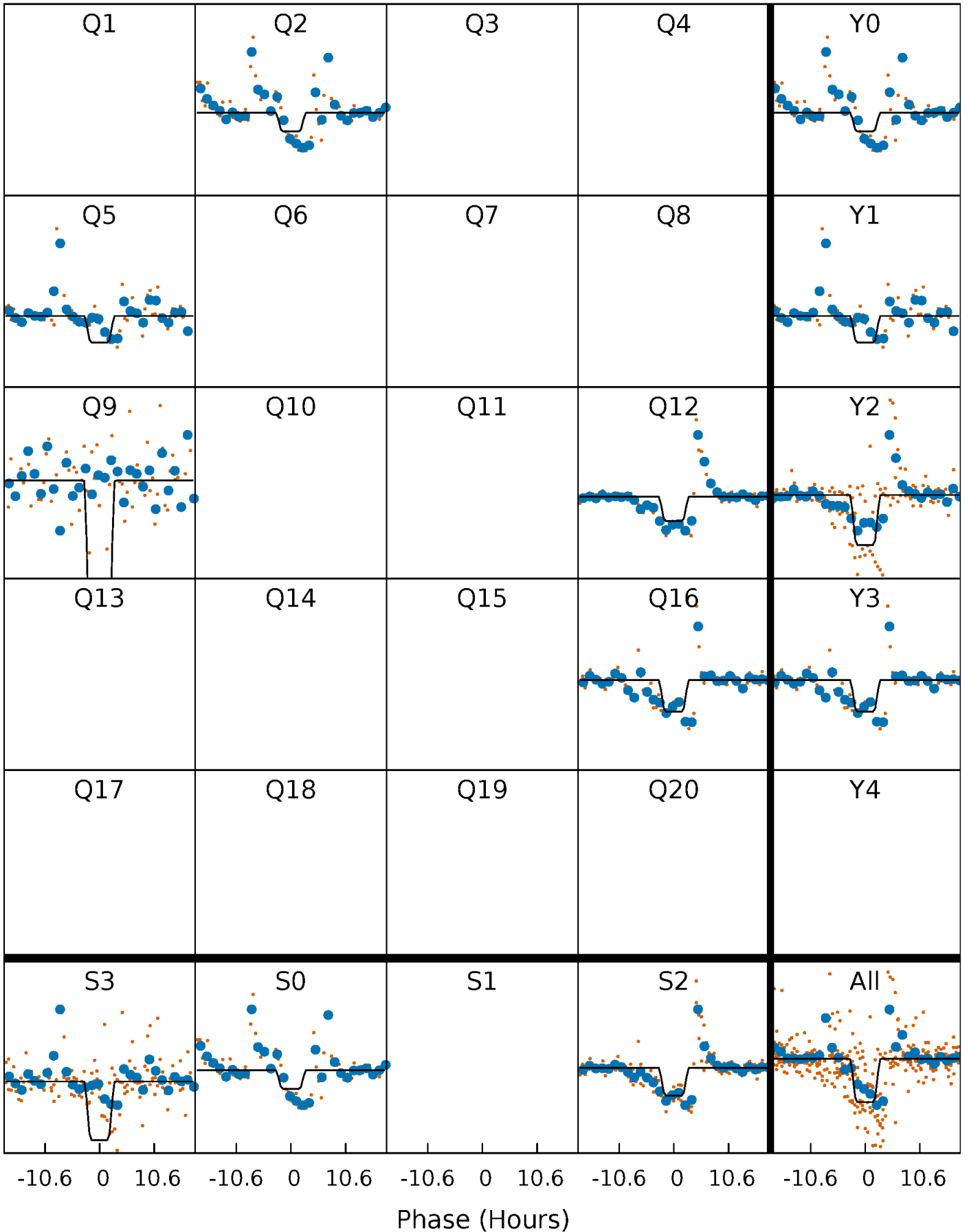
# DV Quarter-Phased Transit Curves

TCE 009540467-06     $P=320.975459$  Days     $T_0=210.598826$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

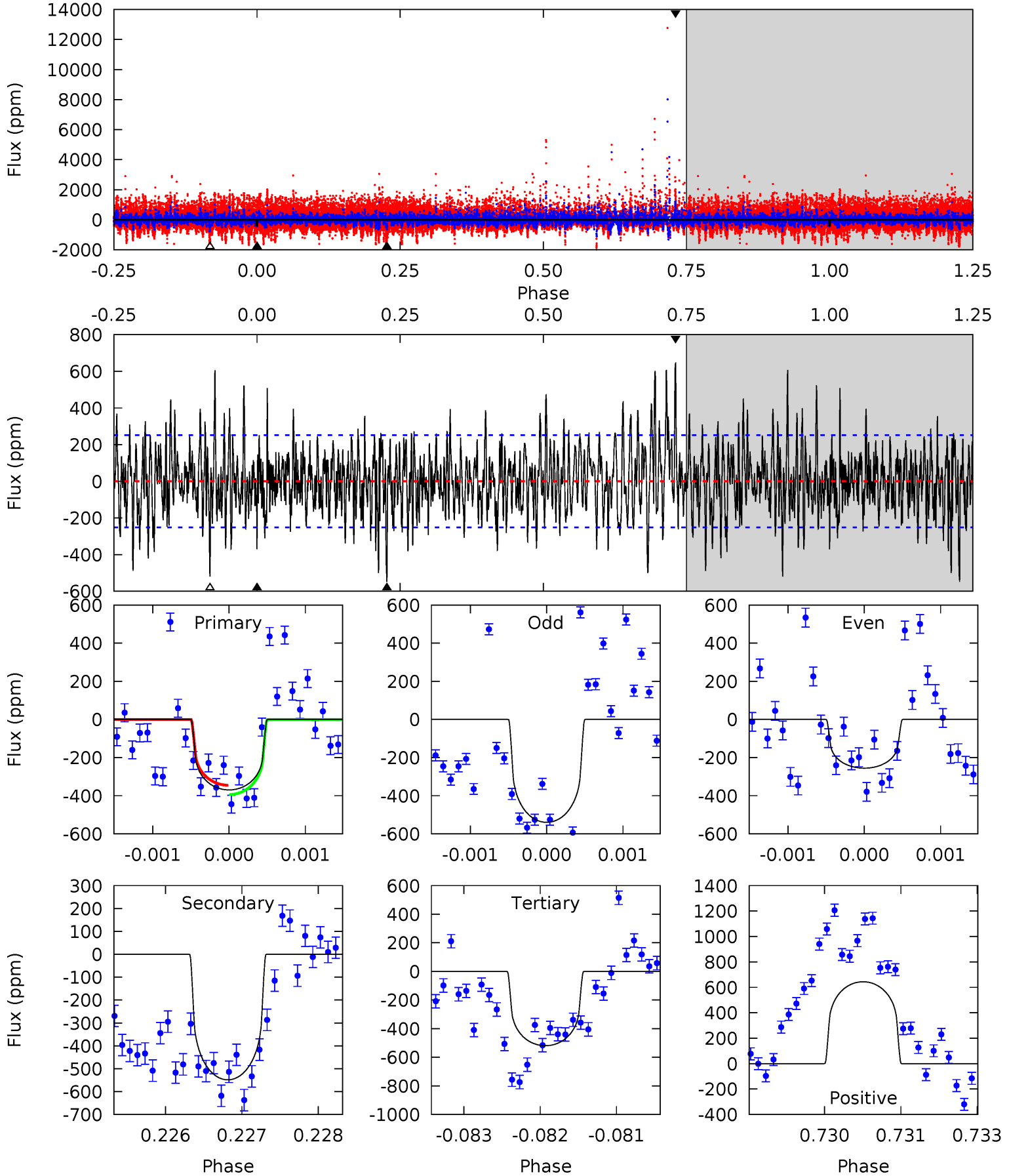
TCE 009540467-06     $P=320.970361$  Days     $T_0=210.611674$  (BKJD)



# DV Model-Shift Uniqueness Test

009540467-06, P = 320.975459 Days, E = 210.598826 Days

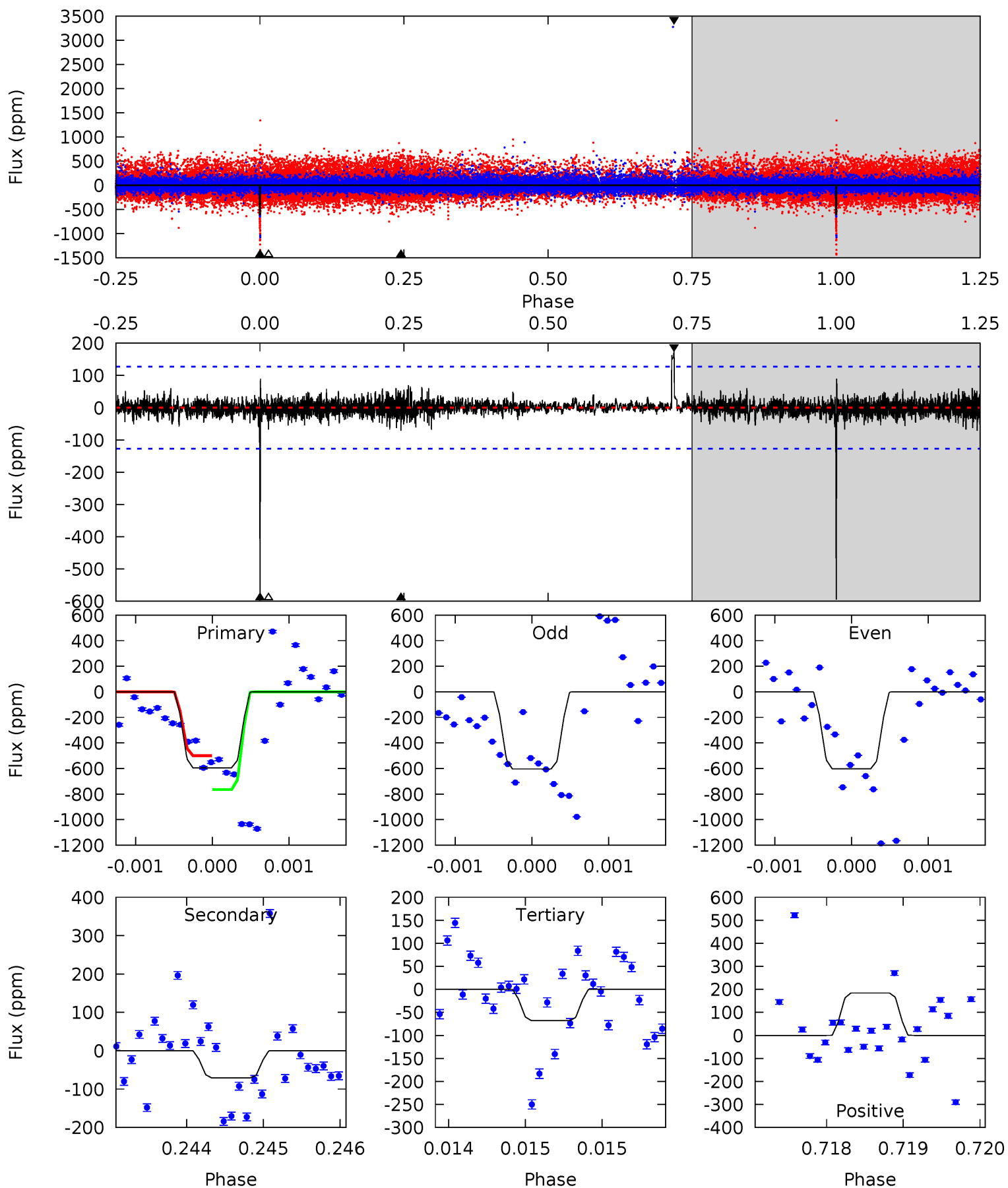
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.95	11.8	11.2	13.8	5.41	3.23	3.31	-3.22	-5.90	0.63	-2.05	2.15	0.85	0.54	0.52



# Alt Model-Shift Uniqueness Test

009540467-06, P = 320.970361 Days, E = 210.611674 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
25.7	3.06	2.92	7.95	5.50	3.36	0.73	22.7	17.7	0.14	-4.89	0.03	0.79	0.24	5.78



### Stellar Parameters For KIC 009540467

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3919^{+121}_{-148}$	$4.679^{+0.070}_{-0.025}$	$0.020^{+0.250}_{-0.300}$	$0.572^{+0.042}_{-0.079}$	$0.570^{+0.051}_{-0.070}$	$4.295^{+1.555}_{-0.534}$
	+3%/-4%	+1%/-1%	+1250%/-1500%	+7%/-14%	+9%/-12%	+36%/-12%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 009540467-06 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-548 \pm 46$	$1.49^{+1.07}_{-0.91}$	$208^{+8}_{-9}$	$3869^{+1785}_{-646}$	$78662^{+467376}_{-51652}$
Alt.	$-71 \pm 23$	$1.75^{+1.18}_{-1.02}$	$207^{+8}_{-9}$	$2693^{+785}_{-327}$	$6918^{+33490}_{-4502}$

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

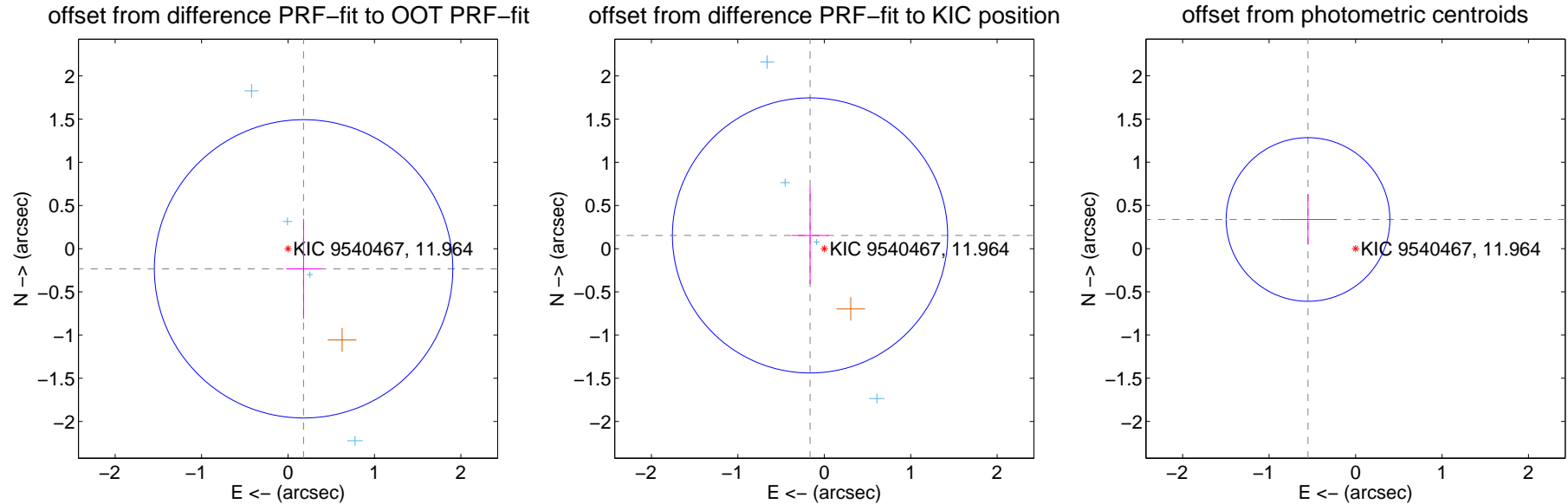
## DV Centroid Data

Supplemental centroid analysis for 009540467-06. **Kepler magnitude: 11.96.** Transit SNR 6.18

There are 4 quarters with good PRF difference image offsets

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

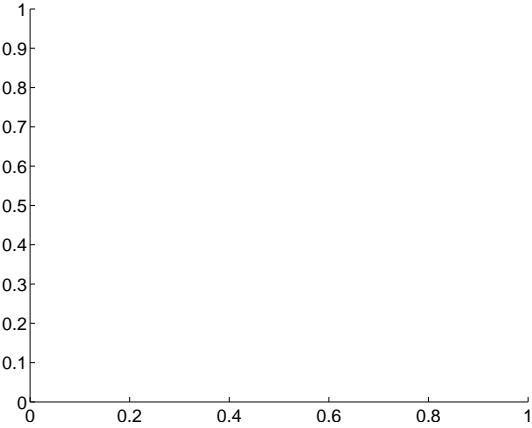
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.295 \pm 0.576$	0.51	$-0.180 \pm 0.203$	$-0.233 \pm 0.579$
PRF-fit source offset from KIC position	$0.225 \pm 0.531$	0.42	$0.165 \pm 0.214$	$0.154 \pm 0.562$
photometric centroid source offset	$0.65 \pm 0.32$	2.04	$0.55 \pm 0.32$	$0.34 \pm 0.29$



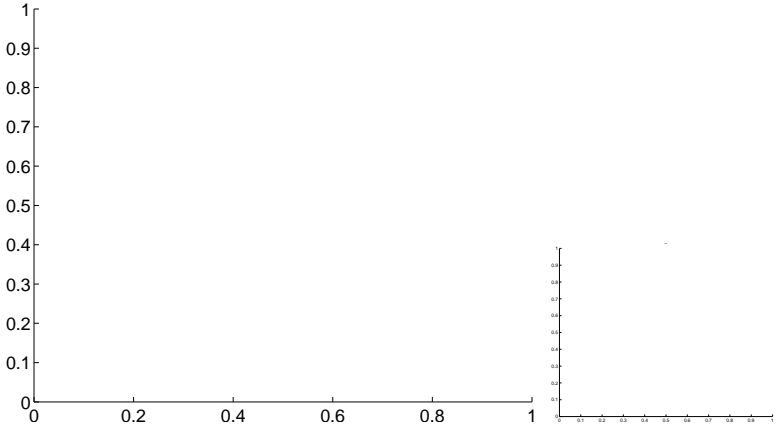
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

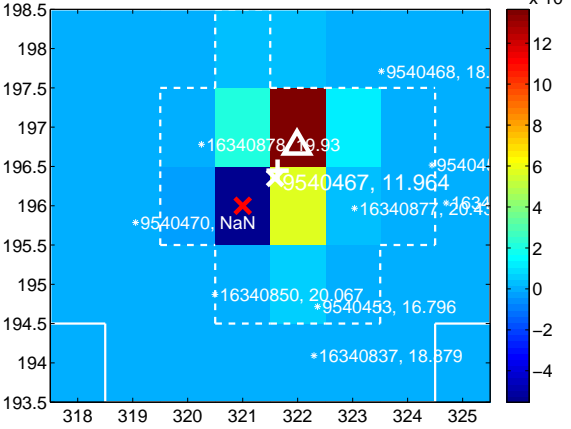
Q1 no difference image



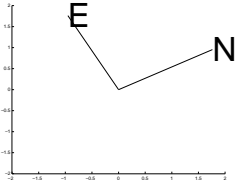
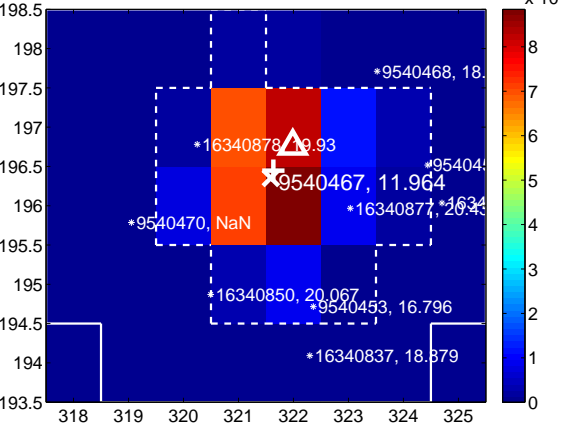
Q1 no OOT image



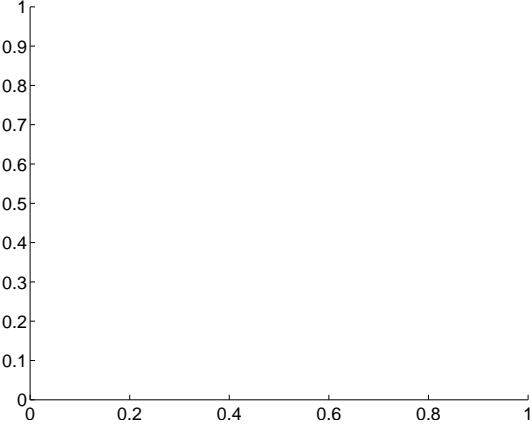
Q2 difference image



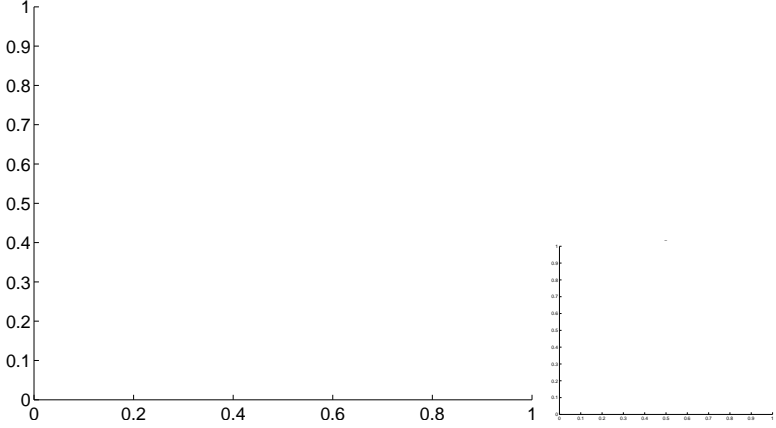
Q2 OOT image



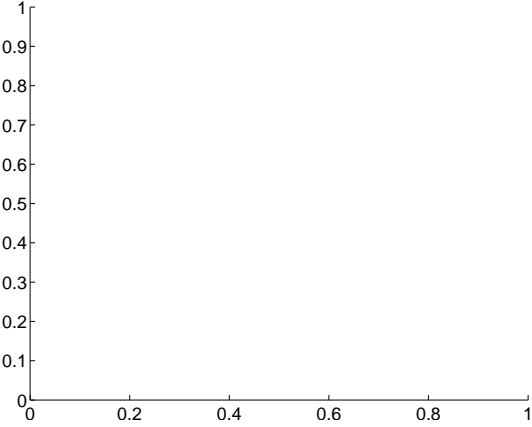
Q3 no difference image



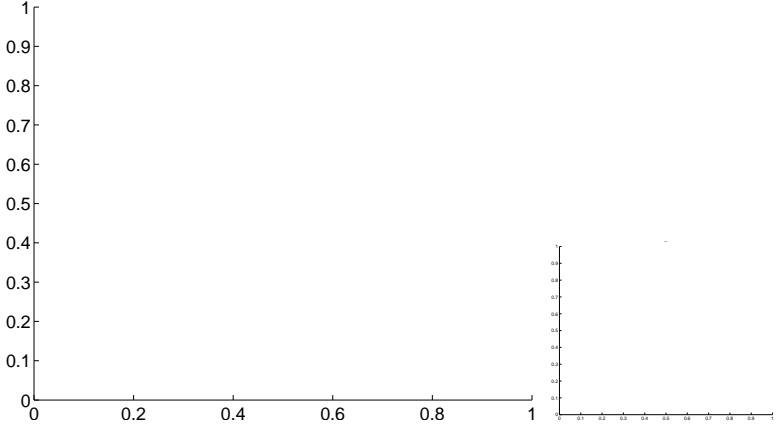
Q3 no OOT image



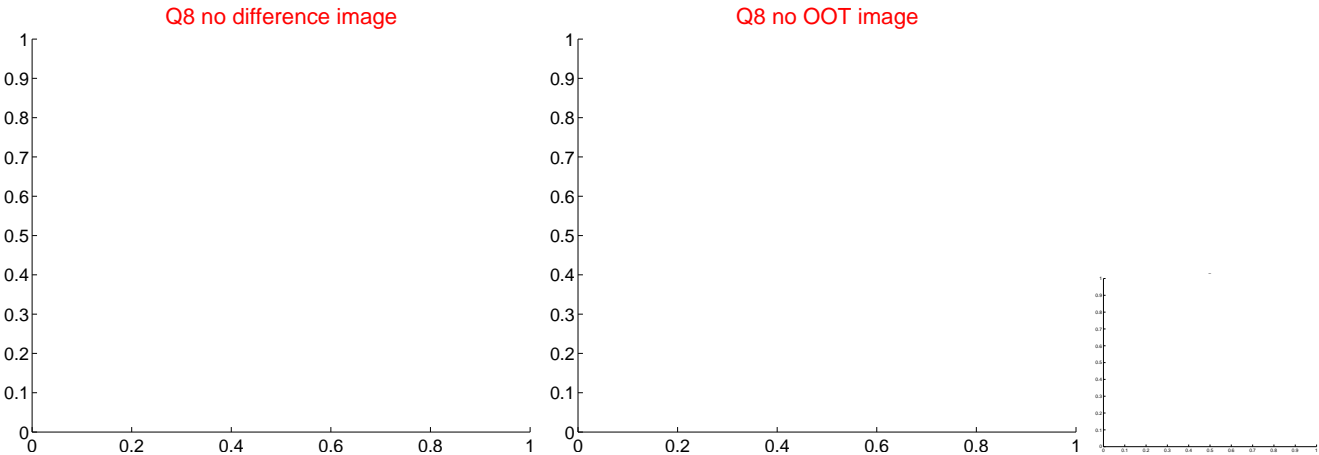
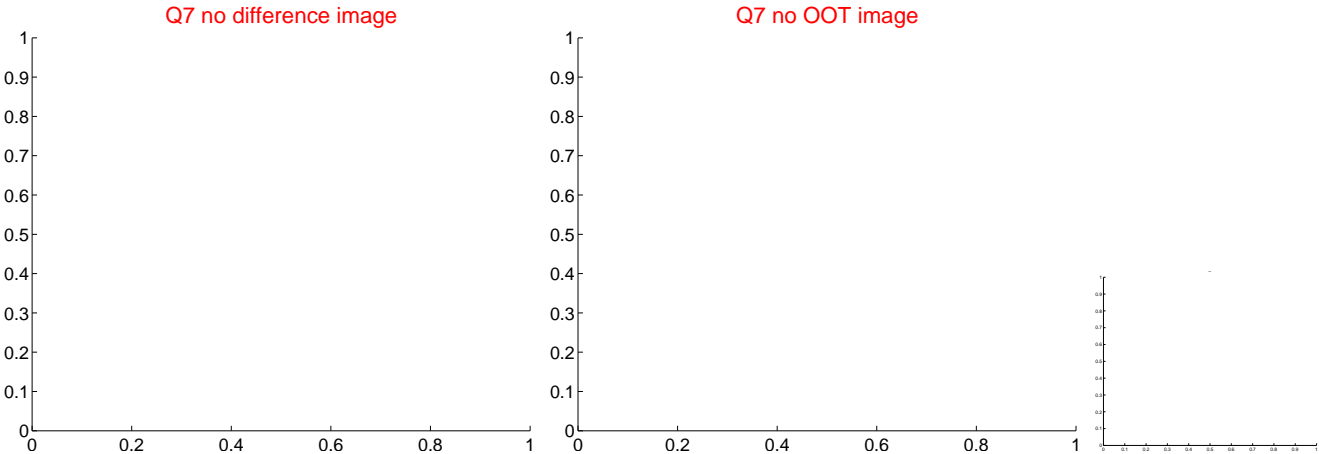
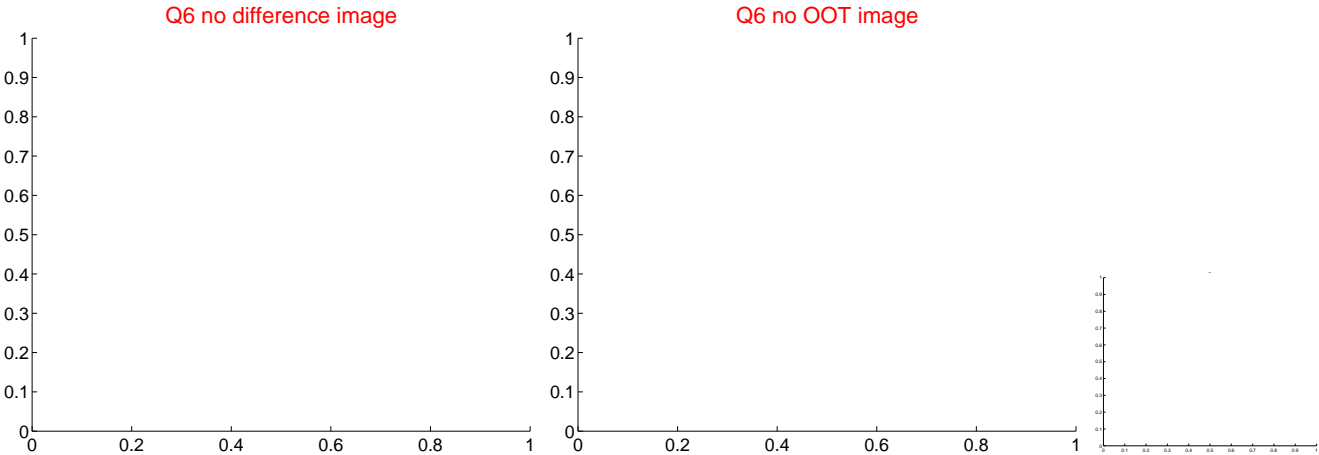
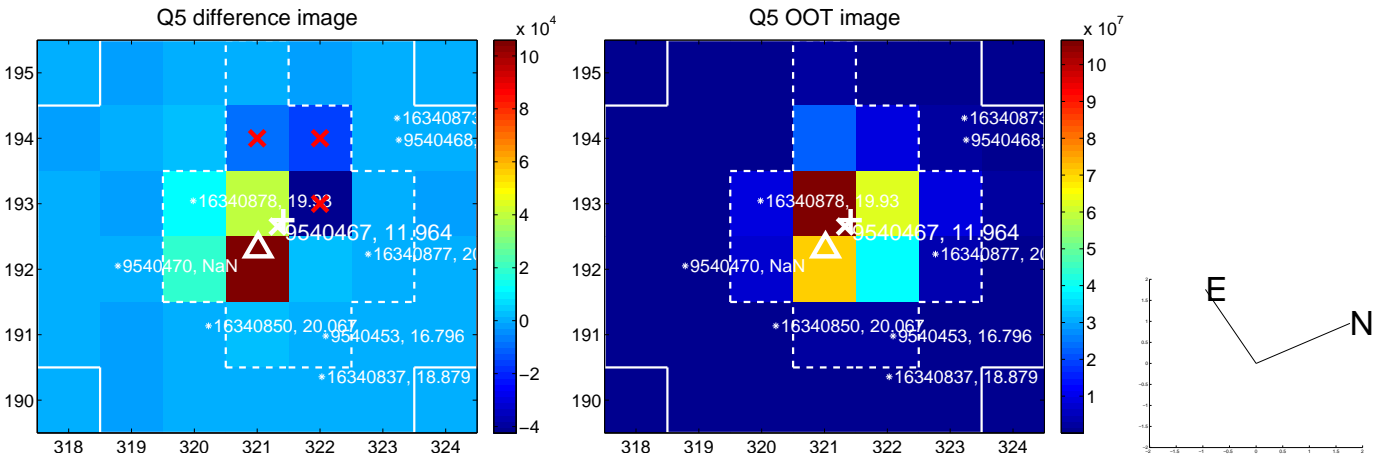
Q4 no difference image



