

# KIC 002167444

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002167444-01	OBS	6261.01	2.436132	133.461910	183.6	13.847	14.6	2.7	1.78	7239	2.51	4625.06
002167444-02	OBS	No	41.767300	133.051118	9768.1	4.645	17.3	16.9	1.78	7239	22.40	104.62
002167444-03	OBS	No	59.957046	148.015307	8629.5	5.029	16.6	16.0	1.78	7239	24.89	64.61
002167444-04	OBS	No	18.853189	138.257909	6213.5	4.514	13.9	16.2	1.78	7239	23.94	302.14
002167444-05	OBS	No	55.971983	138.453394	7128.2	4.837	13.9	13.2	1.78	7239	26.48	70.81
002167444-06	OBS	No	50.694800	164.270937	6960.6	4.426	13.0	14.1	1.78	7239	19.97	80.80
002167444-07	OBS	No	31.334397	148.069009	5987.4	4.388	12.8	12.3	1.78	7239	24.13	153.47
002167444-09	OBS	No	43.476060	133.067820	6087.2	5.222	12.2	12.2	1.78	7239	17.15	99.17
002167444-10	OBS	No	71.875232	162.459931	4760.8	4.459	11.4	11.0	1.78	7239	19.78	50.73

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002167444-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV
002167444-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-03	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT
002167444-04	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
002167444-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-07	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-10	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

