

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004577324-01	OBS	No	2.676955	133.989377	23.7	9.268	8.5	8.2	1.55	6490	0.84	2508.57
004577324-02	OBS	No	5.352929	135.260103	33.6	9.181	10.0	9.7	1.55	6490	1.05	995.77
004577324-03	OBS	No	283.674058	186.080756	103.5	25.045	8.5	4.6	1.55	6490	1.73	5.00
004577324-04	OBS	No	310.445932	432.392002	164.8	7.764	7.9	6.3	1.55	6490	2.19	4.44
004577324-05	OBS	No	173.353436	171.891158	171.1	9.852	7.6	6.9	1.55	6490	2.22	9.65
004577324-06	OBS	No	15.793664	139.332735	72.1	14.982	8.0	8.0	1.55	6490	1.54	235.31
004577324-07	OBS	No	185.917423	244.975369	135.5	25.942	8.3	4.5	1.55	6490	2.10	8.79
004577324-08	OBS	No	171.313674	196.888564	98.3	5.032	7.4	5.4	1.55	6490	1.70	9.80
004577324-09	OBS	No	143.173964	238.606043	293.0	0.835	7.5	3.3	1.55	6490	2.73	12.45
004577324-10	OBS	No	143.175229	238.960367	60.4	1.407	7.6	1.6	1.55	6490	1.36	12.45

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004577324-01	OBS	FP	0.00	1	0	0	0	LPP_DV
004577324-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD
004577324-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS
004577324-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004577324-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS
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004577324-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004577324-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004577324-10	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_FEW_DIFFS

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

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

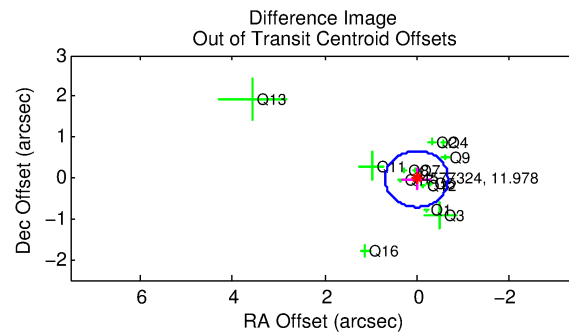
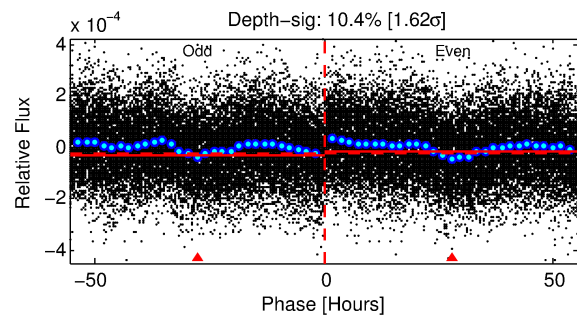
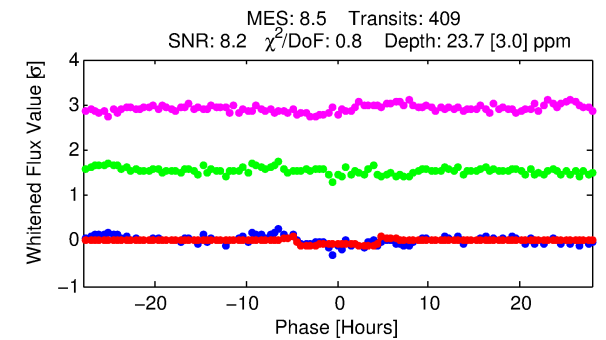
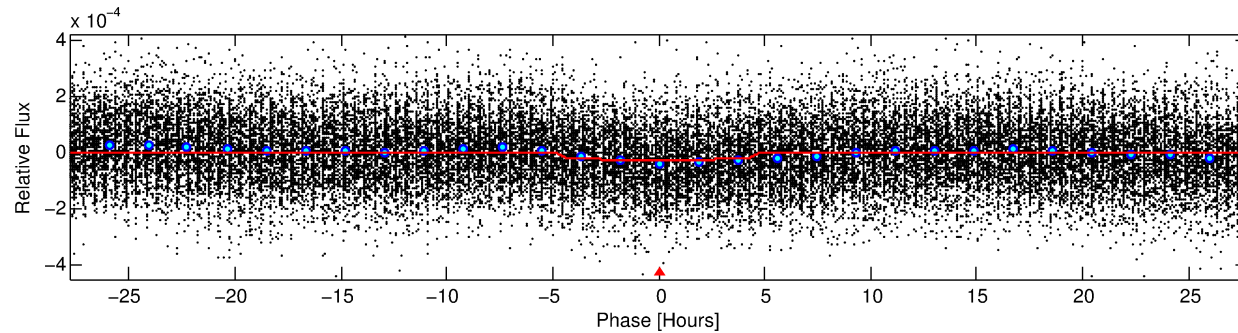
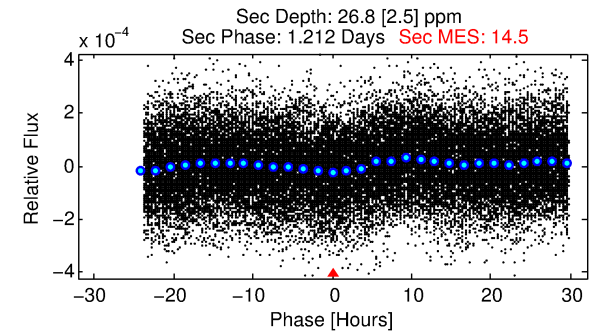
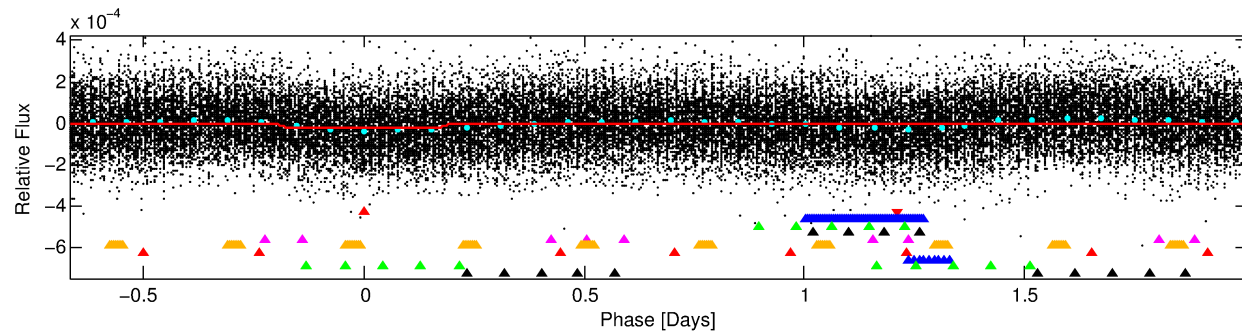
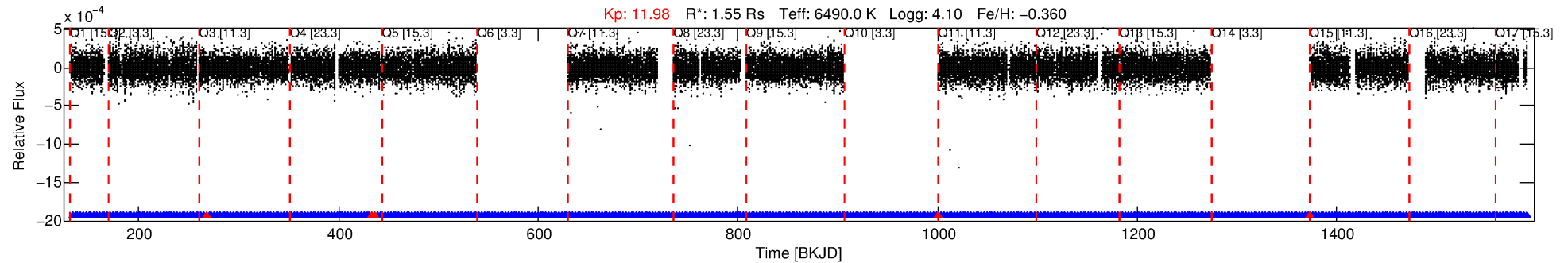
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004577324-01

No Significant Match Found

# DV One-Page Summary

KIC: 4577324 Candidate: 1 of 10 Period: 2.677 d



## DV Fit Results:

Period = 2.67696 [0.00002] d  
Epoch = 133.9894 [0.0048] BKJD  
Rp/R\* = 0.0049 [0.0009]  
a/R\* = 1.58 [0.95]  
b = 0.81 [0.43]  
Seff = 2508.57 [993.92]  
Teq = 1805 [179] K  
Rp = 0.84 [0.27] Re  
a = 0.0390 [0.0095] AU  
Ag = 32.15 [17.53] [1.78σ]  
Teffp = 6644 [673] K [6.95σ]

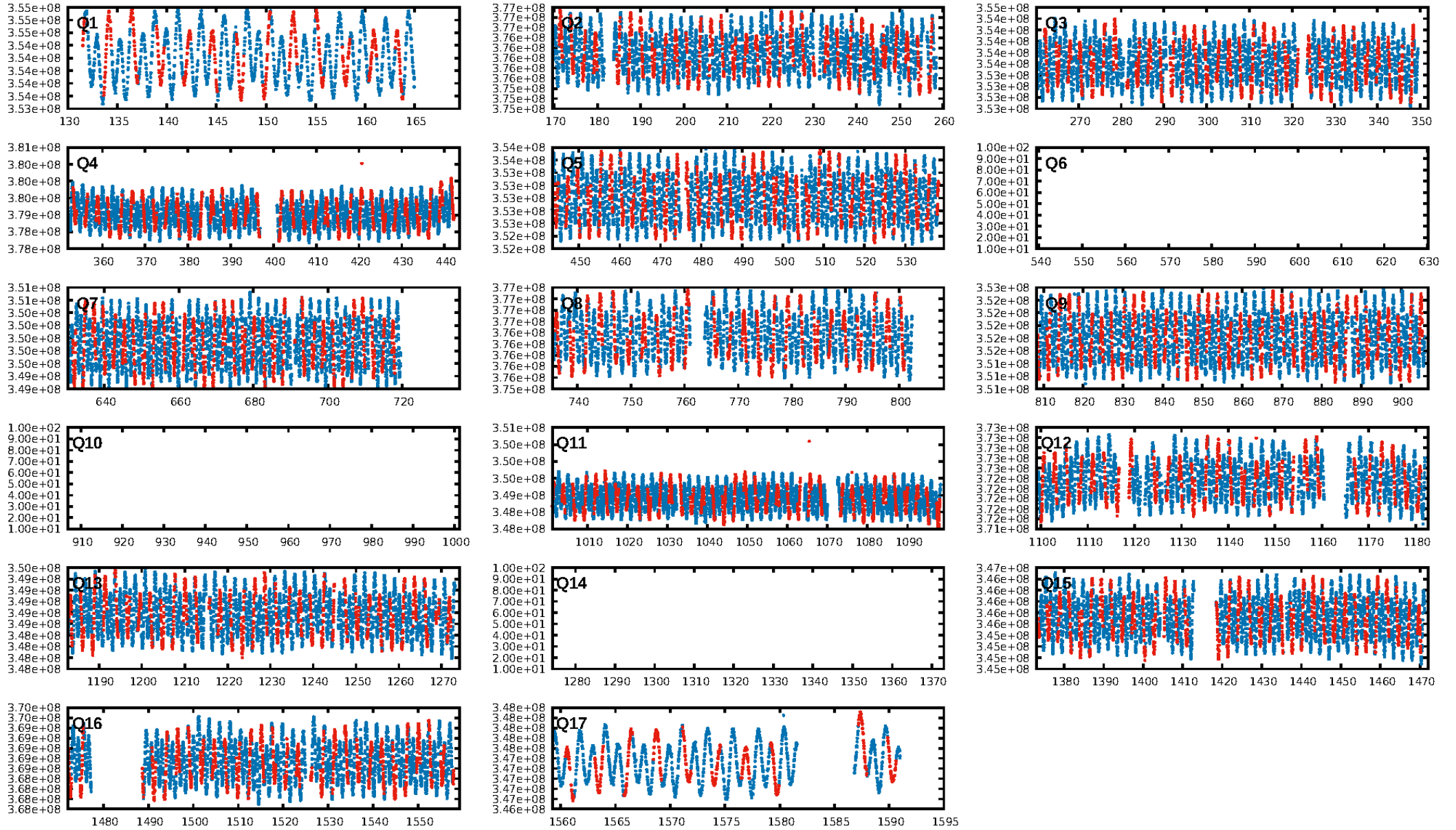
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [4.92σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.99 [381/386]  
GhostDiagnostic-chr: 1.104  
Centroid-sig: 69.4%  
Centroid-so: 0.119 arcsec [0.16σ]  
OotOffset-rm: 0.032 arcsec [0.14σ]  
OotOffset-st: 1/3/4/5 [13]  
KicOffset-rm: 0.152 arcsec [0.46σ]  
KicOffset-st: 1/3/4/5 [13]  
DiffImageQuality-fgm: 0.54 [7/13]  
DiffImageOverlap-fno: 1.00 [14/14]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 00:55:15 Z

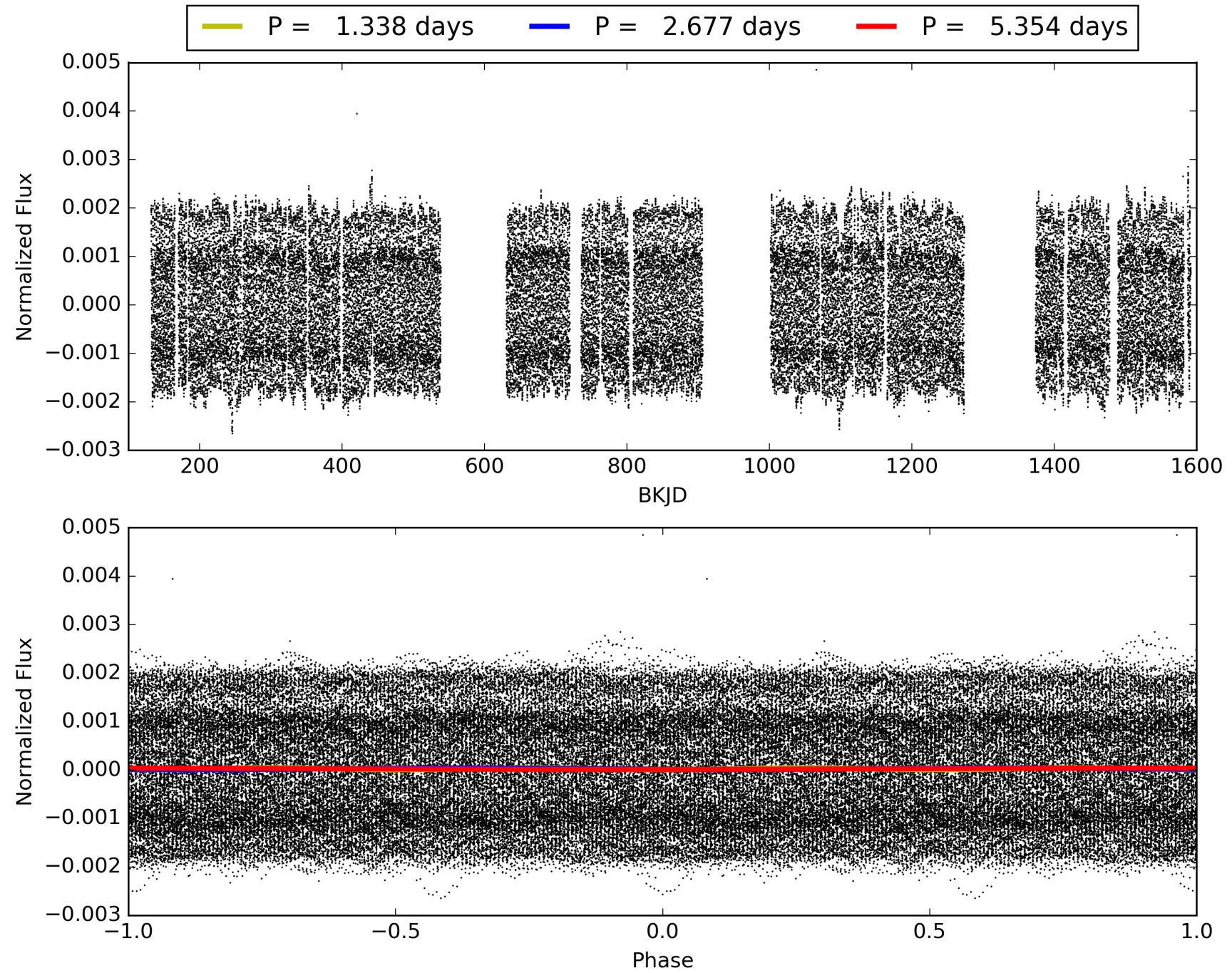
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004577324-01, PDC Light Curves





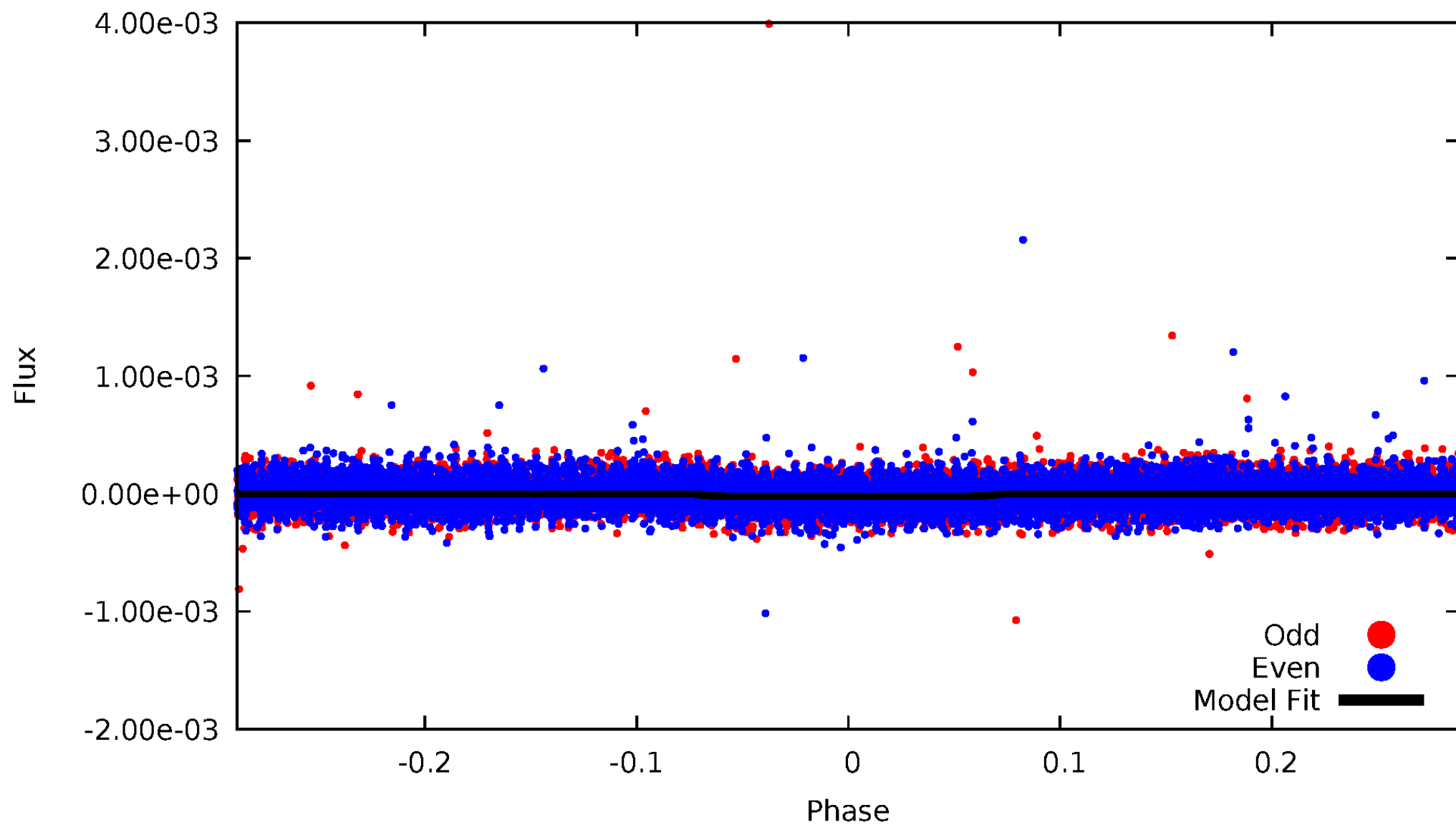
TCE 004577324-01





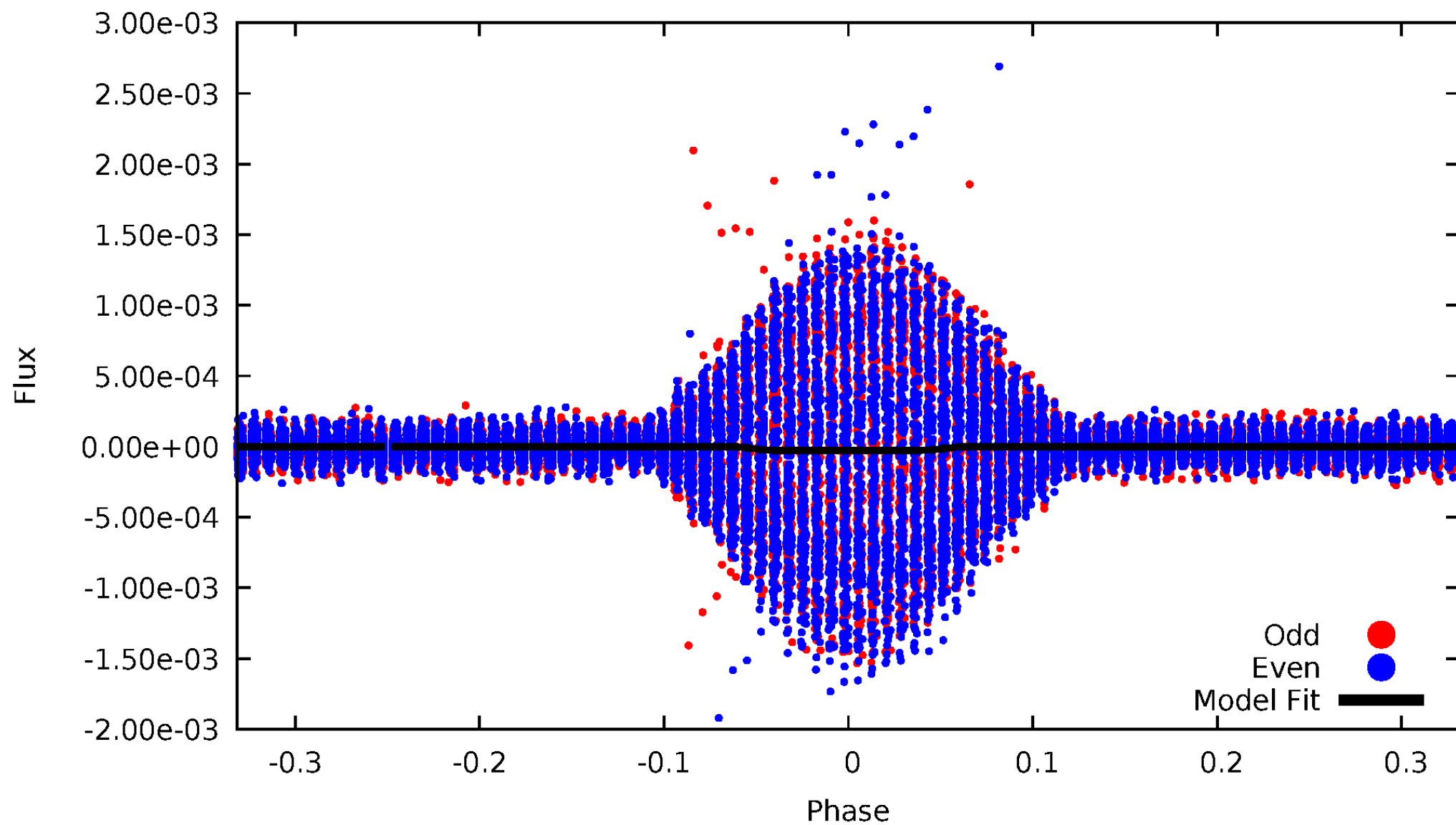
# DV Odd/Even

TCE 004577324-01



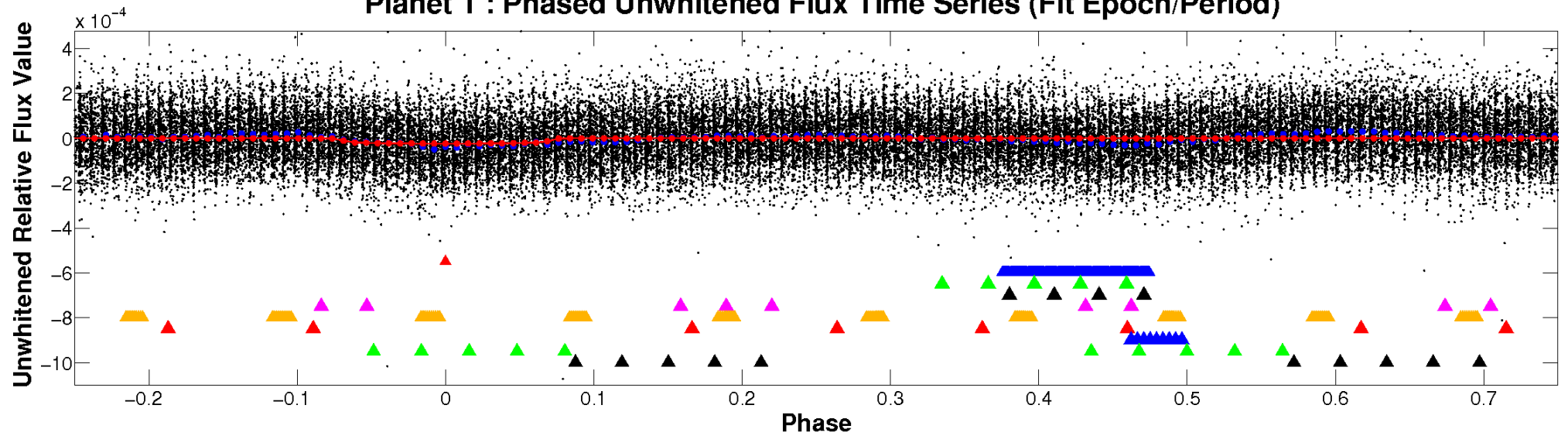
# ALT Odd/Even

TCE 004577324-01

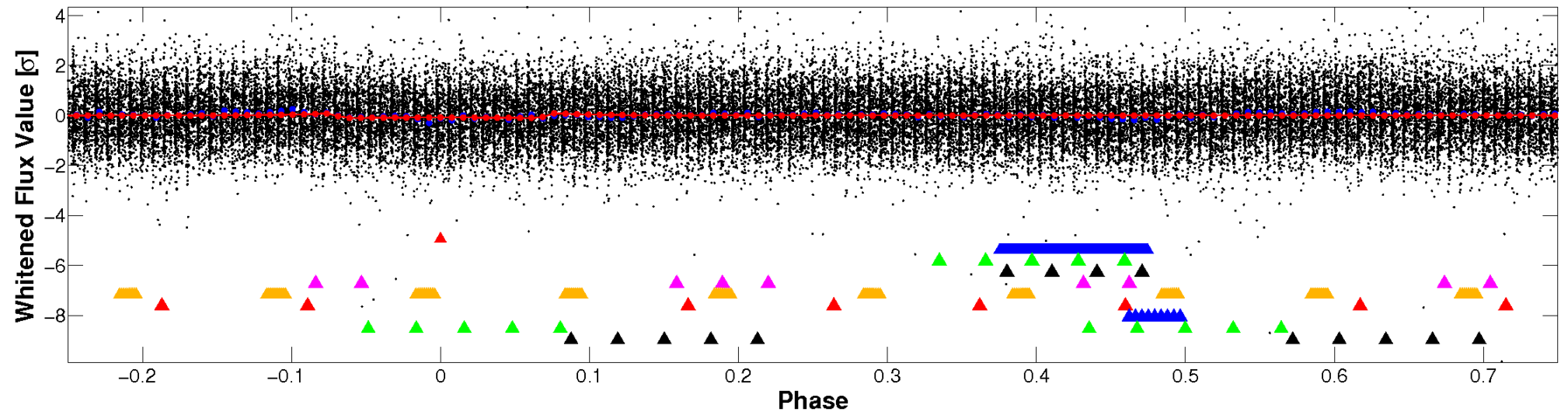


# Non-Whitened Vs. Whitened Light Curve

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



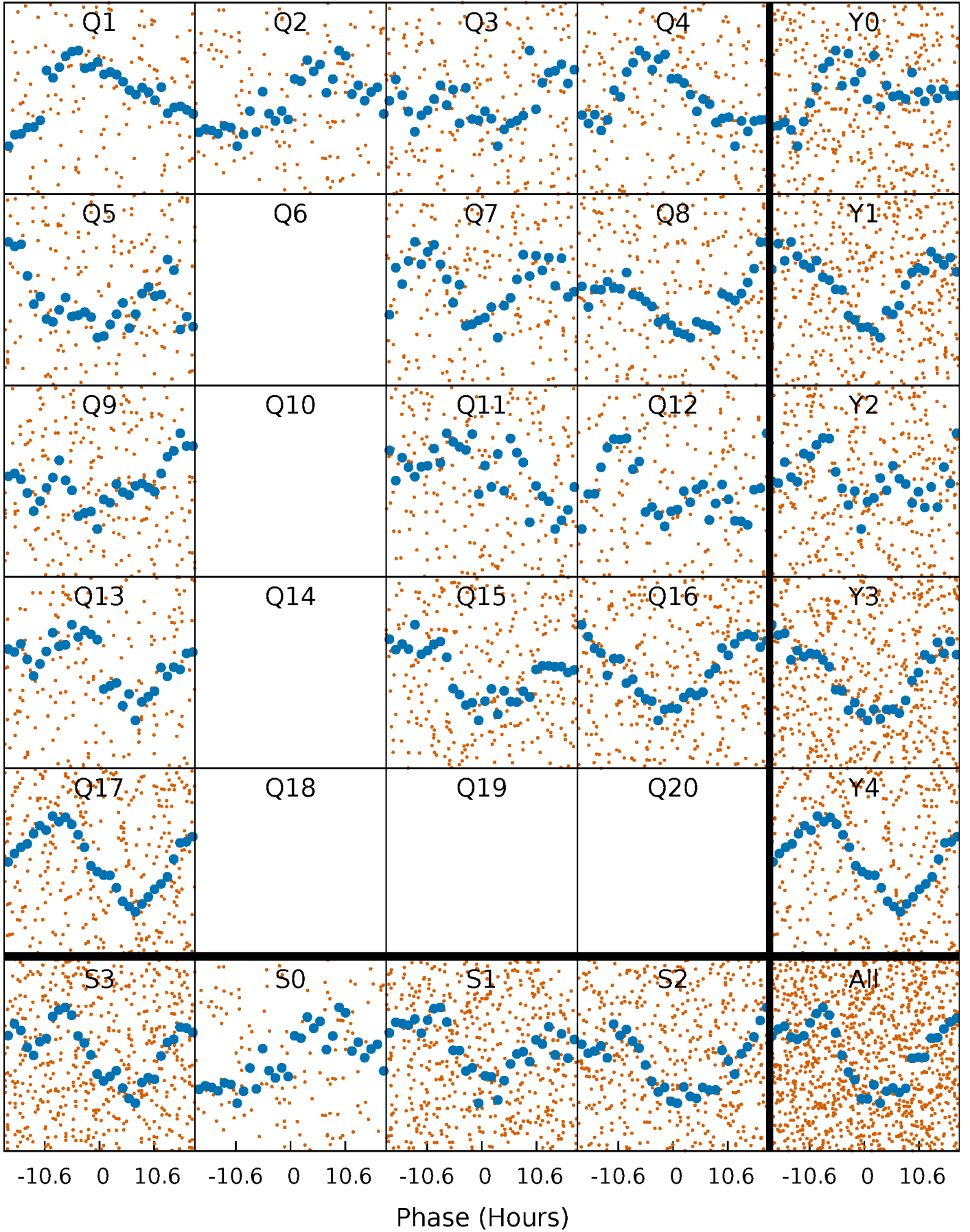
## Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)





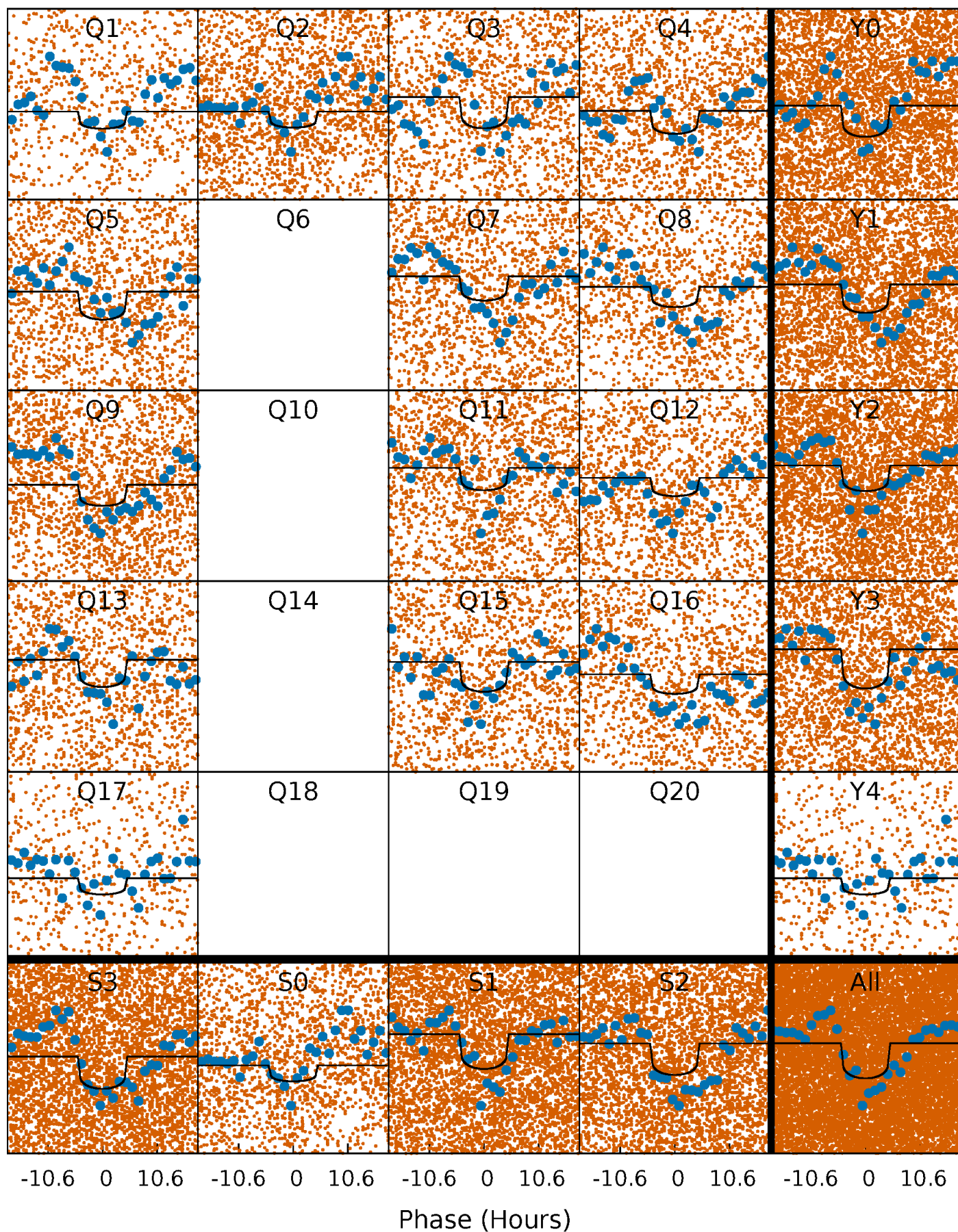
# PDC Quarter-Phased Transit Curves

TCE 004577324-01   P= 2.676955 Days    $T_0=133.989377$  (BKJD)



# DV Quarter-Phased Transit Curves

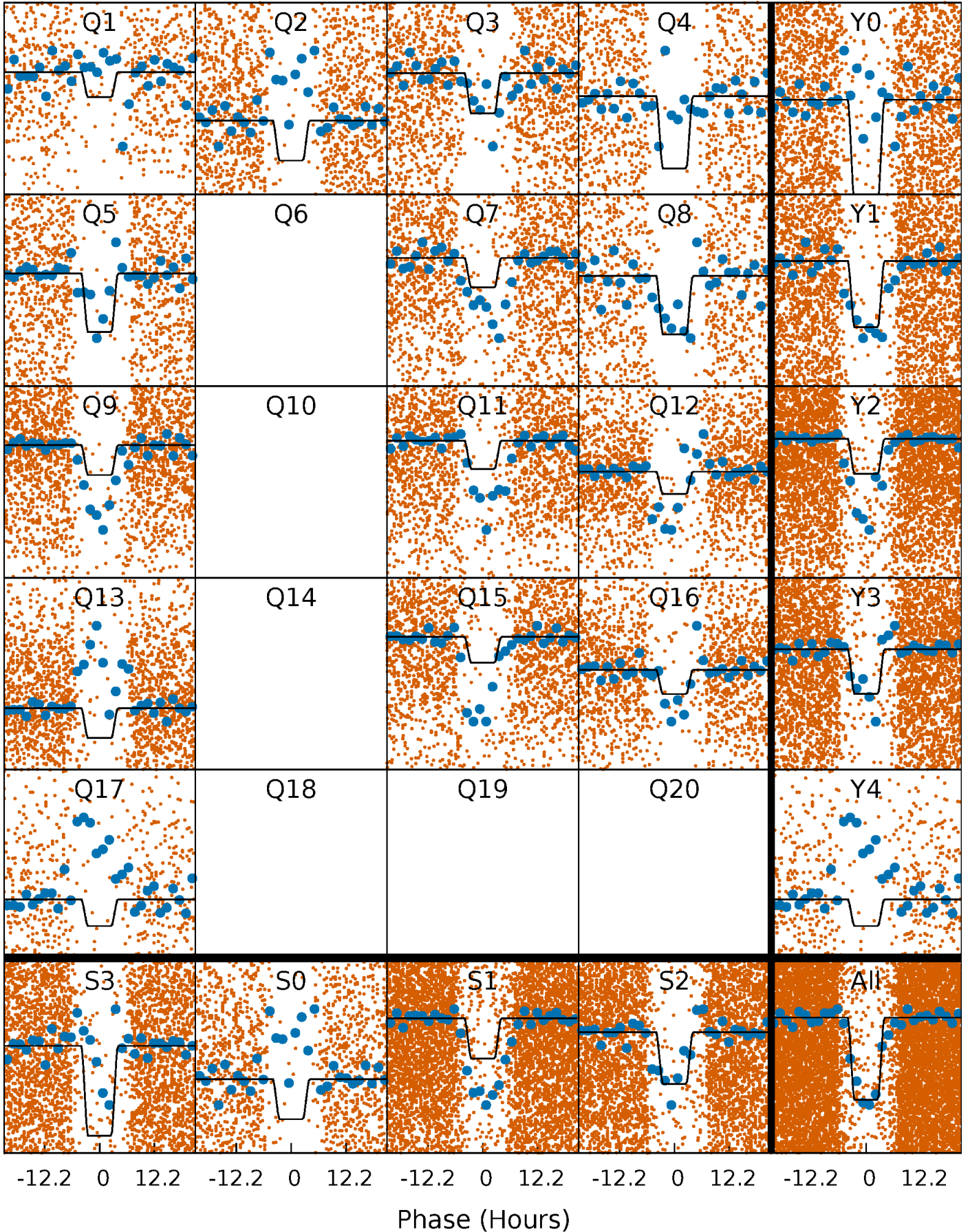
TCE 004577324-01 P= 2.676955 Days  $T_0=133.989377$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 004577324-01 P= 2.676807 Days  $T_0=134.007177$  (BKJD)

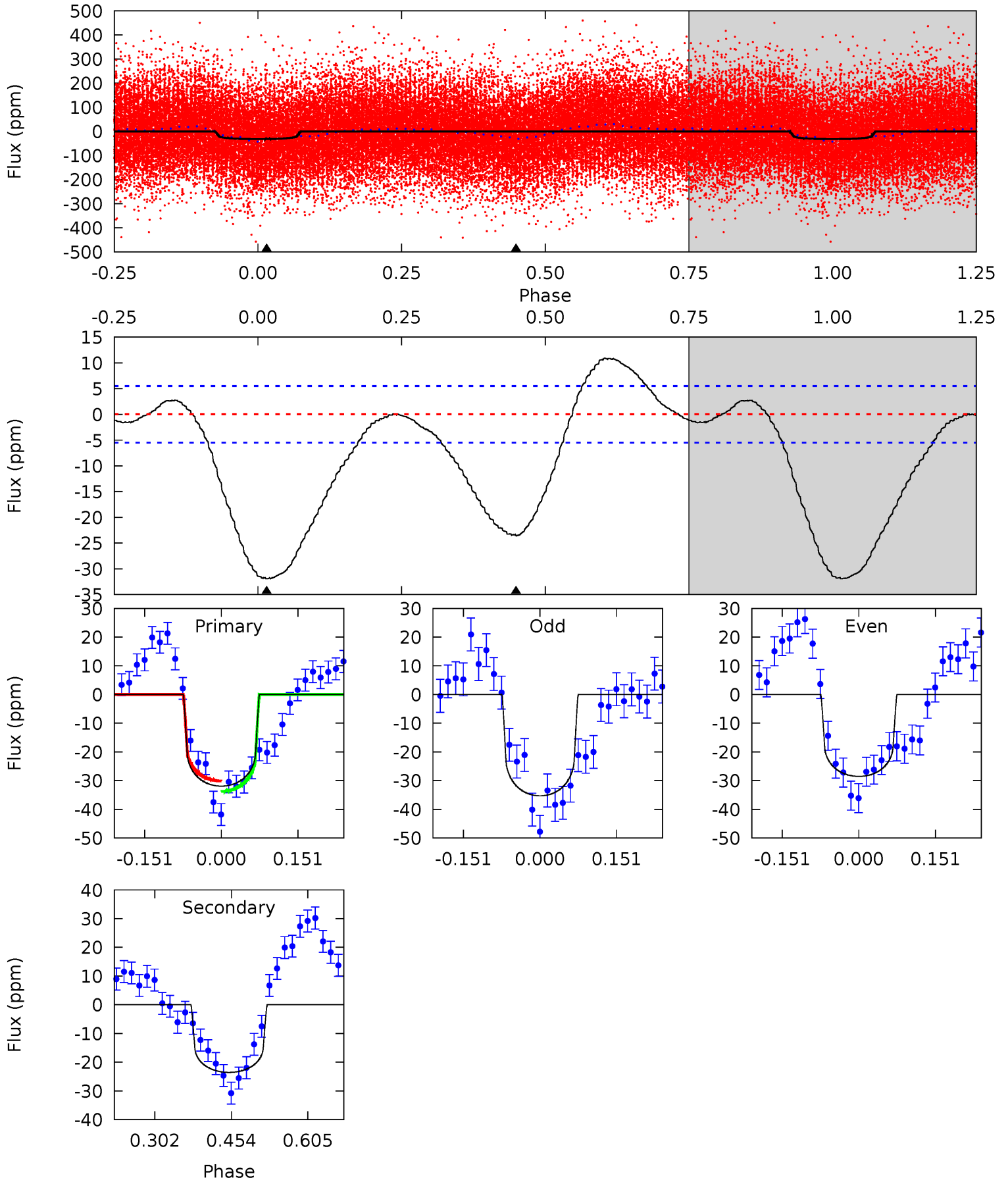




# DV Model-Shift Uniqueness Test

004577324-01, P = 2.676955 Days, E = 131.312422 Days

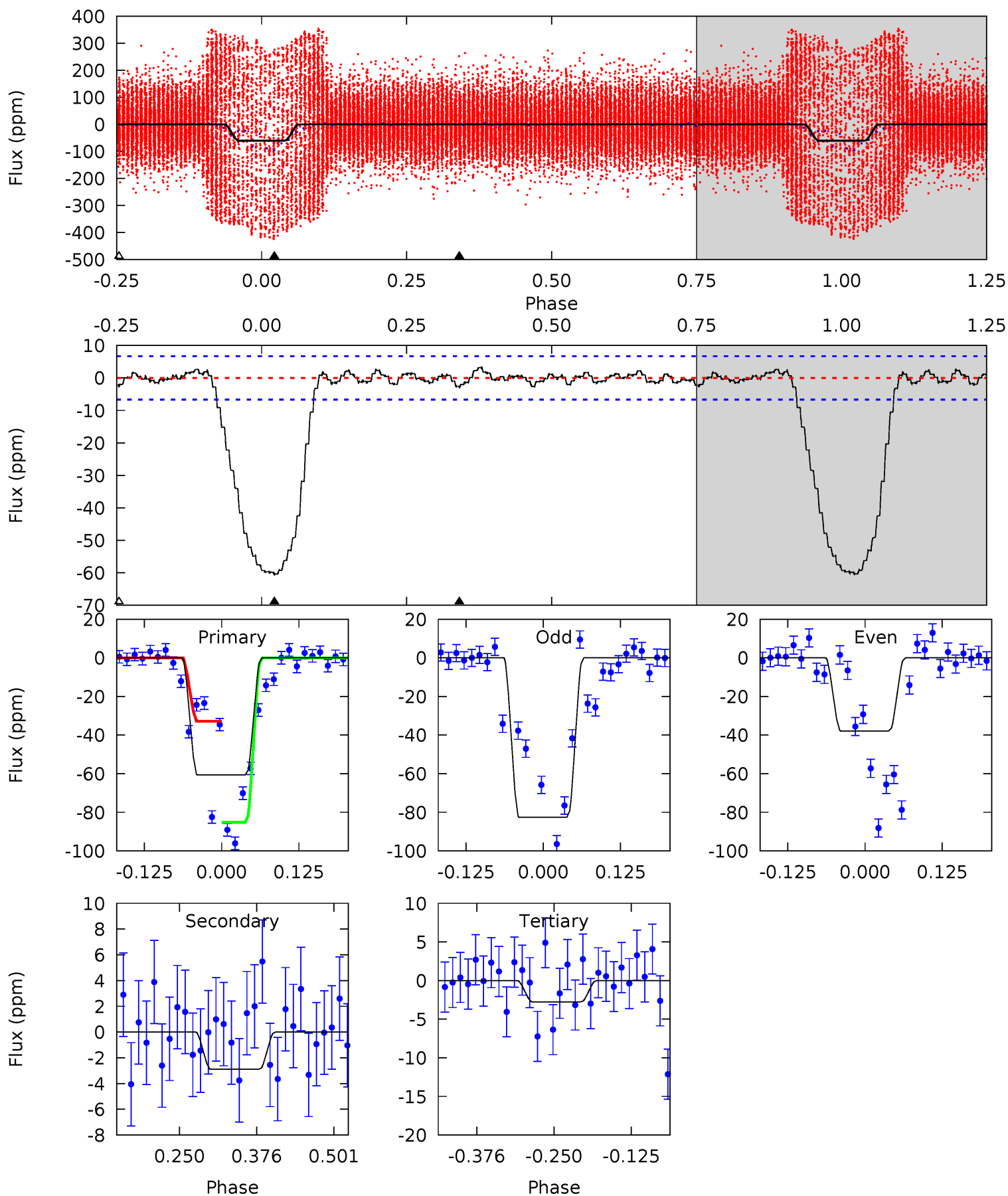
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
25.9	19.1	0	0	4.48	1.44	3.46	25.9	25.9	19.1	19.1	2.76	0.87	0.25	1.48



# Alt Model-Shift Uniqueness Test

004577324-01, P = 2.676807 Days, E = 131.330370 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
41.0	1.96	1.86	0	4.52	1.53	0.80	39.1	41.0	0.10	1.96	14.7	0.36	0.05	0



### Stellar Parameters For KIC 004577324

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6490^{+146}_{-178}$	$4.101^{+0.221}_{-0.119}$	$-0.360^{+0.300}_{-0.300}$	$1.551^{+0.329}_{-0.402}$	$1.107^{+0.177}_{-0.145}$	$0.418^{+0.512}_{-0.145}$
	+2%/-3%	+5%/-3%	+83%/-83%	+21%/-26%	+16%/-13%	+122%/-35%
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 004577324-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-24 \pm 1$	$0.80^{+0.22}_{-0.18}$	$2493^{+144}_{-185}$	$6448^{+772}_{-633}$	$31^{+20}_{-12}$
Alt.	$-3 \pm 1$	$0.85^{+0.21}_{-0.18}$	$2497^{+152}_{-188}$	$3952^{+491}_{-561}$	$3.306^{+2.908}_{-1.841}$

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



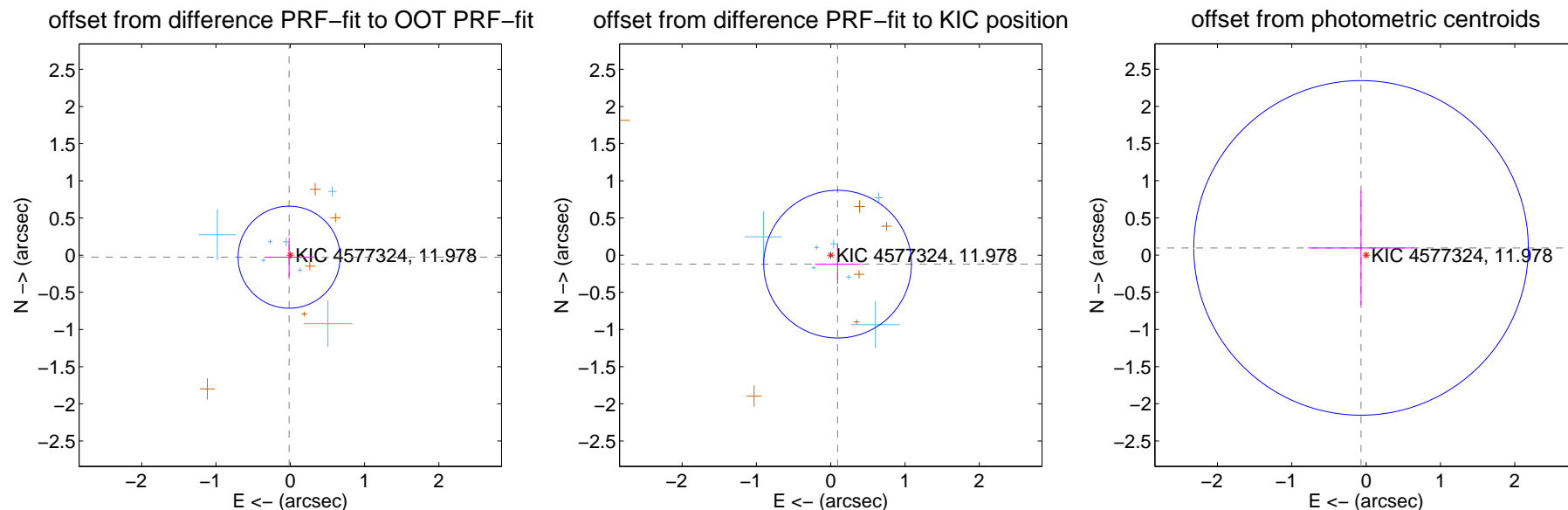
## DV Centroid Data

Supplemental centroid analysis for 004577324-01. **Kepler magnitude: 11.98.** Transit SNR 8.17

There are 7 quarters with good PRF difference image offsets

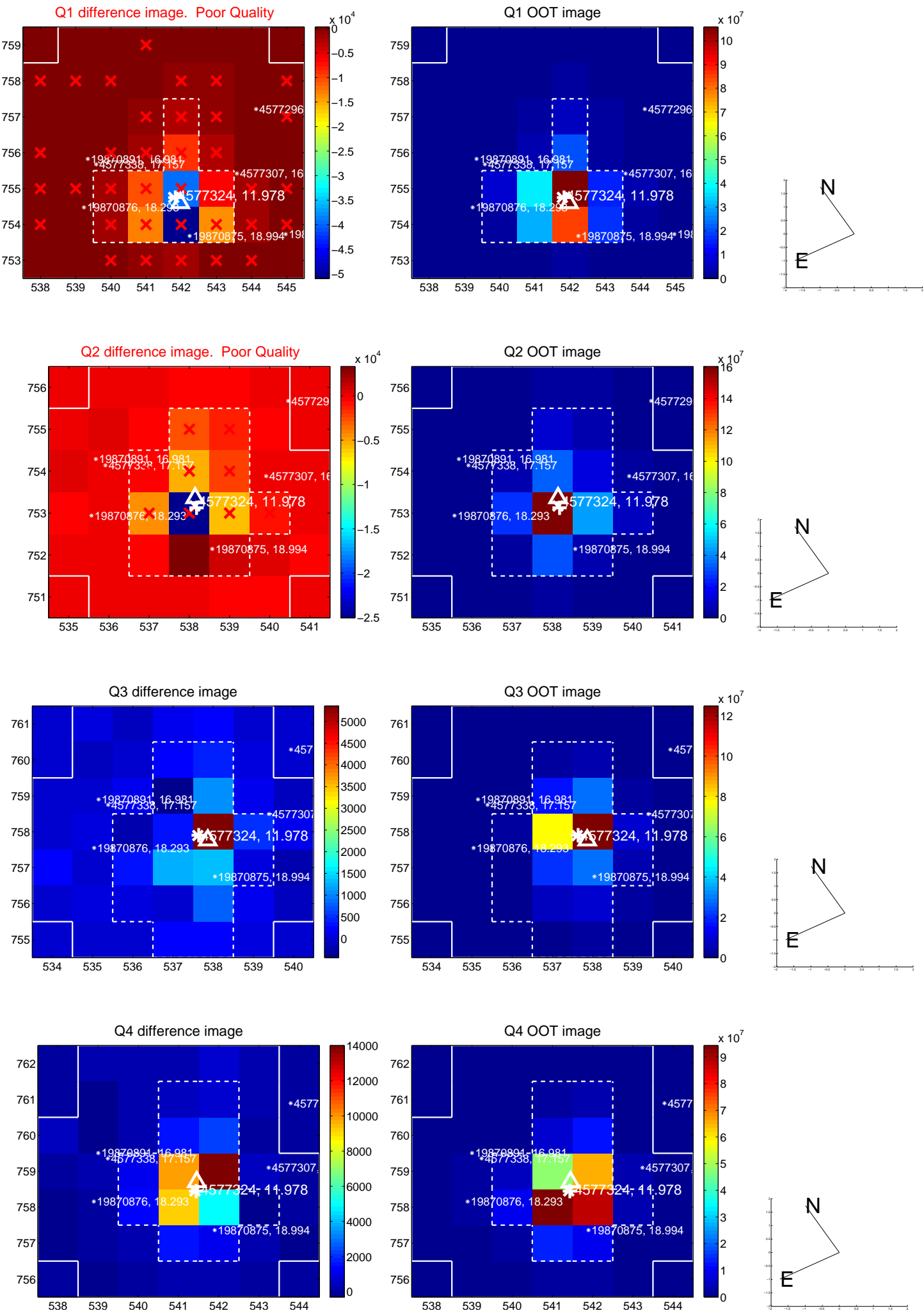
The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.032 \pm 0.229$	0.14	$0.016 \pm 0.309$	$-0.028 \pm 0.263$
PRF-fit source offset from KIC position	$0.152 \pm 0.331$	0.46	$-0.092 \pm 0.306$	$-0.121 \pm 0.268$
photometric centroid source offset	$0.12 \pm 0.75$	0.16	$0.07 \pm 0.71$	$0.10 \pm 0.77$

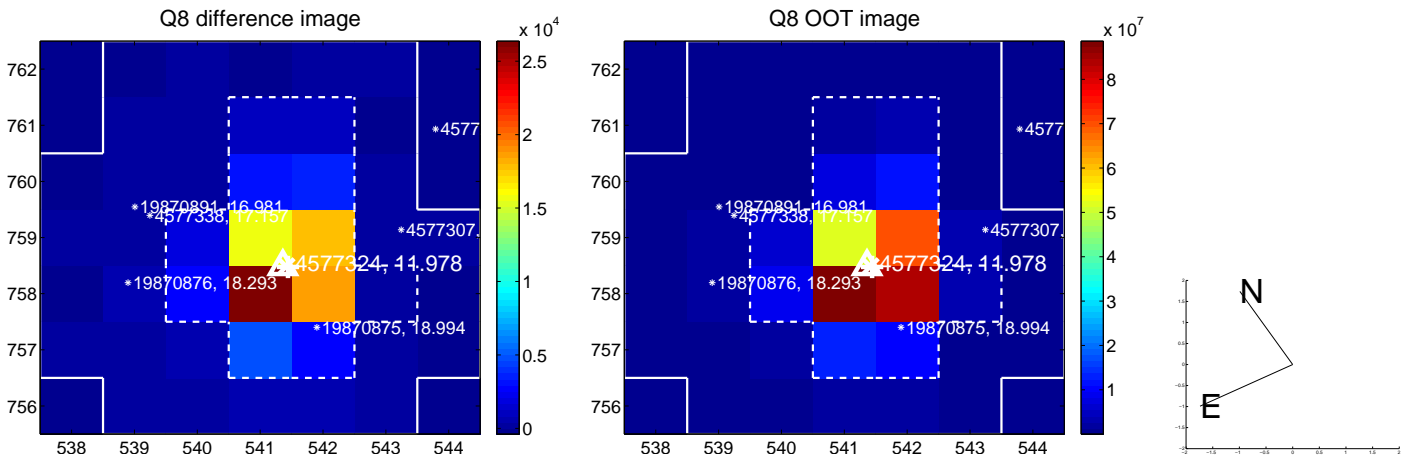
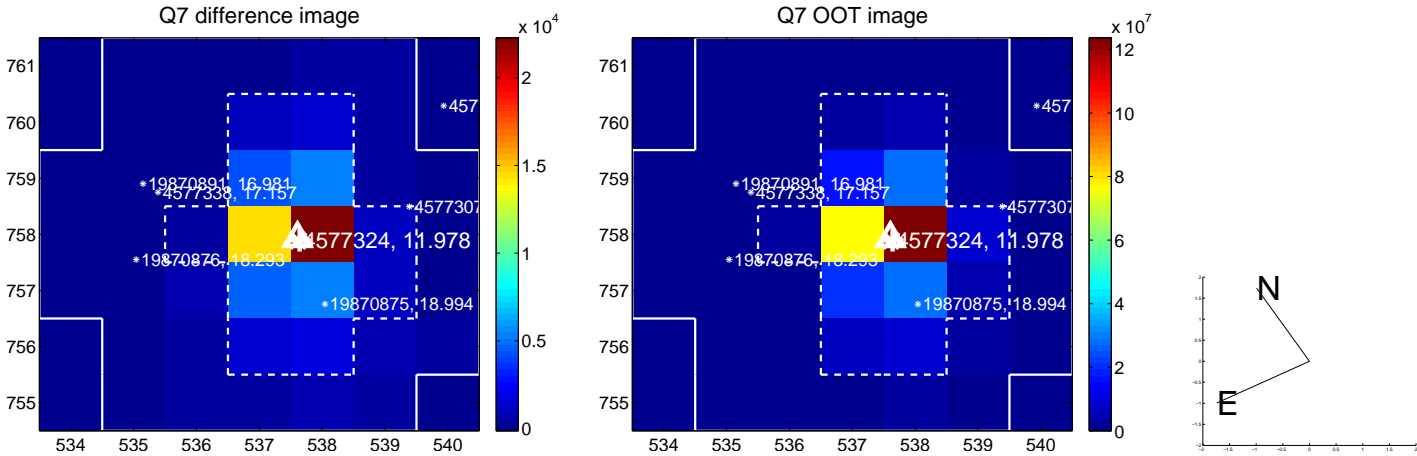
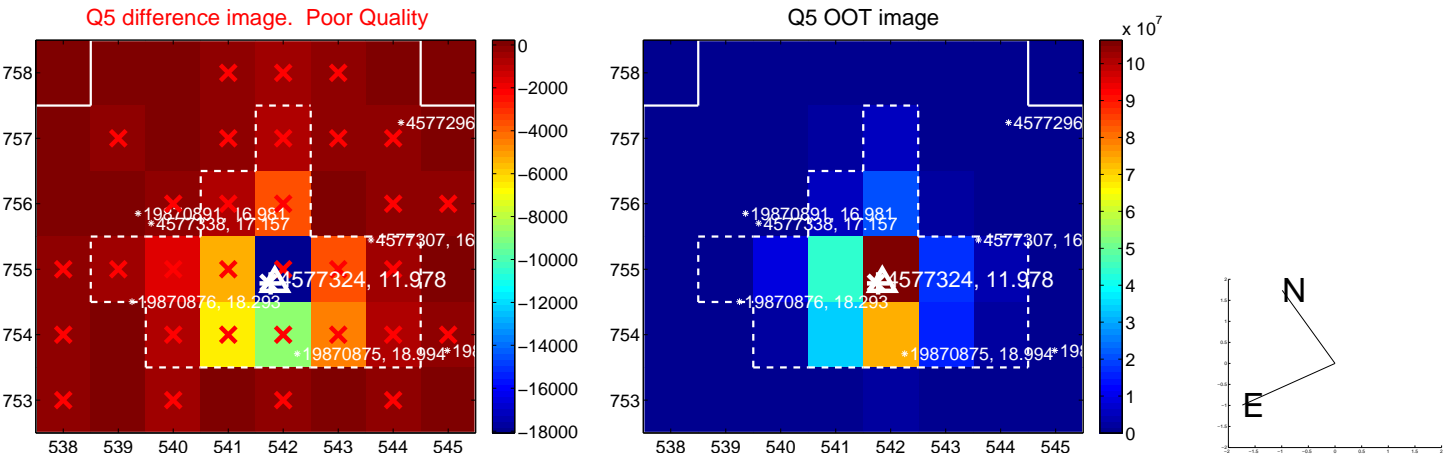


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

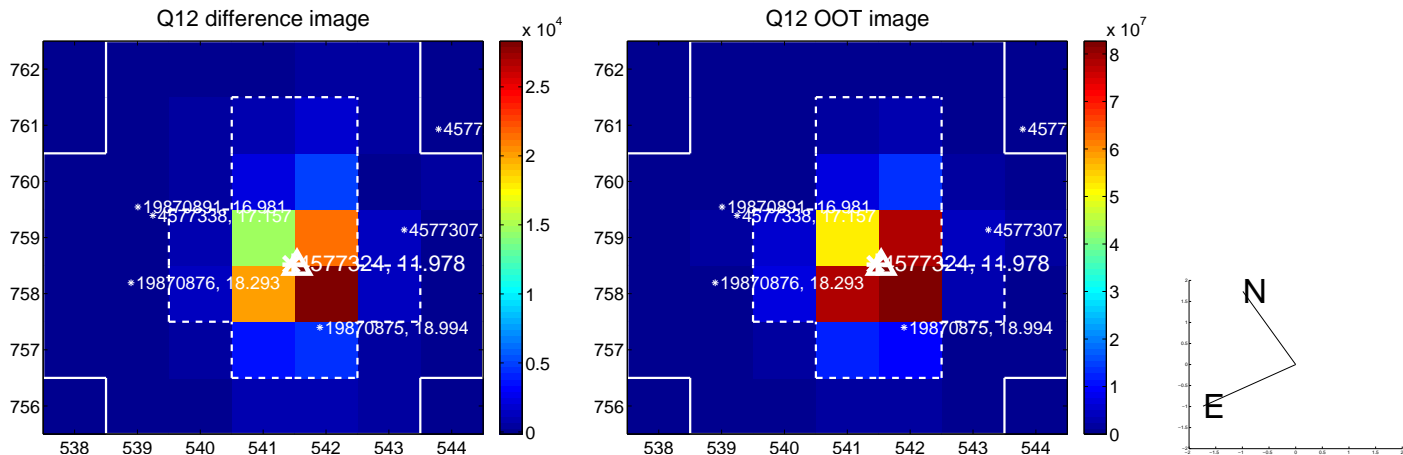
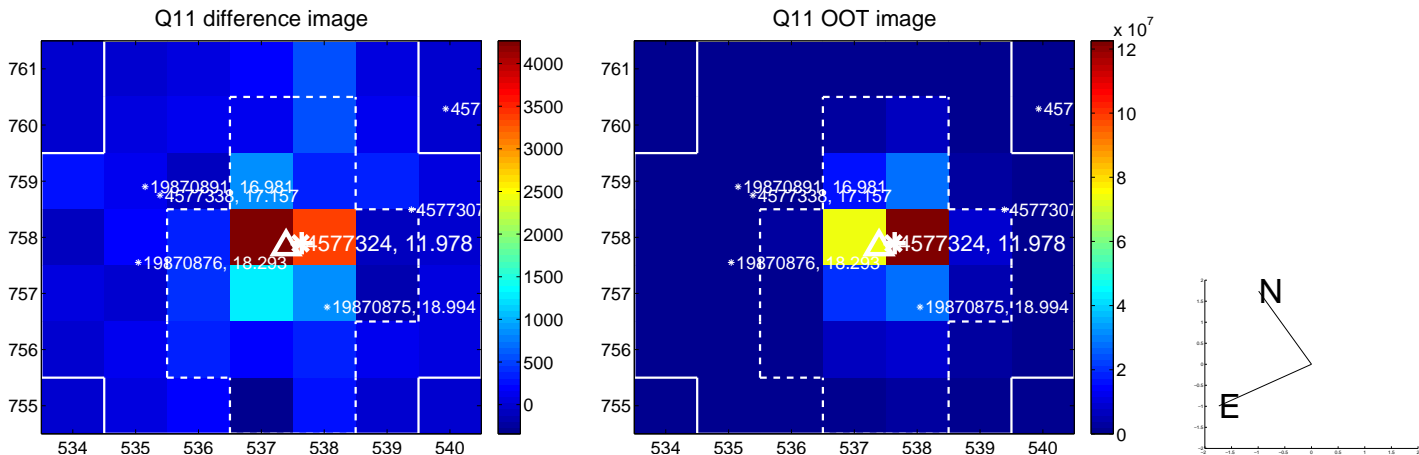
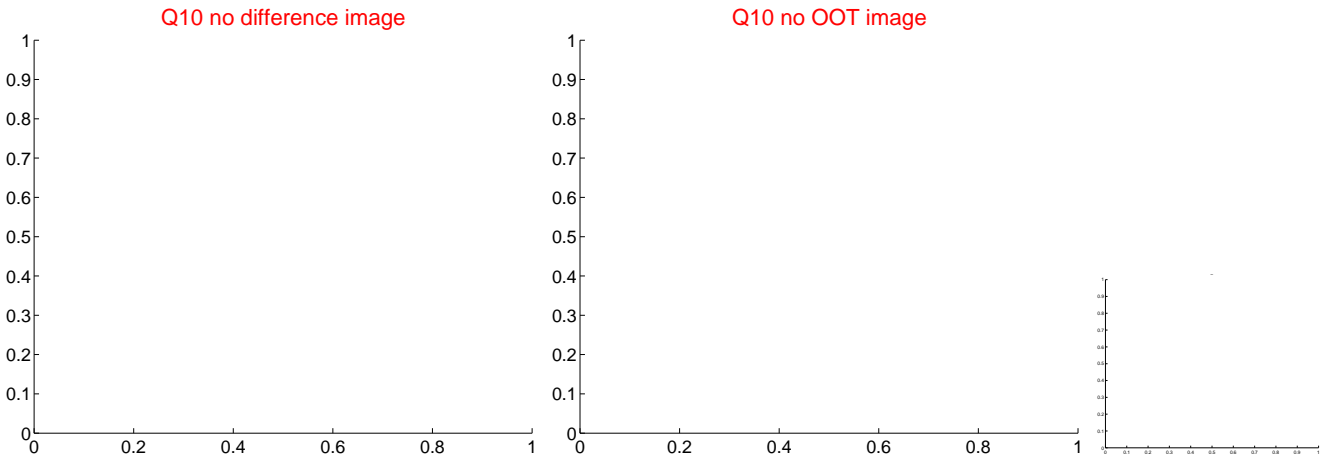
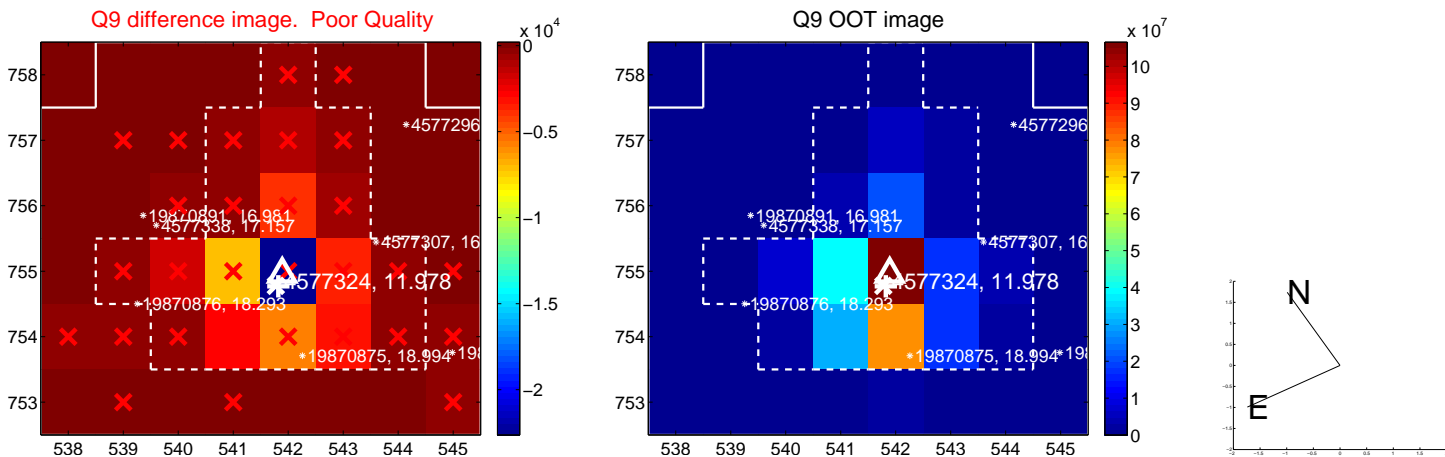


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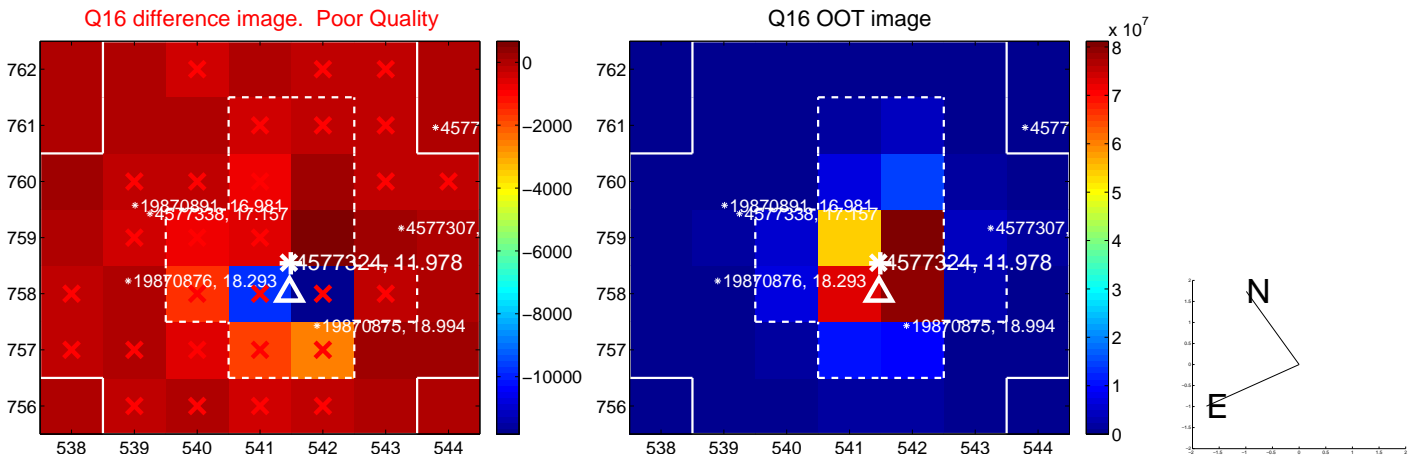
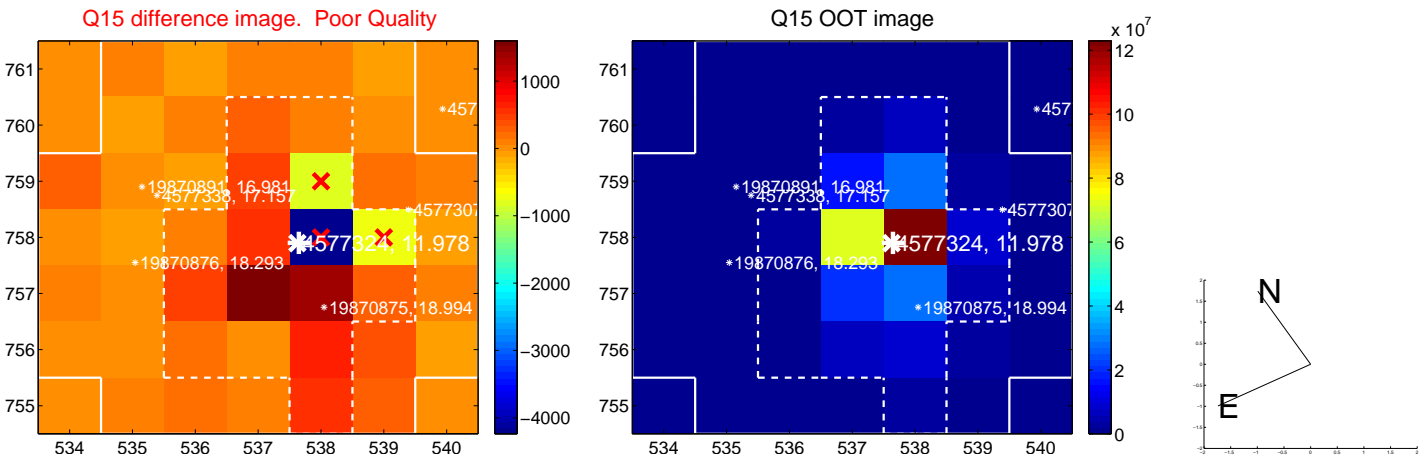
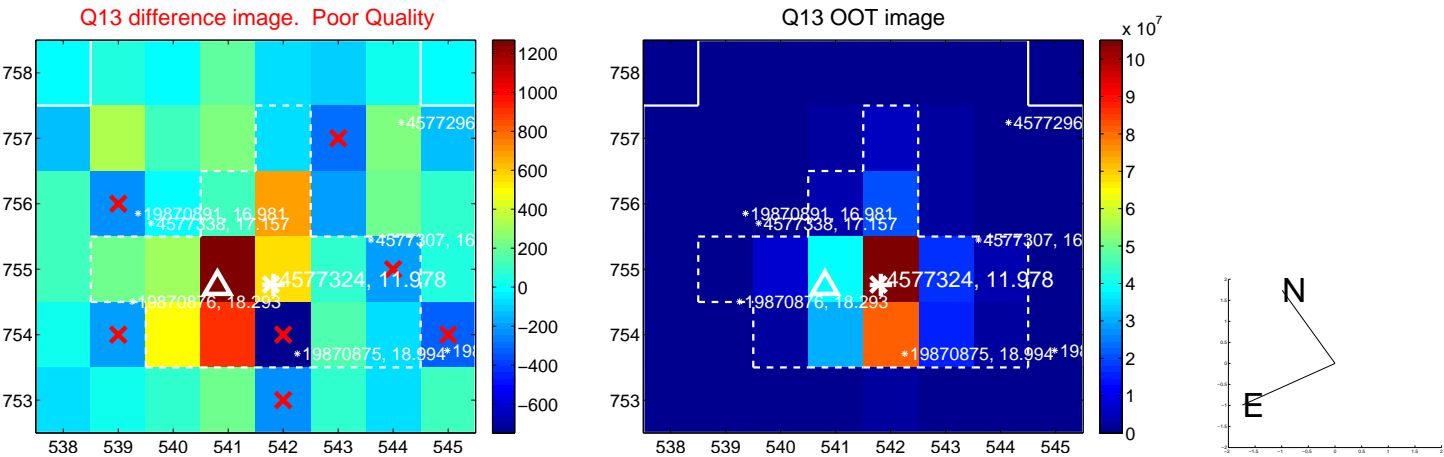




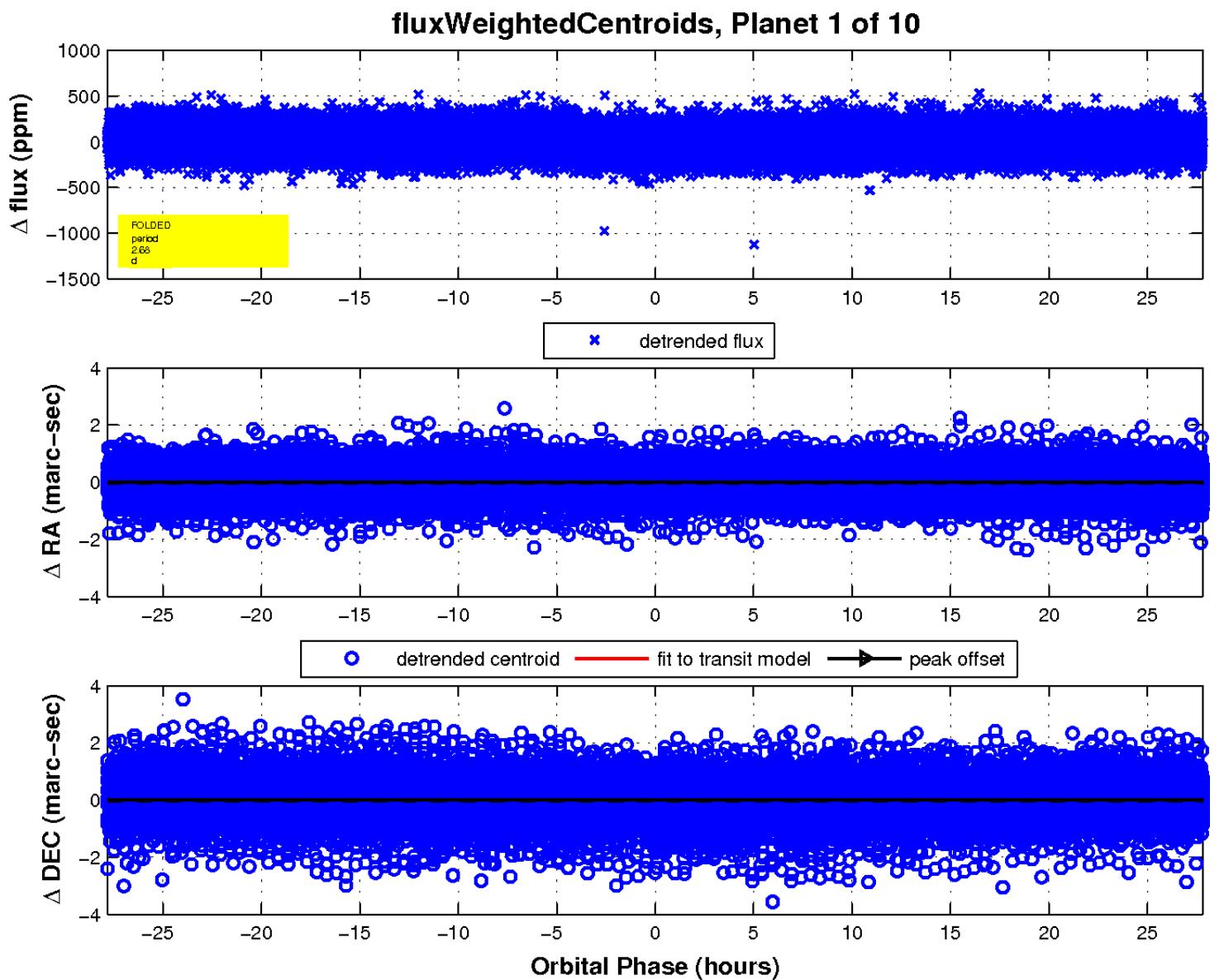
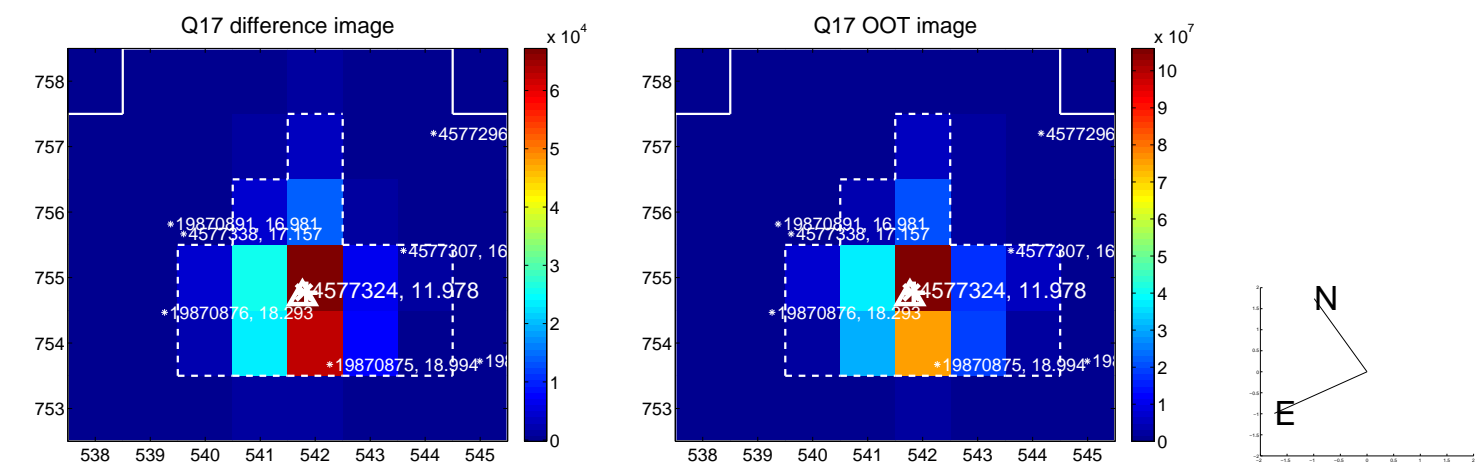
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Declination

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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.

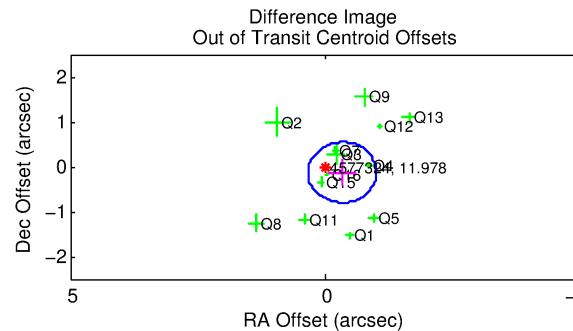
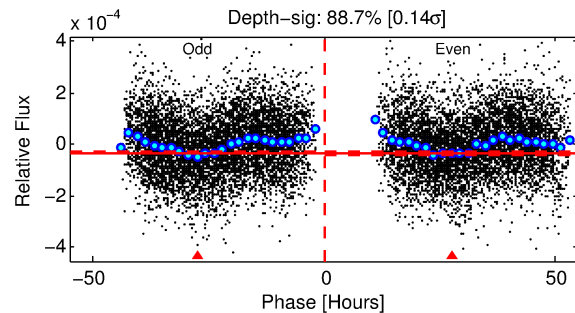
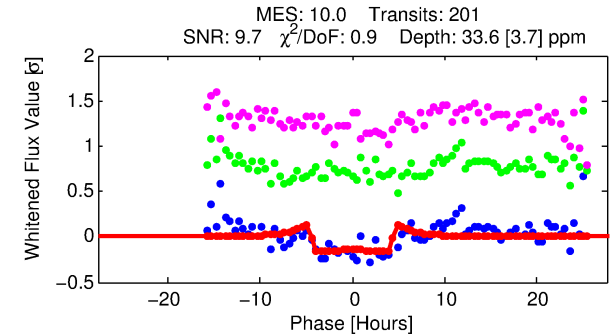
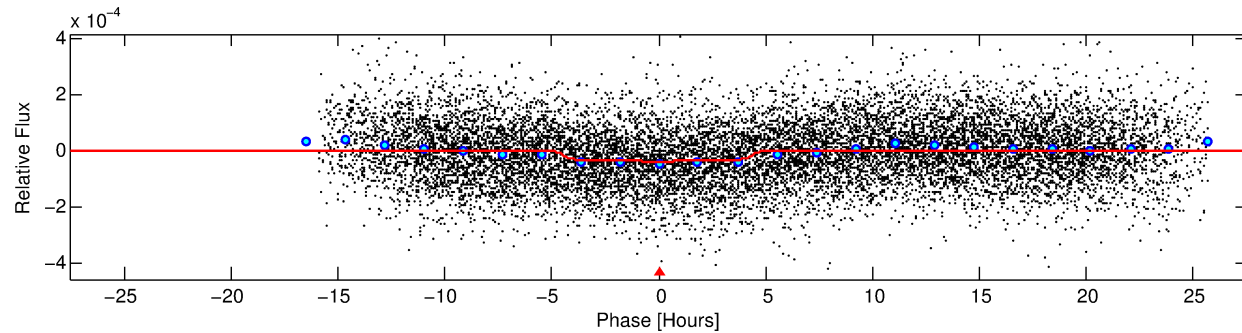
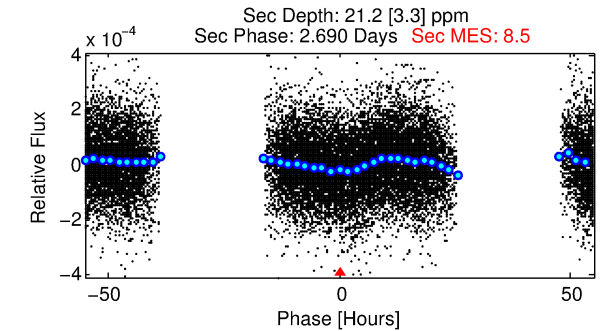
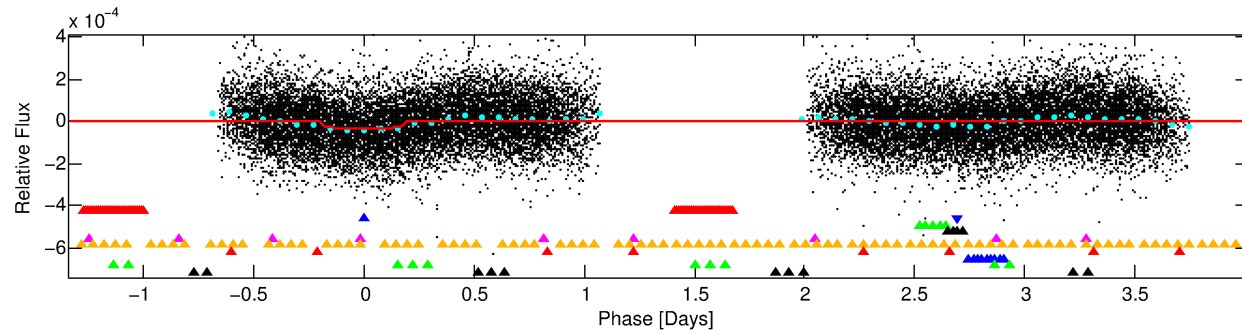
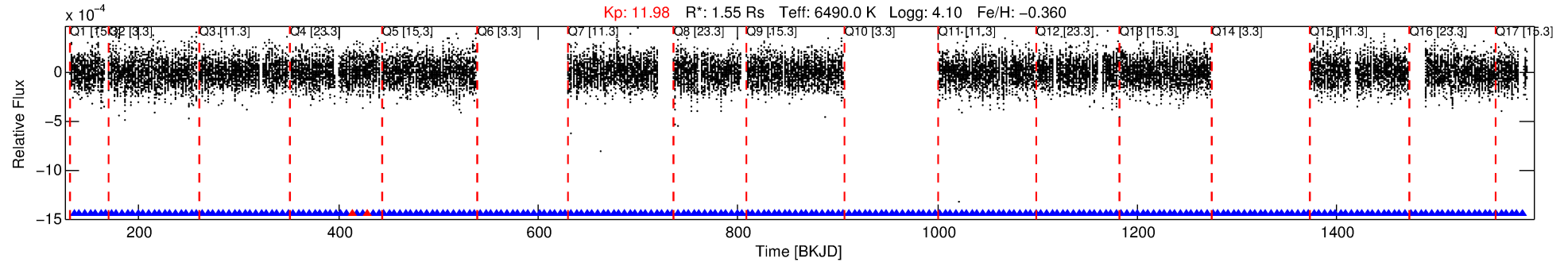
Ephemeris Match Information For 004577324-02

No Significant Match Found



# DV One-Page Summary

KIC: 4577324 Candidate: 2 of 10 Period: 5.353 d



## DV Fit Results:

Period = 5.35293 [0.00005] d  
Epoch = 135.2601 [0.0061] BKJD  
 $R_p/R^* = 0.0062$  [0.0009]  
 $a/R^* = 2.21$  [1.43]  
 $b = 0.90$  [0.17]  
 $S_{\text{eff}} = 995.77$  [394.53]  
 $T_{\text{eq}} = 1432$  [142] K  
 $R_p = 1.05$  [0.32]  $R_e$   
 $a = 0.0620$  [0.0150] AU  
 $A_g = 40.68$  [20.80] [1.91σ]  
 **$T_{\text{eff}} = 5593$  [501] K [7.99σ]**

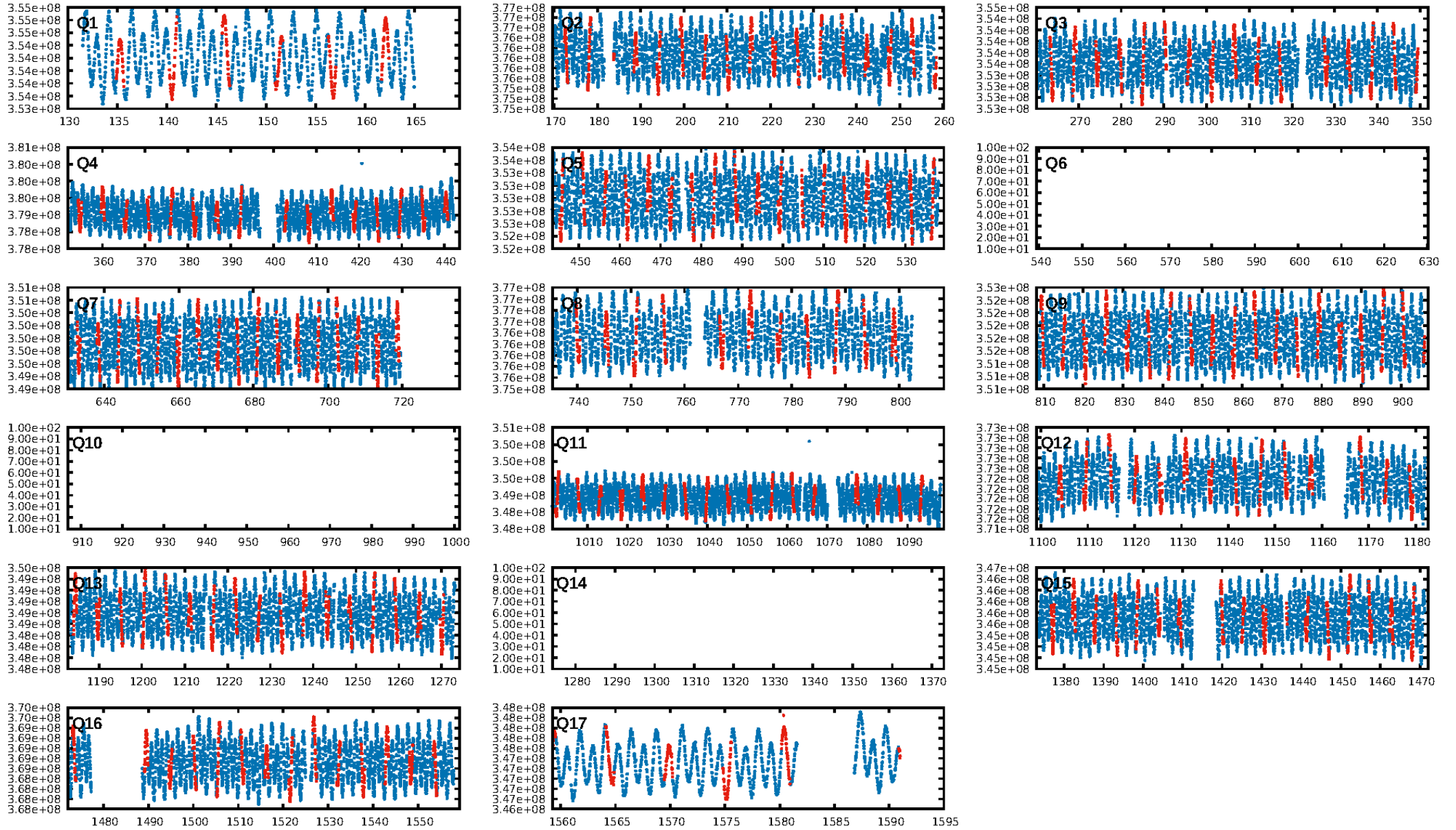
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [4.92σ]  
LongPeriod-sig: 100.0% [14.26σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.99 [188/190]  
GhostDiagnostic-chr: 1.193  
**Centroid-sig: 0.1%**  
**Centroid-so: 2.200 arcsec [3.00σ]**  
OotOffset-rm: 0.369 arcsec [1.64σ]  
KicOffset-rm: 0.500 arcsec [2.41σ]  
OotOffset-st: 1/4/4/4 [13]  
KicOffset-st: 1/4/4/4 [13]  
DiffImageQuality-fgm: 0.38 [5/13]  
DiffImageOverlap-fno: 1.00 [14/14]

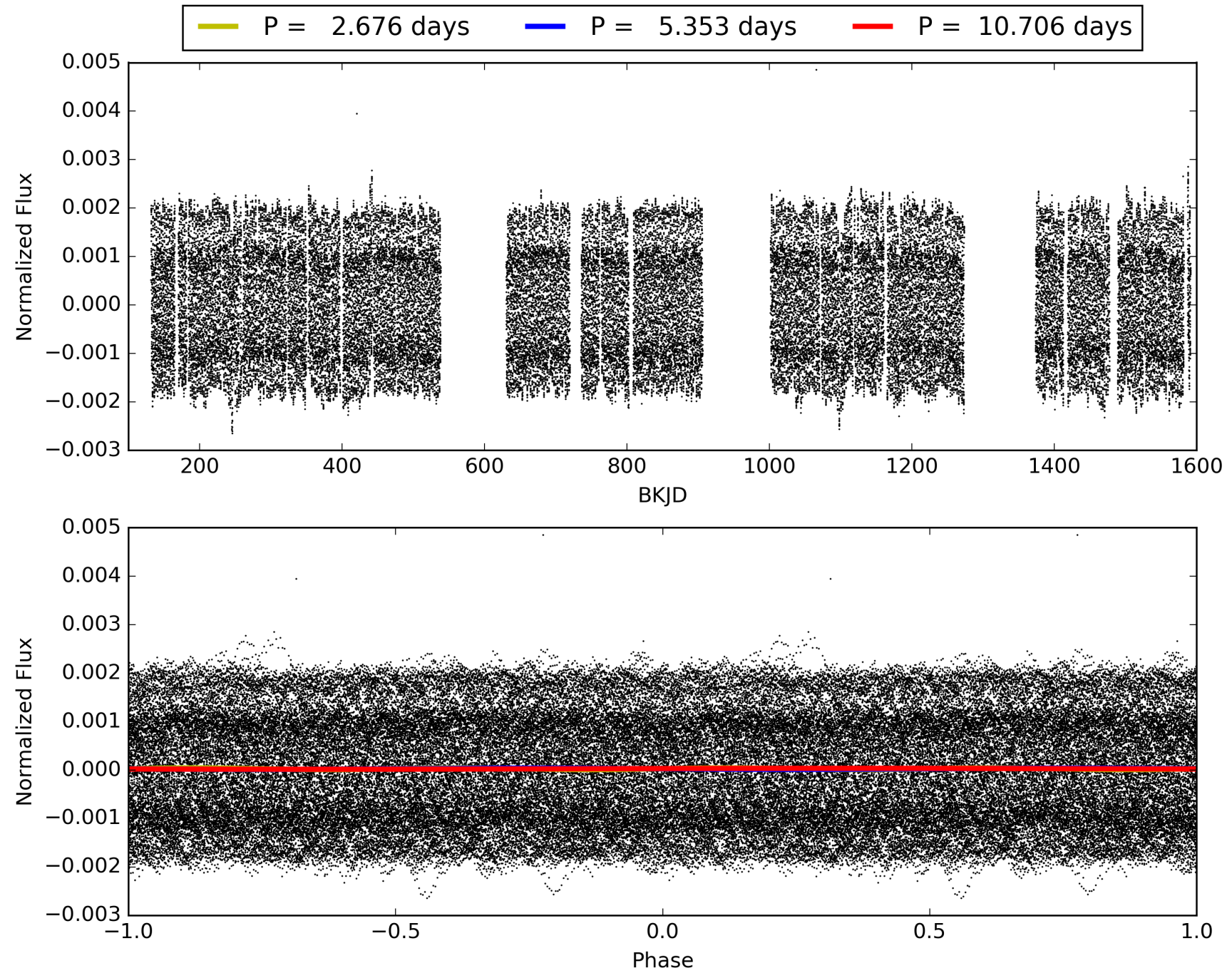
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 00:55:24 Z