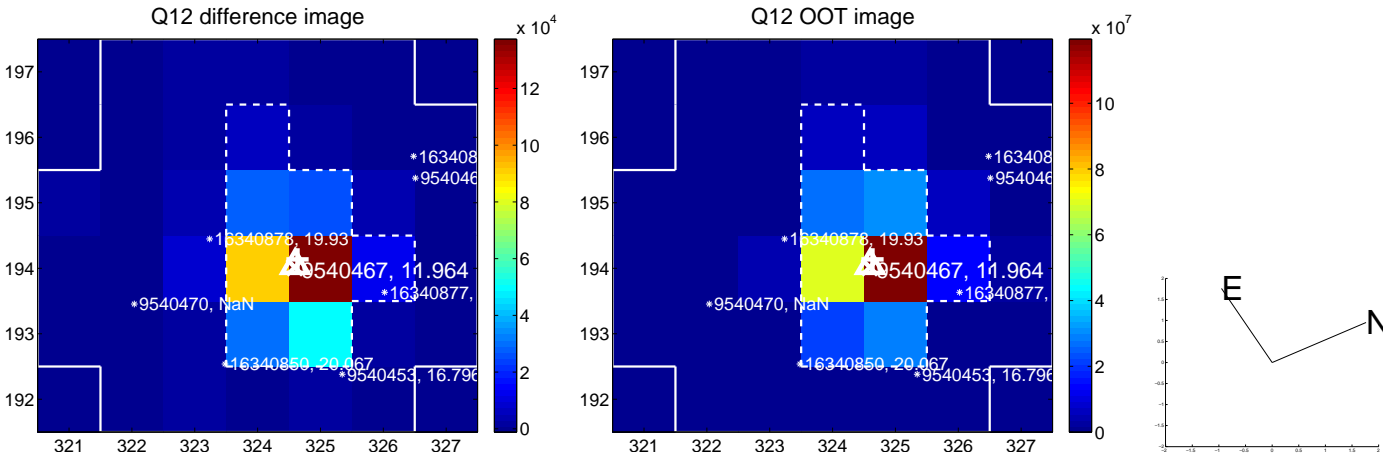
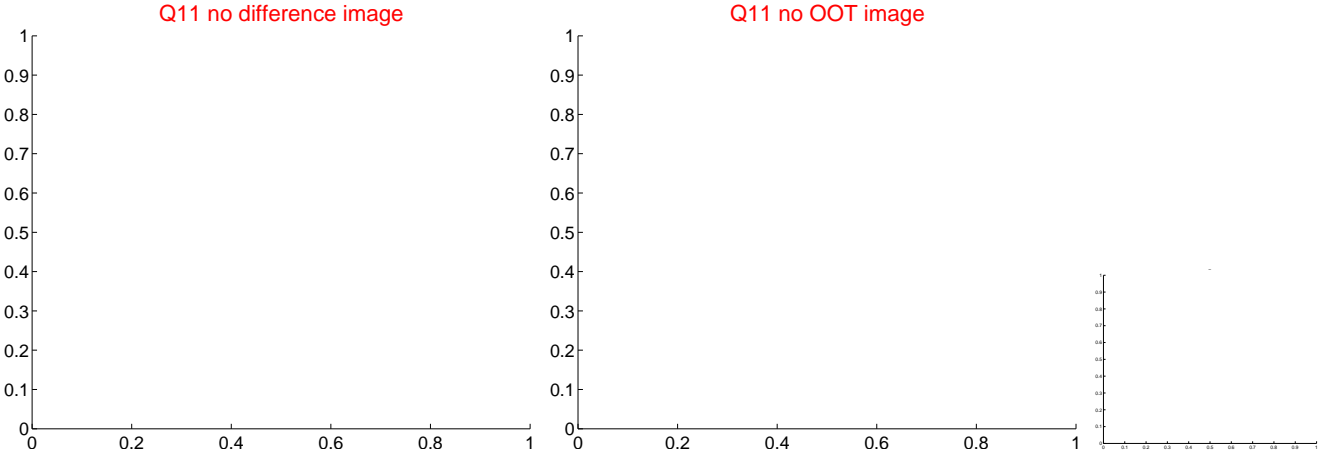
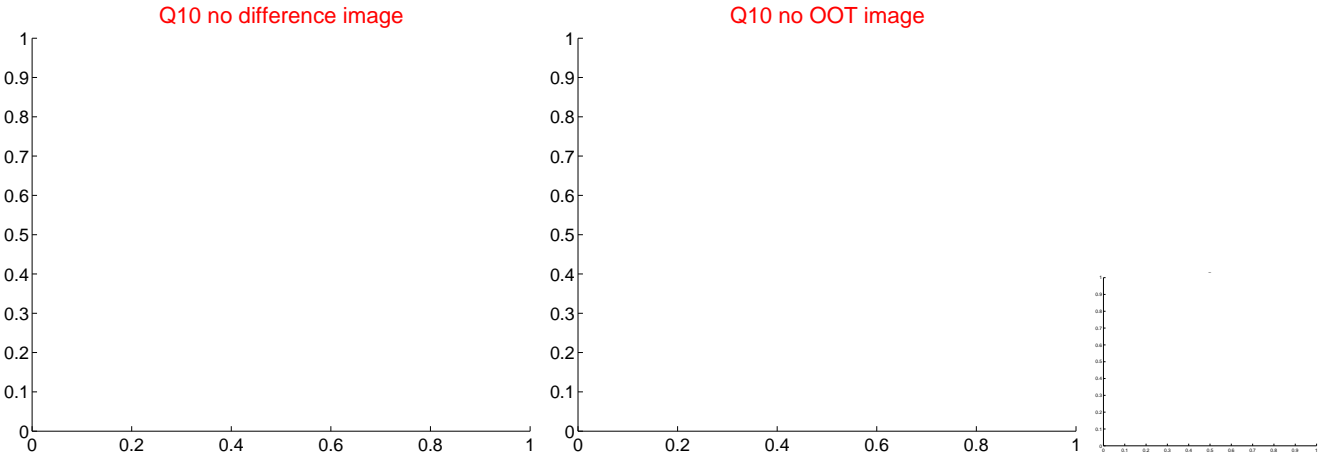
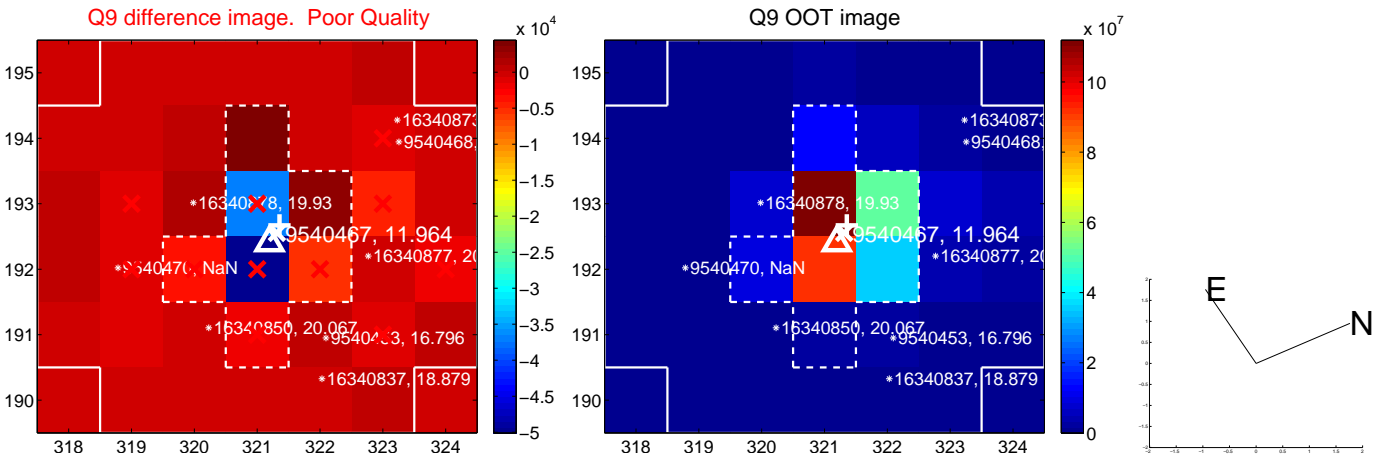
Q4 no OOT image



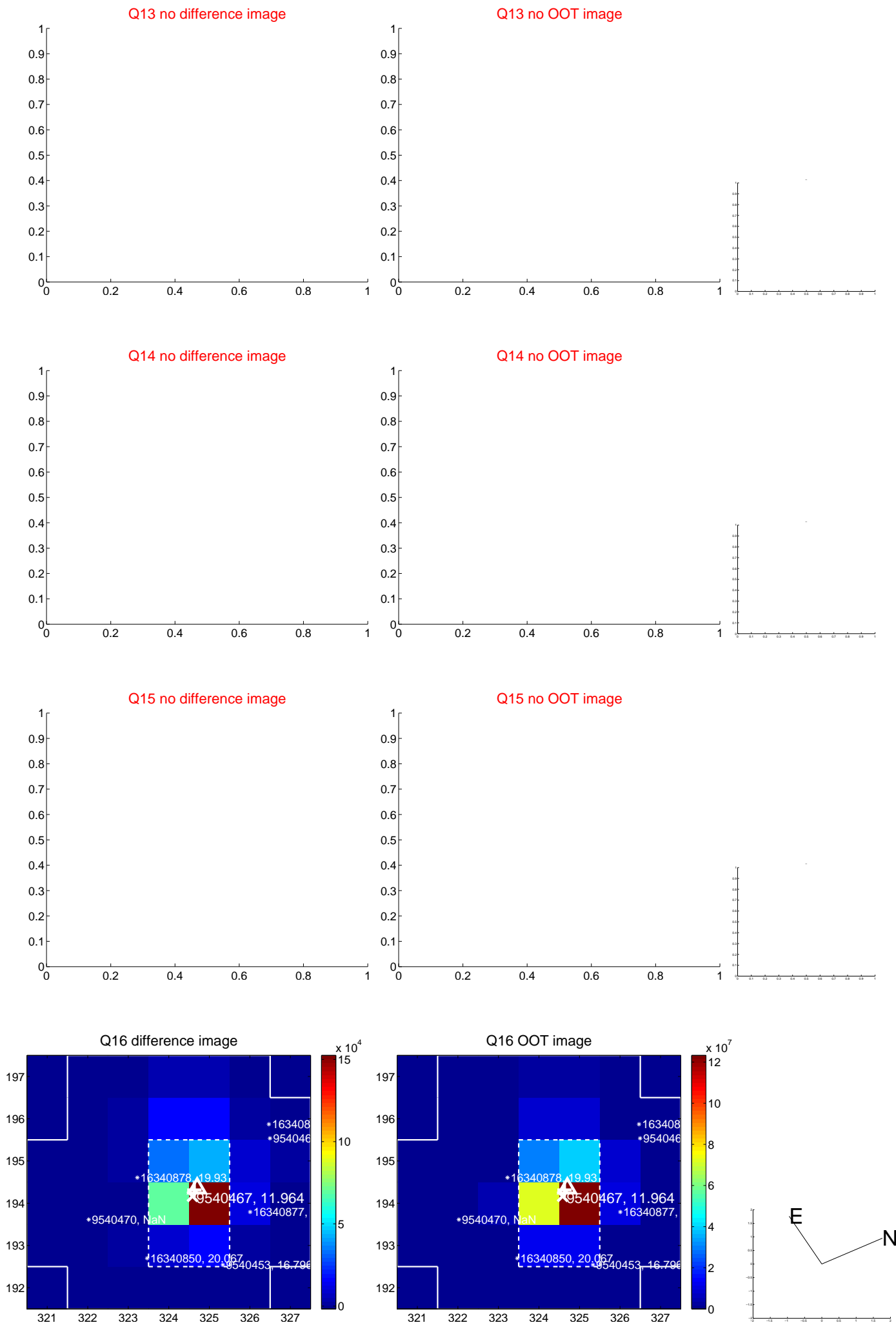
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



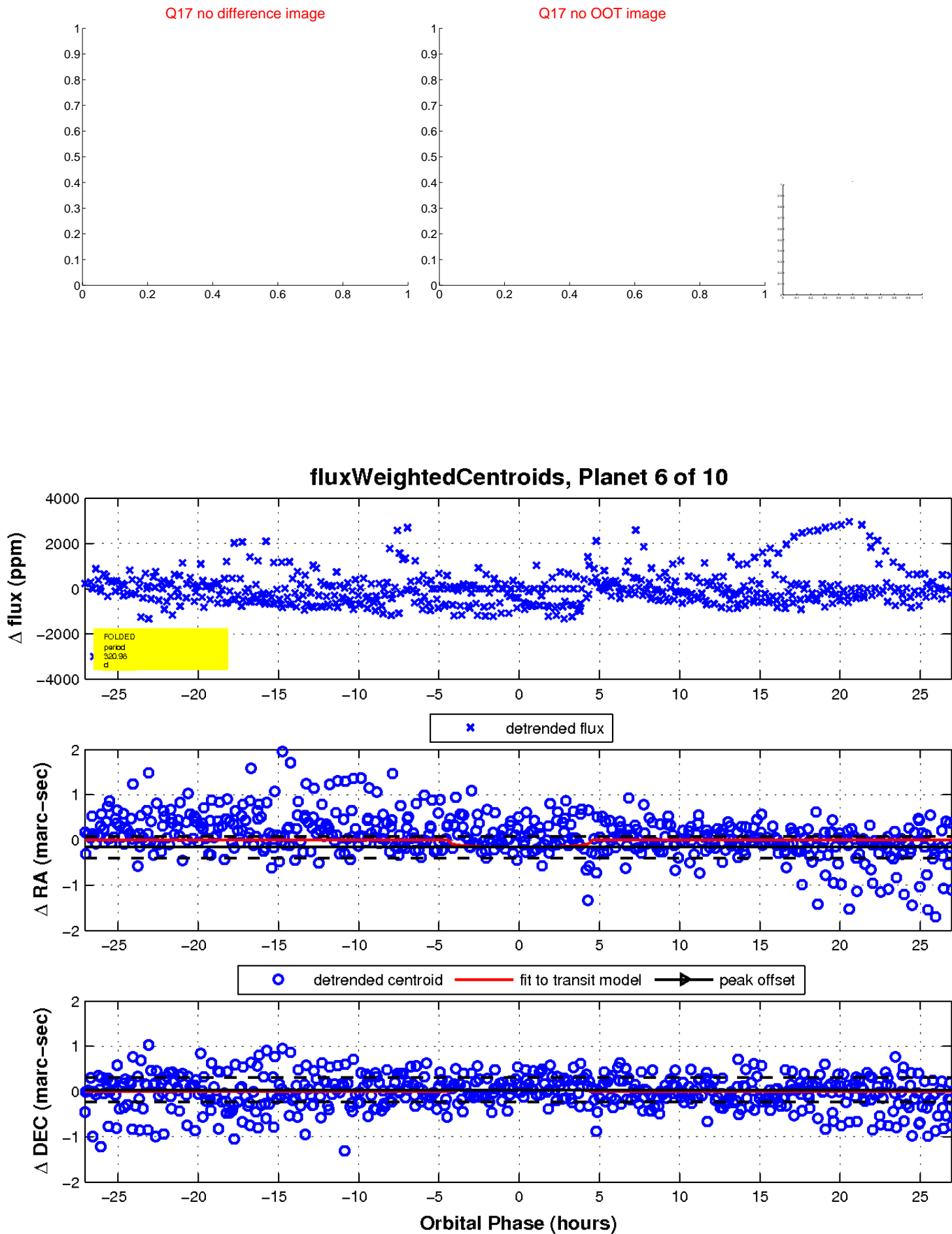
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



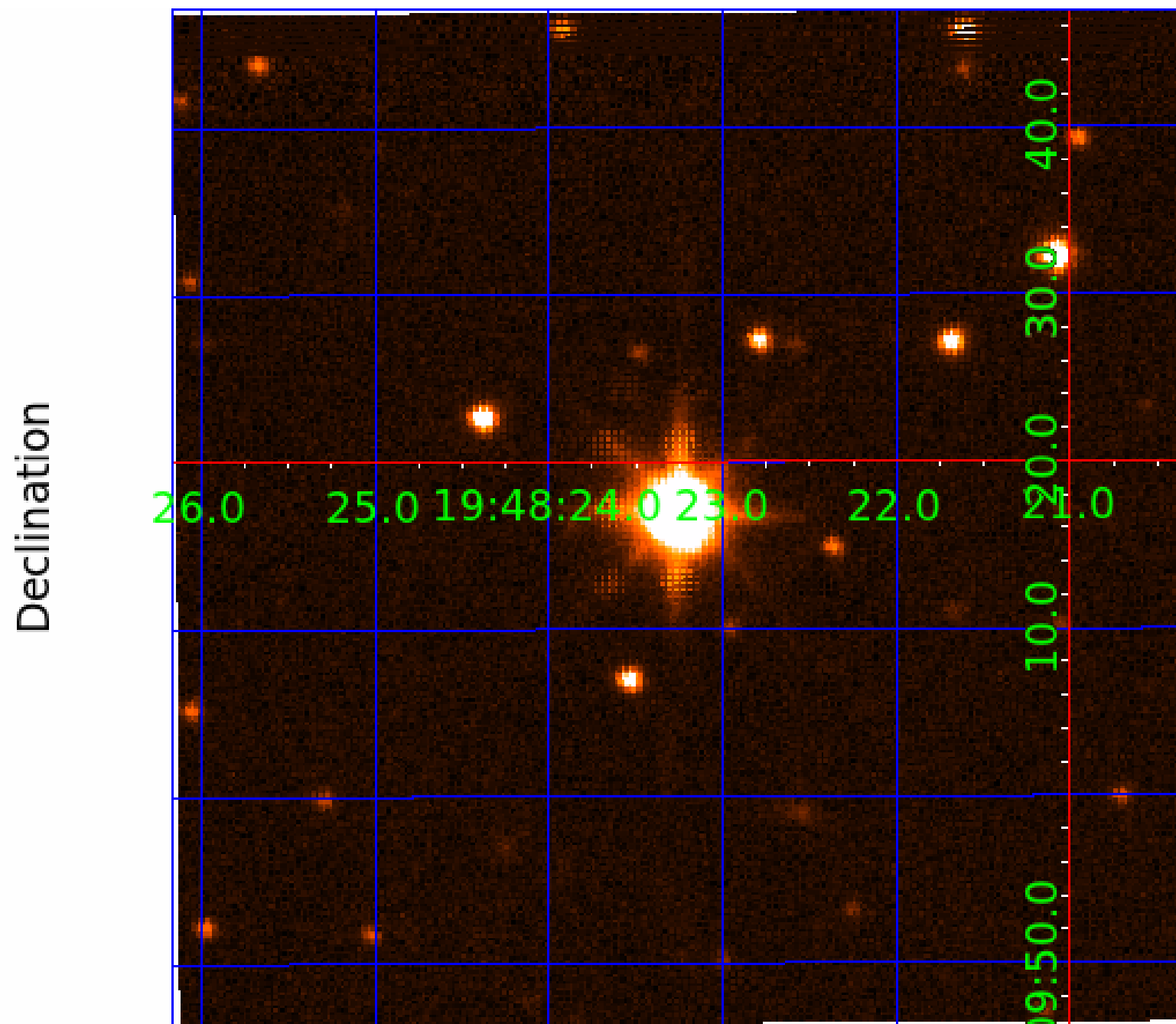
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image



# KIC 009540467

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009540467-01	OBS	No	525.337604	265.984740	518.3	9.332	17.4	4.7	0.57	3919	1.47	0.06
009540467-02	OBS	No	270.386745	360.361405	854.9	4.035	17.7	7.2	0.57	3919	1.75	0.15
009540467-03	OBS	No	360.937549	197.248197	1097.8	2.782	13.7	10.6	0.57	3919	2.07	0.10
009540467-05	OBS	No	418.686753	432.378155	794.3	6.491	15.0	6.7	0.57	3919	1.61	0.08
009540467-06	OBS	No	320.975460	210.598826	530.3	9.030	13.8	6.2	0.57	3919	1.32	0.12
009540467-08	OBS	No	679.085465	141.867271	741.8	3.869	15.2	7.9	0.57	3919	1.55	0.04
009540467-10	OBS	No	274.537158	346.932388	550.2	2.569	13.8	5.5	0.57	3919	1.50	0.15

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009540467-01	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—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009540467-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS
009540467-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS
009540467-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS
009540467-06	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
009540467-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009540467-10	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS—HALO_GHOST

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

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

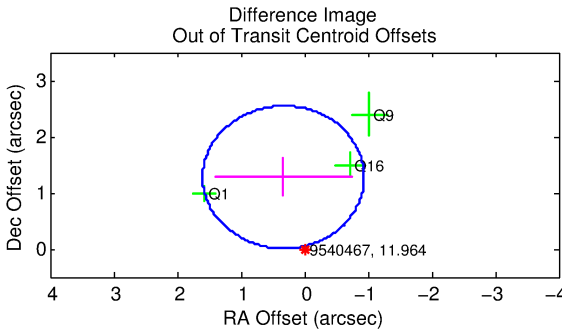
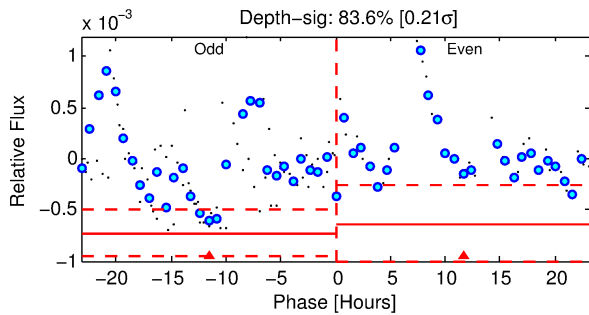
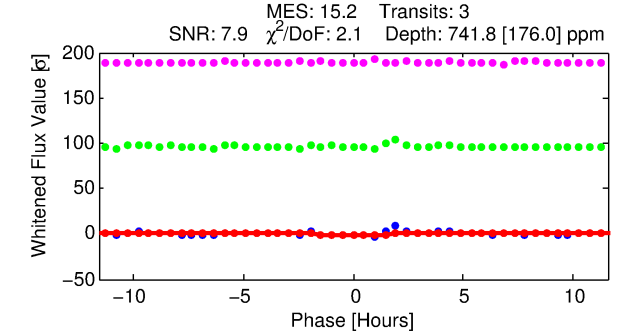
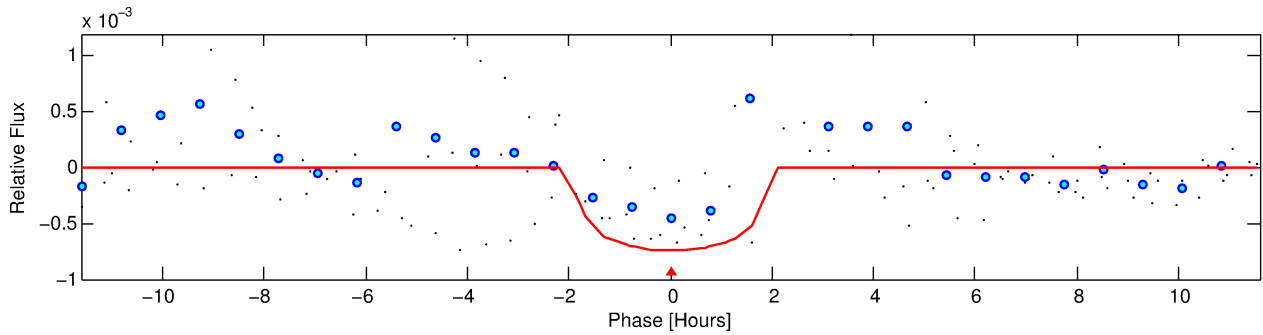
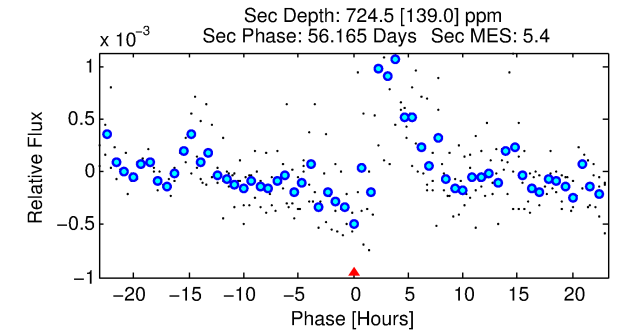
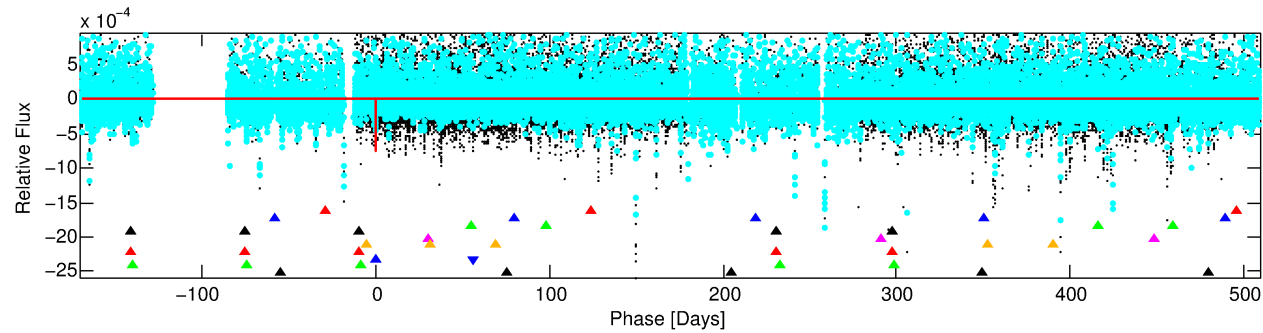
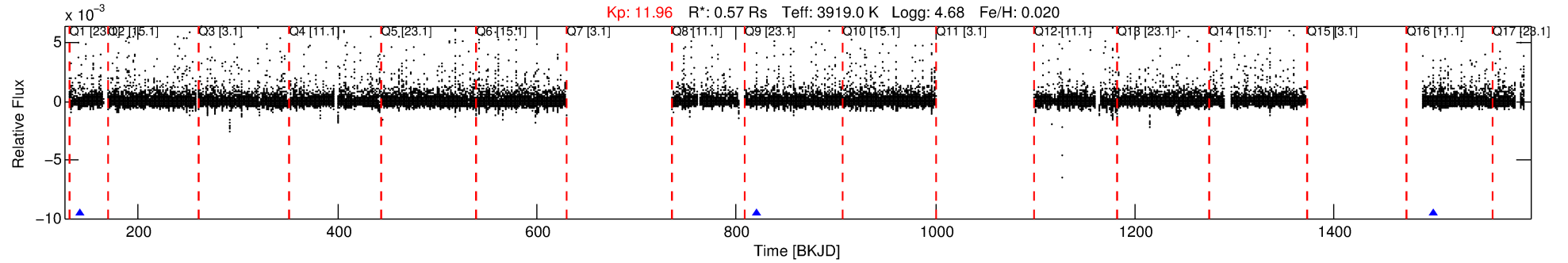
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009540467-08

No Significant Match Found

# DV One-Page Summary

KIC: 9540467 Candidate: 8 of 10 Period: 679.085 d



## DV Fit Results:

Period = 679.08546 [0.00745] d  
Epoch = 141.8673 [0.0093] BKJD  
Rp/R\* = 0.0248 [0.0618]  
a/R\* = 1293.98 [12296.13]  
b = 0.34 [24.48]  
Seff = 0.04 [0.01]  
Teq = 117 [6] K  
Rp = 1.55 [3.86] Re  
a = 1.2538 [0.1337] AU  
Ag = 261144.89 [1301452.21] [0.20σ]  
Teffp = 4081 [5085] K [0.78σ]

