

# KIC 010333254

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010333254-01	OBS	No	6.722893	137.475942	87.9	15.137	14.1	14.9	2.53	6714	3.41	1794.52
010333254-02	OBS	No	6.724655	132.709949	57.0	12.956	9.3	11.4	2.53	6714	3.83	1793.90
010333254-03	OBS	No	372.827910	155.750785	307.1	10.390	10.9	8.2	2.53	6714	5.23	8.49
010333254-04	OBS	No	186.778799	267.059650	182.7	5.251	8.0	6.6	2.53	6714	3.98	21.33
010333254-05	OBS	No	169.268559	167.694248	188.1	5.844	7.8	6.9	2.53	6714	3.84	24.32
010333254-06	OBS	No	209.835227	250.336223	176.0	5.160	7.8	7.4	2.53	6714	3.92	18.26
010333254-07	OBS	No	22.397421	137.445498	85.3	5.909	7.8	7.7	2.53	6714	2.79	360.66
010333254-08	OBS	No	141.378804	194.828778	127.9	5.405	7.3	8.0	2.53	6714	3.43	30.92
010333254-09	OBS	No	363.741743	457.410736	271.3	10.246	8.7	8.3	2.53	6714	5.37	8.77

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010333254-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—CENT_SATURATED
010333254-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—SAME_NTL_PERIOD—CENT_SATURATED
010333254-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
010333254-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—CENT_SATURATED
010333254-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-07	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

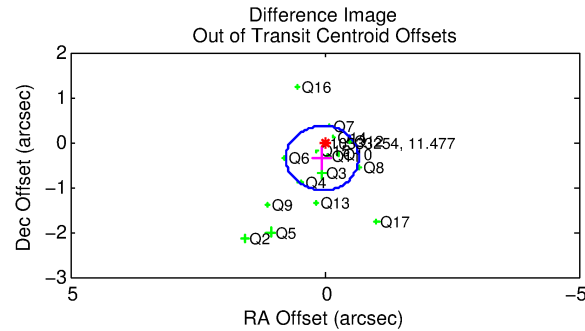
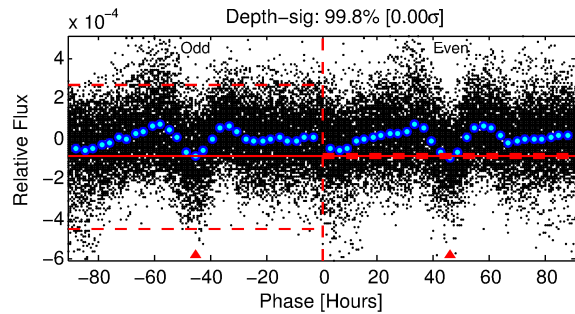
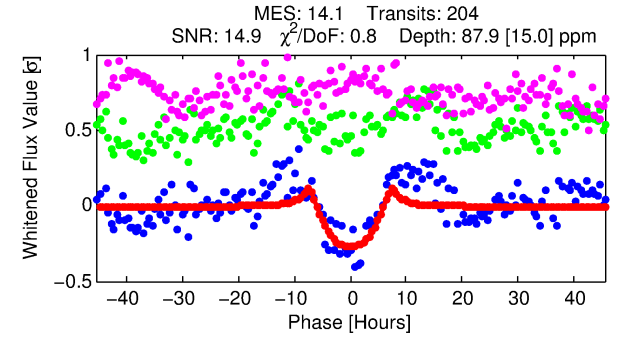
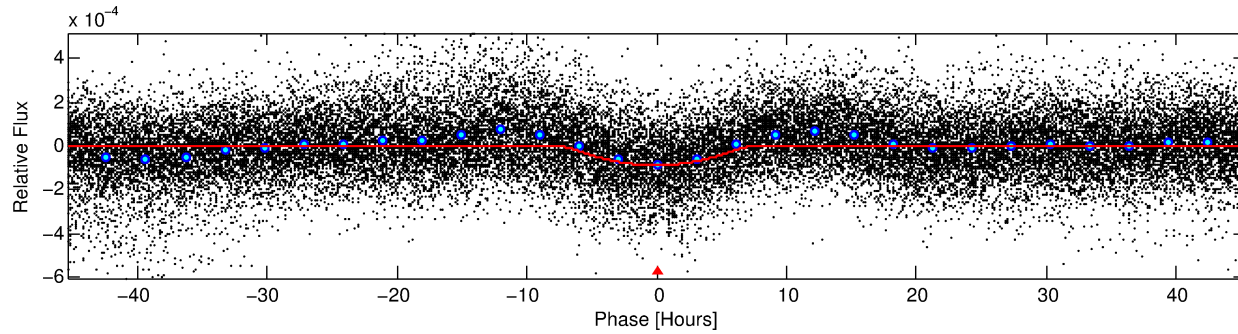
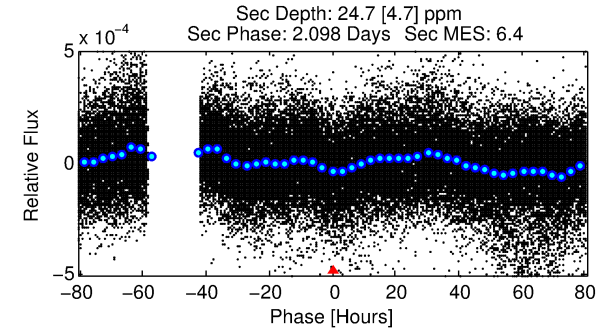
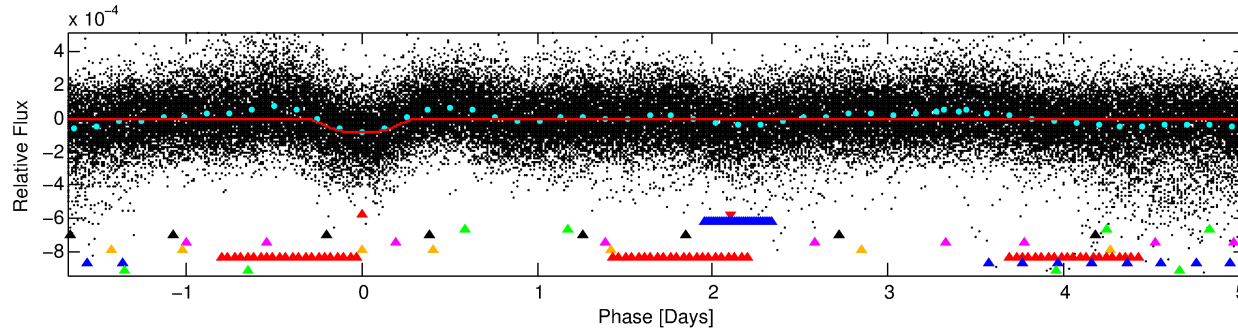
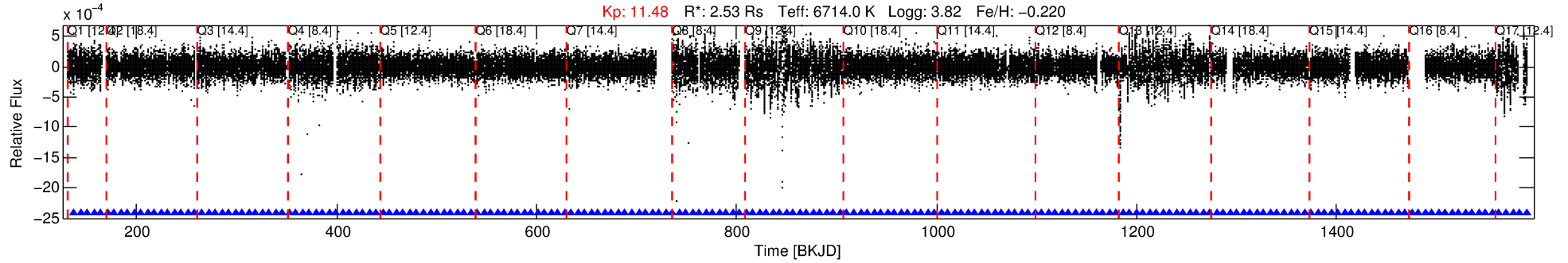
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 010333254-01

No Significant Match Found

# DV One-Page Summary

KIC: 10333254 Candidate: 1 of 9 Period: 6.723 d



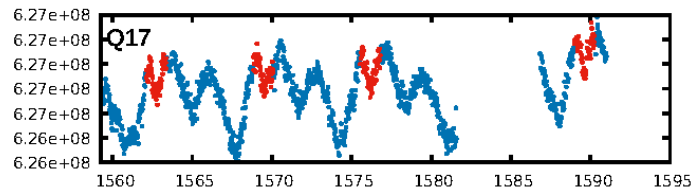
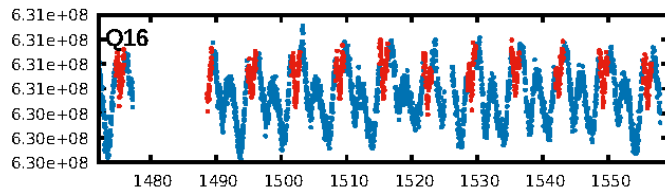
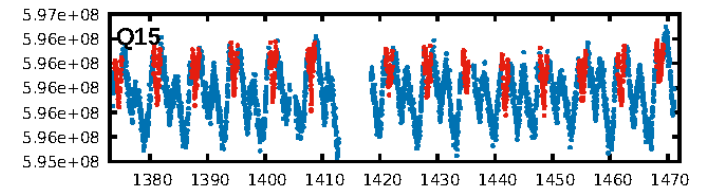
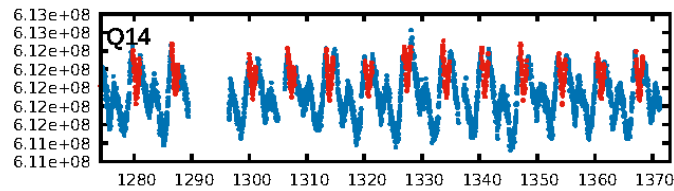
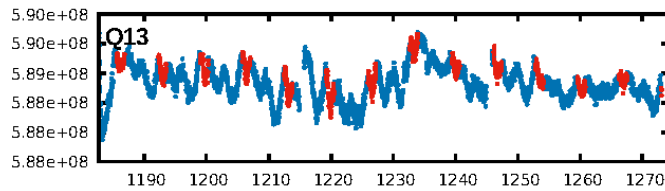
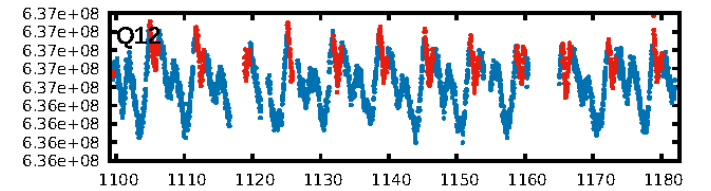
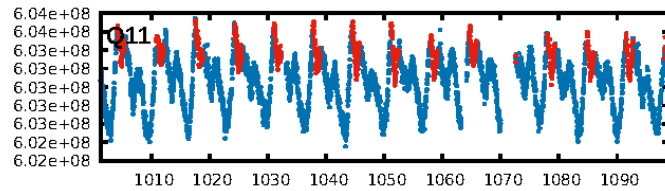
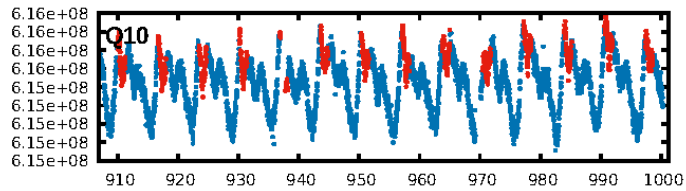
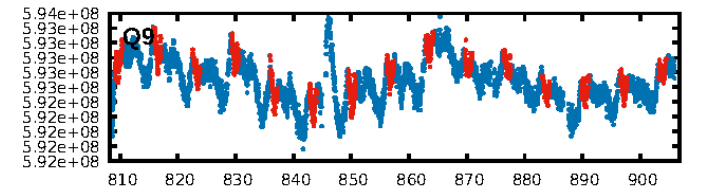
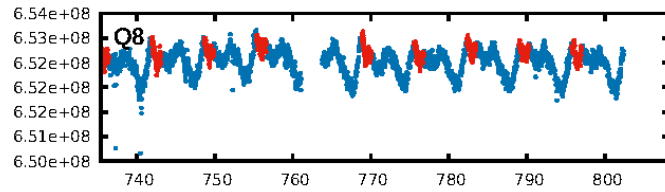
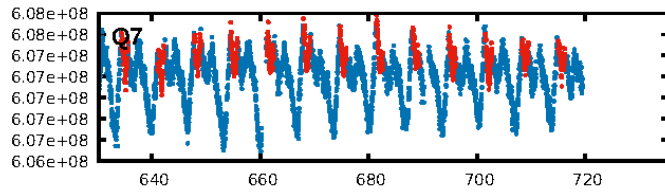
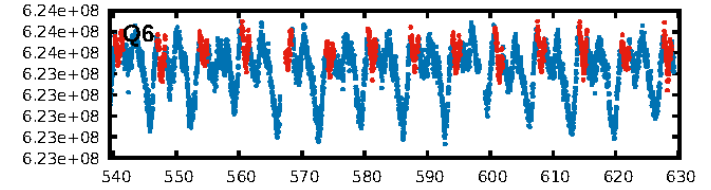
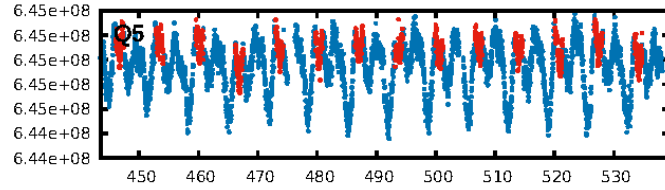
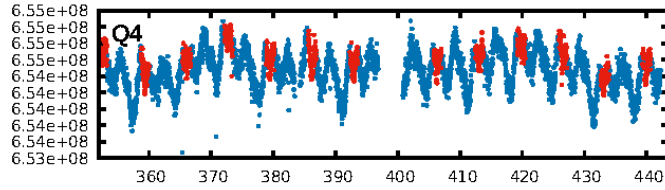
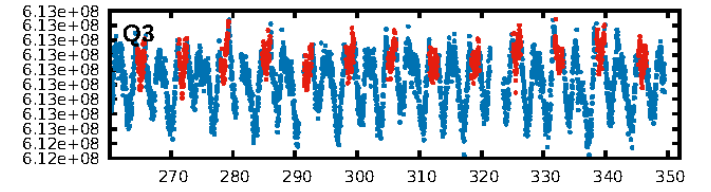
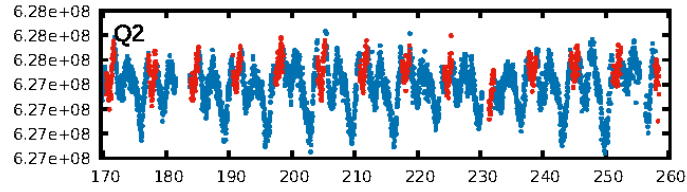
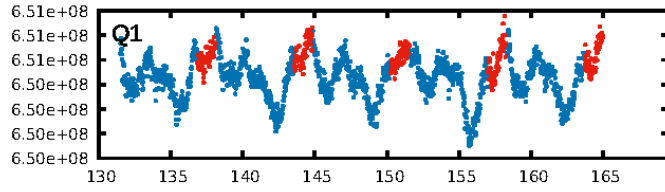
## DV Fit Results:

Period = 6.72289 [0.00013] d  
Epoch = 137.4759 [0.0156] BKJD  
Rp/R\* = 0.0123 [0.0019]  
a/R\* = 1.22 [0.04]  
b = 0.99 [0.00]  
Seff = 1794.52 [920.11]  
Teq = 1660 [213] K  
Rp = 3.41 [1.35] Re  
a = 0.0807 [0.0264] AU  
Ag = 7.61 [4.68] [1.41σ]  
Teffp = 4262 [397] K [5.77σ]

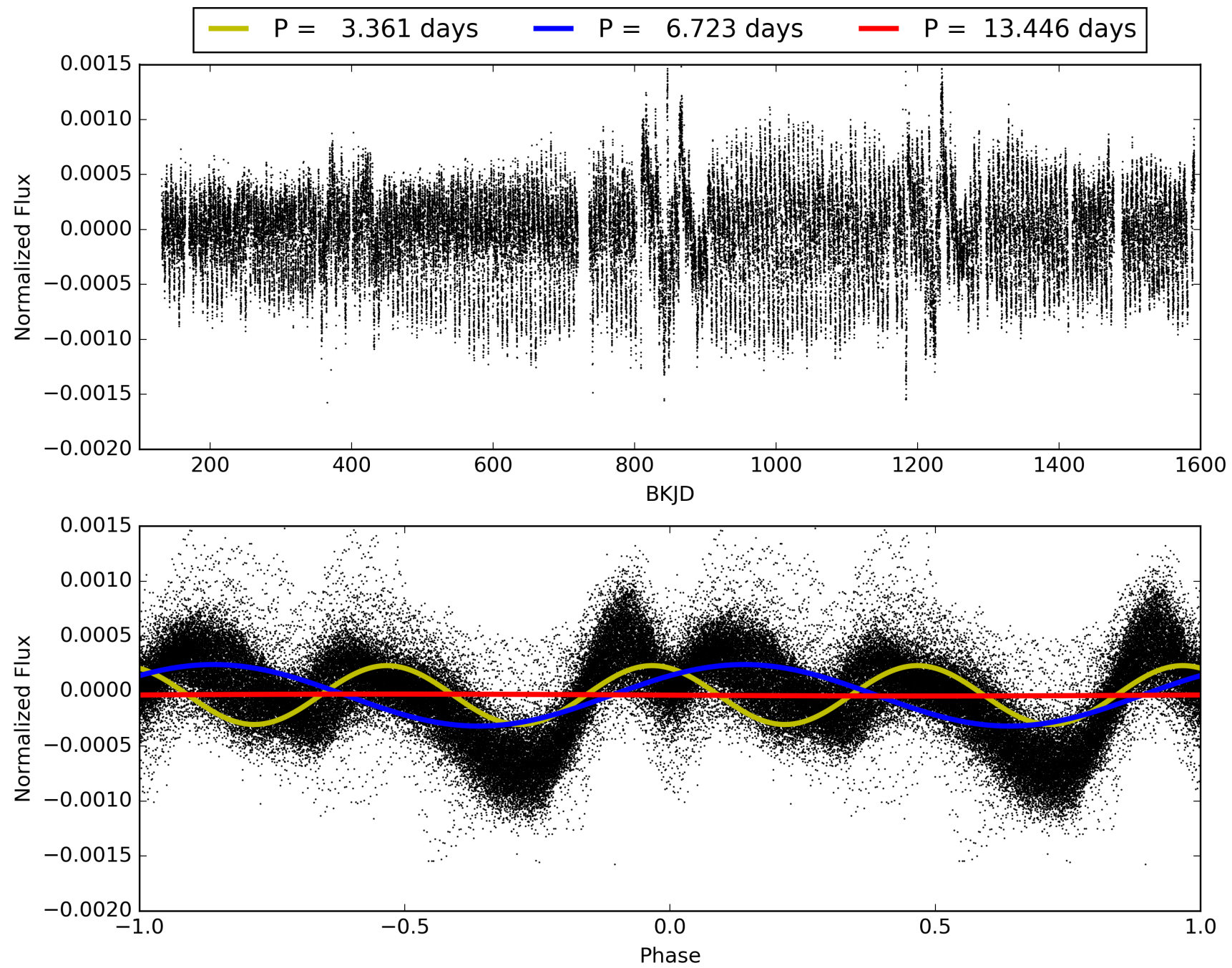
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.2% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.65e-24  
RollingBand-fgt: 1.00 [195/195]  
GhostDiagnostic-chr: 3.323  
Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 0.358 arcsec [1.50σ]  
KicOffset-rm: 0.233 arcsec [0.98σ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 0.69 [11/16]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 010333254-01, PDC Light Curves



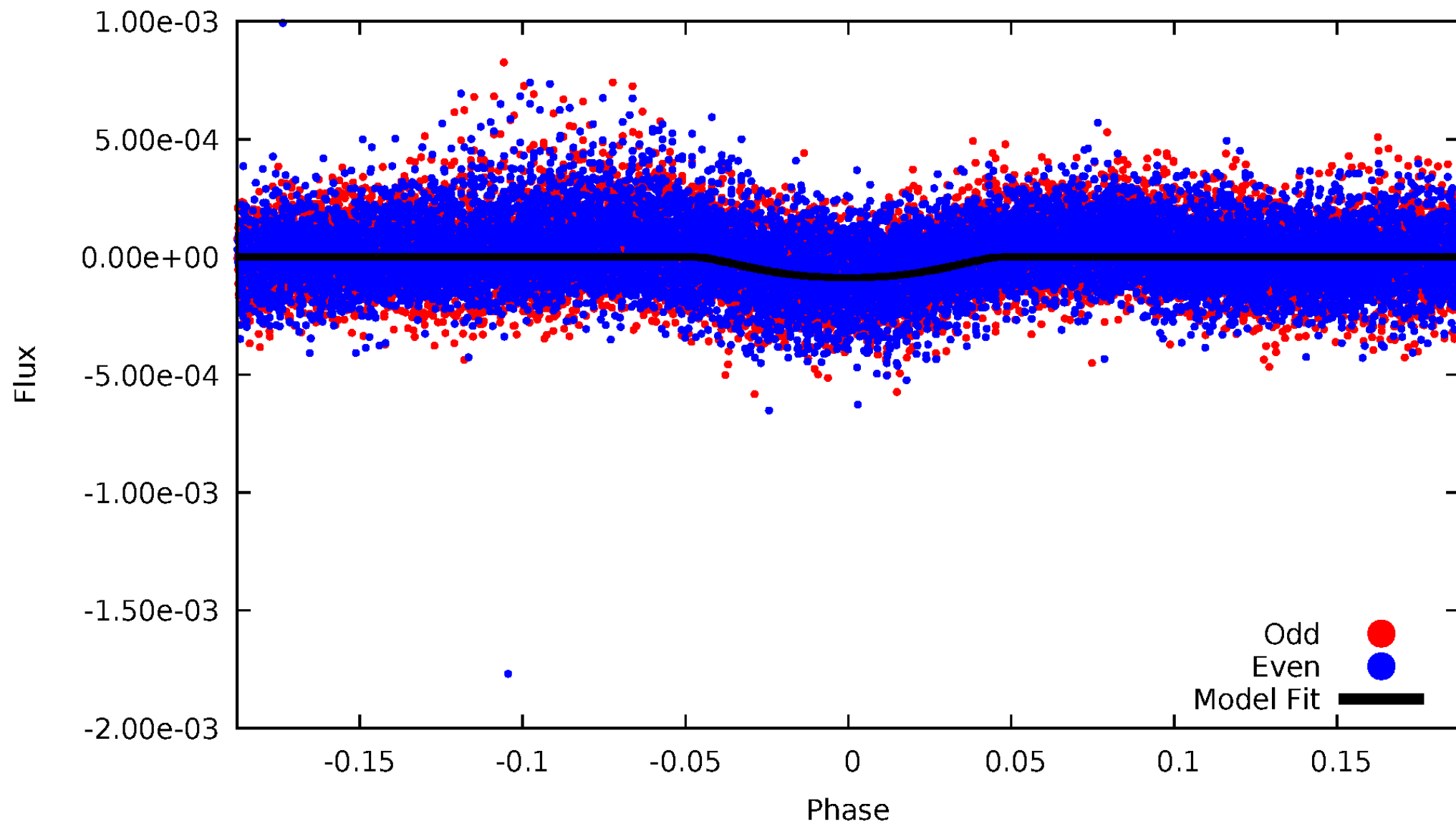
# TCE 010333254-01





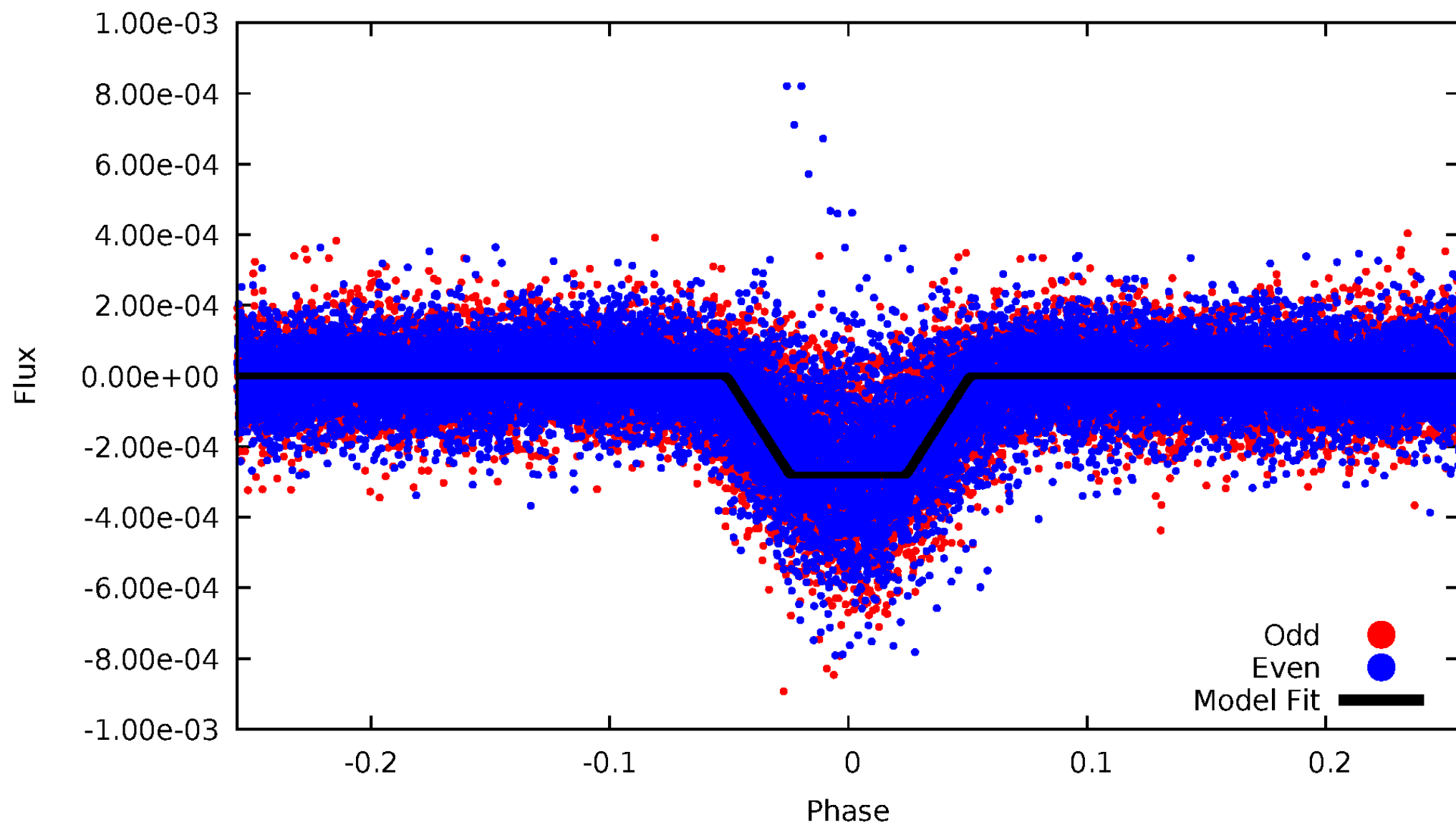
# DV Odd/Even

TCE 010333254-01

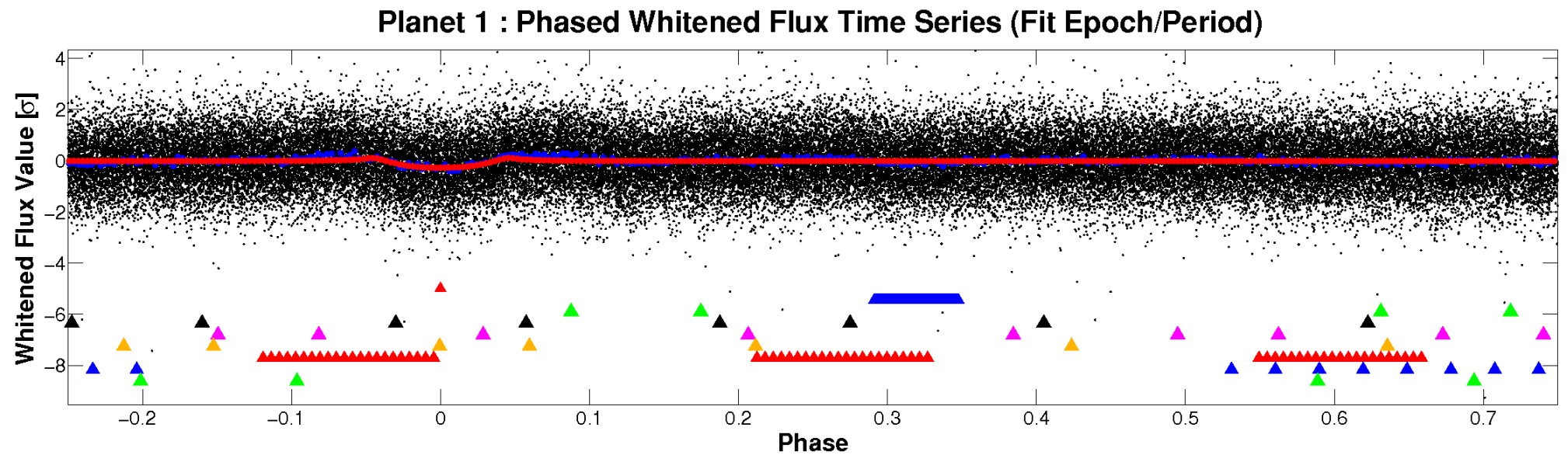
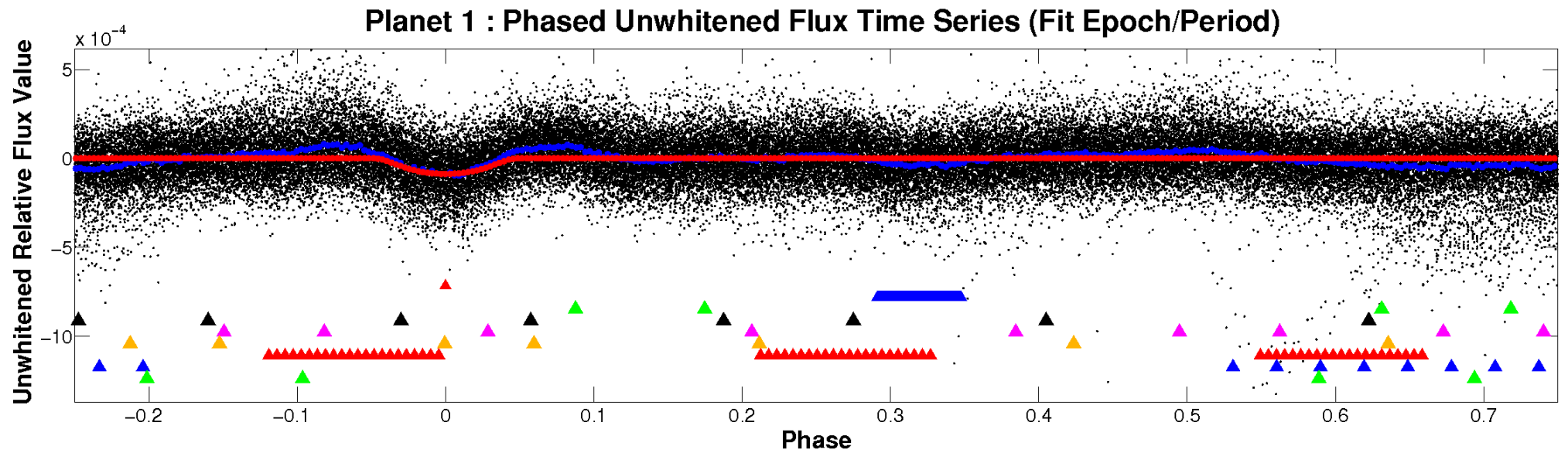


# ALT Odd/Even

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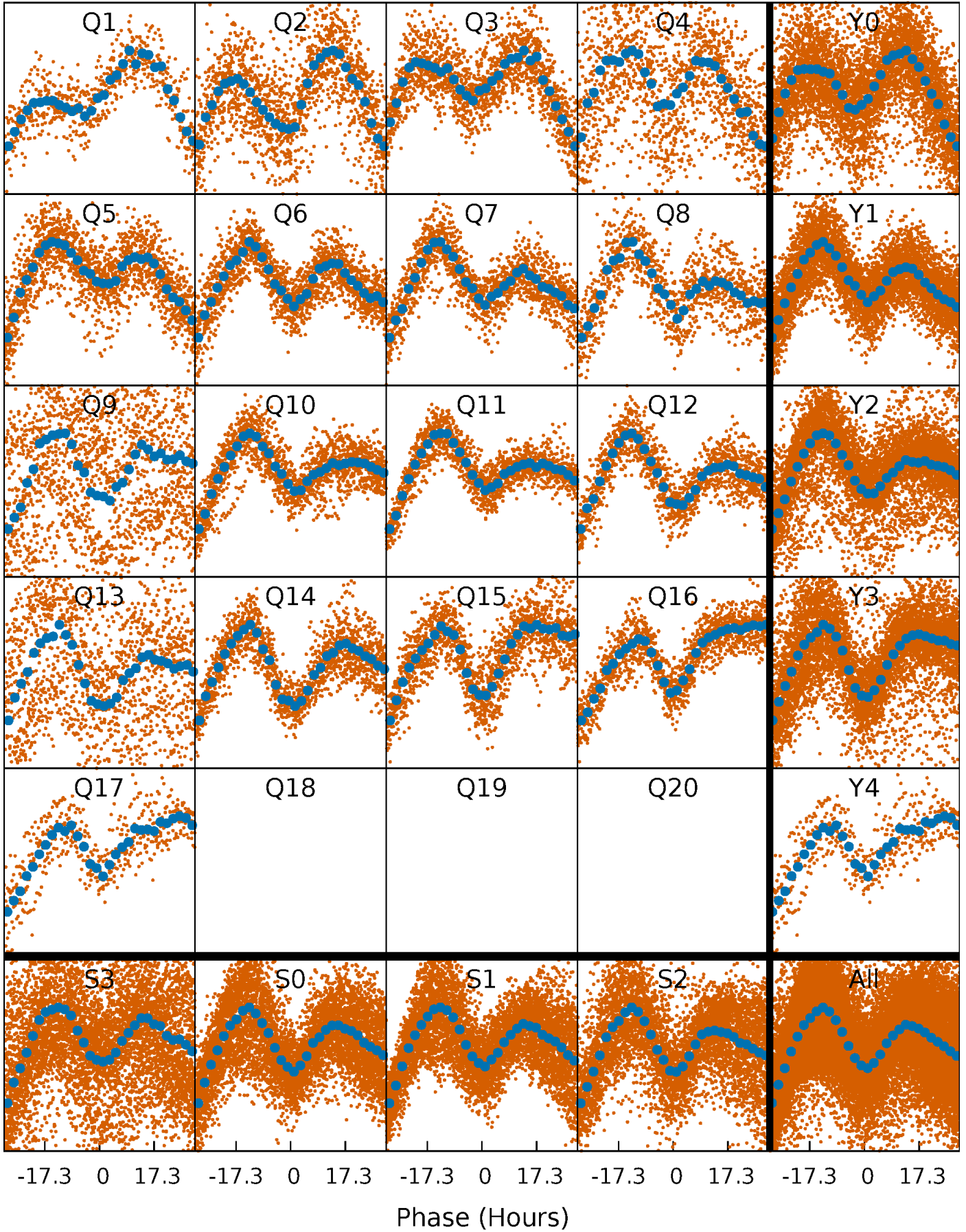


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

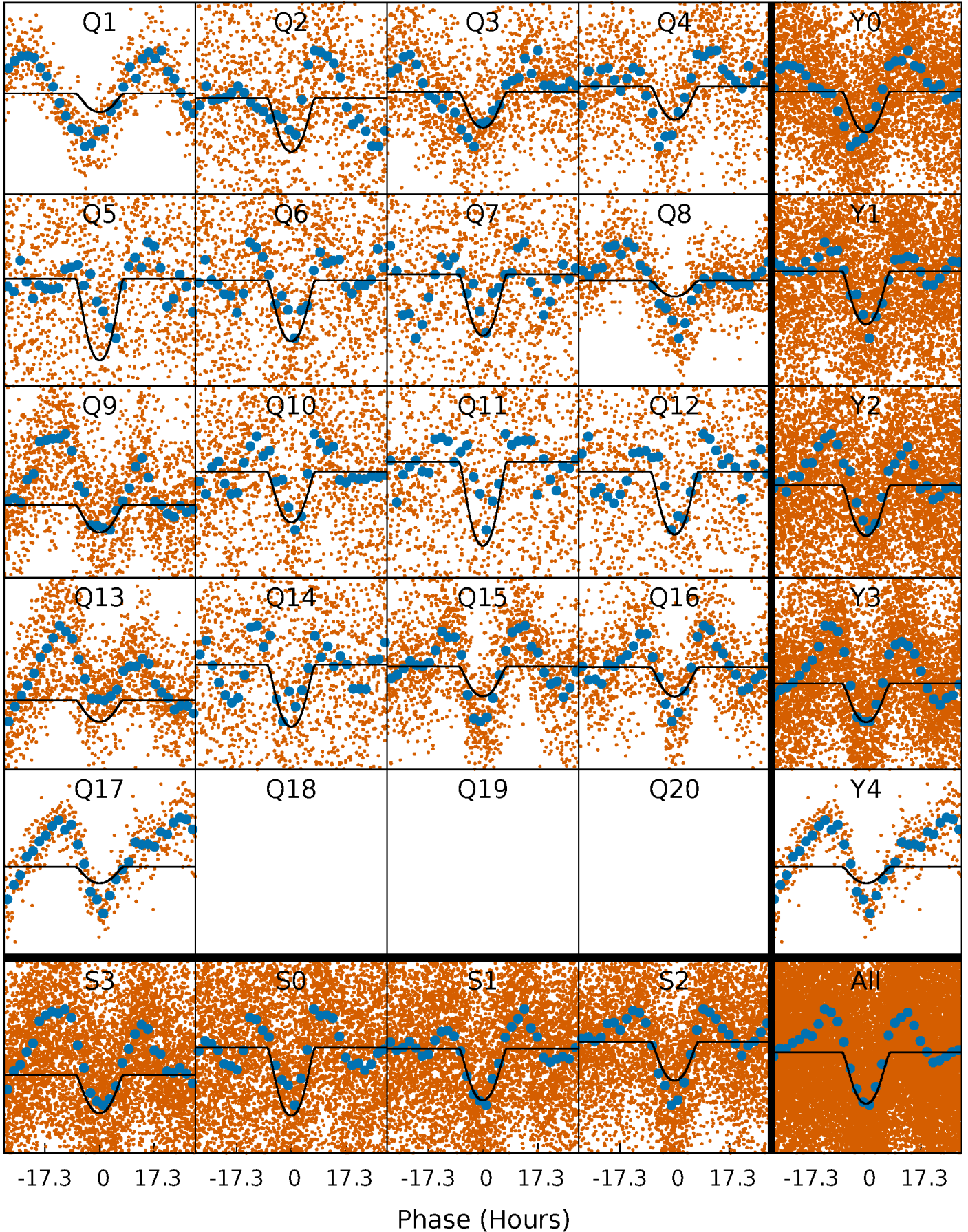
TCE 010333254-01 P= 6.722893 Days  $T_0=137.475942$  (BKJD)





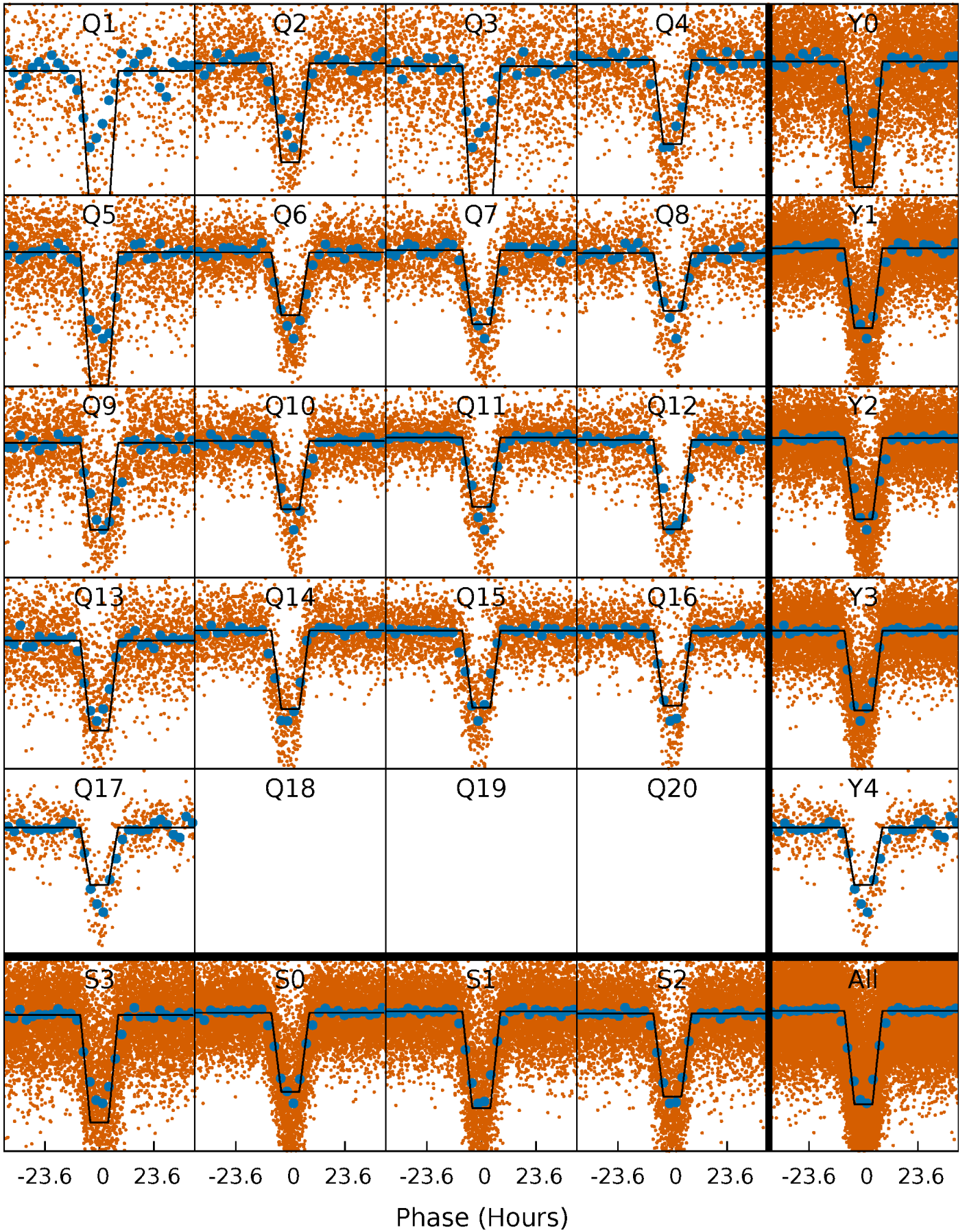
# DV Quarter-Phased Transit Curves

TCE 010333254-01 P= 6.722893 Days  $T_0=137.475942$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

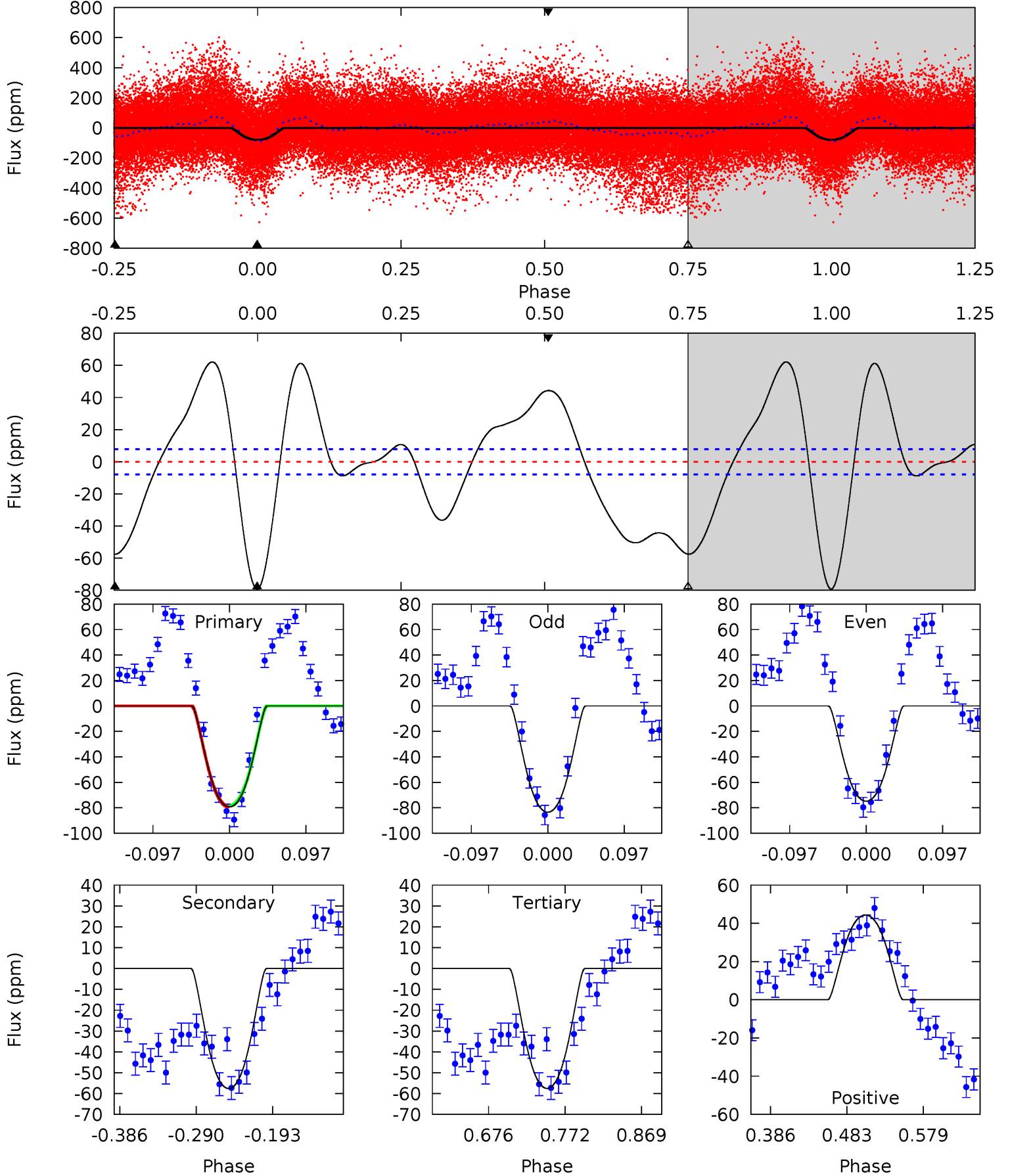
TCE 010333254-01 P= 6.722961 Days  $T_0=137.461725$  (BKJD)



# DV Model-Shift Uniqueness Test

010333254-01, P = 6.722893 Days, E = 130.753049 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
46.0	33.4	33.4	25.7	4.57	1.66	17.4	12.6	20.3	0.03	7.70	2.56	0.85	0.44	0.24

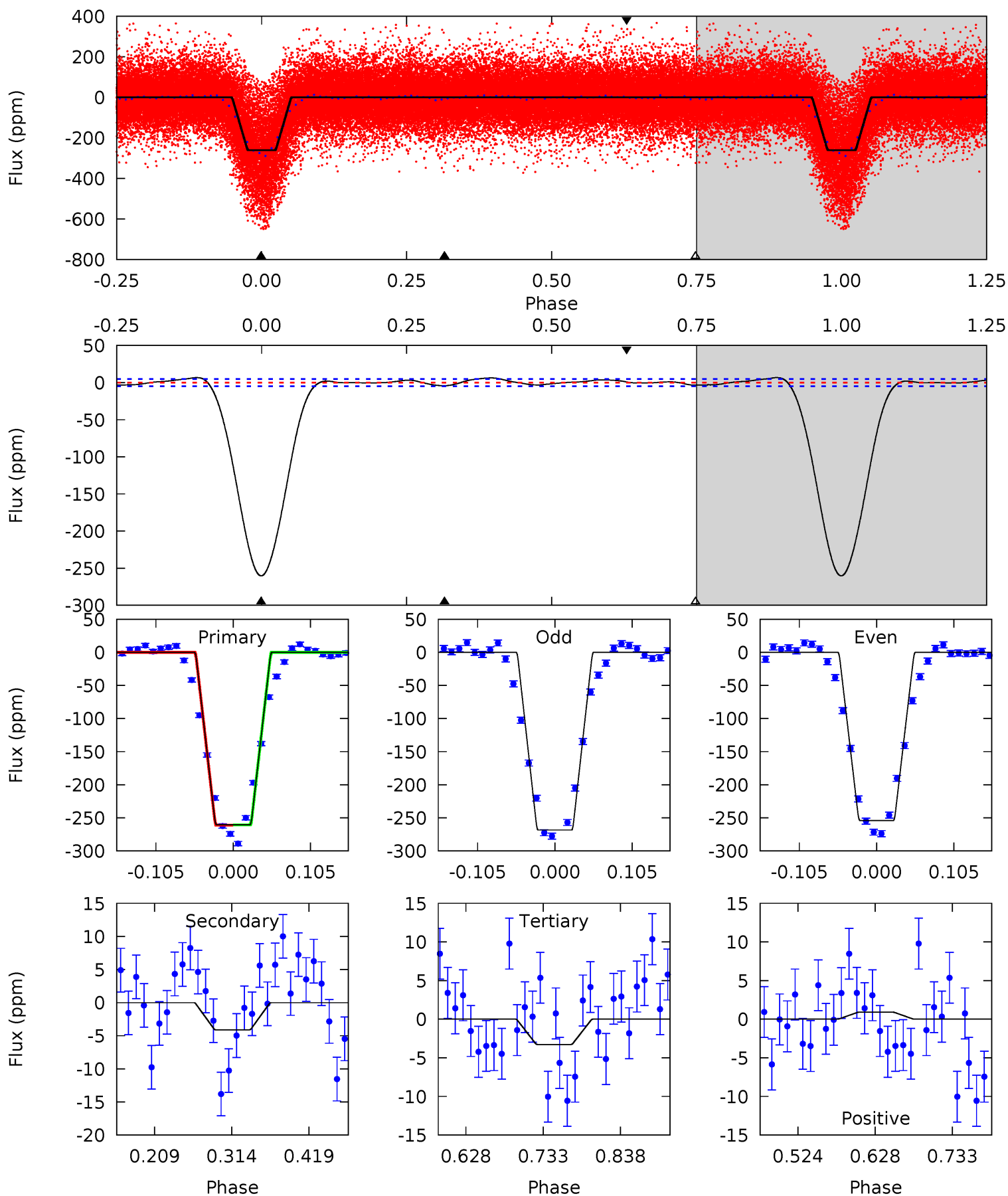




# Alt Model-Shift Uniqueness Test

010333254-01, P = 6.722961 Days, E = 130.738764 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
247.0	3.90	3.11	0.86	4.56	1.62	2.15	243.9	246.1	0.79	3.04	6.84	0.96	0.03	0.31





### Stellar Parameters For KIC 010333254

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$\rho_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6714^{+168}_{-184}$	$3.821^{+0.285}_{-0.095}$	$-0.220^{+0.300}_{-0.250}$	$2.534^{+0.463}_{-0.927}$	$1.550^{+0.183}_{-0.340}$	$0.134^{+0.245}_{-0.041}$
	+3%/-3%	+7%/-2%	+136%/-114%	+18%/-37%	+12%/-22%	+183%/-31%
Source	PHO1	FLK73	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 010333254-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-58 \pm 2$	$3.25^{+0.70}_{-0.69}$	$2281^{+131}_{-186}$	$5259^{+456}_{-323}$	$19^{+11}_{-6}$
Alt.	$-4 \pm 1$	$4.40^{+0.82}_{-0.91}$	$2267^{+139}_{-182}$	$2776^{+222}_{-263}$	$0.743^{+0.463}_{-0.274}$

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

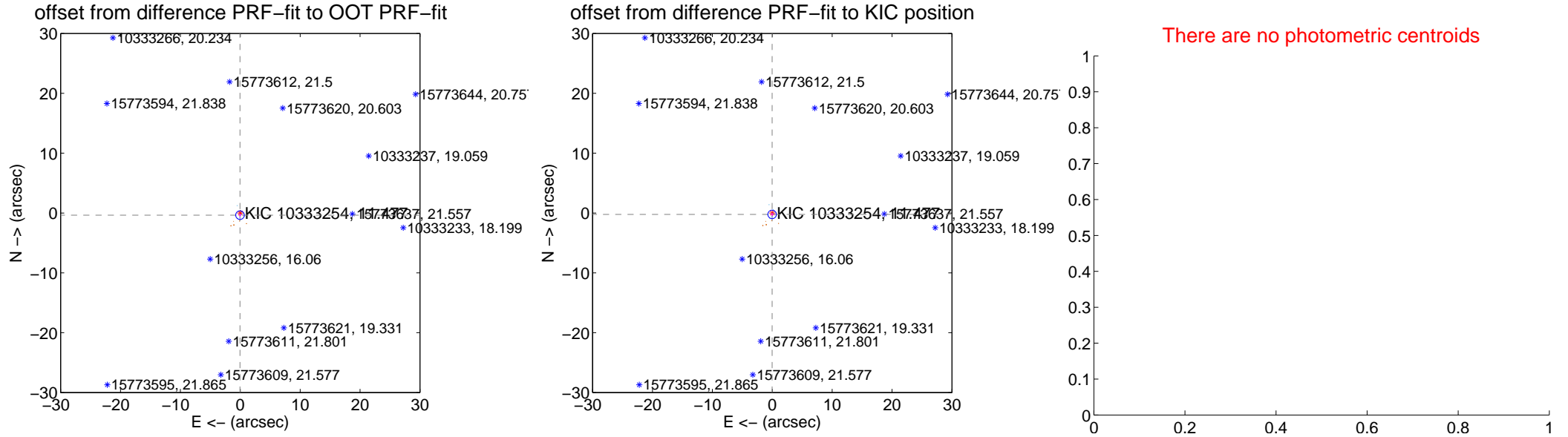
## DV Centroid Data

Supplemental centroid analysis for 010333254-01. **Kepler magnitude: 11.48.** Transit SNR 14.90

There are 11 quarters with good PRF difference image offsets

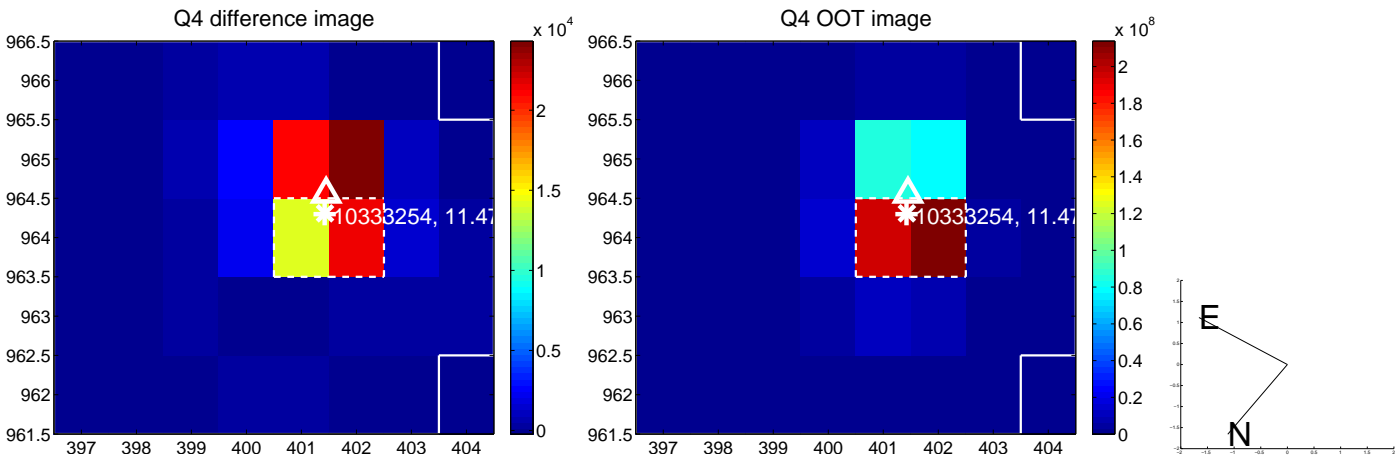
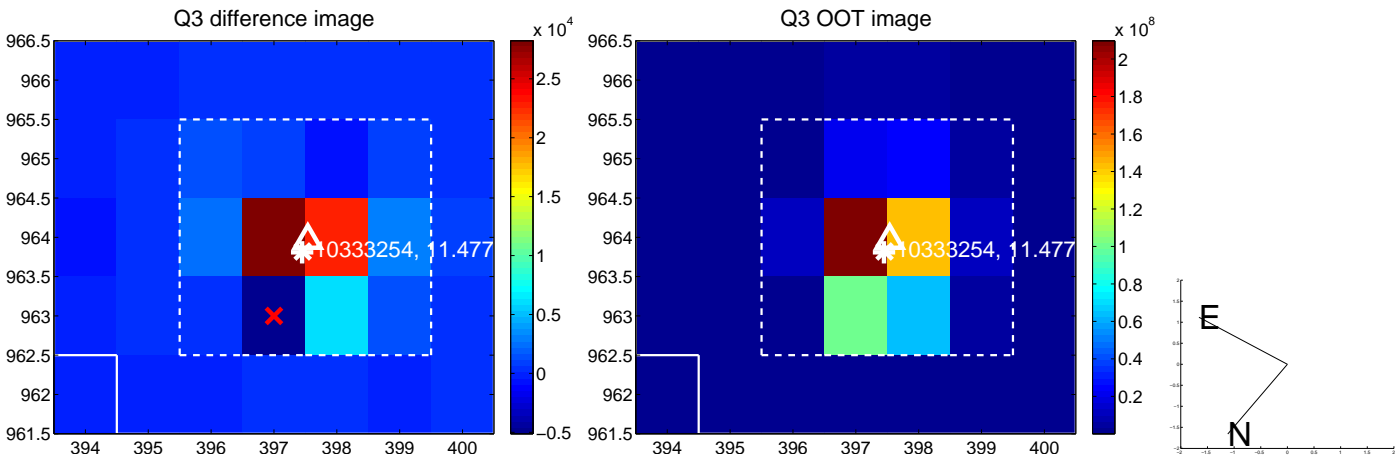
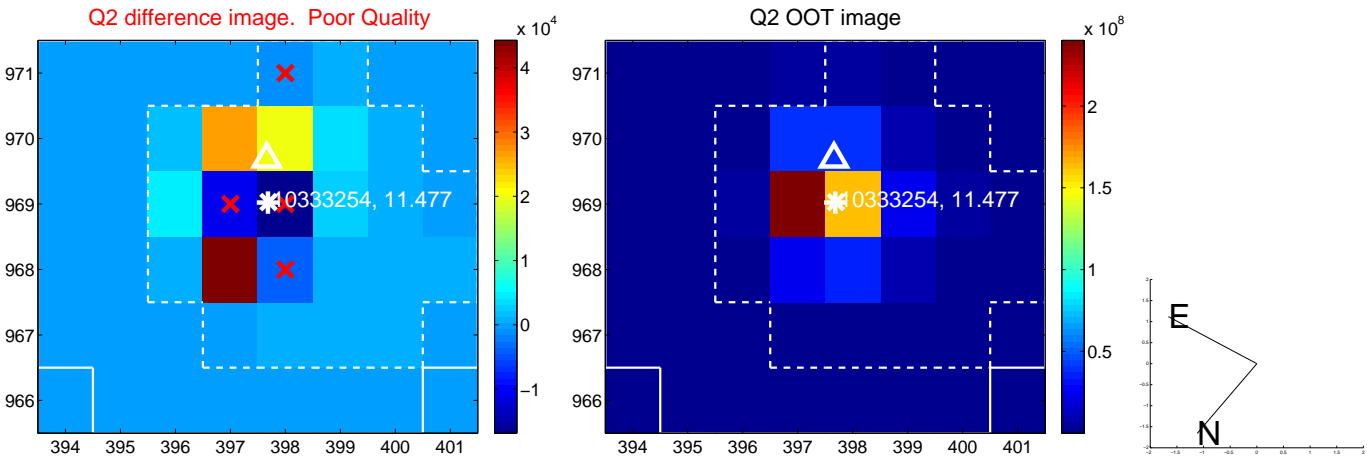
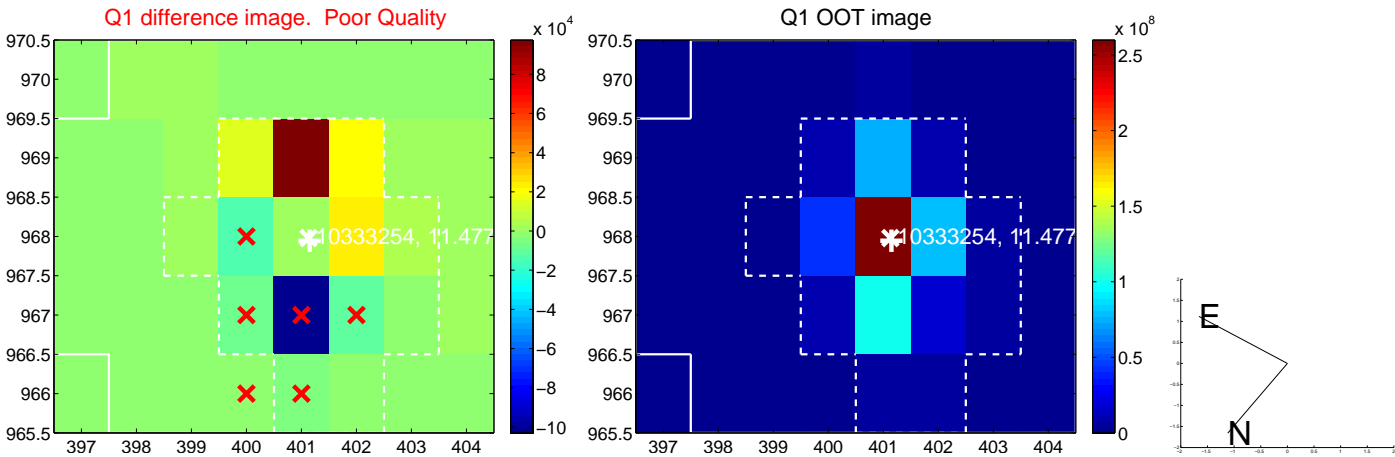
The direct PRF centroid is offset from the target star catalog position by about 0.03 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.358 \pm 0.239$	1.50	$0.049 \pm 0.187$	$-0.355 \pm 0.233$
PRF-fit source offset from KIC position	$0.233 \pm 0.237$	0.98	$0.022 \pm 0.188$	$-0.231 \pm 0.233$
photometric centroid source offset	—	—	—	—

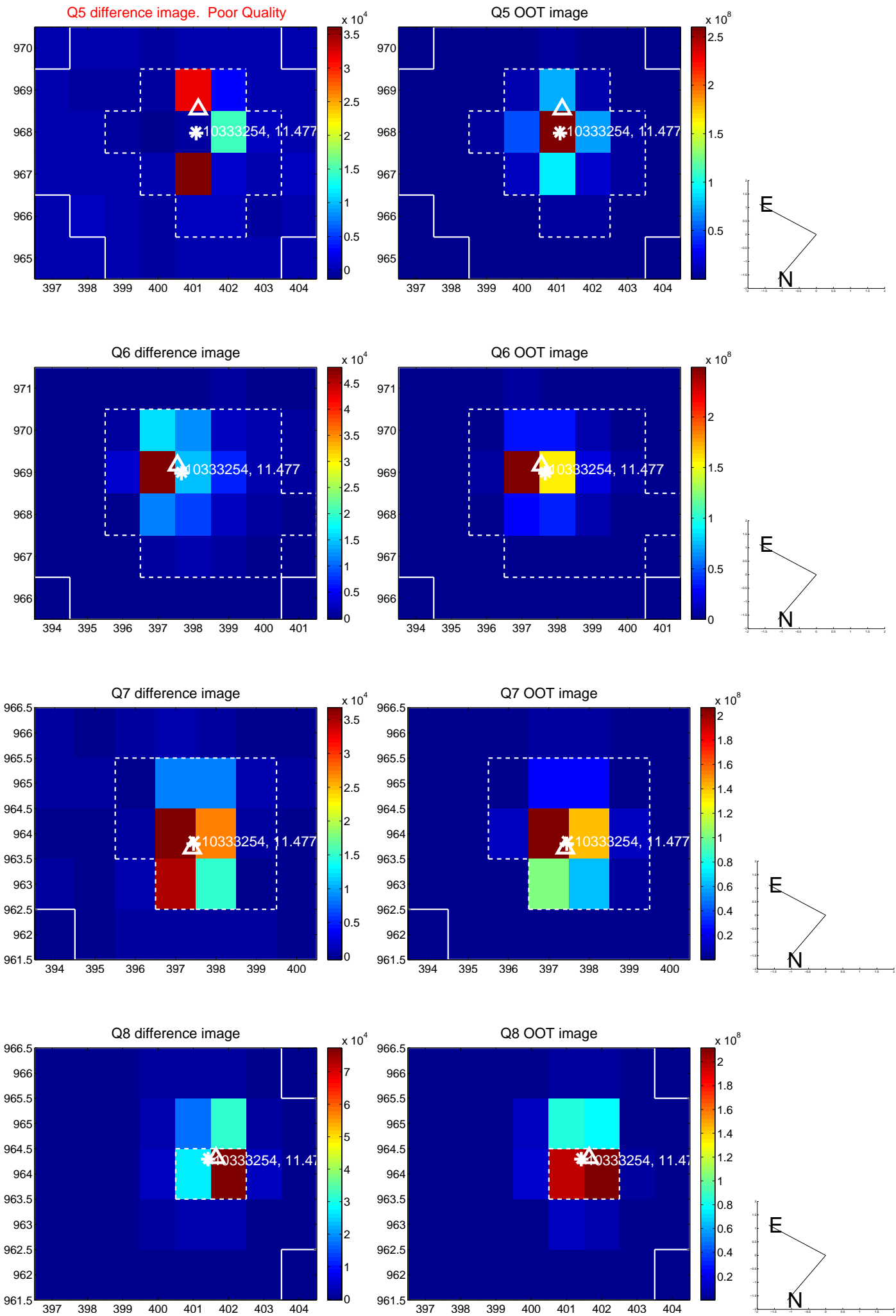


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

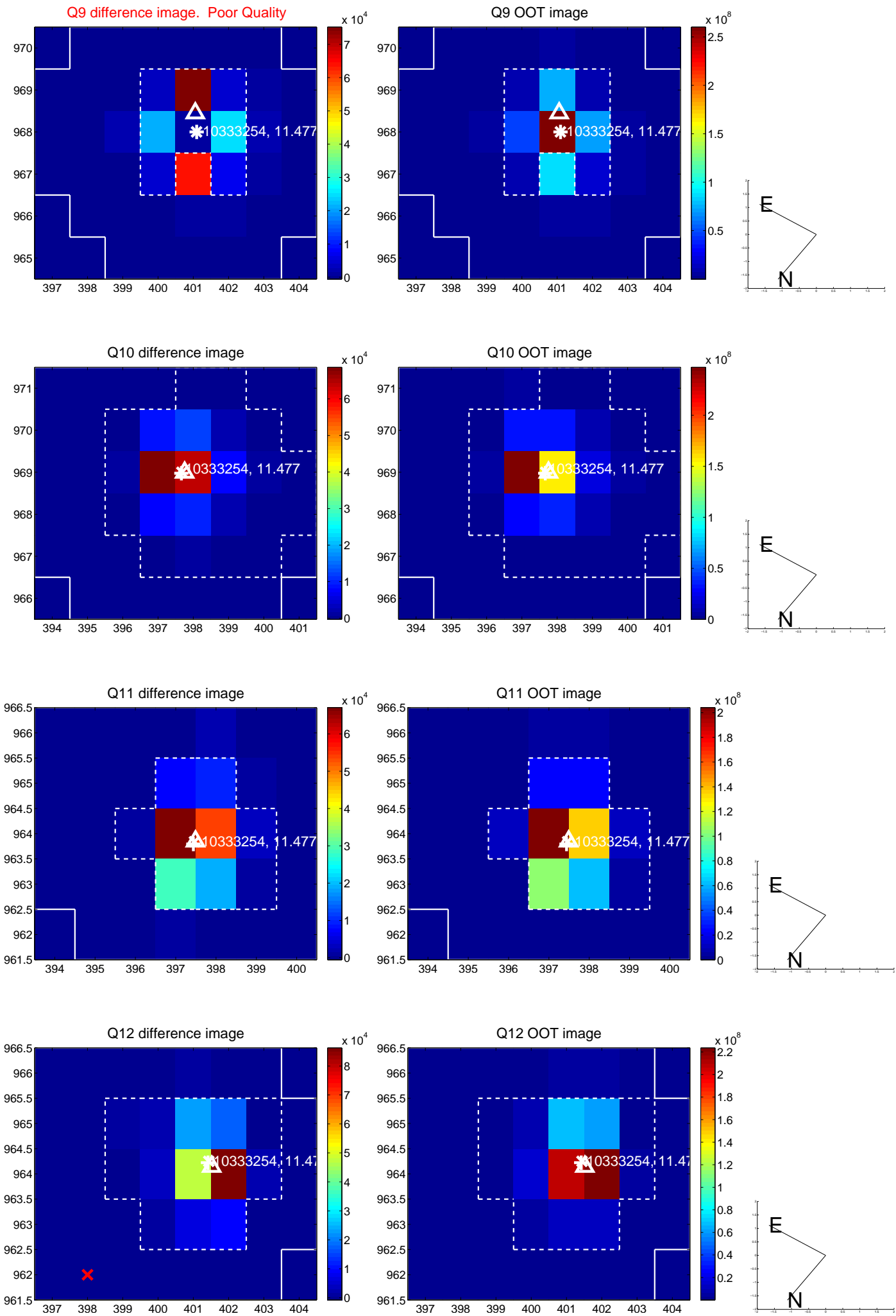


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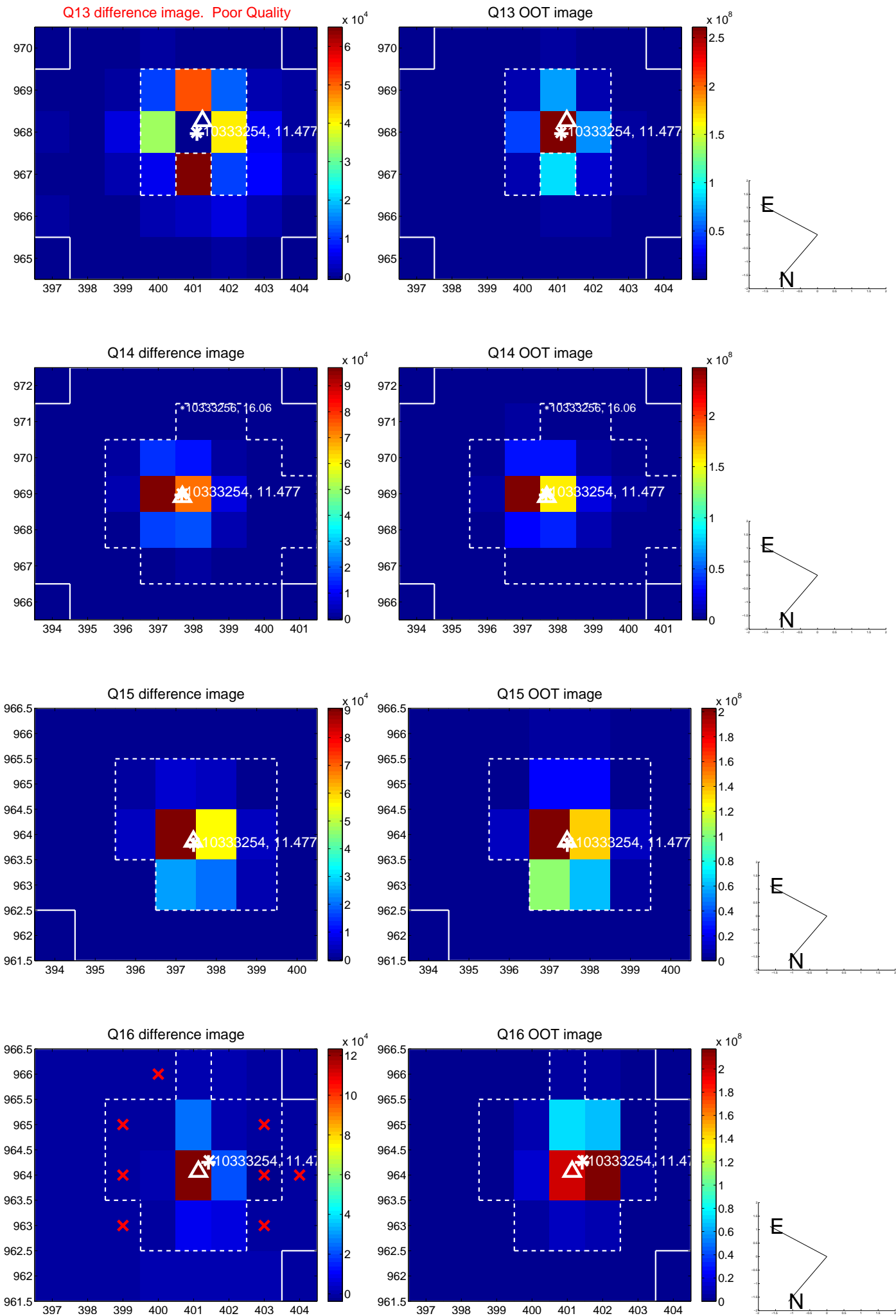




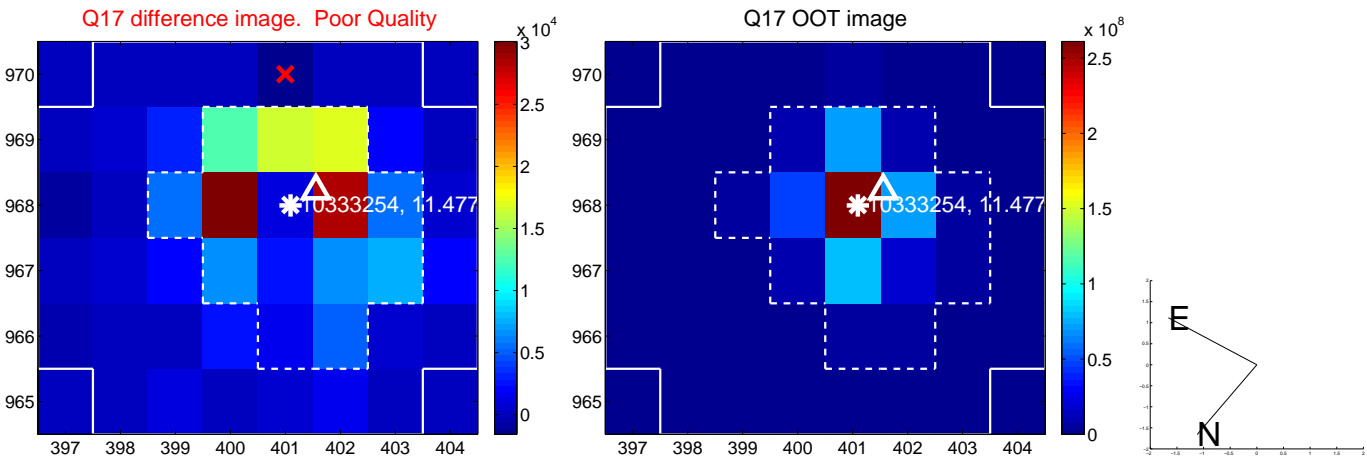
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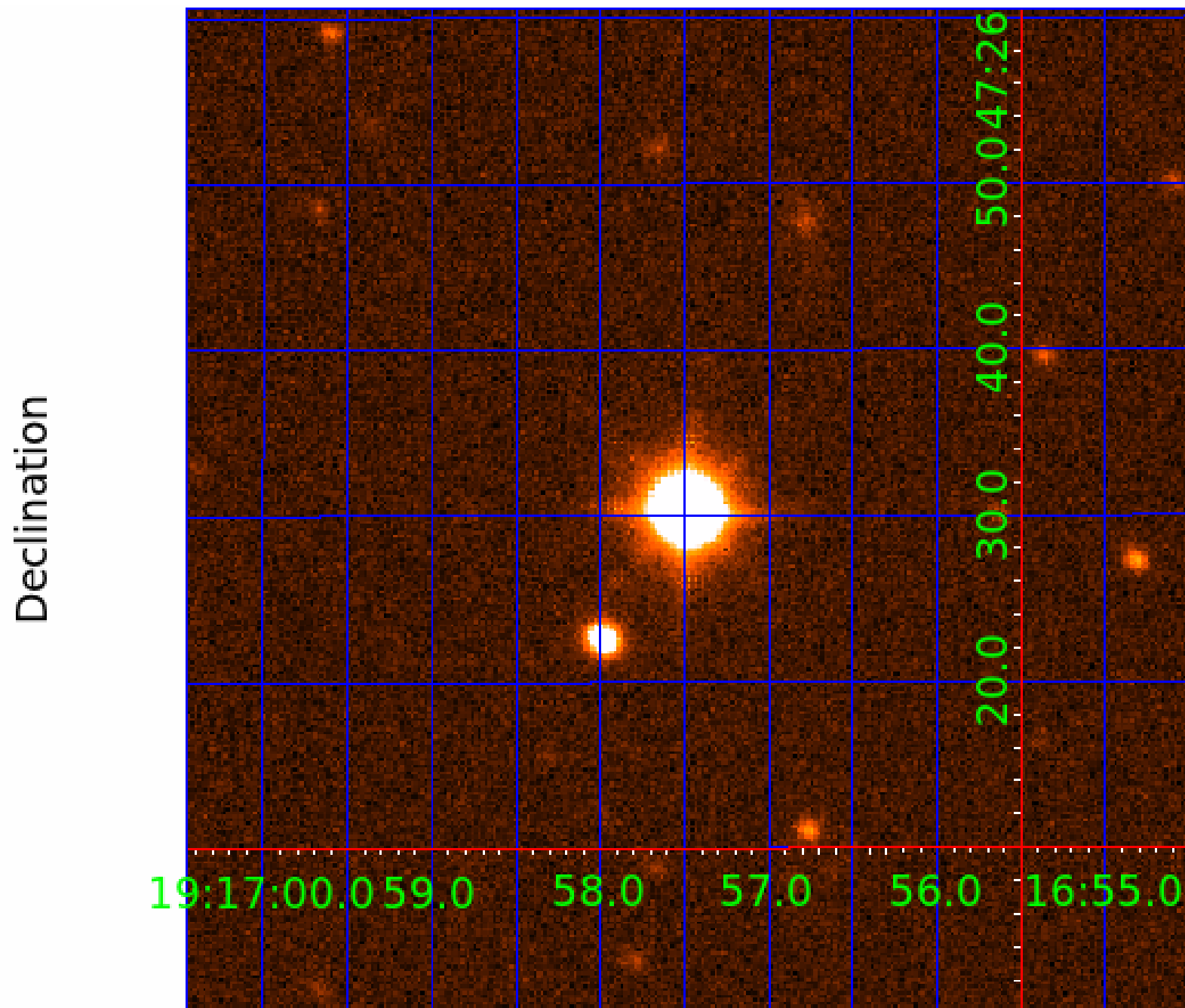


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



folded centroid time series figure for this object.