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

# TCE 004577324-02, PDC Light Curves

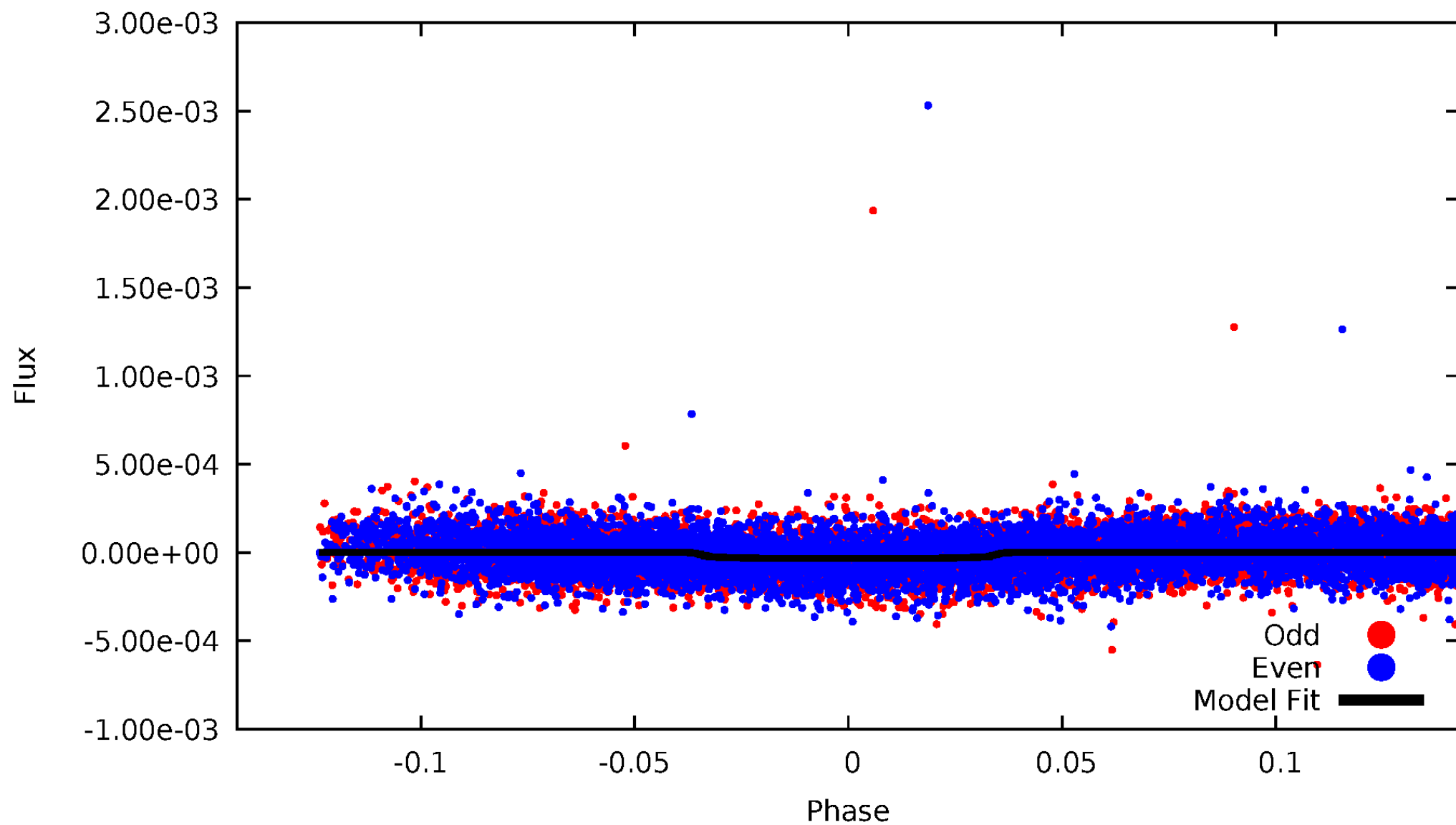


TCE 004577324-02



# DV Odd/Even

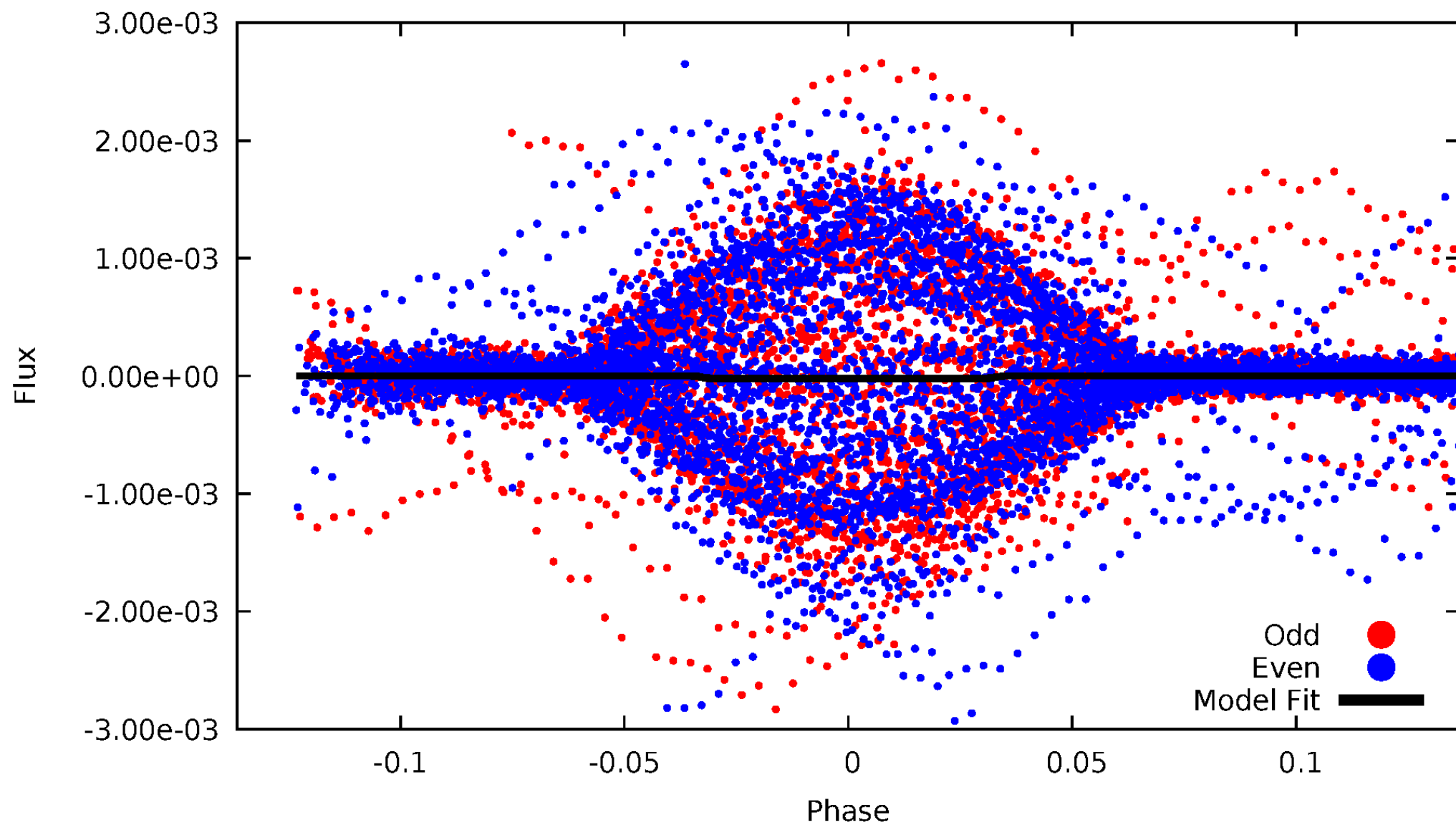
TCE 004577324-02





# ALT Odd/Even

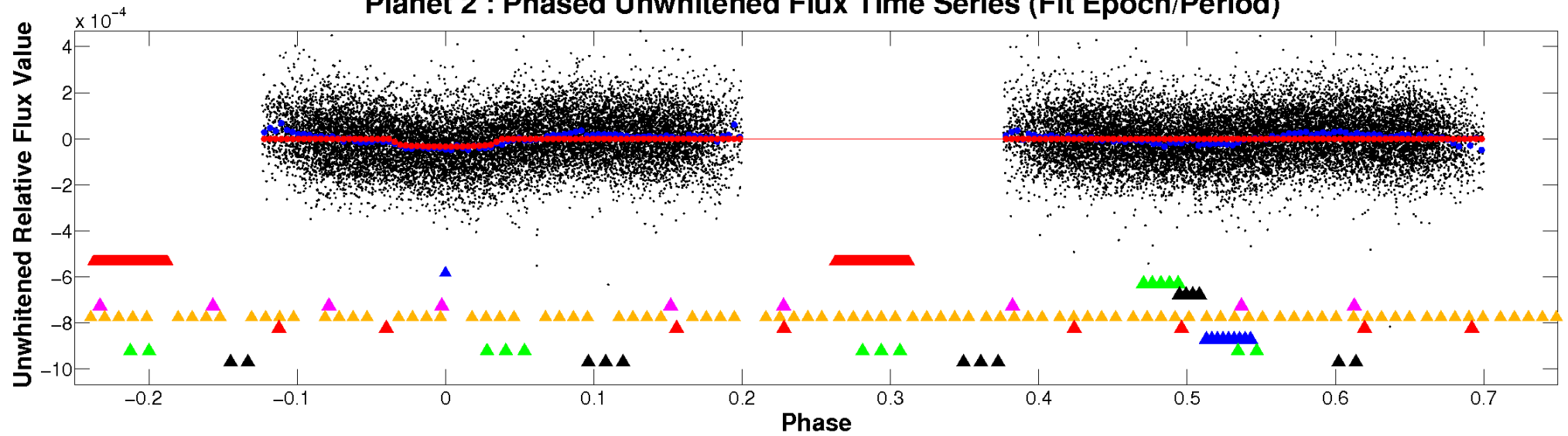
TCE 004577324-02



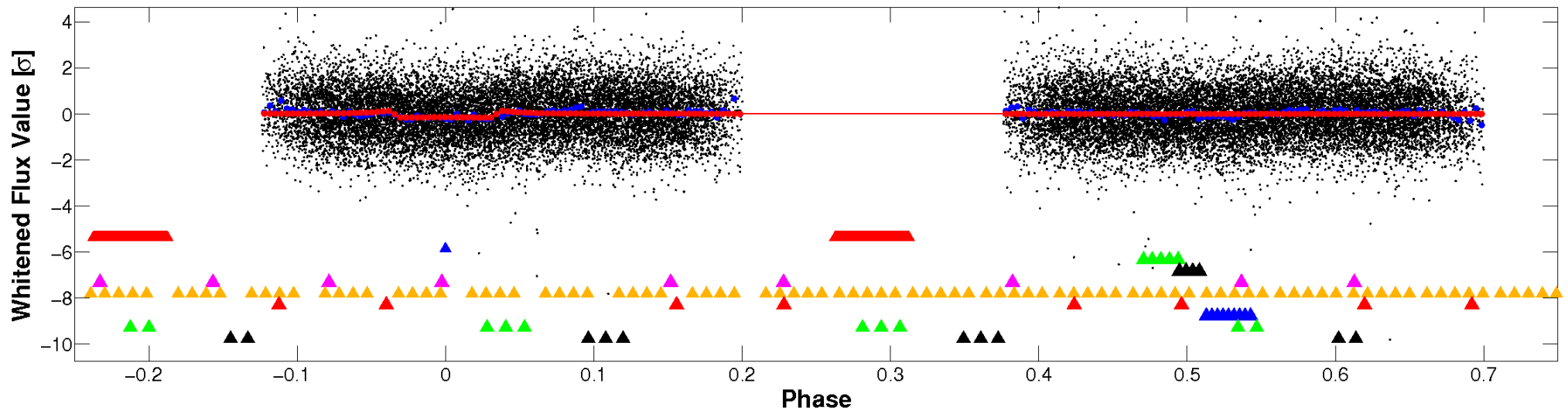


# Non-Whitened Vs. Whitened Light Curve

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

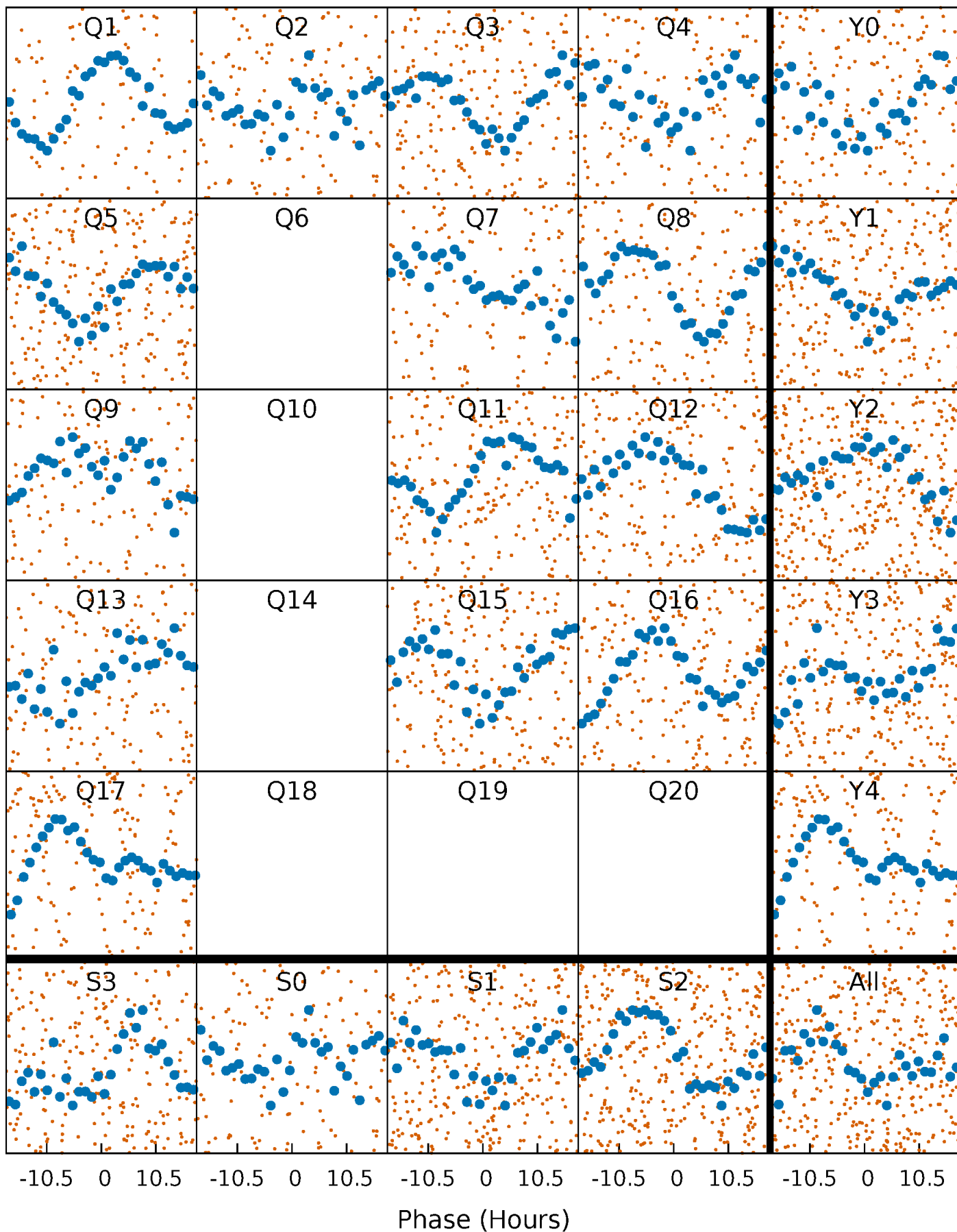


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



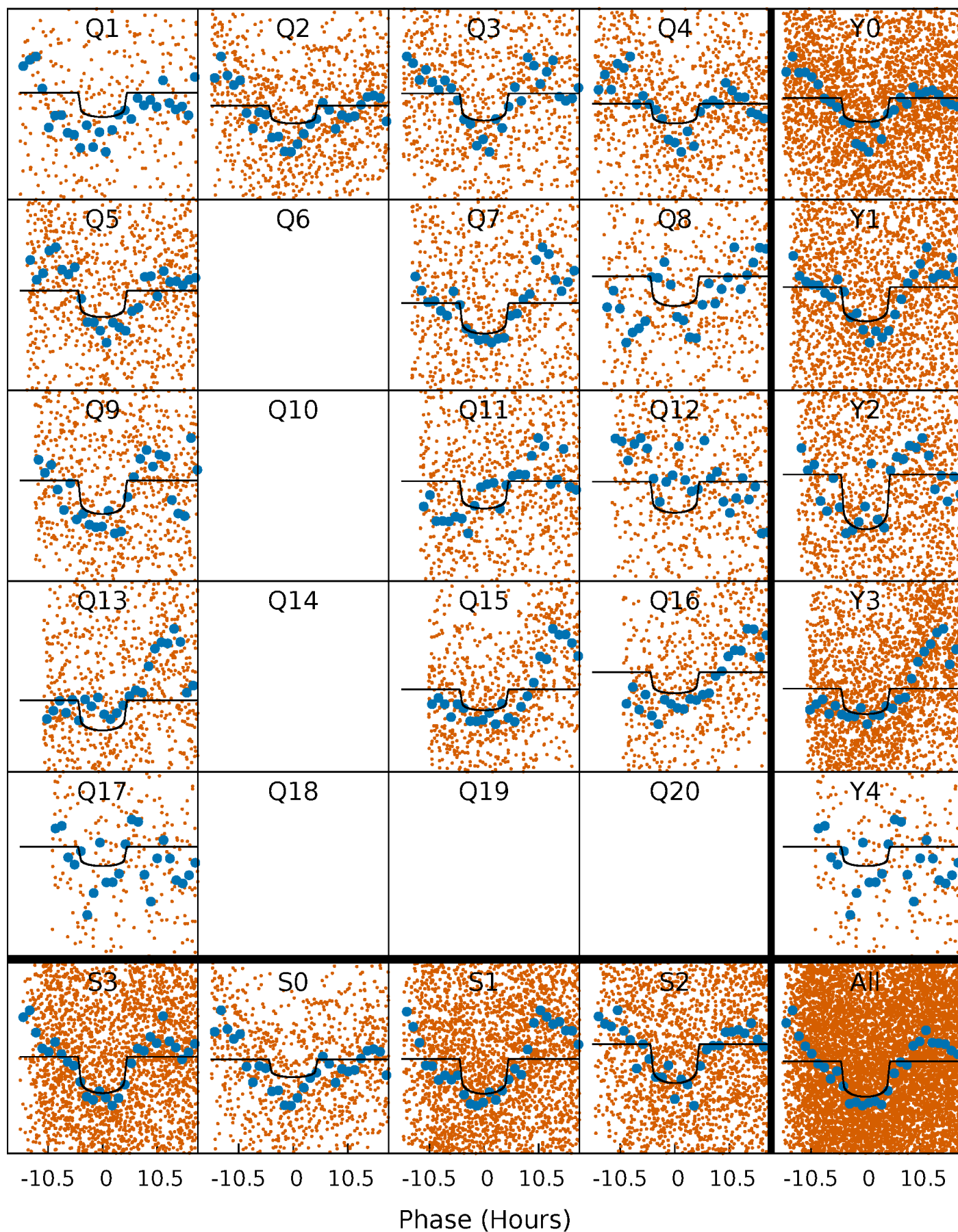
# PDC Quarter-Phased Transit Curves

TCE 004577324-02   P= 5.352929 Days    $T_0=135.260104$  (BKJD)



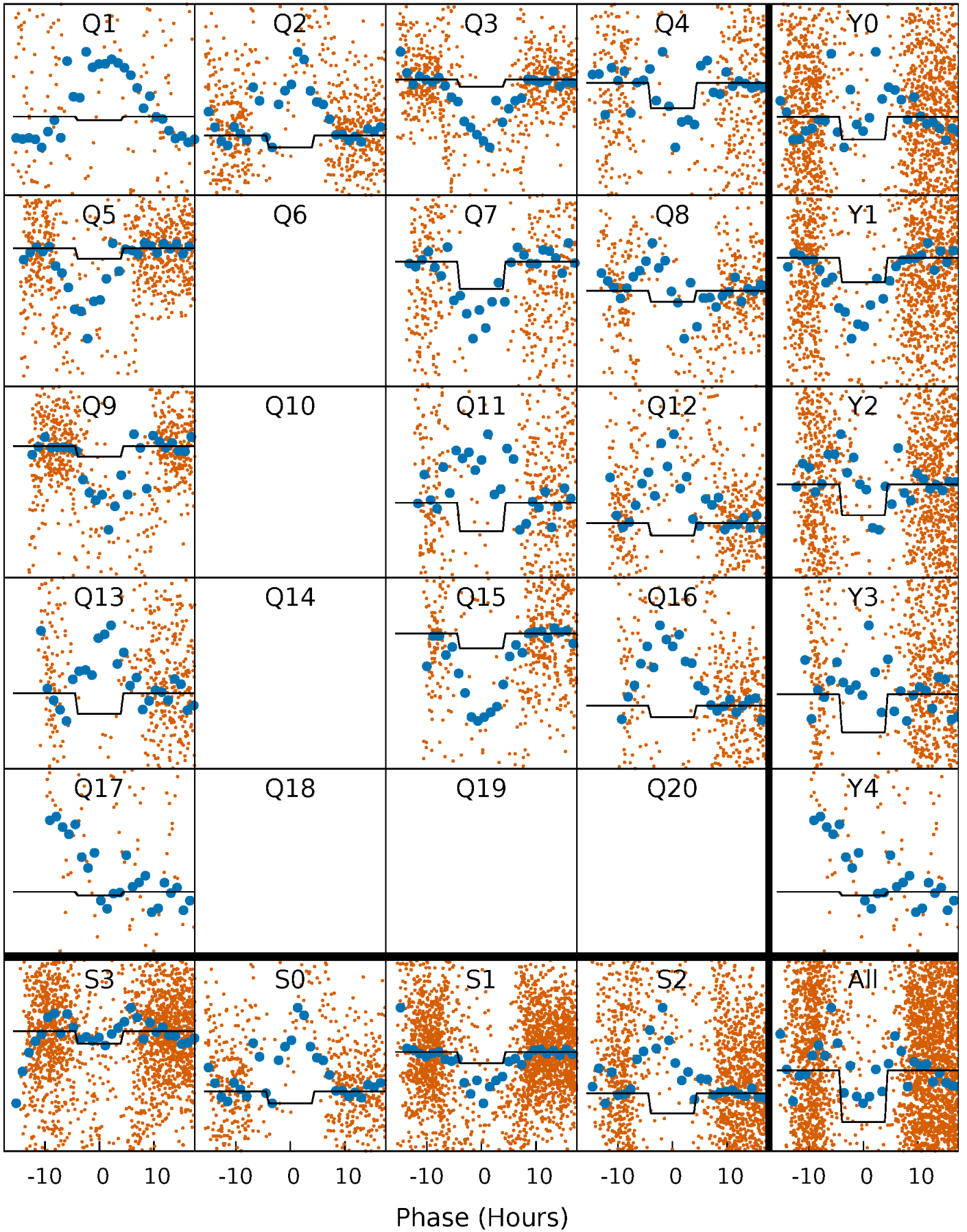
# DV Quarter-Phased Transit Curves

TCE 004577324-02   P= 5.352929 Days    $T_0=135.260104$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 004577324-02 P= 5.352935 Days  $T_0=135.257588$  (BKJD)

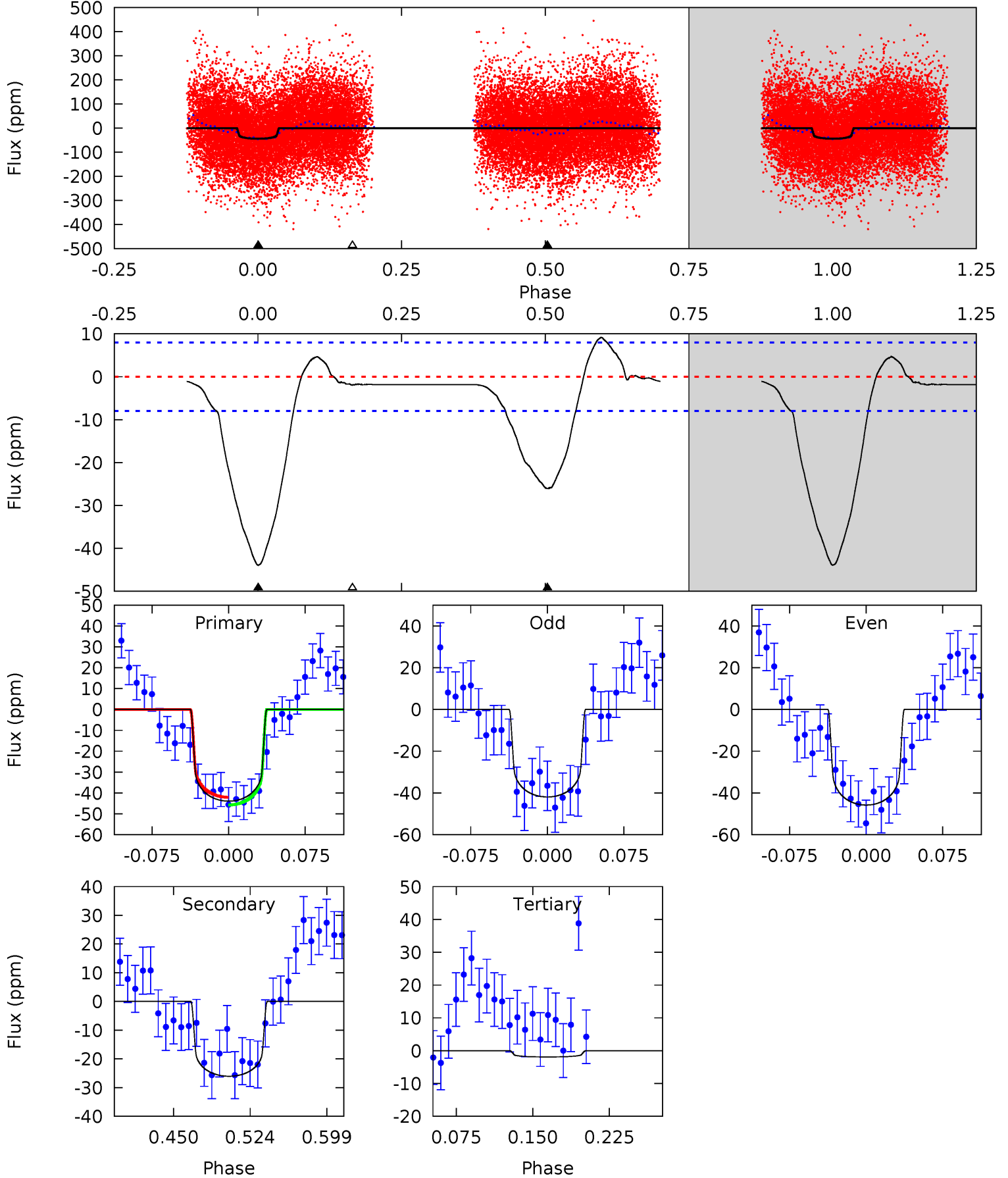




# DV Model-Shift Uniqueness Test

004577324-02, P = 5.352929 Days, E = 129.907175 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
25.4	15.1	1.11	0	4.62	1.78	2.46	24.3	25.4	14.0	15.1	1.13	1.02	0.17	1.07

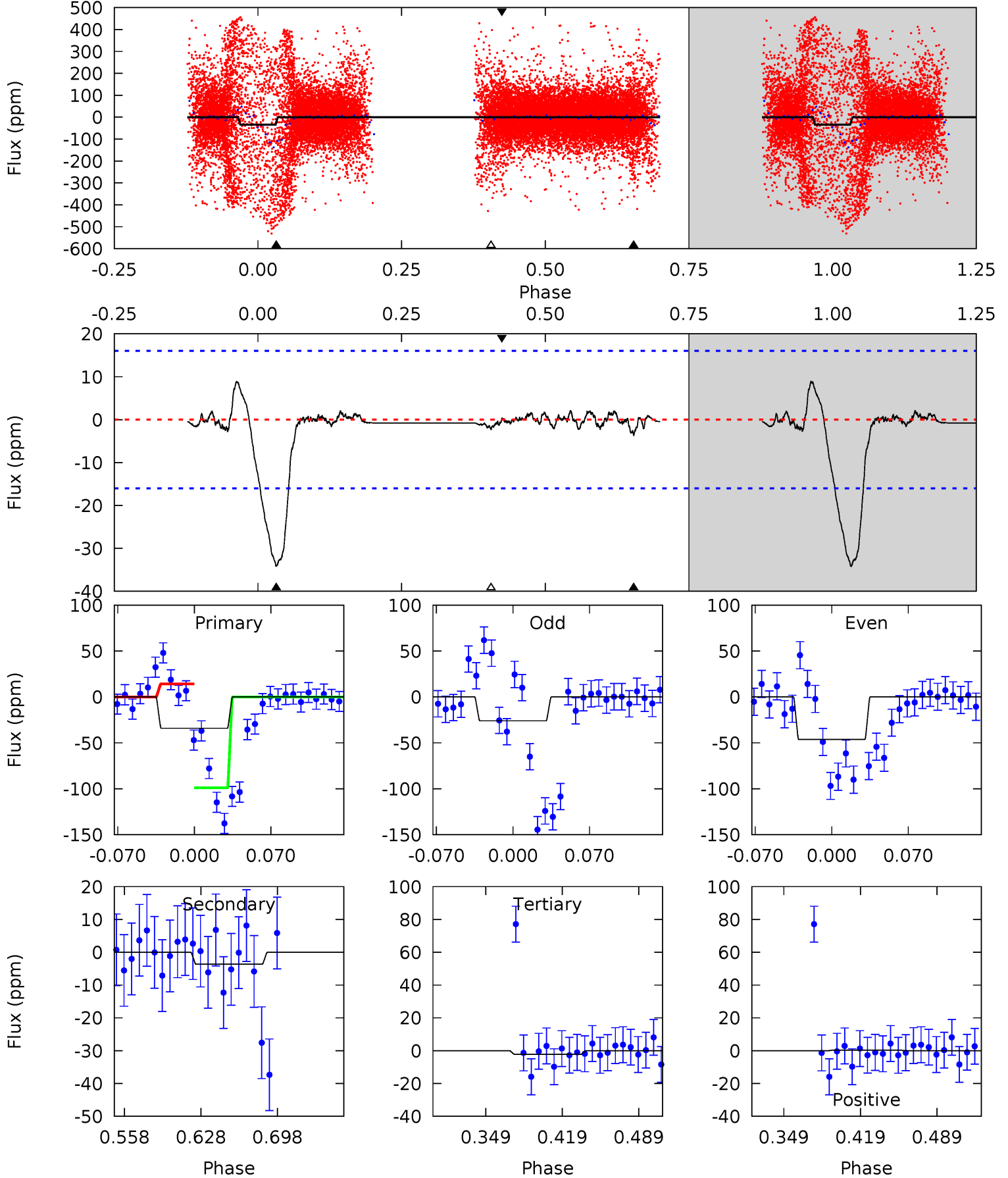




# Alt Model-Shift Uniqueness Test

004577324-02, P = 5.352935 Days, E = 129.904653 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
9.88	1.06	0.64	0.10	4.64	1.81	0.37	9.23	9.77	0.41	0.95	2.95	0.12	0.21	12.5



### Stellar Parameters For KIC 004577324

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6490^{+146}_{-178}$	$4.101^{+0.221}_{-0.119}$	$-0.360^{+0.300}_{-0.300}$	$1.551^{+0.329}_{-0.402}$	$1.107^{+0.177}_{-0.145}$	$0.418^{+0.512}_{-0.145}$
	+2%/-3%	+5%/-3%	+83%/-83%	+21%/-26%	+16%/-13%	+122%/-35%
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 004577324-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-26 \pm 2$	$1.02^{+0.21}_{-0.20}$	$1975^{+117}_{-135}$	$5874^{+563}_{-406}$	$53^{+29}_{-16}$
Alt.	$-4 \pm 3$	$0.78^{+0.19}_{-0.18}$	$1984^{+115}_{-139}$	$4275^{+840}_{-1606}$	$12^{+19}_{-11}$

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

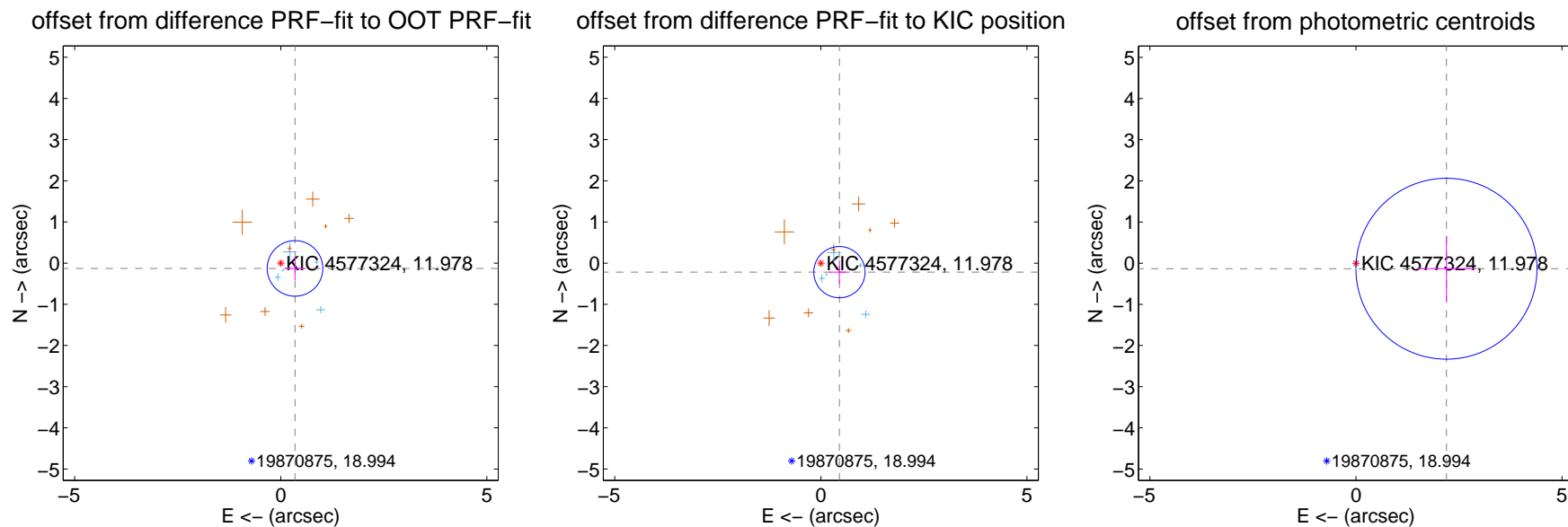
## DV Centroid Data

Supplemental centroid analysis for 004577324-02. **Kepler magnitude: 11.98.** Transit SNR 9.68

There are 5 quarters with good PRF difference image offsets

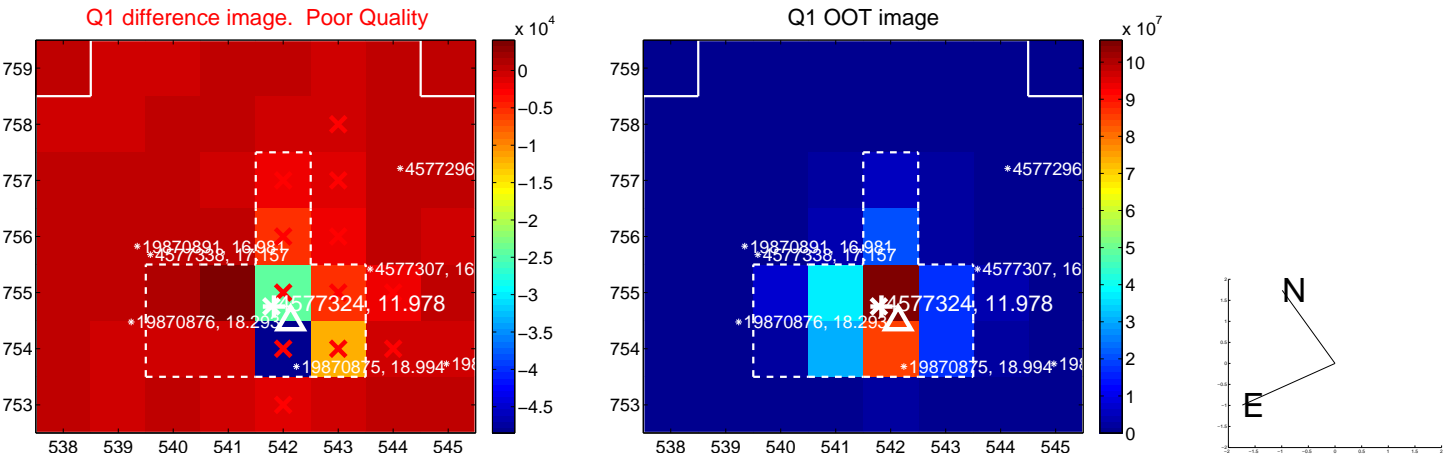
The direct PRF centroid is offset from the target star catalog position by about 0.13 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.369 \pm 0.225$	1.64	$-0.346 \pm 0.244$	$-0.128 \pm 0.288$
PRF-fit source offset from KIC position	$0.500 \pm 0.207$	2.41	$-0.450 \pm 0.245$	$-0.219 \pm 0.288$
photometric centroid source offset	<b><math>2.20 \pm 0.73</math></b>	<b>3.00</b>	$-2.20 \pm 0.73$	$-0.13 \pm 0.79$

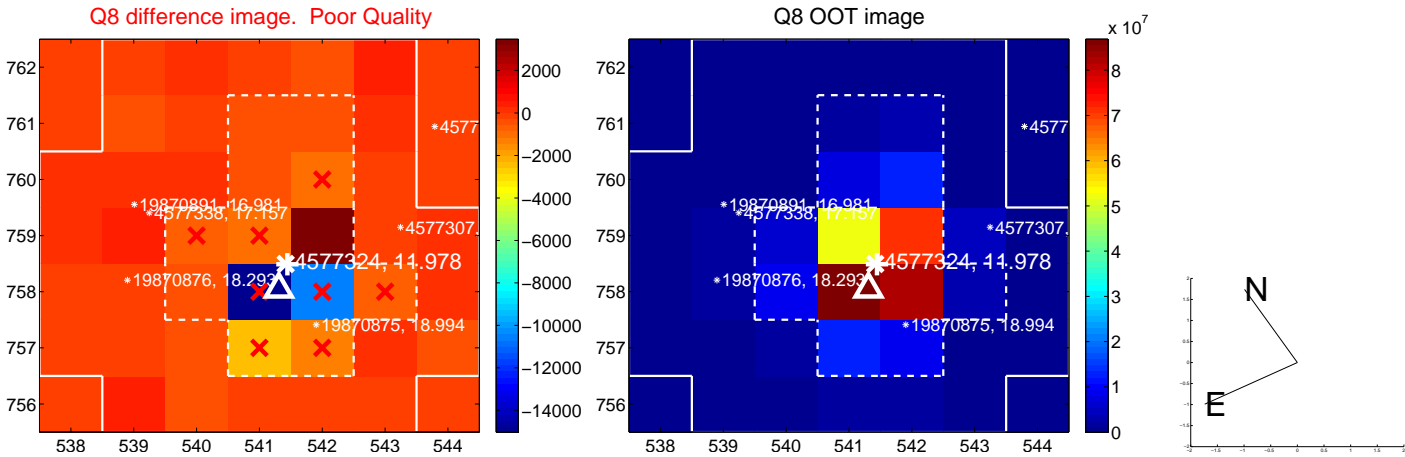
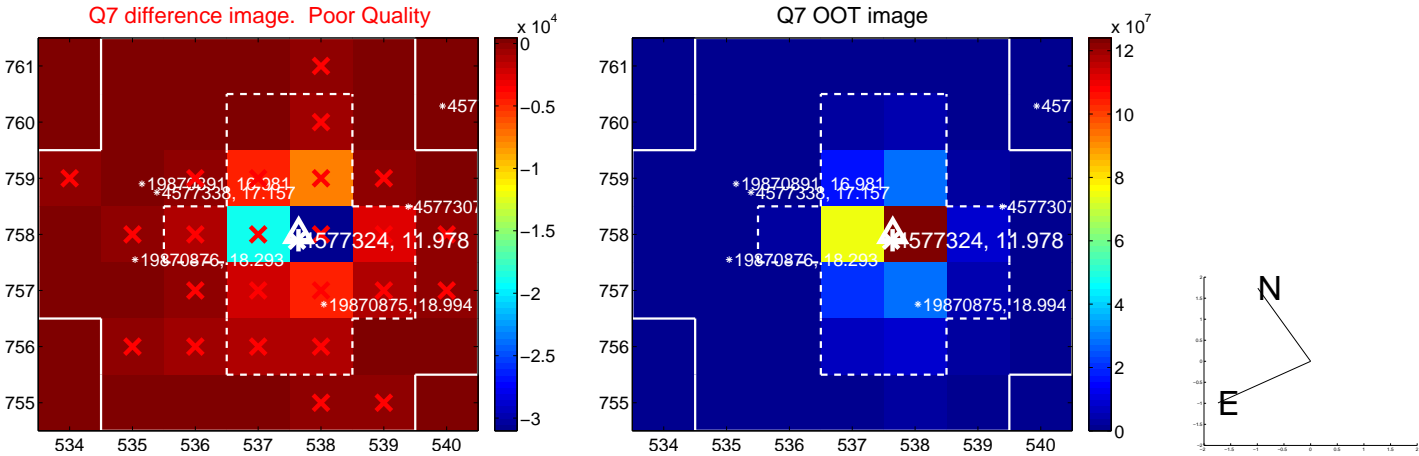
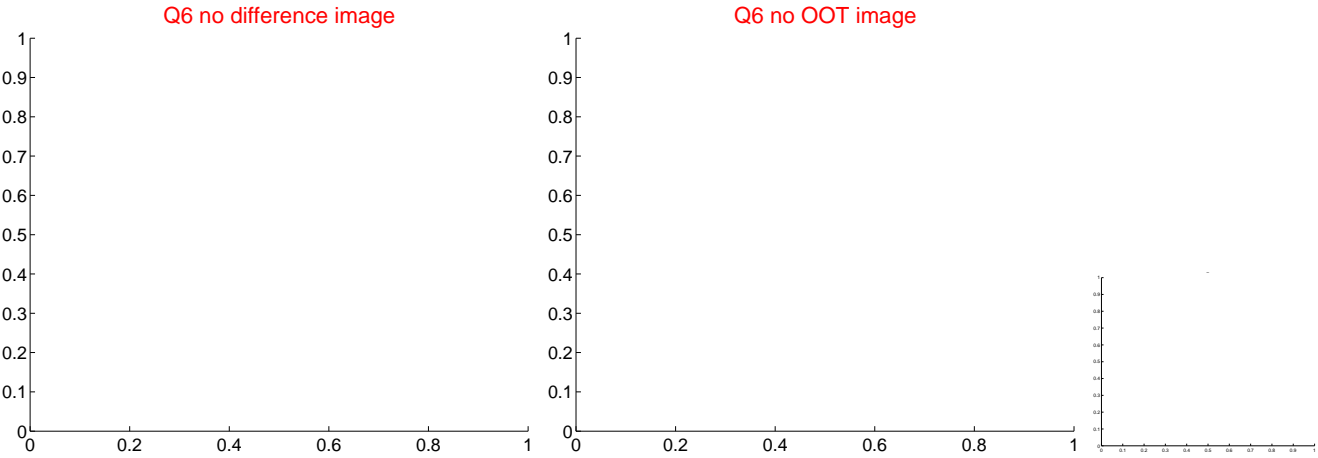
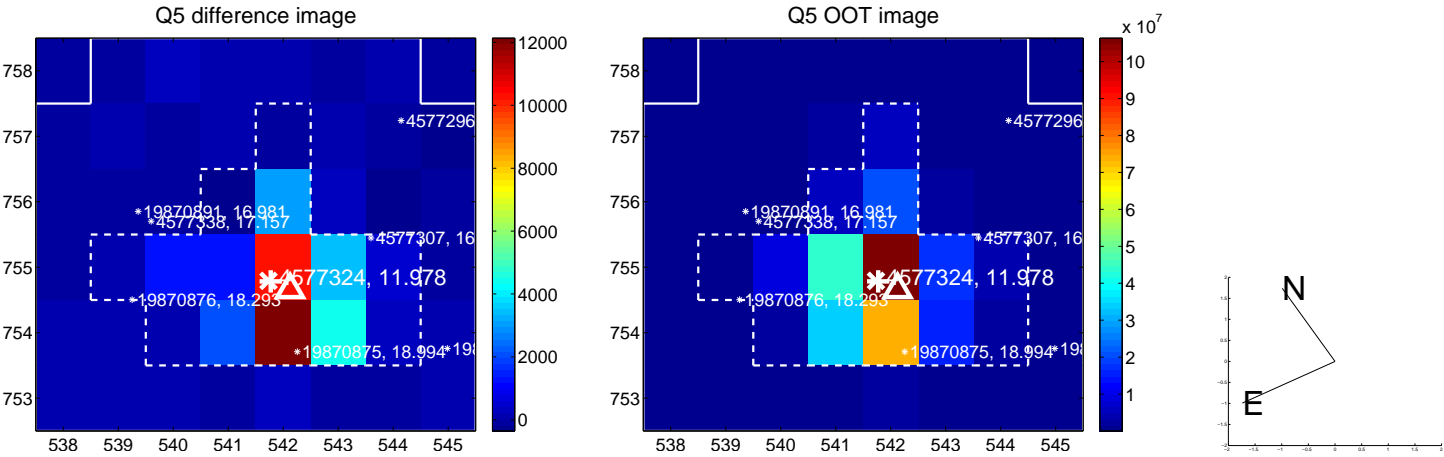


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

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

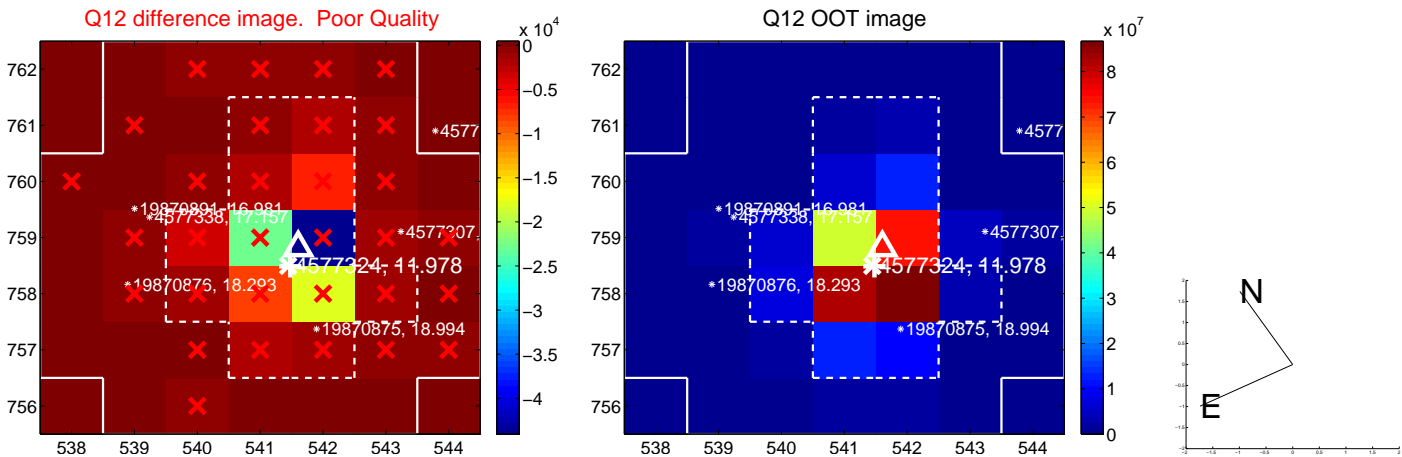
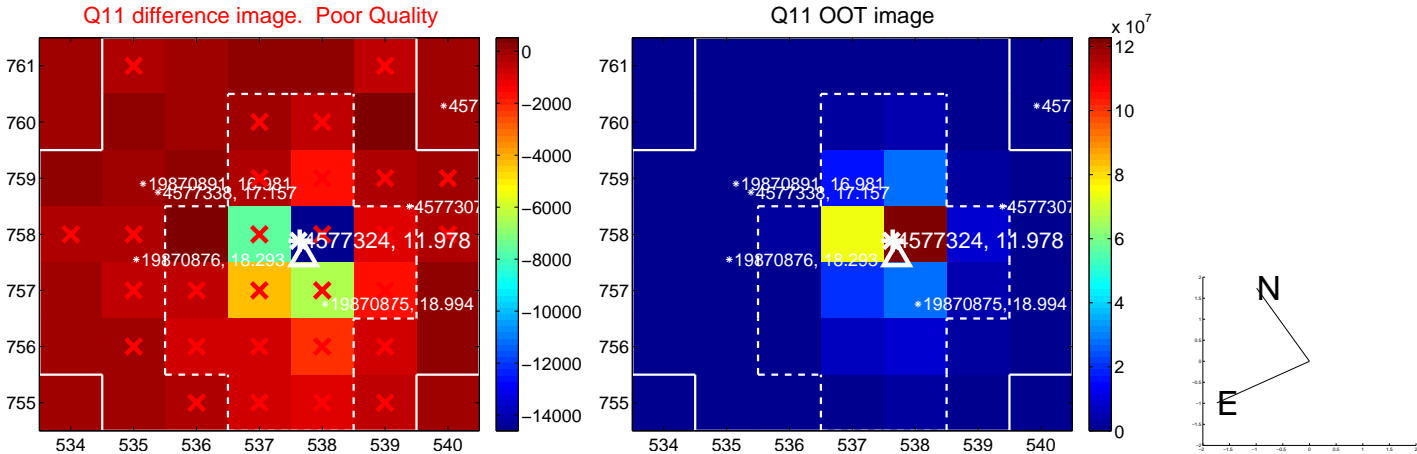
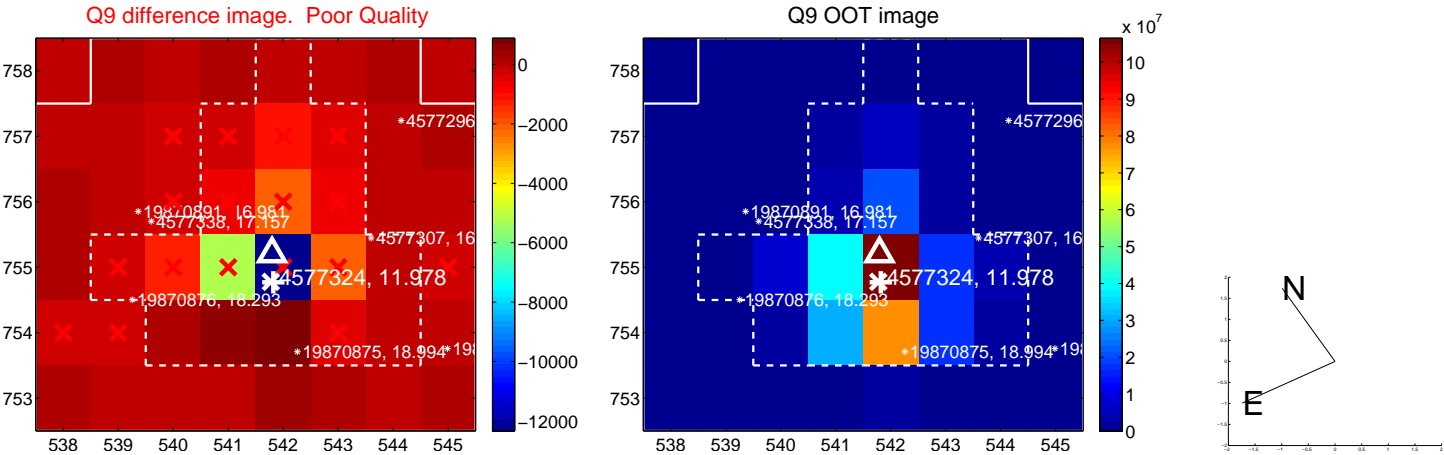


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

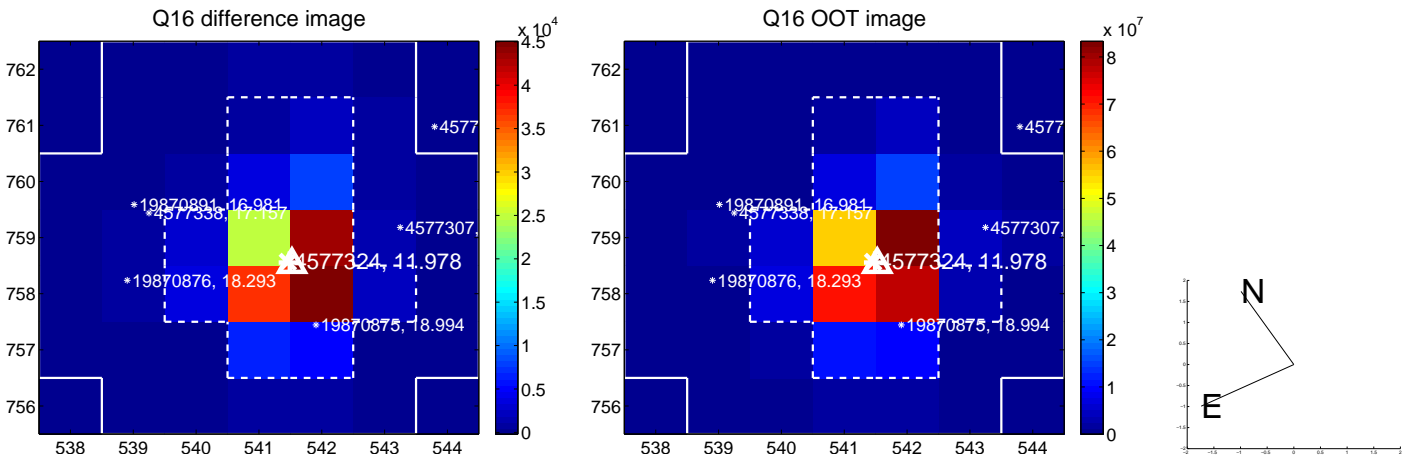
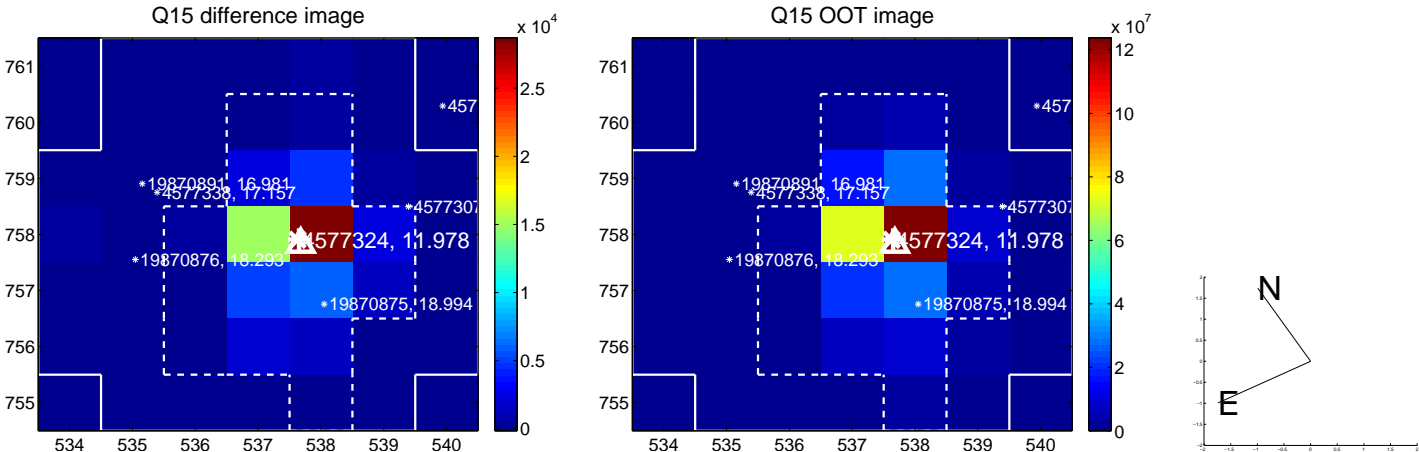
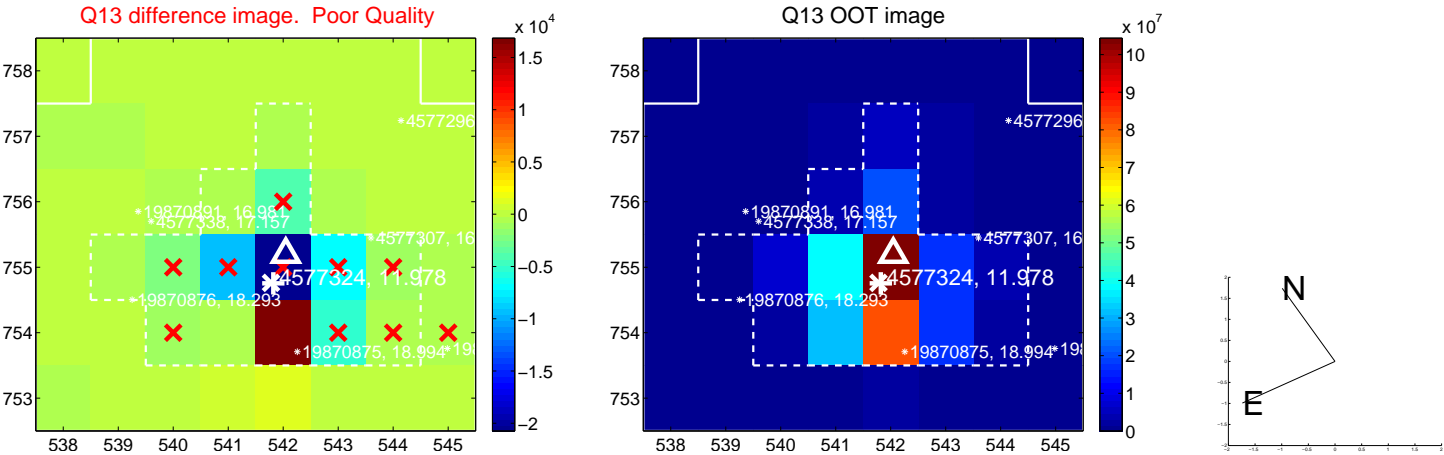




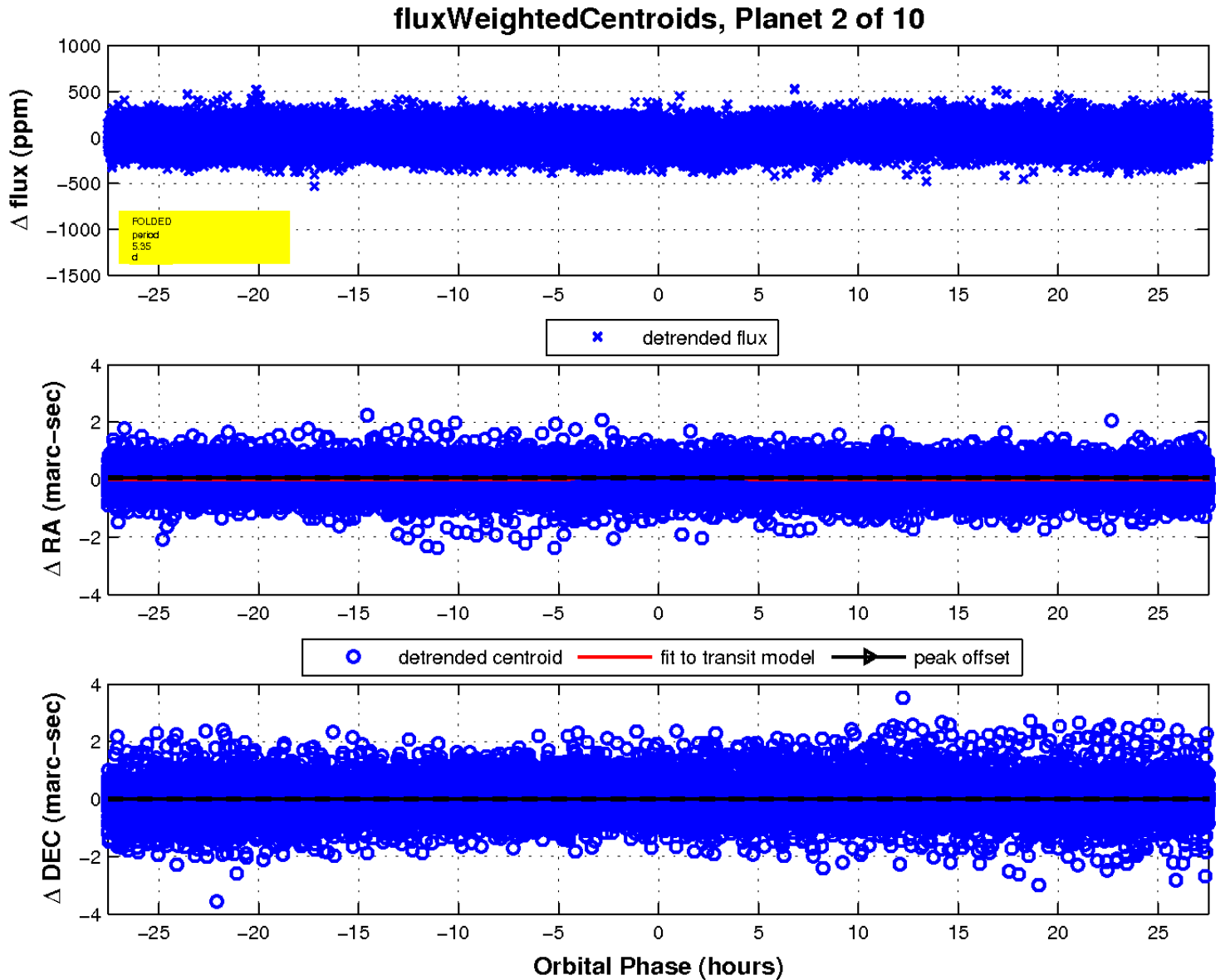
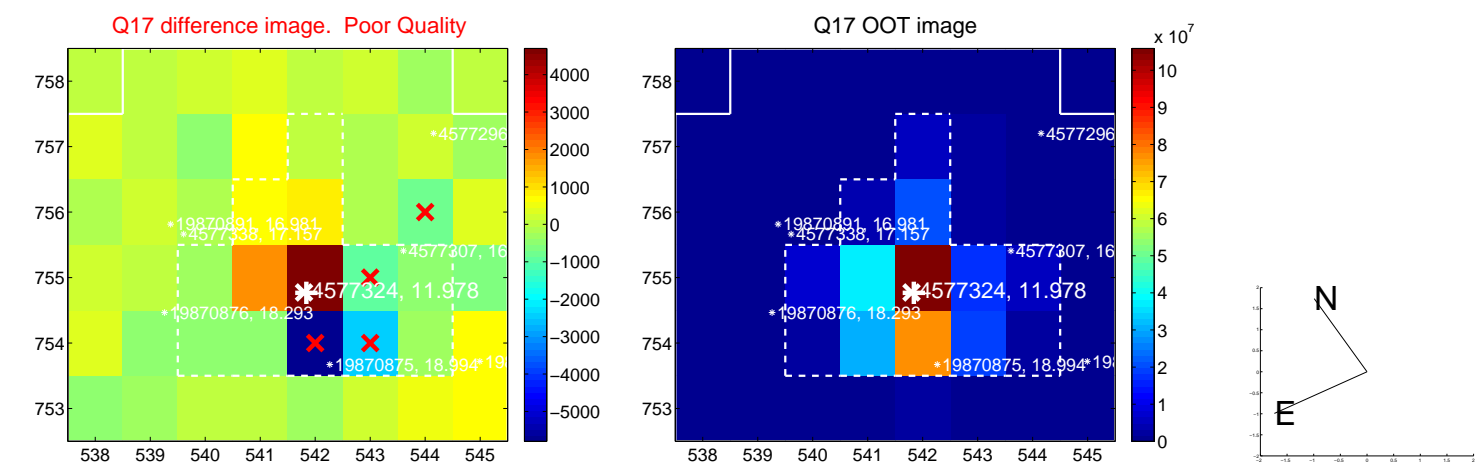
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

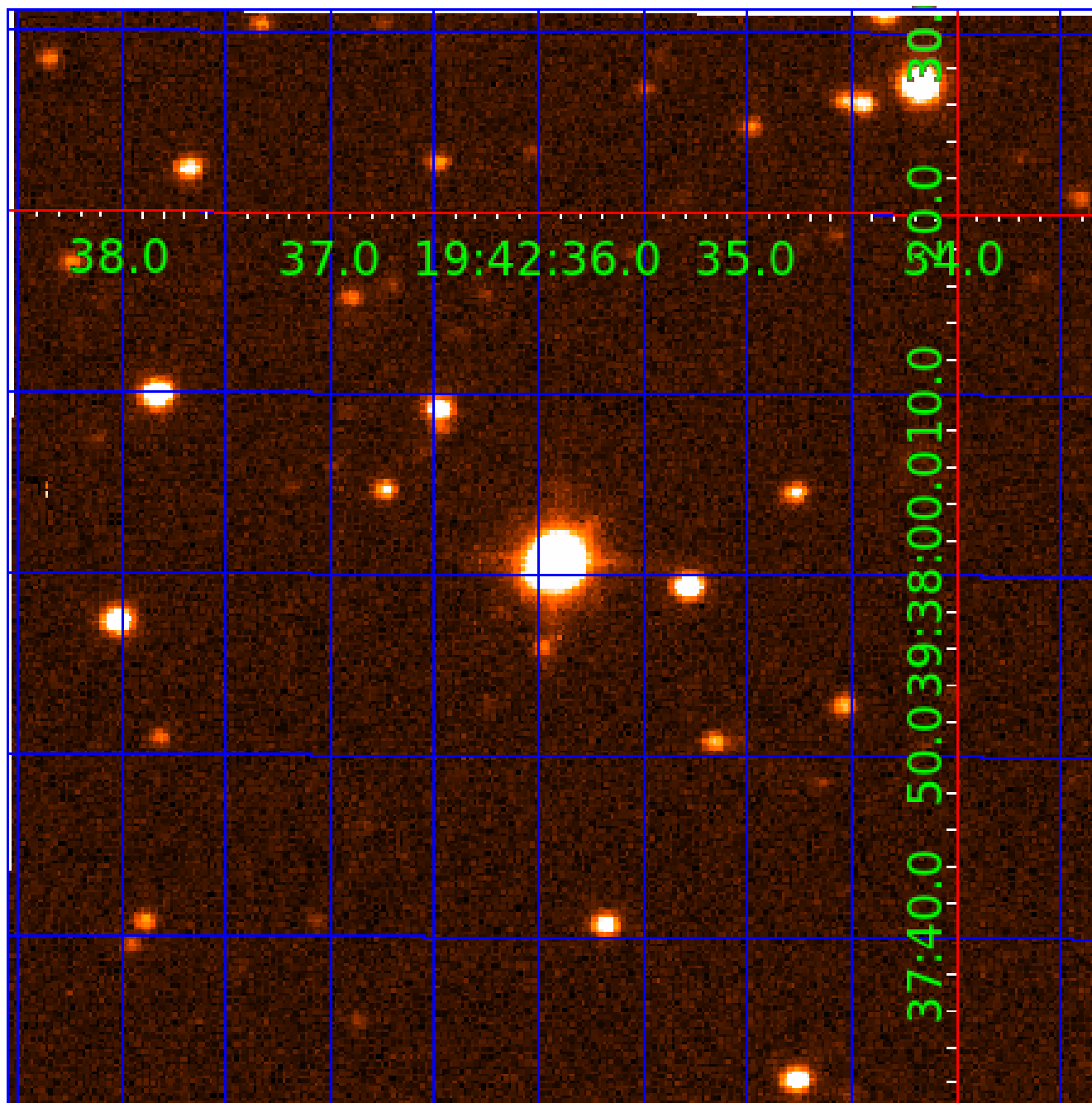


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004577324-01	OBS	No	2.676955	133.989377	23.7	9.268	8.5	8.2	1.55	6490	0.84	2508.57
004577324-02	OBS	No	5.352929	135.260103	33.6	9.181	10.0	9.7	1.55	6490	1.05	995.77
004577324-03	OBS	No	283.674058	186.080756	103.5	25.045	8.5	4.6	1.55	6490	1.73	5.00
004577324-04	OBS	No	310.445932	432.392002	164.8	7.764	7.9	6.3	1.55	6490	2.19	4.44
004577324-05	OBS	No	173.353436	171.891158	171.1	9.852	7.6	6.9	1.55	6490	2.22	9.65
004577324-06	OBS	No	15.793664	139.332735	72.1	14.982	8.0	8.0	1.55	6490	1.54	235.31
004577324-07	OBS	No	185.917423	244.975369	135.5	25.942	8.3	4.5	1.55	6490	2.10	8.79
004577324-08	OBS	No	171.313674	196.888564	98.3	5.032	7.4	5.4	1.55	6490	1.70	9.80
004577324-09	OBS	No	143.173964	238.606043	293.0	0.835	7.5	3.3	1.55	6490	2.73	12.45
004577324-10	OBS	No	143.175229	238.960367	60.4	1.407	7.6	1.6	1.55	6490	1.36	12.45

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004577324-01	OBS	FP	0.00	1	0	0	0	LPP_DV
004577324-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD
004577324-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS
004577324-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004577324-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS
004577324-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT
004577324-07	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST
004577324-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004577324-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004577324-10	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_FEW_DIFFS

**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.

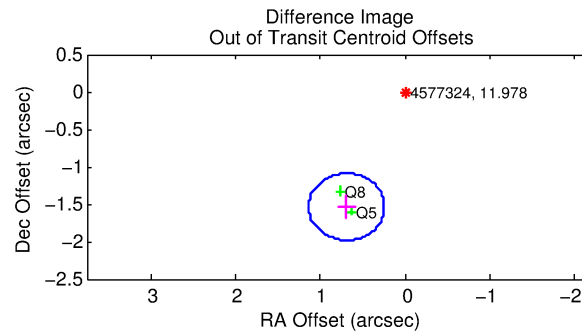
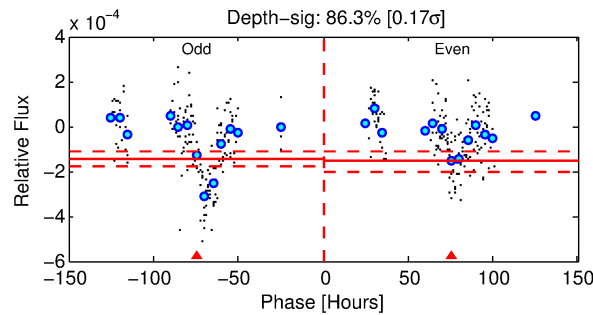
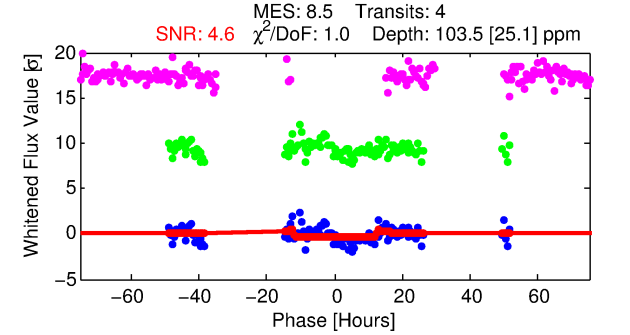
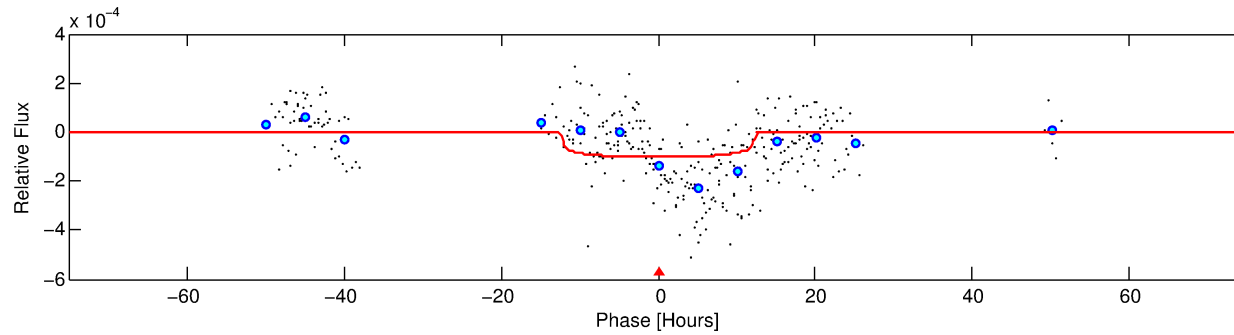
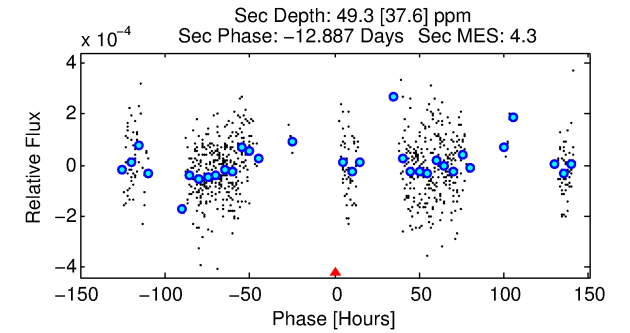
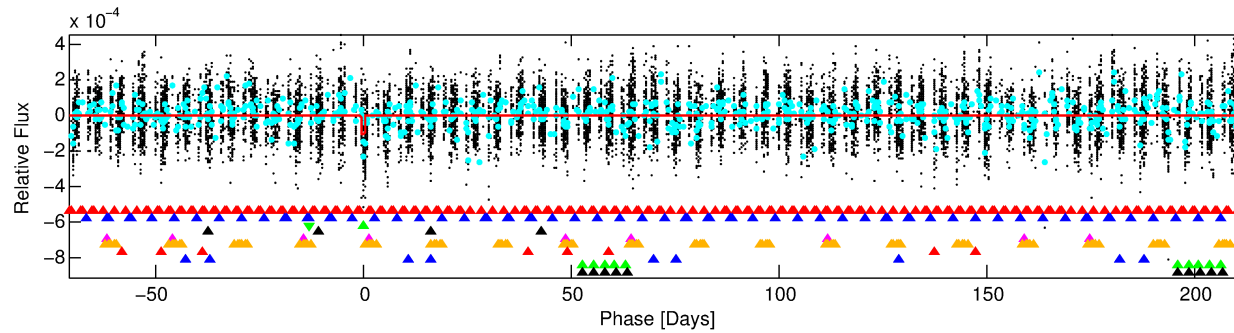
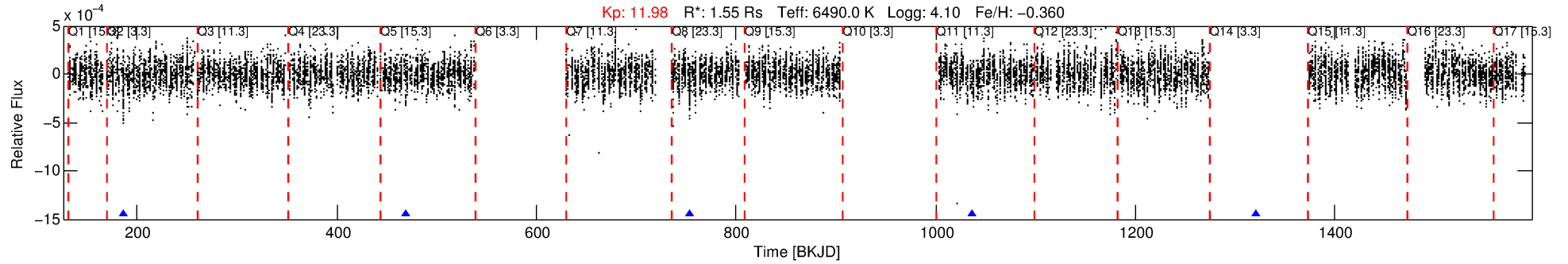
Ephemeris Match Information For 004577324-03

No Significant Match Found



# DV One-Page Summary

KIC: 4577324 Candidate: 3 of 10 Period: 283.674 d



## DV Fit Results:

Period = 283.67406 [0.01885] d  
Epoch = 186.0808 [0.0250] BKJD  
Rp/R\* = 0.0102 [0.0024]  
a/R\* = 56.38 [60.95]  
b = 0.77 [0.56]  
Seff = 5.00 [1.98]  
Teq = 381 [38] K  
Rp = 1.72 [0.61] Re  
a = 0.8743 [0.2117] AU  
Ag = 6966.42 [6812.04] [1.02σ]  
Teffp = 5387 [1222] K [4.09σ]

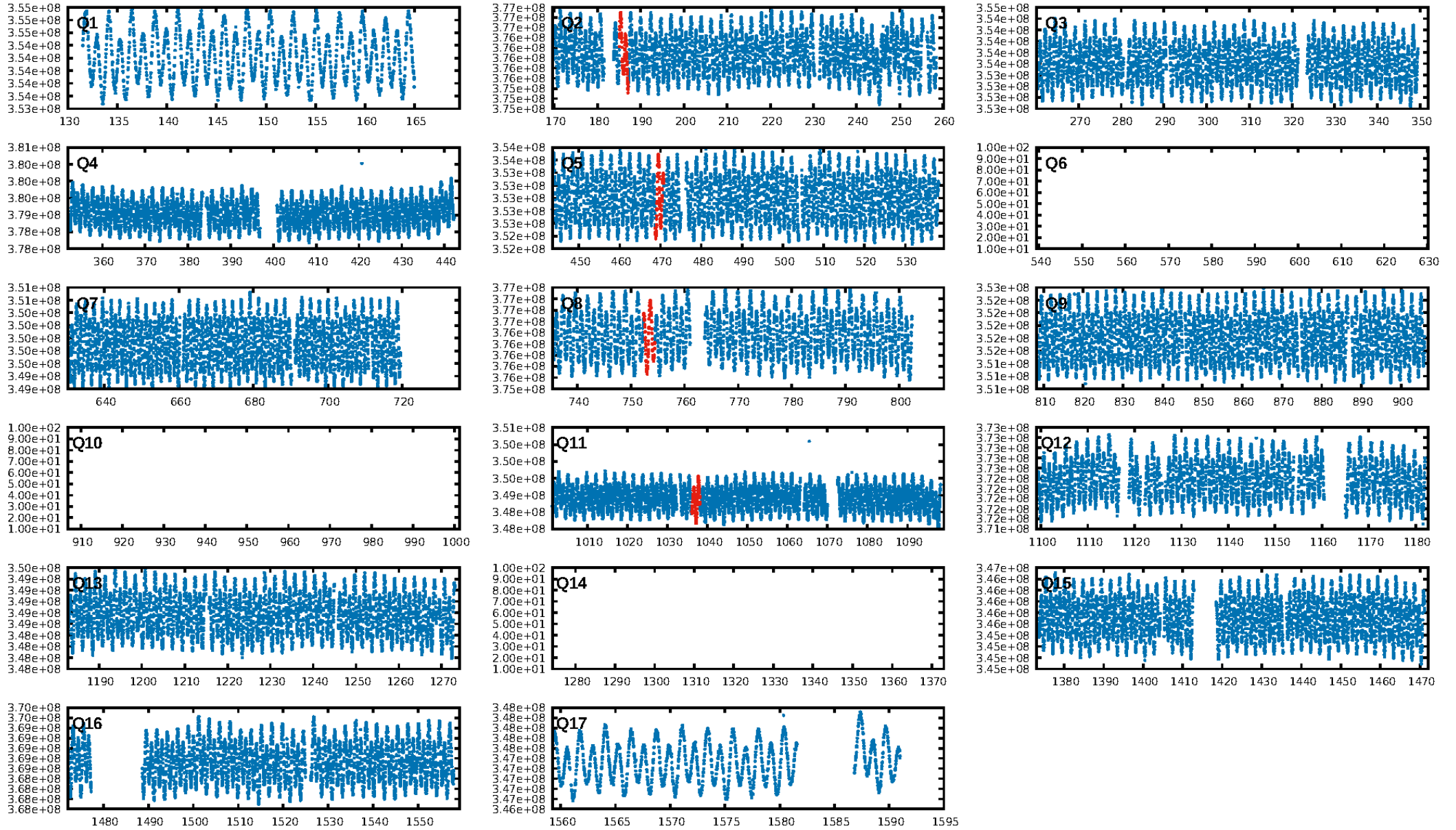
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [65.06σ]  
LongPeriod-sig: 100.0% [24.50σ]  
ModelChiSquare2-sig: 67.7%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 2.354  
Centroid-sig: 1.6%  
Centroid-so: 2.825 arcsec [1.75σ]  
OotOffset-rm: 1.684 arcsec [11.33σ]  
KicOffset-rm: 1.744 arcsec [11.34σ]  
OotOffset-st: 0/0/1/1 [2]  
KicOffset-st: 0/0/1/1 [2]  
DiffImageQuality-fgm: 0.00 [0/2]  
DiffImageOverlap-fno: 0.00 [0/2]

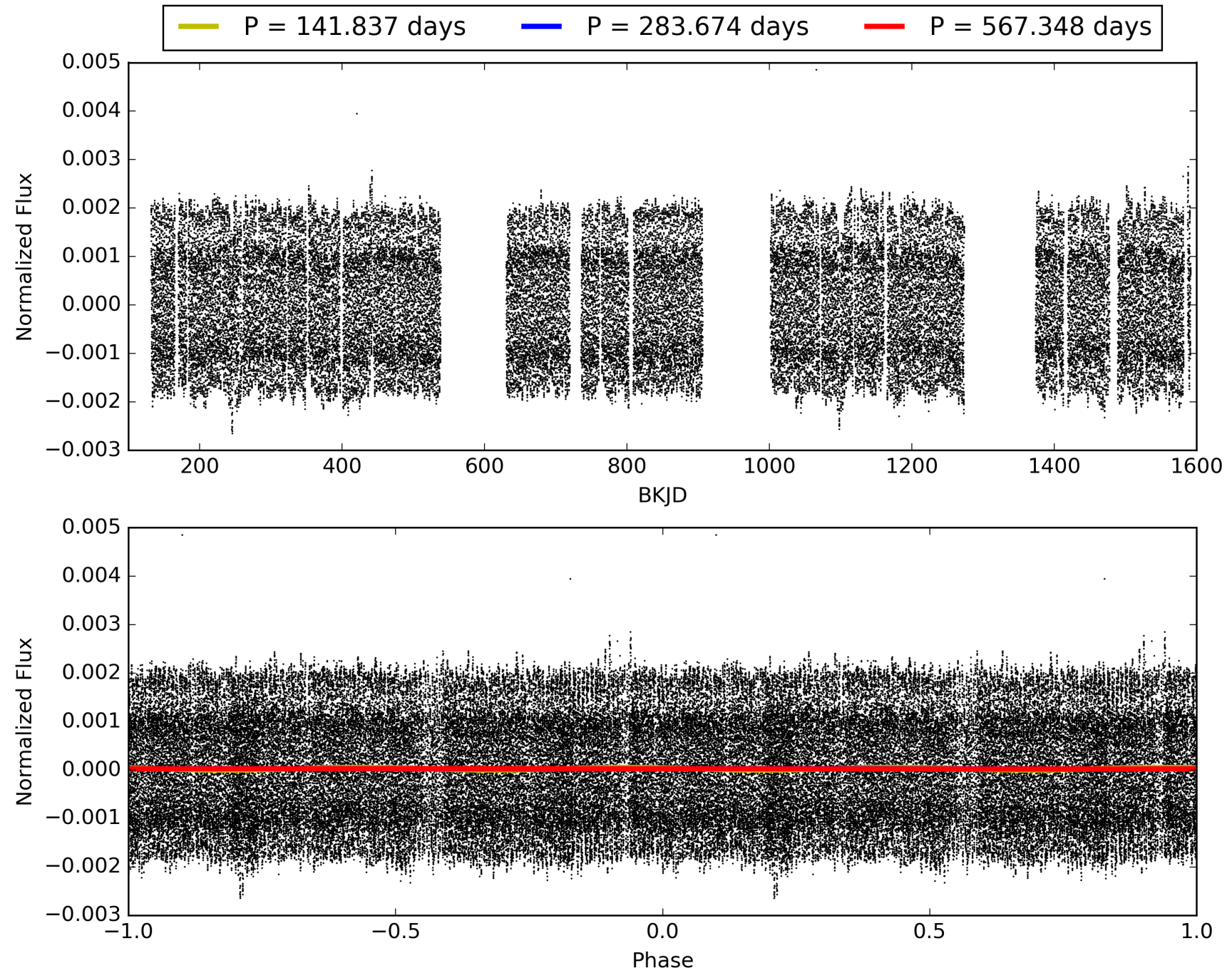
Software Revision: svn-ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 00:55:31 Z

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

# TCE 004577324-03, PDC Light Curves

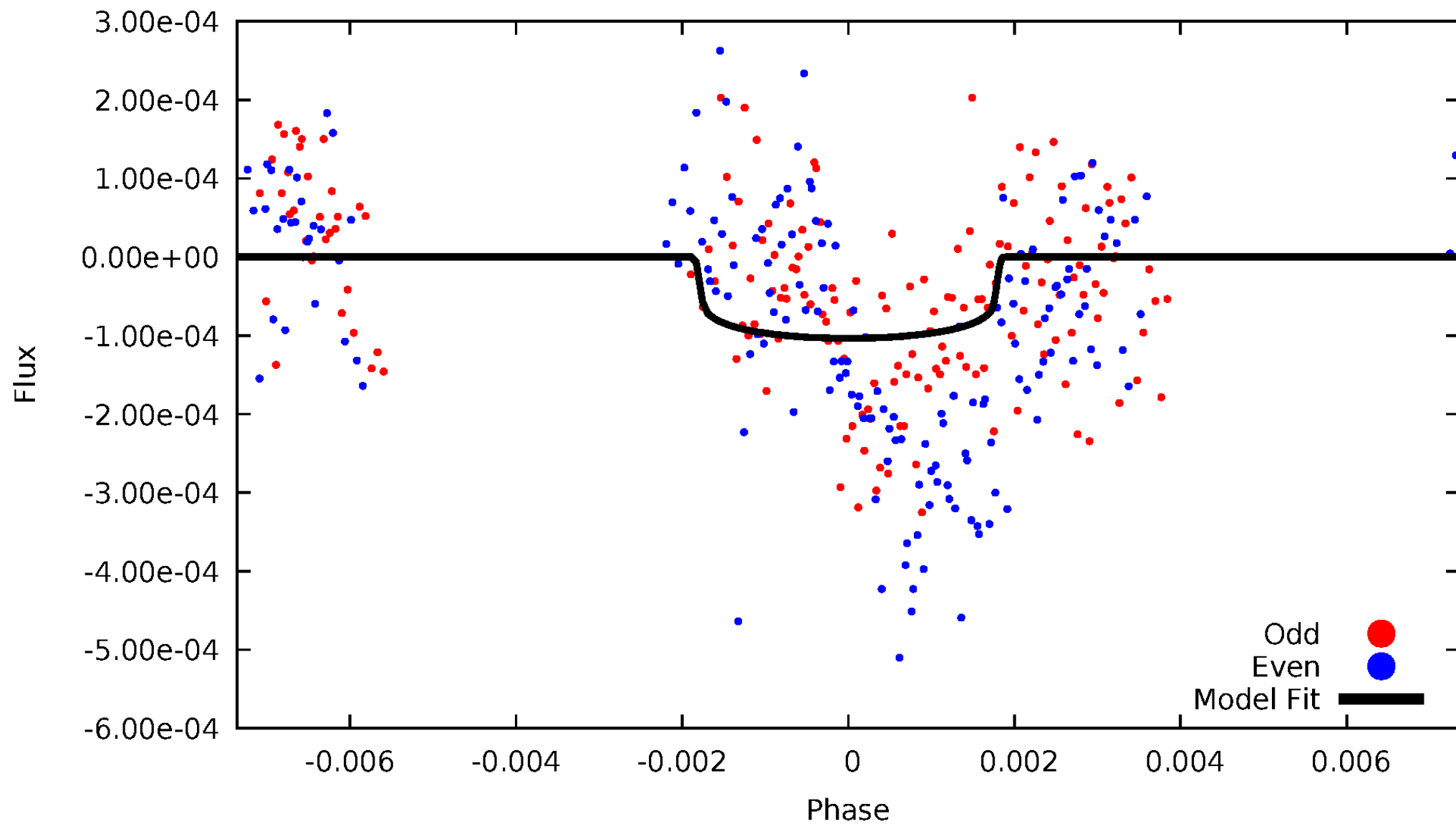


TCE 004577324-03



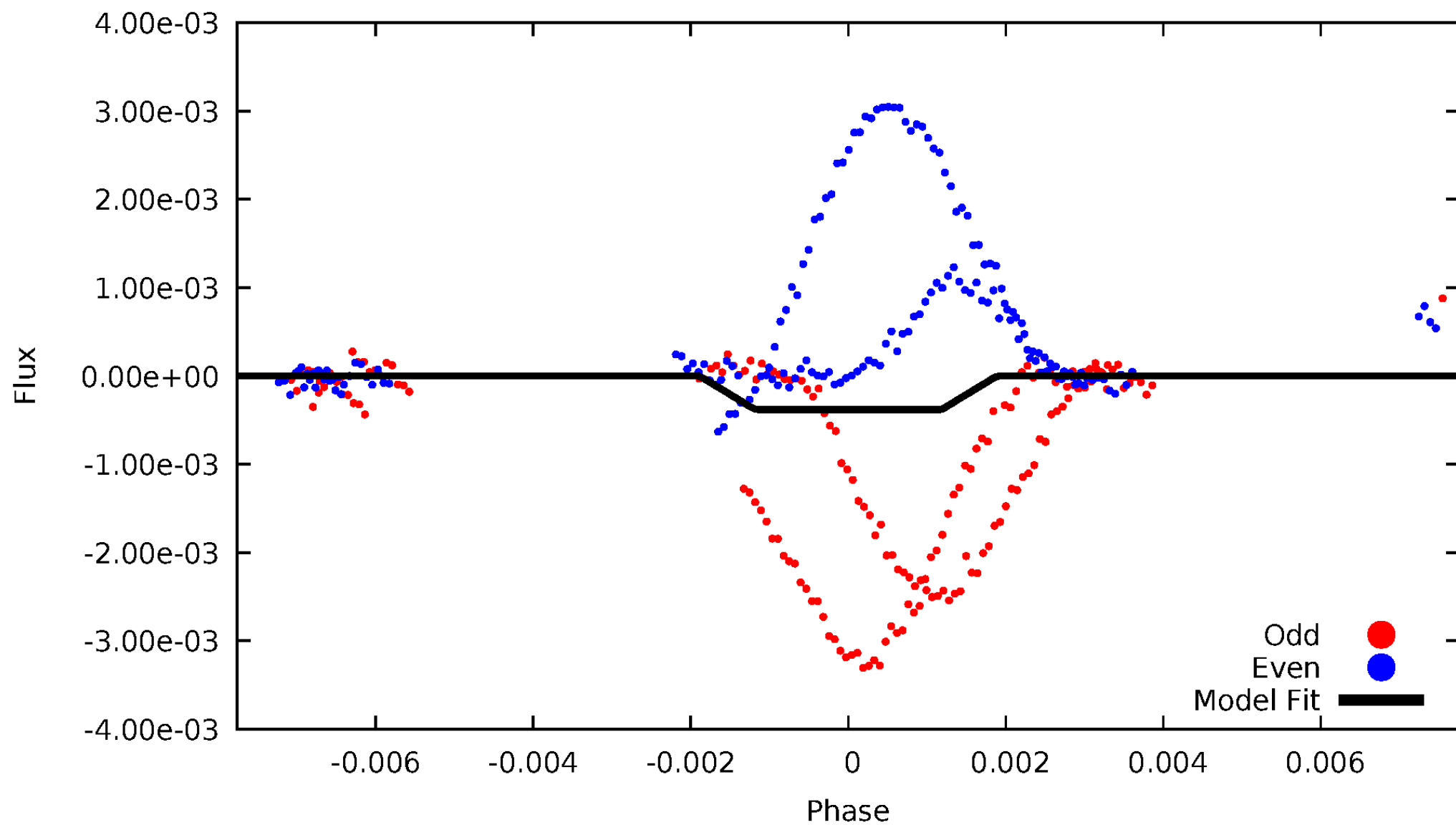
# DV Odd/Even

TCE 004577324-03



# ALT Odd/Even

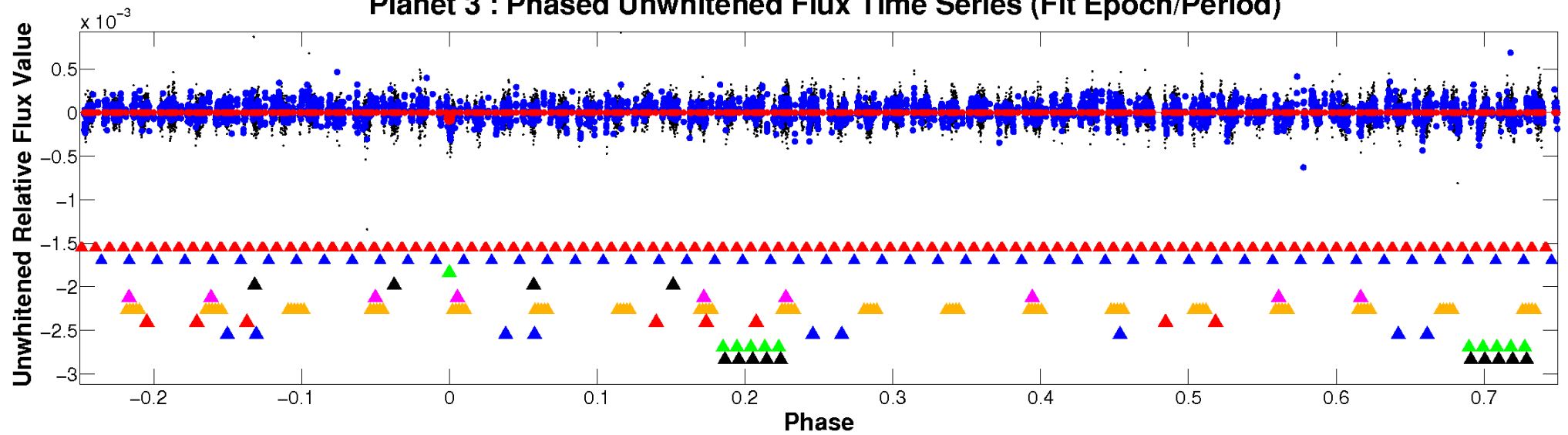
TCE 004577324-03



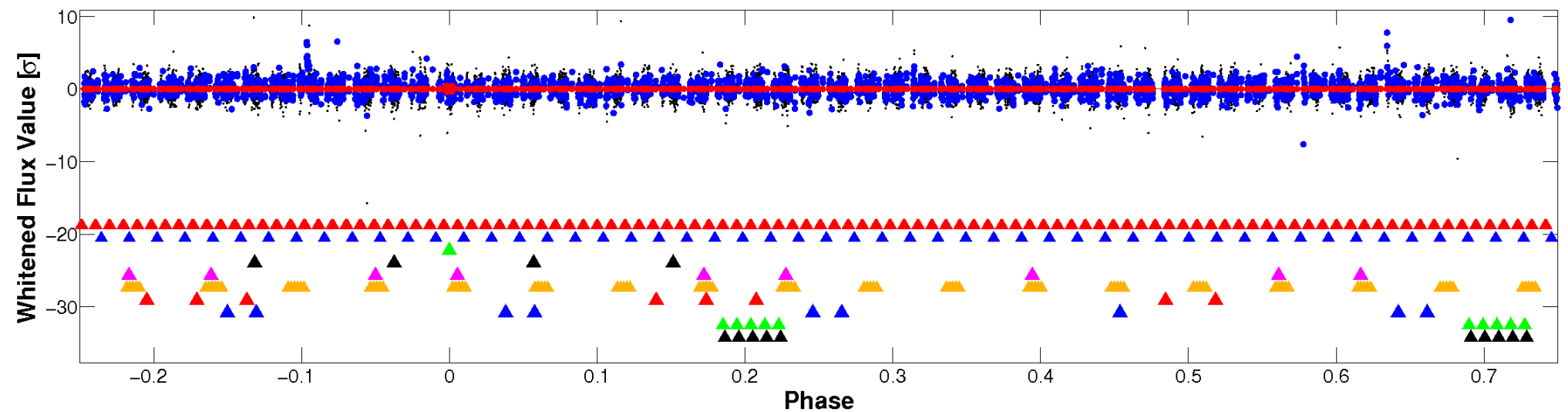


# Non-Whitened Vs. Whitened Light Curve

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



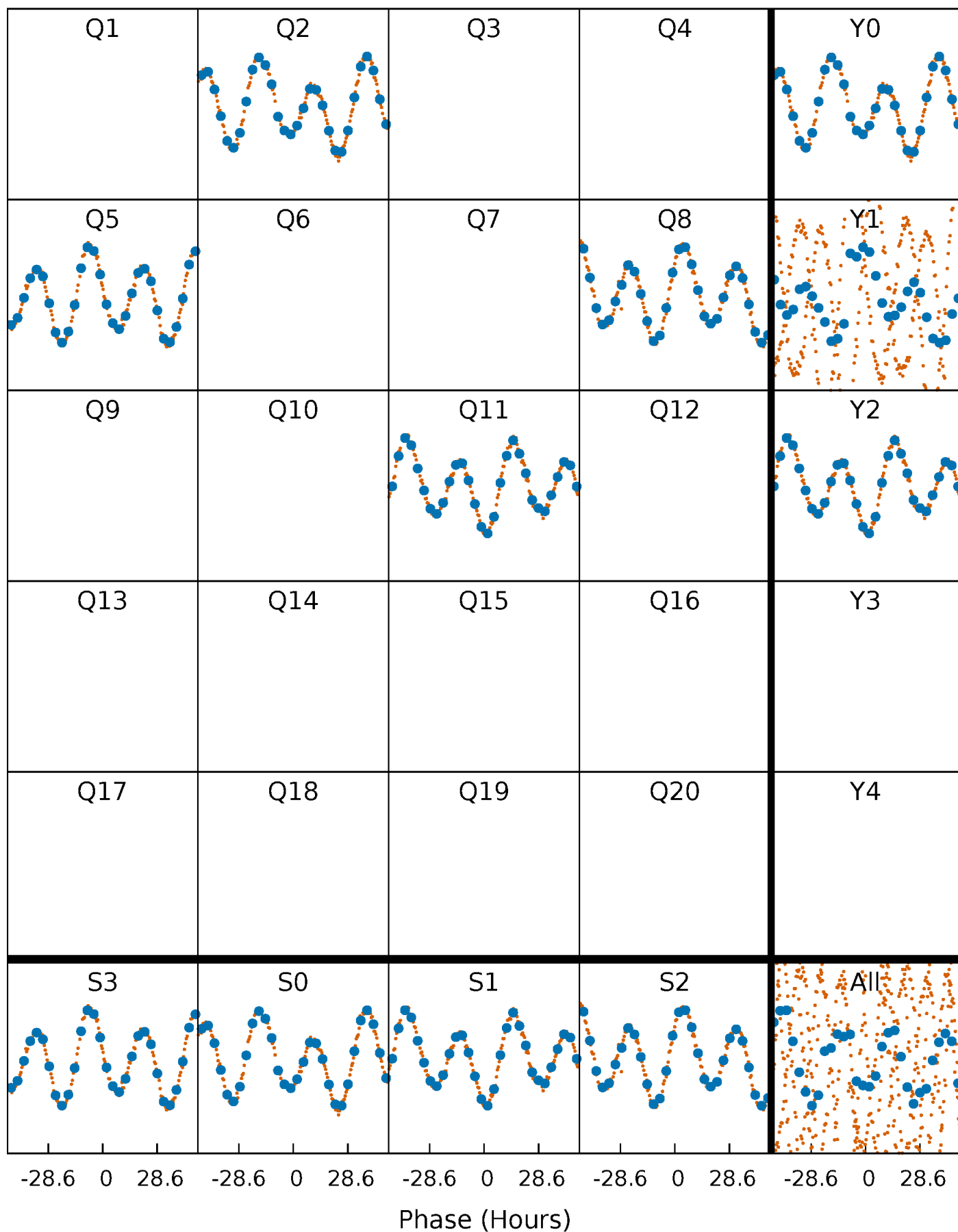
## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)