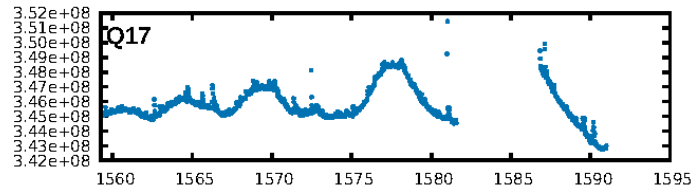
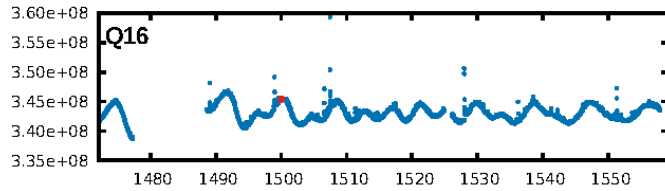
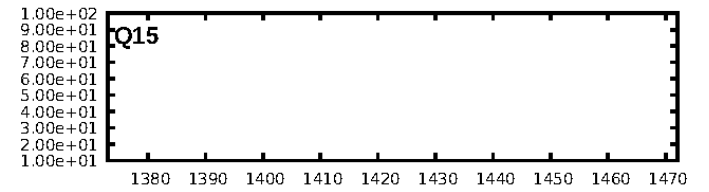
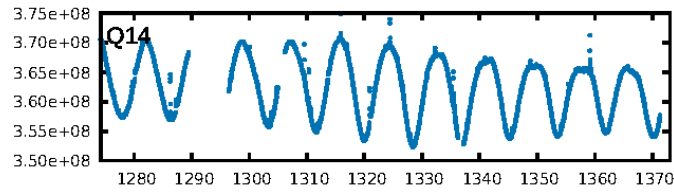
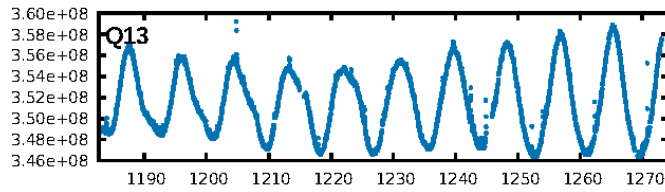
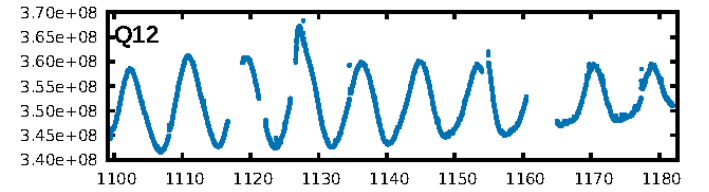
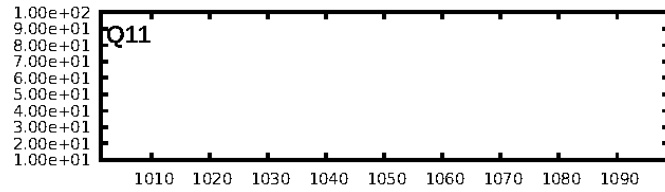
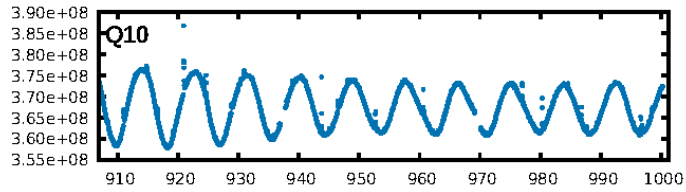
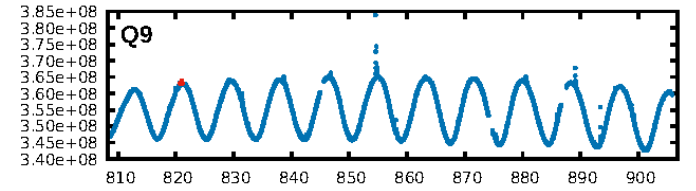
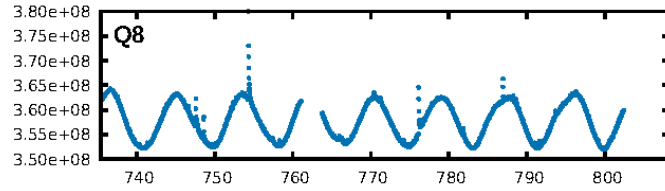
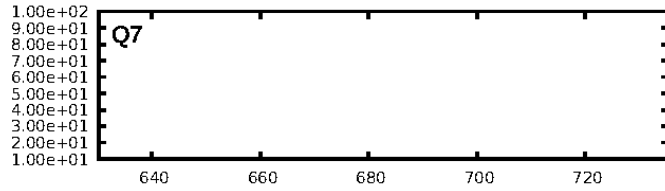
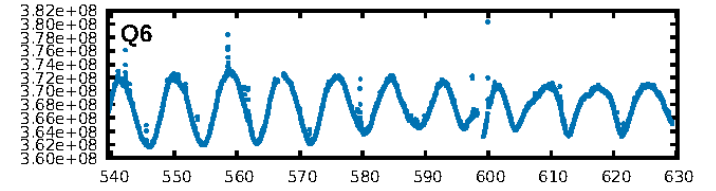
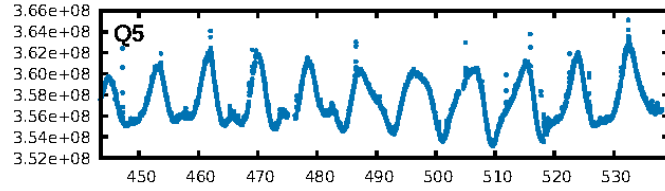
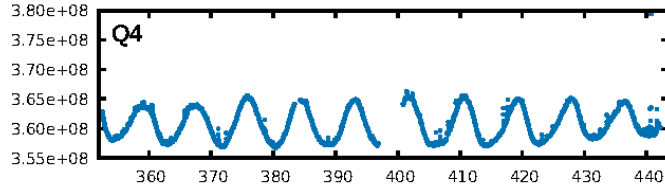
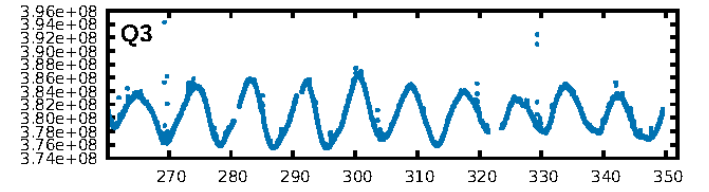
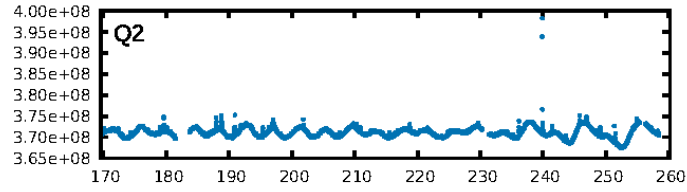
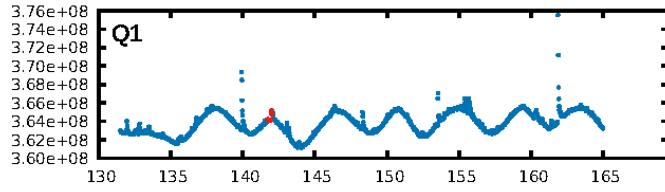
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [365.27σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 37.4%  
ModelChiSquareGof-sig: 97.1%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [2/2]  
GhostDiagnostic-chr: -1.325  
Centroid-sig: 37.1%  
Centroid-so: 0.258 arcsec [0.90σ]  
OotOffset-rm: 1.318 arcsec [3.11σ]  
KicOffset-rm: 1.772 arcsec [3.59σ]  
OotOffset-st: 0/0/1/2 [3]  
KicOffset-st: 0/0/1/2 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

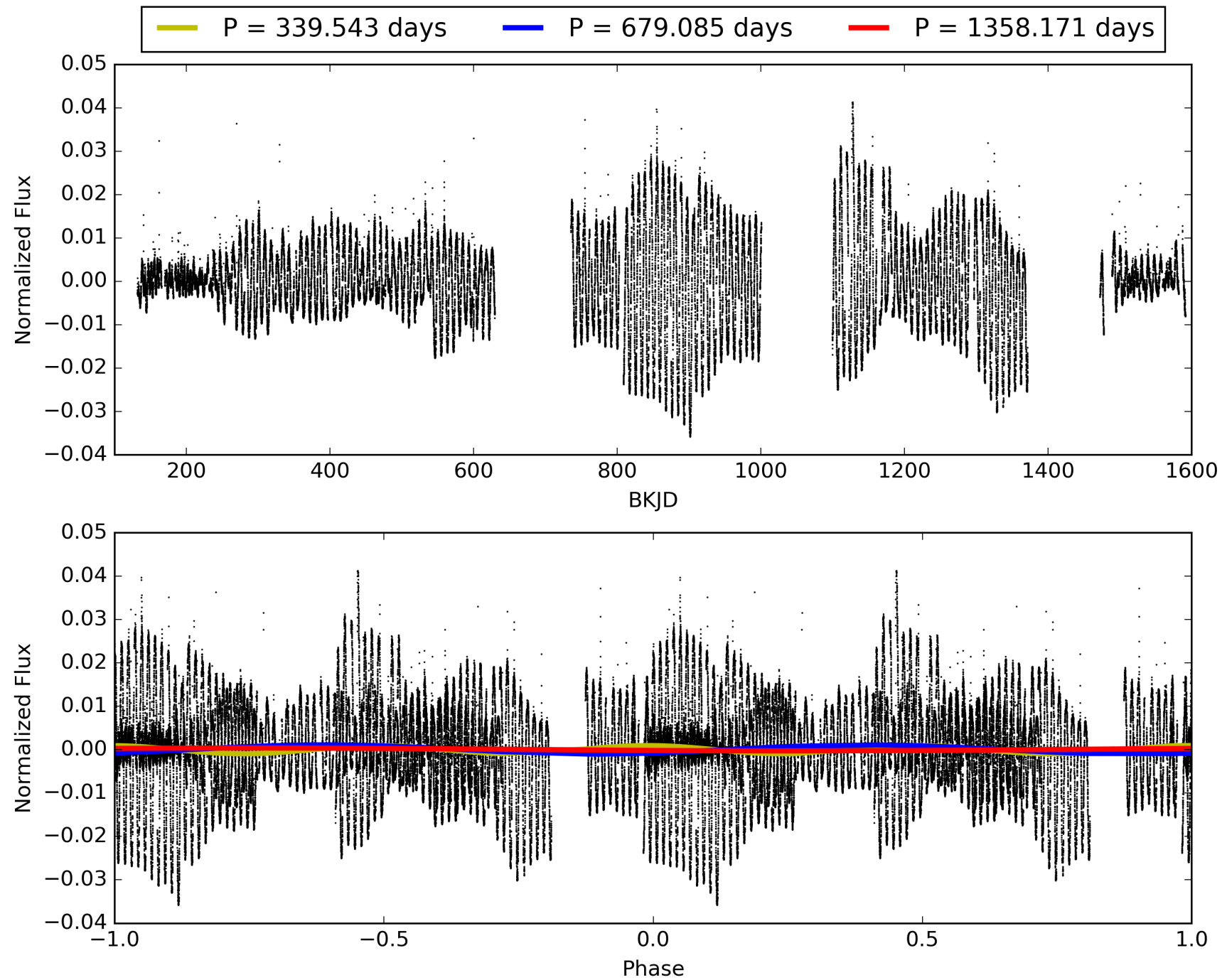
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 16:21:37 Z

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

# TCE 009540467-08, PDC Light Curves

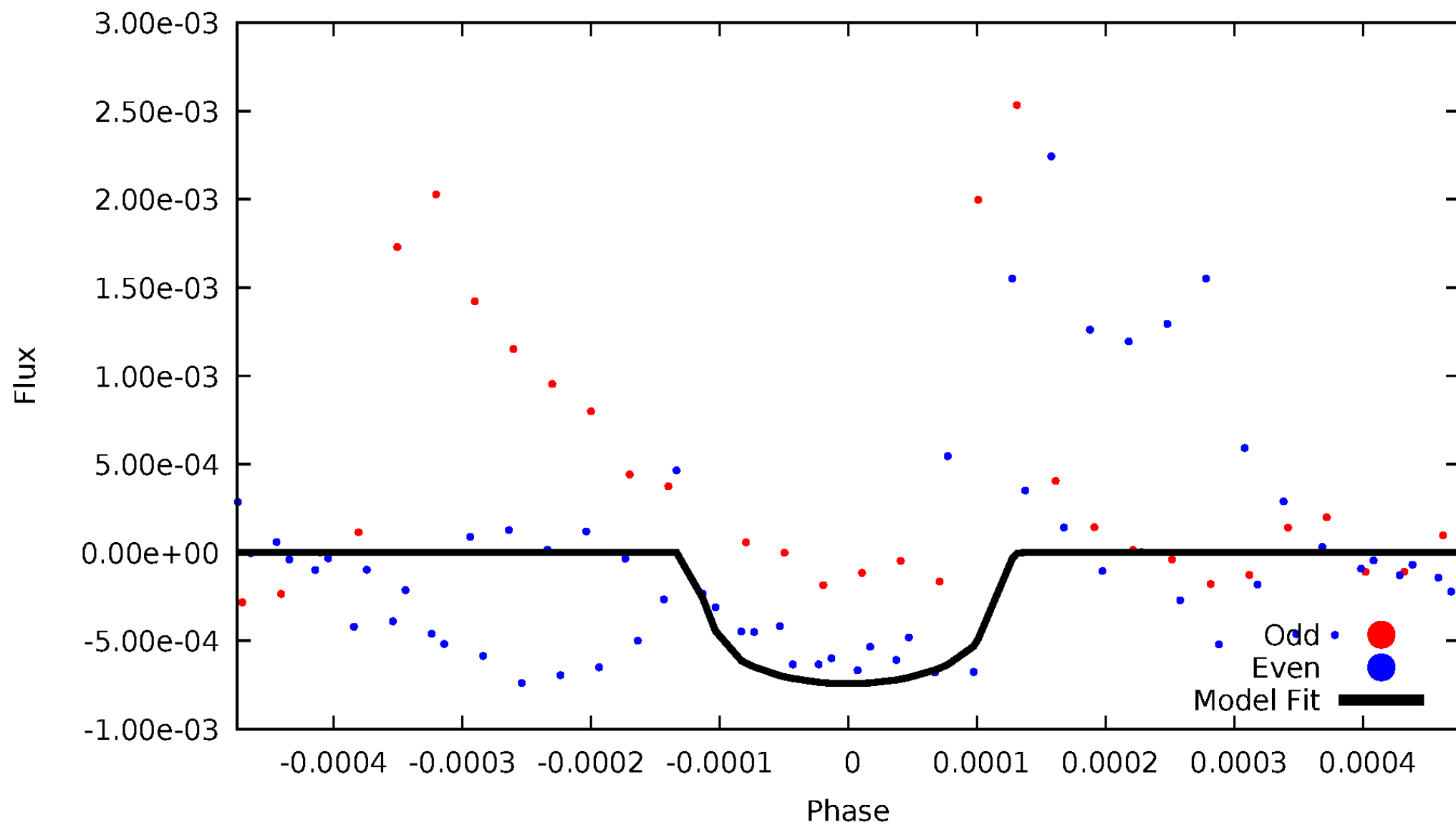


TCE 009540467-08



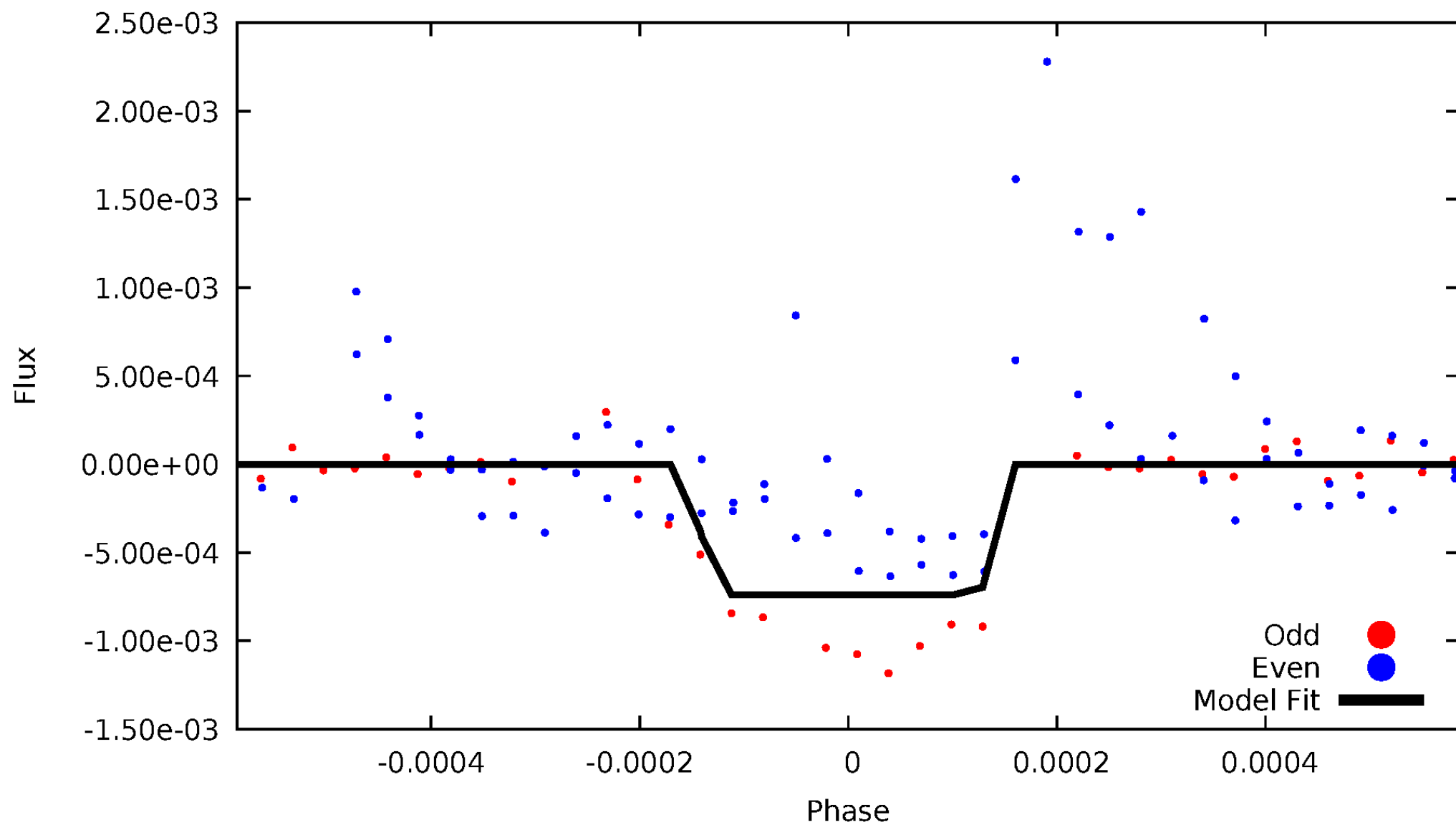
# DV Odd/Even

TCE 009540467-08



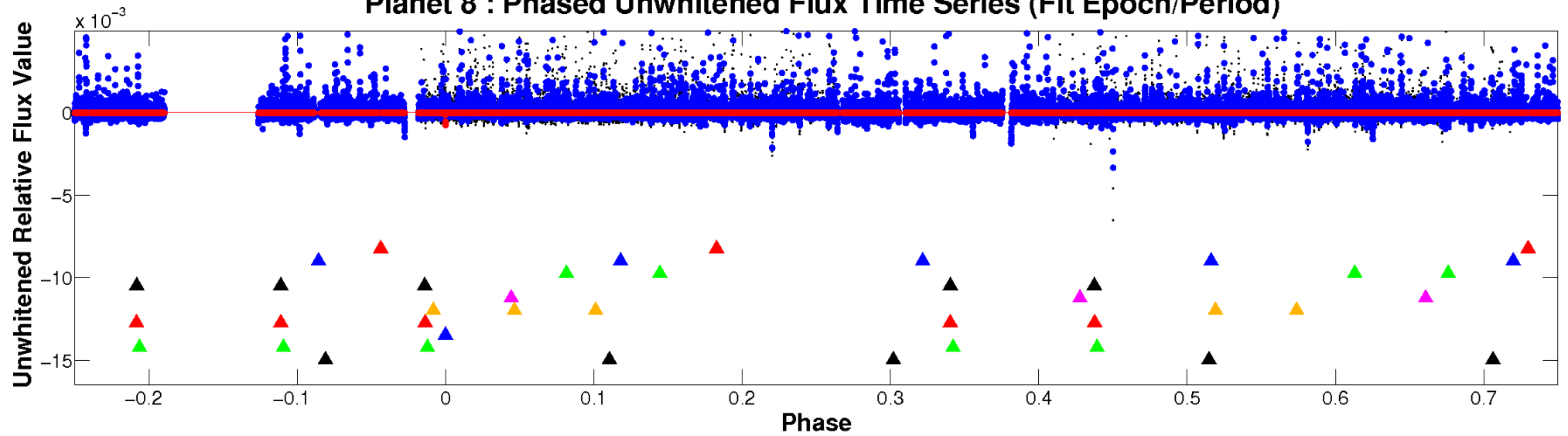
# ALT Odd/Even

TCE 009540467-08

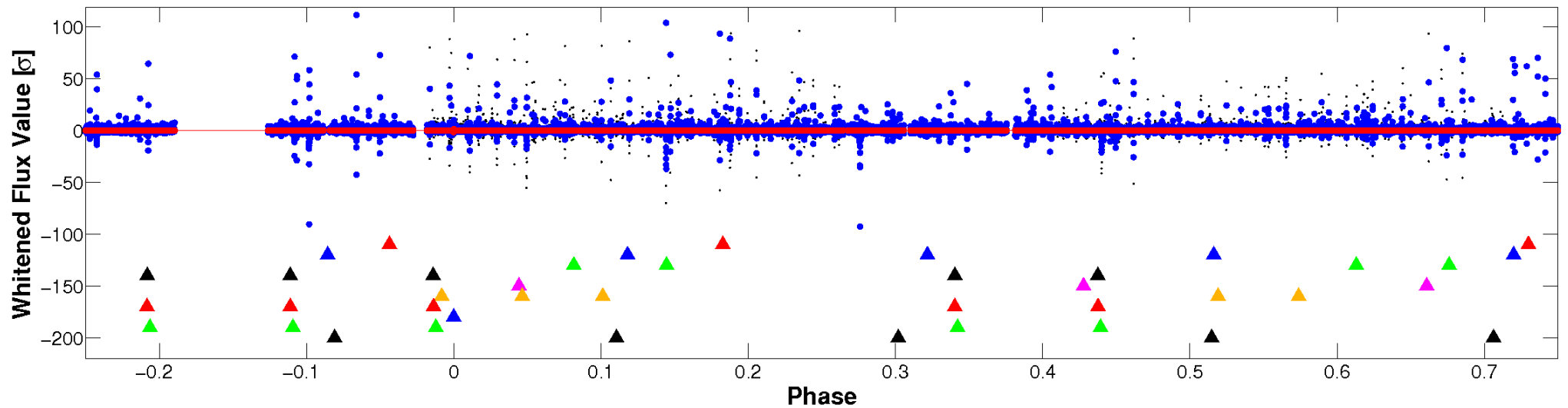


# Non-Whitened Vs. Whitened Light Curve

## Planet 8 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

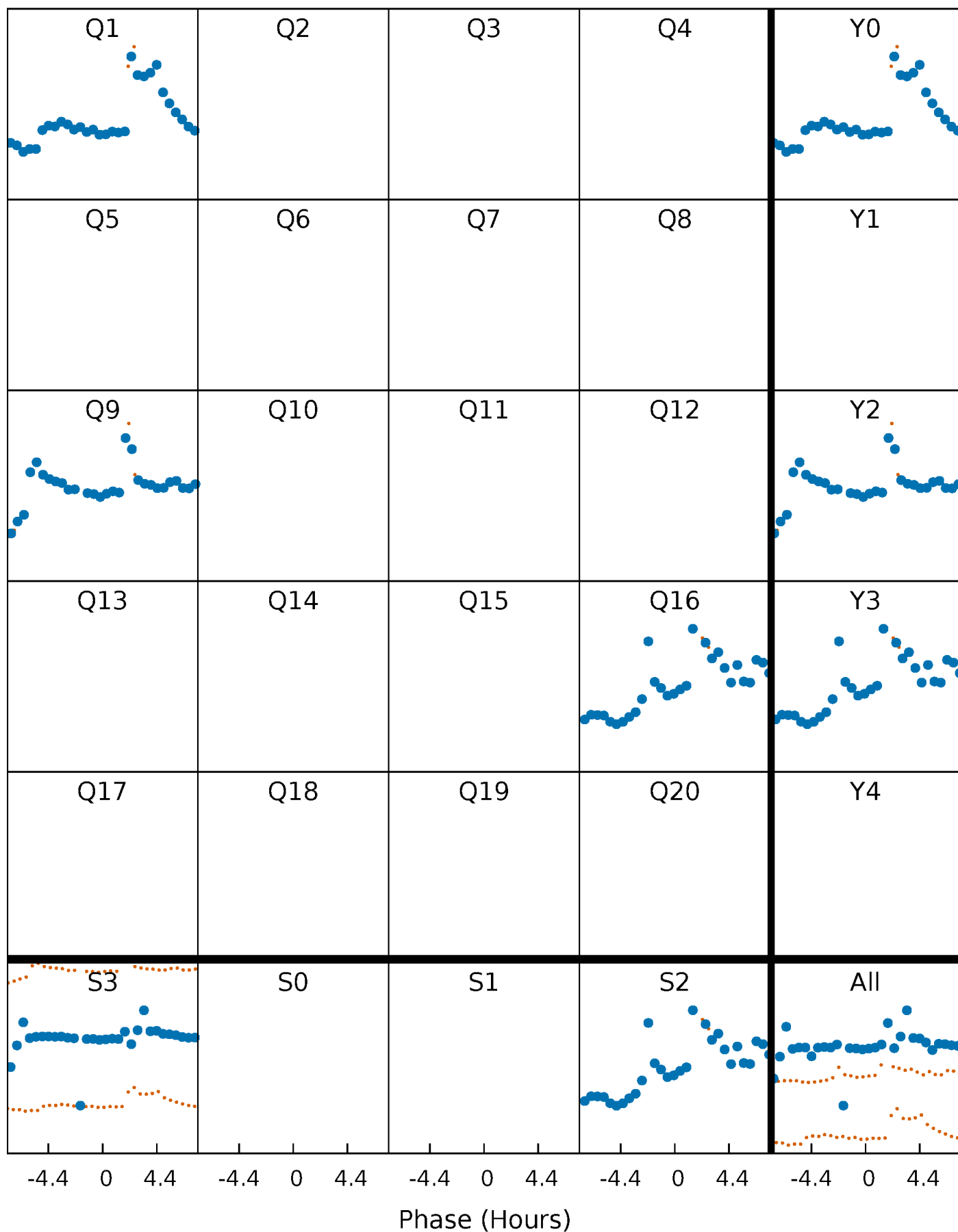


## Planet 8 : Phased Whitened Flux Time Series (Fit Epoch/Period)



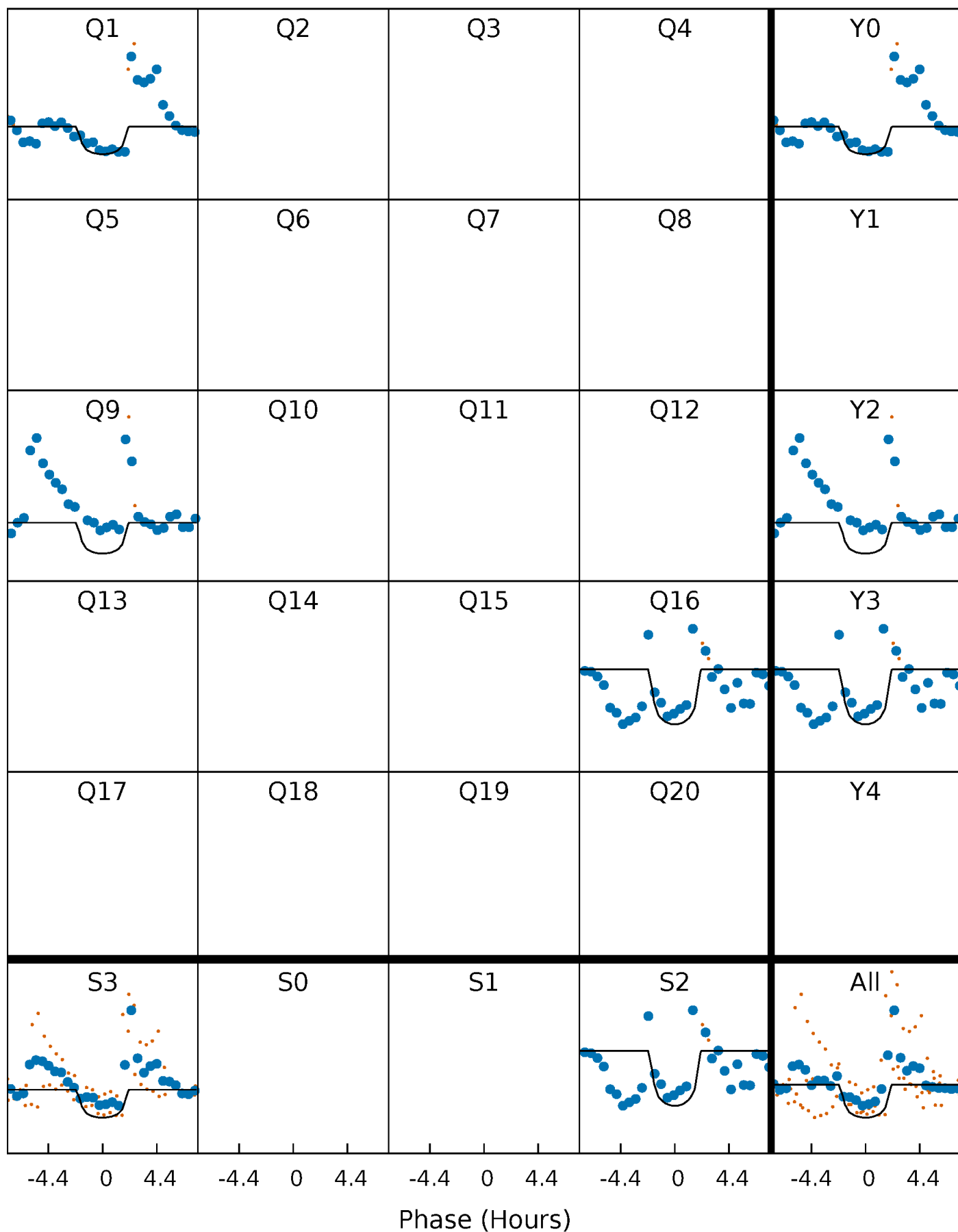
# PDC Quarter-Phased Transit Curves

TCE 009540467-08     $P=679.085465$  Days     $T_0=141.867271$  (BKJD)