UKIRT Image





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TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
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010333254-08	OBS	No	141.378804	194.828778	127.9	5.405	7.3	8.0	2.53	6714	3.43	30.92
010333254-09	OBS	No	363.741743	457.410736	271.3	10.246	8.7	8.3	2.53	6714	5.37	8.77

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010333254-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—SAME_NTL_PERIOD—CENT_SATURATED
010333254-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
010333254-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—CENT_SATURATED
010333254-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-07	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

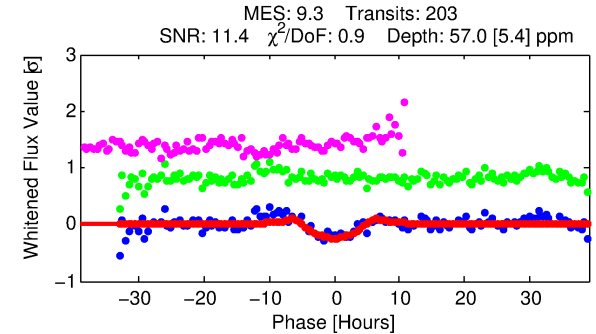
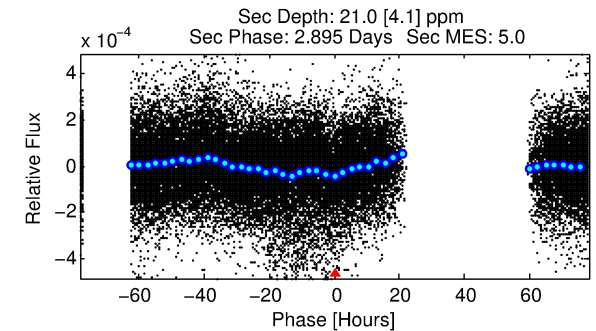
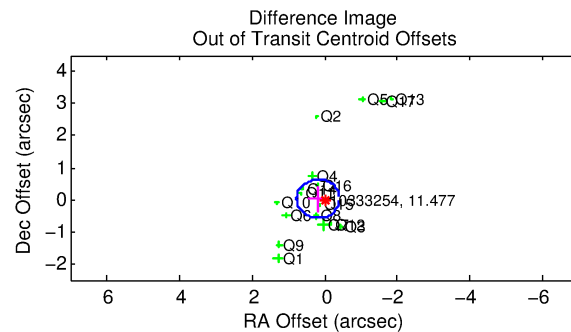
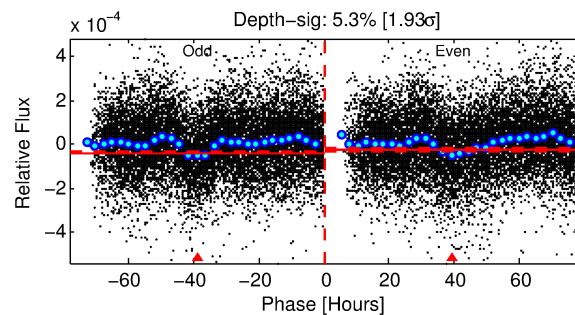
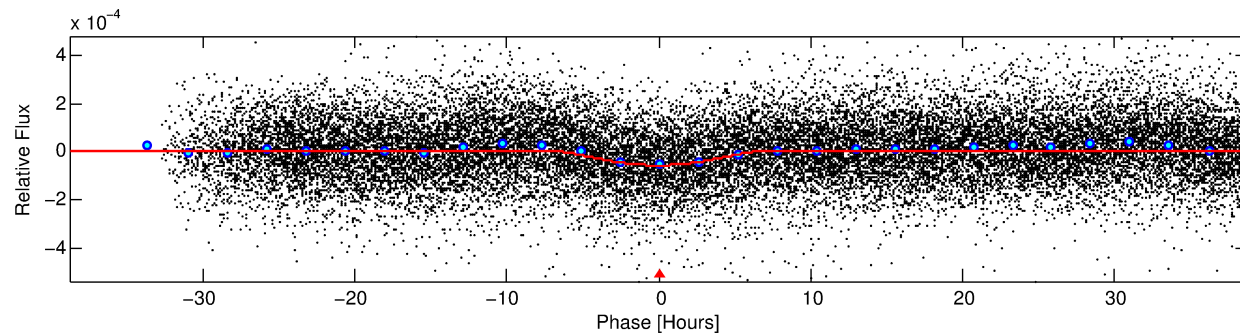
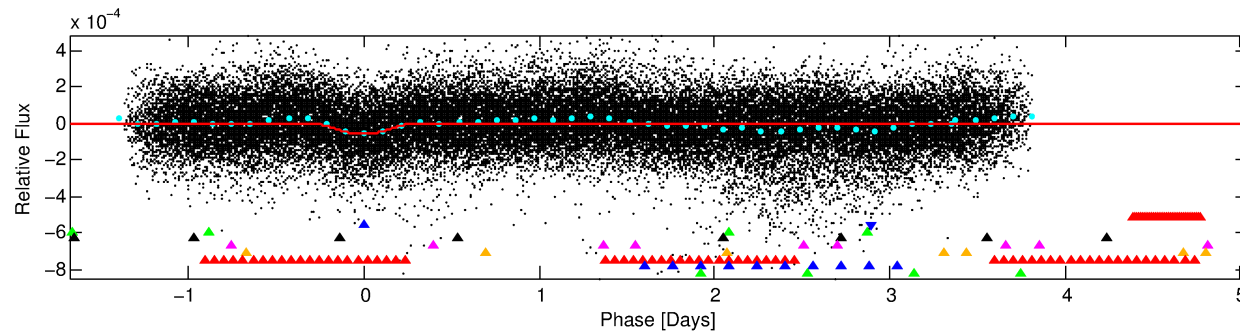
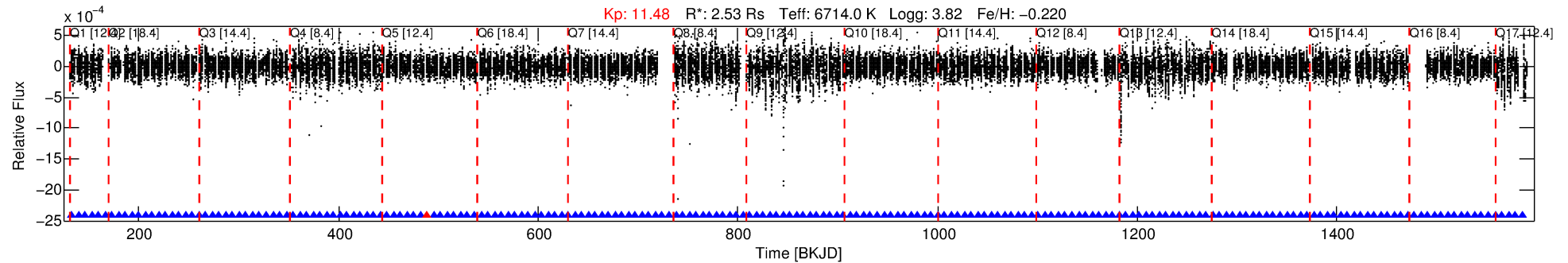
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 010333254-02

No Significant Match Found

# DV One-Page Summary

KIC: 10333254 Candidate: 2 of 9 Period: 6.725 d



## DV Fit Results:

Period = 6.72466 [0.00015] d  
Epoch = 132.7099 [0.0189] BKJD  
 $R_p/R^* = 0.0138$  [0.0187]  
 $a/R^* = 1.21$  [0.12]  
 $b = 1.00$  [0.03]  
 $S_{\text{eff}} = 1793.90$  [919.79]  
 $T_{\text{eq}} = 1659$  [213] K  
 $R_p = 3.83$  [5.35]  $R_e$   
 $a = 0.0807$  [0.0264] AU  
 $A_g = 5.13$  [14.11] [0.29 $\sigma$ ]  
 $T_{\text{eff}} = 3861$  [2613] K [0.84 $\sigma$ ]

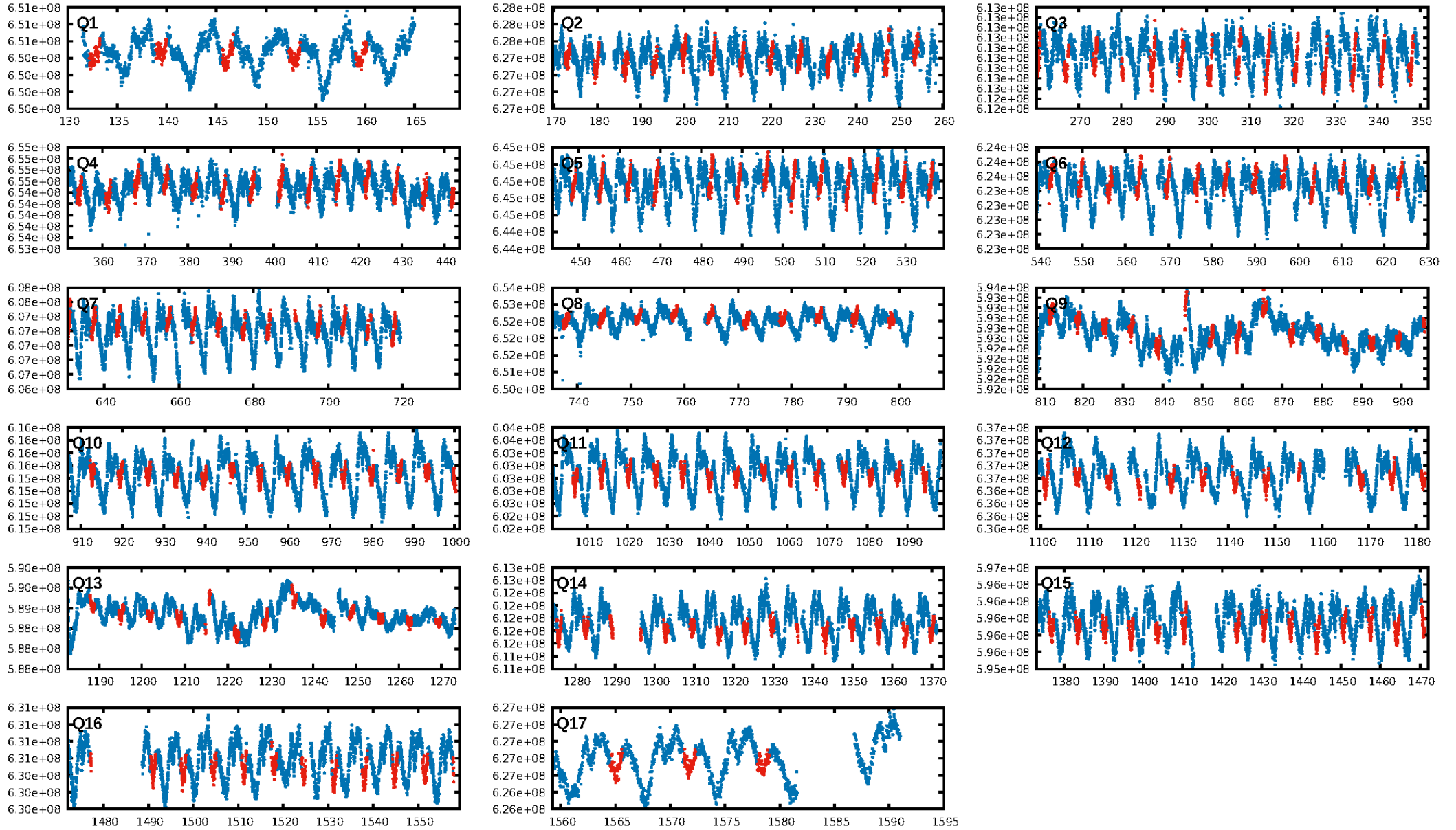
## DV Diagnostic Results:

ShortPeriod-sig: 0.2% [0.00 $\sigma$ ]  
LongPeriod-sig: 100.0% [26.42 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.44e-11  
RollingBand-fgt: 0.99 [194/195]  
GhostDiagnostic-chr: 1.569  
Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 0.181 arcsec [0.92 $\sigma$ ]  
KicOffset-rm: 0.265 arcsec [1.08 $\sigma$ ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.88 [15/17]  
DiffImageOverlap-fno: 1.00 [17/17]

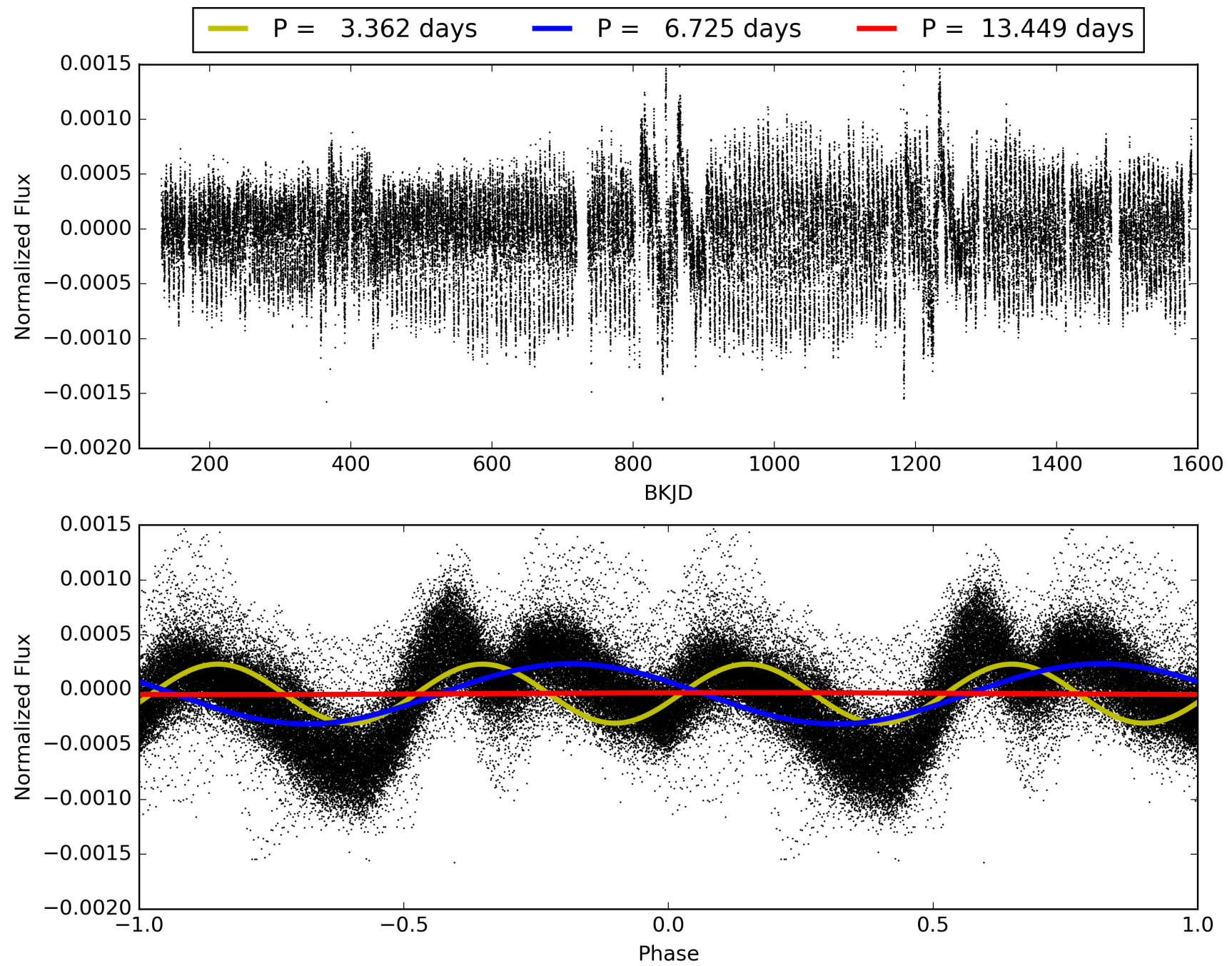
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 07:16:43 Z

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

# TCE 010333254-02, PDC Light Curves

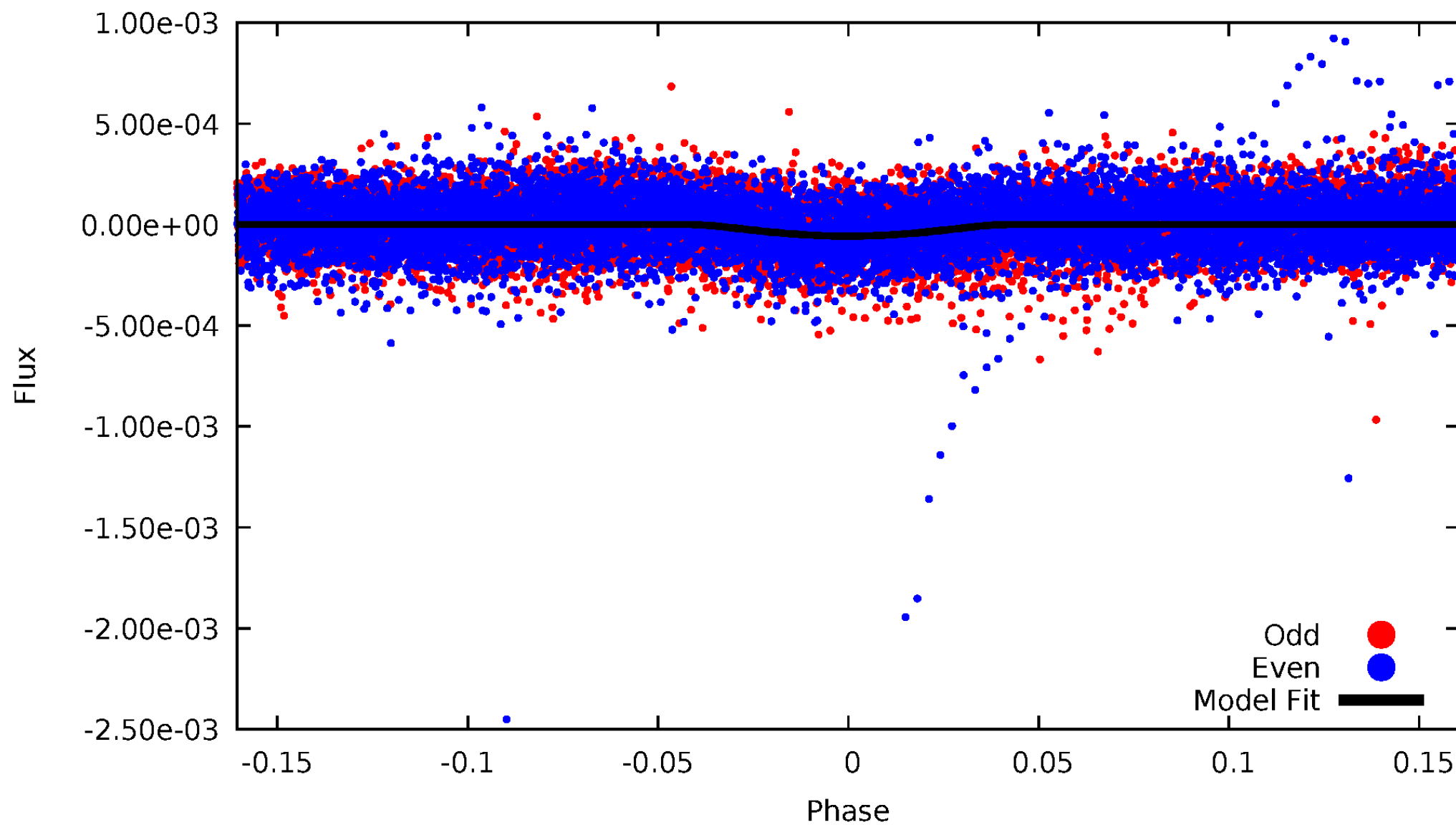


TCE 010333254-02



DV Odd/Even

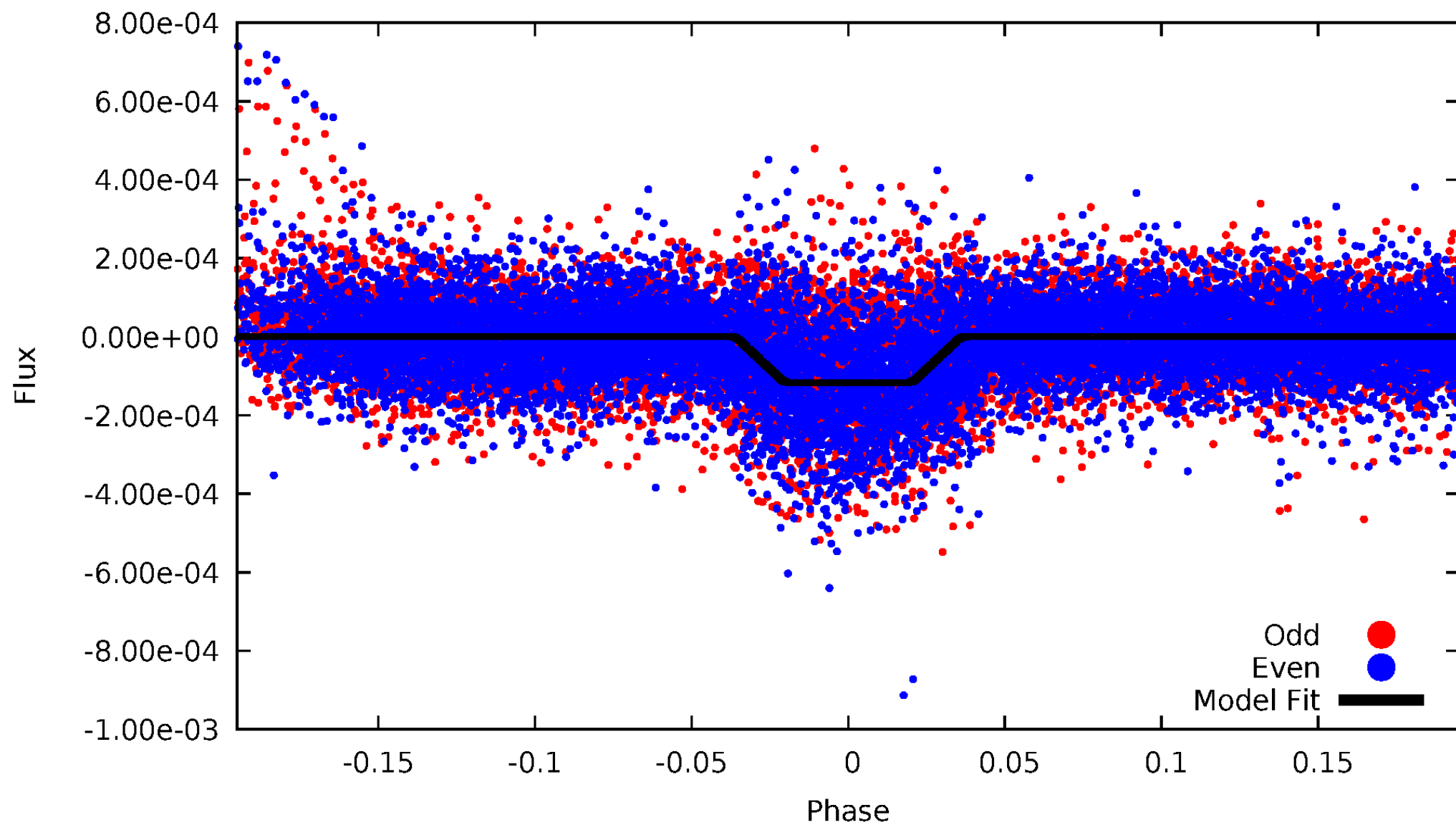
TCE 010333254-02





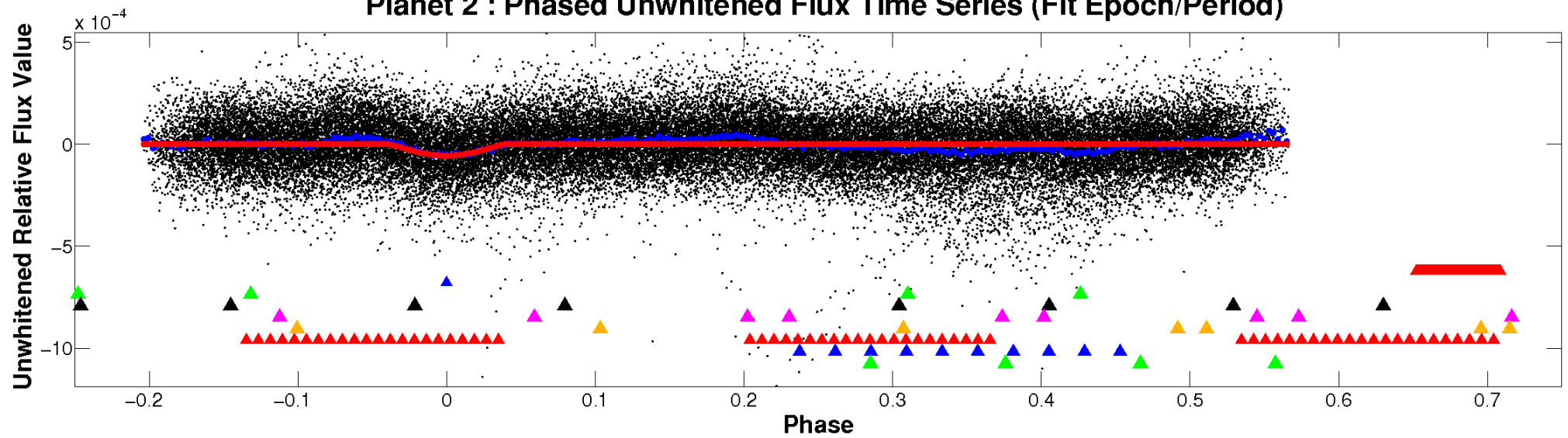
# ALT Odd/Even

TCE 010333254-02

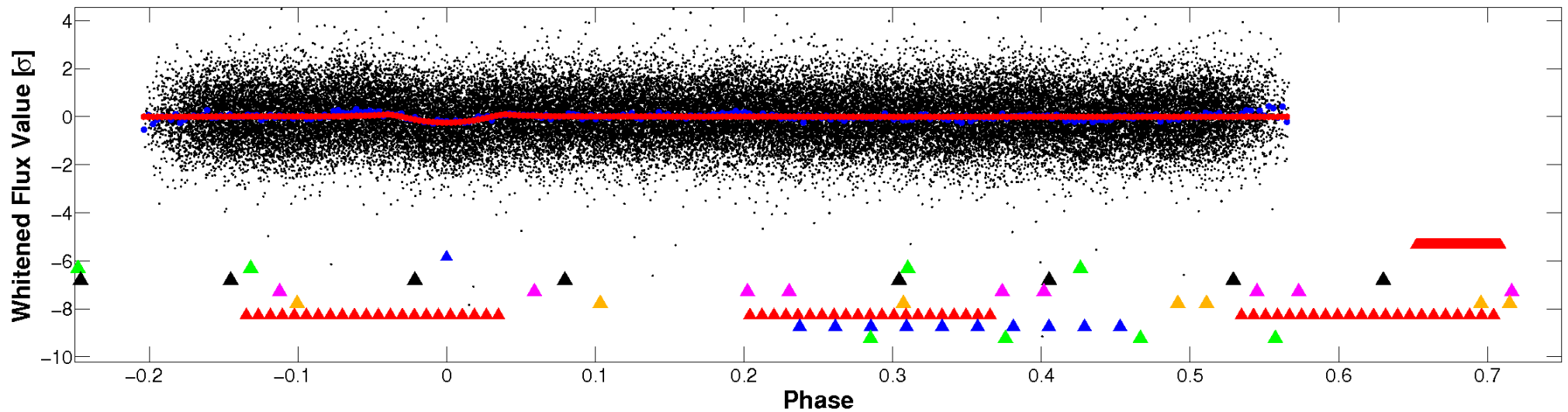


# Non-Whitened Vs. Whitened Light Curve

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



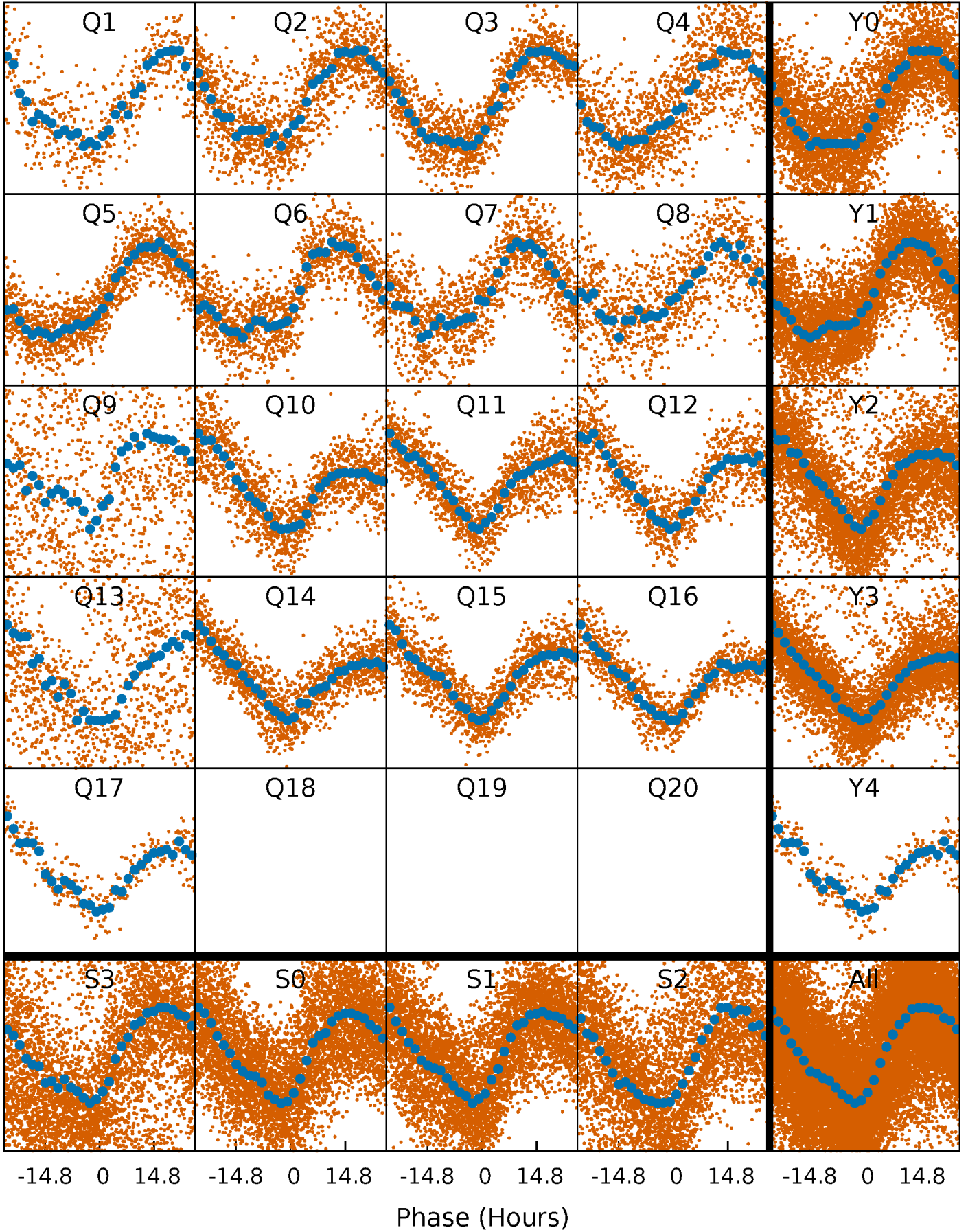
## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)





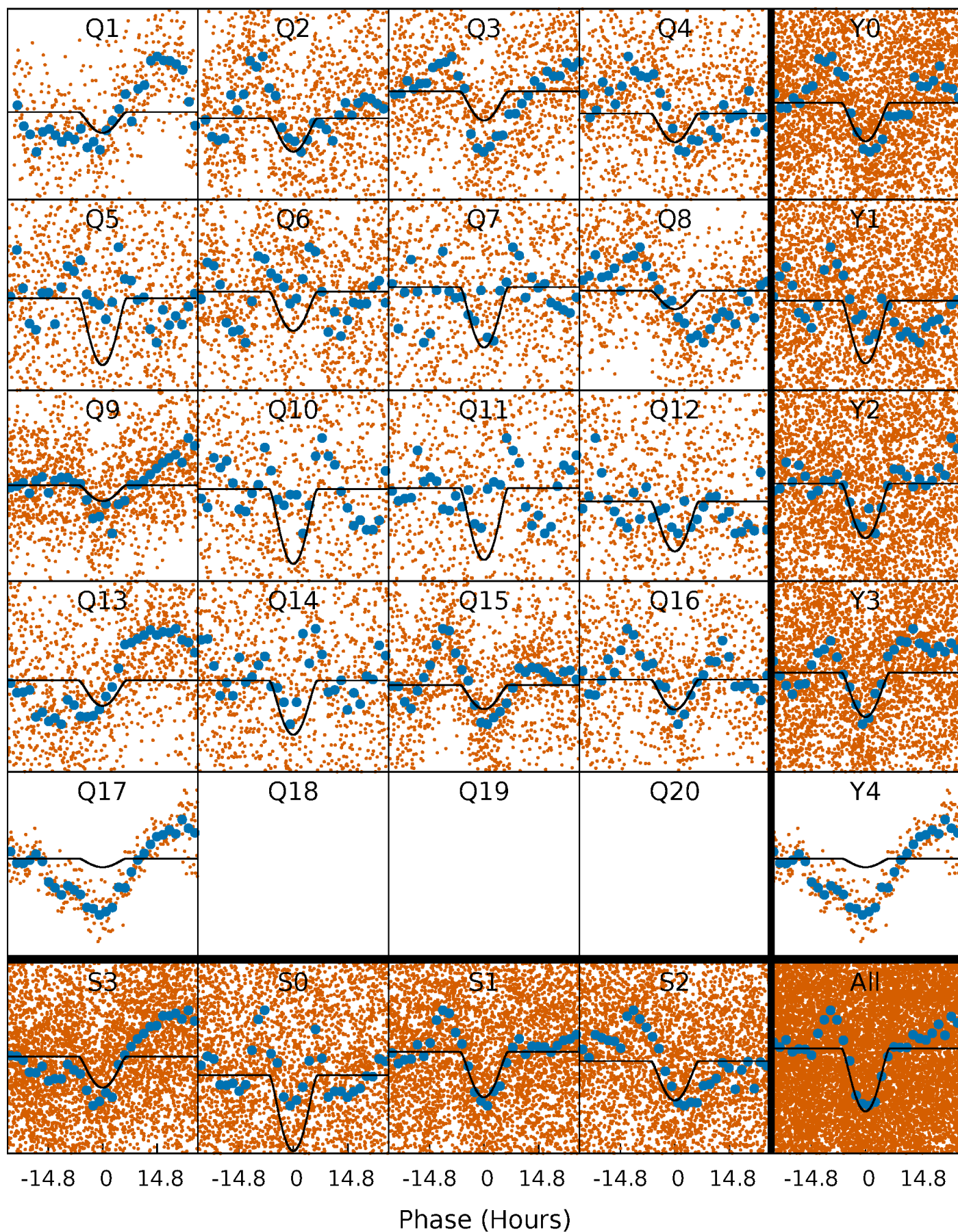
# PDC Quarter-Phased Transit Curves

TCE 010333254-02   P= 6.724655 Days    $T_0=132.709949$  (BKJD)



# DV Quarter-Phased Transit Curves

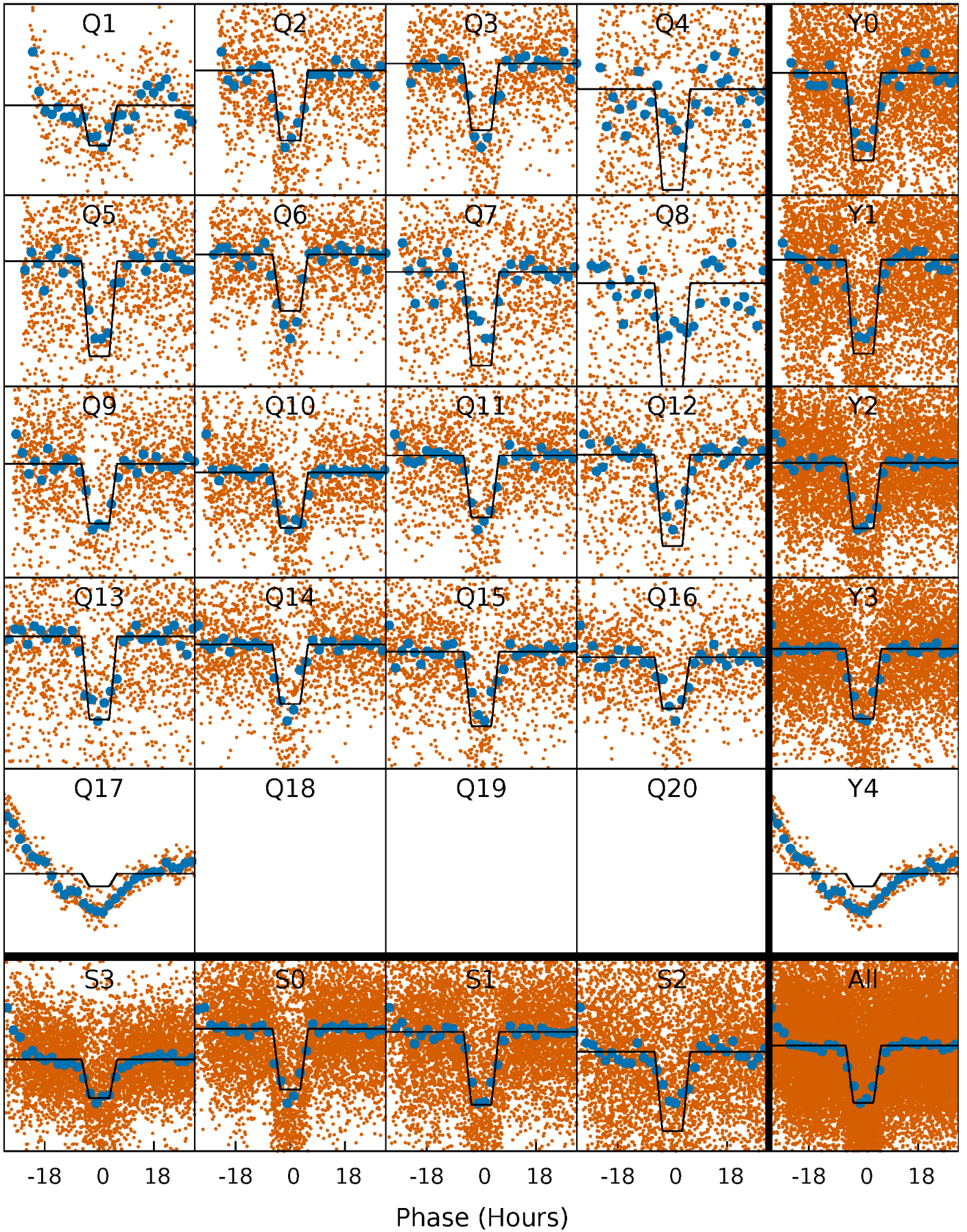
TCE 010333254-02 P= 6.724655 Days  $T_0=132.709949$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

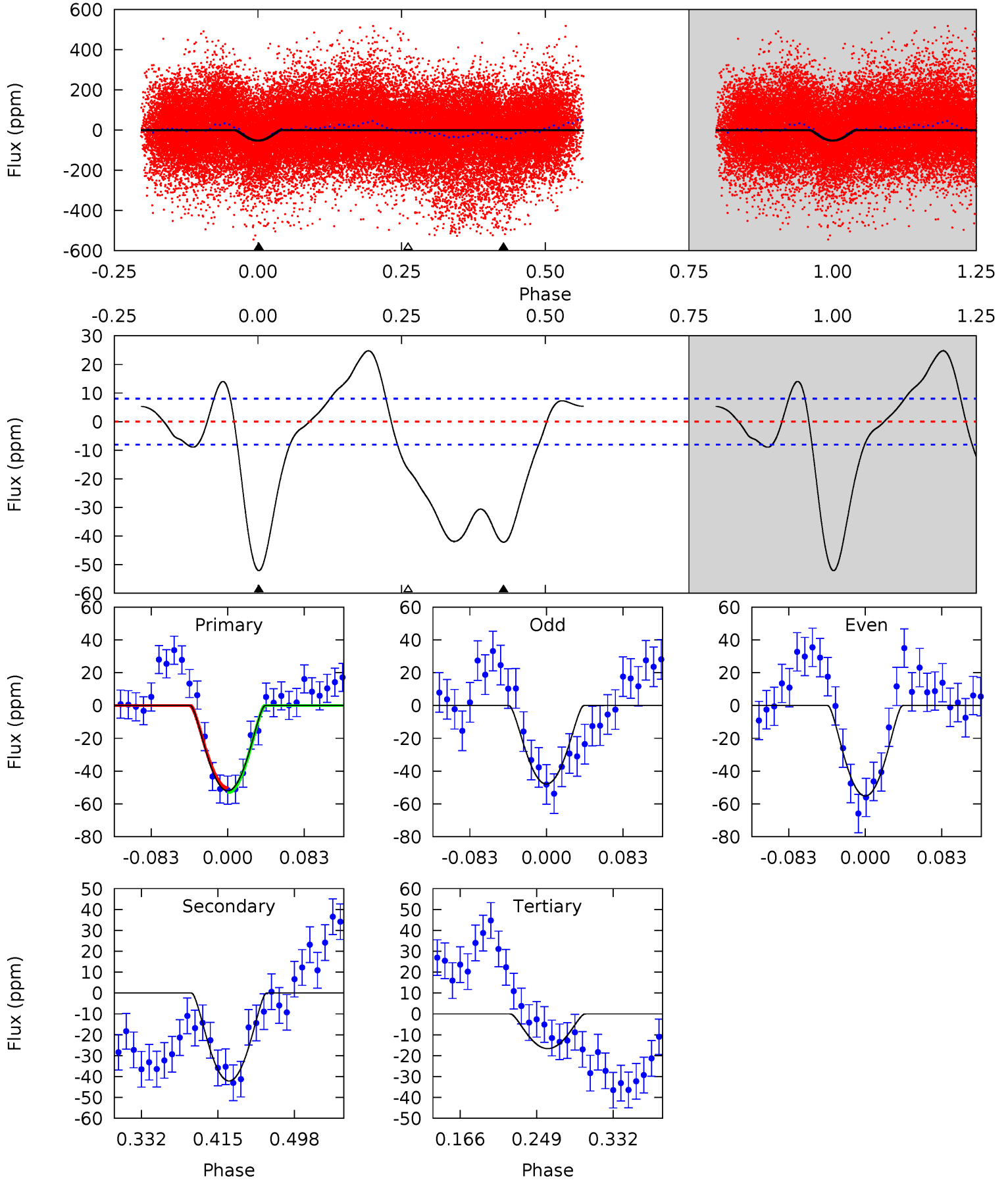
TCE 010333254-02 P= 6.724901 Days  $T_0=132.666386$  (BKJD)



# DV Model-Shift Uniqueness Test

010333254-02, P = 6.724655 Days, E = 125.985294 Days

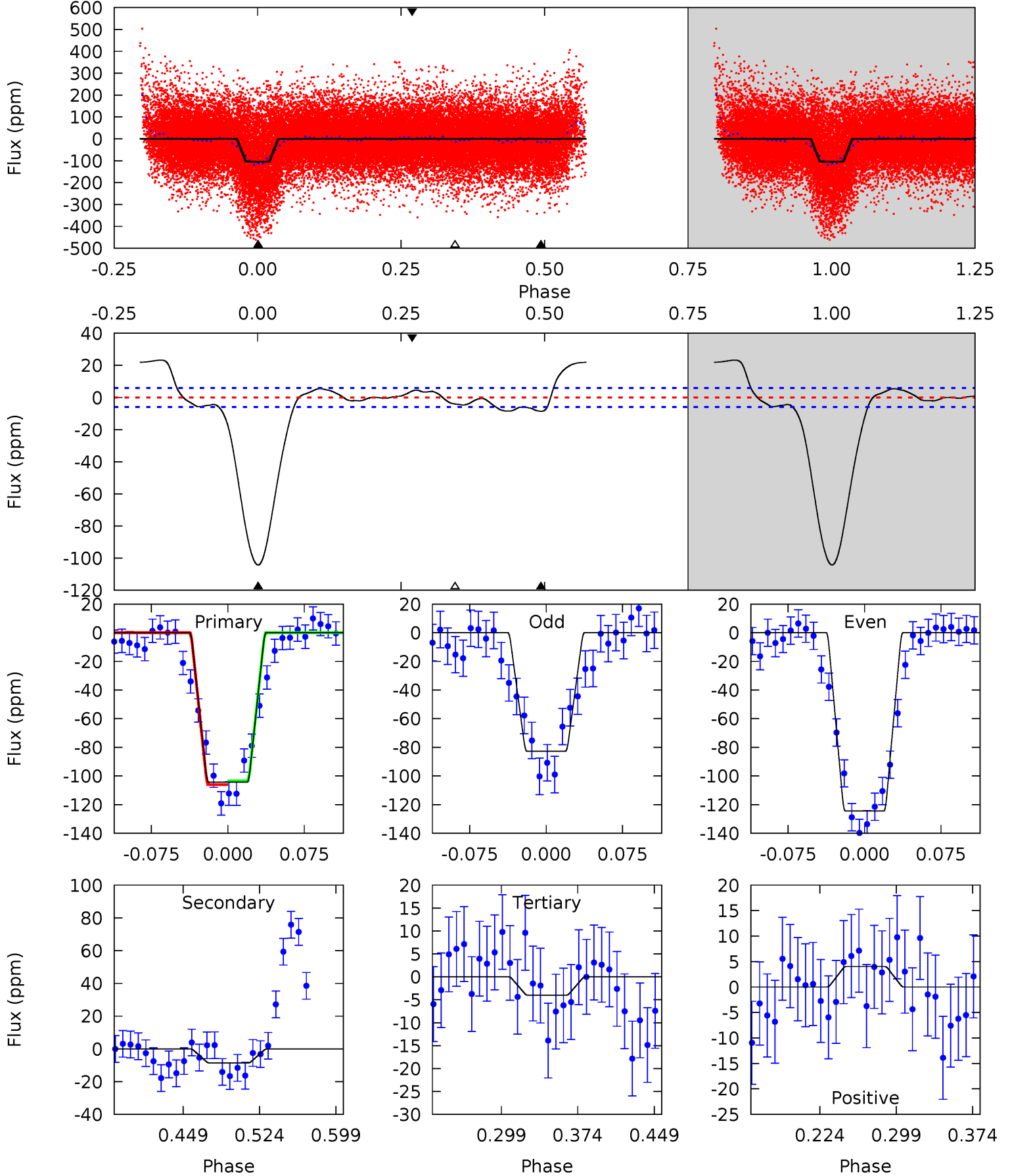
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
29.9	24.2	9.54	0	4.60	1.73	9.98	20.3	29.9	14.6	24.2	2.13	1.60	0.32	0.77



# Alt Model-Shift Uniqueness Test

010333254-02, P = 6.724901 Days, E = 125.941485 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
82.1	6.78	3.15	3.18	4.63	1.78	4.84	79.0	79.0	3.63	3.61	16.5	0.95	0.18	0.99



### Stellar Parameters For KIC 010333254

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$\rho_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6714^{+168}_{-184}$	$3.821^{+0.285}_{-0.095}$	$-0.220^{+0.300}_{-0.250}$	$2.534^{+0.463}_{-0.927}$	$1.550^{+0.183}_{-0.340}$	$0.134^{+0.245}_{-0.041}$
	+3%/-3%	+7%/-2%	+136%/-114%	+18%/-37%	+12%/-22%	+183%/-31%
Source	PHO1	FLK73	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 010333254-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-42 \pm 2$	$4.87^{+4.52}_{-3.41}$	$2275^{+139}_{-200}$	$4122^{+3014}_{-817}$	$6.527^{+63.375}_{-4.807}$
Alt.	$-9 \pm 1$	$4.41^{+4.21}_{-3.05}$	$2280^{+144}_{-206}$	$3212^{+1784}_{-864}$	$1.576^{+14.398}_{-1.169}$

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



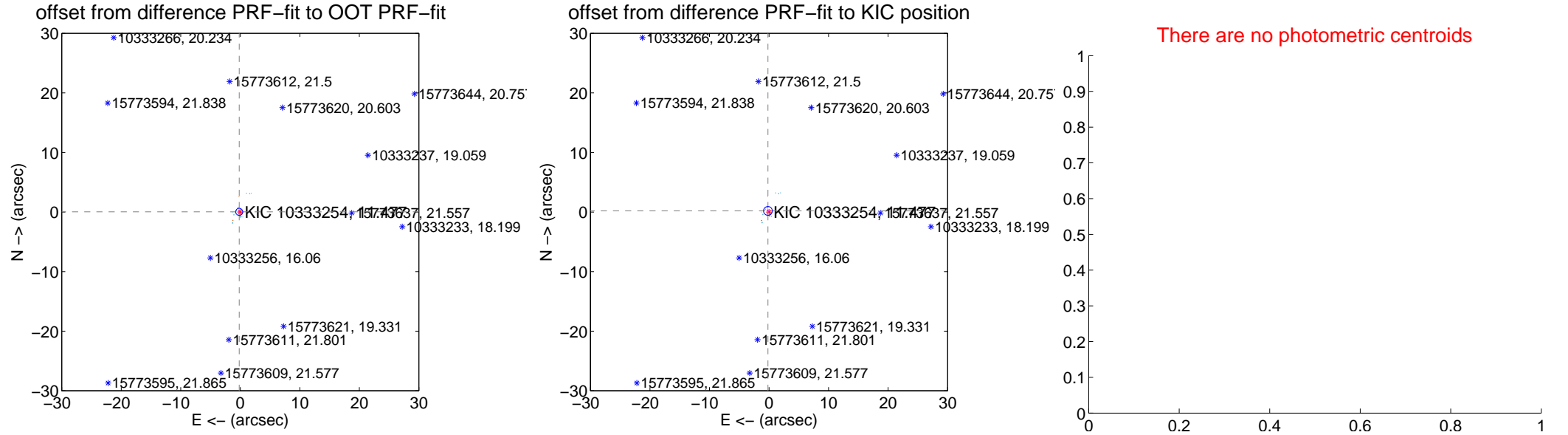
## DV Centroid Data

Supplemental centroid analysis for 010333254-02. **Kepler magnitude: 11.48.** Transit SNR 11.36

There are 15 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.03 arcsec

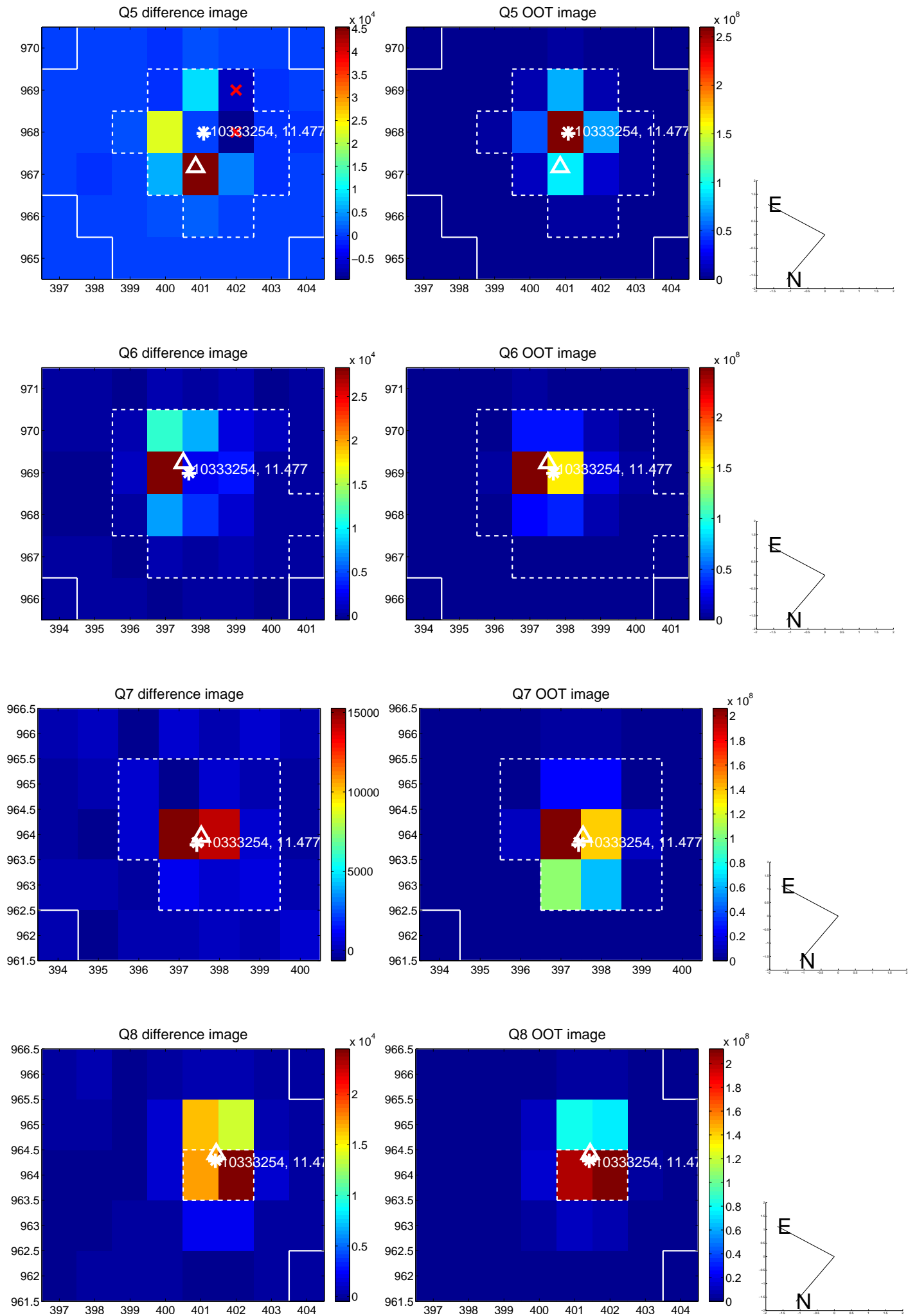
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.181 \pm 0.198$	0.92	$0.179 \pm 0.238$	$0.030 \pm 0.372$
PRF-fit source offset from KIC position	$0.265 \pm 0.246$	1.08	$0.182 \pm 0.193$	$0.192 \pm 0.285$
photometric centroid source offset	—	—	—	—



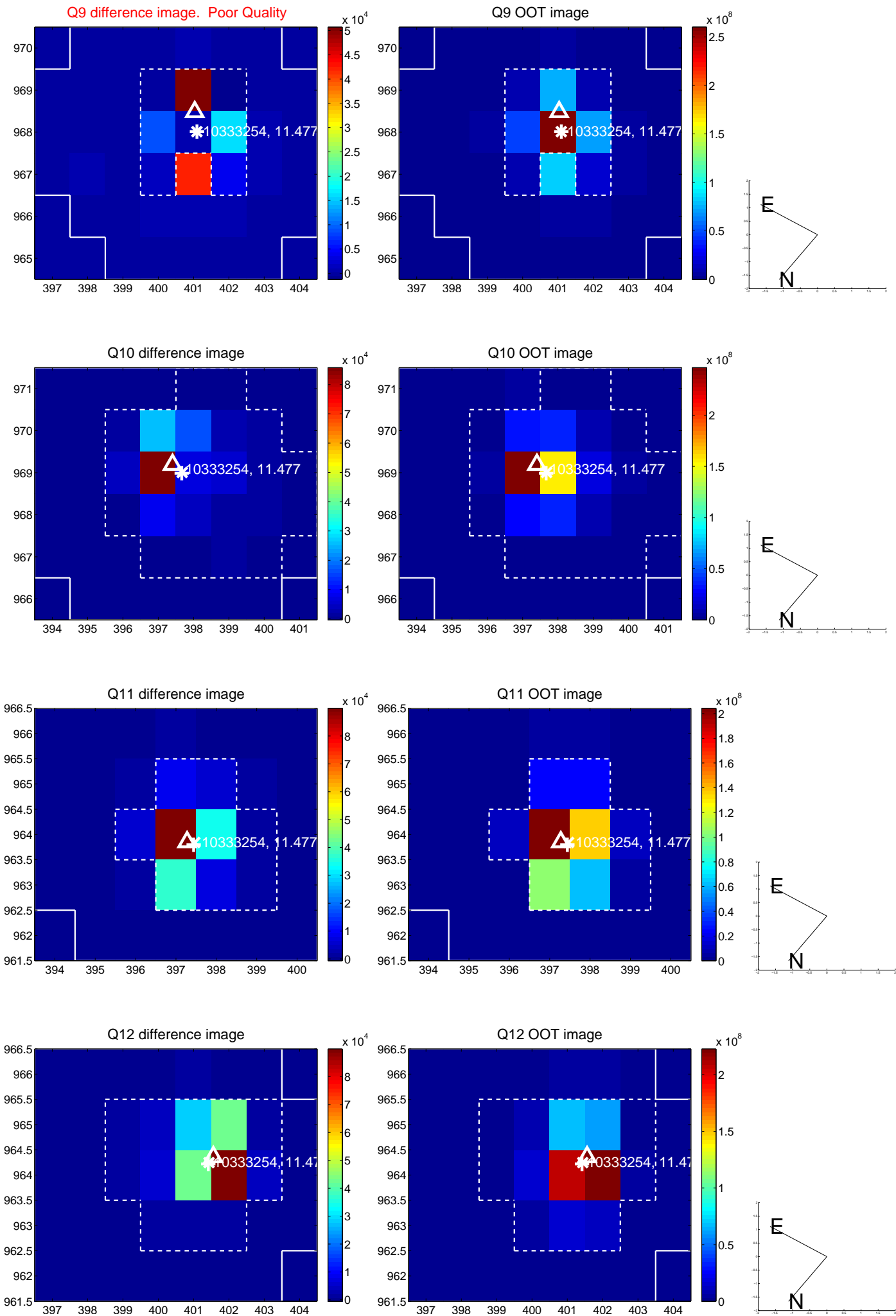
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



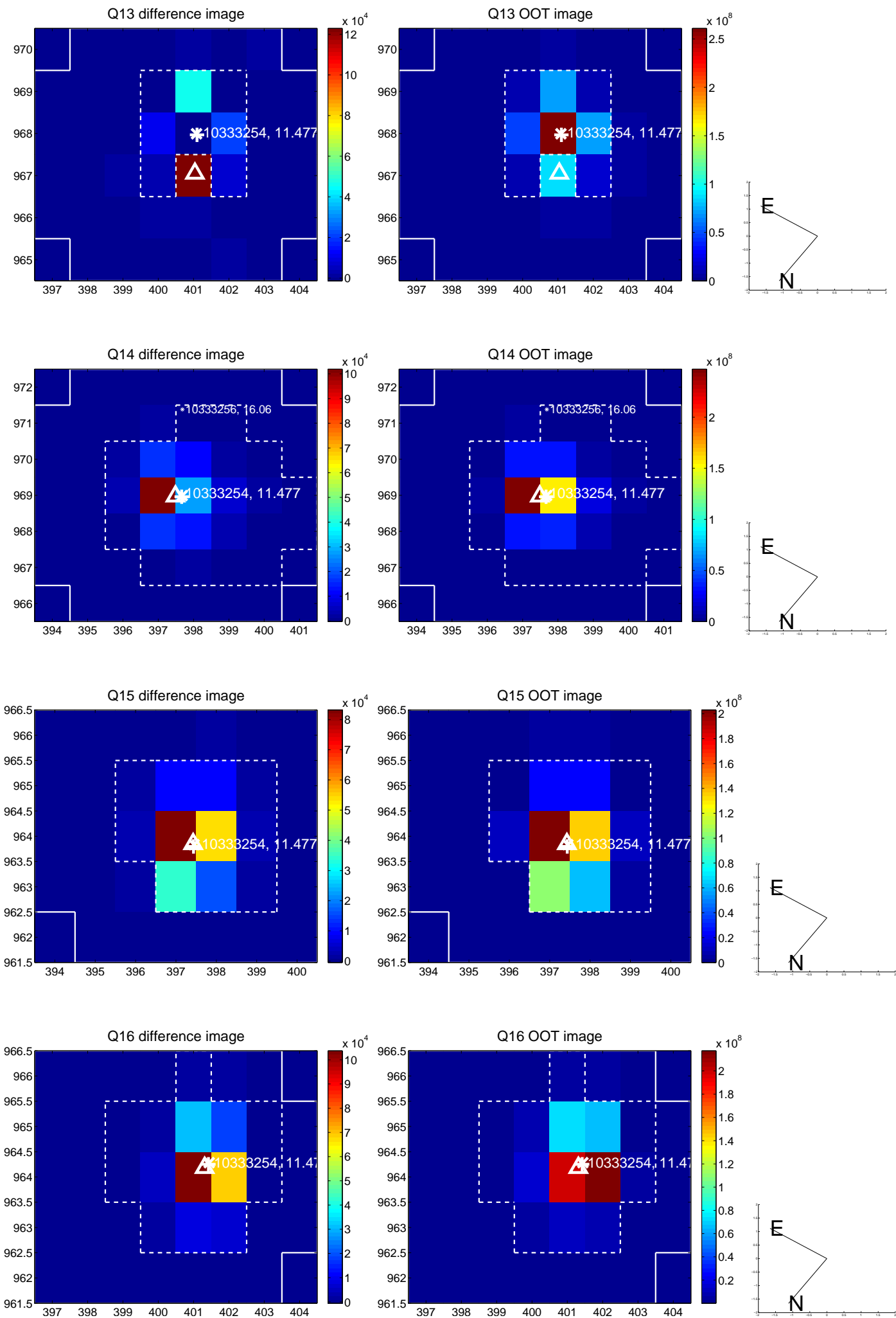
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



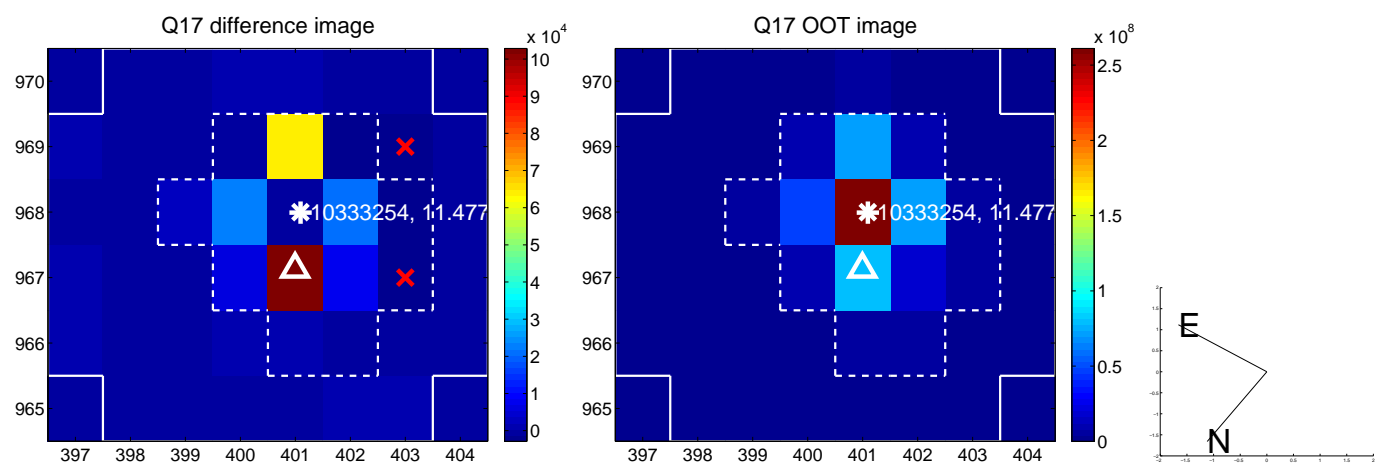
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



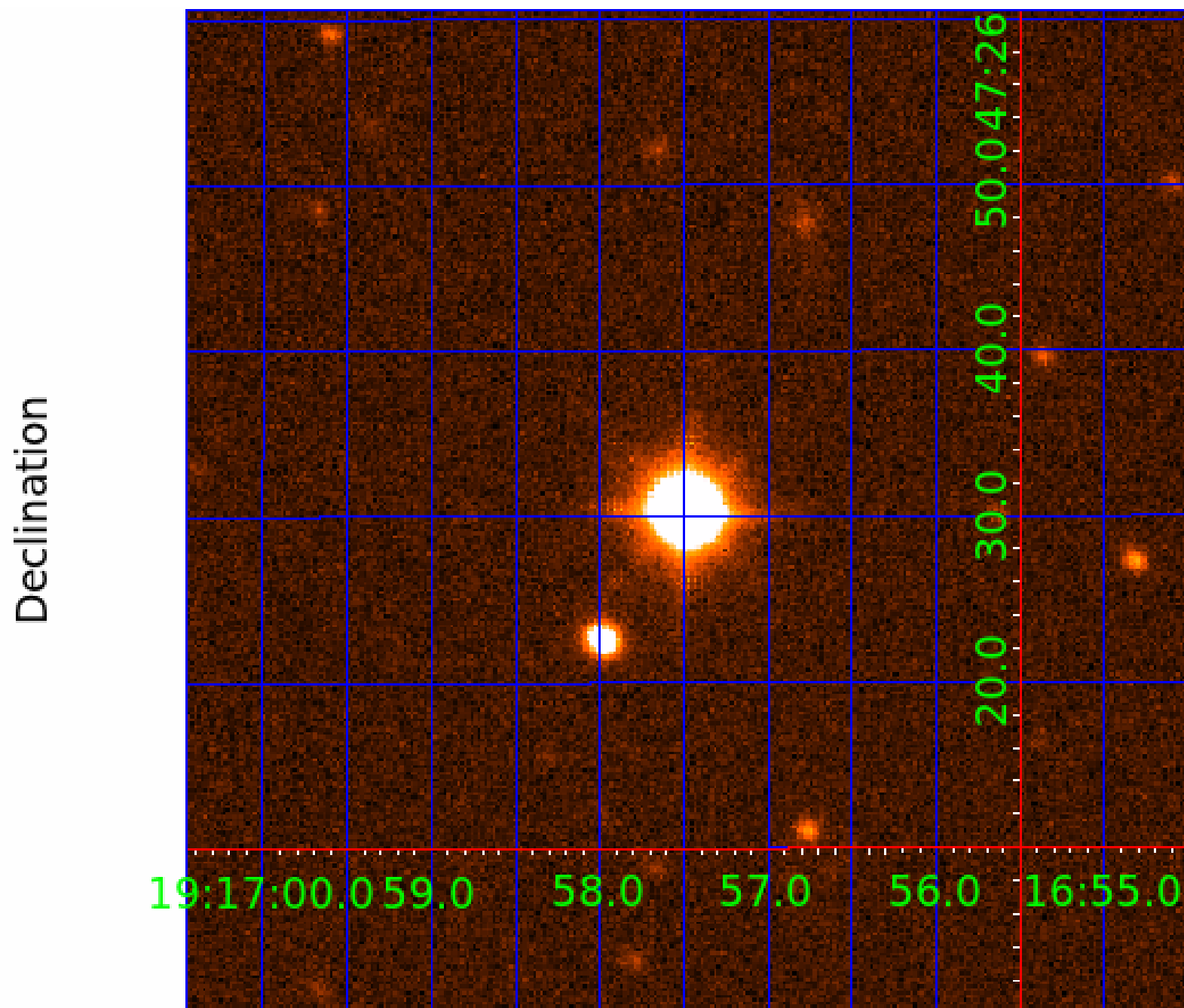
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



folded centroid time series figure for this object.



UKIRT Image



# KIC 010333254

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010333254-01	OBS	No	6.722893	137.475942	87.9	15.137	14.1	14.9	2.53	6714	3.41	1794.52
010333254-02	OBS	No	6.724655	132.709949	57.0	12.956	9.3	11.4	2.53	6714	3.83	1793.90
010333254-03	OBS	No	372.827910	155.750785	307.1	10.390	10.9	8.2	2.53	6714	5.23	8.49
010333254-04	OBS	No	186.778799	267.059650	182.7	5.251	8.0	6.6	2.53	6714	3.98	21.33
010333254-05	OBS	No	169.268559	167.694248	188.1	5.844	7.8	6.9	2.53	6714	3.84	24.32
010333254-06	OBS	No	209.835227	250.336223	176.0	5.160	7.8	7.4	2.53	6714	3.92	18.26
010333254-07	OBS	No	22.397421	137.445498	85.3	5.909	7.8	7.7	2.53	6714	2.79	360.66
010333254-08	OBS	No	141.378804	194.828778	127.9	5.405	7.3	8.0	2.53	6714	3.43	30.92
010333254-09	OBS	No	363.741743	457.410736	271.3	10.246	8.7	8.3	2.53	6714	5.37	8.77

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010333254-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—CENT_SATURATED
010333254-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—SAME_NTL_PERIOD—CENT_SATURATED
010333254-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
010333254-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—CENT_SATURATED
010333254-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-07	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

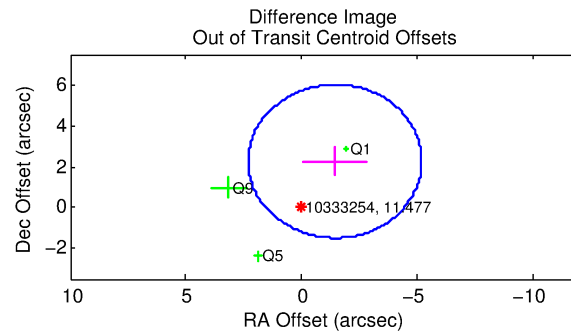
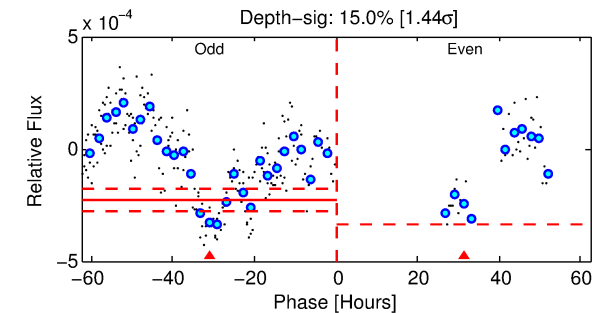
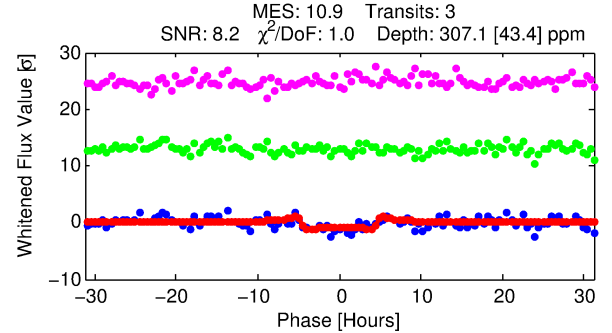
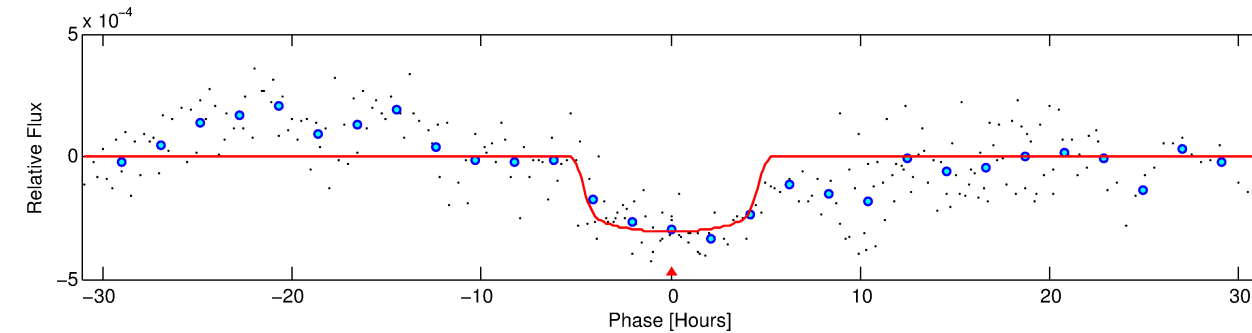
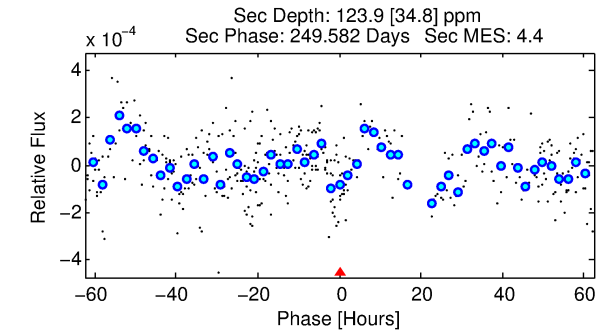
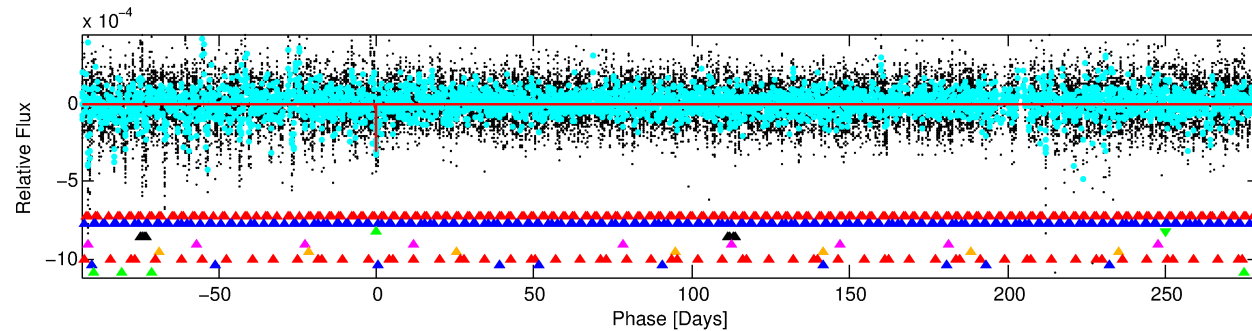
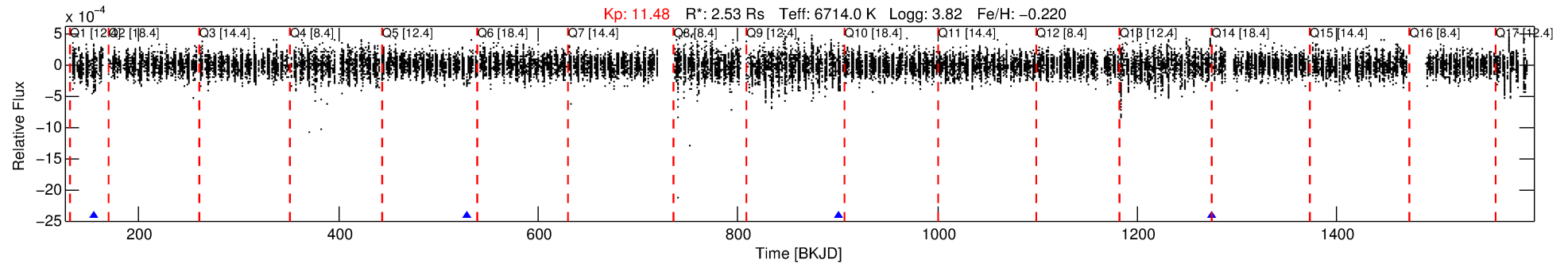
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 010333254-03

No Significant Match Found

# DV One-Page Summary

KIC: 10333254 Candidate: 3 of 9 Period: 372.828 d



## DV Fit Results:

Period = 372.82791 [0.00784] d  
Epoch = 155.7508 [0.0110] BKJD  
Rp/R\* = 0.0189 [0.0017]  
a/R\* = 123.66 [34.33]  
b = 0.91 [0.05]  
Seff = 8.49 [4.35]  
Teq = 435 [56] K  
Rp = 5.23 [1.97] Re  
a = 1.1737 [0.3845] AU  
Ag = 3432.58 [2068.19] [1.66 $\sigma$ ]  
Teffp = 5150 [454] K [10.31 $\sigma$ ]

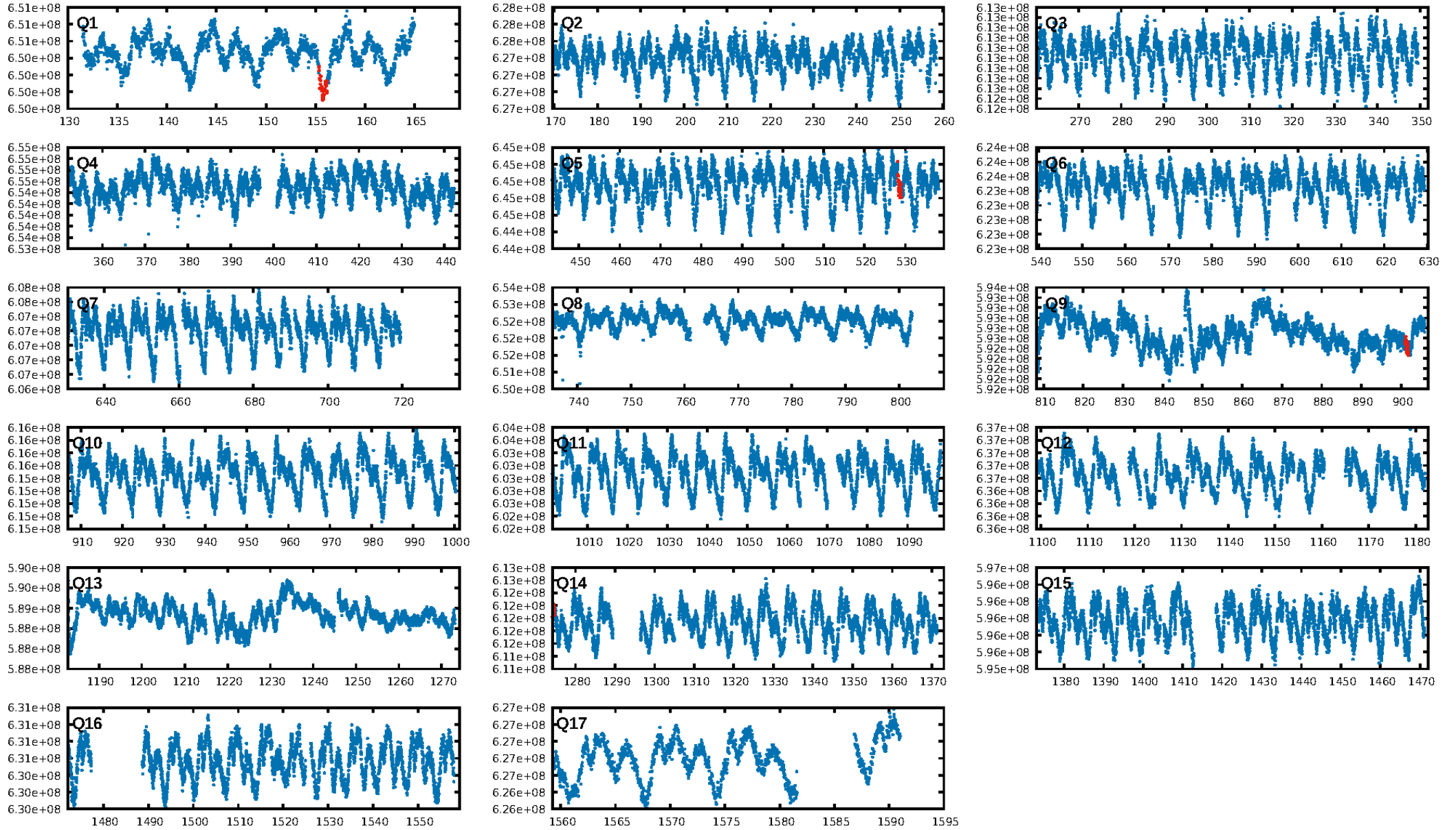
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [14.94 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 4.2%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 7.94e-13  
RollingBand-fgt: 1.00 [2/2]  
GhostDiagnostic-chr: 1.603  
Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 2.683 arcsec [2.14 $\sigma$ ]  
KicOffset-rm: 2.828 arcsec [1.80 $\sigma$ ]  
OotOffset-st: 0/0/0/3 [3]  
KicOffset-st: 0/0/0/3 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 0.33 [1/3]

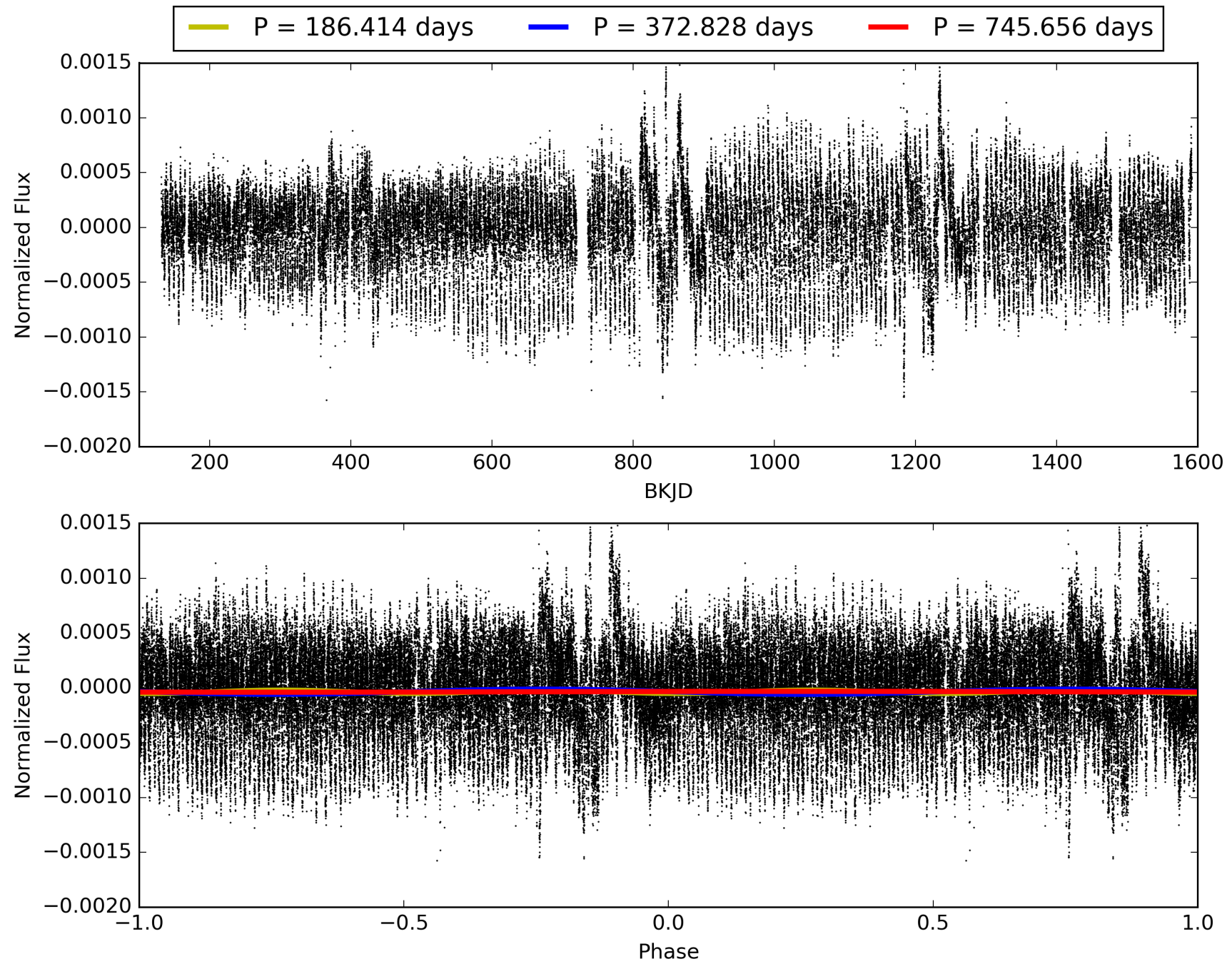
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 07:16:52 Z

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

# TCE 010333254-03, PDC Light Curves

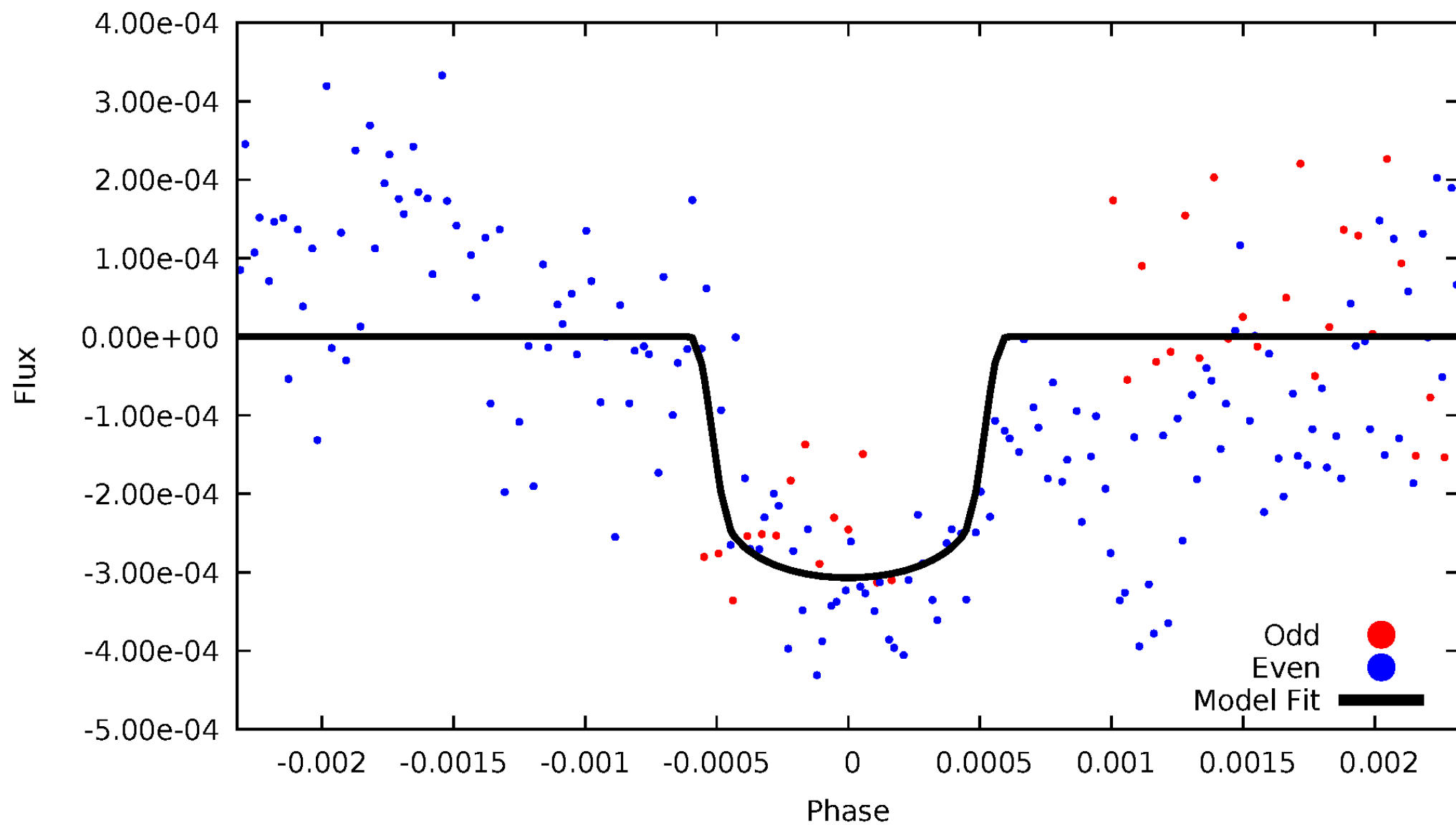


TCE 010333254-03



# DV Odd/Even

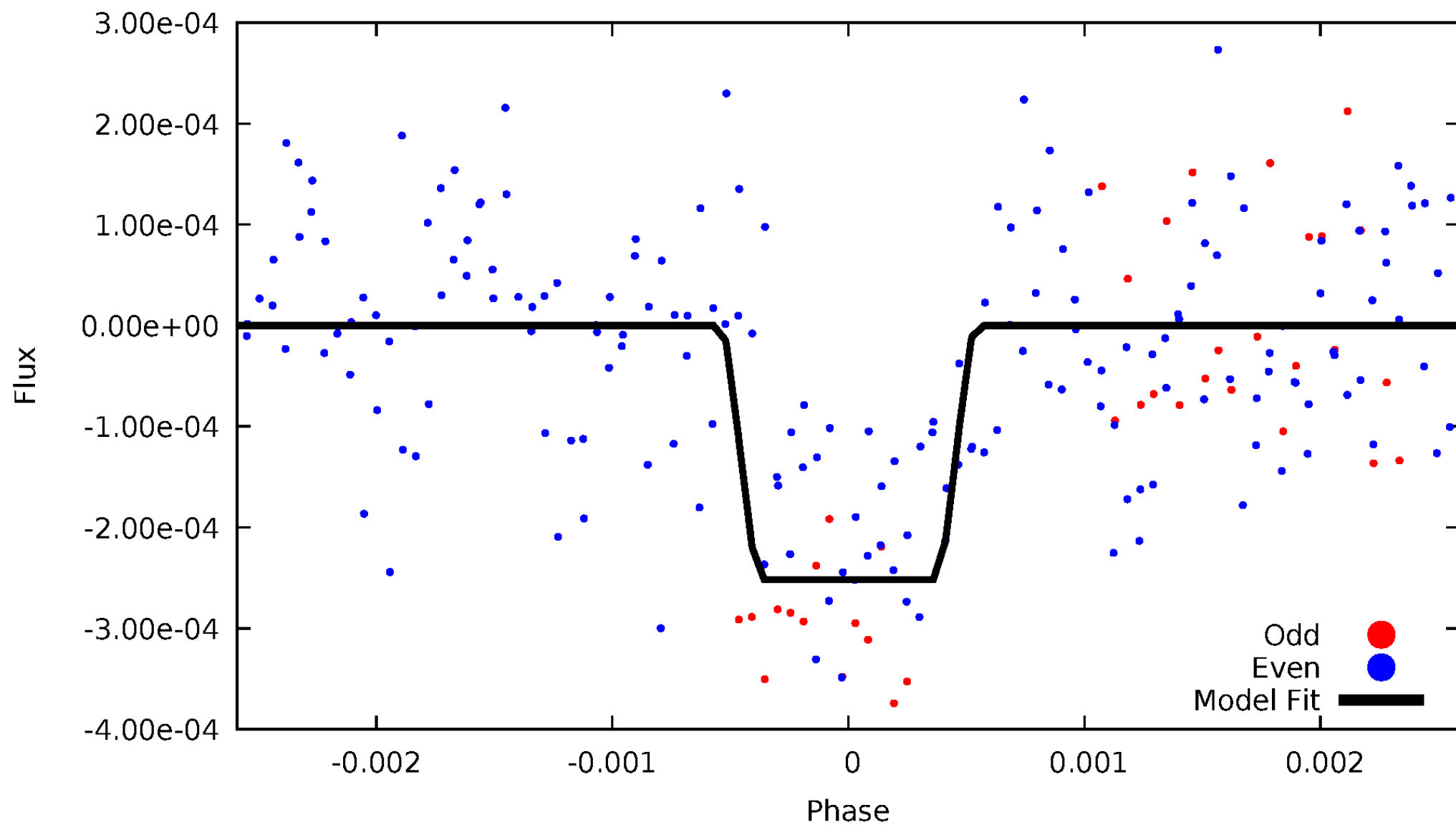
TCE 010333254-03





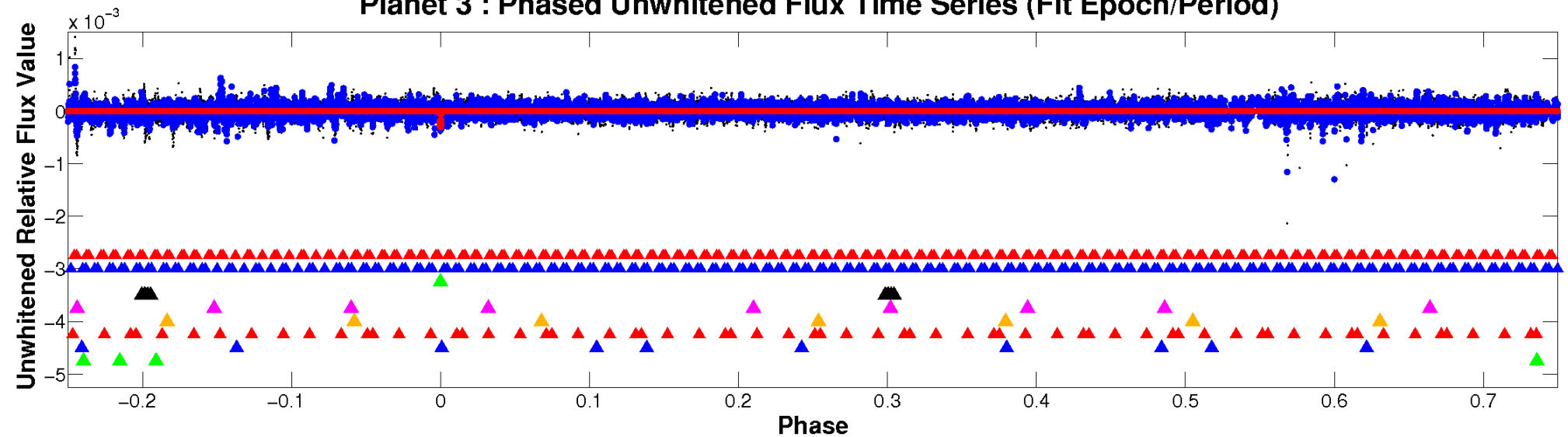
# ALT Odd/Even

TCE 010333254-03

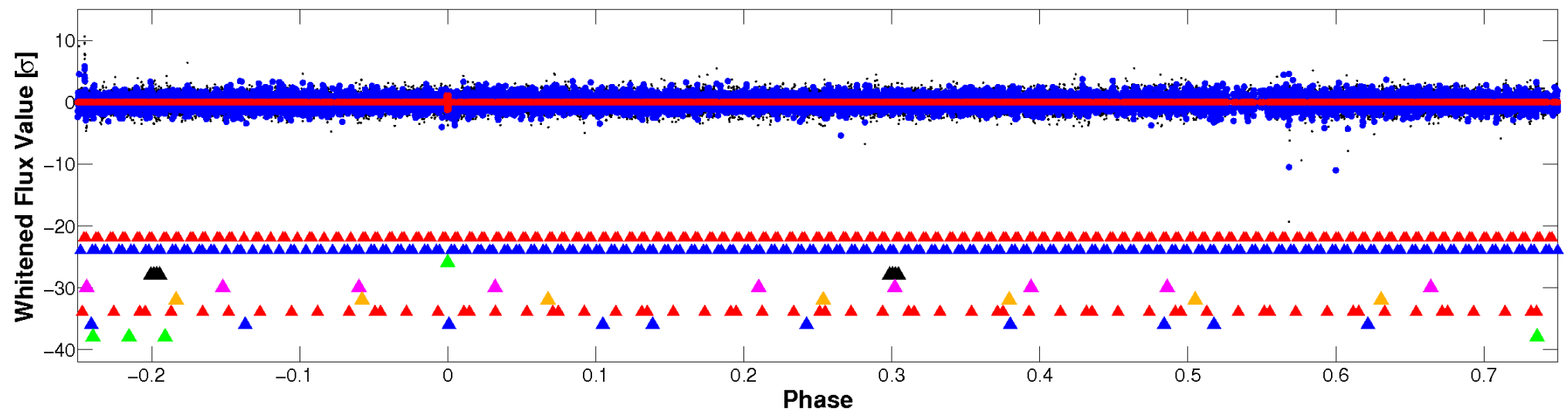


# Non-Whitened Vs. Whitened Light Curve

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

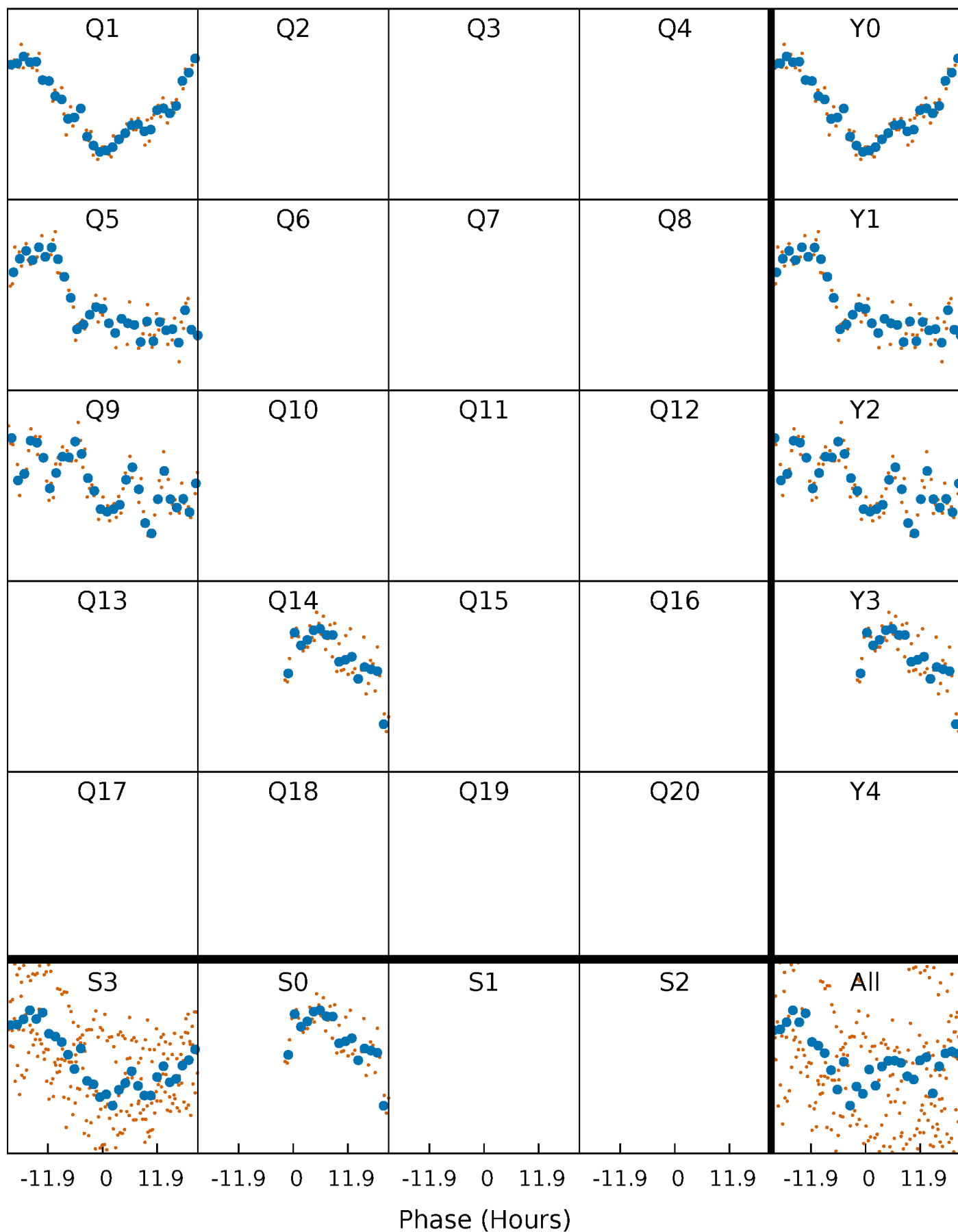


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



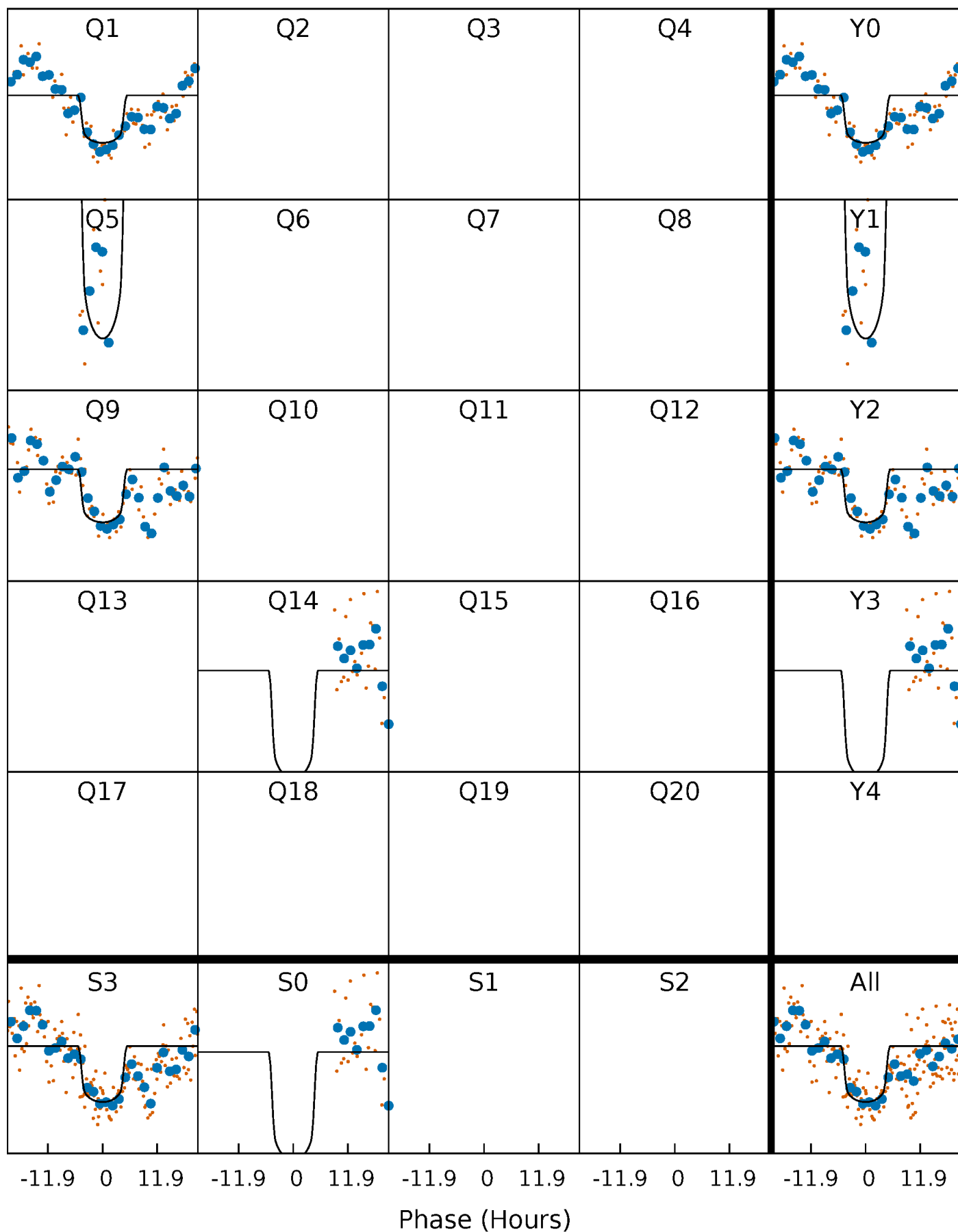
# PDC Quarter-Phased Transit Curves

TCE 010333254-03     $P=372.827910$  Days     $T_0=155.750785$  (BKJD)