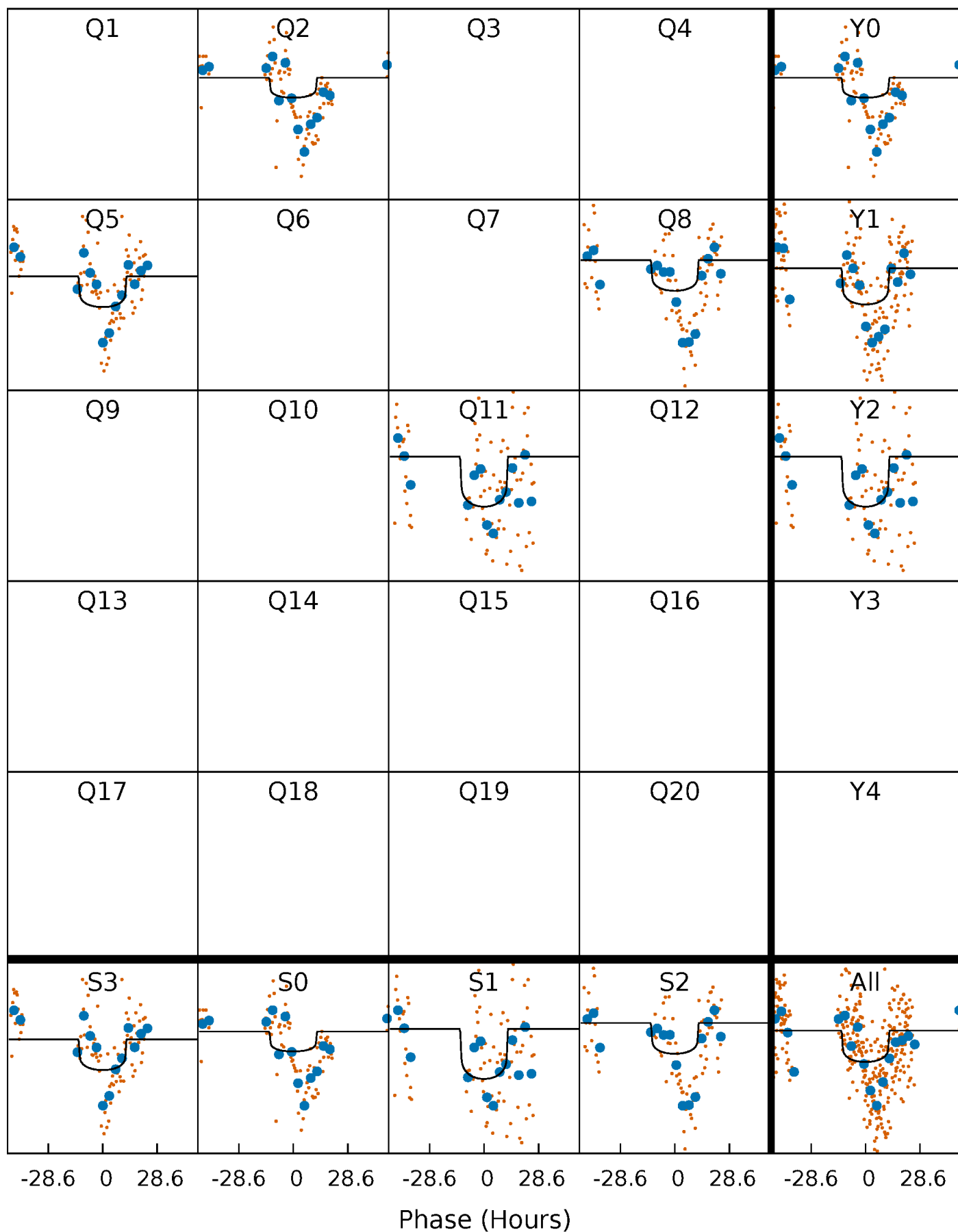
# PDC Quarter-Phased Transit Curves

TCE 004577324-03     $P=283.674058$  Days     $T_0=186.080756$  (BKJD)



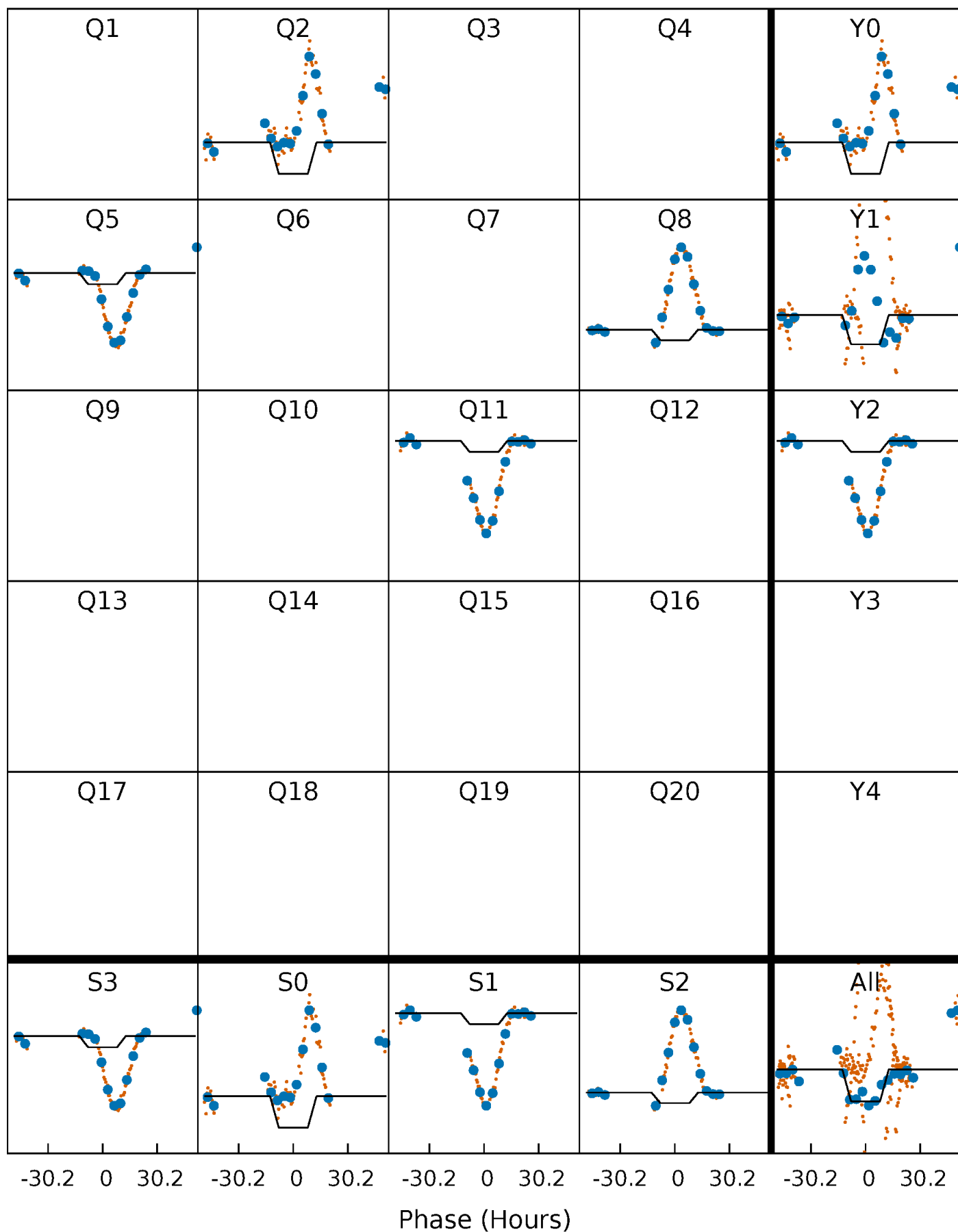
# DV Quarter-Phased Transit Curves

TCE 004577324-03     $P=283.674058$  Days     $T_0=186.080756$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

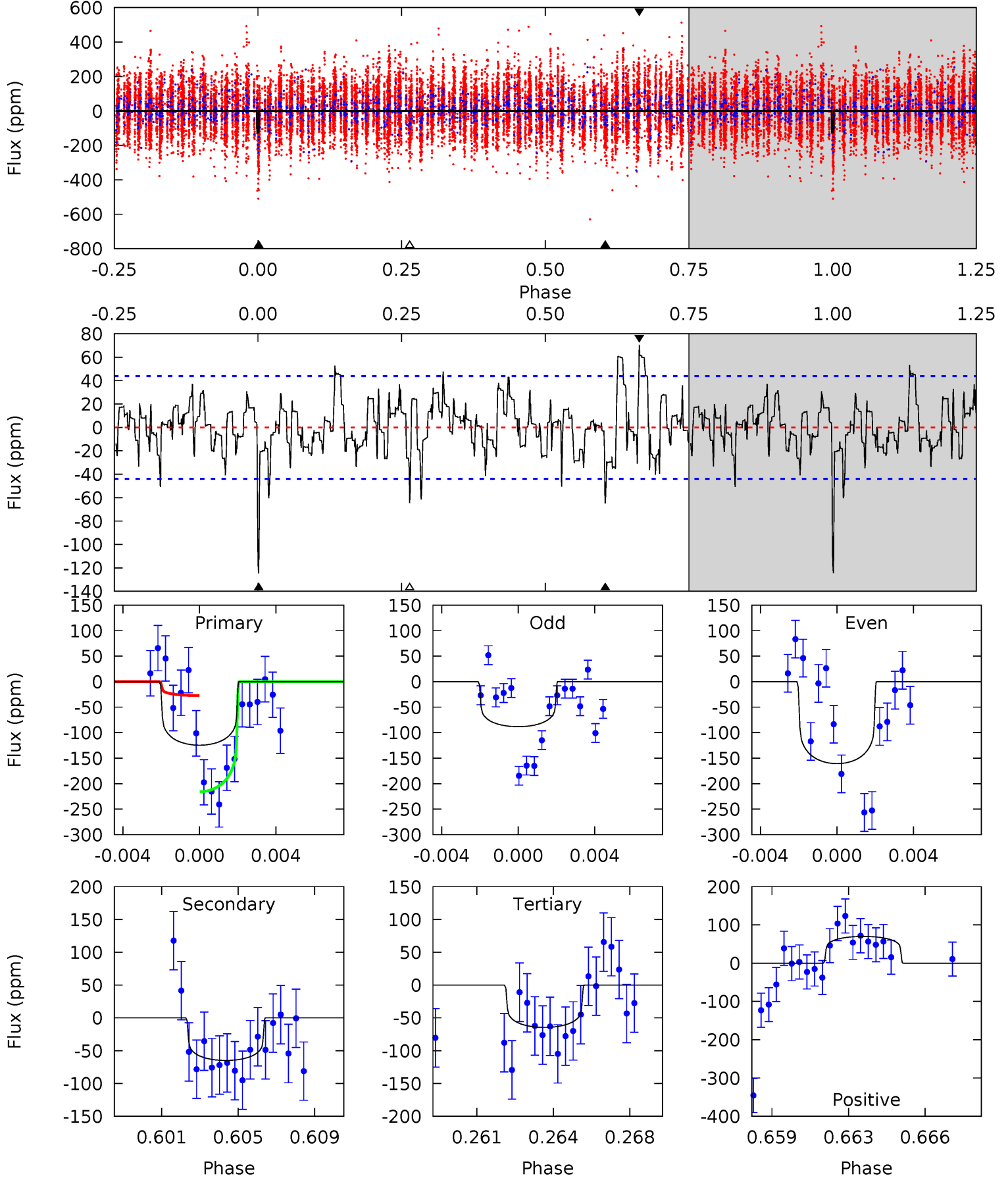
TCE 004577324-03 P=283.672302 Days  $T_0=186.080570$  (BKJD)



# DV Model-Shift Uniqueness Test

004577324-03, P = 283.674058 Days, E = 186.080756 Days

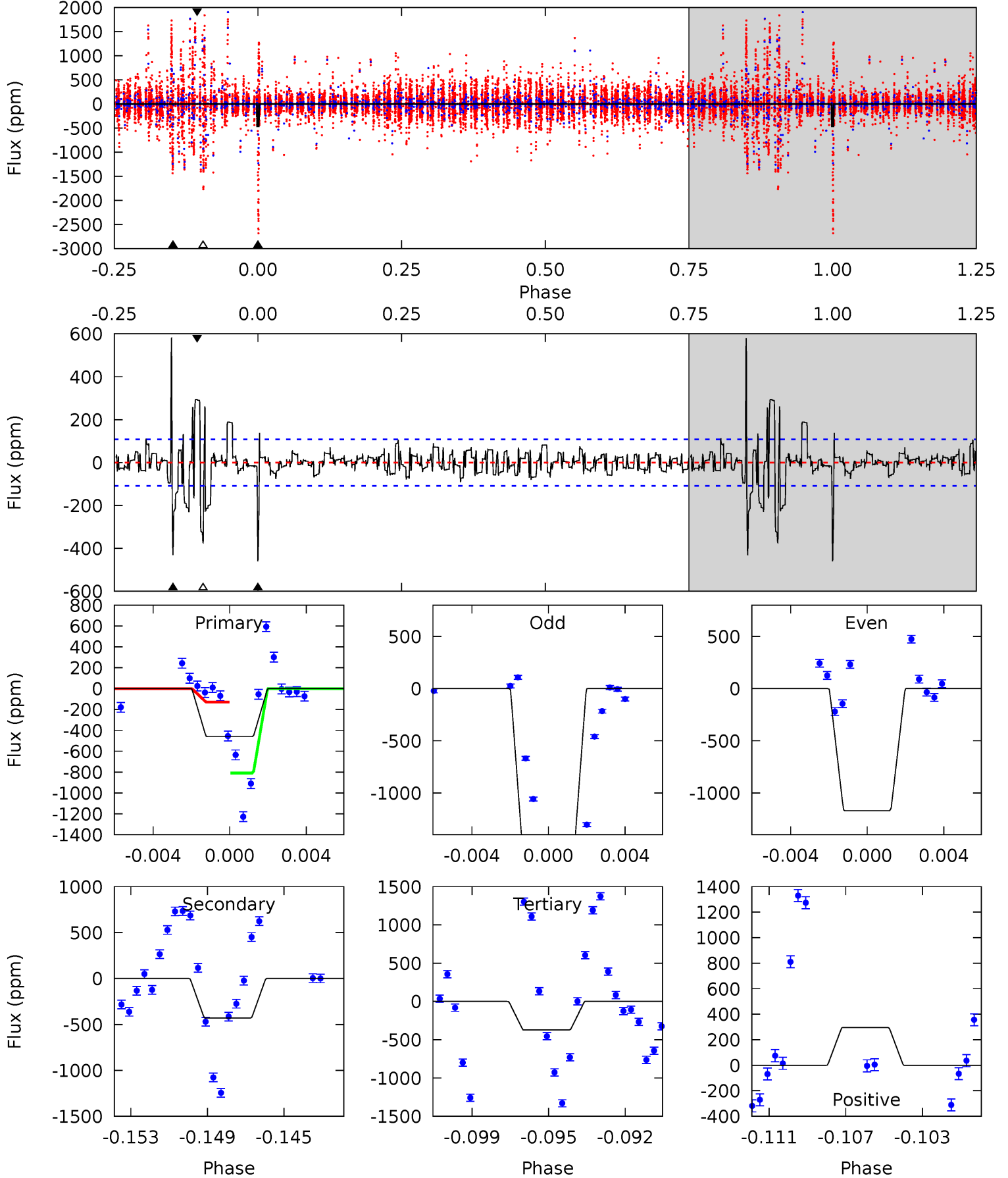
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.8	7.71	7.67	8.30	5.22	2.91	2.53	7.14	6.51	0.04	-0.59	4.31	0.99	0.36	11.2



# Alt Model-Shift Uniqueness Test

004577324-03, P = 283.672302 Days, E = 186.080570 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
22.1	20.7	18.0	14.2	5.21	2.89	2.38	4.16	7.88	2.78	6.50	17.6	0.70	0.56	16.3



### Stellar Parameters For KIC 004577324

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6490^{+146}_{-178}$	$4.101^{+0.221}_{-0.119}$	$-0.360^{+0.300}_{-0.300}$	$1.551^{+0.329}_{-0.402}$	$1.107^{+0.177}_{-0.145}$	$0.418^{+0.512}_{-0.145}$
	+2%/-3%	+5%/-3%	+83%/-83%	+21%/-26%	+16%/-13%	+122%/-35%
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 004577324-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-65 \pm 8$	$1.69^{+0.50}_{-0.45}$	$526^{+31}_{-39}$	$5707^{+827}_{-554}$	$9398^{+8985}_{-3840}$
Alt.	$-431 \pm 21$	$3.25^{+0.59}_{-0.53}$	$529^{+28}_{-37}$	$6688^{+531}_{-448}$	$17464^{+7133}_{-5204}$

$T_{\text{max}}$  = 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

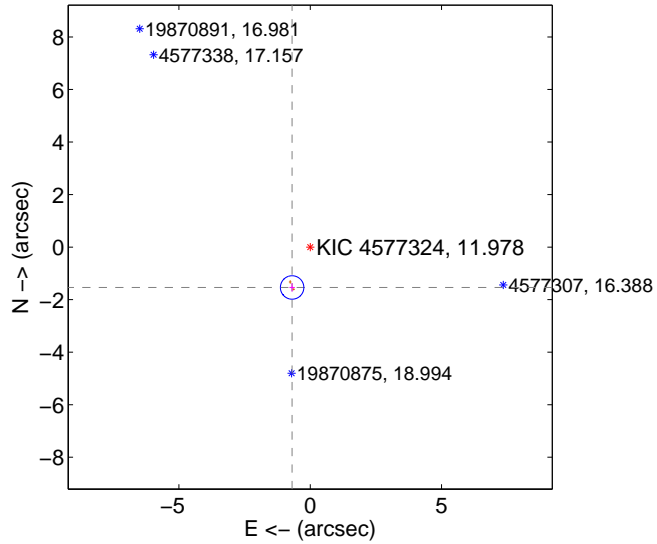
Supplemental centroid analysis for 004577324-03. **Kepler magnitude: 11.98.** Transit SNR 4.56

**There are 0 quarters with good PRF difference image offsets**

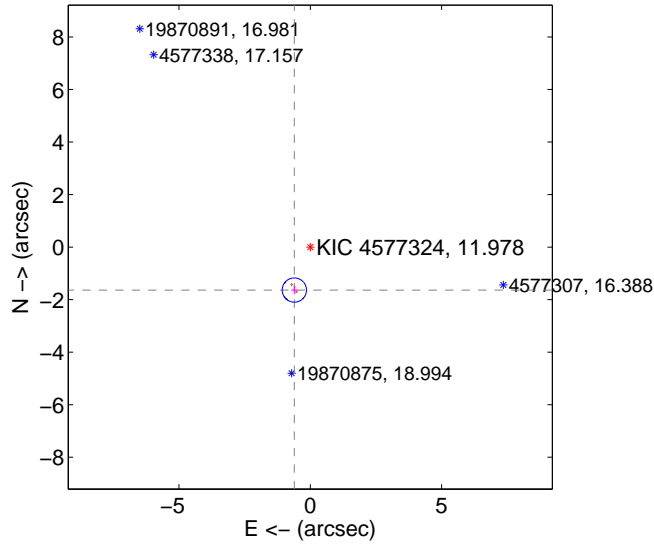
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>1.684 \pm 0.149</math></b>	<b>11.33</b>	$0.689 \pm 0.102$	$-1.537 \pm 0.156$
PRF-fit source offset from KIC position	<b><math>1.744 \pm 0.154</math></b>	<b>11.34</b>	$0.607 \pm 0.125$	$-1.635 \pm 0.157$
photometric centroid source offset	$2.83 \pm 1.62$	1.75	$1.57 \pm 1.47$	$-2.35 \pm 1.68$

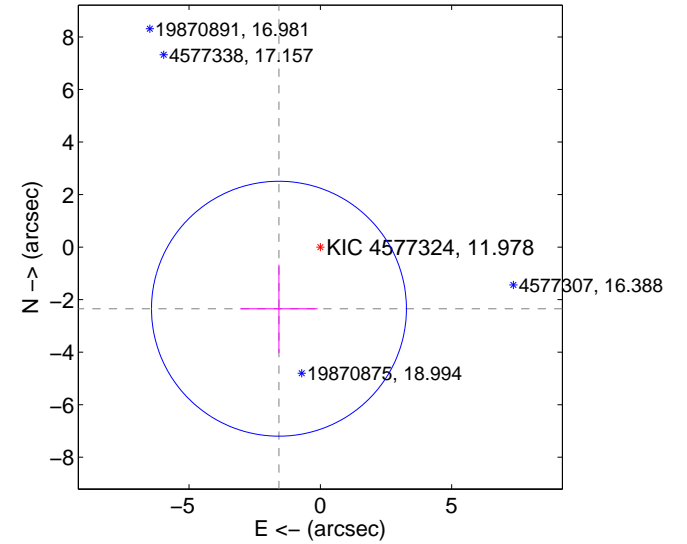
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids

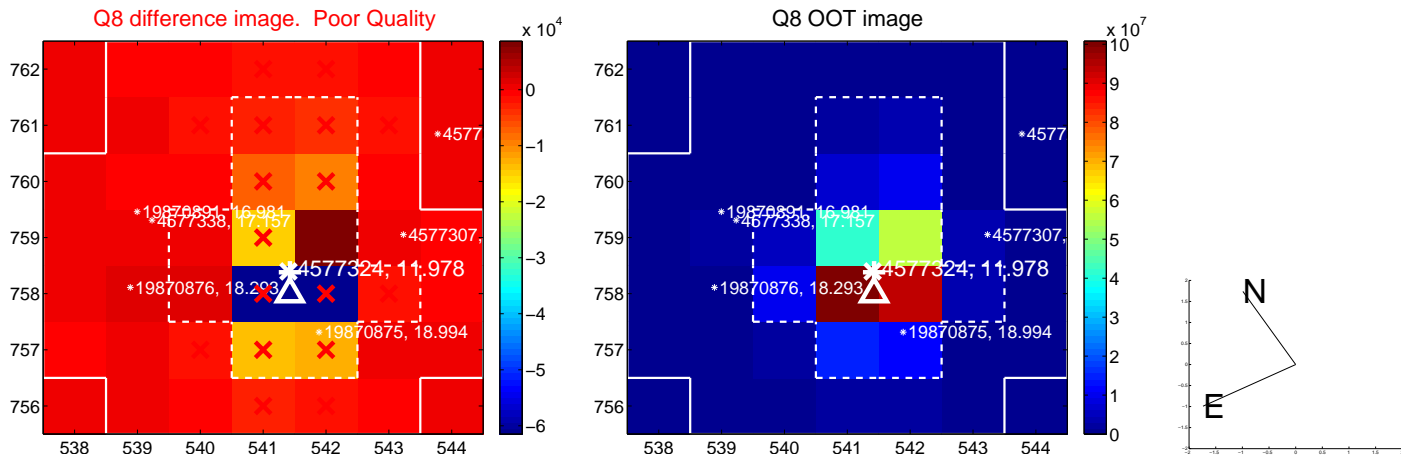
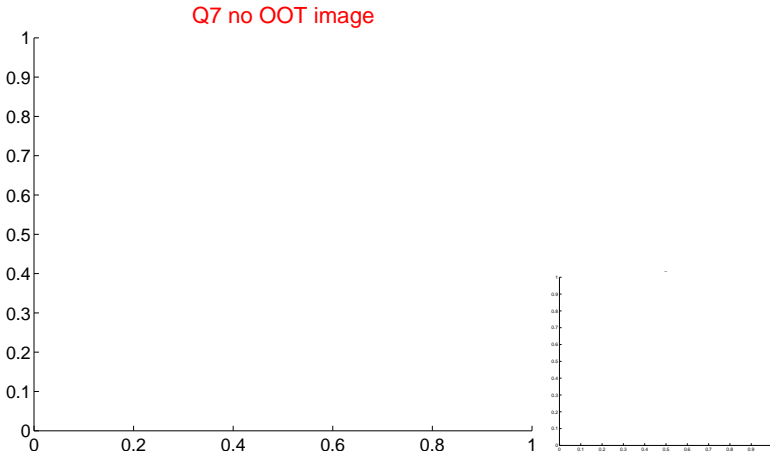
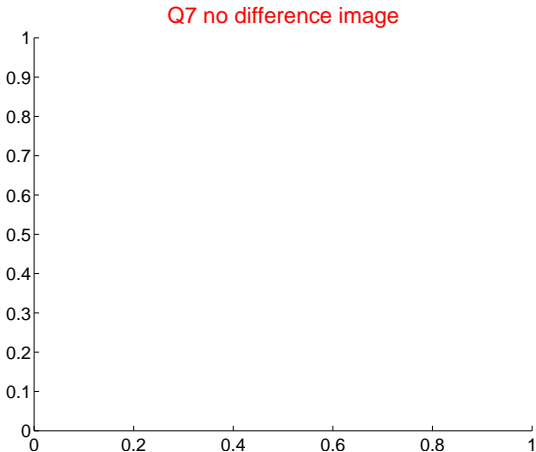
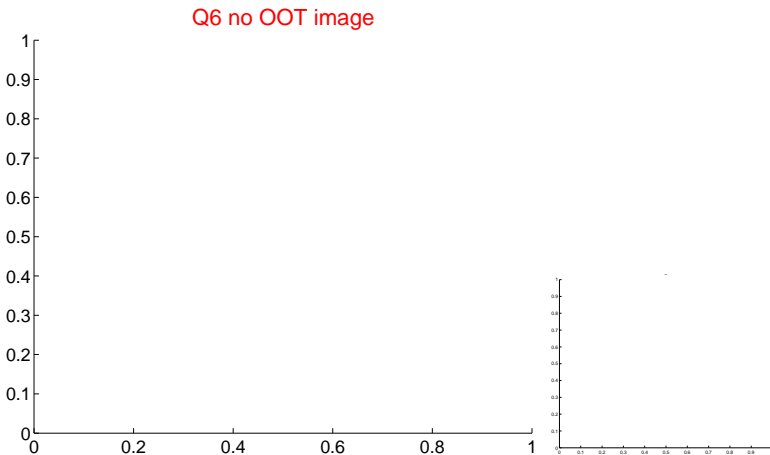
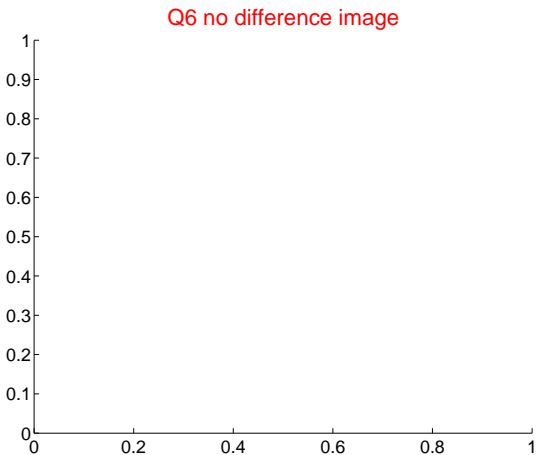
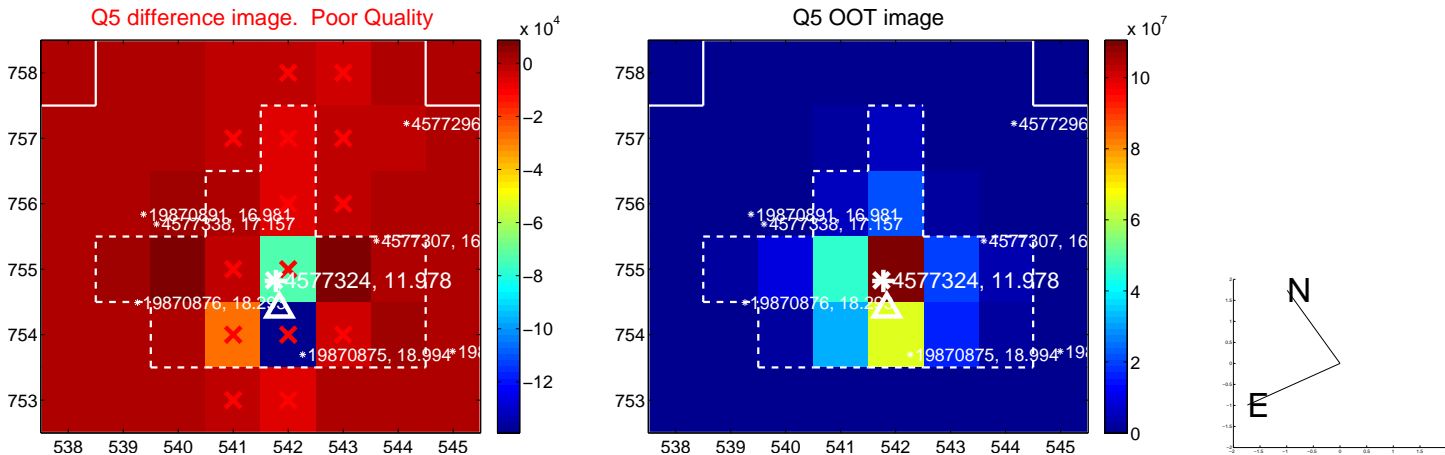


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

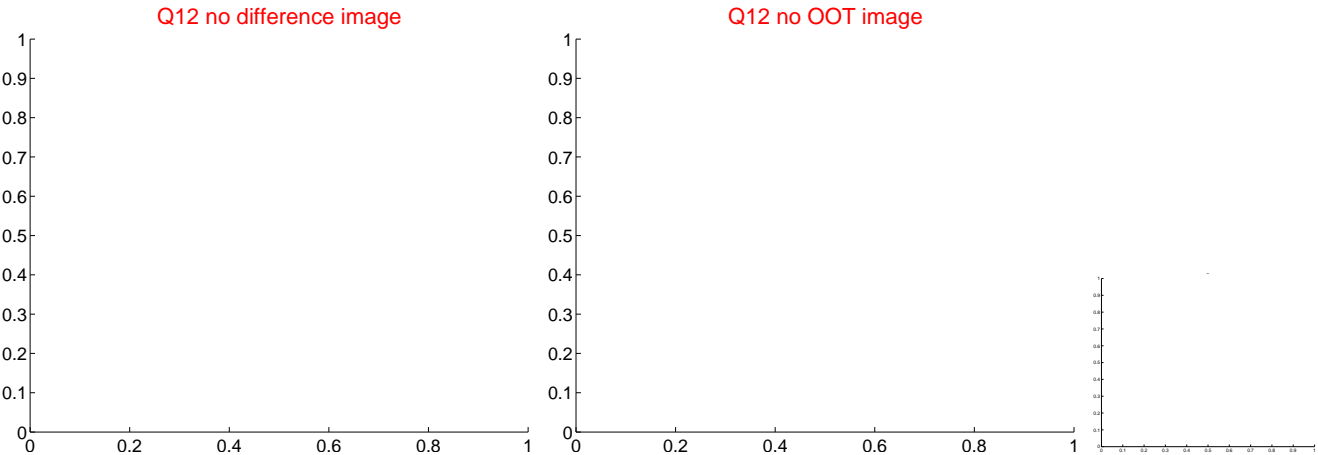
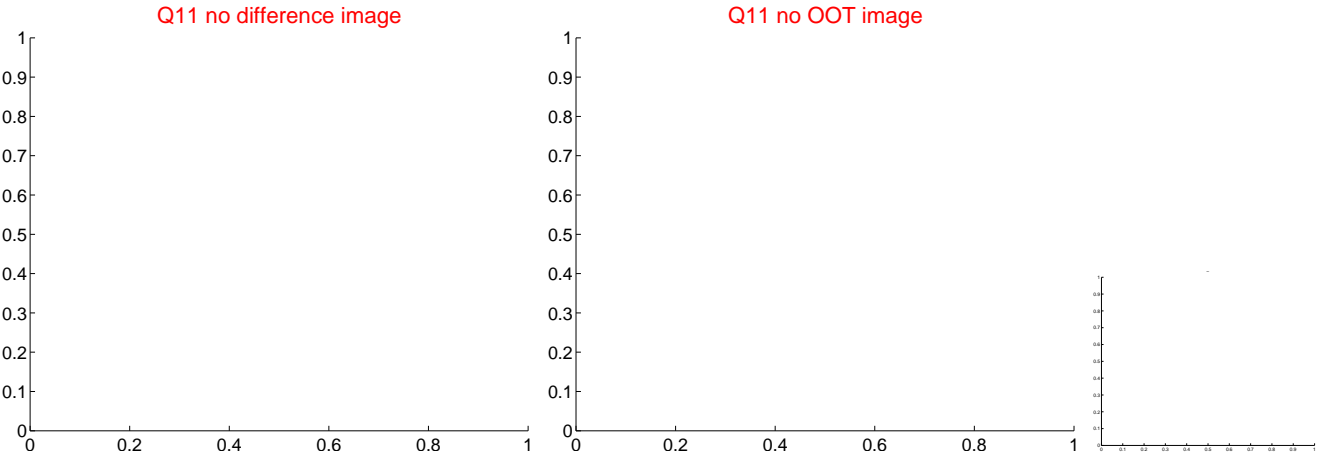
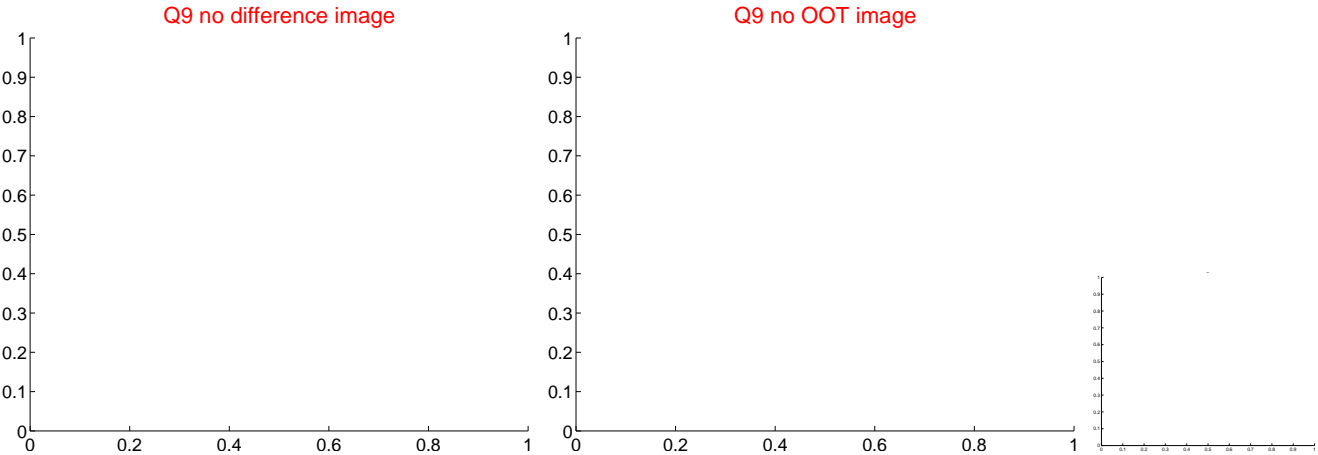
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



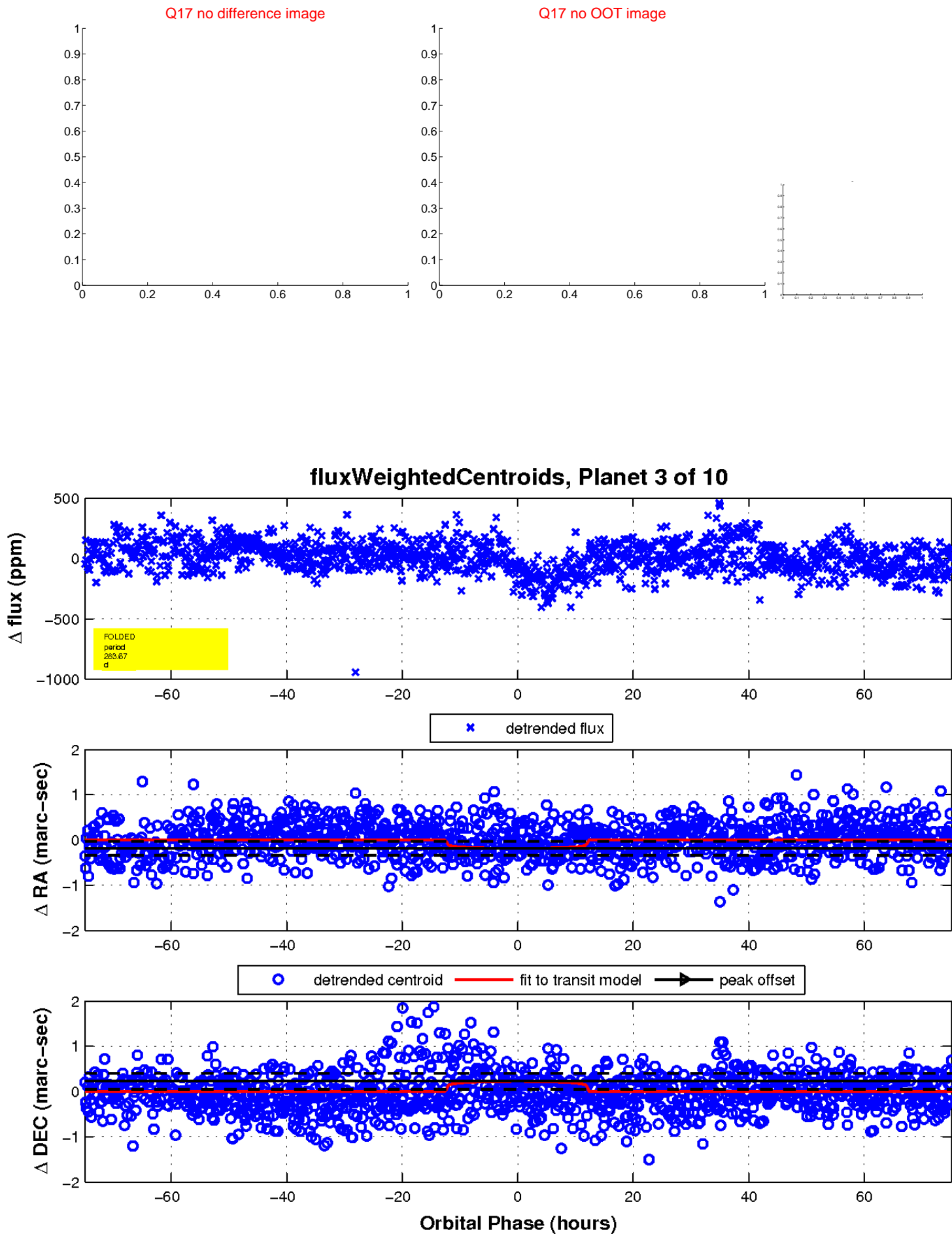
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



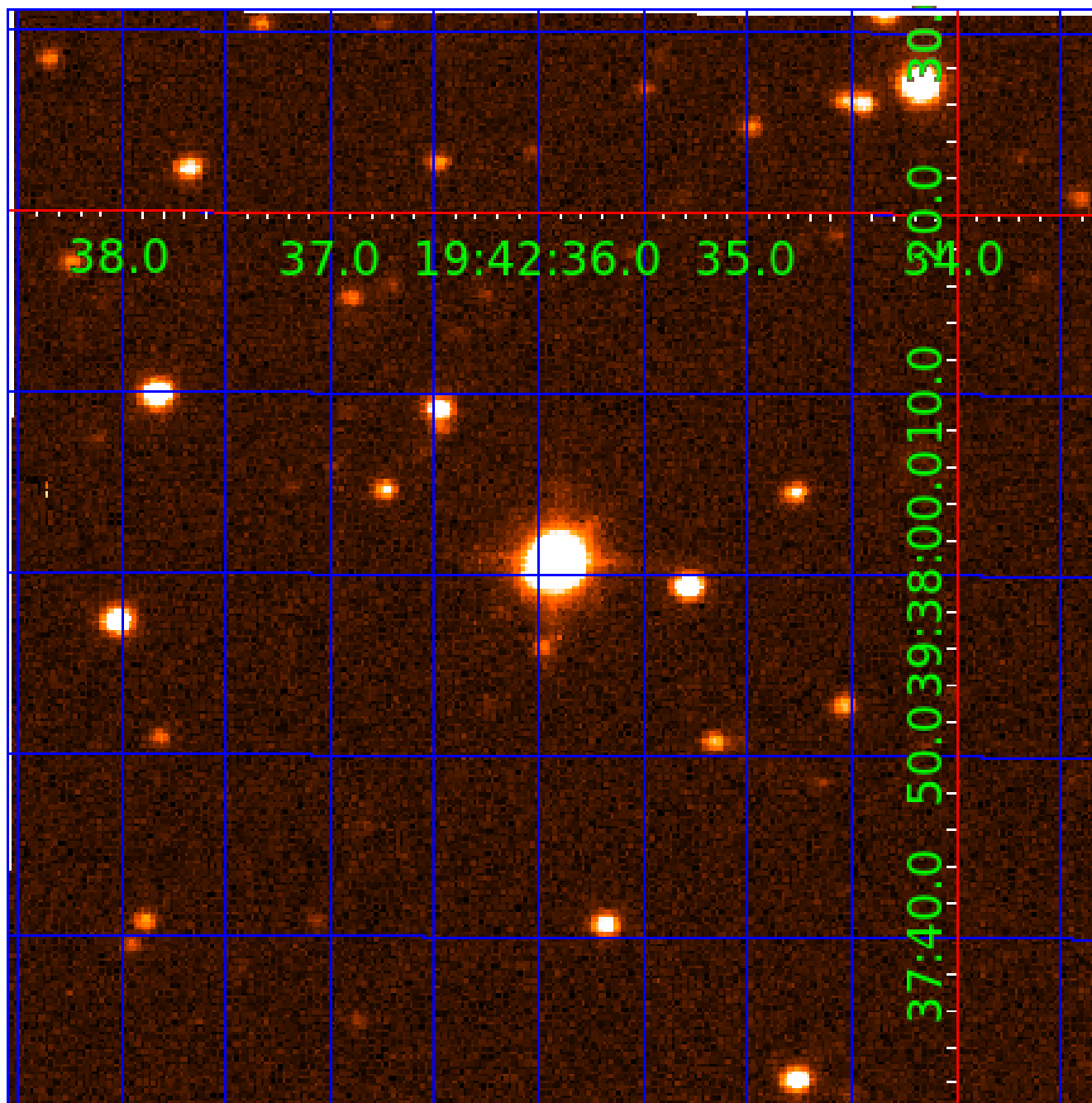
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004577324-01	OBS	No	2.676955	133.989377	23.7	9.268	8.5	8.2	1.55	6490	0.84	2508.57
004577324-02	OBS	No	5.352929	135.260103	33.6	9.181	10.0	9.7	1.55	6490	1.05	995.77
004577324-03	OBS	No	283.674058	186.080756	103.5	25.045	8.5	4.6	1.55	6490	1.73	5.00
004577324-04	OBS	No	310.445932	432.392002	164.8	7.764	7.9	6.3	1.55	6490	2.19	4.44
004577324-05	OBS	No	173.353436	171.891158	171.1	9.852	7.6	6.9	1.55	6490	2.22	9.65
004577324-06	OBS	No	15.793664	139.332735	72.1	14.982	8.0	8.0	1.55	6490	1.54	235.31
004577324-07	OBS	No	185.917423	244.975369	135.5	25.942	8.3	4.5	1.55	6490	2.10	8.79
004577324-08	OBS	No	171.313674	196.888564	98.3	5.032	7.4	5.4	1.55	6490	1.70	9.80
004577324-09	OBS	No	143.173964	238.606043	293.0	0.835	7.5	3.3	1.55	6490	2.73	12.45
004577324-10	OBS	No	143.175229	238.960367	60.4	1.407	7.6	1.6	1.55	6490	1.36	12.45

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004577324-01	OBS	FP	0.00	1	0	0	0	LPP_DV
004577324-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD
004577324-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS
004577324-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004577324-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS
004577324-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT
004577324-07	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST
004577324-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004577324-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004577324-10	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_FEW_DIFFS

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

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

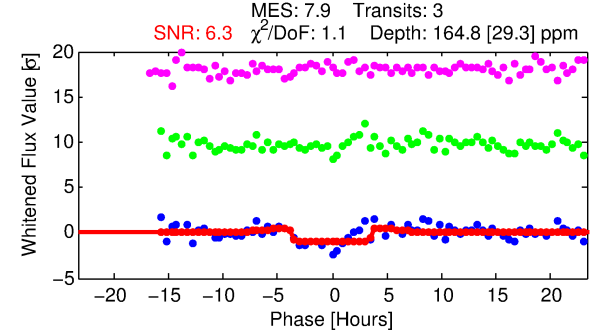
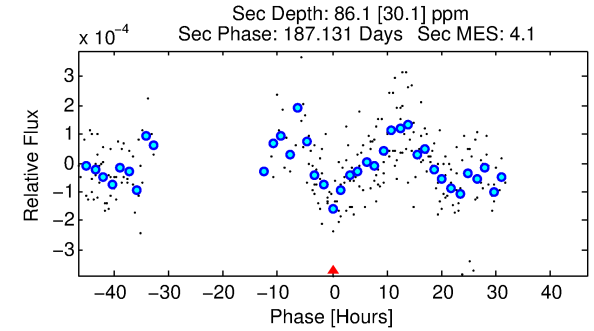
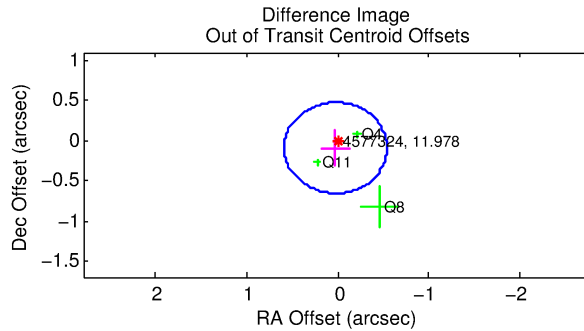
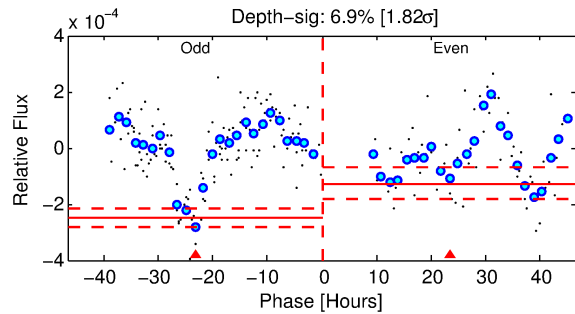
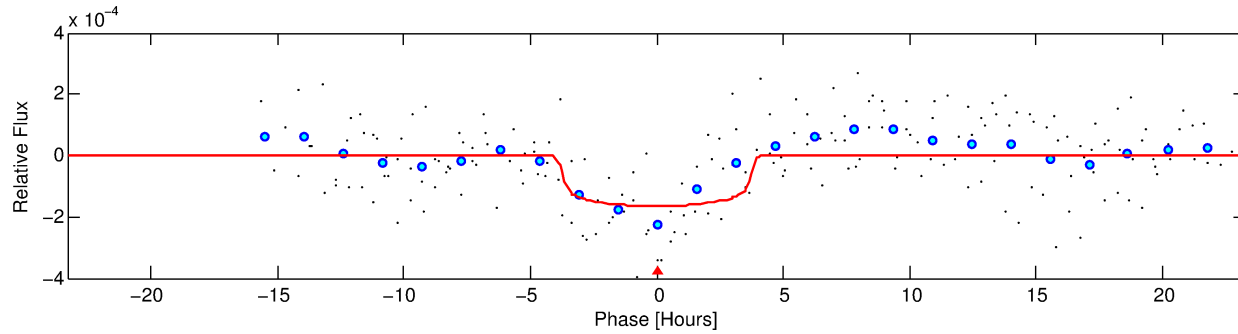
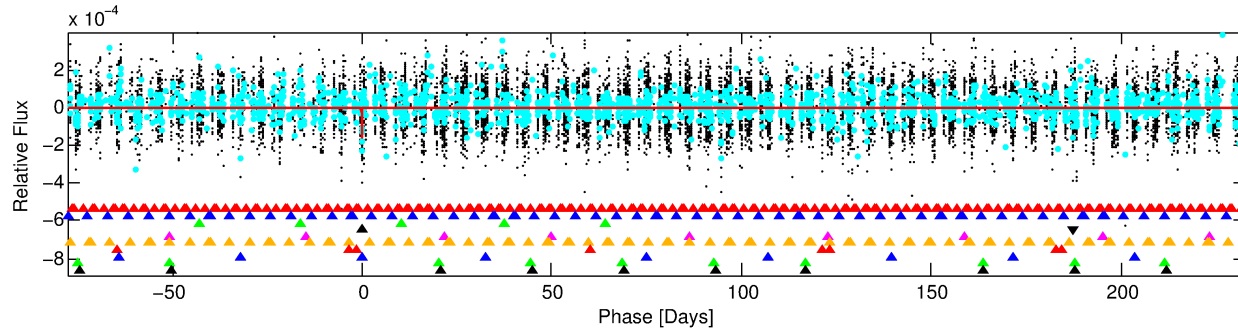
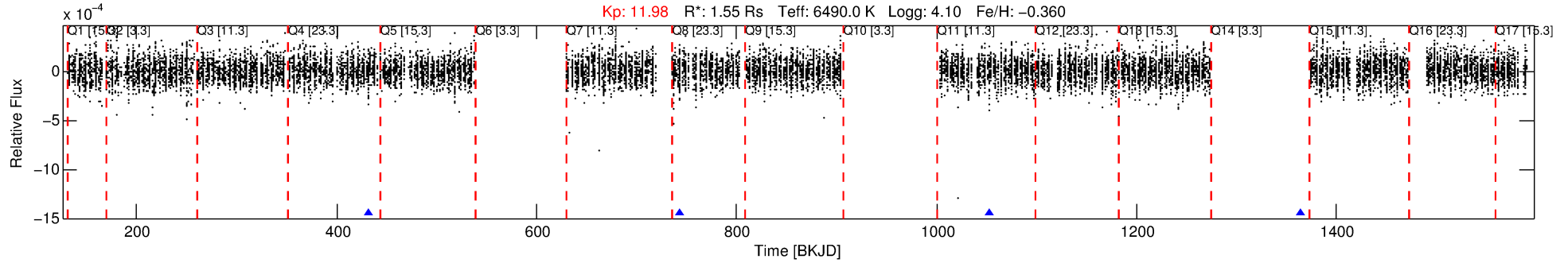
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004577324-04

No Significant Match Found

# DV One-Page Summary

KIC: 4577324 Candidate: 4 of 10 Period: 310.446 d



## DV Fit Results:

Period = 310.44593 [0.00865] d  
Epoch = 432.3920 [0.0132] BKJD  
 $R_p/R^*$  = 0.0130 [0.0053]  
 $a/R^*$  = 191.61 [420.35]  
 $b$  = 0.80 [1.02]  
 $\text{Seff}$  = 4.44 [1.76]  
 $T_{\text{eq}}$  = 370 [37] K  
 $R_p$  = 2.19 [1.07]  $R_e$   
 $a$  = 0.9285 [0.2248] AU  
 $A_g$  = 8475.50 [8225.40] [1.03 $\sigma$ ]  
 $T_{\text{eff}}$  = 5490 [1234] K [4.15 $\sigma$ ]

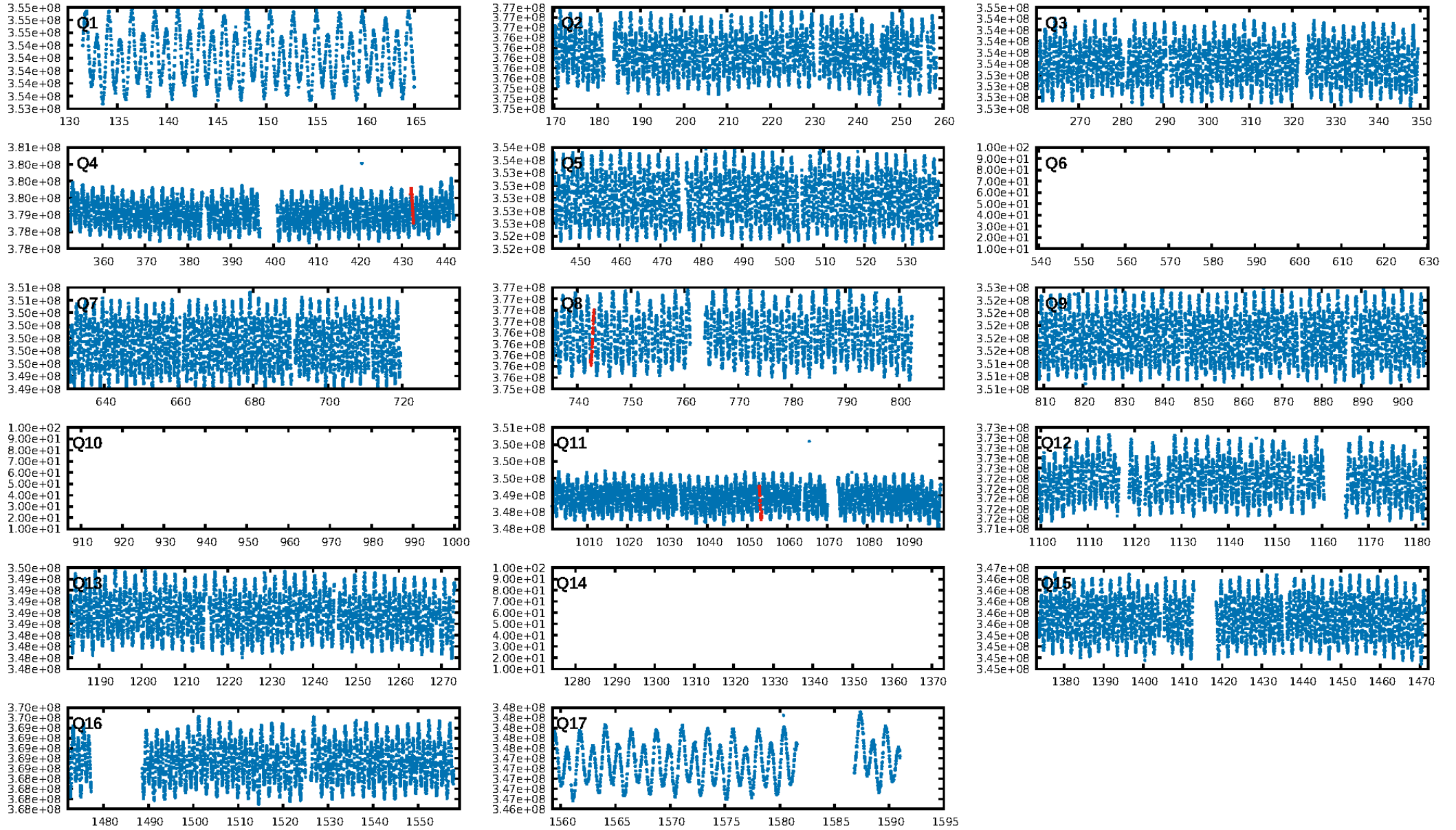
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [24.50 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 47.7%  
ModelChiSquareGof-sig: 81.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 2.289  
Centroid-sig: 7.3%  
Centroid-so: 1.553 arcsec [1.14 $\sigma$ ]  
OotOffset-rm: 0.094 arcsec [0.50 $\sigma$ ]  
KicOffset-rm: 0.183 arcsec [0.96 $\sigma$ ]  
OotOffset-st: 0/1/2/0 [3]  
KicOffset-st: 0/1/2/0 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 0.67 [2/3]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 00:55:36 Z

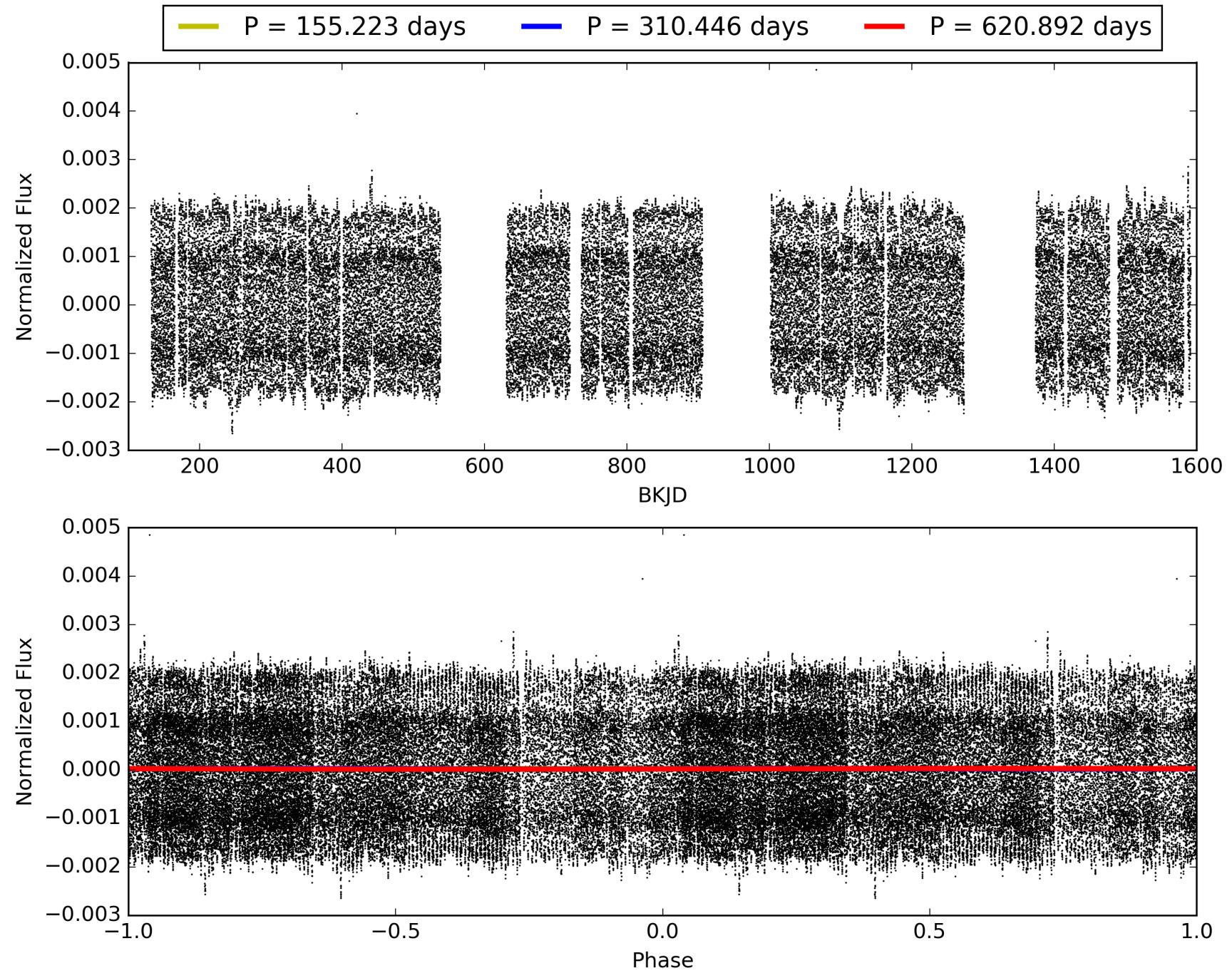
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004577324-04, PDC Light Curves



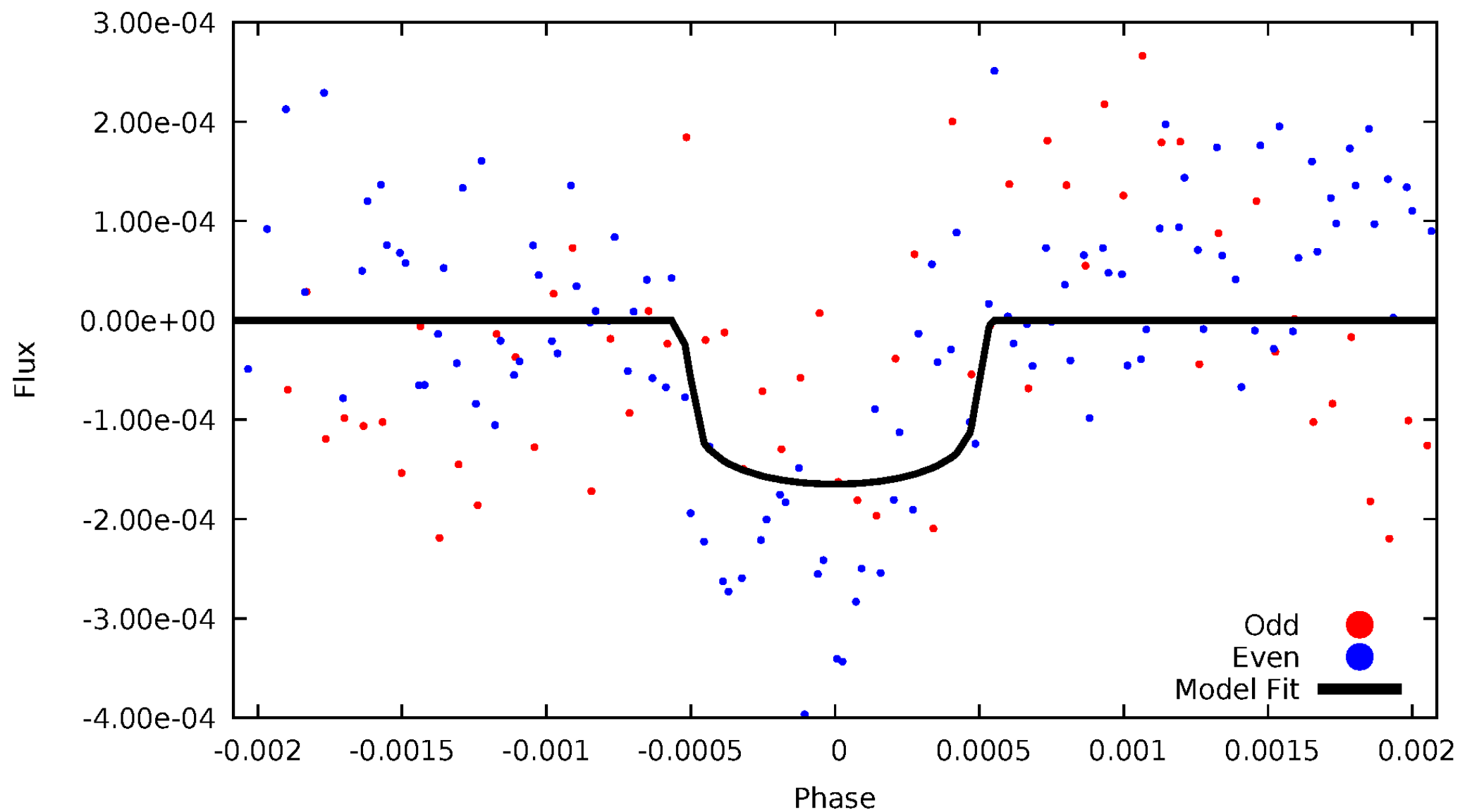


# TCE 004577324-04



# DV Odd/Even

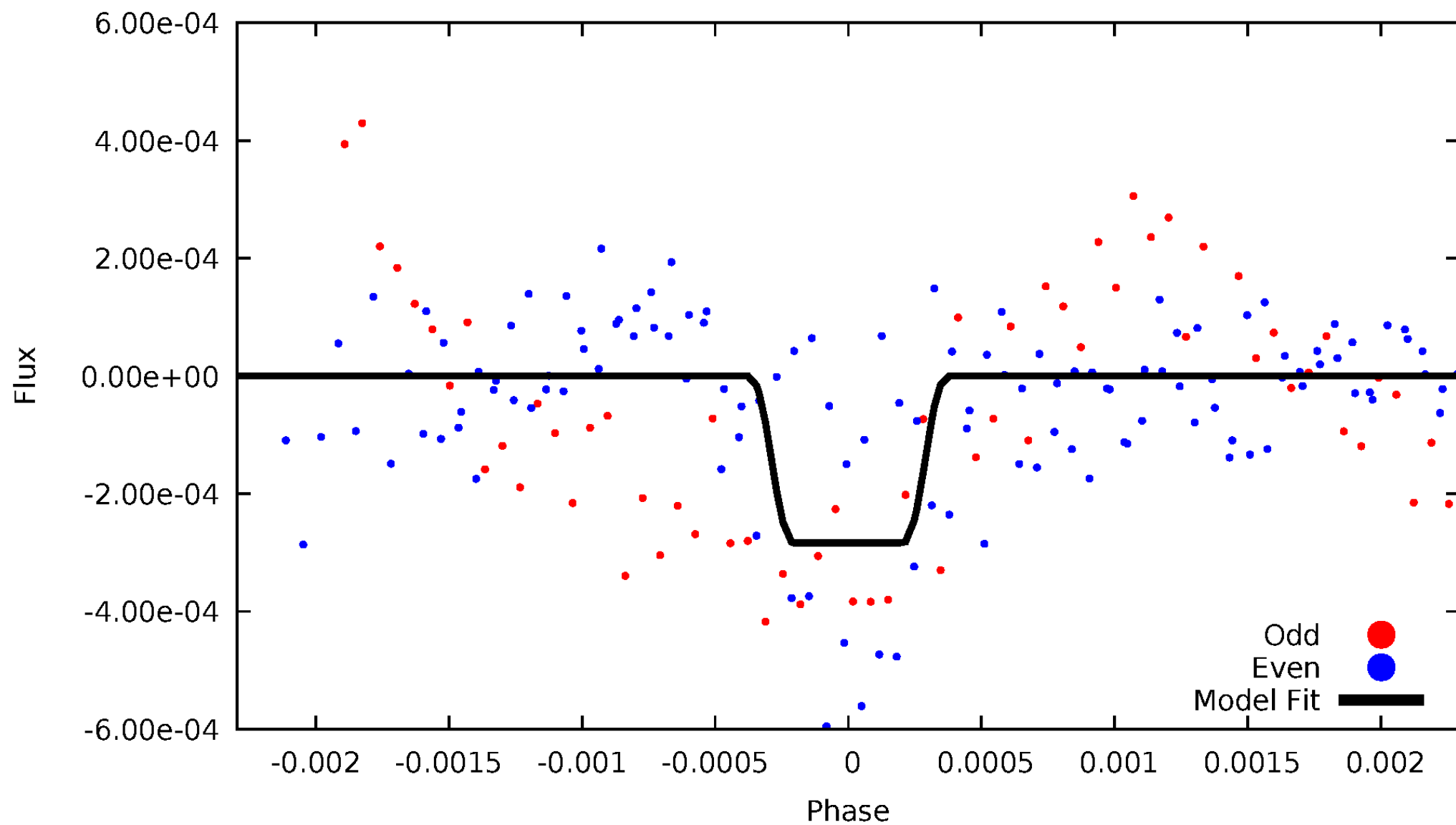
TCE 004577324-04





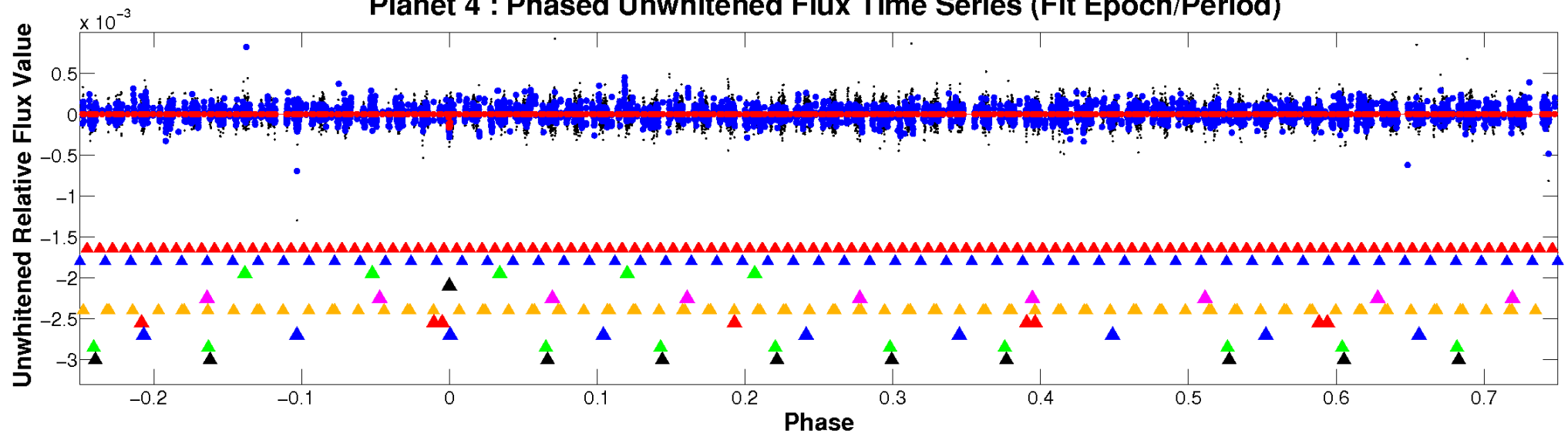
# ALT Odd/Even

TCE 004577324-04

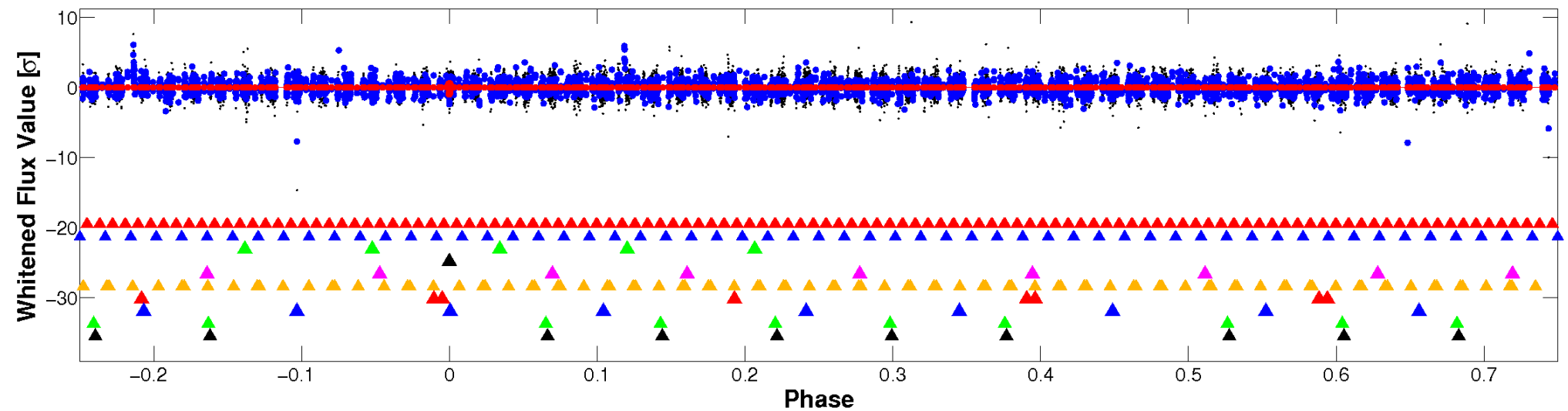


# Non-Whitened Vs. Whitened Light Curve

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

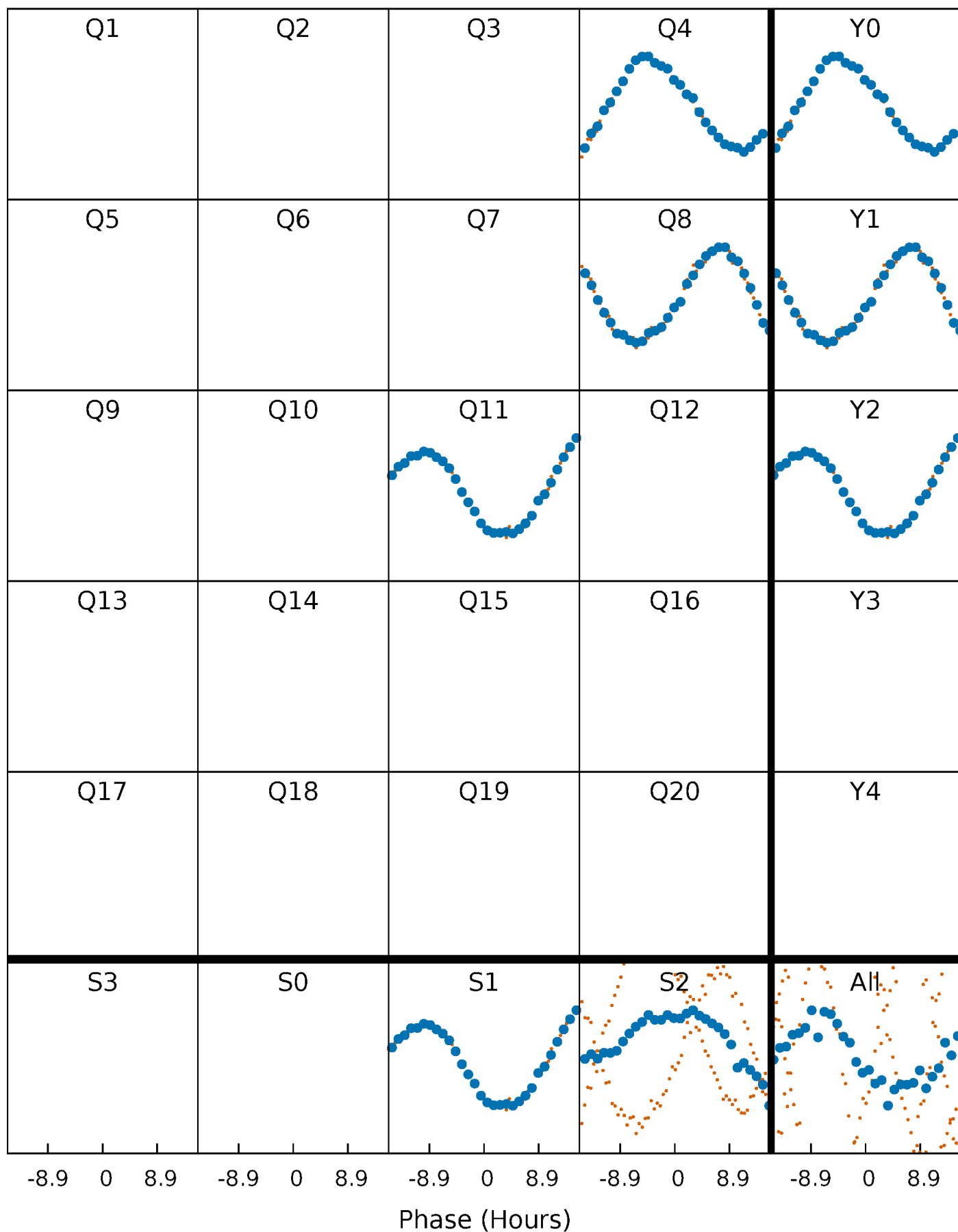


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



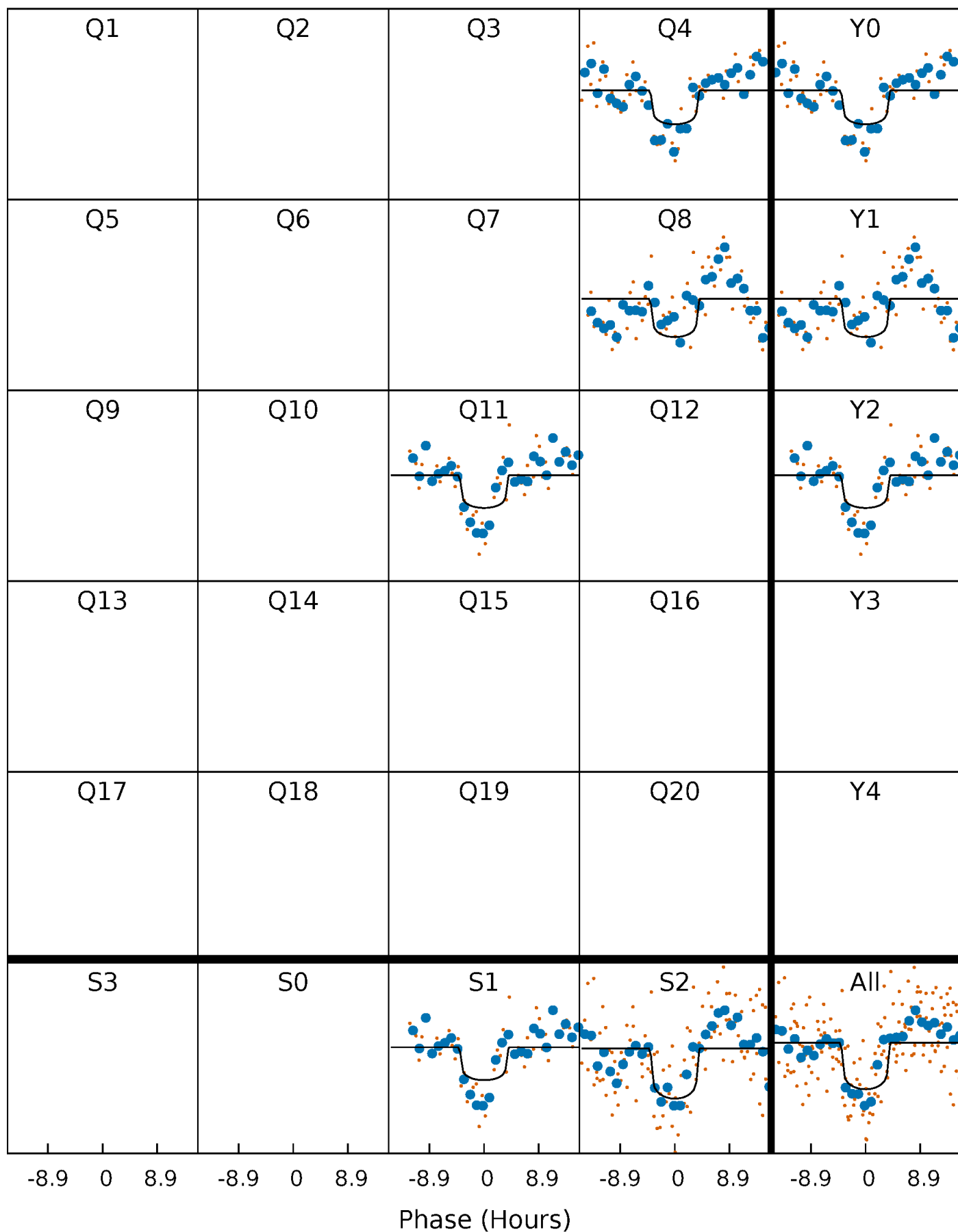
# PDC Quarter-Phased Transit Curves

TCE 004577324-04     $P=310.445933$  Days     $T_0=432.392002$  (BKJD)



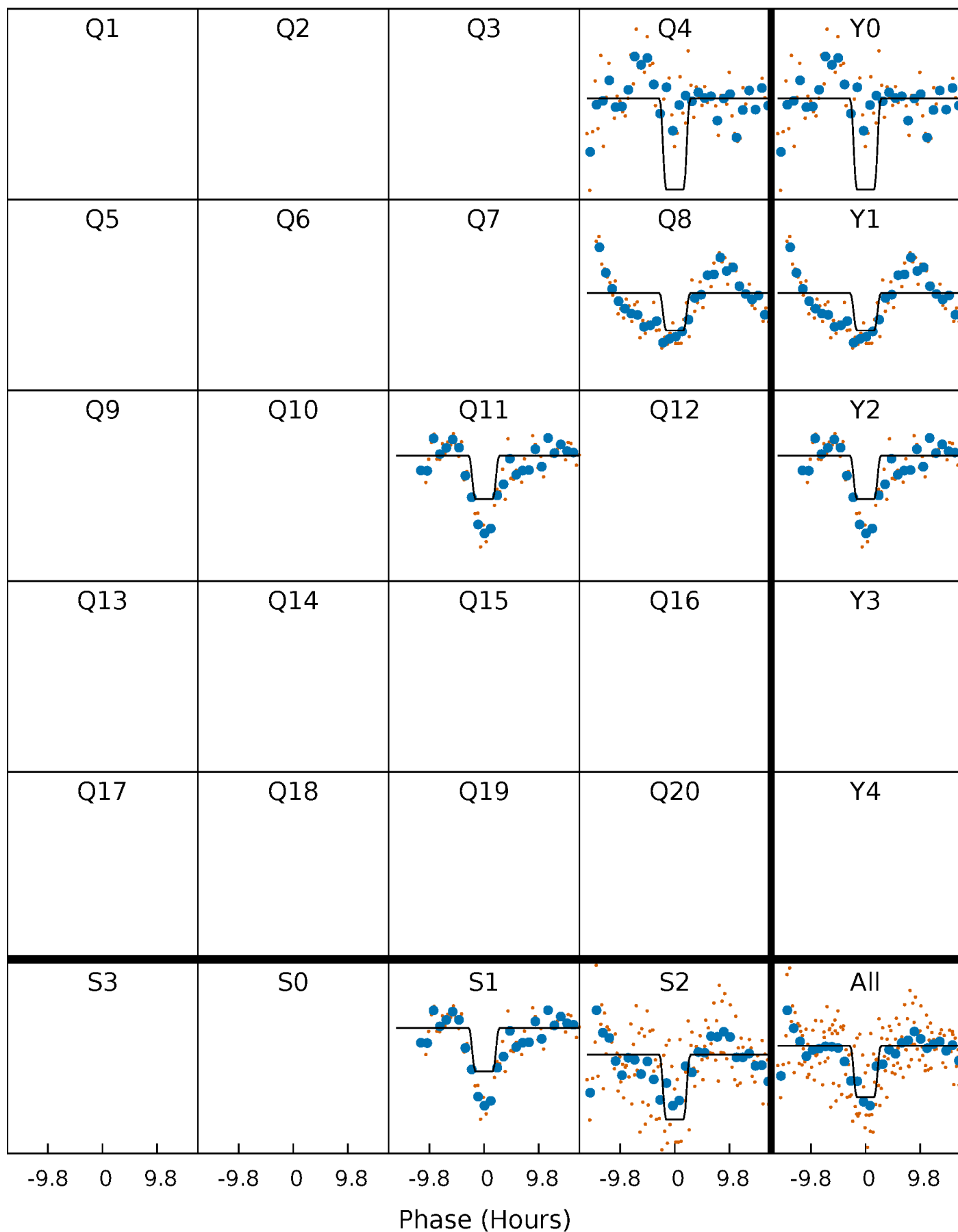
# DV Quarter-Phased Transit Curves

TCE 004577324-04     $P=310.445933$  Days     $T_0=432.392002$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

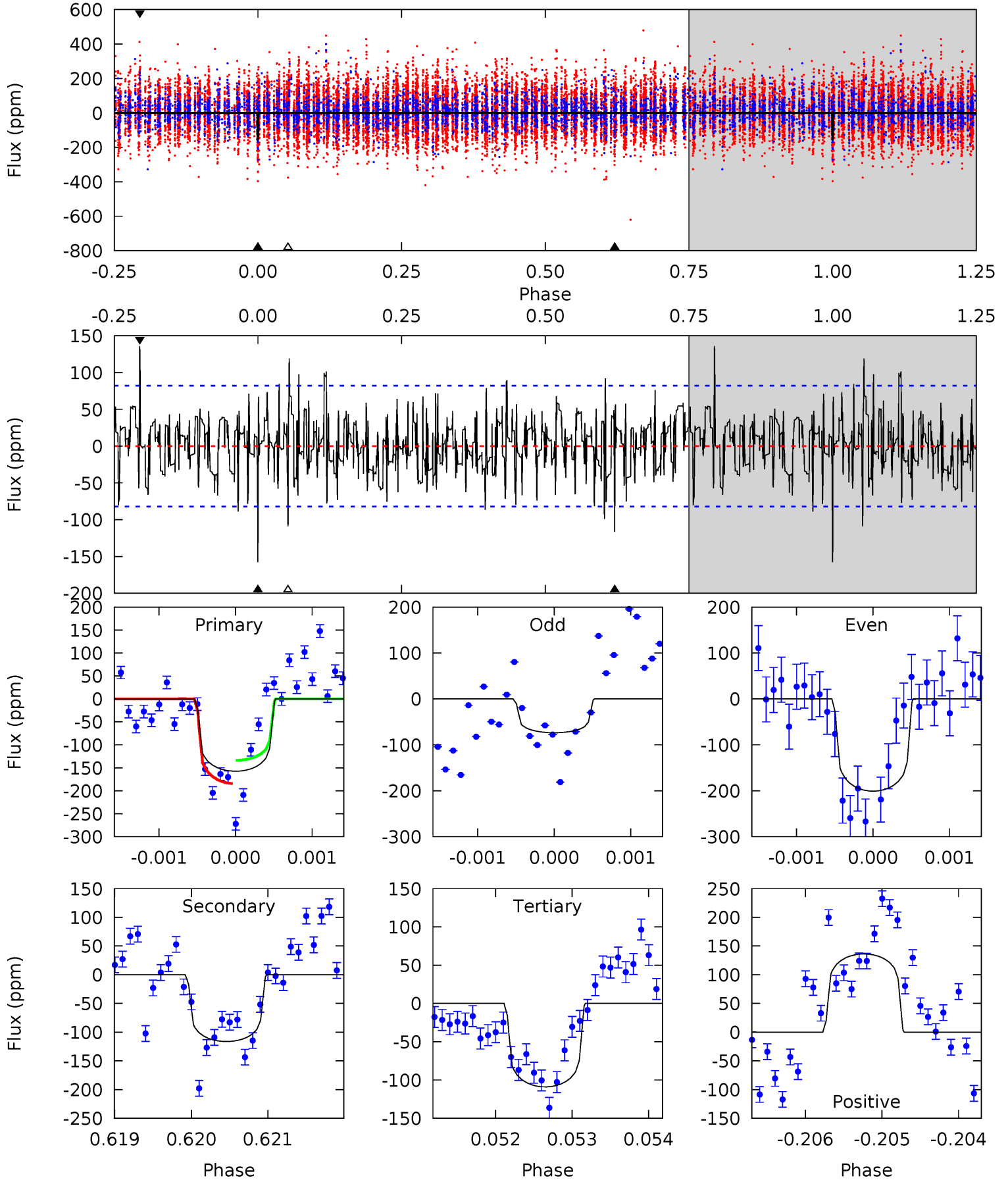
TCE 004577324-04     $P=310.440266$  Days     $T_0=432.395877$  (BKJD)



# DV Model-Shift Uniqueness Test

004577324-04, P = 310.445933 Days, E = 121.946069 Days

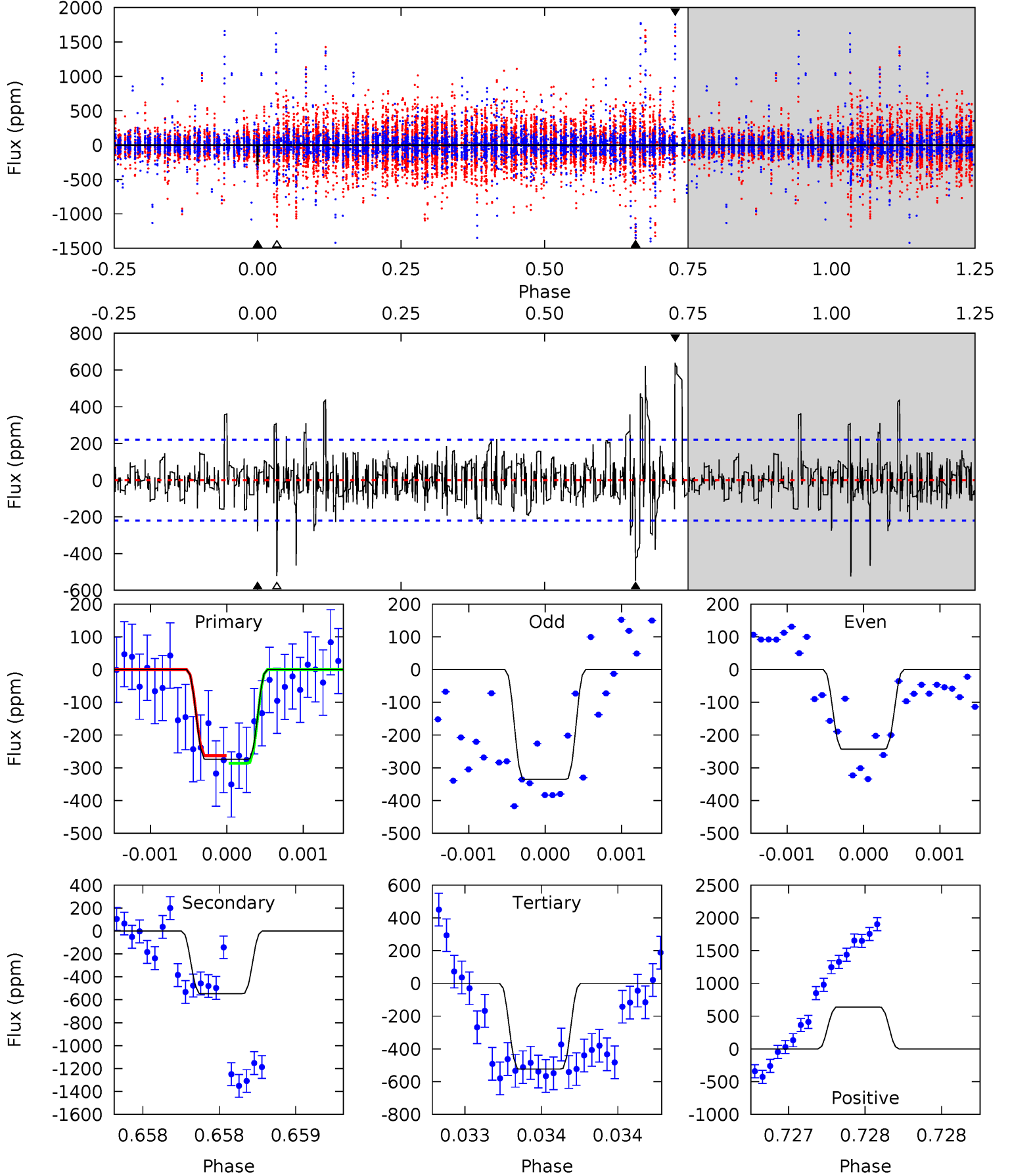
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.4	7.70	7.22	9.02	5.44	3.28	2.18	3.21	1.41	0.48	-1.32	3.91	0.80	0.46	1.68



# Alt Model-Shift Uniqueness Test

004577324-04, P = 310.440266 Days, E = 121.955611 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.87	13.7	13.1	16.0	5.51	3.38	1.98	-6.23	-9.13	0.59	-2.31	0.96	0.83	0.54	0.29





### Stellar Parameters For KIC 004577324

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6490^{+146}_{-178}$	$4.101^{+0.221}_{-0.119}$	$-0.360^{+0.300}_{-0.300}$	$1.551^{+0.329}_{-0.402}$	$1.107^{+0.177}_{-0.145}$	$0.418^{+0.512}_{-0.145}$
	+2%/-3%	+5%/-3%	+83%/-83%	+21%/-26%	+16%/-13%	+122%/-35%
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 004577324-04 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-116 \pm 15$	$2.15^{+0.93}_{-0.88}$	$509^{+31}_{-35}$	$5867^{+2002}_{-865}$	$12104^{+23308}_{-6360}$
Alt.	$-546 \pm 40$	$2.77^{+1.04}_{-0.95}$	$510^{+33}_{-33}$	$7821^{+2266}_{-1192}$	$34124^{+43047}_{-16073}$

$T_{max}$  = 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

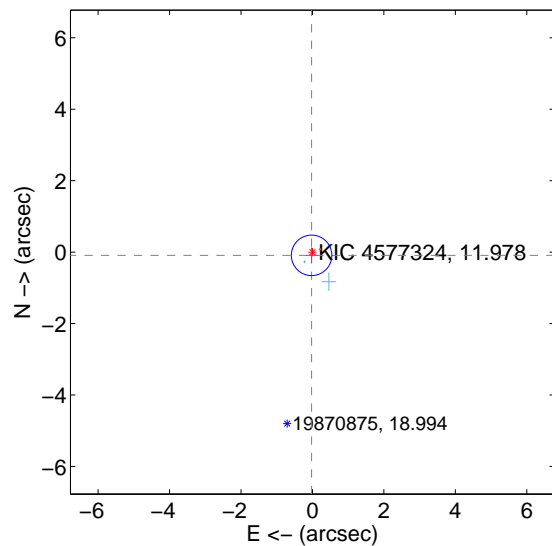
Supplemental centroid analysis for 004577324-04. **Kepler magnitude: 11.98.** Transit SNR 6.31

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

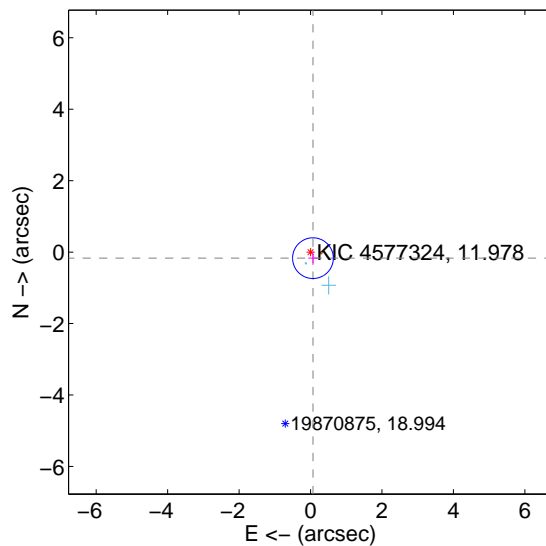
The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.094 \pm 0.189$	0.50	$0.024 \pm 0.158$	$-0.091 \pm 0.220$
PRF-fit source offset from KIC position	$0.183 \pm 0.190$	0.96	$-0.068 \pm 0.132$	$-0.169 \pm 0.188$
photometric centroid source offset	$1.55 \pm 1.36$	1.14	$0.17 \pm 1.21$	$1.54 \pm 1.37$

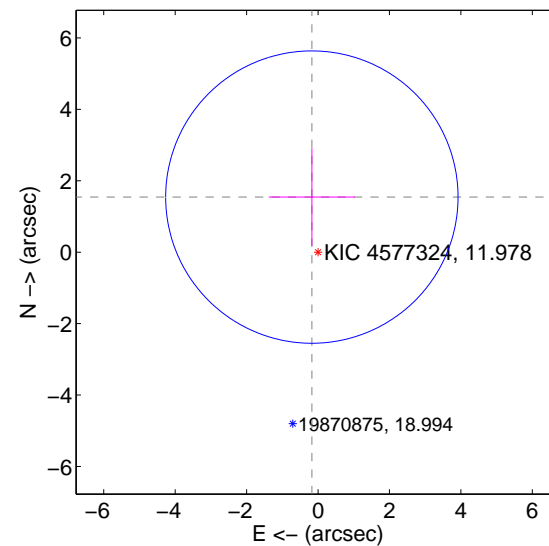
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids



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

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

Q1 no difference image



Q1 no OOT image



Q2 no difference image



Q2 no OOT image



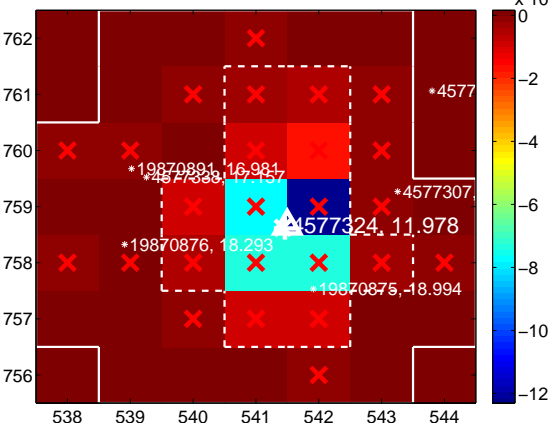
Q3 no difference image



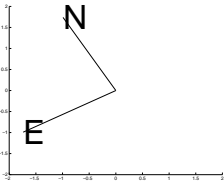
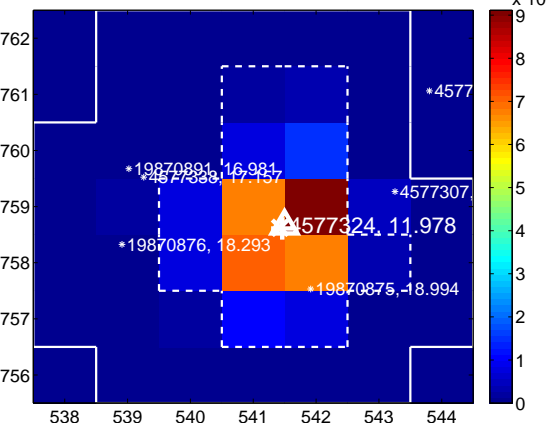
Q3 no OOT image