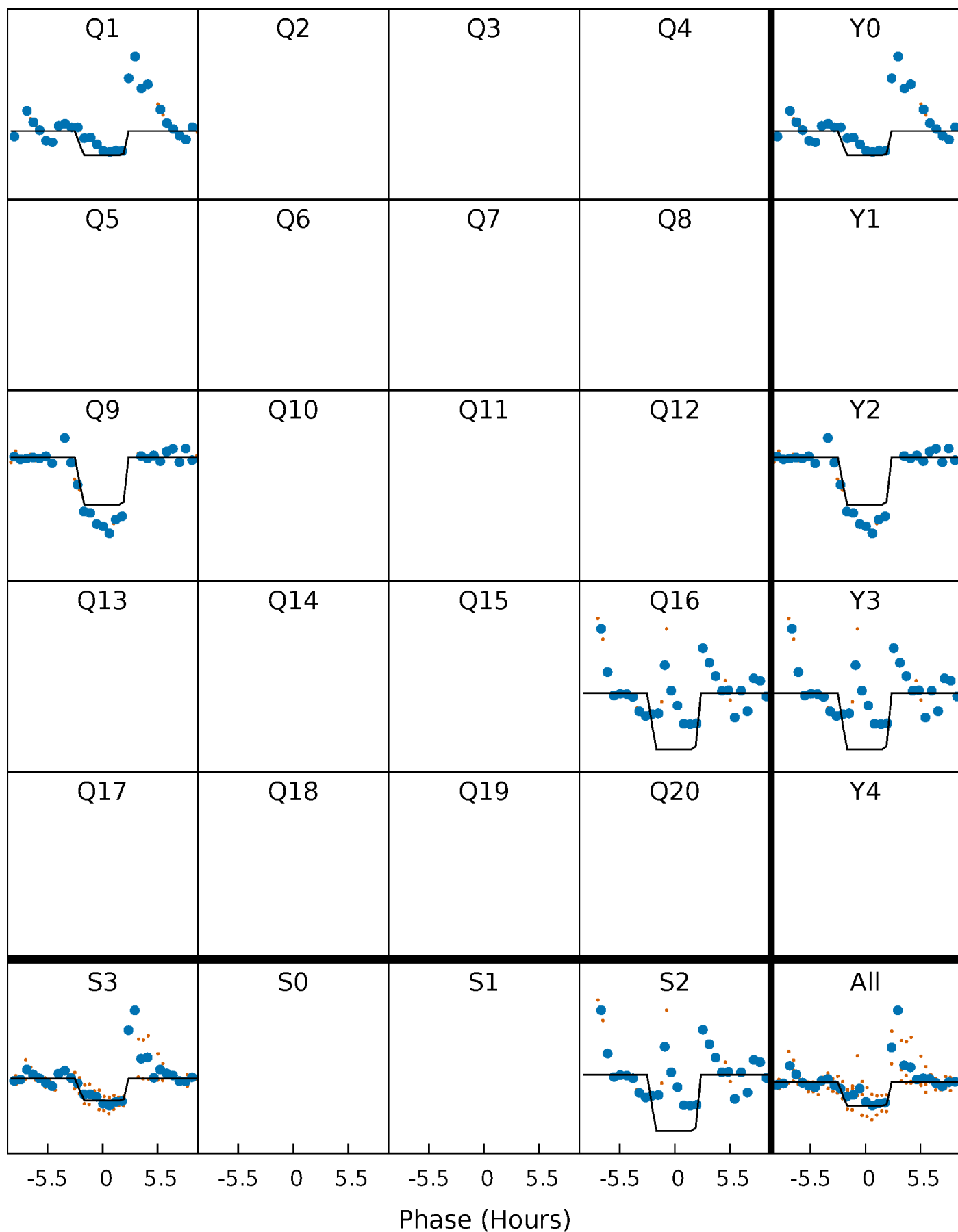
# DV Quarter-Phased Transit Curves

TCE 009540467-08     $P=679.085465$  Days     $T_0=141.867271$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

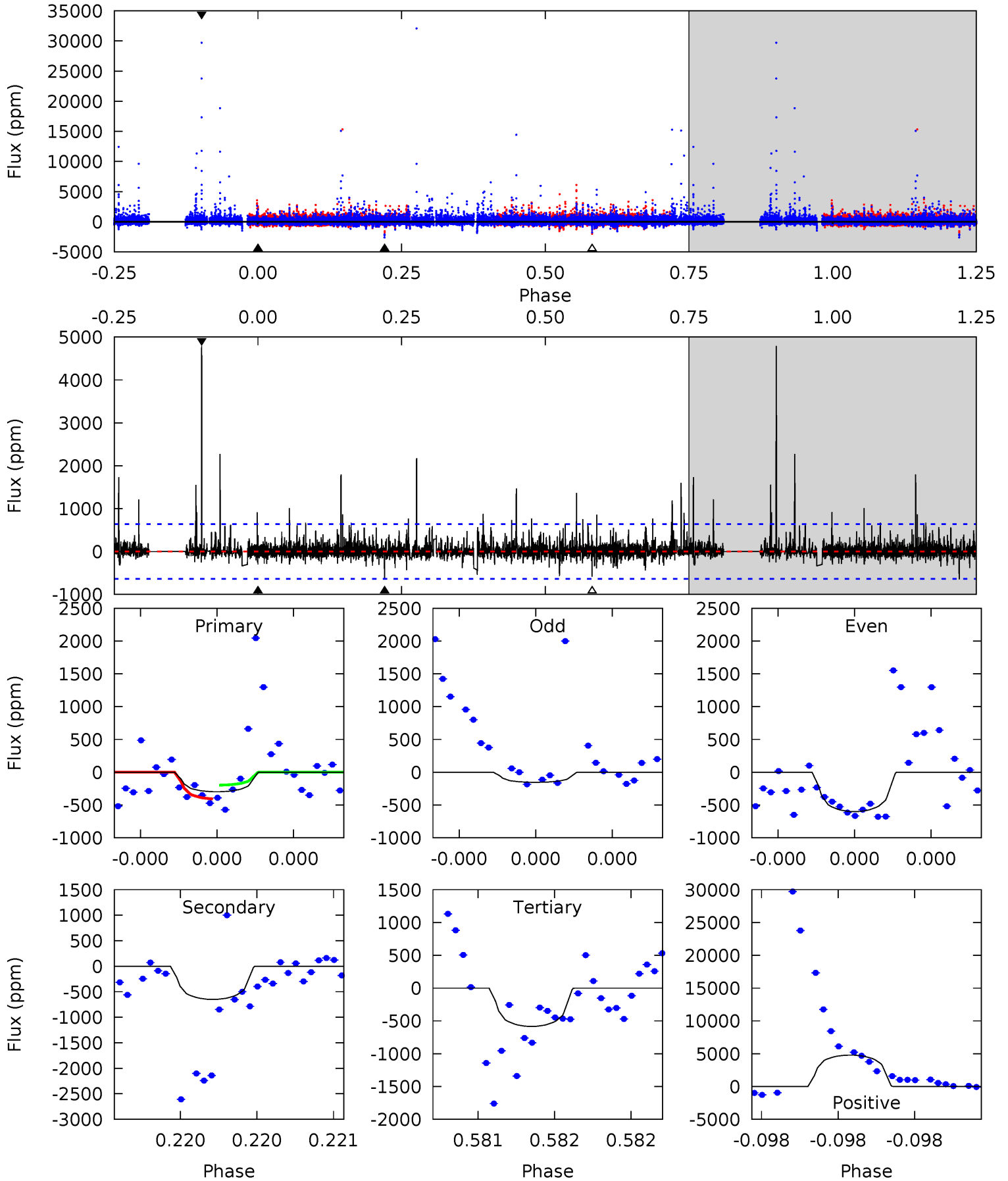
TCE 009540467-08     $P=679.068500$  Days     $T_0=141.844871$  (BKJD)



# DV Model-Shift Uniqueness Test

009540467-08, P = 679.085465 Days, E = 141.867271 Days

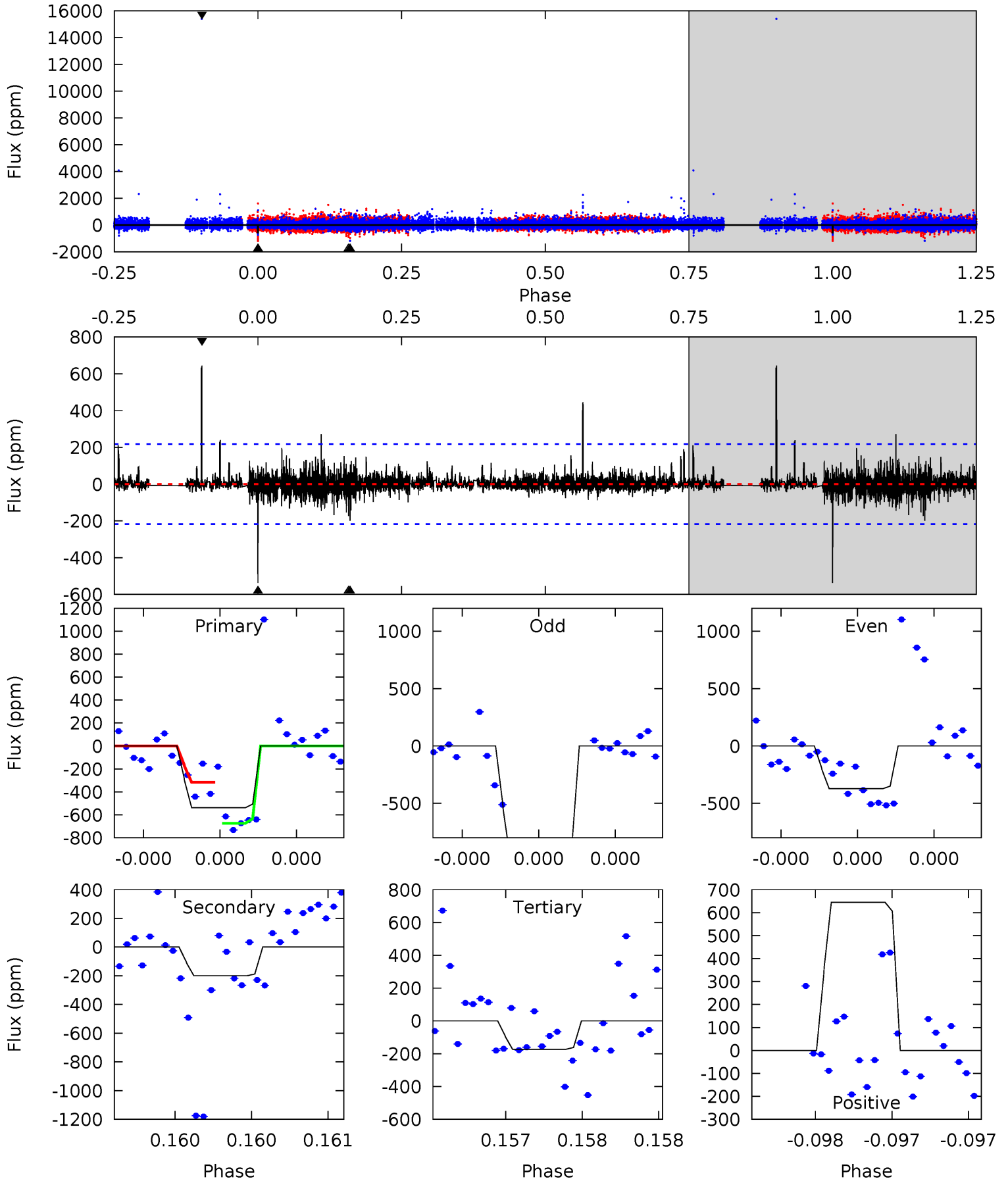
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2.66	5.81	5.22	42.8	5.70	3.67	1.60	-2.56	-40.1	0.59	-37.0	1.35	0.73	0.88	0.88



# Alt Model-Shift Uniqueness Test

009540467-08, P = 679.068500 Days, E = 141.844871 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
14.0	5.18	4.49	16.8	5.66	3.61	0.93	9.51	-2.78	0.69	-11.6	6.83	1.16	0.55	4.46



### Stellar Parameters For KIC 009540467

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3919^{+121}_{-148}$	$4.679^{+0.070}_{-0.025}$	$0.020^{+0.250}_{-0.300}$	$0.572^{+0.042}_{-0.079}$	$0.570^{+0.051}_{-0.070}$	$4.295^{+1.555}_{-0.534}$
	+3%/-4%	+1%/-1%	+1250%/-1500%	+7%/-14%	+9%/-12%	+36%/-12%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 009540467-08 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-650 \pm 112$	$3.47^{+3.01}_{-2.41}$	$161^{+6}_{-6}$	$3049^{+1503}_{-482}$	$47042^{+469947}_{-33456}$
Alt.	$-199 \pm 38$	$3.11^{+3.24}_{-2.19}$	$161^{+6}_{-7}$	$2657^{+1172}_{-414}$	$17283^{+183259}_{-12940}$

$T_{\text{max}}$  = 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

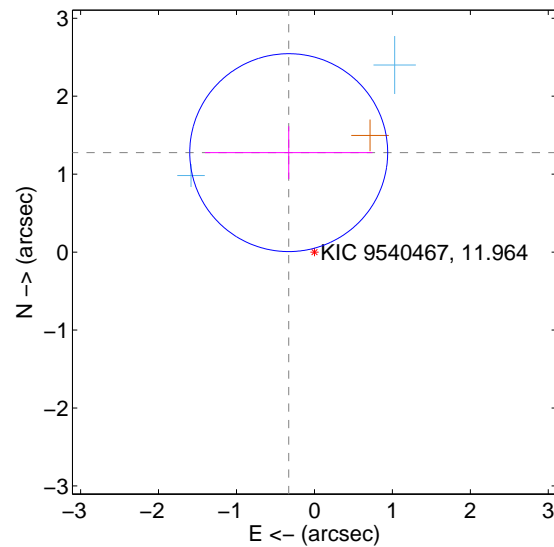
Supplemental centroid analysis for 009540467-08. **Kepler magnitude: 11.96.** Transit SNR 7.94

**There are 2 quarters with good PRF difference image offsets**

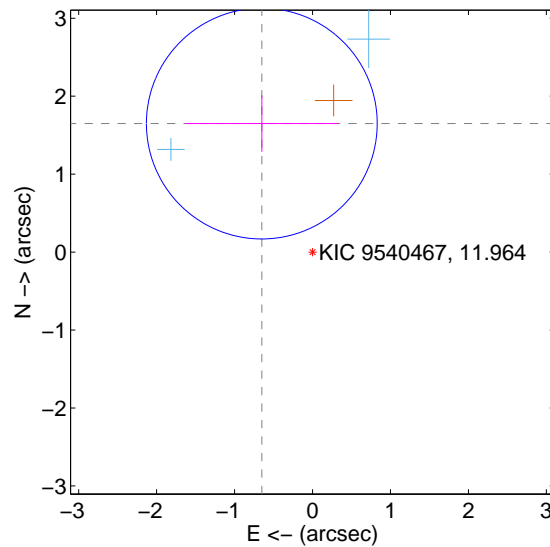
The direct PRF centroid is offset from the target star catalog position by about 0.63 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>1.318 \pm 0.423</math></b>	<b>3.11</b>	$0.330 \pm 1.074$	$1.276 \pm 0.337$
PRF-fit source offset from KIC position	<b><math>1.772 \pm 0.493</math></b>	<b>3.59</b>	$0.651 \pm 0.982$	$1.649 \pm 0.362$
photometric centroid source offset	$0.26 \pm 0.29$	0.90	$0.04 \pm 0.30$	$0.25 \pm 0.29$

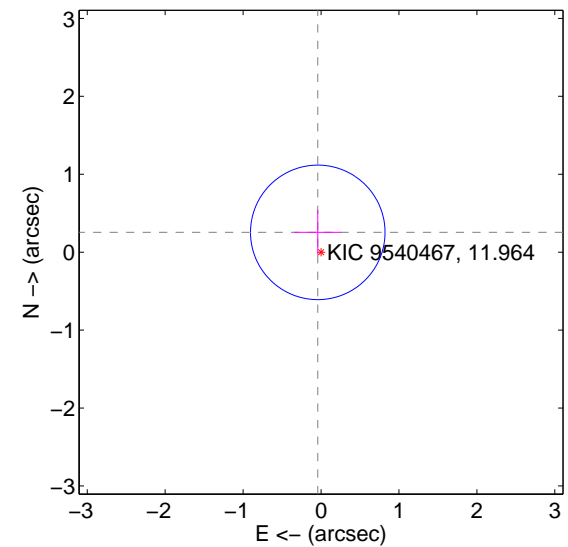
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

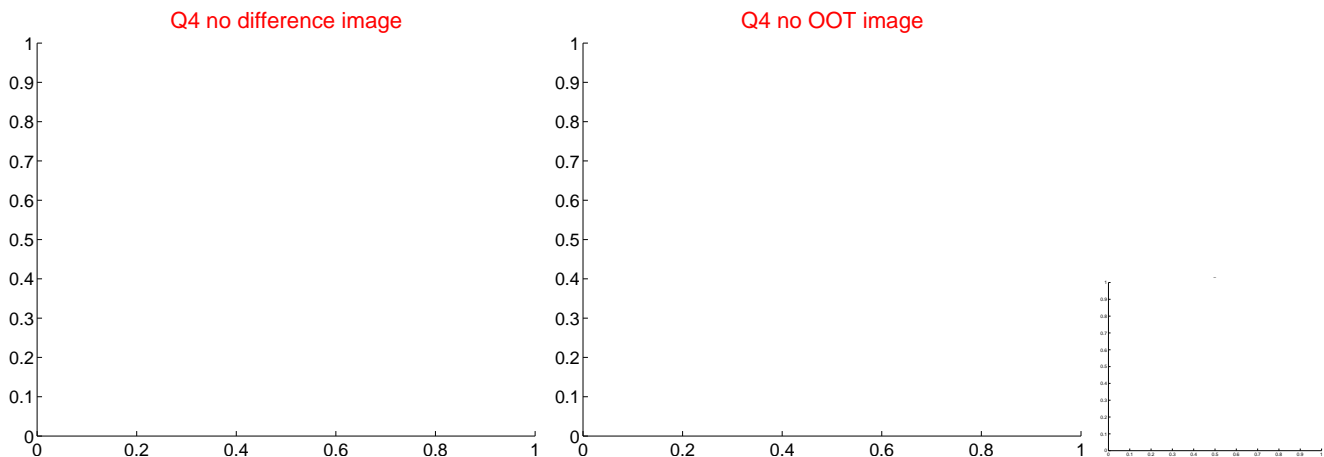
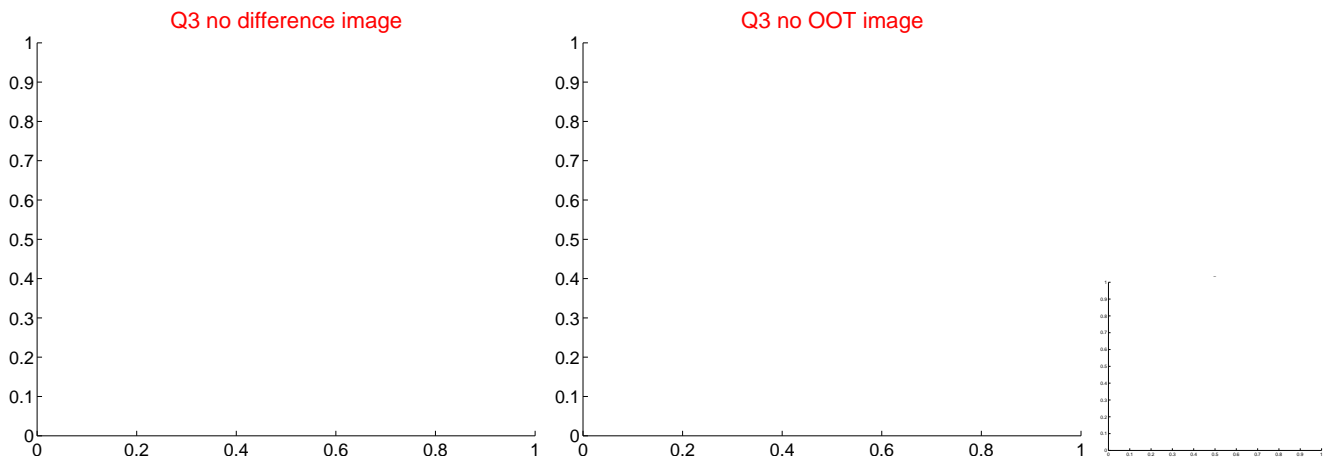
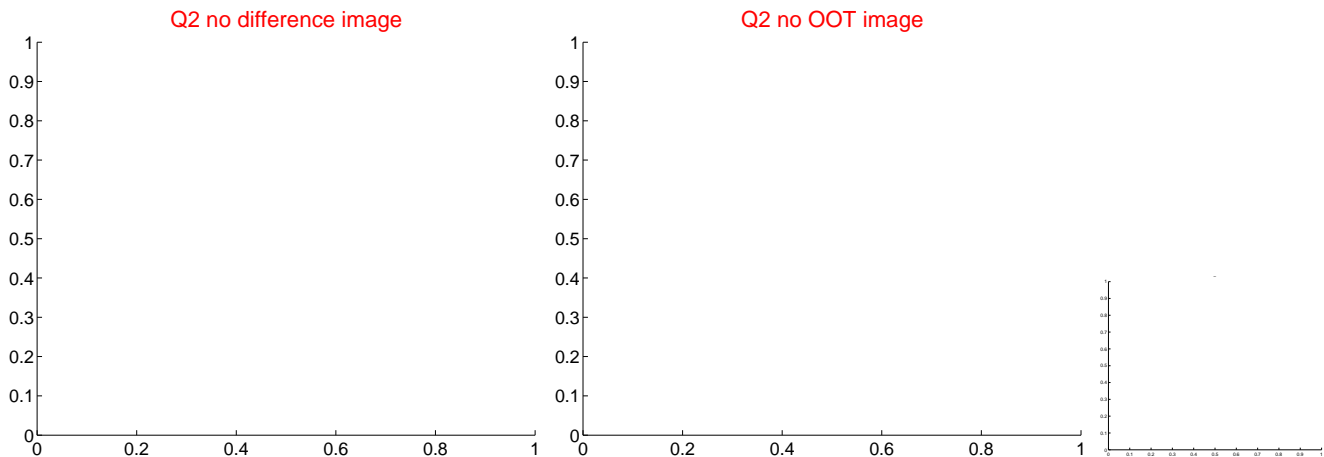
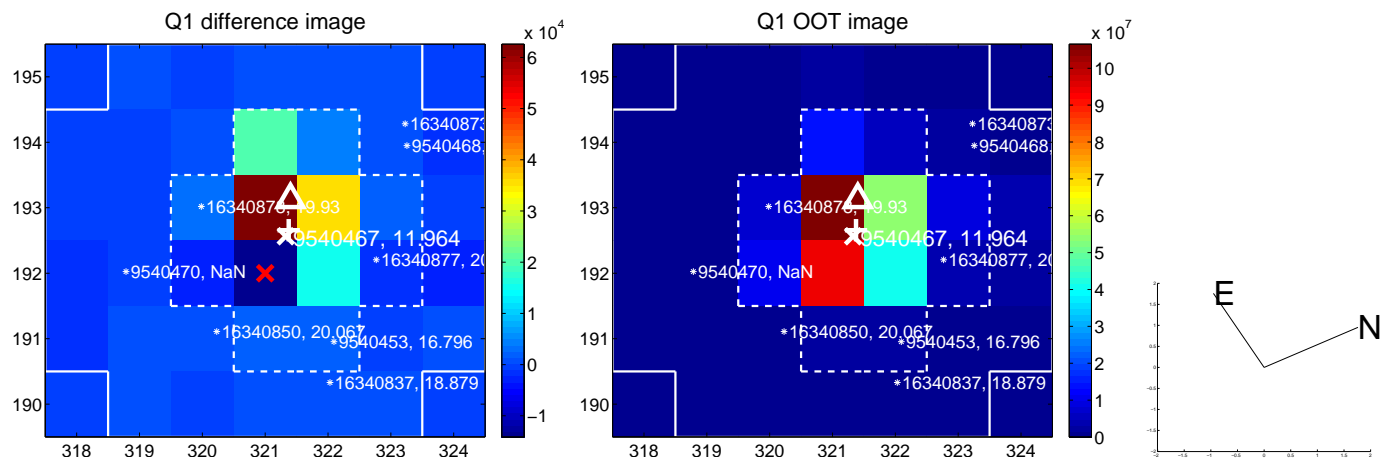


offset from photometric centroids

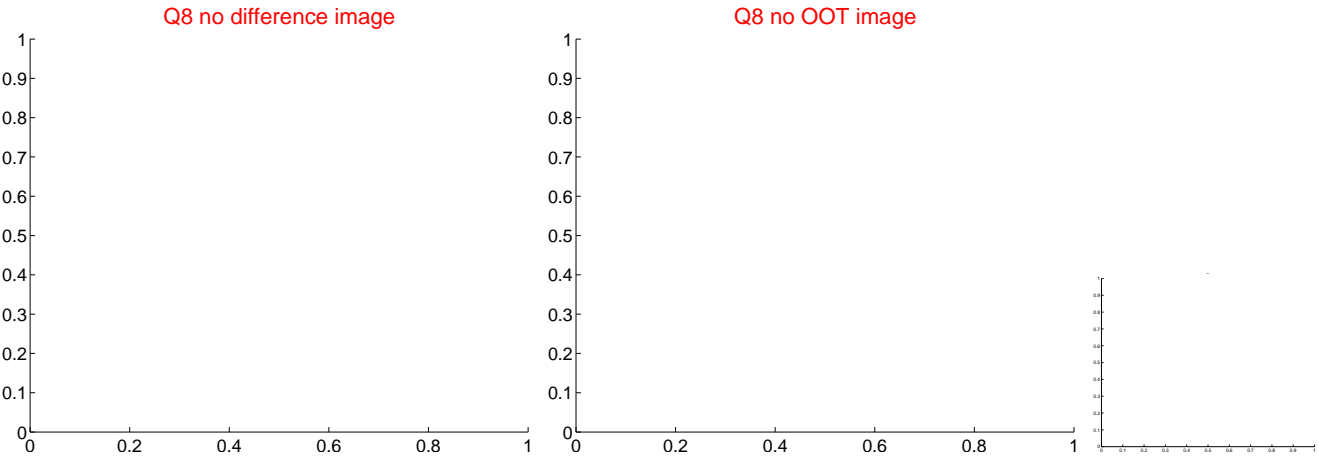
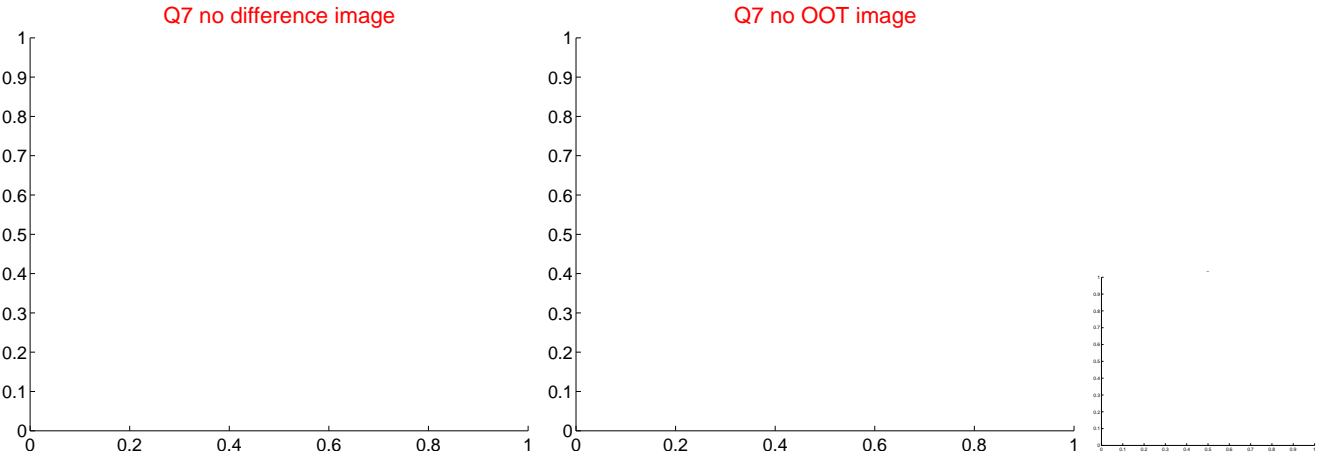
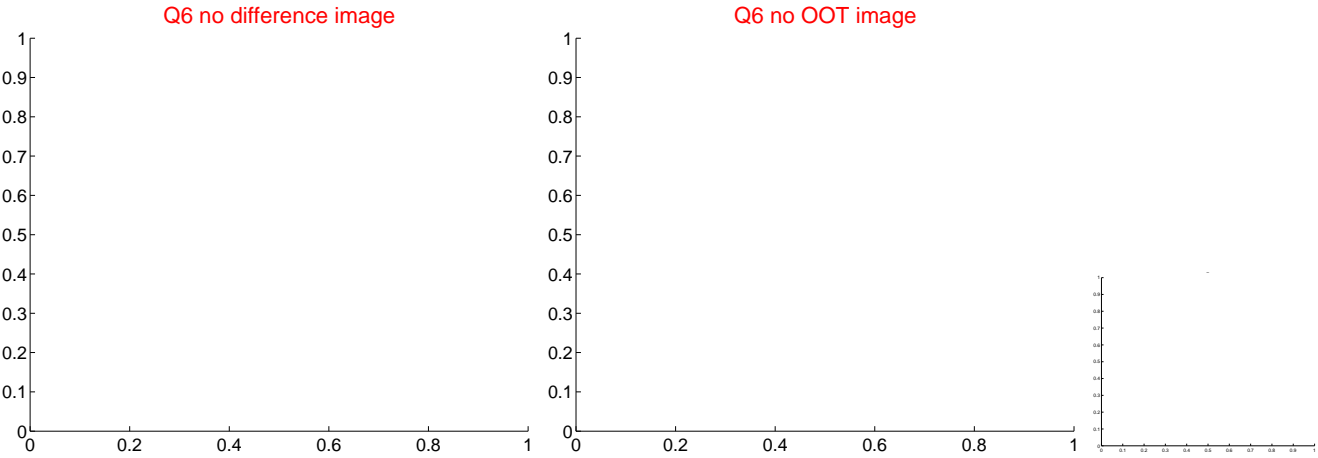
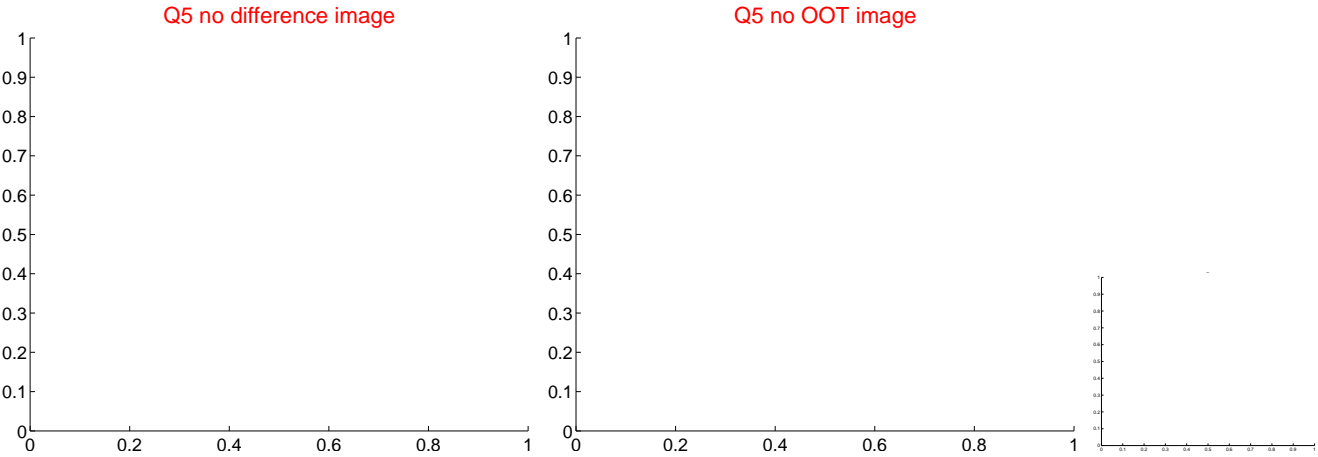