**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.

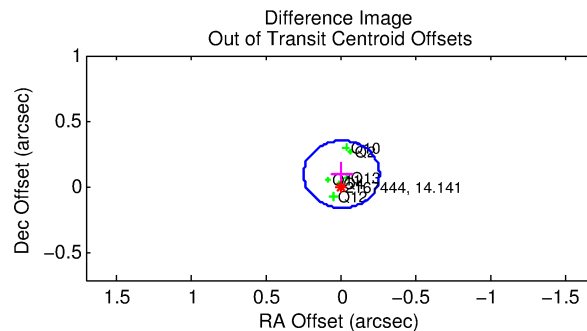
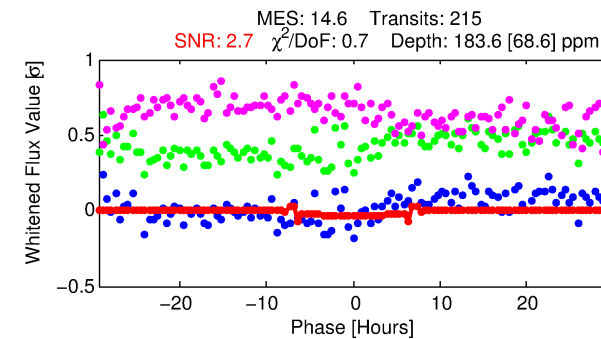
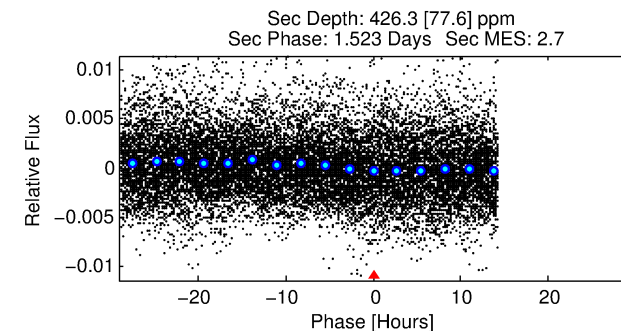
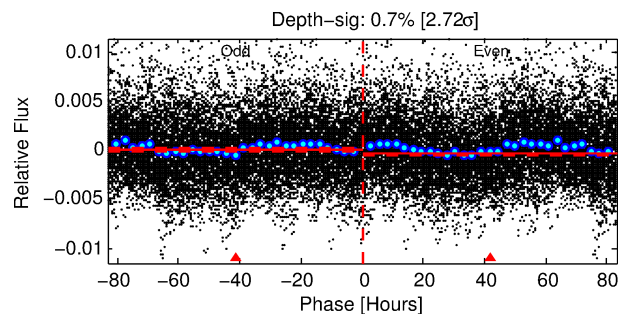
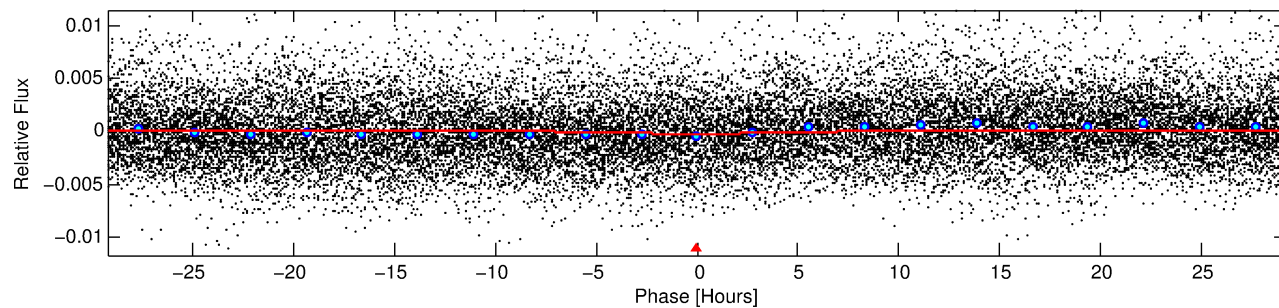
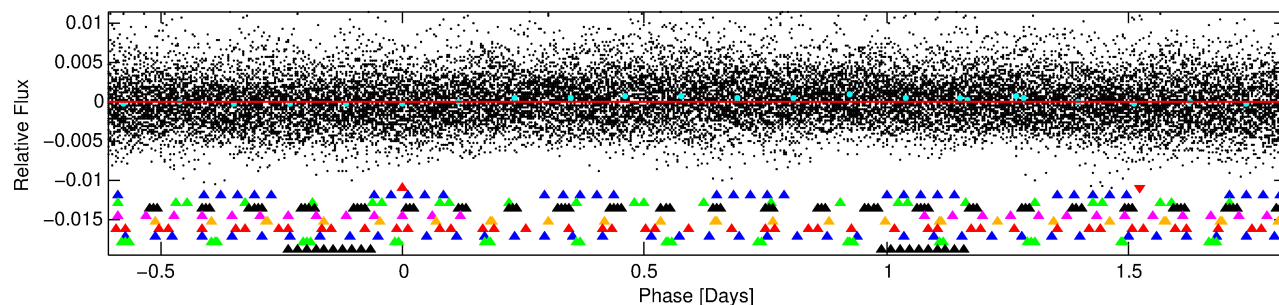
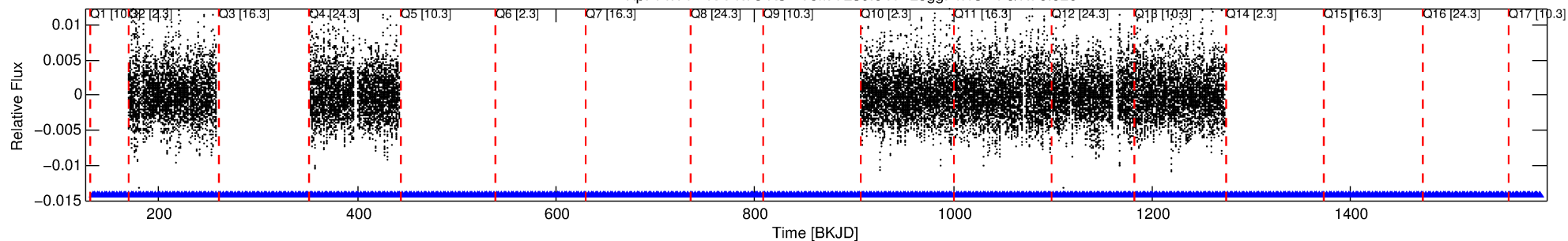
Ephemeris Match Information For 002167444-01