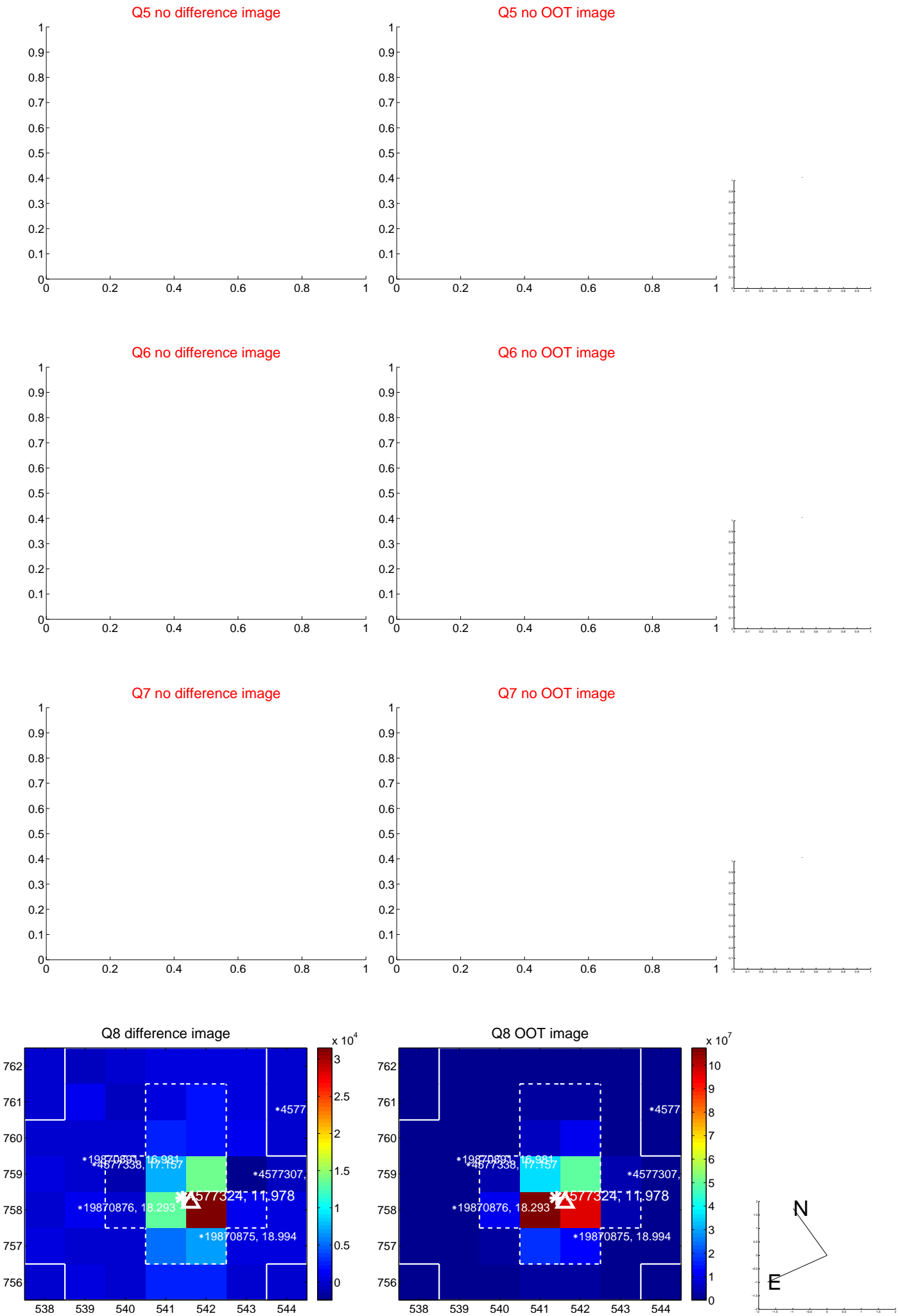
Q4 difference image. Poor Quality



Q4 OOT image



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



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

Q9 no difference image



Q9 no OOT image



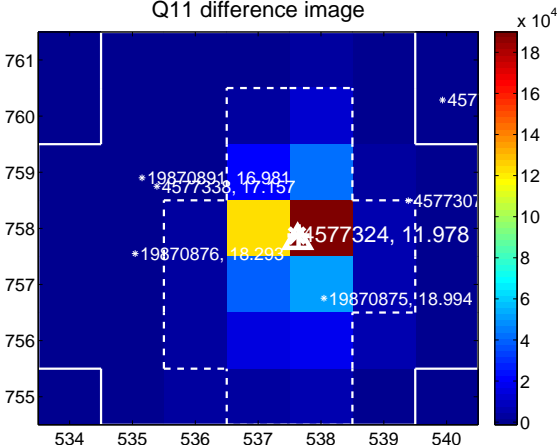
Q10 no difference image



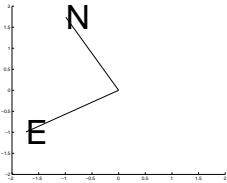
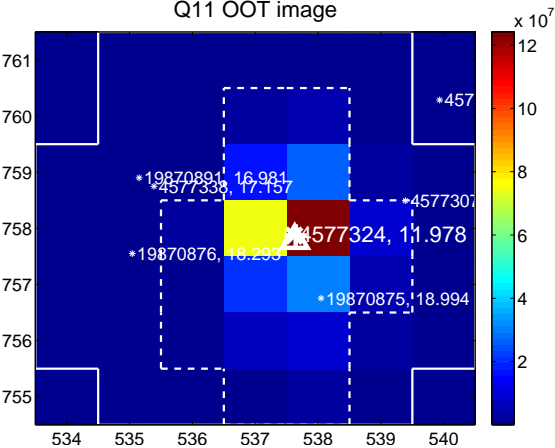
Q10 no OOT image



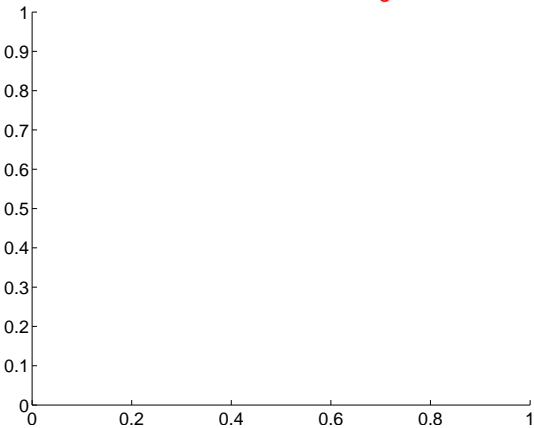
Q11 difference image



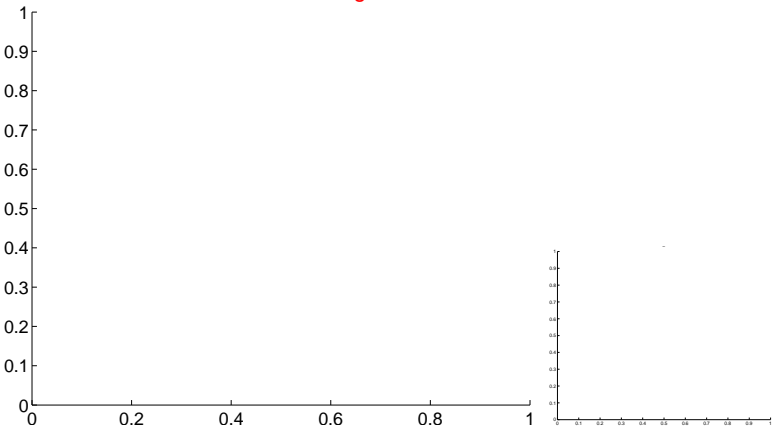
Q11 OOT image



Q12 no difference image



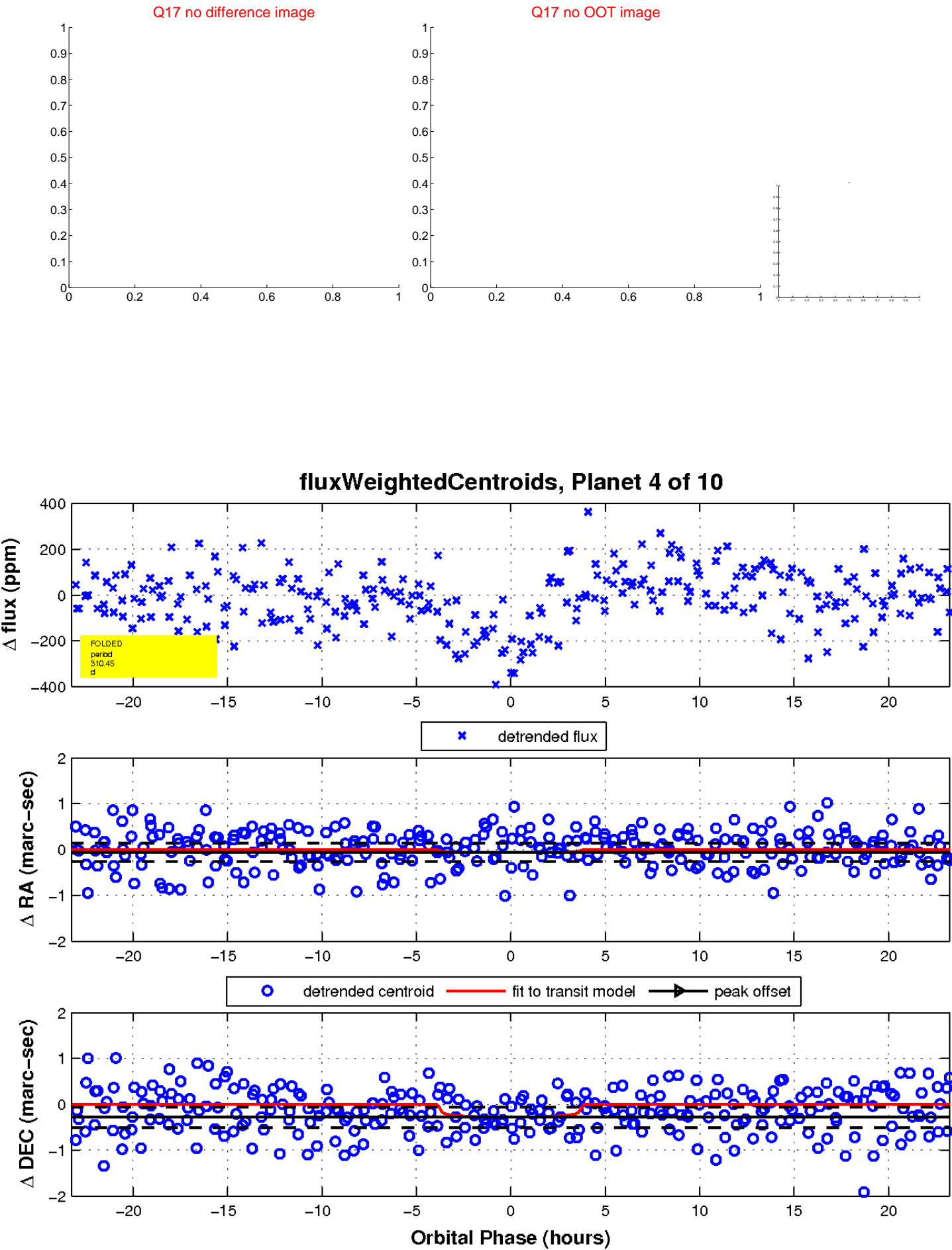
Q12 no OOT image



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



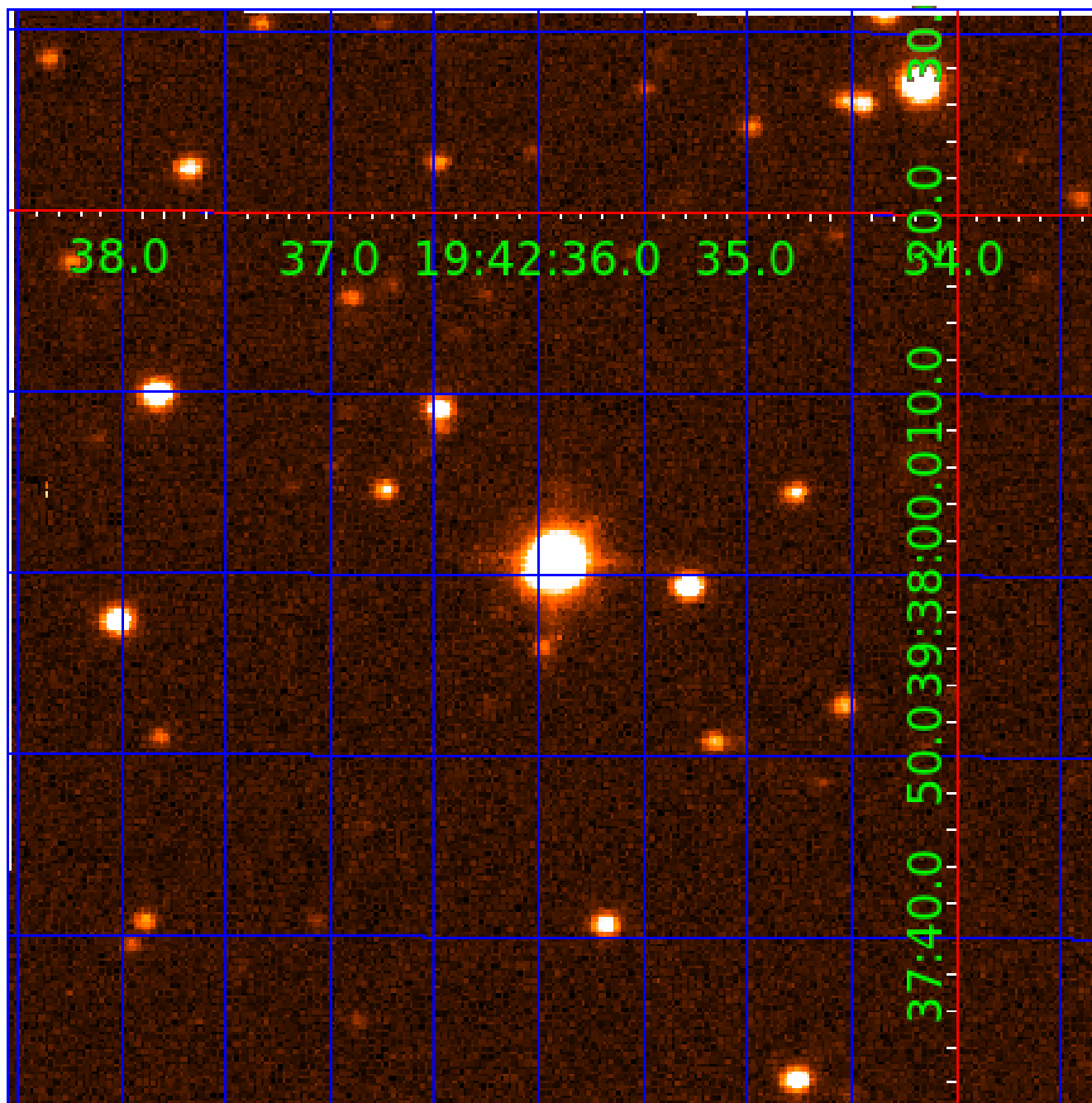
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004577324-01	OBS	No	2.676955	133.989377	23.7	9.268	8.5	8.2	1.55	6490	0.84	2508.57
004577324-02	OBS	No	5.352929	135.260103	33.6	9.181	10.0	9.7	1.55	6490	1.05	995.77
004577324-03	OBS	No	283.674058	186.080756	103.5	25.045	8.5	4.6	1.55	6490	1.73	5.00
004577324-04	OBS	No	310.445932	432.392002	164.8	7.764	7.9	6.3	1.55	6490	2.19	4.44
004577324-05	OBS	No	173.353436	171.891158	171.1	9.852	7.6	6.9	1.55	6490	2.22	9.65
004577324-06	OBS	No	15.793664	139.332735	72.1	14.982	8.0	8.0	1.55	6490	1.54	235.31
004577324-07	OBS	No	185.917423	244.975369	135.5	25.942	8.3	4.5	1.55	6490	2.10	8.79
004577324-08	OBS	No	171.313674	196.888564	98.3	5.032	7.4	5.4	1.55	6490	1.70	9.80
004577324-09	OBS	No	143.173964	238.606043	293.0	0.835	7.5	3.3	1.55	6490	2.73	12.45
004577324-10	OBS	No	143.175229	238.960367	60.4	1.407	7.6	1.6	1.55	6490	1.36	12.45

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004577324-01	OBS	FP	0.00	1	0	0	0	LPP_DV
004577324-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD
004577324-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS
004577324-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004577324-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS
004577324-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT
004577324-07	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST
004577324-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004577324-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004577324-10	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_FEW_DIFFS

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

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

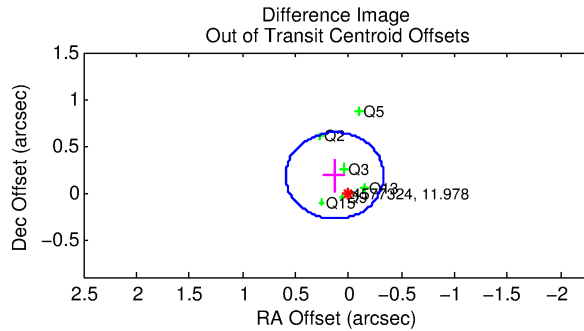
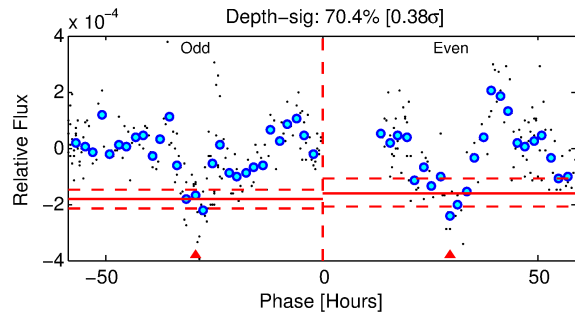
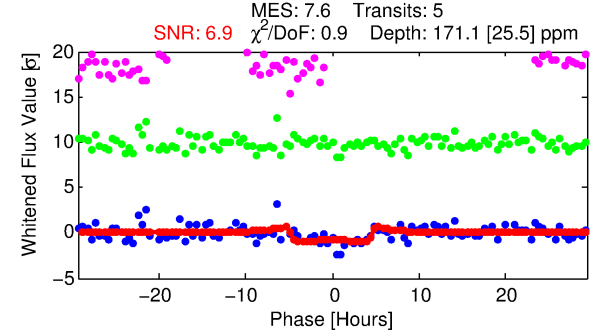
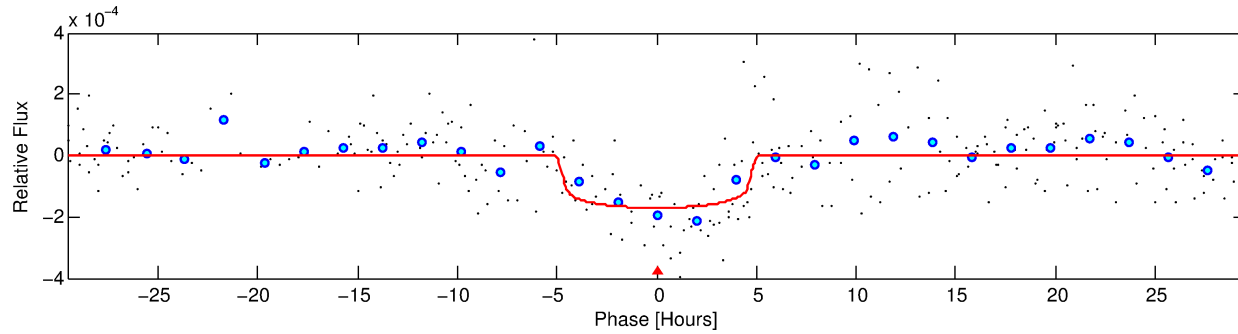
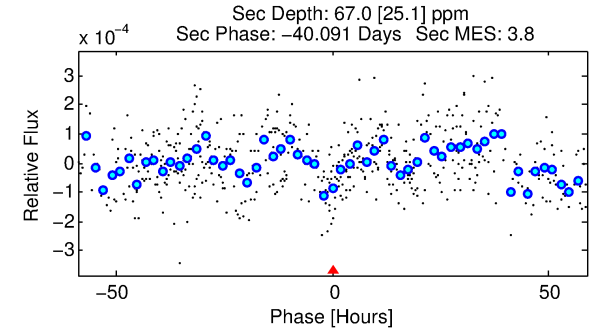
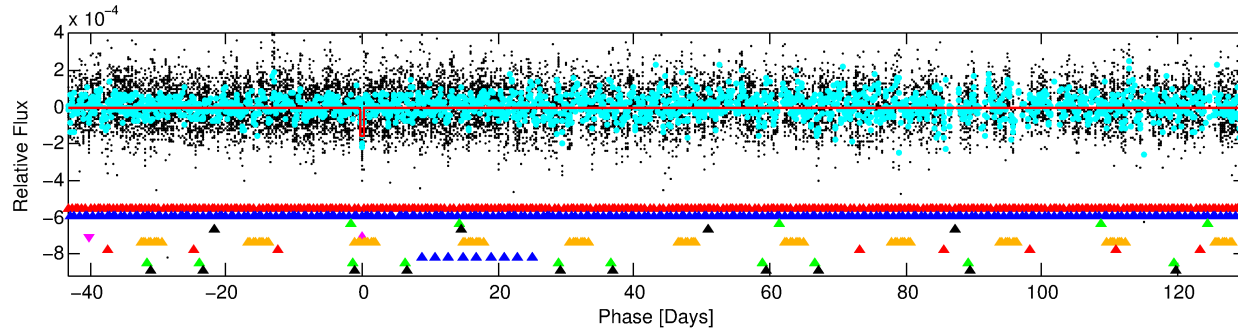
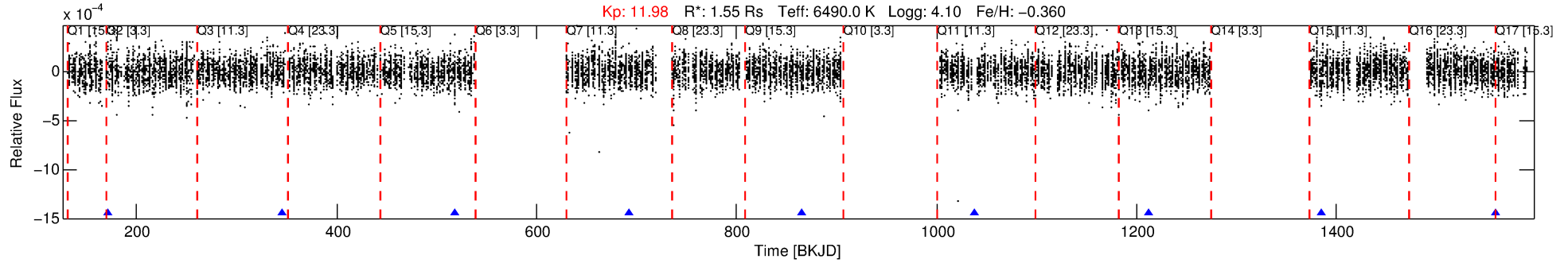
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004577324-05

No Significant Match Found

# DV One-Page Summary

KIC: 4577324 Candidate: 5 of 10 Period: 173.353 d



## DV Fit Results:

Period = 173.35344 [0.00242] d  
Epoch = 171.8912 [0.0113] BKJD  
Rp/R\* = 0.0131 [0.0053]  
a/R\* = 86.88 [191.42]  
b = 0.78 [1.11]  
Seff = 9.65 [3.82]  
Teq = 449 [45] K  
Rp = 2.22 [1.07] Re  
a = 0.6296 [0.1524] AU  
Ag = 2954.65 [2858.76] [1.03σ]  
Teffp = 5123 [1148] K [4.07σ]

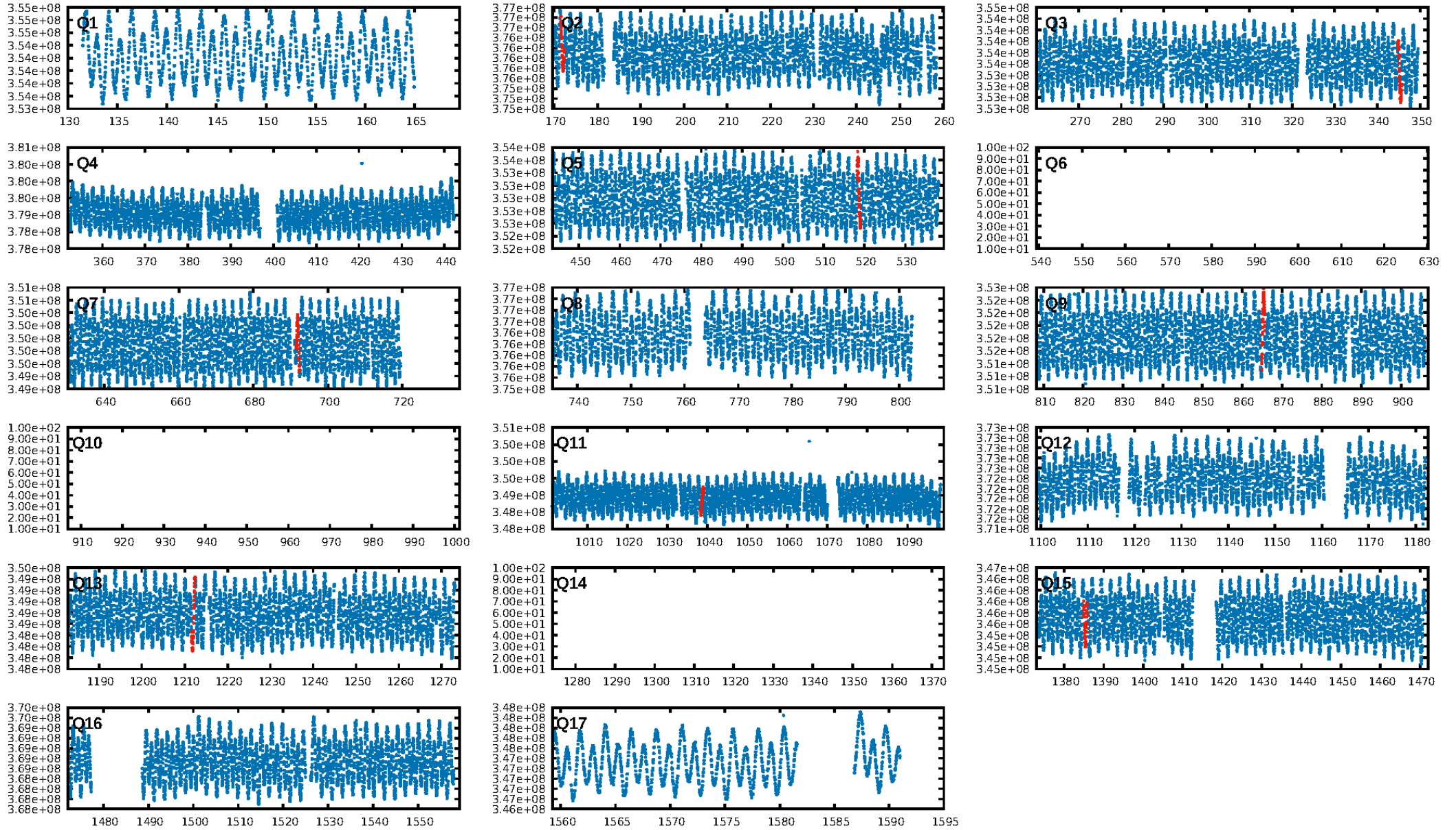
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [4.43σ]  
LongPeriod-sig: 100.0% [10.87σ]  
ModelChiSquare2-sig: 55.4%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 0.6729  
Centroid-sig: 5.8%  
Centroid-so: 1.507 arcsec [2.00σ]  
OotOffset-rm: 0.223 arcsec [1.45σ]  
KicOffset-rm: 0.102 arcsec [0.59σ]  
OotOffset-st: 1/2/0/3 [6]  
KicOffset-st: 1/2/0/3 [6]  
DiffImageQuality-fgm: 0.67 [4/6]  
DiffImageOverlap-fno: 0.17 [1/6]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 00:55:40 Z

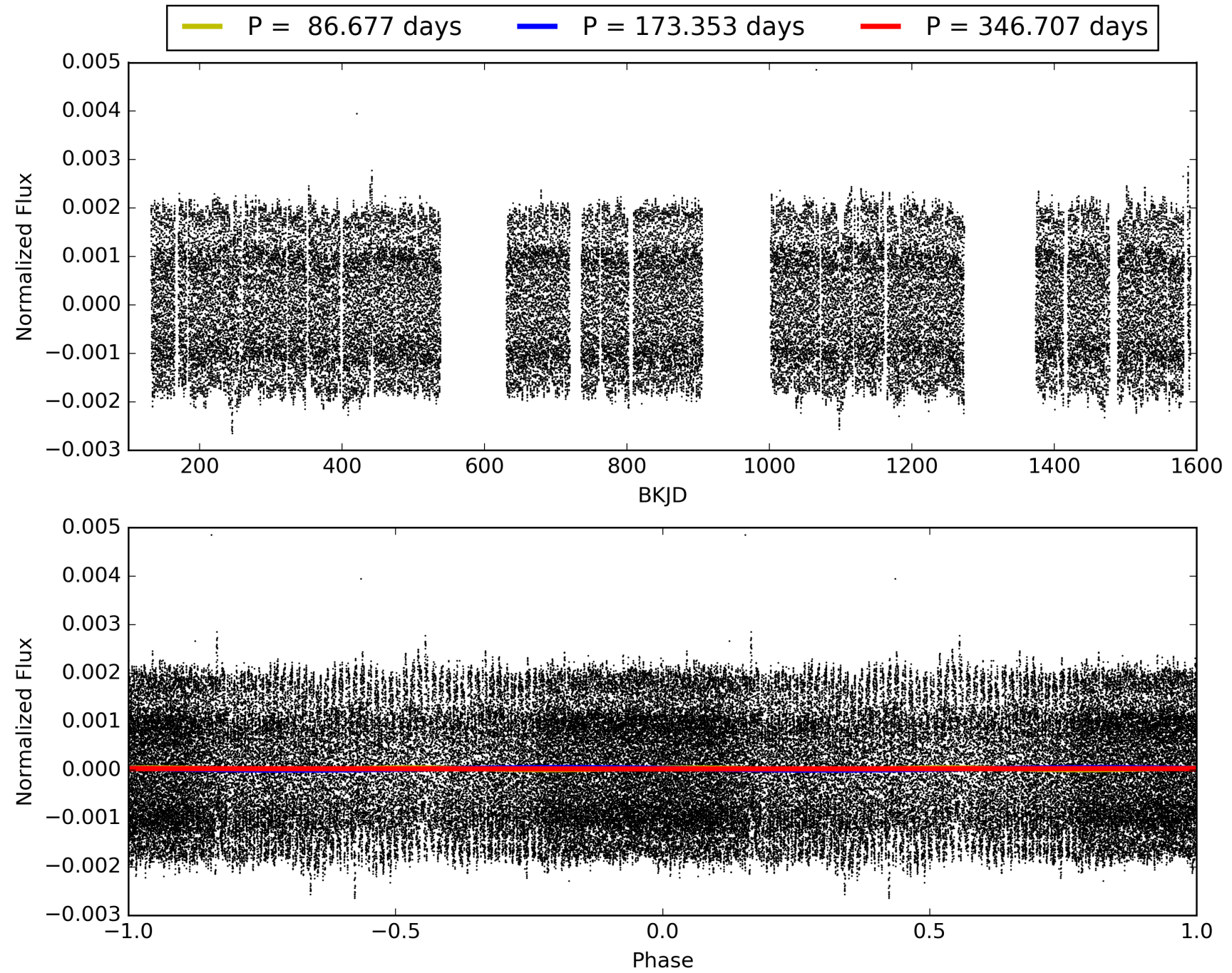
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004577324-05, PDC Light Curves



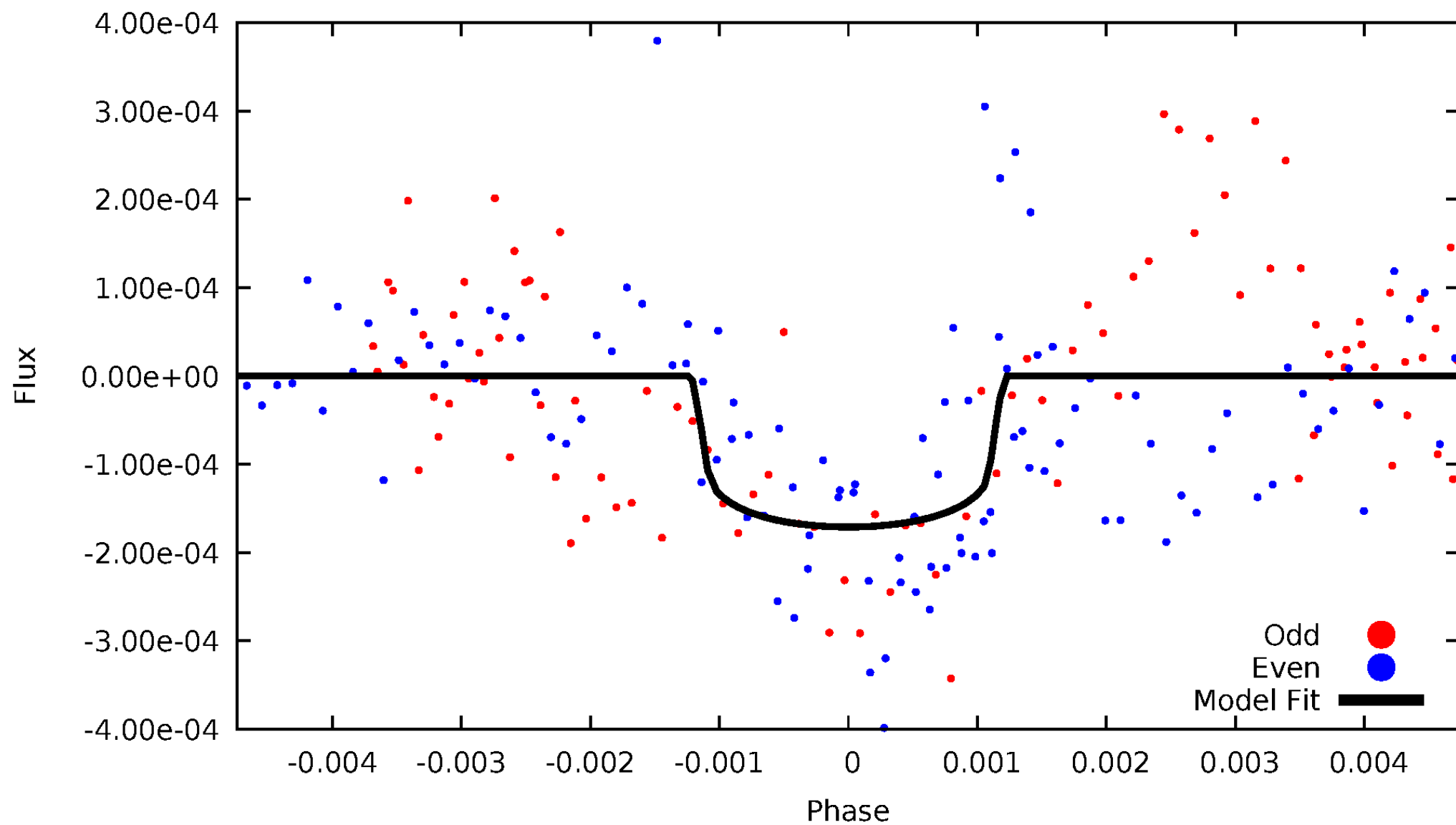


# TCE 004577324-05



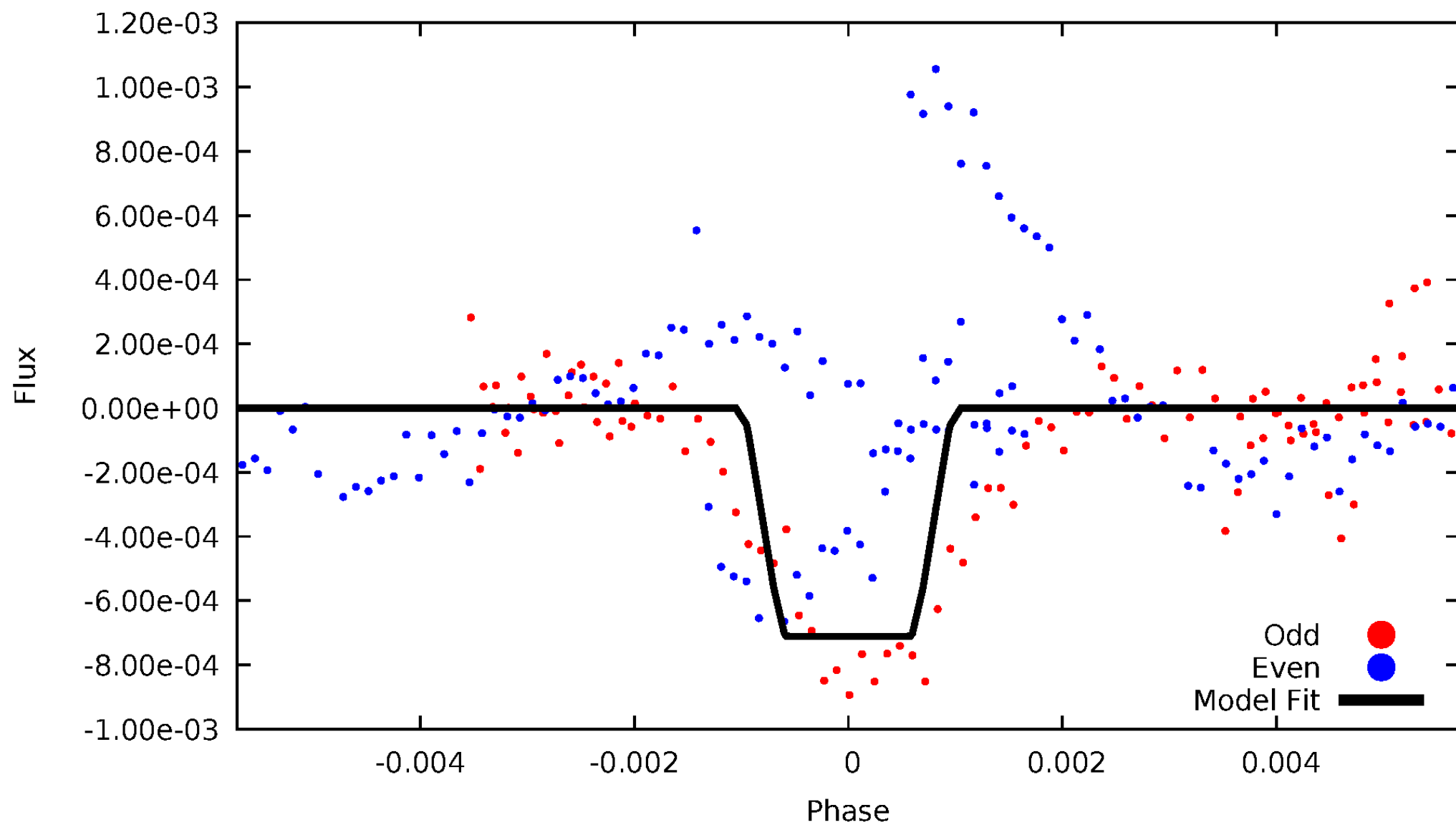
# DV Odd/Even

TCE 004577324-05



# ALT Odd/Even

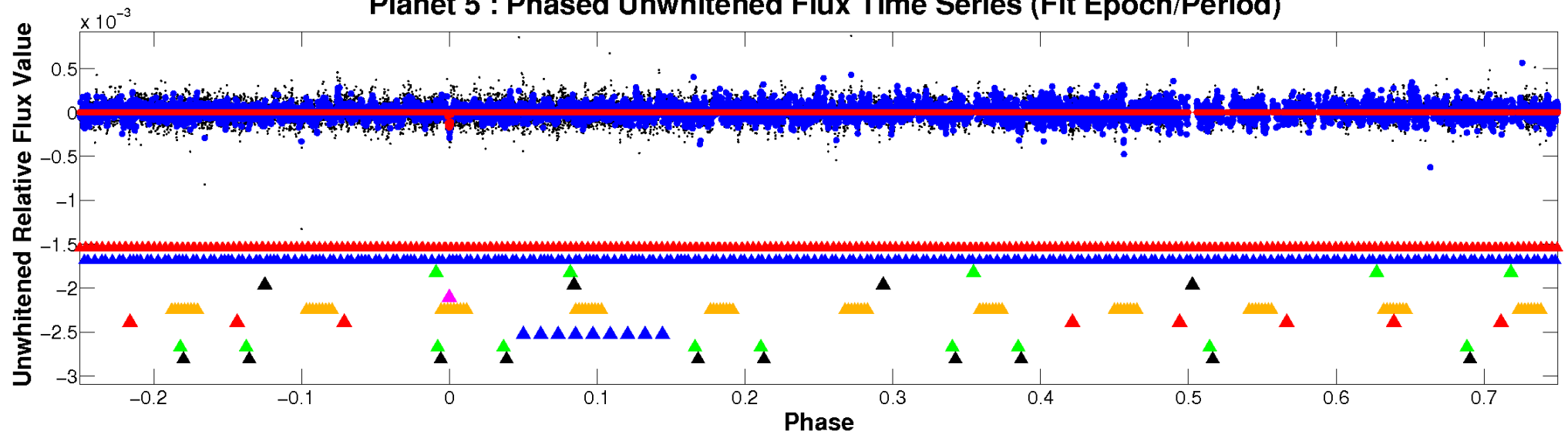
TCE 004577324-05



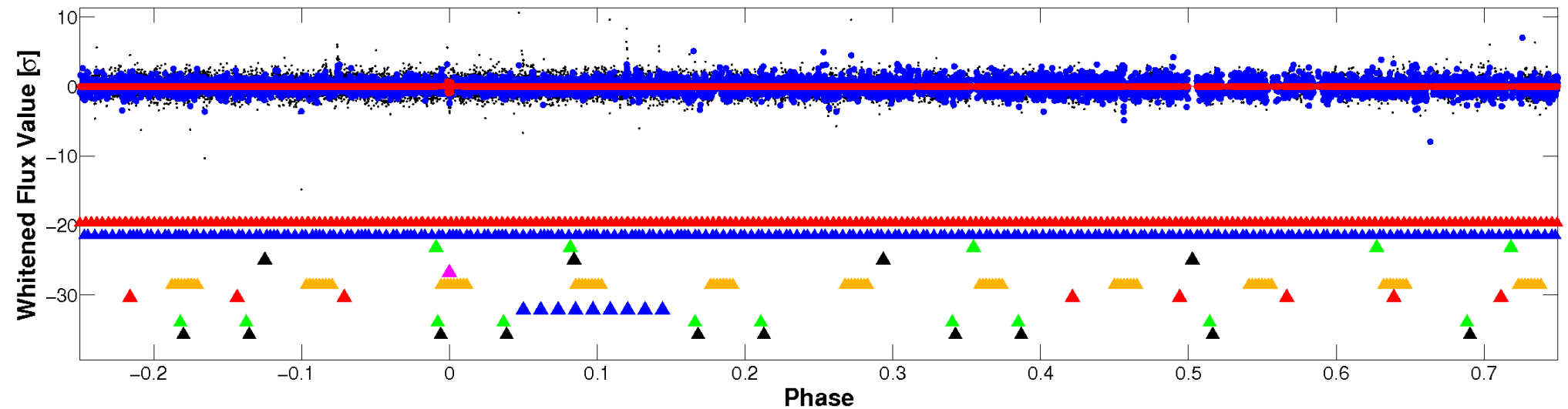


# Non-Whitened Vs. Whitened Light Curve

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

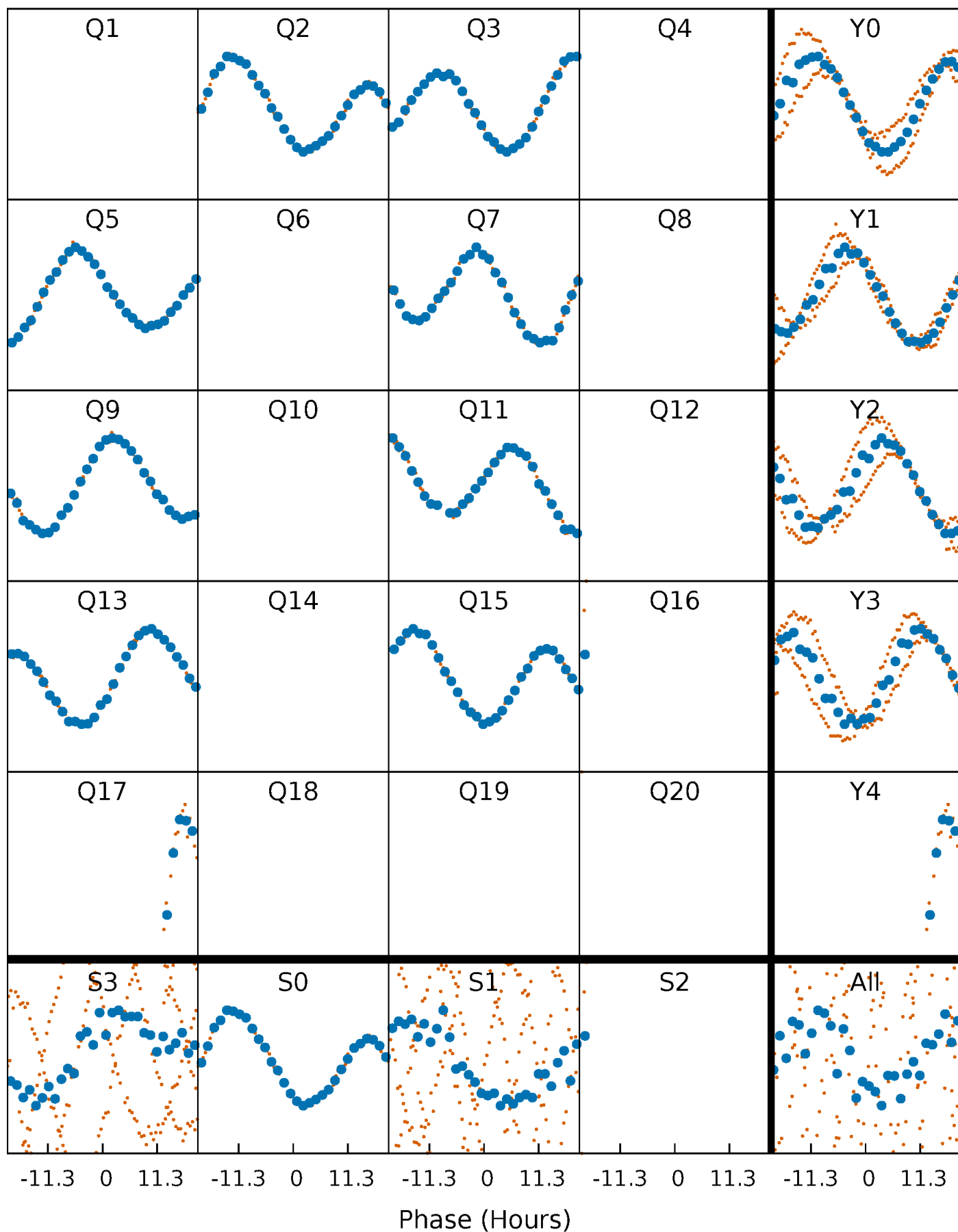


## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



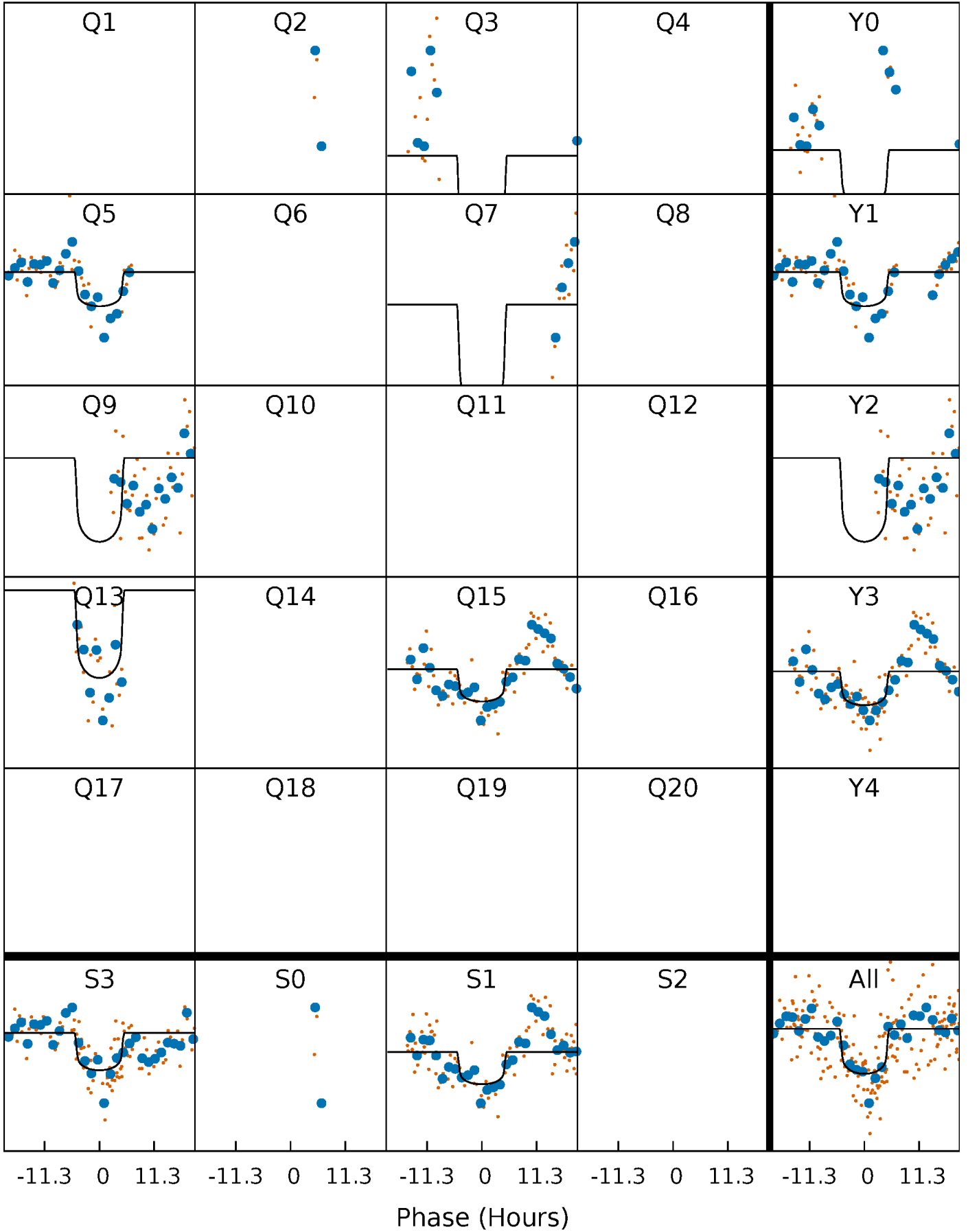
# PDC Quarter-Phased Transit Curves

TCE 004577324-05     $P=173.353436$  Days     $T_0=171.891158$  (BKJD)



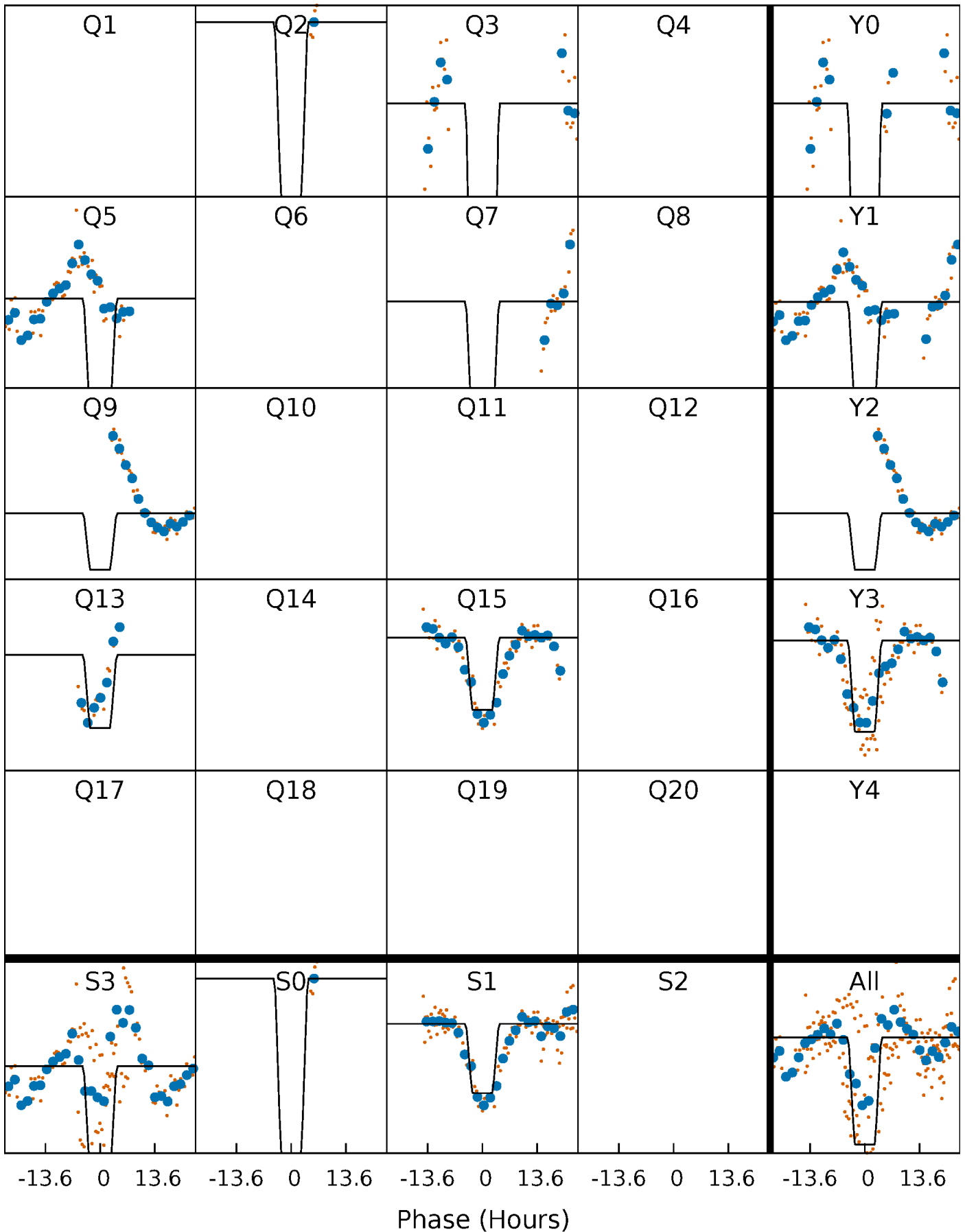
# DV Quarter-Phased Transit Curves

TCE 004577324-05     $P=173.353436$  Days     $T_0=171.891158$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

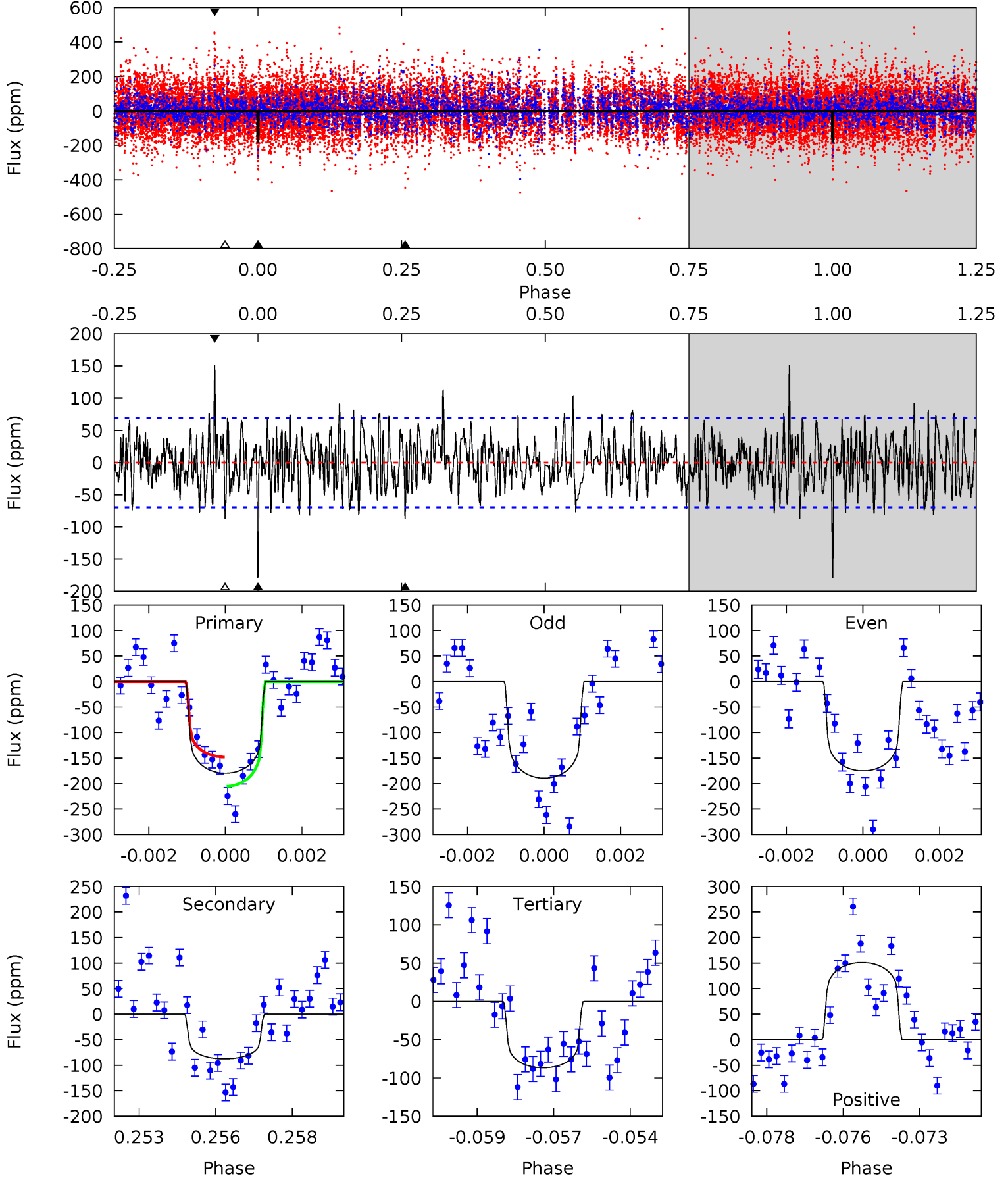
TCE 004577324-05     $P=173.358323$  Days     $T_0=171.870754$  (BKJD)



# DV Model-Shift Uniqueness Test

004577324-05, P = 173.353436 Days, E = 171.891158 Days

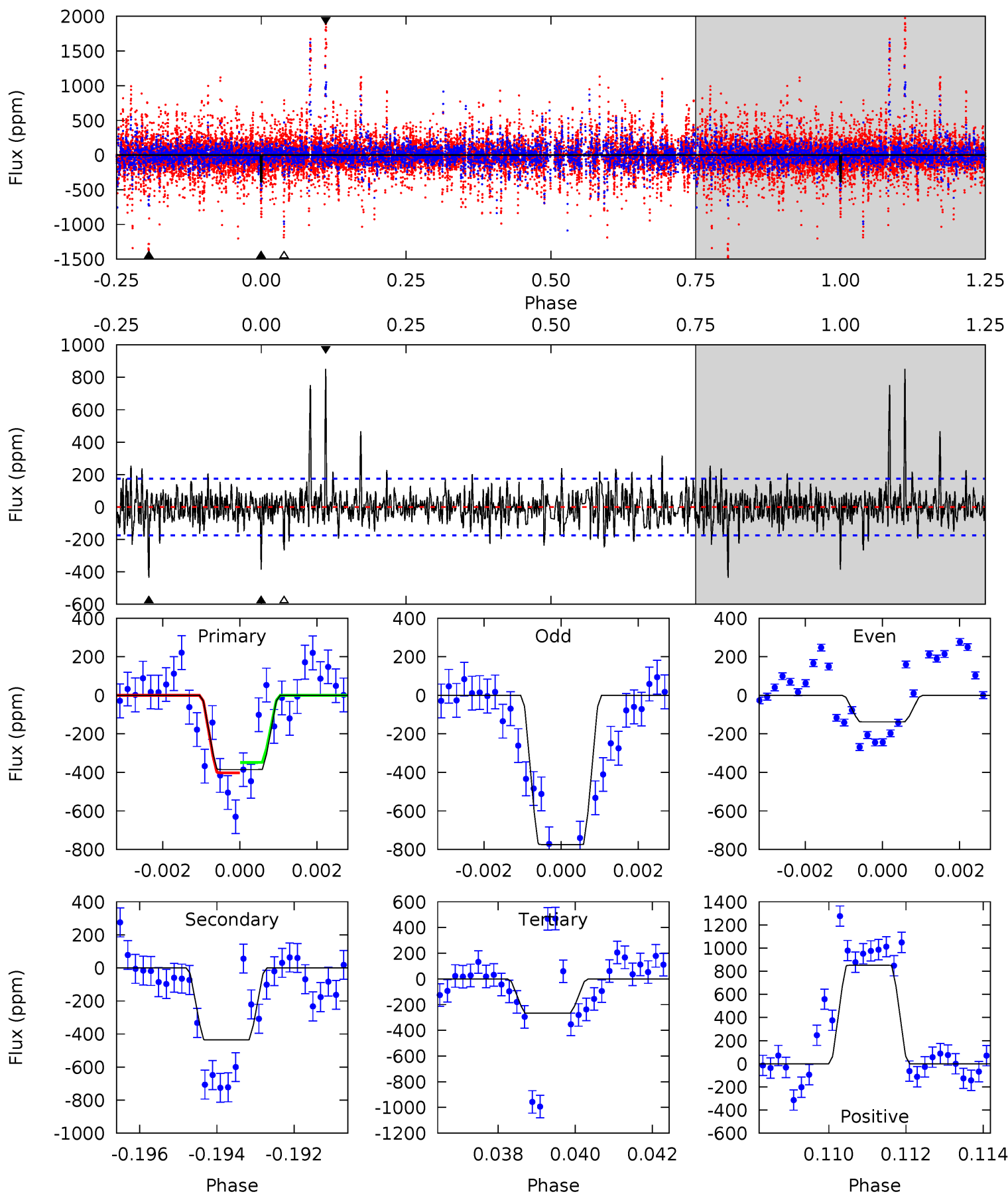
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.6	6.64	6.57	11.5	5.30	3.04	2.46	7.05	2.15	0.07	-4.84	0.51	0.18	0.46	2.17



# Alt Model-Shift Uniqueness Test

004577324-05, P = 173.358323 Days, E = 171.870754 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.7	13.3	8.14	26.0	5.33	3.09	2.59	3.61	-14.2	5.17	-12.7	9.25	-0.19	0.66	0.82



### Stellar Parameters For KIC 004577324

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6490^{+146}_{-178}$	$4.101^{+0.221}_{-0.119}$	$-0.360^{+0.300}_{-0.300}$	$1.551^{+0.329}_{-0.402}$	$1.107^{+0.177}_{-0.145}$	$0.418^{+0.512}_{-0.145}$
	+2%/-3%	+5%/-3%	+83%/-83%	+21%/-26%	+16%/-13%	+122%/-35%
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 004577324-05 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-87 \pm 13$	$2.16^{+0.94}_{-0.87}$	$623^{+38}_{-45}$	$5491^{+1499}_{-755}$	$4055^{+7206}_{-2106}$
Alt.	$-436 \pm 33$	$4.41^{+1.16}_{-0.96}$	$620^{+34}_{-44}$	$5731^{+662}_{-496}$	$5063^{+3012}_{-1891}$

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



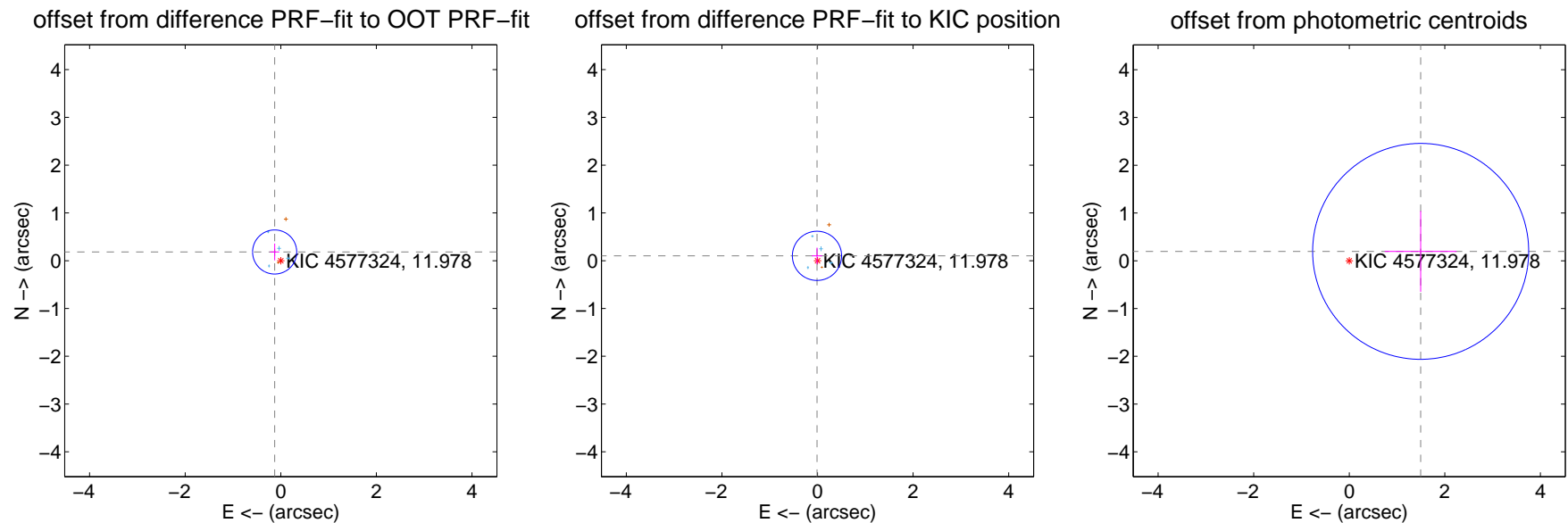
## DV Centroid Data

Supplemental centroid analysis for 004577324-05. **Kepler magnitude: 11.98.** Transit SNR 6.93

There are 4 quarters with good PRF difference image offsets

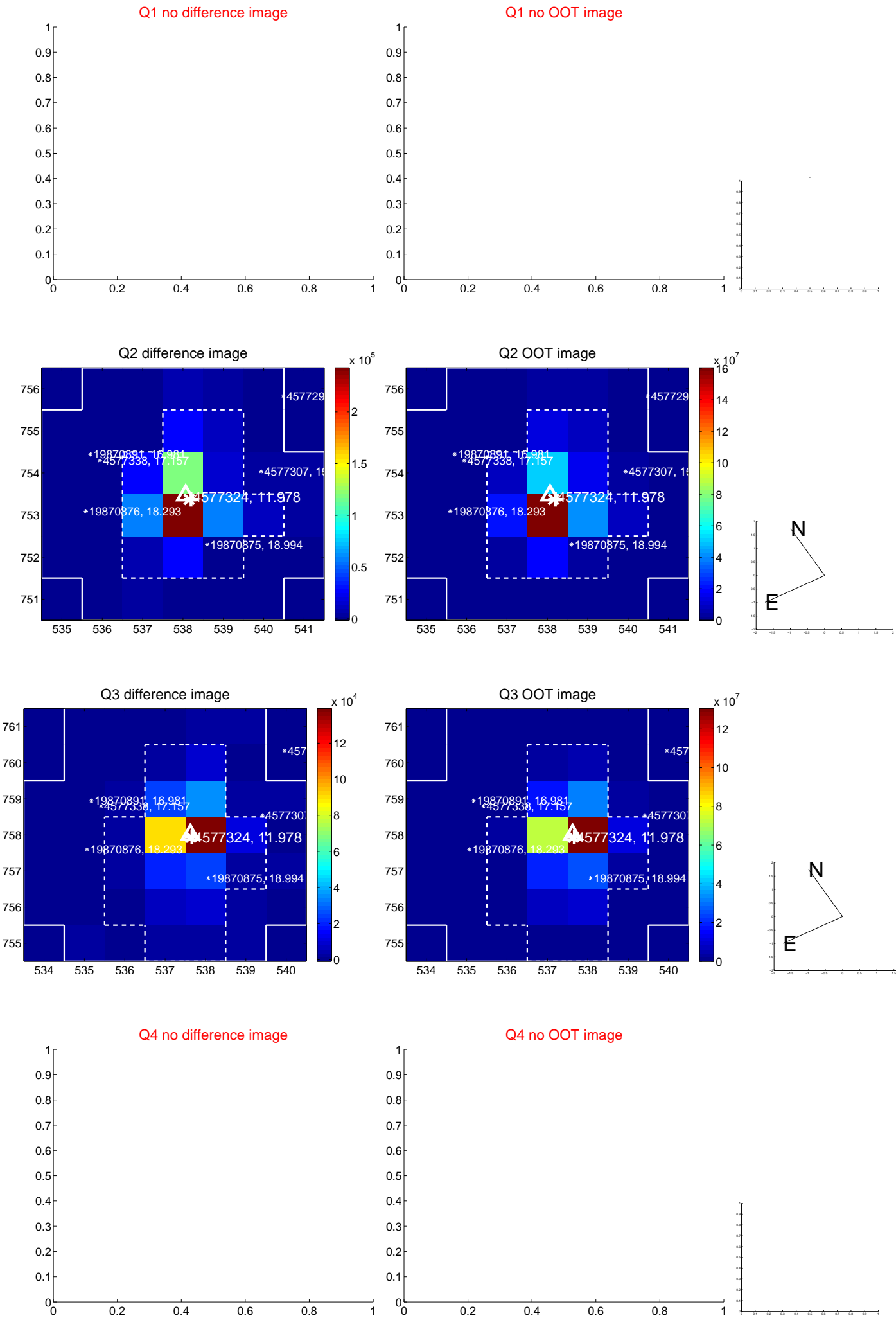
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.223 \pm 0.154$	1.45	$0.128 \pm 0.096$	$0.182 \pm 0.175$
PRF-fit source offset from KIC position	$0.102 \pm 0.172$	0.59	$0.011 \pm 0.106$	$0.102 \pm 0.172$
photometric centroid source offset	$1.51 \pm 0.75$	2.00	$-1.49 \pm 0.75$	$0.20 \pm 0.85$

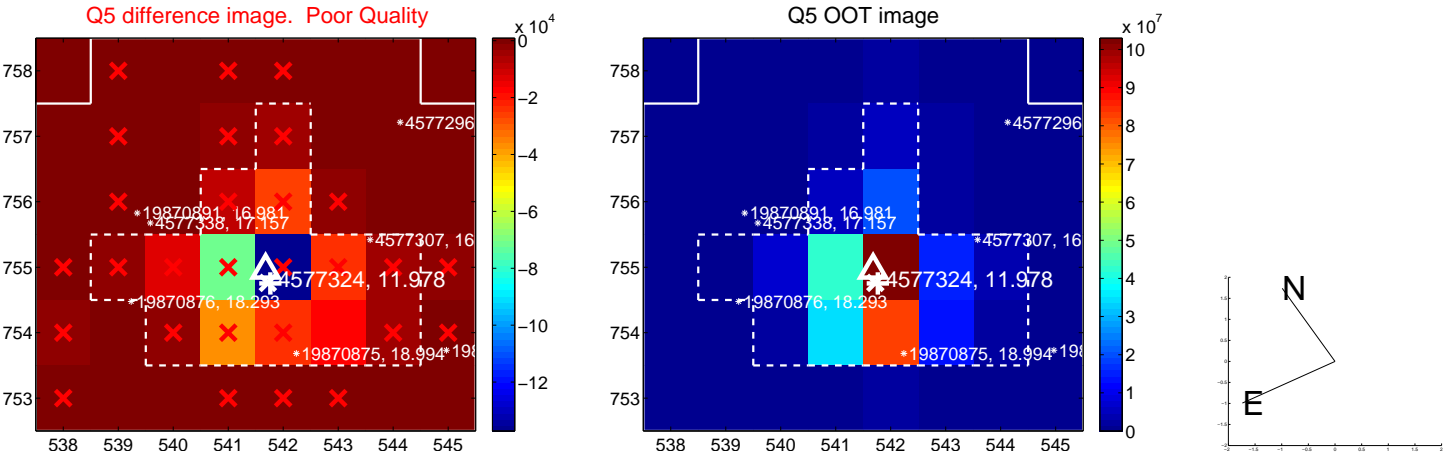


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

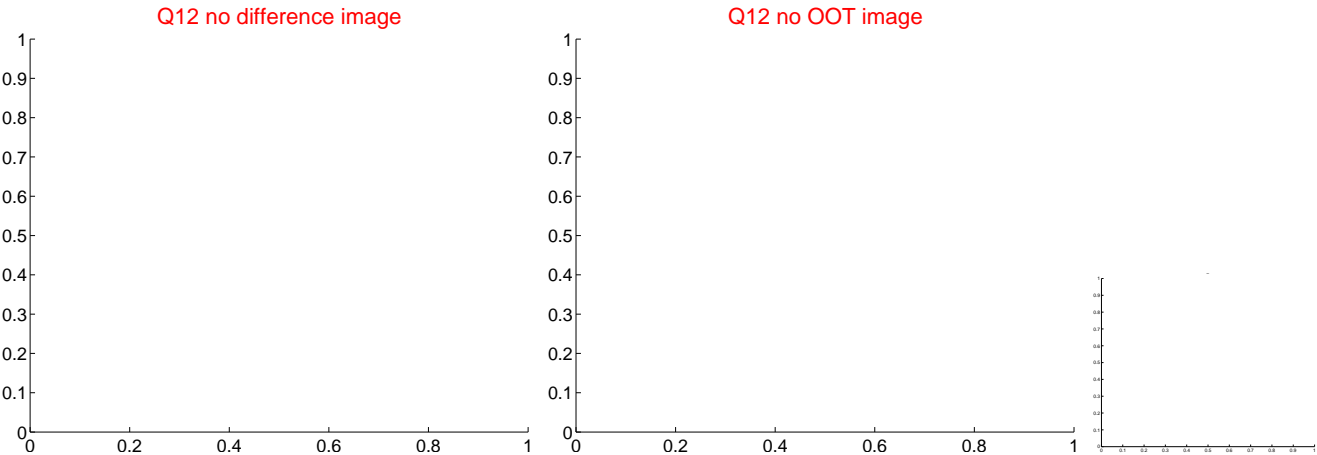
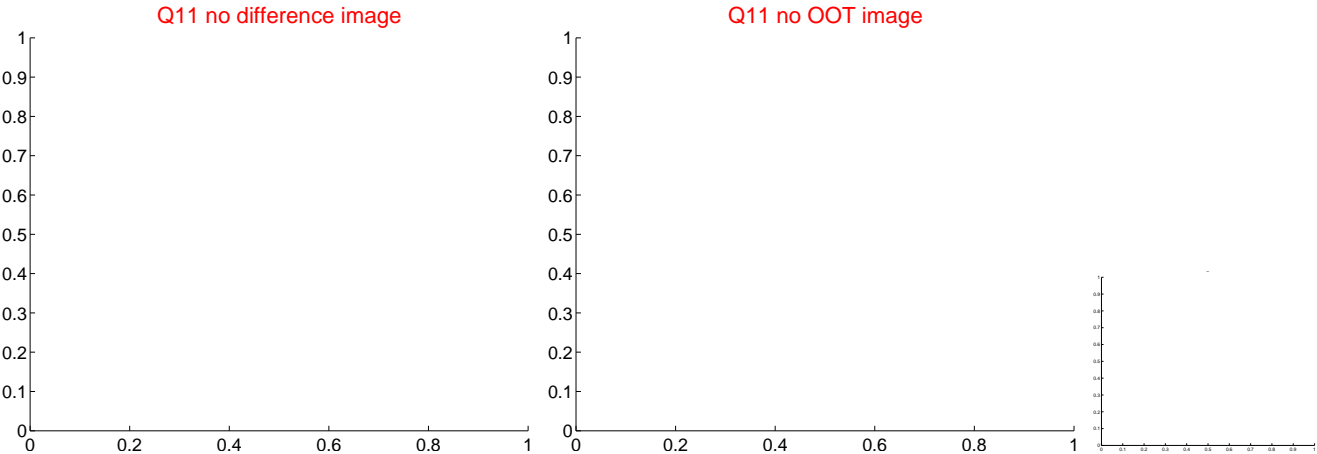
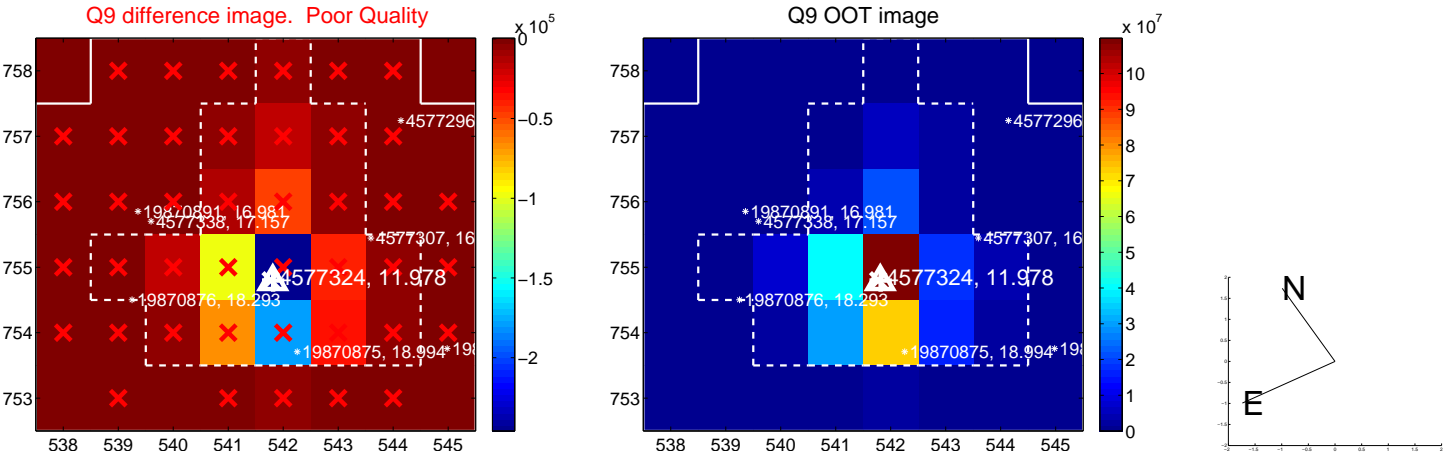
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



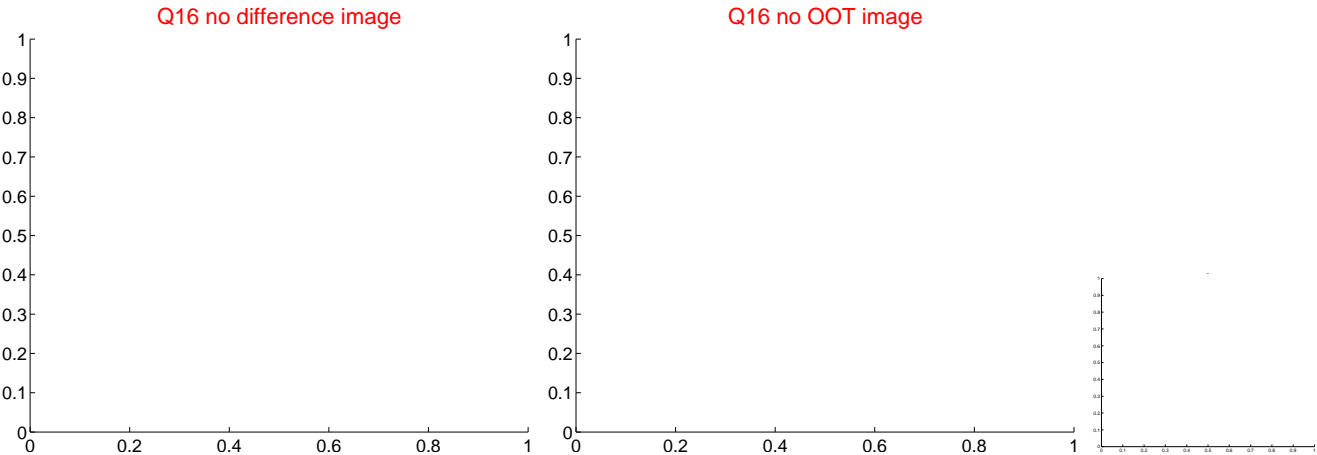
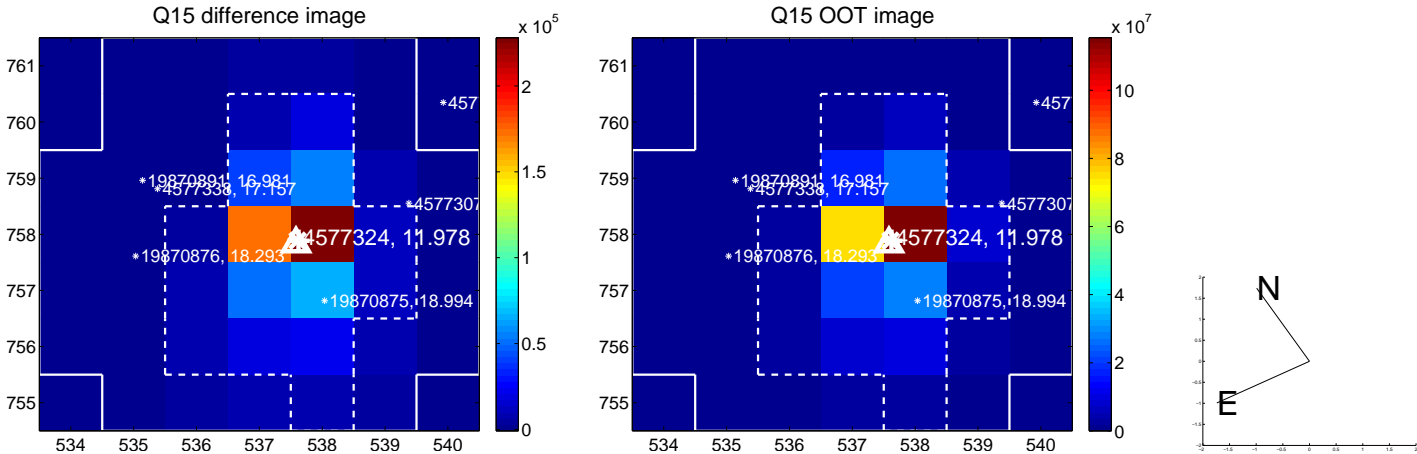
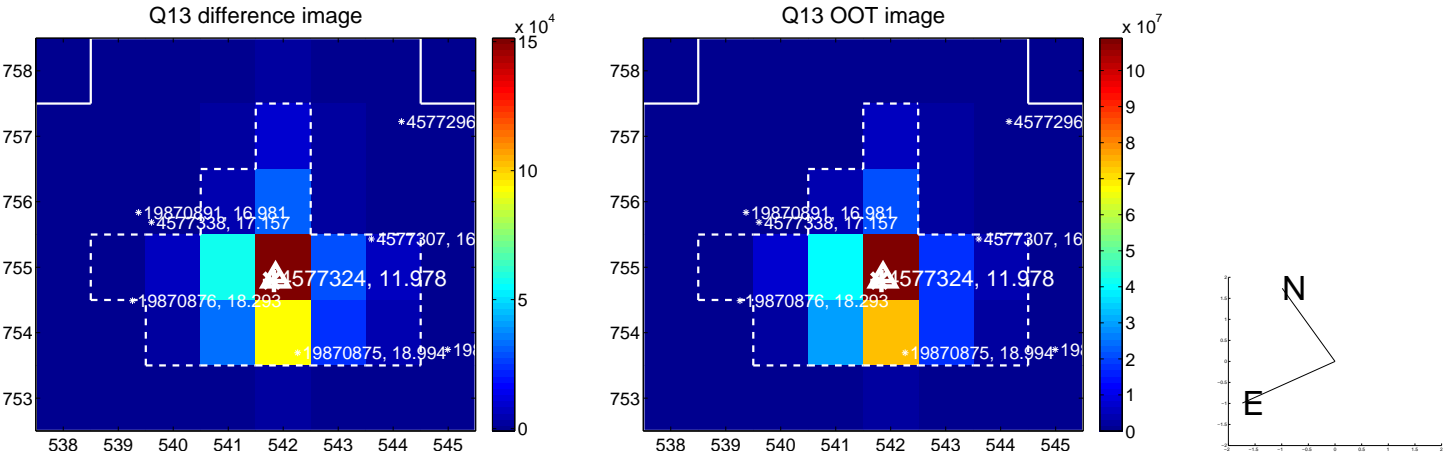
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



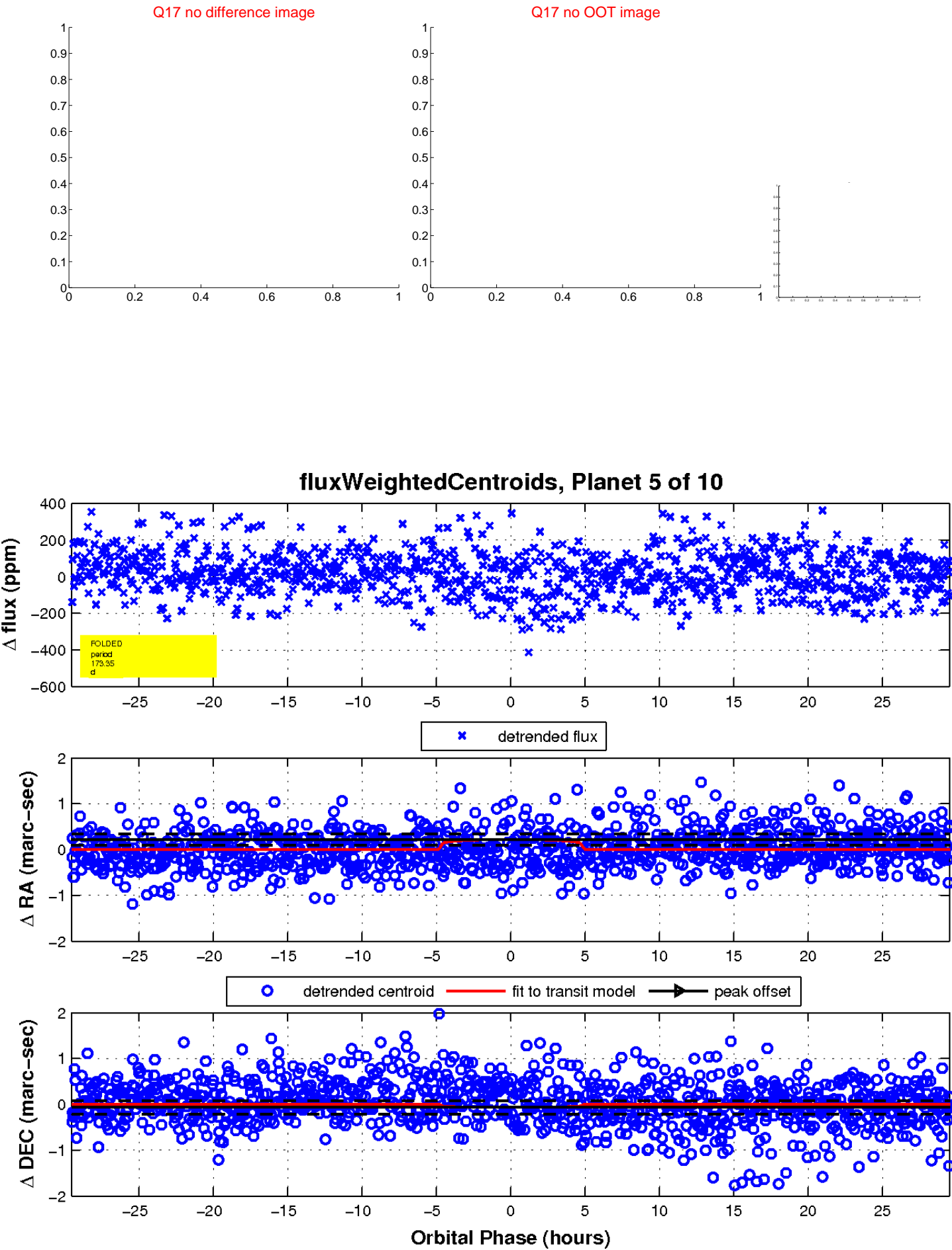
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

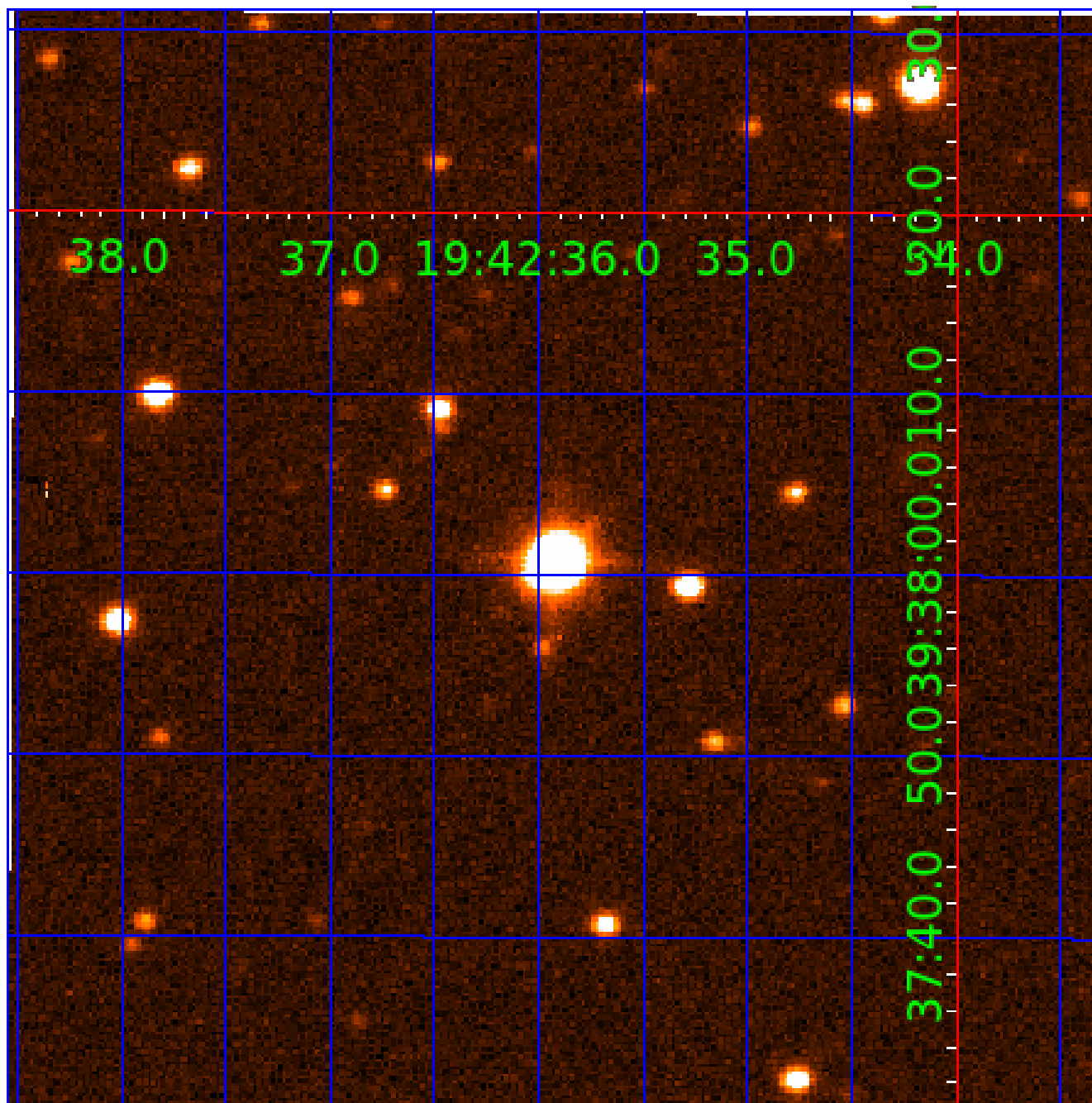


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004577324-01	OBS	No	2.676955	133.989377	23.7	9.268	8.5	8.2	1.55	6490	0.84	2508.57
004577324-02	OBS	No	5.352929	135.260103	33.6	9.181	10.0	9.7	1.55	6490	1.05	995.77
004577324-03	OBS	No	283.674058	186.080756	103.5	25.045	8.5	4.6	1.55	6490	1.73	5.00
004577324-04	OBS	No	310.445932	432.392002	164.8	7.764	7.9	6.3	1.55	6490	2.19	4.44
004577324-05	OBS	No	173.353436	171.891158	171.1	9.852	7.6	6.9	1.55	6490	2.22	9.65
004577324-06	OBS	No	15.793664	139.332735	72.1	14.982	8.0	8.0	1.55	6490	1.54	235.31
004577324-07	OBS	No	185.917423	244.975369	135.5	25.942	8.3	4.5	1.55	6490	2.10	8.79
004577324-08	OBS	No	171.313674	196.888564	98.3	5.032	7.4	5.4	1.55	6490	1.70	9.80
004577324-09	OBS	No	143.173964	238.606043	293.0	0.835	7.5	3.3	1.55	6490	2.73	12.45
004577324-10	OBS	No	143.175229	238.960367	60.4	1.407	7.6	1.6	1.55	6490	1.36	12.45

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004577324-01	OBS	FP	0.00	1	0	0	0	LPP_DV
004577324-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD
004577324-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS
004577324-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004577324-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS
004577324-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT
004577324-07	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST
004577324-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004577324-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004577324-10	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_FEW_DIFFS

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

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

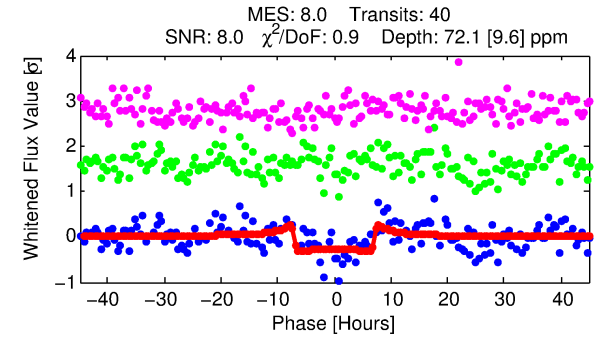
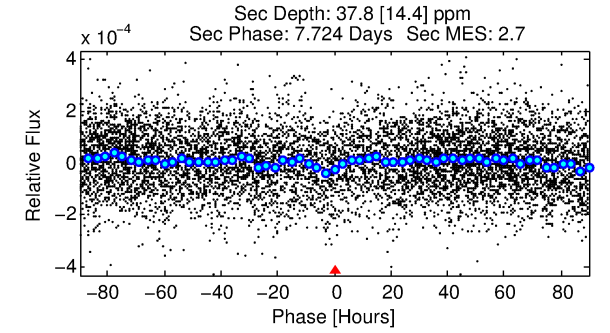
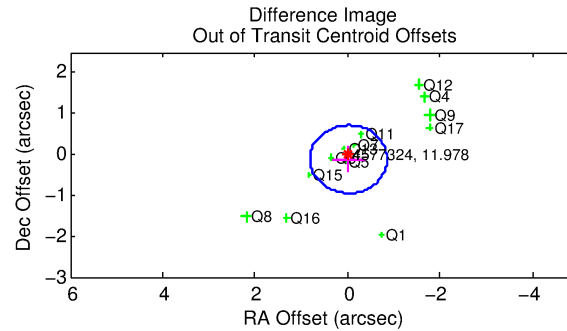
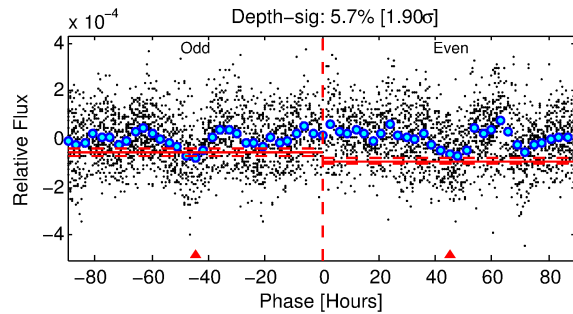
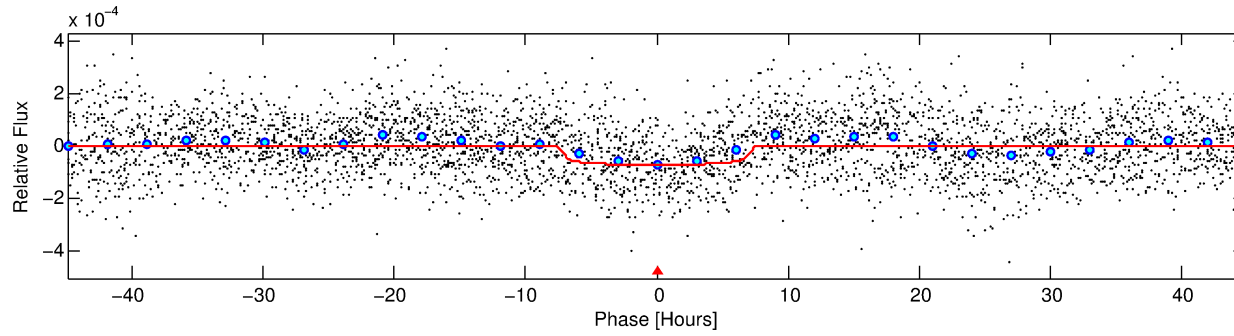
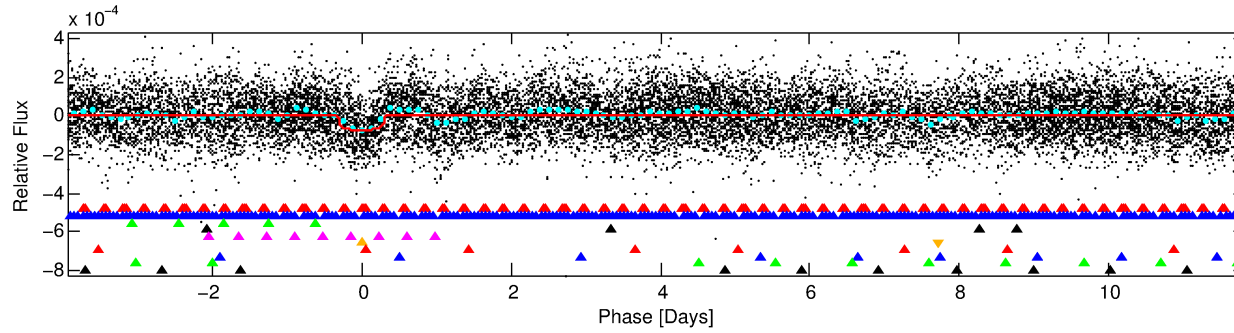
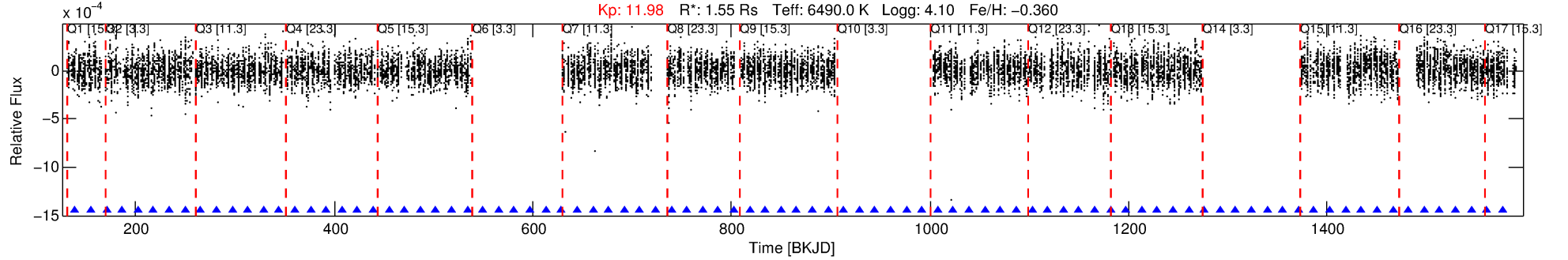
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004577324-06

No Significant Match Found

# DV One-Page Summary

KIC: 4577324 Candidate: 6 of 10 Period: 15.794 d



## DV Fit Results:

Period = 15.79366 [0.00025] d  
Epoch = 139.3327 [0.0132] BKJD  
Rp/R\* = 0.0091 [0.0010]  
a/R\* = 3.81 [1.63]  
b = 0.90 [0.10]  
Seff = 235.31 [93.23]  
Teq = 999 [99] K  
Rp = 1.54 [0.43] Re  
a = 0.1275 [0.0309] AU  
Ag = 143.09 [83.20] [1.71 $\sigma$ ]  
Teff = 5340 [605] K [7.08 $\sigma$ ]