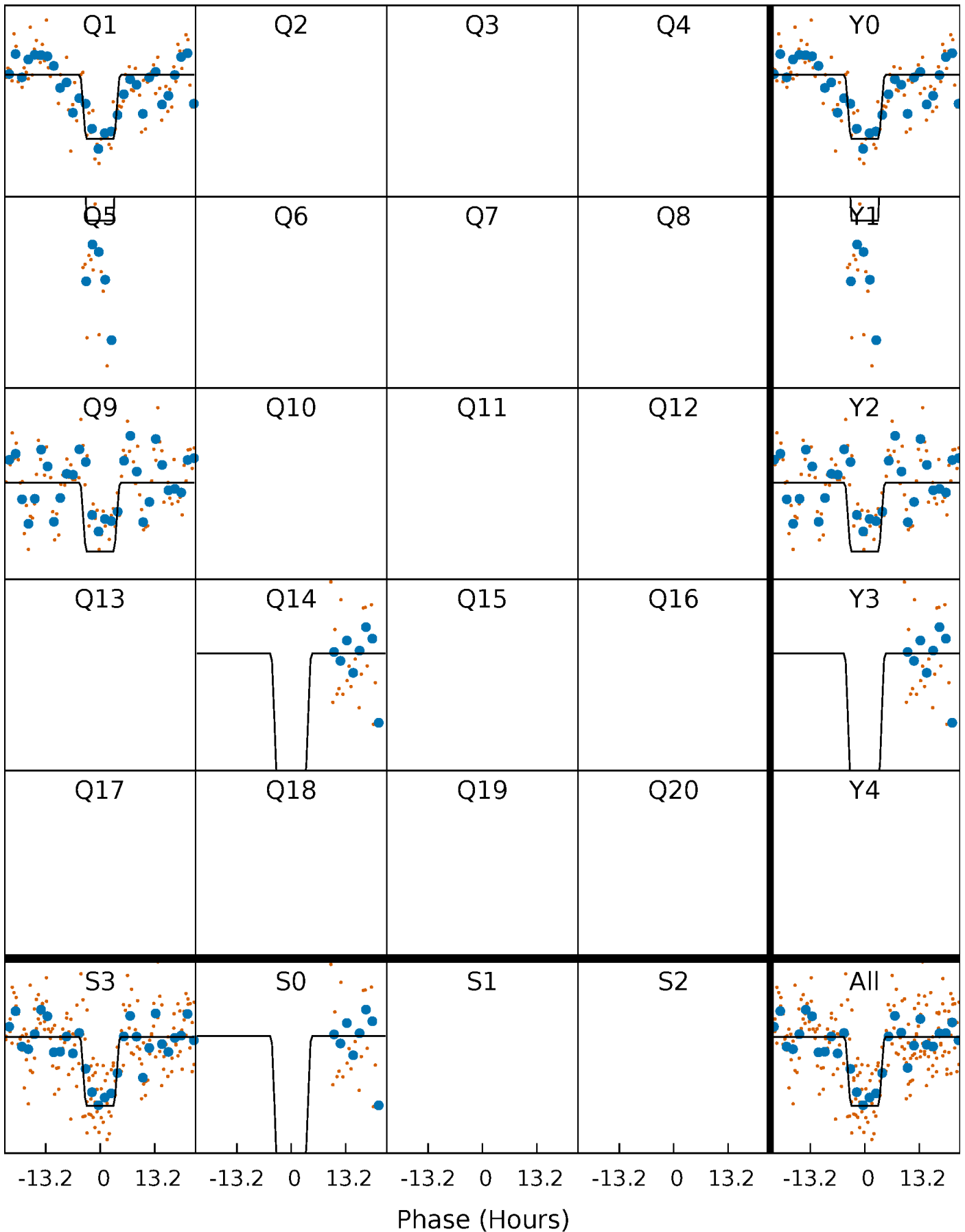
# DV Quarter-Phased Transit Curves

TCE 010333254-03     $P=372.827910$  Days     $T_0=155.750785$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

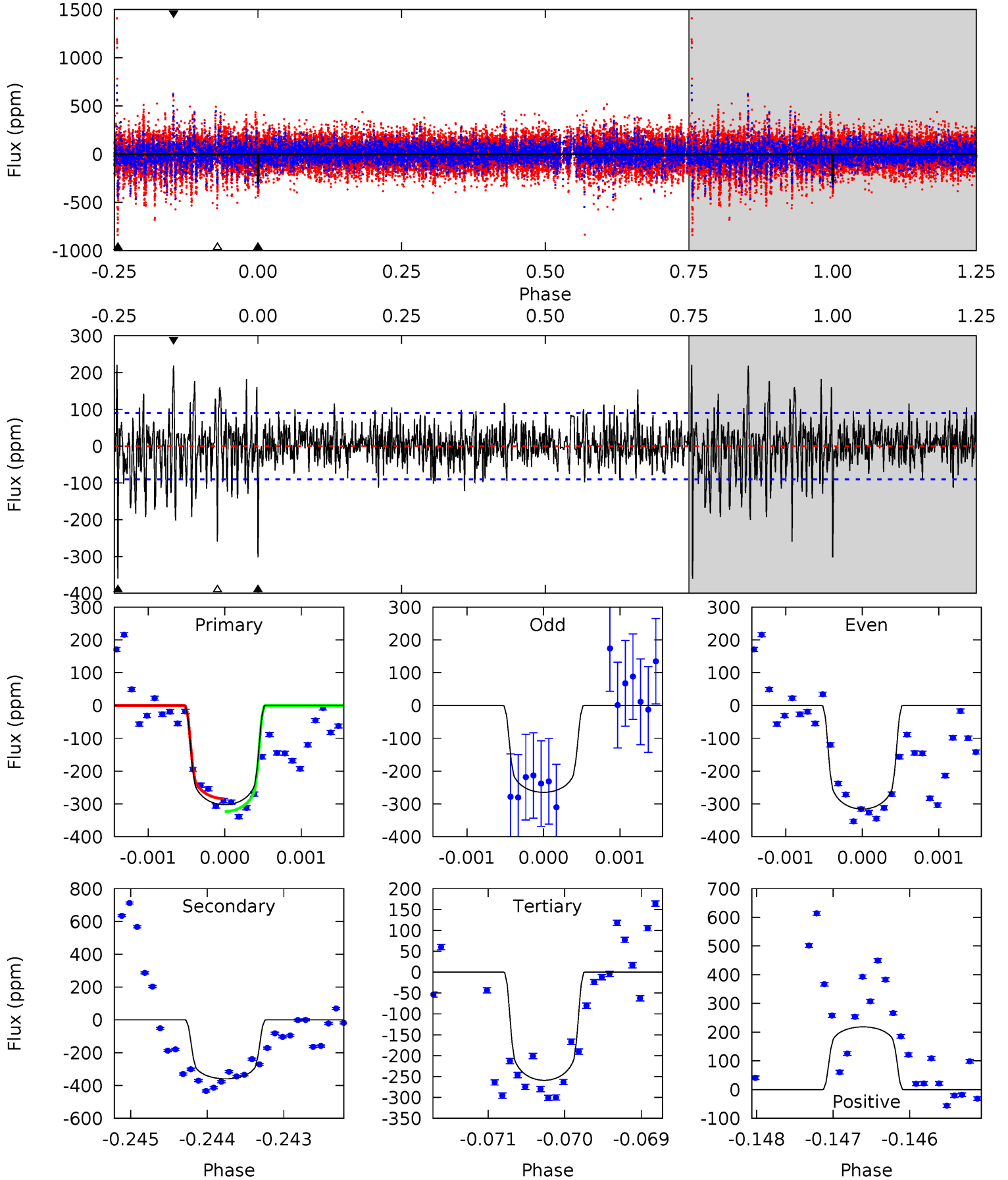
TCE 010333254-03     $P=372.830736$  Days     $T_0=155.716695$  (BKJD)



# DV Model-Shift Uniqueness Test

010333254-03, P = 372.827910 Days, E = 155.750785 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
18.2	21.6	15.6	13.1	5.43	3.25	2.90	2.60	5.05	6.03	8.49	1.38	1.01	0.38	1.18

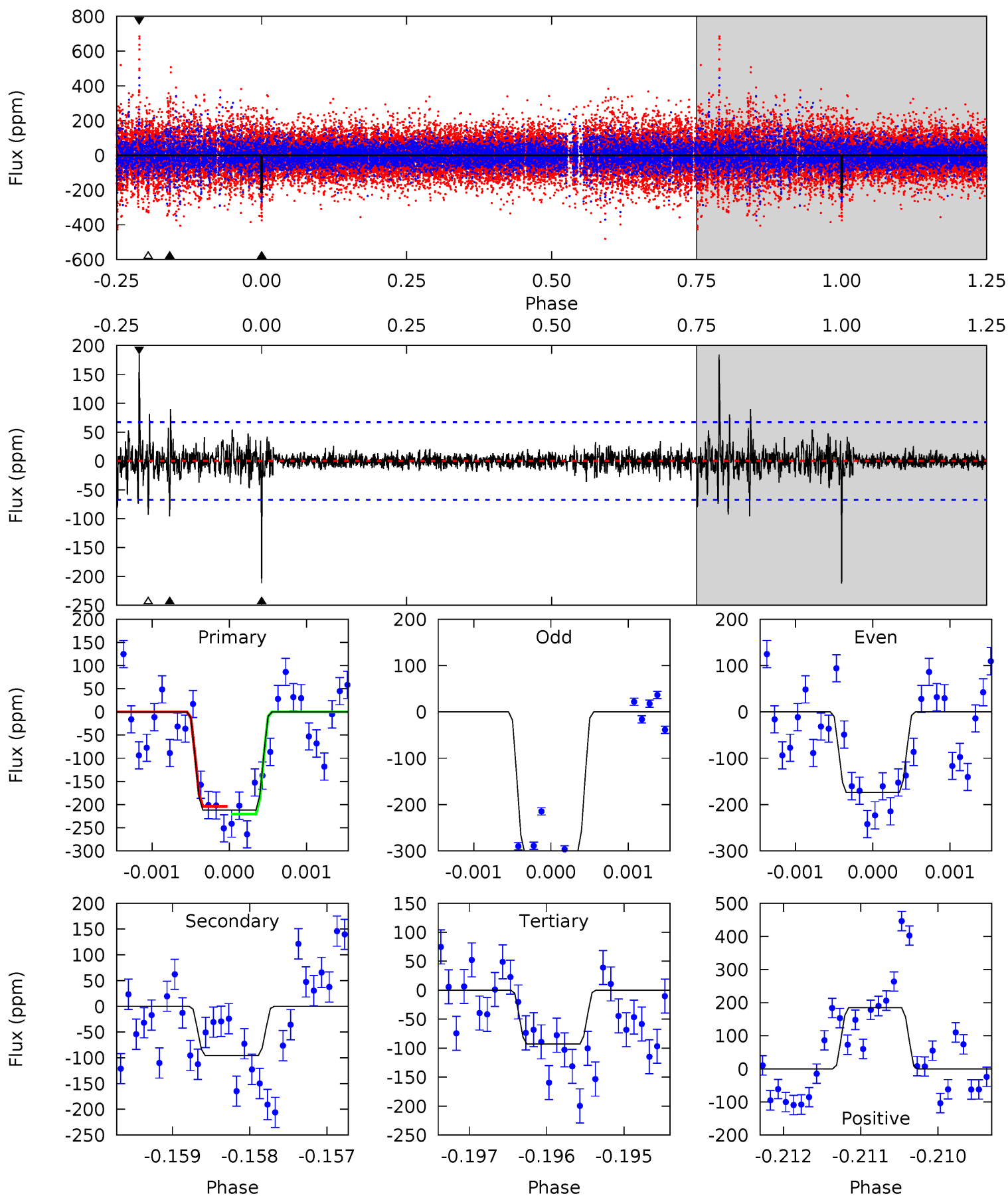




# Alt Model-Shift Uniqueness Test

010333254-03, P = 372.830736 Days, E = 155.716695 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
17.1	7.74	7.52	14.9	5.44	3.28	1.08	9.61	2.20	0.22	-7.19	4.76	0.92	0.47	0.65



### Stellar Parameters For KIC 010333254

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6714^{+168}_{-184}$	$3.821^{+0.285}_{-0.095}$	$-0.220^{+0.300}_{-0.250}$	$2.534^{+0.463}_{-0.927}$	$1.550^{+0.183}_{-0.340}$	$0.134^{+0.245}_{-0.041}$
	+3%/-3%	+7%/-2%	+136%/-114%	+18%/-37%	+12%/-22%	+183%/-31%
Source	PHO1	FLK73	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 010333254-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-359 \pm 17$	$5.04^{+0.85}_{-0.96}$	$599^{+34}_{-50}$	$6709^{+410}_{-373}$	$10756^{+5092}_{-2858}$
Alt.	$-96 \pm 12$	$4.12^{+0.82}_{-0.83}$	$597^{+36}_{-55}$	$5325^{+350}_{-297}$	$4265^{+2079}_{-1279}$

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

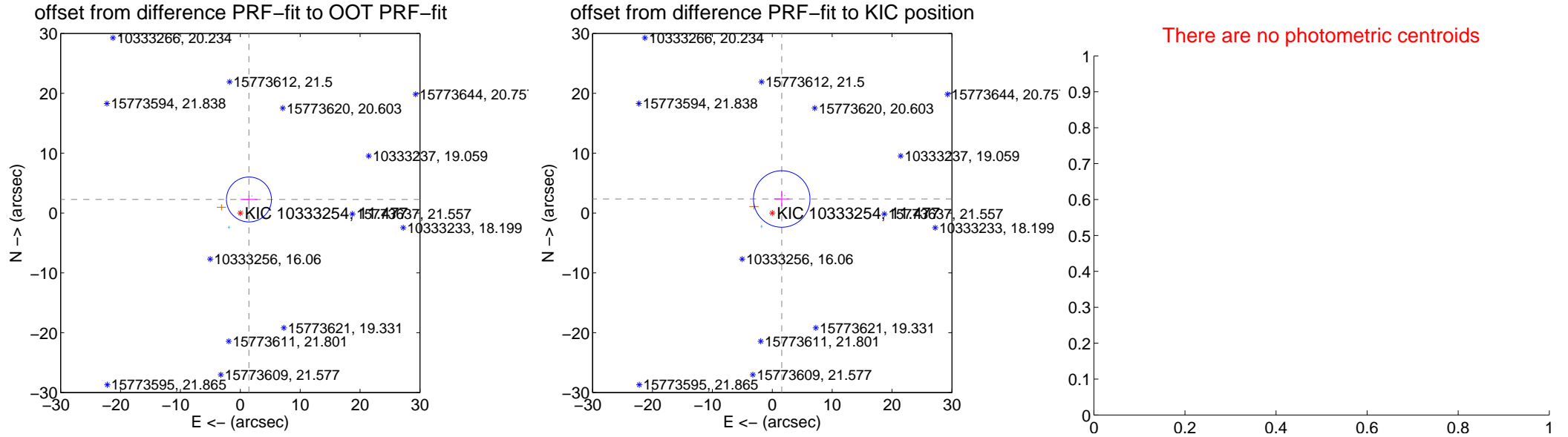
## DV Centroid Data

Supplemental centroid analysis for 010333254-03. **Kepler magnitude: 11.48.** Transit SNR 8.17

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

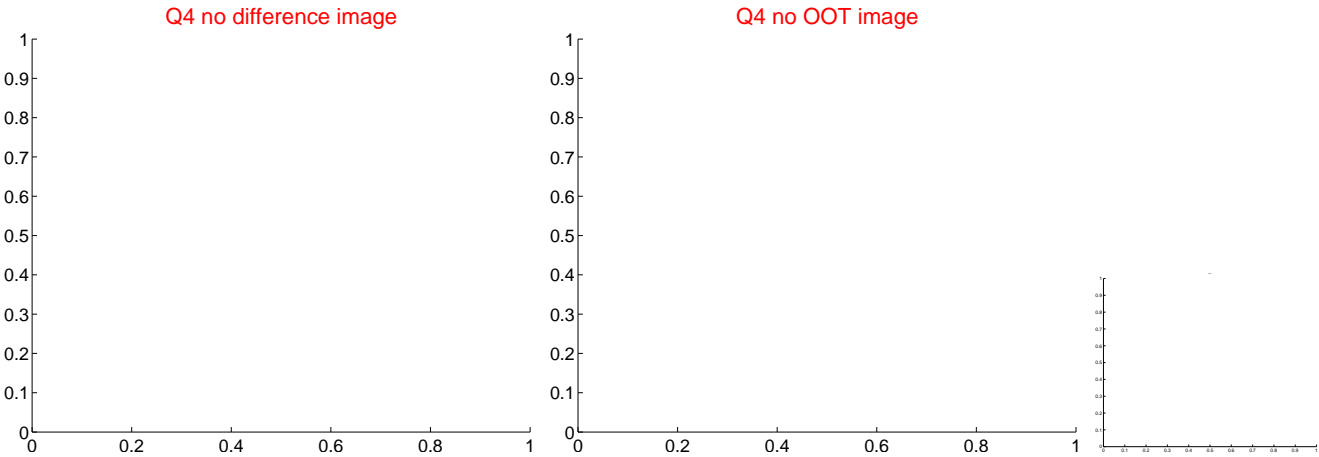
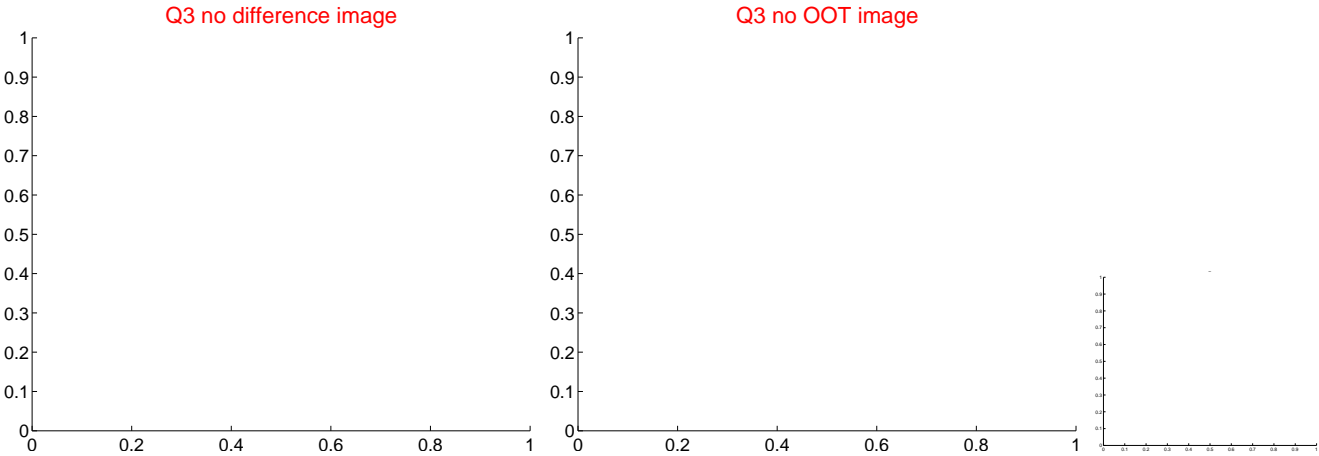
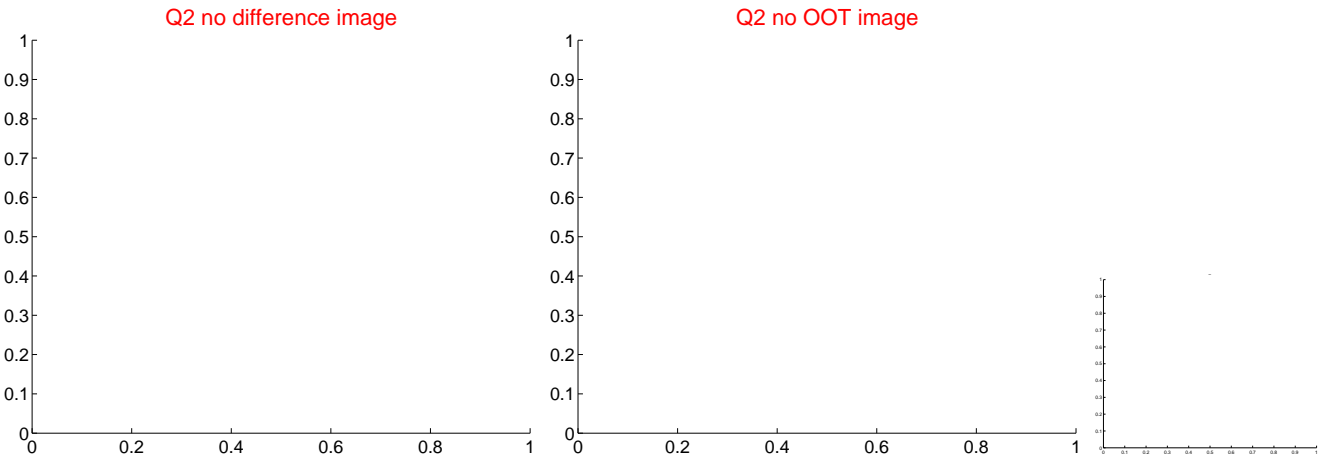
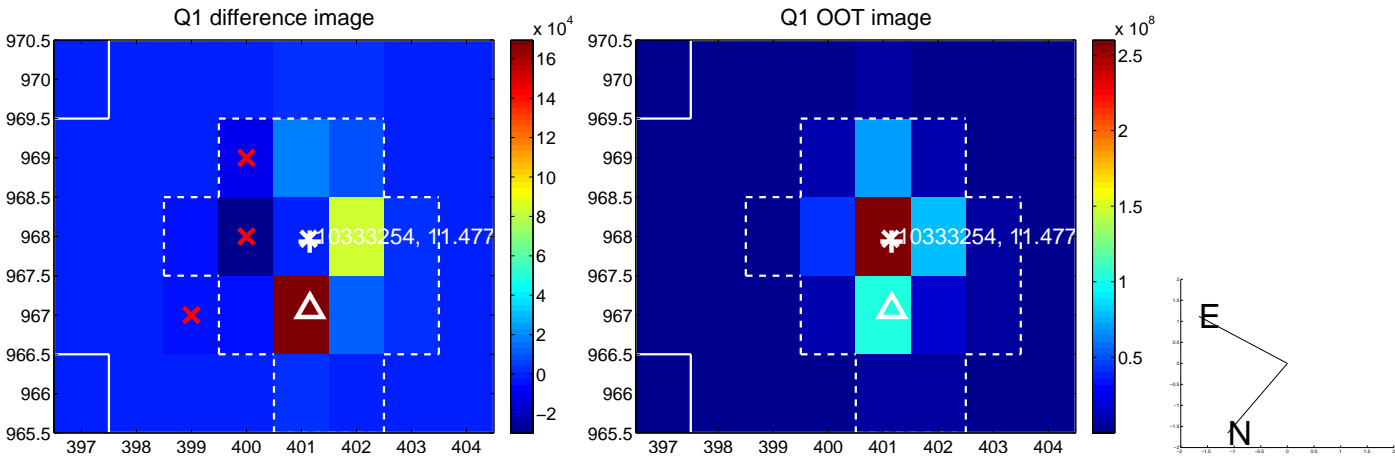
The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.683 \pm 1.251$	2.14	$-1.446 \pm 1.408$	$2.260 \pm 0.675$
PRF-fit source offset from KIC position	$2.828 \pm 1.573$	1.80	$-1.582 \pm 1.281$	$2.343 \pm 1.222$
photometric centroid source offset	—	—	—	—

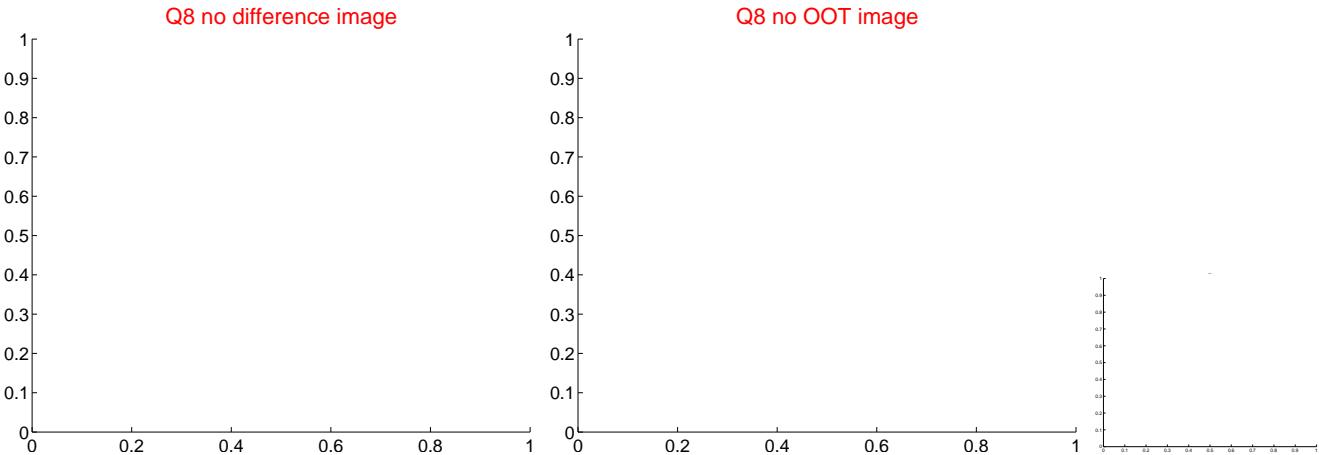
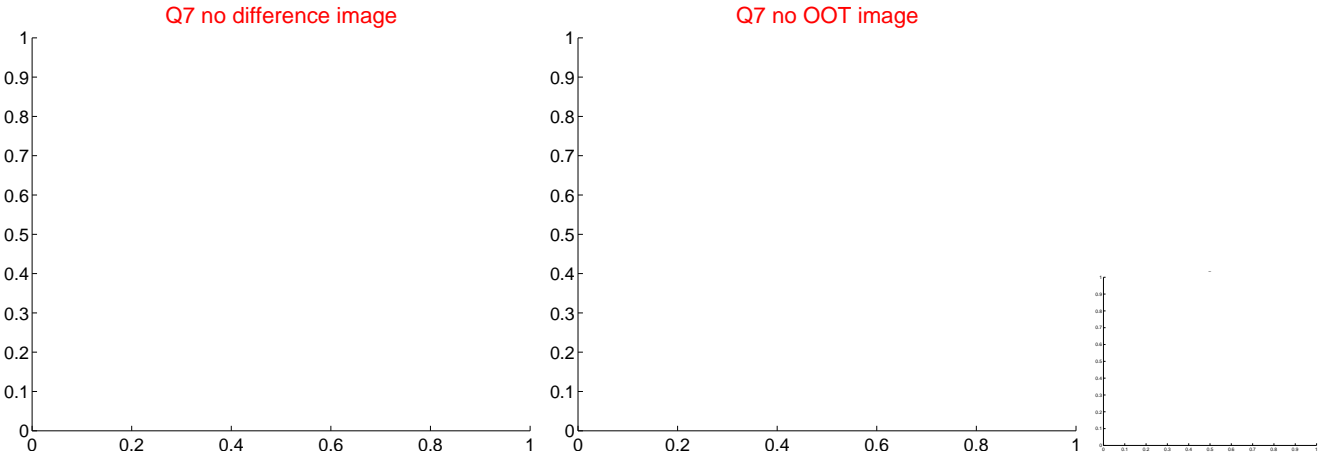
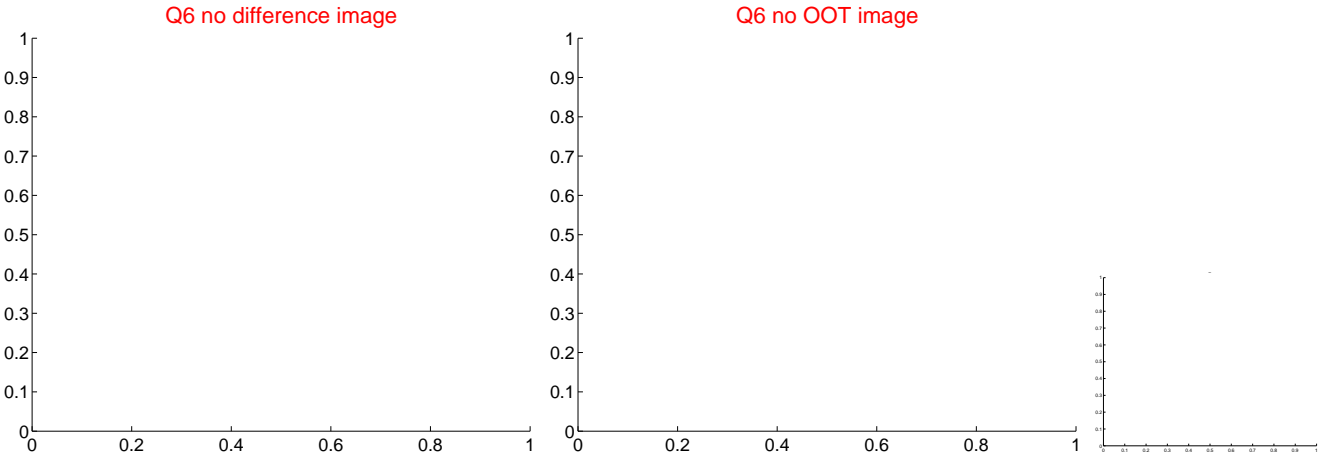
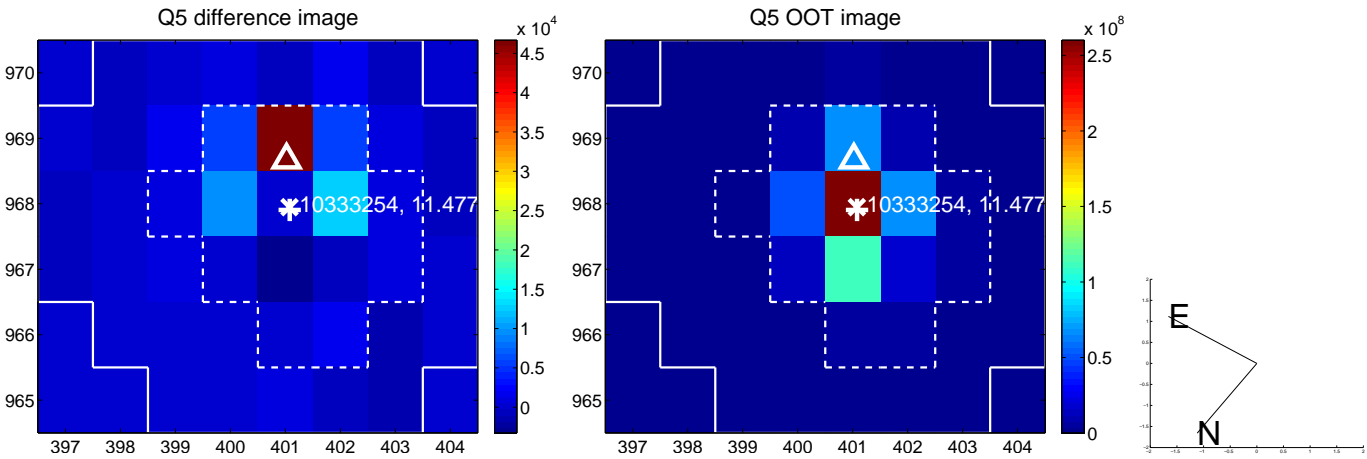


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

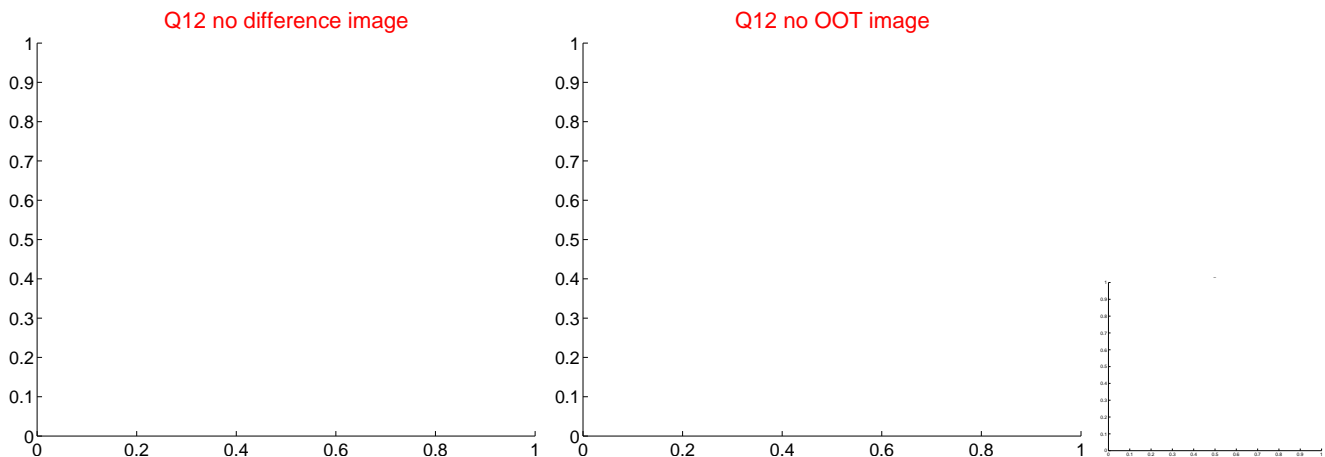
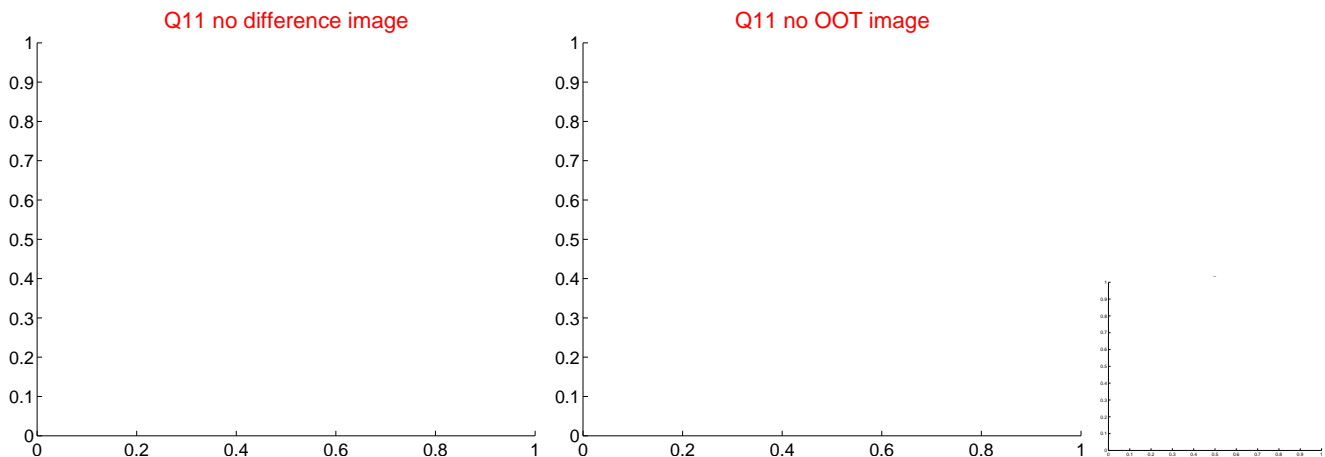
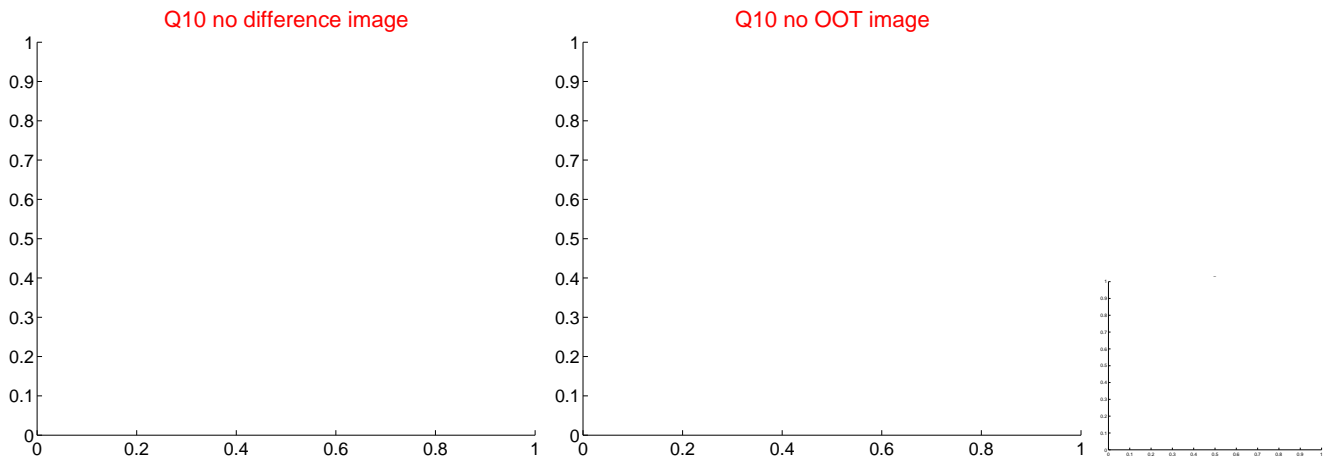
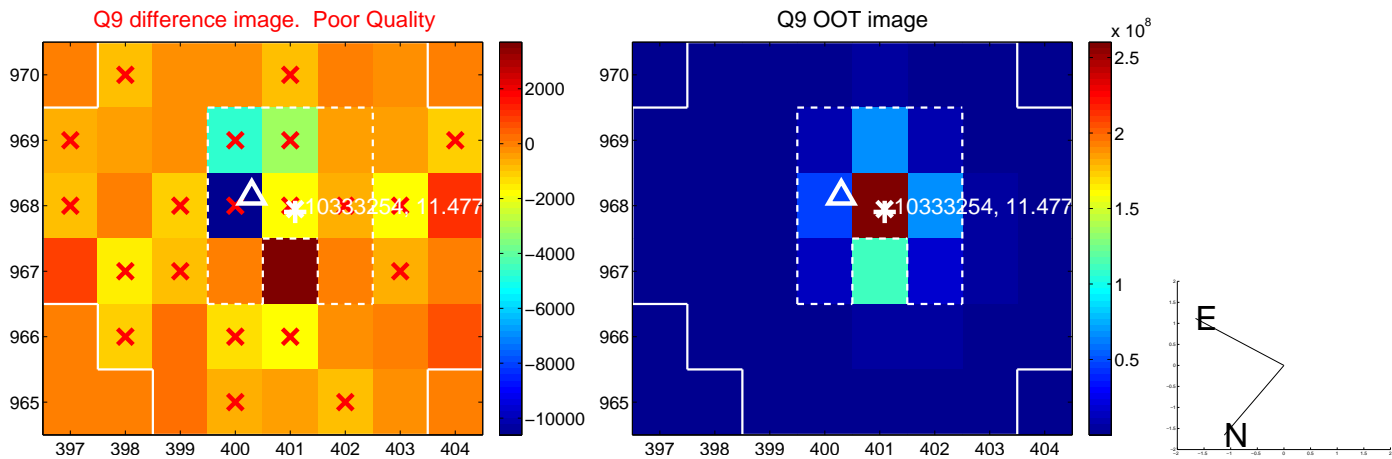
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

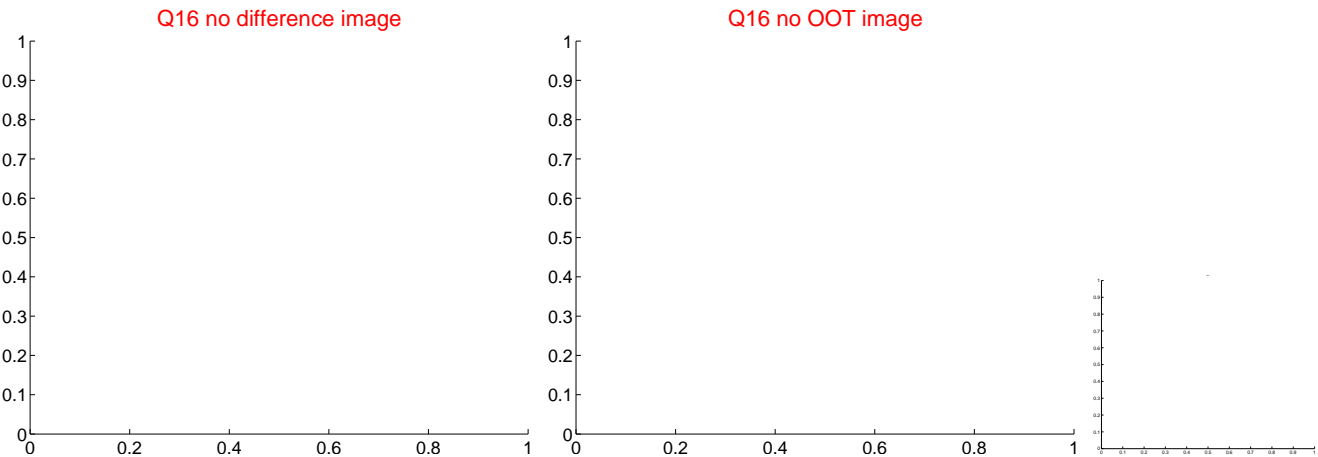
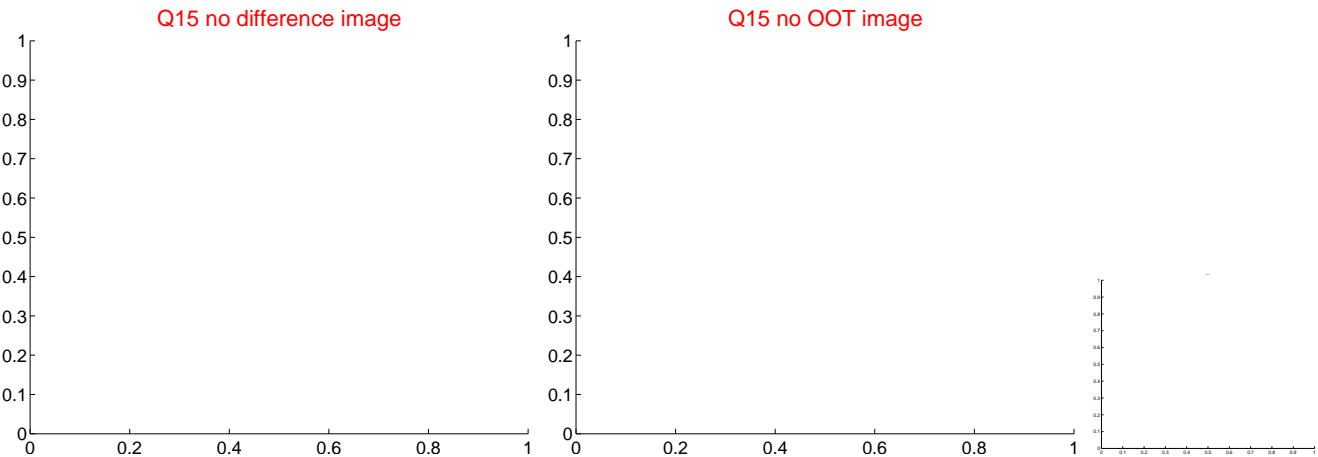
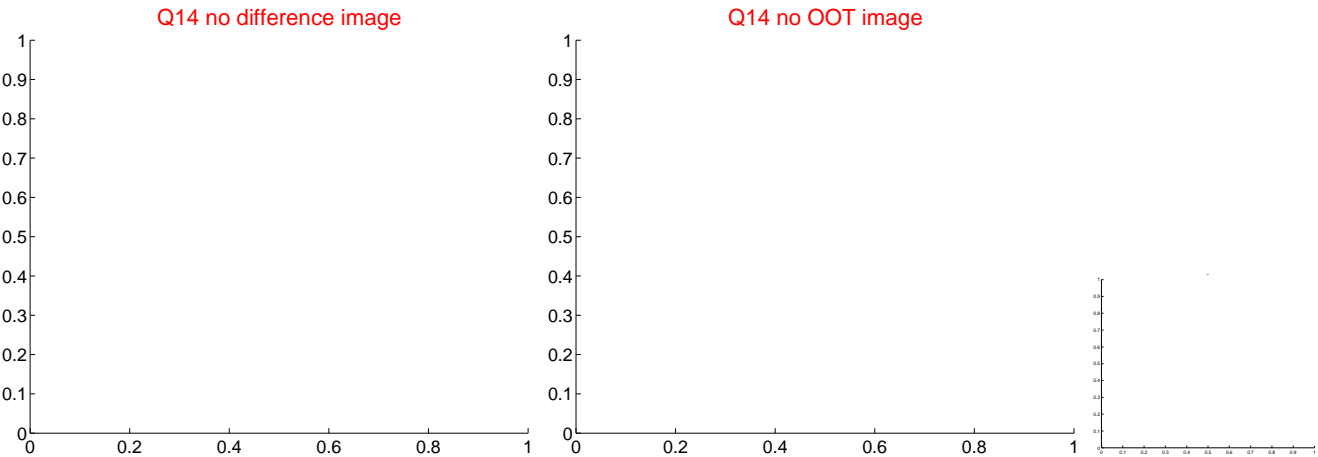
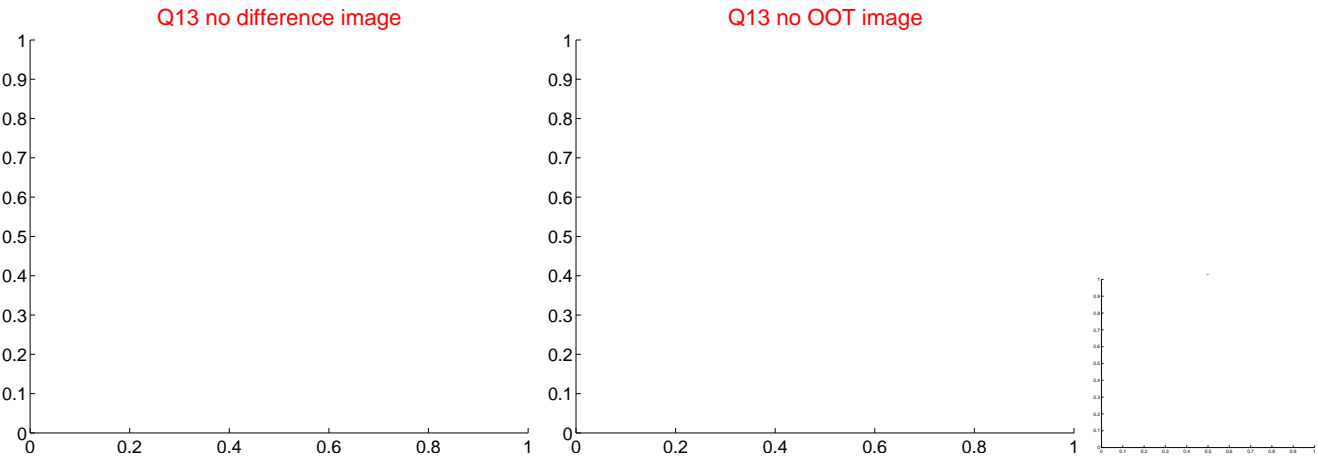


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

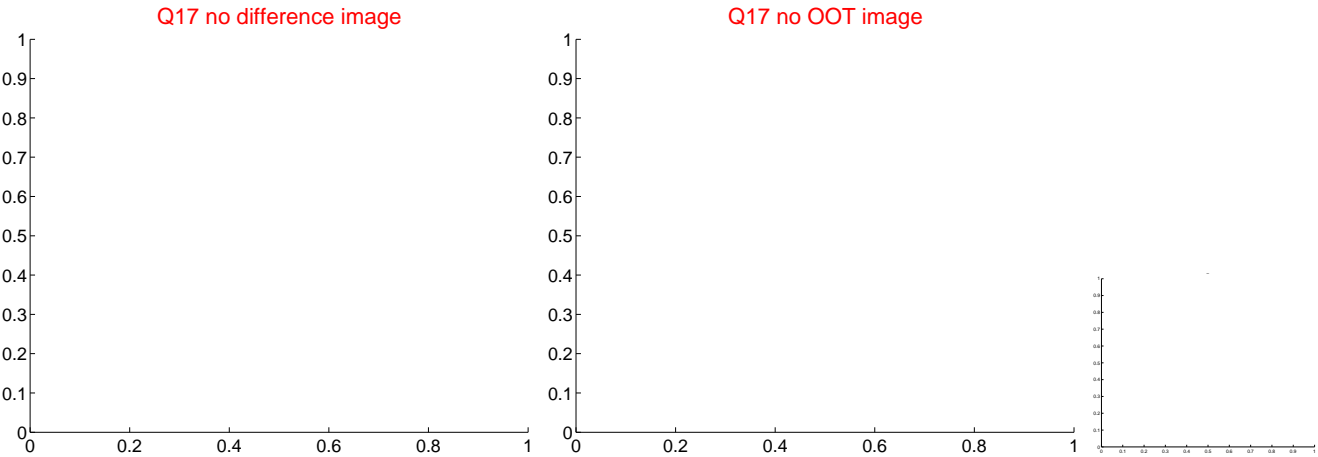




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

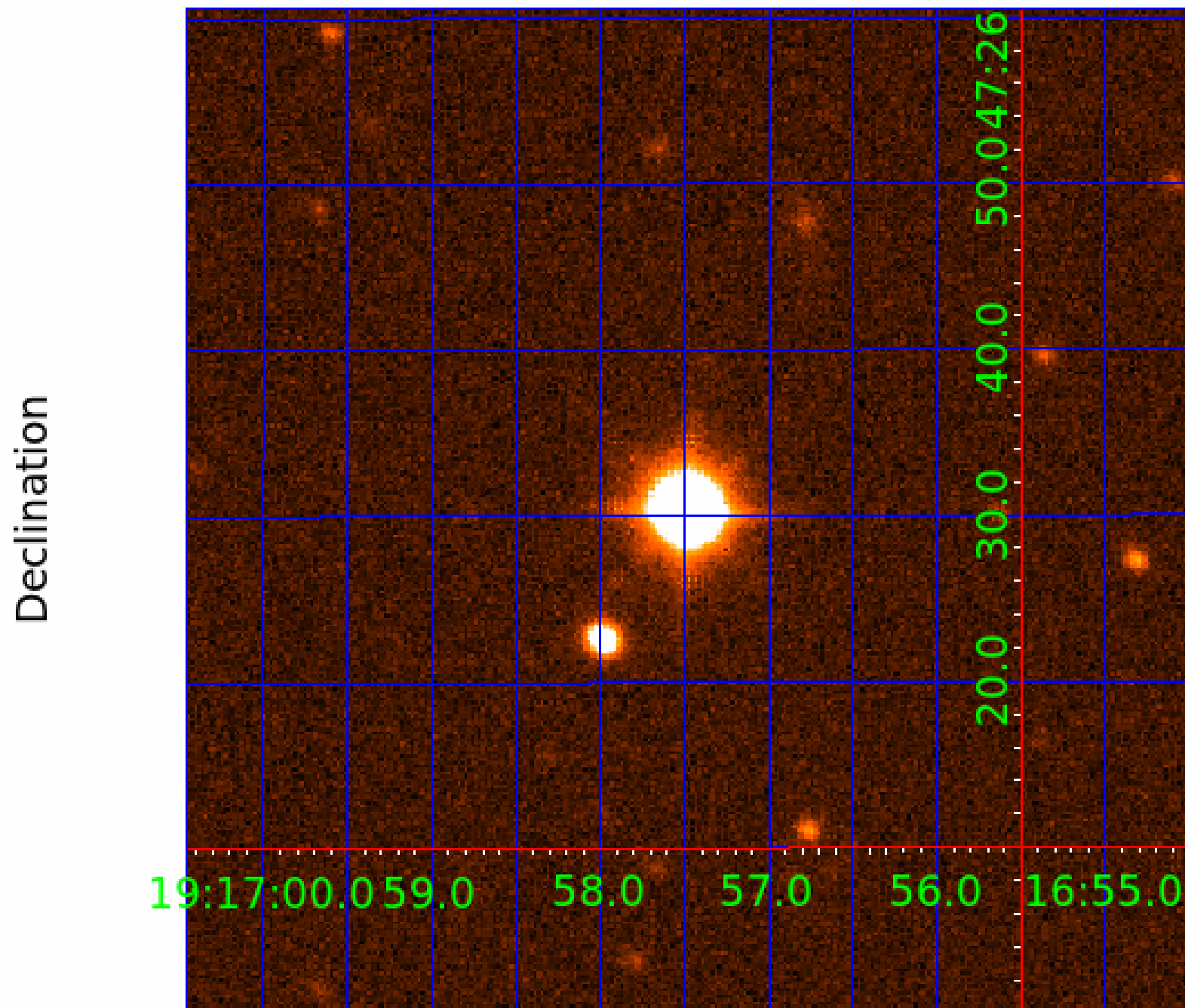


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



folded centroid time series figure for this object.

UKIRT Image



# KIC 010333254

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010333254-01	OBS	No	6.722893	137.475942	87.9	15.137	14.1	14.9	2.53	6714	3.41	1794.52
010333254-02	OBS	No	6.724655	132.709949	57.0	12.956	9.3	11.4	2.53	6714	3.83	1793.90
010333254-03	OBS	No	372.827910	155.750785	307.1	10.390	10.9	8.2	2.53	6714	5.23	8.49
010333254-04	OBS	No	186.778799	267.059650	182.7	5.251	8.0	6.6	2.53	6714	3.98	21.33
010333254-05	OBS	No	169.268559	167.694248	188.1	5.844	7.8	6.9	2.53	6714	3.84	24.32
010333254-06	OBS	No	209.835227	250.336223	176.0	5.160	7.8	7.4	2.53	6714	3.92	18.26
010333254-07	OBS	No	22.397421	137.445498	85.3	5.909	7.8	7.7	2.53	6714	2.79	360.66
010333254-08	OBS	No	141.378804	194.828778	127.9	5.405	7.3	8.0	2.53	6714	3.43	30.92
010333254-09	OBS	No	363.741743	457.410736	271.3	10.246	8.7	8.3	2.53	6714	5.37	8.77

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010333254-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—CENT_SATURATED
010333254-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—SAME_NTL_PERIOD—CENT_SATURATED
010333254-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
010333254-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—CENT_SATURATED
010333254-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-07	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

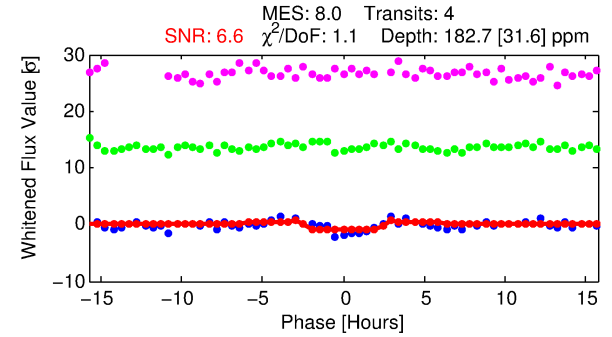
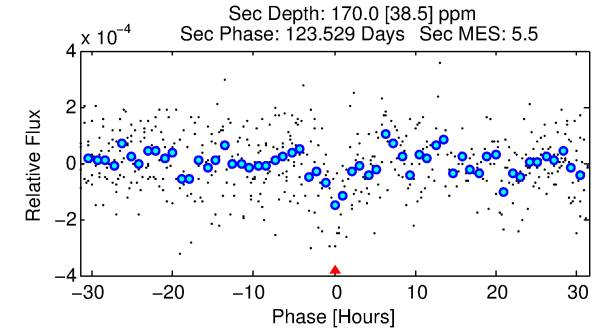
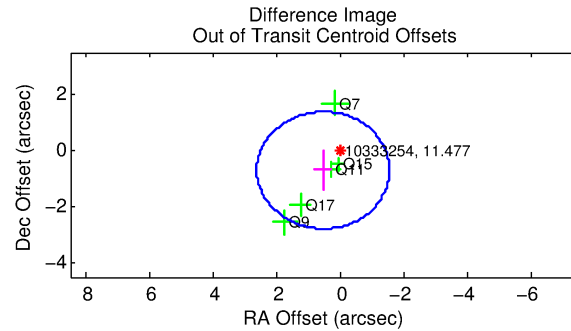
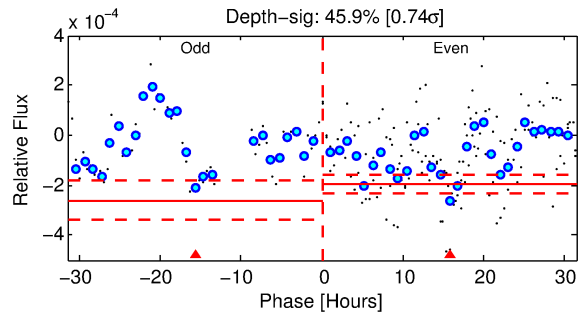
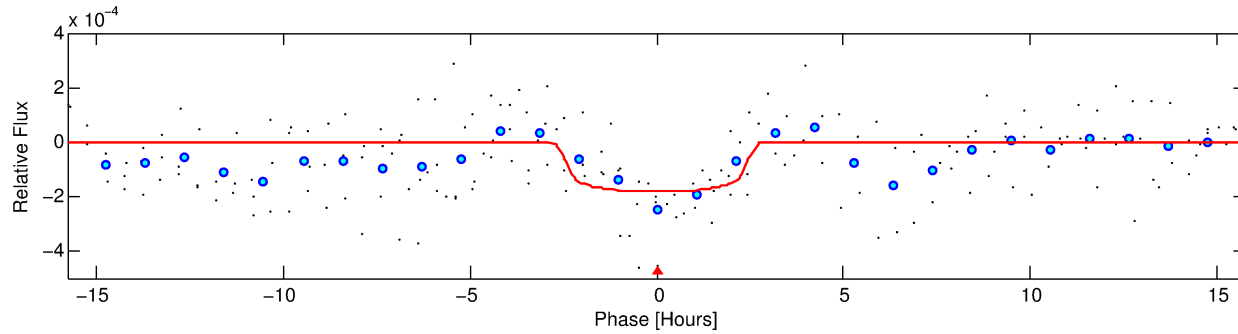
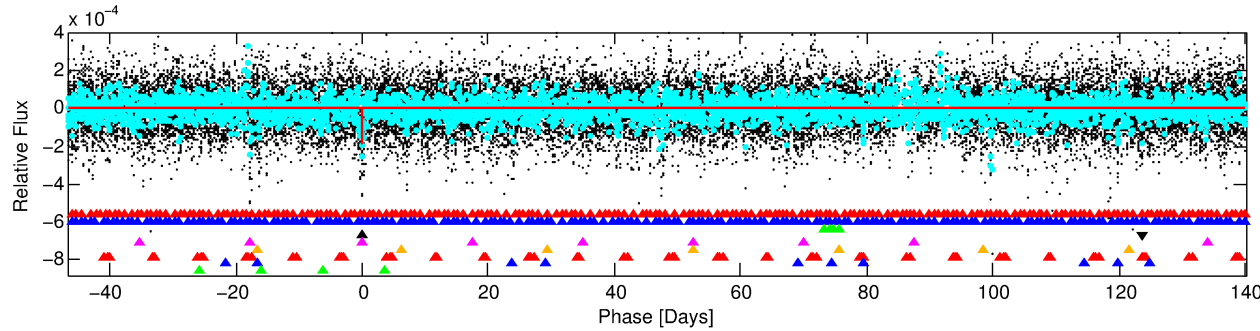
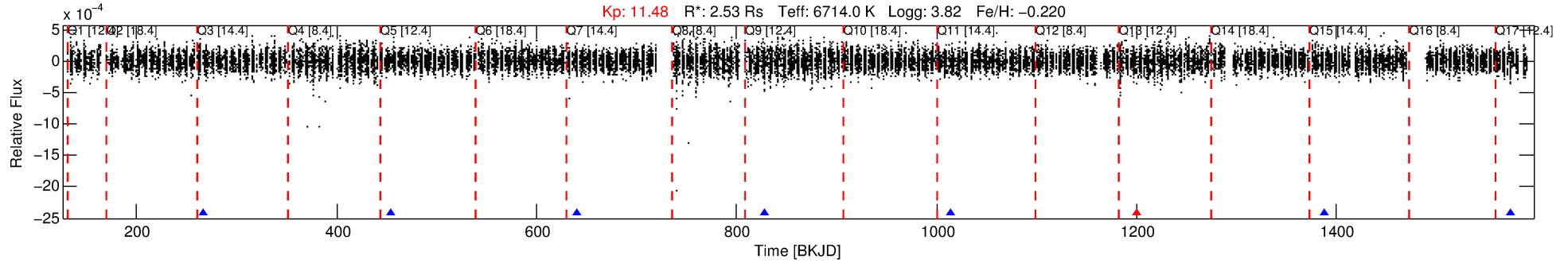
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 010333254-04

No Significant Match Found

# DV One-Page Summary

KIC: 10333254 Candidate: 4 of 9 Period: 186.779 d



## DV Fit Results:

Period = 186.77880 [0.00249] d  
Epoch = 267.0596 [0.0125] BKJD  
Rp/R\* = 0.0144 [0.0049]  
a/R\* = 128.05 [246.71]  
b = 0.90 [0.42]  
Seff = 21.33 [10.93]  
Teq = 548 [70] K  
Rp = 3.98 [1.99] Re  
a = 0.7404 [0.2426] AU  
Ag = 3229.72 [2832.46] [1.14 $\sigma$ ]  
Teffp = 6387 [1163] K [5.01 $\sigma$ ]

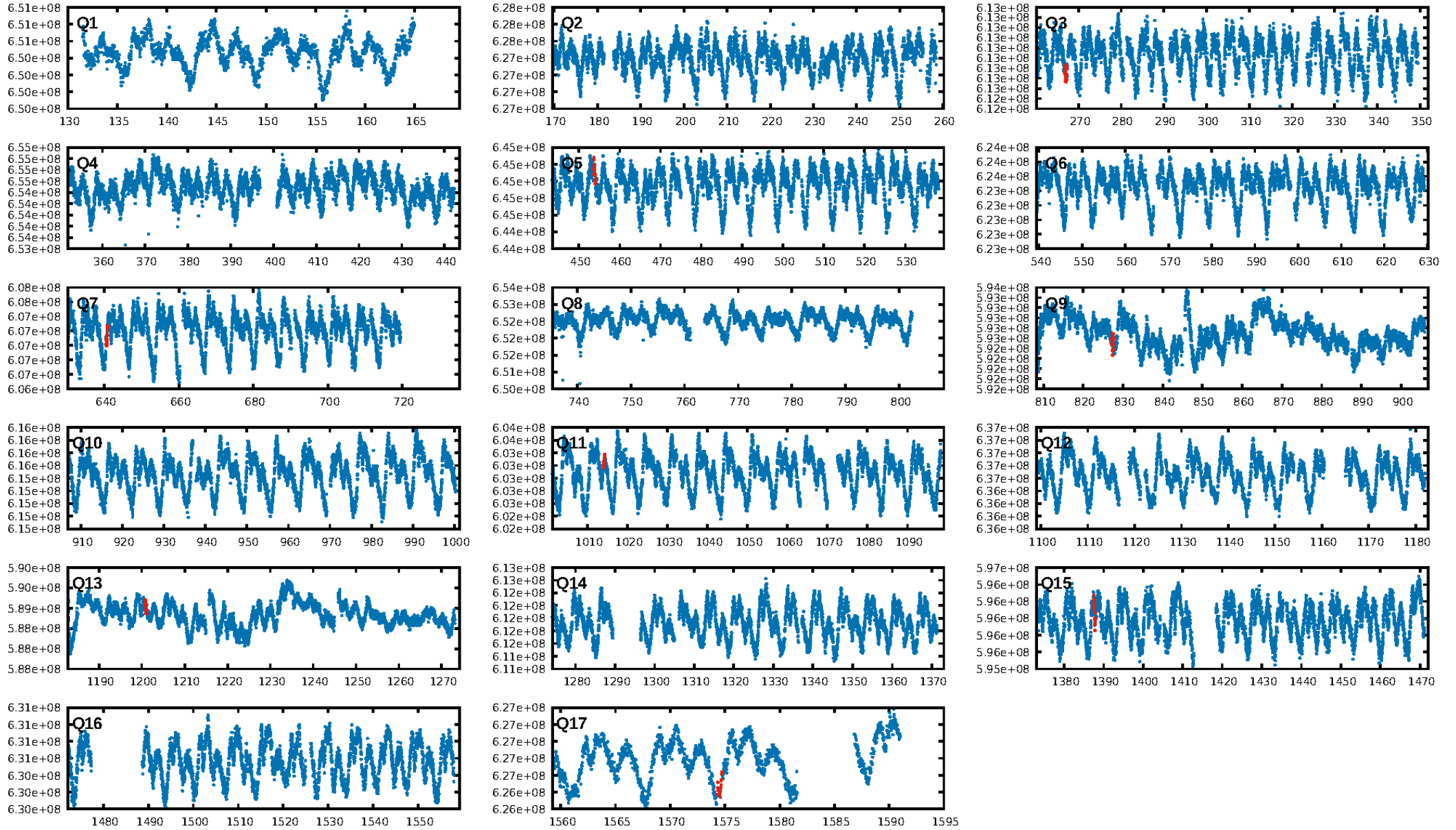
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [53.49 $\sigma$ ]  
LongPeriod-sig: 100.0% [75.17 $\sigma$ ]  
ModelChiSquare2-sig: 79.0%  
ModelChiSquareGof-sig: 90.5%  
Bootstrap-pfa: 2.12e-09  
RollingBand-fgt: 0.67 [2/3]  
GhostDiagnostic-chr: 0.5639  
Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 0.886 arcsec [1.28 $\sigma$ ]  
KicOffset-rm: 0.761 arcsec [1.12 $\sigma$ ]  
OotOffset-st: 0/3/0/2 [5]  
KicOffset-st: 0/3/0/2 [5]  
DiffImageQuality-fgm: 0.60 [3/5]  
DiffImageOverlap-fno: 0.50 [3/6]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 07:16:58 Z

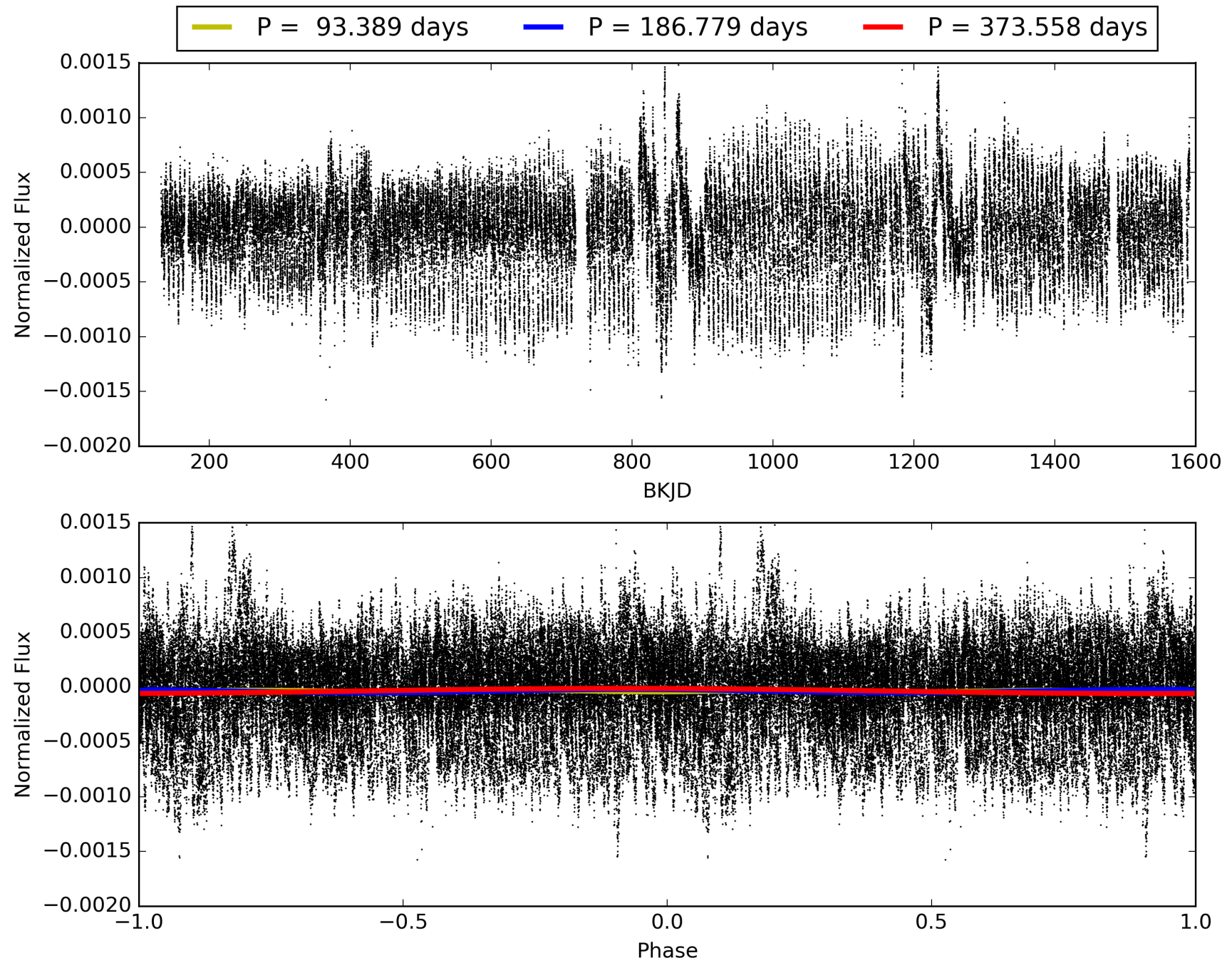
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010333254-04, PDC Light Curves



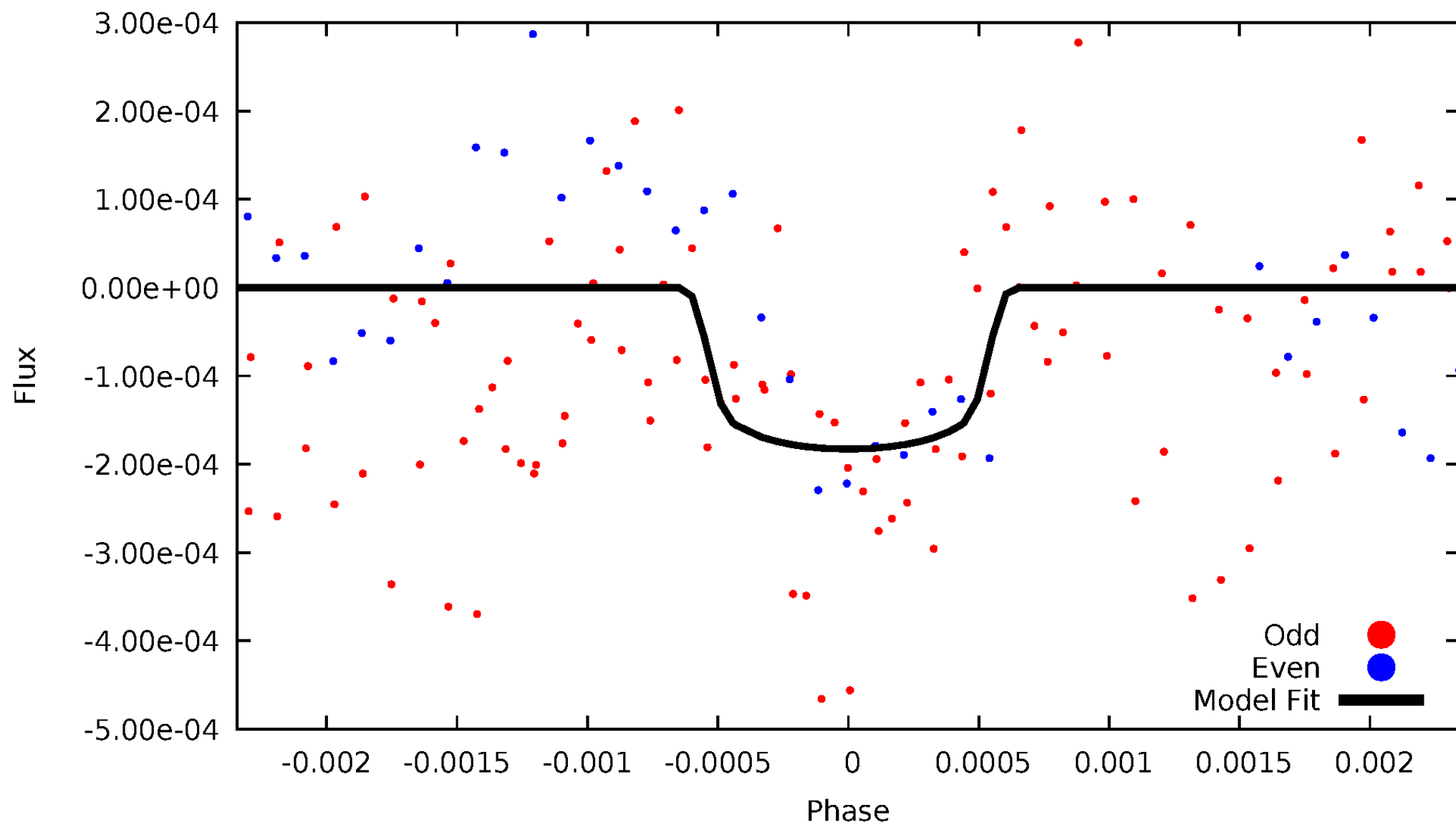


TCE 010333254-04



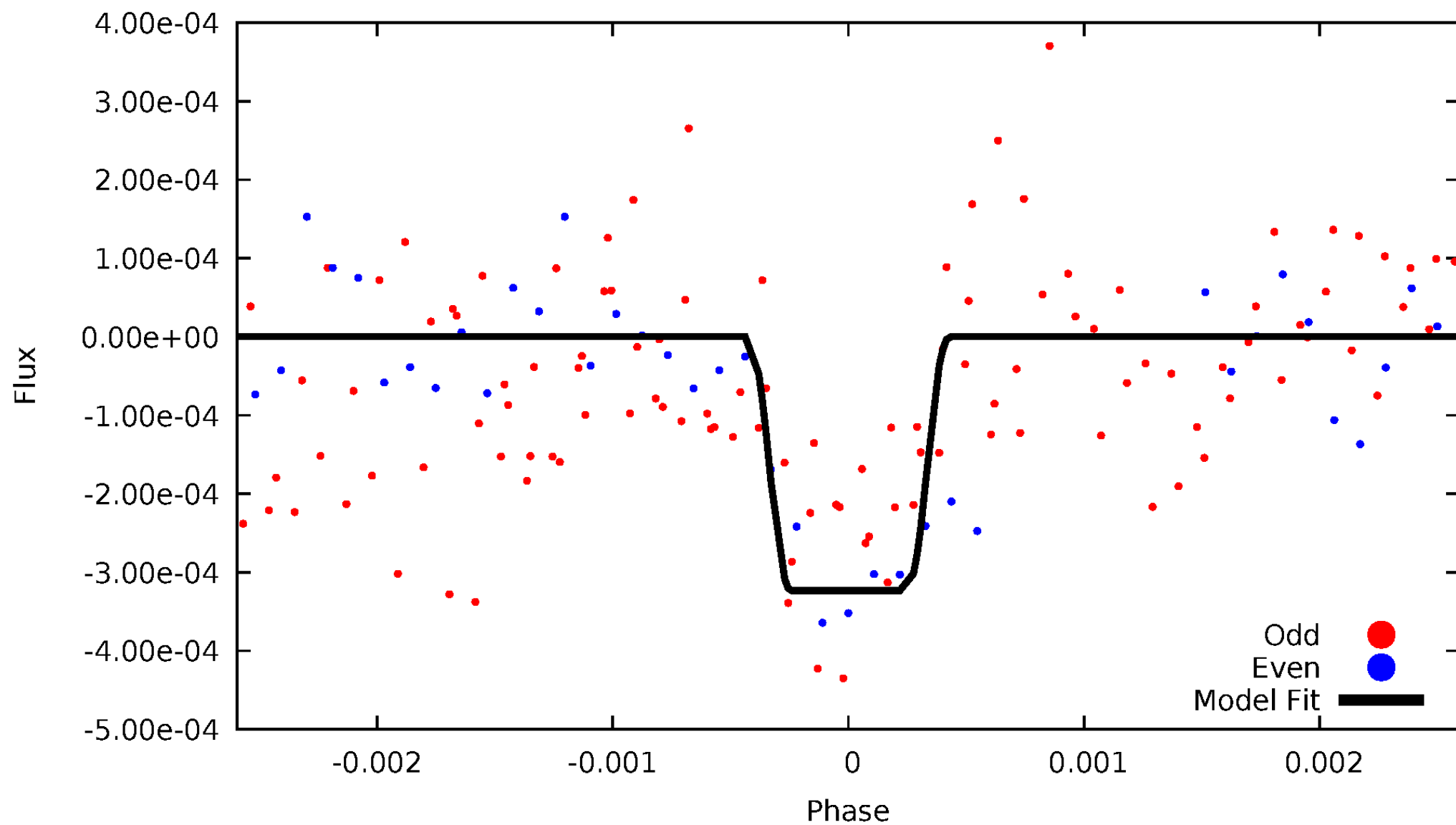
# DV Odd/Even

TCE 010333254-04



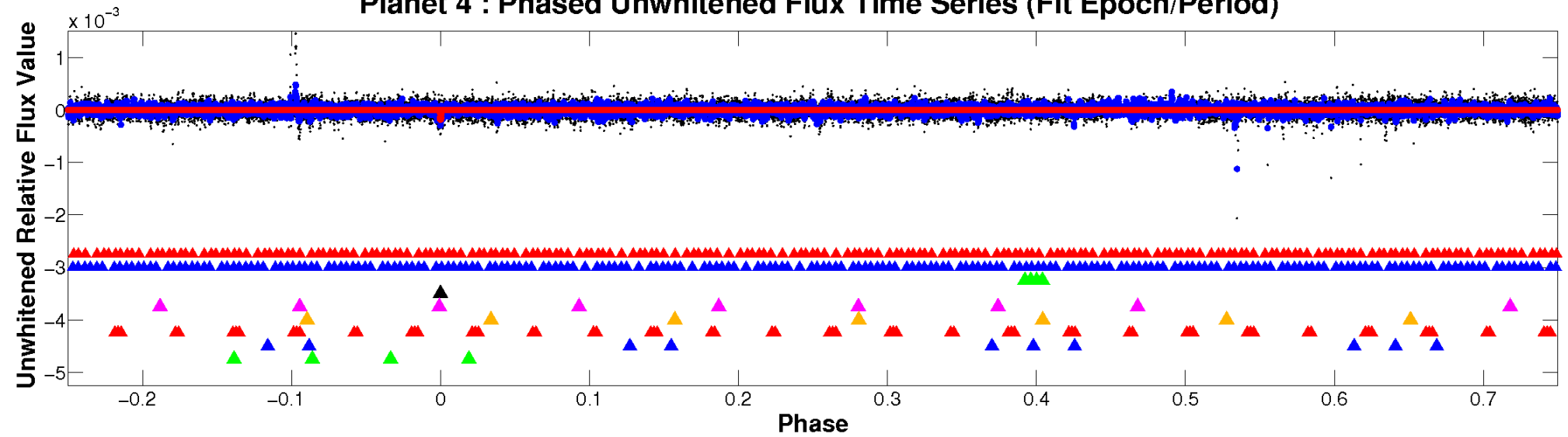
# ALT Odd/Even

TCE 010333254-04

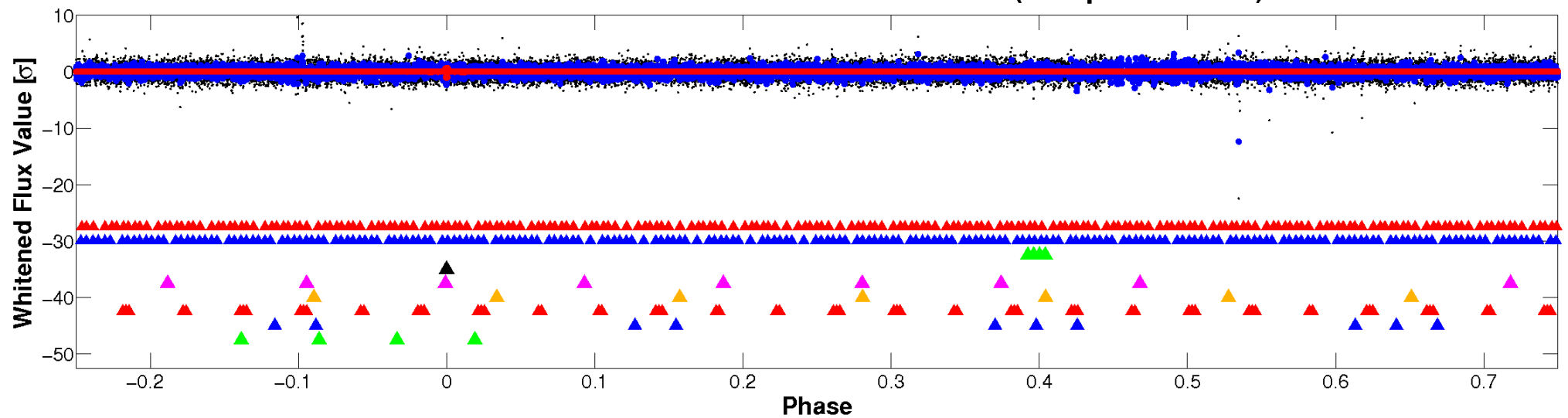


# Non-Whitened Vs. Whitened Light Curve

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

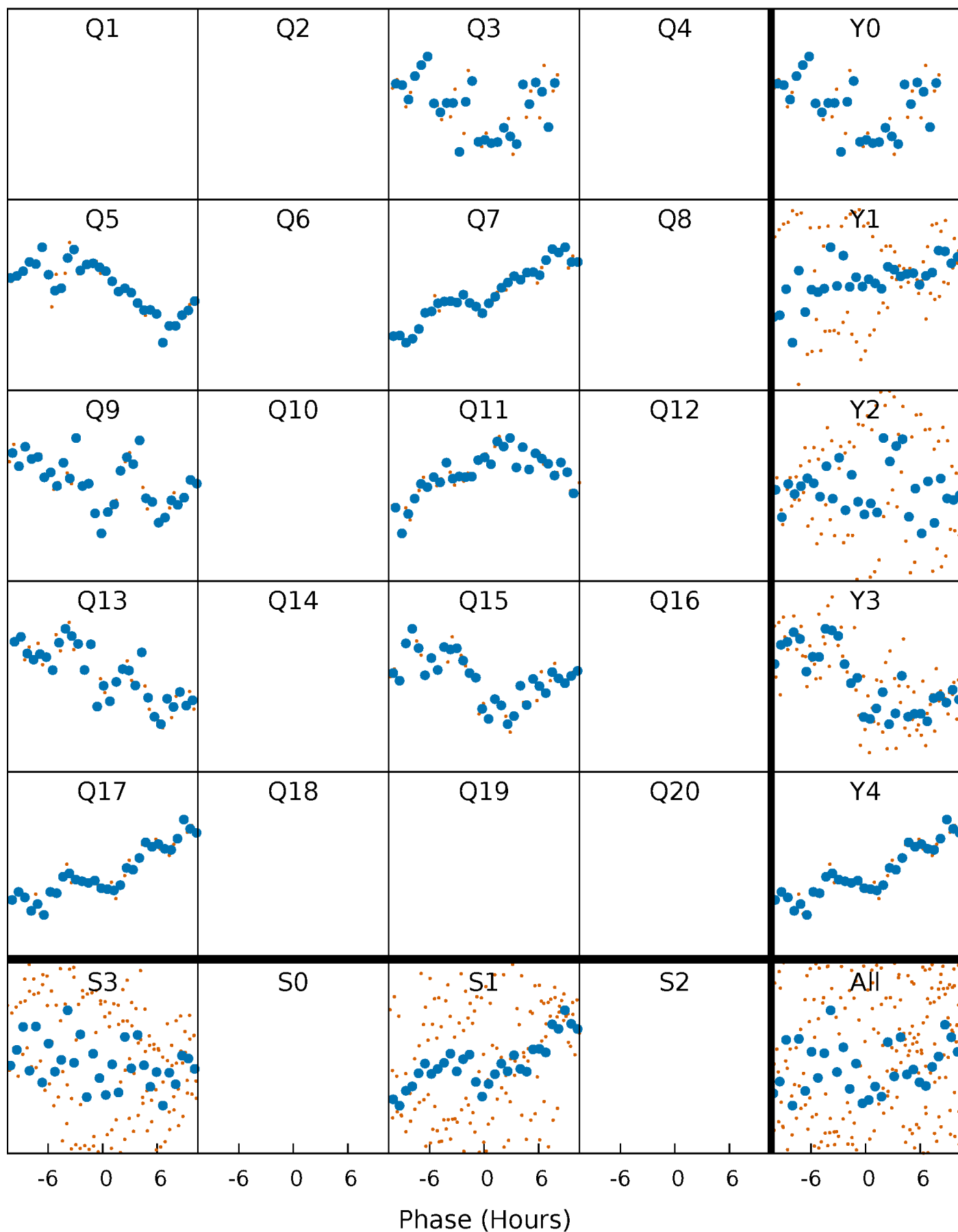


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



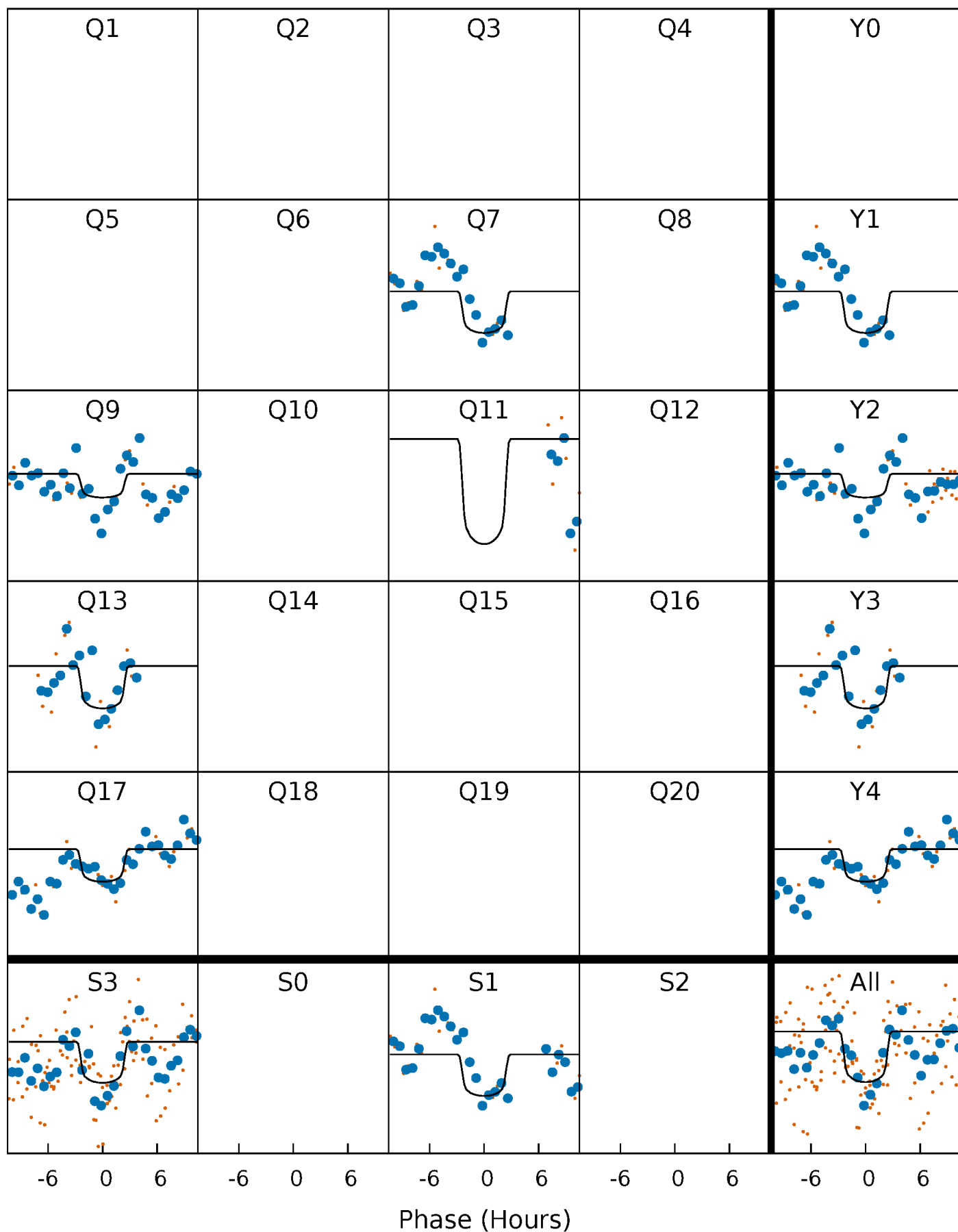
# PDC Quarter-Phased Transit Curves

TCE 010333254-04     $P=186.778799$  Days     $T_0=267.059650$  (BKJD)



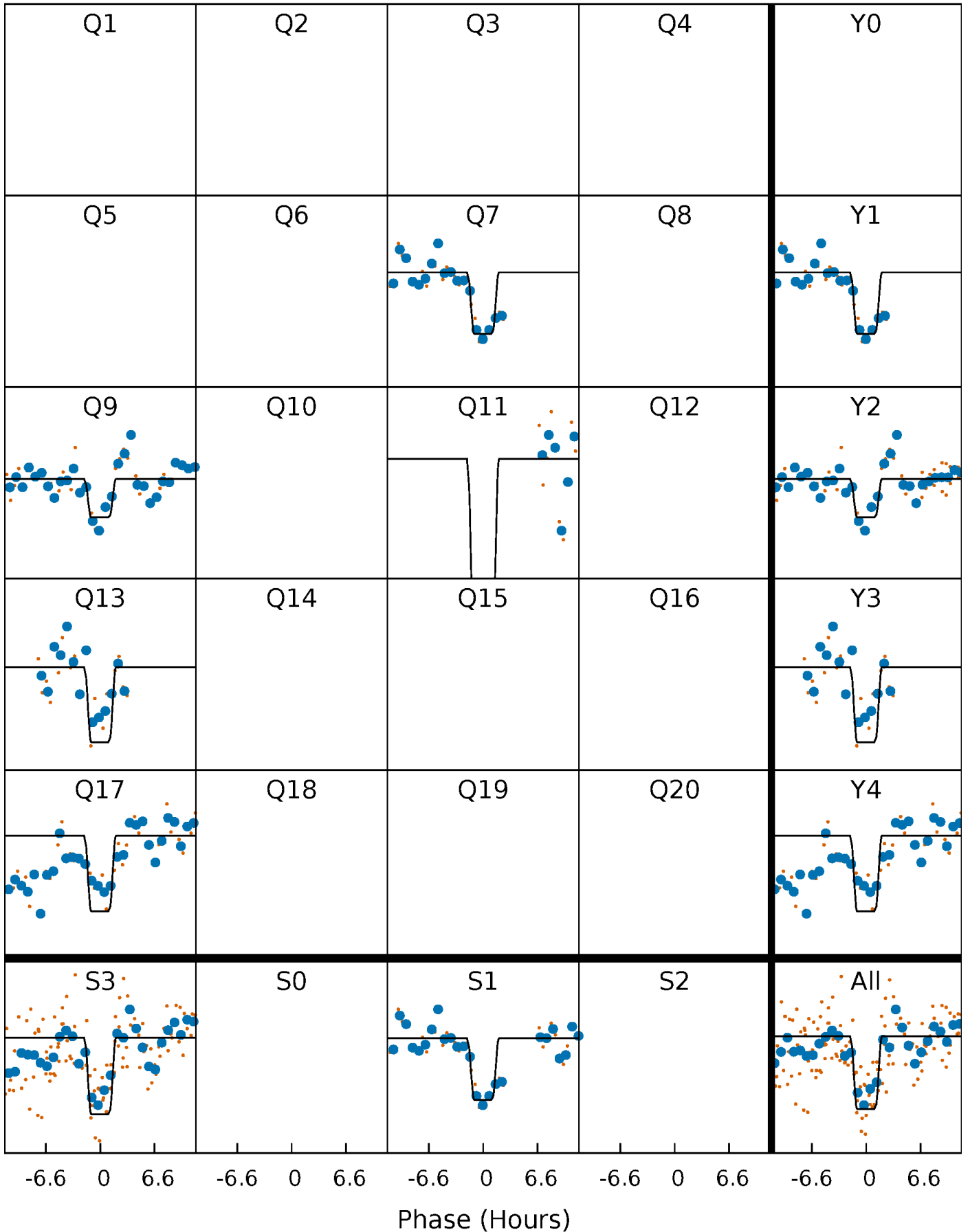
# DV Quarter-Phased Transit Curves

TCE 010333254-04     $P=186.778799$  Days     $T_0=267.059650$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 010333254-04     $P=186.784975$  Days     $T_0=267.046286$  (BKJD)