No Significant Match Found

# DV One-Page Summary

KIC: 2167444 Candidate: 1 of 10 Period: 2.436 d  
KOI: K06261.01 Corr: 0.806

Kp: 14.14 R\*: 1.78 Rs Teff: 7239.0 K Logg: 4.13 Fe/H: 0.020



## DV Fit Results:

Period = 2.43613 [0.00004] d  
Epoch = 133.4619 [0.0054] BKJD  
Rp/R\* = 0.0129 [0.0050]  
a/R\* = 1.39 [1.24]  
b = 0.51 [2.67]  
Seff = 4625.06 [1929.19]  
Teq = 2103 [219] K  
Rp = 2.51 [1.26] Re  
a = 0.0411 [0.0106] AU  
Ag = 62.93 [55.34] [1.12σ]  
Teffp = 9157 [1895] K [3.70σ]

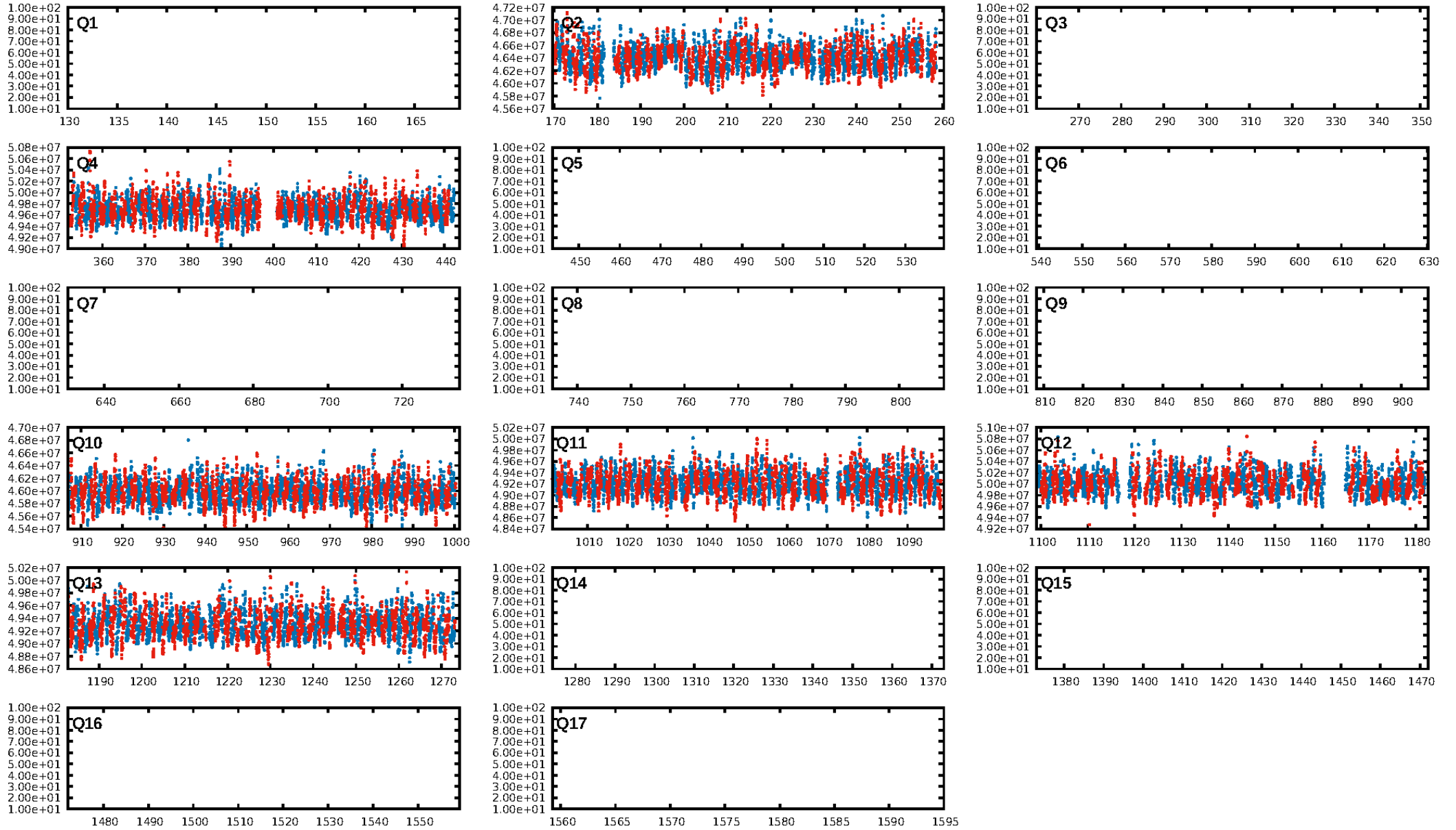
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [27.05σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [215/215]  
GhostDiagnostic-chr: 1.126  
Centroid-sig: 25.1%  
Centroid-so: 0.891 arcsec [2.50σ]  
OotOffset-rm: 0.100 arcsec [1.18σ]  
KicOffset-rm: 0.137 arcsec [1.93σ]  
OotOffset-st: 2/1/2/1 [6]  
KicOffset-st: 2/1/2/1 [6]  
DiffImageQuality-fgm: 1.00 [6/6]  
DiffImageOverlap-fno: 1.00 [6/6]