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

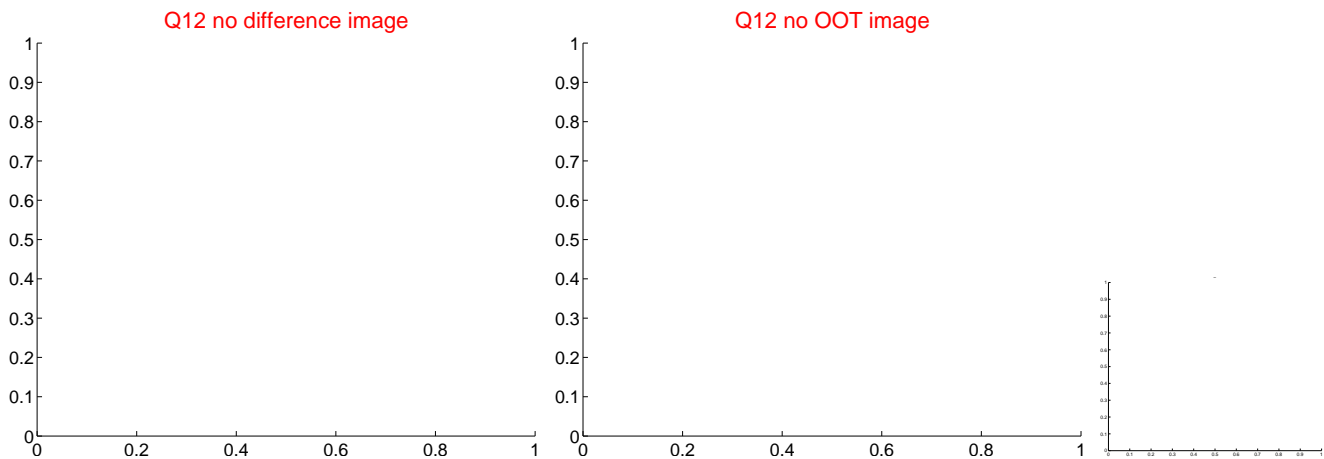
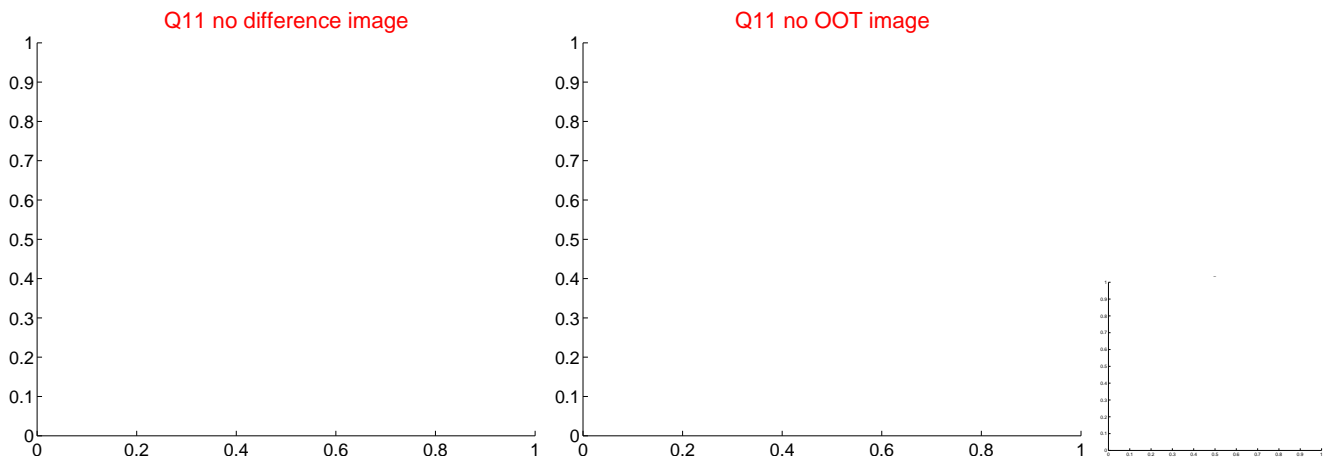
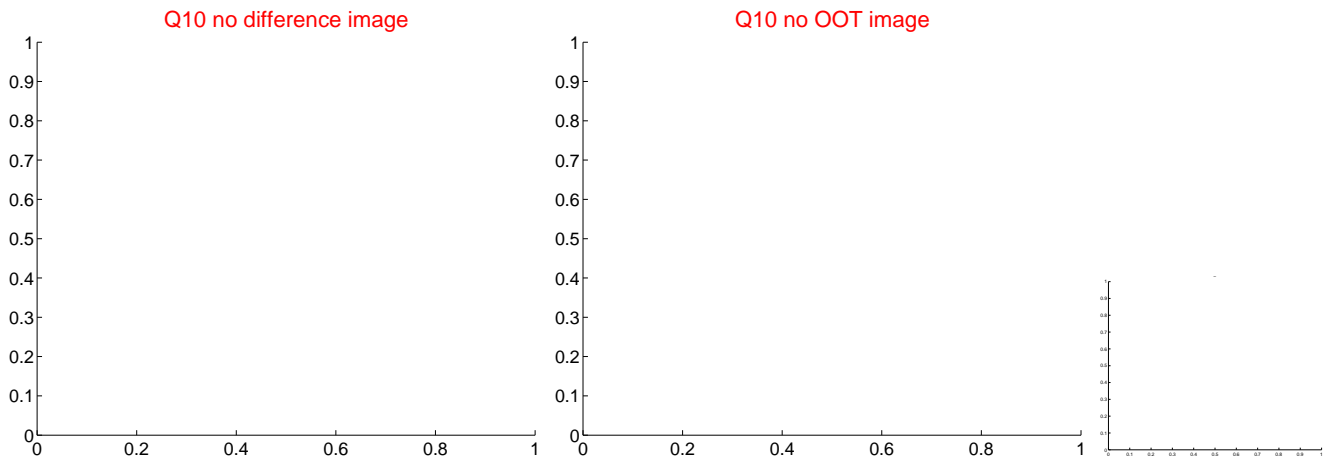
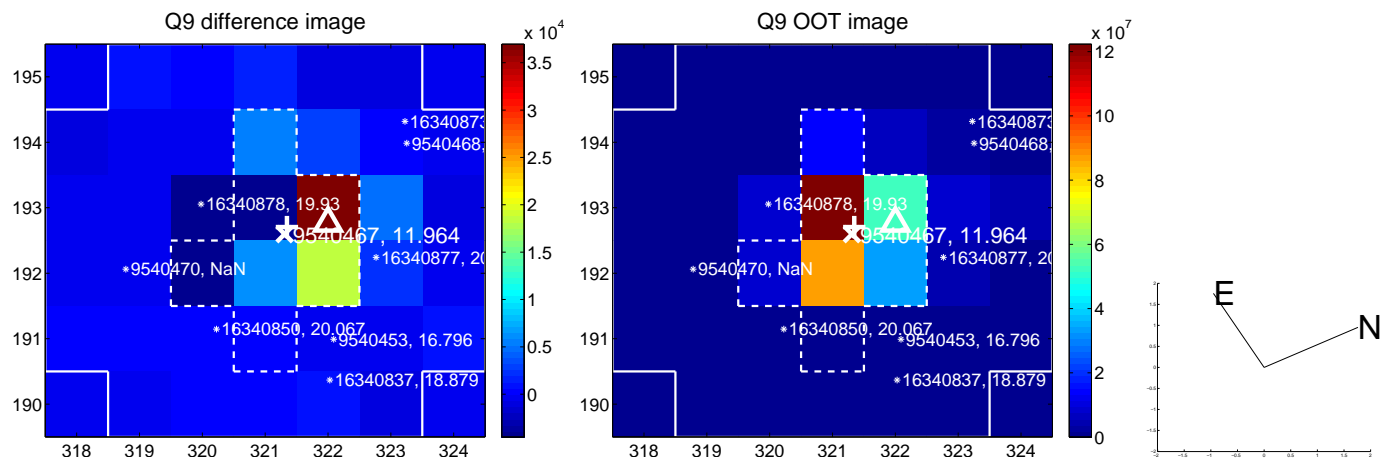
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



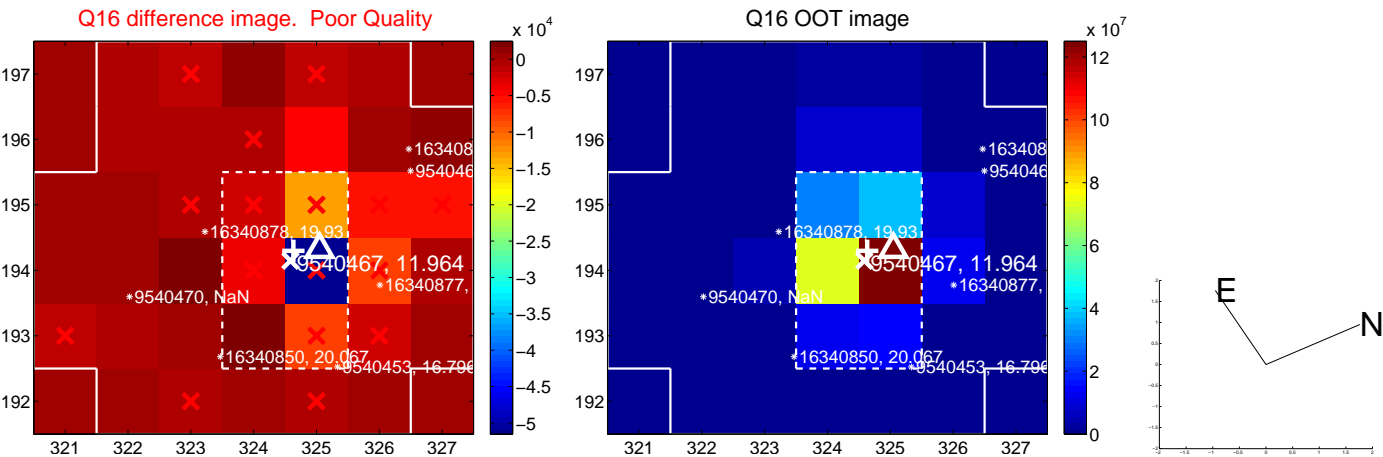
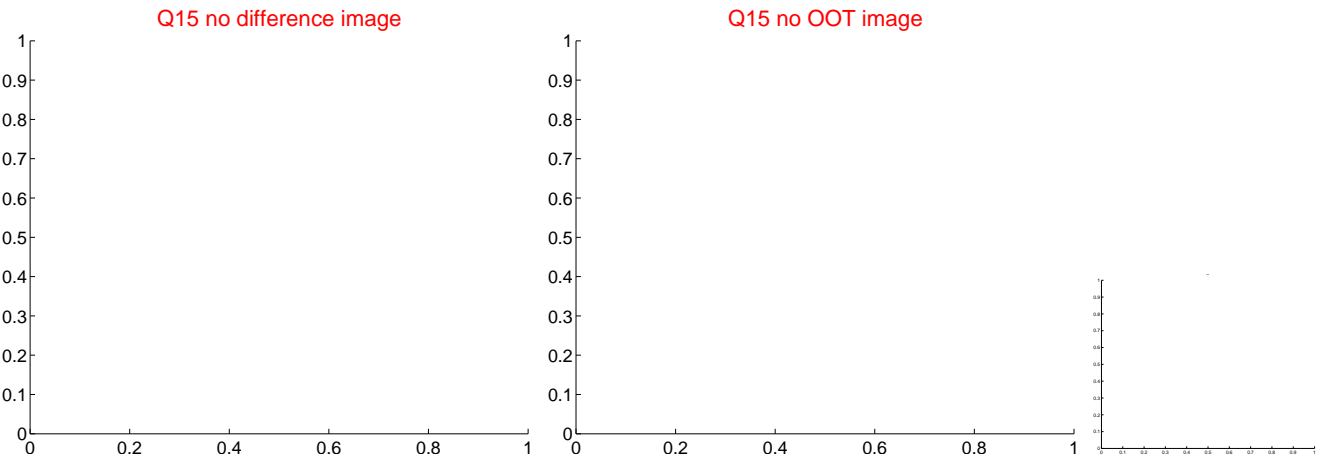
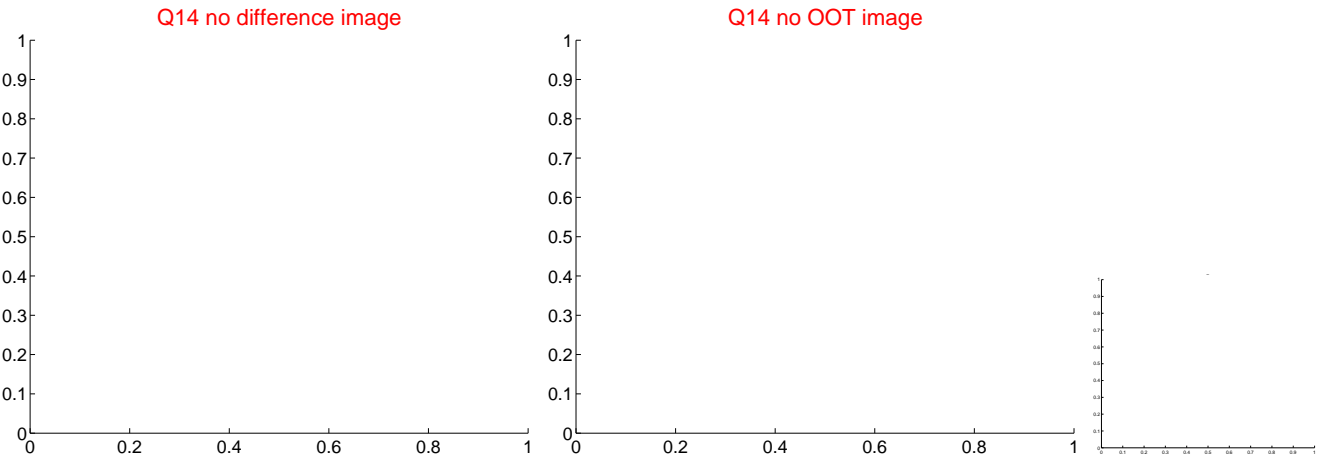
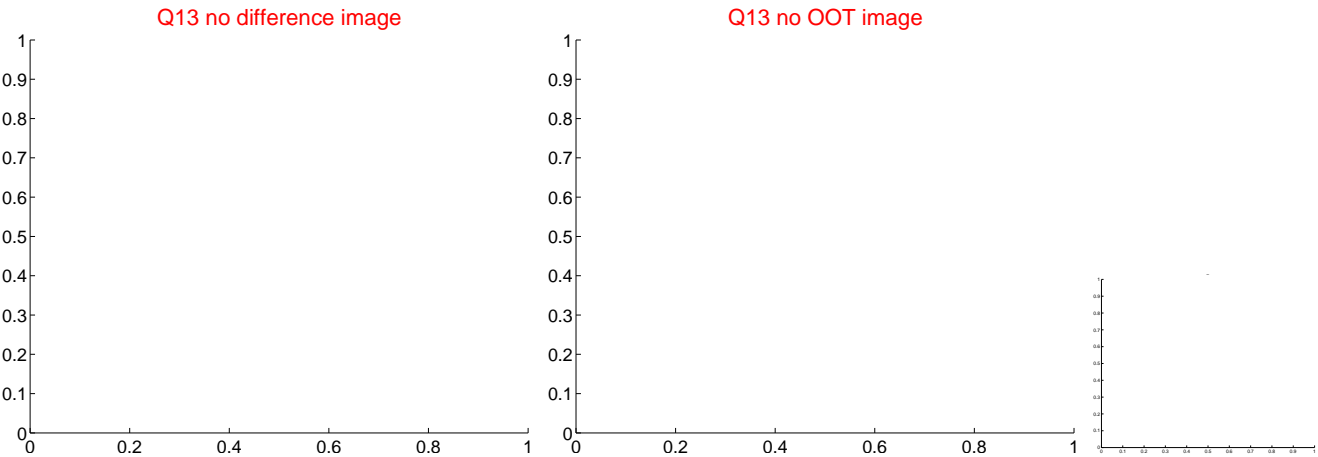
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



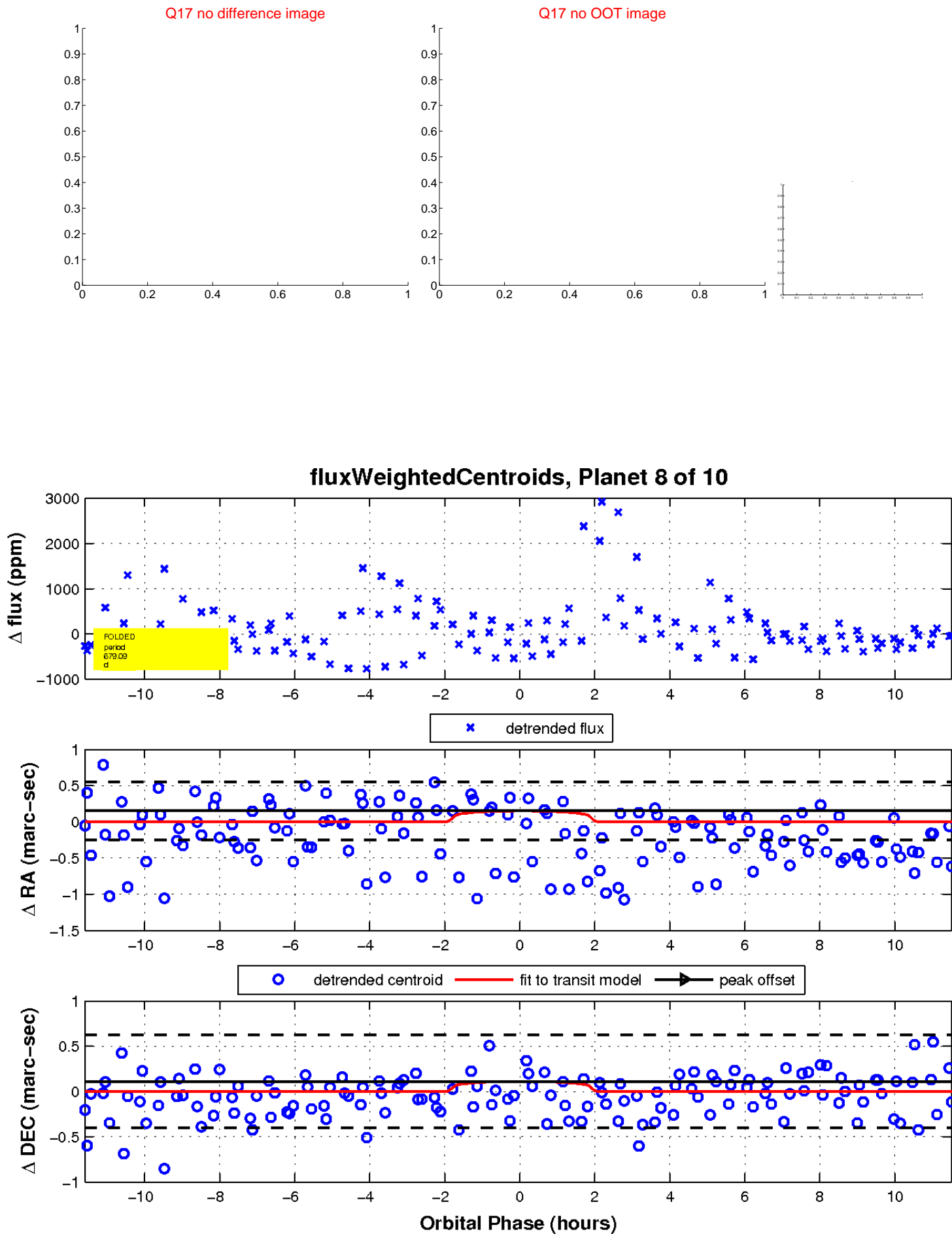
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



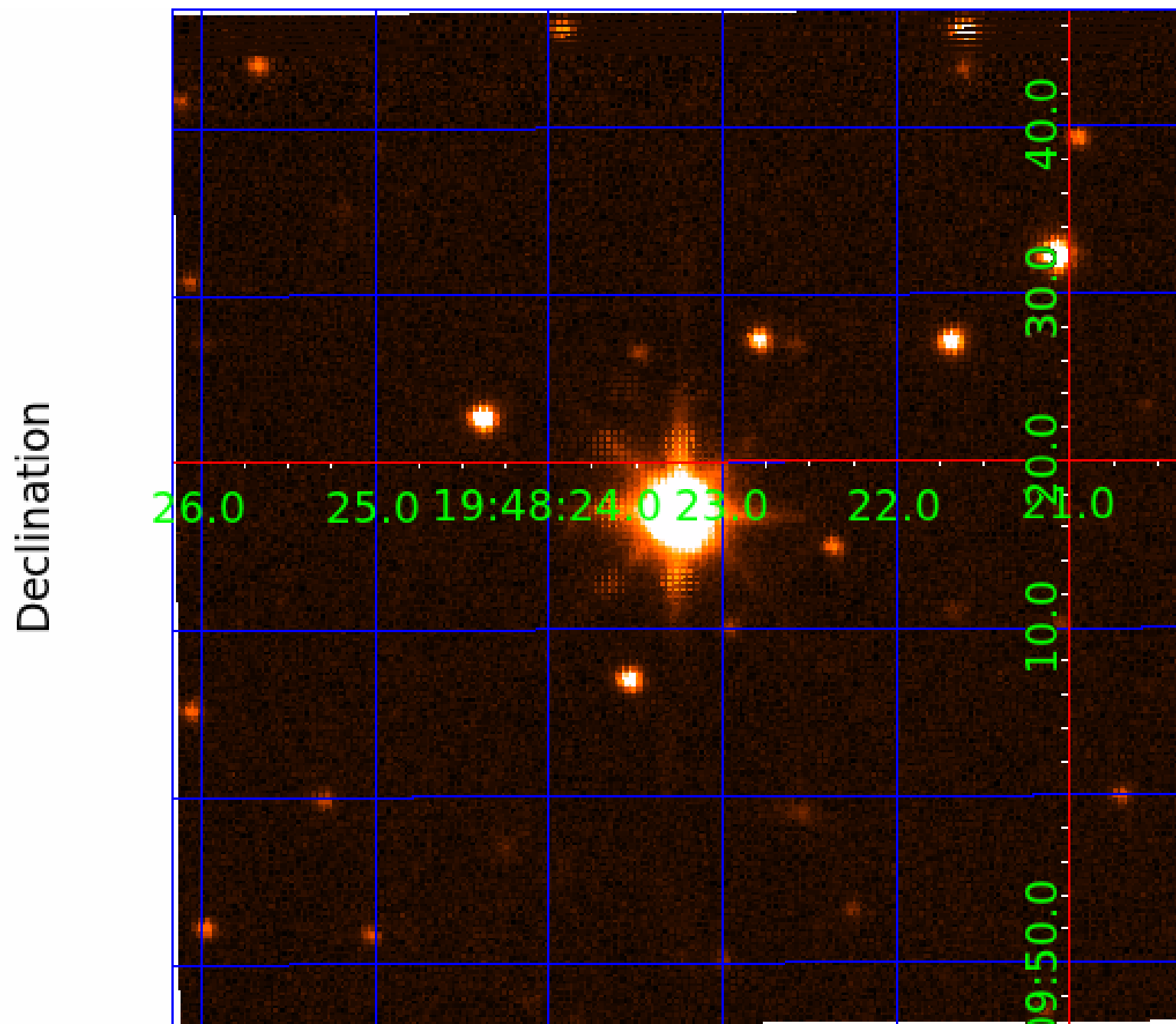
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image



# KIC 009540467

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009540467-01	OBS	No	525.337604	265.984740	518.3	9.332	17.4	4.7	0.57	3919	1.47	0.06
009540467-02	OBS	No	270.386745	360.361405	854.9	4.035	17.7	7.2	0.57	3919	1.75	0.15
009540467-03	OBS	No	360.937549	197.248197	1097.8	2.782	13.7	10.6	0.57	3919	2.07	0.10
009540467-05	OBS	No	418.686753	432.378155	794.3	6.491	15.0	6.7	0.57	3919	1.61	0.08
009540467-06	OBS	No	320.975460	210.598826	530.3	9.030	13.8	6.2	0.57	3919	1.32	0.12
009540467-08	OBS	No	679.085465	141.867271	741.8	3.869	15.2	7.9	0.57	3919	1.55	0.04
009540467-10	OBS	No	274.537158	346.932388	550.2	2.569	13.8	5.5	0.57	3919	1.50	0.15

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009540467-01	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—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009540467-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS
009540467-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS
009540467-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS
009540467-06	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
009540467-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009540467-10	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS—HALO_GHOST