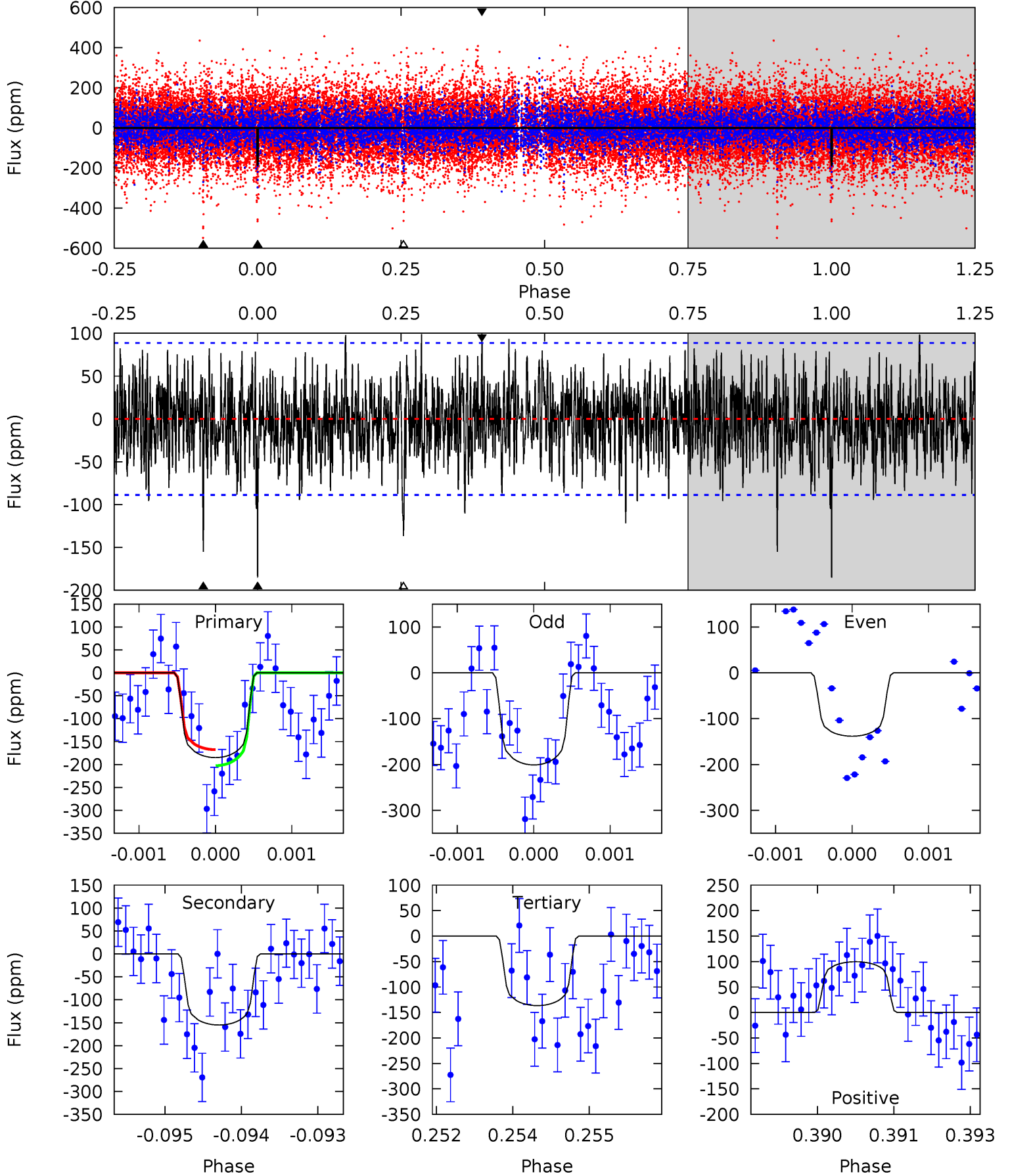




# DV Model-Shift Uniqueness Test

010333254-04,  $P = 186.778799$  Days,  $E = 80.280851$  Days

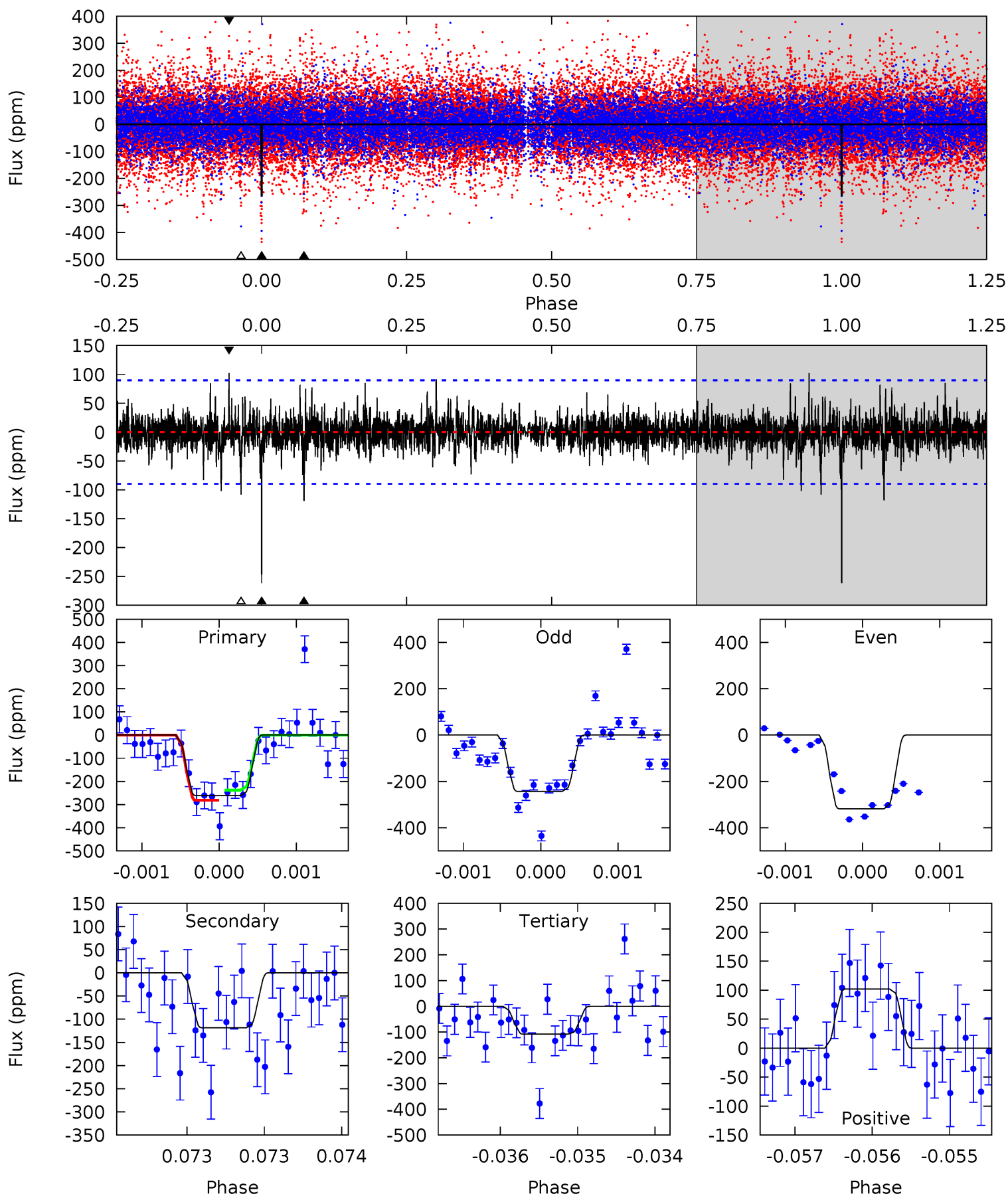
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.3	9.47	8.33	6.08	5.42	3.24	2.02	2.96	5.20	1.13	3.38	1.72	1.09	0.35	1.06



# Alt Model-Shift Uniqueness Test

010333254-04,  $P = 186.784975$  Days,  $E = 80.261311$  Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
16.0	7.26	6.62	6.25	5.50	3.36	1.23	9.42	9.79	0.64	1.01	2.09	0.99	0.28	1.34



### Stellar Parameters For KIC 010333254

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6714^{+168}_{-184}$	$3.821^{+0.285}_{-0.095}$	$-0.220^{+0.300}_{-0.250}$	$2.534^{+0.463}_{-0.927}$	$1.550^{+0.183}_{-0.340}$	$0.134^{+0.245}_{-0.041}$
	+3%/-3%	+7%/-2%	+136%/-114%	+18%/-37%	+12%/-22%	+183%/-31%
Source	PHO1	FLK73	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 010333254-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-155 \pm 16$	$3.61^{+1.60}_{-1.24}$	$749^{+49}_{-69}$	$6217^{+1724}_{-805}$	$3461^{+4579}_{-1747}$
Alt.	$-118 \pm 16$	$4.70^{+1.63}_{-1.51}$	$751^{+45}_{-62}$	$5243^{+869}_{-561}$	$1625^{+1846}_{-752}$

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

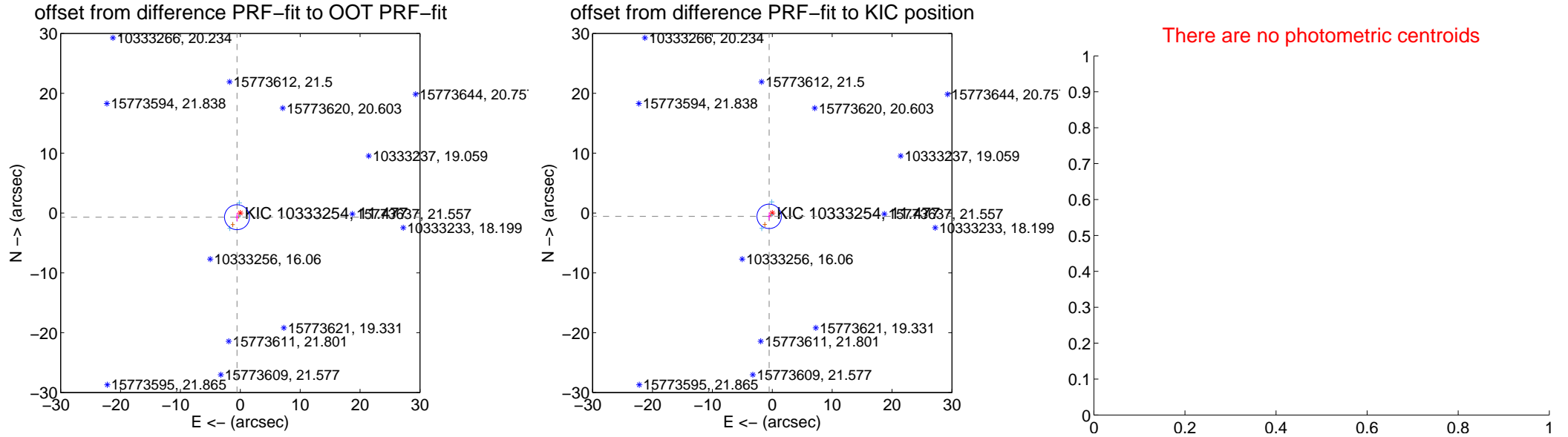
## DV Centroid Data

Supplemental centroid analysis for 010333254-04. **Kepler magnitude: 11.48.** Transit SNR 6.61

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

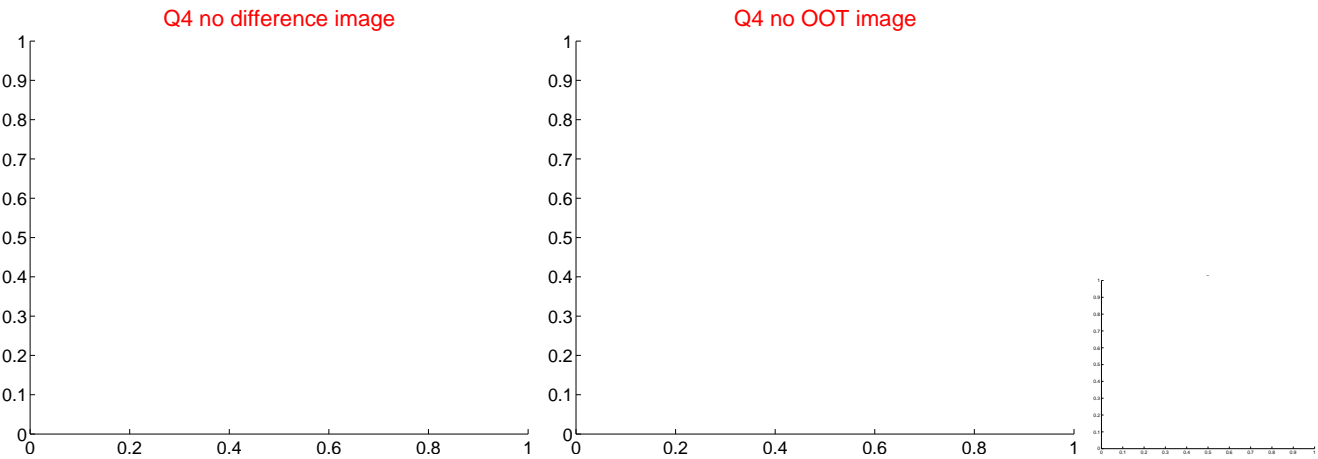
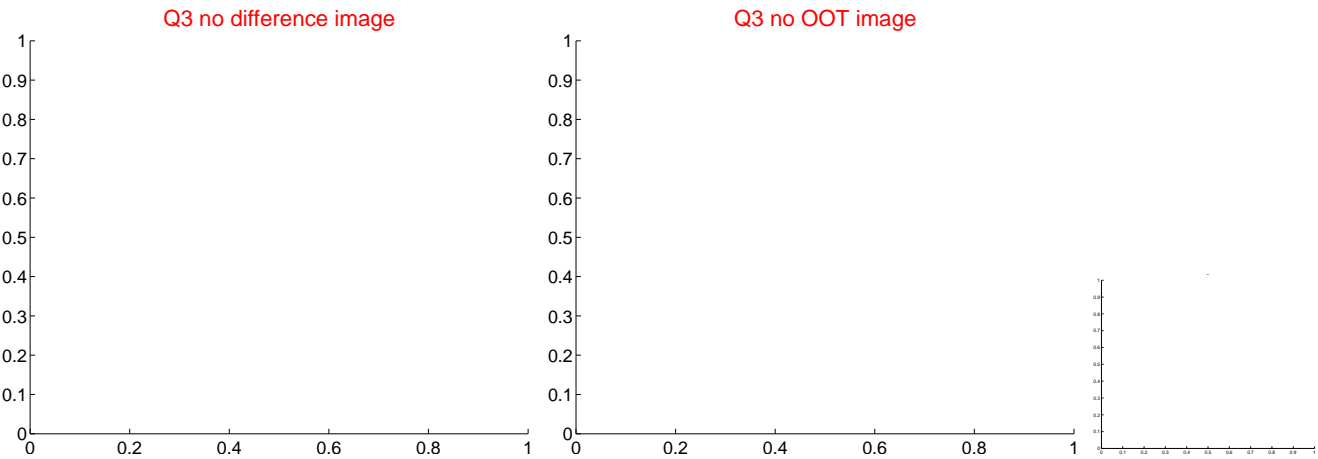
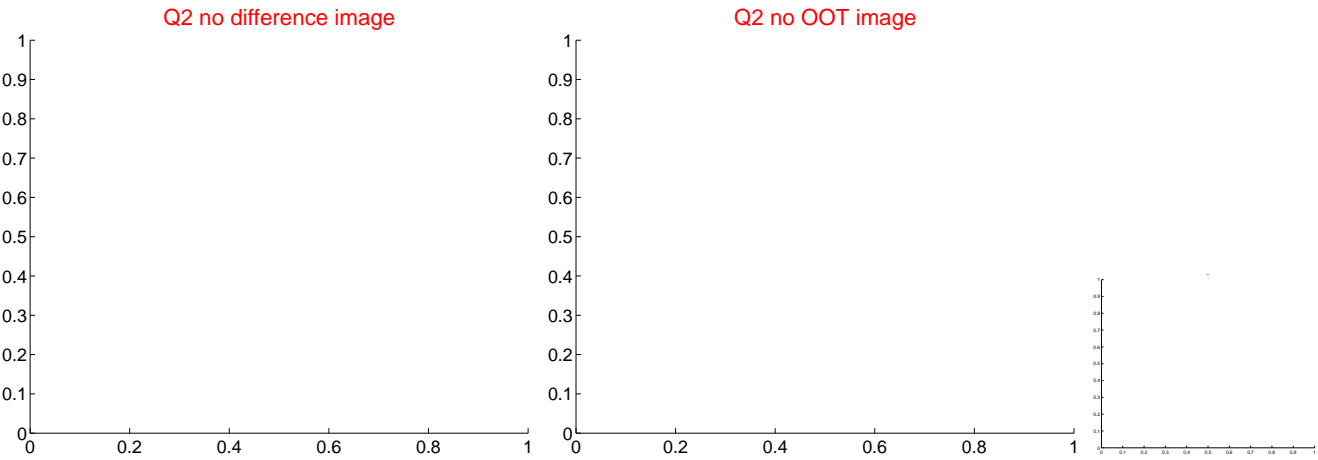
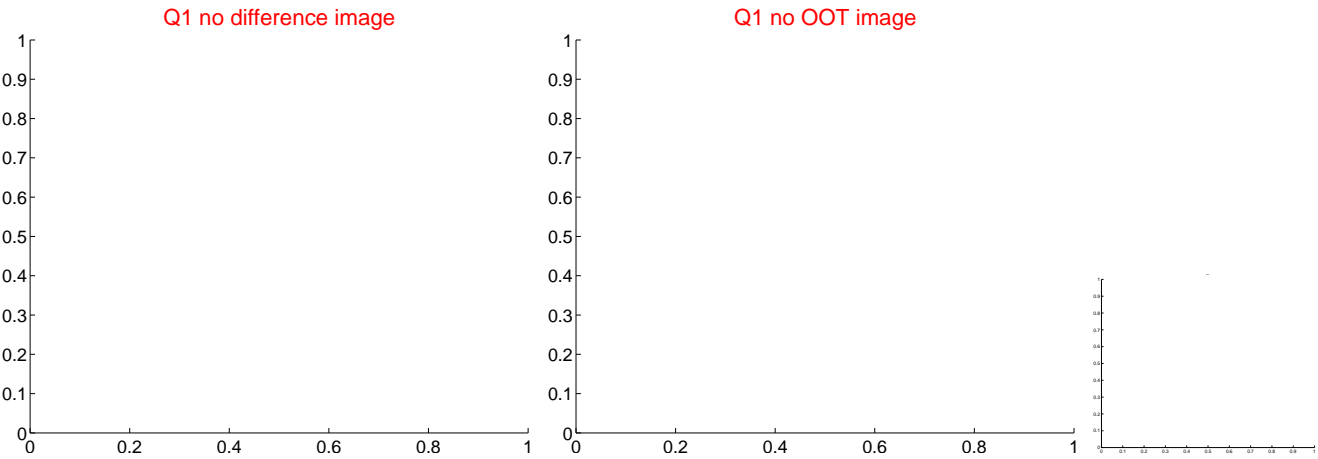
The direct PRF centroid is offset from the target star catalog position by about 0.02 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.886 \pm 0.695$	1.28	$0.545 \pm 0.258$	$-0.699 \pm 0.717$
PRF-fit source offset from KIC position	$0.761 \pm 0.679$	1.12	$0.518 \pm 0.307$	$-0.558 \pm 0.666$
photometric centroid source offset	—	—	—	—

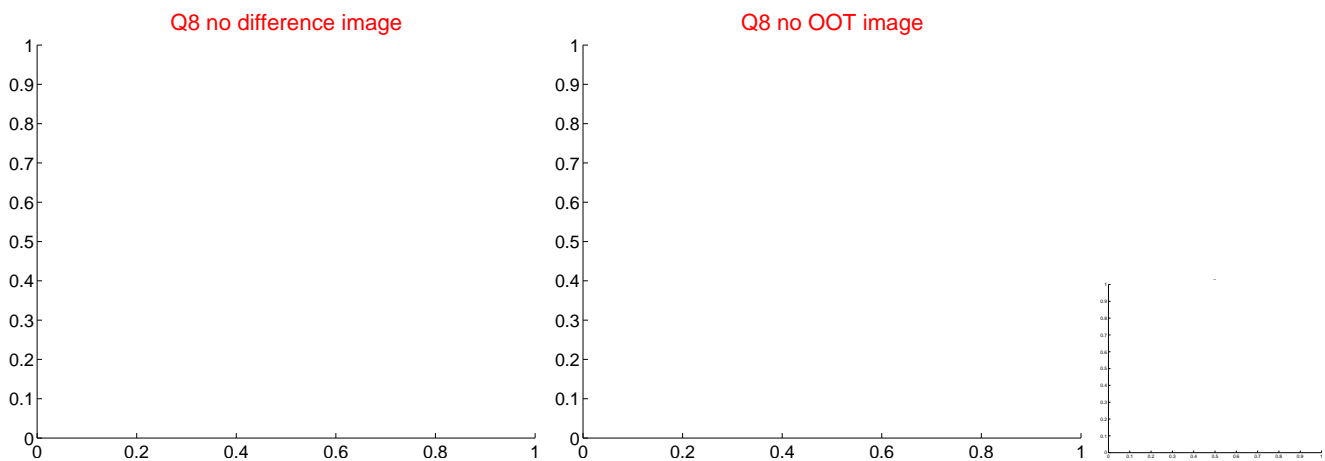
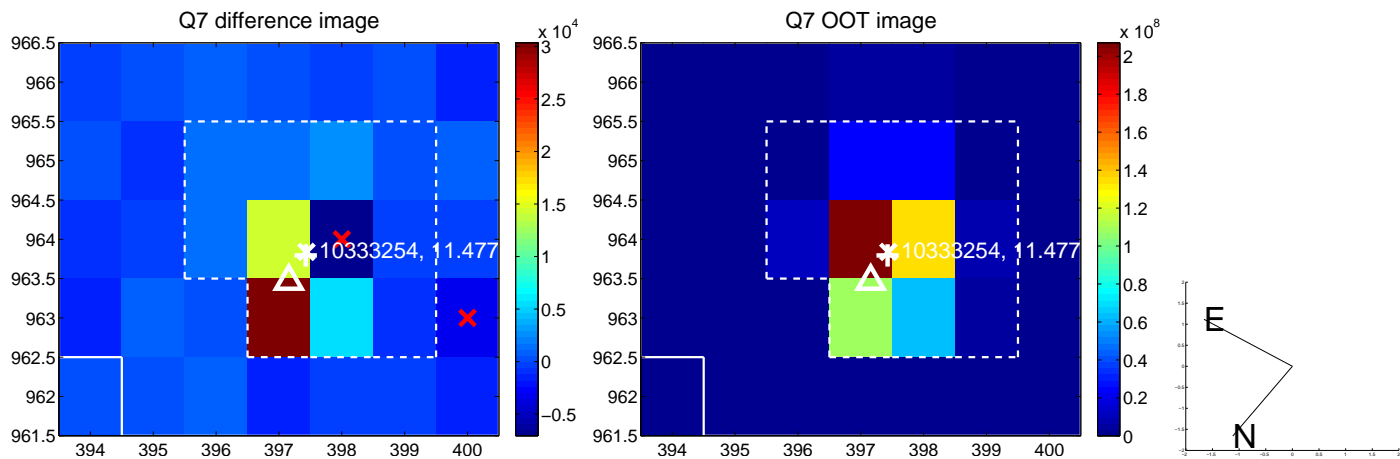
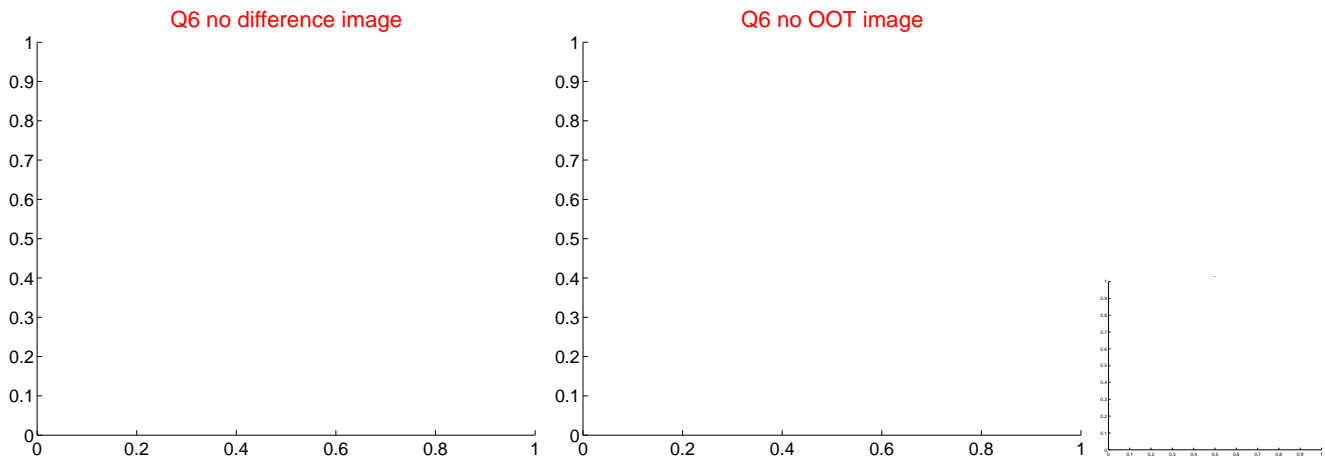
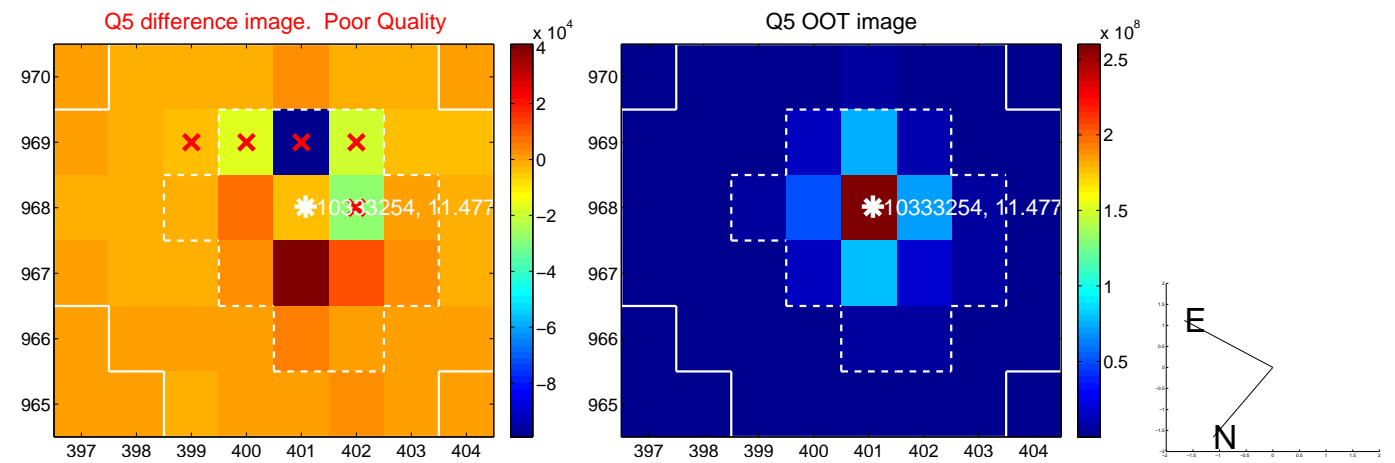


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

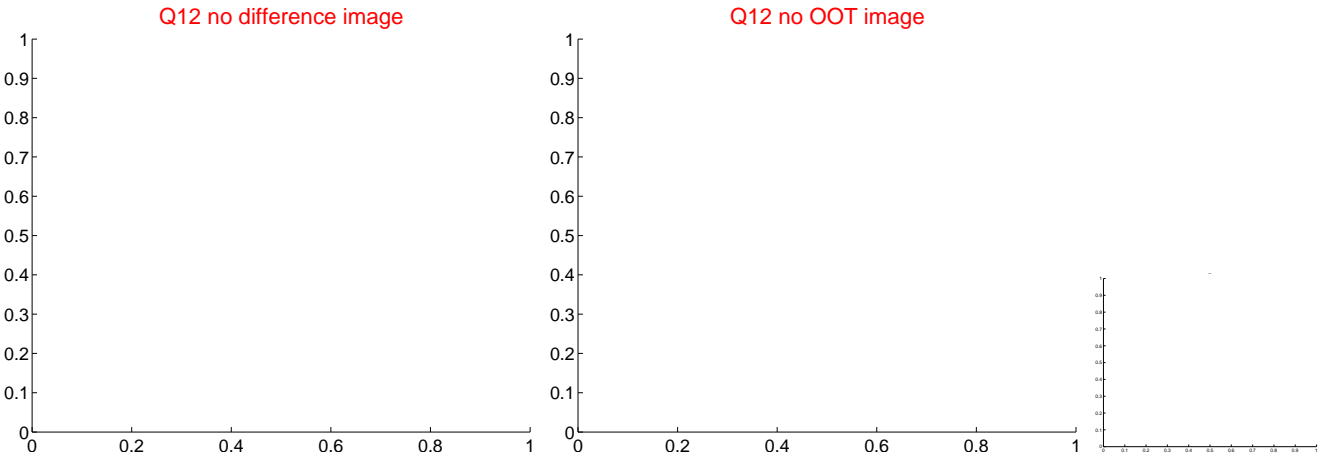
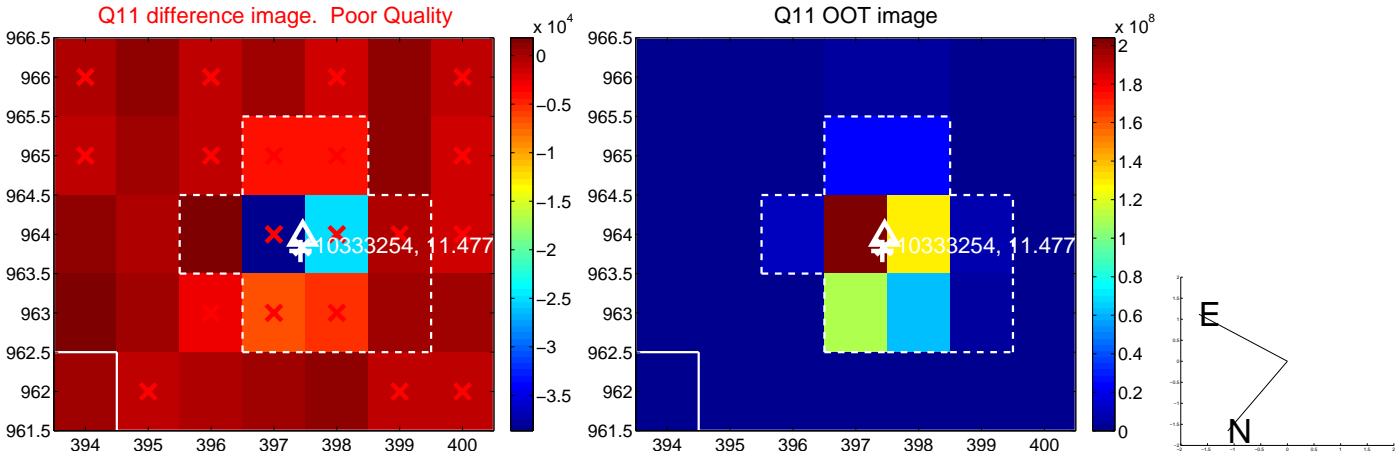
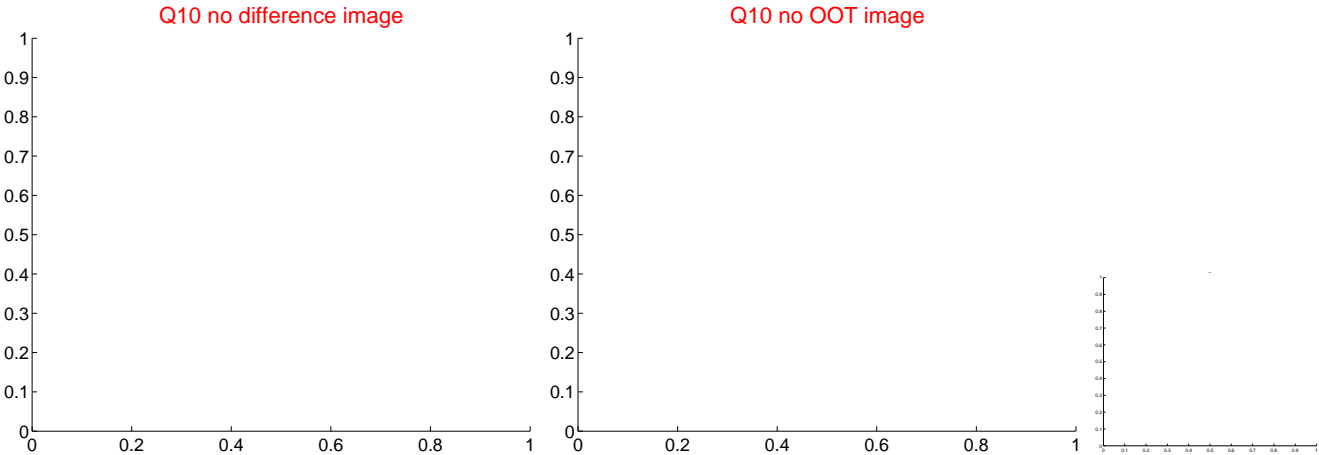
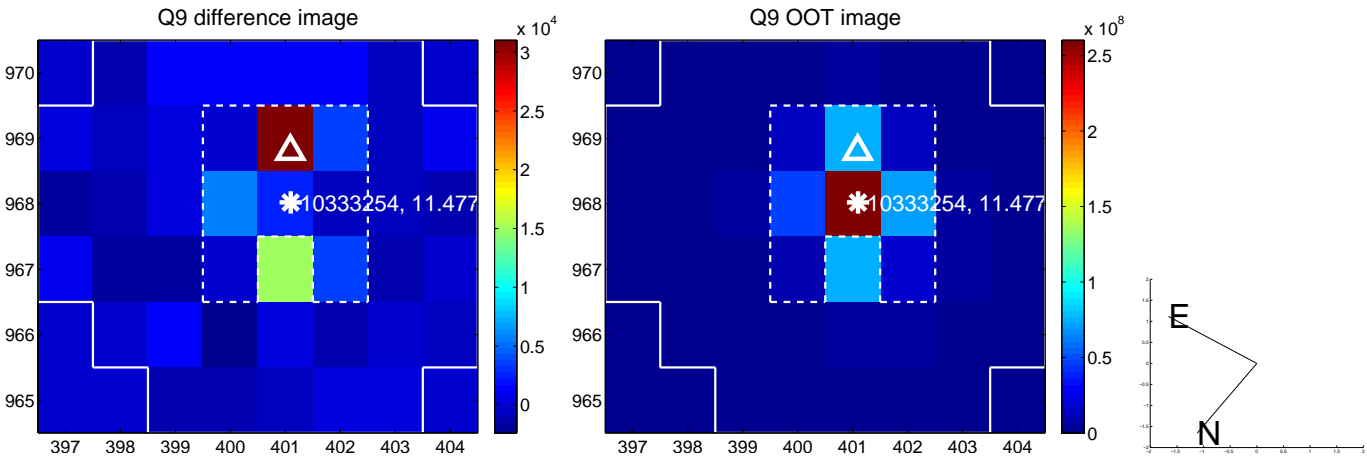
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



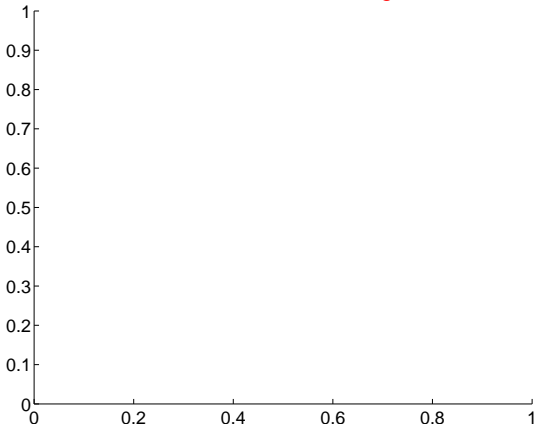
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



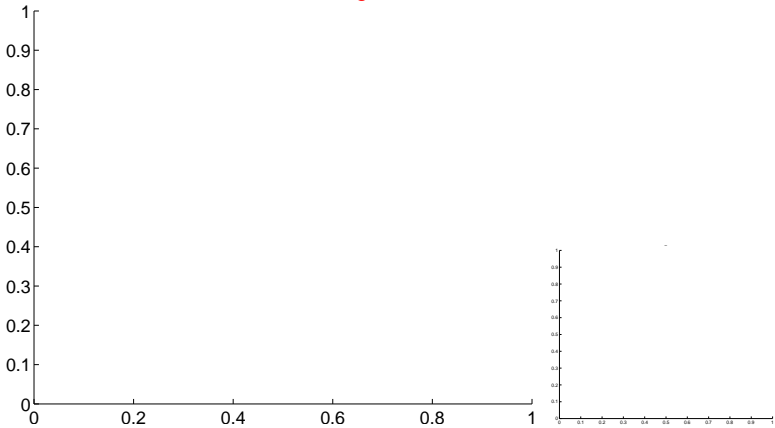


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

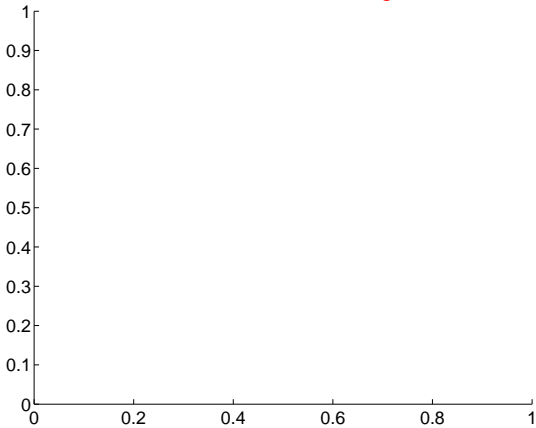
Q13 no difference image



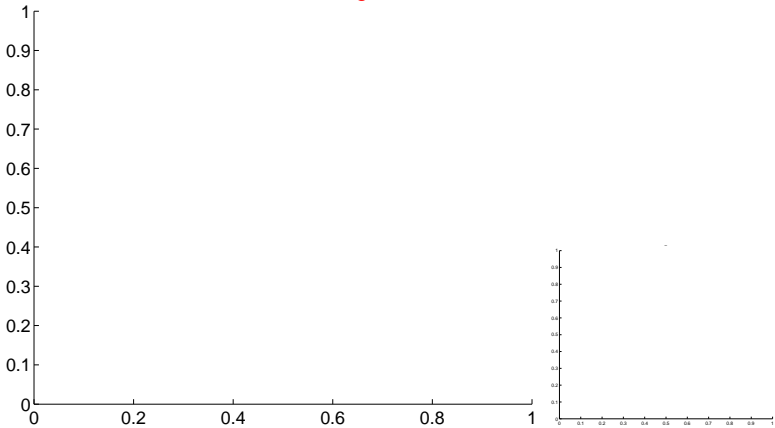
Q13 no OOT image



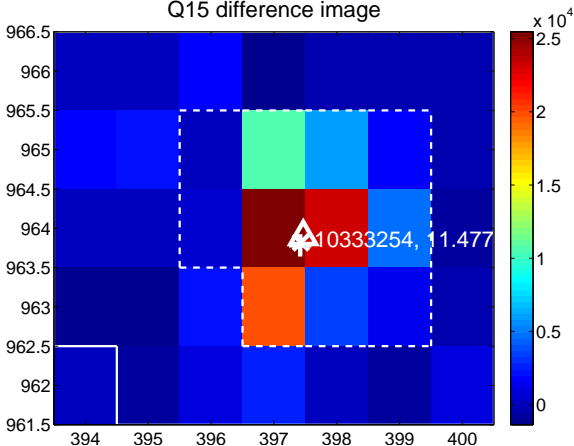
Q14 no difference image



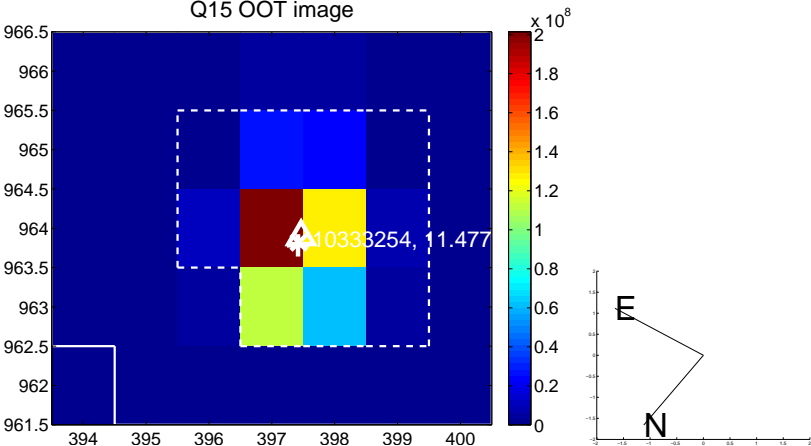
Q14 no OOT image



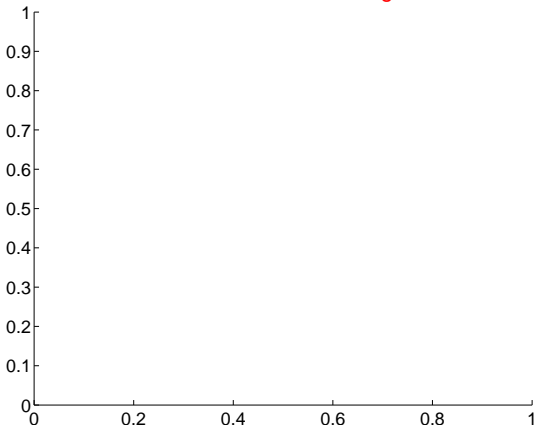
Q15 difference image



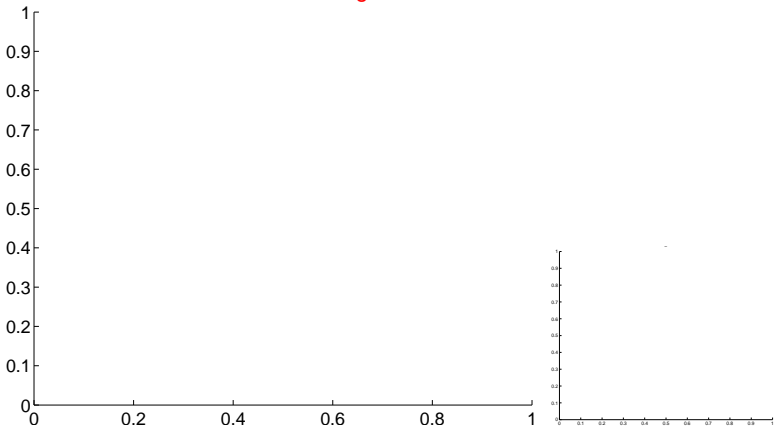
Q15 OOT image



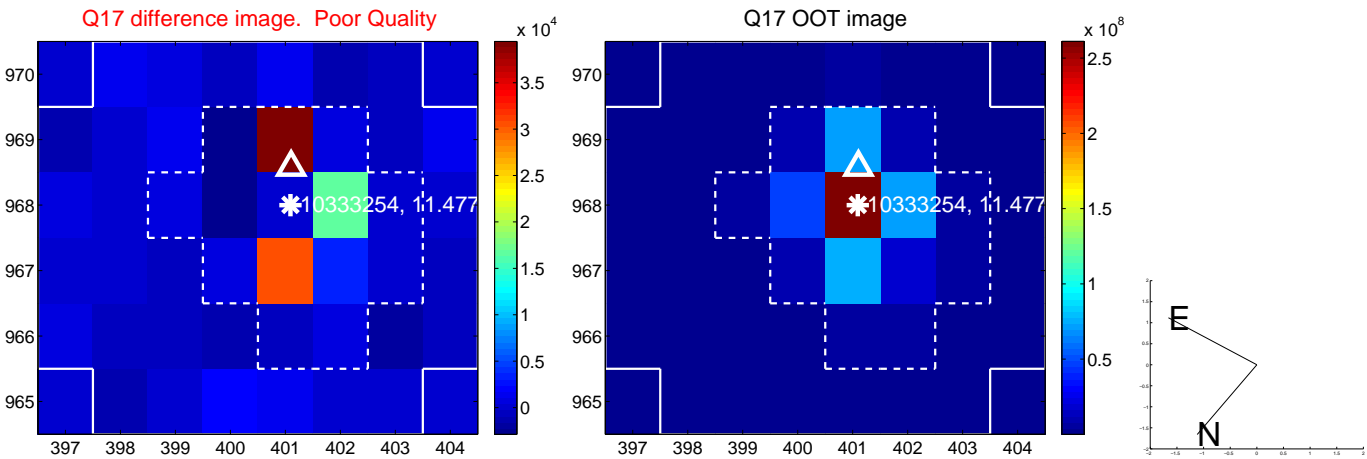
Q16 no difference image



Q16 no OOT image

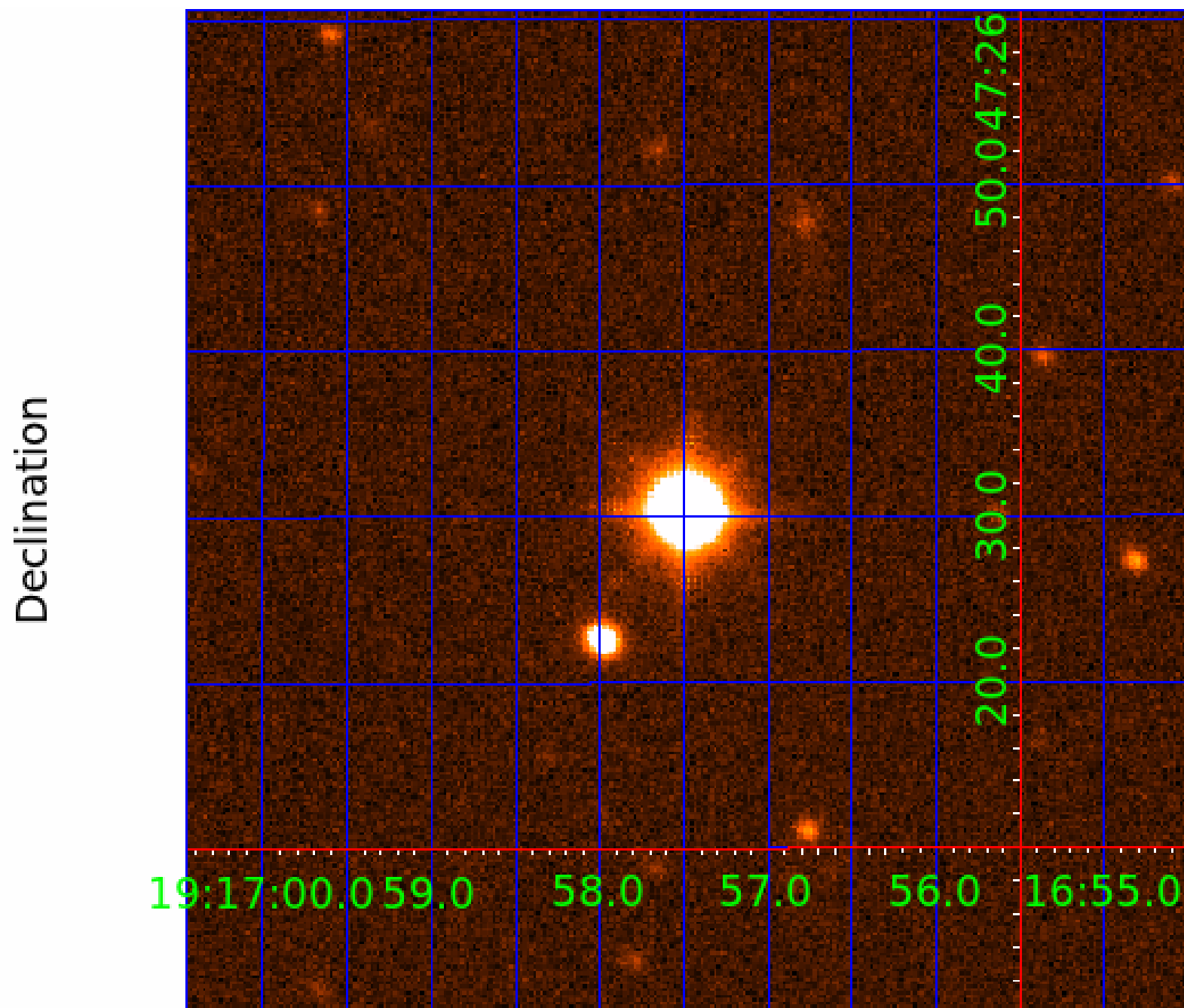


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



folded centroid time series figure for this object.

UKIRT Image



# KIC 010333254

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010333254-01	OBS	No	6.722893	137.475942	87.9	15.137	14.1	14.9	2.53	6714	3.41	1794.52
010333254-02	OBS	No	6.724655	132.709949	57.0	12.956	9.3	11.4	2.53	6714	3.83	1793.90
010333254-03	OBS	No	372.827910	155.750785	307.1	10.390	10.9	8.2	2.53	6714	5.23	8.49
010333254-04	OBS	No	186.778799	267.059650	182.7	5.251	8.0	6.6	2.53	6714	3.98	21.33
010333254-05	OBS	No	169.268559	167.694248	188.1	5.844	7.8	6.9	2.53	6714	3.84	24.32
010333254-06	OBS	No	209.835227	250.336223	176.0	5.160	7.8	7.4	2.53	6714	3.92	18.26
010333254-07	OBS	No	22.397421	137.445498	85.3	5.909	7.8	7.7	2.53	6714	2.79	360.66
010333254-08	OBS	No	141.378804	194.828778	127.9	5.405	7.3	8.0	2.53	6714	3.43	30.92
010333254-09	OBS	No	363.741743	457.410736	271.3	10.246	8.7	8.3	2.53	6714	5.37	8.77

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010333254-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—CENT_SATURATED
010333254-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—SAME_NTL_PERIOD—CENT_SATURATED
010333254-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
010333254-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—CENT_SATURATED
010333254-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-07	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

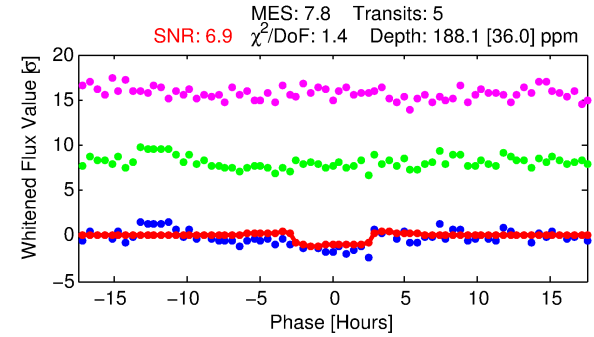
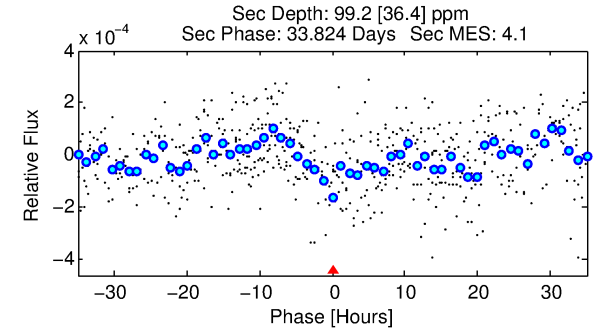
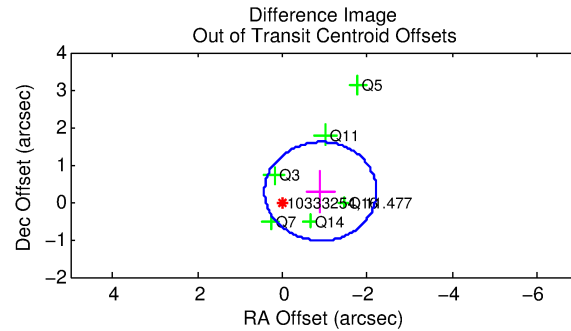
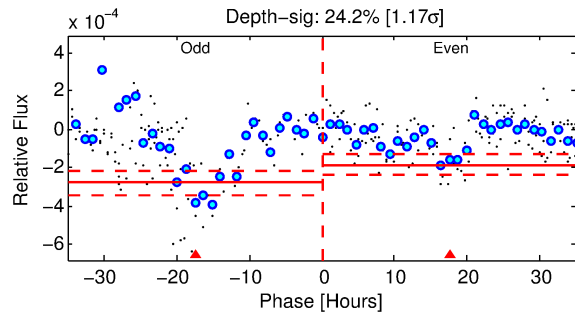
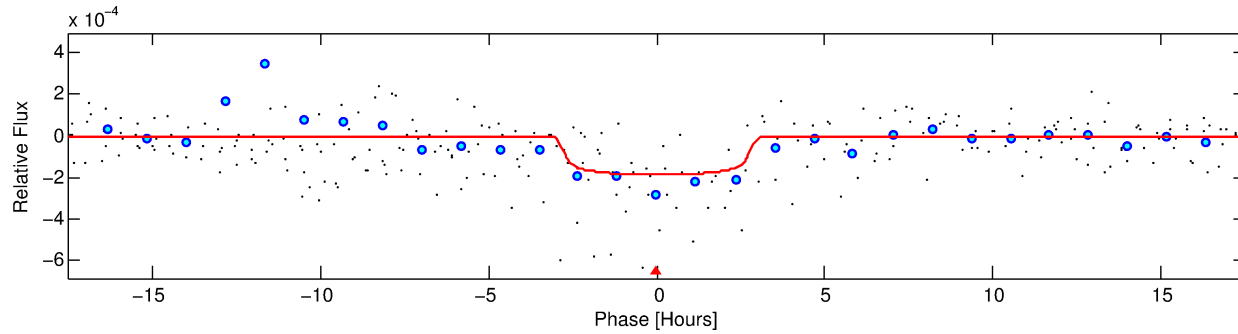
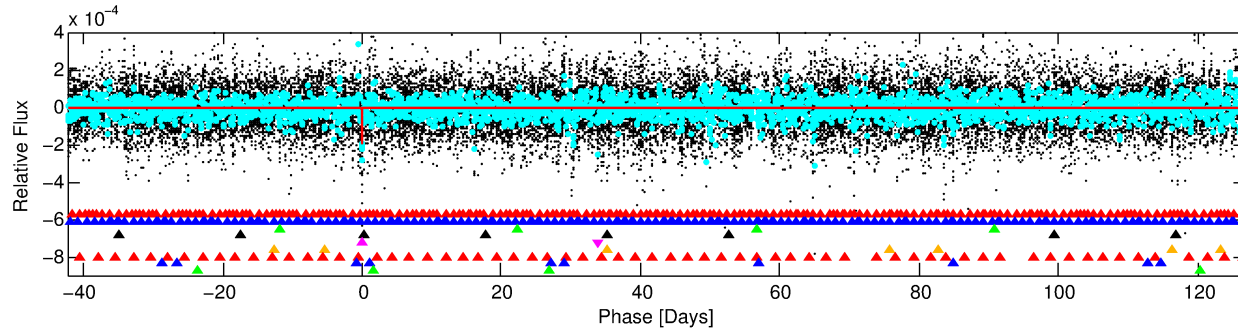
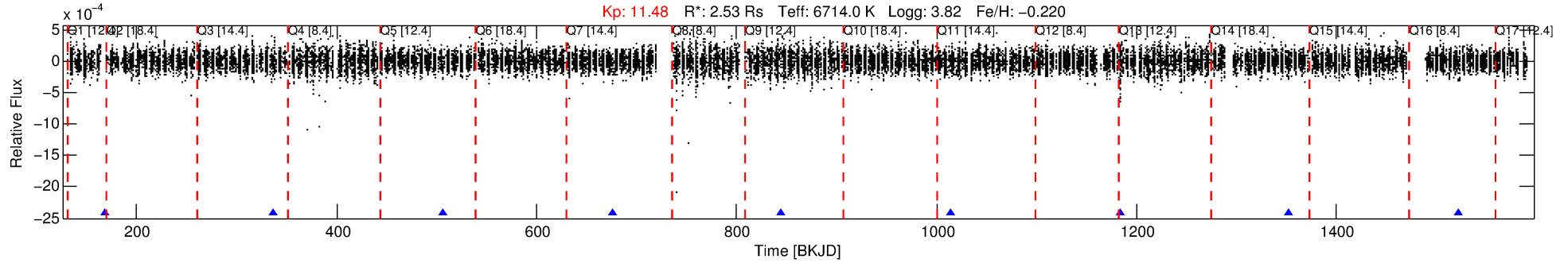
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 010333254-05

No Significant Match Found

# DV One-Page Summary

KIC: 10333254 Candidate: 5 of 9 Period: 169.269 d



## DV Fit Results:

Period = 169.26856 [0.00279] d  
Epoch = 167.6942 [0.0139] BKJD  
Rp/R\* = 0.0139 [0.0112]  
a/R\* = 137.67 [638.46]  
b = 0.80 [2.09]  
Seff = 24.32 [12.47]  
Teq = 566 [73] K  
Rp = 3.84 [3.40] Re  
a = 0.6933 [0.2271] AU  
Ag = 1783.03 [3088.41] [0.58 $\sigma$ ]  
Teffp = 5689 [2363] K [2.17 $\sigma$ ]

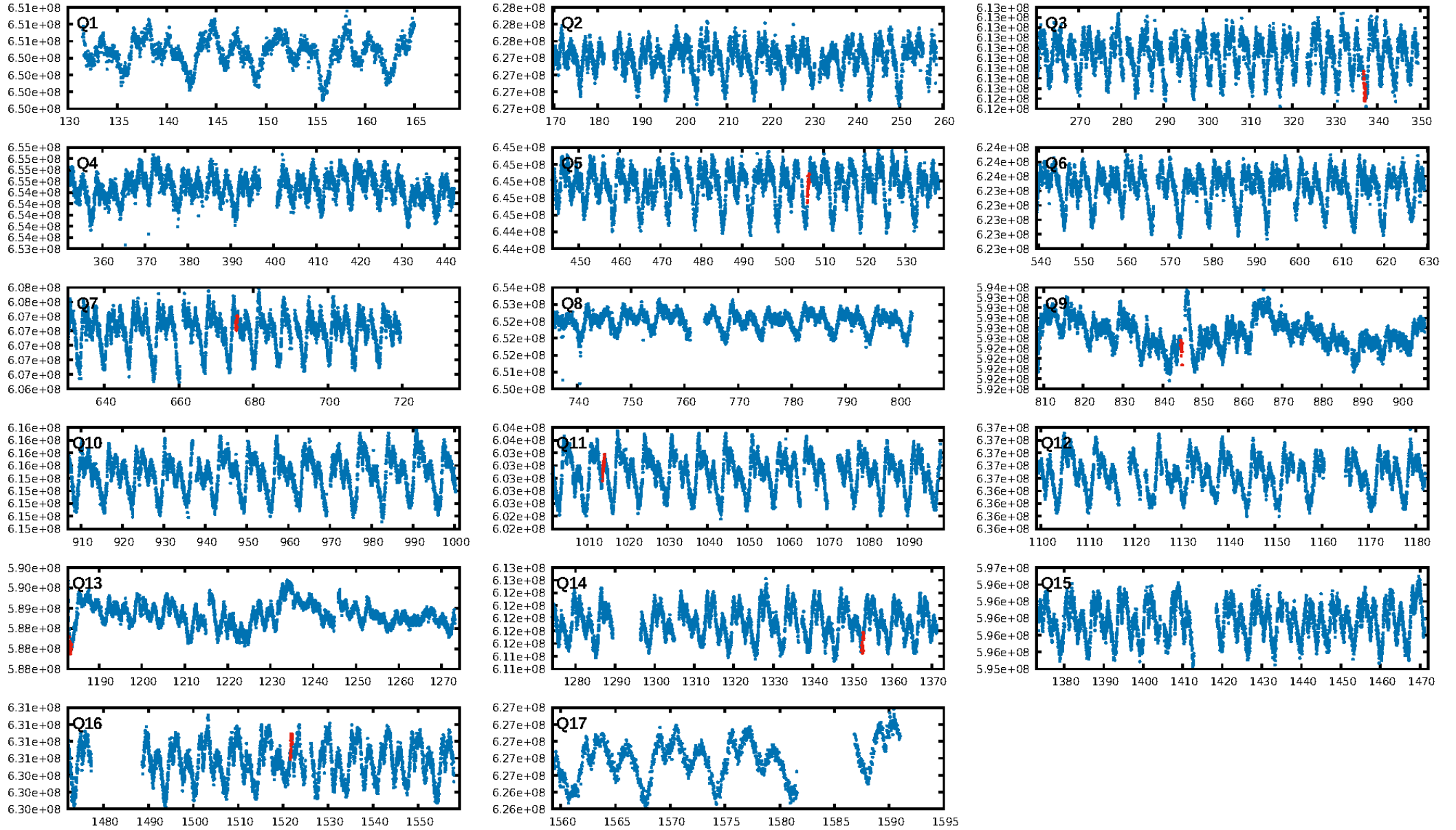
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [84.09 $\sigma$ ]  
LongPeriod-sig: 100.0% [53.49 $\sigma$ ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 69.2%  
Bootstrap-pfa: 3.72e-09  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 2.04  
Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 0.946 arcsec [2.15 $\sigma$ ]  
KicOffset-rm: 1.022 arcsec [2.58 $\sigma$ ]  
OotOffset-st: 1/3/1/1 [6]  
KicOffset-st: 1/3/1/1 [6]  
DiffImageQuality-fgm: 0.50 [3/6]  
DiffImageOverlap-fno: 0.50 [3/6]

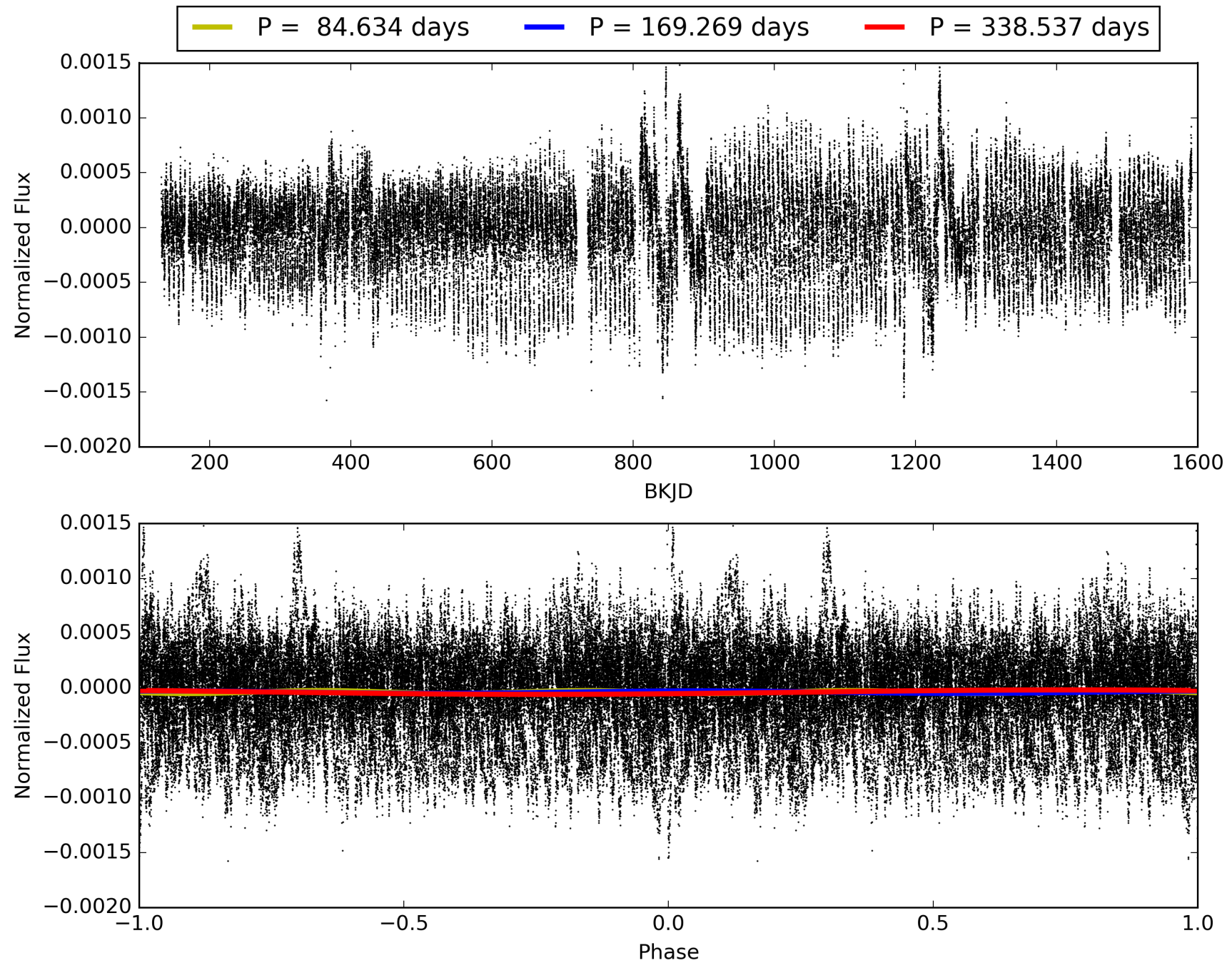
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 07:17:04 Z

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

# TCE 010333254-05, PDC Light Curves



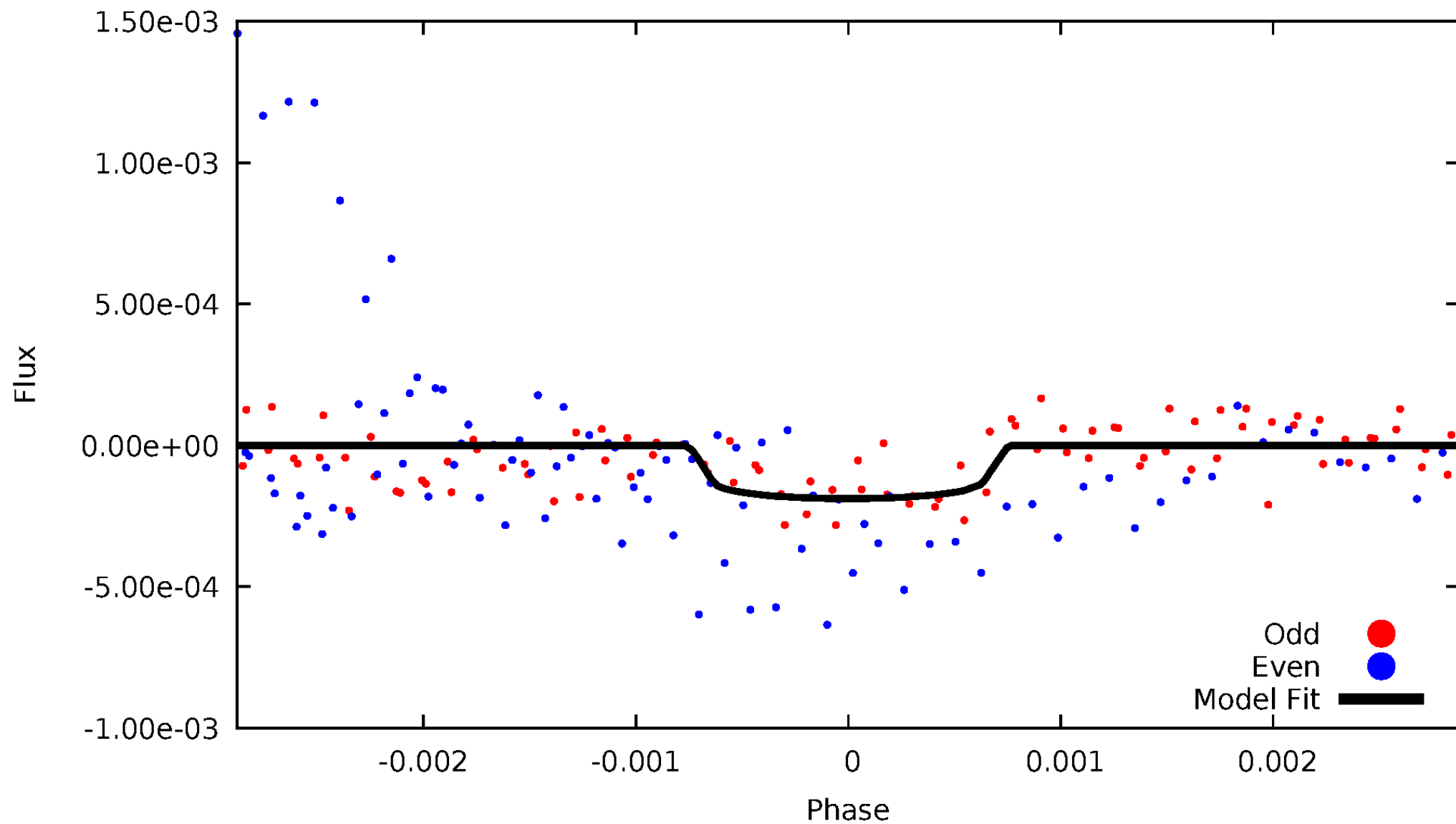
TCE 010333254-05





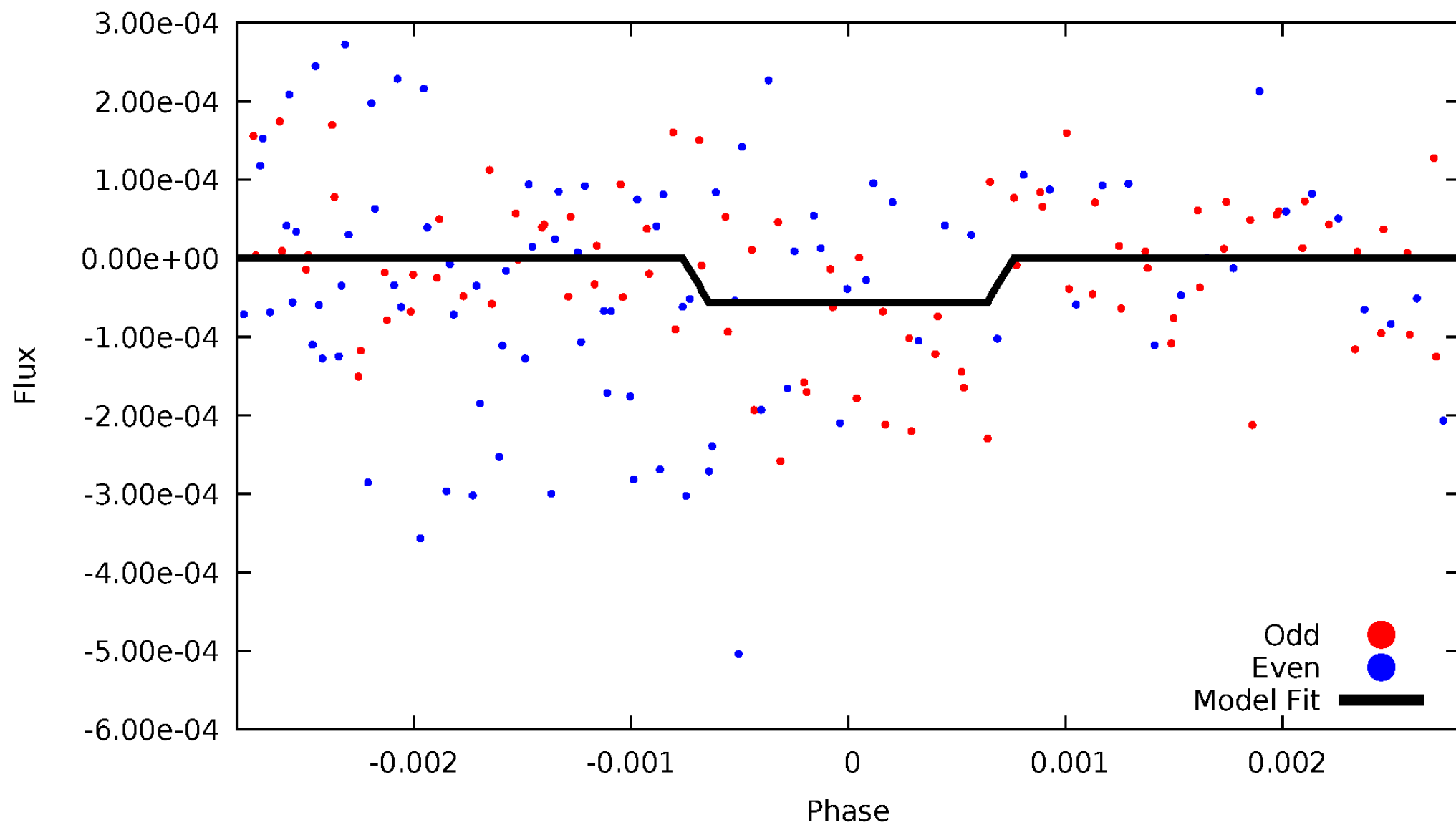
# DV Odd/Even

TCE 010333254-05



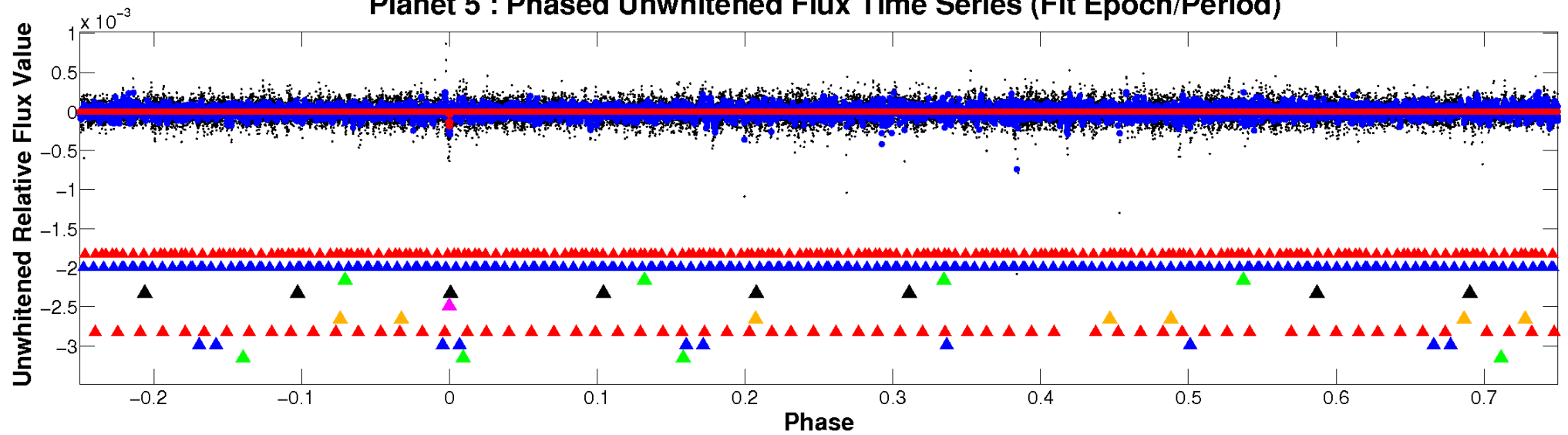
# ALT Odd/Even

TCE 010333254-05

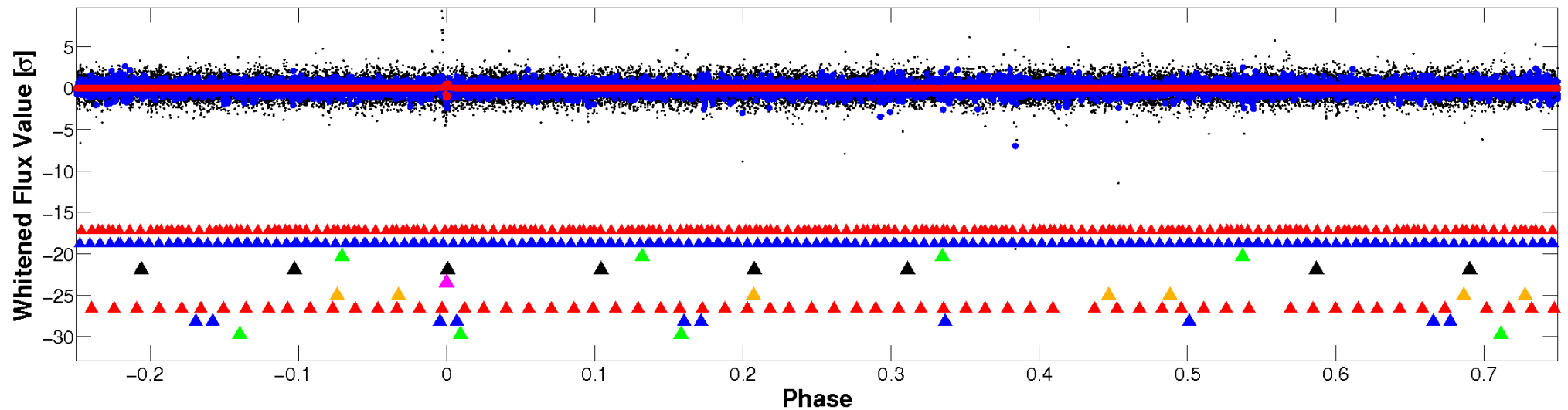


# Non-Whitened Vs. Whitened Light Curve

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

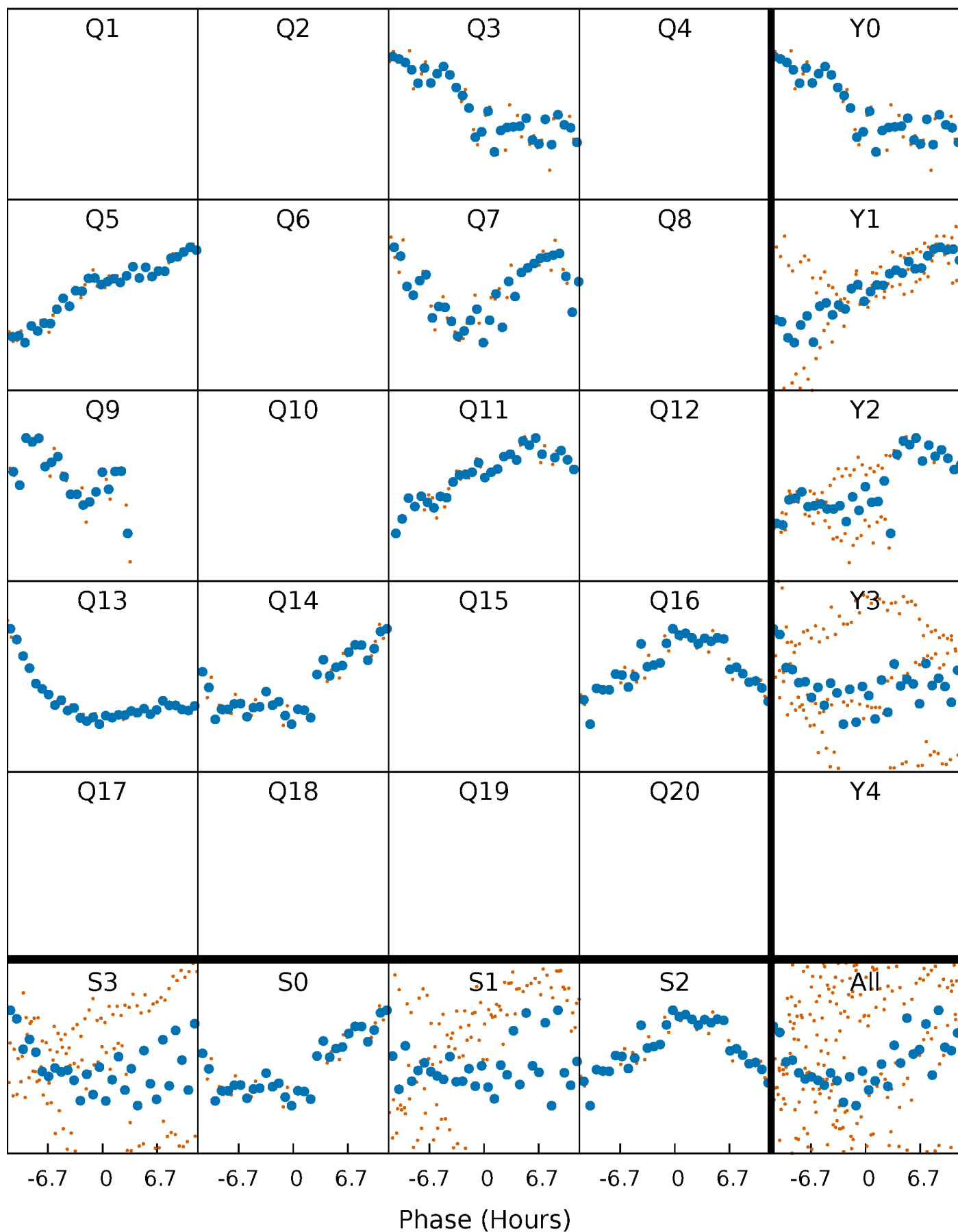


## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



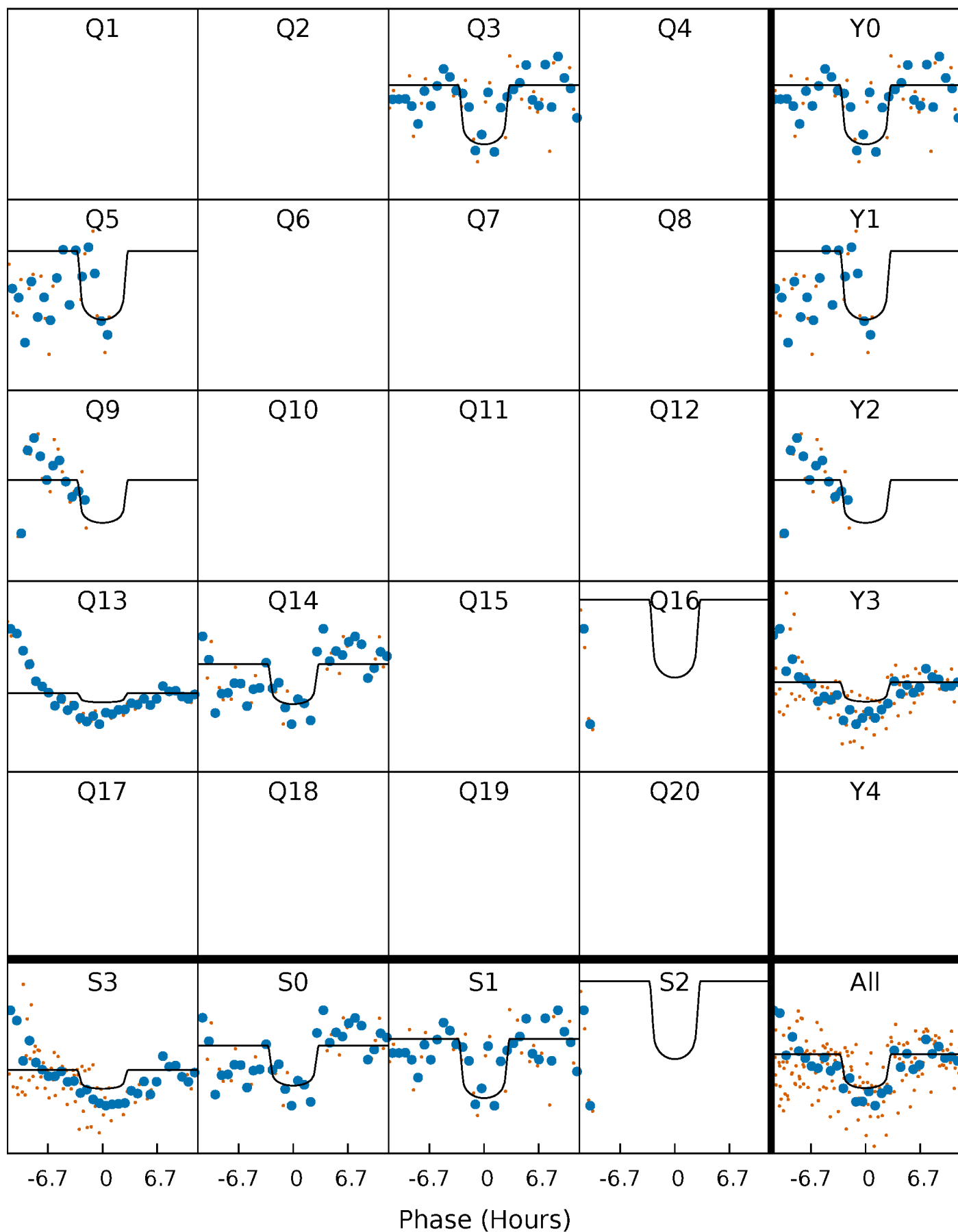
# PDC Quarter-Phased Transit Curves

TCE 010333254-05     $P=169.268559$  Days     $T_0=167.694248$  (BKJD)



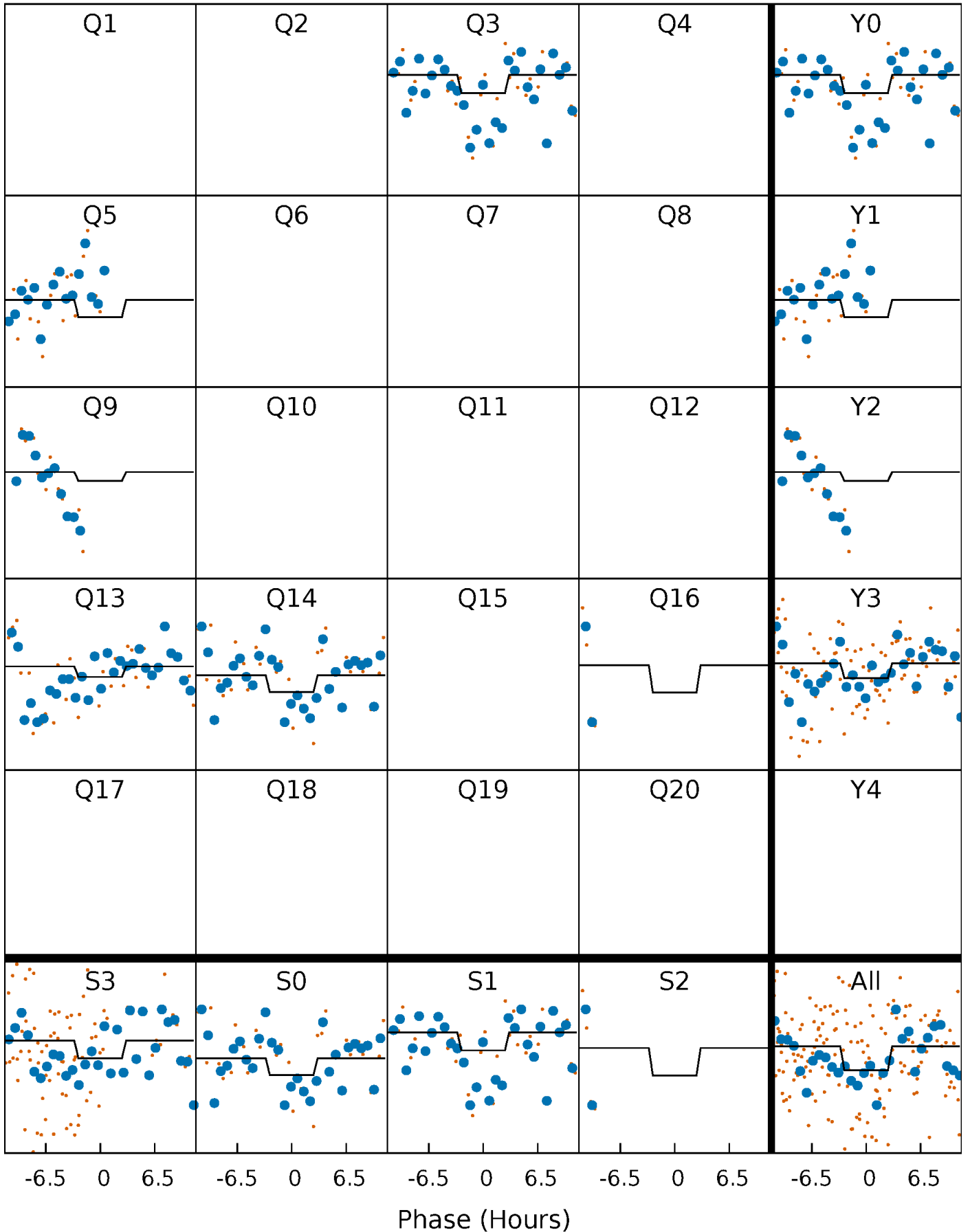
# DV Quarter-Phased Transit Curves

TCE 010333254-05     $P=169.268559$  Days     $T_0=167.694248$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

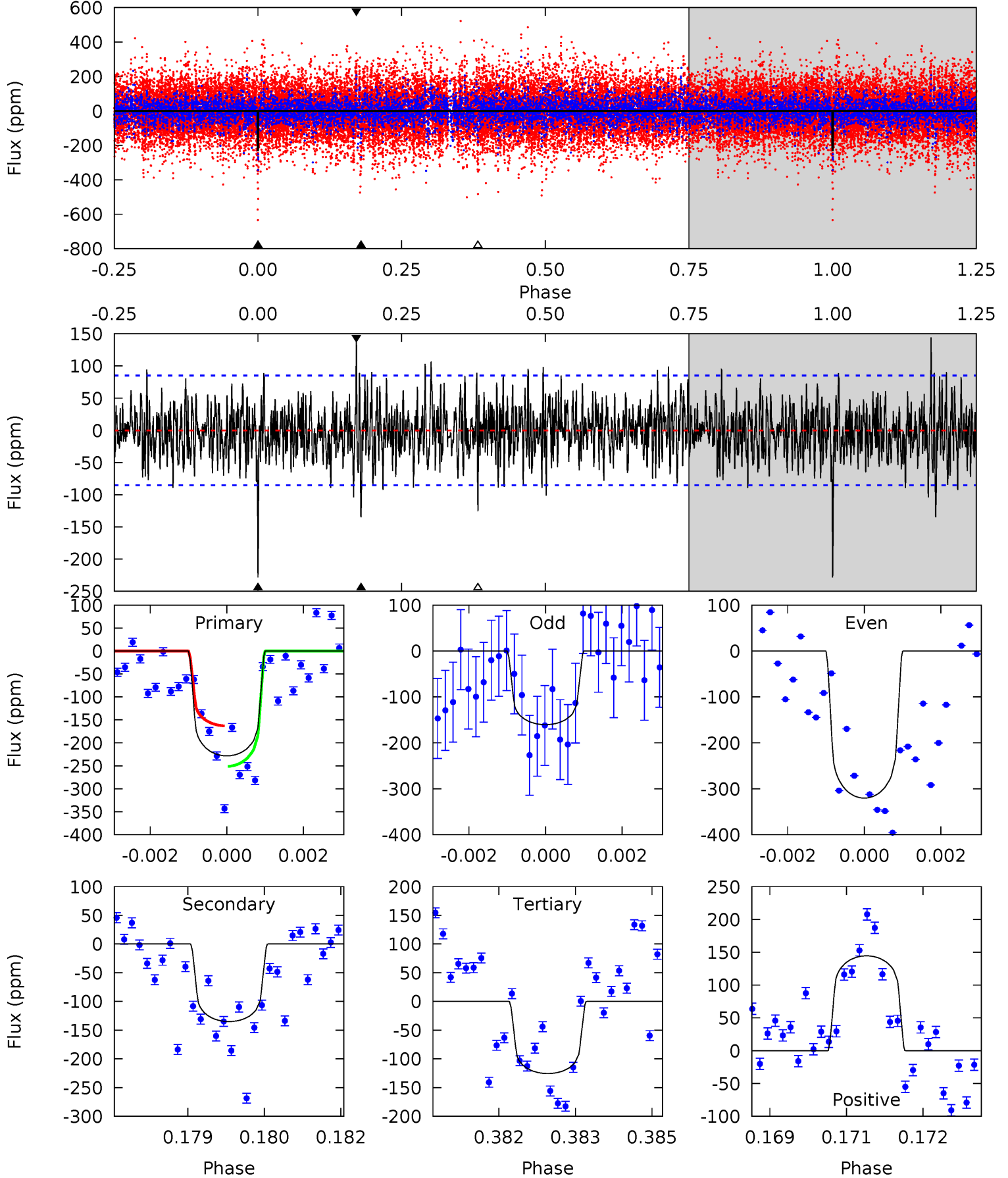
TCE 010333254-05     $P=169.262536$  Days     $T_0=167.720081$  (BKJD)