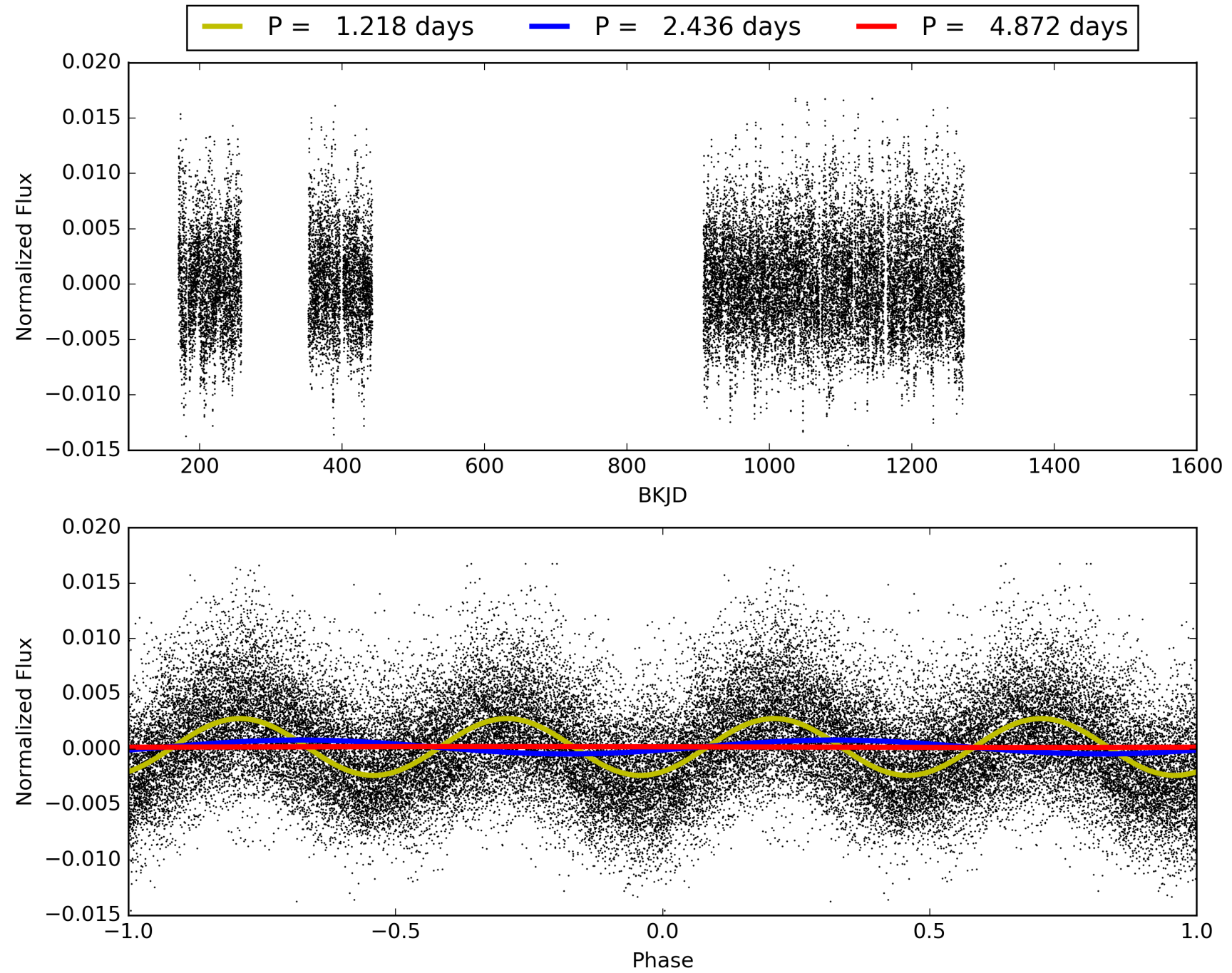
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 03:46:47 Z