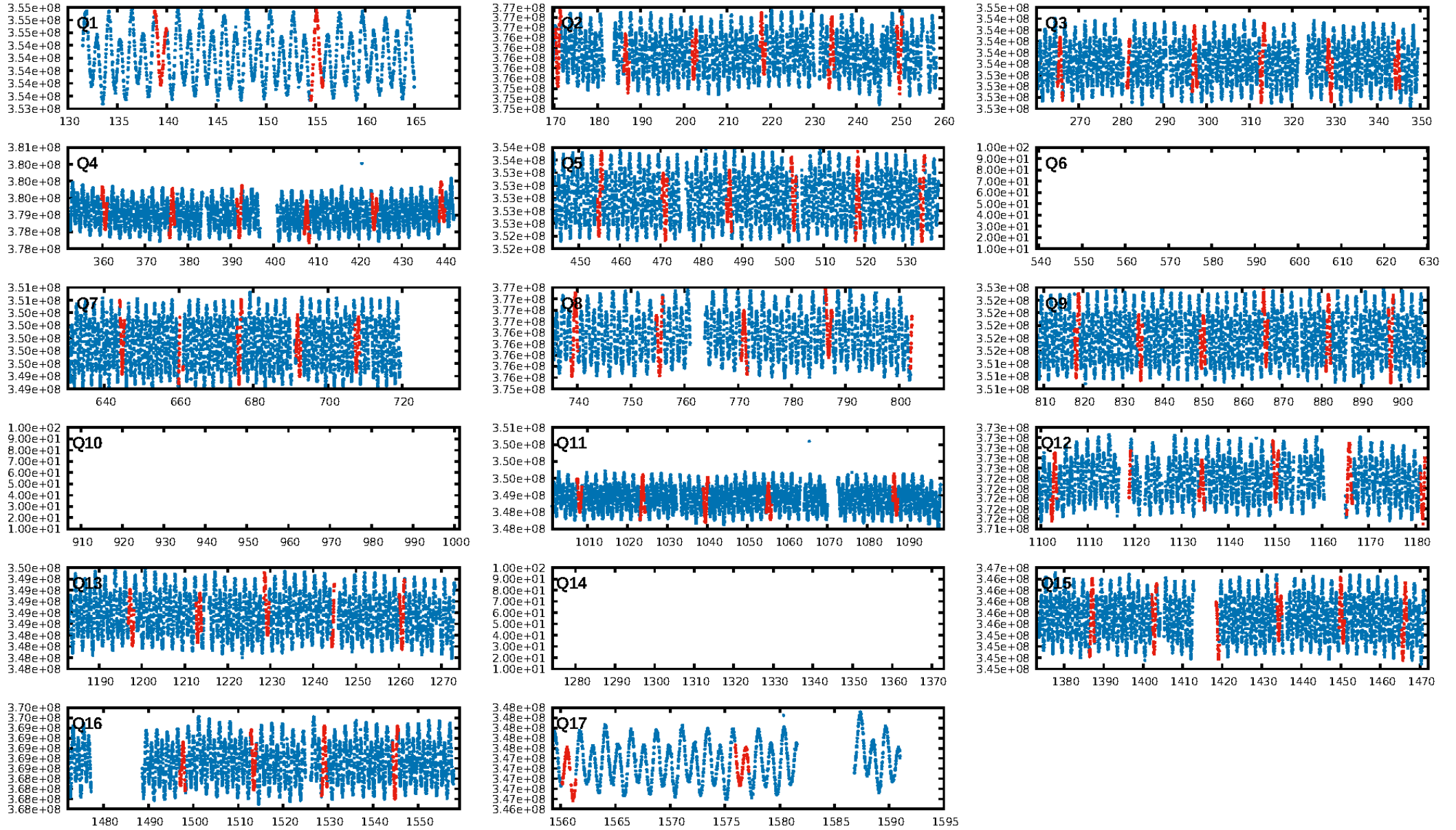
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [14.26 $\sigma$ ]  
LongPeriod-sig: 100.0% [203.74 $\sigma$ ]  
ModelChiSquare2-sig: 60.2%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [38/38]  
GhostDiagnostic-chr: 1.966  
Centroid-sig: 1.9%  
Centroid-so: 1.039 arcsec [1.76 $\sigma$ ]  
OotOffset-rm: 0.119 arcsec [0.43 $\sigma$ ]  
KicOffset-rm: 0.260 arcsec [1.25 $\sigma$ ]  
OotOffset-st: 0/4/4/5 [13]  
KicOffset-st: 0/4/4/5 [13]  
DiffImageQuality-fgm: 0.62 [8/13]  
DiffImageOverlap-fno: 0.21 [3/14]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 00:55:44 Z

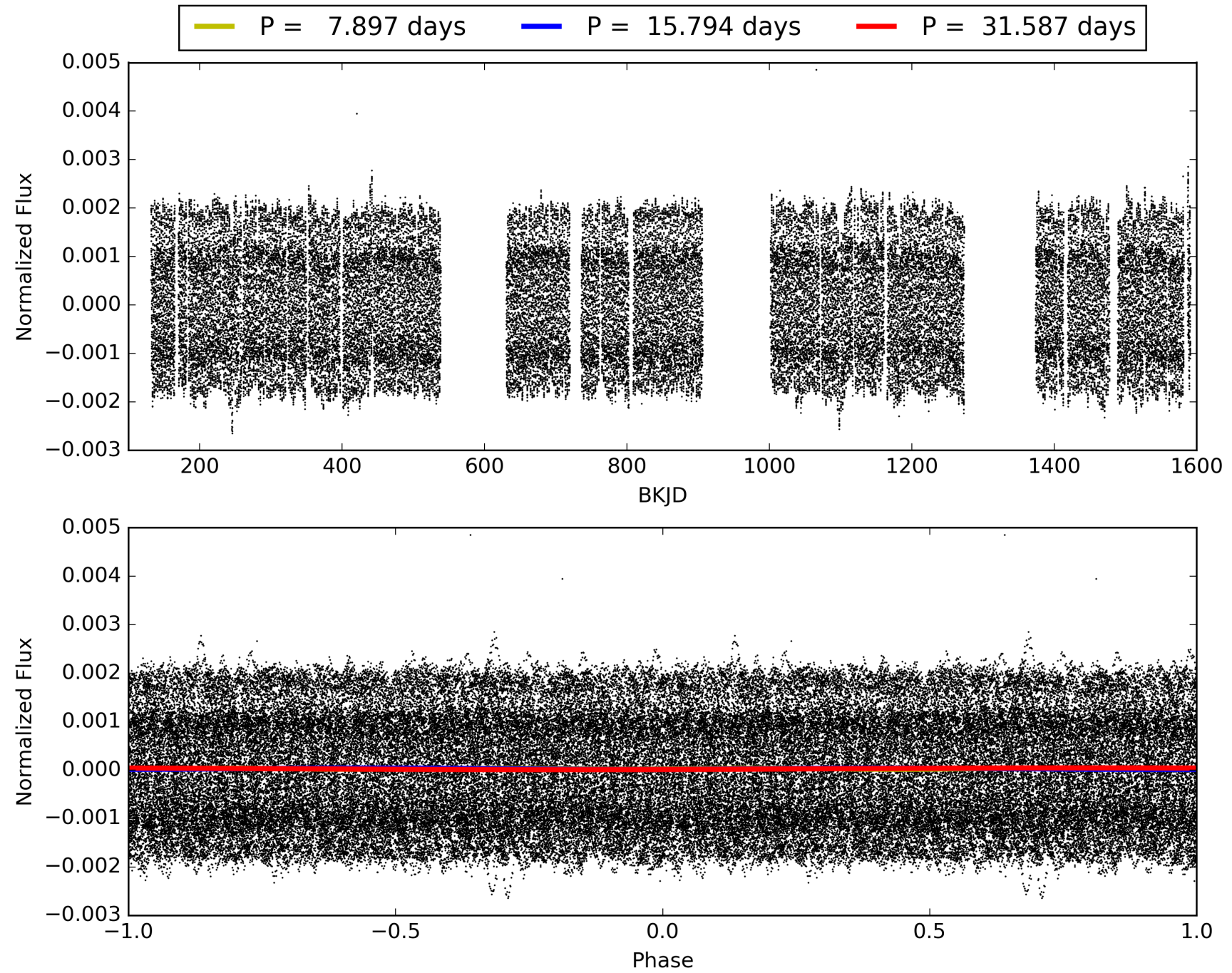
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004577324-06, PDC Light Curves



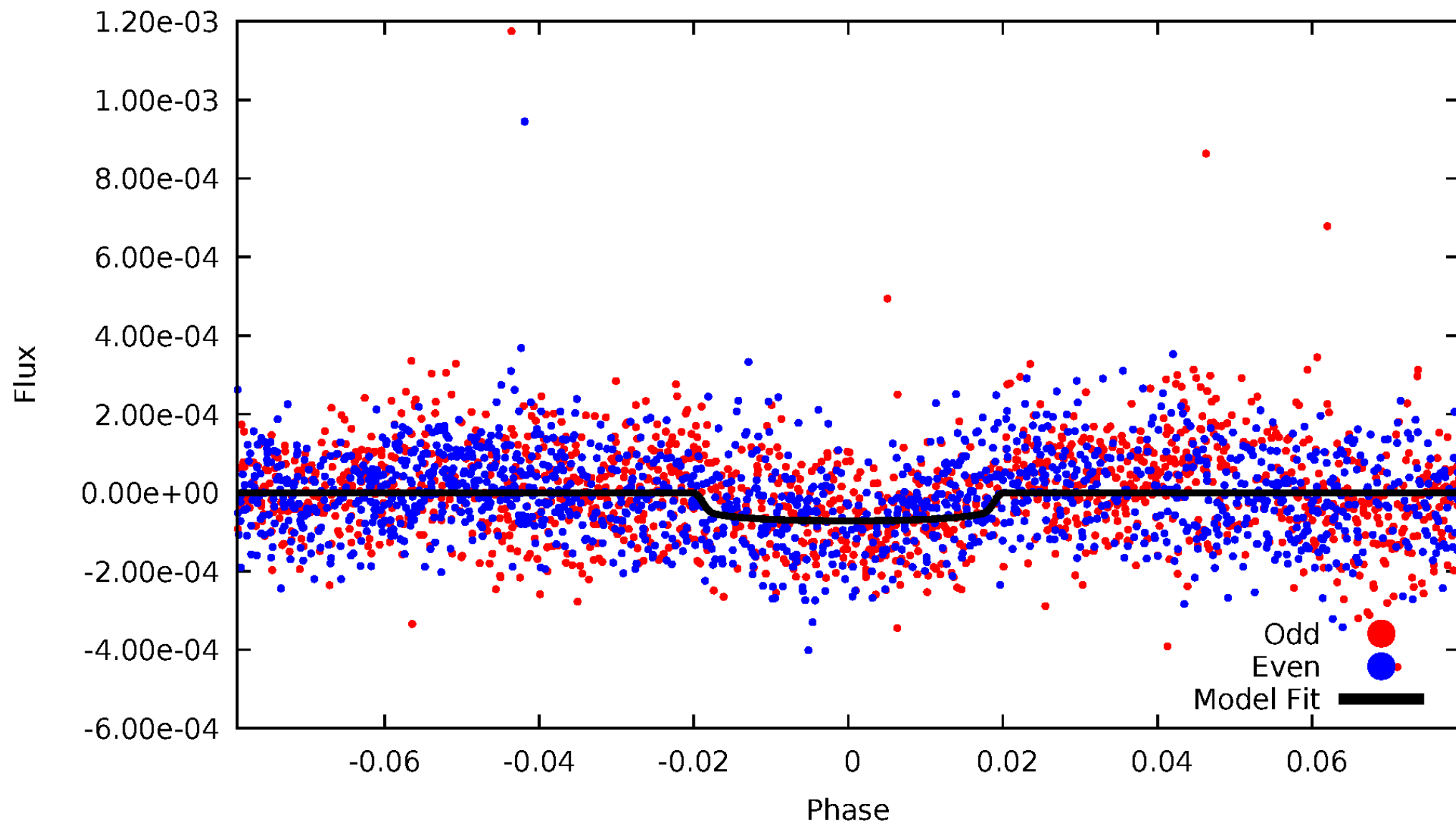


TCE 004577324-06



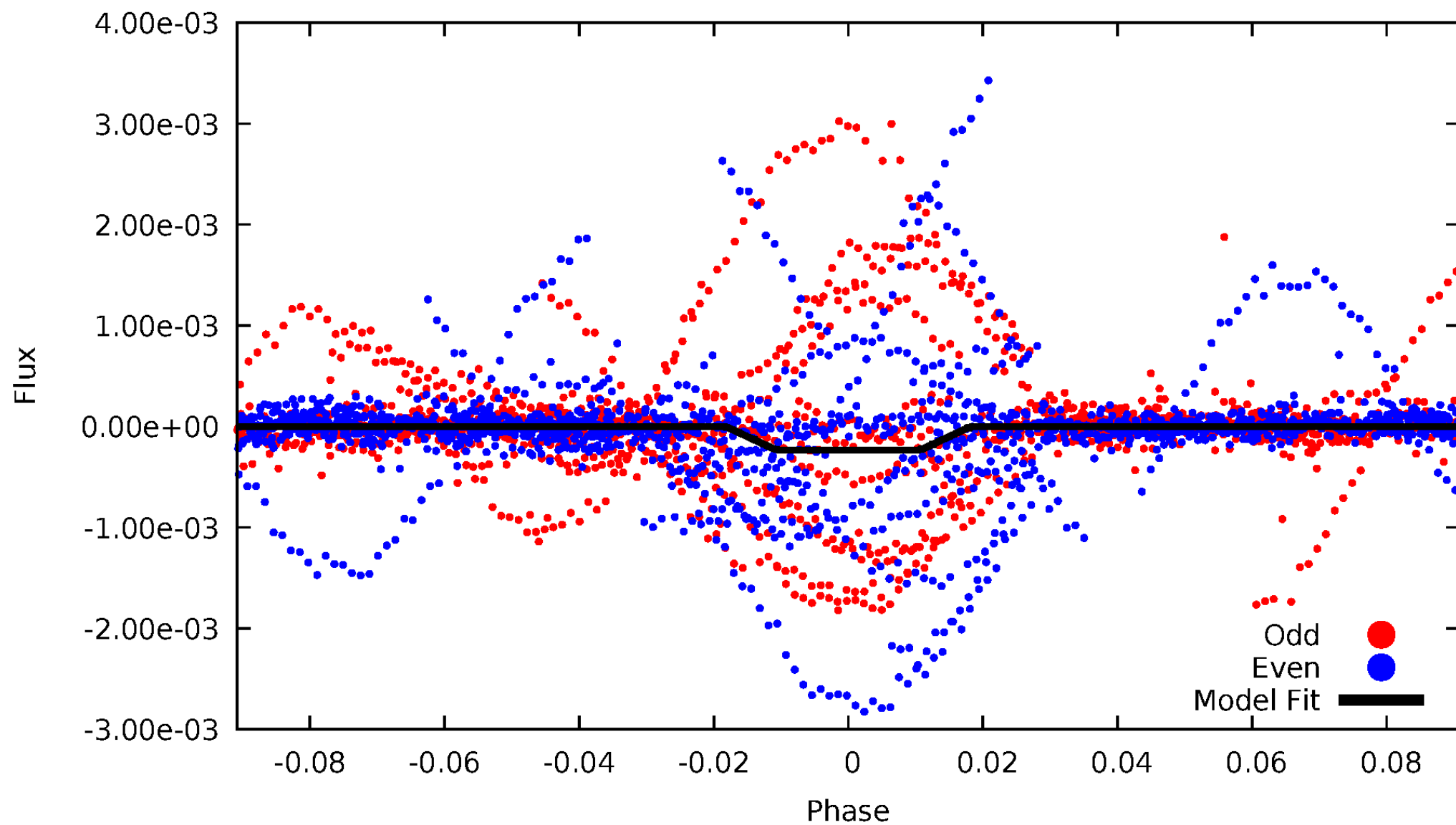
# DV Odd/Even

TCE 004577324-06



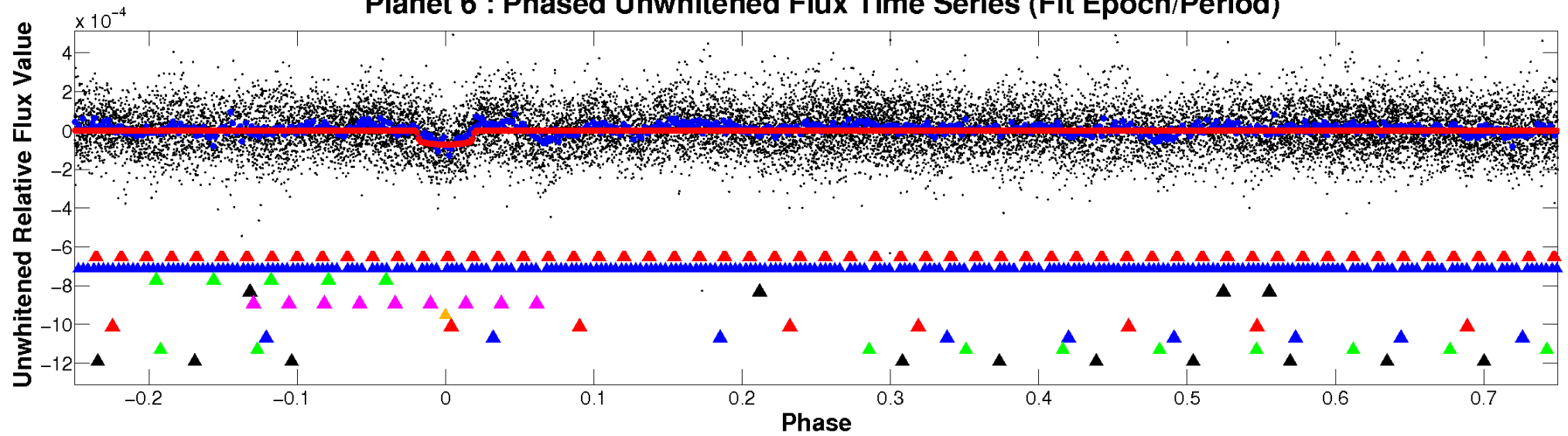
# ALT Odd/Even

TCE 004577324-06

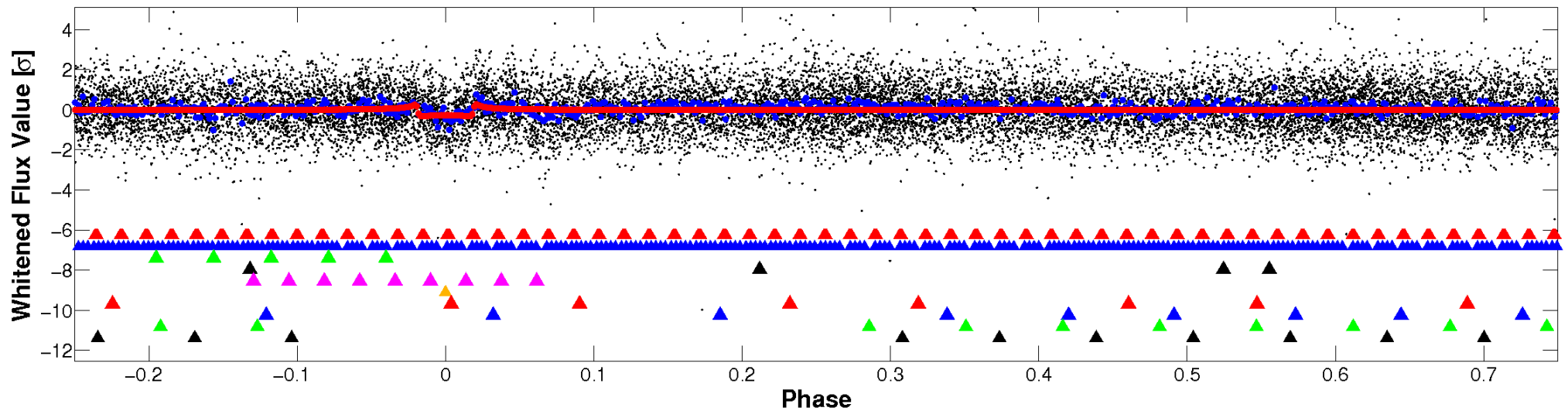


# Non-Whitened Vs. Whitened Light Curve

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



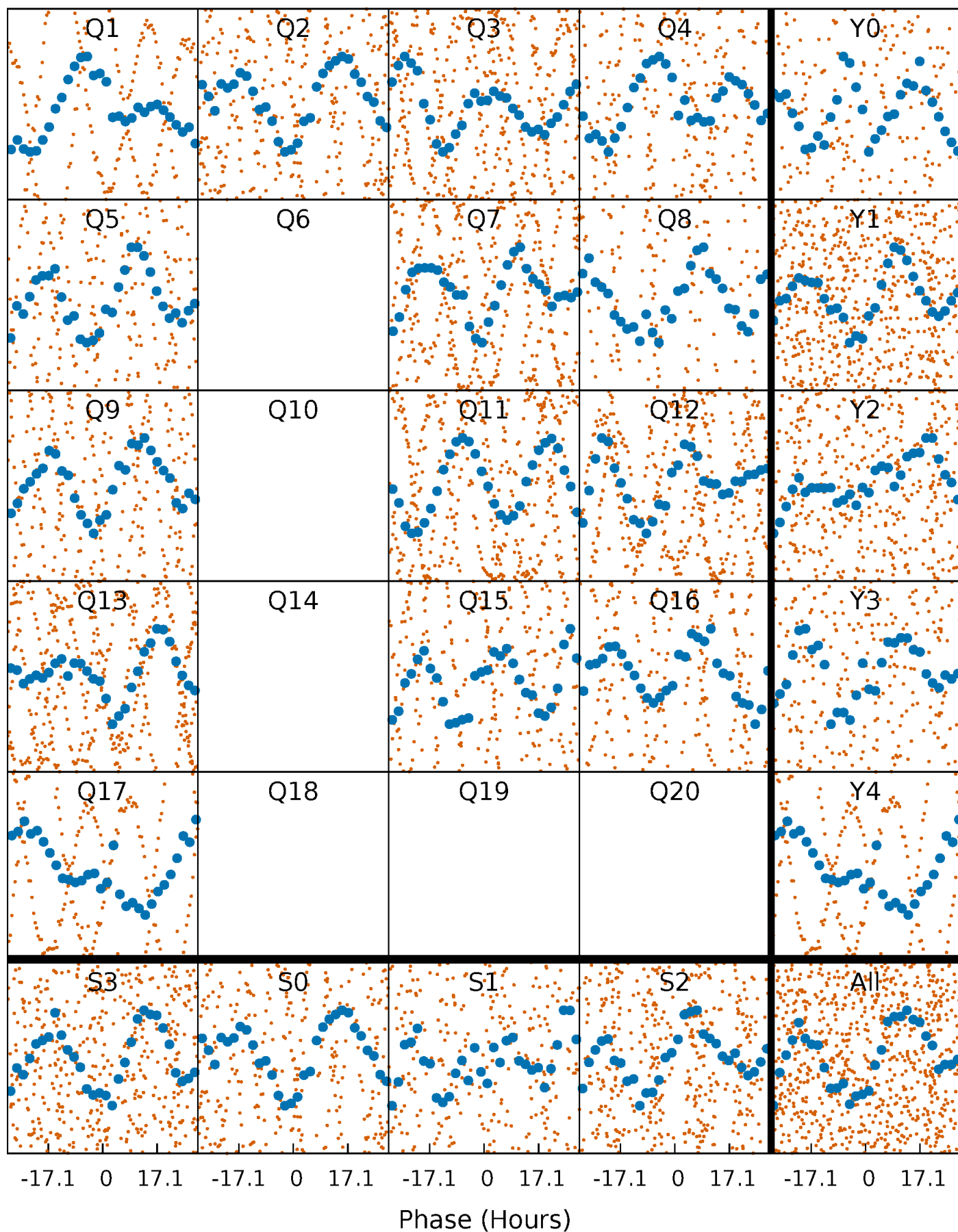
## Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)





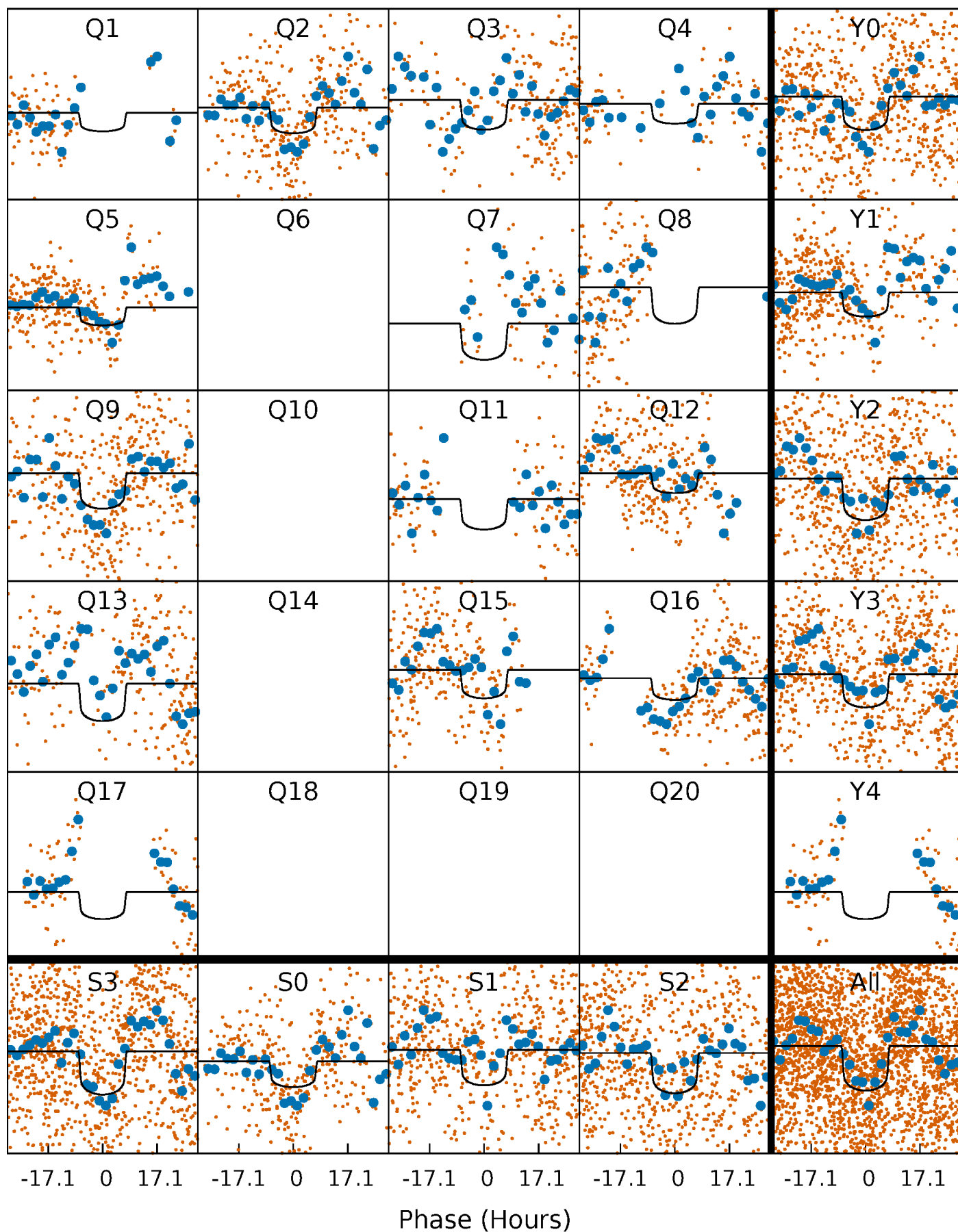
# PDC Quarter-Phased Transit Curves

TCE 004577324-06 P= 15.793664 Days  $T_0=139.332735$  (BKJD)



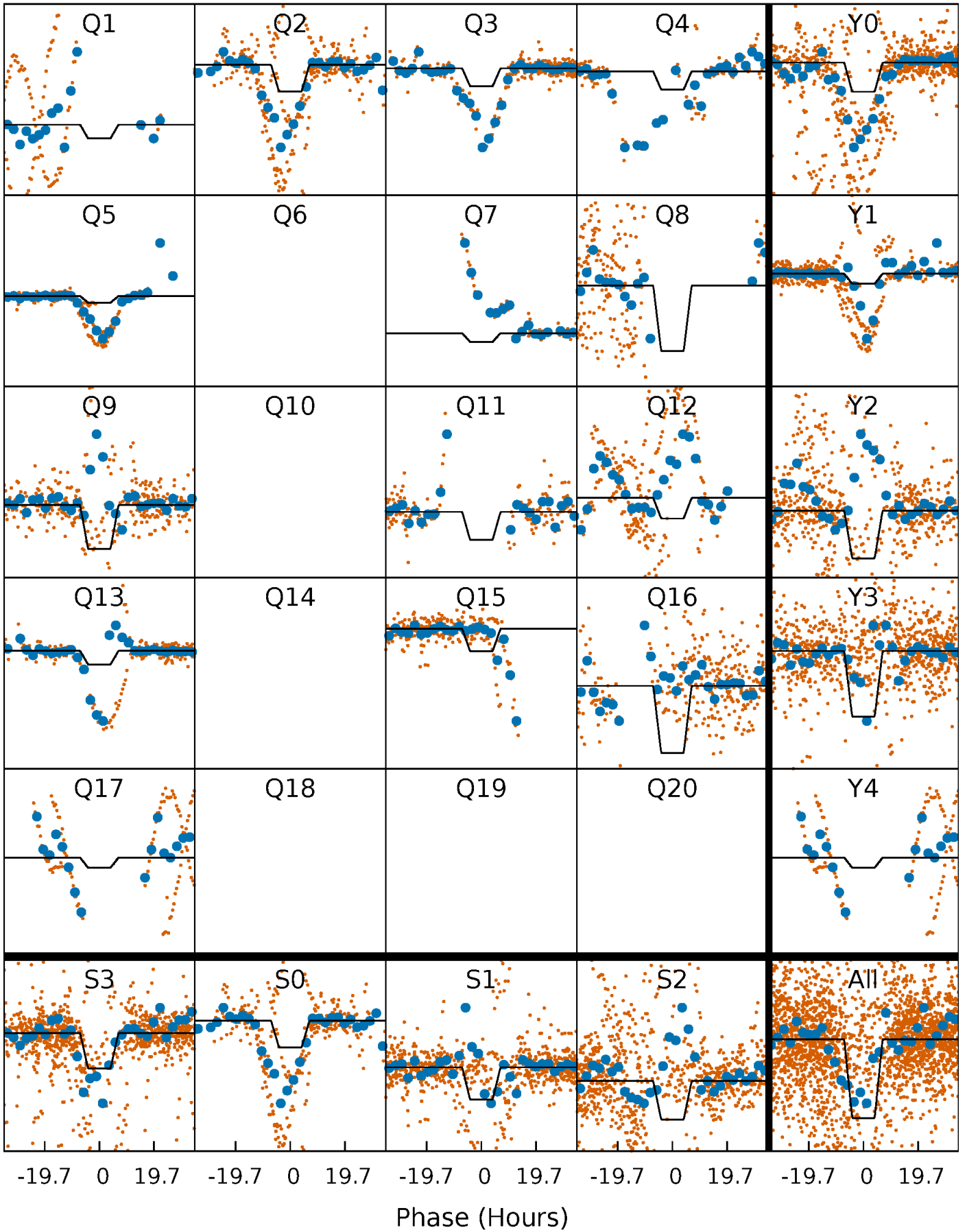
# DV Quarter-Phased Transit Curves

TCE 004577324-06 P= 15.793664 Days  $T_0=139.332735$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

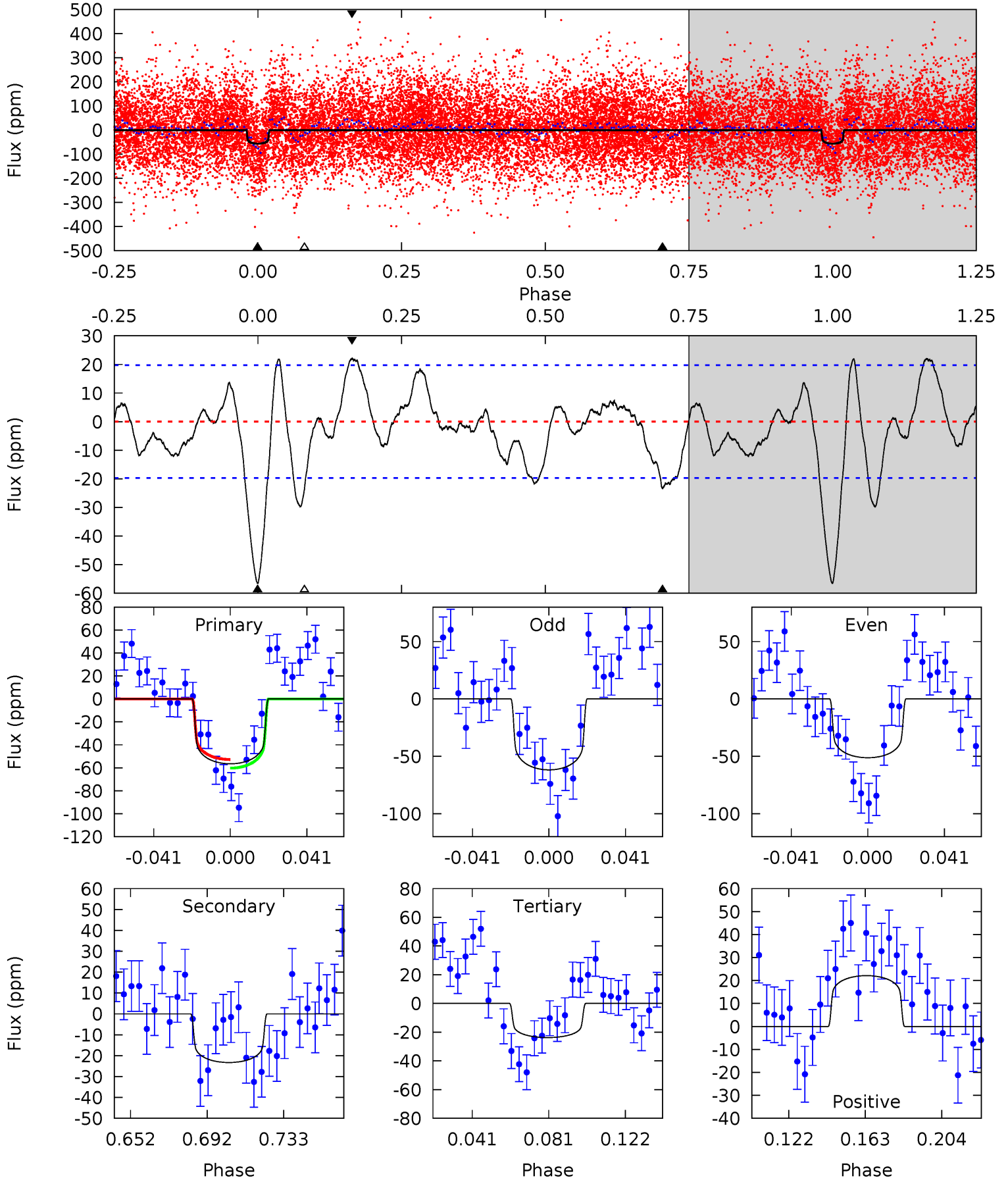
TCE 004577324-06   P= 15.792925 Days    $T_0=139.359616$  (BKJD)



# DV Model-Shift Uniqueness Test

004577324-06, P = 15.793664 Days, E = 123.539071 Days

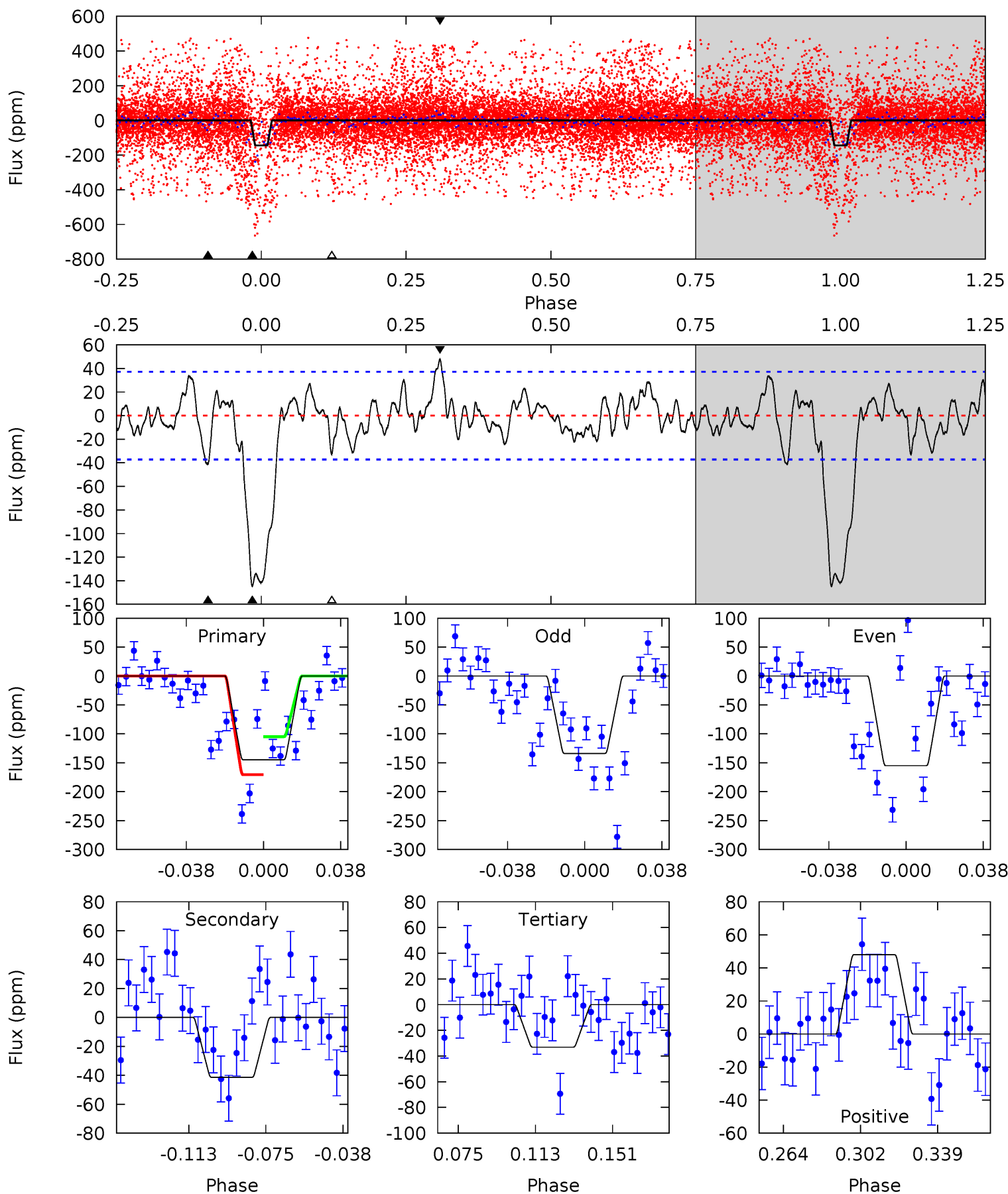
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.6	5.61	5.73	5.32	4.75	2.05	2.24	7.89	8.29	-0.12	0.28	1.28	0.50	0.28	0.90



# Alt Model-Shift Uniqueness Test

004577324-06, P = 15.792925 Days, E = 123.566691 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
18.5	5.29	4.24	6.15	4.77	2.08	1.76	14.3	12.4	1.05	-0.86	1.31	1.32	0.25	0



### Stellar Parameters For KIC 004577324

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6490^{+146}_{-178}$	$4.101^{+0.221}_{-0.119}$	$-0.360^{+0.300}_{-0.300}$	$1.551^{+0.329}_{-0.402}$	$1.107^{+0.177}_{-0.145}$	$0.418^{+0.512}_{-0.145}$
	+2%/-3%	+5%/-3%	+83%/-83%	+21%/-26%	+16%/-13%	+122%/-35%
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 004577324-06 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-23 \pm 4$	$1.52^{+0.28}_{-0.24}$	$1380^{+85}_{-86}$	$4821^{+316}_{-274}$	$91^{+42}_{-28}$
Alt.	$-41 \pm 8$	$2.55^{+0.35}_{-0.39}$	$1377^{+83}_{-91}$	$4401^{+205}_{-226}$	$58^{+23}_{-16}$

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

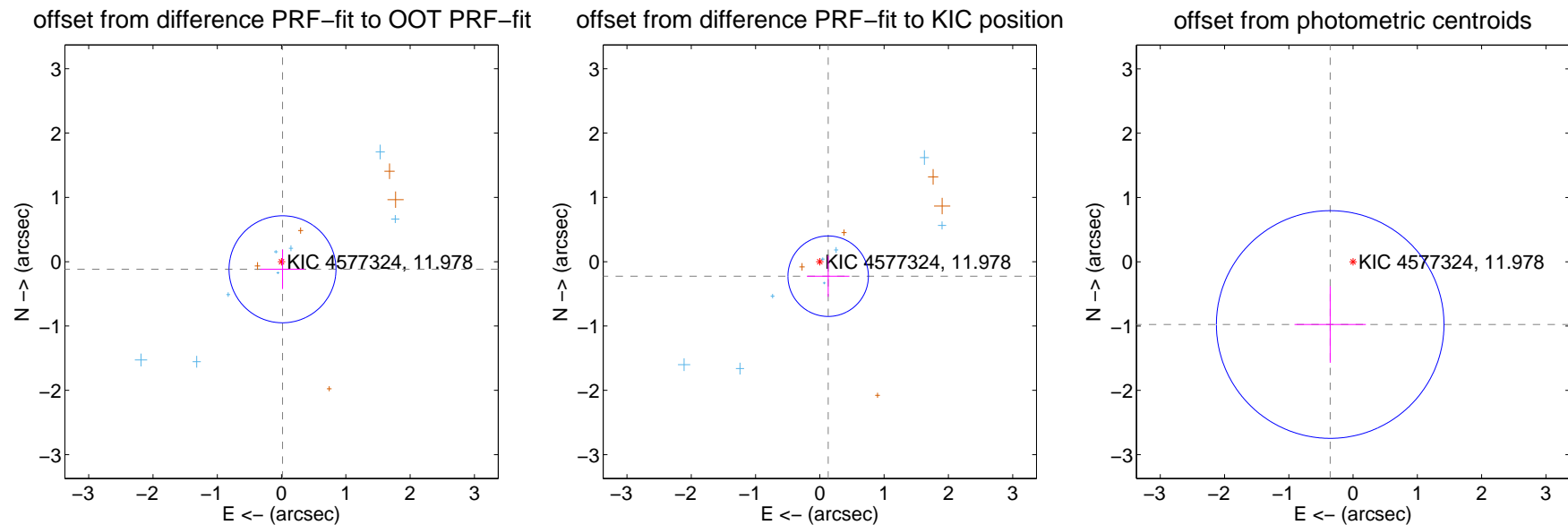
## DV Centroid Data

Supplemental centroid analysis for 004577324-06. **Kepler magnitude: 11.98.** Transit SNR 7.99

There are 8 quarters with good PRF difference image offsets

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

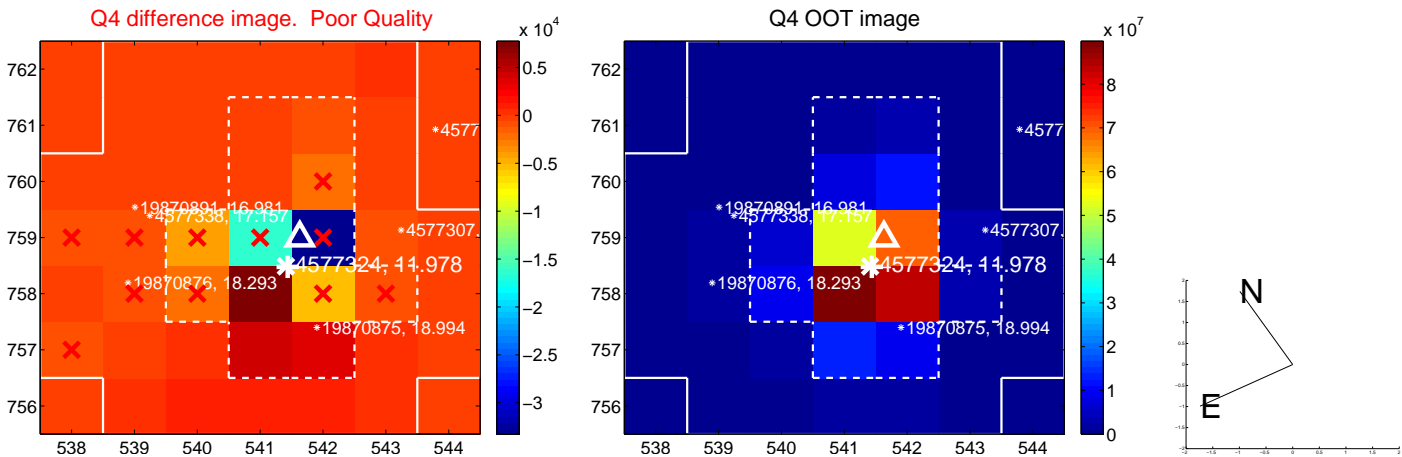
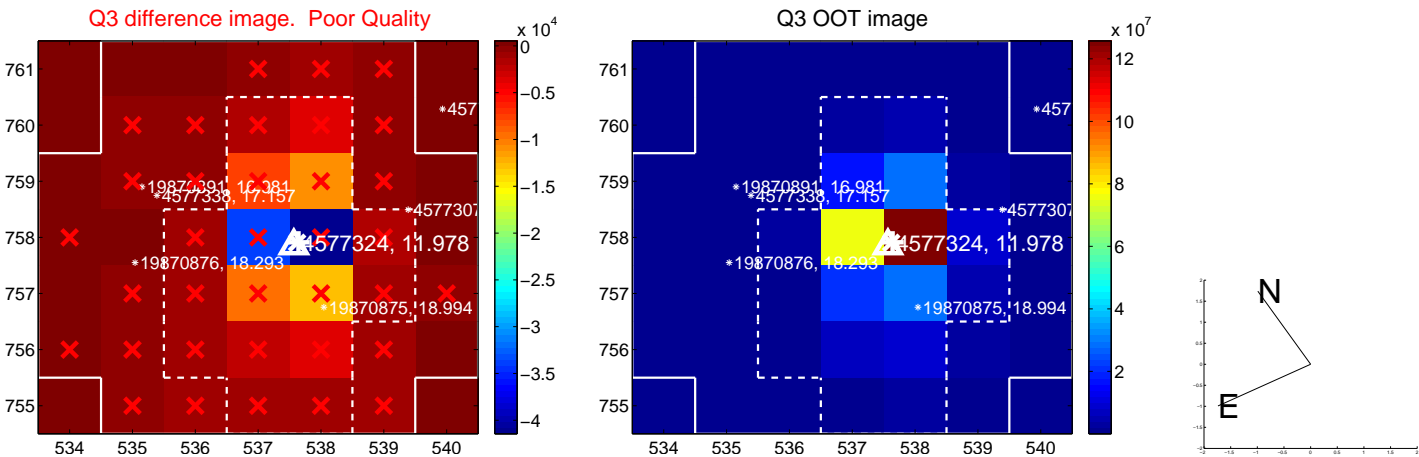
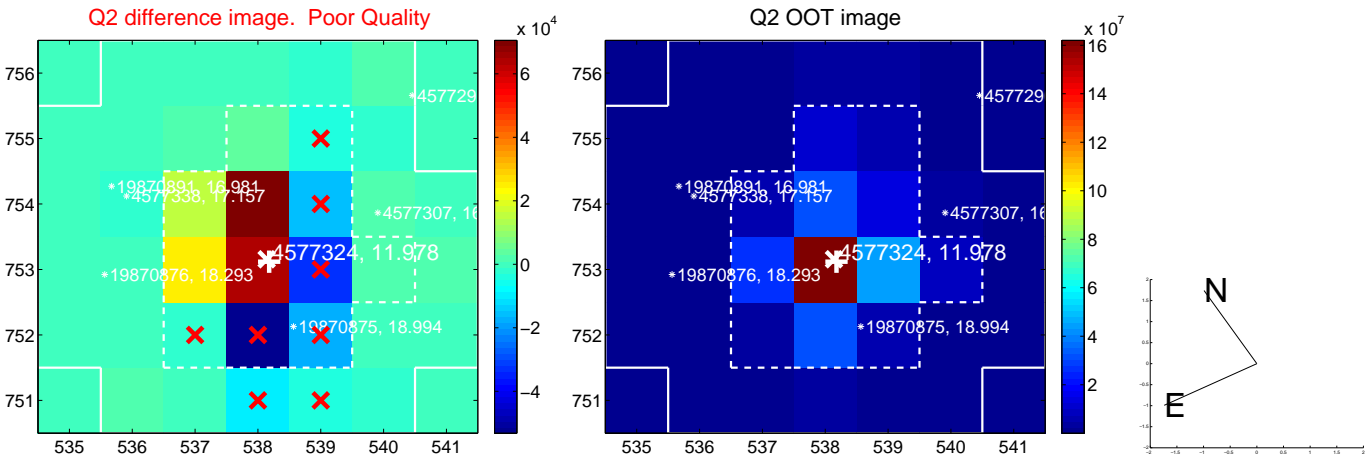
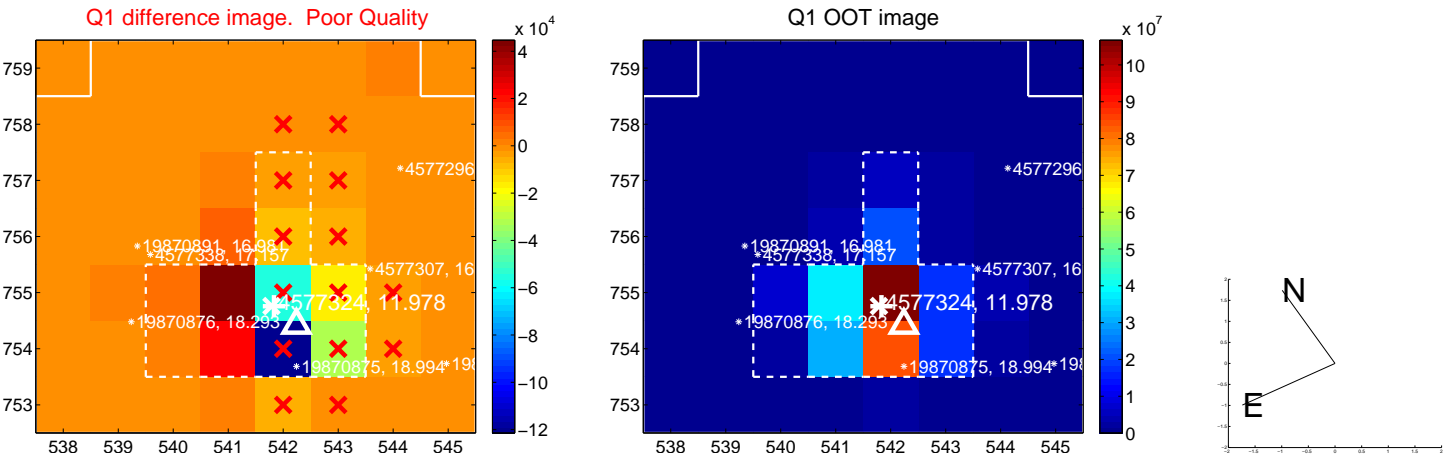
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.119 \pm 0.277$	0.43	$-0.015 \pm 0.342$	$-0.118 \pm 0.307$
PRF-fit source offset from KIC position	$0.260 \pm 0.209$	1.25	$-0.129 \pm 0.331$	$-0.226 \pm 0.319$
photometric centroid source offset	$1.04 \pm 0.59$	1.76	$0.36 \pm 0.55$	$-0.98 \pm 0.59$



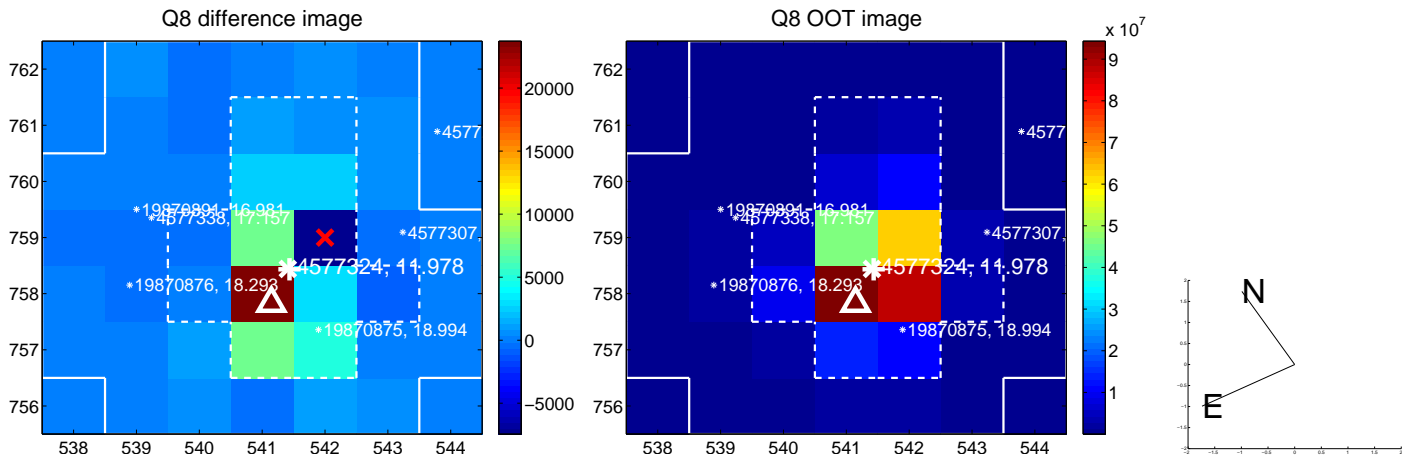
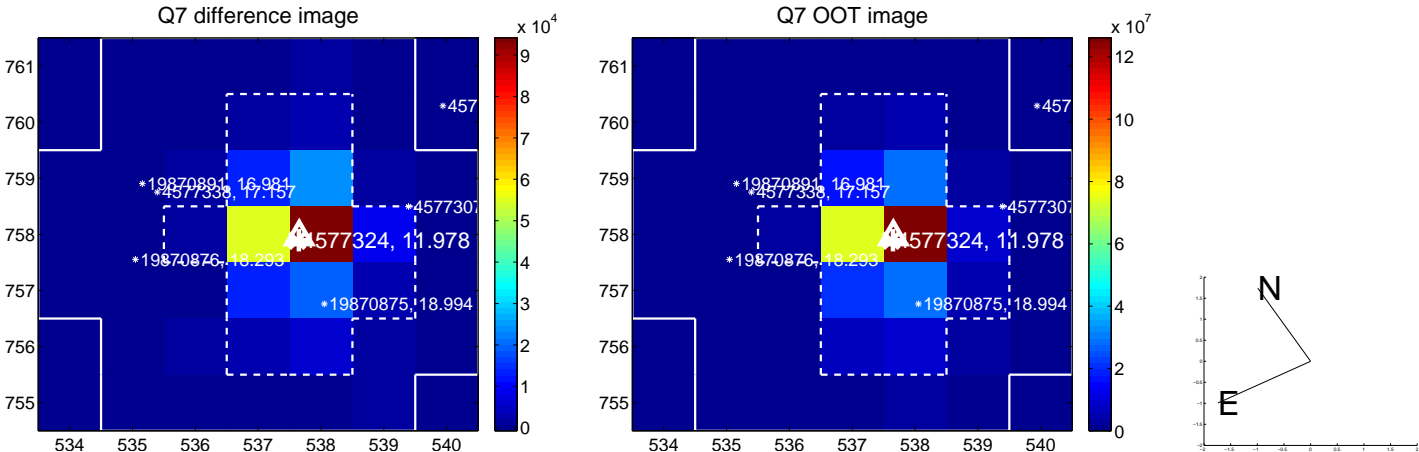
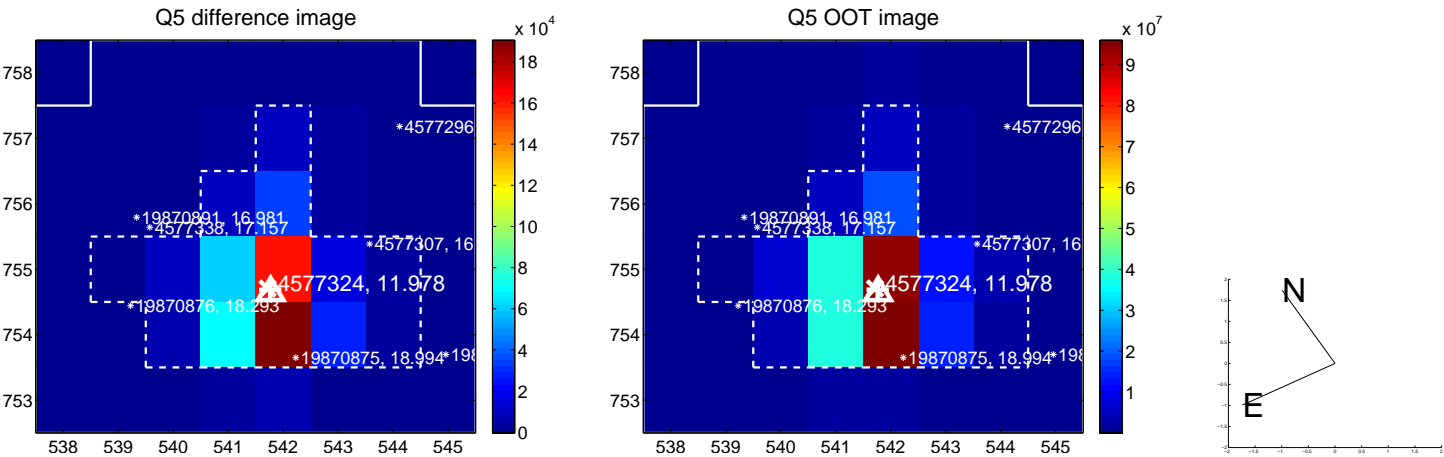
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



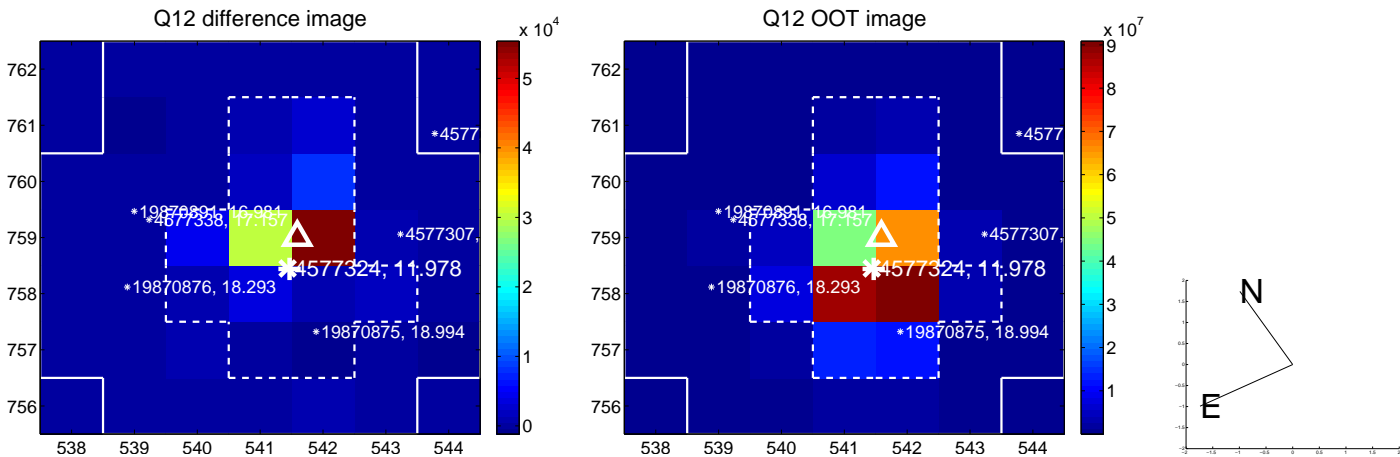
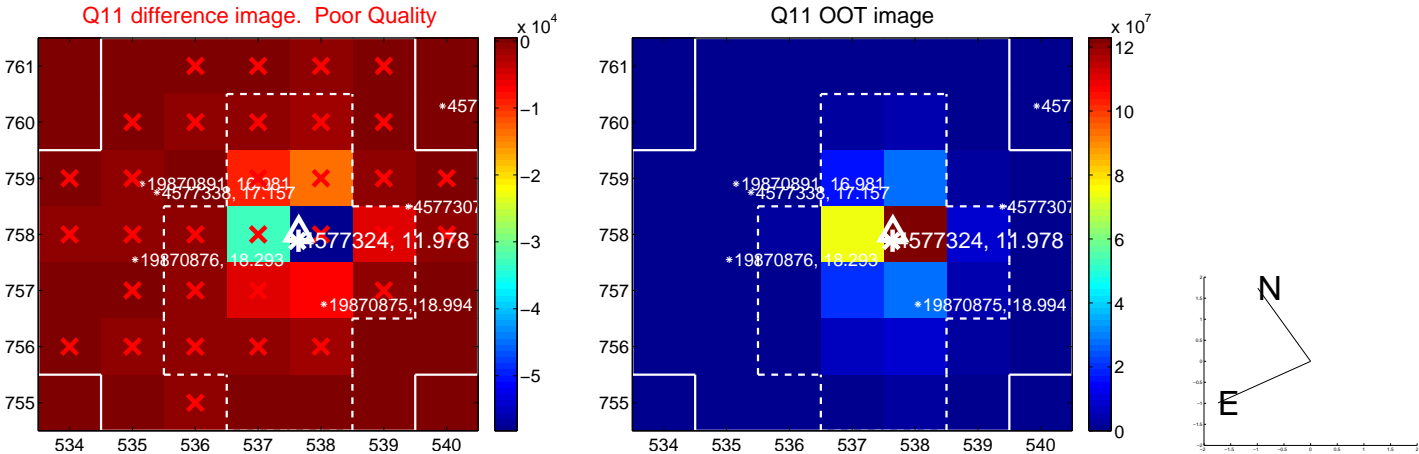
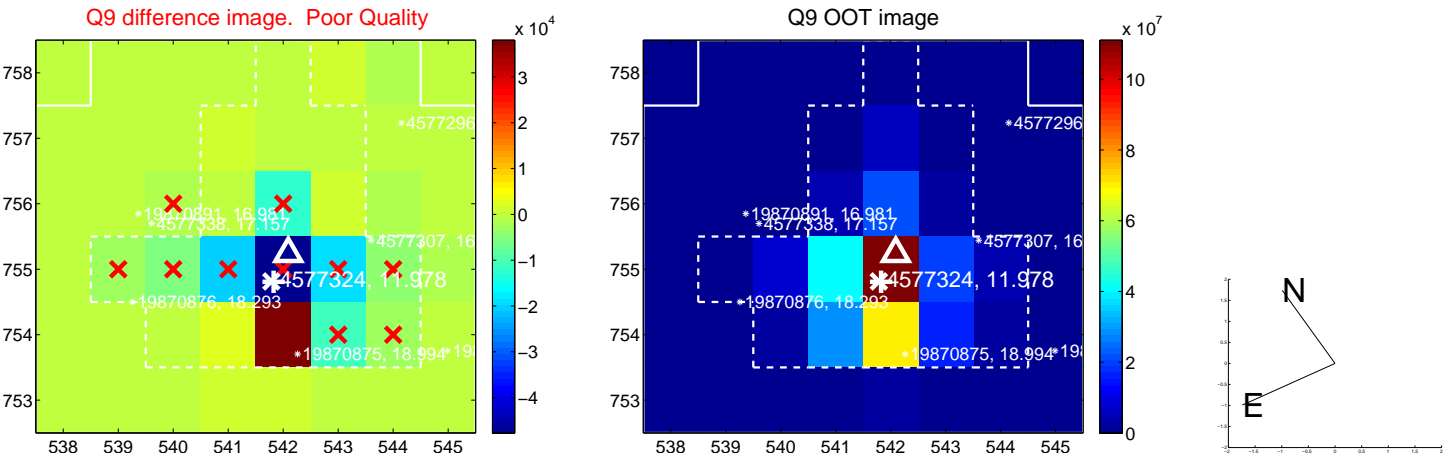
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



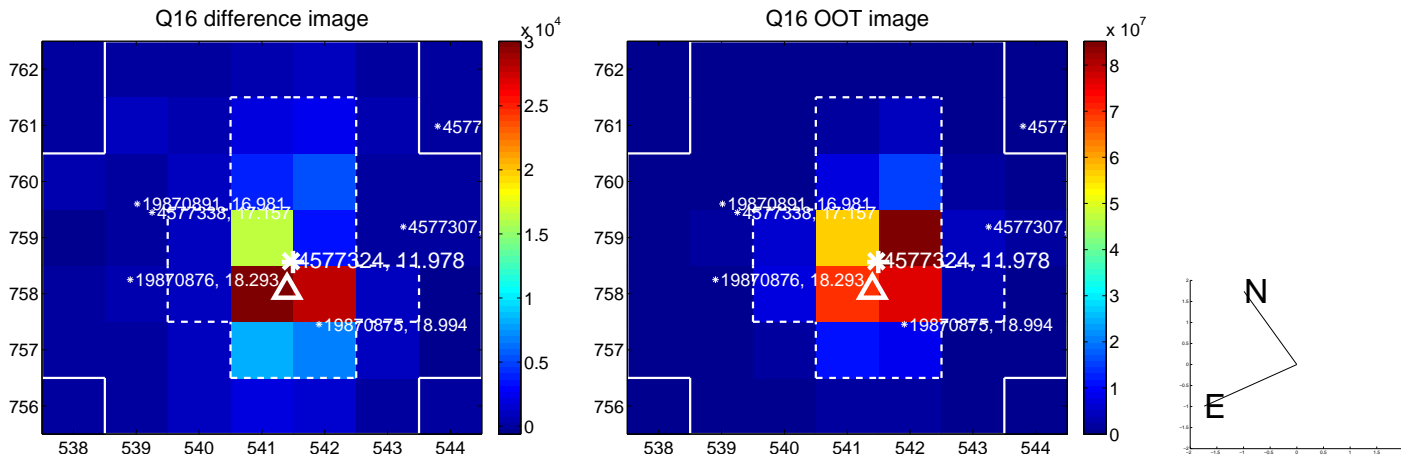
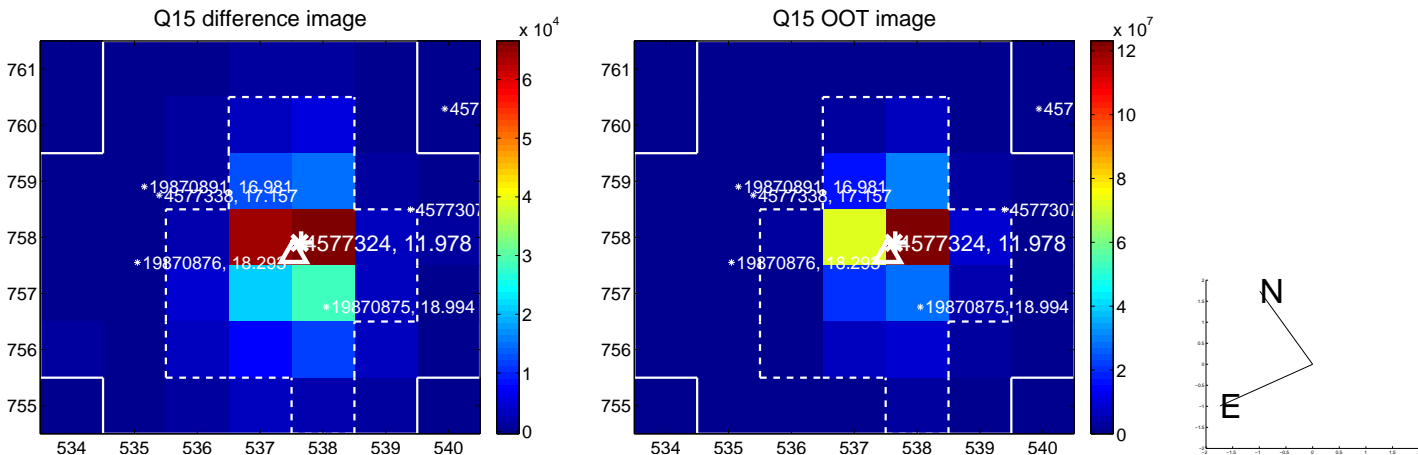
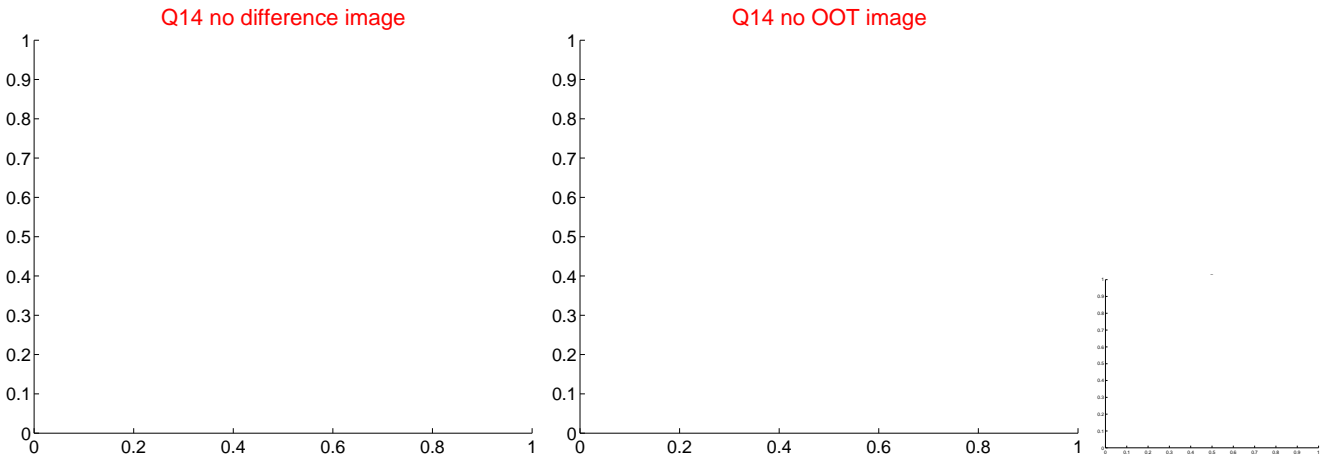
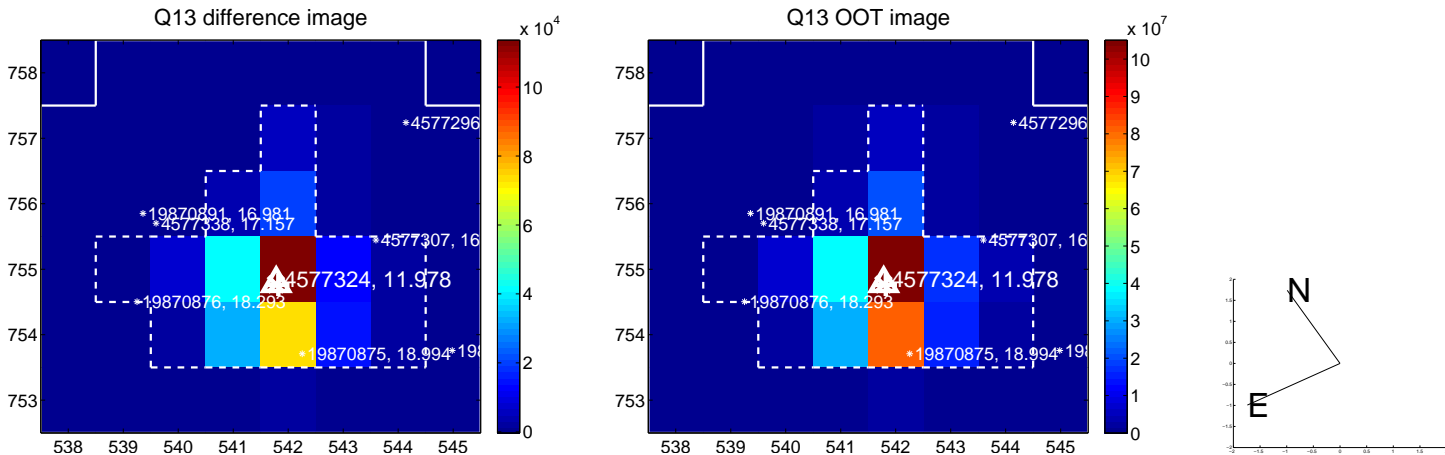
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



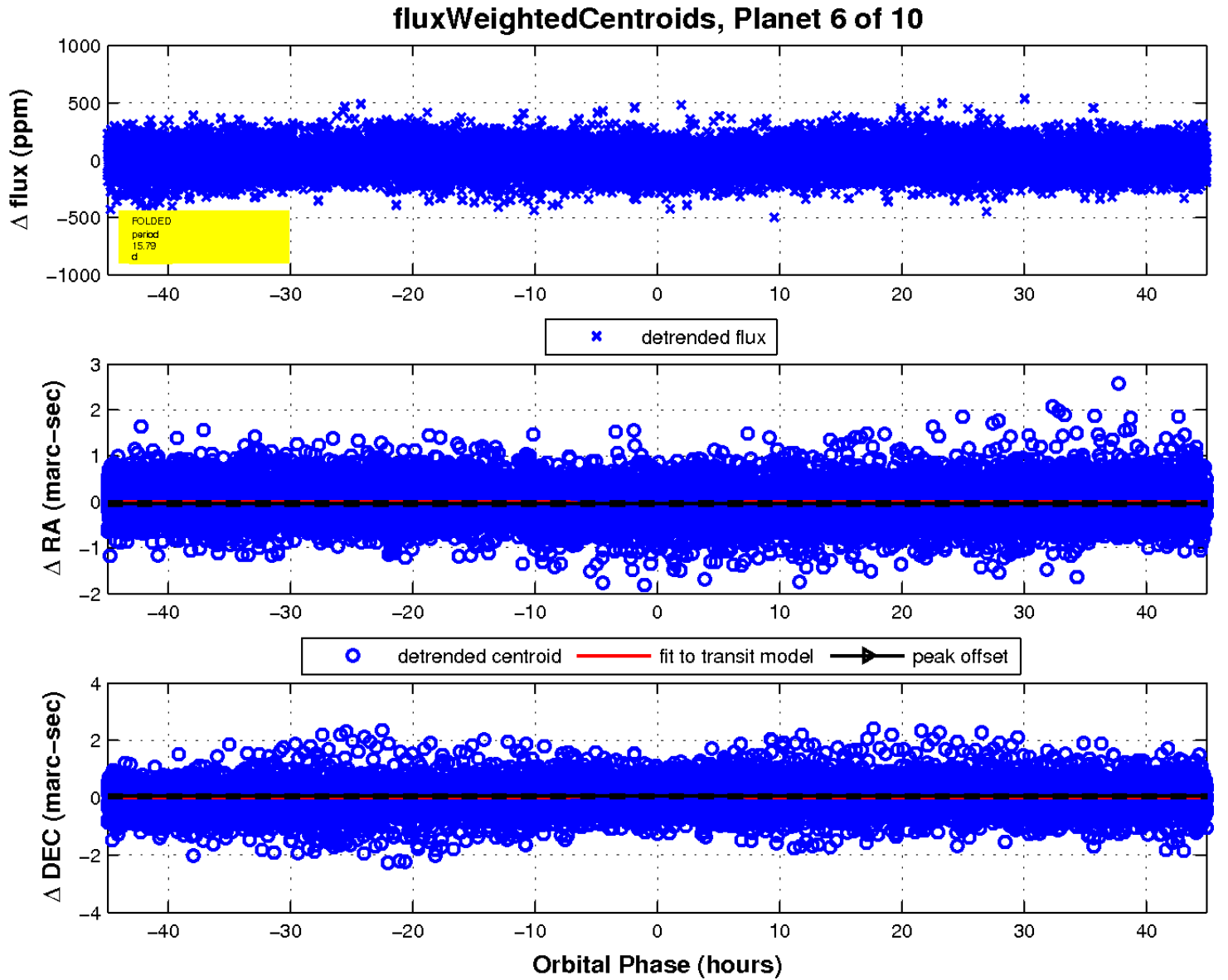
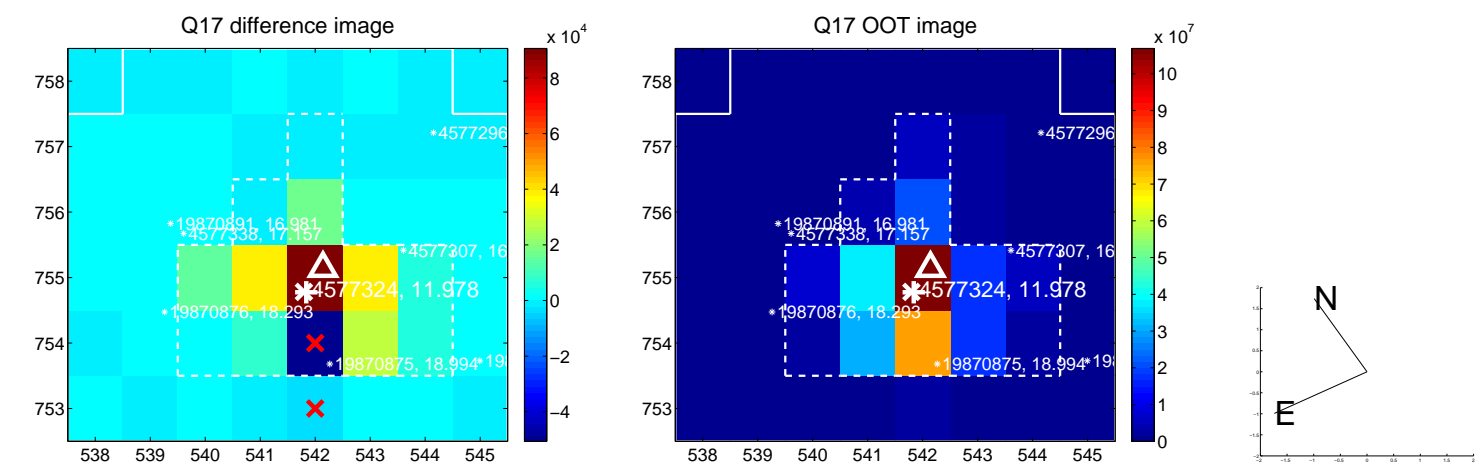
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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





## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
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004577324-03	OBS	No	283.674058	186.080756	103.5	25.045	8.5	4.6	1.55	6490	1.73	5.00
004577324-04	OBS	No	310.445932	432.392002	164.8	7.764	7.9	6.3	1.55	6490	2.19	4.44
004577324-05	OBS	No	173.353436	171.891158	171.1	9.852	7.6	6.9	1.55	6490	2.22	9.65
004577324-06	OBS	No	15.793664	139.332735	72.1	14.982	8.0	8.0	1.55	6490	1.54	235.31
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004577324-08	OBS	No	171.313674	196.888564	98.3	5.032	7.4	5.4	1.55	6490	1.70	9.80
004577324-09	OBS	No	143.173964	238.606043	293.0	0.835	7.5	3.3	1.55	6490	2.73	12.45
004577324-10	OBS	No	143.175229	238.960367	60.4	1.407	7.6	1.6	1.55	6490	1.36	12.45

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004577324-01	OBS	FP	0.00	1	0	0	0	LPP_DV
004577324-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD
004577324-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS
004577324-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004577324-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS
004577324-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT
004577324-07	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST
004577324-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004577324-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004577324-10	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_FEW_DIFFS

**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.

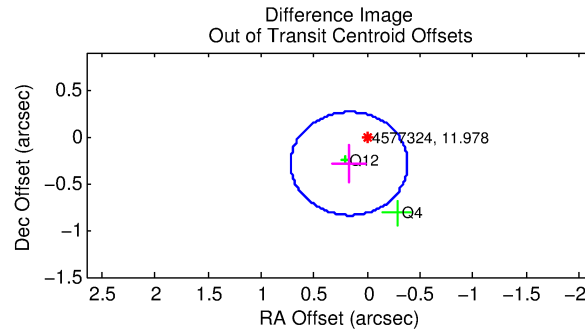
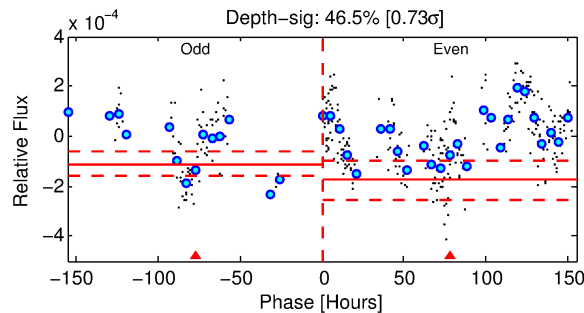
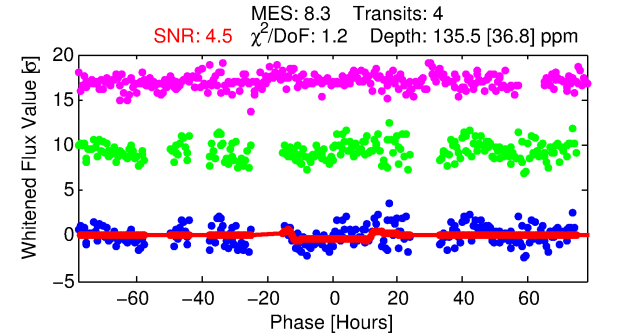
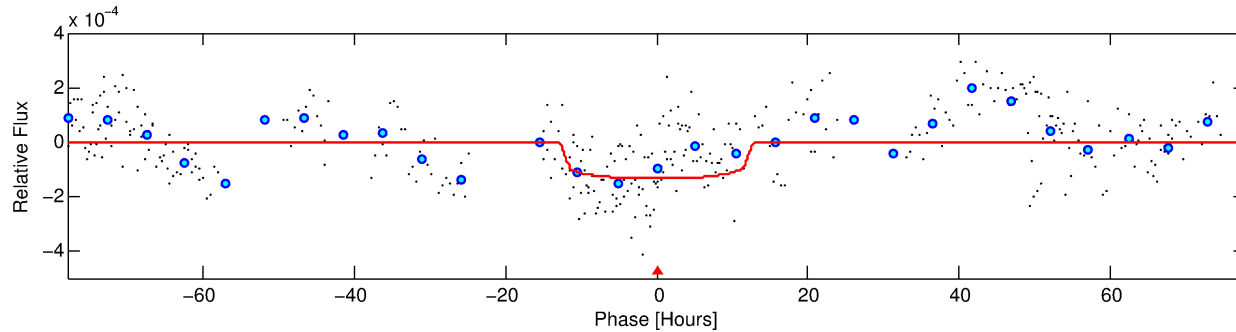
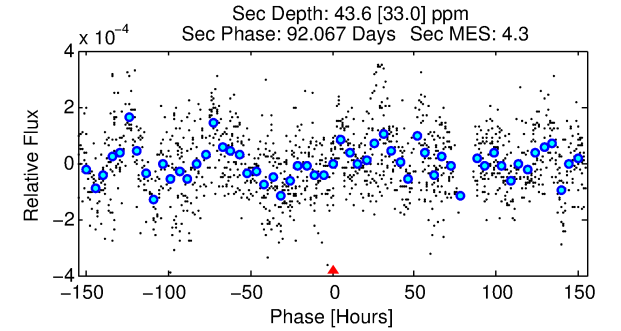
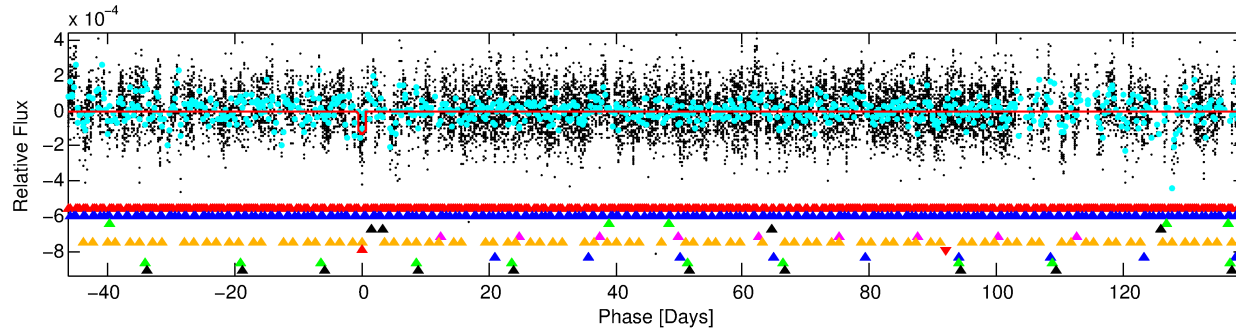
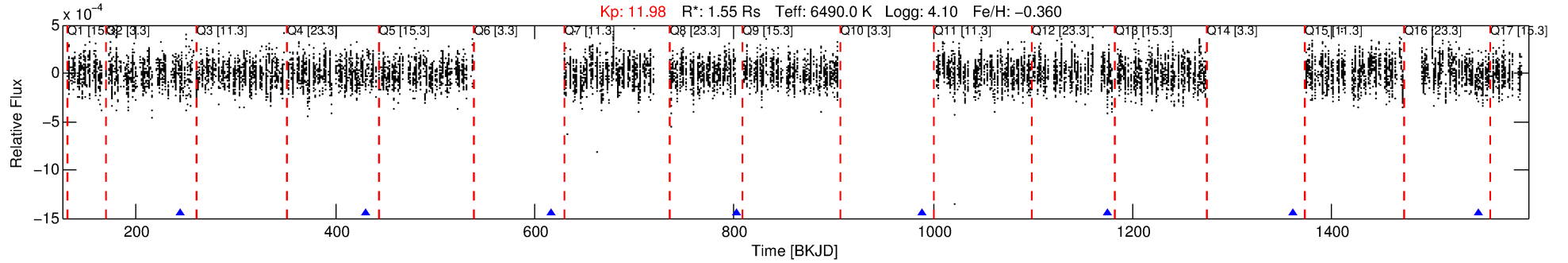
Ephemeris Match Information For 004577324-07

No Significant Match Found



# DV One-Page Summary

KIC: 4577324 Candidate: 7 of 10 Period: 185.917 d



## DV Fit Results:

Period = 185.91742 [0.02555] d  
Epoch = 244.9754 [0.0266] BKJD  
Rp/R\* = 0.0124 [0.0023]  
a/R\* = 25.56 [15.29]  
b = 0.90 [0.13]  
Seff = 8.79 [3.48]  
Teq = 439 [43] K  
Rp = 2.10 [0.67] Re  
a = 0.6597 [0.1597] AU  
Ag = 2358.21 [2175.08] [1.08σ]  
Teffp = 4730 [1002] K [4.28σ]

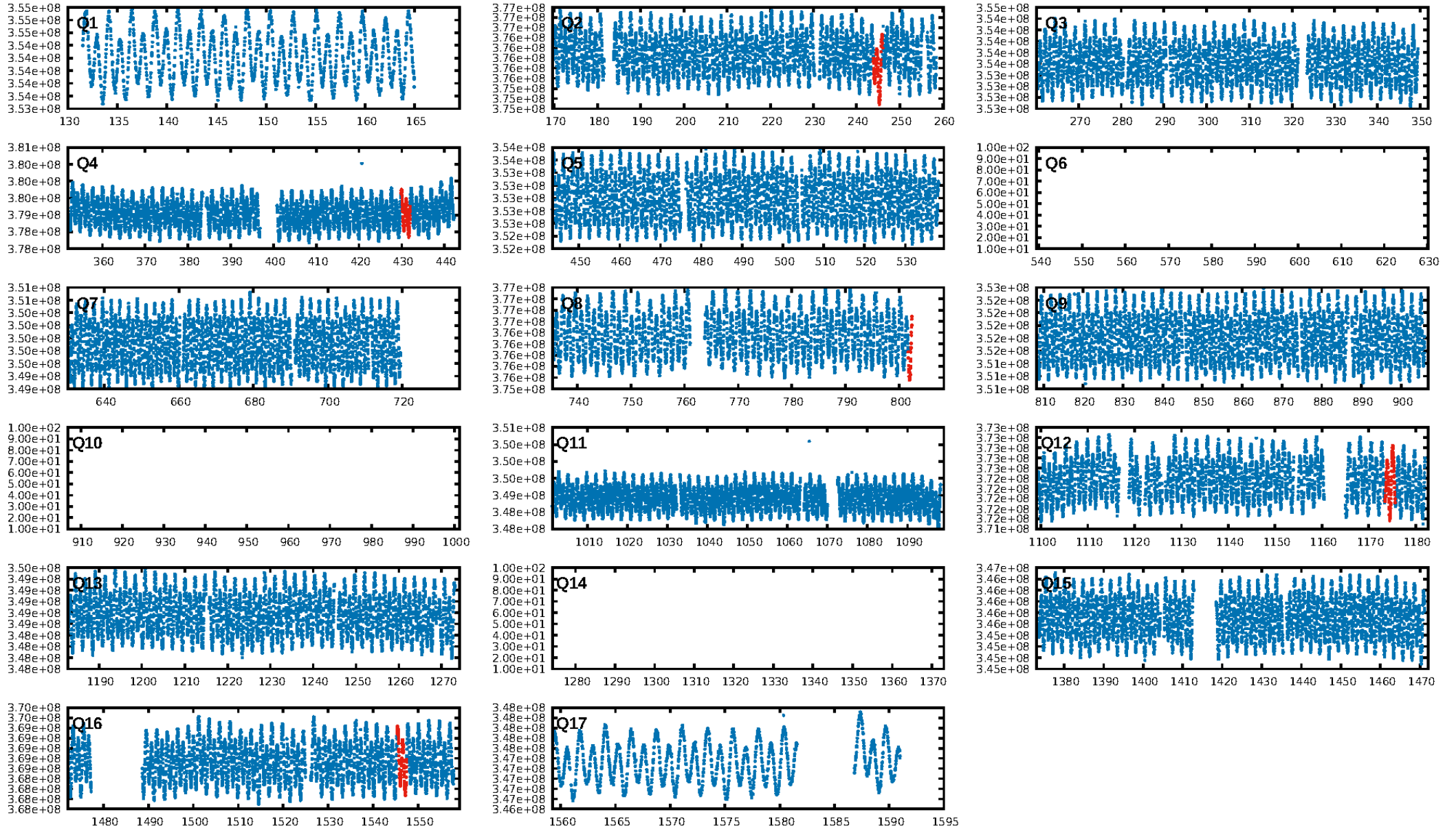
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [10.87σ]  
LongPeriod-sig: 100.0% [65.06σ]  
ModelChiSquare2-sig: 18.1%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 0.231  
Centroid-sig: 31.7%  
Centroid-so: 1.582 arcsec [1.12σ]  
OotOffset-rm: 0.335 arcsec [1.82σ]  
KicOffset-rm: 0.395 arcsec [1.53σ]  
OotOffset-st: 0/0/2/0 [2]  
KicOffset-st: 0/0/2/0 [2]  
DiffImageQuality-fgm: 1.00 [2/2]  
DiffImageOverlap-fno: 0.00 [0/2]

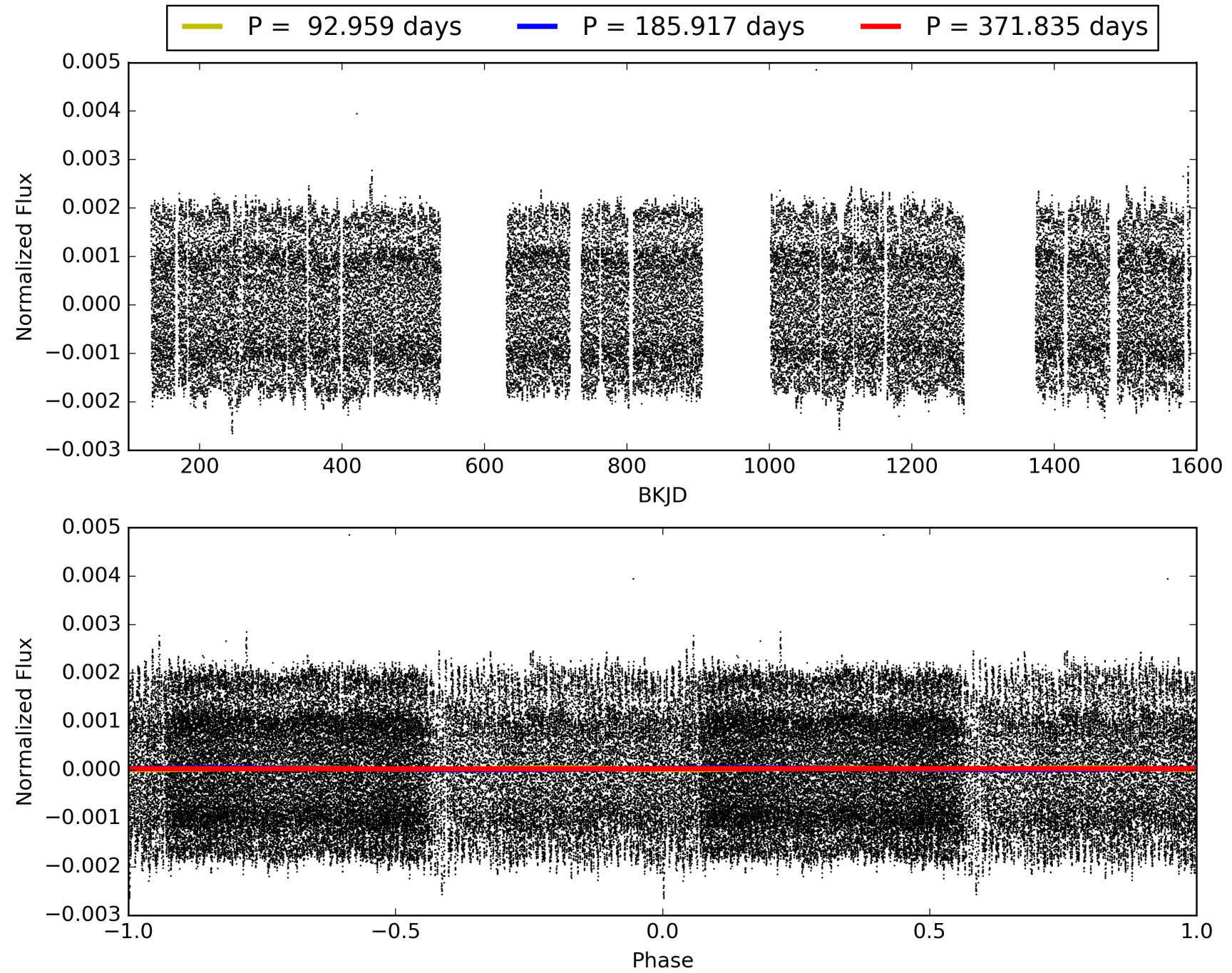
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 00:55:49 Z