# DV Model-Shift Uniqueness Test

010333254-05, P = 169.268559 Days, E = 167.694248 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
14.4	8.52	7.92	9.12	5.37	3.17	2.07	6.49	5.29	0.60	-0.60	5.15	1.62	0.39	2.72

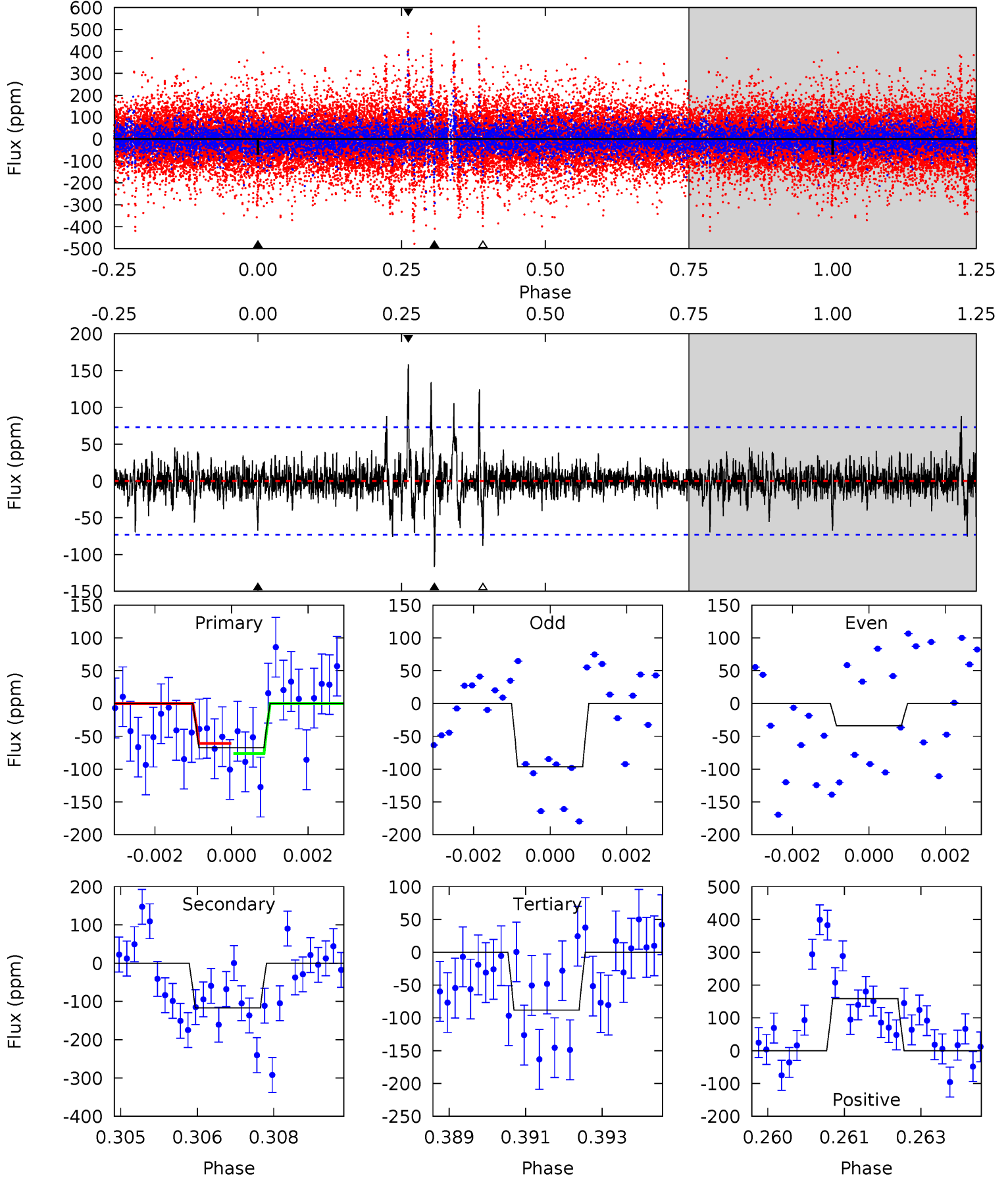




# Alt Model-Shift Uniqueness Test

010333254-05, P = 169.262536 Days, E = 167.720081 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
4.97	8.61	6.50	11.7	5.38	3.17	1.34	-1.53	-6.73	2.11	-3.09	2.28	1.49	0.58	0.56



### Stellar Parameters For KIC 010333254

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$\rho_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6714^{+168}_{-184}$	$3.821^{+0.285}_{-0.095}$	$-0.220^{+0.300}_{-0.250}$	$2.534^{+0.463}_{-0.927}$	$1.550^{+0.183}_{-0.340}$	$0.134^{+0.245}_{-0.041}$
	+3%/-3%	+7%/-2%	+136%/-114%	+18%/-37%	+12%/-22%	+183%/-31%
Source	PHO1	FLK73	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 010333254-05 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-135 \pm 16$	$4.09^{+2.93}_{-2.40}$	$777^{+44}_{-71}$	$5705^{+4150}_{-1131}$	$2100^{+10742}_{-1358}$
Alt.	$-117 \pm 14$	$2.98^{+2.67}_{-2.02}$	$778^{+46}_{-66}$	$6473^{+6903}_{-1582}$	$3429^{+26172}_{-2476}$

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

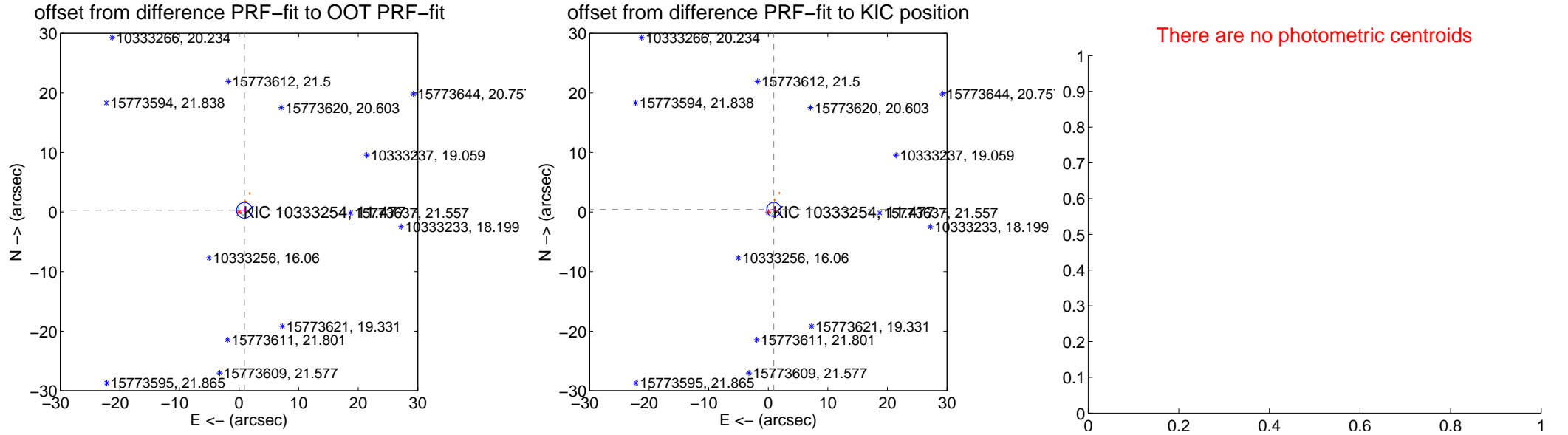
## DV Centroid Data

Supplemental centroid analysis for 010333254-05. **Kepler magnitude: 11.48.** Transit SNR 6.94

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

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

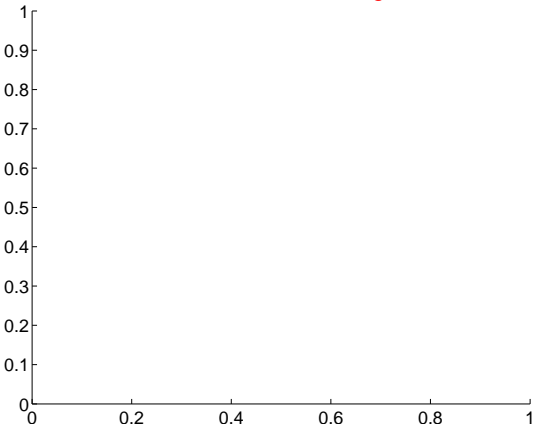
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.946 \pm 0.440$	2.15	$-0.902 \pm 0.319$	$0.286 \pm 0.542$
PRF-fit source offset from KIC position	$1.022 \pm 0.397$	2.58	$-0.929 \pm 0.360$	$0.425 \pm 0.537$
photometric centroid source offset	—	—	—	—



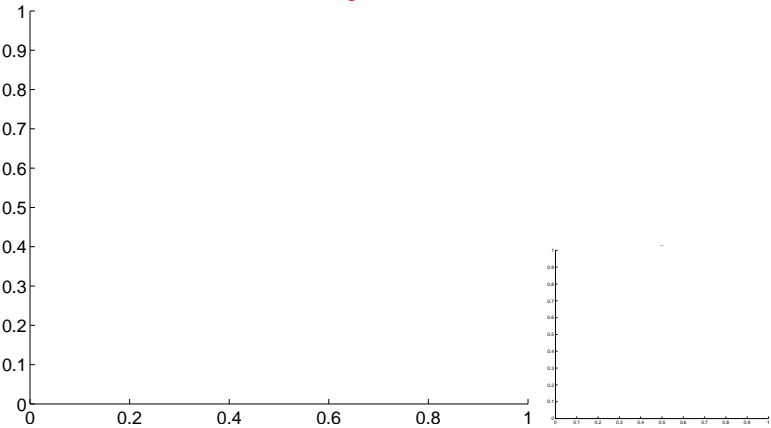
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

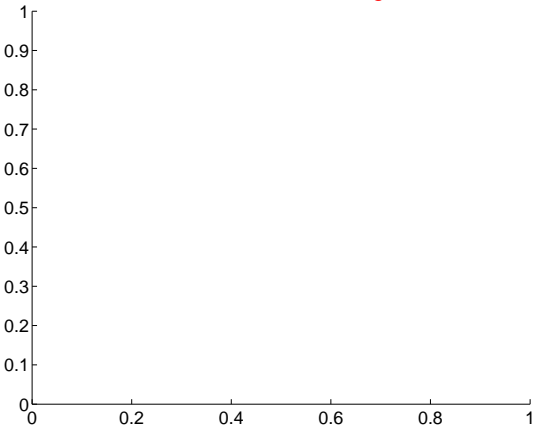
Q1 no difference image



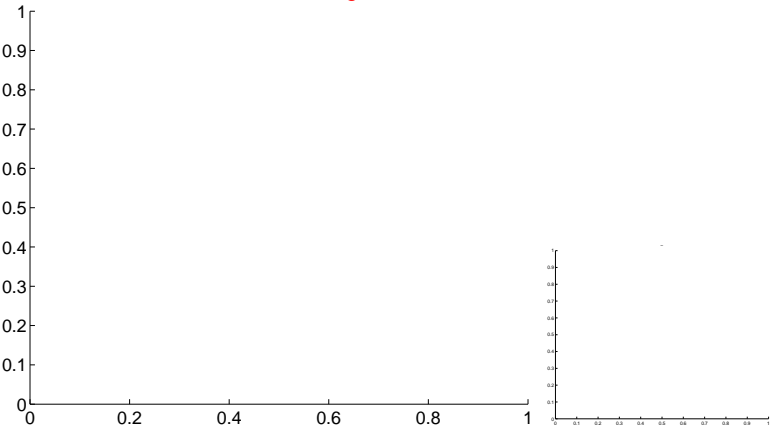
Q1 no OOT image



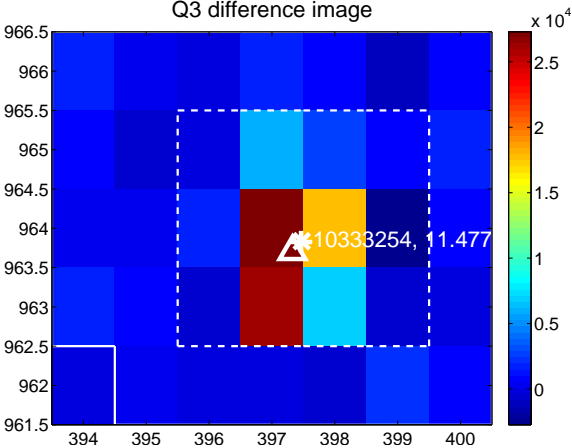
Q2 no difference image



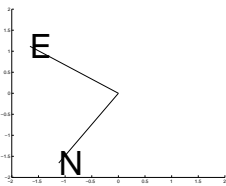
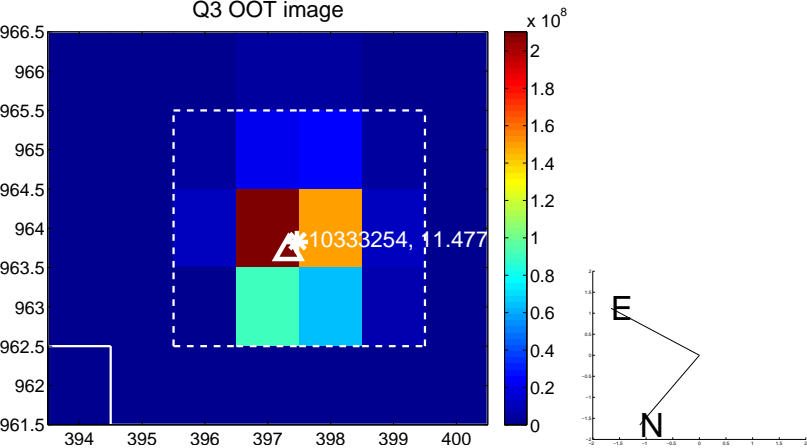
Q2 no OOT image



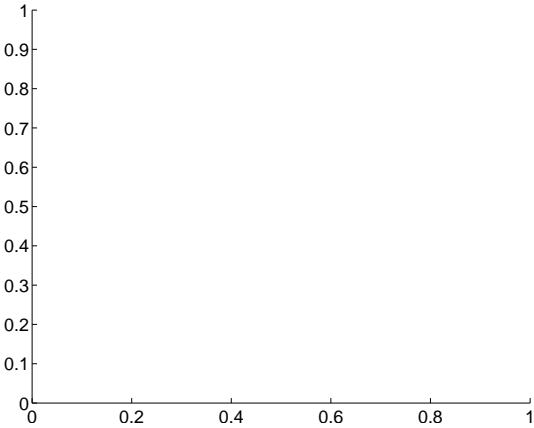
Q3 difference image



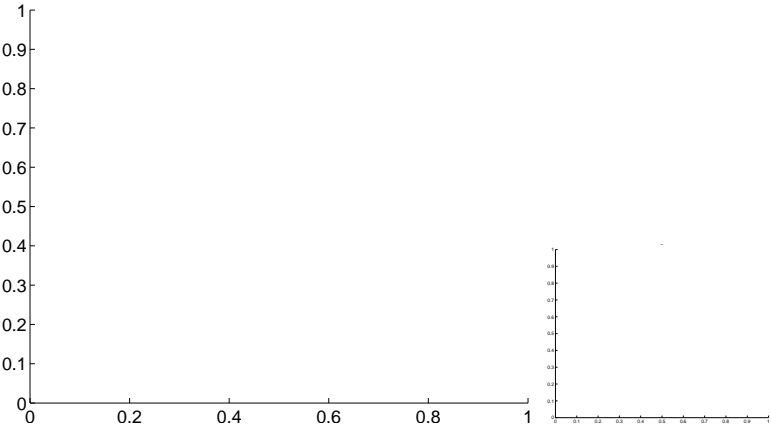
Q3 OOT image



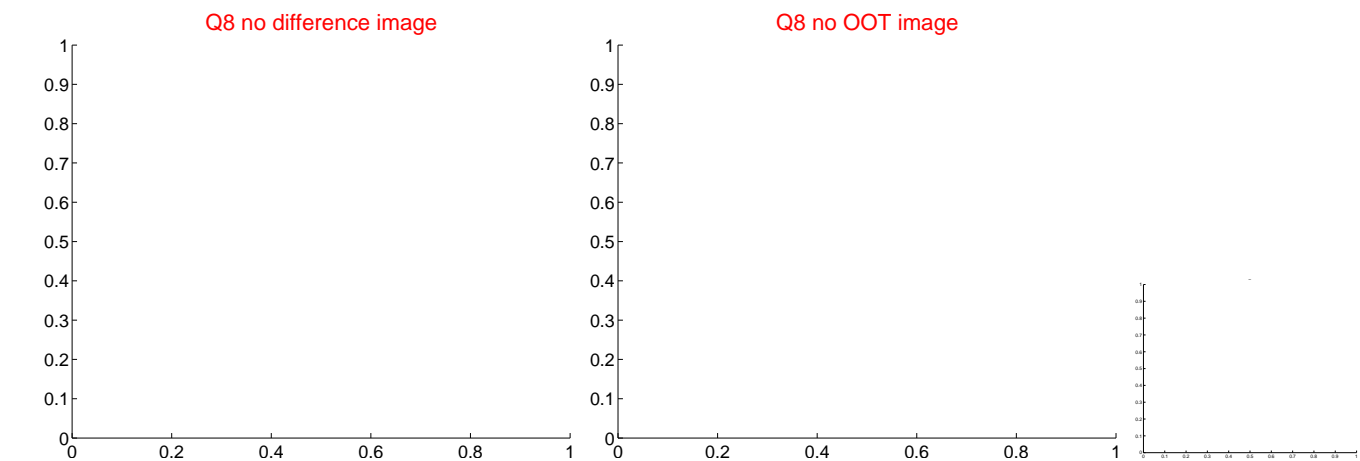
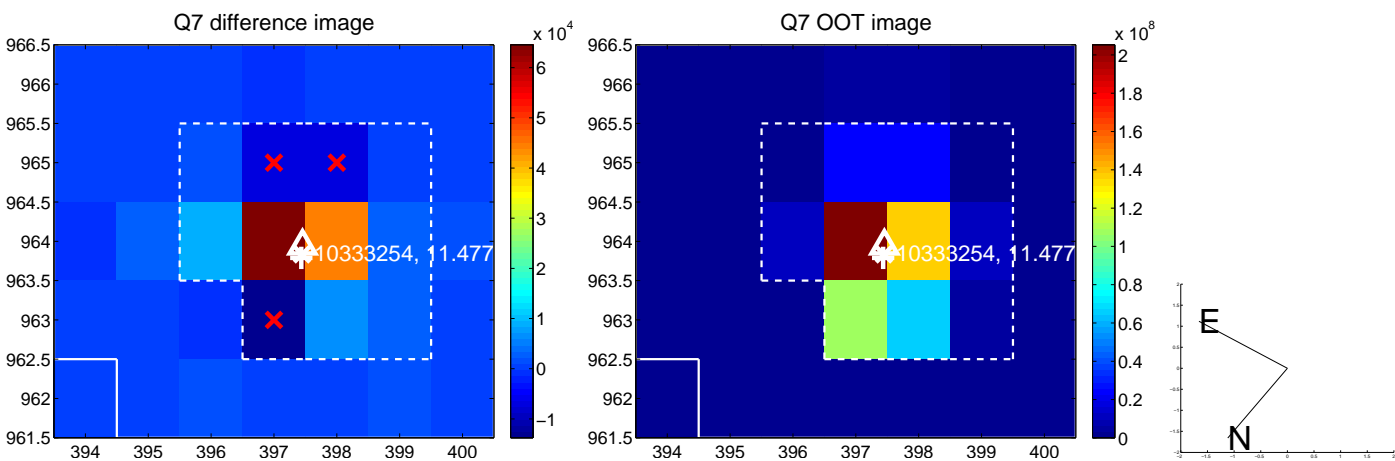
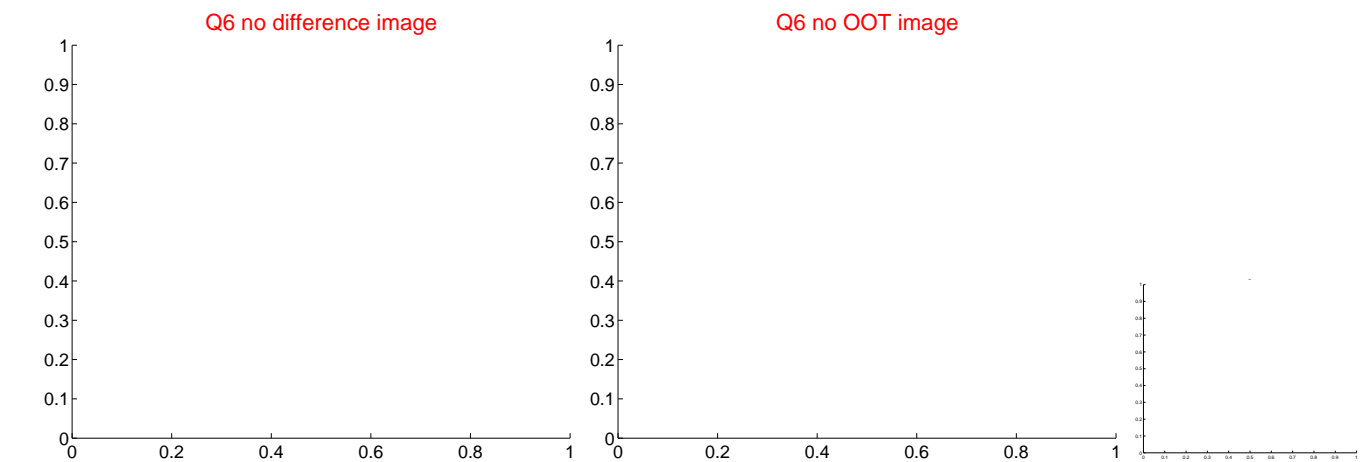
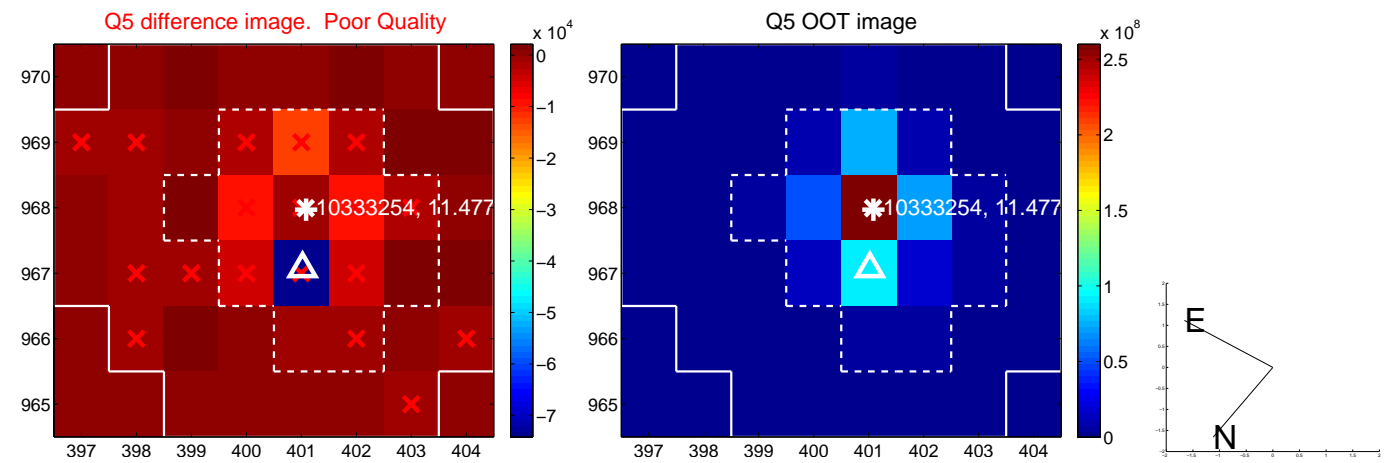
Q4 no difference image



Q4 no OOT image

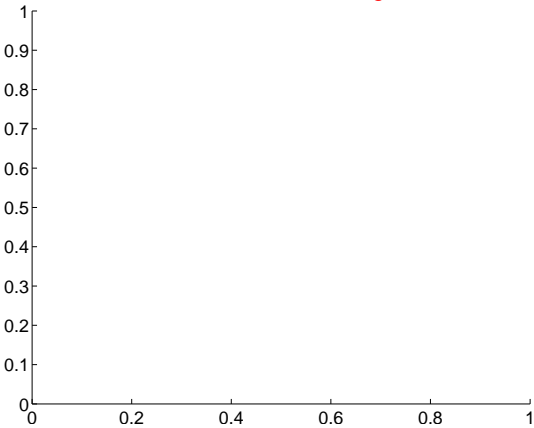


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

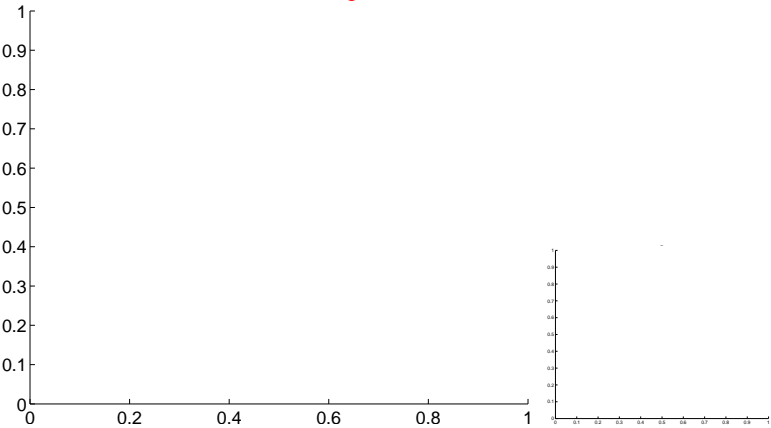


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

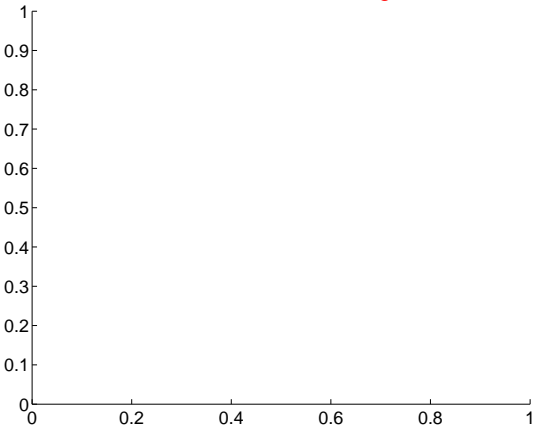
Q9 no difference image



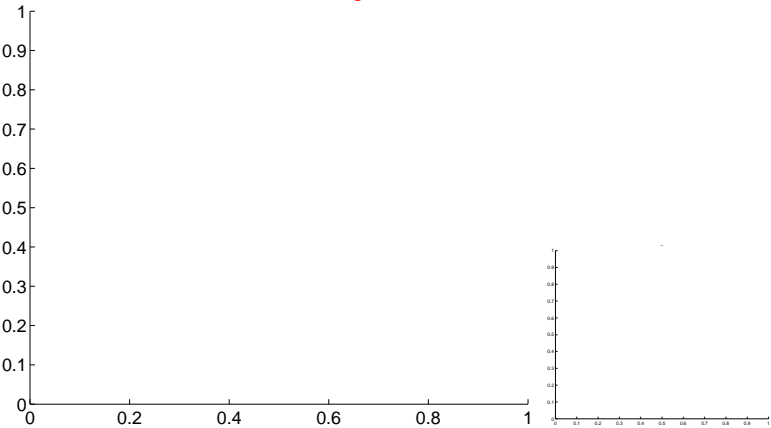
Q9 no OOT image



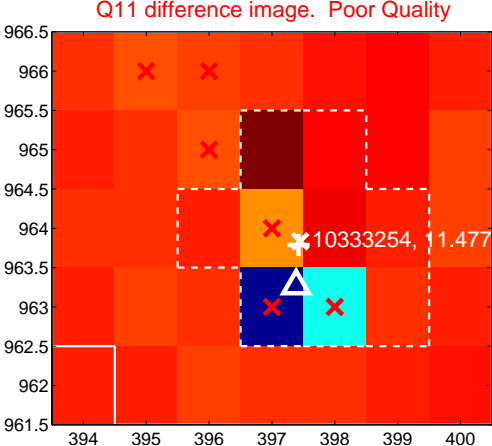
Q10 no difference image



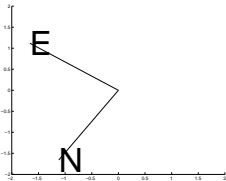
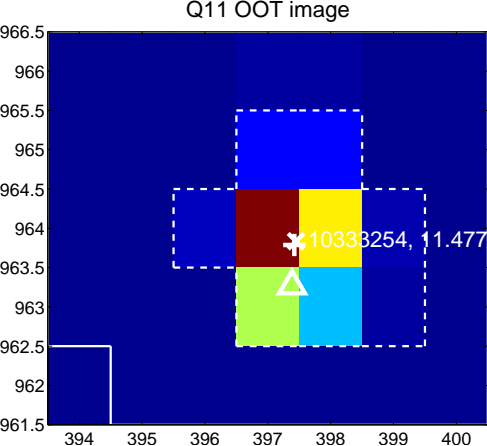
Q10 no OOT image



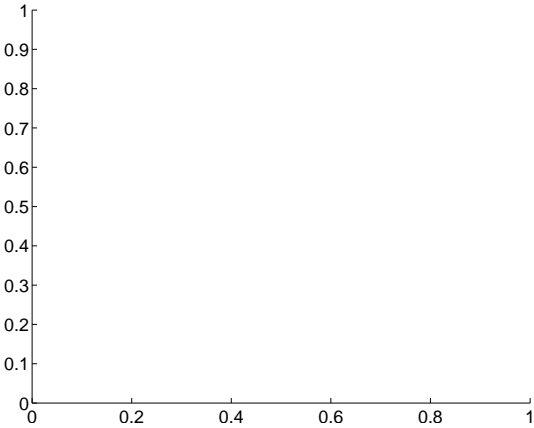
Q11 difference image. Poor Quality



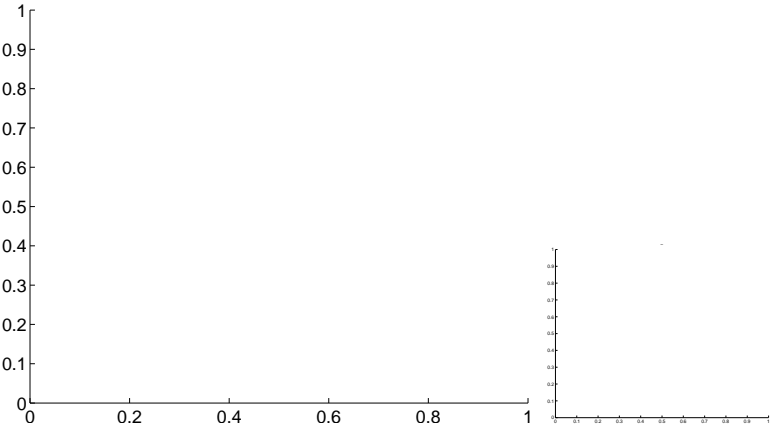
Q11 OOT image



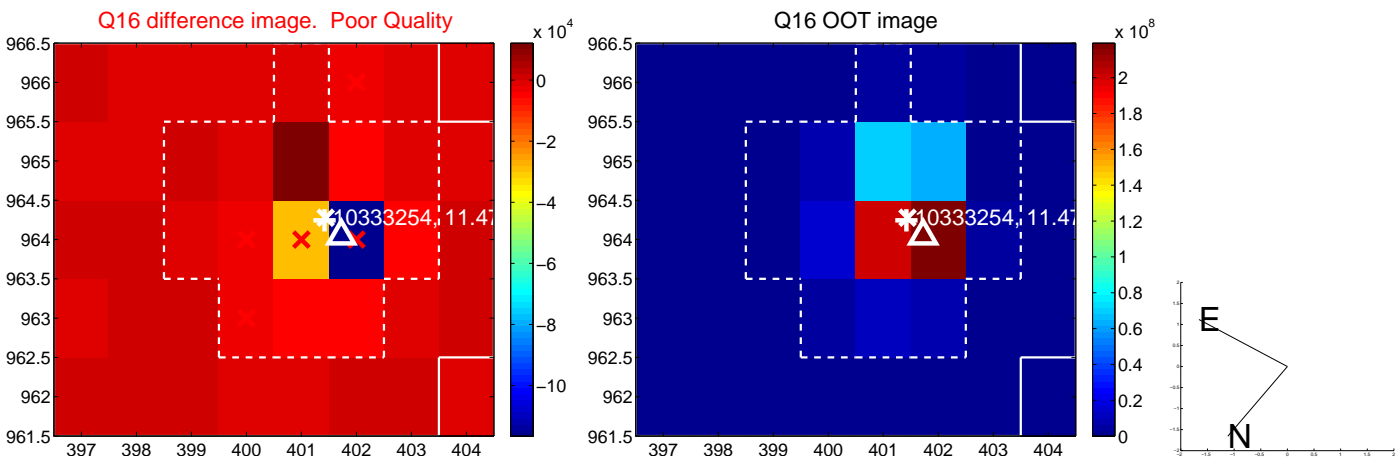
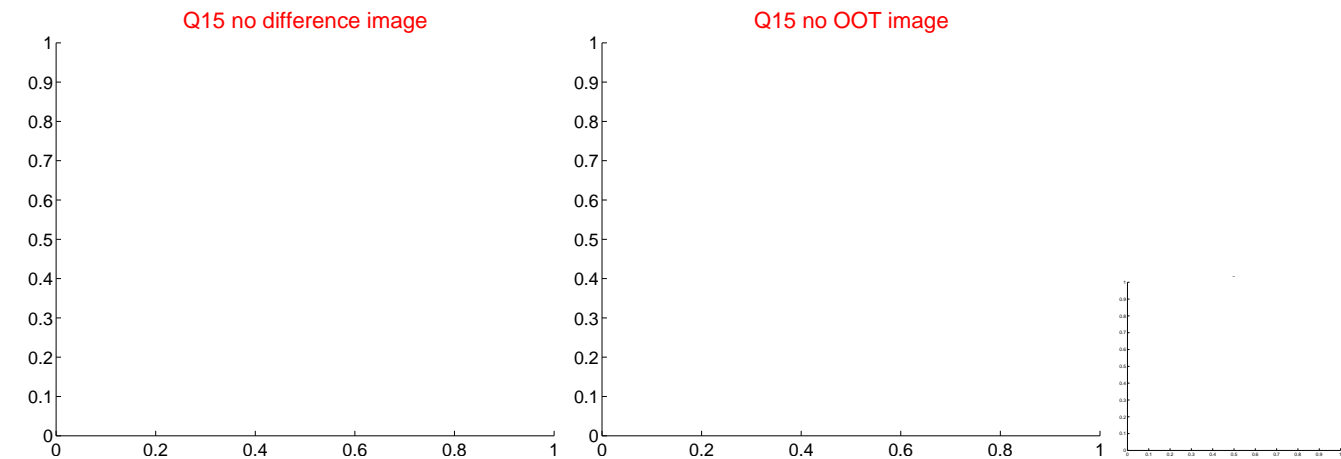
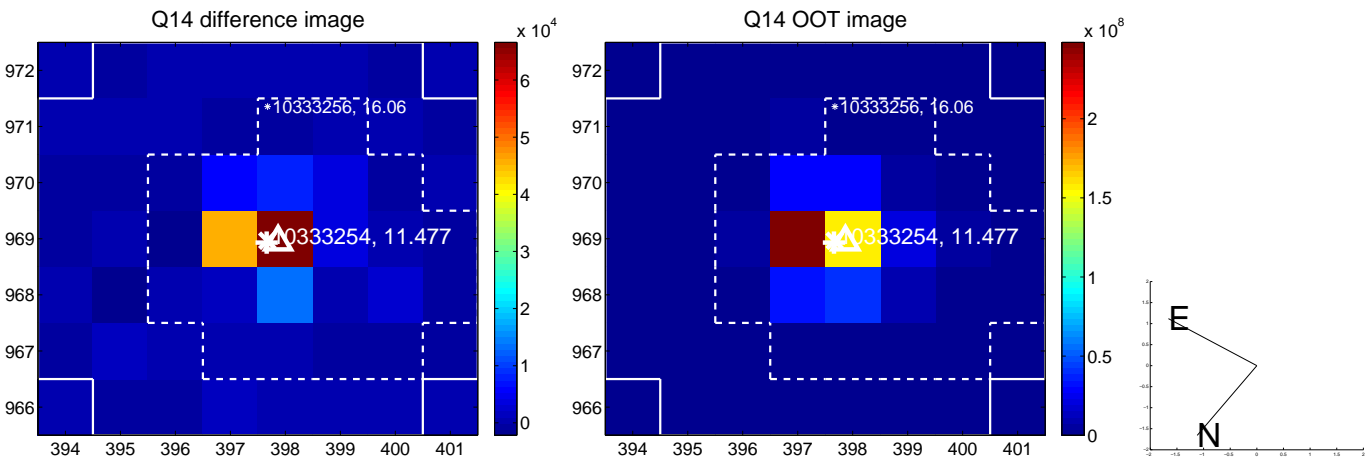
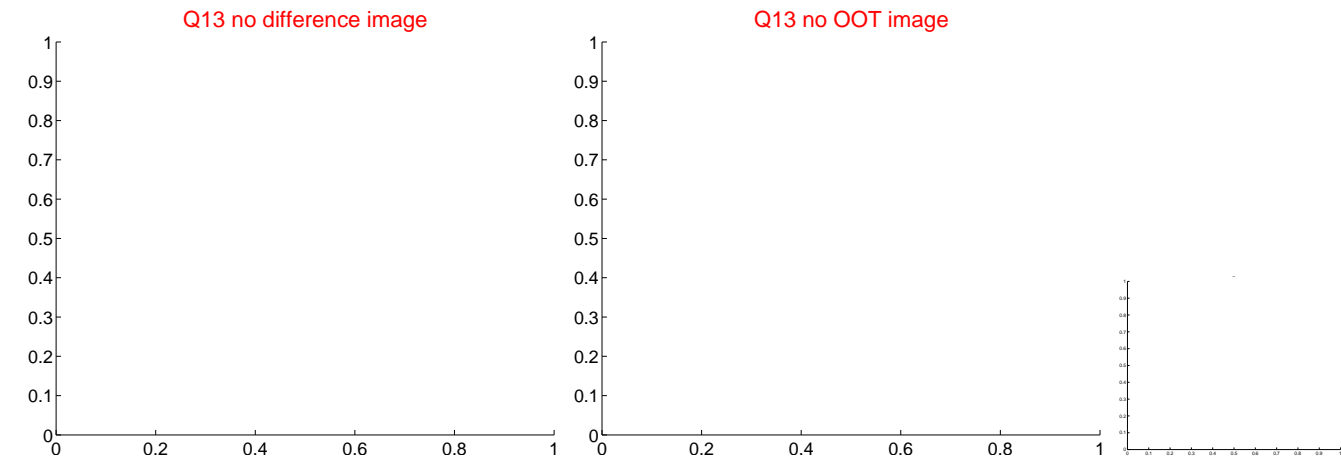
Q12 no difference image



Q12 no OOT image

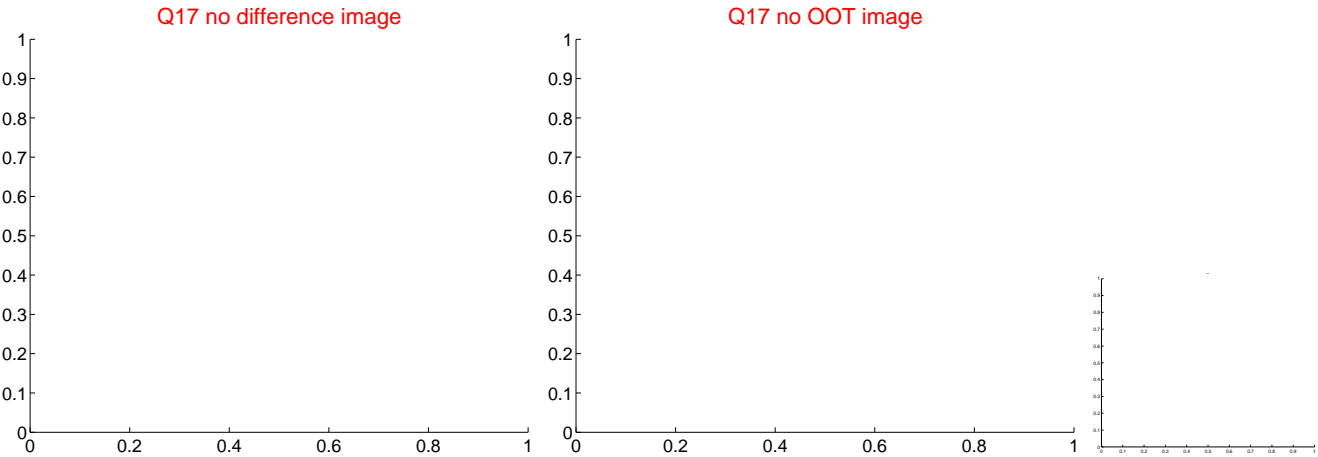


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



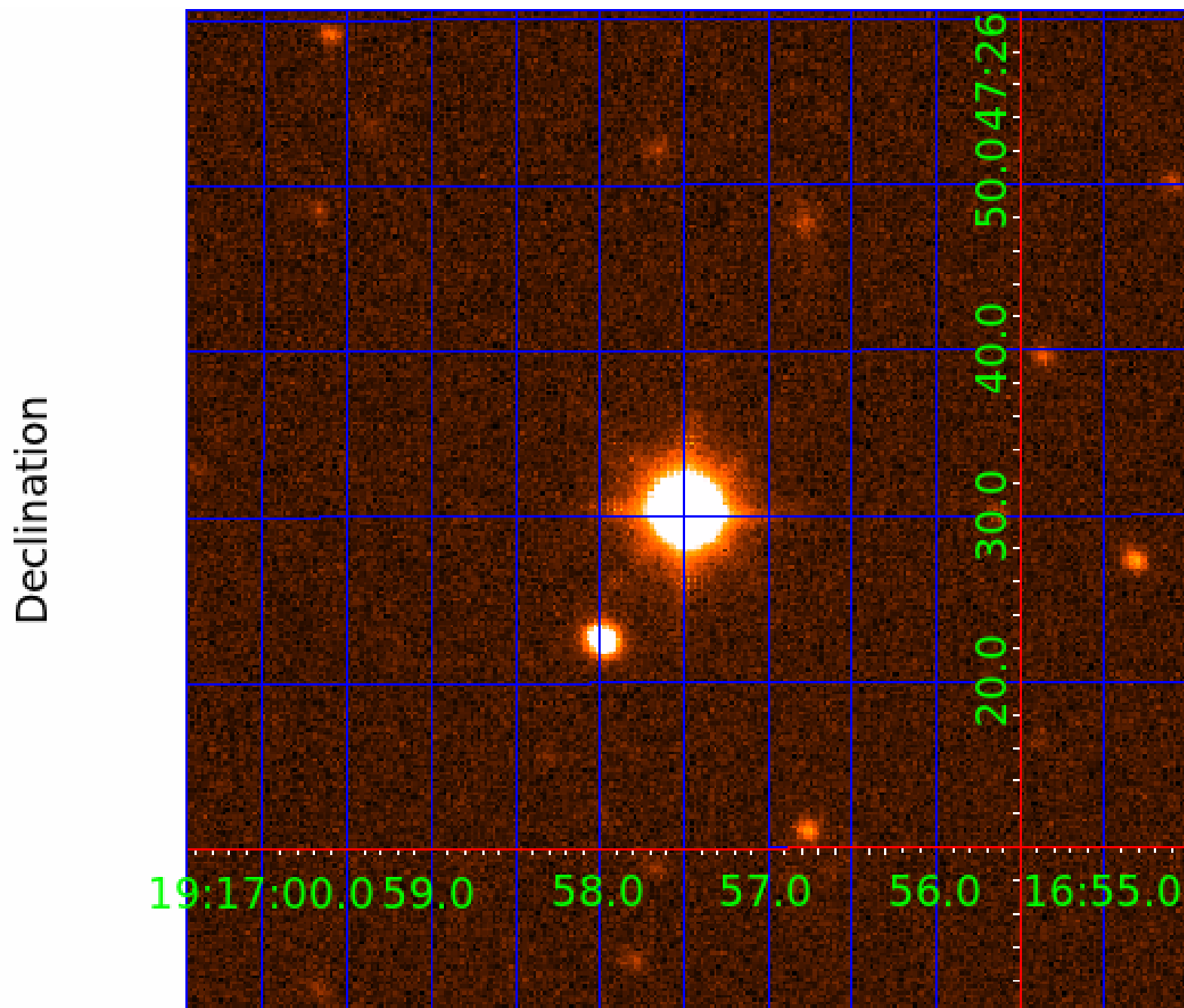


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



folded centroid time series figure for this object.

UKIRT Image



# KIC 010333254

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010333254-01	OBS	No	6.722893	137.475942	87.9	15.137	14.1	14.9	2.53	6714	3.41	1794.52
010333254-02	OBS	No	6.724655	132.709949	57.0	12.956	9.3	11.4	2.53	6714	3.83	1793.90
010333254-03	OBS	No	372.827910	155.750785	307.1	10.390	10.9	8.2	2.53	6714	5.23	8.49
010333254-04	OBS	No	186.778799	267.059650	182.7	5.251	8.0	6.6	2.53	6714	3.98	21.33
010333254-05	OBS	No	169.268559	167.694248	188.1	5.844	7.8	6.9	2.53	6714	3.84	24.32
010333254-06	OBS	No	209.835227	250.336223	176.0	5.160	7.8	7.4	2.53	6714	3.92	18.26
010333254-07	OBS	No	22.397421	137.445498	85.3	5.909	7.8	7.7	2.53	6714	2.79	360.66
010333254-08	OBS	No	141.378804	194.828778	127.9	5.405	7.3	8.0	2.53	6714	3.43	30.92
010333254-09	OBS	No	363.741743	457.410736	271.3	10.246	8.7	8.3	2.53	6714	5.37	8.77

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010333254-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—CENT_SATURATED
010333254-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—SAME_NTL_PERIOD—CENT_SATURATED
010333254-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
010333254-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—CENT_SATURATED
010333254-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-07	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

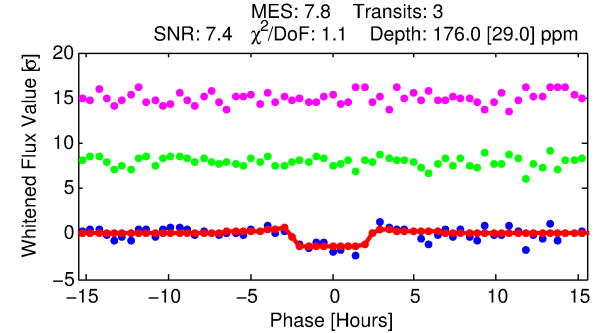
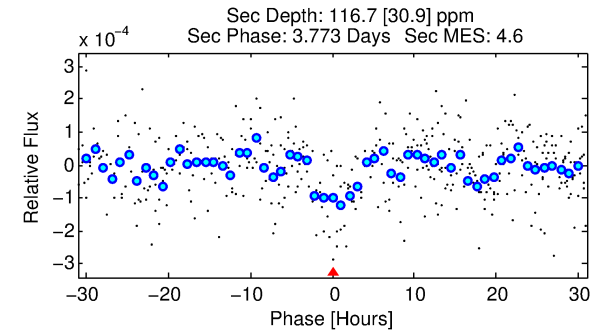
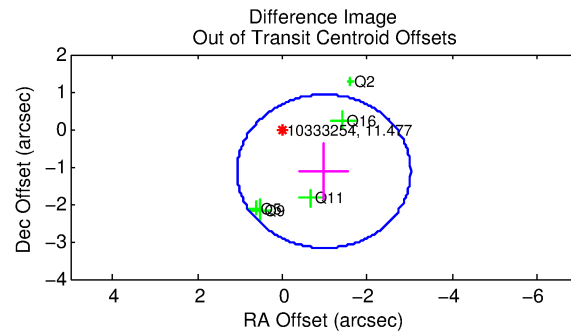
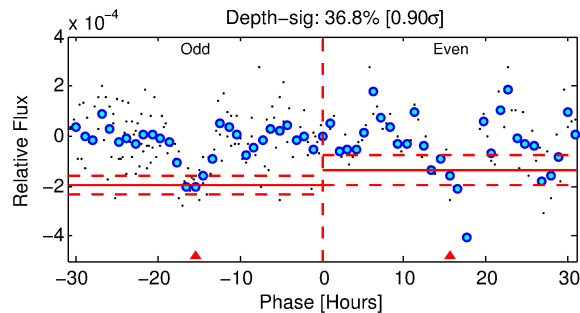
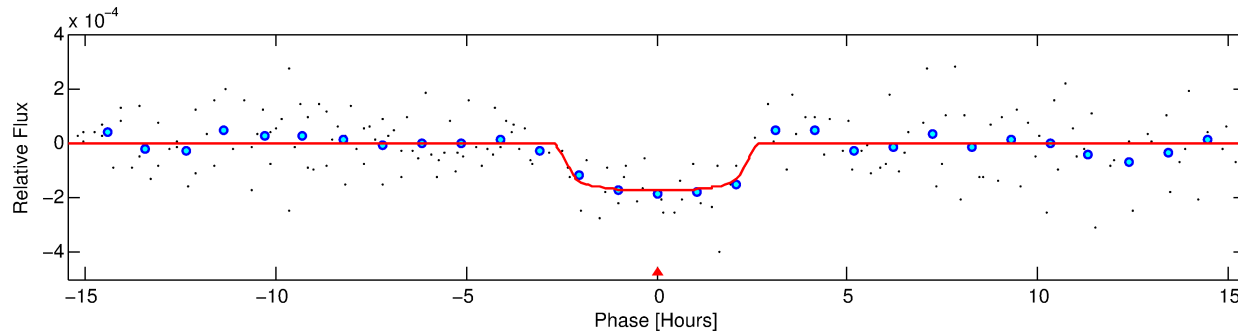
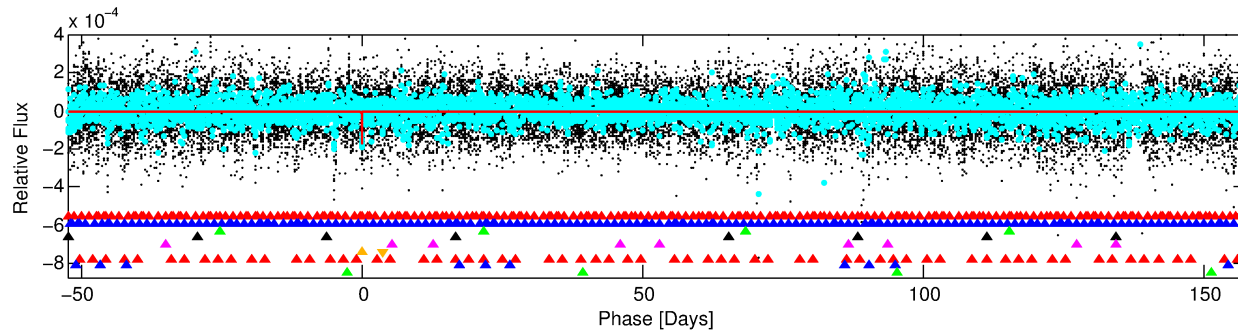
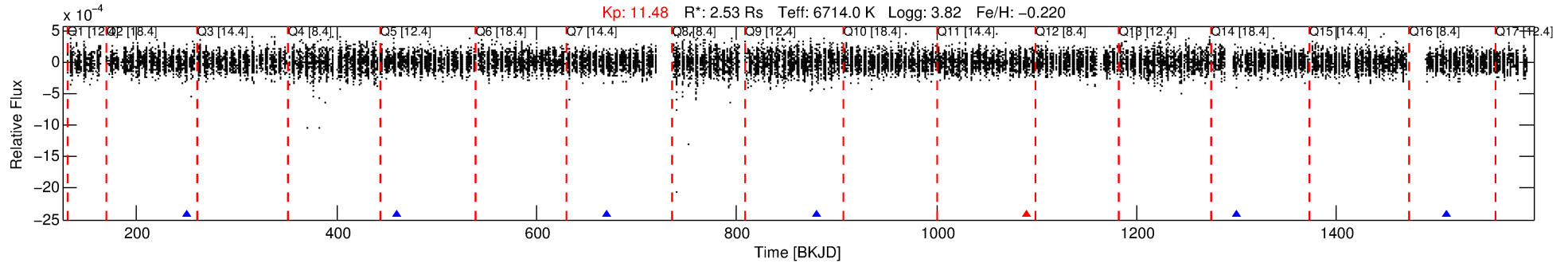
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 010333254-06

No Significant Match Found

# DV One-Page Summary

KIC: 10333254 Candidate: 6 of 9 Period: 209.835 d



## DV Fit Results:

Period = 209.83523 [0.00336] d  
Epoch = 250.3362 [0.0110] BKJD  
 $R_p/R^* = 0.0142$  [0.0069]  
 $a/R^* = 145.00$  [406.56]  
 $b = 0.90$  [0.60]  
 $S_{\text{eff}} = 18.26$  [9.36]  
 $T_{\text{eq}} = 527$  [68] K  
 $R_p = 3.92$  [2.38]  $R_e$   
 $a = 0.8001$  [0.2621] AU  
 $A_g = 2679.79$  [3009.87] [0.89 $\sigma$ ]  
 $T_{\text{eff}} = 5864$  [1482] K [3.60 $\sigma$ ]

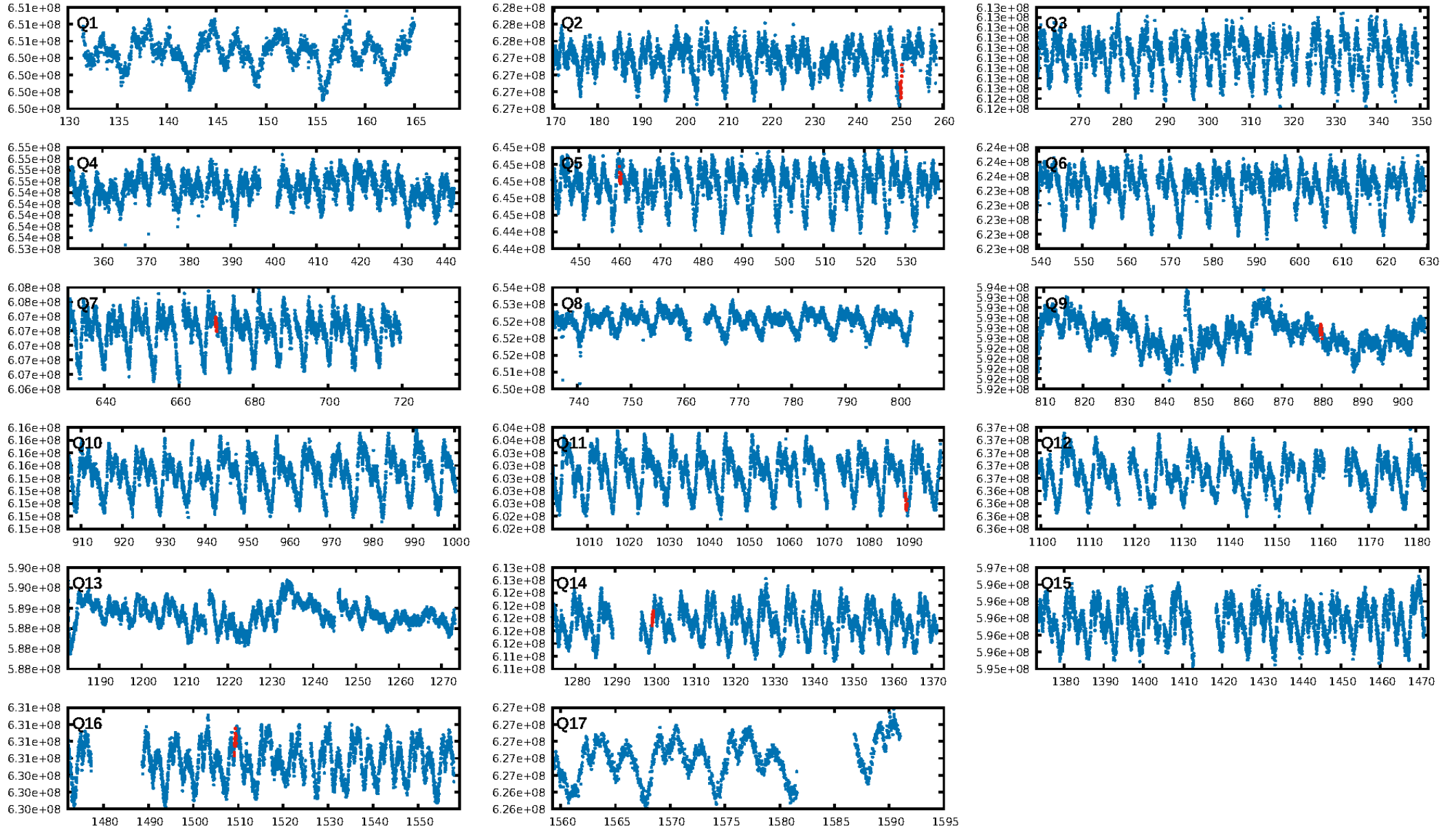
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [75.17 $\sigma$ ]  
LongPeriod-sig: 100.0% [321.98 $\sigma$ ]  
ModelChiSquare2-sig: 34.1%  
ModelChiSquareGof-sig: 99.1%  
Bootstrap-pfa: 4.30e-09  
RollingBand-fgt: 0.67 [2/3]  
GhostDiagnostic-chr: 4.278  
Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 1.491 arcsec [2.18 $\sigma$ ]  
KicOffset-rm: 1.387 arcsec [1.92 $\sigma$ ]  
OotOffset-st: 1/1/1/2 [5]  
KicOffset-st: 1/1/1/2 [5]  
DiffImageQuality-fgm: 0.60 [3/5]  
DiffImageOverlap-fno: 0.43 [3/7]

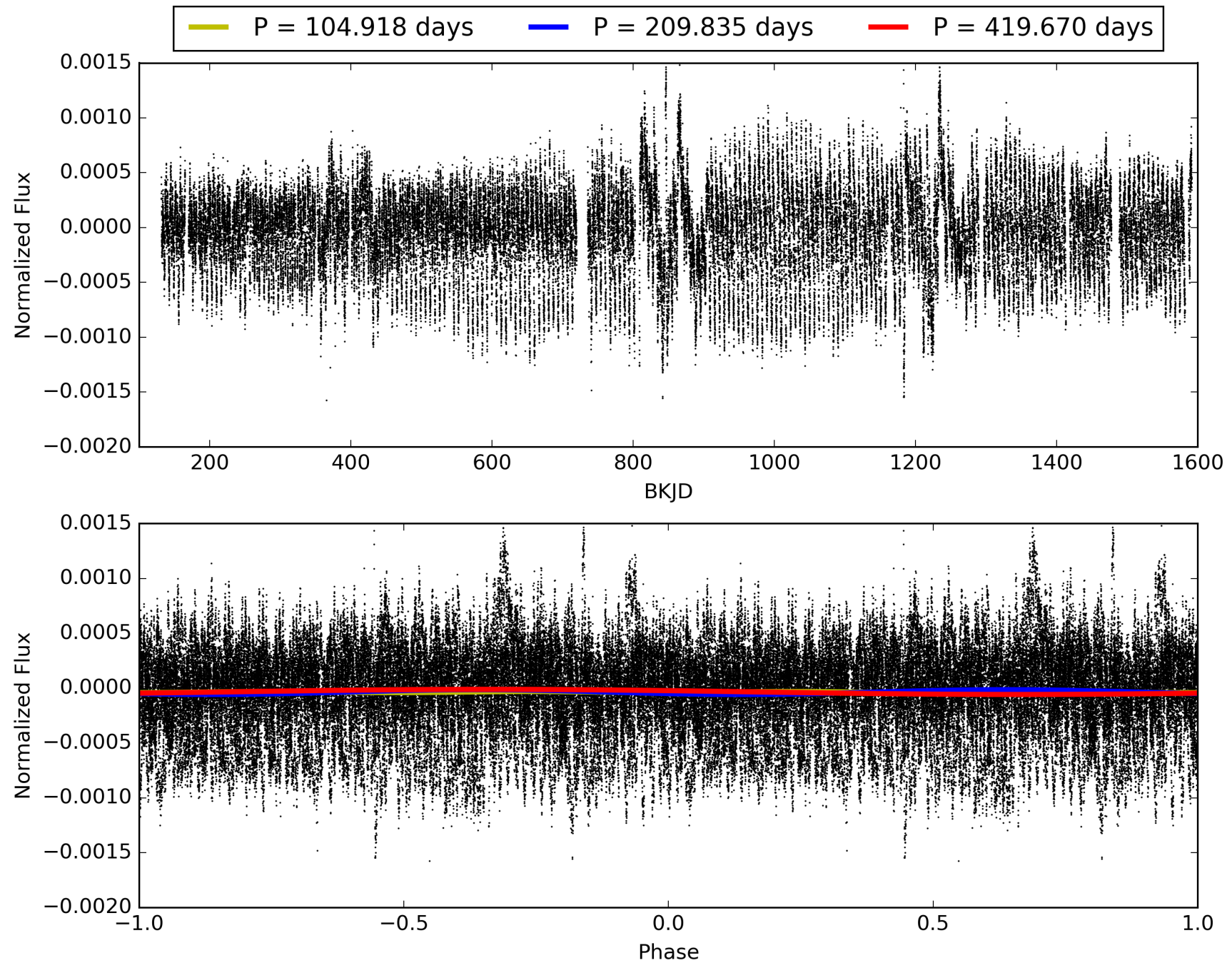
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 07:17:10 Z

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

# TCE 010333254-06, PDC Light Curves

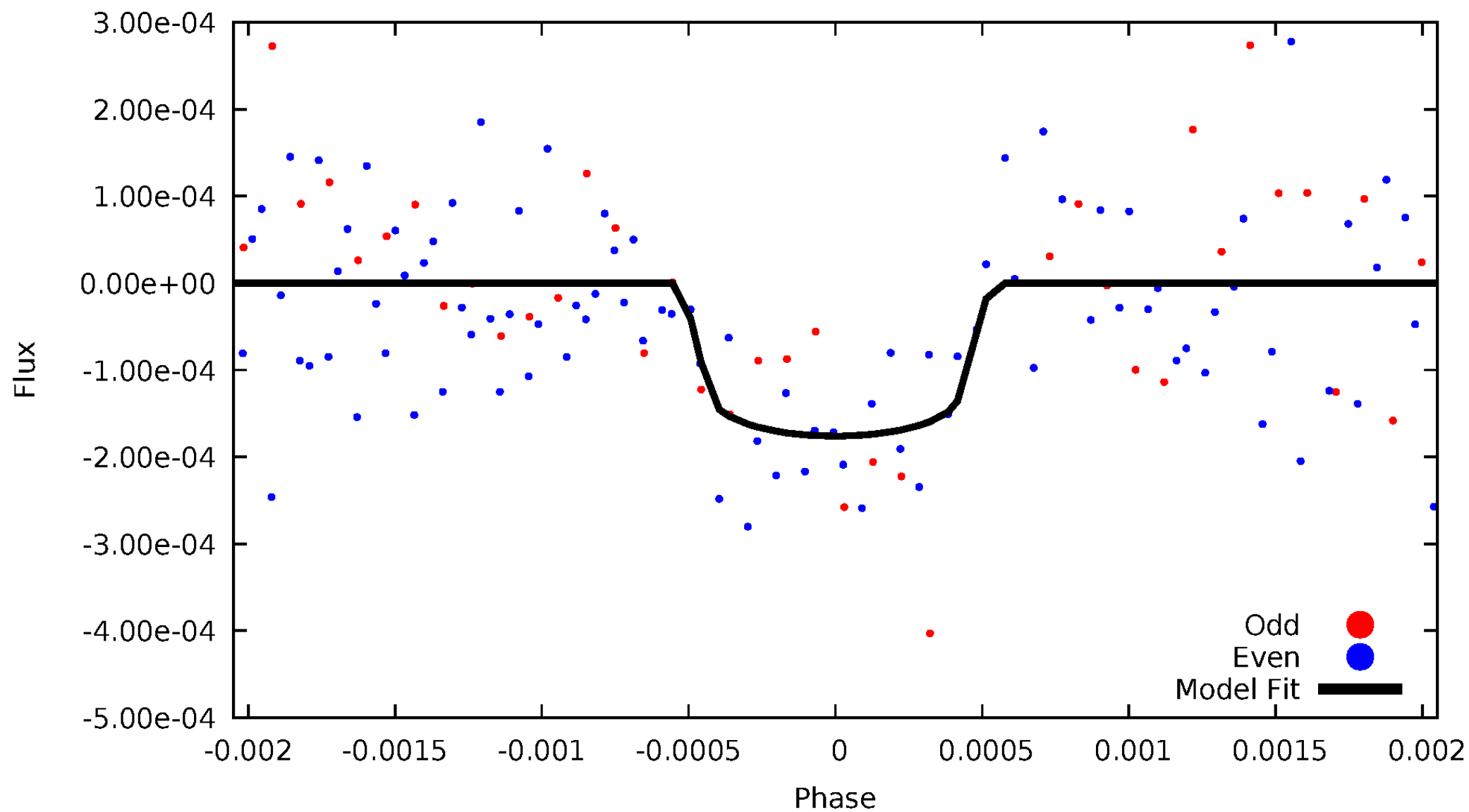


TCE 010333254-06



# DV Odd/Even

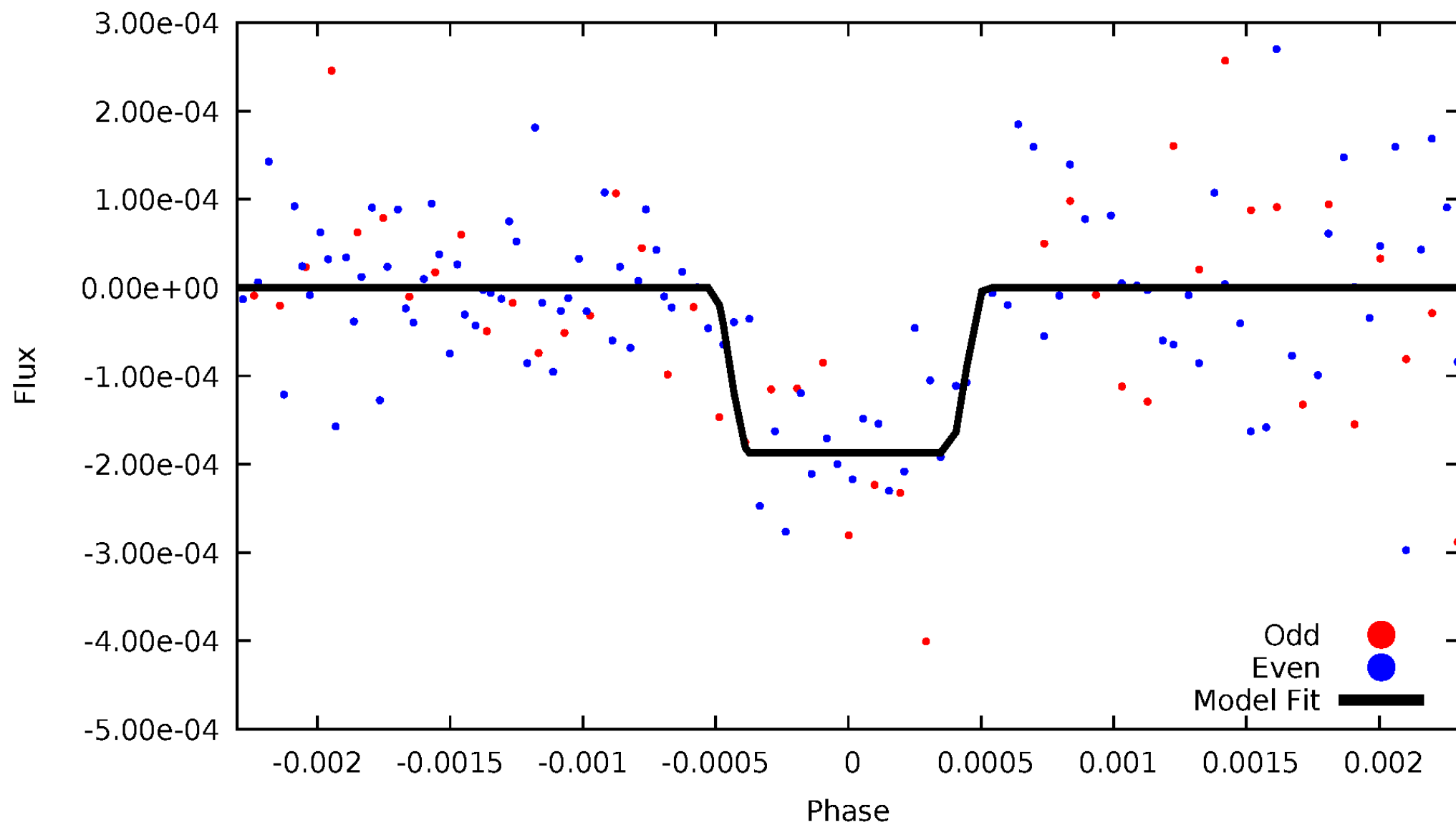
TCE 010333254-06





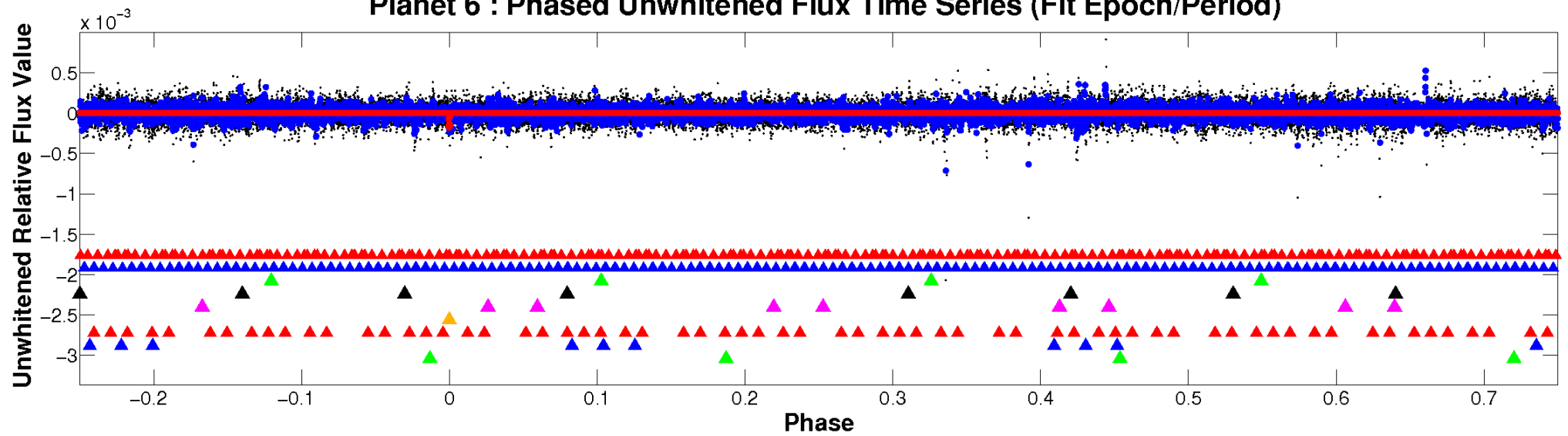
# ALT Odd/Even

TCE 010333254-06

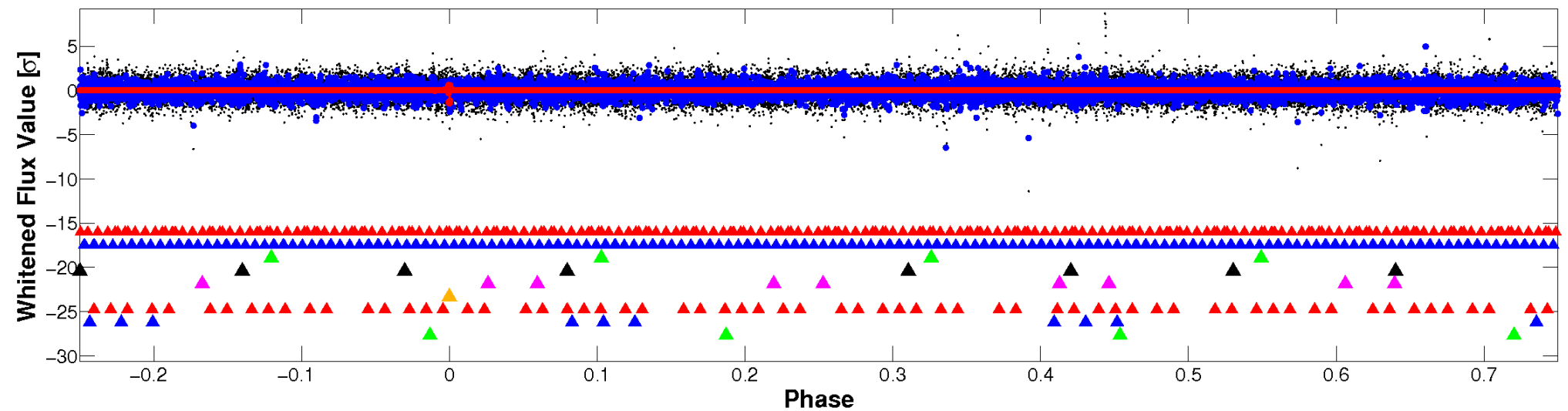


# Non-Whitened Vs. Whitened Light Curve

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

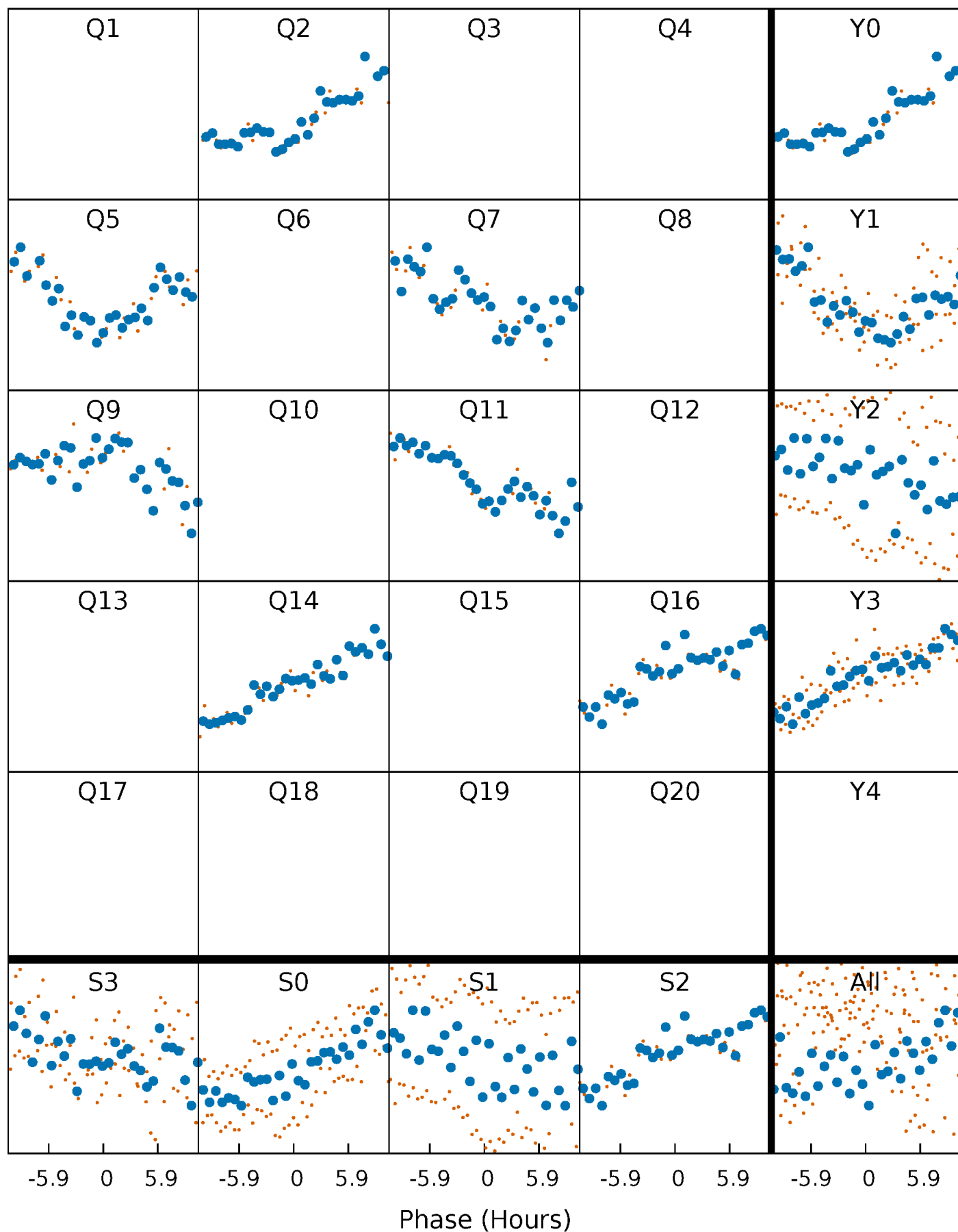


## Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)



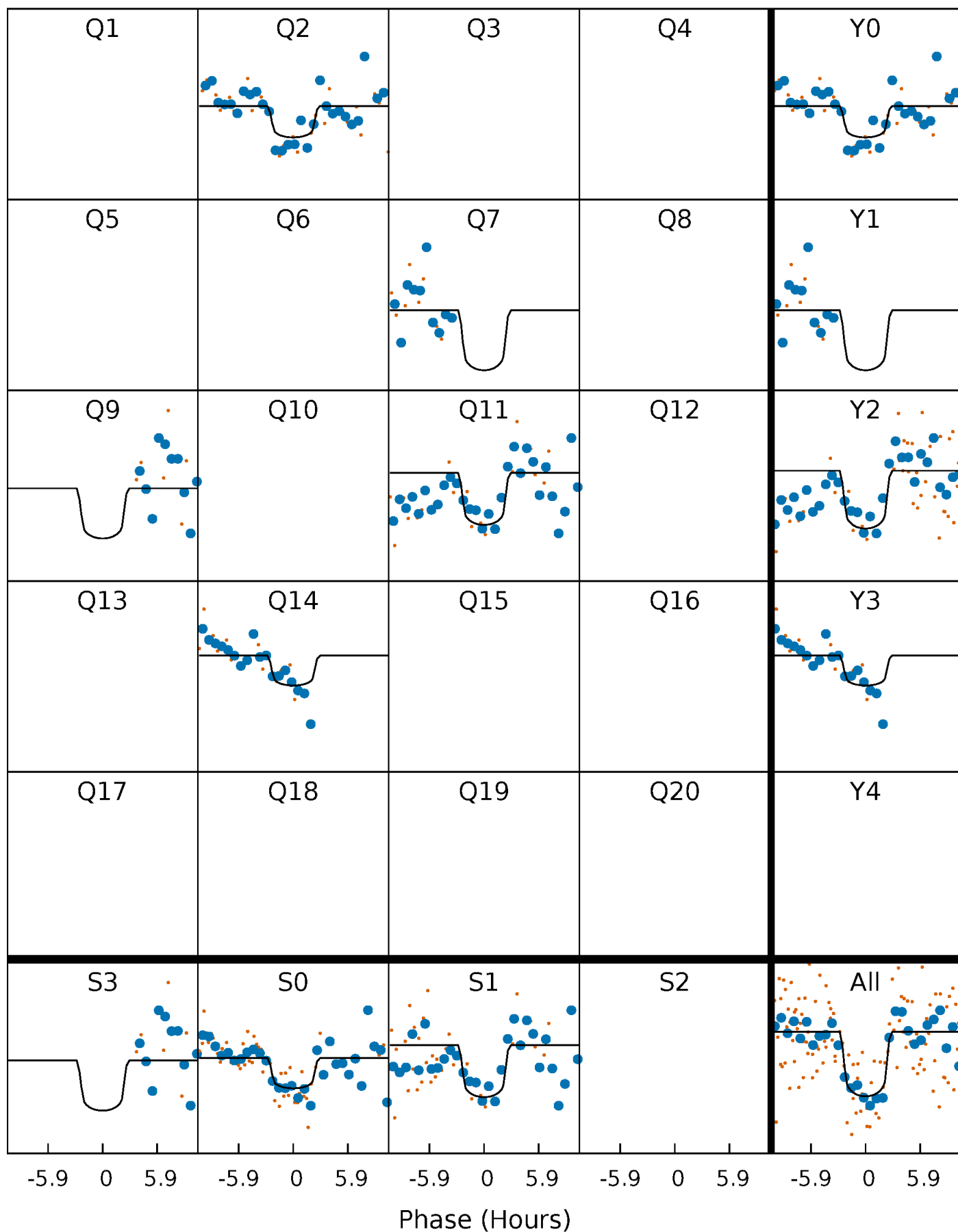
# PDC Quarter-Phased Transit Curves

TCE 010333254-06 P=209.835227 Days  $T_0=250.336223$  (BKJD)



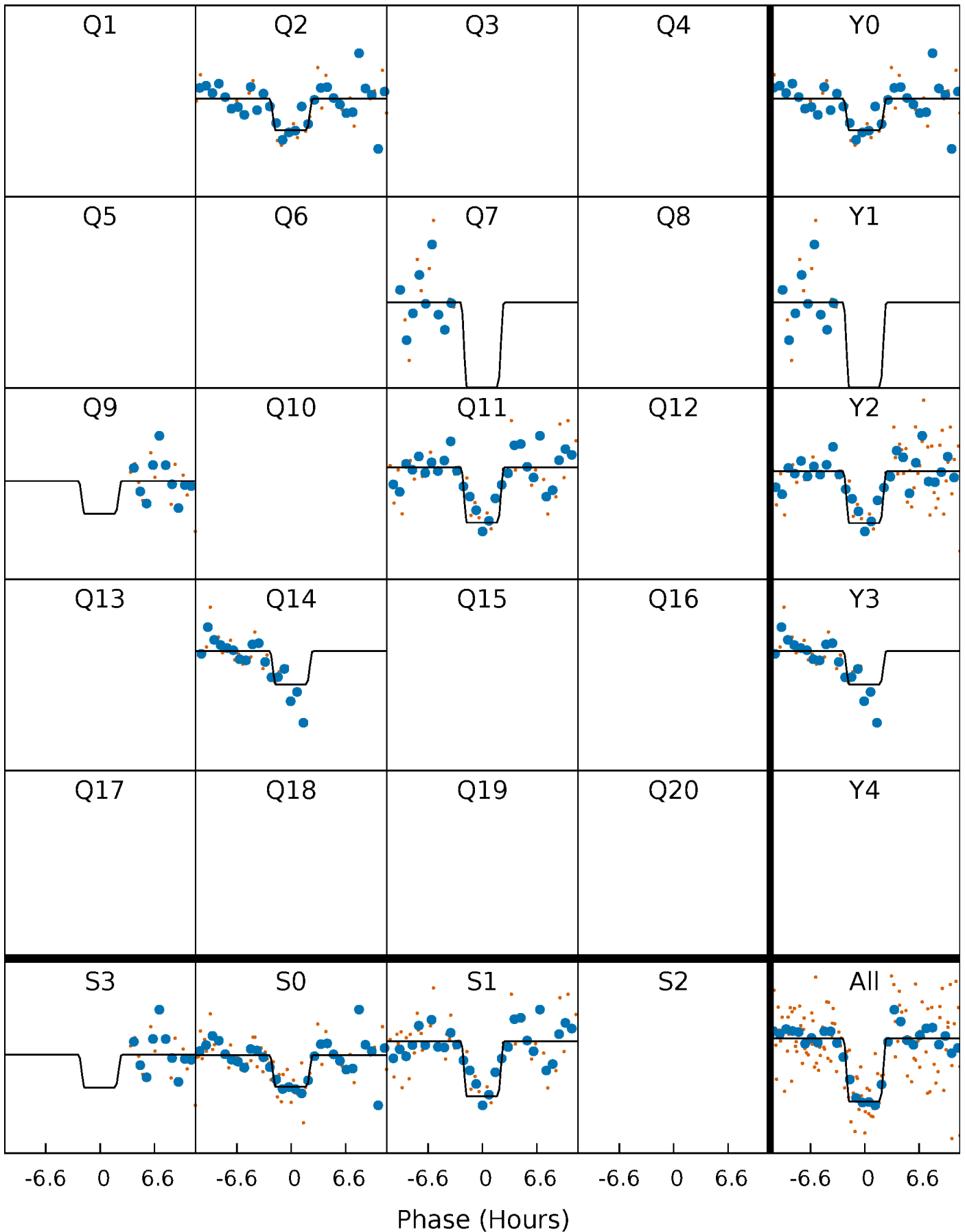
# DV Quarter-Phased Transit Curves

TCE 010333254-06 P=209.835227 Days  $T_0=250.336223$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

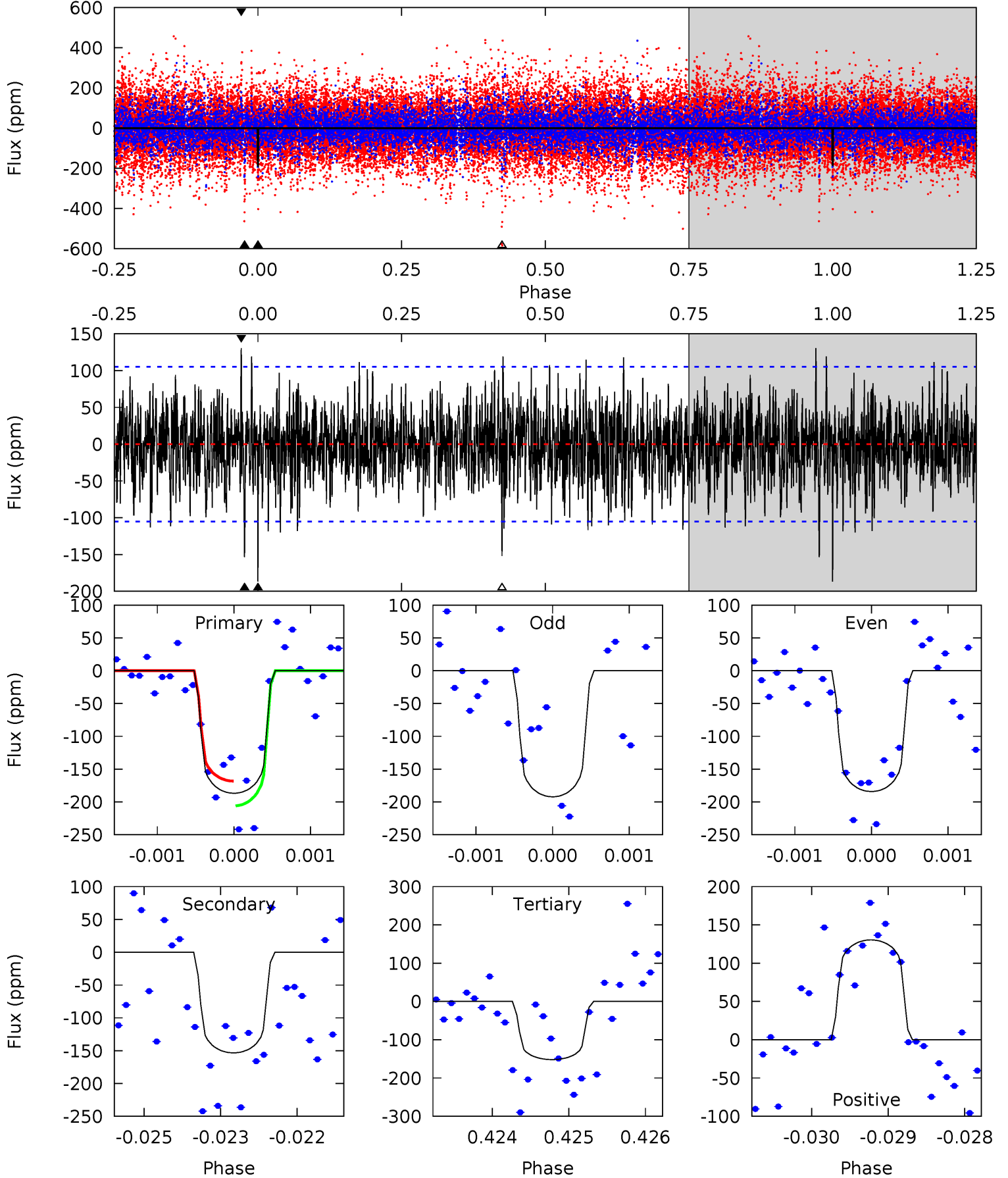
TCE 010333254-06 P=209.839039 Days  $T_0=250.323185$  (BKJD)



# DV Model-Shift Uniqueness Test

010333254-06, P = 209.835227 Days, E = 40.500996 Days

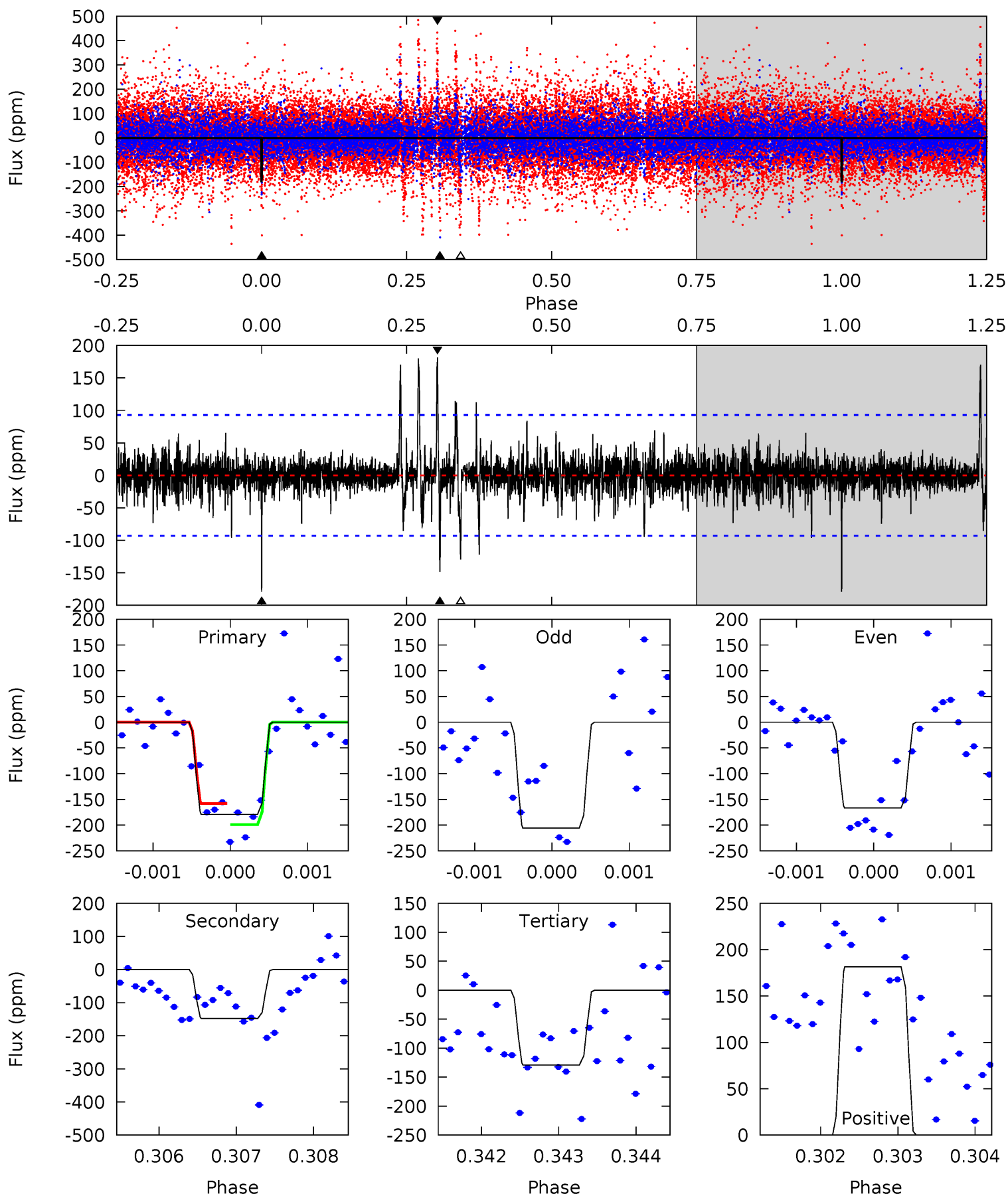
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.66	7.93	7.86	6.75	5.44	3.27	1.93	1.80	2.92	0.07	1.19	0.18	0.97	0.41	0.98