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

# TCE 002167444-01, PDC Light Curves



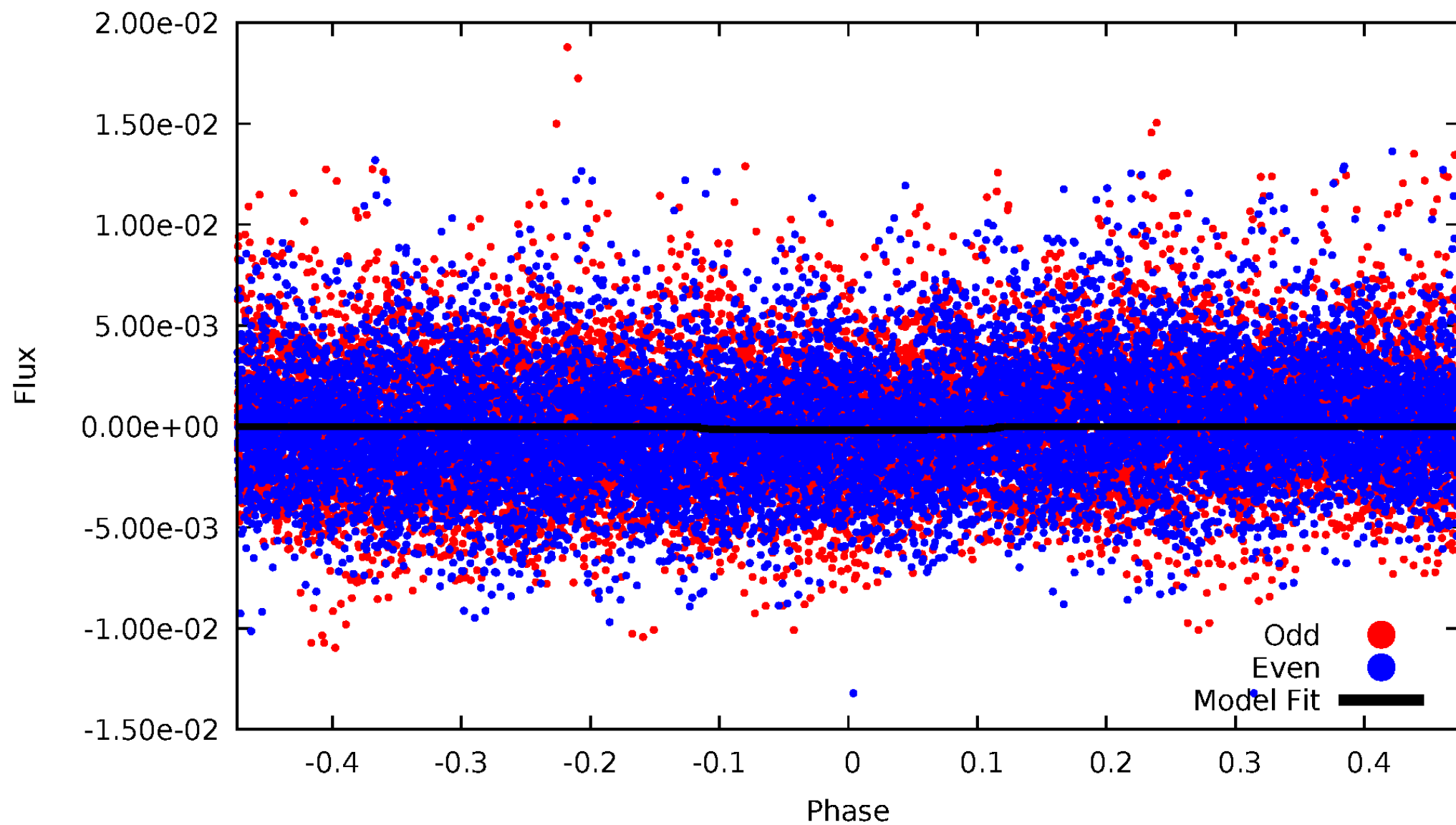