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

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

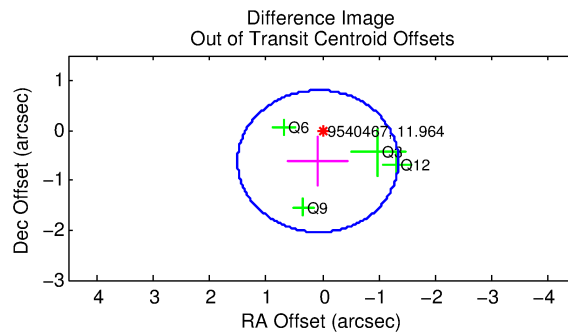
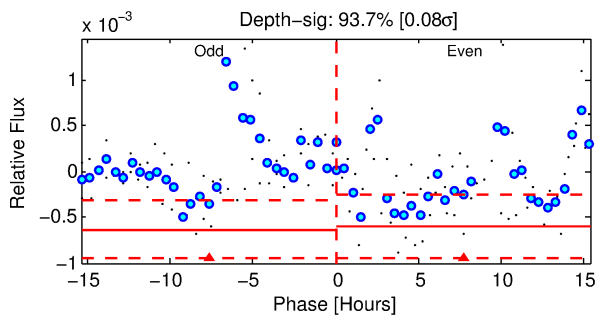
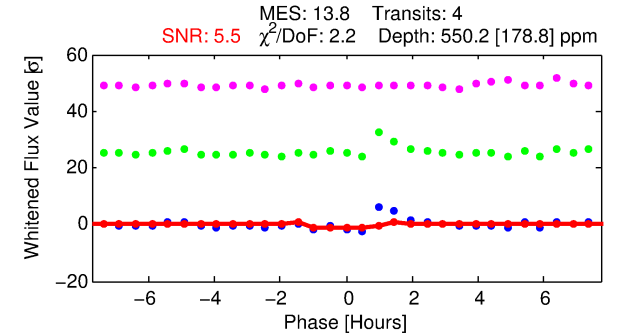
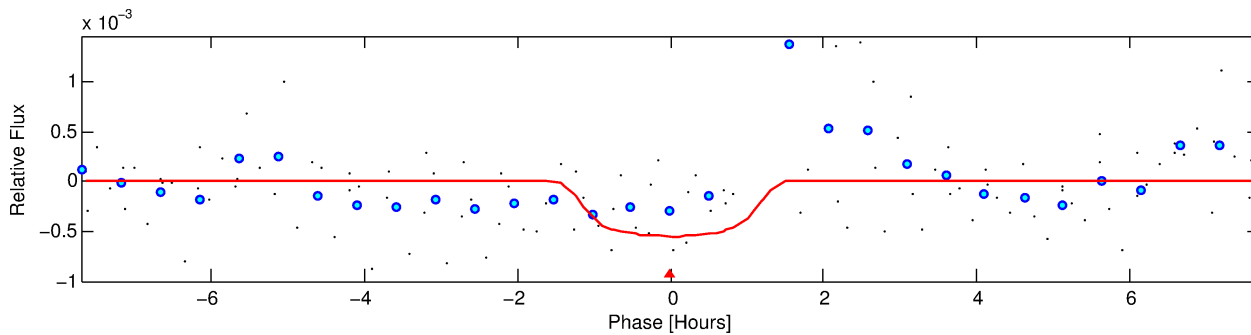
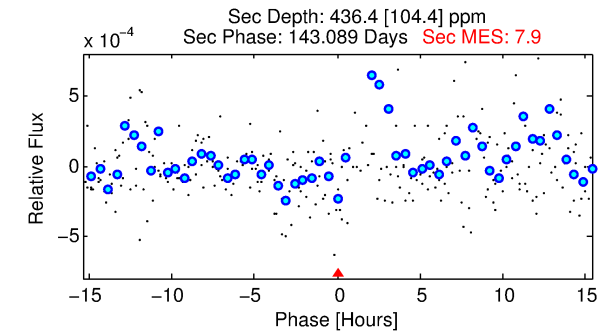
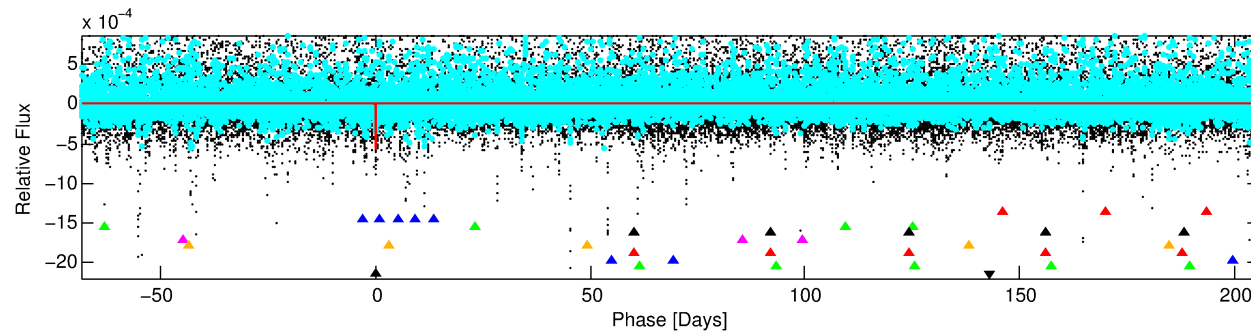
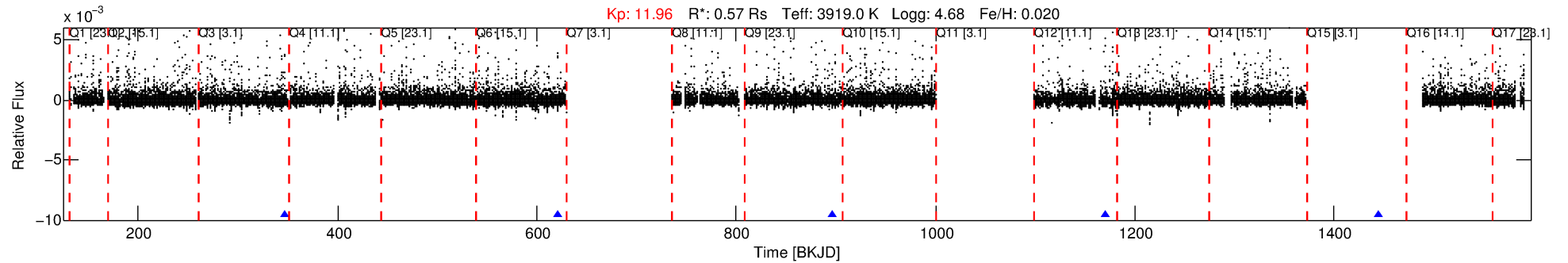
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009540467-10

No Significant Match Found

# DV One-Page Summary

KIC: 9540467 Candidate: 10 of 10 Period: 274.537 d



## DV Fit Results:

Period = 274.53716 [0.00528] d  
Epoch = 346.9324 [0.0111] BKJD  
 $R_p/R^* = 0.0240$  [0.0506]  
 $a/R^* = 521.22$  [4416.11]  
 $b = 0.80$  [3.85]  
 $\text{Seff} = 0.15$  [0.03]  
 $T_{\text{eq}} = 158$  [8] K  
 $R_p = 1.50$  [3.17]  $R_e$   
 $a = 0.6855$  [0.0731] AU  
 $A_g = 50357.14$  [213046.55] [0.24σ]  
 $T_{\text{eff}} = 3658$  [3869] K [0.90σ]

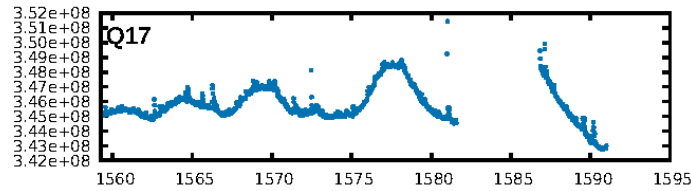
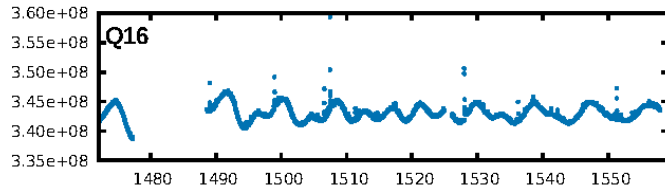
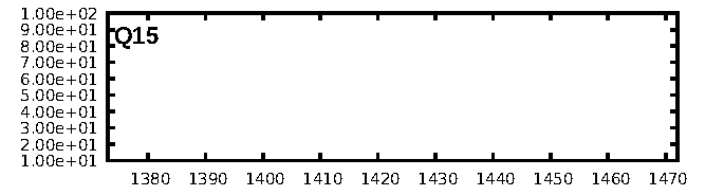
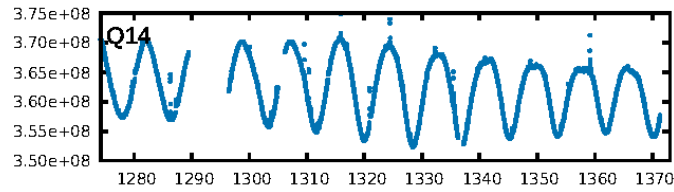
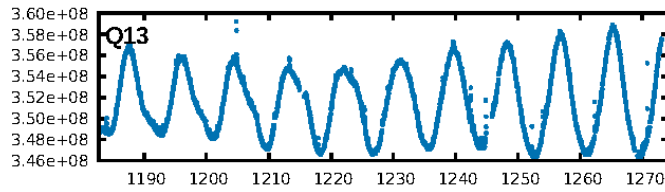
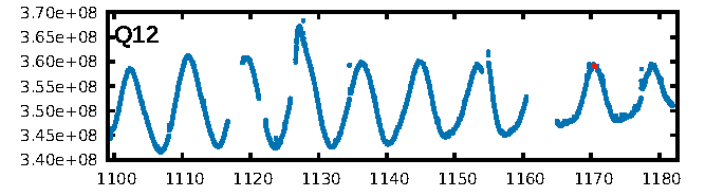
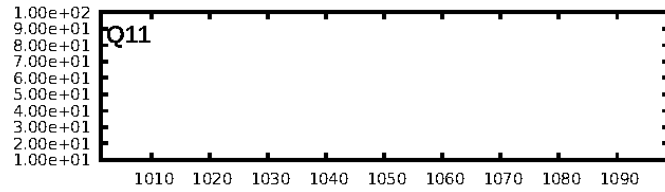
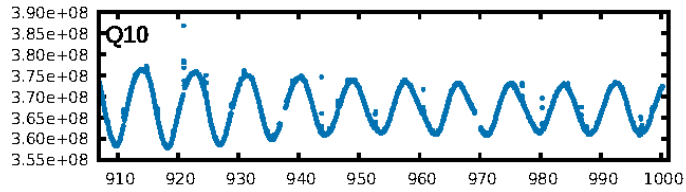
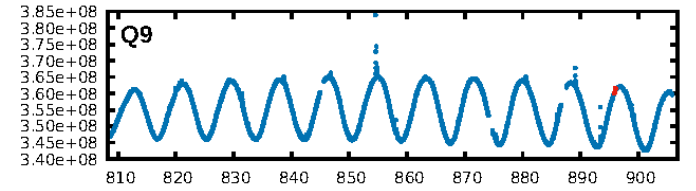
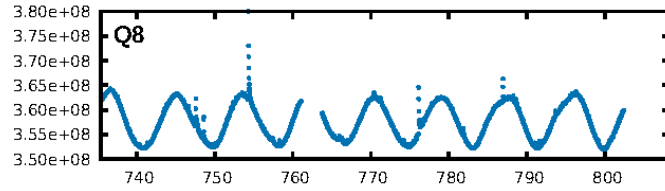
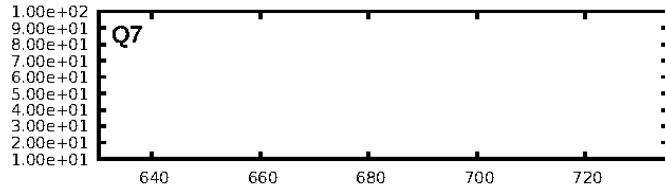
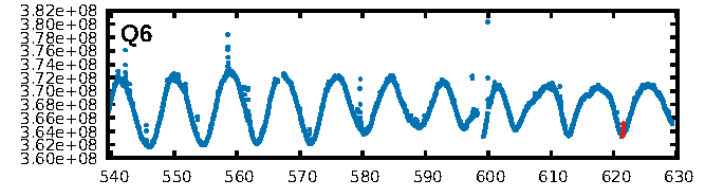
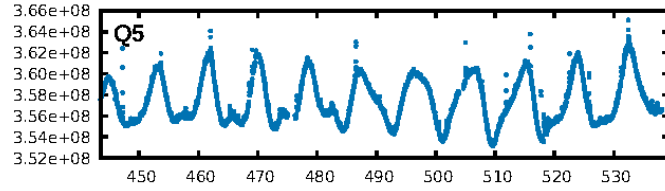
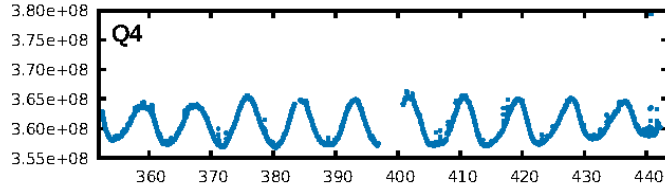
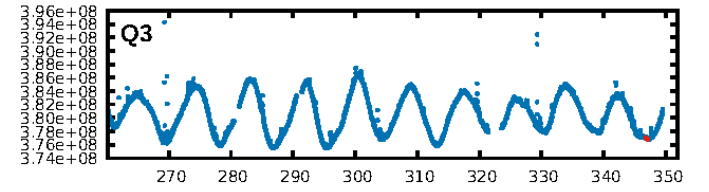
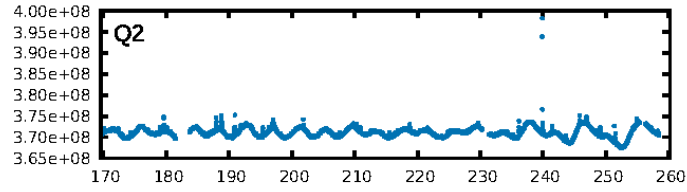
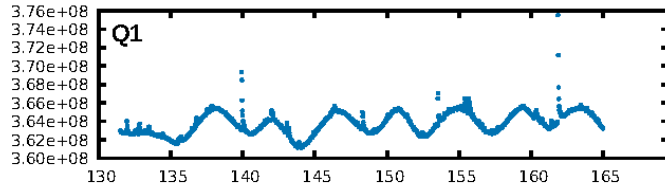
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [20.82σ]  
LongPeriod-sig: 100.0% [292.67σ]  
**ModelChiSquare2-sig: 0.0%**  
ModelChiSquareGof-sig: 4.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 0.07959  
Centroid-sig: 43.7%  
Centroid-so: 0.623 arcsec [1.39σ]  
OotOffset-rm: 0.626 arcsec [1.32σ]  
OotOffset-st: 1/1/1/1 [4]  
KicOffset-rm: 0.404 arcsec [0.86σ]  
KicOffset-st: 1/1/1/1 [4]  
DiffImageQuality-fgm: 0.75 [3/4]  
DiffImageOverlap-fno: 1.00 [4/4]

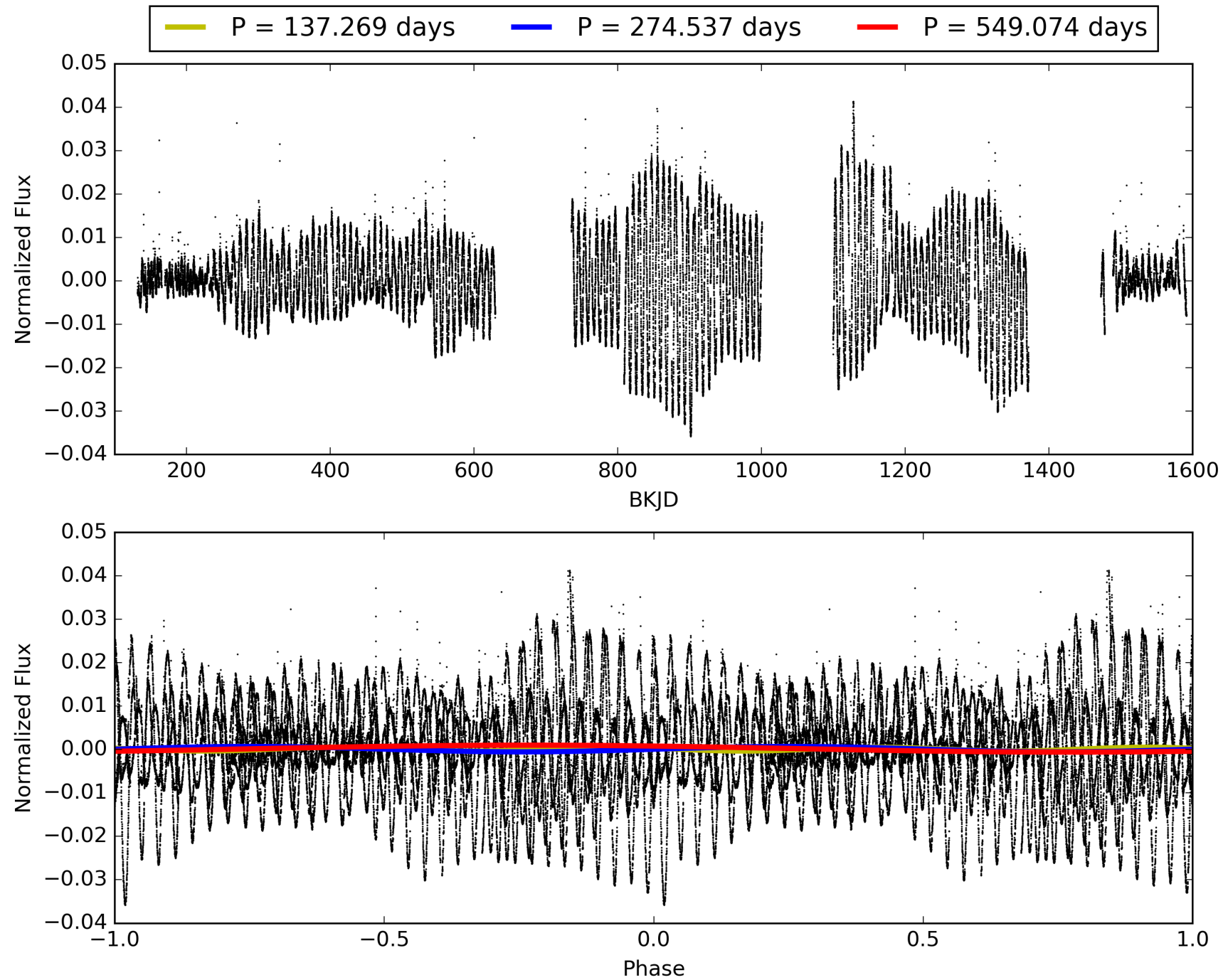
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 16:21:57 Z