# Alt Model-Shift Uniqueness Test

010333254-06, P = 209.839039 Days, E = 40.484146 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
10.5	8.69	7.58	10.7	5.45	3.29	1.40	2.92	-0.15	1.11	-1.96	1.01	0.96	0.50	1.21





### Stellar Parameters For KIC 010333254

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6714^{+168}_{-184}$	$3.821^{+0.285}_{-0.095}$	$-0.220^{+0.300}_{-0.250}$	$2.534^{+0.463}_{-0.927}$	$1.550^{+0.183}_{-0.340}$	$0.134^{+0.245}_{-0.041}$
	+3%/-3%	+7%/-2%	+136%/-114%	+18%/-37%	+12%/-22%	+183%/-31%
Source	PHO1	FLK73	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 010333254-06 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-153 \pm 19$	$3.62^{+2.03}_{-1.82}$	$723^{+44}_{-64}$	$6247^{+3058}_{-1100}$	$4148^{+11662}_{-2457}$
Alt.	$-148 \pm 17$	$3.51^{+2.00}_{-1.64}$	$722^{+40}_{-65}$	$6284^{+2549}_{-1100}$	$4160^{+10510}_{-2456}$

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

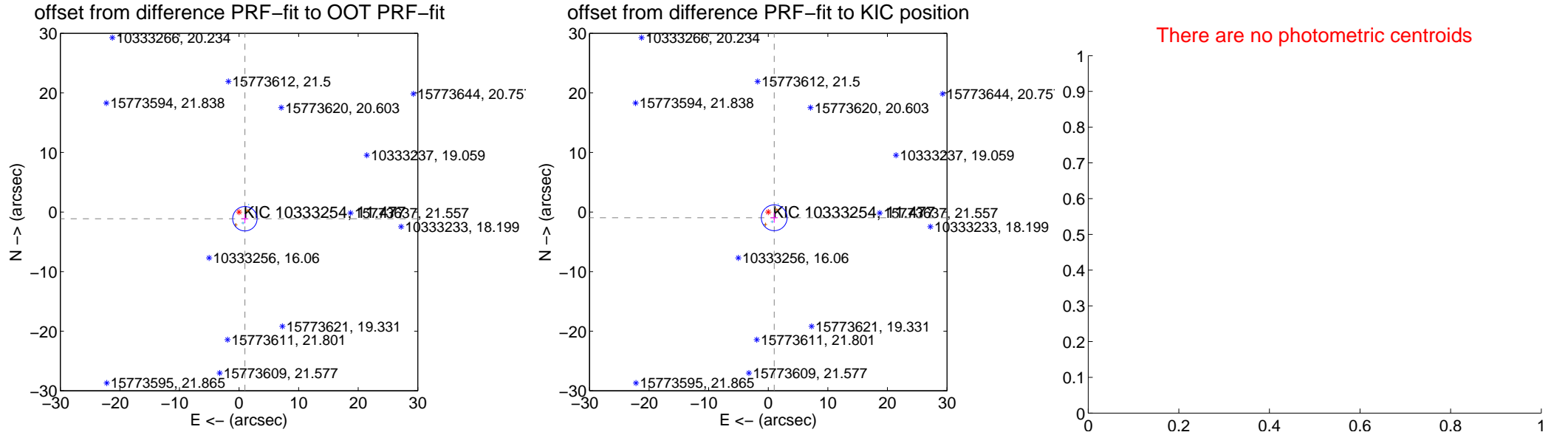
## DV Centroid Data

Supplemental centroid analysis for 010333254-06. **Kepler magnitude: 11.48.** Transit SNR 7.42

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

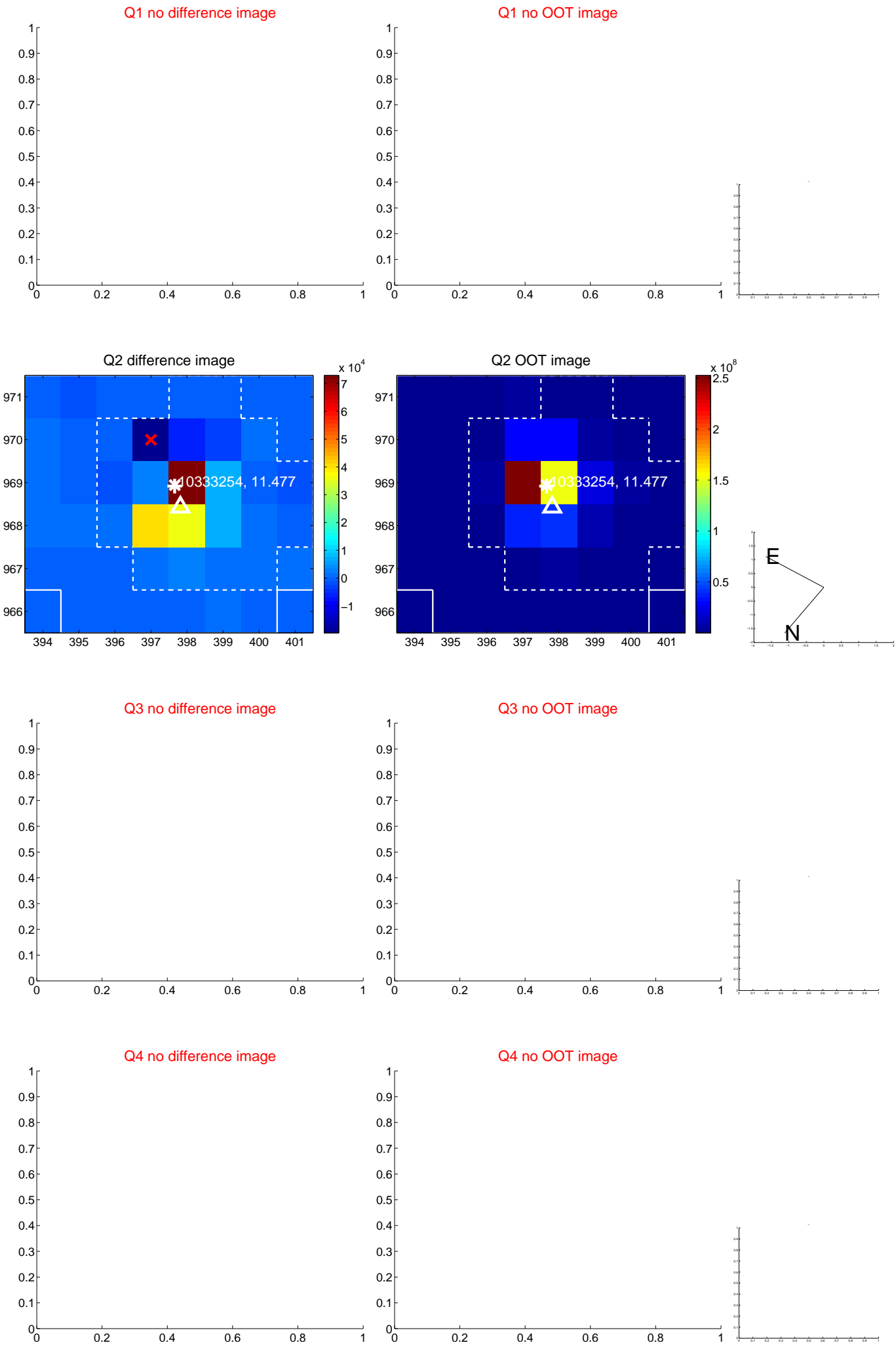
The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.491 \pm 0.683$	2.18	$-0.981 \pm 0.577$	$-1.123 \pm 0.754$
PRF-fit source offset from KIC position	$1.387 \pm 0.722$	1.92	$-0.999 \pm 0.602$	$-0.962 \pm 0.833$
photometric centroid source offset	—	—	—	—

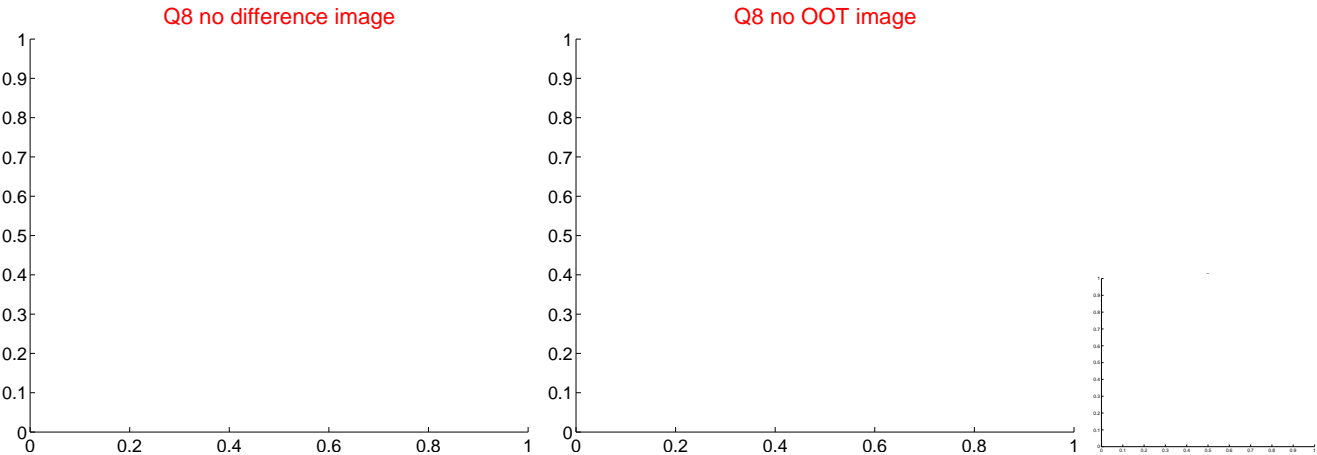
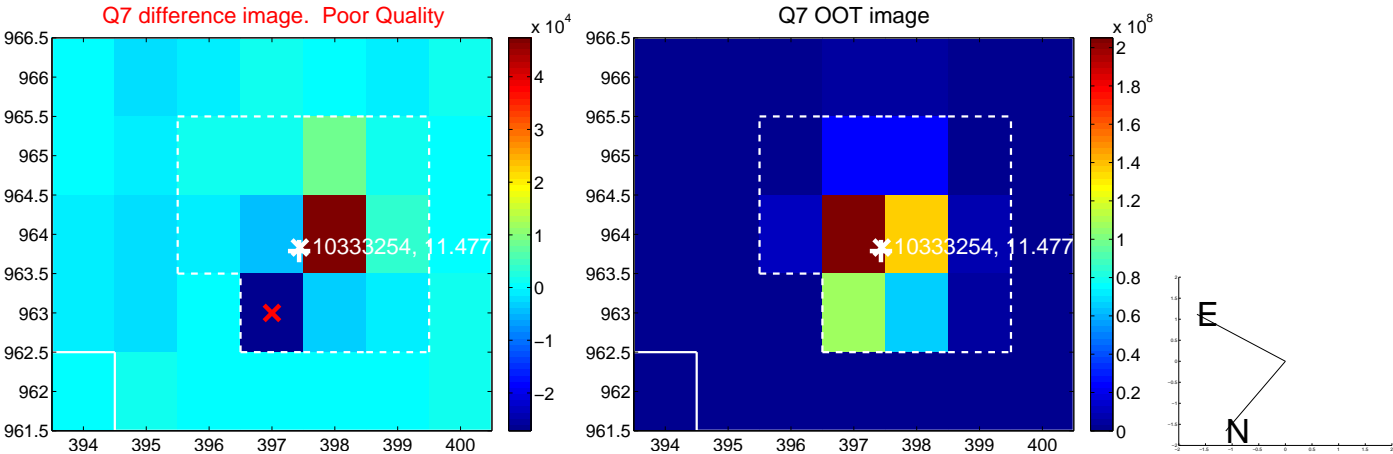
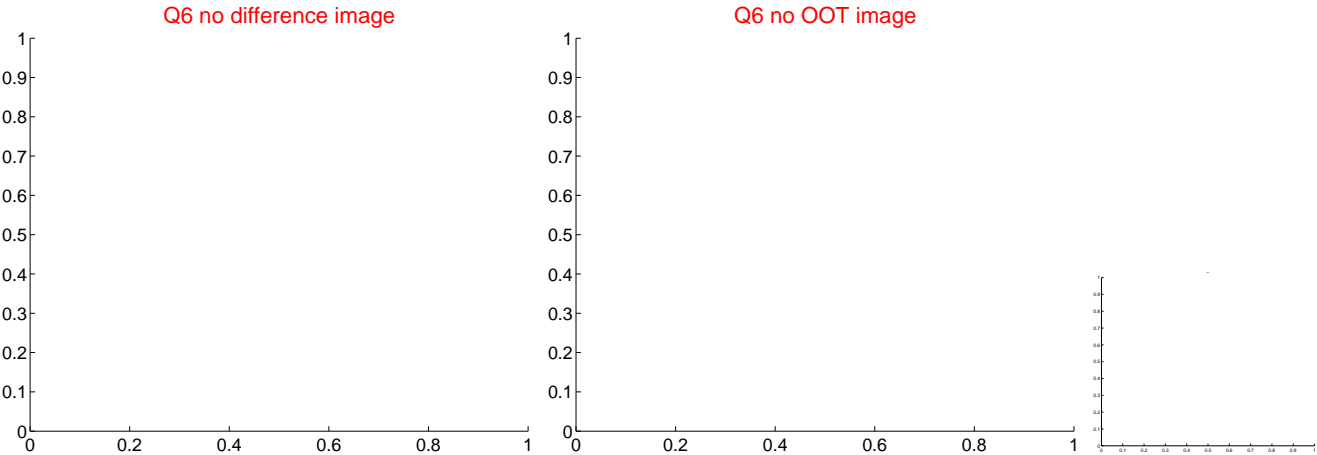
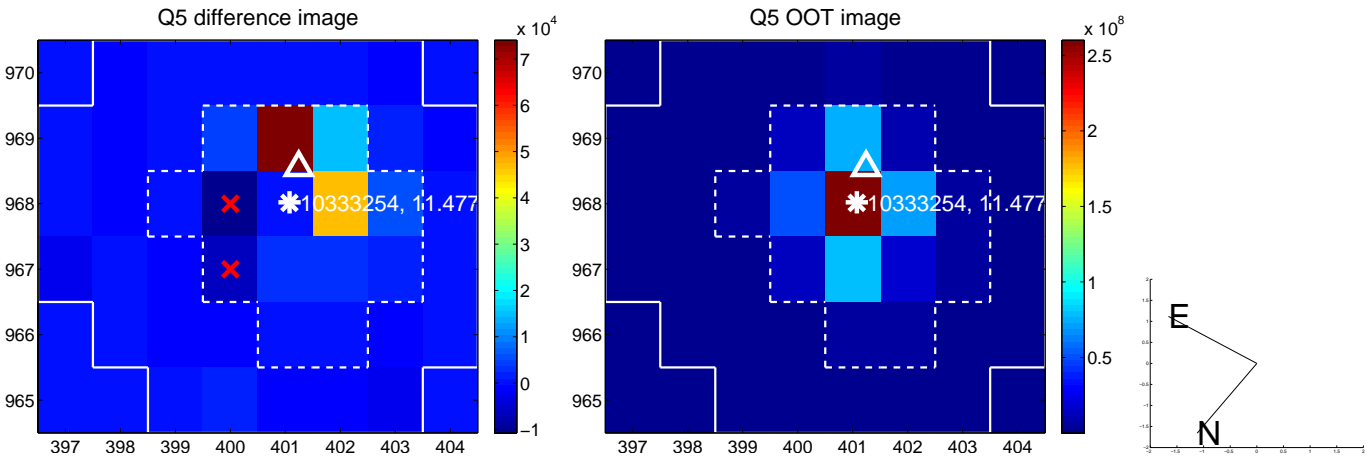


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

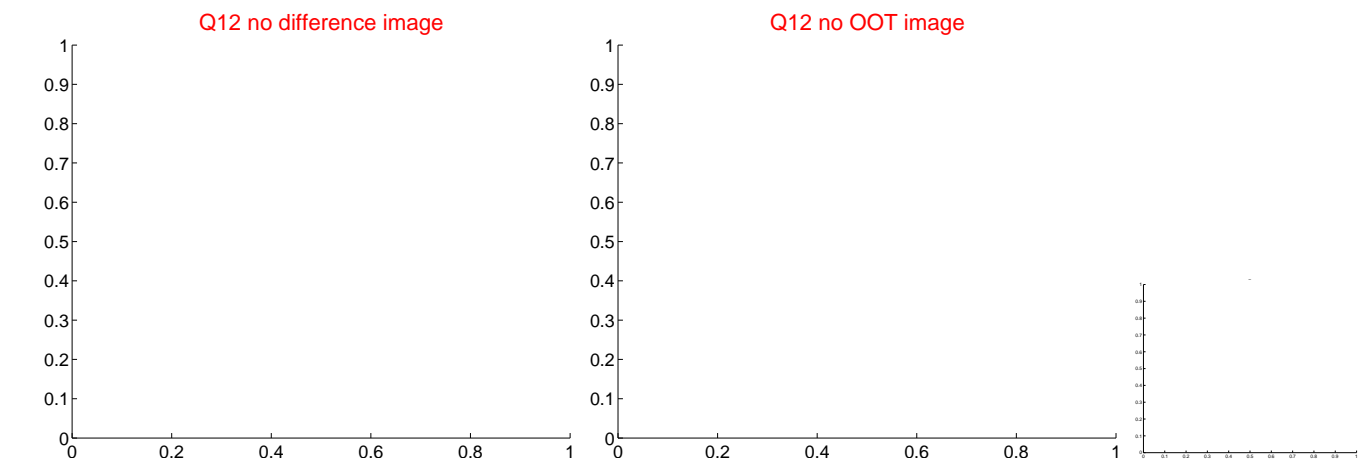
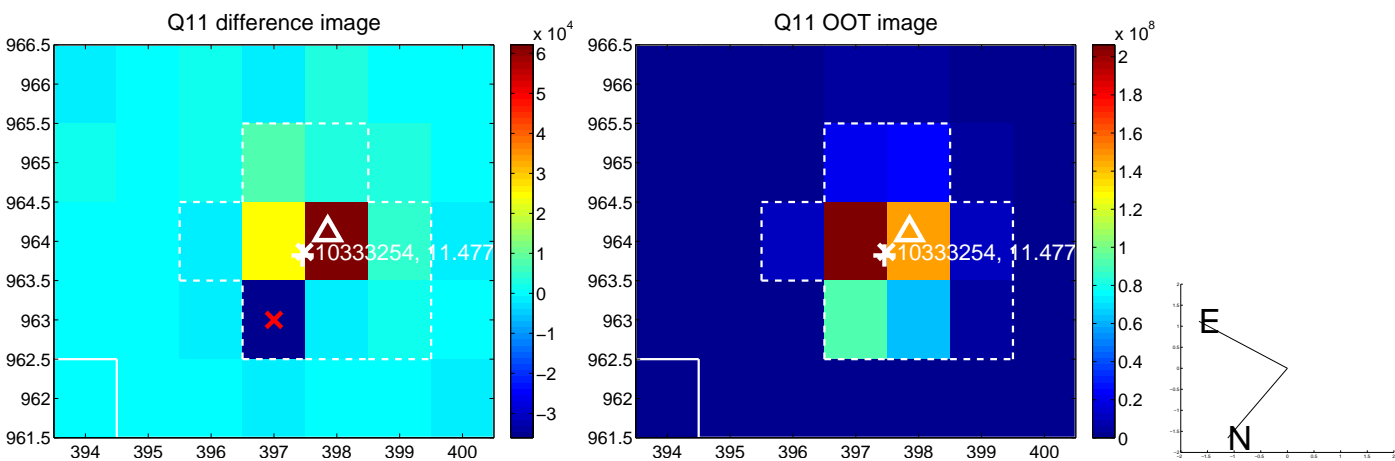
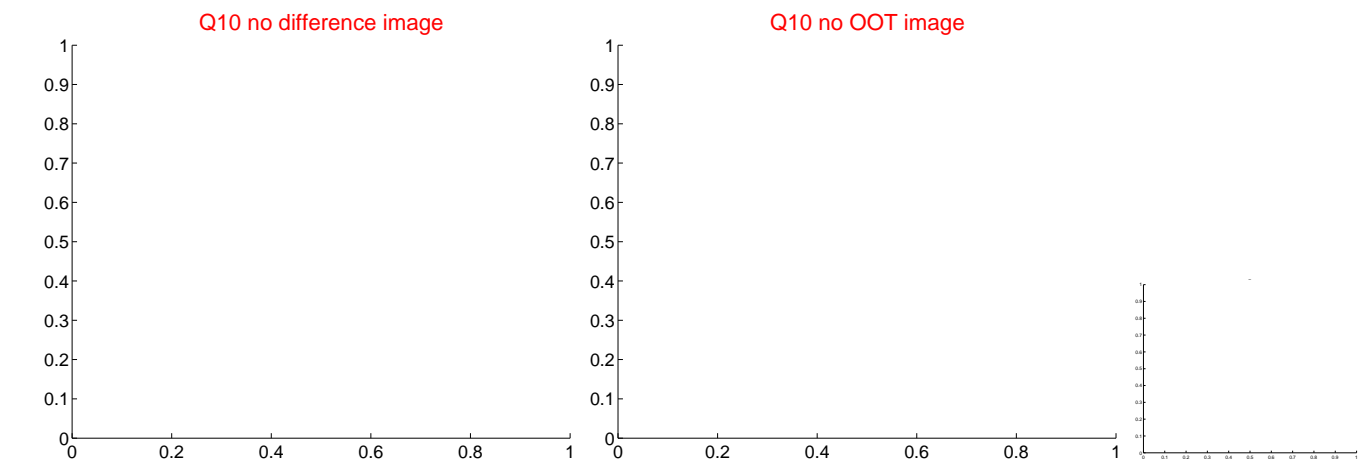
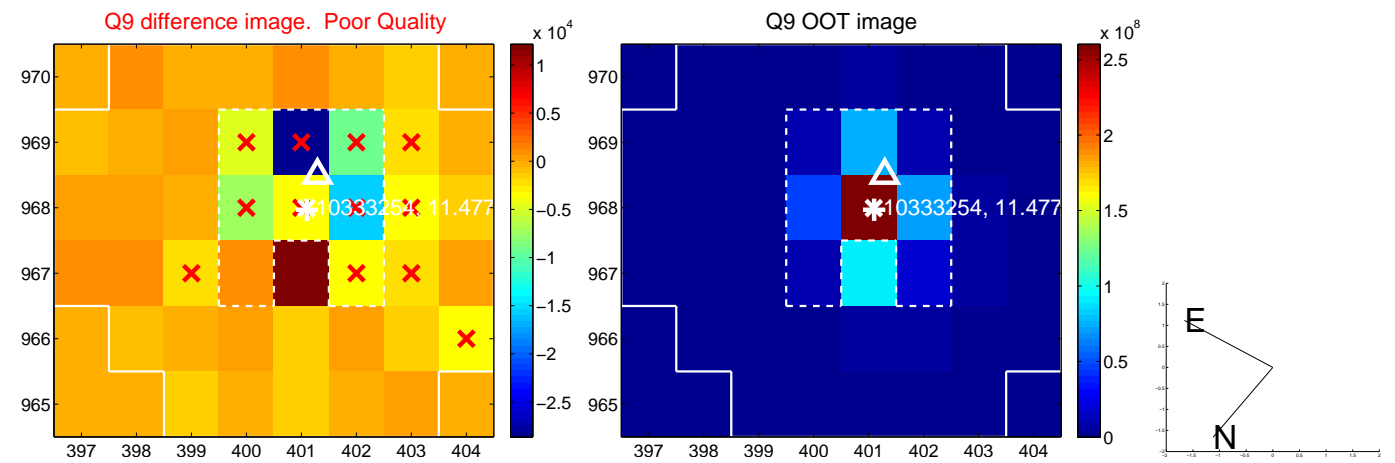
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



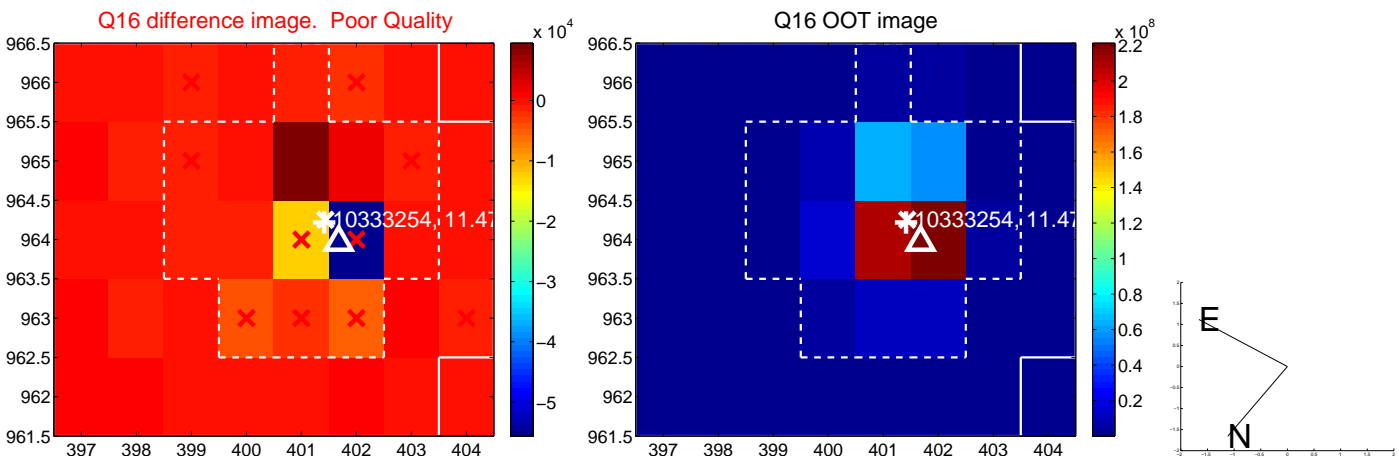
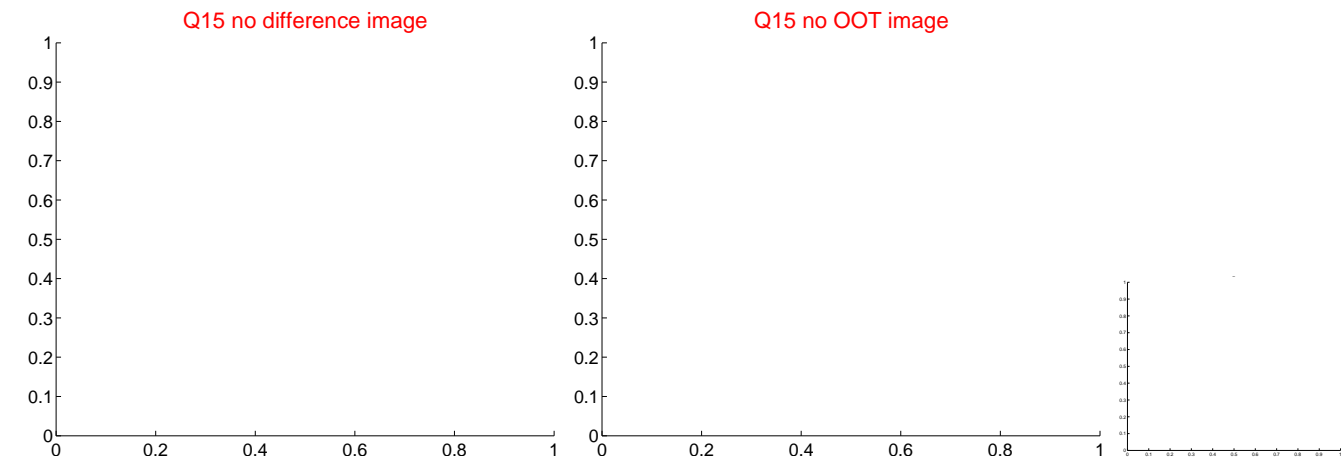
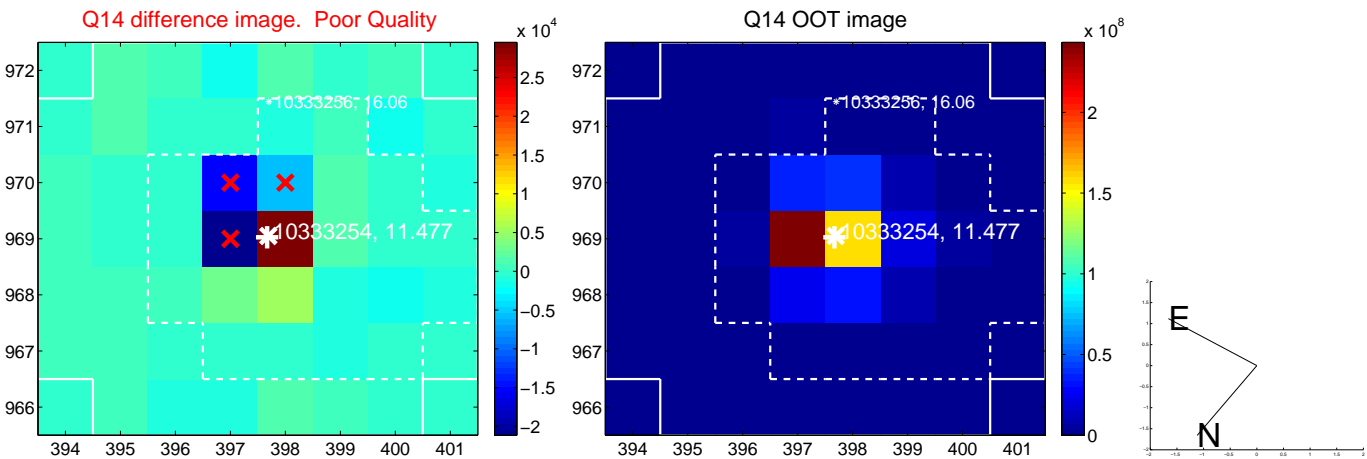
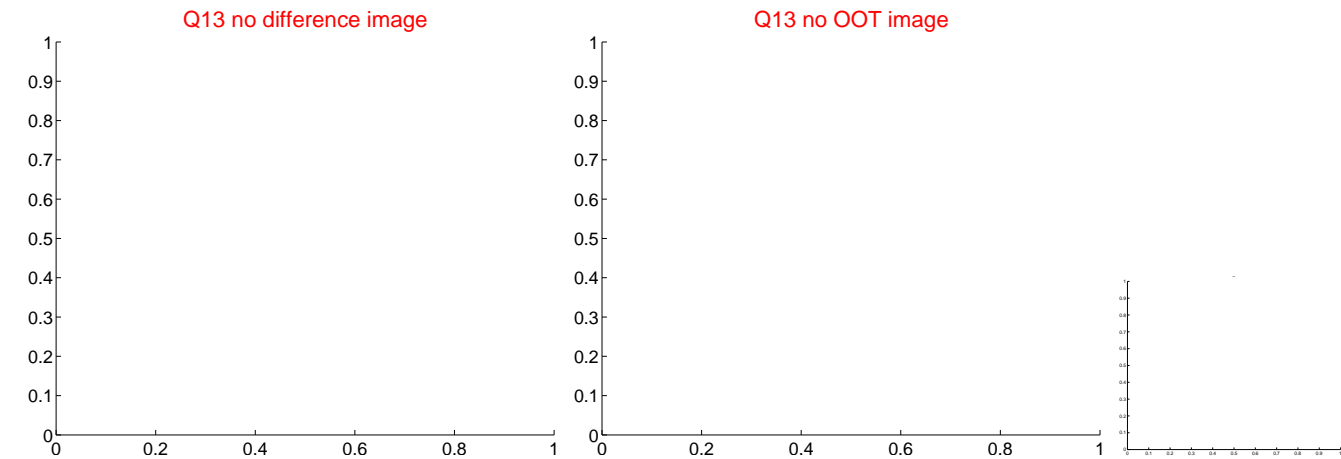
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



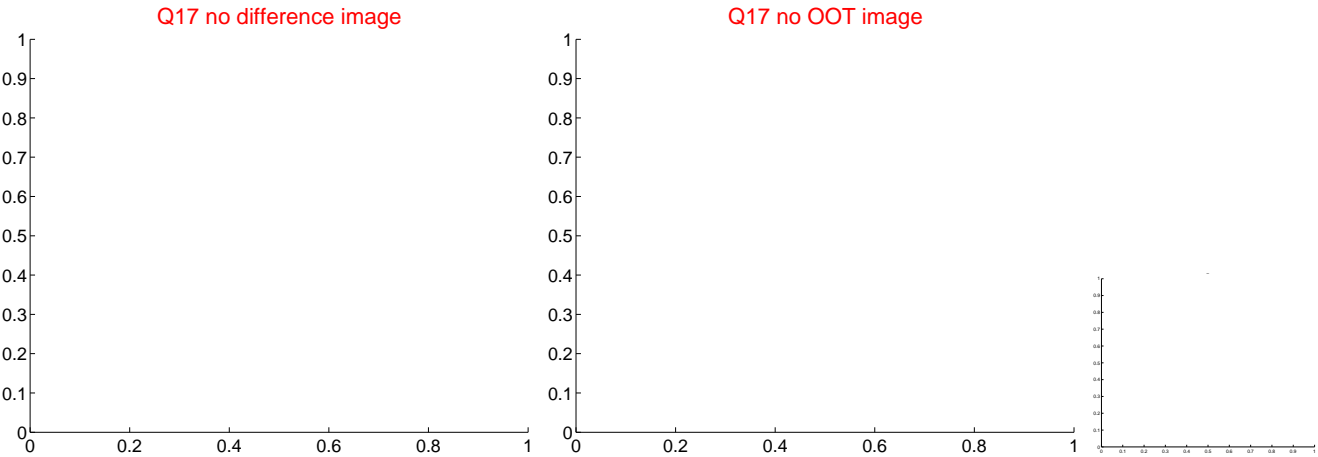
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

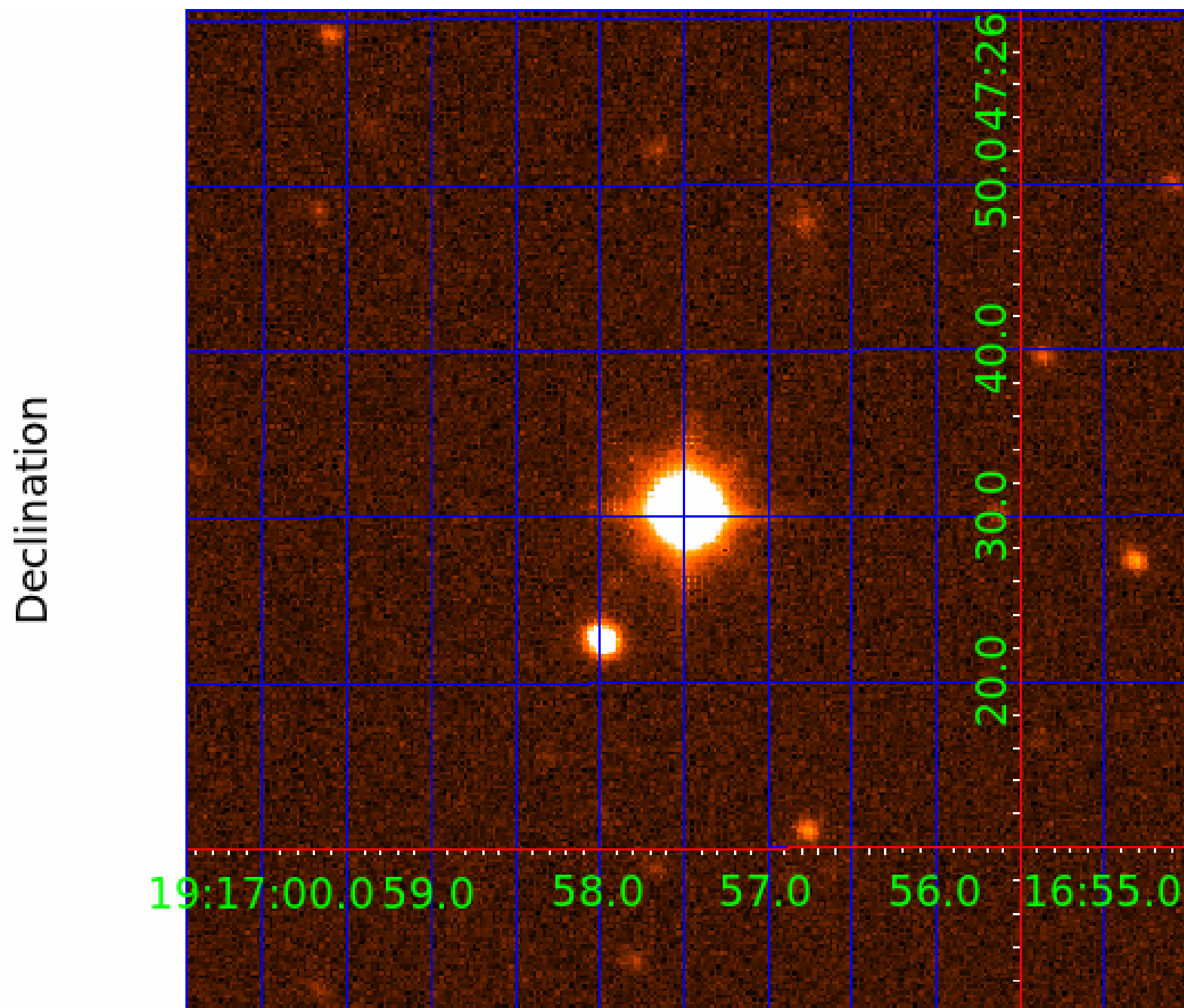


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



folded centroid time series figure for this object.

UKIRT Image





# KIC 010333254

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010333254-01	OBS	No	6.722893	137.475942	87.9	15.137	14.1	14.9	2.53	6714	3.41	1794.52
010333254-02	OBS	No	6.724655	132.709949	57.0	12.956	9.3	11.4	2.53	6714	3.83	1793.90
010333254-03	OBS	No	372.827910	155.750785	307.1	10.390	10.9	8.2	2.53	6714	5.23	8.49
010333254-04	OBS	No	186.778799	267.059650	182.7	5.251	8.0	6.6	2.53	6714	3.98	21.33
010333254-05	OBS	No	169.268559	167.694248	188.1	5.844	7.8	6.9	2.53	6714	3.84	24.32
010333254-06	OBS	No	209.835227	250.336223	176.0	5.160	7.8	7.4	2.53	6714	3.92	18.26
010333254-07	OBS	No	22.397421	137.445498	85.3	5.909	7.8	7.7	2.53	6714	2.79	360.66
010333254-08	OBS	No	141.378804	194.828778	127.9	5.405	7.3	8.0	2.53	6714	3.43	30.92
010333254-09	OBS	No	363.741743	457.410736	271.3	10.246	8.7	8.3	2.53	6714	5.37	8.77

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010333254-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—CENT_SATURATED
010333254-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—SAME_NTL_PERIOD—CENT_SATURATED
010333254-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
010333254-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—CENT_SATURATED
010333254-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-07	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

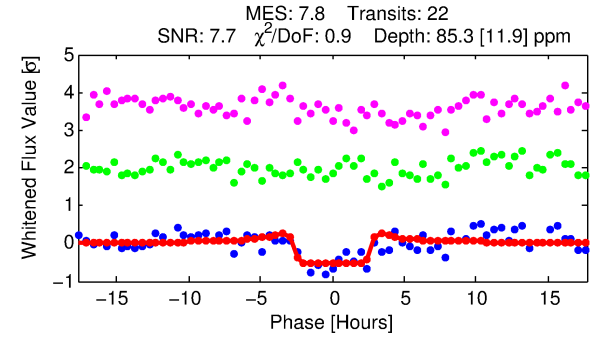
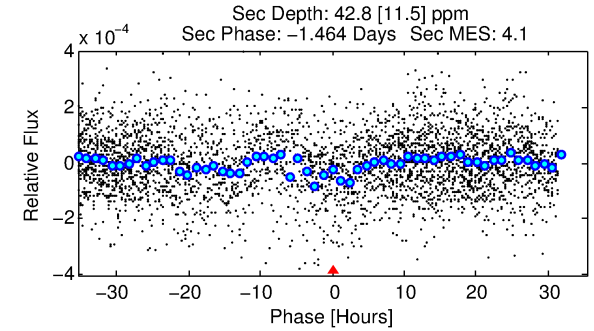
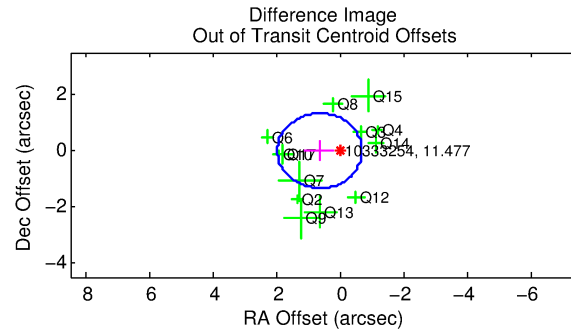
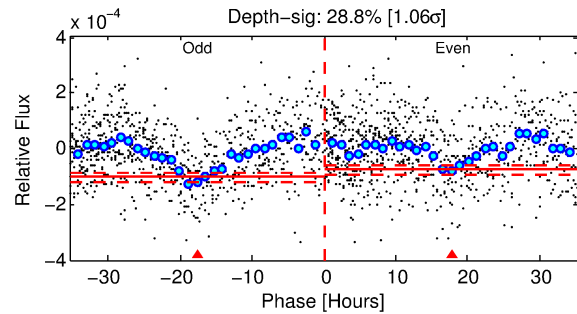
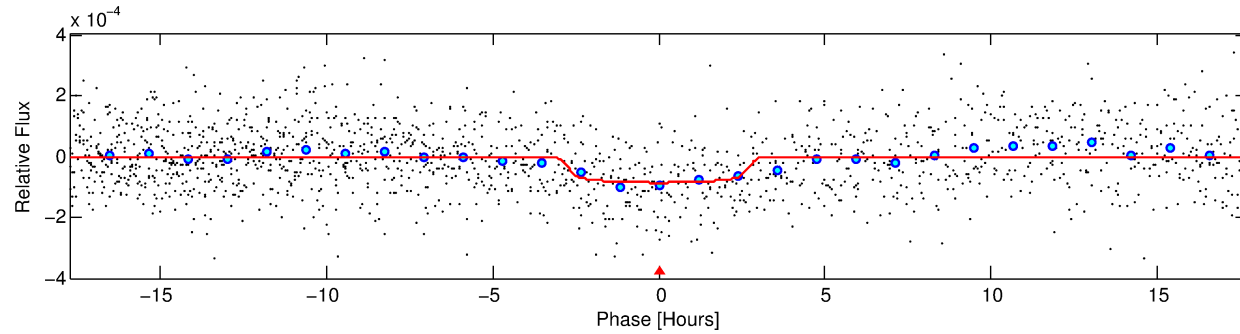
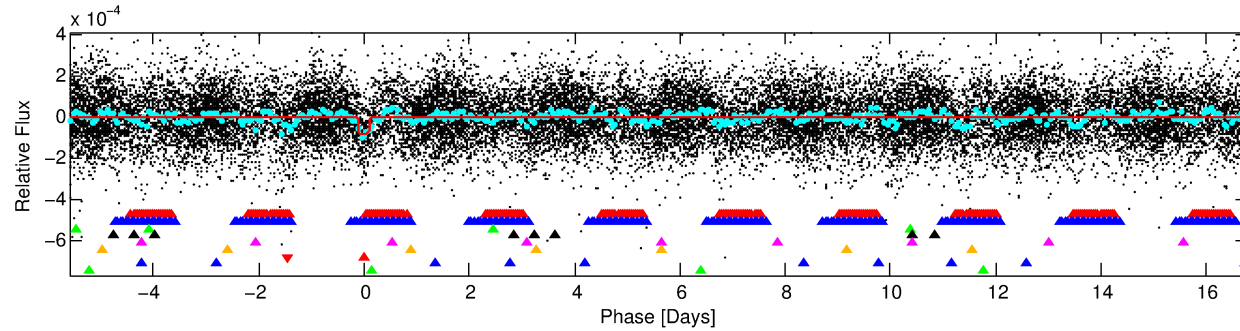
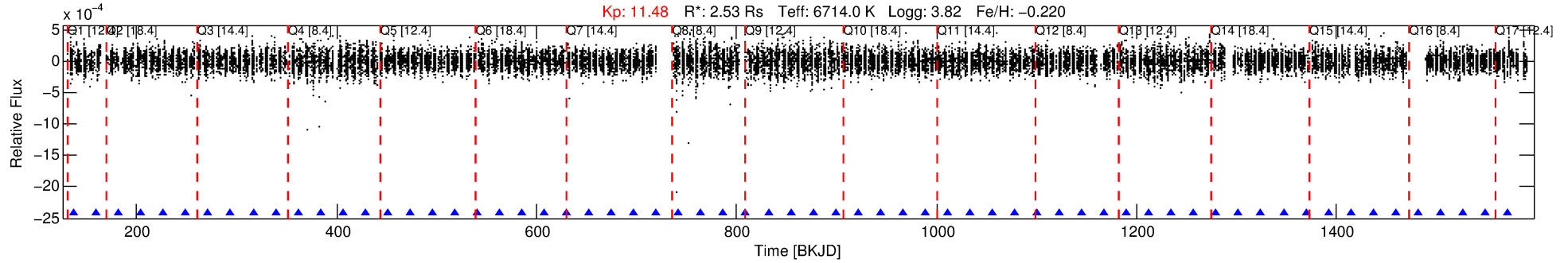
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 010333254-07

No Significant Match Found

# DV One-Page Summary

KIC: 10333254 Candidate: 7 of 9 Period: 22.397 d



## DV Fit Results:

Period = 22.39742 [0.00028] d  
Epoch = 137.4455 [0.0118] BKJD  
 $R_p/R^* = 0.0101$  [0.0019]  
 $a/R^* = 11.63$  [11.67]  
 $b = 0.93$  [0.15]  
 $S_{\text{eff}} = 360.66$  [184.92]  
 $T_{\text{eq}} = 1111$  [142] K  
 $R_p = 2.79$  [1.15]  $R_e$   
 $a = 0.1800$  [0.0590] AU  
 $A_g = 97.82$  [66.87] [1.45 $\sigma$ ]  
 $T_{\text{eff}} = 5403$  [646] K [6.49 $\sigma$ ]

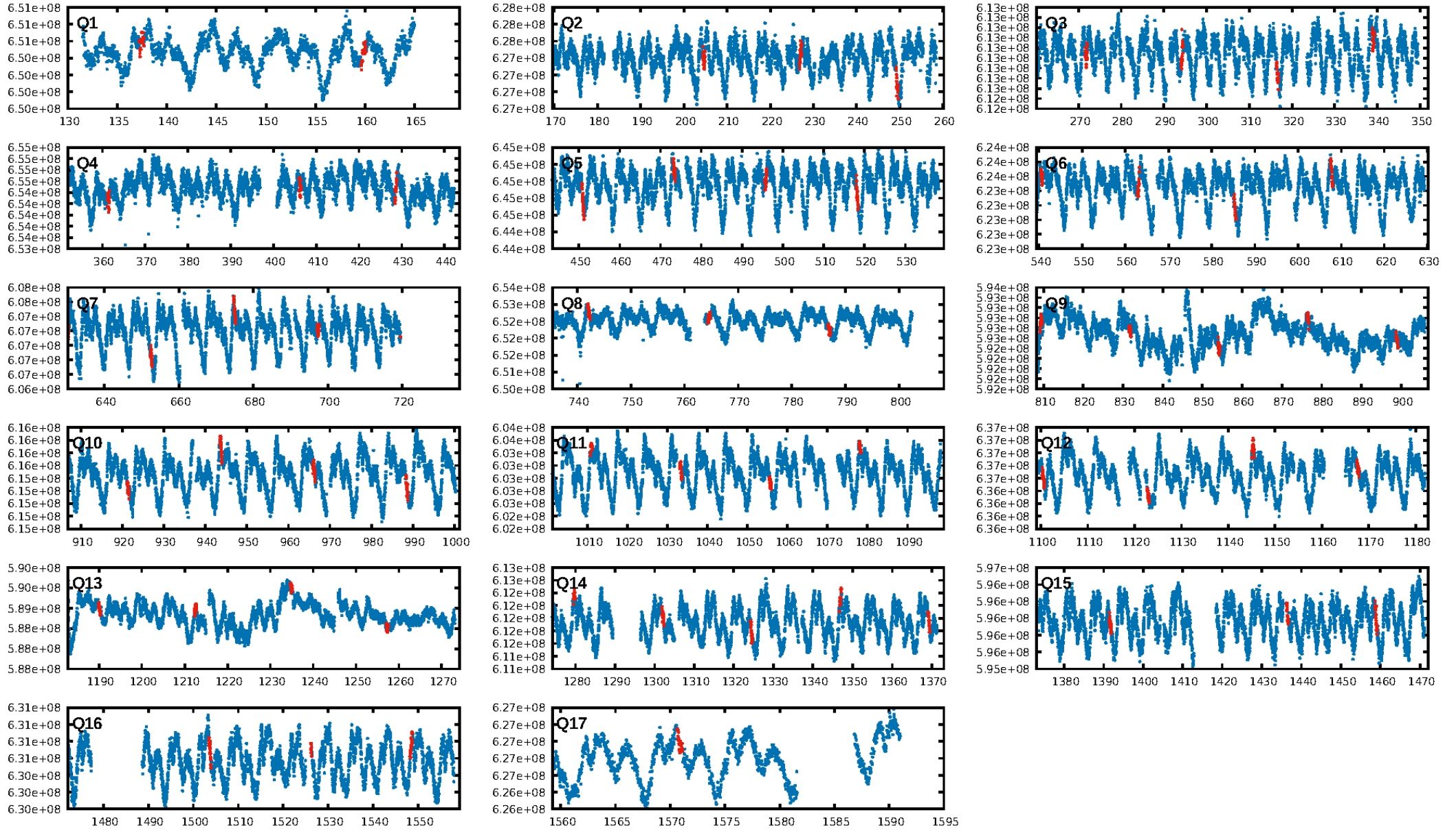
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [26.42 $\sigma$ ]  
LongPeriod-sig: 100.0% [356.57 $\sigma$ ]  
ModelChiSquare2-sig: 59.0%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 3.52e-09**  
RollingBand-fgt: 1.00 [21/21]  
**GhostDiagnostic-chr: 0.6811**  
Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 0.656 arcsec [1.48 $\sigma$ ]  
KicOffset-rm: 0.636 arcsec [1.45 $\sigma$ ]  
OotOffset-st: 4/3/3/3 [13]  
KicOffset-st: 4/3/3/3 [13]  
DiffImageQuality-fgm: 0.62 [8/13]  
DiffImageOverlap-fno: 0.88 [15/17]

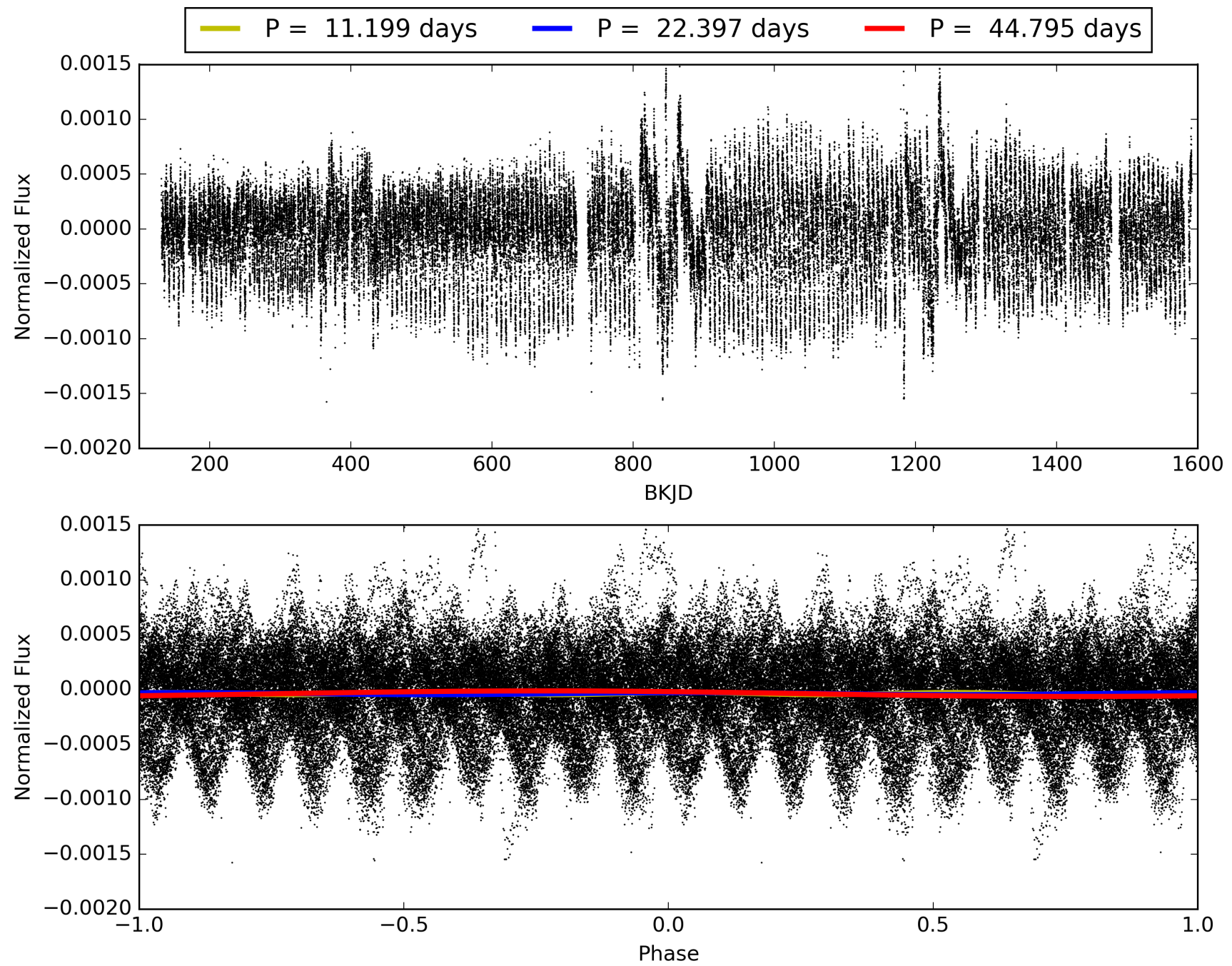
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 07:17:16 Z

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

# TCE 010333254-07, PDC Light Curves

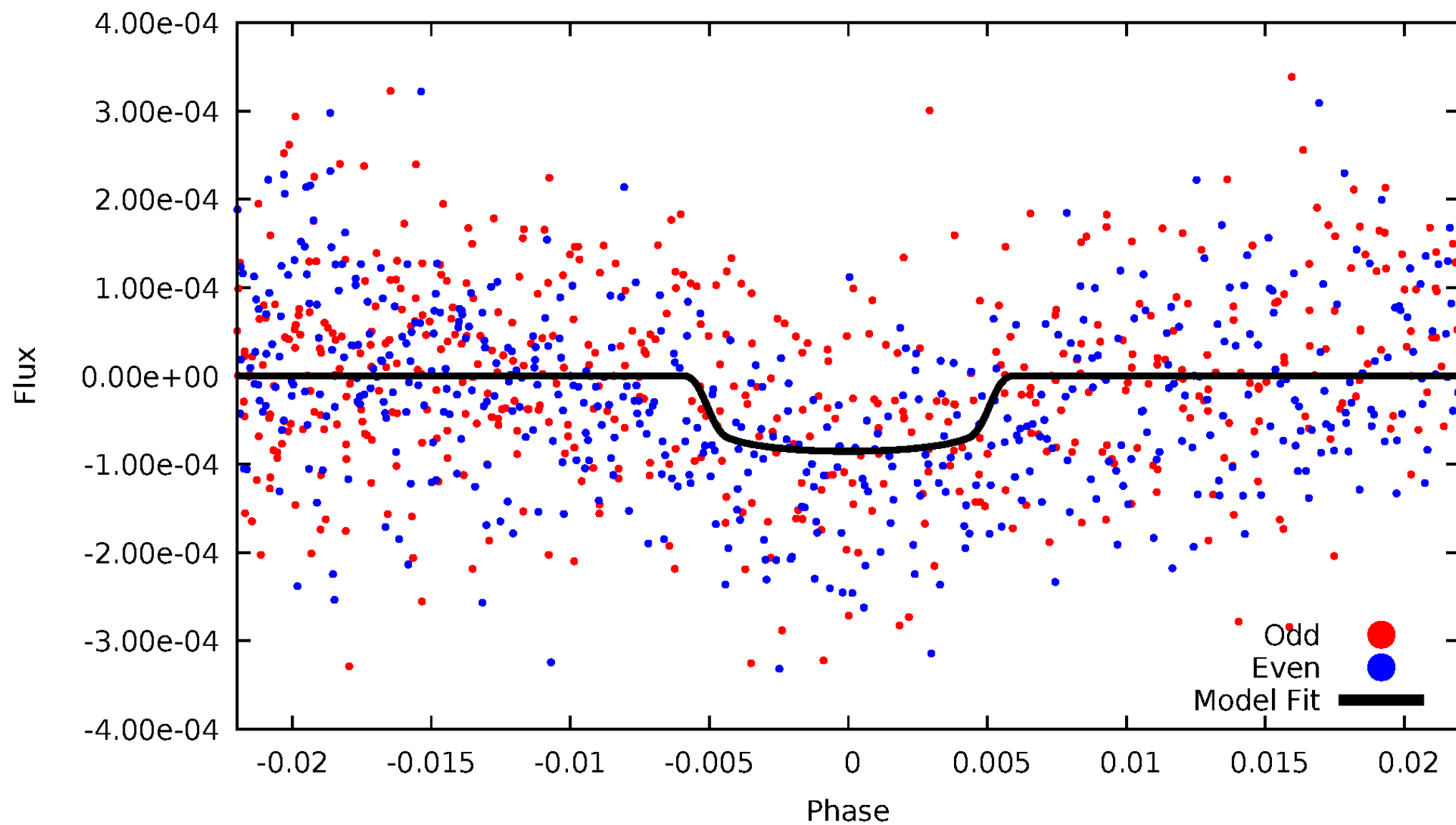


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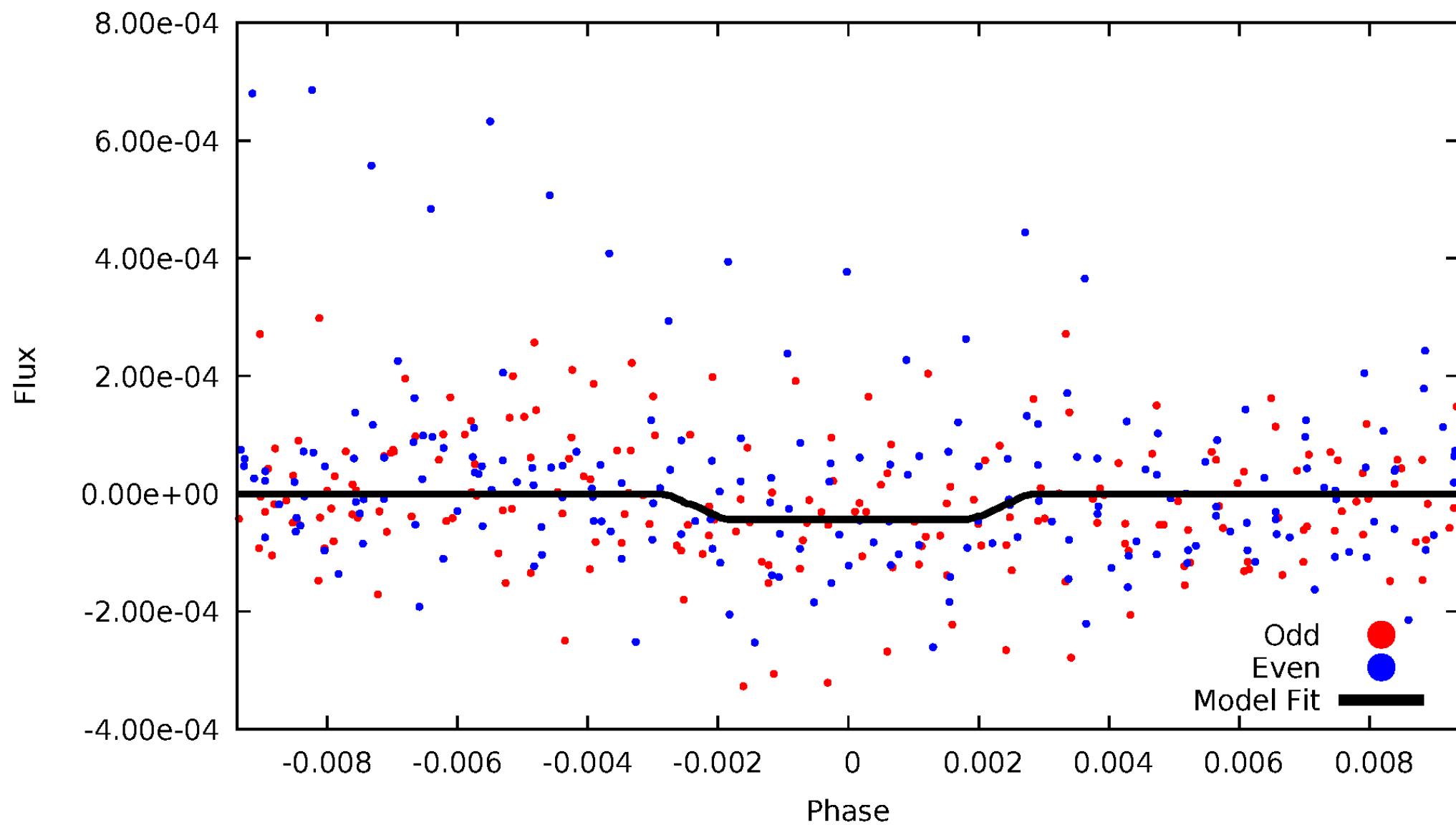
# DV Odd/Even

TCE 010333254-07



# ALT Odd/Even

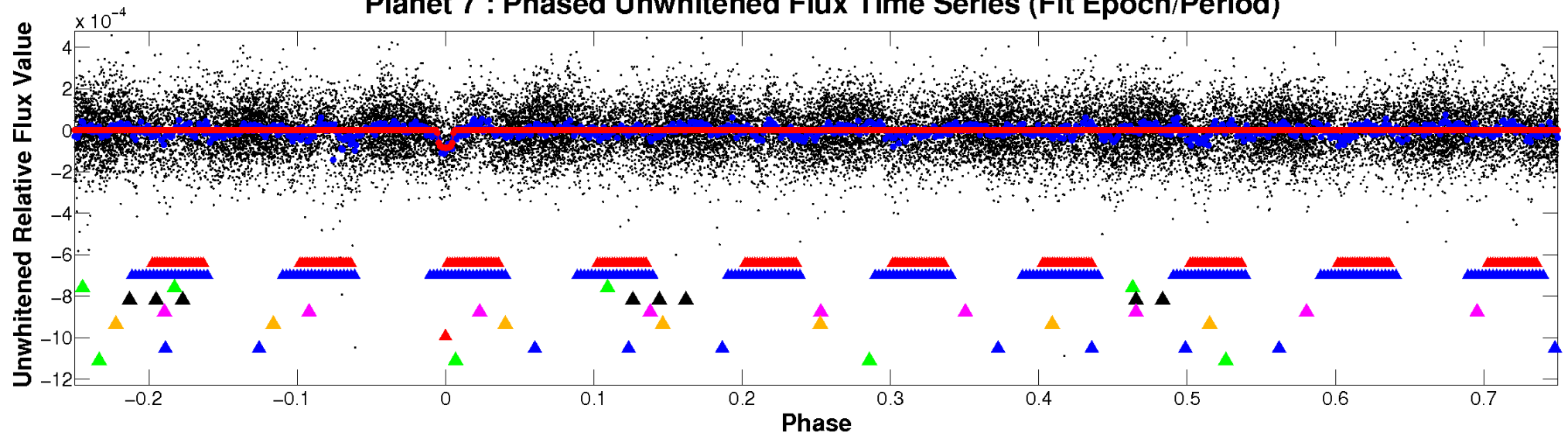
TCE 010333254-07



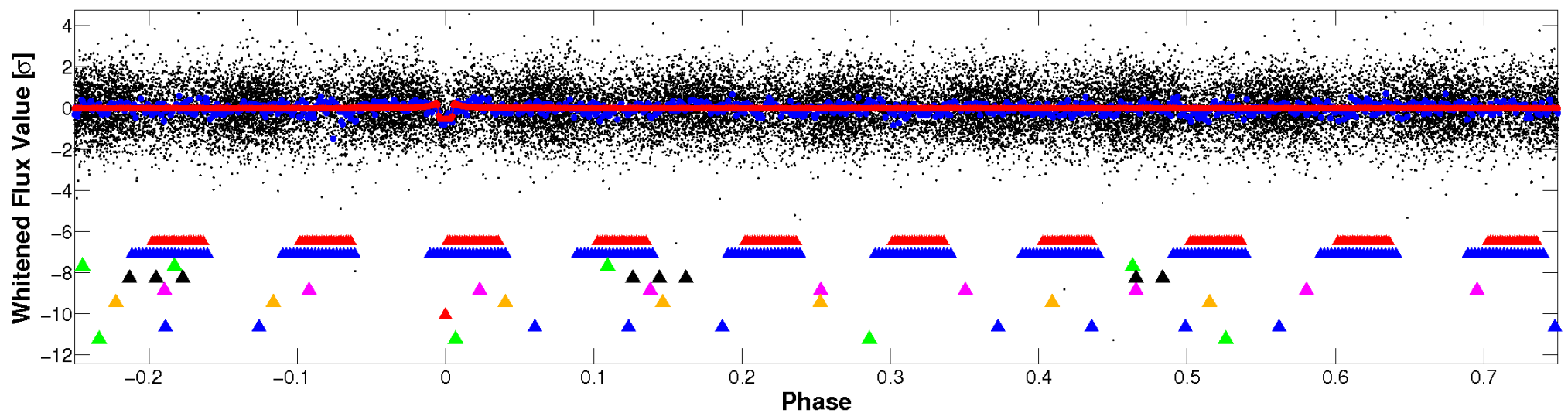


# Non-Whitened Vs. Whitened Light Curve

## Planet 7 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

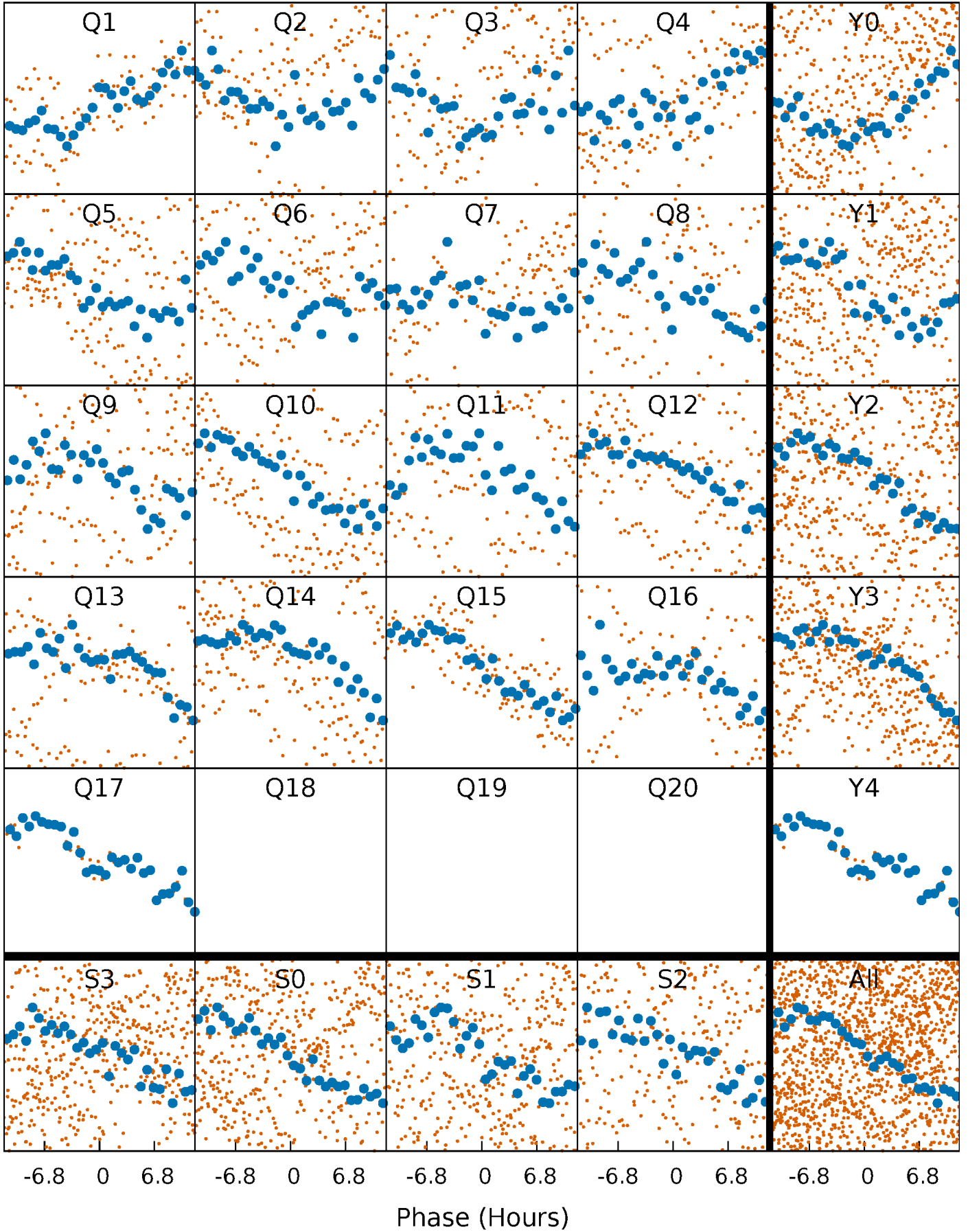


## Planet 7 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

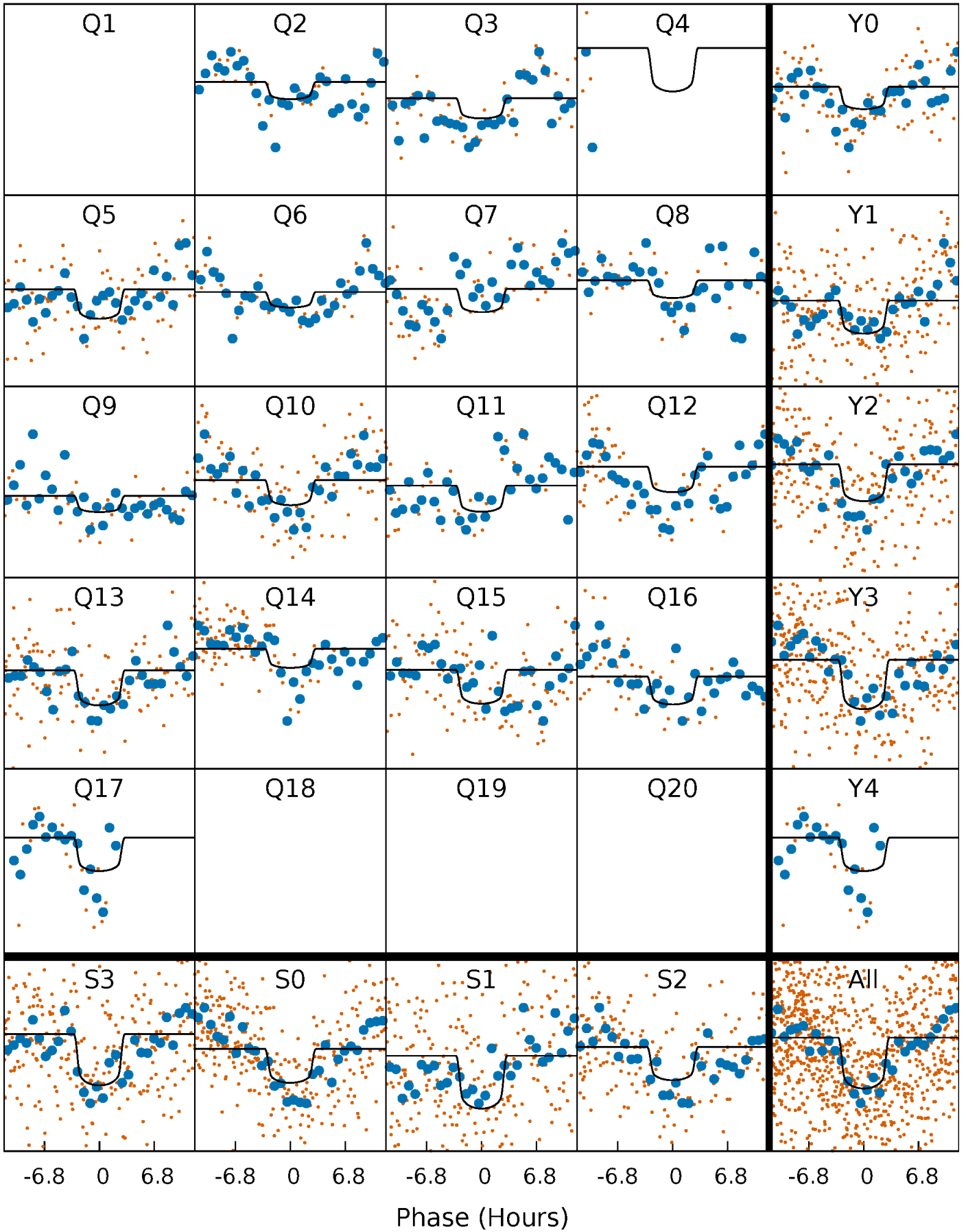
TCE 010333254-07 P= 22.397421 Days  $T_0=137.445498$  (BKJD)





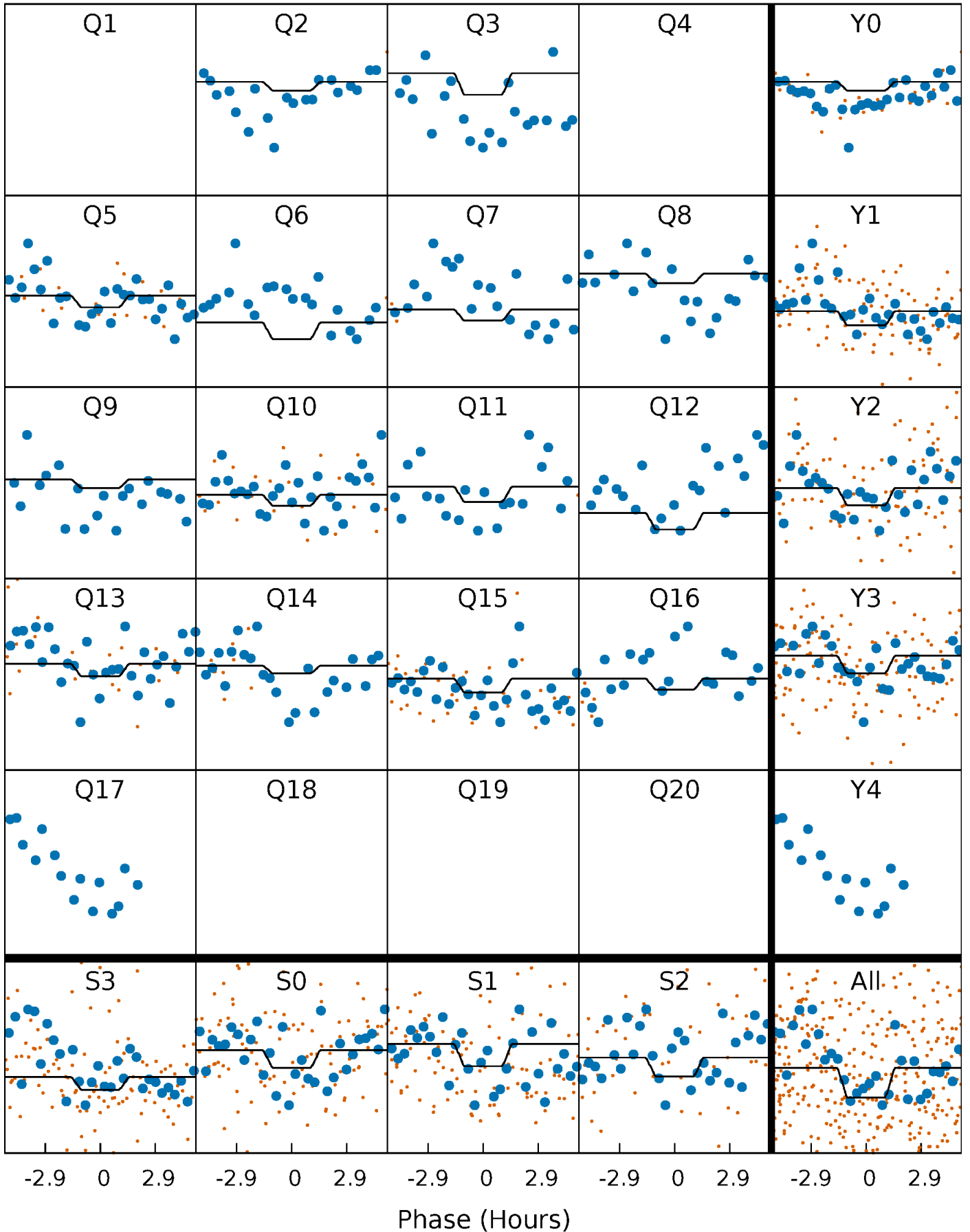
# DV Quarter-Phased Transit Curves

TCE 010333254-07   P= 22.397421 Days    $T_0=137.445498$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

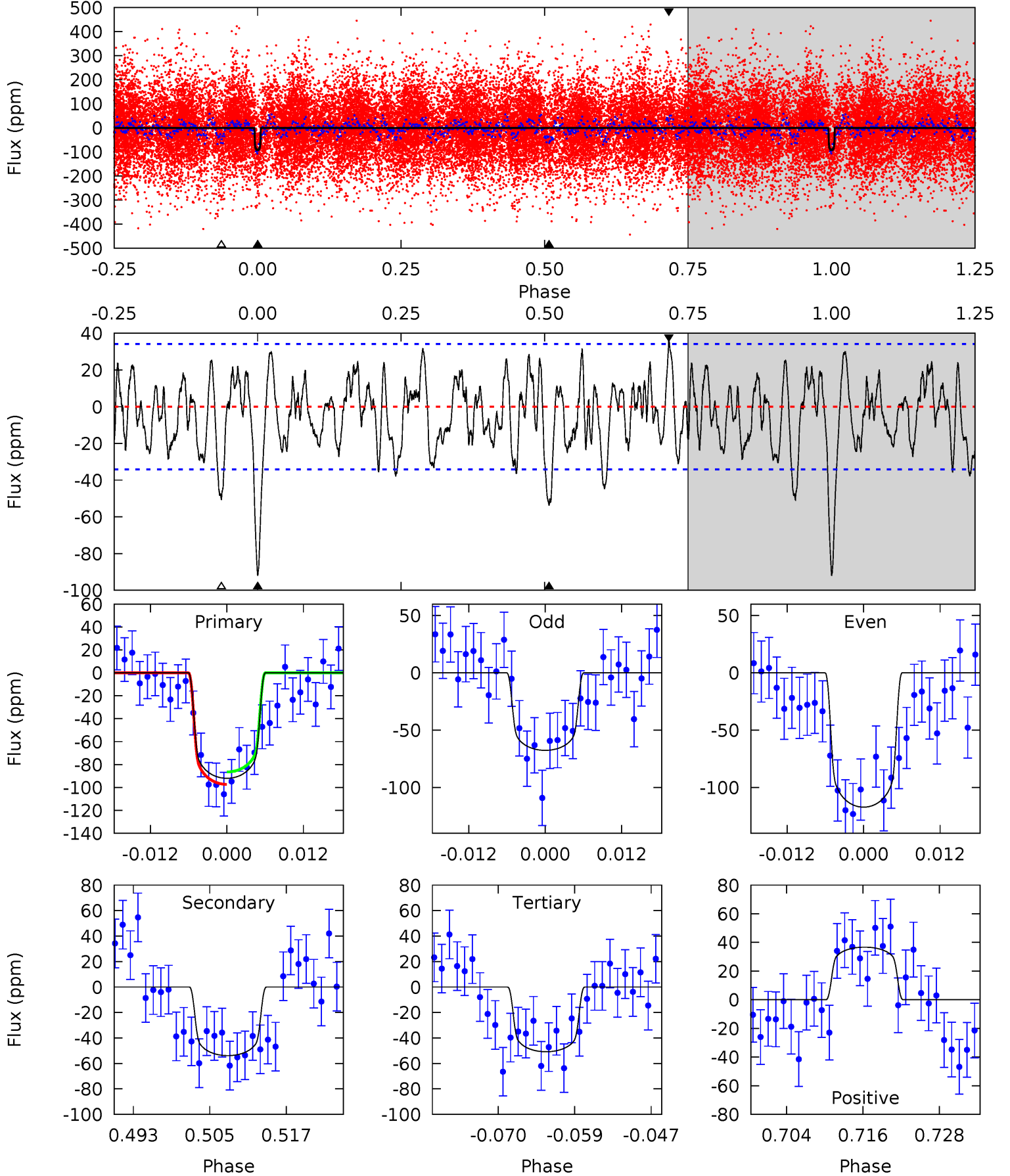
TCE 010333254-07     $P = 22.398034$  Days     $T_0 = 137.400019$  (BKJD)



# DV Model-Shift Uniqueness Test

010333254-07, P = 22.397421 Days, E = 115.048077 Days

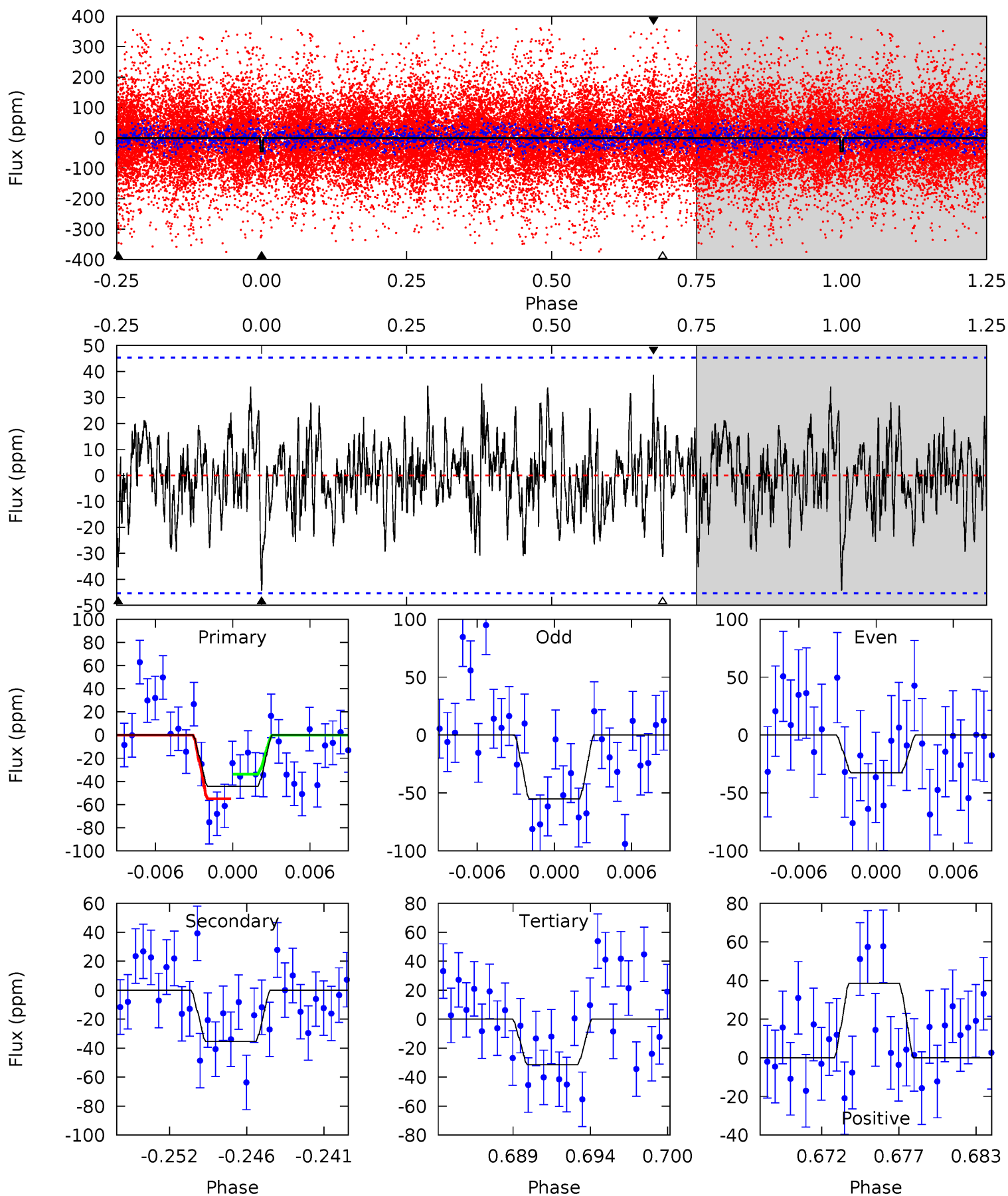
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.5	7.88	7.43	5.37	5.00	2.52	2.30	6.02	8.09	0.44	2.51	3.64	0.76	0.29	0.80



# Alt Model-Shift Uniqueness Test

010333254-07, P = 22.398034 Days, E = 115.001985 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
5.02	4.00	3.56	4.37	5.14	2.77	1.32	1.46	0.65	0.44	-0.37	1.29	0.70	0.47	0



### Stellar Parameters For KIC 010333254

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6714^{+168}_{-184}$	$3.821^{+0.285}_{-0.095}$	$-0.220^{+0.300}_{-0.250}$	$2.534^{+0.463}_{-0.927}$	$1.550^{+0.183}_{-0.340}$	$0.134^{+0.245}_{-0.041}$
	+3%/-3%	+7%/-2%	+136%/-114%	+18%/-37%	+12%/-22%	+183%/-31%
Source	PHO1	FLK73	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 010333254-07 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-54 \pm 7$	$2.61^{+0.67}_{-0.62}$	$1522^{+92}_{-133}$	$5706^{+650}_{-476}$	$139^{+97}_{-49}$
Alt.	$-35 \pm 9$	$1.73^{+0.65}_{-0.56}$	$1535^{+86}_{-132}$	$6278^{+1405}_{-800}$	$204^{+245}_{-100}$

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

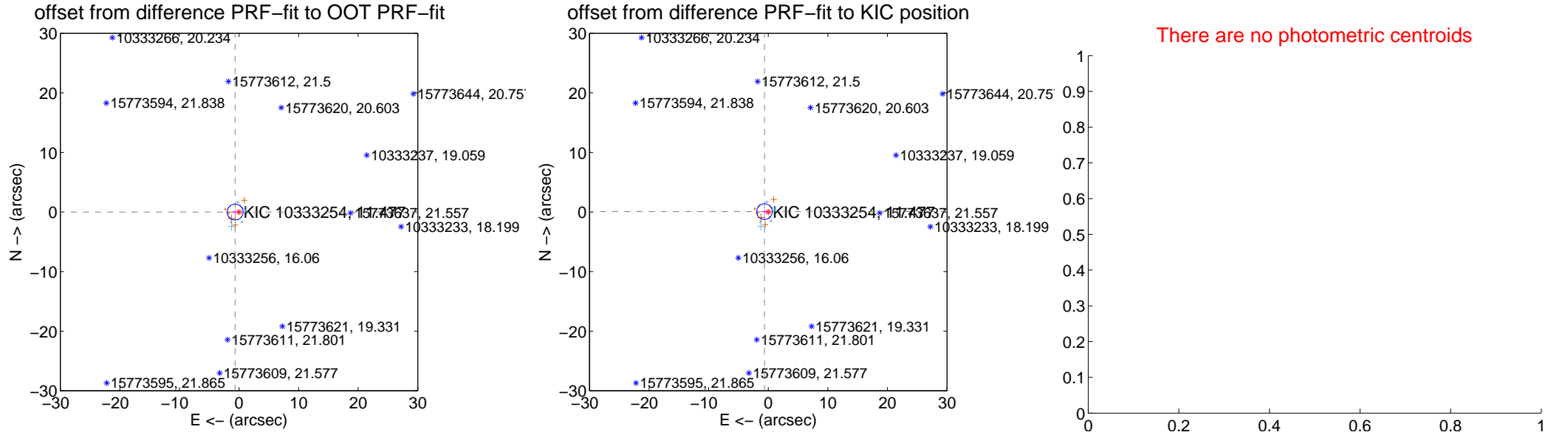
## DV Centroid Data

Supplemental centroid analysis for 010333254-07. **Kepler magnitude: 11.48.** Transit SNR 7.73