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

# TCE 004577324-07, PDC Light Curves

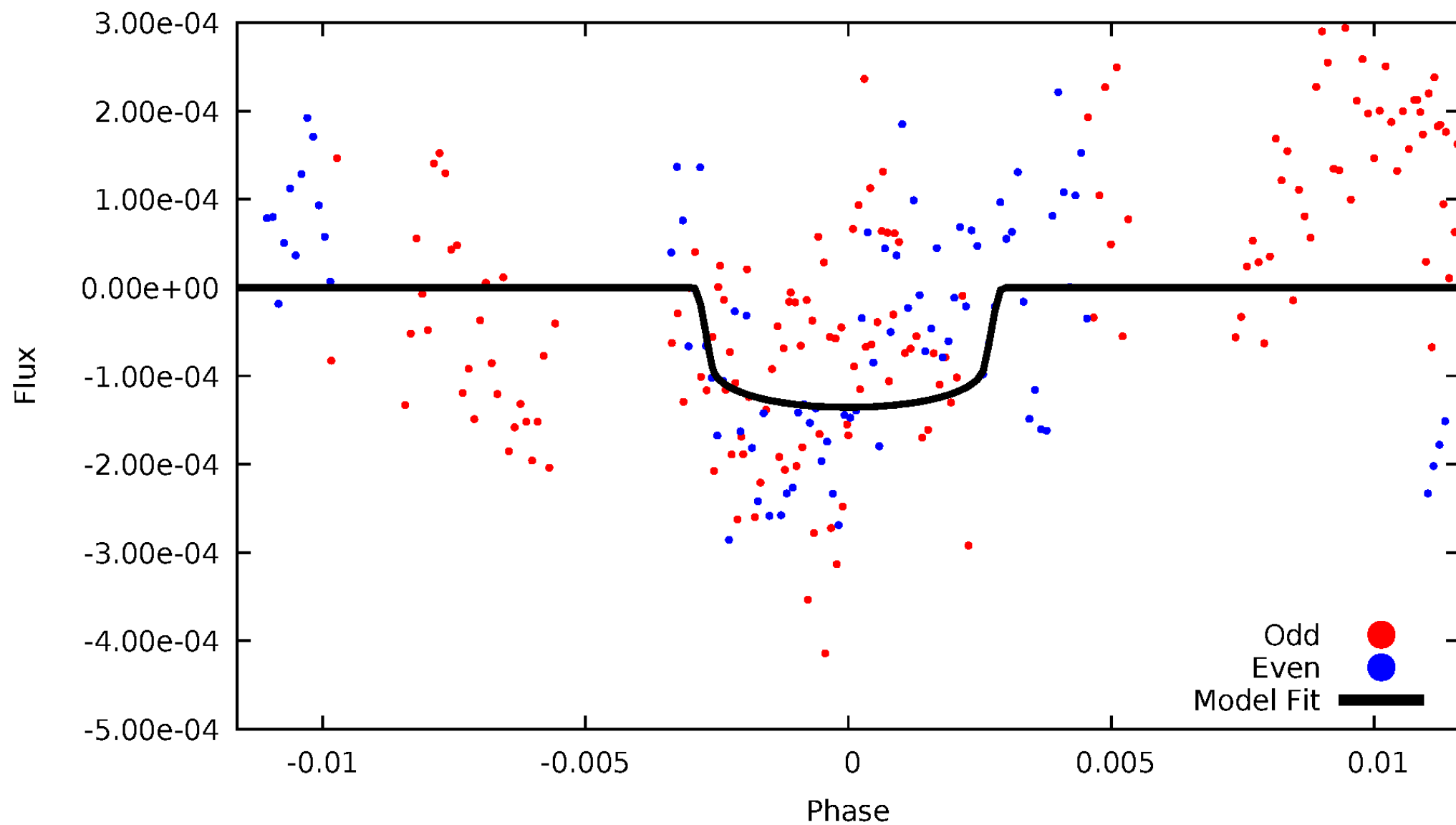


TCE 004577324-07



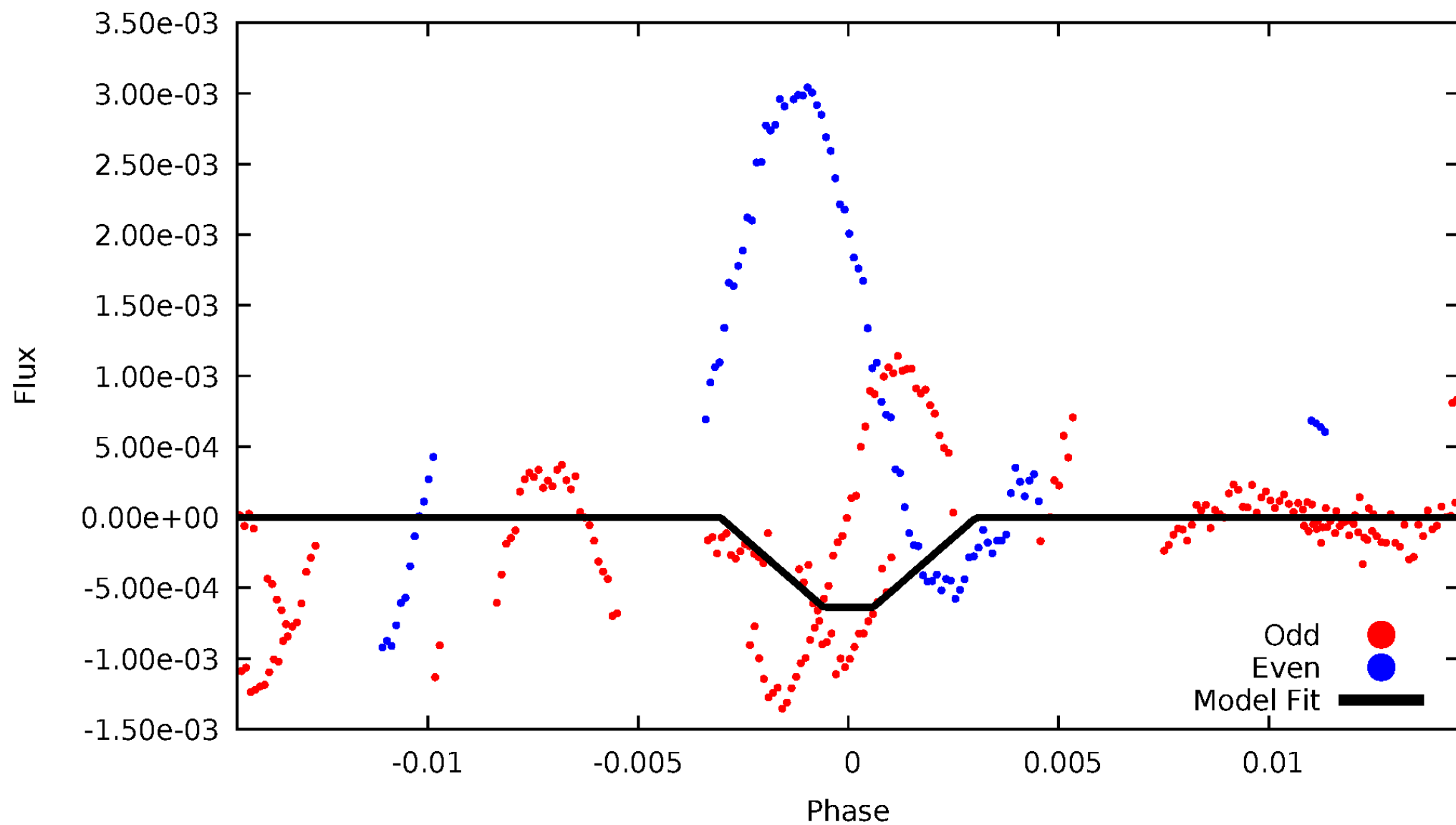
# DV Odd/Even

TCE 004577324-07



# ALT Odd/Even

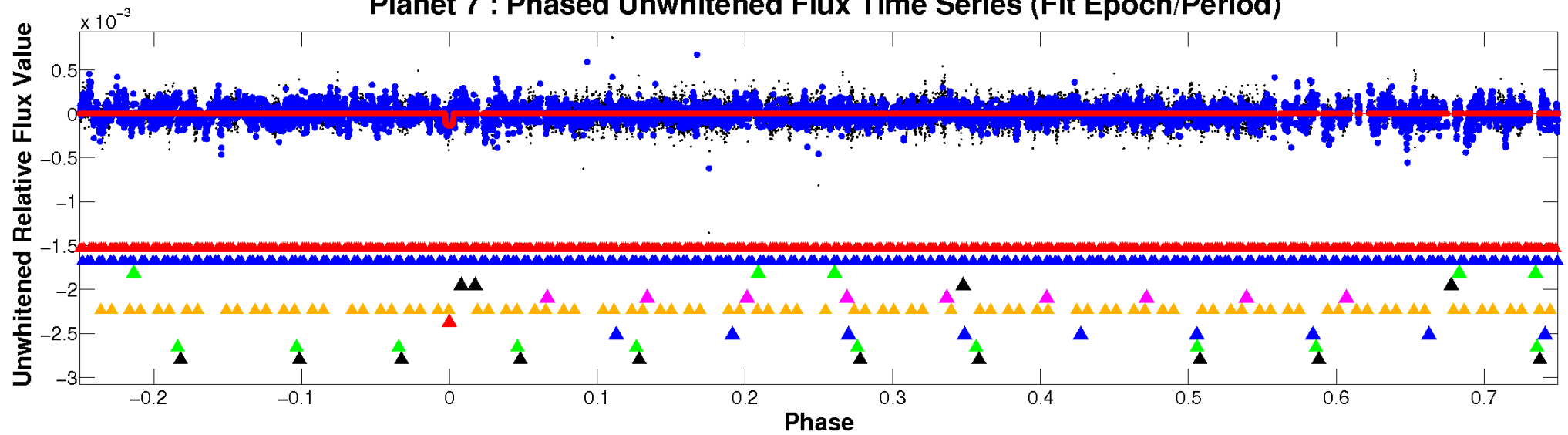
TCE 004577324-07



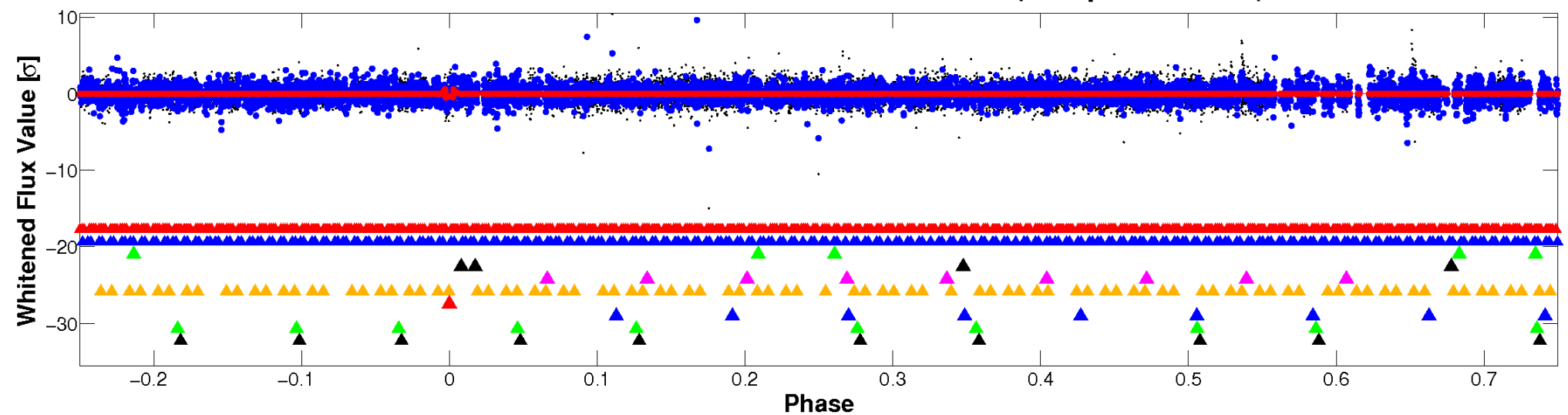


# Non-Whitened Vs. Whitened Light Curve

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

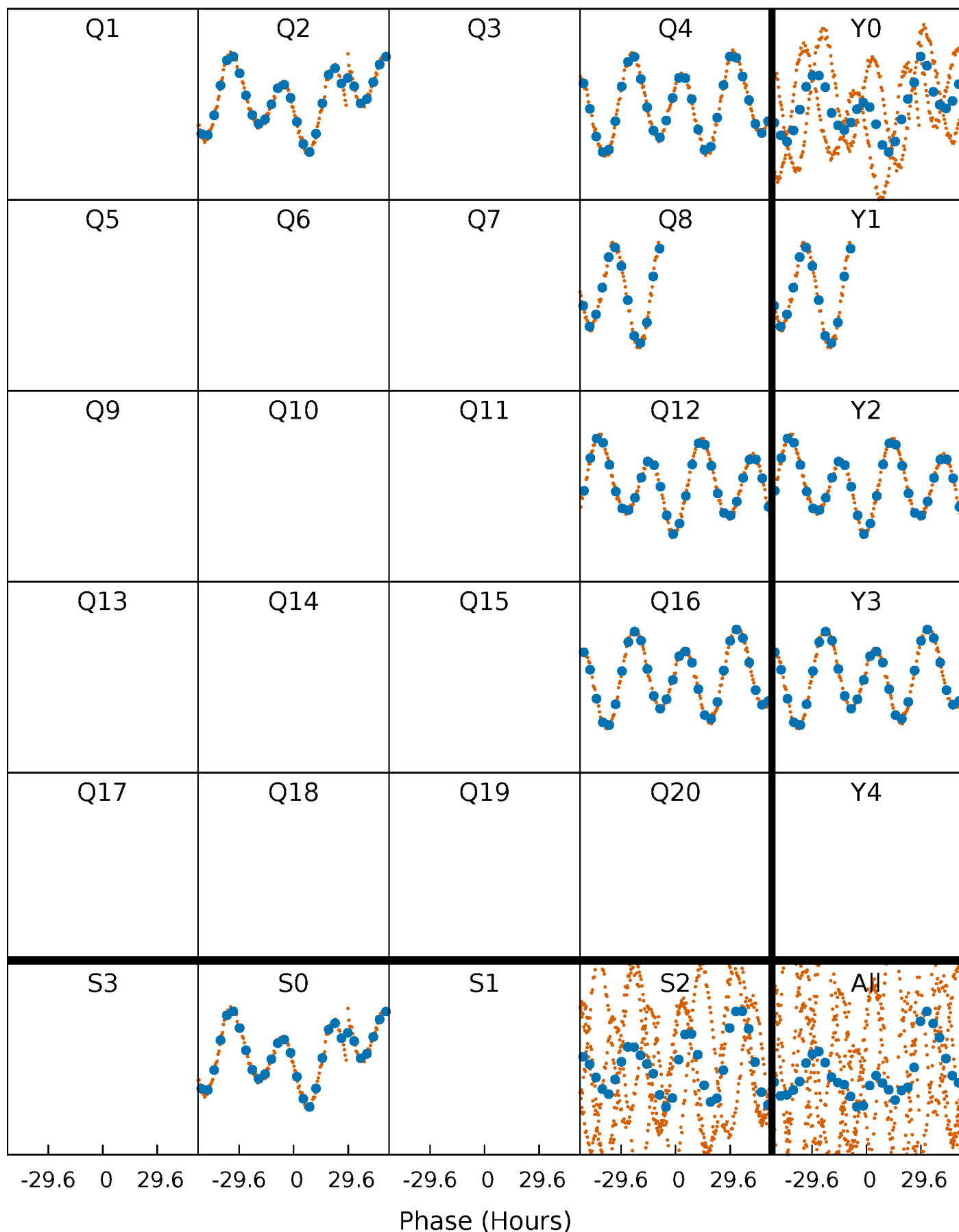


## Planet 7 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

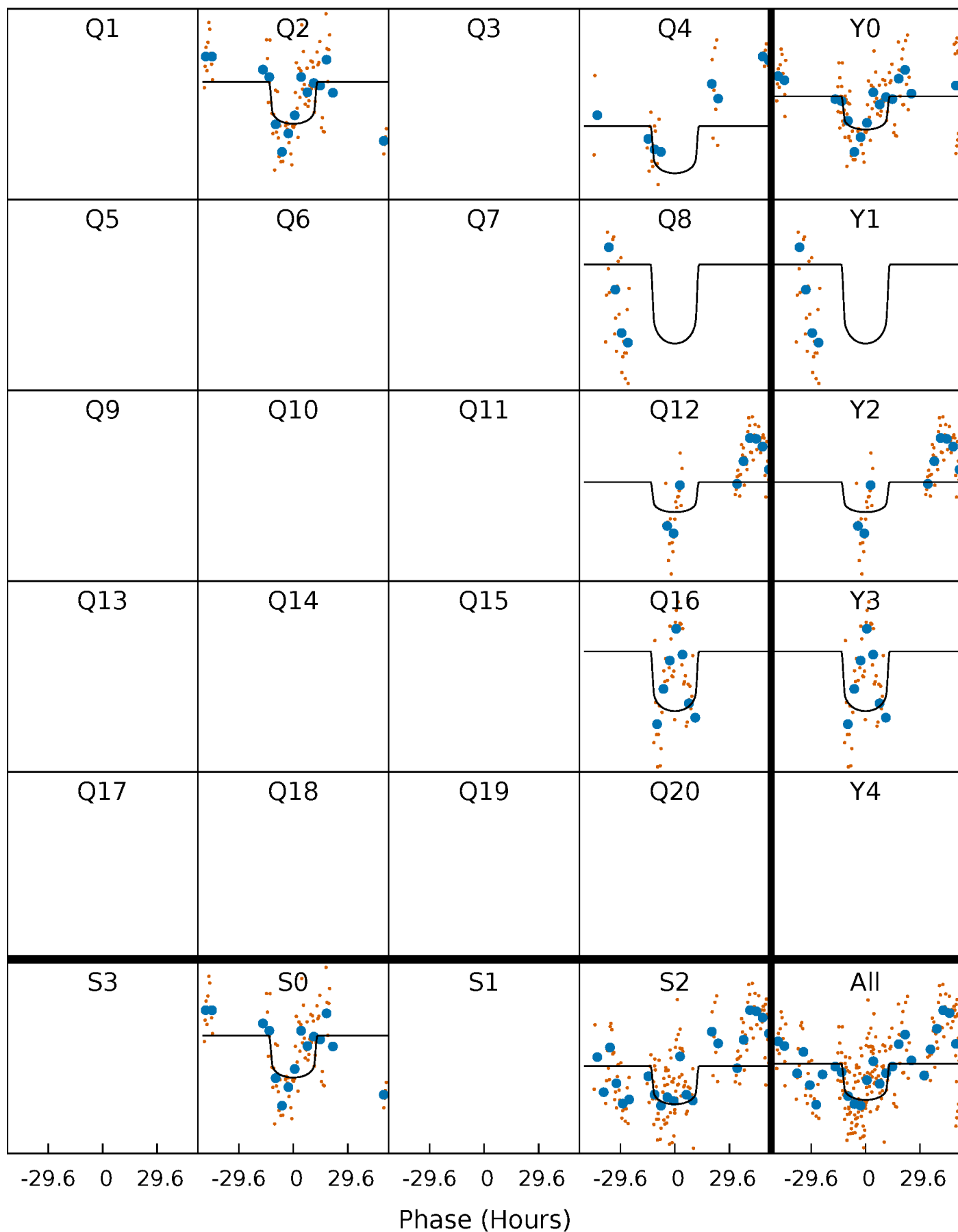
TCE 004577324-07 P=185.917423 Days  $T_0=244.975369$  (BKJD)





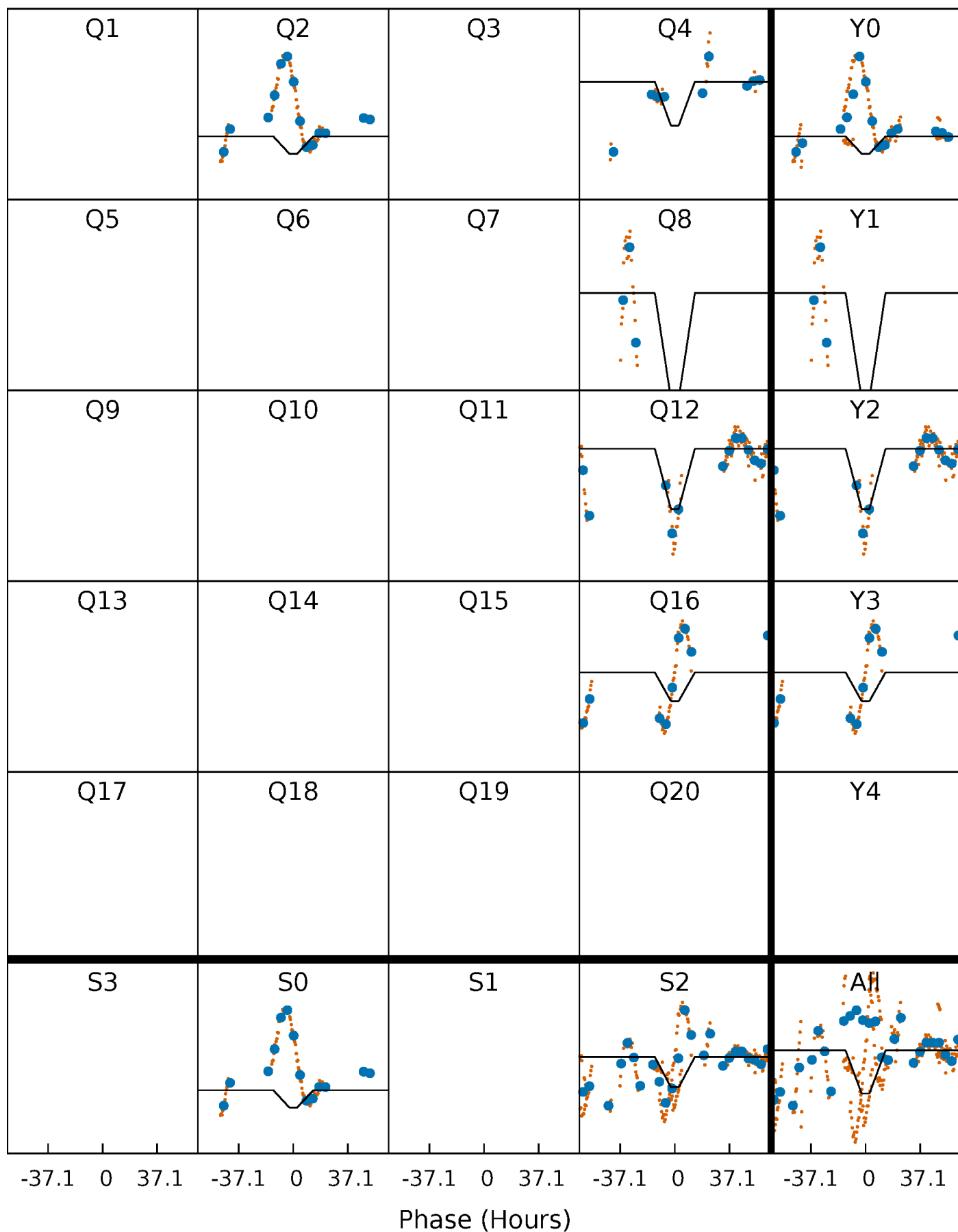
# DV Quarter-Phased Transit Curves

TCE 004577324-07     $P=185.917423$  Days     $T_0=244.975369$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

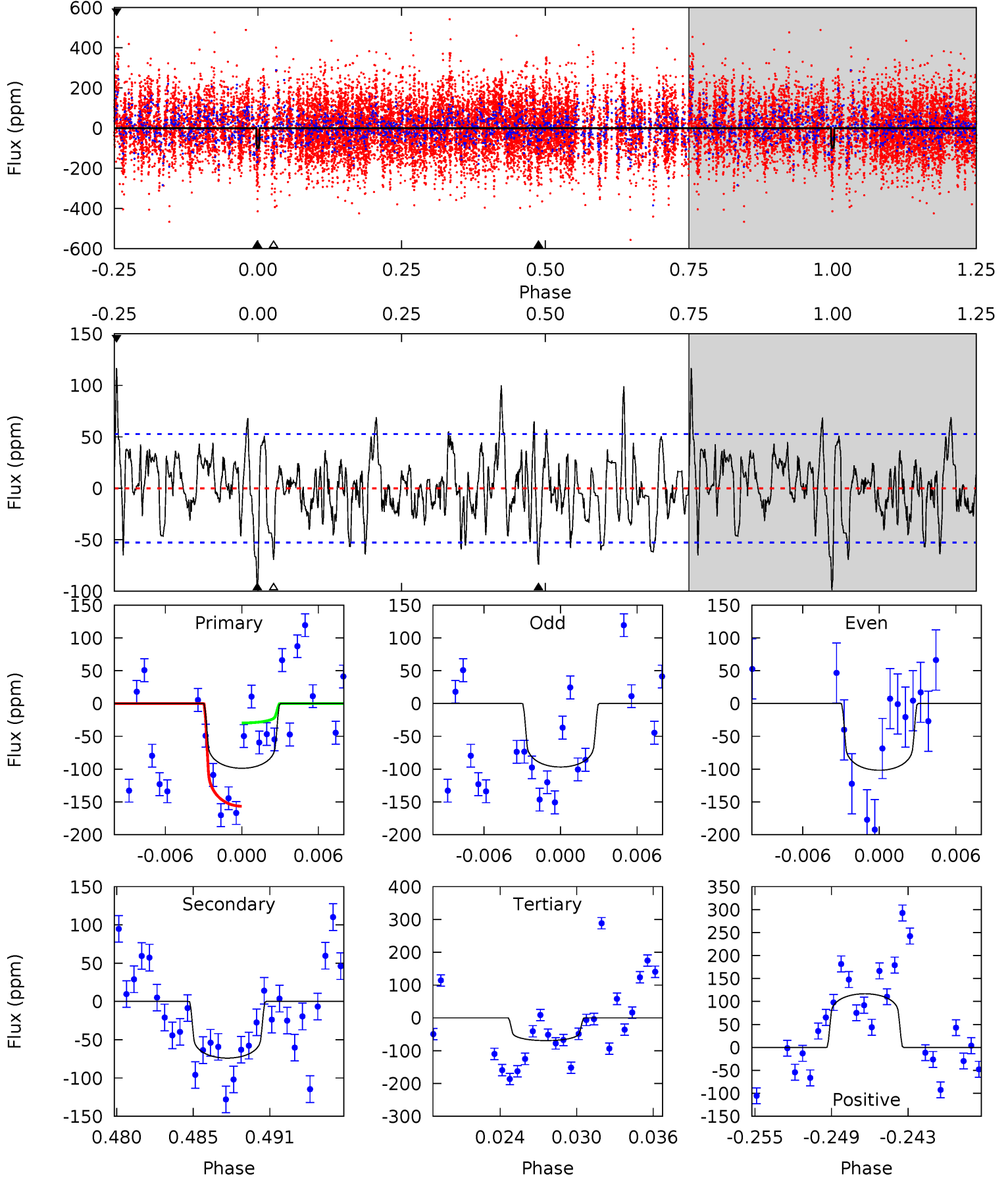
TCE 004577324-07 P=185.911340 Days  $T_0=244.978695$  (BKJD)



# DV Model-Shift Uniqueness Test

004577324-07,  $P = 185.917423$  Days,  $E = 59.057946$  Days

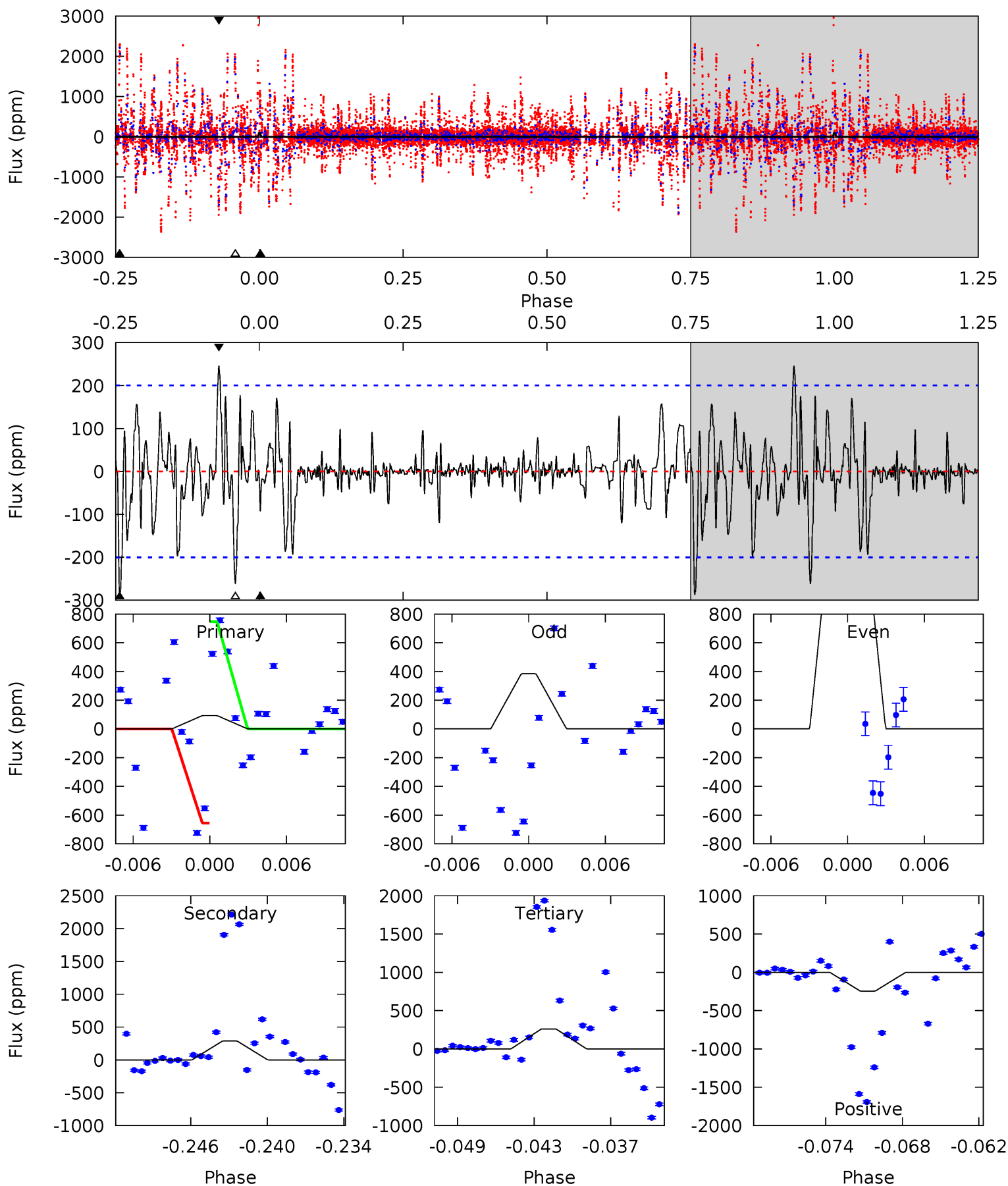
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.60	7.19	6.74	11.3	5.13	2.75	2.71	2.86	-1.74	0.45	-4.15	0.23	1.11	0.54	6.14



# Alt Model-Shift Uniqueness Test

004577324-07, P = 185.911340 Days, E = 59.067355 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
2.37	7.34	6.66	6.26	5.12	2.74	1.17	-4.29	-3.88	0.67	1.08	25.4	-0.39	0.46	1.12



### Stellar Parameters For KIC 004577324

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6490^{+146}_{-178}$	$4.101^{+0.221}_{-0.119}$	$-0.360^{+0.300}_{-0.300}$	$1.551^{+0.329}_{-0.402}$	$1.107^{+0.177}_{-0.145}$	$0.418^{+0.512}_{-0.145}$
	+2%/-3%	+5%/-3%	+83%/-83%	+21%/-26%	+16%/-13%	+122%/-35%
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 004577324-07 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-74 \pm 10$	$2.04^{+0.49}_{-0.44}$	$608^{+37}_{-42}$	$5436^{+526}_{-437}$	$4298^{+2599}_{-1459}$
Alt.	$-287 \pm 39$	$4.19^{+0.69}_{-0.63}$	$608^{+35}_{-43}$	$5332^{+330}_{-270}$	$3954^{+1578}_{-1073}$

$T_{max}$  = 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

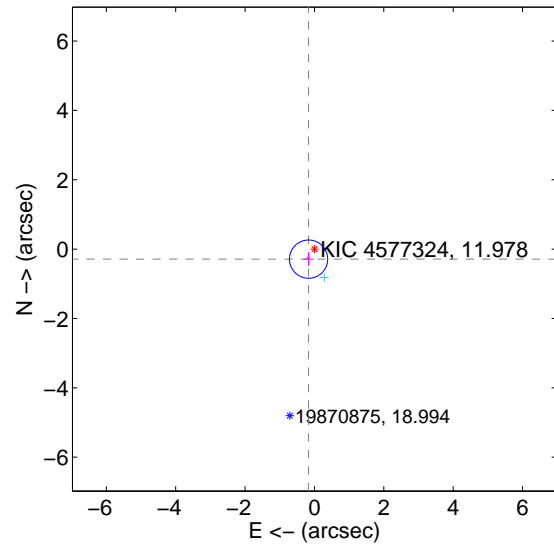
Supplemental centroid analysis for 004577324-07. **Kepler magnitude: 11.98.** Transit SNR 4.47

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

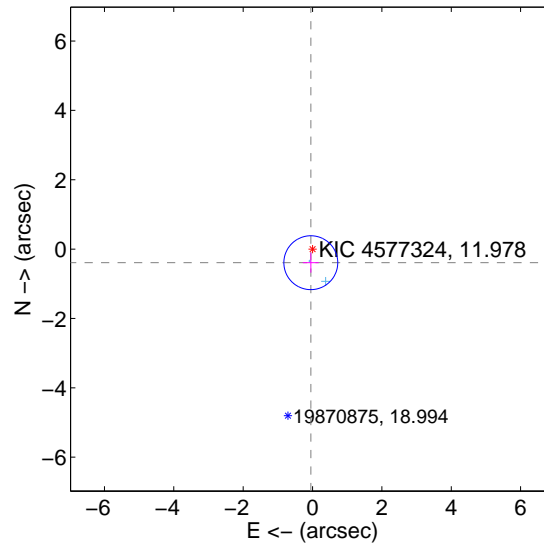
The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.335 \pm 0.184$	1.82	$0.169 \pm 0.157$	$-0.289 \pm 0.192$
PRF-fit source offset from KIC position	$0.395 \pm 0.259$	1.53	$0.050 \pm 0.229$	$-0.392 \pm 0.288$
photometric centroid source offset	$1.58 \pm 1.41$	1.12	$-0.79 \pm 1.32$	$-1.37 \pm 1.44$

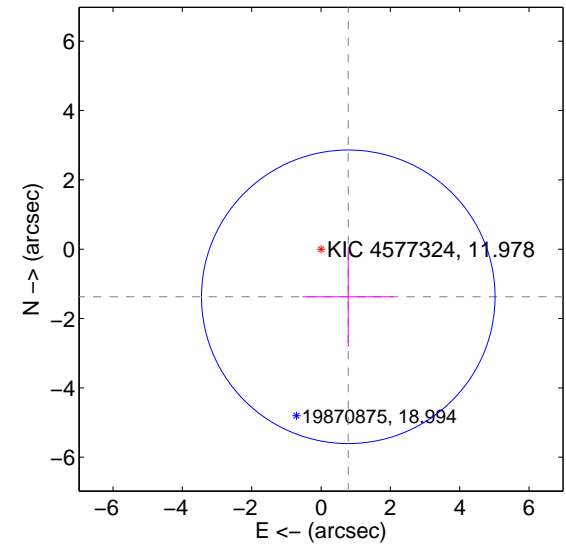
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

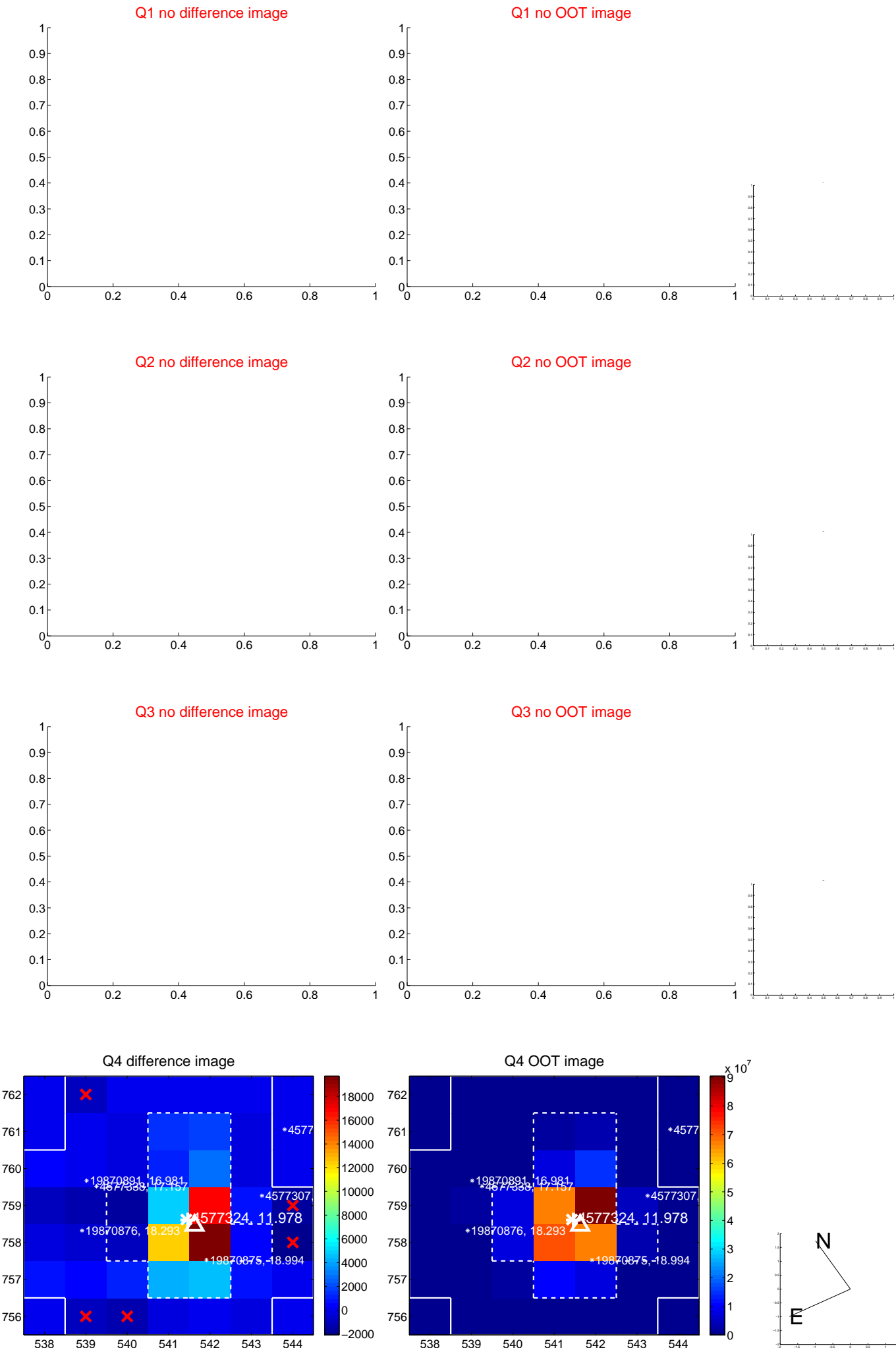


offset from photometric centroids



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

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

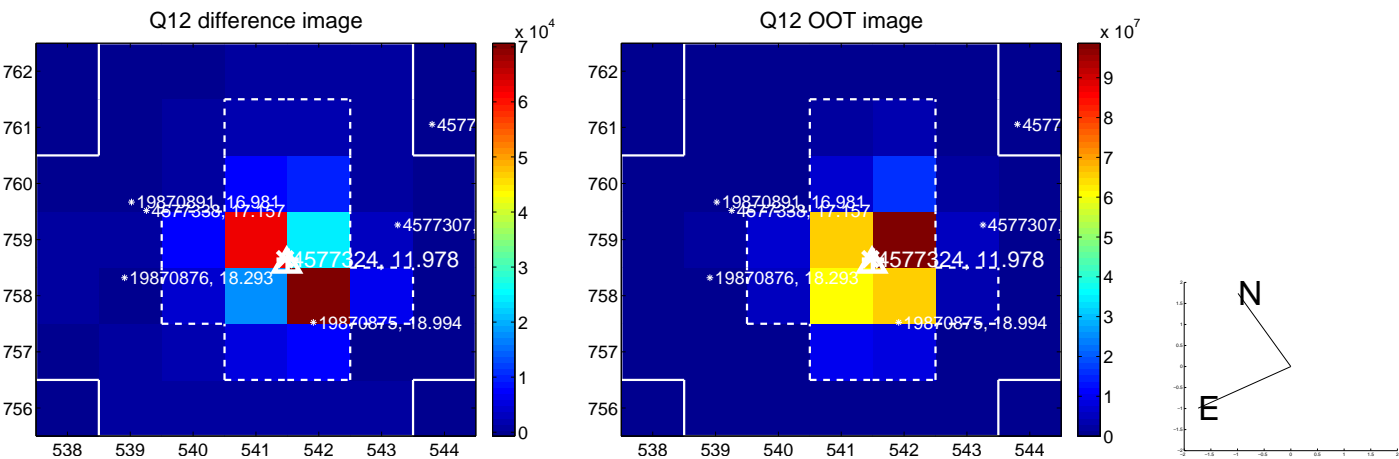
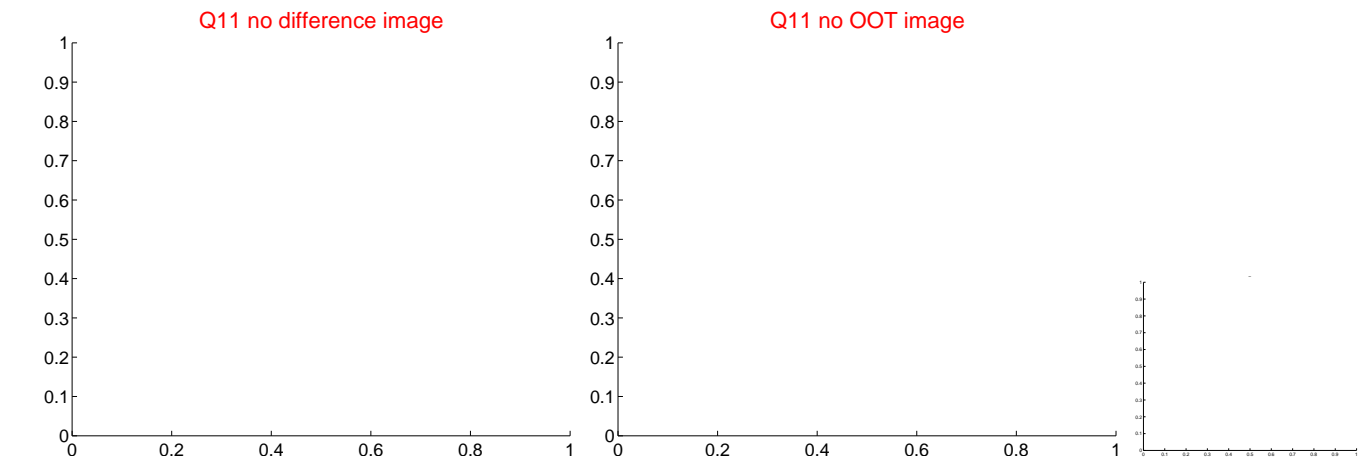
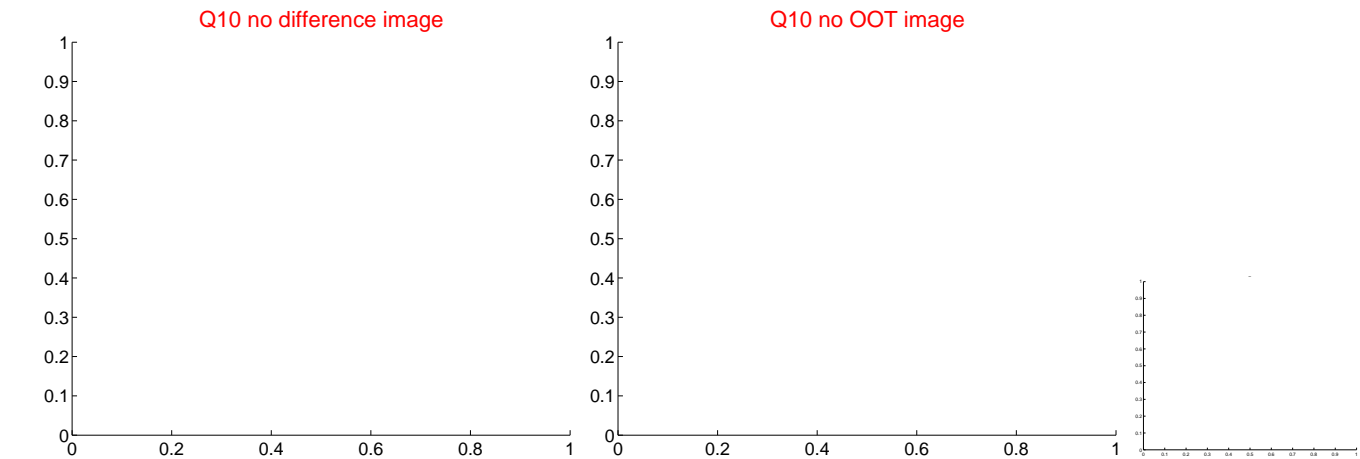
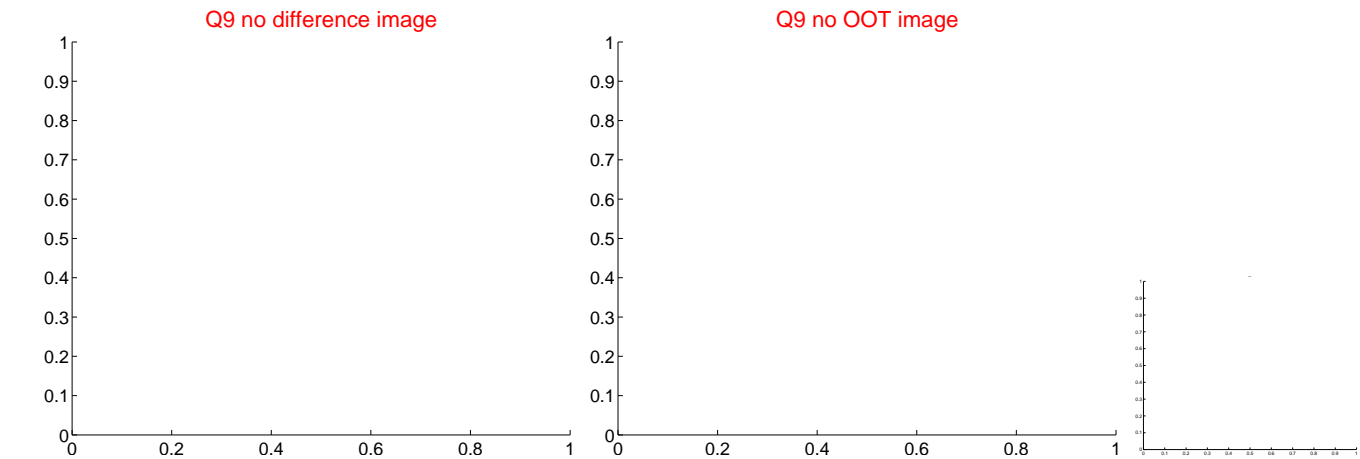




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



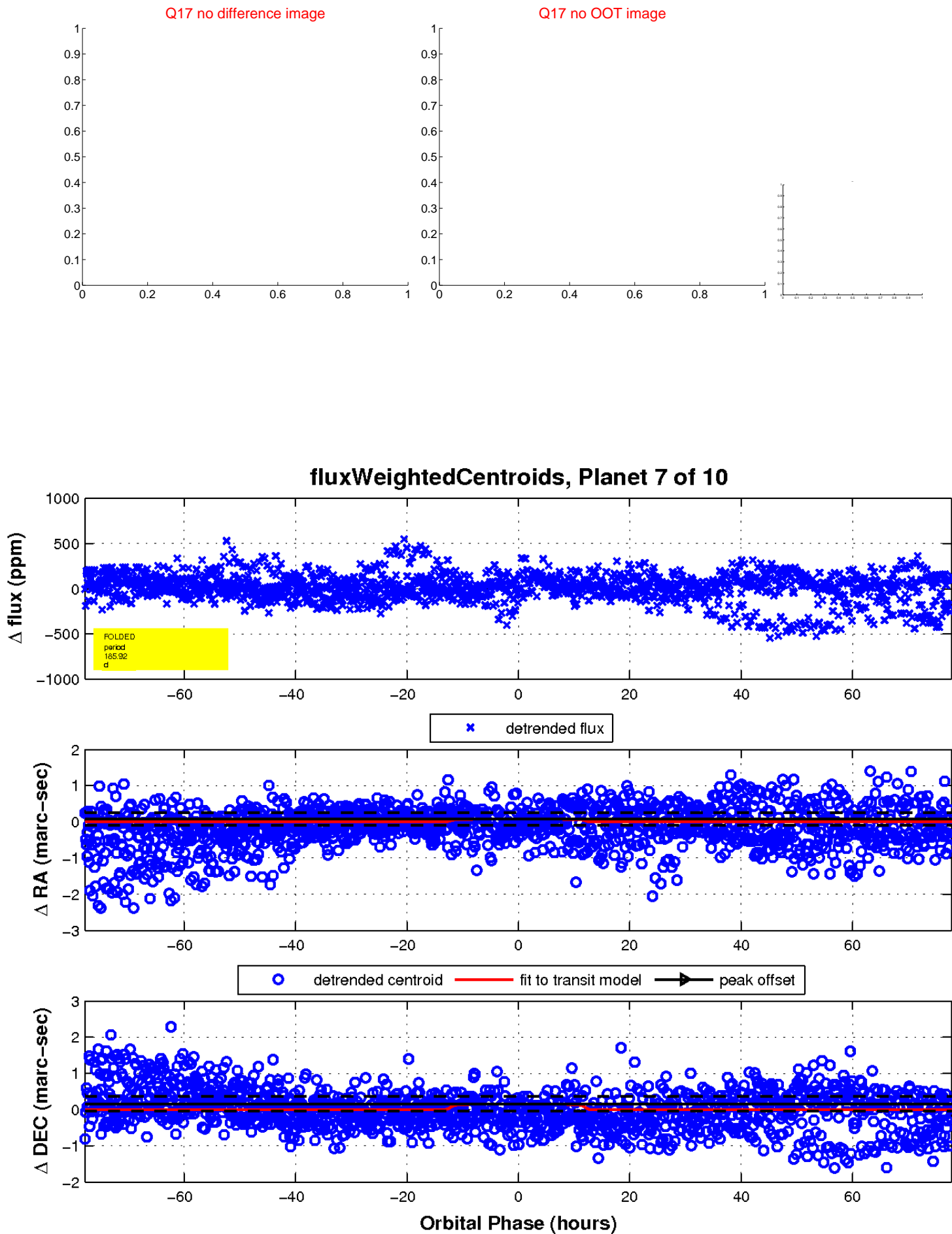
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

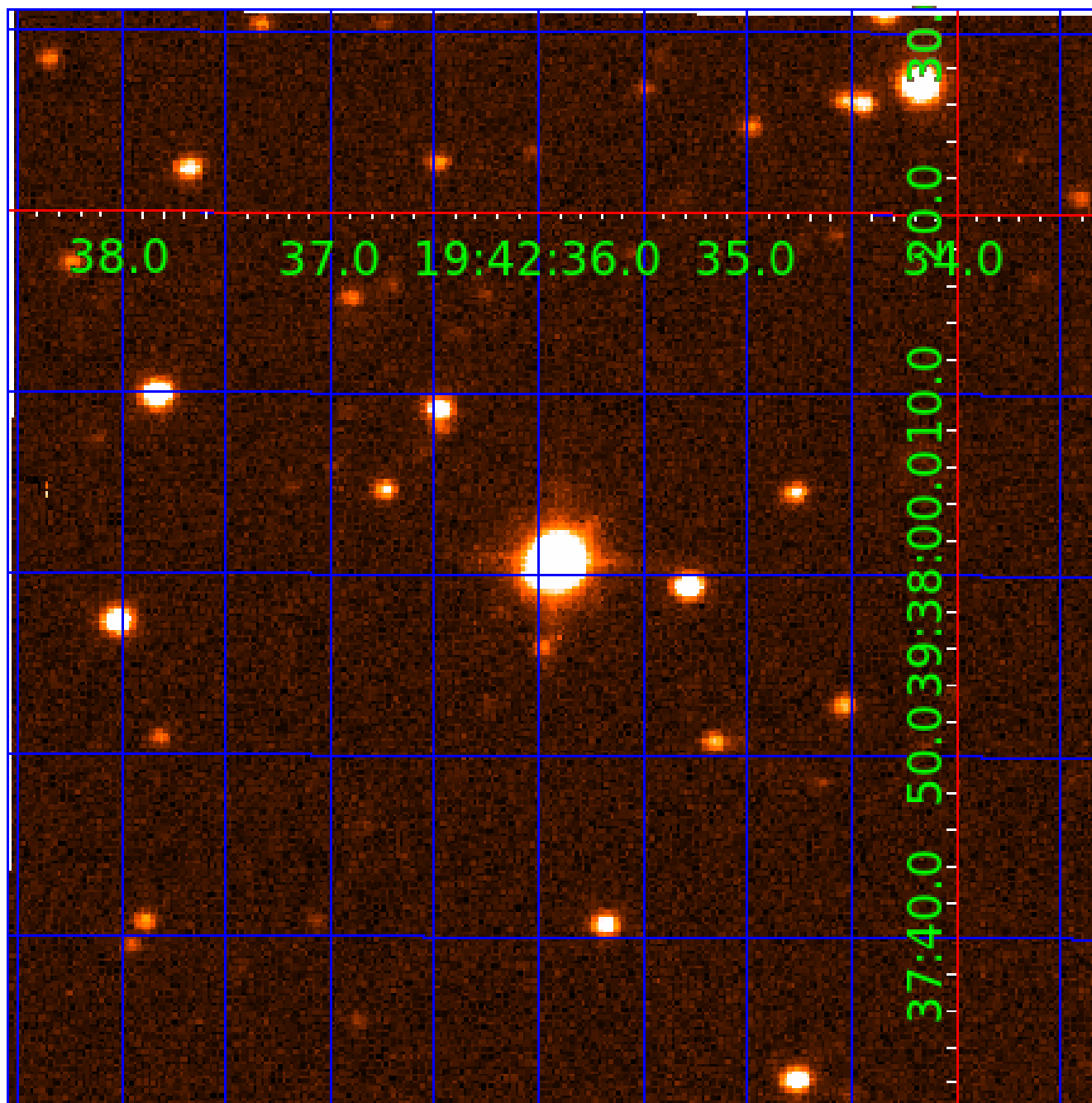


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004577324-01	OBS	No	2.676955	133.989377	23.7	9.268	8.5	8.2	1.55	6490	0.84	2508.57
004577324-02	OBS	No	5.352929	135.260103	33.6	9.181	10.0	9.7	1.55	6490	1.05	995.77
004577324-03	OBS	No	283.674058	186.080756	103.5	25.045	8.5	4.6	1.55	6490	1.73	5.00
004577324-04	OBS	No	310.445932	432.392002	164.8	7.764	7.9	6.3	1.55	6490	2.19	4.44
004577324-05	OBS	No	173.353436	171.891158	171.1	9.852	7.6	6.9	1.55	6490	2.22	9.65
004577324-06	OBS	No	15.793664	139.332735	72.1	14.982	8.0	8.0	1.55	6490	1.54	235.31
004577324-07	OBS	No	185.917423	244.975369	135.5	25.942	8.3	4.5	1.55	6490	2.10	8.79
004577324-08	OBS	No	171.313674	196.888564	98.3	5.032	7.4	5.4	1.55	6490	1.70	9.80
004577324-09	OBS	No	143.173964	238.606043	293.0	0.835	7.5	3.3	1.55	6490	2.73	12.45
004577324-10	OBS	No	143.175229	238.960367	60.4	1.407	7.6	1.6	1.55	6490	1.36	12.45

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004577324-01	OBS	FP	0.00	1	0	0	0	LPP_DV
004577324-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD
004577324-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS
004577324-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004577324-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS
004577324-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT
004577324-07	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST
004577324-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004577324-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004577324-10	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_FEW_DIFFS

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

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

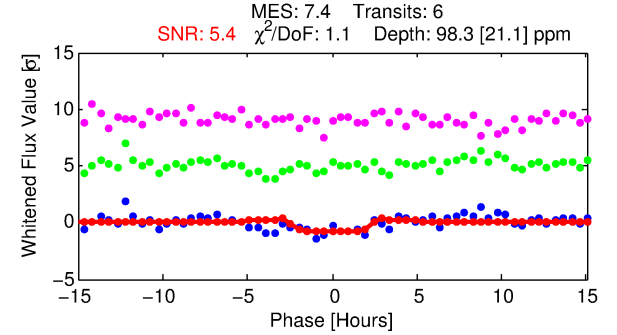
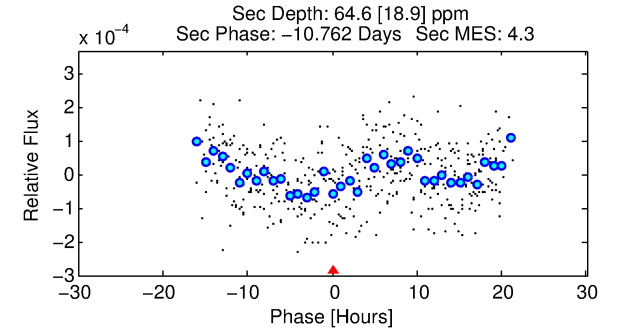
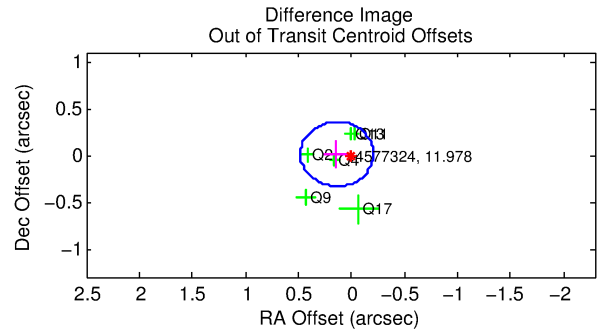
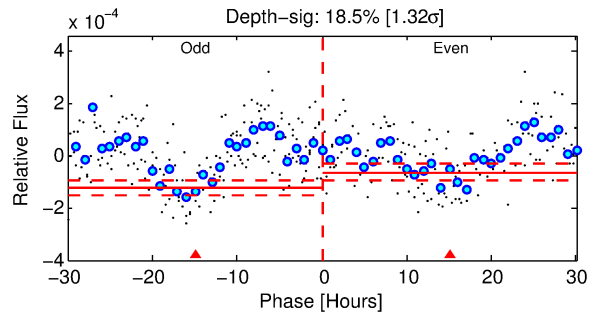
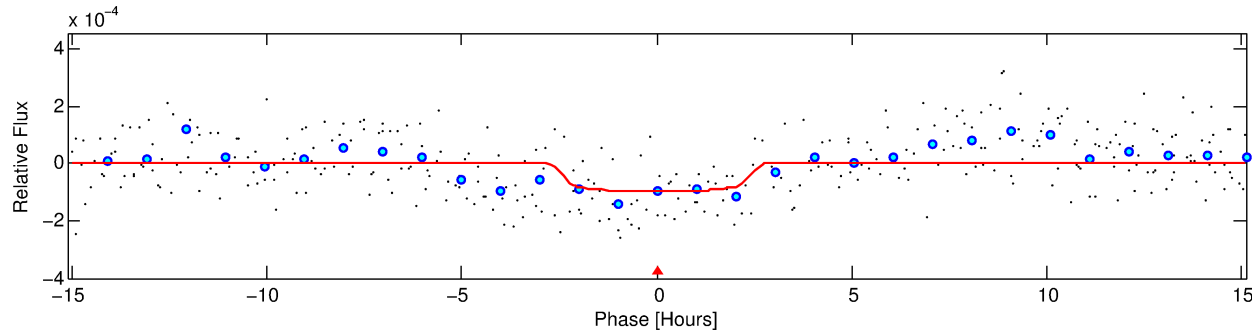
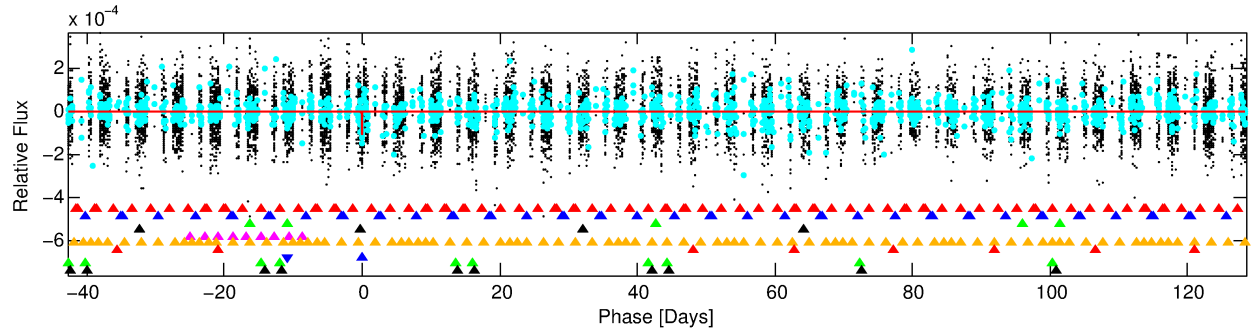
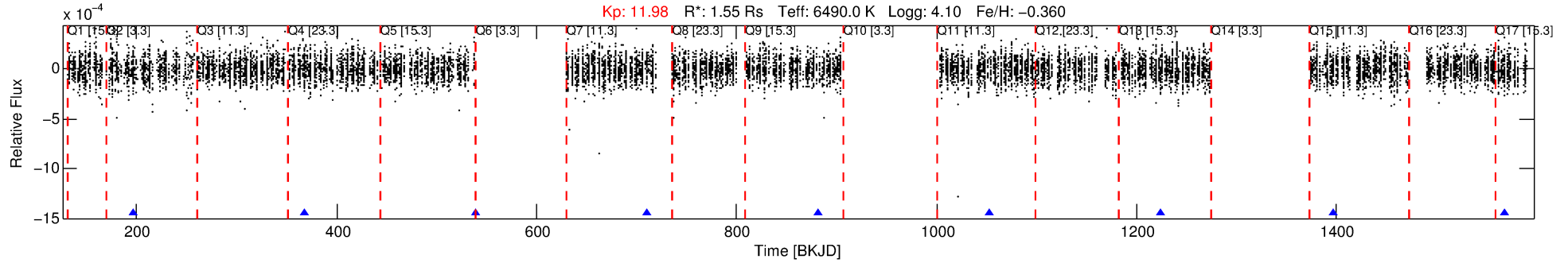
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004577324-08

No Significant Match Found

# DV One-Page Summary

KIC: 4577324 Candidate: 8 of 10 Period: 171.314 d



## DV Fit Results:

Period = 171.31367 [0.00266] d  
Epoch = 196.8886 [0.0147] BKJD  
Rp/R\* = 0.0101 [0.0071]  
a/R\* = 158.75 [629.54]  
b = 0.80 [1.74]  
Seff = 9.80 [3.88]  
Teq = 451 [45] K  
Rp = 1.70 [1.28] Re  
a = 0.6246 [0.1512] AU  
Ag = 4788.33 [7152.12] [0.67 $\sigma$ ]  
Teffp = 5803 [2101] K [2.55 $\sigma$ ]

## DV Diagnostic Results:

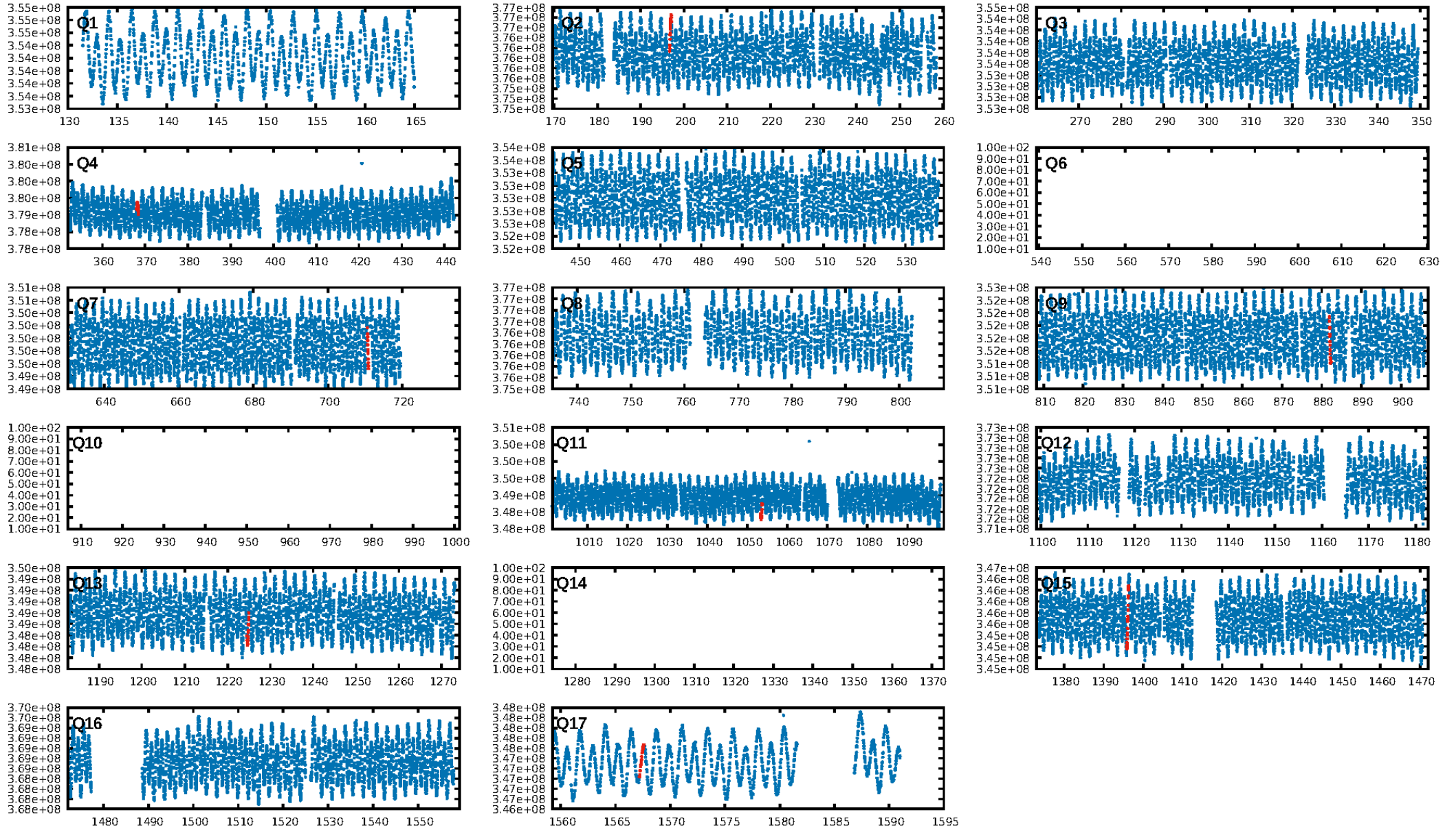
ShortPeriod-sig: 100.0% [129.25 $\sigma$ ]  
LongPeriod-sig: 100.0% [4.43 $\sigma$ ]  
ModelChiSquare2-sig: 27.2%  
ModelChiSquareGof-sig: 97.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 2.587  
Centroid-sig: 49.3%  
Centroid-so: 1.059 arcsec [0.71 $\sigma$ ]  
OotOffset-rm: 0.136 arcsec [1.19 $\sigma$ ]  
OotOffset-st: 1/1/1/3 [6]  
KicOffset-rm: 0.103 arcsec [0.61 $\sigma$ ]  
KicOffset-st: 1/1/1/3 [6]  
DiffImageQuality-fgm: 0.50 [3/6]  
DiffImageOverlap-fno: 0.67 [4/6]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 00:55:54 Z

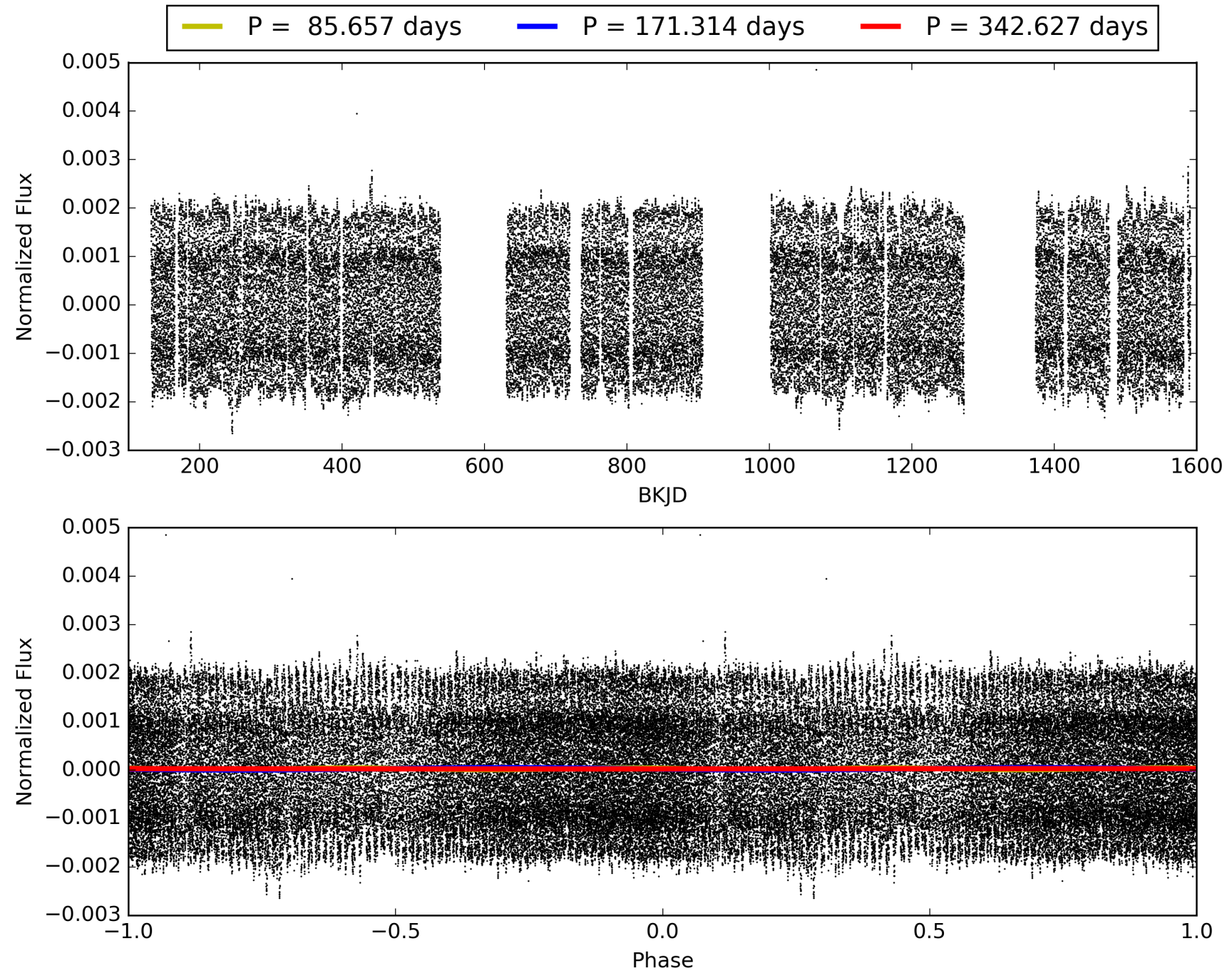
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 004577324-08, PDC Light Curves

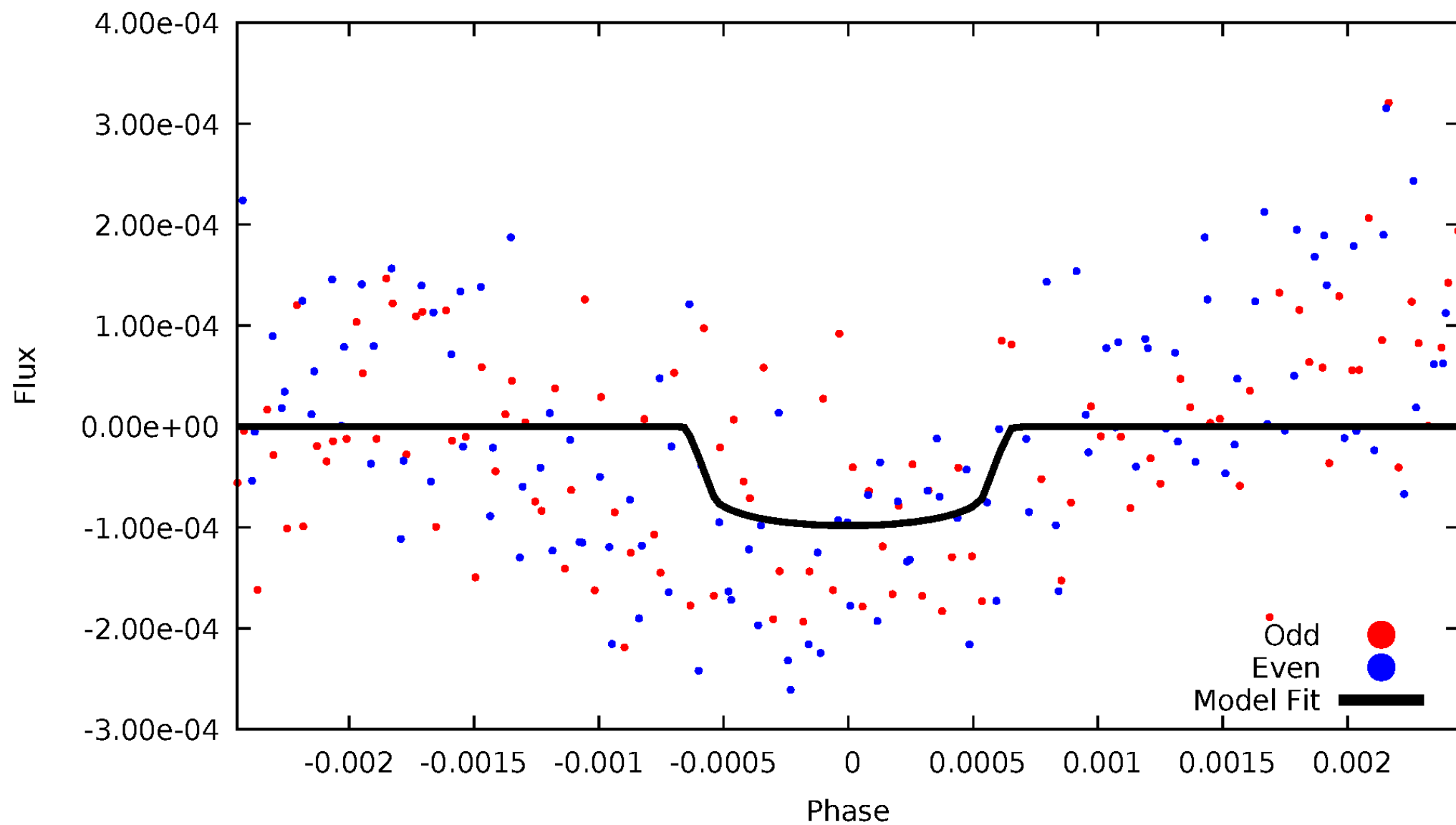


TCE 004577324-08



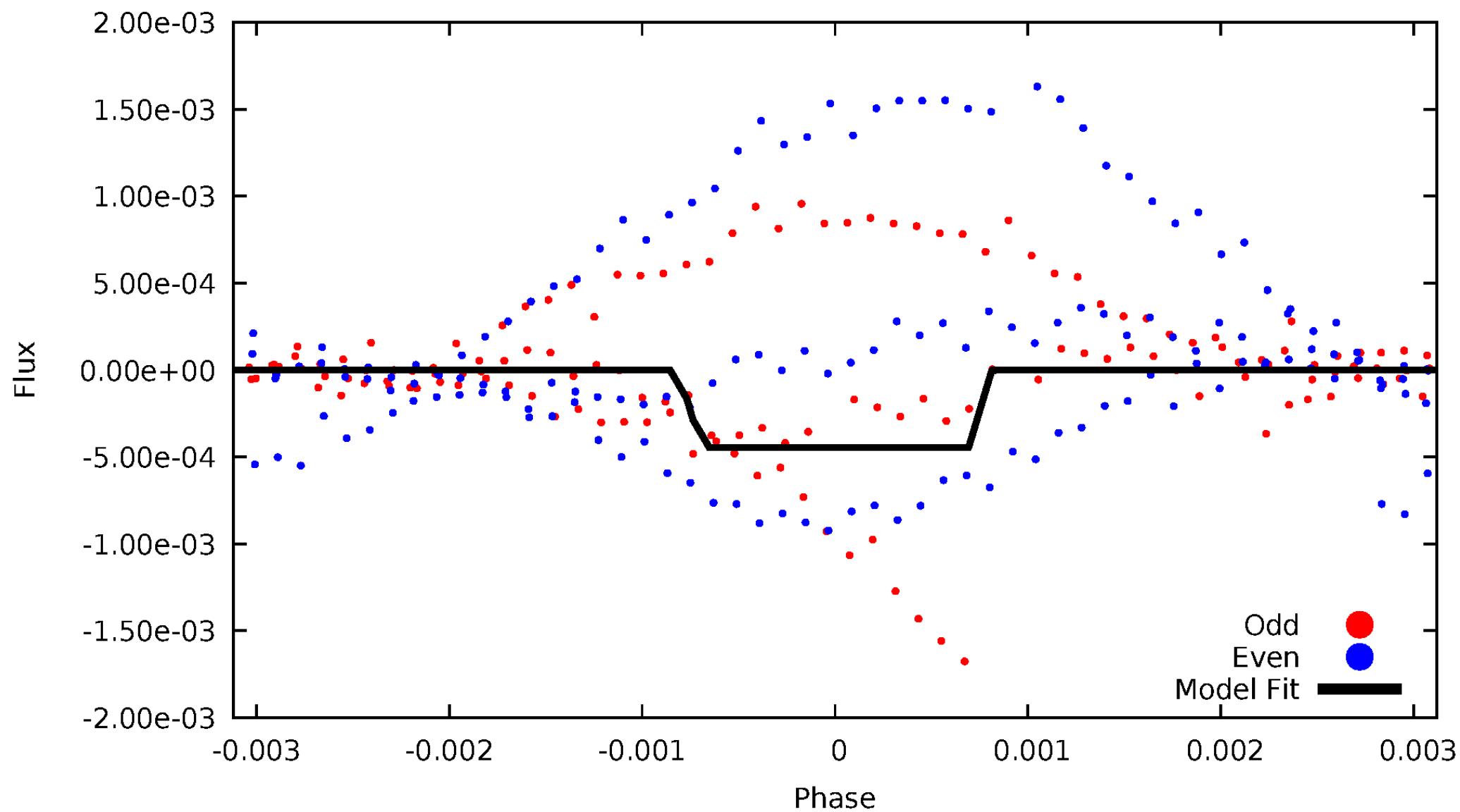
# DV Odd/Even

TCE 004577324-08



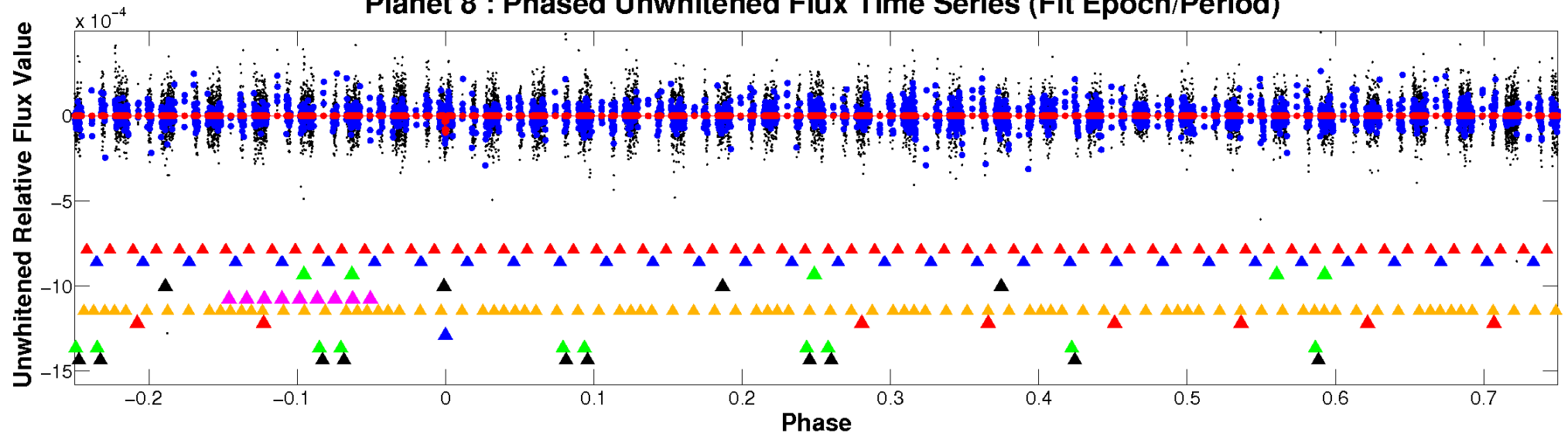
# ALT Odd/Even

TCE 004577324-08

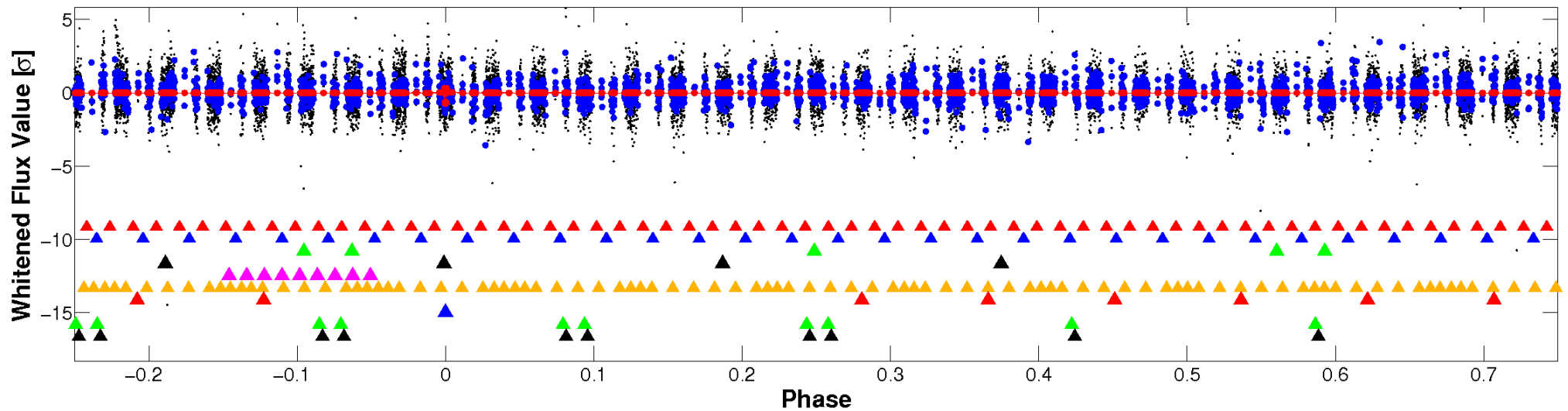


# Non-Whitened Vs. Whitened Light Curve

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

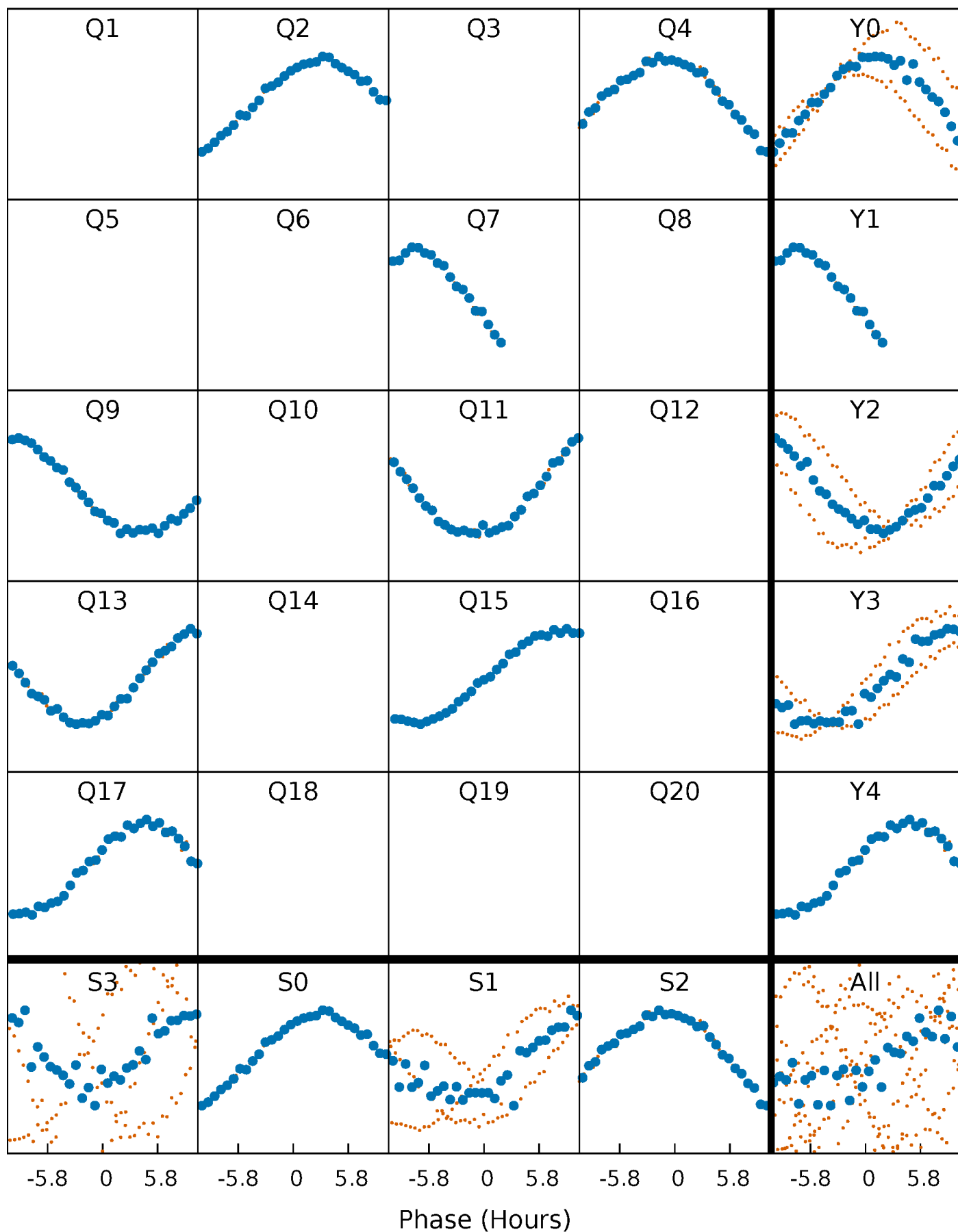


## Planet 8 : Phased Whitened Flux Time Series (Fit Epoch/Period)



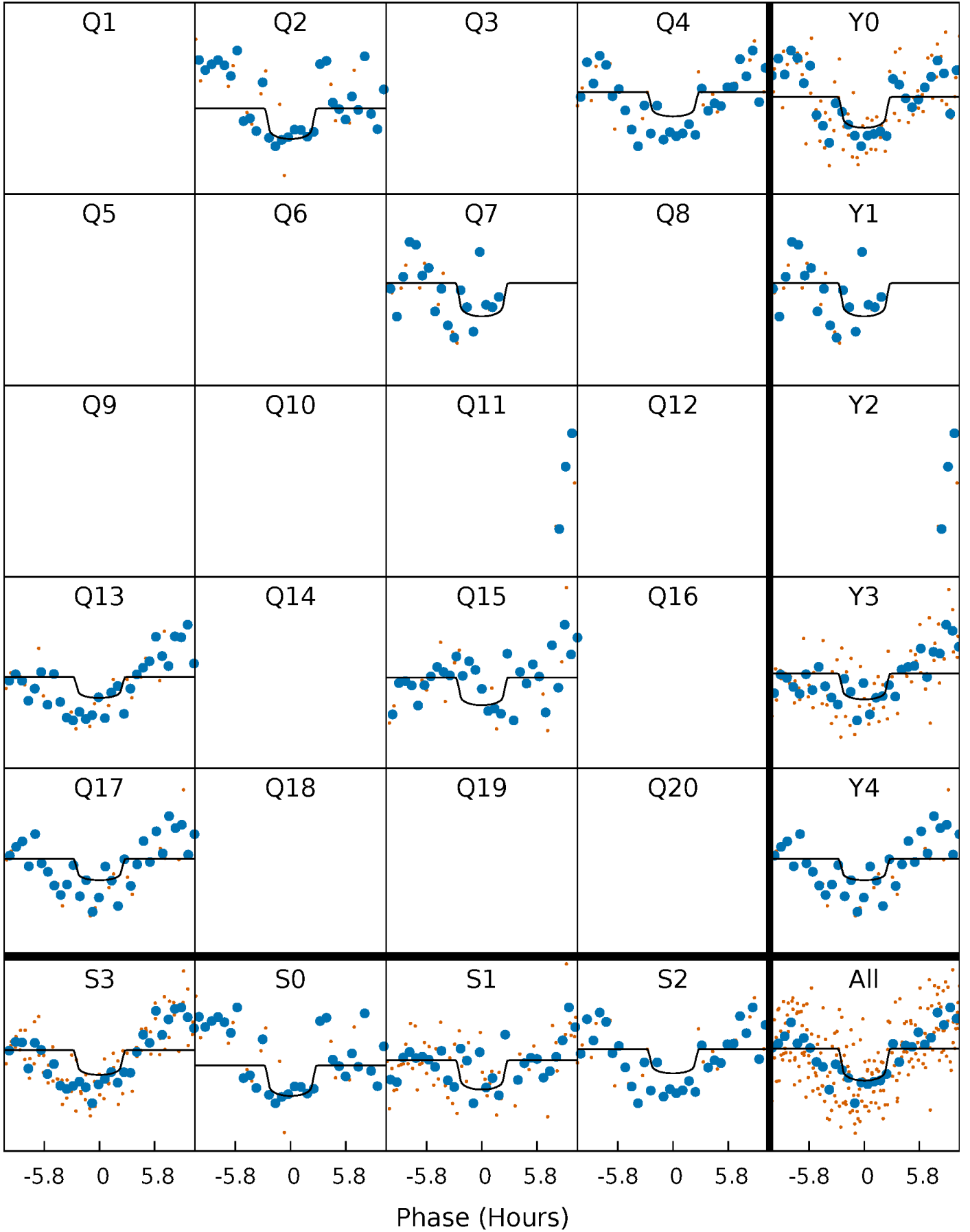
# PDC Quarter-Phased Transit Curves

TCE 004577324-08 P=171.313674 Days  $T_0=196.888564$  (BKJD)



# DV Quarter-Phased Transit Curves

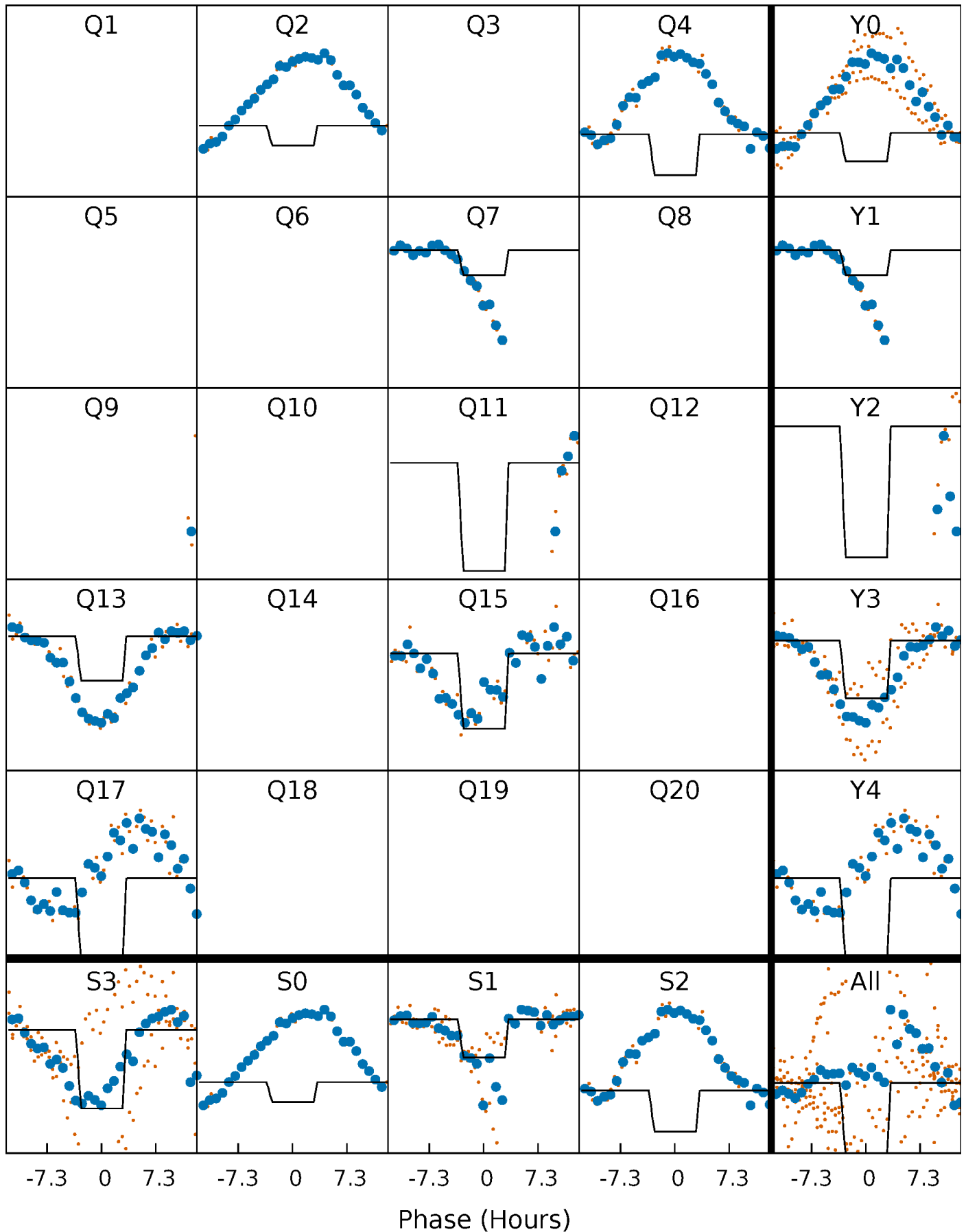
TCE 004577324-08     $P=171.313674$  Days     $T_0=196.888564$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

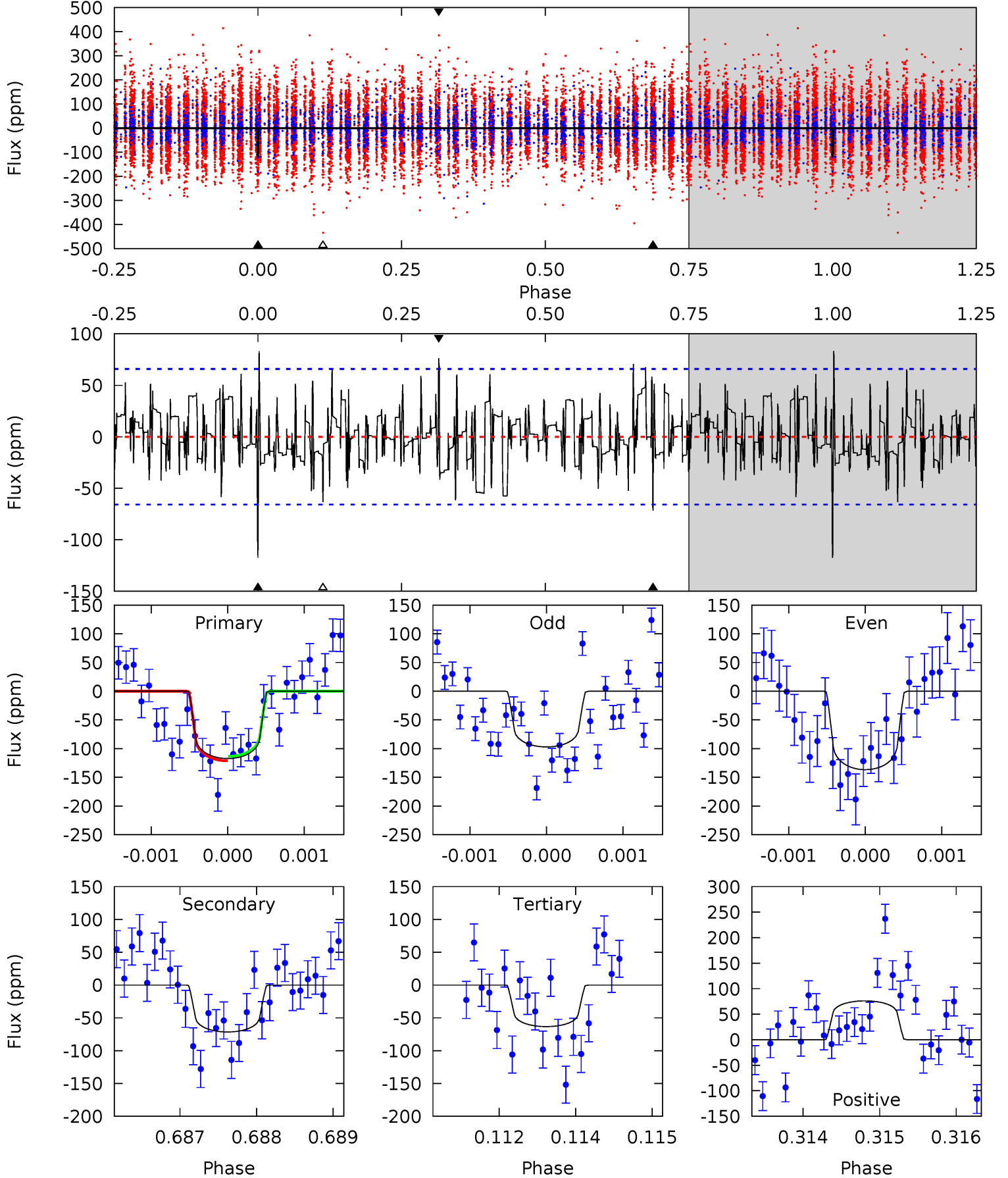
TCE 004577324-08 P=171.314967 Days  $T_0=196.845168$  (BKJD)



# DV Model-Shift Uniqueness Test

004577324-08, P = 171.313674 Days, E = 25.574890 Days

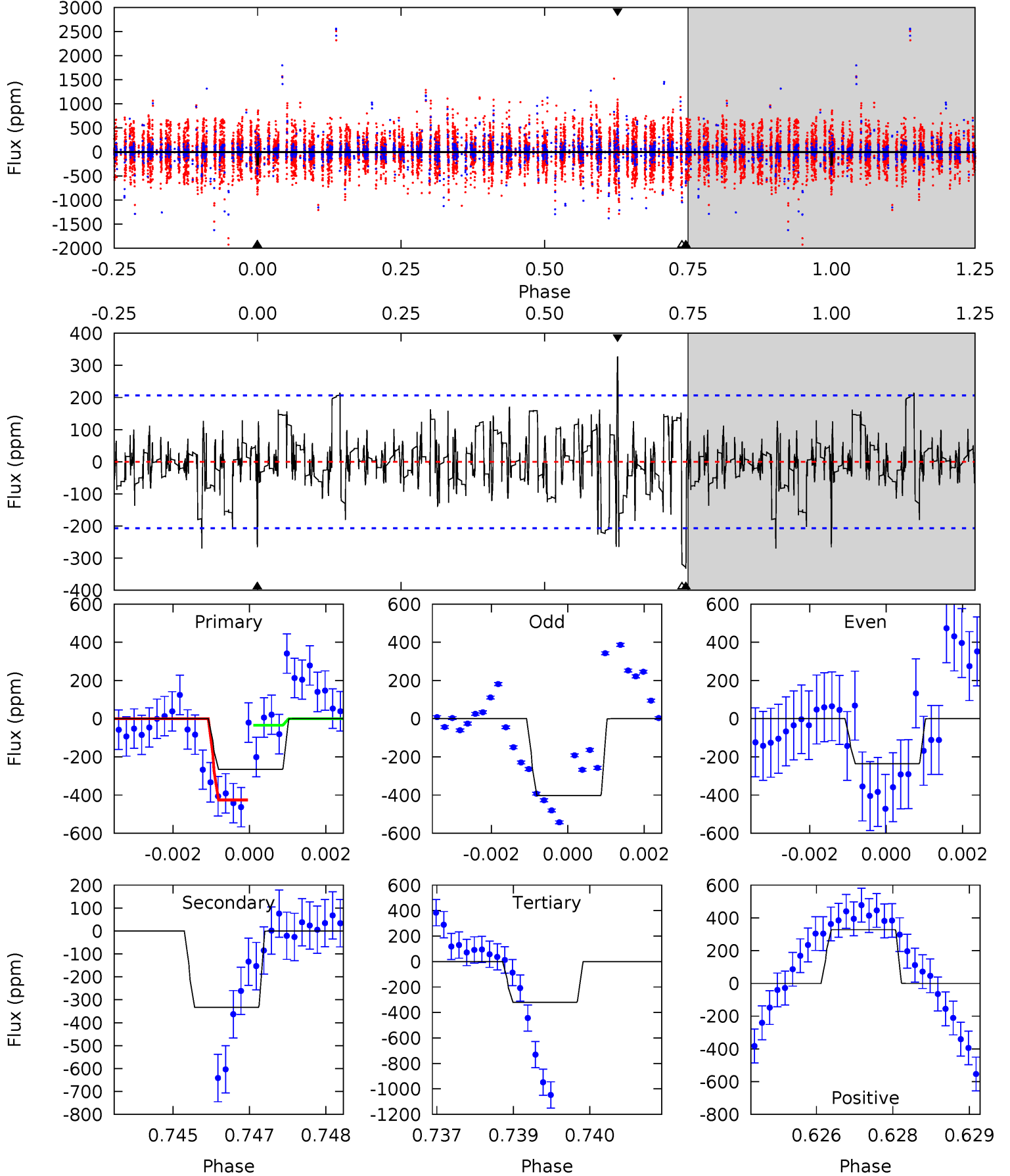
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.63	5.87	5.20	6.25	5.41	3.22	1.96	4.43	3.38	0.67	-0.38	1.62	0.92	0.41	0.32