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

# TCE 009540467-10, PDC Light Curves

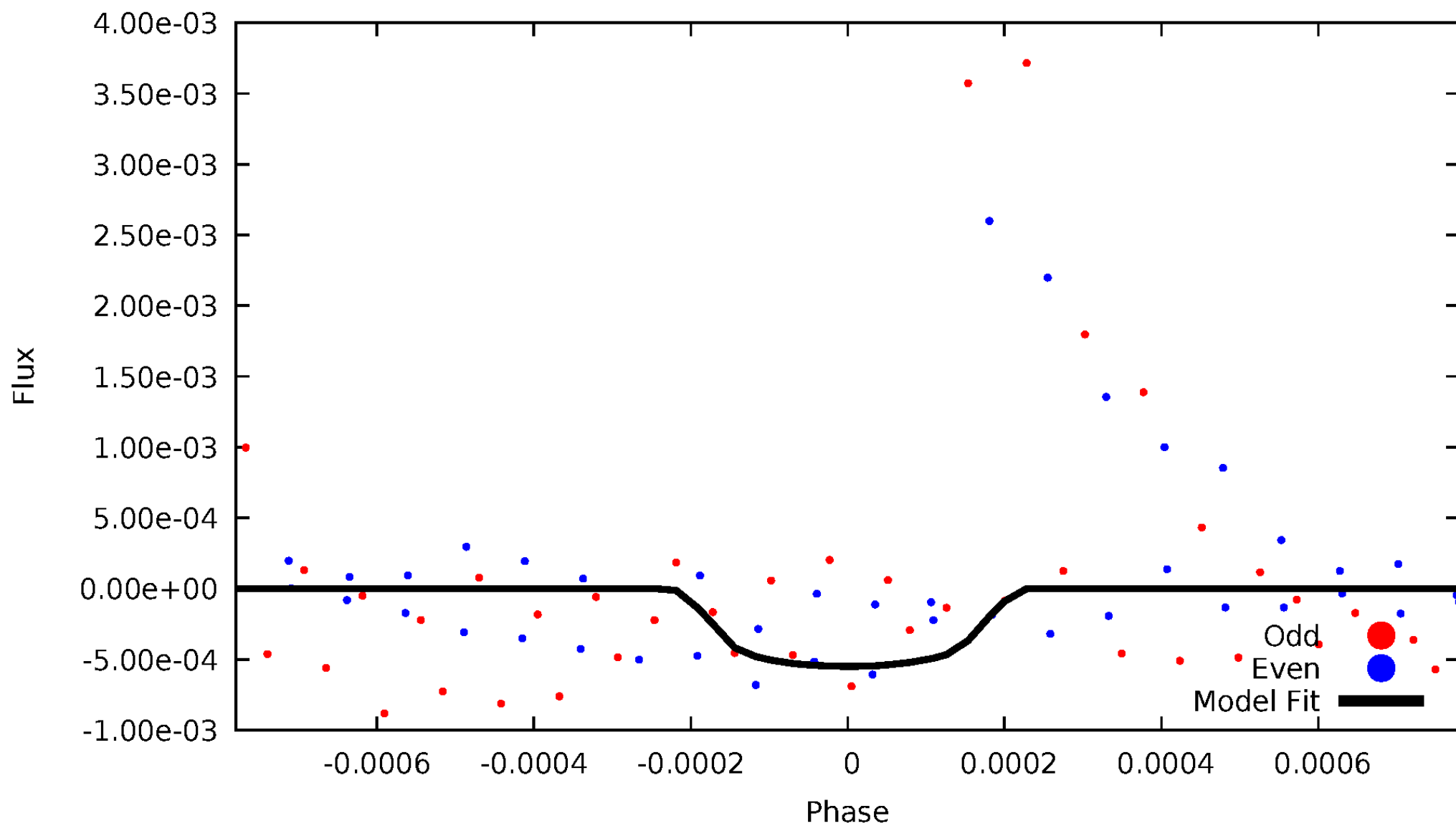


# TCE 009540467-10



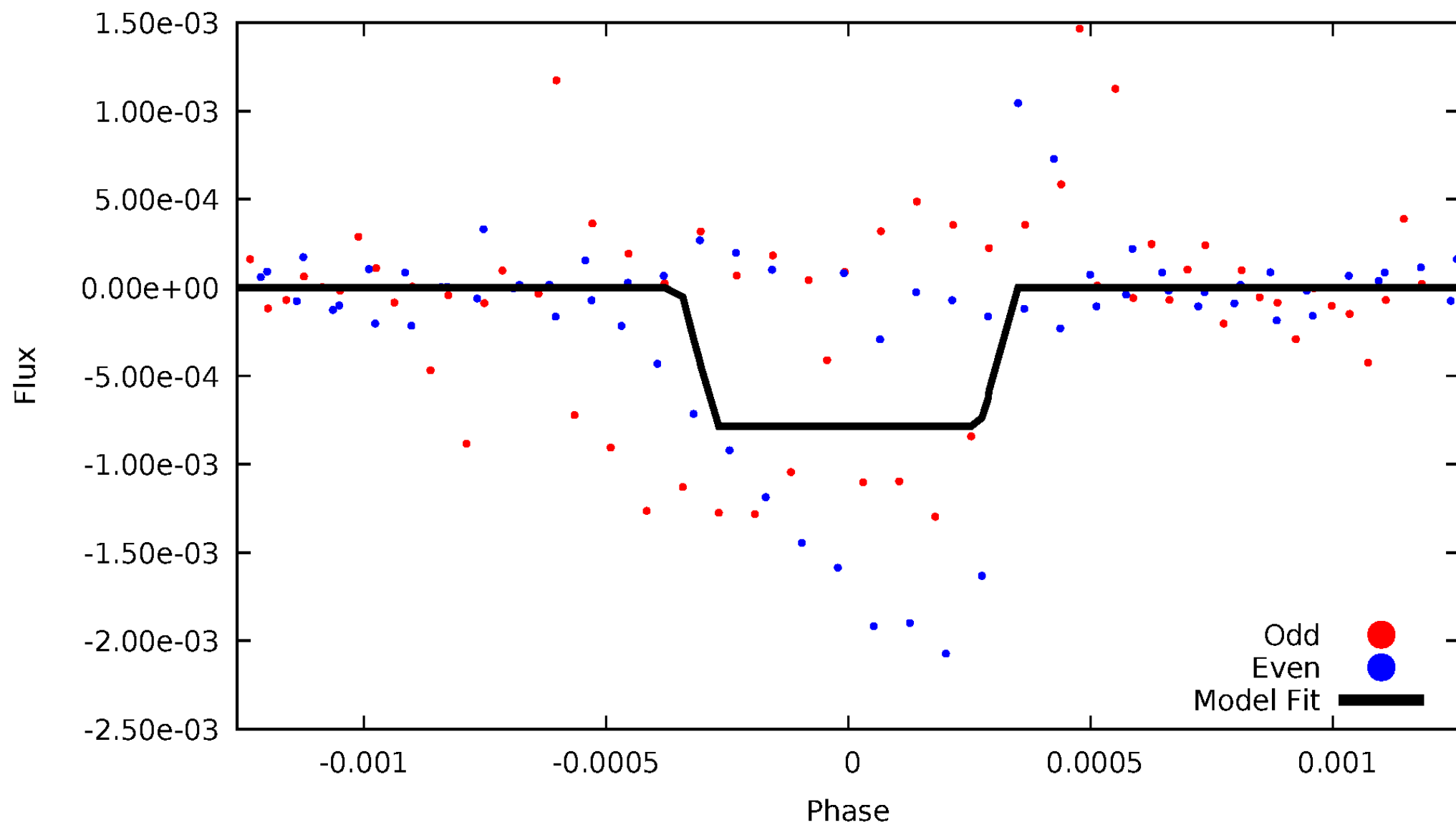
# DV Odd/Even

TCE 009540467-10



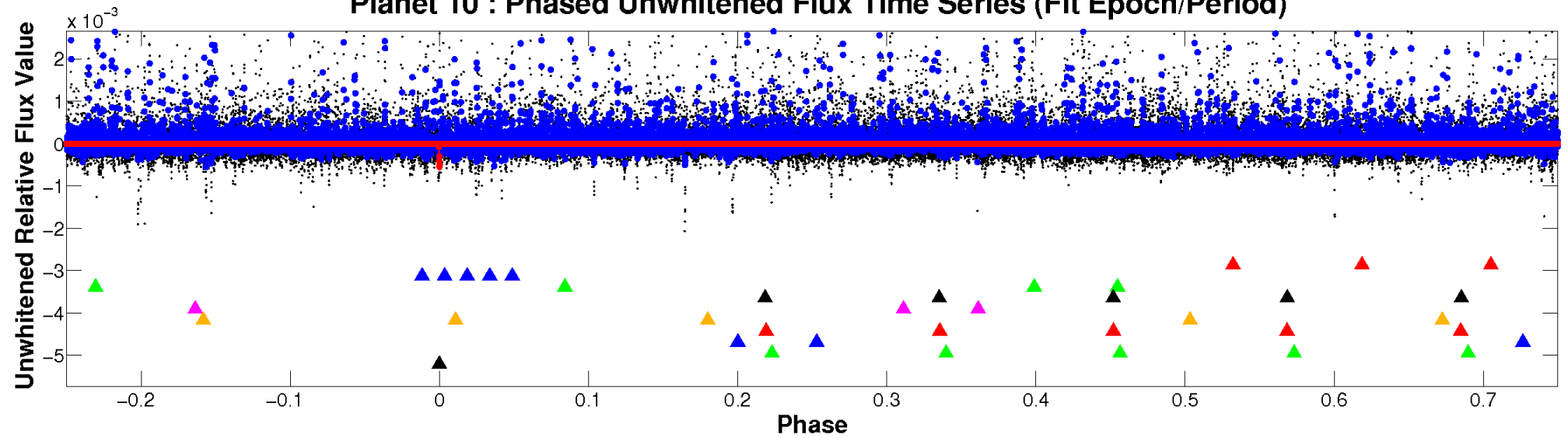
# ALT Odd/Even

TCE 009540467-10

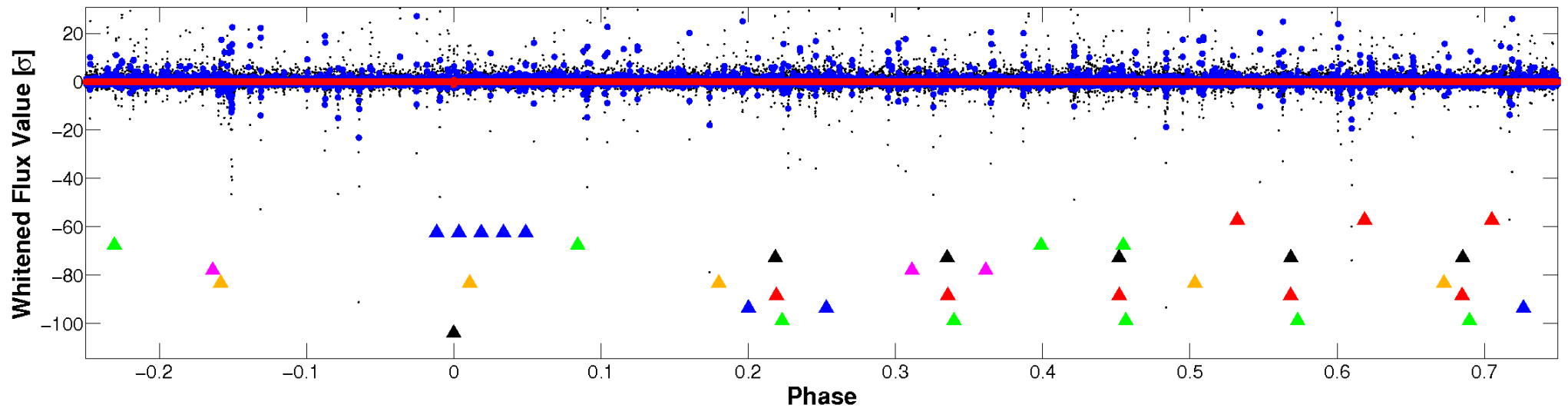


# Non-Whitened Vs. Whitened Light Curve

Planet 10 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

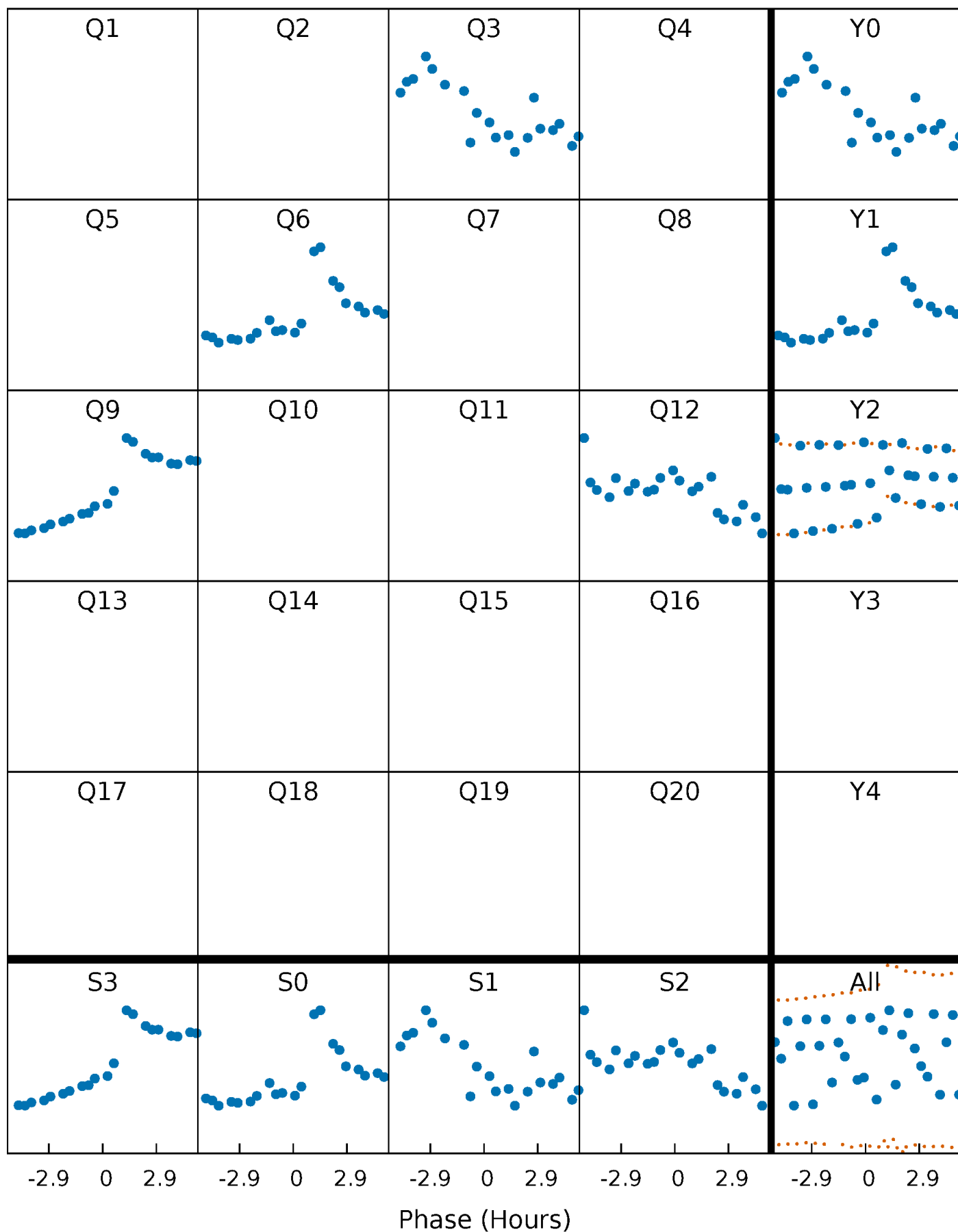


Planet 10 : Phased Whitened Flux Time Series (Fit Epoch/Period)



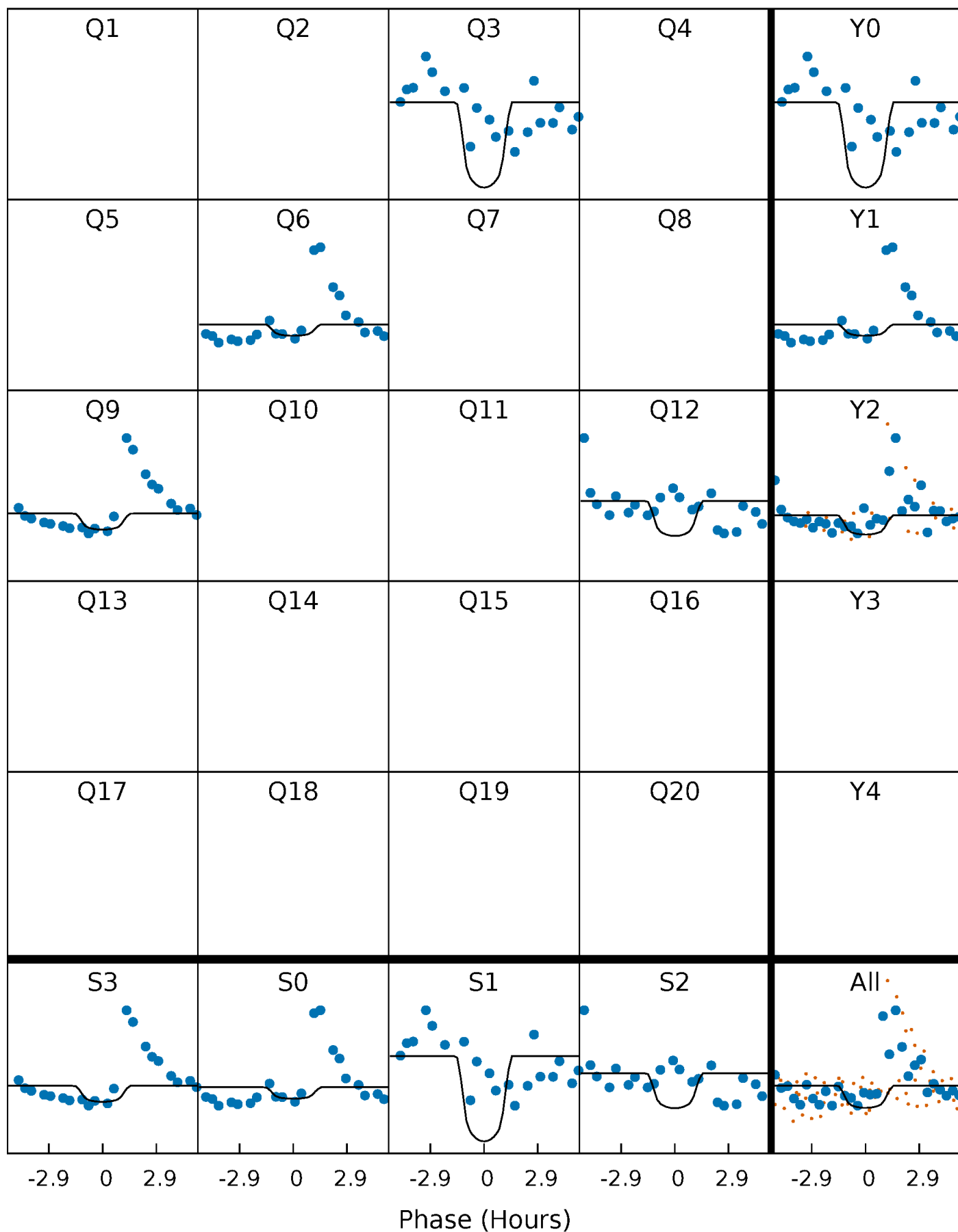
# PDC Quarter-Phased Transit Curves

TCE 009540467-10 P=274.537158 Days  $T_0=346.932388$  (BKJD)



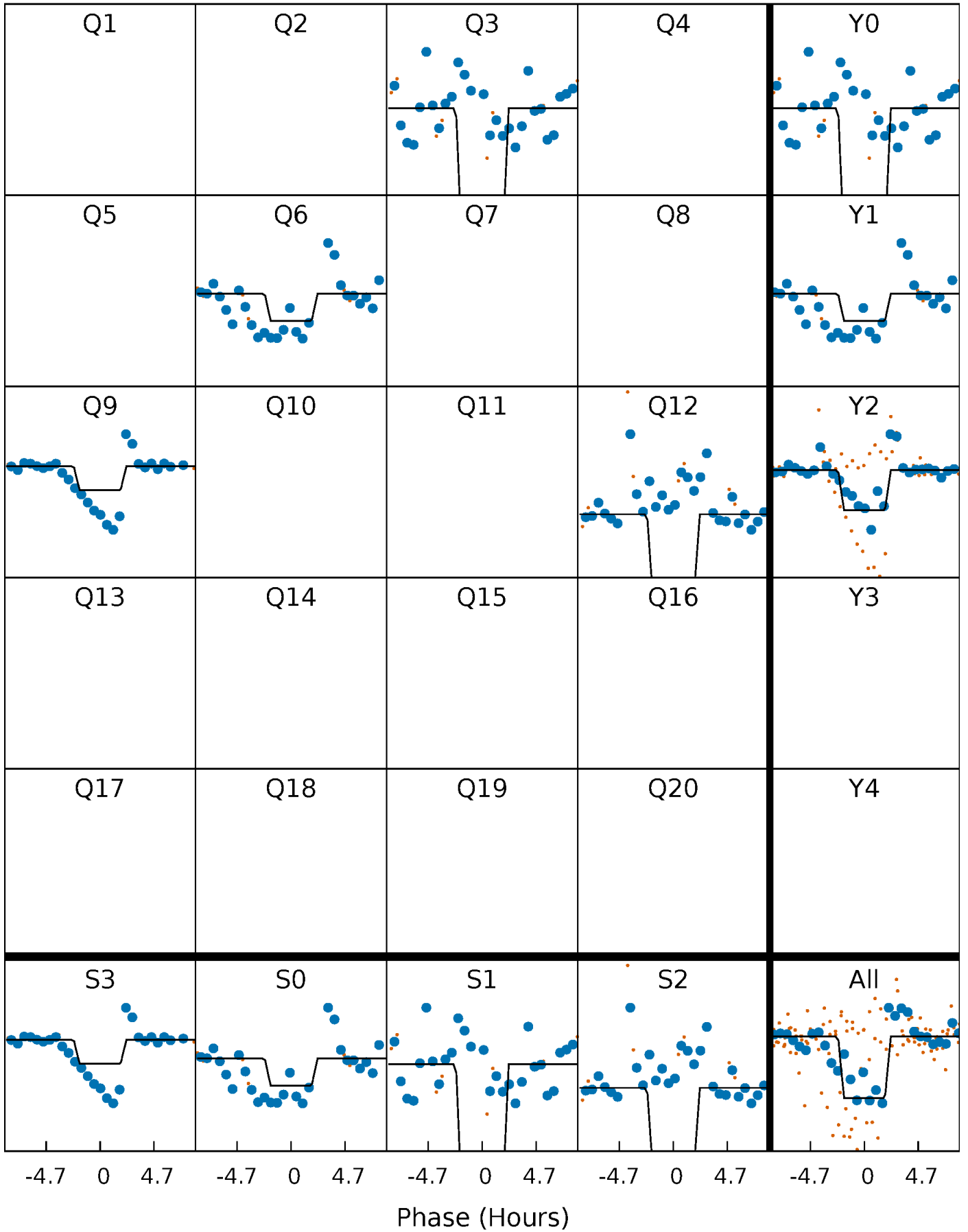
# DV Quarter-Phased Transit Curves

TCE 009540467-10 P=274.537158 Days  $T_0=346.932388$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

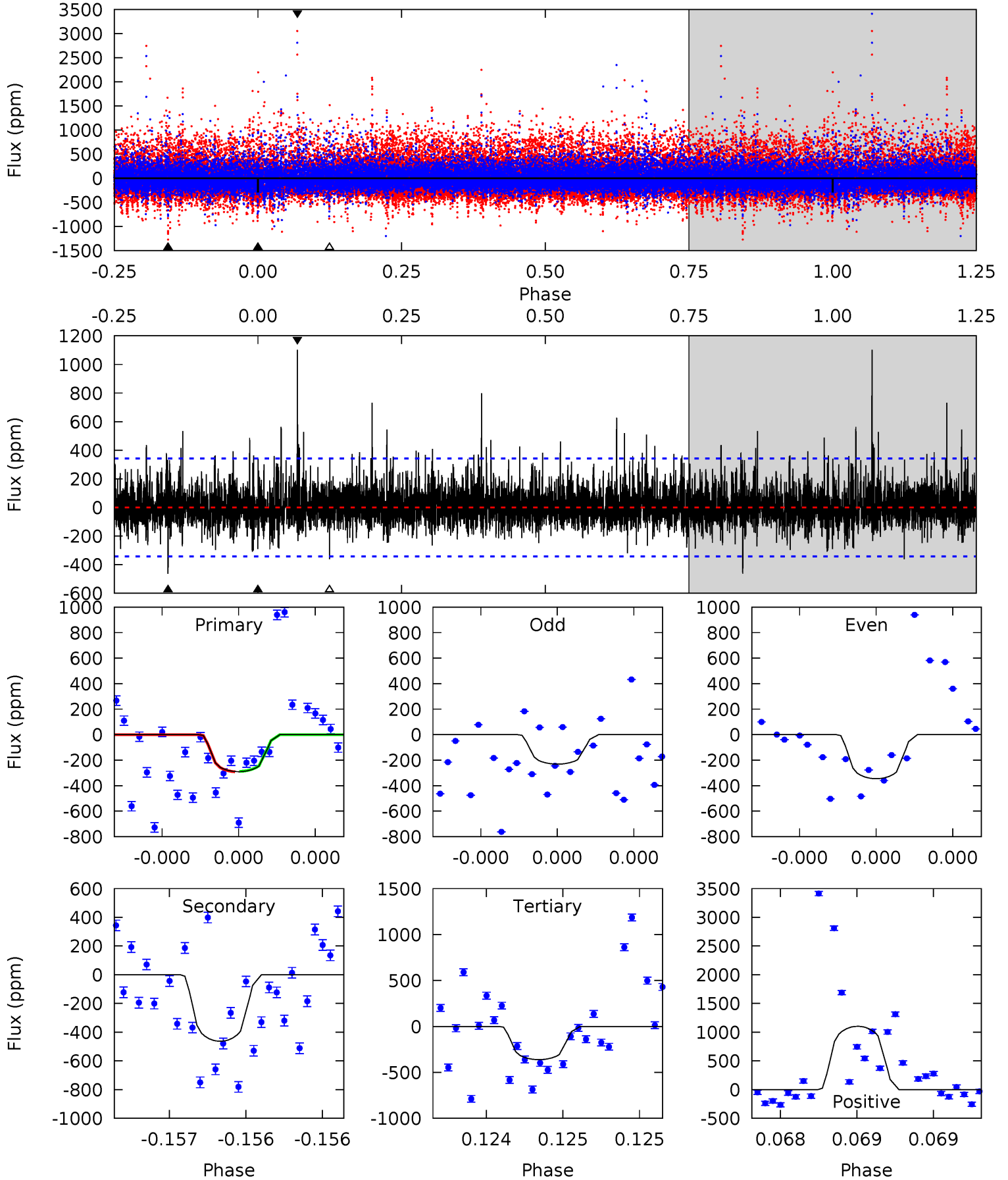
TCE 009540467-10 P=274.538501 Days  $T_0=346.883116$  (BKJD)



# DV Model-Shift Uniqueness Test

009540467-10, P = 274.537158 Days, E = 72.395230 Days

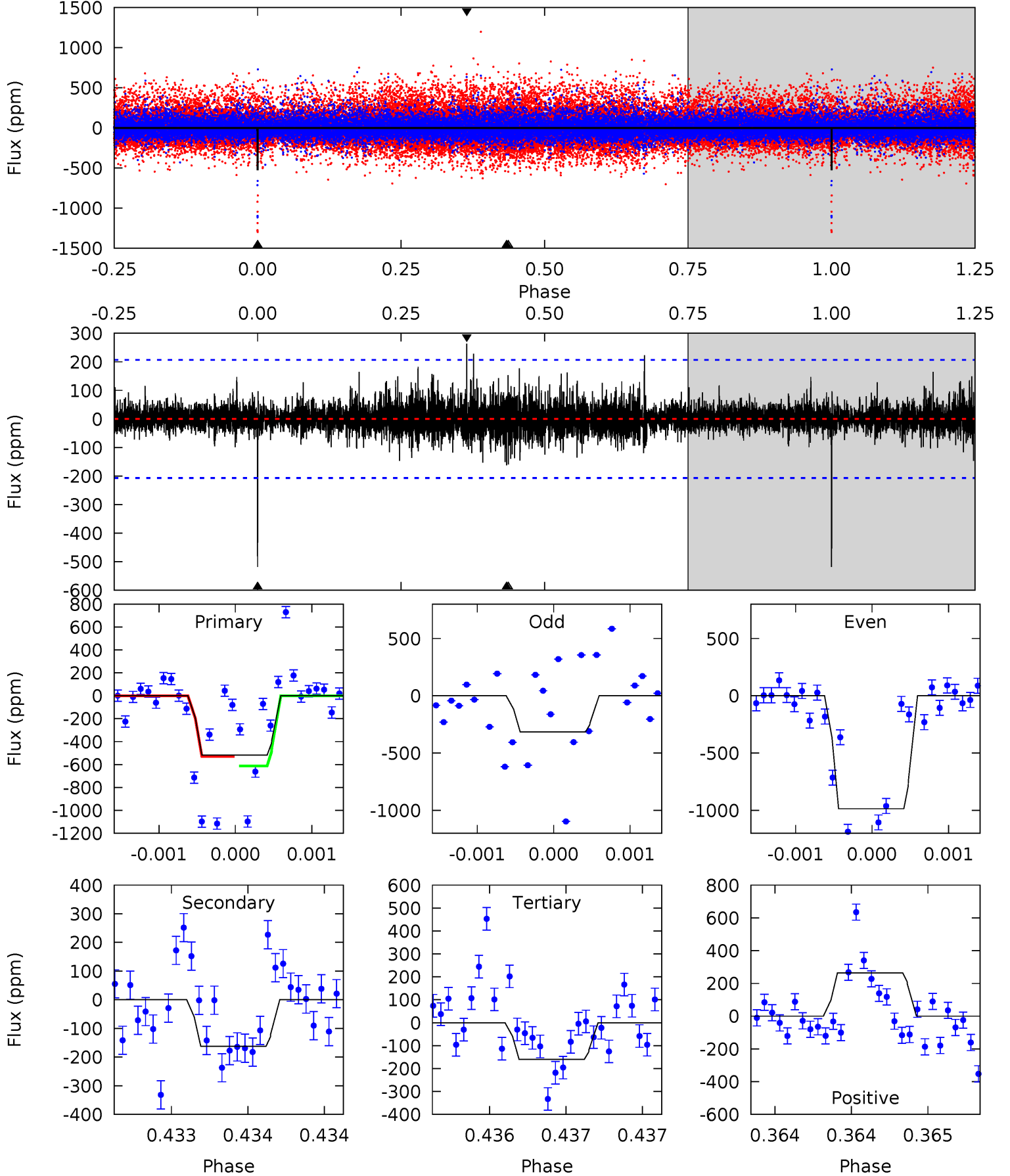
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.73	7.54	5.89	17.9	5.58	3.50	1.75	-1.16	-13.2	1.66	-10.4	0.69	0.85	0.70	0.03



# Alt Model-Shift Uniqueness Test

009540467-10,  $P = 274.538501$  Days,  $E = 72.344615$  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
13.9	4.34	4.27	7.06	5.54	3.43	0.98	9.60	6.81	0.07	-2.72	10.1	1.15	0.34	1.06



### Stellar Parameters For KIC 009540467

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3919^{+121}_{-148}$	$4.679^{+0.070}_{-0.025}$	$0.020^{+0.250}_{-0.300}$	$0.572^{+0.042}_{-0.079}$	$0.570^{+0.051}_{-0.070}$	$4.295^{+1.555}_{-0.534}$
	+3%/-4%	+1%/-1%	+1250%/-1500%	+7%/-14%	+9%/-12%	+36%/-12%
Source	KIC0	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 009540467-10 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-463 \pm 61$	$2.82^{+2.63}_{-1.94}$	$218^{+9}_{-9}$	$3093^{+1430}_{-517}$	$15050^{+147103}_{-10908}$
Alt.	$-162 \pm 37$	$3.01^{+2.57}_{-1.91}$	$218^{+8}_{-9}$	$2626^{+912}_{-365}$	$4629^{+31197}_{-3321}$

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

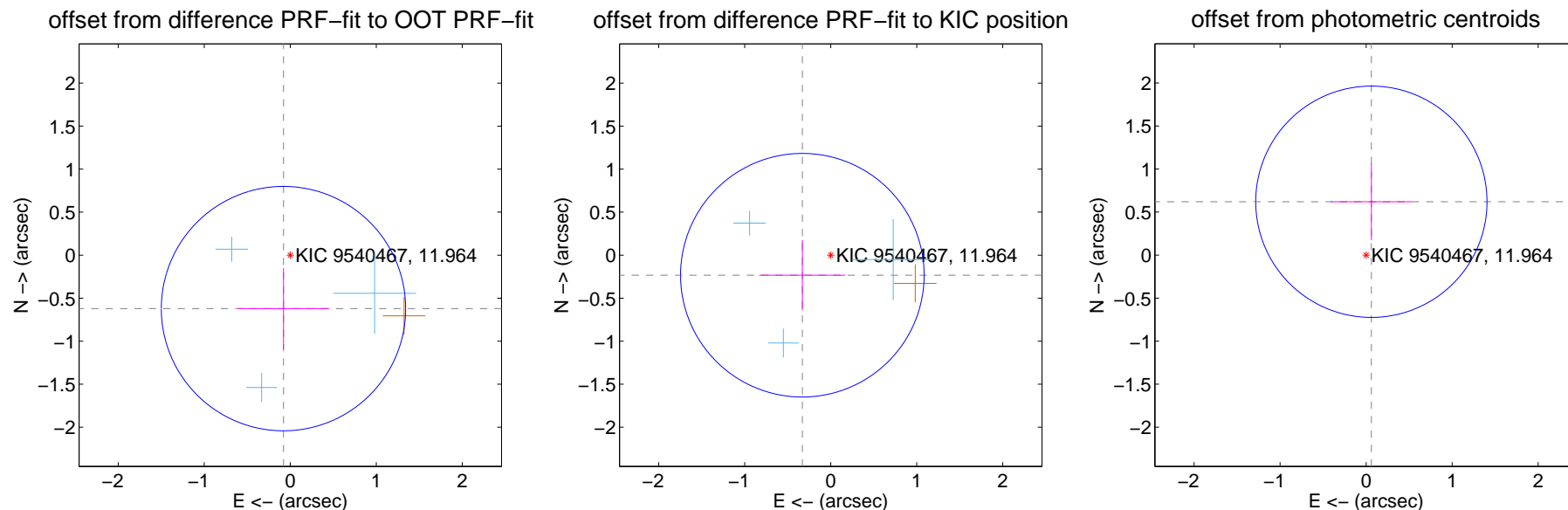
## DV Centroid Data

Supplemental centroid analysis for 009540467-10. **Kepler magnitude: 11.96.** Transit SNR 5.45

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

The direct PRF centroid is offset from the target star catalog position by about 0.51 arcsec

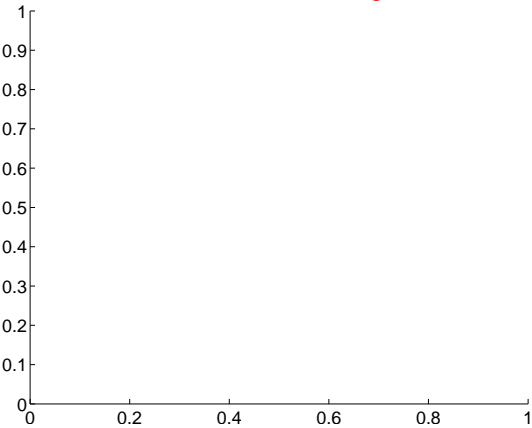
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.626 \pm 0.474$	1.32	$0.079 \pm 0.528$	$-0.621 \pm 0.473$
PRF-fit source offset from KIC position	$0.404 \pm 0.472$	0.86	$0.330 \pm 0.501$	$-0.233 \pm 0.409$
photometric centroid source offset	$0.62 \pm 0.45$	1.39	$-0.06 \pm 0.47$	$0.62 \pm 0.45$



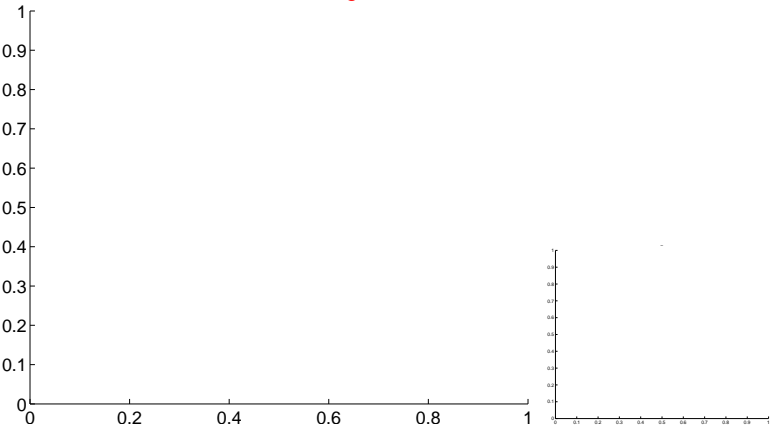
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