There are 8 quarters with good PRF difference image offsets

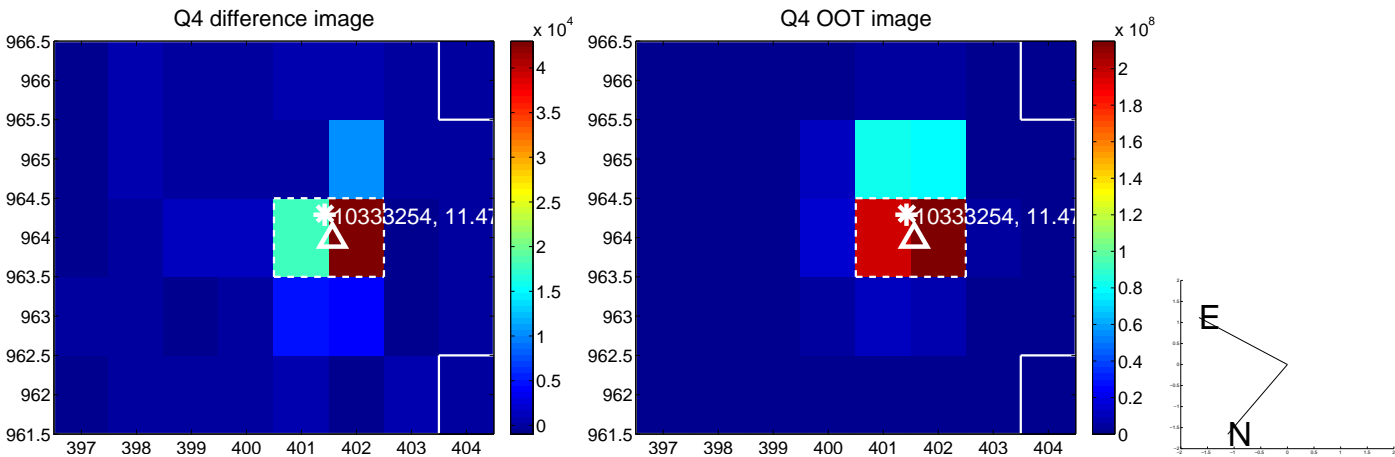
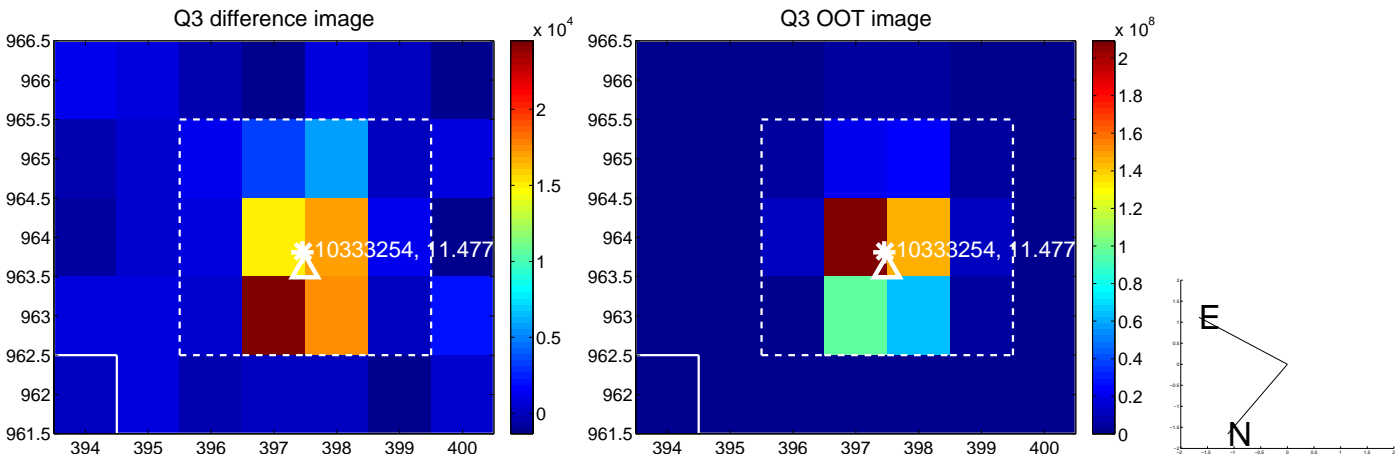
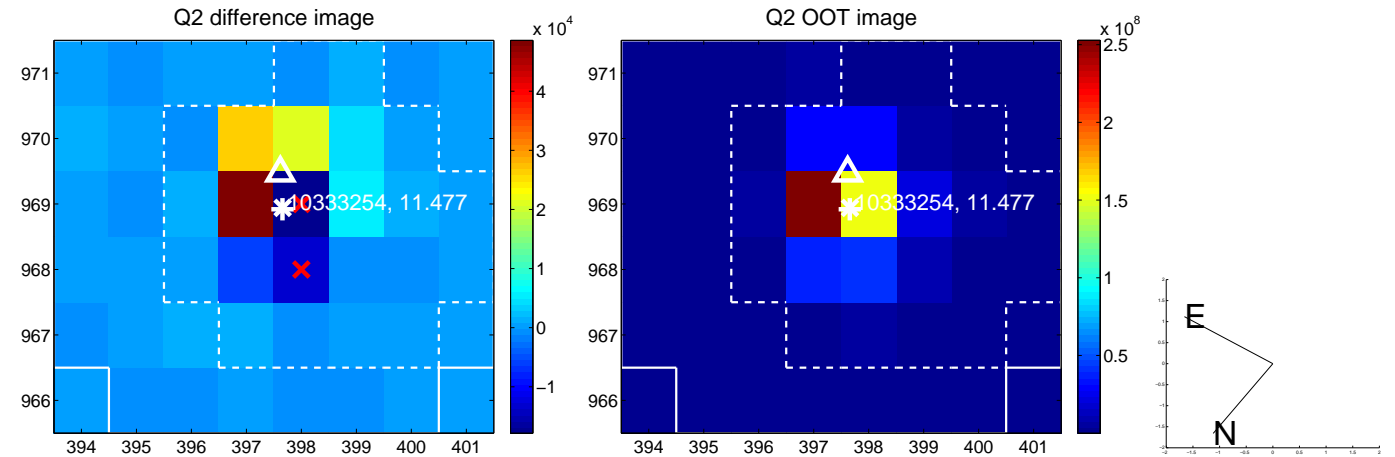
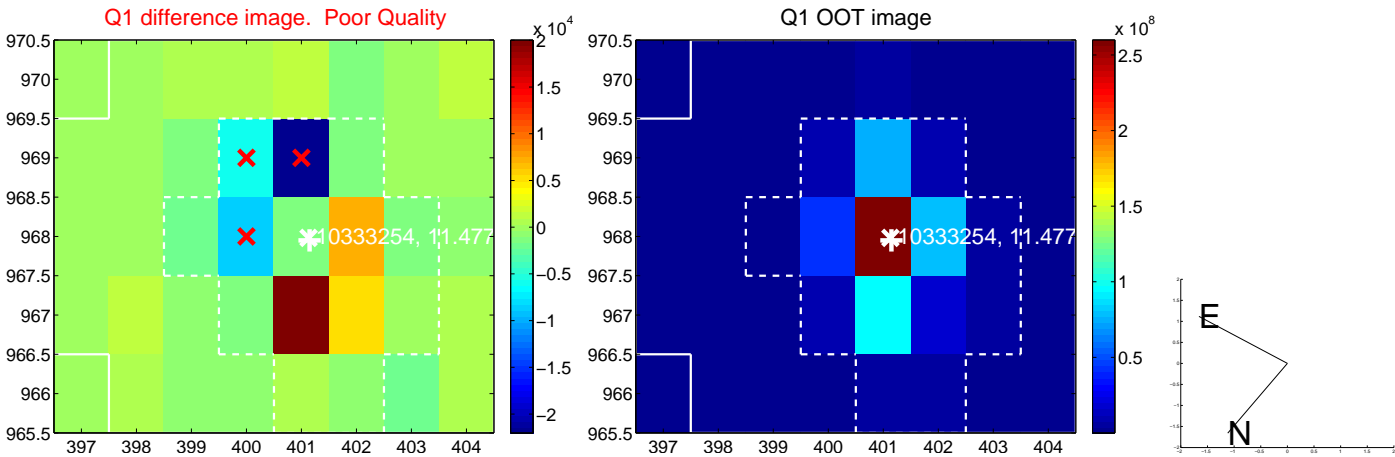
The direct PRF centroid is offset from the target star catalog position by about 0.02 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.656 \pm 0.444$	1.48	$0.656 \pm 0.444$	$-0.003 \pm 0.318$
PRF-fit source offset from KIC position	$0.636 \pm 0.439$	1.45	$0.632 \pm 0.440$	$0.073 \pm 0.314$
photometric centroid source offset	—	—	—	—

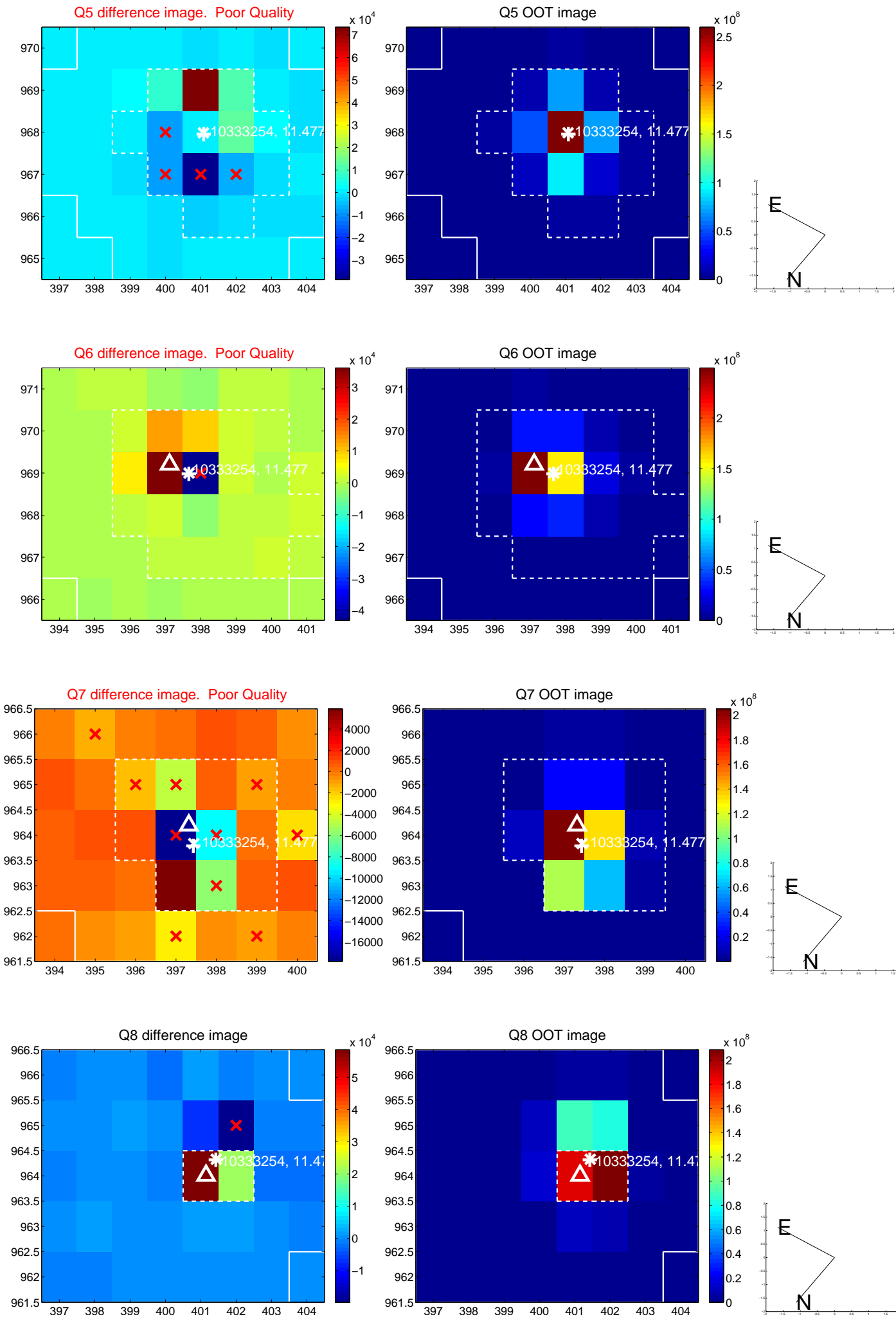


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

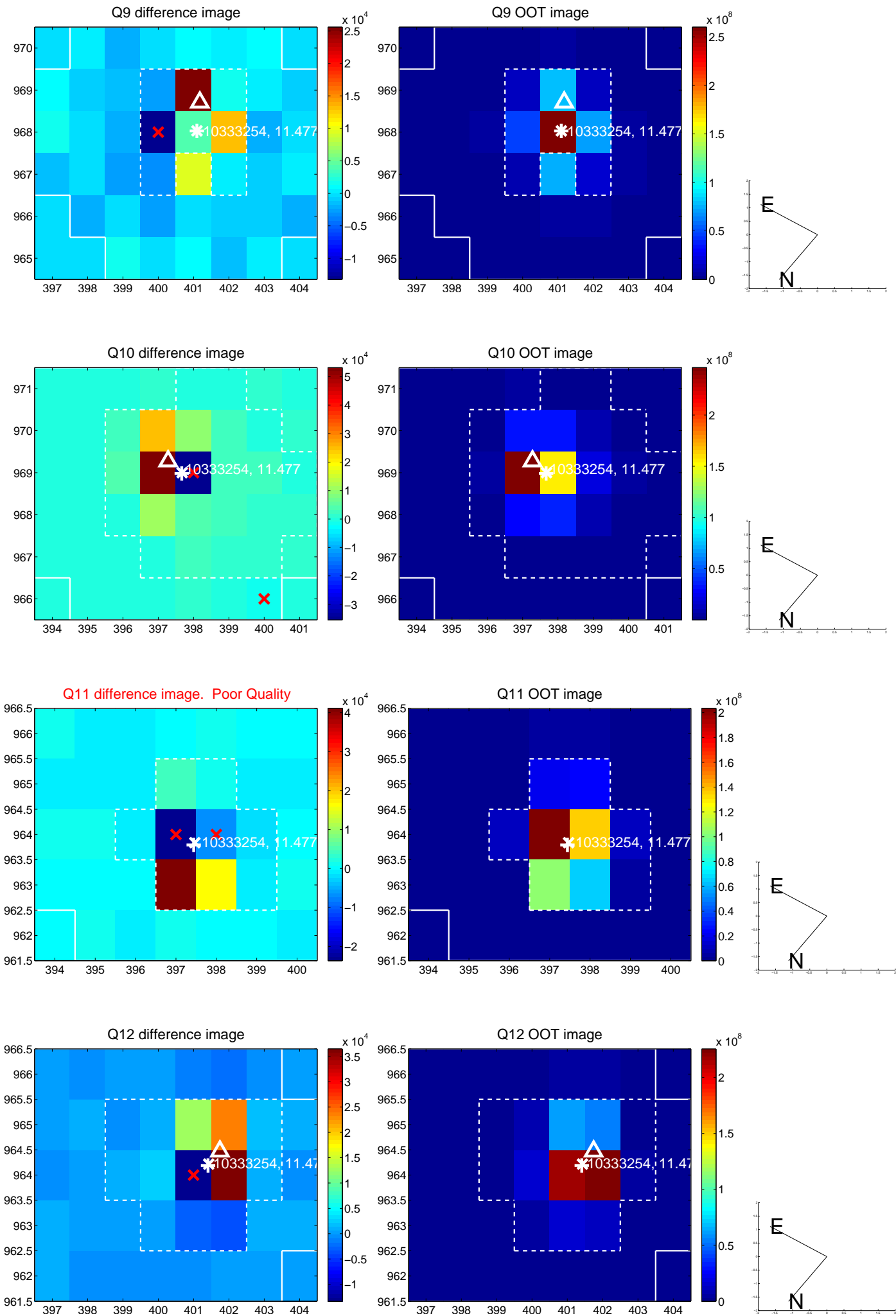


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

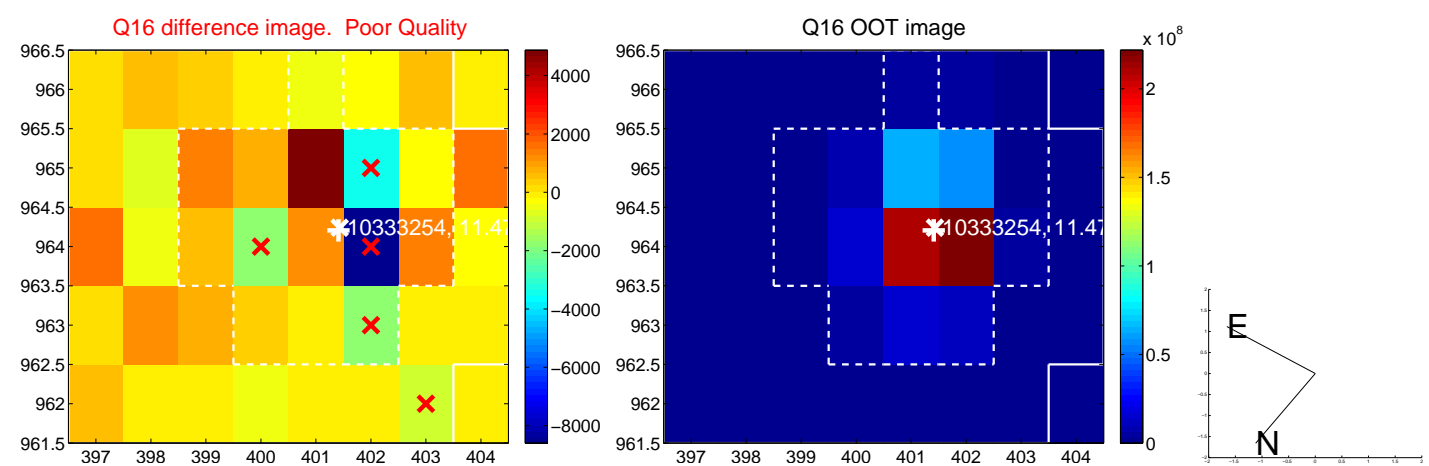
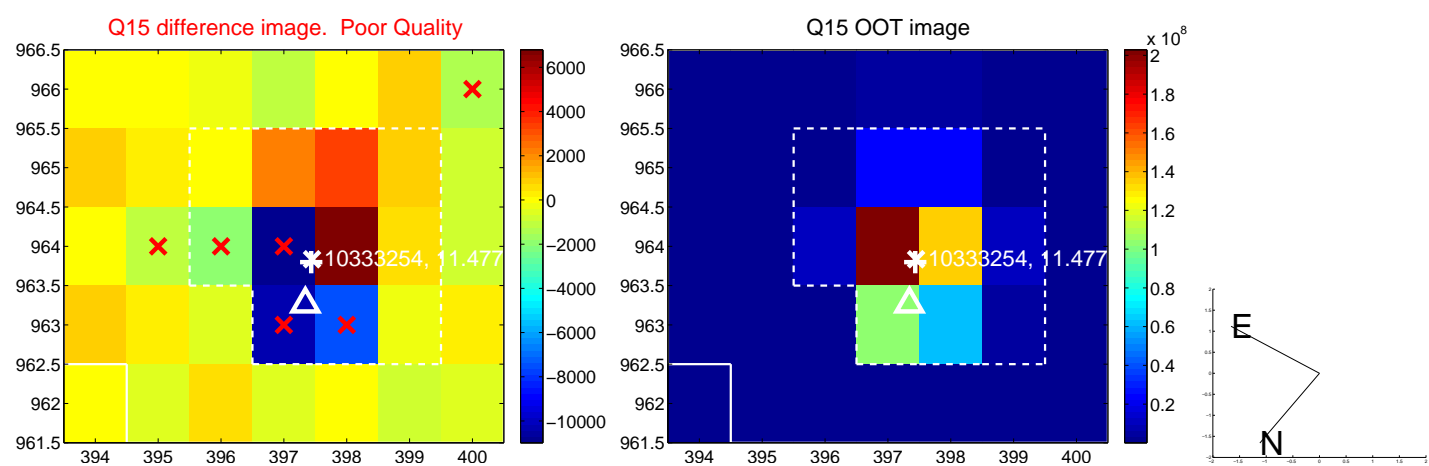
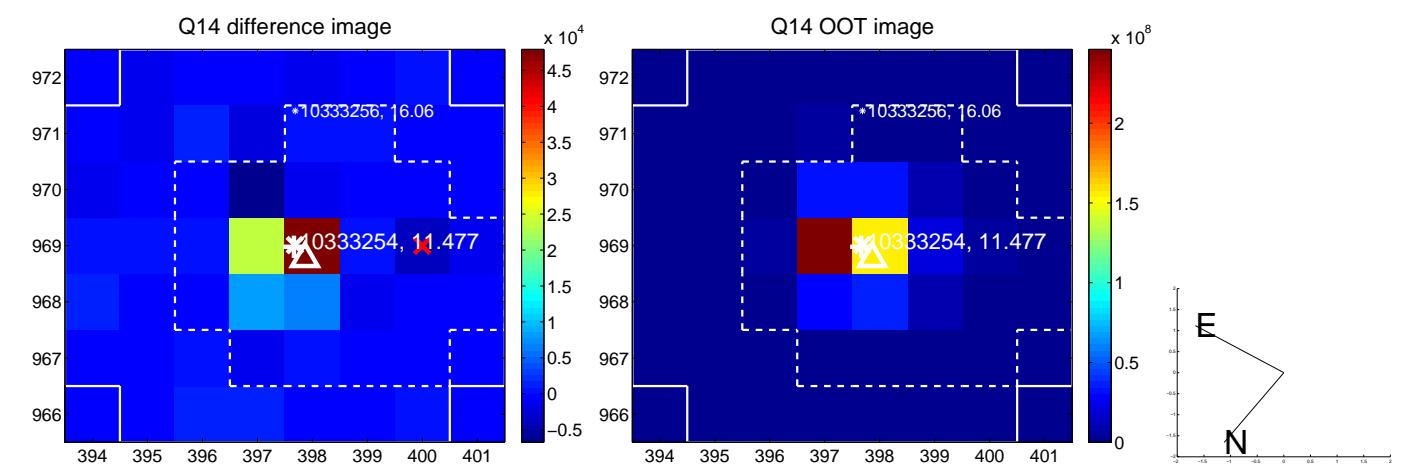
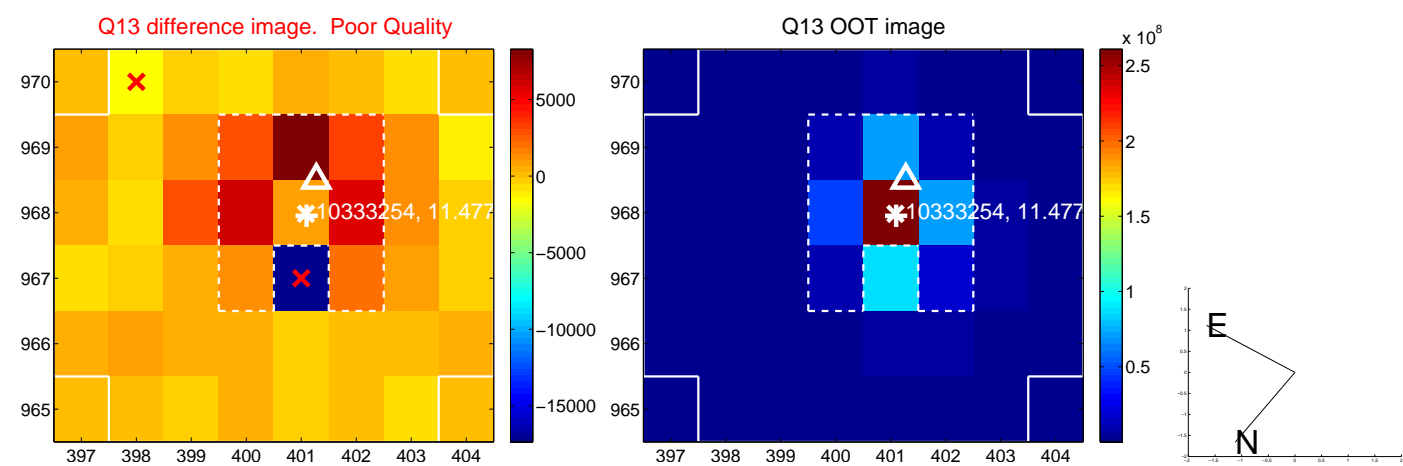




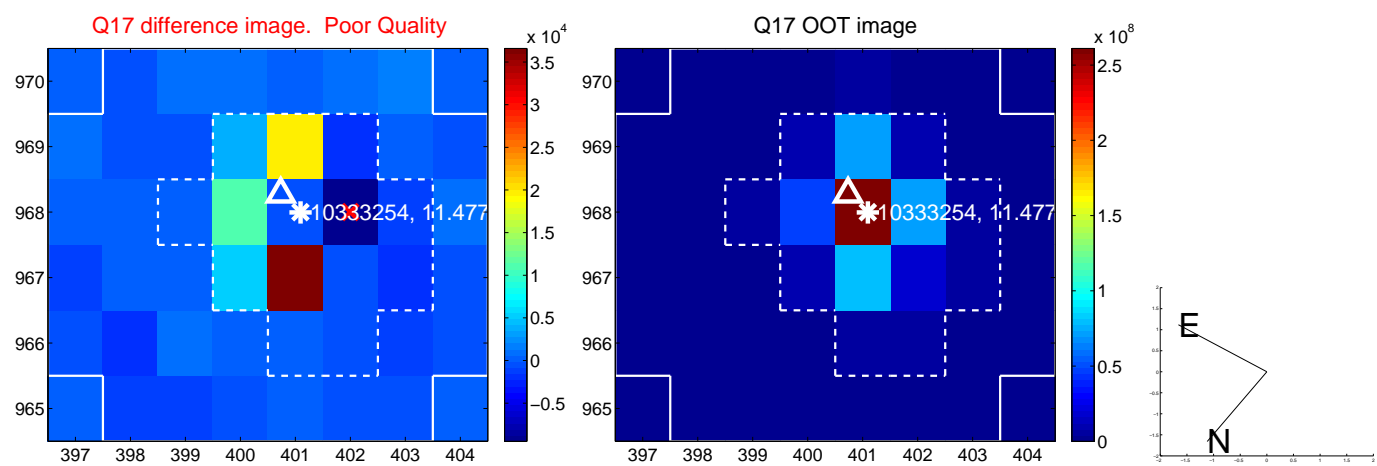
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

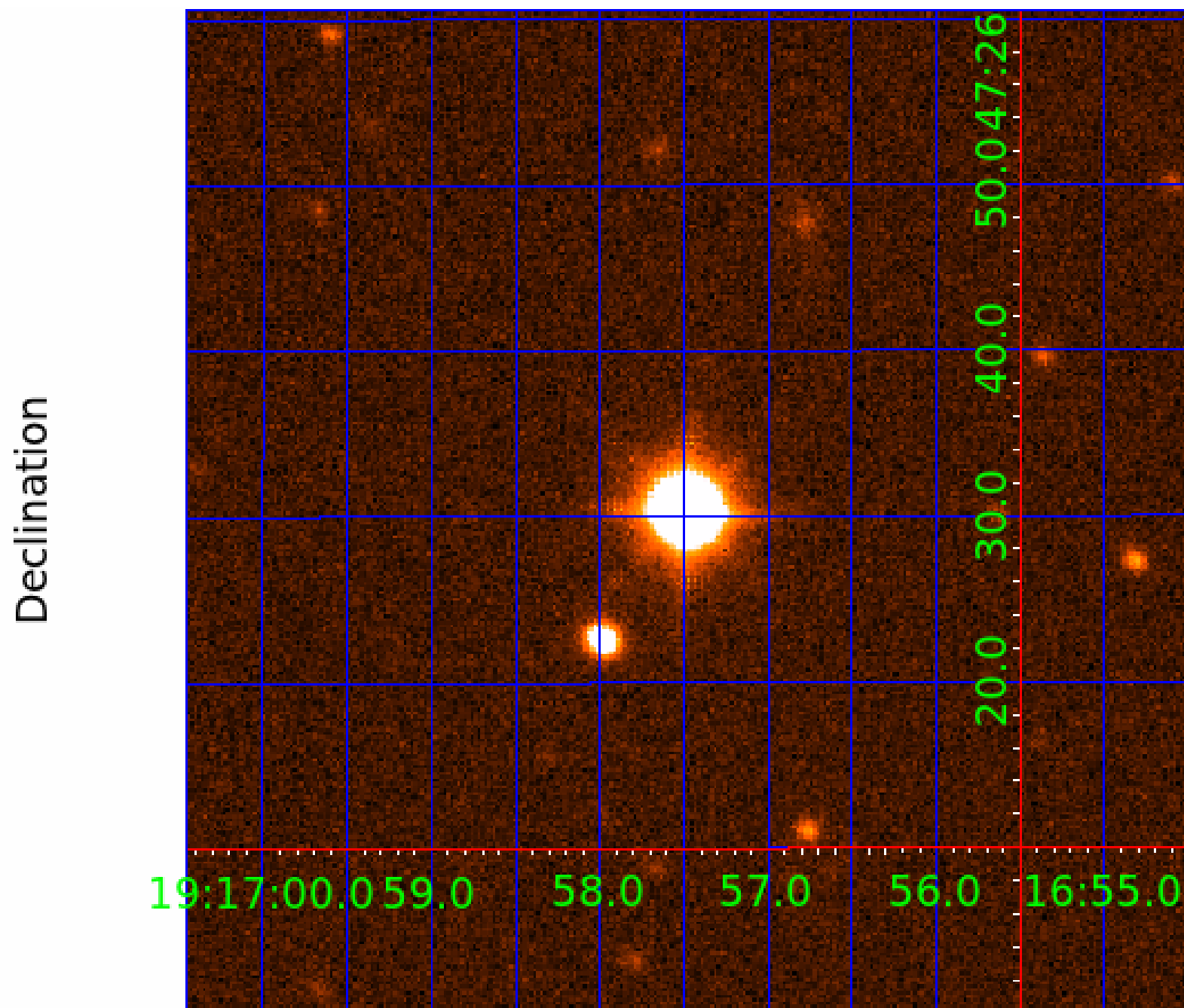


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



folded centroid time series figure for this object.

UKIRT Image



# KIC 010333254

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010333254-01	OBS	No	6.722893	137.475942	87.9	15.137	14.1	14.9	2.53	6714	3.41	1794.52
010333254-02	OBS	No	6.724655	132.709949	57.0	12.956	9.3	11.4	2.53	6714	3.83	1793.90
010333254-03	OBS	No	372.827910	155.750785	307.1	10.390	10.9	8.2	2.53	6714	5.23	8.49
010333254-04	OBS	No	186.778799	267.059650	182.7	5.251	8.0	6.6	2.53	6714	3.98	21.33
010333254-05	OBS	No	169.268559	167.694248	188.1	5.844	7.8	6.9	2.53	6714	3.84	24.32
010333254-06	OBS	No	209.835227	250.336223	176.0	5.160	7.8	7.4	2.53	6714	3.92	18.26
010333254-07	OBS	No	22.397421	137.445498	85.3	5.909	7.8	7.7	2.53	6714	2.79	360.66
010333254-08	OBS	No	141.378804	194.828778	127.9	5.405	7.3	8.0	2.53	6714	3.43	30.92
010333254-09	OBS	No	363.741743	457.410736	271.3	10.246	8.7	8.3	2.53	6714	5.37	8.77

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010333254-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—CENT_SATURATED
010333254-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—SAME_NTL_PERIOD—CENT_SATURATED
010333254-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
010333254-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—CENT_SATURATED
010333254-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-07	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

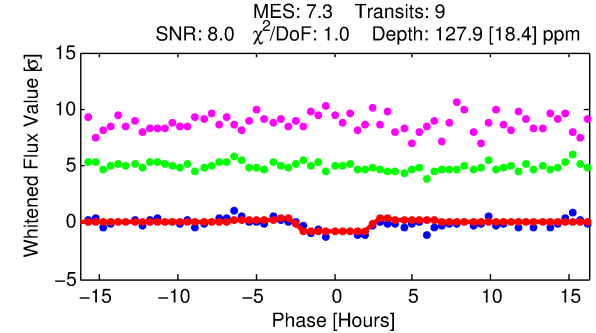
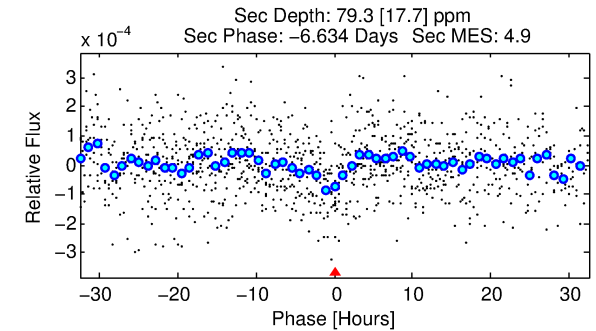
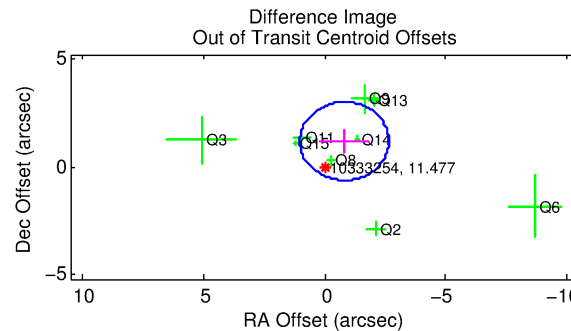
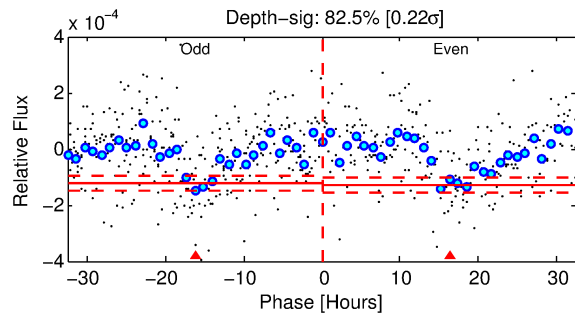
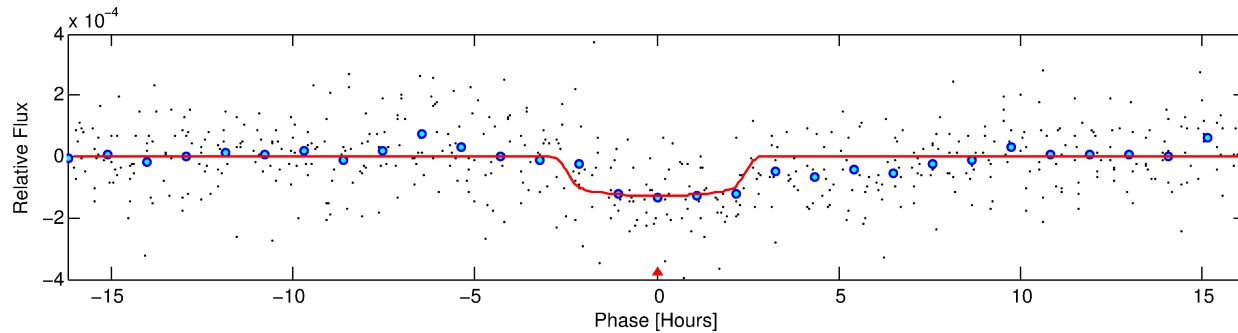
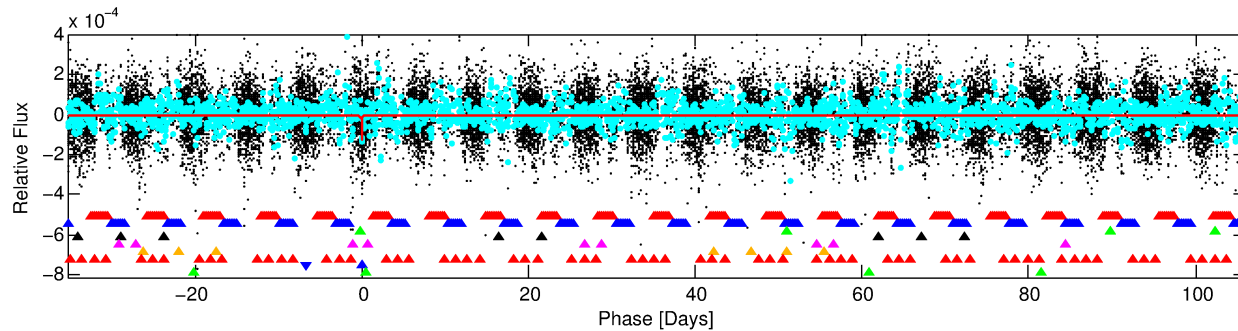
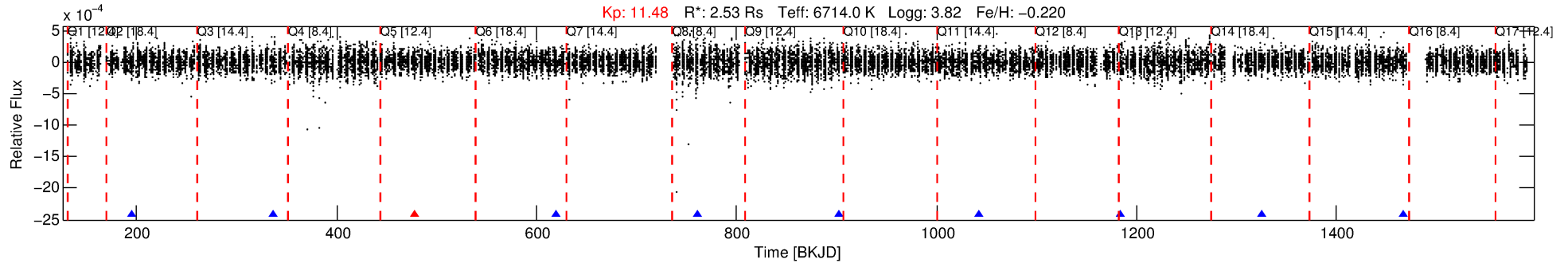
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 010333254-08

No Significant Match Found

# DV One-Page Summary

KIC: 10333254 Candidate: 8 of 9 Period: 141.379 d



## DV Fit Results:

Period = 141.37880 [0.00167] d  
Epoch = 194.8288 [0.0100] BKJD  
Rp/R\* = 0.0124 [0.0021]  
a/R\* = 80.06 [67.20]  
b = 0.93 [0.12]  
Seff = 30.92 [15.85]  
Teq = 601 [77] K  
Rp = 3.43 [1.38] Re  
a = 0.6149 [0.2015] AU  
Ag = 1402.20 [898.54] [1.56 $\sigma$ ]  
Teffp = 5689 [589] K [8.56 $\sigma$ ]

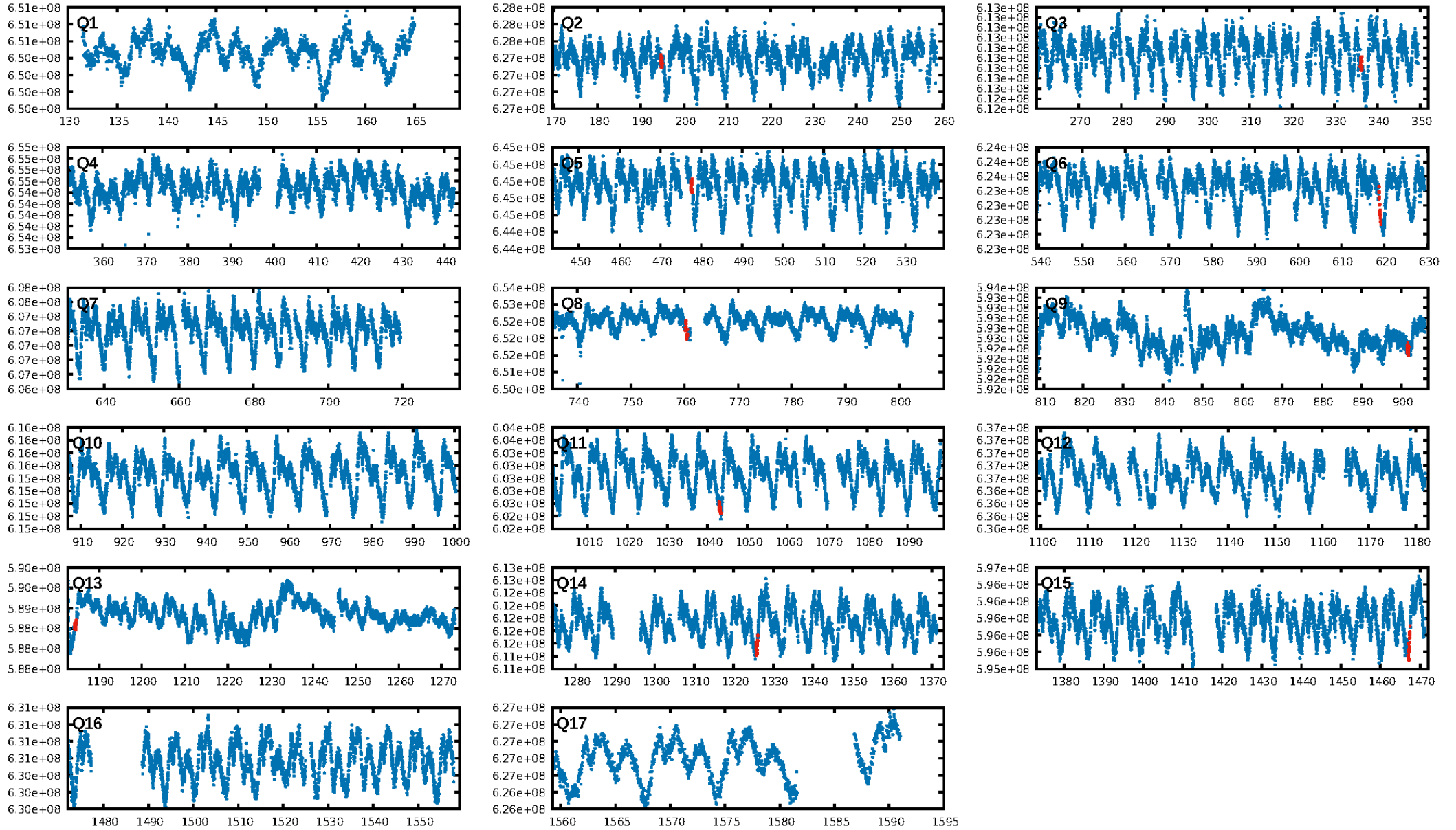
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [356.57 $\sigma$ ]  
LongPeriod-sig: 100.0% [84.09 $\sigma$ ]  
ModelChiSquare2-sig: 66.5%  
ModelChiSquareGof-sig: 99.4%  
**Bootstrap-pfa: 4.80e-08**  
RollingBand-fgt: 0.89 [8/9]  
GhostDiagnostic-chr: 2.731  
Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 1.442 arcsec [2.36 $\sigma$ ]  
KicOffset-rm: 1.570 arcsec [2.56 $\sigma$ ]  
OotOffset-st: 3/3/1/2 [9]  
KicOffset-st: 3/3/1/2 [9]  
DiffImageQuality-fgm: 0.67 [6/9]  
DiffImageOverlap-fno: 0.78 [7/9]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 07:17:21 Z

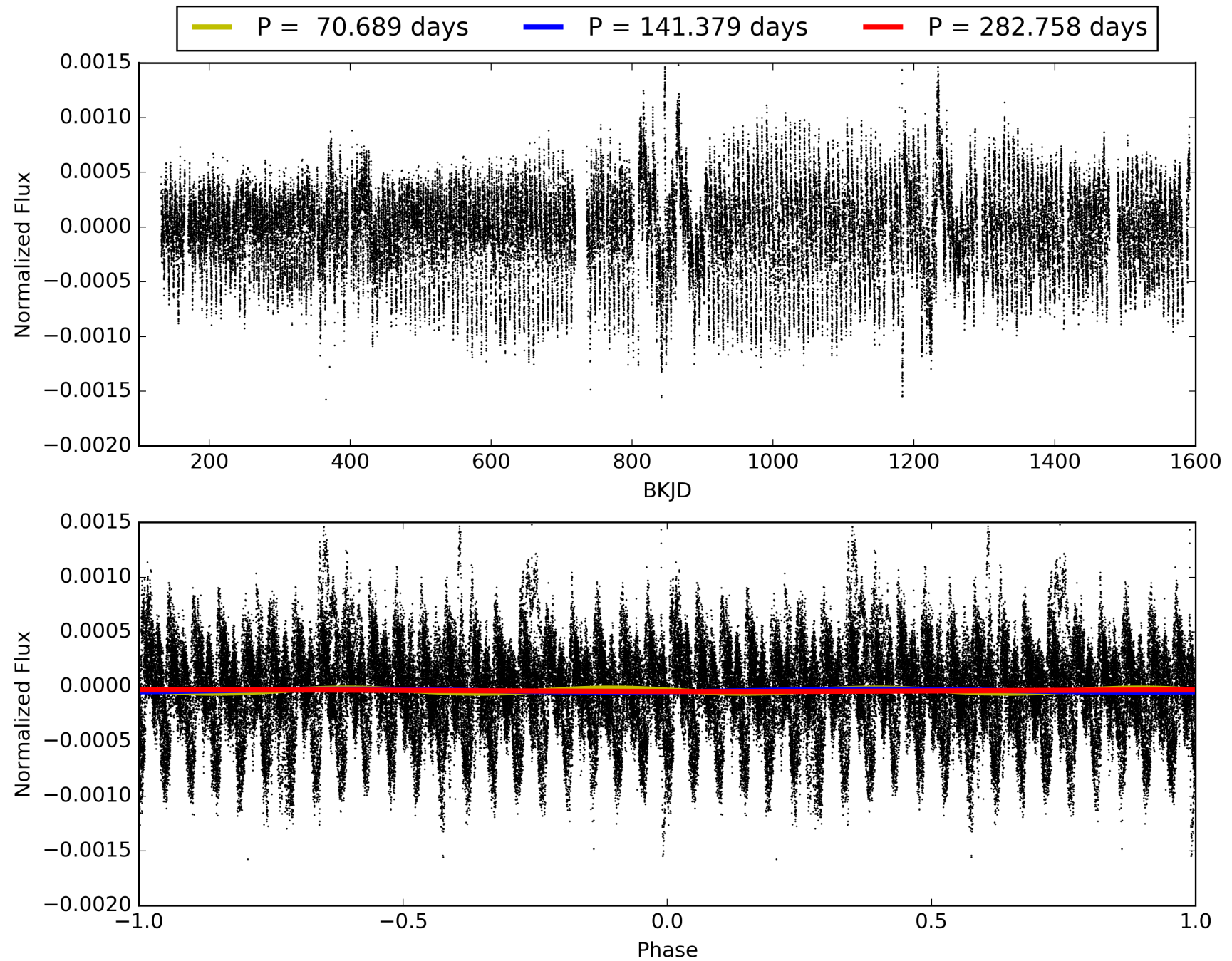
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010333254-08, PDC Light Curves





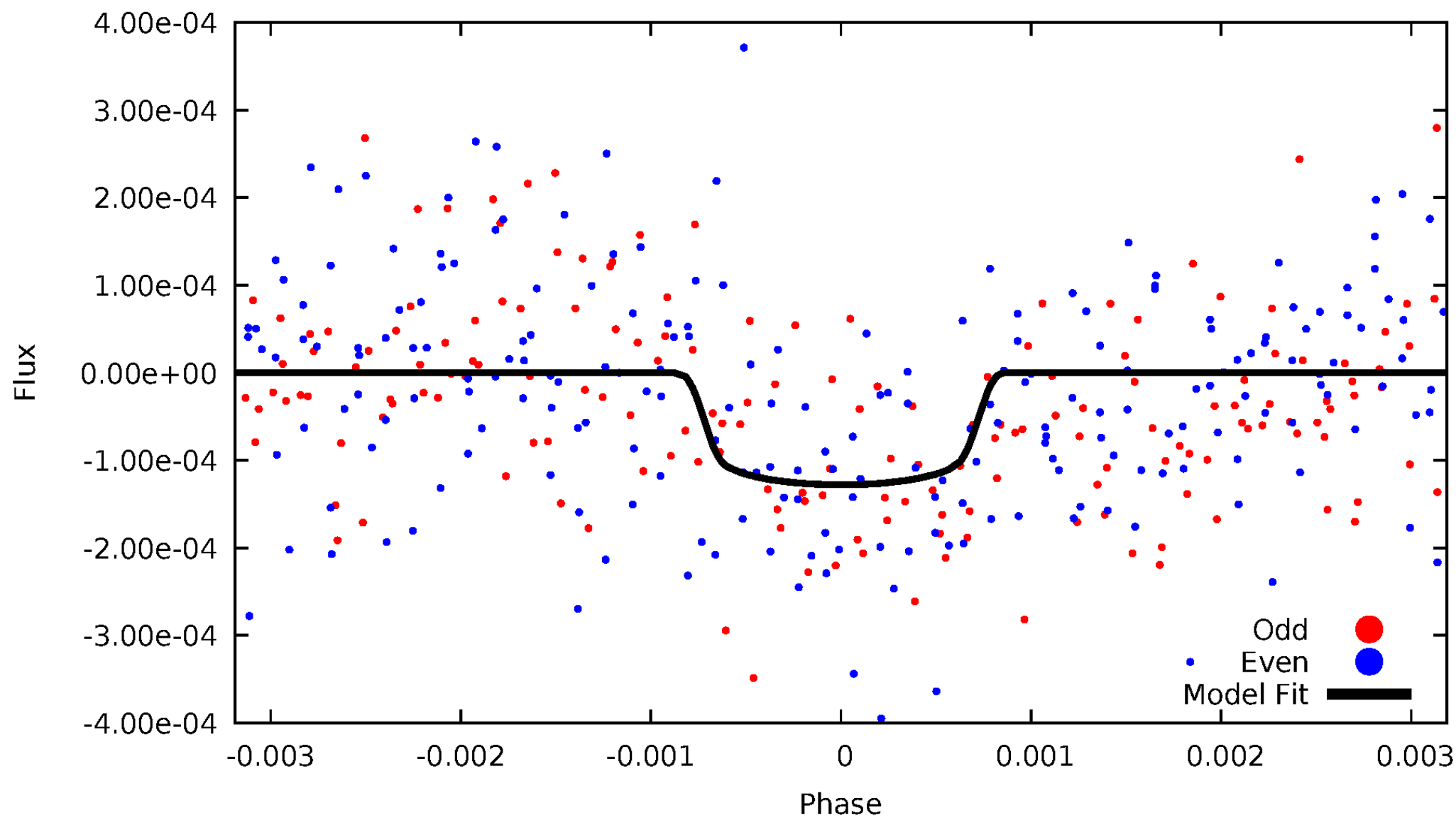
# TCE 010333254-08





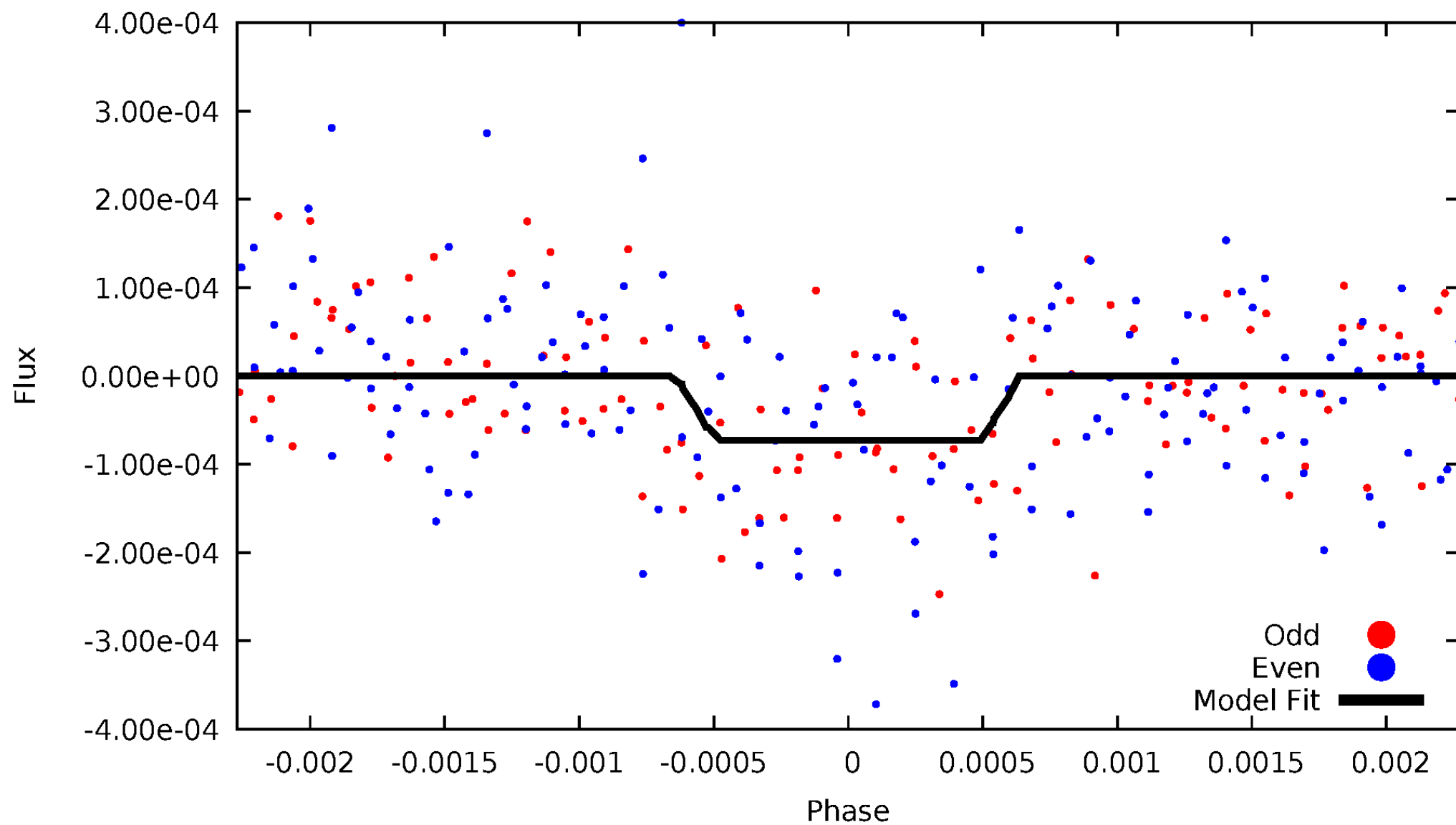
# DV Odd/Even

TCE 010333254-08



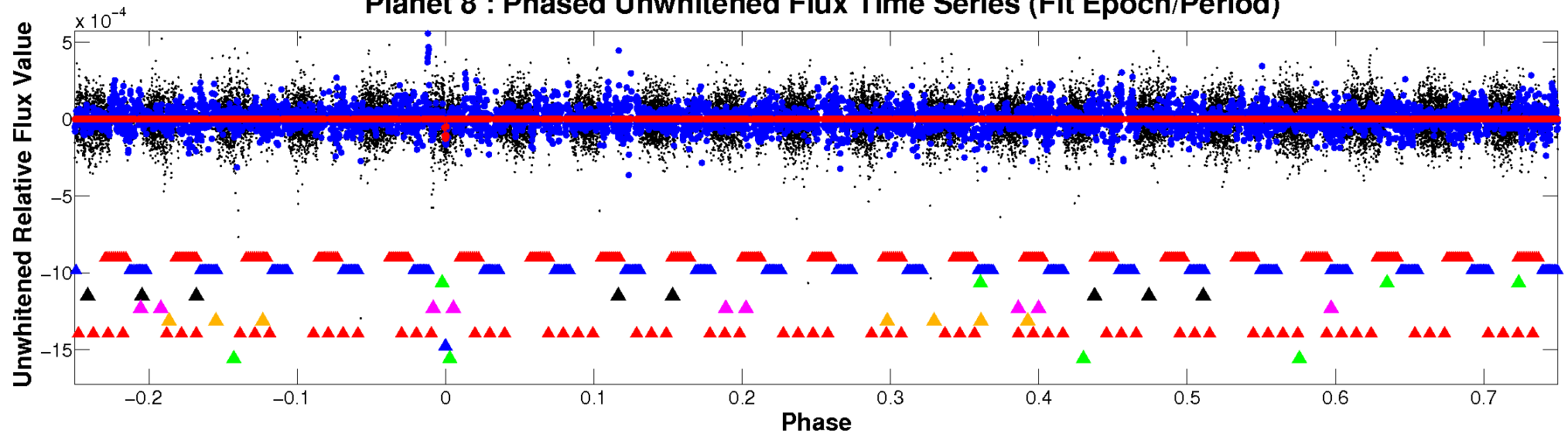
# ALT Odd/Even

TCE 010333254-08

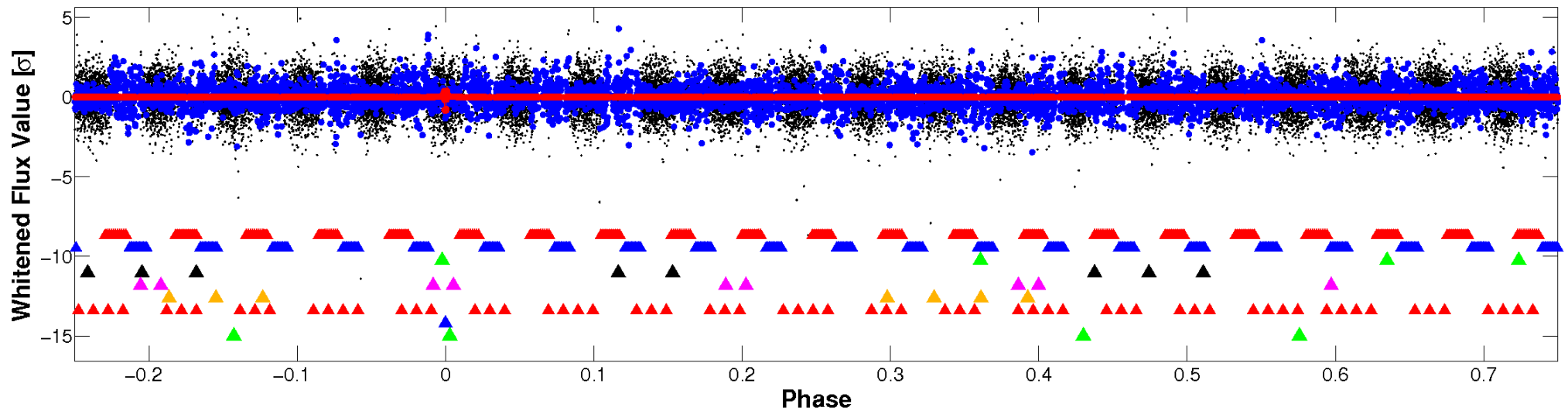


# Non-Whitened Vs. Whitened Light Curve

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

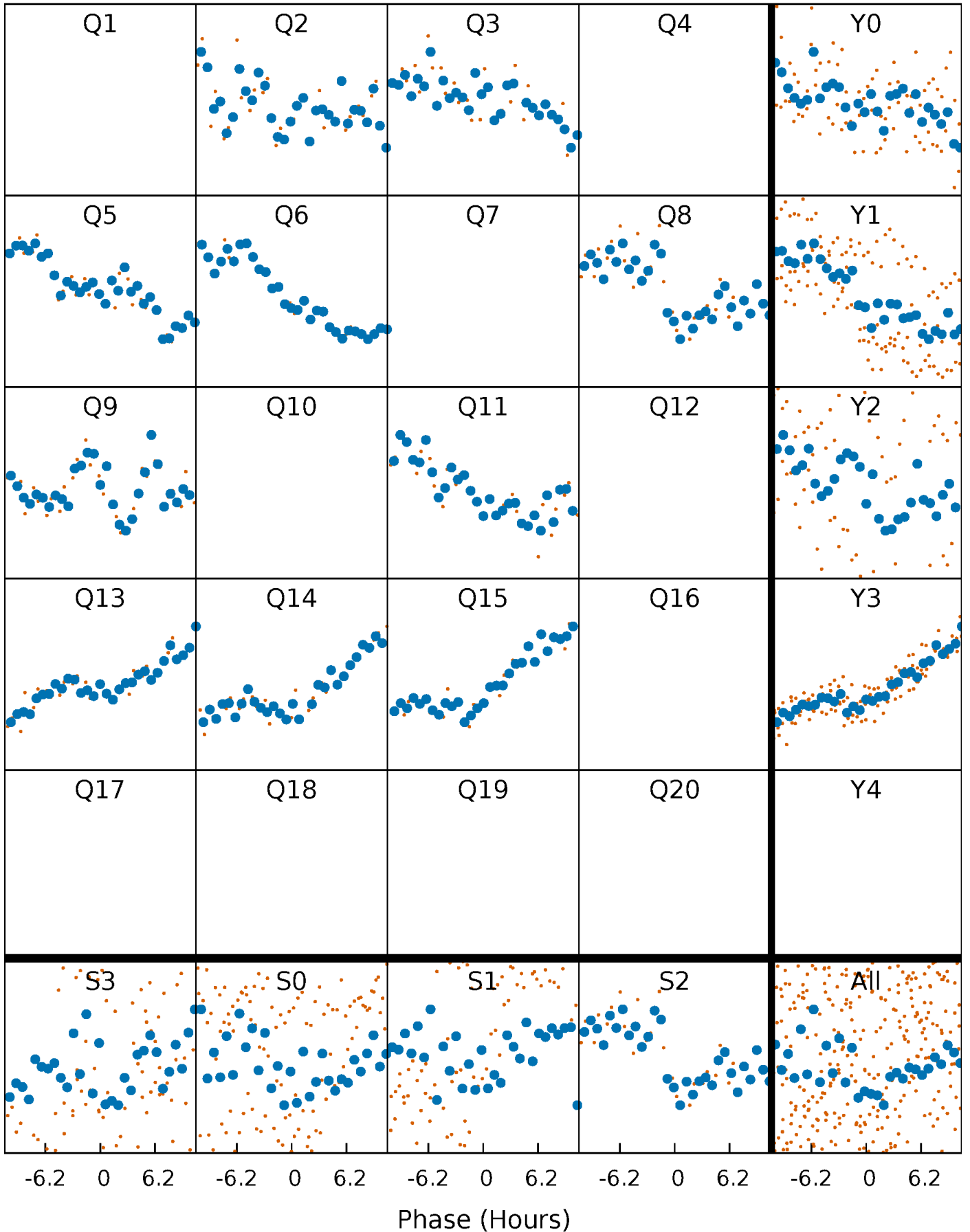


## Planet 8 : Phased Whitened Flux Time Series (Fit Epoch/Period)



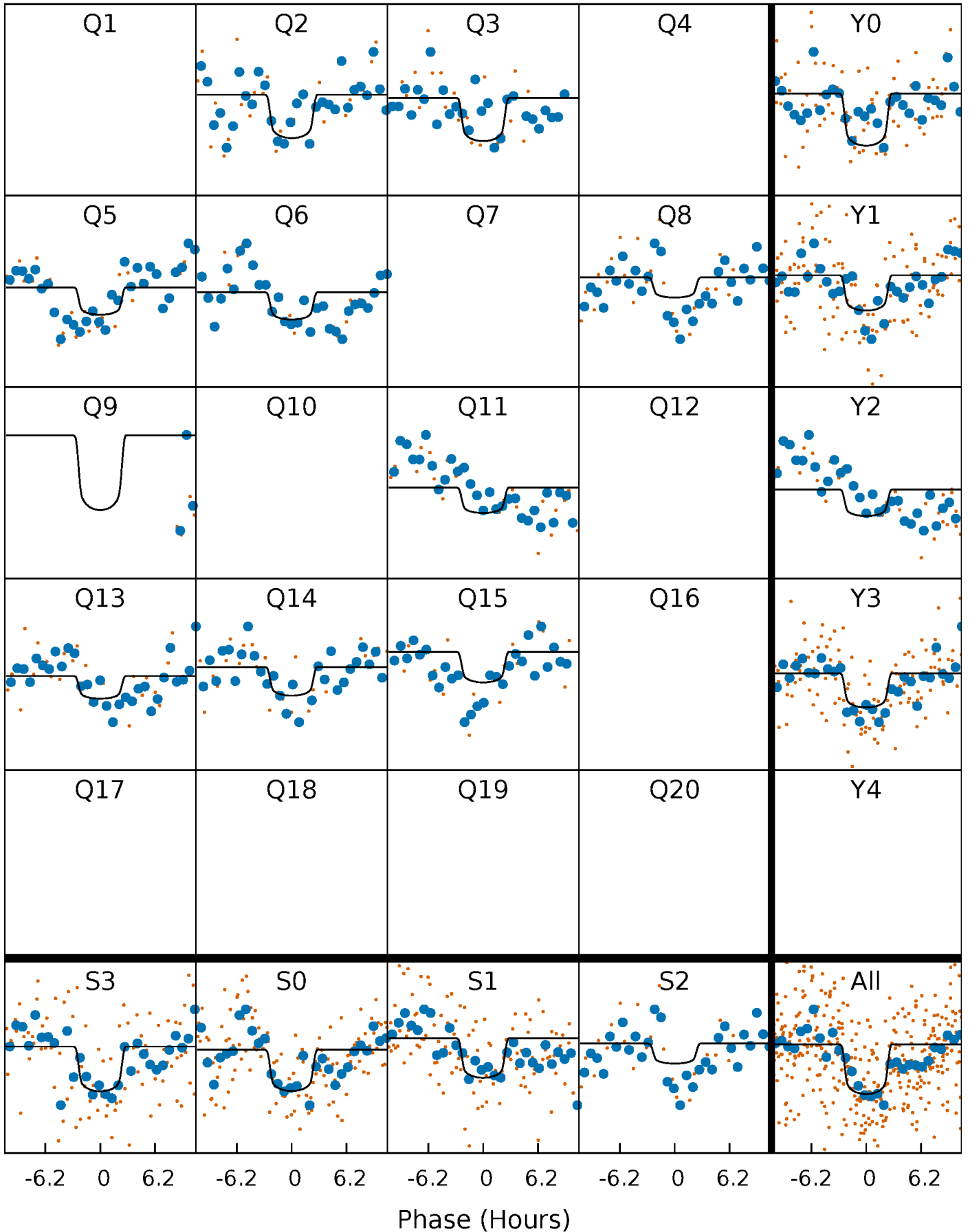
# PDC Quarter-Phased Transit Curves

TCE 010333254-08 P=141.378804 Days  $T_0=194.828778$  (BKJD)



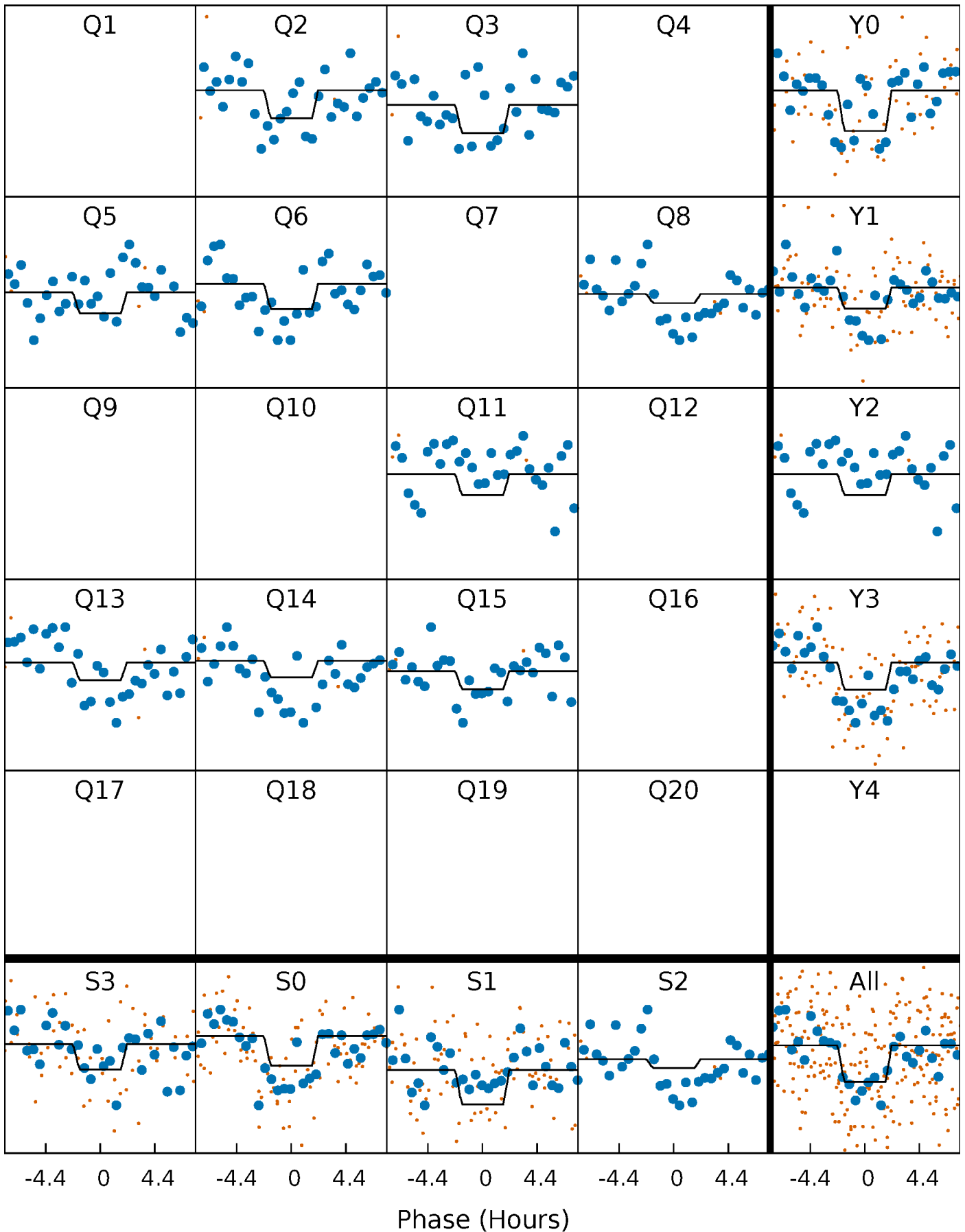
# DV Quarter-Phased Transit Curves

TCE 010333254-08 P=141.378804 Days  $T_0=194.828778$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

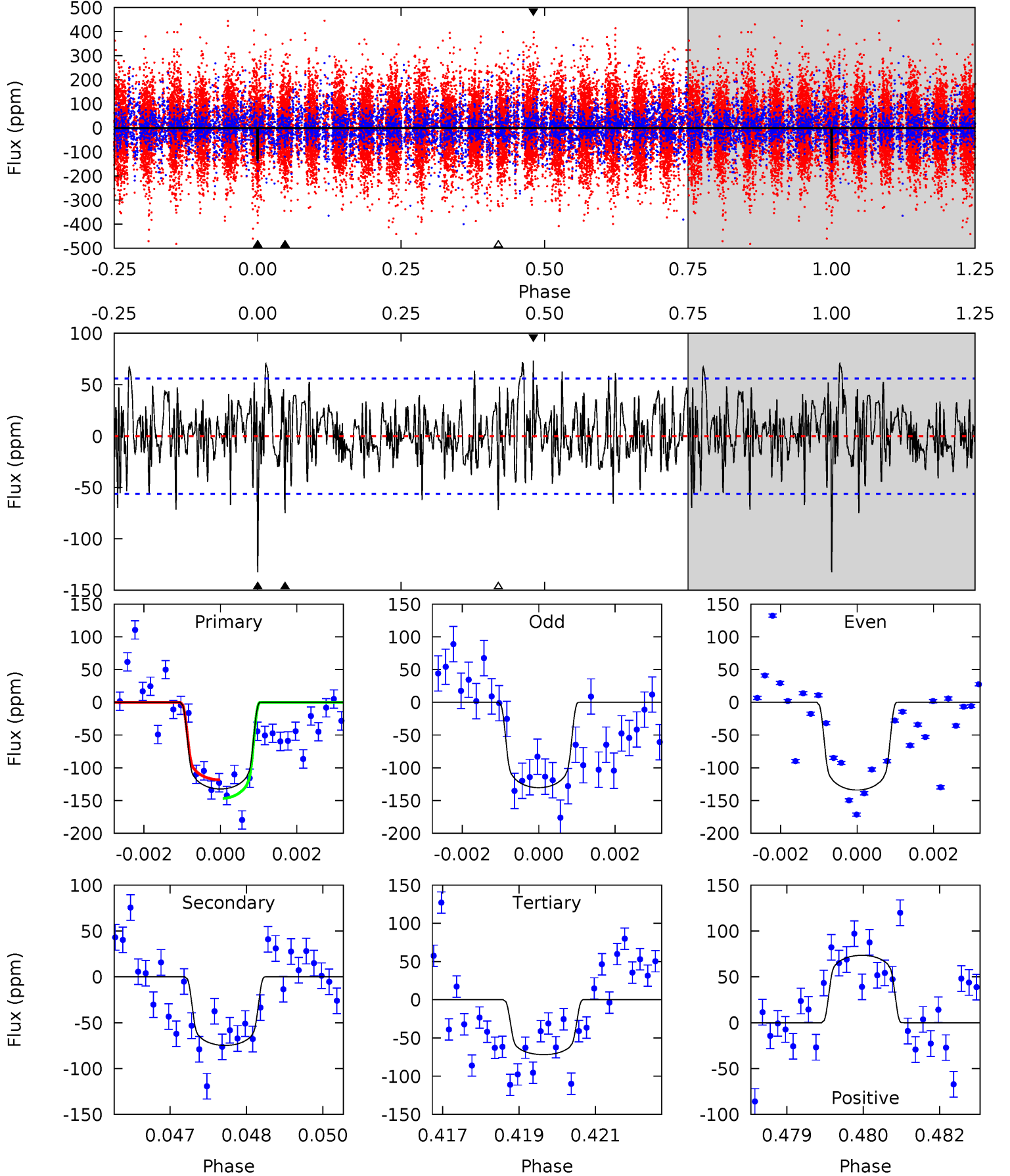
TCE 010333254-08     $P=141.375983$  Days     $T_0=194.855563$  (BKJD)



# DV Model-Shift Uniqueness Test

010333254-08, P = 141.378804 Days, E = 53.449974 Days

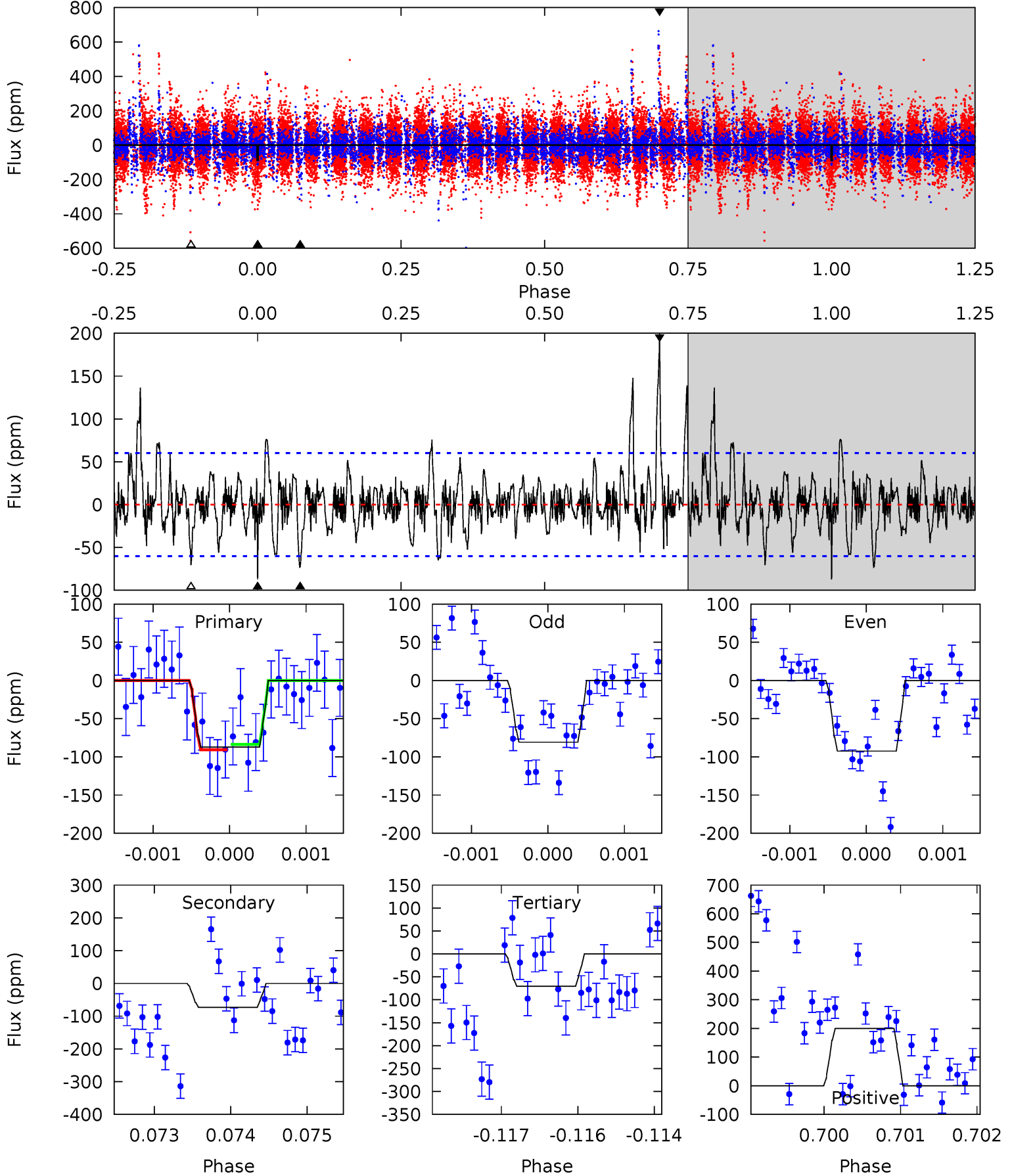
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.7	7.15	6.87	7.02	5.36	3.14	2.14	5.78	5.63	0.29	0.13	0.17	1.06	0.36	1.37



# Alt Model-Shift Uniqueness Test

010333254-08, P = 141.375983 Days, E = 53.479580 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
7.84	6.56	6.34	18.0	5.41	3.23	1.92	1.51	-10.1	0.23	-11.4	0.52	1.06	0.70	0.32





### Stellar Parameters For KIC 010333254

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6714^{+168}_{-184}$	$3.821^{+0.285}_{-0.095}$	$-0.220^{+0.300}_{-0.250}$	$2.534^{+0.463}_{-0.927}$	$1.550^{+0.183}_{-0.340}$	$0.134^{+0.245}_{-0.041}$
	+3%/-3%	+7%/-2%	+136%/-114%	+18%/-37%	+12%/-22%	+183%/-31%
Source	PHO1	FLK73	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 010333254-08 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-75 \pm 10$	$3.22^{+0.76}_{-0.75}$	$823^{+51}_{-72}$	$5608^{+559}_{-441}$	$1514^{+965}_{-562}$
Alt.	$-73 \pm 11$	$2.22^{+0.69}_{-0.66}$	$823^{+50}_{-73}$	$6661^{+1279}_{-735}$	$3020^{+3066}_{-1252}$

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

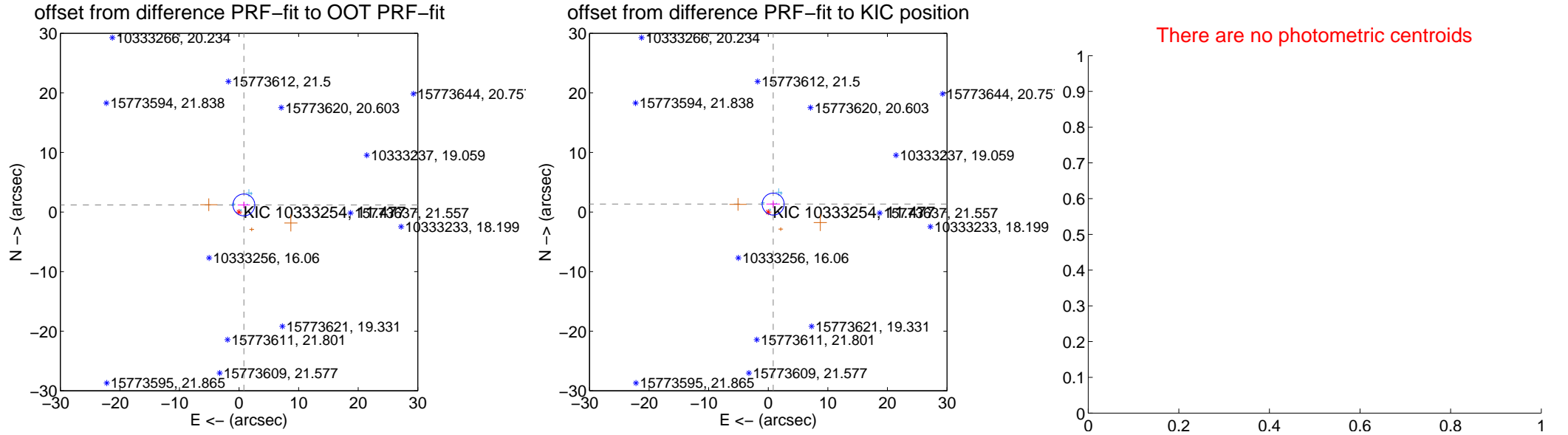
## DV Centroid Data

Supplemental centroid analysis for 010333254-08. **Kepler magnitude: 11.48.** Transit SNR 7.97

There are 6 quarters with good PRF difference image offsets

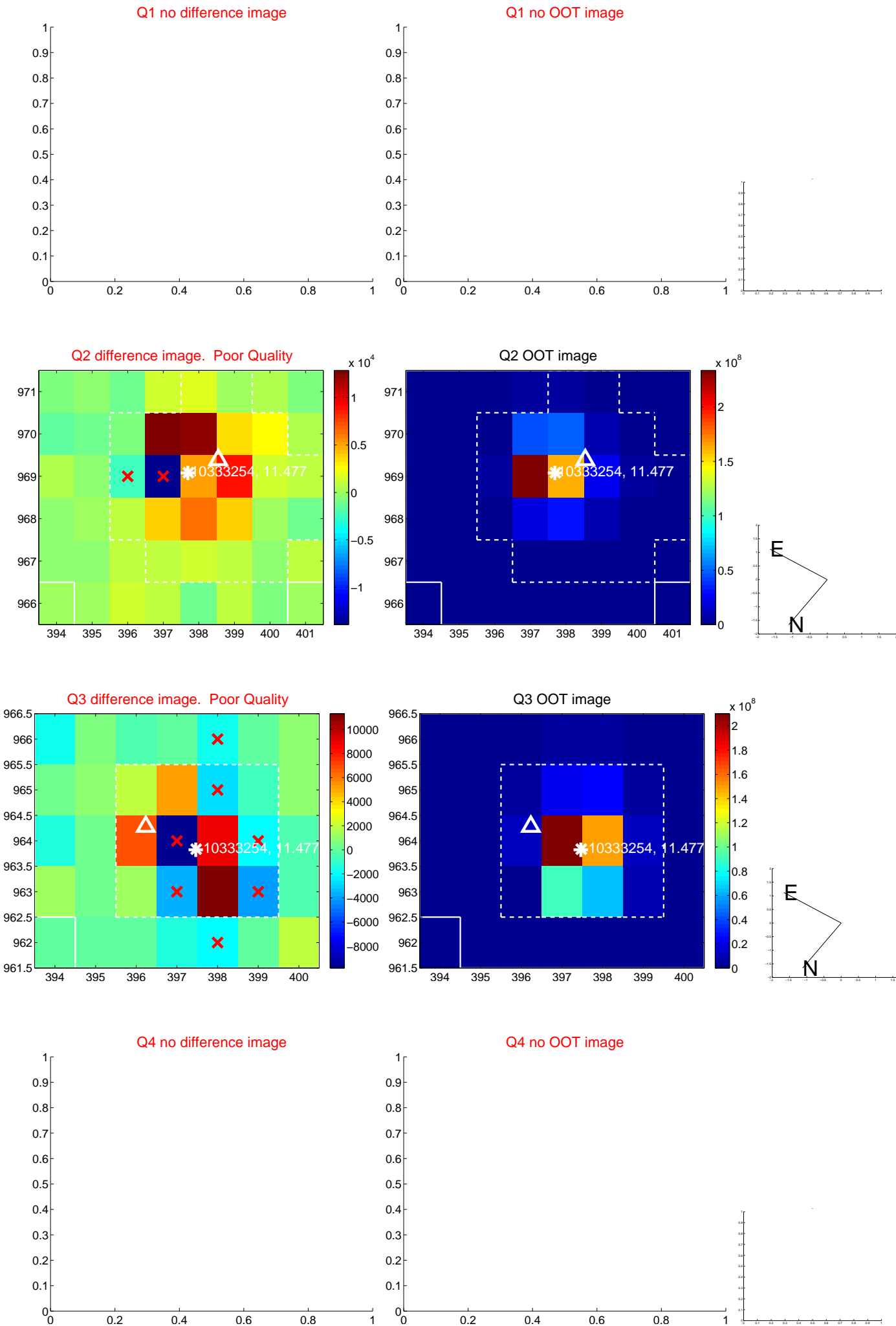
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.442 \pm 0.611$	2.36	$-0.810 \pm 1.027$	$1.193 \pm 0.556$
PRF-fit source offset from KIC position	$1.570 \pm 0.614$	2.56	$-0.824 \pm 1.138$	$1.336 \pm 0.617$
photometric centroid source offset	—	—	—	—



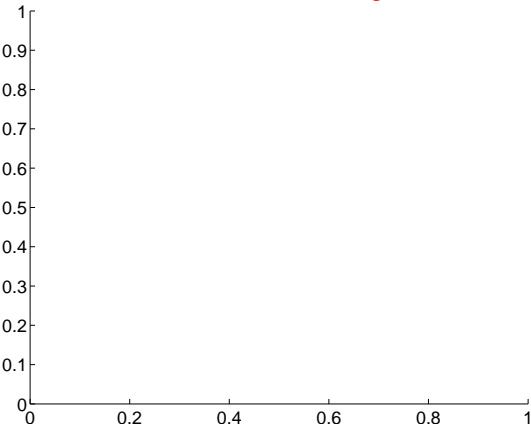
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

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

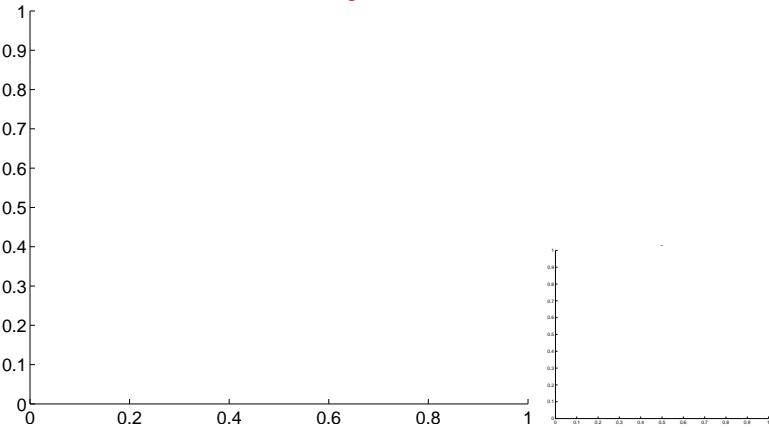


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

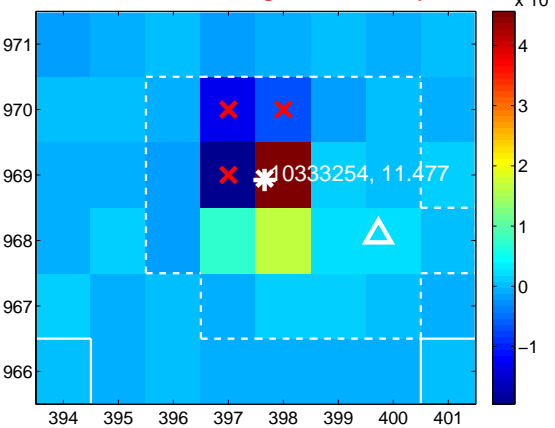
Q5 no difference image



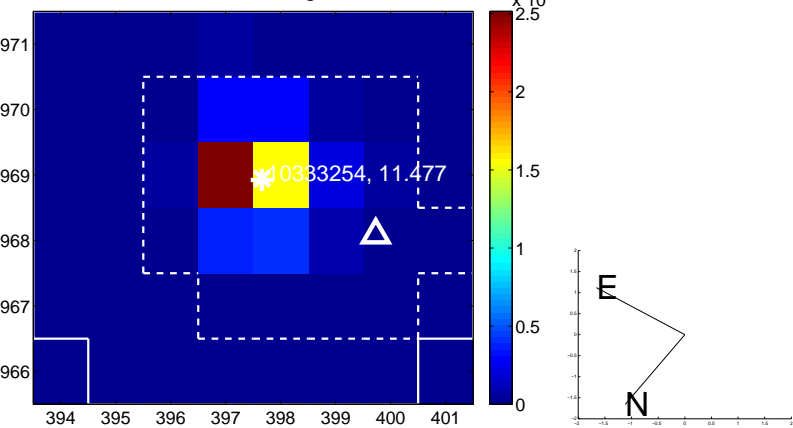
Q5 no OOT image



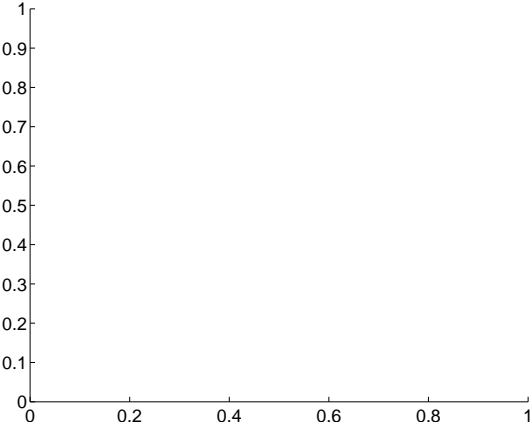
Q6 difference image. Poor Quality



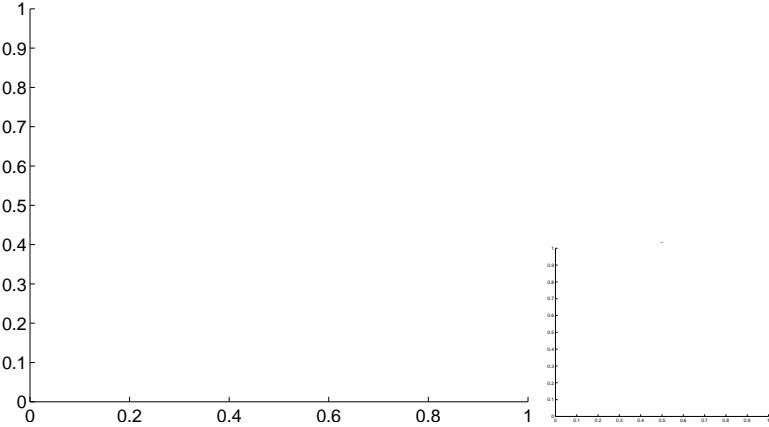
Q6 OOT image



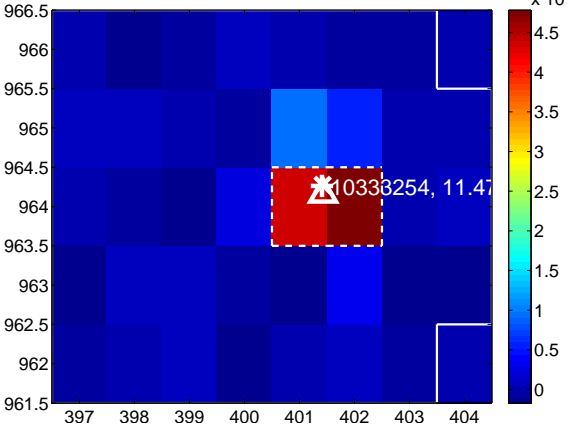
Q7 no difference image



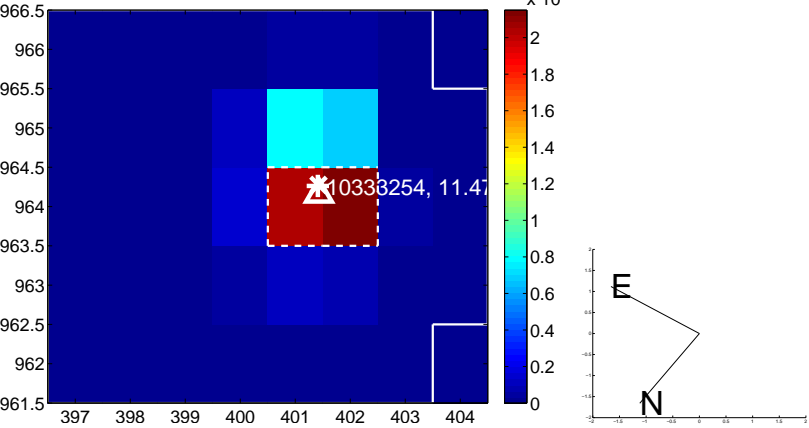
Q7 no OOT image



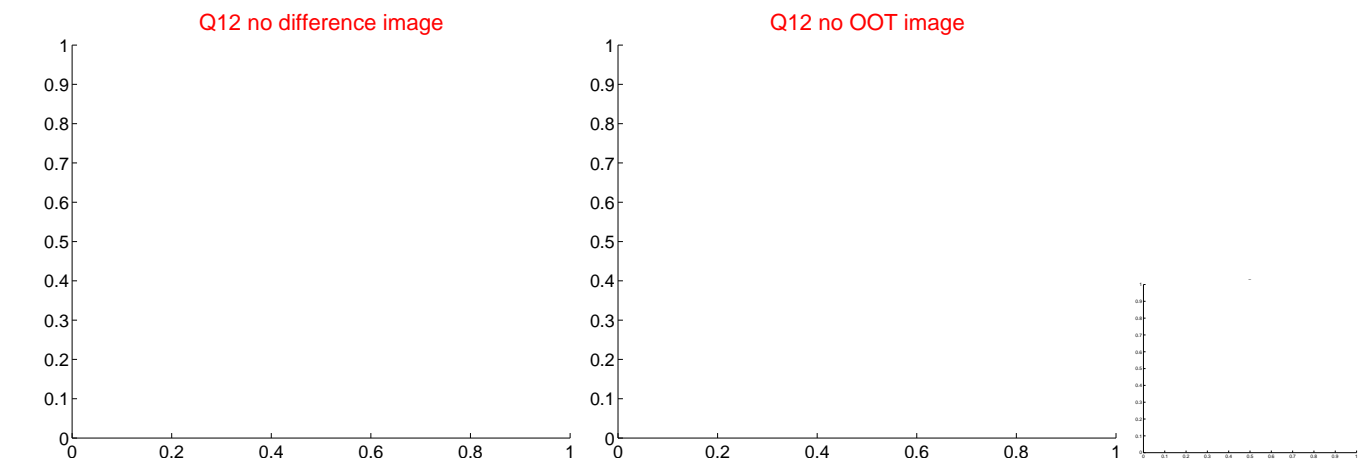
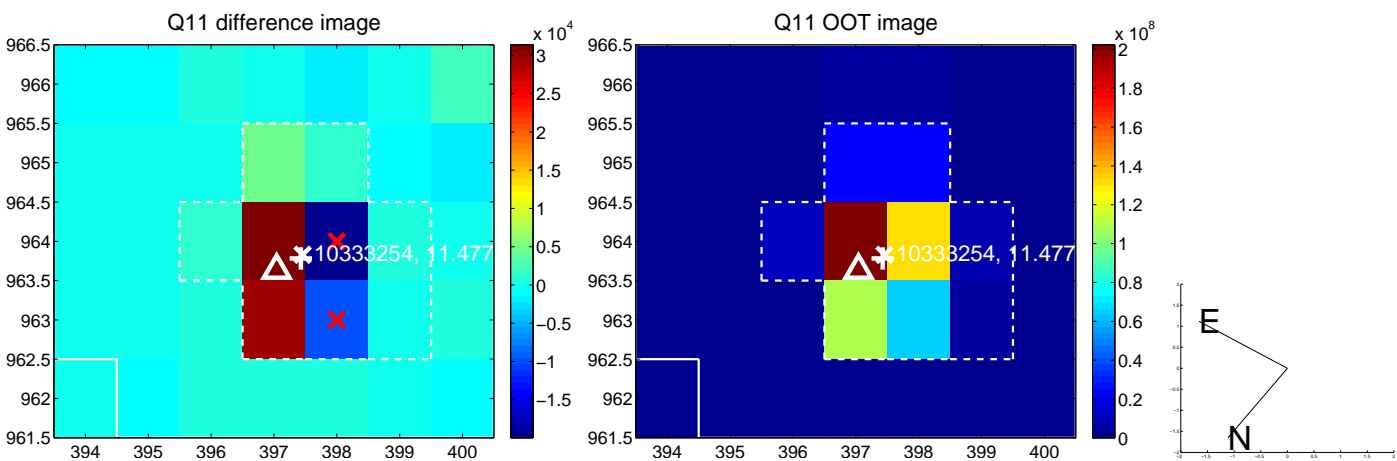
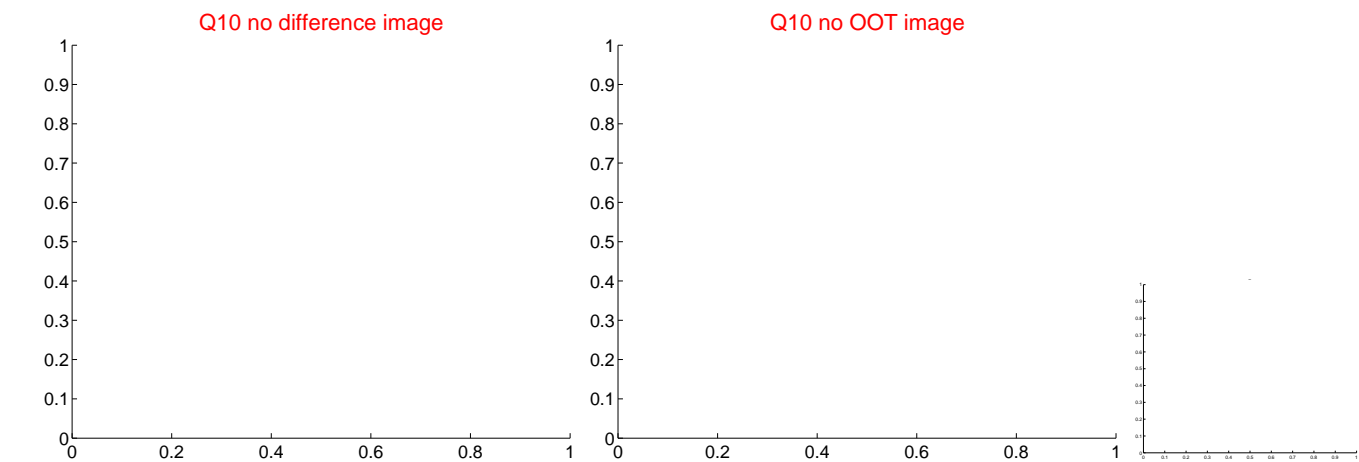
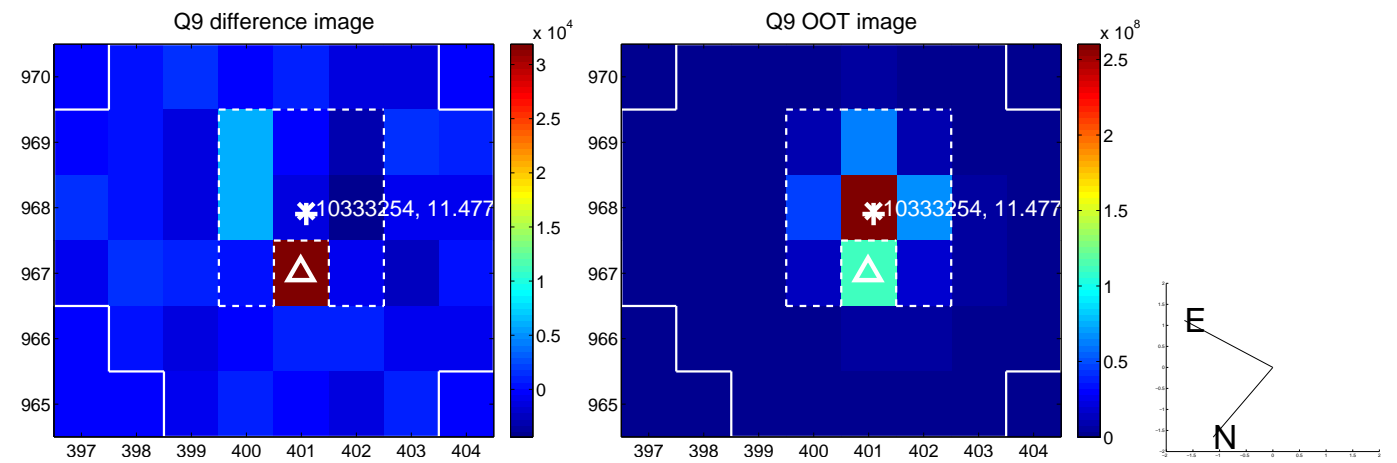
Q8 difference image