# Alt Model-Shift Uniqueness Test

004577324-08, P = 171.314967 Days, E = 25.530201 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.89	8.65	8.30	8.51	5.37	3.16	1.70	-1.41	-1.61	0.35	0.14	1.93	-0.43	0.50	0



### Stellar Parameters For KIC 004577324

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6490^{+146}_{-178}$	$4.101^{+0.221}_{-0.119}$	$-0.360^{+0.300}_{-0.300}$	$1.551^{+0.329}_{-0.402}$	$1.107^{+0.177}_{-0.145}$	$0.418^{+0.512}_{-0.145}$
	+2%/-3%	+5%/-3%	+83%/-83%	+21%/-26%	+16%/-13%	+122%/-35%
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 004577324-08 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-71 \pm 12$	$1.74^{+1.16}_{-0.97}$	$626^{+35}_{-45}$	$5774^{+3141}_{-1114}$	$4930^{+20152}_{-3135}$
Alt.	$-333 \pm 39$	$3.53^{+1.32}_{-1.24}$	$623^{+38}_{-42}$	$5971^{+1464}_{-822}$	$5792^{+8598}_{-2841}$

$T_{max}$  = 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

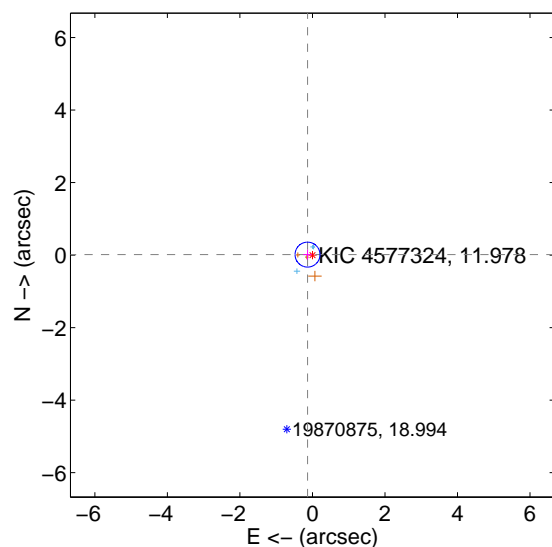
Supplemental centroid analysis for 004577324-08. **Kepler magnitude: 11.98.** Transit SNR 5.42

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

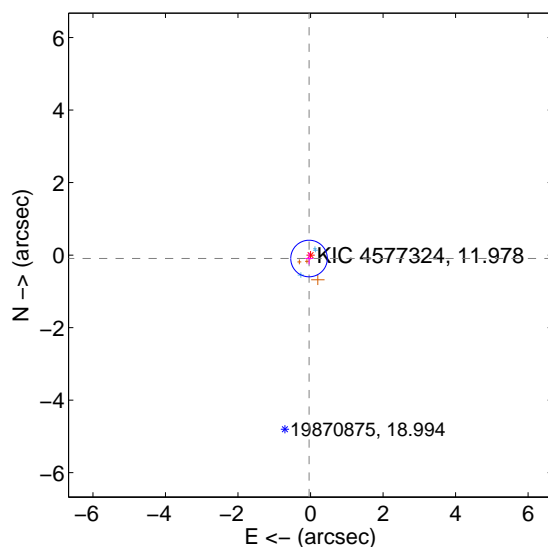
The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.136 \pm 0.115$	1.19	$0.135 \pm 0.116$	$0.013 \pm 0.138$
PRF-fit source offset from KIC position	$0.103 \pm 0.168$	0.61	$0.041 \pm 0.107$	$-0.094 \pm 0.163$
photometric centroid source offset	$1.06 \pm 1.50$	0.71	$0.89 \pm 1.49$	$-0.58 \pm 1.52$

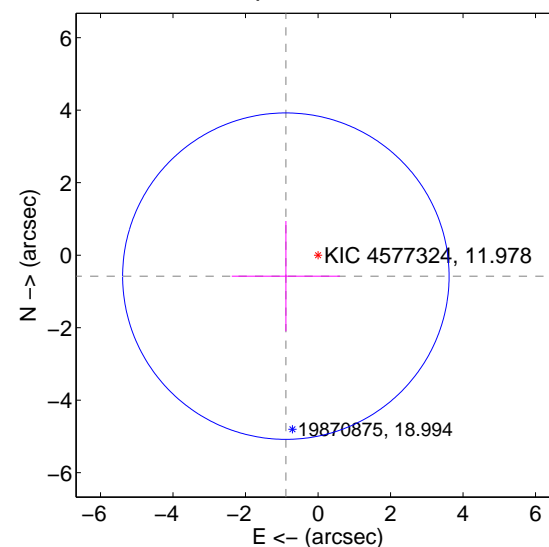
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

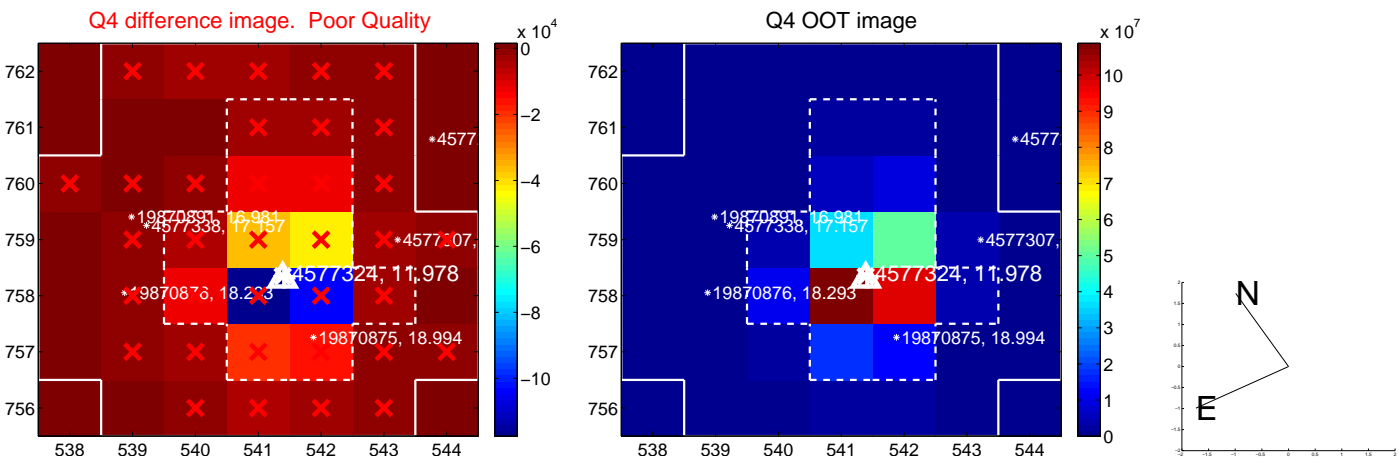
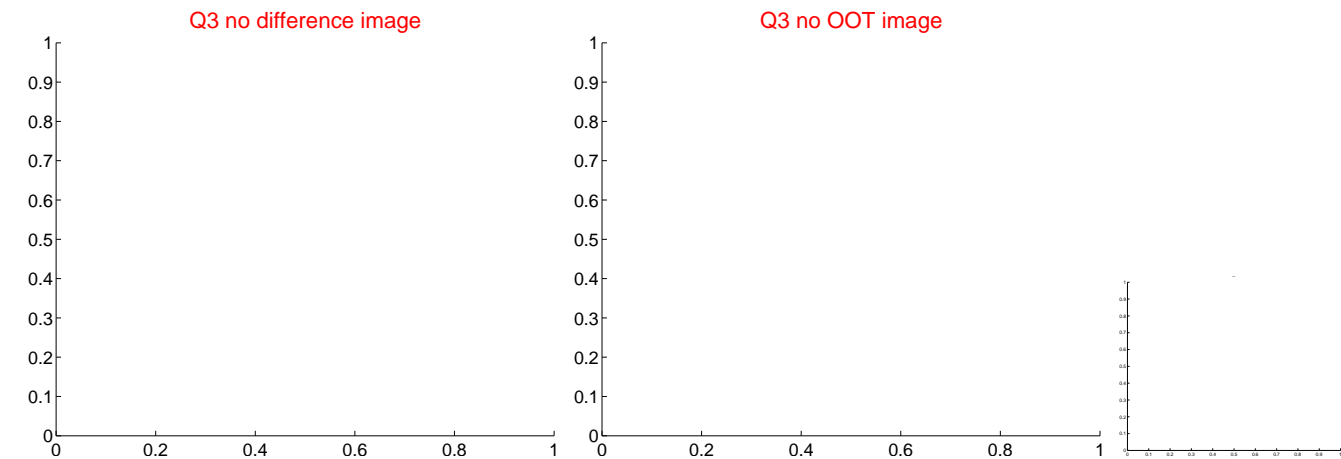
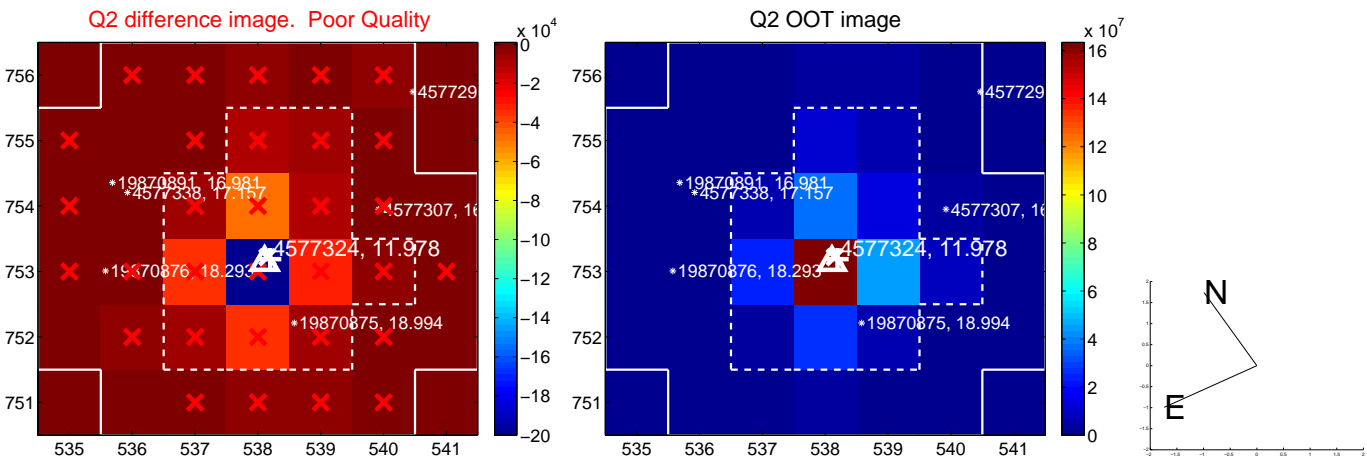
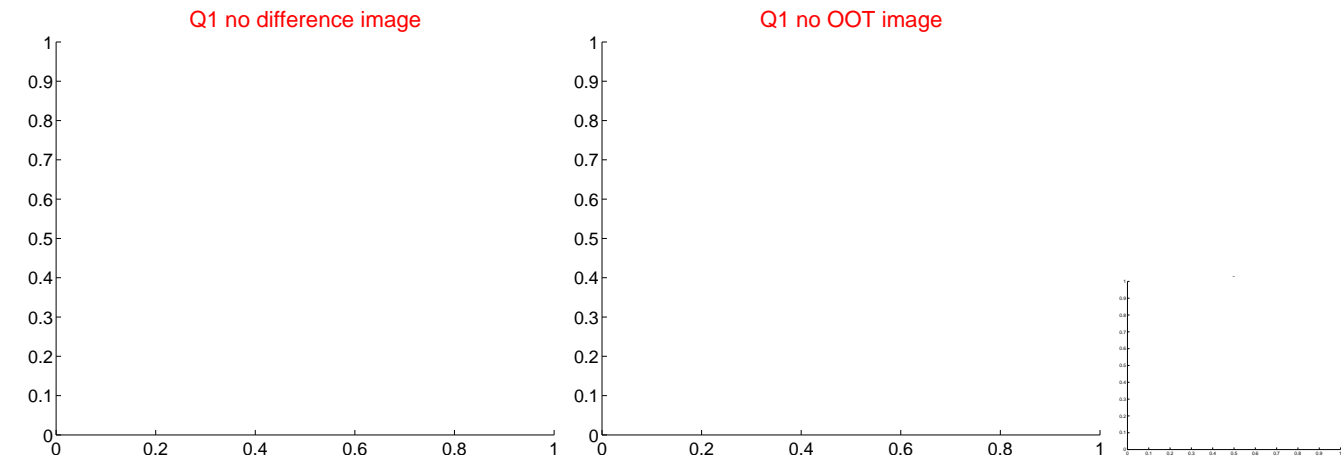


offset from photometric centroids



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

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

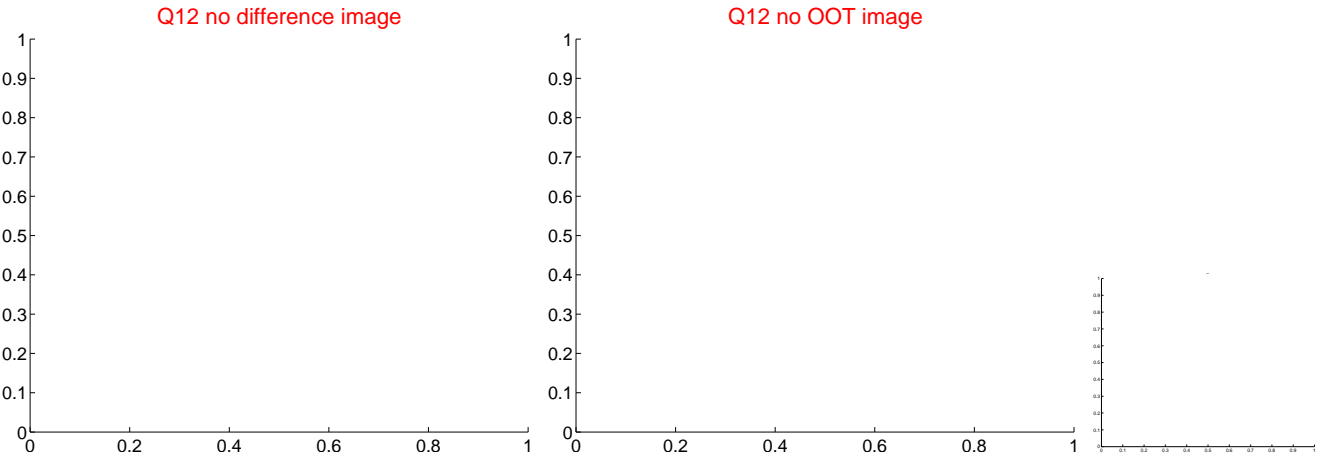
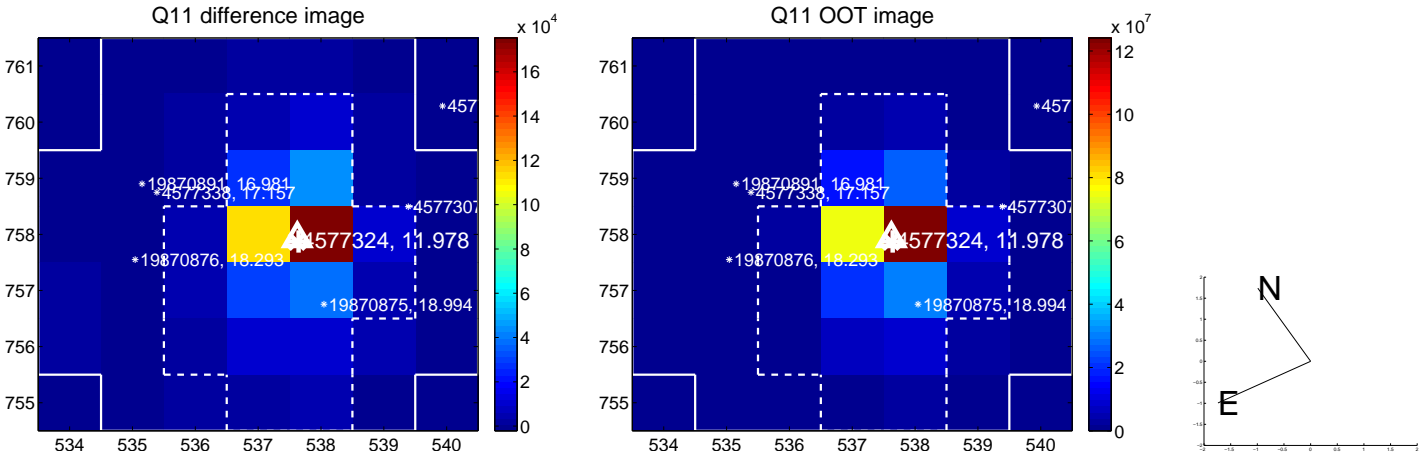
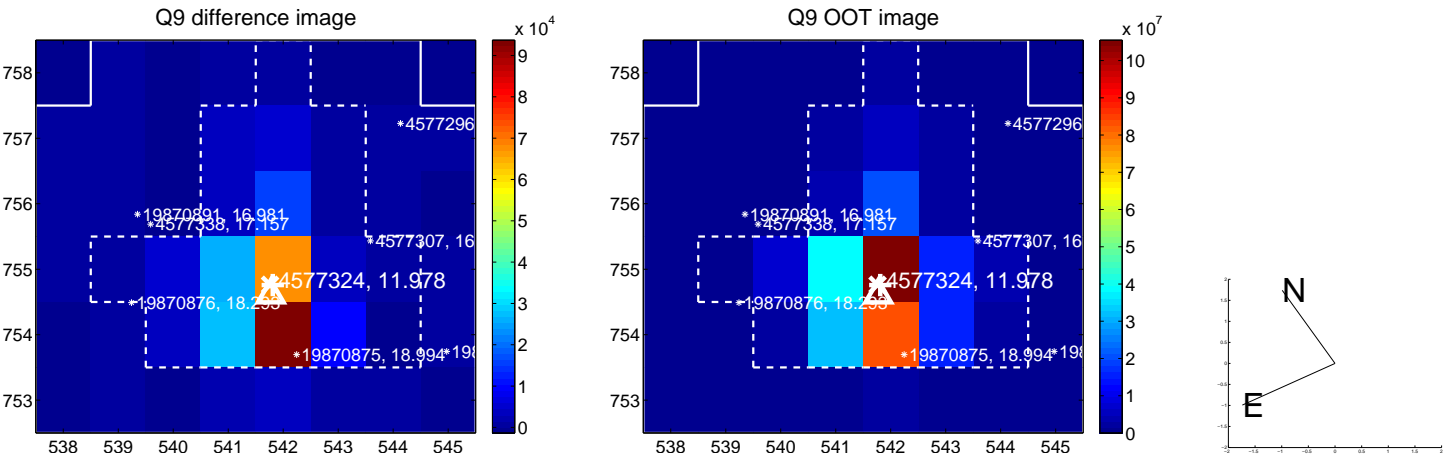


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

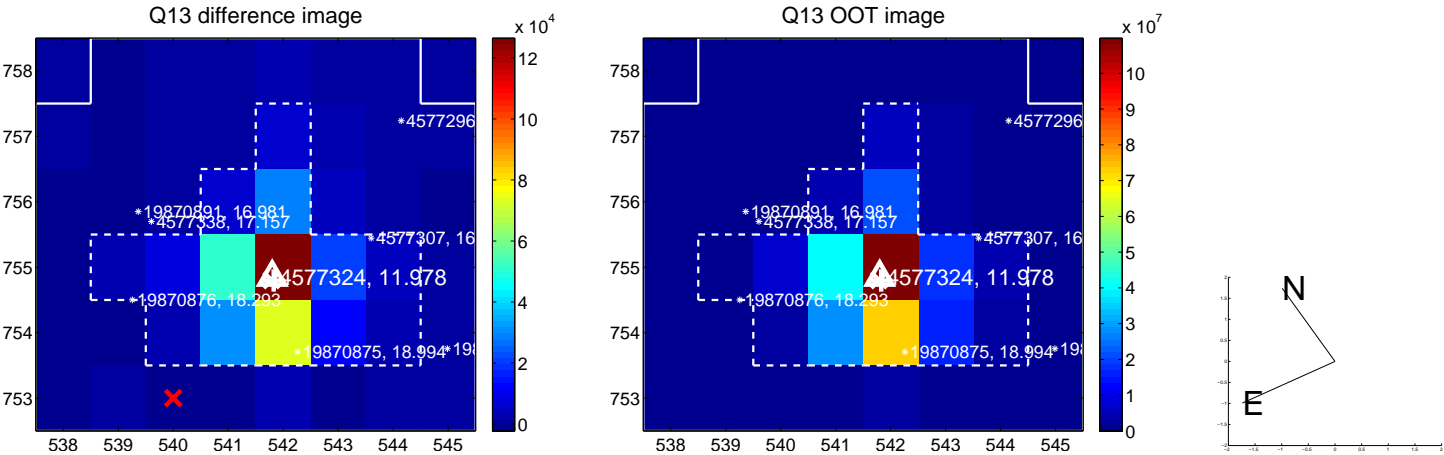




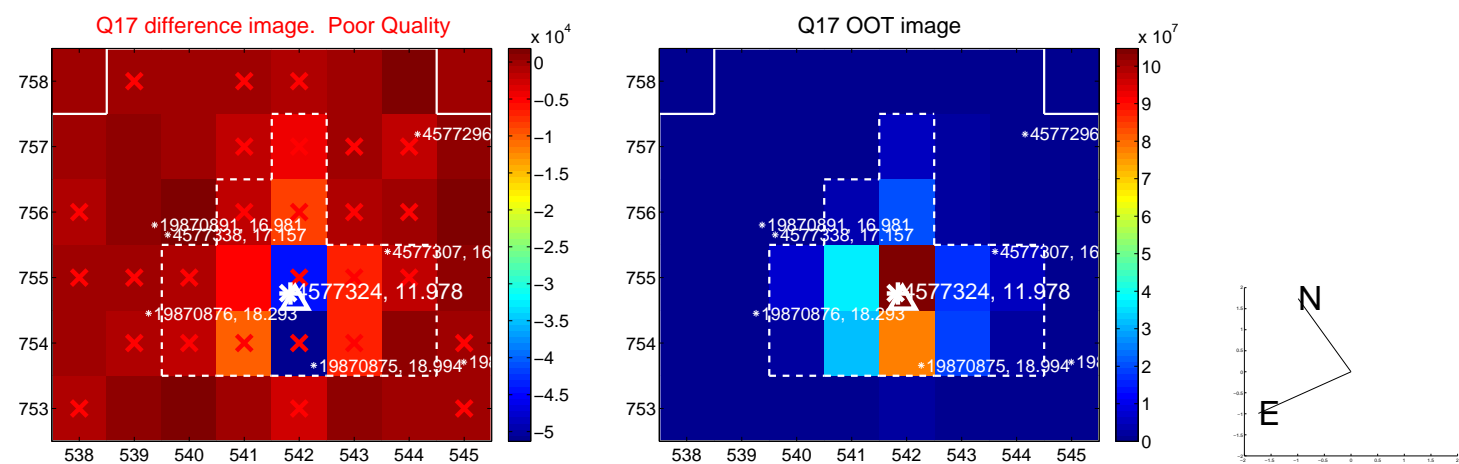
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



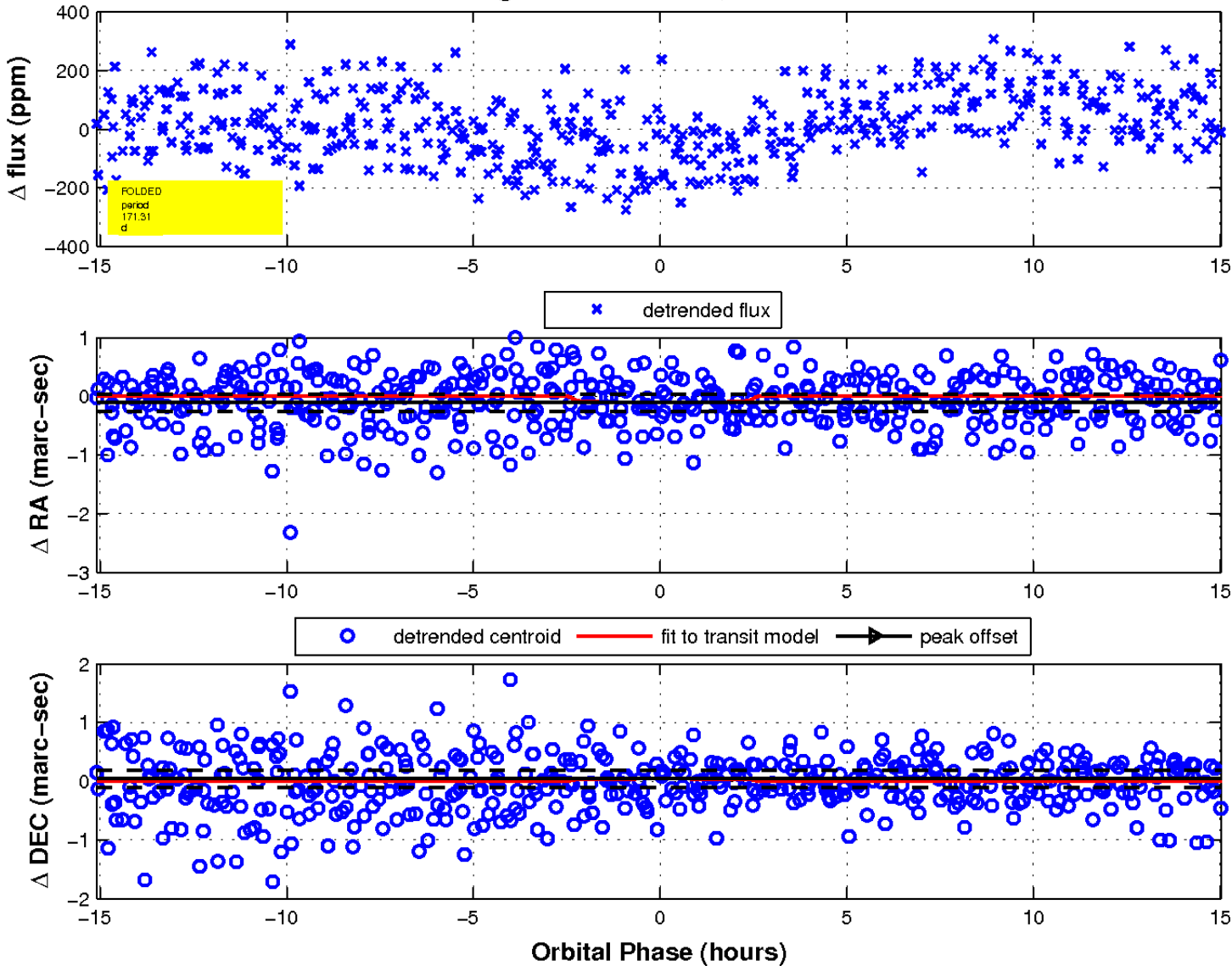
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

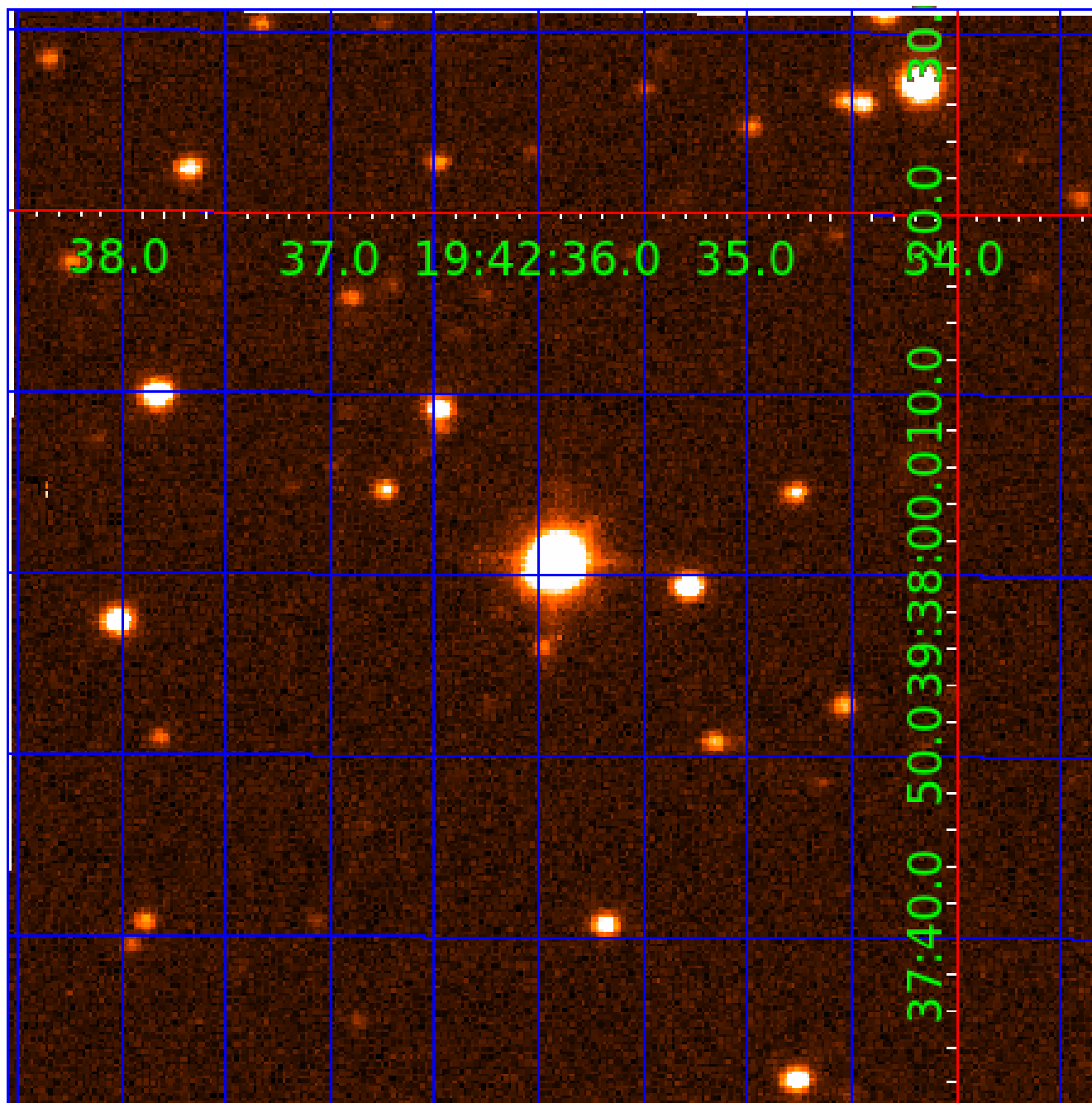


fluxWeightedCentroids, Planet 8 of 10



UKIRT Image

Declination



## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004577324-01	OBS	No	2.676955	133.989377	23.7	9.268	8.5	8.2	1.55	6490	0.84	2508.57
004577324-02	OBS	No	5.352929	135.260103	33.6	9.181	10.0	9.7	1.55	6490	1.05	995.77
004577324-03	OBS	No	283.674058	186.080756	103.5	25.045	8.5	4.6	1.55	6490	1.73	5.00
004577324-04	OBS	No	310.445932	432.392002	164.8	7.764	7.9	6.3	1.55	6490	2.19	4.44
004577324-05	OBS	No	173.353436	171.891158	171.1	9.852	7.6	6.9	1.55	6490	2.22	9.65
004577324-06	OBS	No	15.793664	139.332735	72.1	14.982	8.0	8.0	1.55	6490	1.54	235.31
004577324-07	OBS	No	185.917423	244.975369	135.5	25.942	8.3	4.5	1.55	6490	2.10	8.79
004577324-08	OBS	No	171.313674	196.888564	98.3	5.032	7.4	5.4	1.55	6490	1.70	9.80
004577324-09	OBS	No	143.173964	238.606043	293.0	0.835	7.5	3.3	1.55	6490	2.73	12.45
004577324-10	OBS	No	143.175229	238.960367	60.4	1.407	7.6	1.6	1.55	6490	1.36	12.45

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004577324-01	OBS	FP	0.00	1	0	0	0	LPP_DV
004577324-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD
004577324-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS
004577324-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004577324-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS
004577324-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT
004577324-07	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST
004577324-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004577324-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004577324-10	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_FEW_DIFFS

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

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

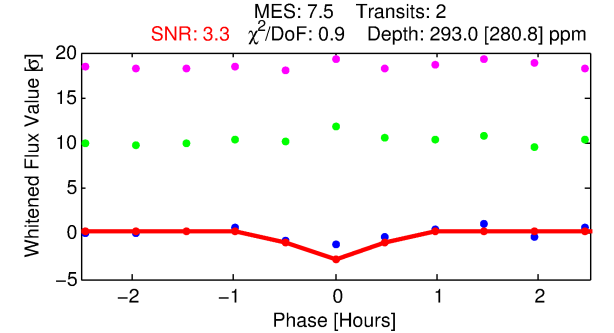
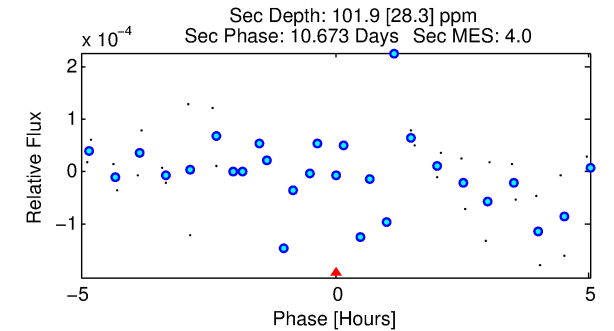
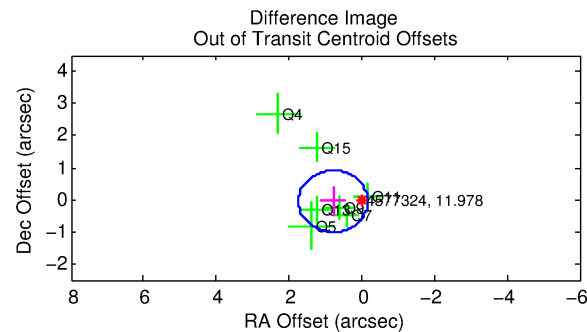
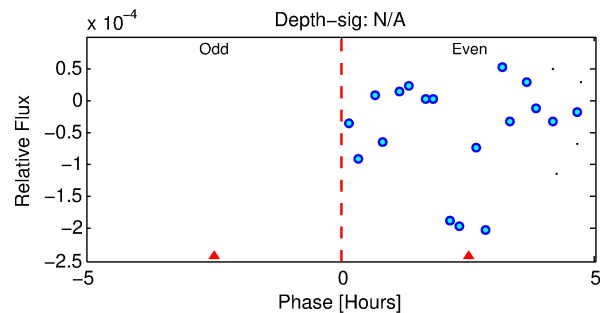
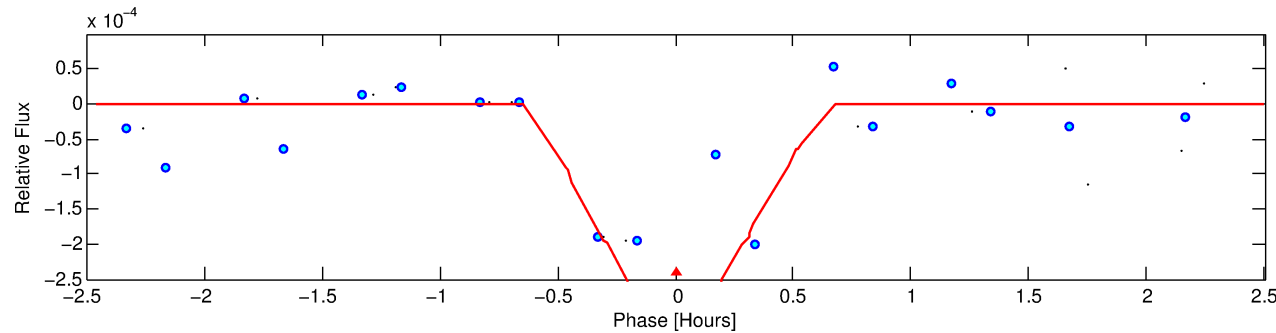
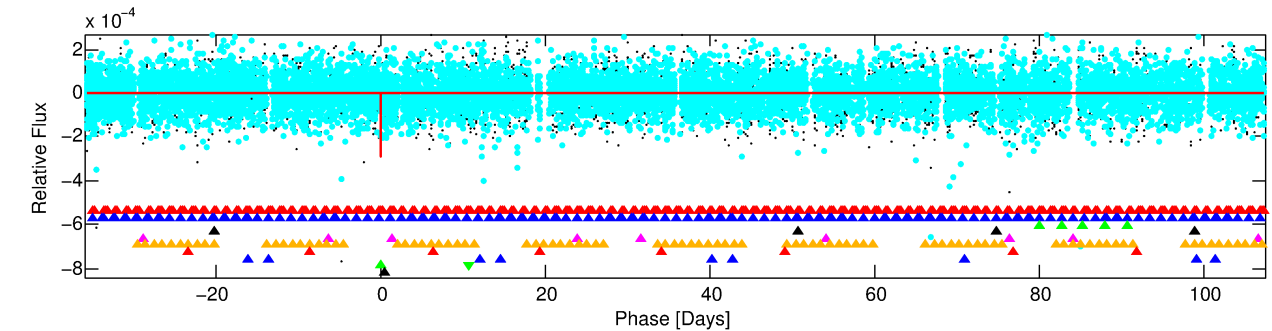
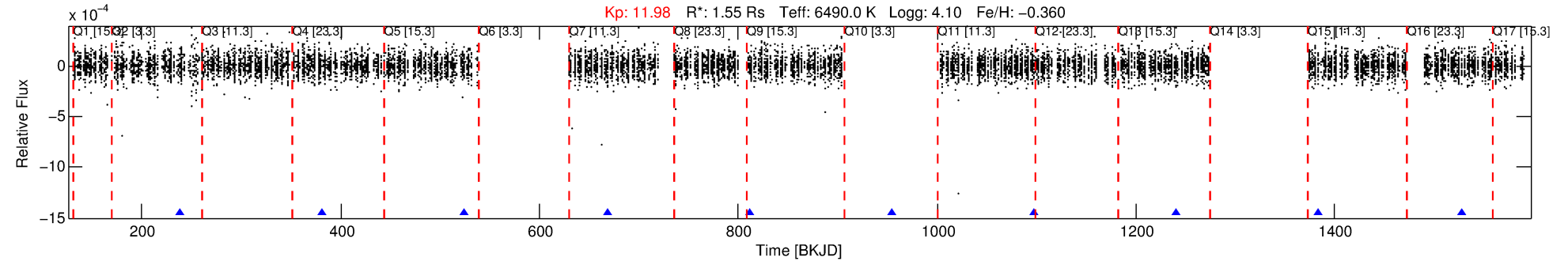
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004577324-09

No Significant Match Found

# DV One-Page Summary

KIC: 4577324 Candidate: 9 of 10 Period: 143.174 d



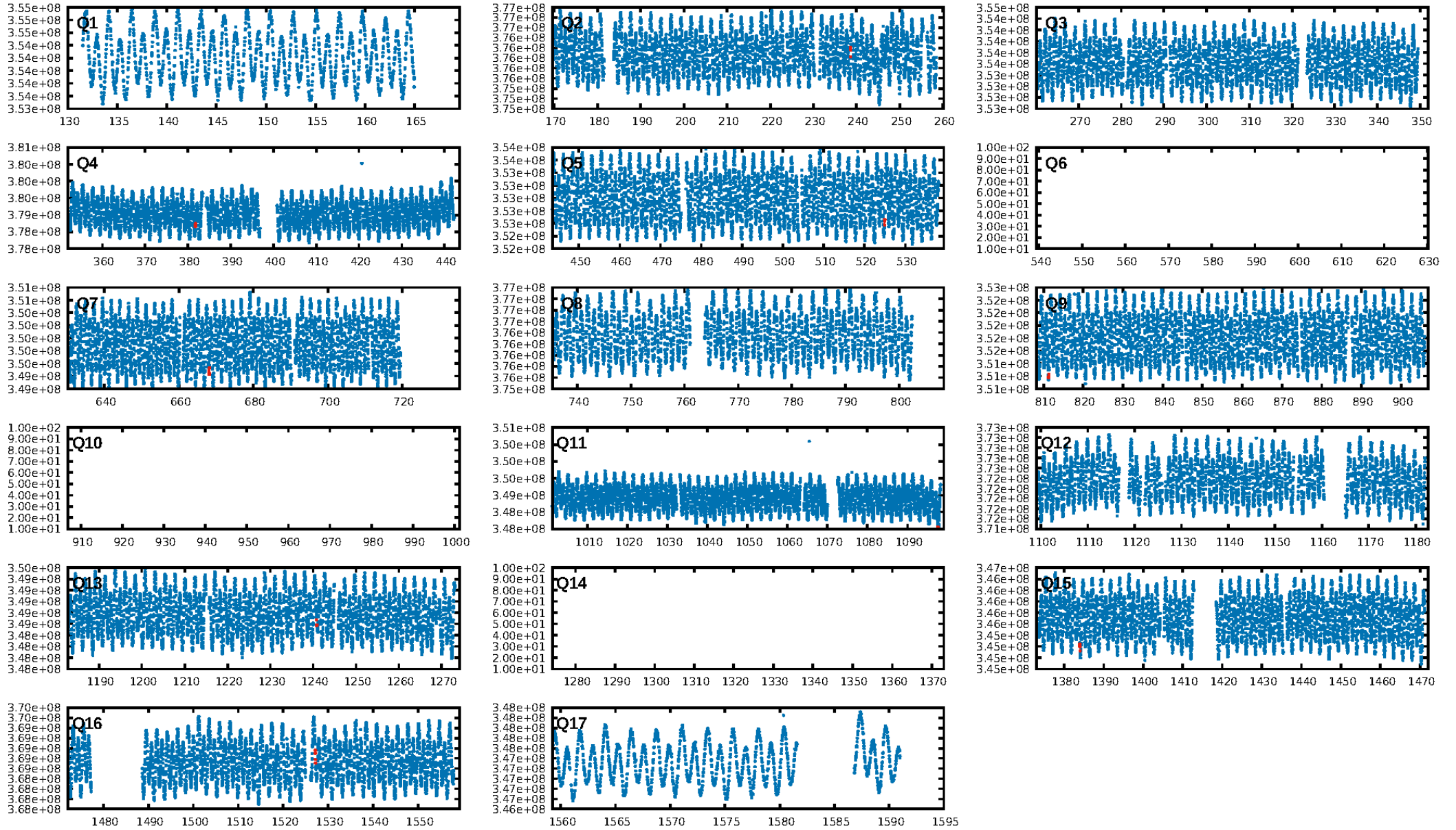
## DV Fit Results:

Period = 143.17396 [0.00128] d  
Epoch = 238.6060 [0.0111] BKJD  
Rp/R\* = 0.0162 [0.0748]  
a/R\* = 1256.03 [32682.51]  
b = 0.34 [68.88]  
Seff = 12.45 [4.93]  
Teff = 479 [47] K  
Rp = 2.73 [12.68] Re  
a = 0.5542 [0.1342] AU  
Ag = 2305.67 [21391.82] [0.11σ]  
Teffp = 5132 [11893] K [0.39σ]

## DV Diagnostic Results:

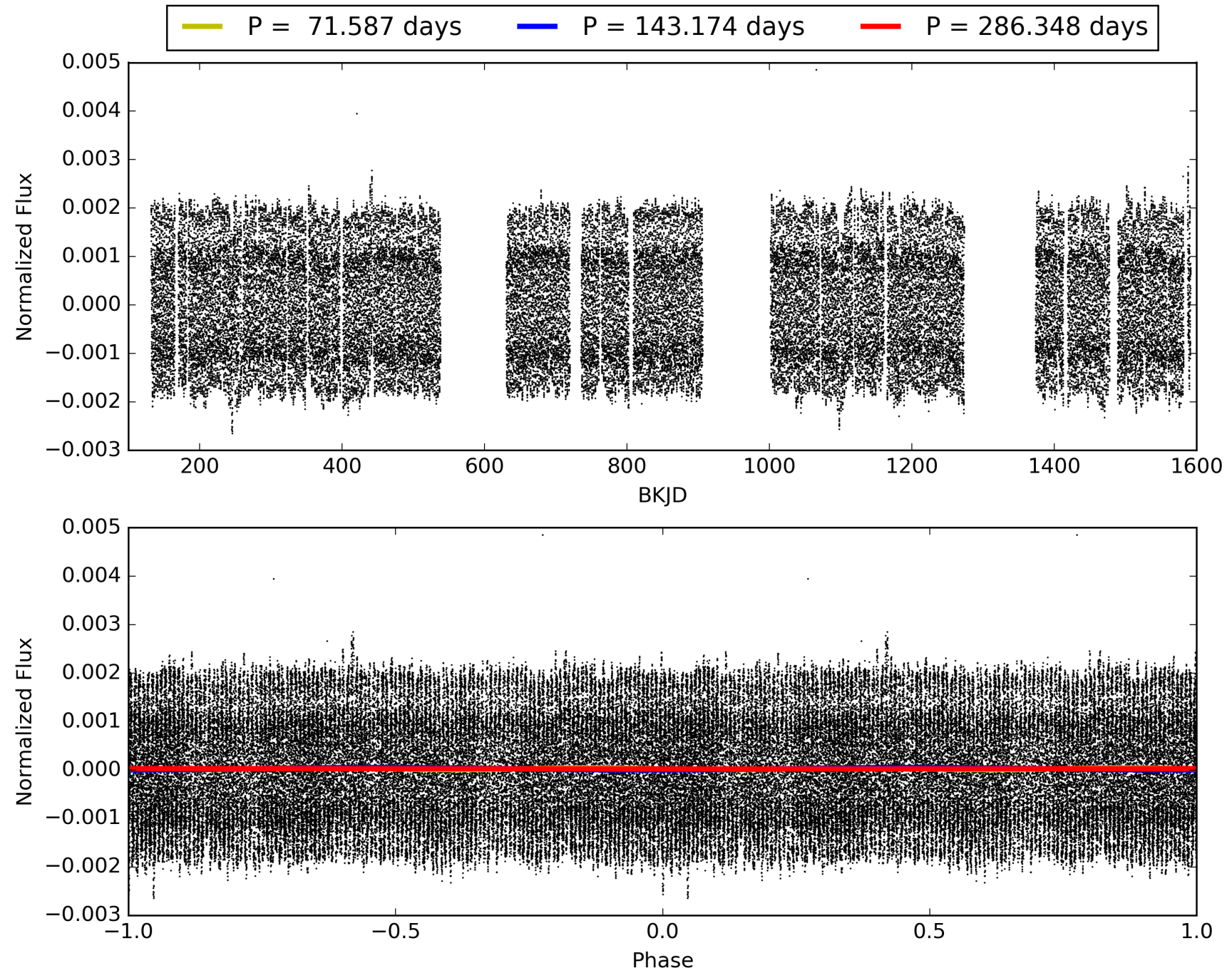
ShortPeriod-sig: 100.0% [203.74σ]  
LongPeriod-sig: 1.5% [0.02σ]  
ModelChiSquare2-sig: 87.6%  
ModelChiSquareGof-sig: 99.7%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [2/2]  
GhostDiagnostic-chr: 0.6574  
Centroid-sig: 84.7%  
Centroid-so: 0.224 arcsec [0.22σ]  
OotOffset-rm: 0.788 arcsec [2.47σ]  
KicOffset-rm: 0.685 arcsec [1.95σ]  
OotOffset-st: 0/3/1/3 [7]  
KicOffset-st: 0/3/1/3 [7]  
DiffImageQuality-fgm: 0.86 [6/7]  
DiffImageOverlap-fno: 0.25 [2/8]

# TCE 004577324-09, PDC Light Curves





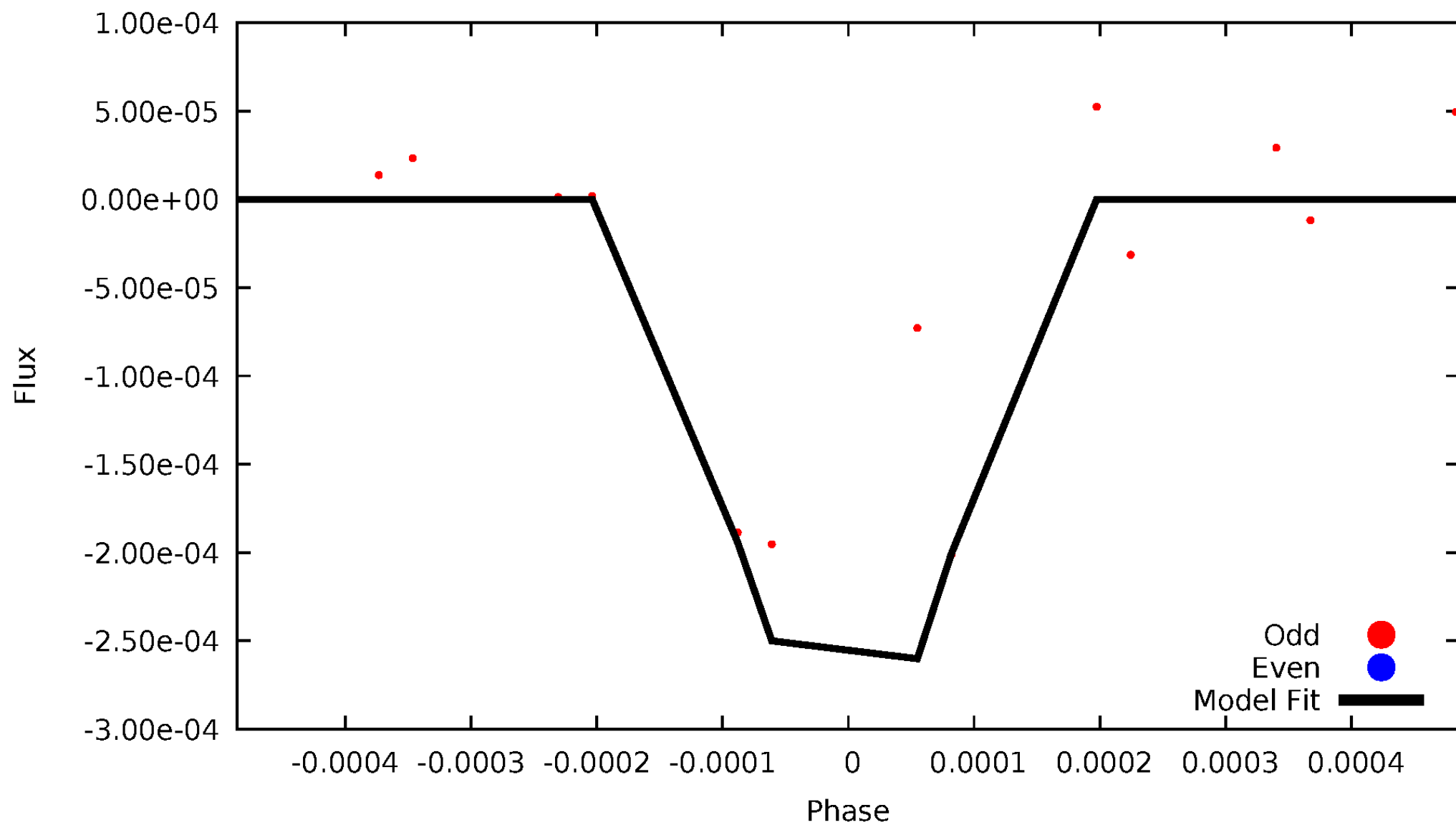
TCE 004577324-09





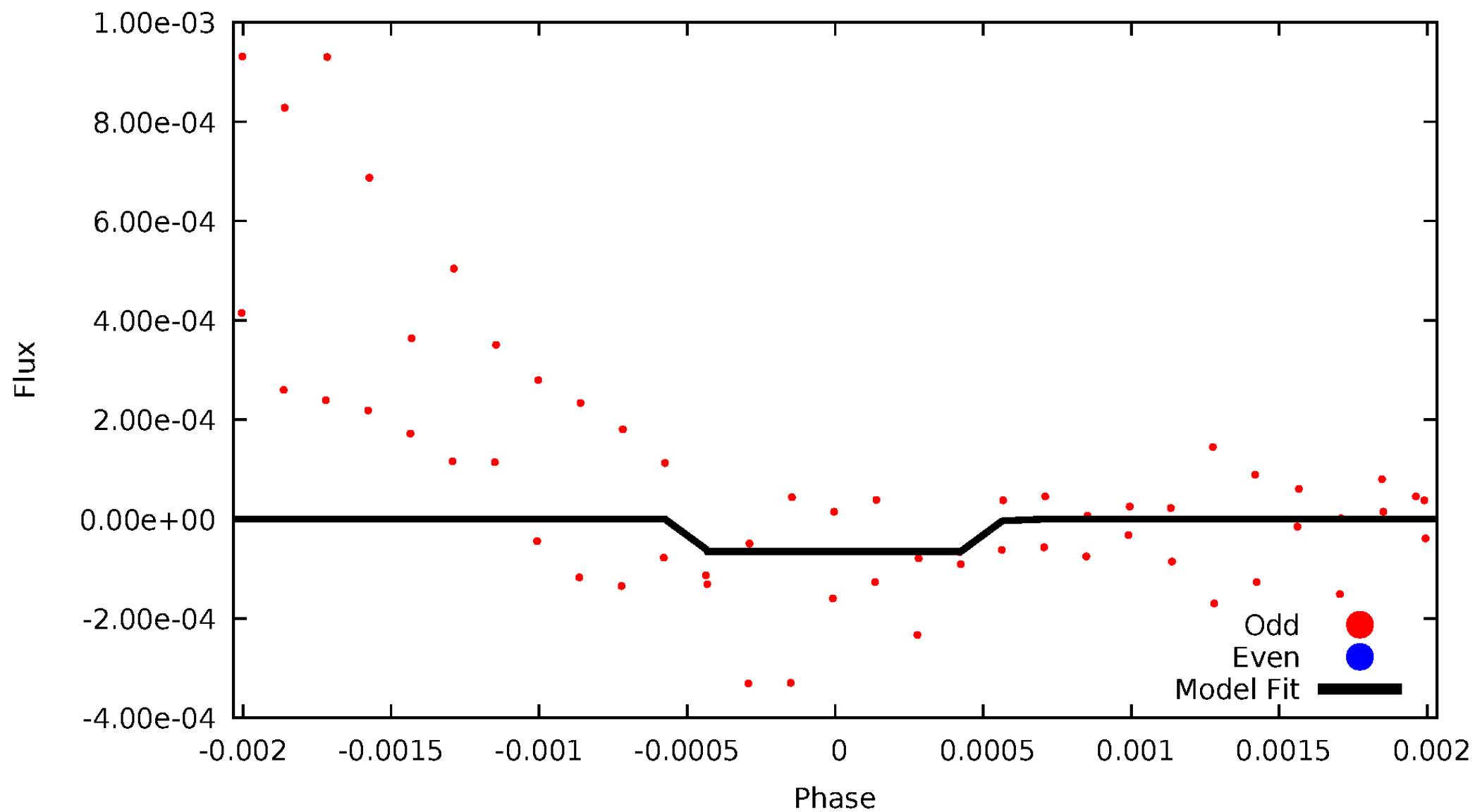
# DV Odd/Even

TCE 004577324-09

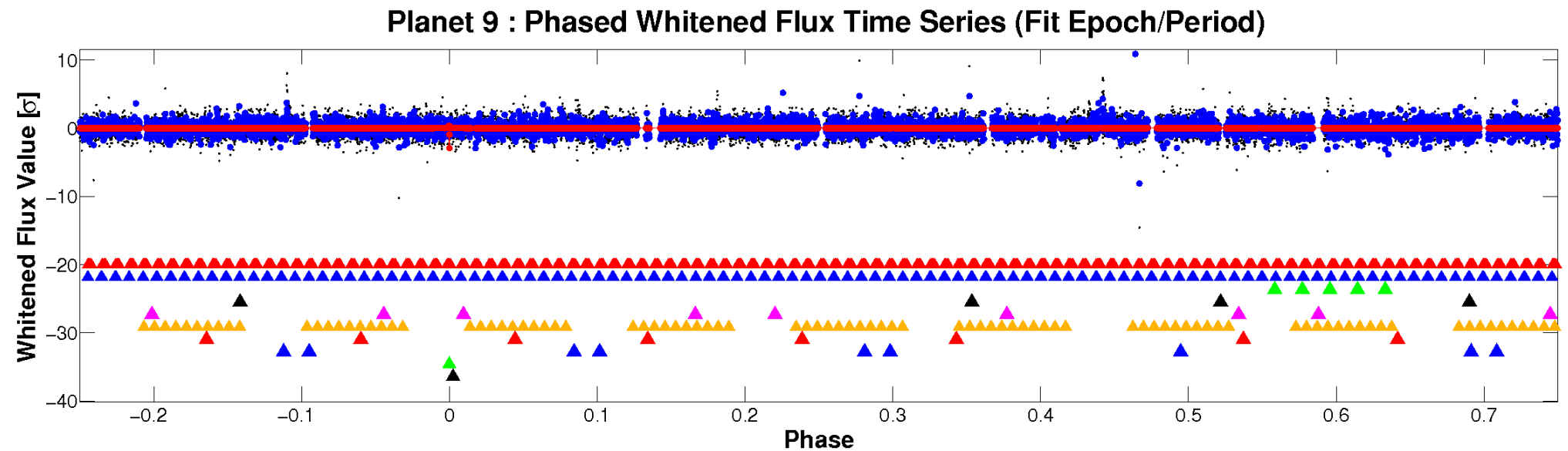
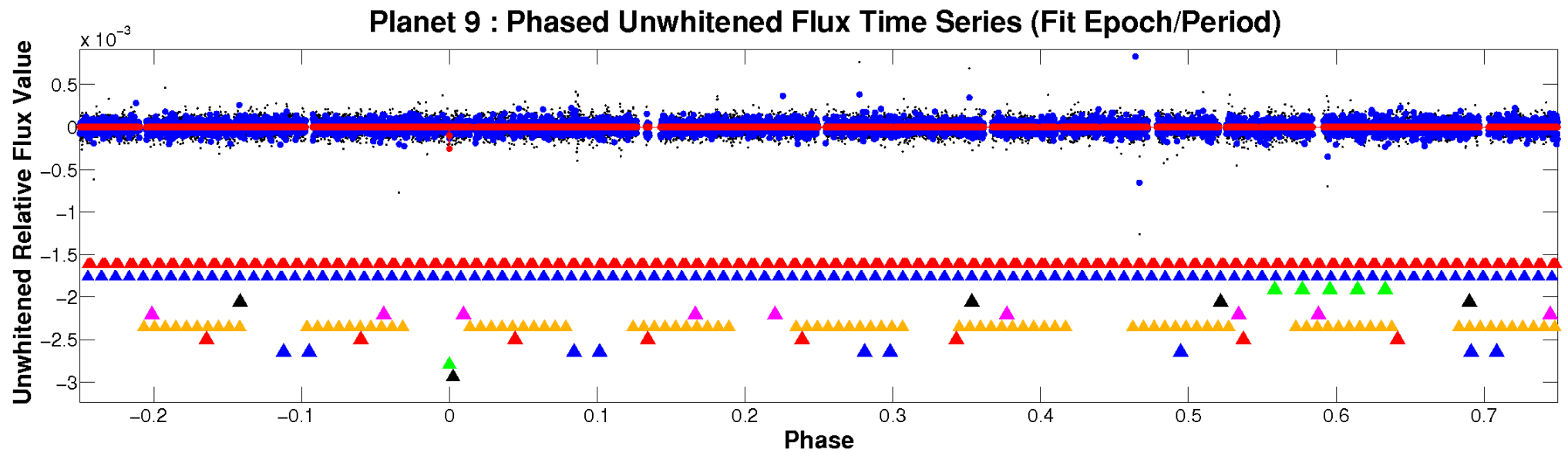


# ALT Odd/Even

TCE 004577324-09

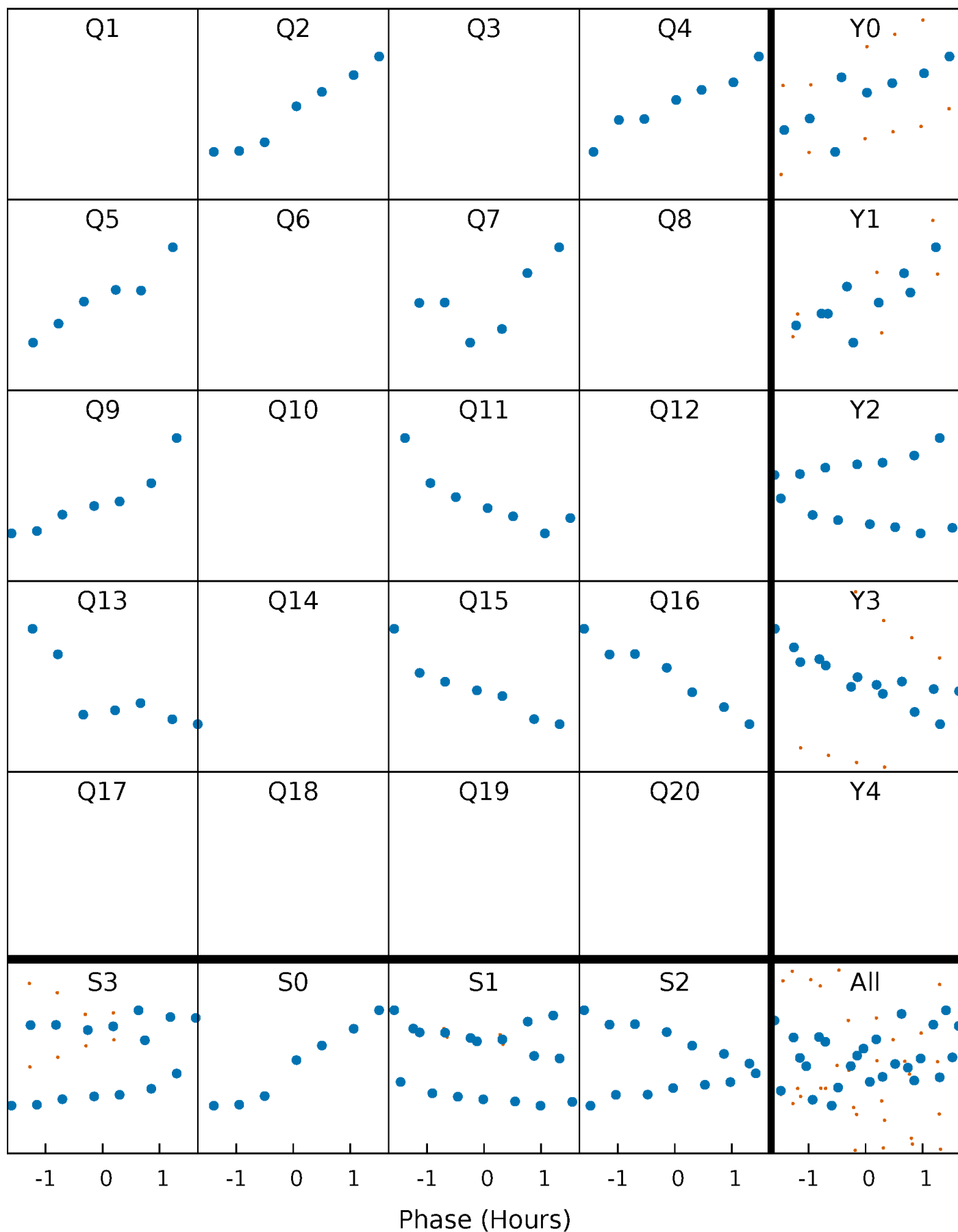


# Non-Whitened Vs. Whitened Light Curve



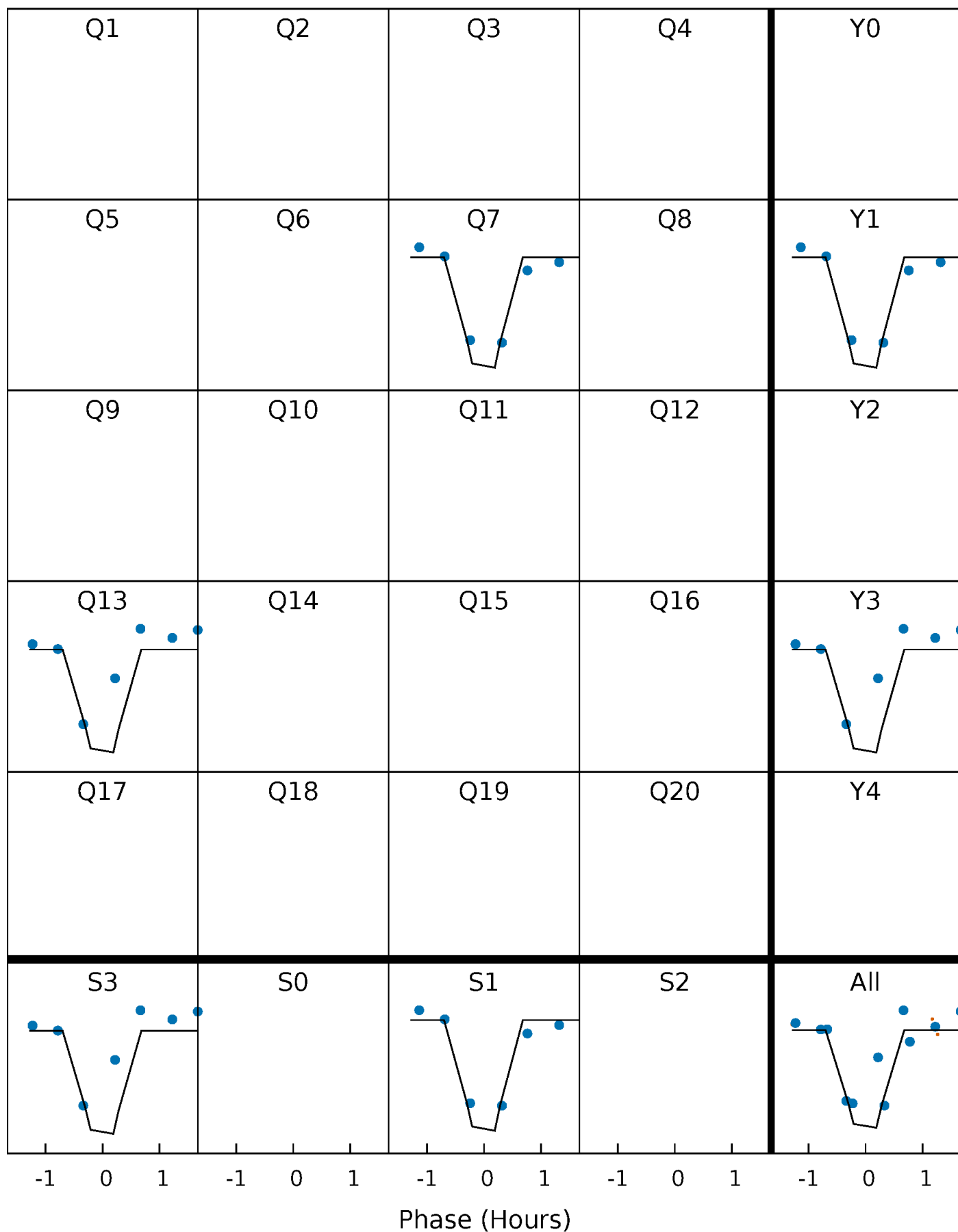
# PDC Quarter-Phased Transit Curves

TCE 004577324-09 P=143.173964 Days  $T_0=238.606043$  (BKJD)



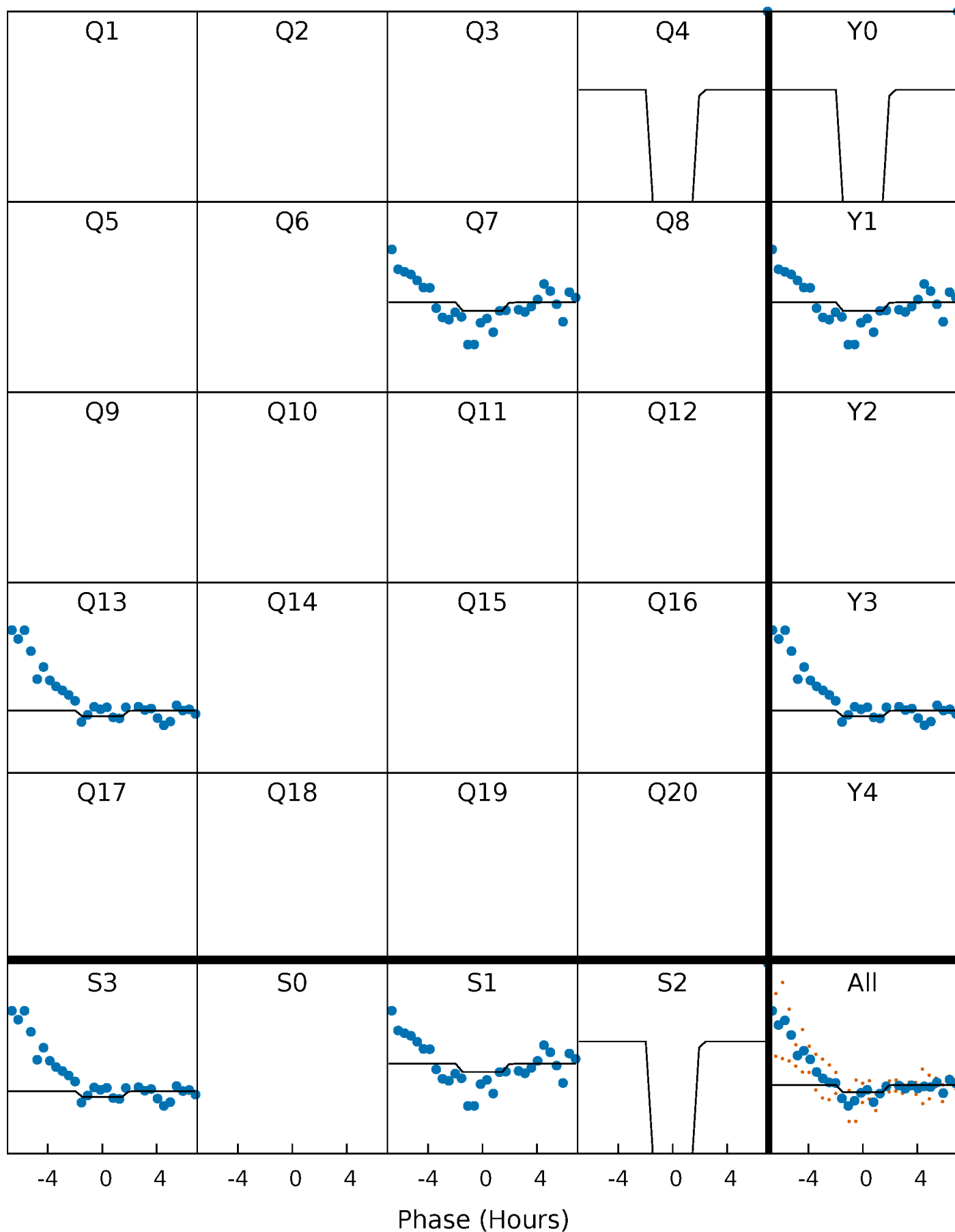
# DV Quarter-Phased Transit Curves

TCE 004577324-09     $P=143.173964$  Days     $T_0=238.606043$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

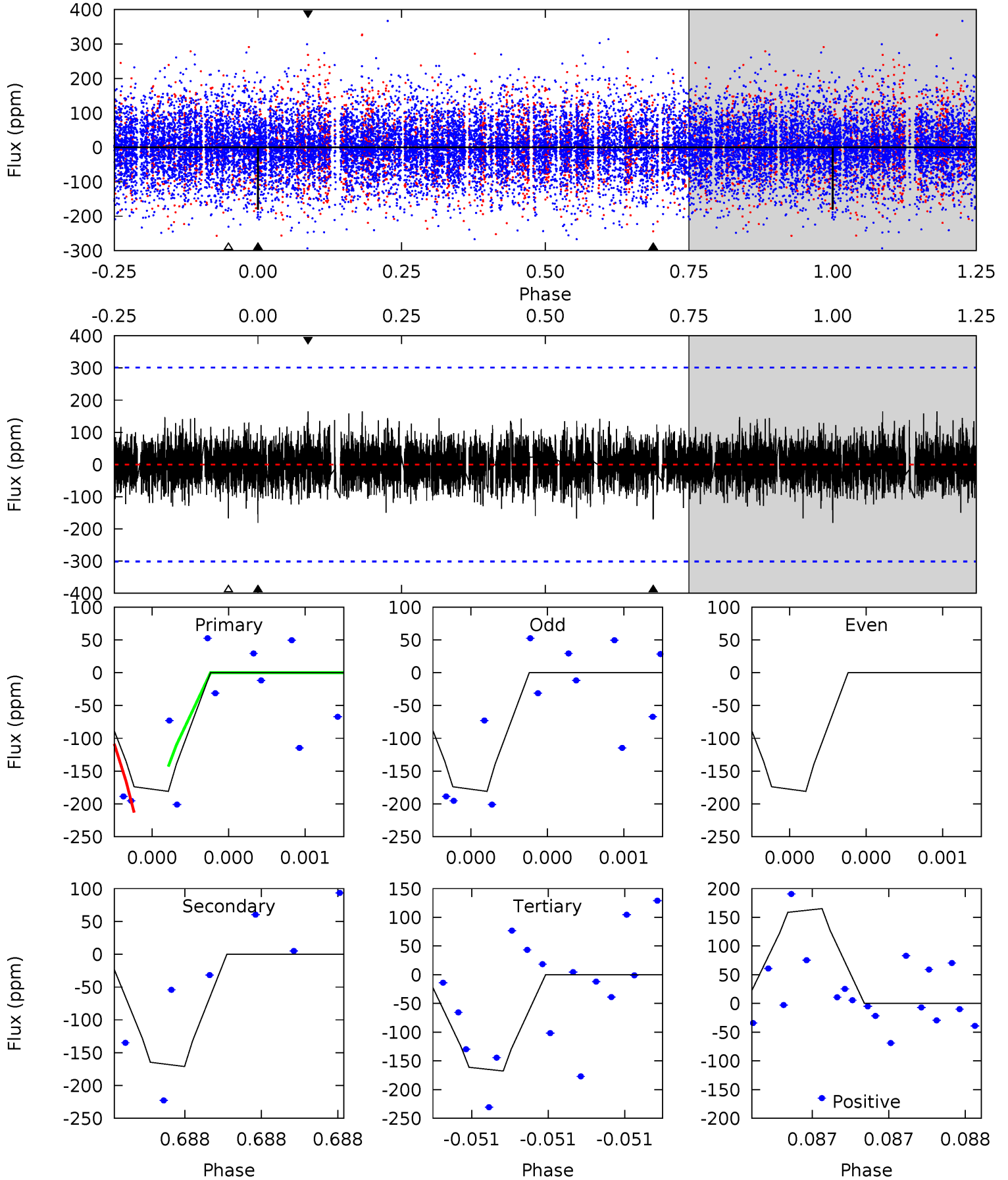
TCE 004577324-09     $P=143.177955$  Days     $T_0=238.627358$  (BKJD)



# DV Model-Shift Uniqueness Test

004577324-09, P = 143.173964 Days, E = 95.432079 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
3.41	3.23	3.16	3.12	5.69	3.65	0.80	0.25	0.30	0.07	0.11	0	1.00	0.48	0.00

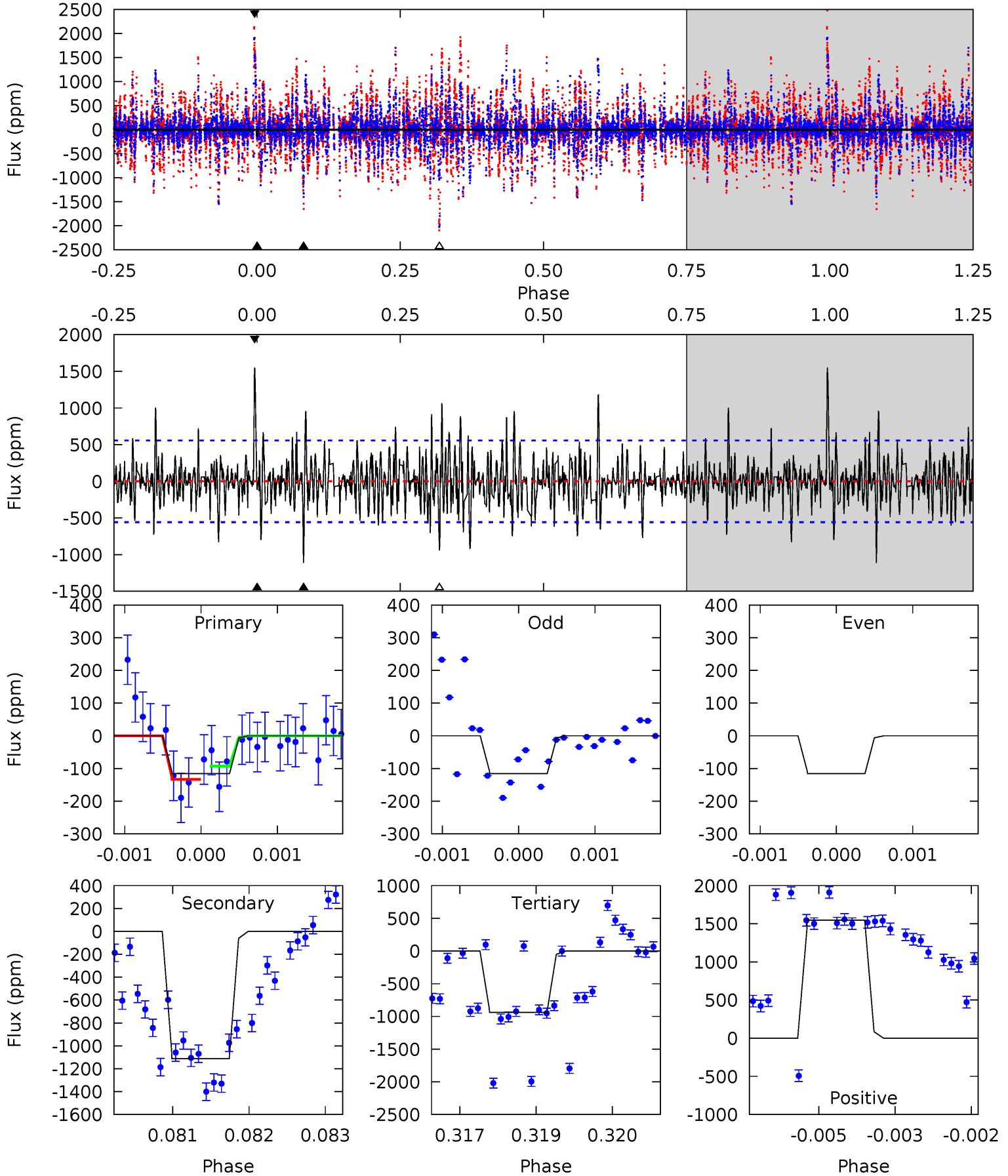




# Alt Model-Shift Uniqueness Test

004577324-09, P = 143.177955 Days, E = 95.449403 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1.13	10.8	9.16	15.1	5.43	3.25	2.40	-8.03	-14.0	1.67	-4.25	0	1.00	0.58	0.20



### Stellar Parameters For KIC 004577324

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6490^{+146}_{-178}$	$4.101^{+0.221}_{-0.119}$	$-0.360^{+0.300}_{-0.300}$	$1.551^{+0.329}_{-0.402}$	$1.107^{+0.177}_{-0.145}$	$0.418^{+0.512}_{-0.145}$
	+2%/-3%	+5%/-3%	+83%/-83%	+21%/-26%	+16%/-13%	+122%/-35%
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 004577324-09 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-171 \pm 53$	$8.86^{+9.80}_{-5.84}$	$661^{+41}_{-44}$	$3627^{+1652}_{-749}$	$348^{+2661}_{-271}$
Alt.	$-1112 \pm 103$	$9.38^{+8.61}_{-6.70}$	$661^{+38}_{-47}$	$5046^{+4818}_{-1162}$	$2110^{+24255}_{-1522}$

$T_{max}$  = 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

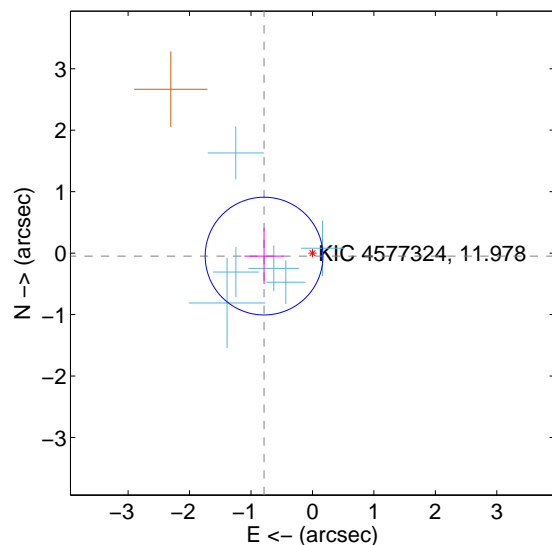
Supplemental centroid analysis for 004577324-09. **Kepler magnitude: 11.98.** Transit SNR 3.33

There are 6 quarters with good PRF difference image offsets

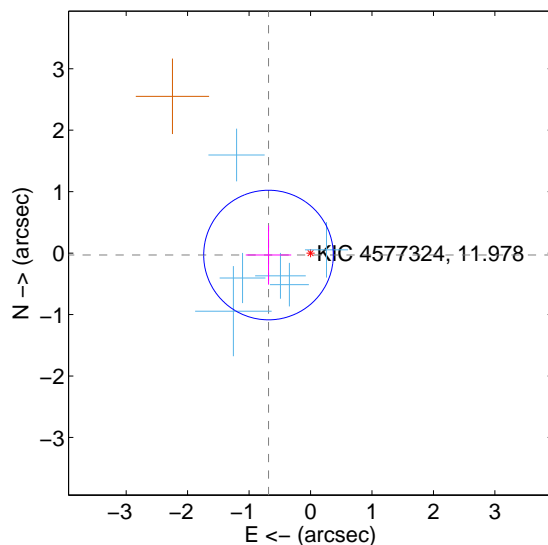
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.788 \pm 0.319$	2.47	$0.787 \pm 0.319$	$-0.048 \pm 0.456$
PRF-fit source offset from KIC position	$0.685 \pm 0.351$	1.95	$0.684 \pm 0.369$	$-0.032 \pm 0.481$
photometric centroid source offset	$0.22 \pm 1.02$	0.22	$-0.11 \pm 1.02$	$0.19 \pm 1.02$

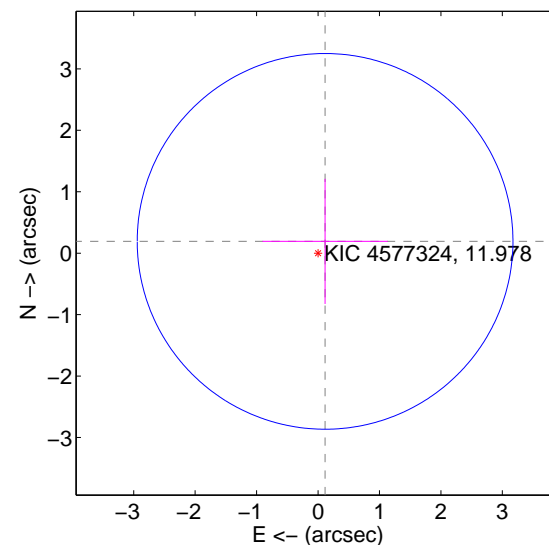
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

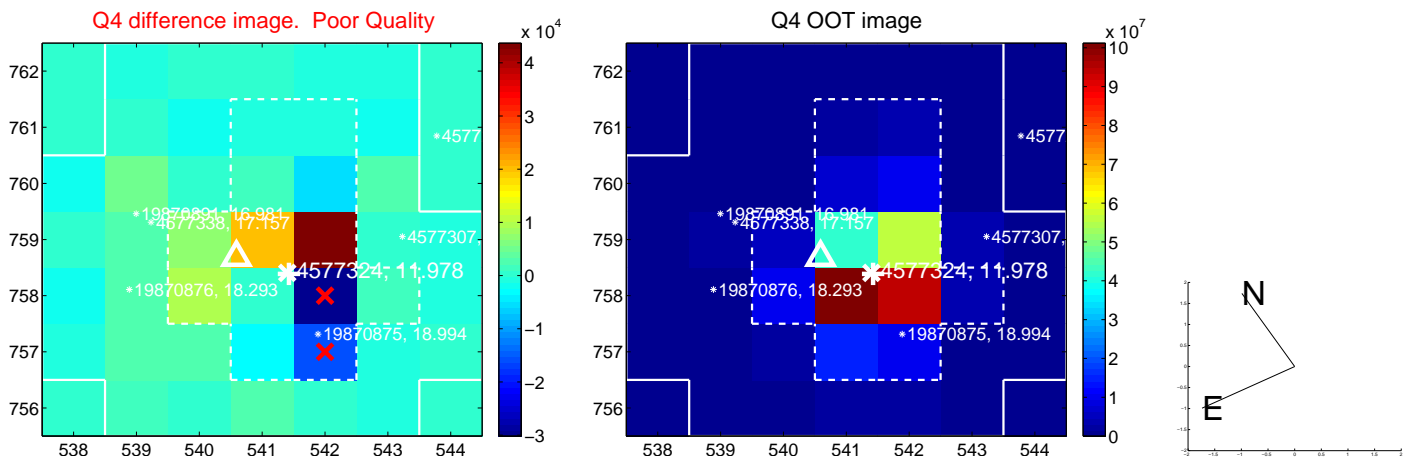
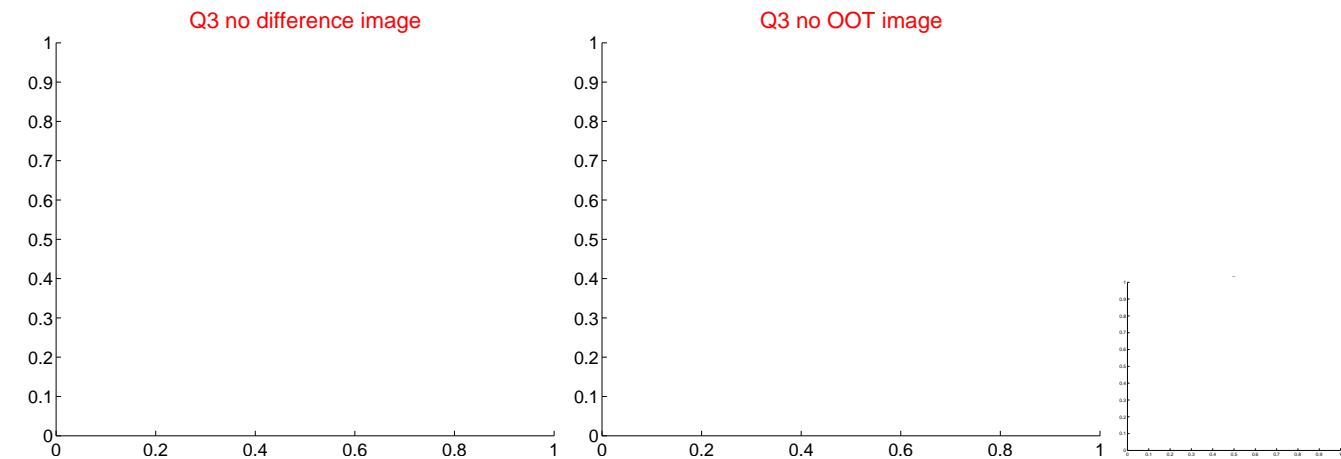
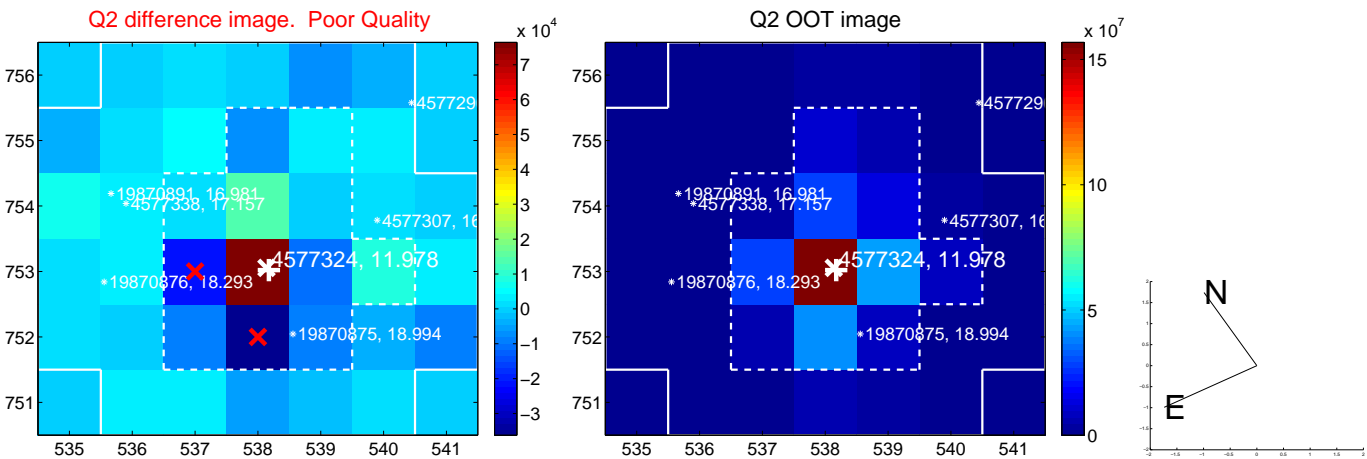


offset from photometric centroids

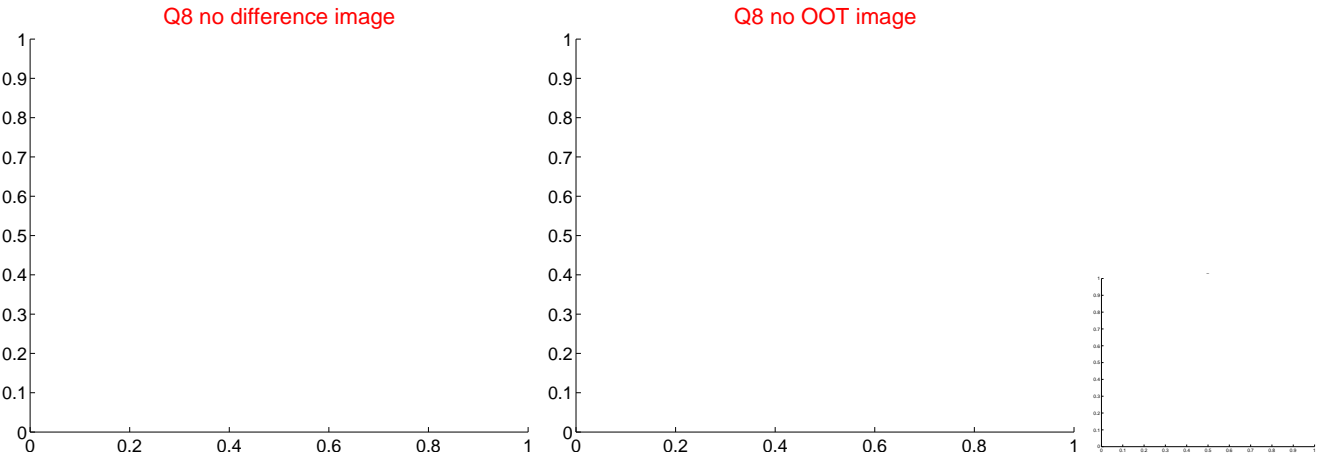
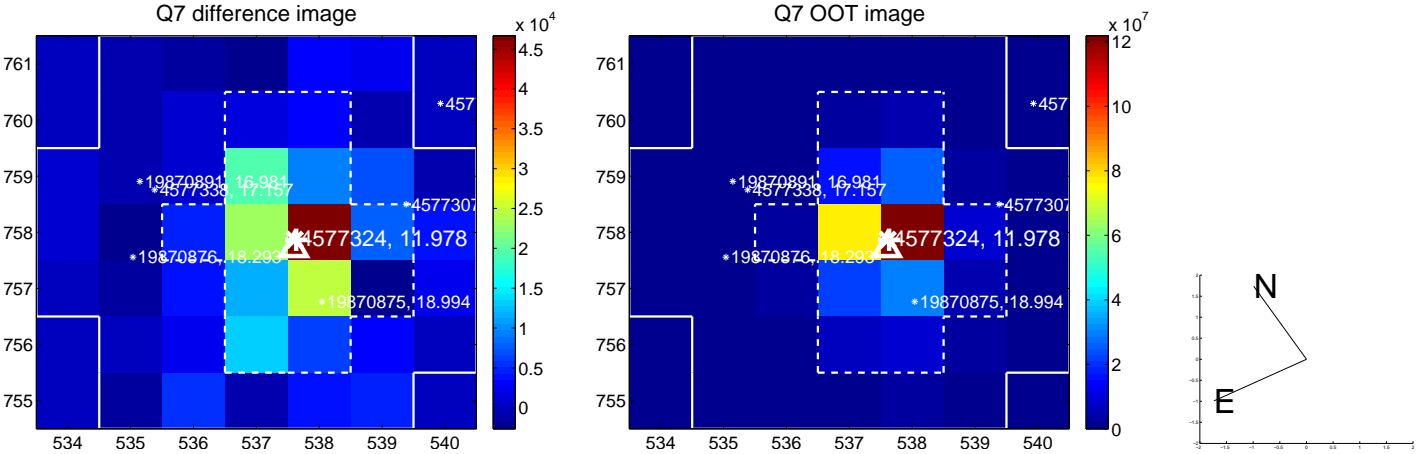
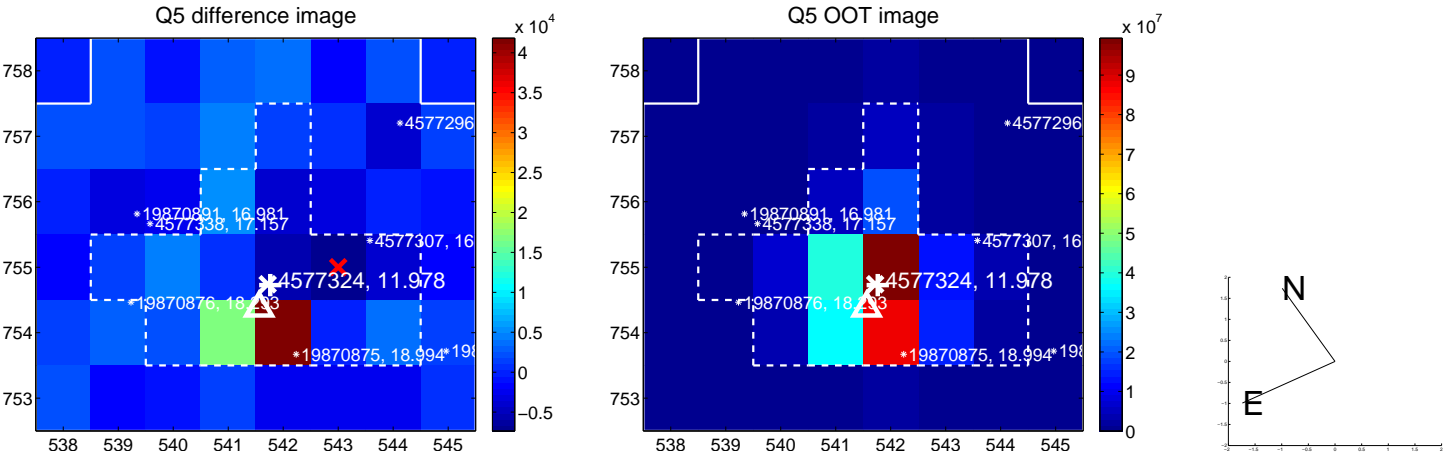