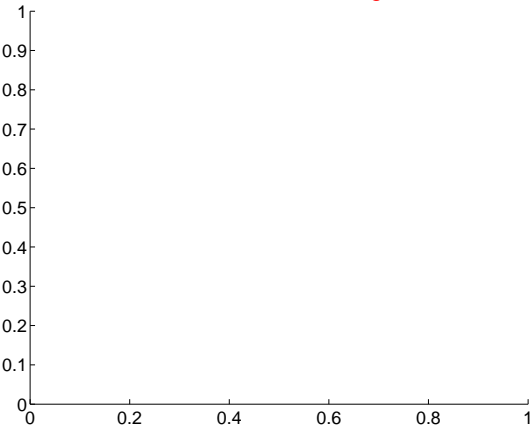
Q1 no difference image



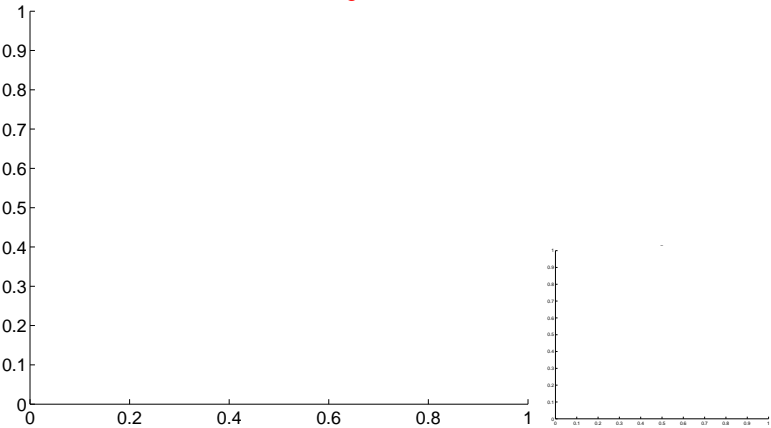
Q1 no OOT image



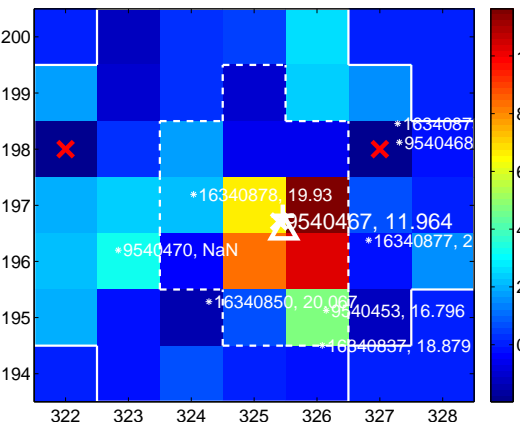
Q2 no difference image



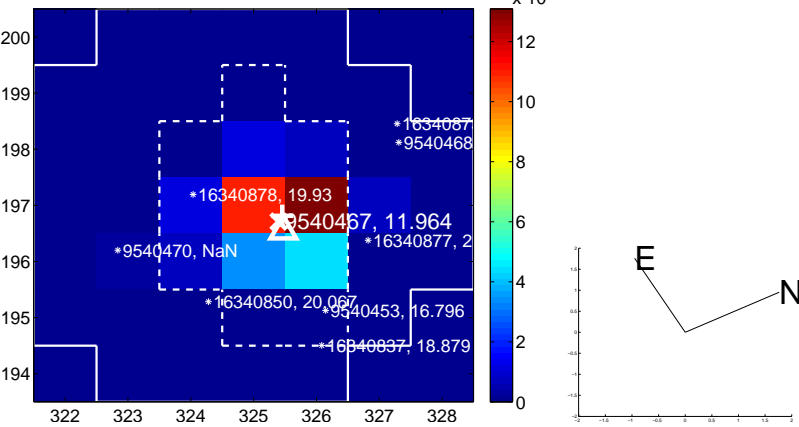
Q2 no OOT image



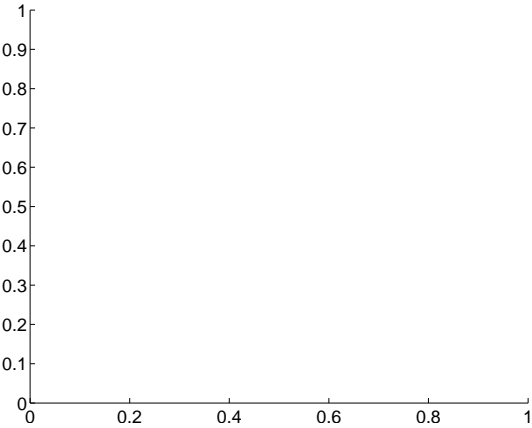
Q3 difference image



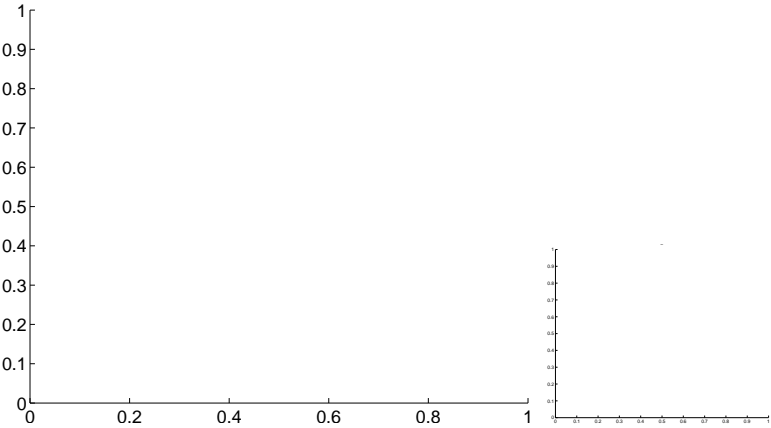
Q3 OOT image



Q4 no difference image

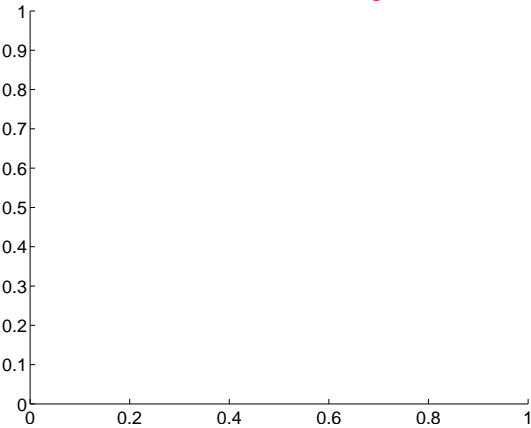


Q4 no OOT image

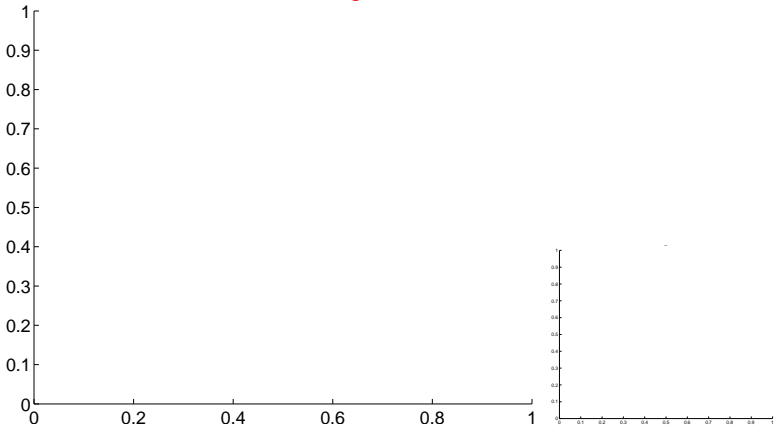


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

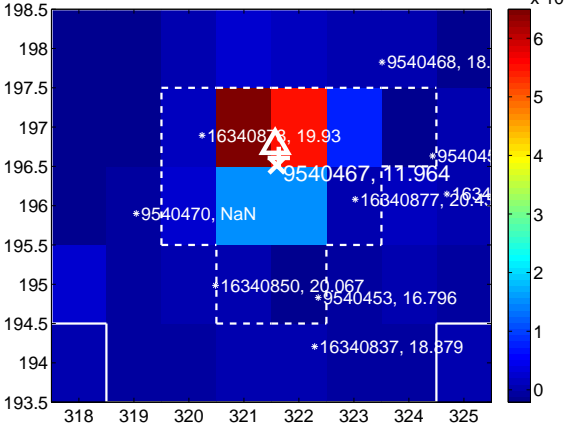
Q5 no difference image



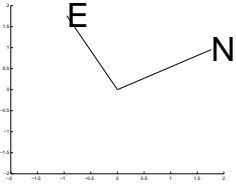
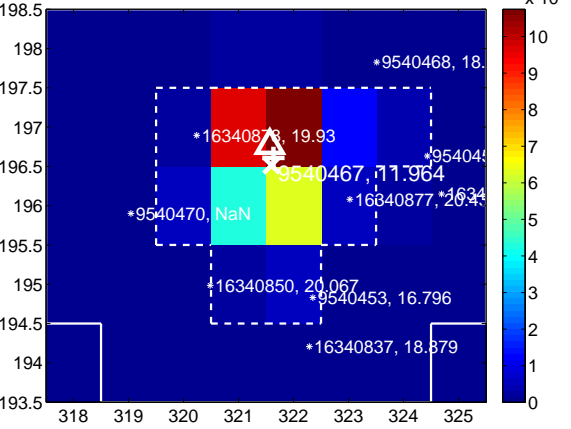
Q5 no OOT image



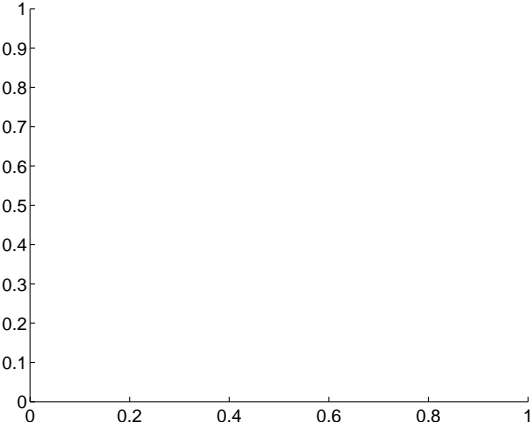
Q6 difference image



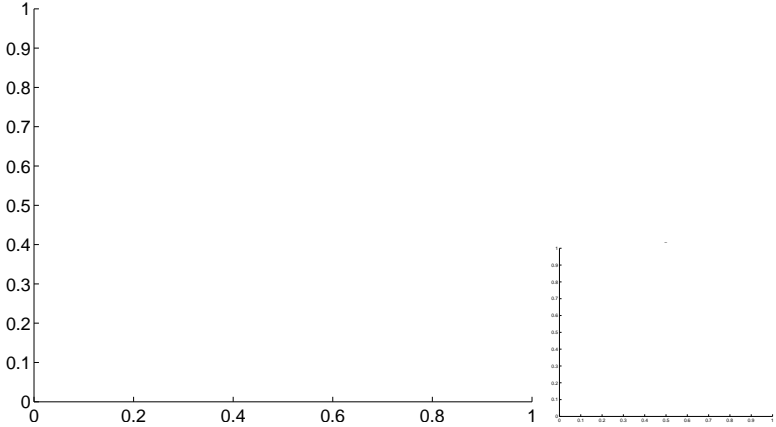
Q6 OOT image



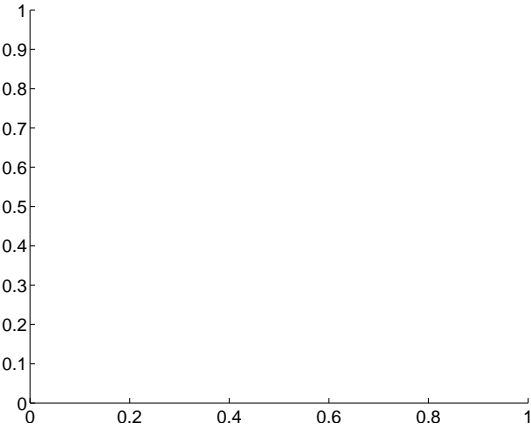
Q7 no difference image



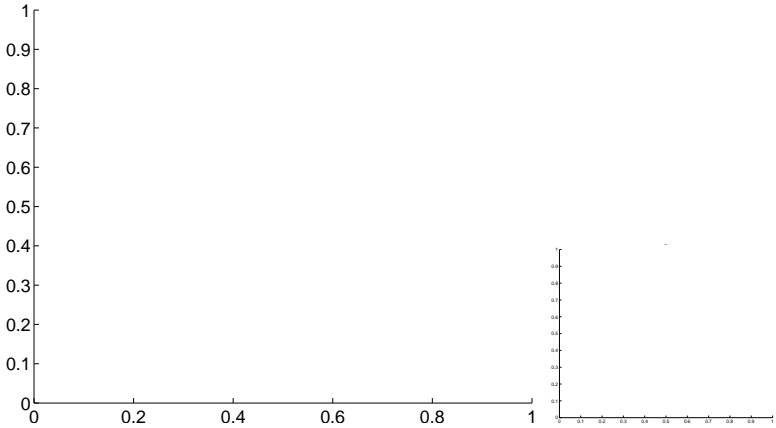
Q7 no OOT image



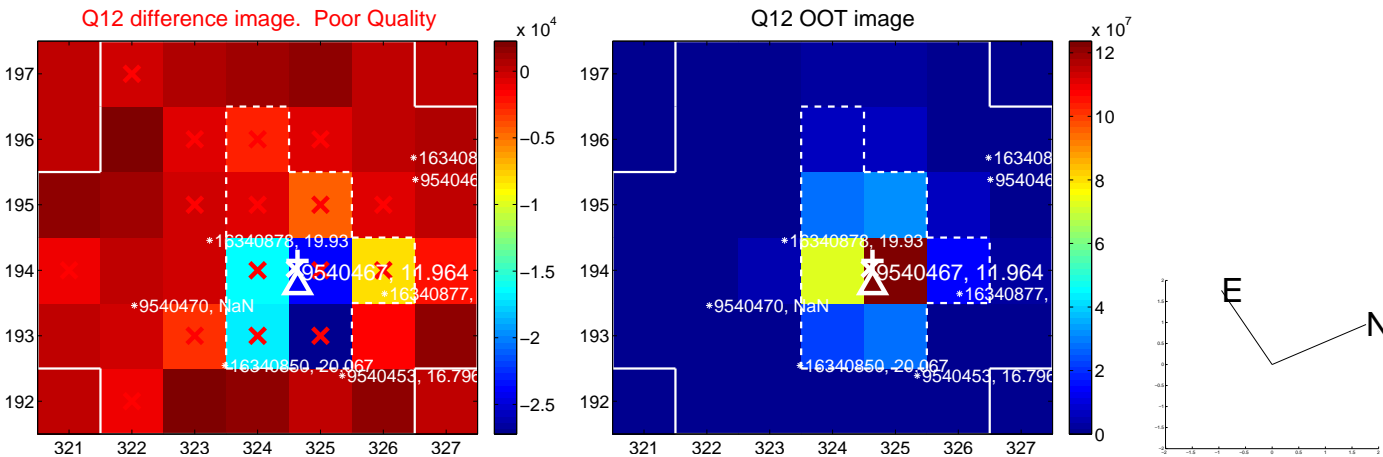
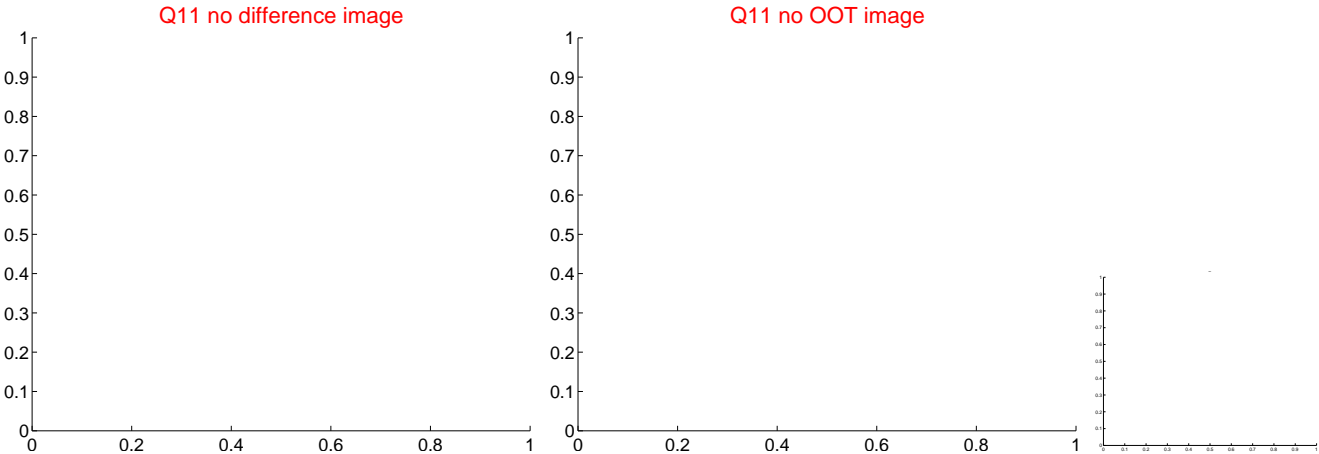
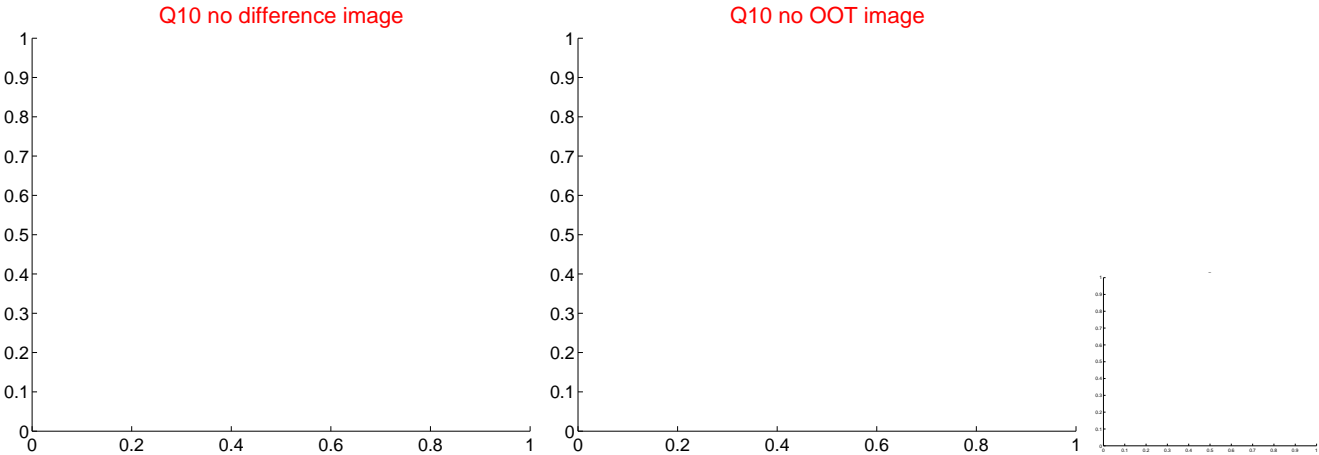
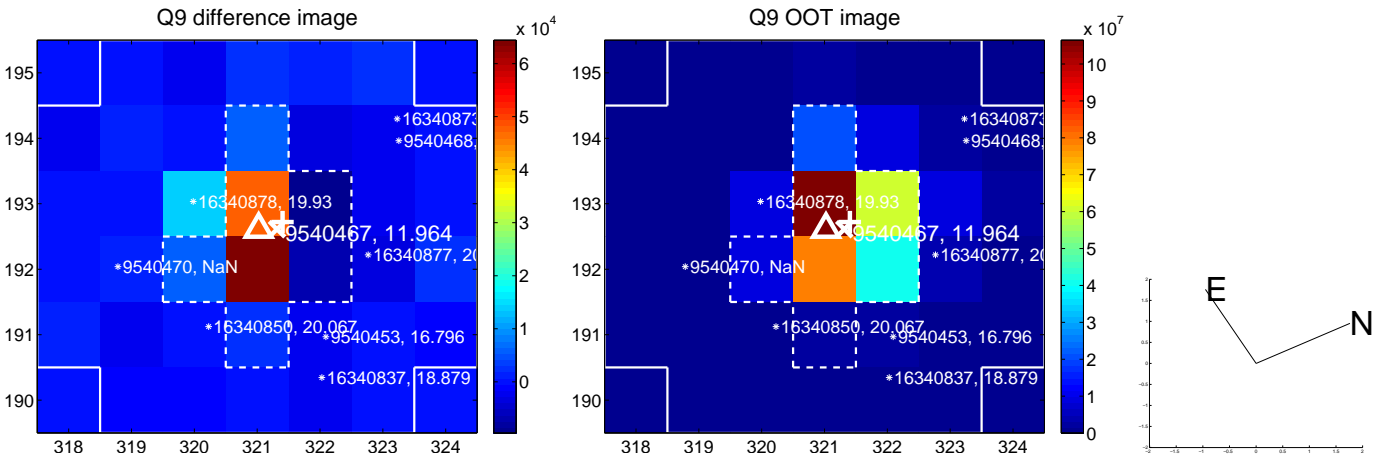
Q8 no difference image



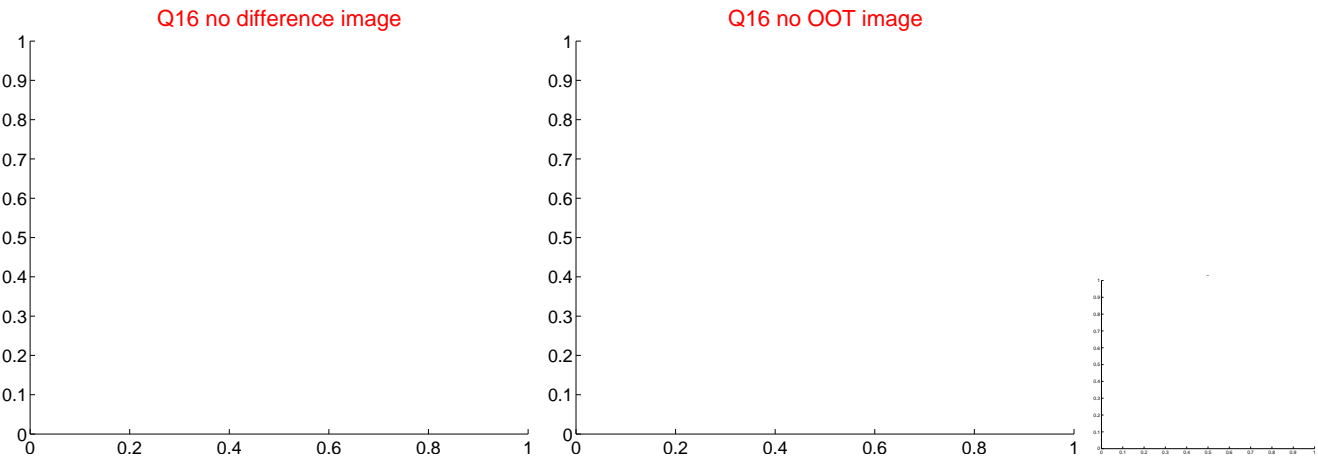
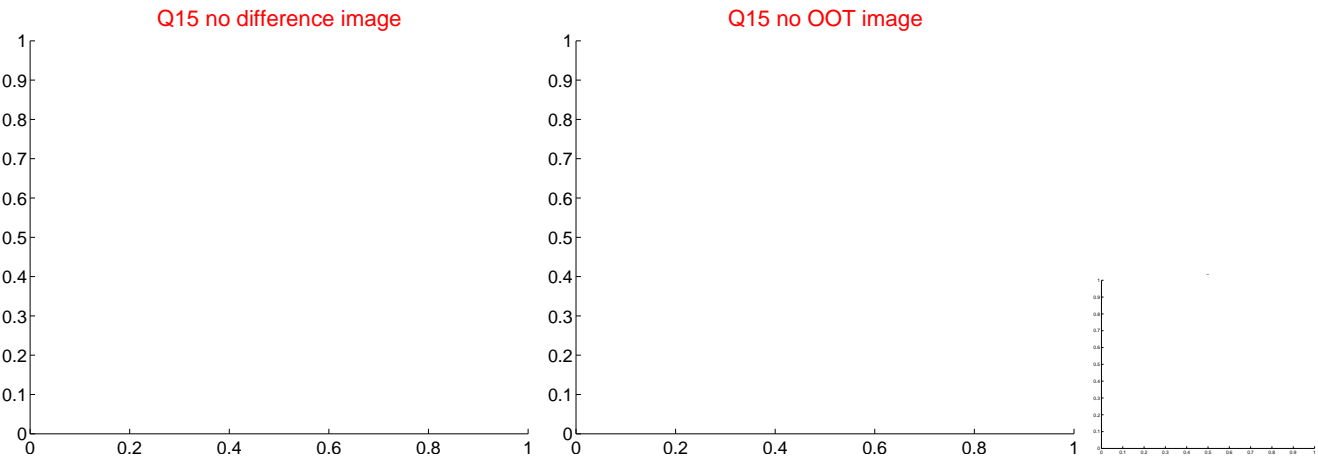
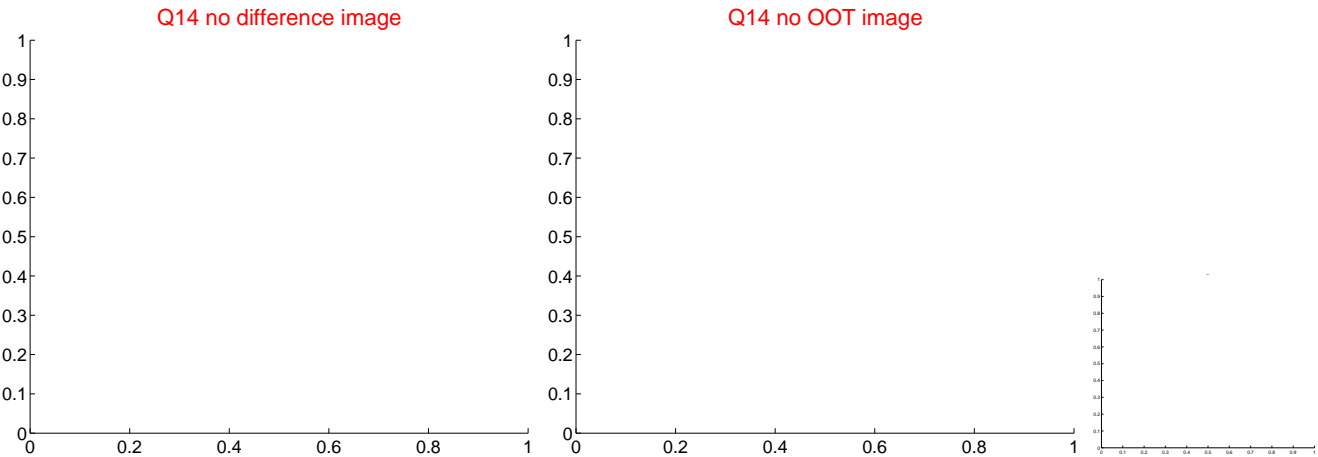
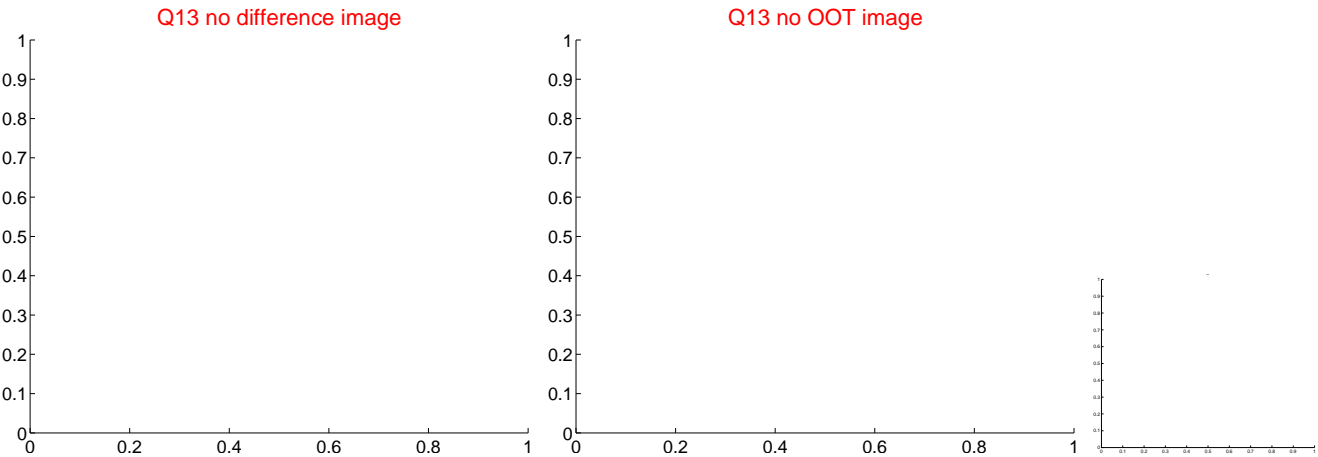
Q8 no OOT image



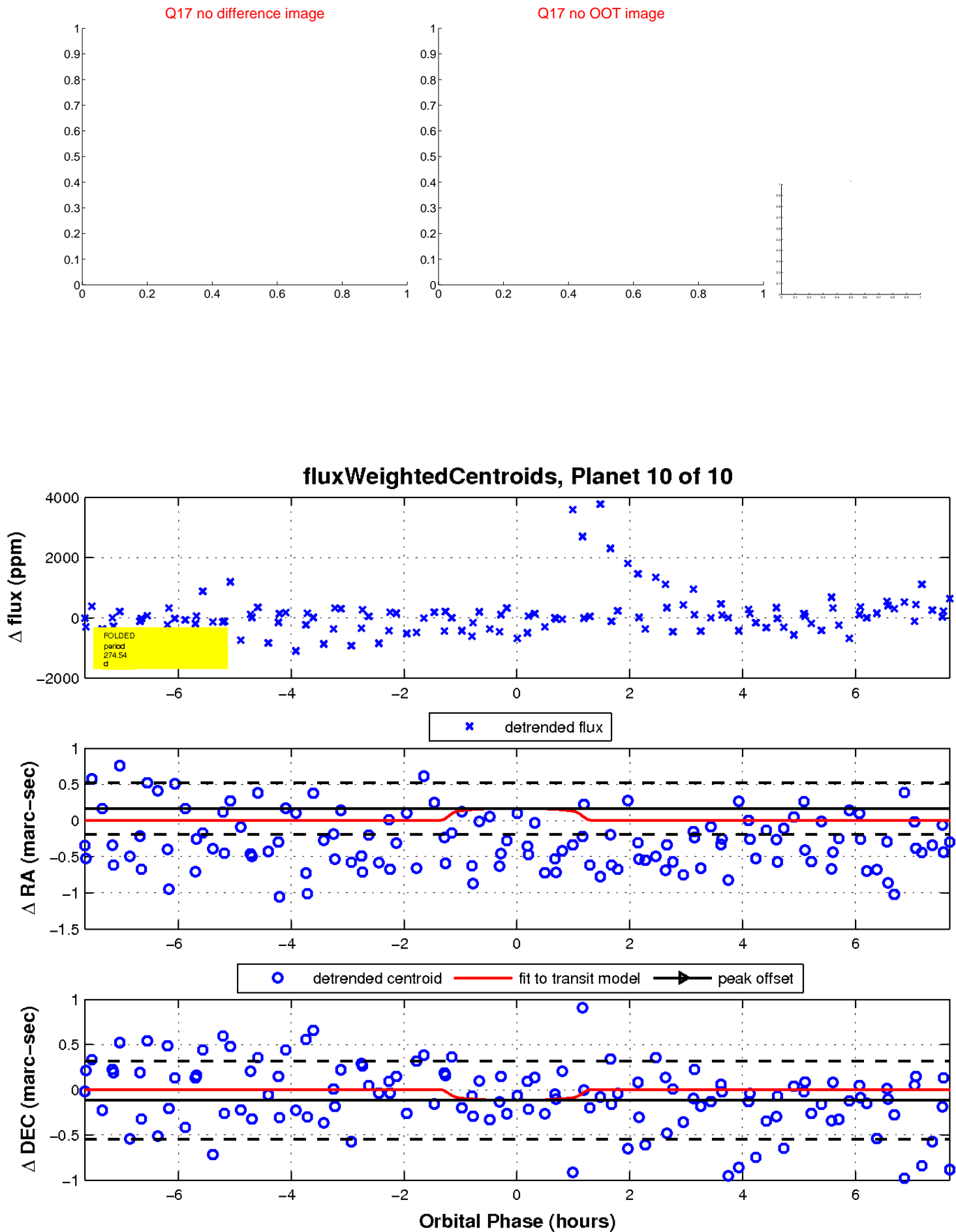
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



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



UKIRT Image