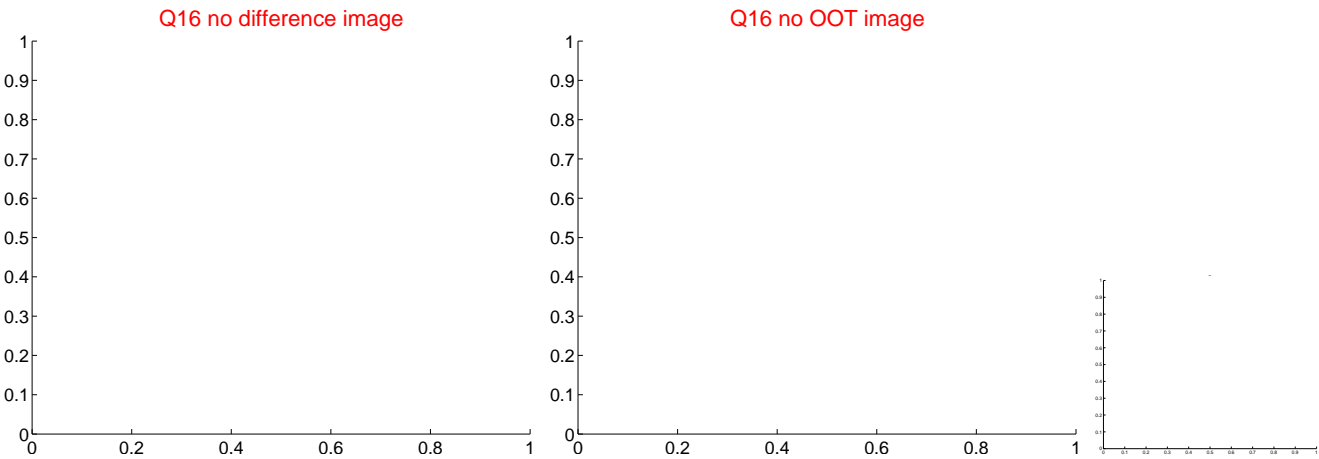
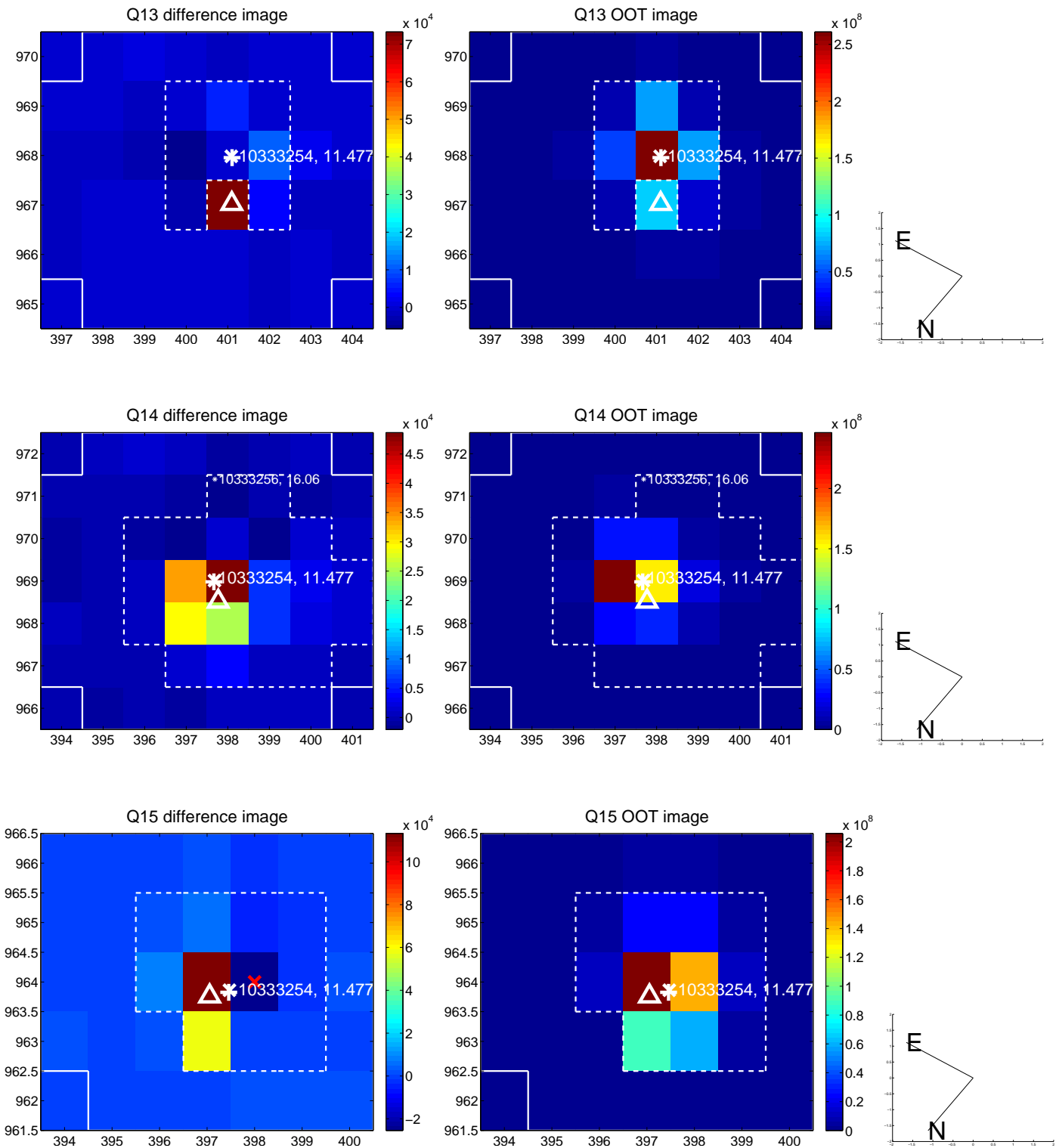
Q8 OOT image



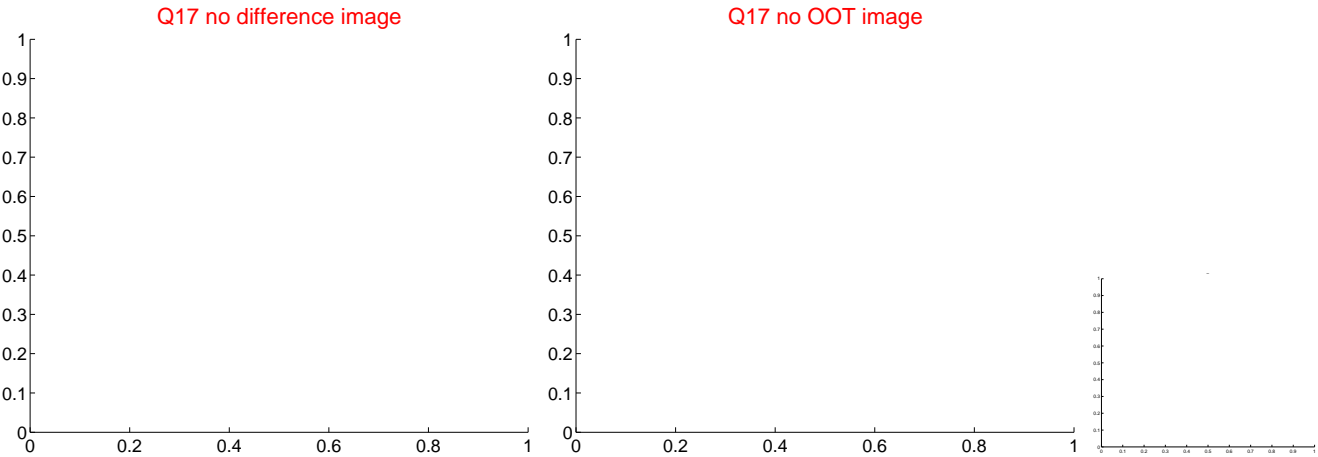
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

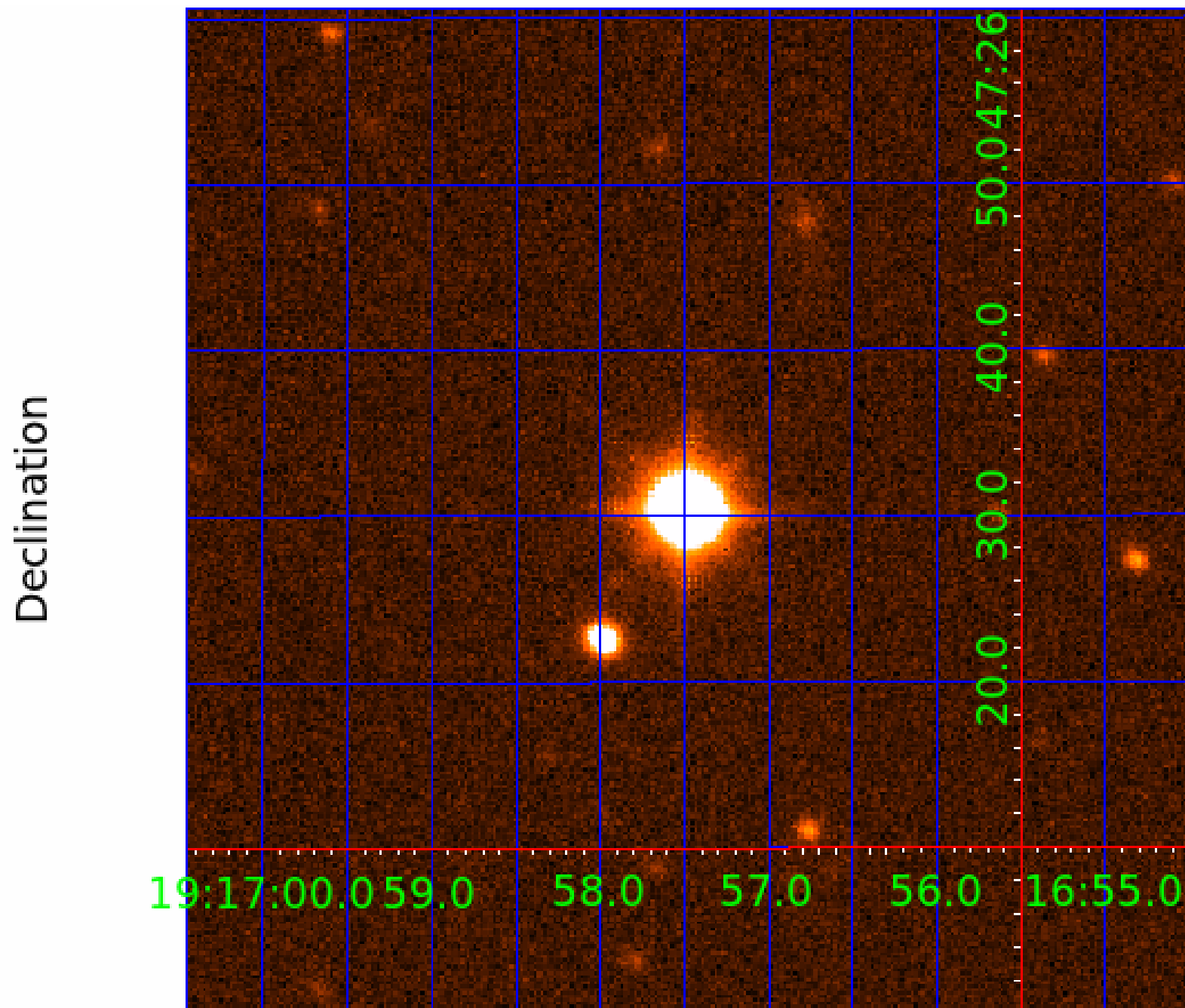


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



folded centroid time series figure for this object.

UKIRT Image





# KIC 010333254

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010333254-01	OBS	No	6.722893	137.475942	87.9	15.137	14.1	14.9	2.53	6714	3.41	1794.52
010333254-02	OBS	No	6.724655	132.709949	57.0	12.956	9.3	11.4	2.53	6714	3.83	1793.90
010333254-03	OBS	No	372.827910	155.750785	307.1	10.390	10.9	8.2	2.53	6714	5.23	8.49
010333254-04	OBS	No	186.778799	267.059650	182.7	5.251	8.0	6.6	2.53	6714	3.98	21.33
010333254-05	OBS	No	169.268559	167.694248	188.1	5.844	7.8	6.9	2.53	6714	3.84	24.32
010333254-06	OBS	No	209.835227	250.336223	176.0	5.160	7.8	7.4	2.53	6714	3.92	18.26
010333254-07	OBS	No	22.397421	137.445498	85.3	5.909	7.8	7.7	2.53	6714	2.79	360.66
010333254-08	OBS	No	141.378804	194.828778	127.9	5.405	7.3	8.0	2.53	6714	3.43	30.92
010333254-09	OBS	No	363.741743	457.410736	271.3	10.246	8.7	8.3	2.53	6714	5.37	8.77

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010333254-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—CENT_SATURATED
010333254-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—SAME_NTL_PERIOD—CENT_SATURATED
010333254-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
010333254-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—CENT_SATURATED
010333254-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-07	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
010333254-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

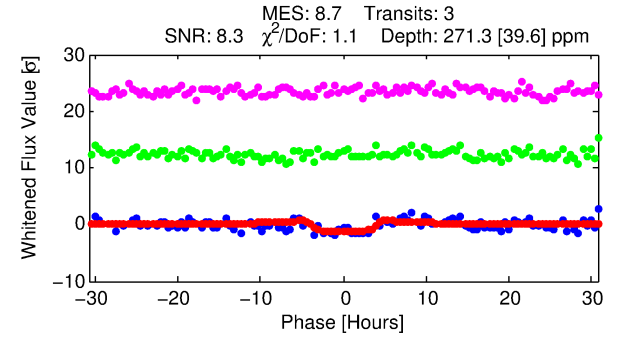
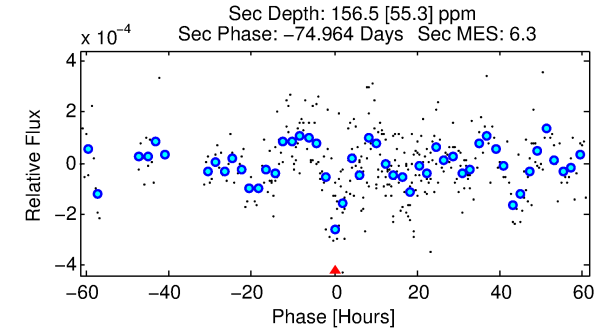
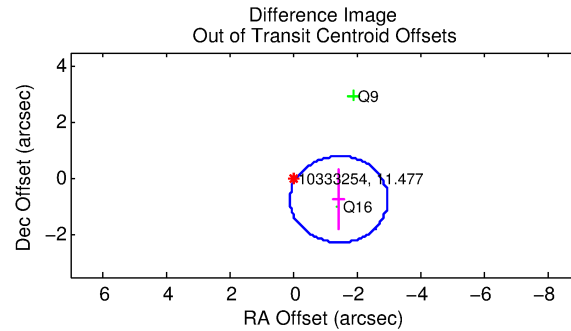
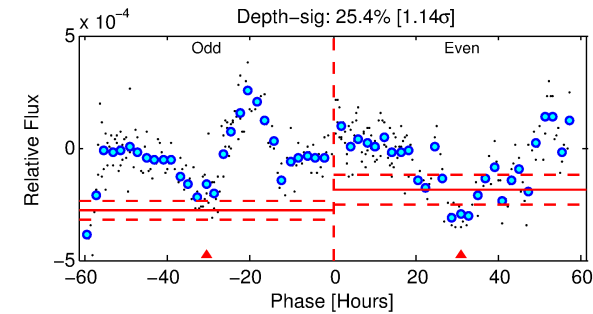
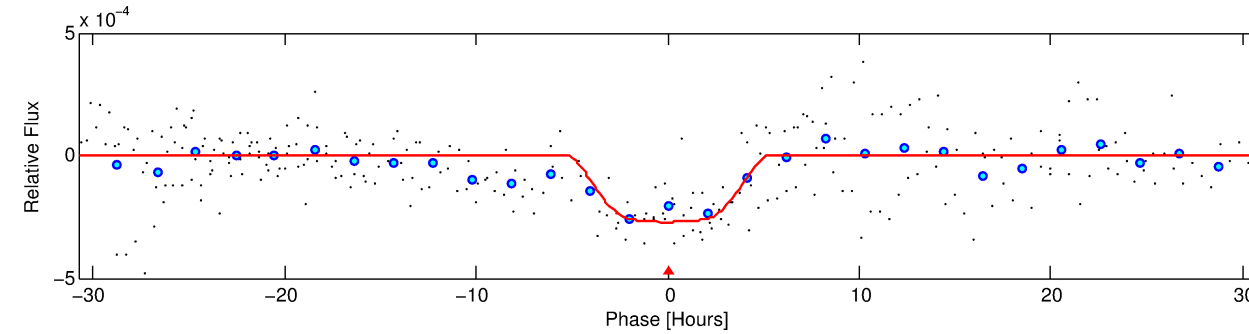
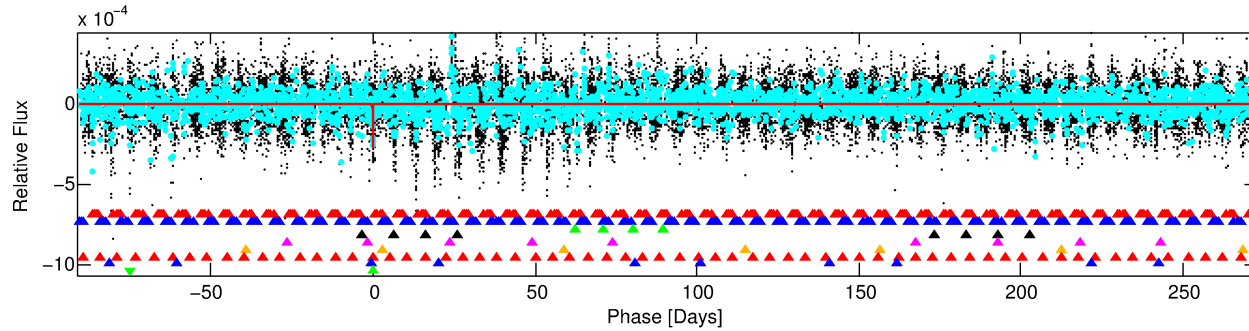
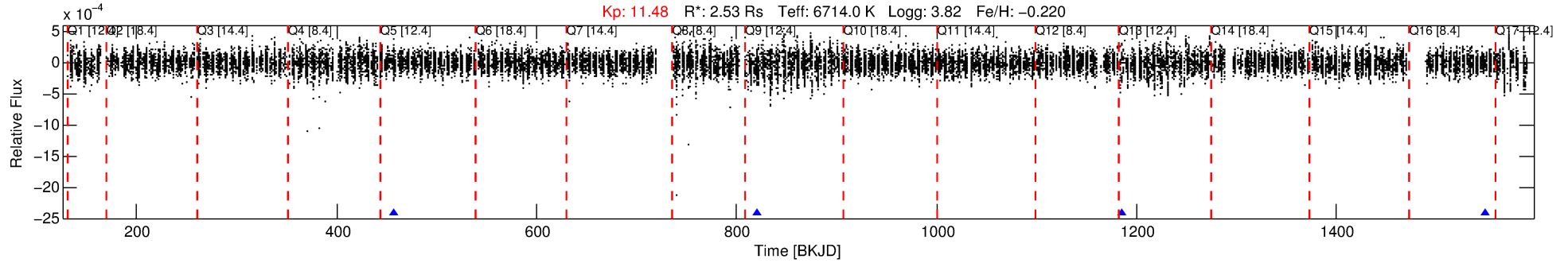
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 010333254-09

No Significant Match Found

# DV One-Page Summary

KIC: 10333254 Candidate: 9 of 9 Period: 363.742 d



## DV Fit Results:

Period = 363.74174 [0.01640] d  
Epoch = 457.4107 [0.0151] BKJD  
Rp/R\* = 0.0194 [0.0017]  
a/R\* = 83.52 [15.37]  
b = 0.97 [0.01]  
Seff = 8.77 [4.50]  
Teq = 439 [56] K  
Rp = 5.37 [2.02] Re  
a = 1.1546 [0.3783] AU  
Ag = 3984.89 [2536.92] [1.57 $\sigma$ ]  
Teffp = 5390 [550] K [8.96 $\sigma$ ]

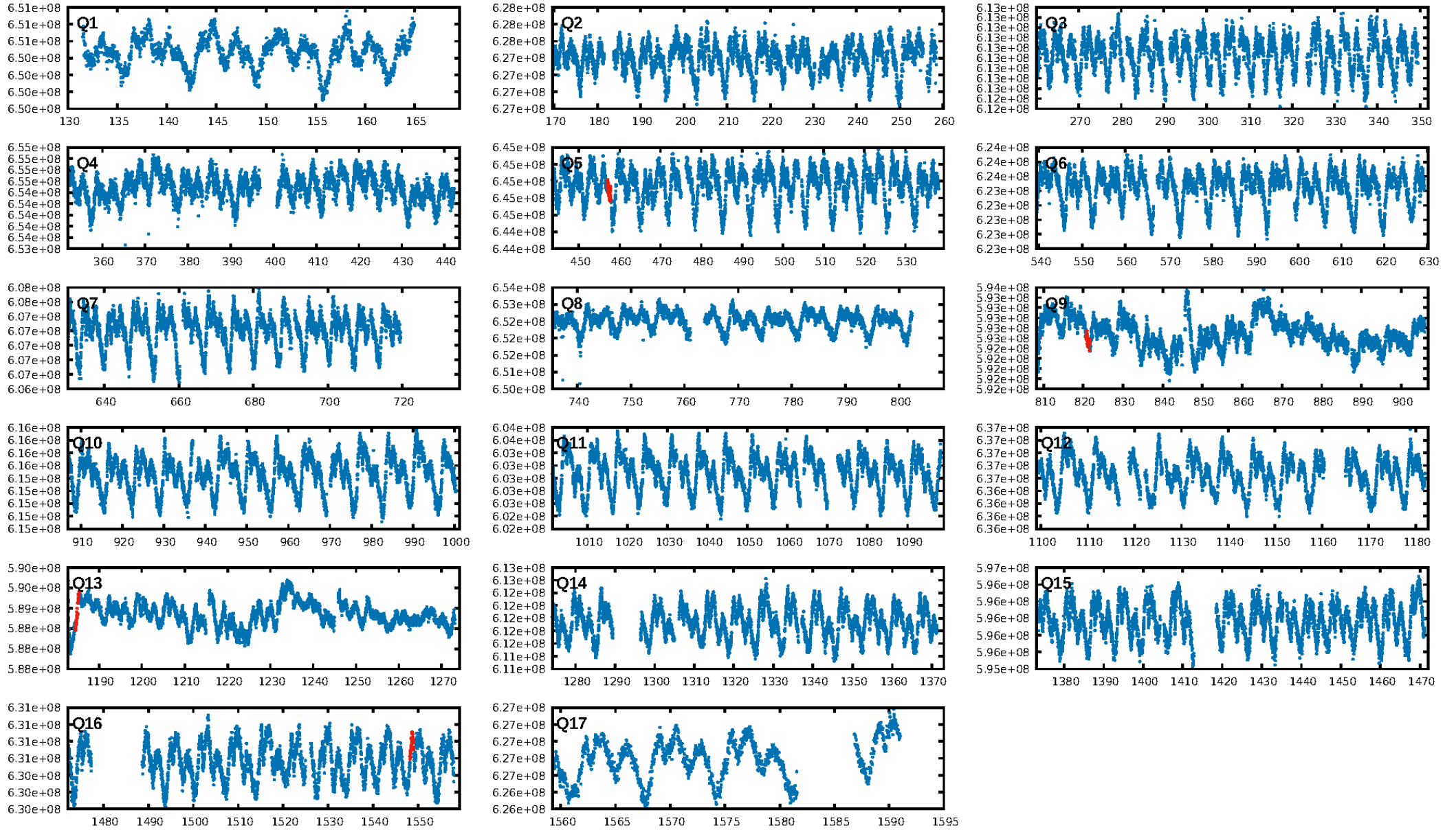
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [321.98 $\sigma$ ]  
LongPeriod-sig: 100.0% [14.94 $\sigma$ ]  
ModelChiSquare2-sig: 0.4%  
ModelChiSquareGof-sig: 99.4%  
**Bootstrap-pfa: 5.48e-11**  
RollingBand-fgt: 1.00 [3/3]  
**GhostDiagnostic-chr: 0.7019**  
Centroid-sig: N/A  
Centroid-so: N/A  
**OotOffset-rm: 1.628 arcsec [3.18 $\sigma$ ]**  
**KicOffset-rm: 1.572 arcsec [3.72 $\sigma$ ]**  
OotOffset-st: 0/0/1/1 [2]  
KicOffset-st: 0/0/1/1 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 0.67 [2/3]

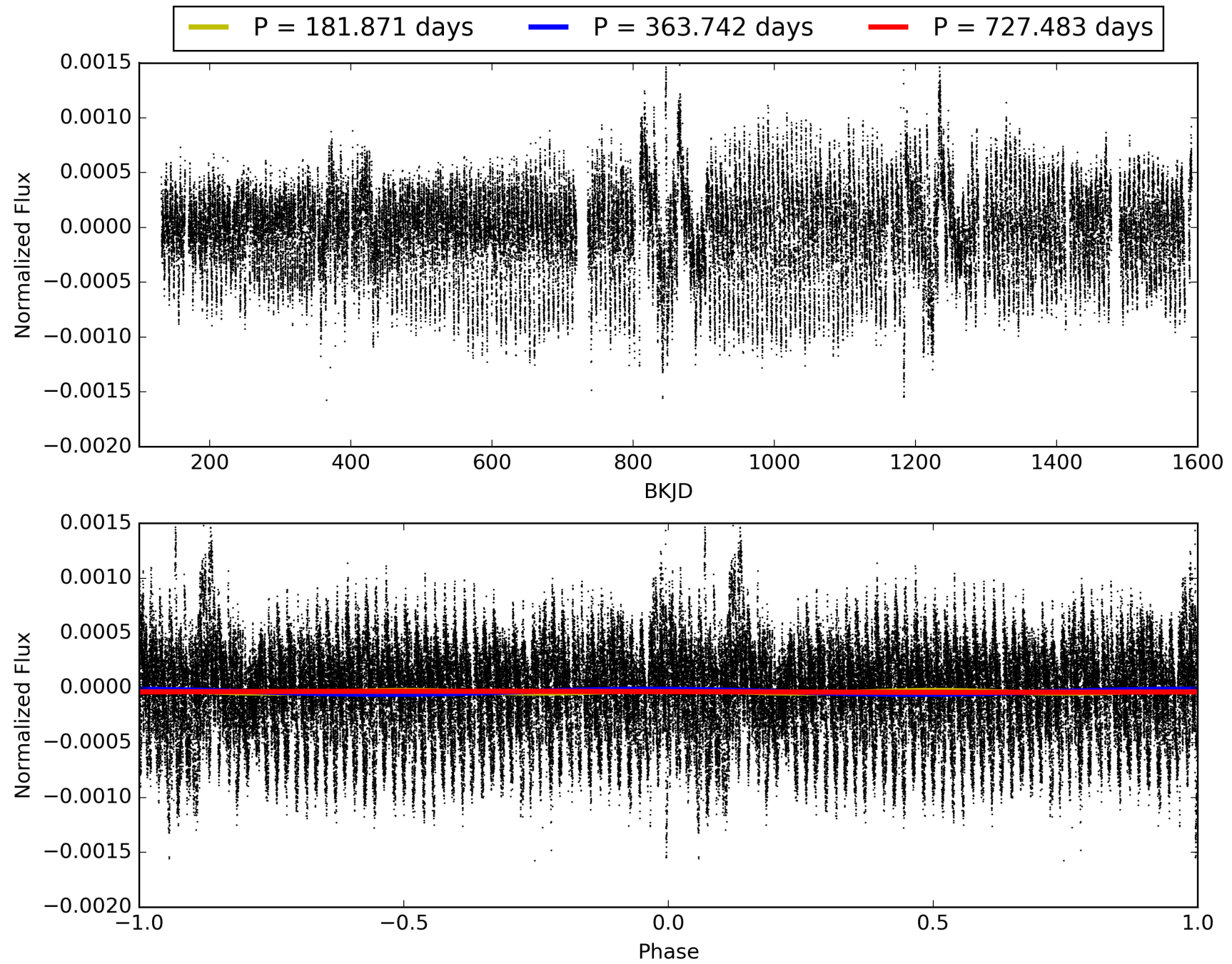
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 07:17:27 Z

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

# TCE 010333254-09, PDC Light Curves

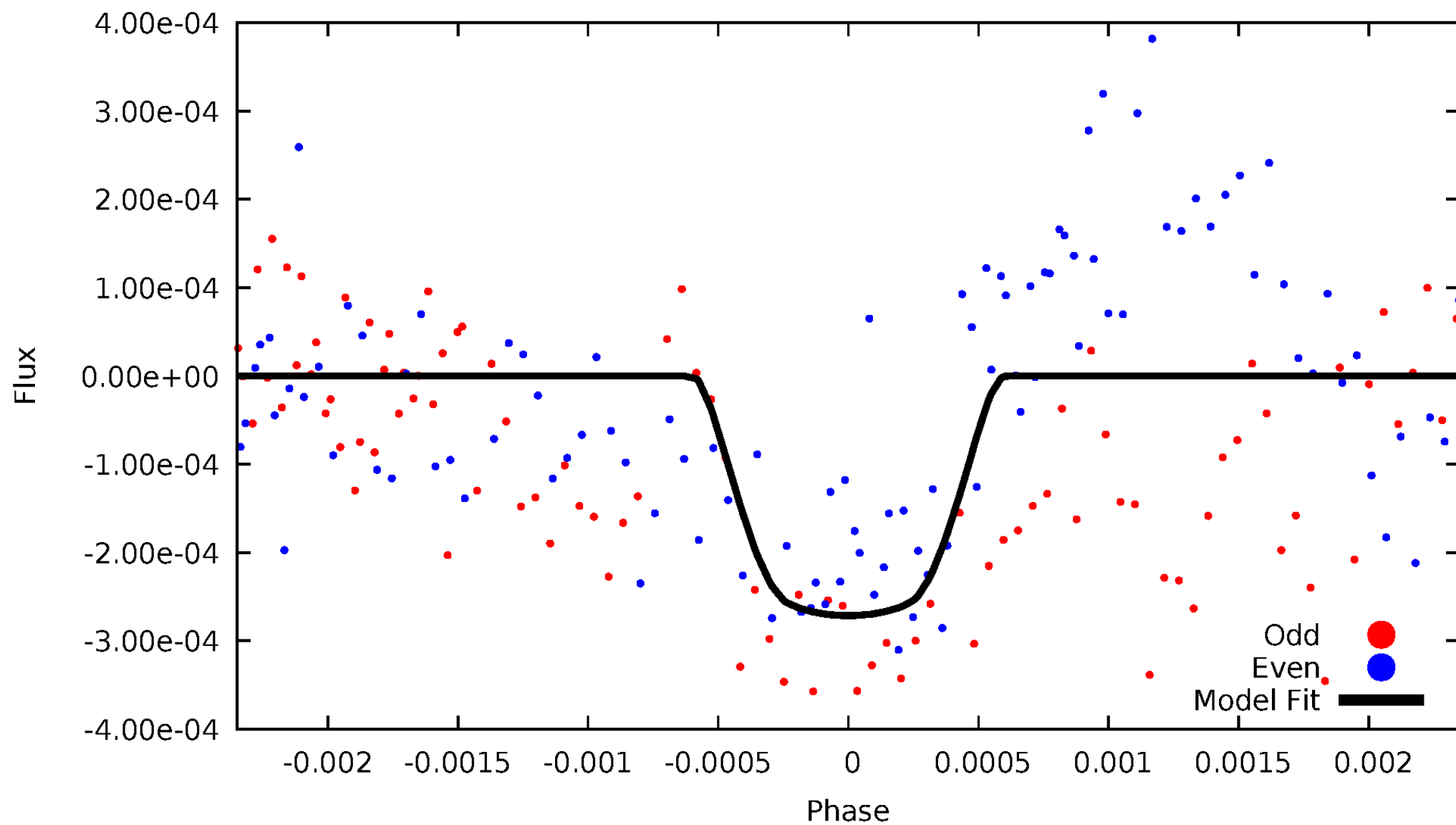


TCE 010333254-09



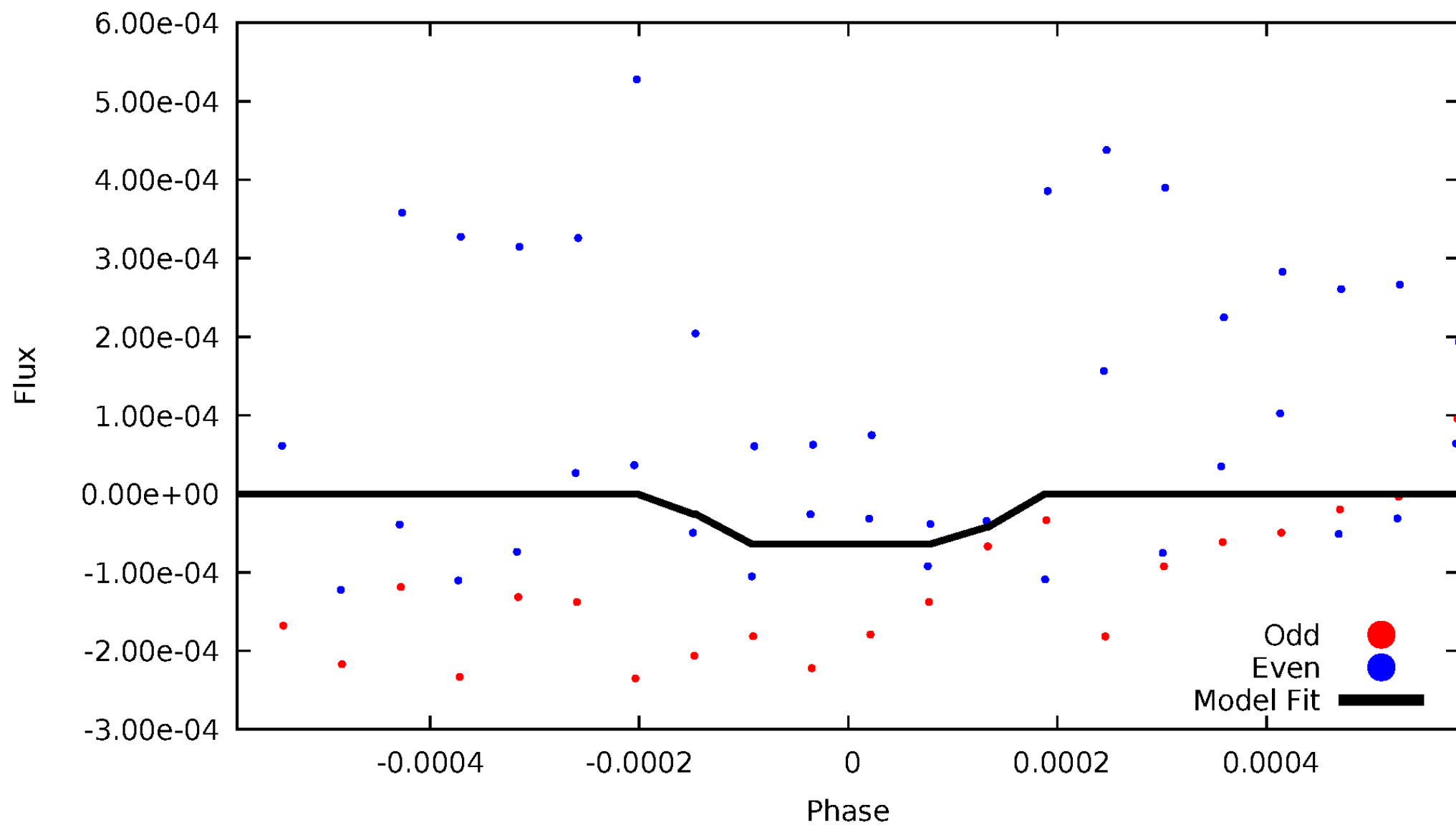
# DV Odd/Even

TCE 010333254-09



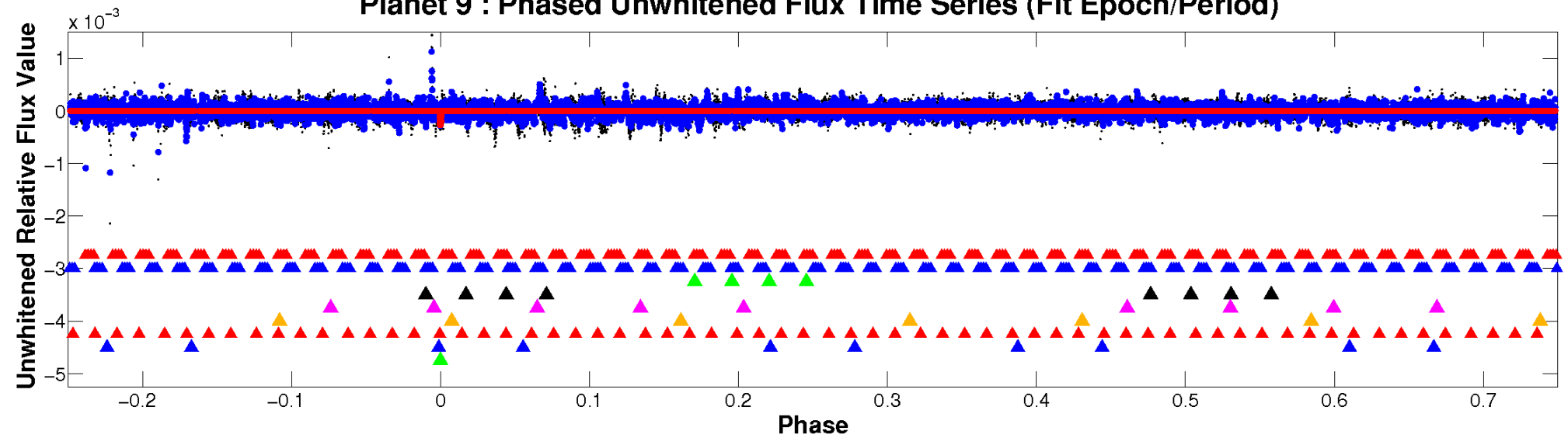
# ALT Odd/Even

TCE 010333254-09

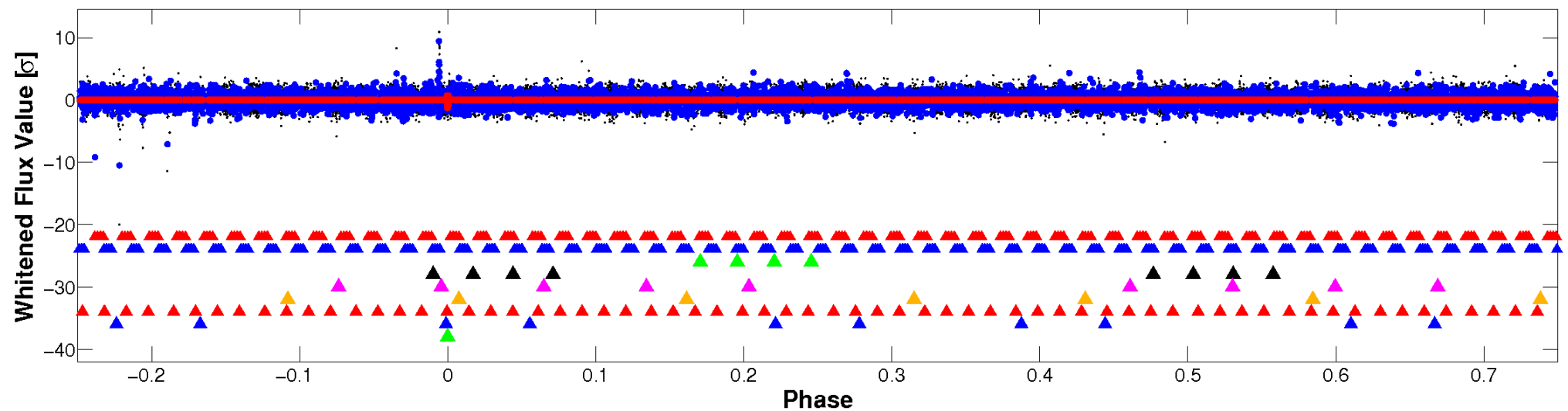


# Non-Whitened Vs. Whitened Light Curve

## Planet 9 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)



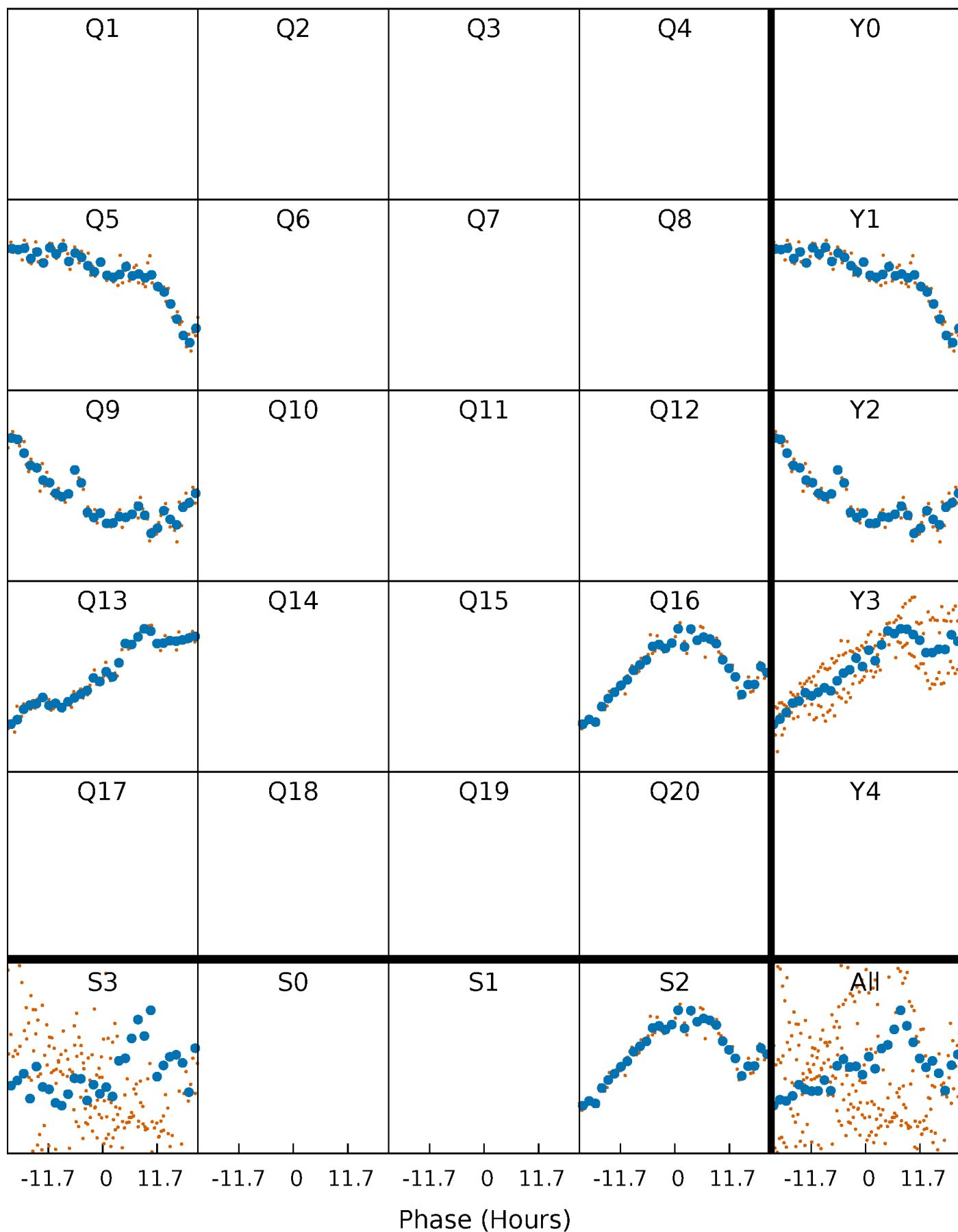
## Planet 9 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

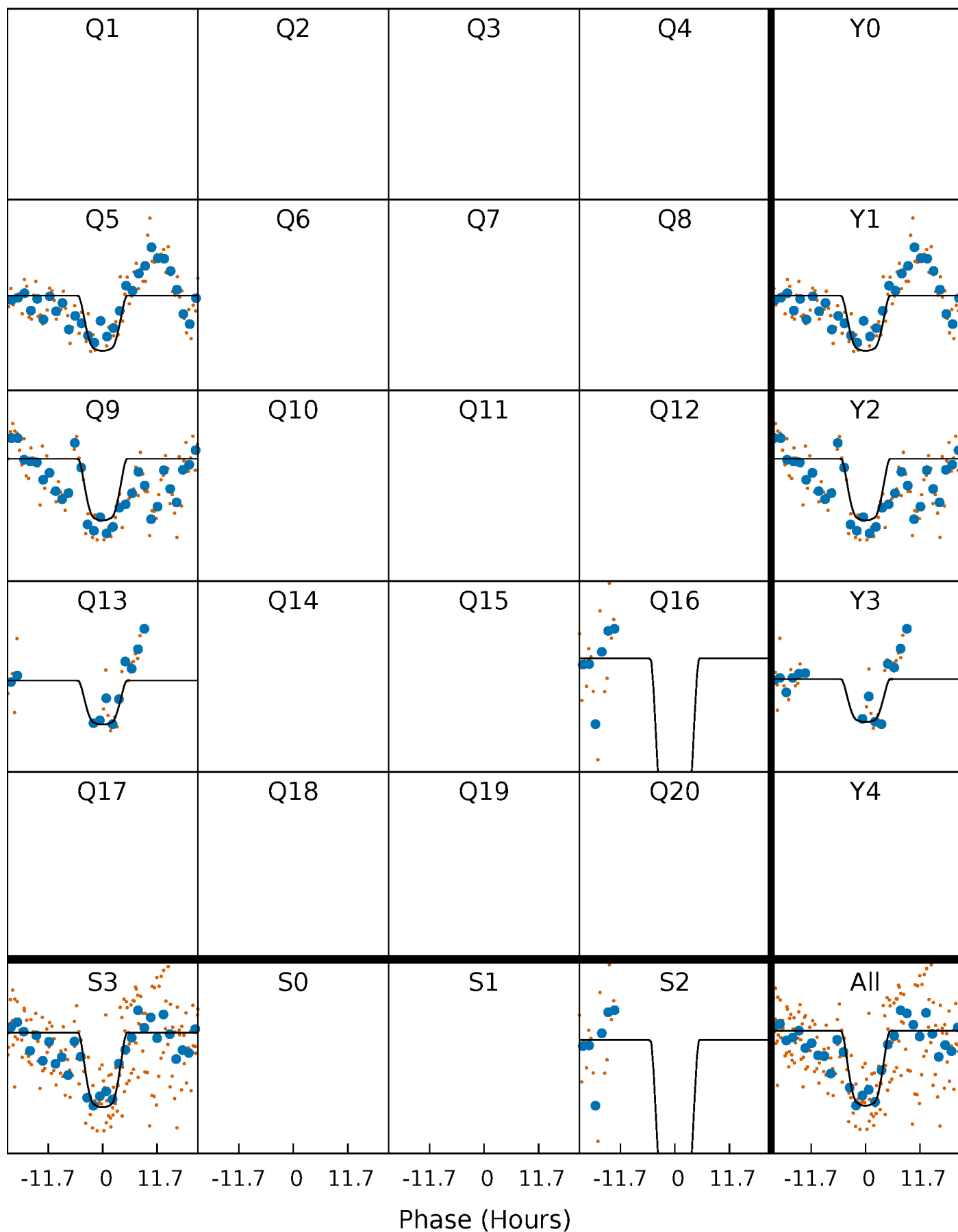
TCE 010333254-09     $P=363.741743$  Days     $T_0=457.410736$  (BKJD)





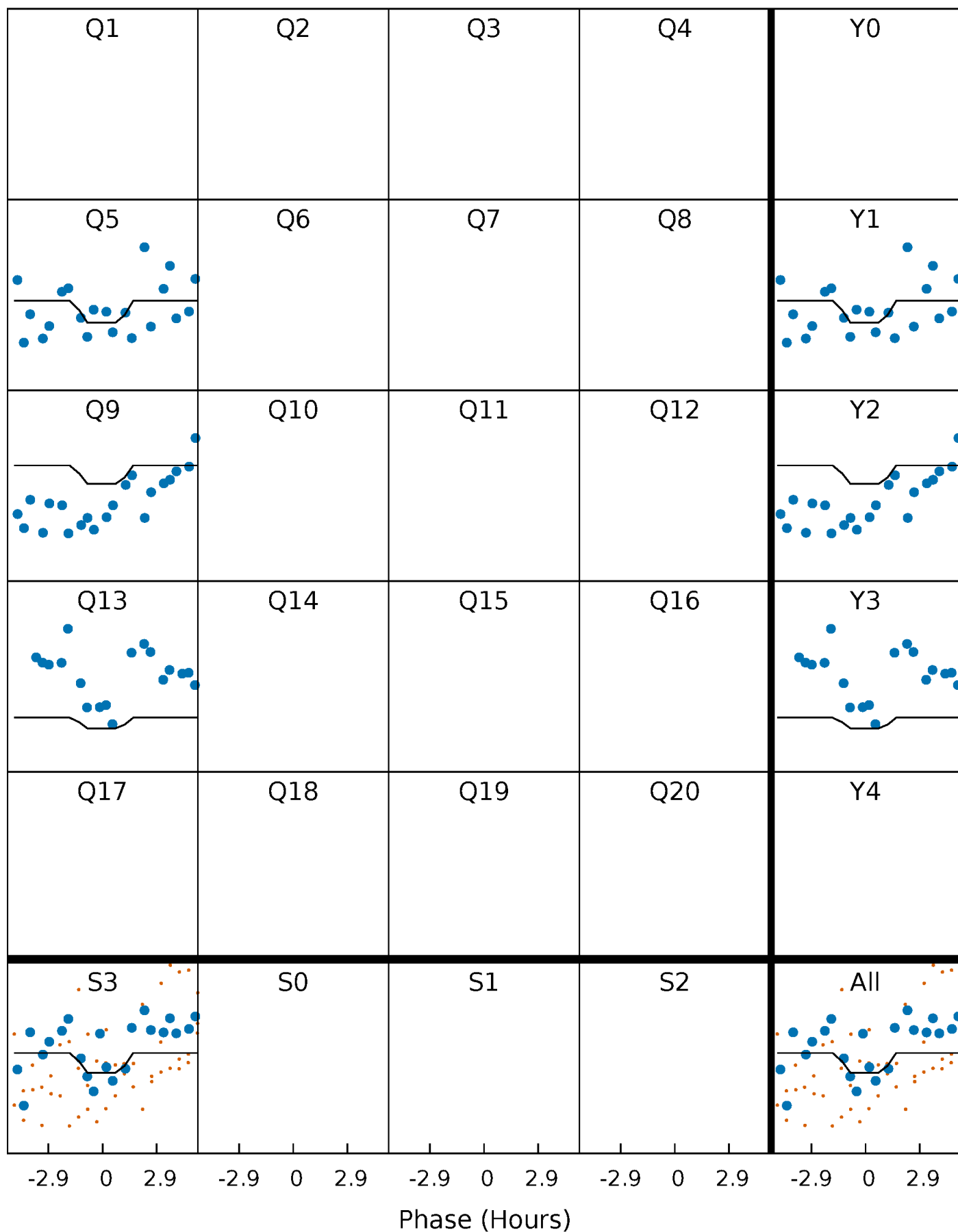
# DV Quarter-Phased Transit Curves

TCE 010333254-09     $P=363.741743$  Days     $T_0=457.410736$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

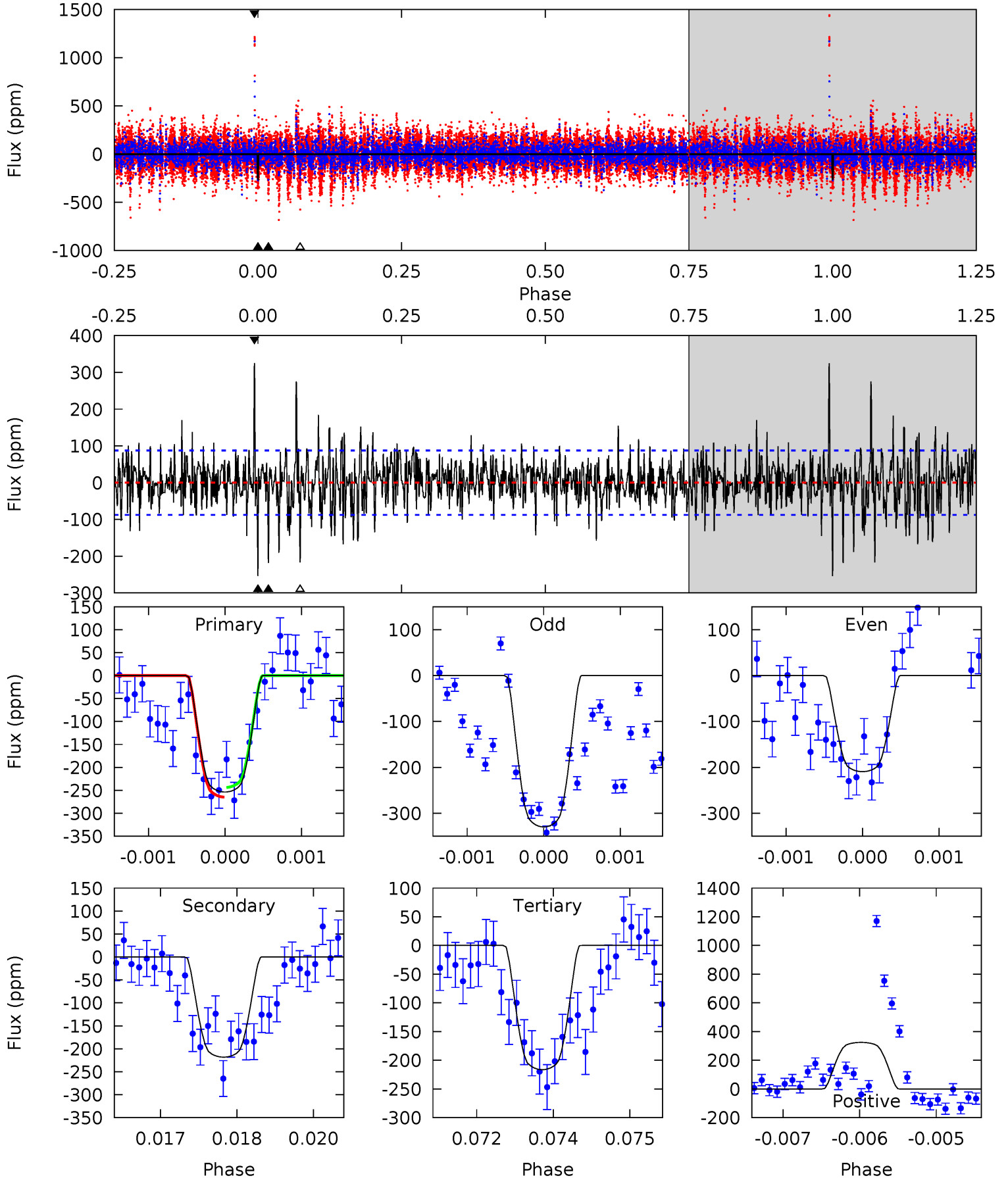
TCE 010333254-09 P=363.758235 Days  $T_0=457.480657$  (BKJD)



# DV Model-Shift Uniqueness Test

010333254-09, P = 363.741743 Days, E = 93.668993 Days

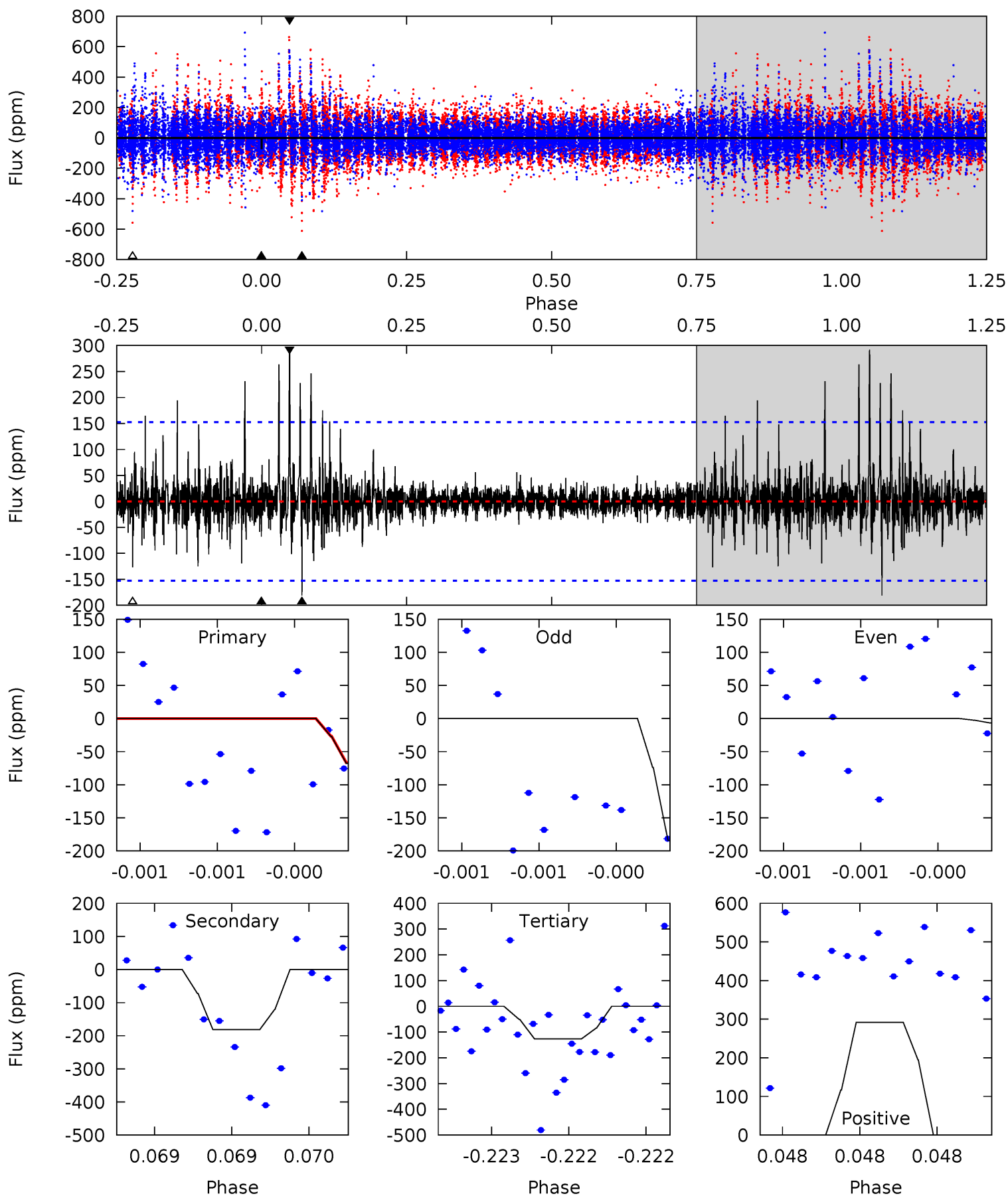
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
15.7	13.5	13.4	20.1	5.41	3.23	3.18	2.31	-4.39	0.11	-6.58	3.59	1.14	0.56	0.64



# Alt Model-Shift Uniqueness Test

010333254-09, P = 363.758235 Days, E = 93.722422 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
2.52	6.74	4.70	10.9	5.67	3.63	1.01	-2.18	-8.33	2.03	-4.12	2.75	0.98	0.62	0.04



### Stellar Parameters For KIC 010333254

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6714^{+168}_{-184}$	$3.821^{+0.285}_{-0.095}$	$-0.220^{+0.300}_{-0.250}$	$2.534^{+0.463}_{-0.927}$	$1.550^{+0.183}_{-0.340}$	$0.134^{+0.245}_{-0.041}$
	+3%/-3%	+7%/-2%	+136%/-114%	+18%/-37%	+12%/-22%	+183%/-31%
Source	PHO1	FLK73	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 010333254-09 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-218 \pm 16$	$5.15^{+0.83}_{-0.96}$	$602^{+38}_{-51}$	$5850^{+291}_{-286}$	$5982^{+2767}_{-1489}$
Alt.	$-181 \pm 27$	$2.07^{+0.62}_{-0.56}$	$604^{+34}_{-53}$	$9184^{+1922}_{-1158}$	$30835^{+24809}_{-12284}$

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

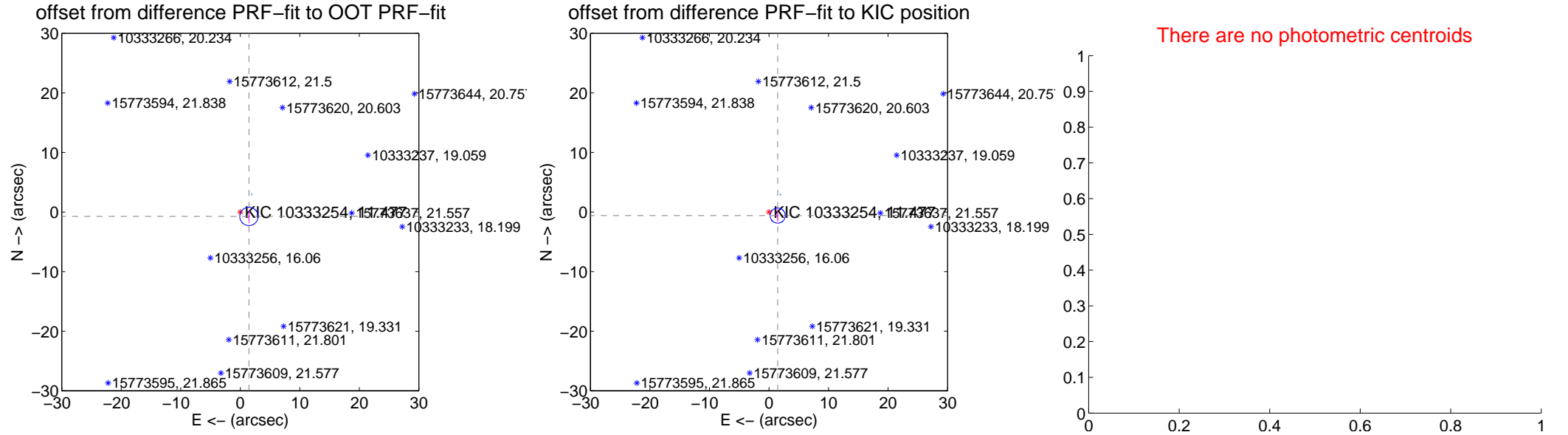
## DV Centroid Data

Supplemental centroid analysis for 010333254-09. **Kepler magnitude: 11.48.** Transit SNR 8.34

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

The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>1.628 \pm 0.512</math></b>	<b>3.18</b>	$-1.451 \pm 0.166$	$-0.737 \pm 1.084$
PRF-fit source offset from KIC position	<b><math>1.572 \pm 0.423</math></b>	<b>3.72</b>	$-1.454 \pm 0.168$	$-0.596 \pm 1.037$
photometric centroid source offset	—	—	—	—

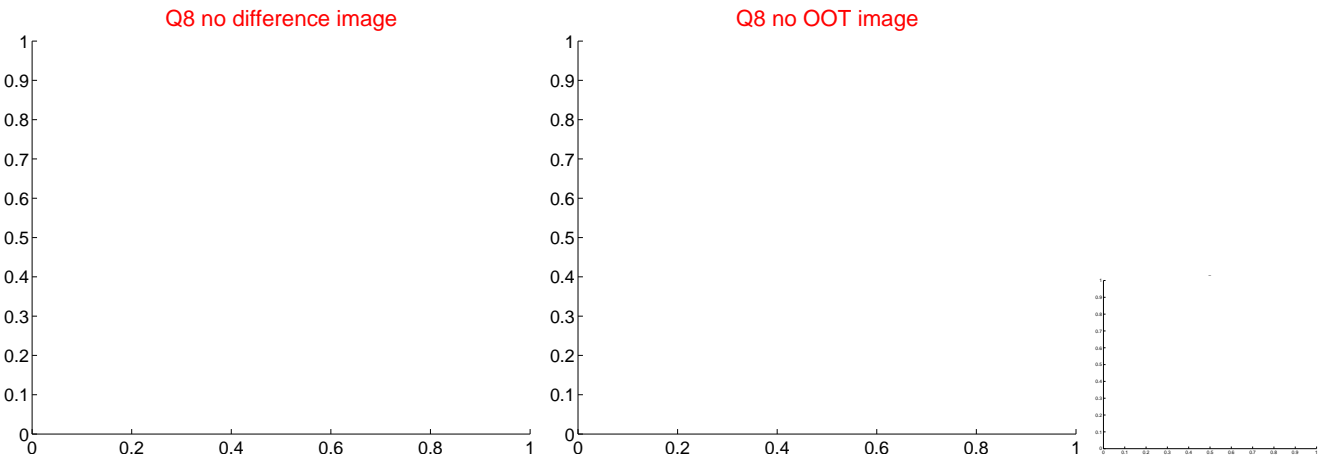
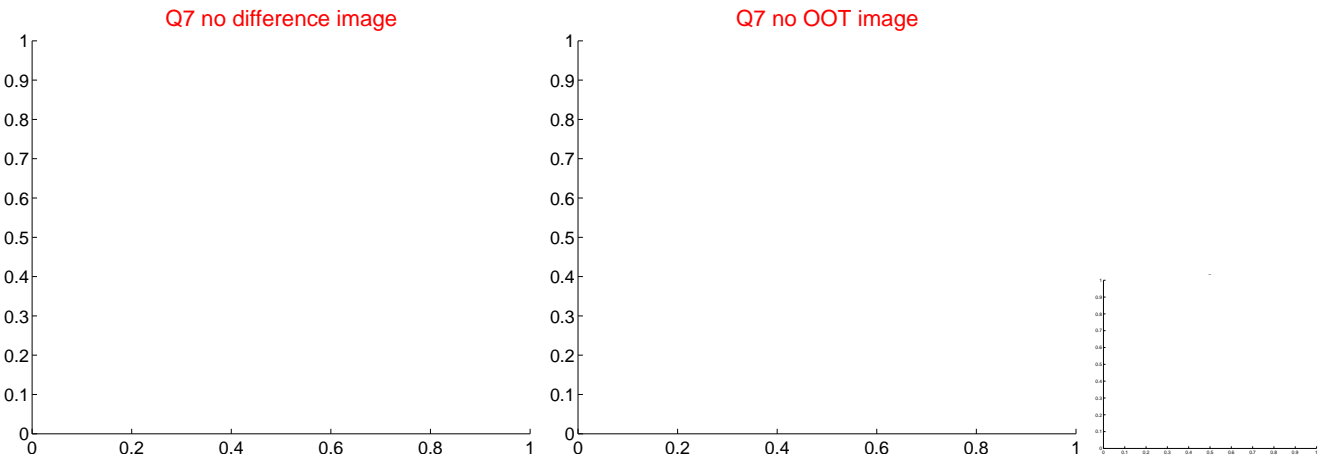
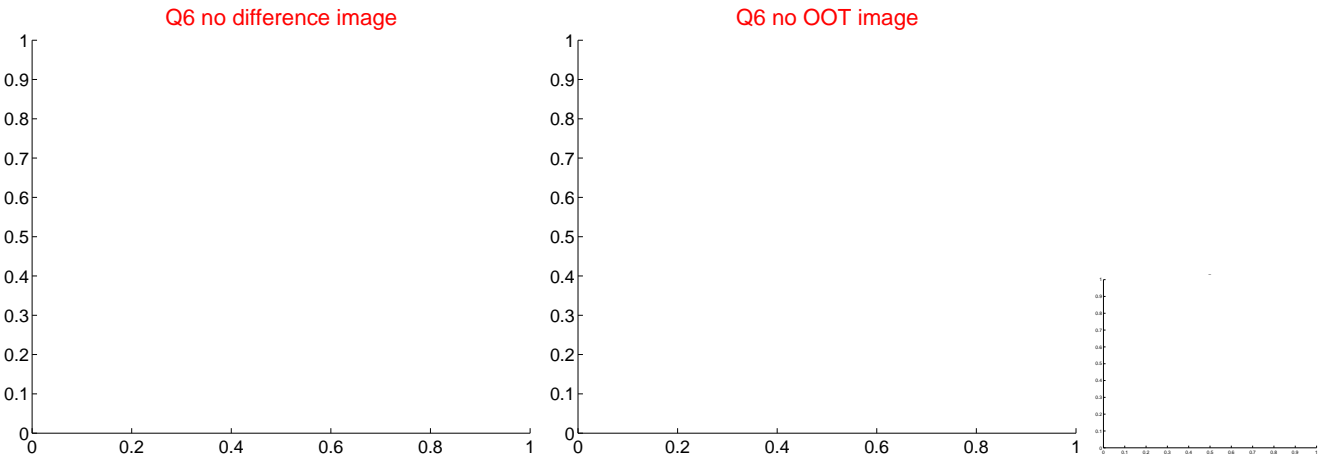
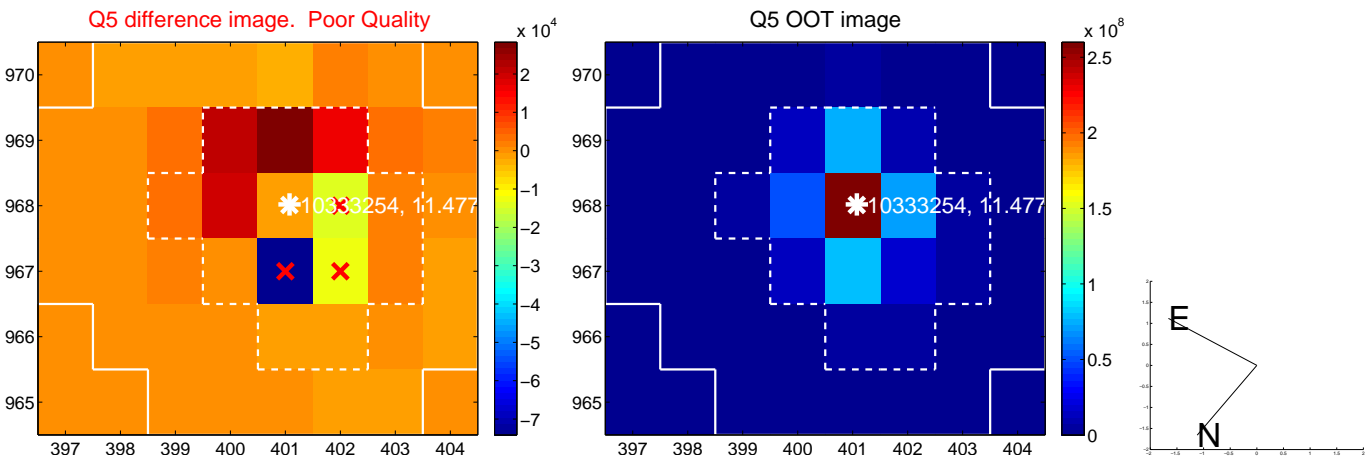


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

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

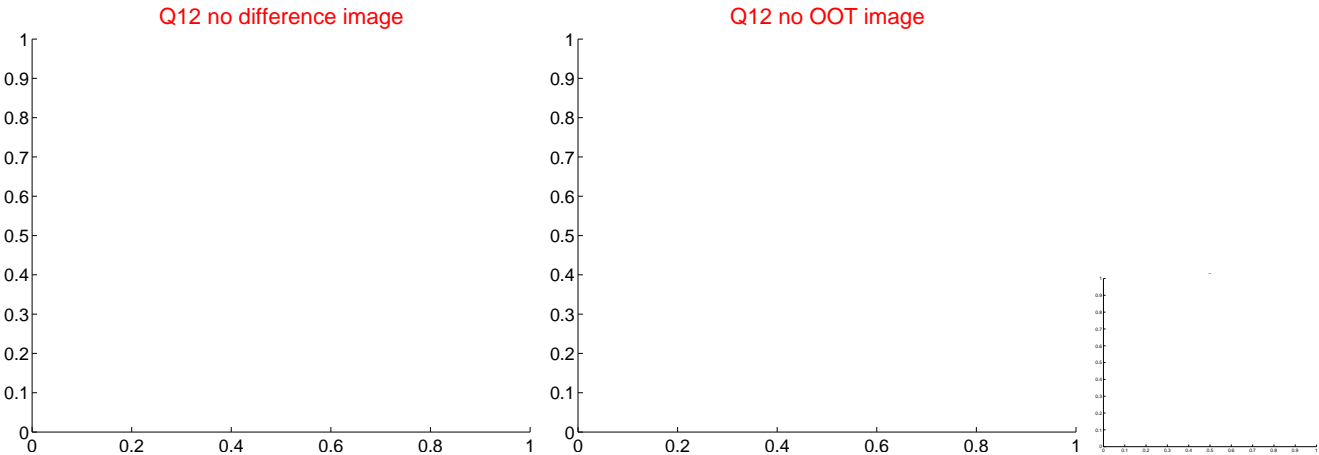
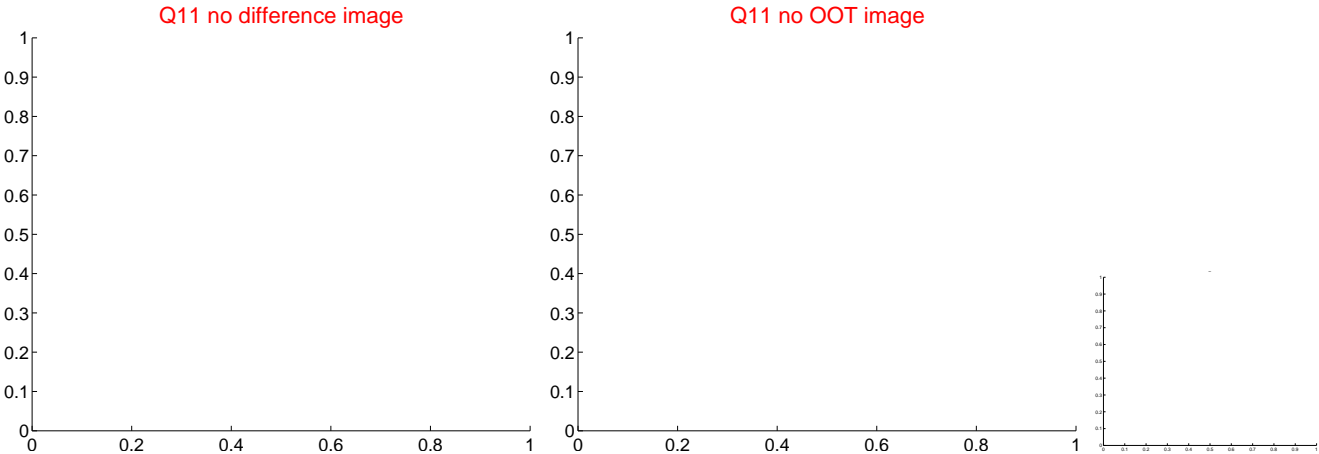
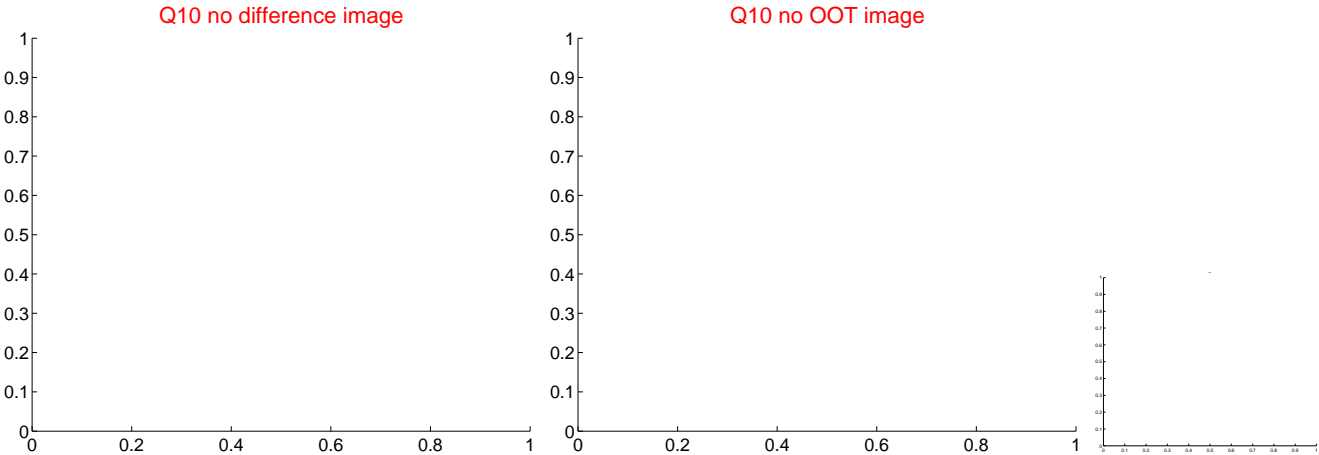
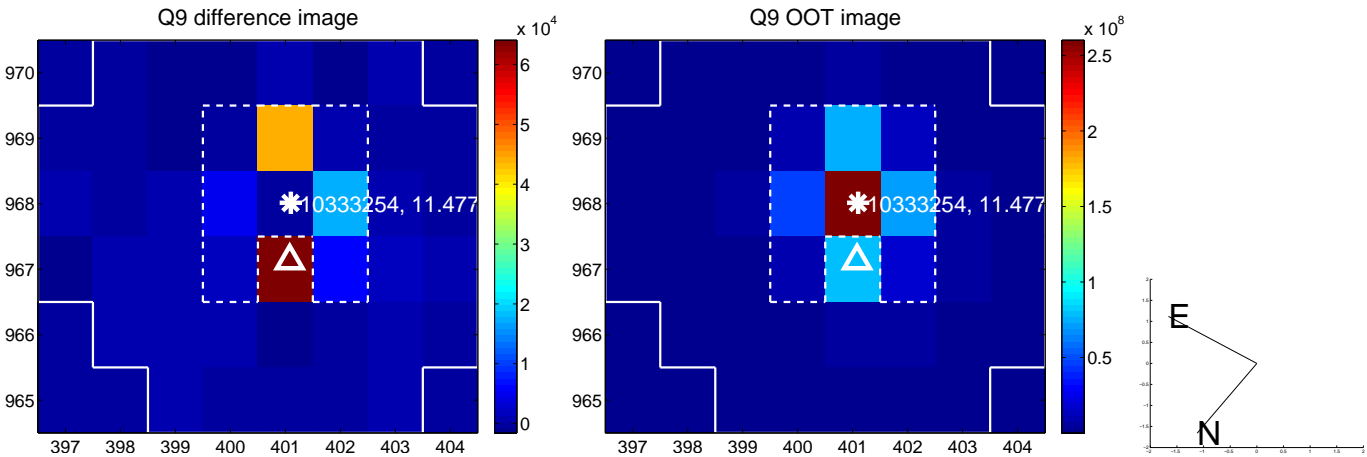


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.

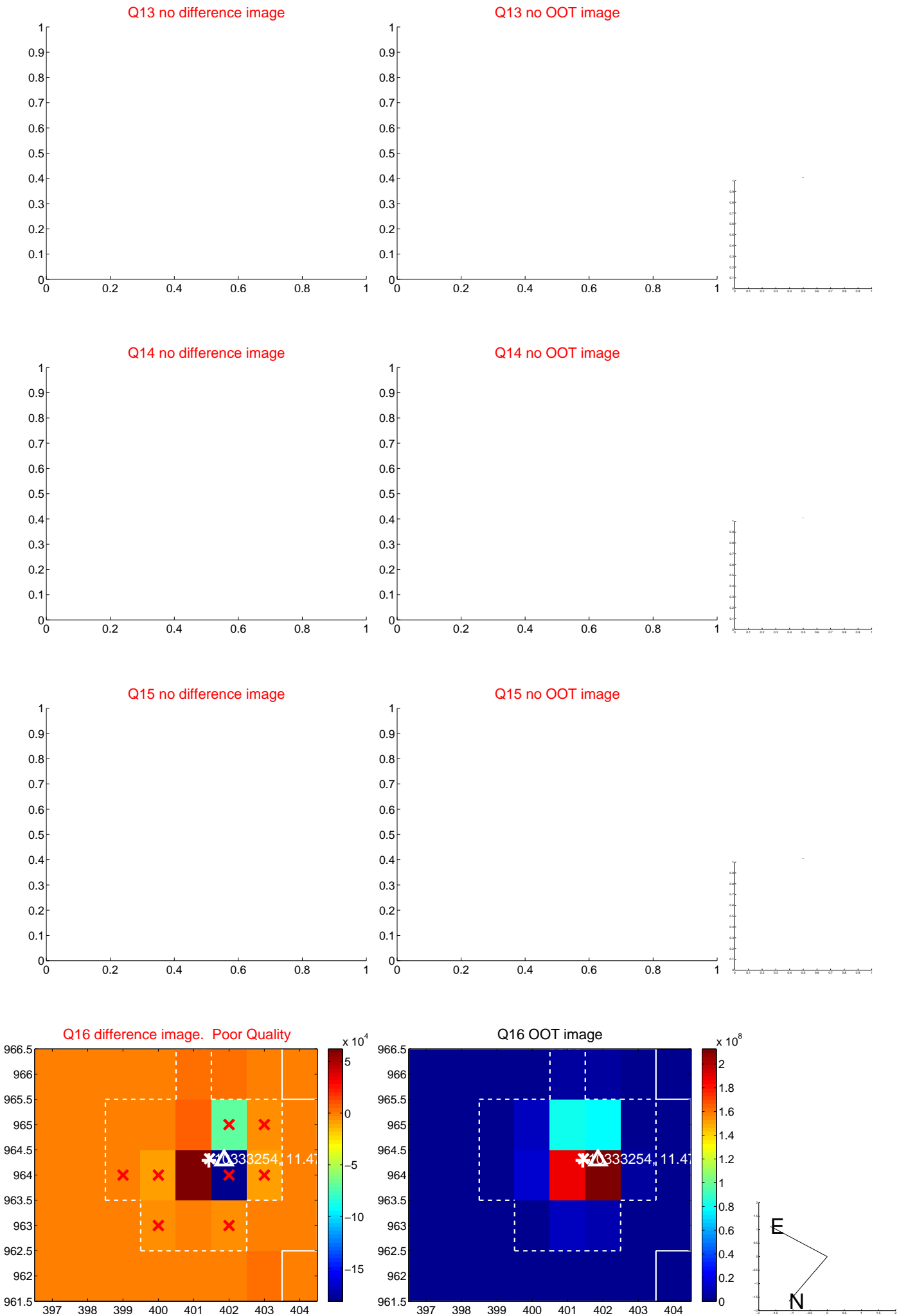




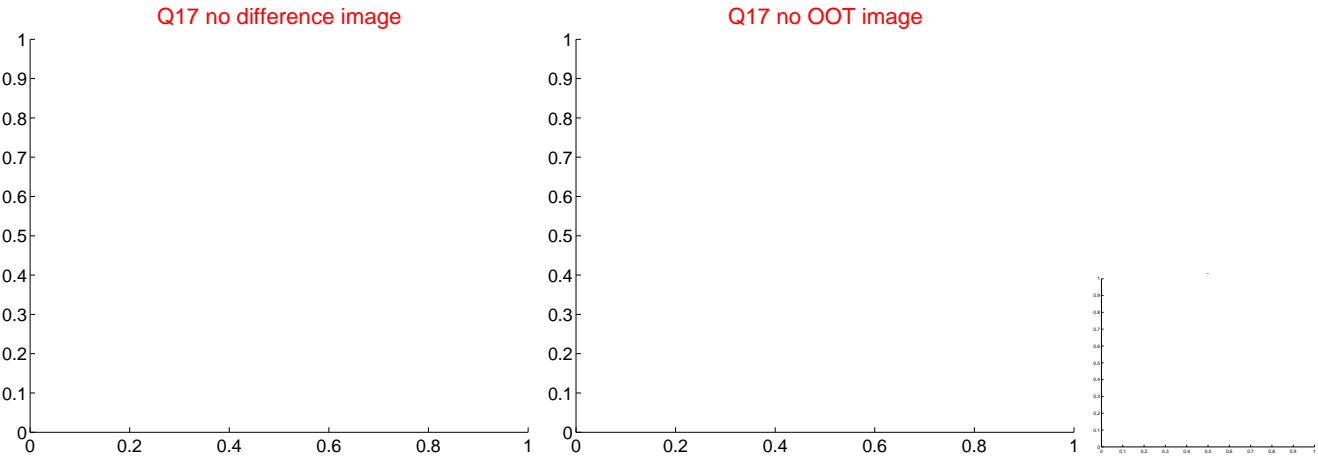
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



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



folded centroid time series figure for this object.

UKIRT Image