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

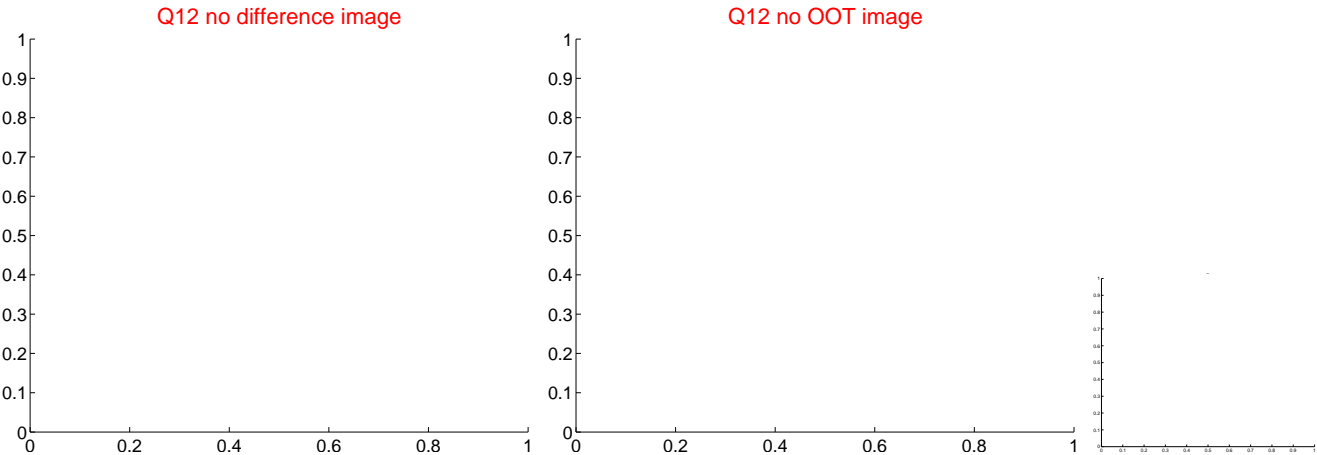
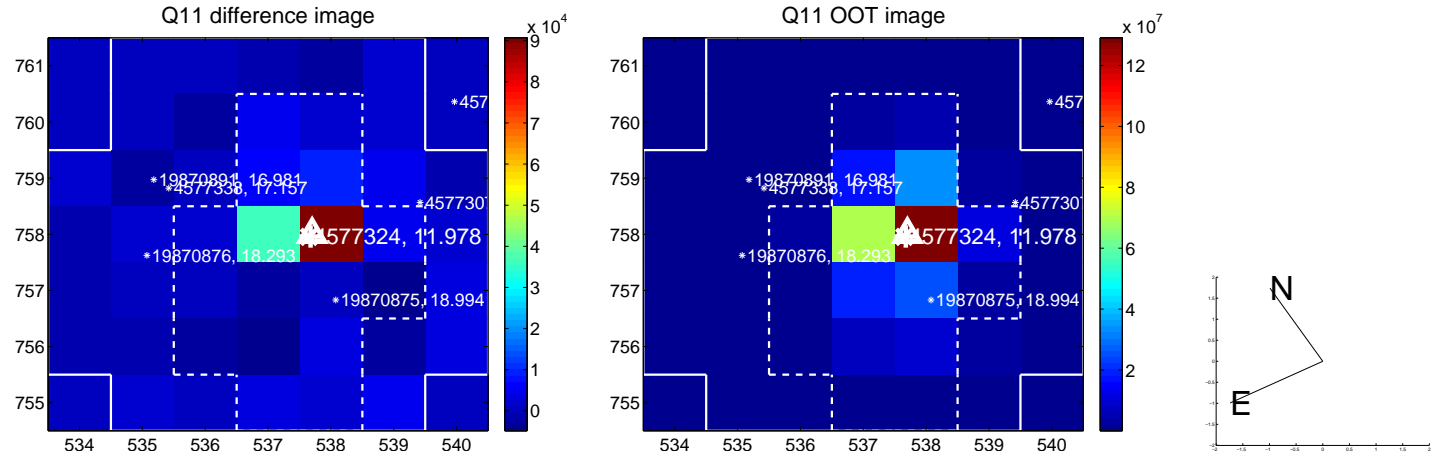
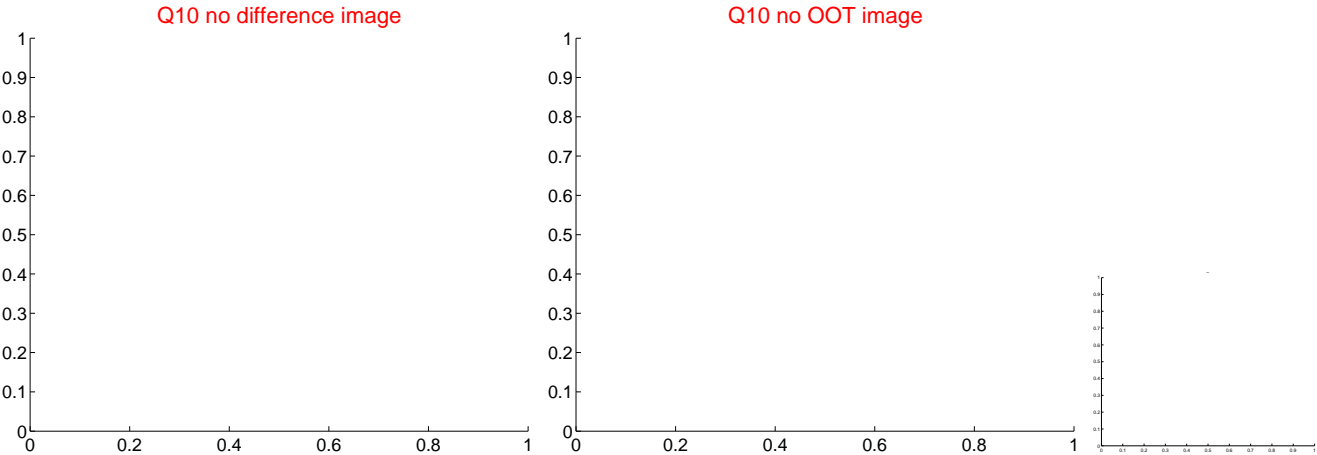
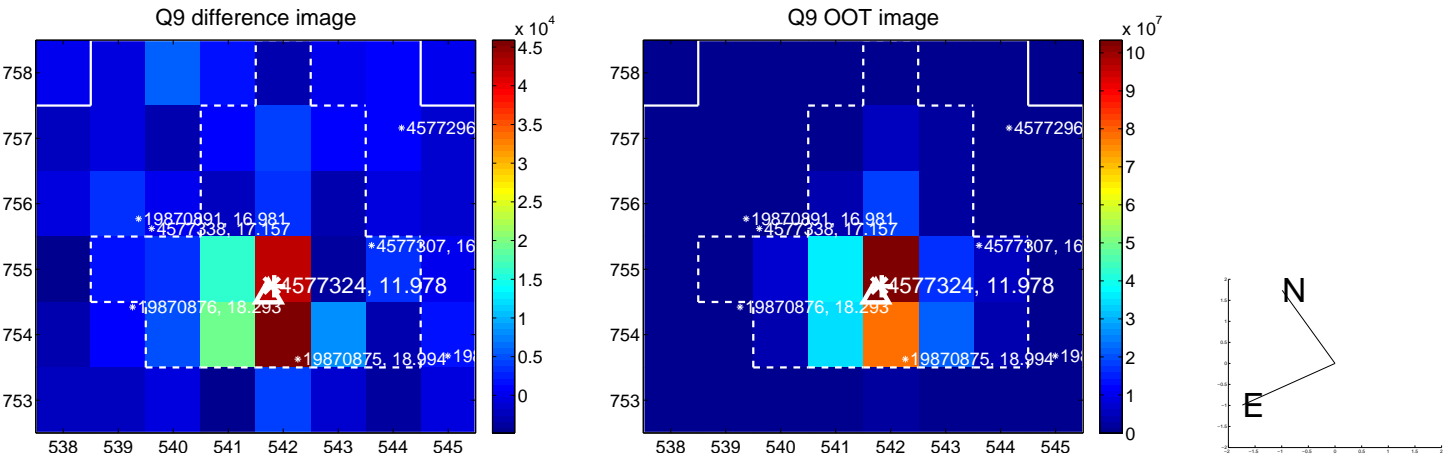
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



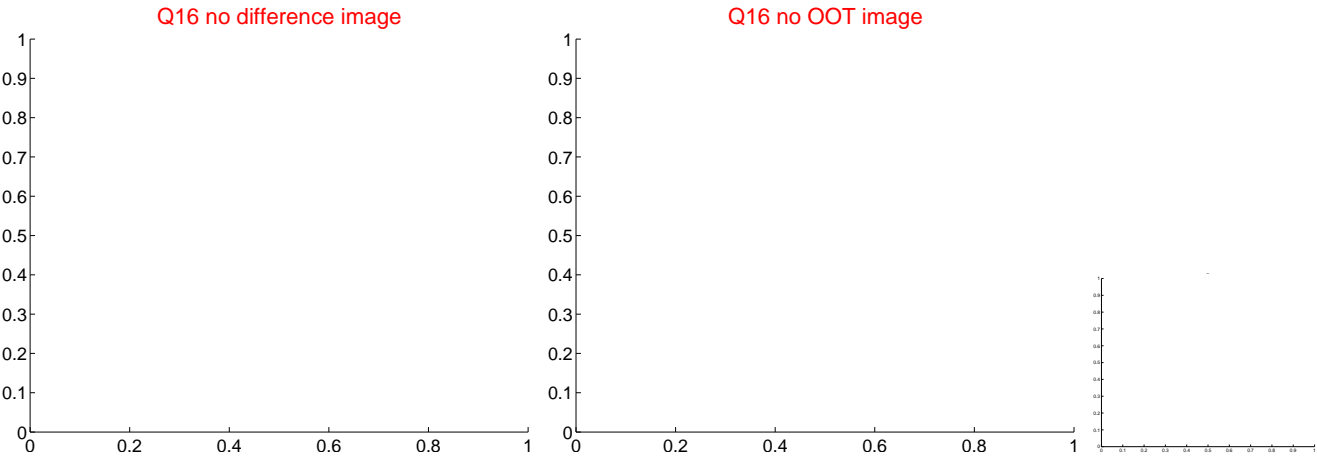
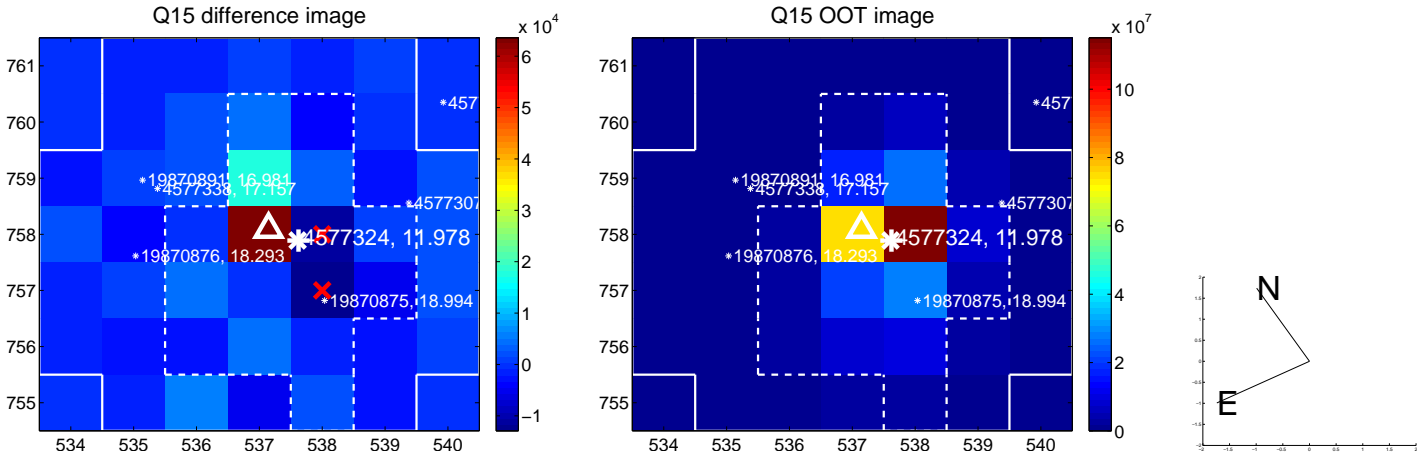
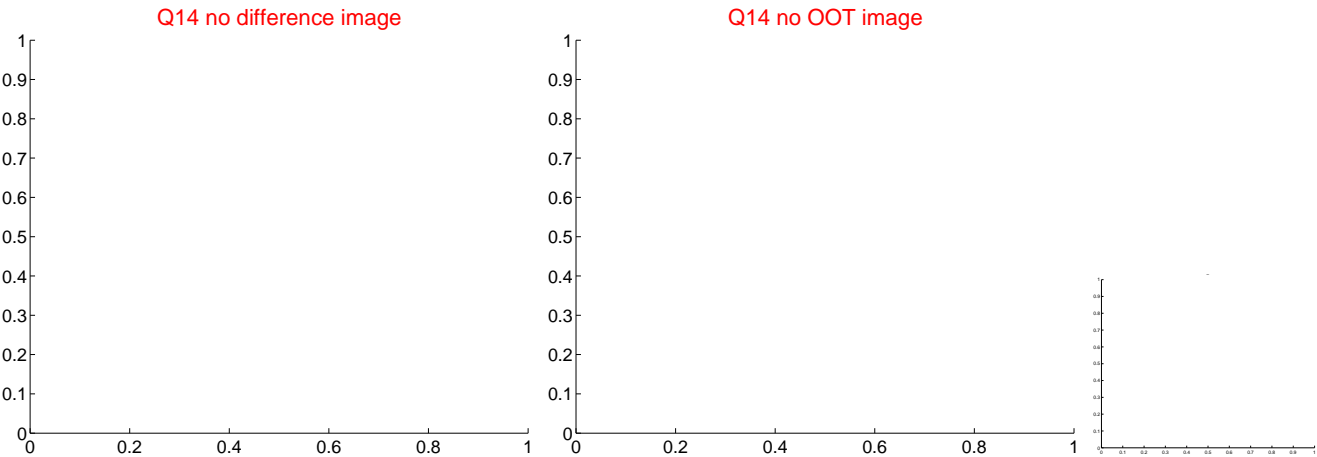
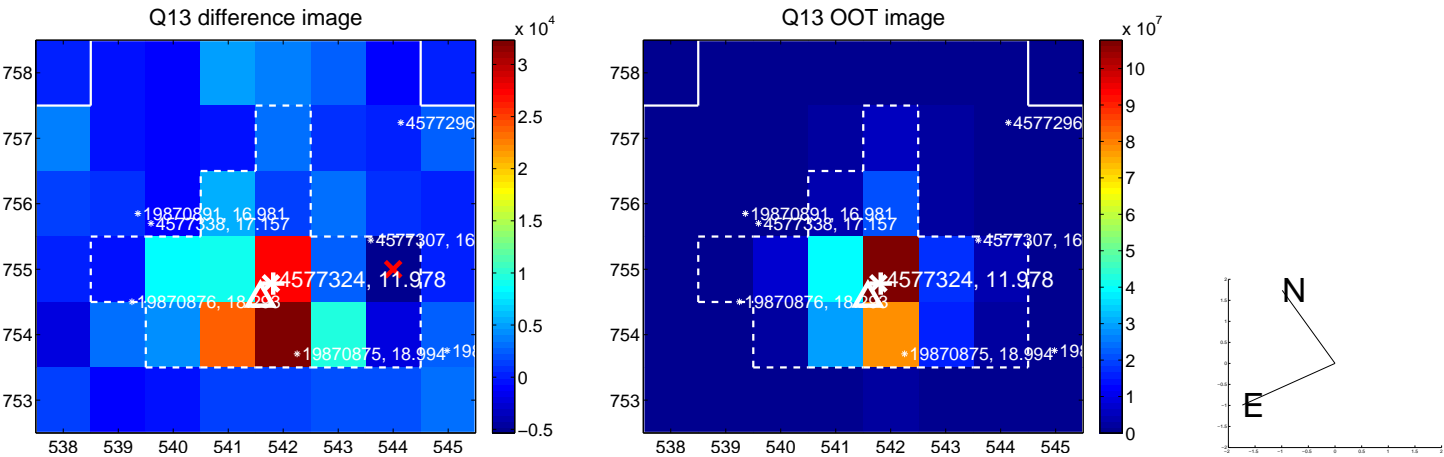
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



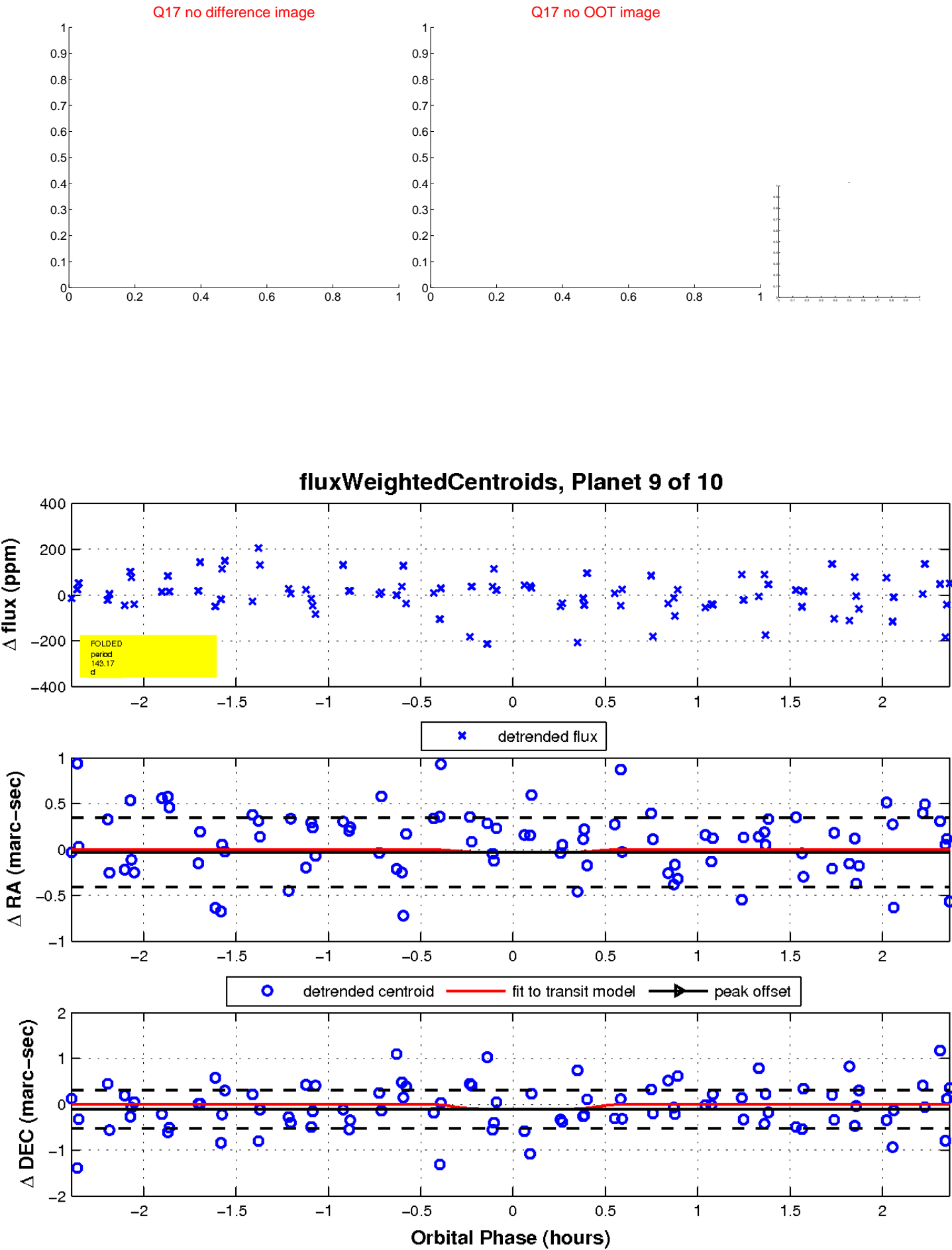
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



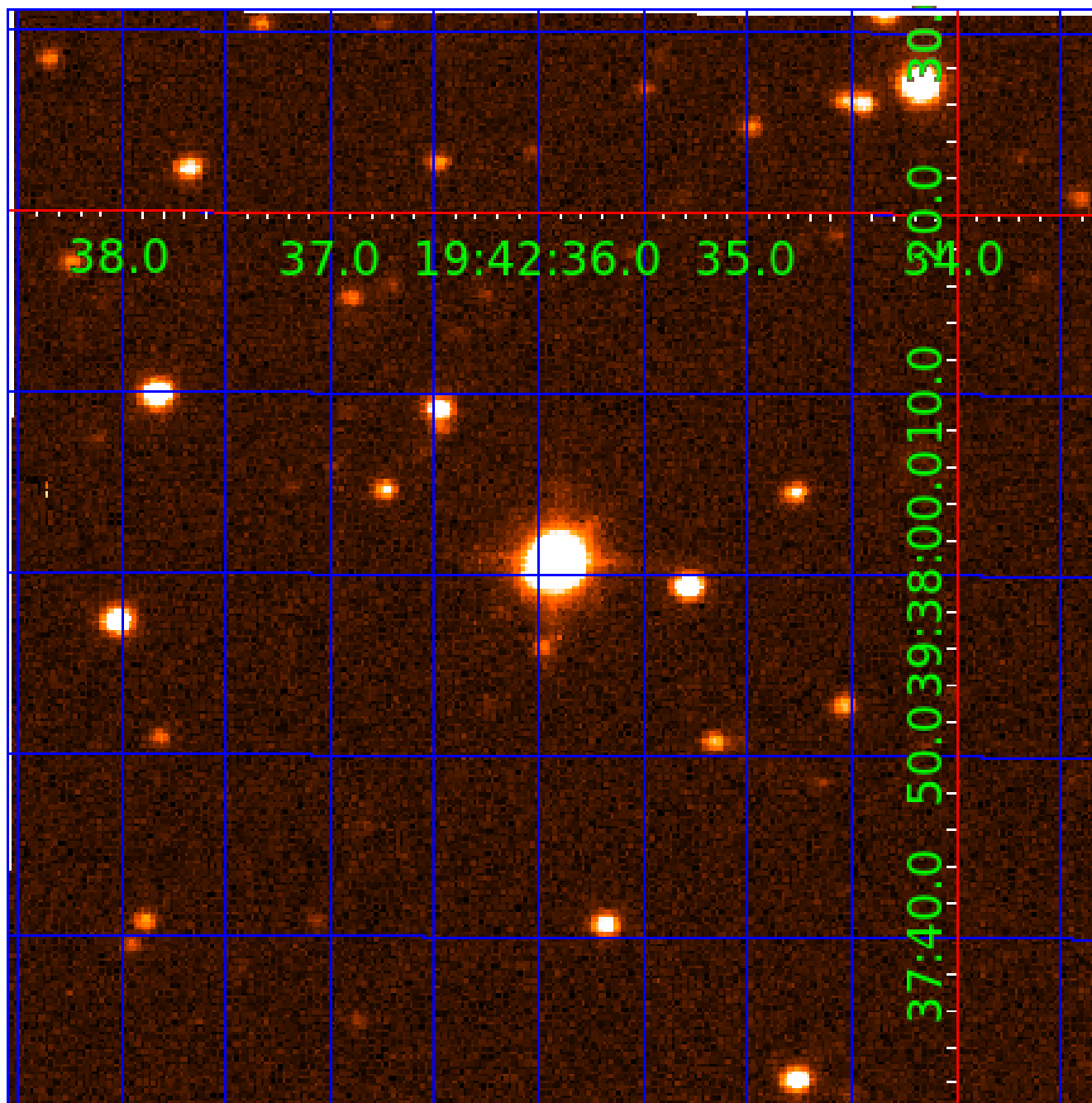
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



## KIC 004577324

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004577324-01	OBS	No	2.676955	133.989377	23.7	9.268	8.5	8.2	1.55	6490	0.84	2508.57
004577324-02	OBS	No	5.352929	135.260103	33.6	9.181	10.0	9.7	1.55	6490	1.05	995.77
004577324-03	OBS	No	283.674058	186.080756	103.5	25.045	8.5	4.6	1.55	6490	1.73	5.00
004577324-04	OBS	No	310.445932	432.392002	164.8	7.764	7.9	6.3	1.55	6490	2.19	4.44
004577324-05	OBS	No	173.353436	171.891158	171.1	9.852	7.6	6.9	1.55	6490	2.22	9.65
004577324-06	OBS	No	15.793664	139.332735	72.1	14.982	8.0	8.0	1.55	6490	1.54	235.31
004577324-07	OBS	No	185.917423	244.975369	135.5	25.942	8.3	4.5	1.55	6490	2.10	8.79
004577324-08	OBS	No	171.313674	196.888564	98.3	5.032	7.4	5.4	1.55	6490	1.70	9.80
004577324-09	OBS	No	143.173964	238.606043	293.0	0.835	7.5	3.3	1.55	6490	2.73	12.45
004577324-10	OBS	No	143.175229	238.960367	60.4	1.407	7.6	1.6	1.55	6490	1.36	12.45

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004577324-01	OBS	FP	0.00	1	0	0	0	LPP_DV
004577324-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD
004577324-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS
004577324-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004577324-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS
004577324-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_ZUMA—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT
004577324-07	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST
004577324-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004577324-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004577324-10	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_FEW_DIFFS

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

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

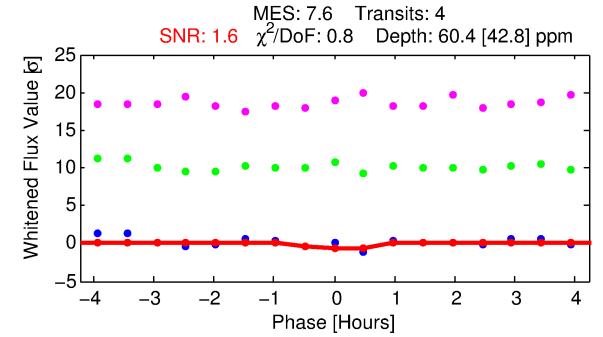
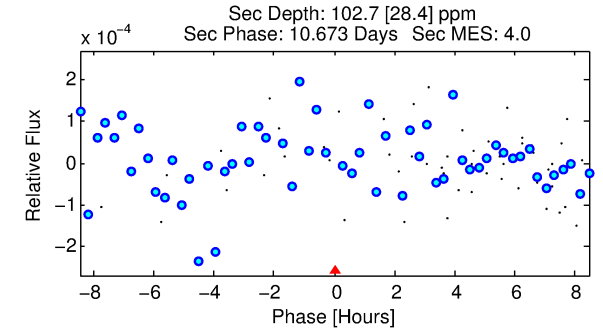
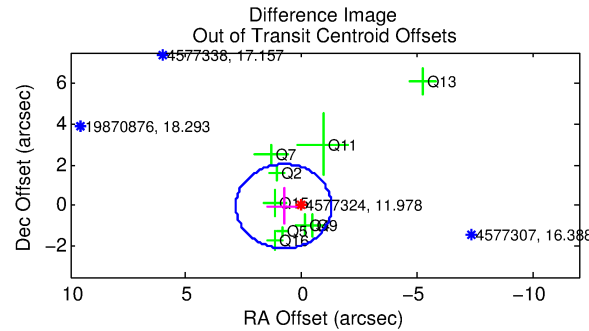
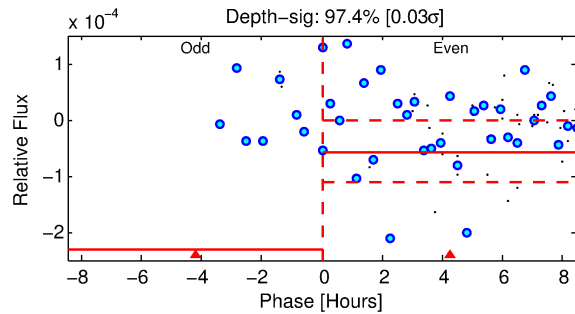
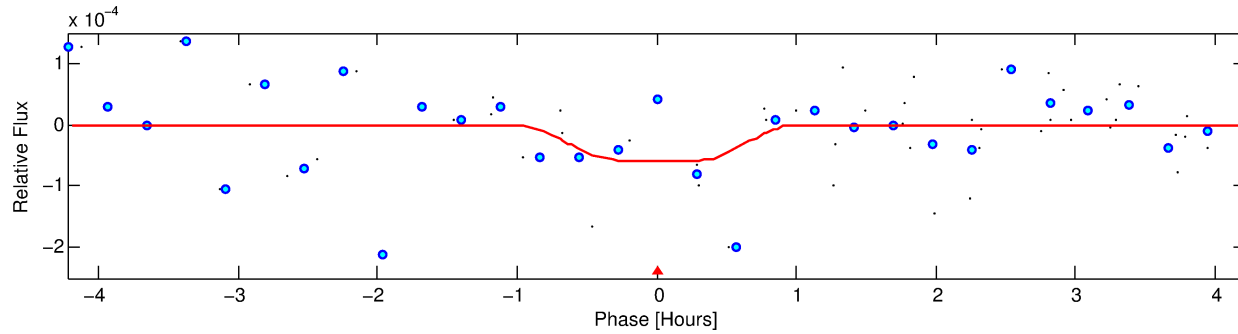
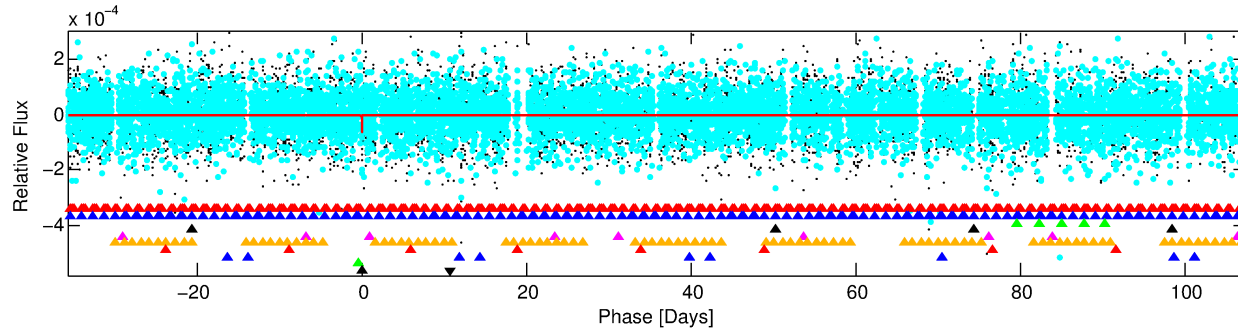
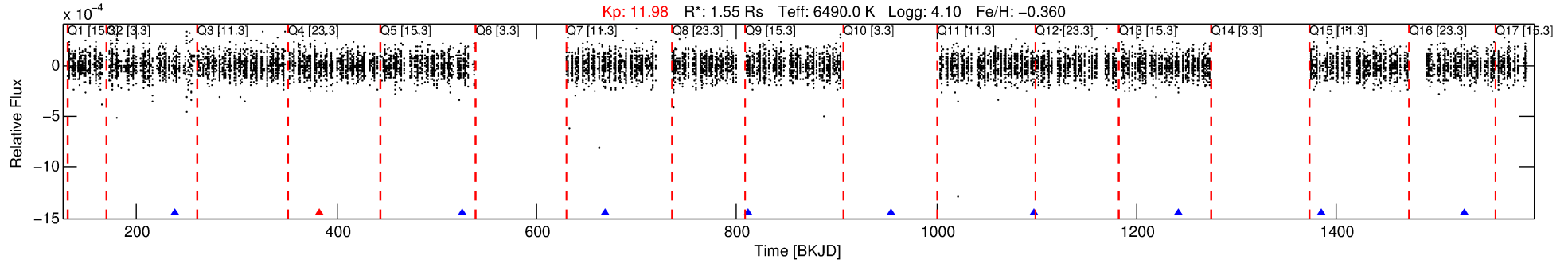
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004577324-10

No Significant Match Found

# DV One-Page Summary

KIC: 4577324 Candidate: 10 of 10 Period: 143.175 d



## DV Fit Results:

Period = 143.17523 [0.01060] d  
Epoch = 238.9604 [0.0336] BKJD  
Rp/R\* = 0.0081 [0.0566]  
a/R\* = 425.51 [16368.51]  
b = 0.85 [13.43]  
Seff = 12.45 [4.93]  
Teq = 479 [47] K  
Rp = 1.36 [9.58] Re  
a = 0.5542 [0.1342] AU  
Ag = 9333.36 [131153.61] [0.07 $\sigma$ ]  
Teffp = 7279 [25562] K [0.27 $\sigma$ ]

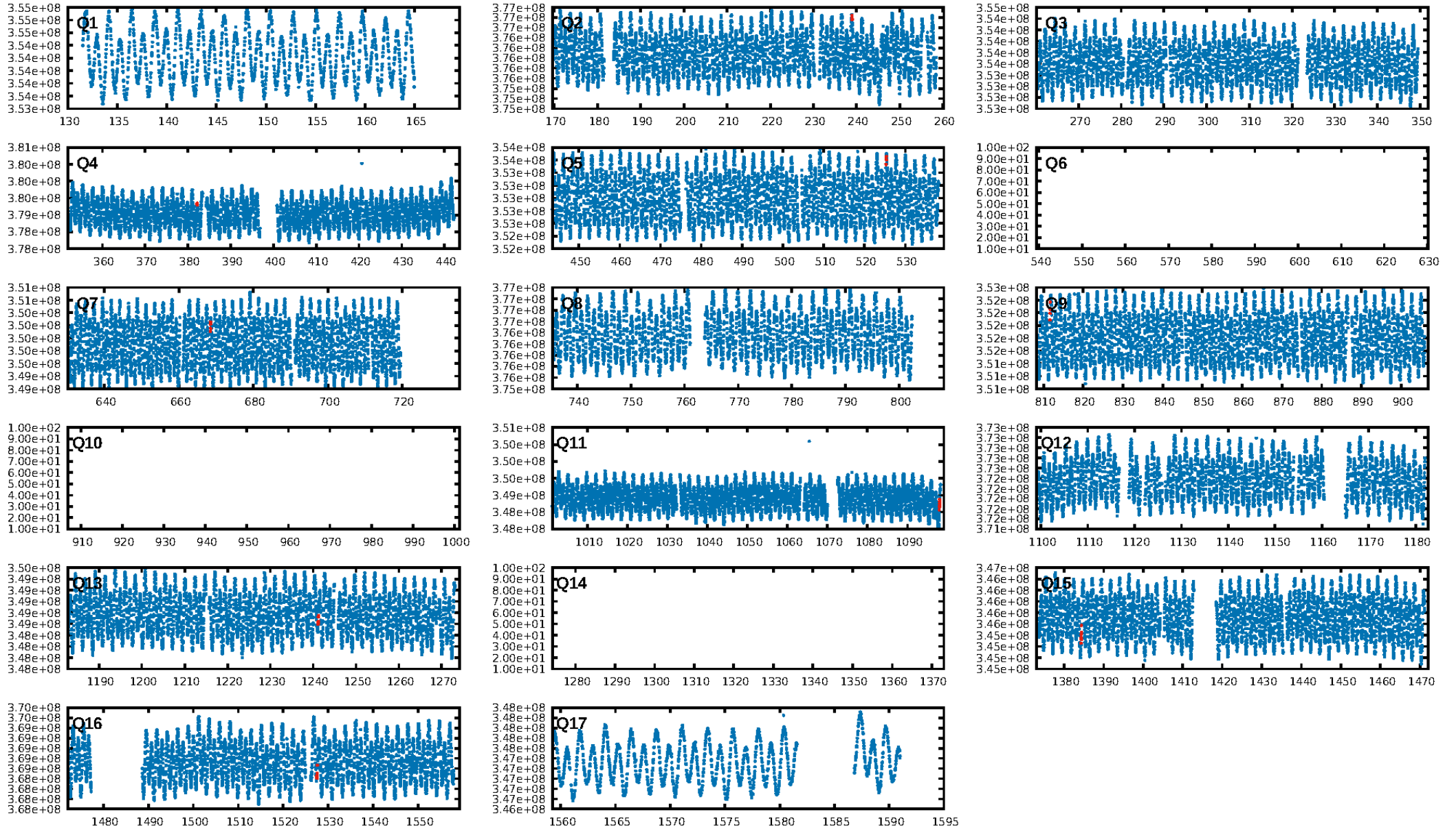
## DV Diagnostic Results:

ShortPeriod-sig: 1.5% [0.02 $\sigma$ ]  
LongPeriod-sig: 100.0% [129.25 $\sigma$ ]  
ModelChiSquare2-sig: 99.0%  
ModelChiSquareGof-sig: 98.6%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.75 [3/4]  
GhostDiagnostic-chr: -0.5459  
Centroid-sig: 90.4%  
Centroid-so: 0.918 arcsec [0.24 $\sigma$ ]  
OotOffset-rm: 0.775 arcsec [1.13 $\sigma$ ]  
OotOffset-st: 1/3/2/3 [9]  
KicOffset-rm: 0.696 arcsec [0.93 $\sigma$ ]  
KicOffset-st: 1/3/2/3 [9]  
DiffImageQuality-fgm: 0.22 [2/9]  
DiffImageOverlap-fno: 0.67 [6/9]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 00:56:08 Z

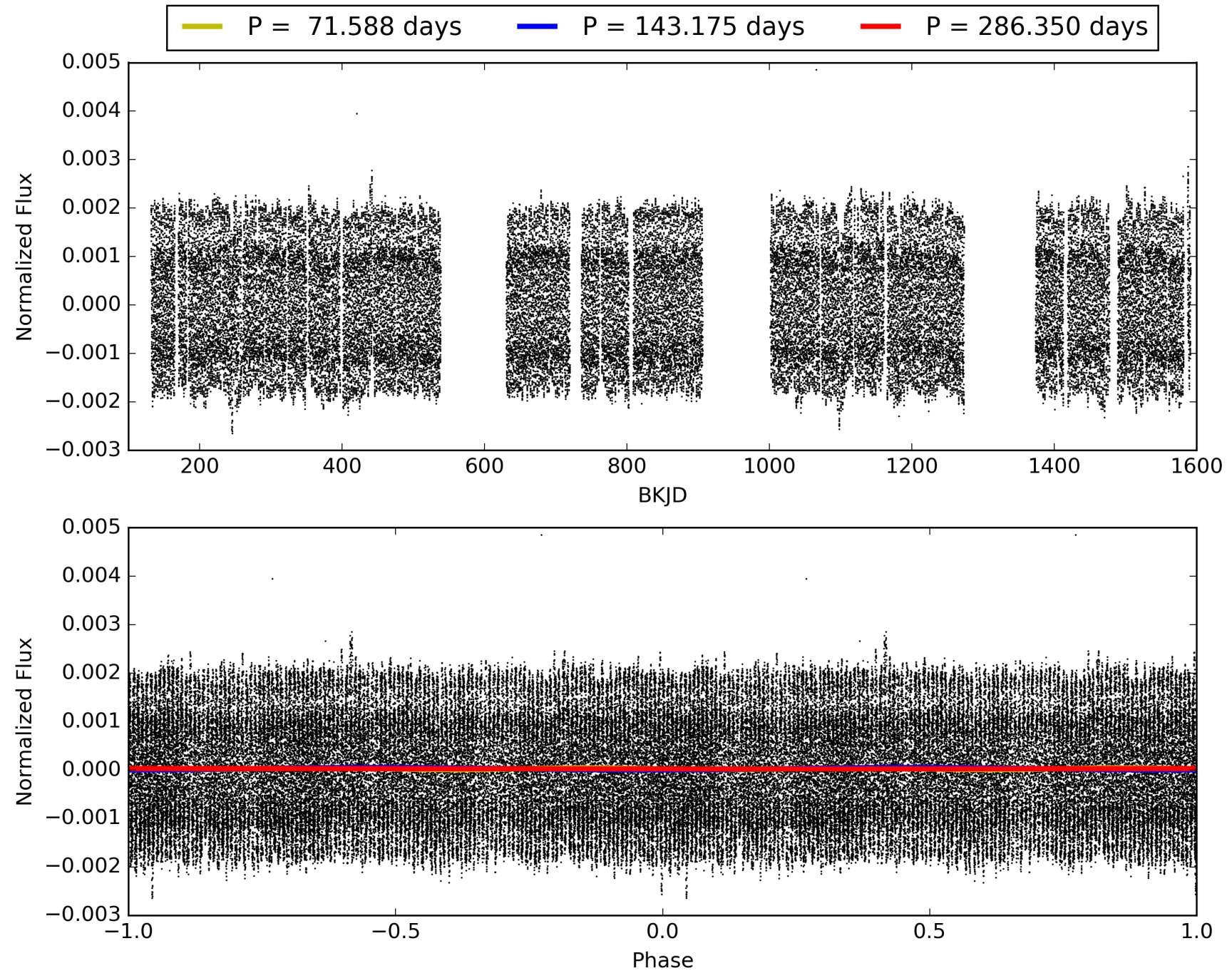
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004577324-10, PDC Light Curves



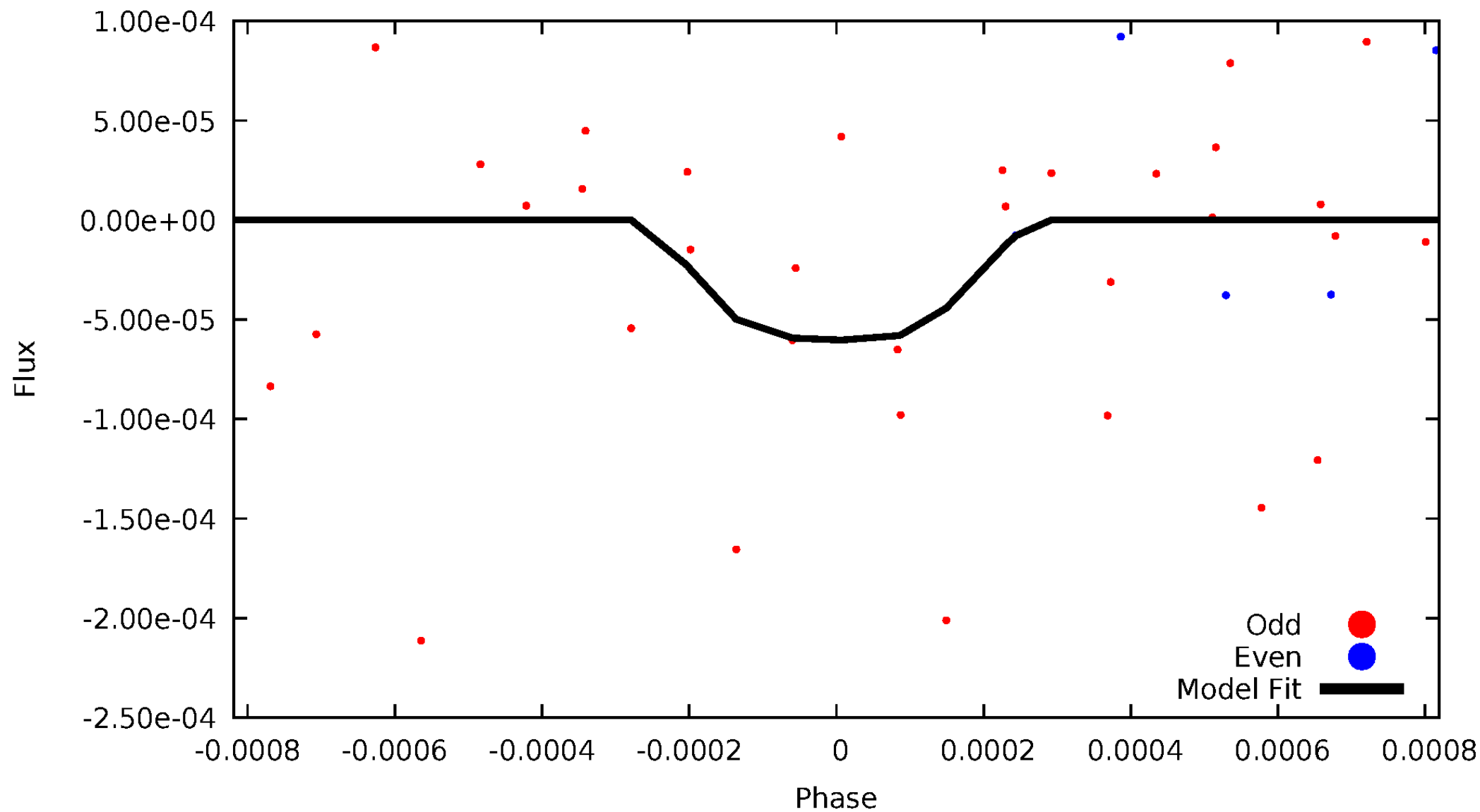


# TCE 004577324-10



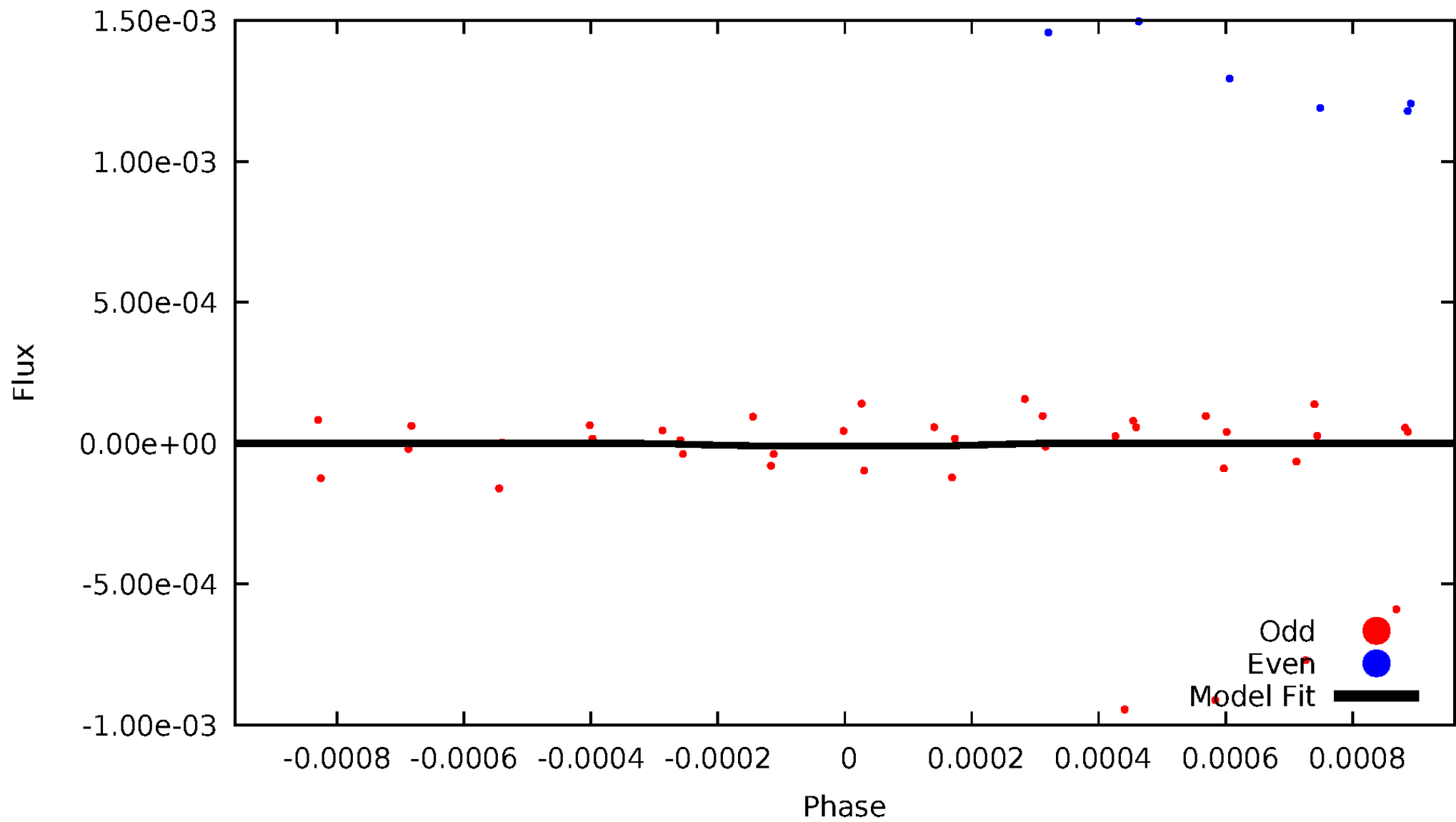
# DV Odd/Even

TCE 004577324-10



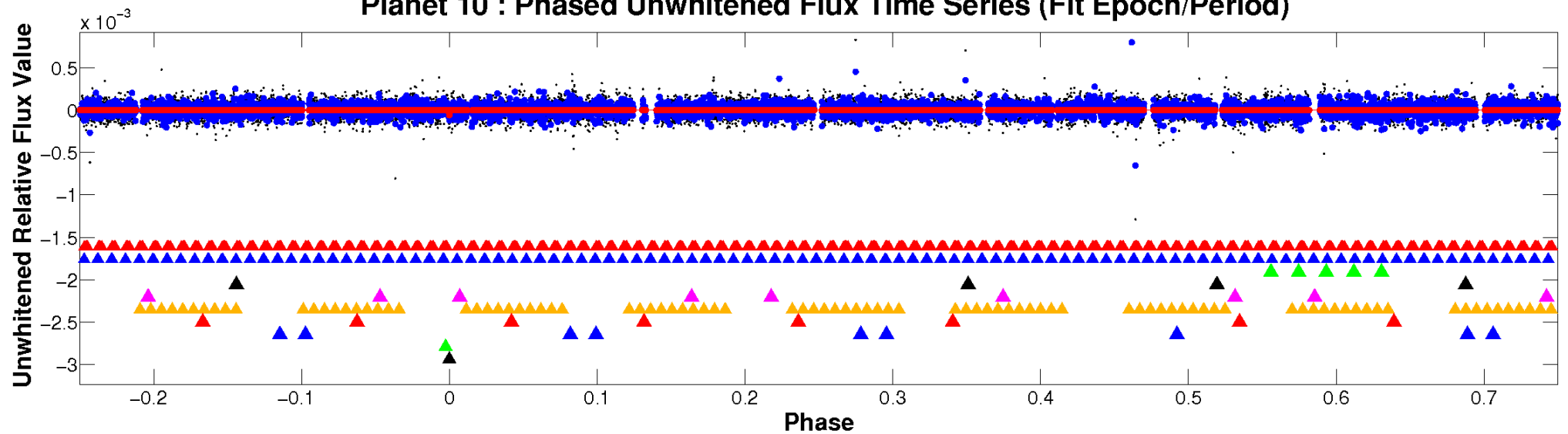
## ALT Odd/Even

TCE 004577324-10

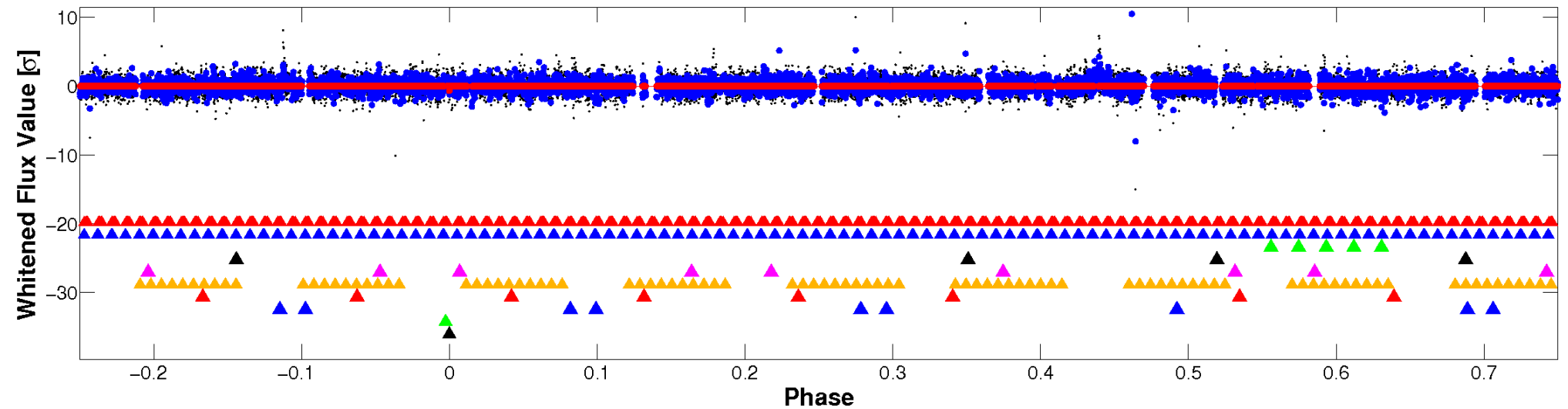


# Non-Whitened Vs. Whitened Light Curve

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



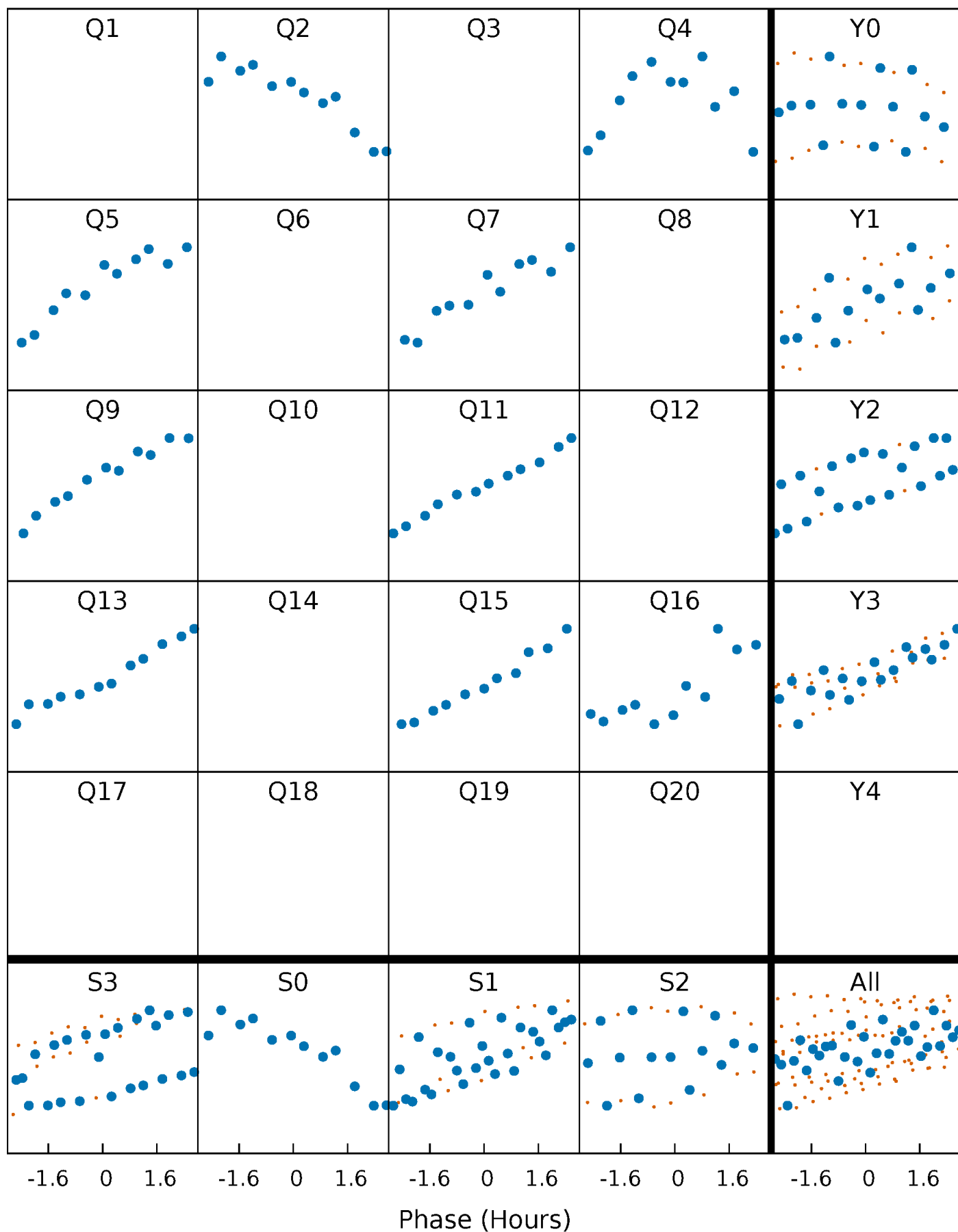
## Planet 10 : Phased Whitened Flux Time Series (Fit Epoch/Period)





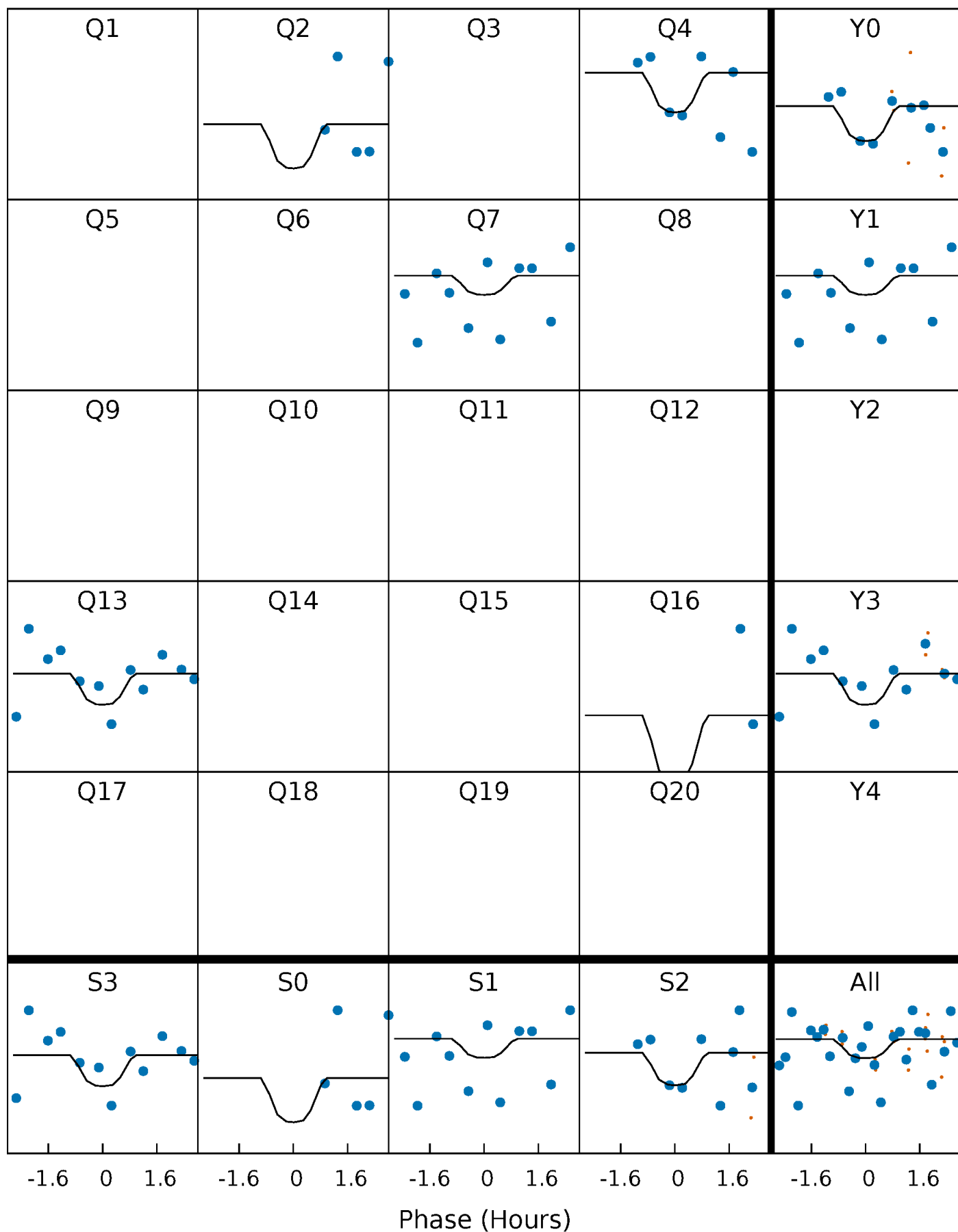
# PDC Quarter-Phased Transit Curves

TCE 004577324-10 P=143.175229 Days  $T_0=238.960367$  (BKJD)



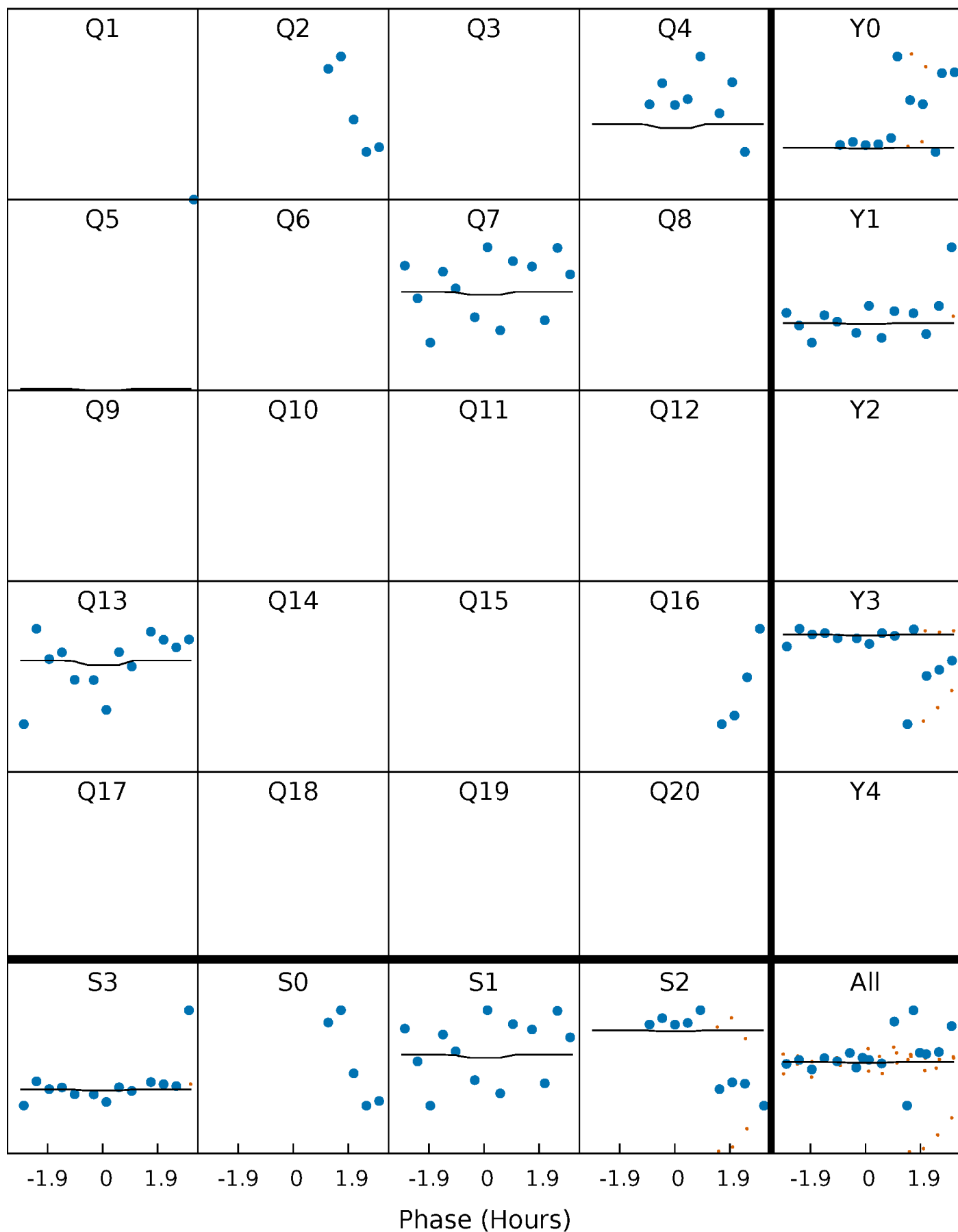
# DV Quarter-Phased Transit Curves

TCE 004577324-10 P=143.175229 Days  $T_0=238.960367$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

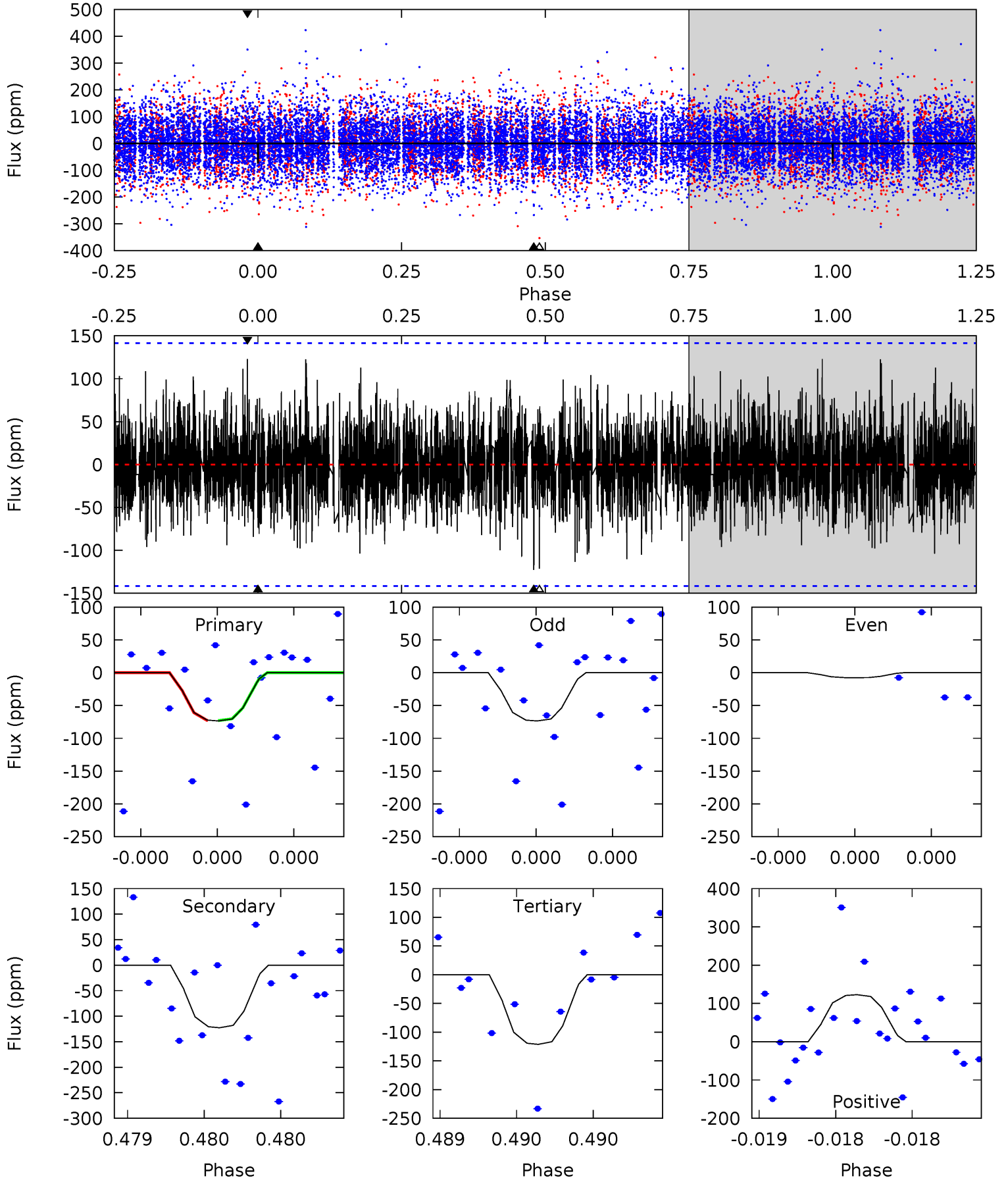
TCE 004577324-10 P=143.177955 Days  $T_0=238.949377$  (BKJD)



# DV Model-Shift Uniqueness Test

004577324-10, P = 143.175229 Days, E = 95.785138 Days

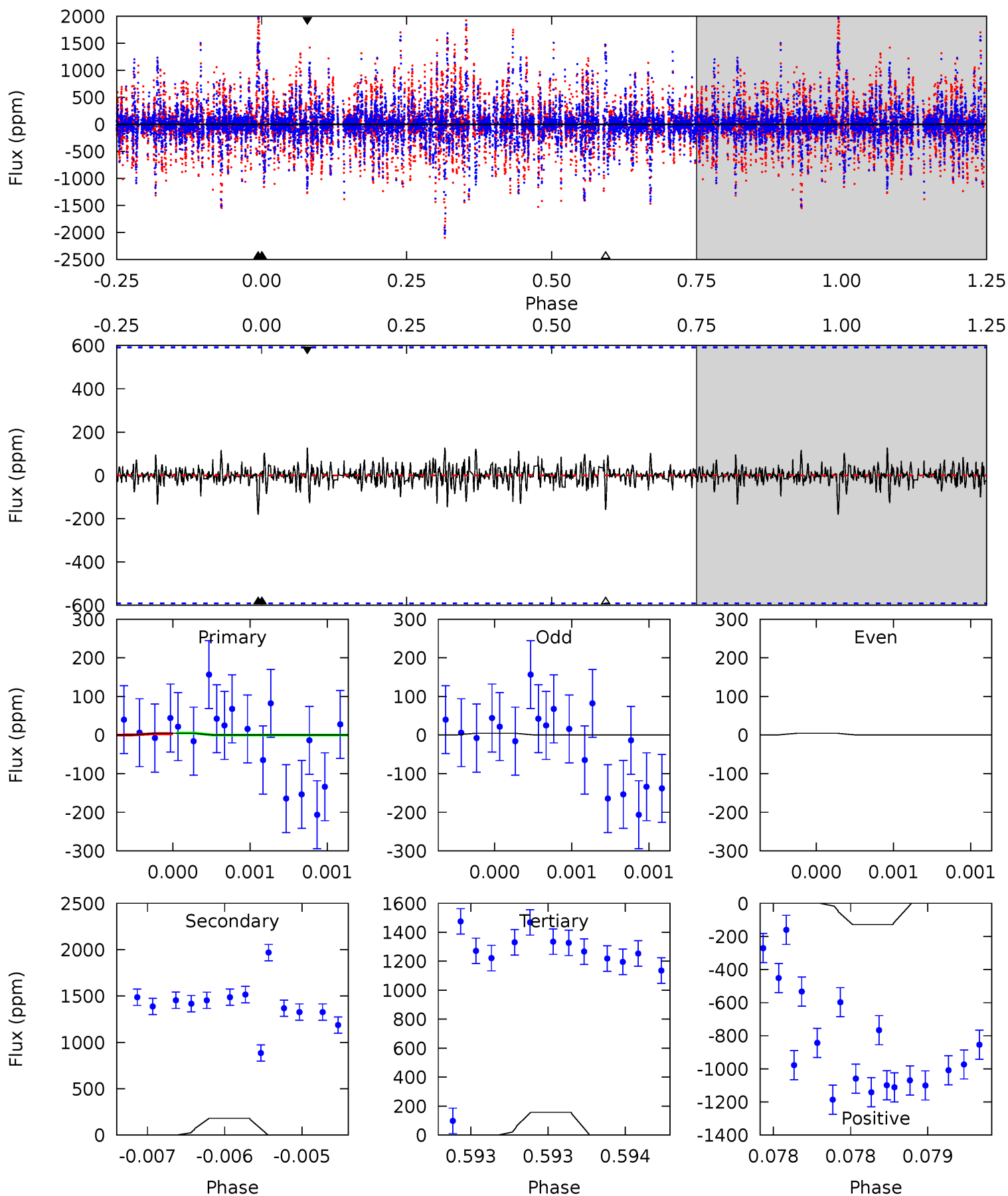
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2.90	4.85	4.80	4.86	5.59	3.51	1.28	-1.89	-1.95	0.05	-0.01	1.86	1.25	0.50	0.00



# Alt Model-Shift Uniqueness Test

004577324-10, P = 143.177955 Days, E = 95.771422 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0.04	1.69	1.47	1.20	5.54	3.43	0.29	-1.43	-1.16	0.22	0.49	0	-0.25	0.42	0.01



### Stellar Parameters For KIC 004577324

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6490^{+146}_{-178}$	$4.101^{+0.221}_{-0.119}$	$-0.360^{+0.300}_{-0.300}$	$1.551^{+0.329}_{-0.402}$	$1.107^{+0.177}_{-0.145}$	$0.418^{+0.512}_{-0.145}$
	+2%/-3%	+5%/-3%	+83%/-83%	+21%/-26%	+16%/-13%	+122%/-35%
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 004577324-10 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-123 \pm 25$	$6.55^{+7.51}_{-4.73}$	$660^{+40}_{-41}$	$3806^{+2646}_{-795}$	$496^{+5650}_{-393}$
Alt.	$-181 \pm 107$	$6.15^{+6.98}_{-4.17}$	$661^{+43}_{-50}$	$3960^{+2710}_{-951}$	$624^{+6755}_{-515}$

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

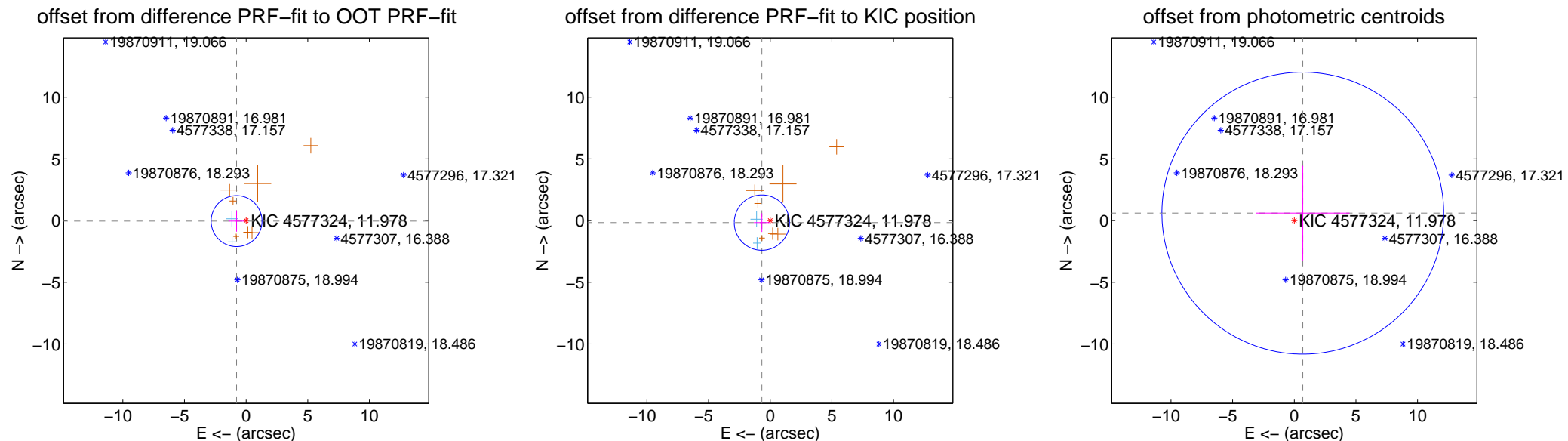
## DV Centroid Data

Supplemental centroid analysis for 004577324-10. **Kepler magnitude: 11.98.** Transit SNR 1.64

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

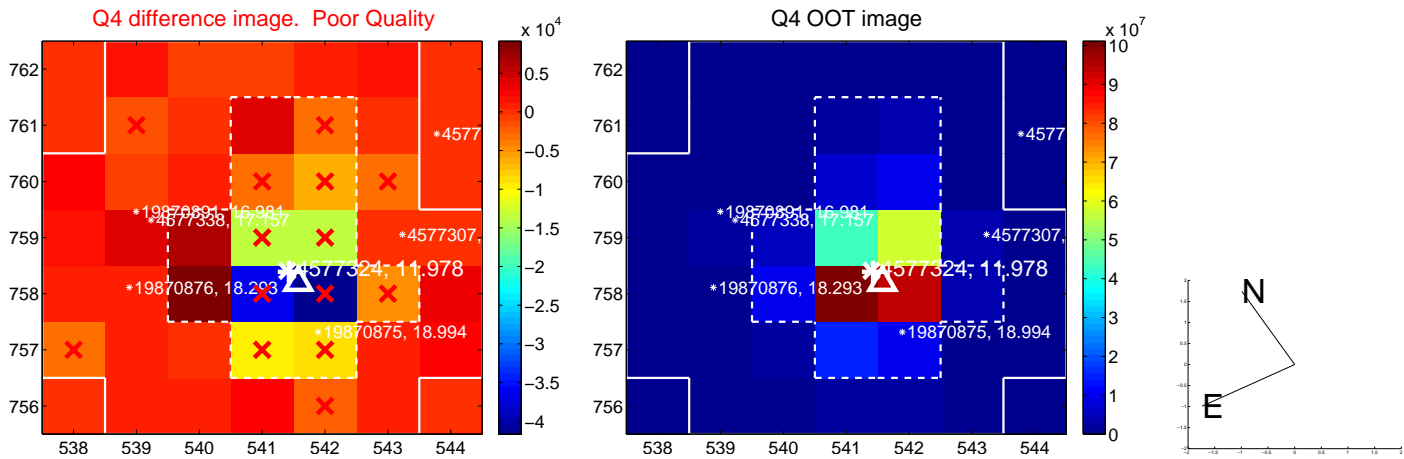
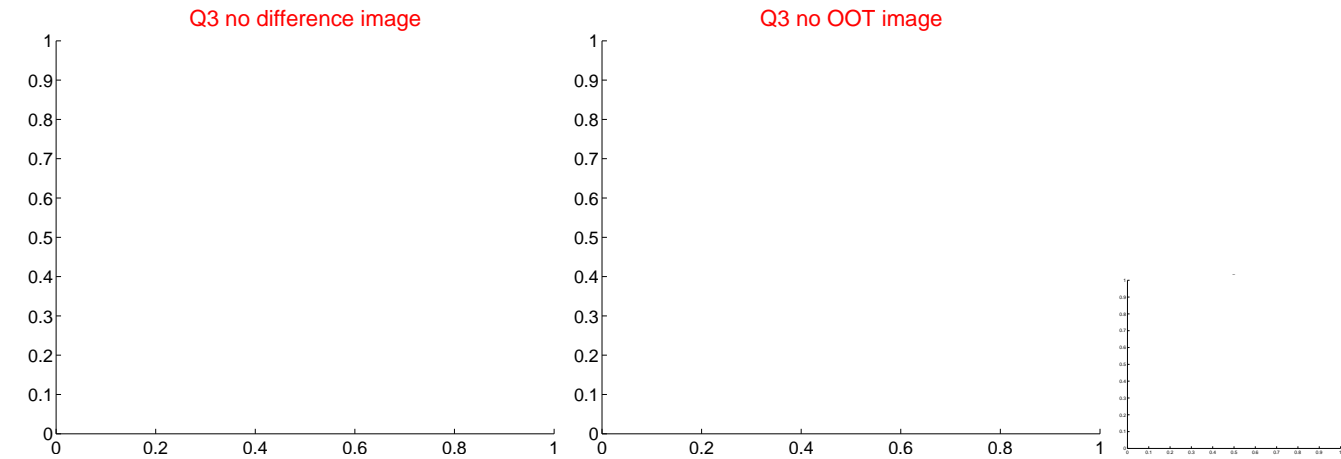
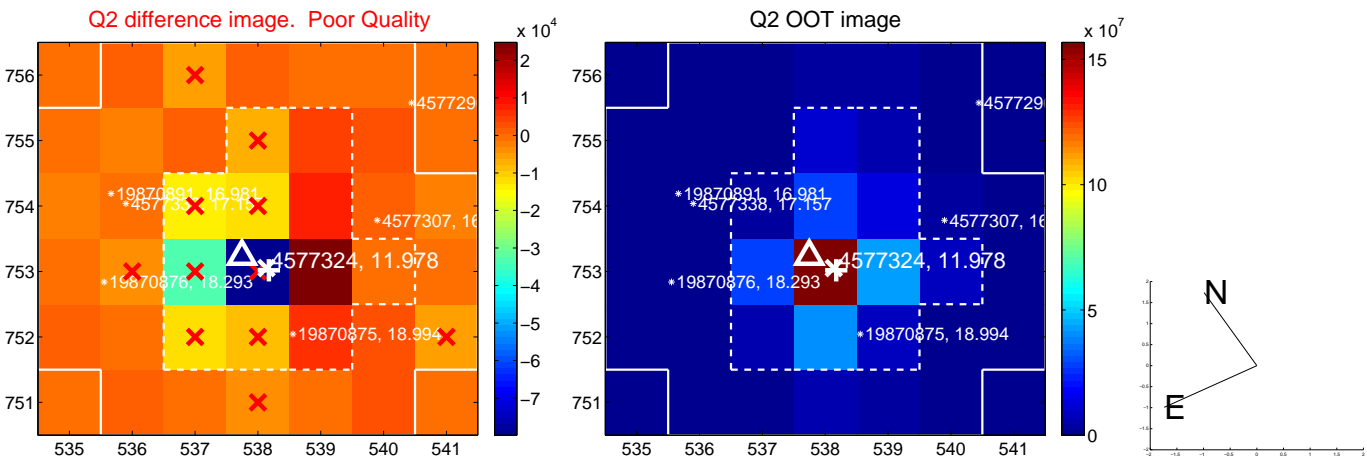
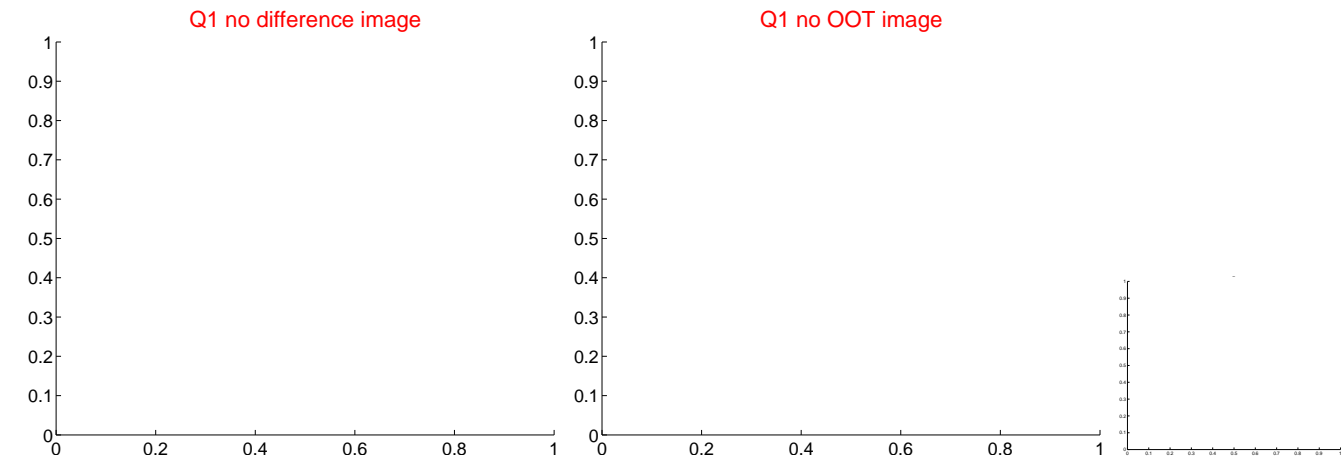
The direct PRF centroid is offset from the target star catalog position by about 0.13 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.775 \pm 0.688$	1.13	$0.774 \pm 0.654$	$-0.043 \pm 0.859$
PRF-fit source offset from KIC position	$0.696 \pm 0.747$	0.93	$0.676 \pm 0.643$	$-0.165 \pm 0.755$
photometric centroid source offset	$0.92 \pm 3.81$	0.24	$-0.69 \pm 3.79$	$0.60 \pm 3.83$



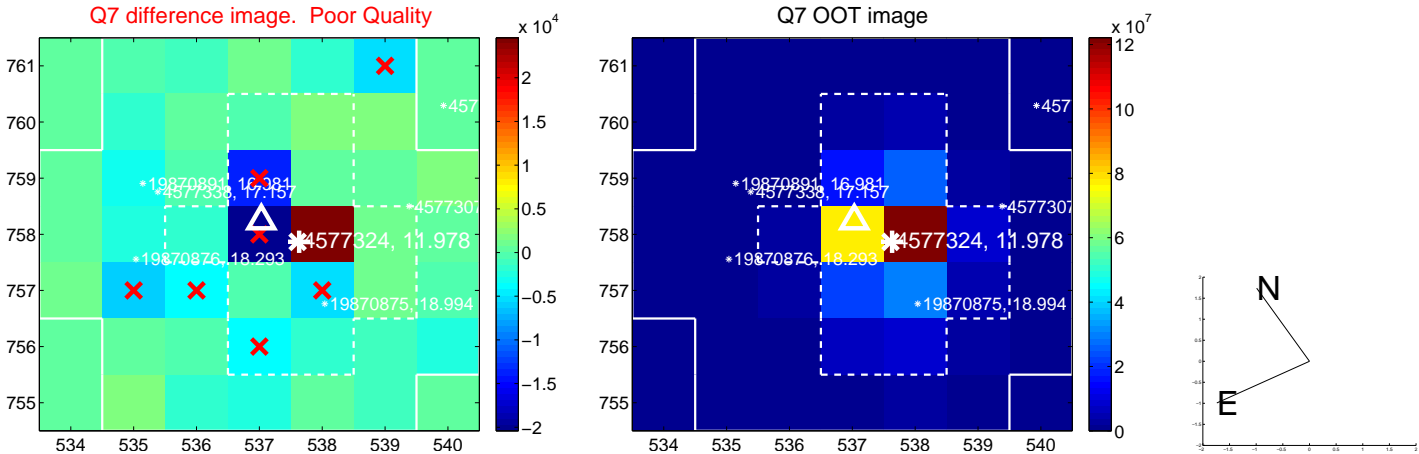
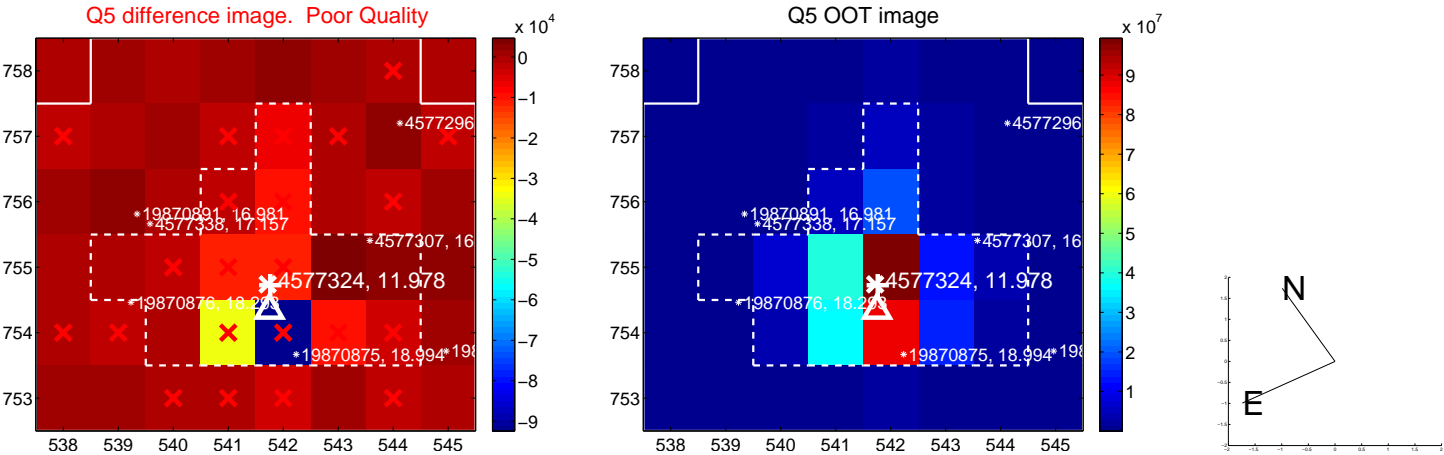
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

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

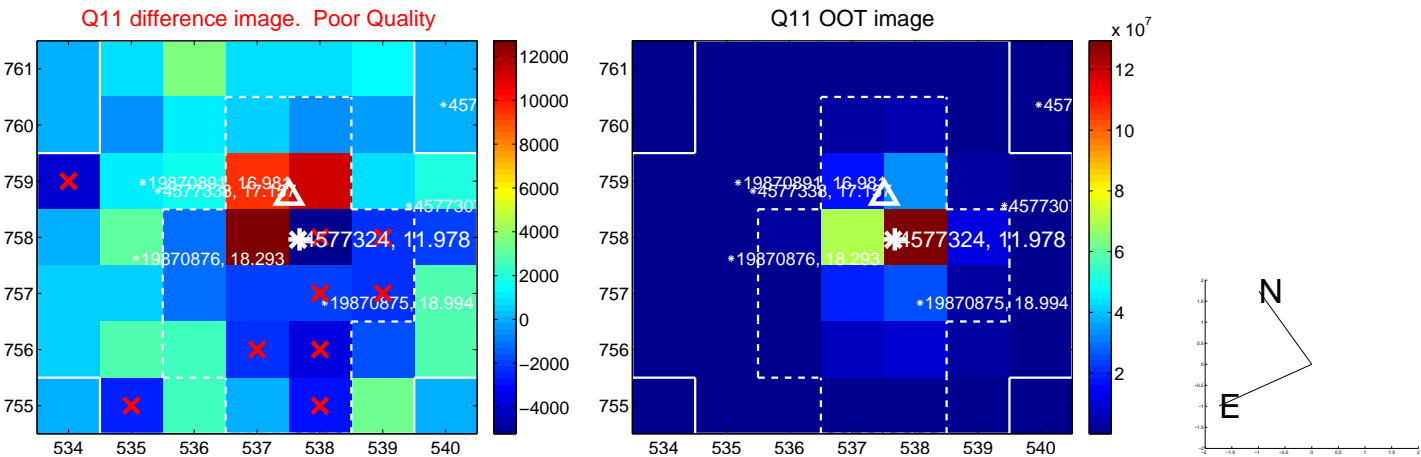
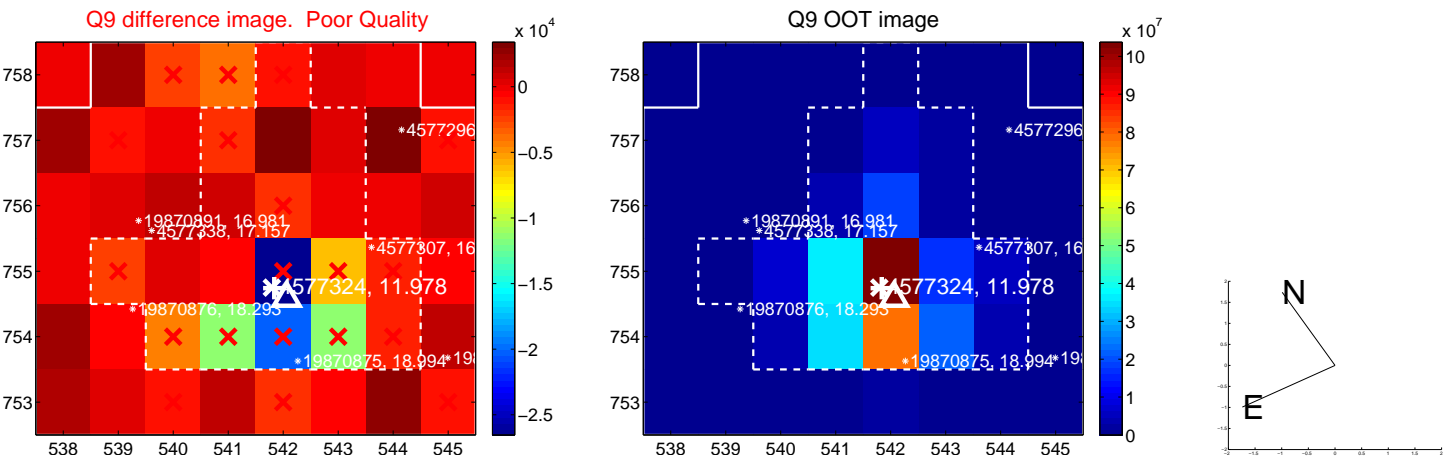




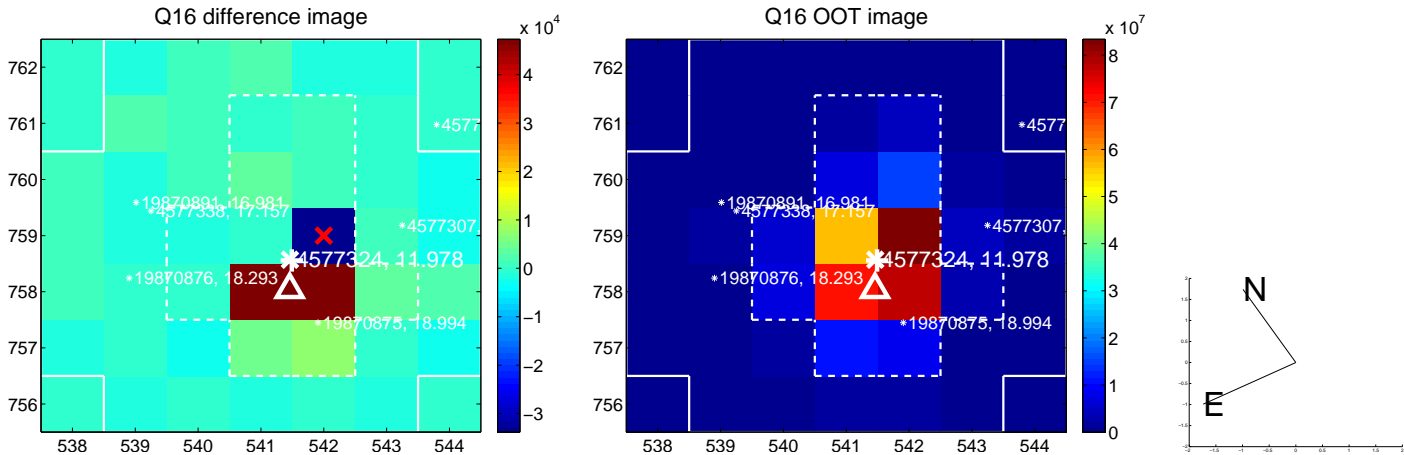
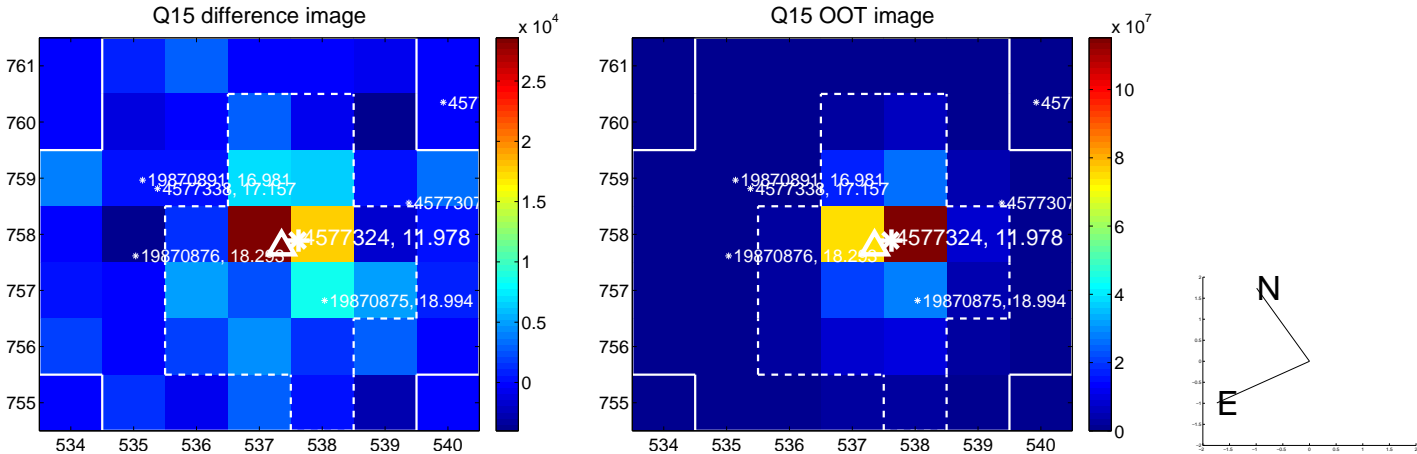
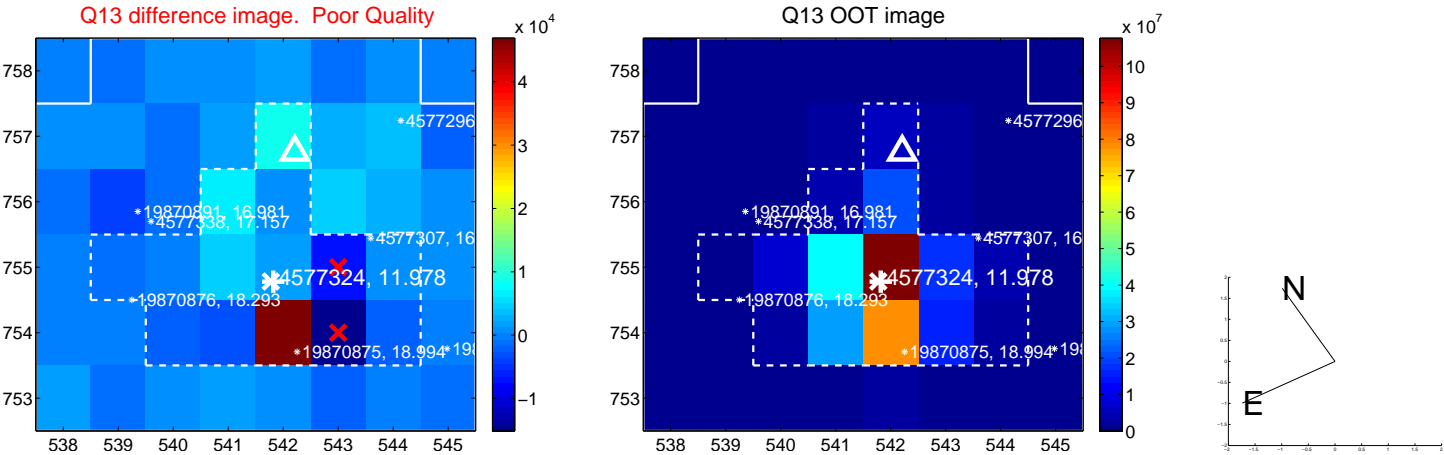
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



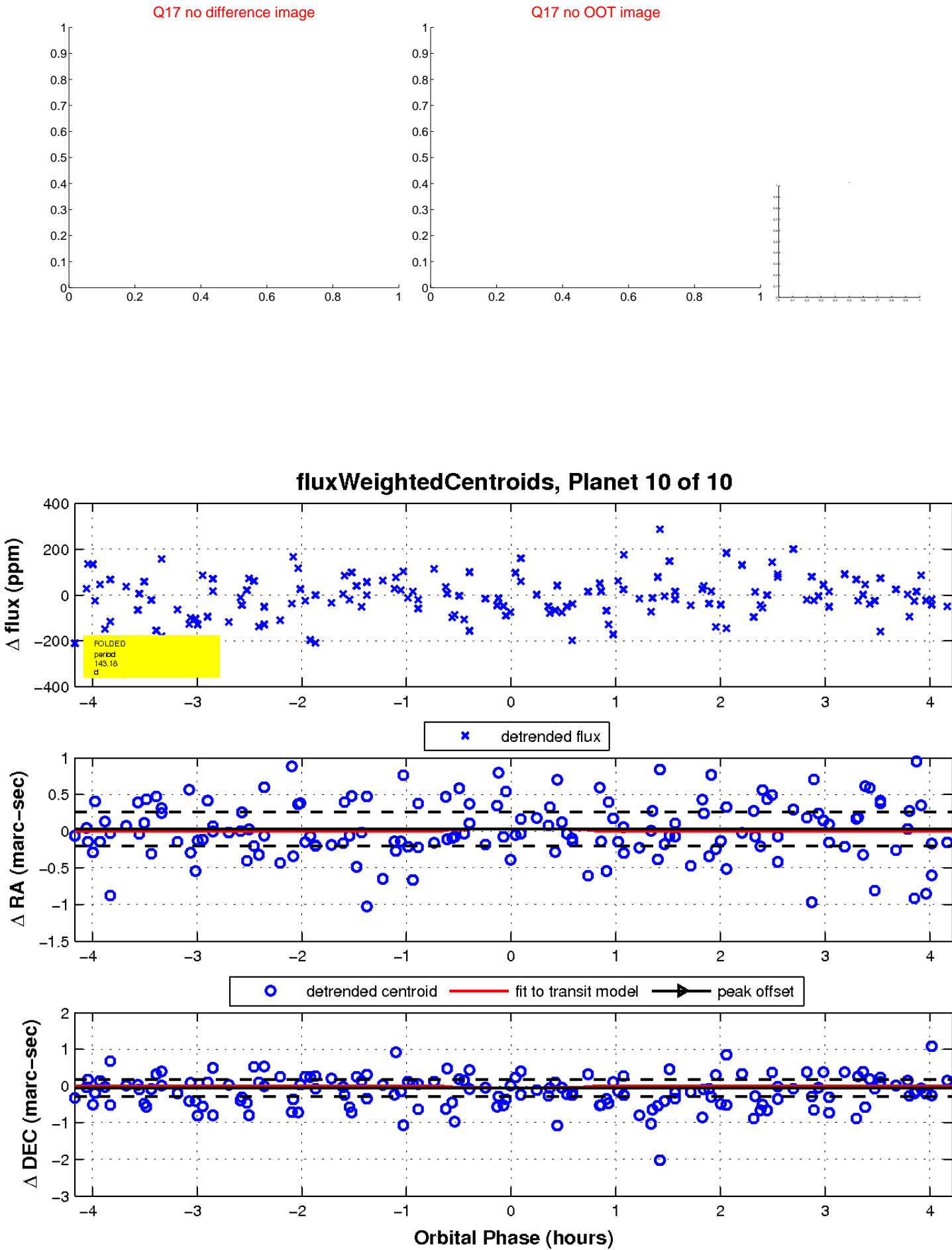
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



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



UKIRT Image

Declination