TCE 002167444-01





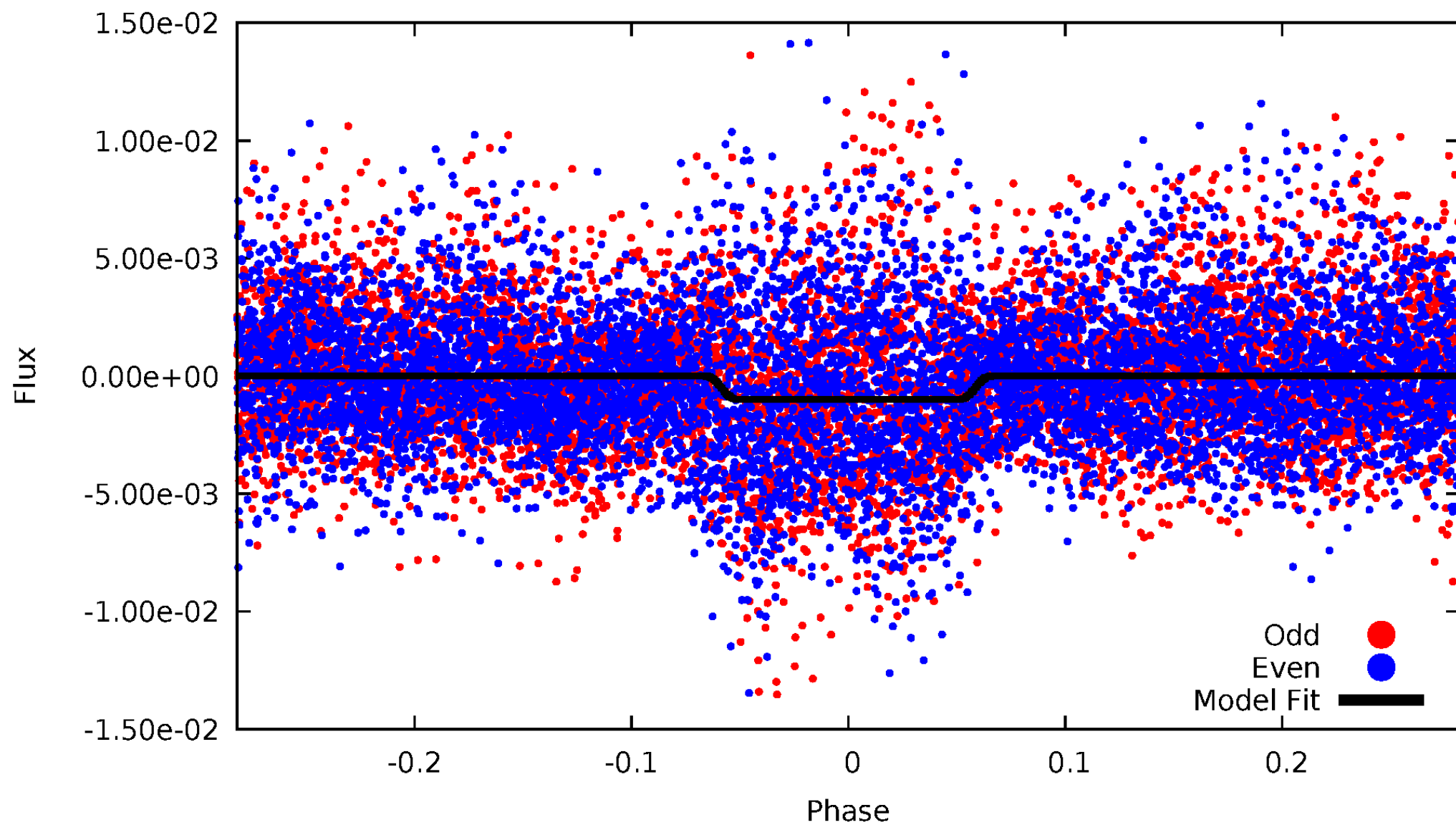
# DV Odd/Even

TCE 002167444-01



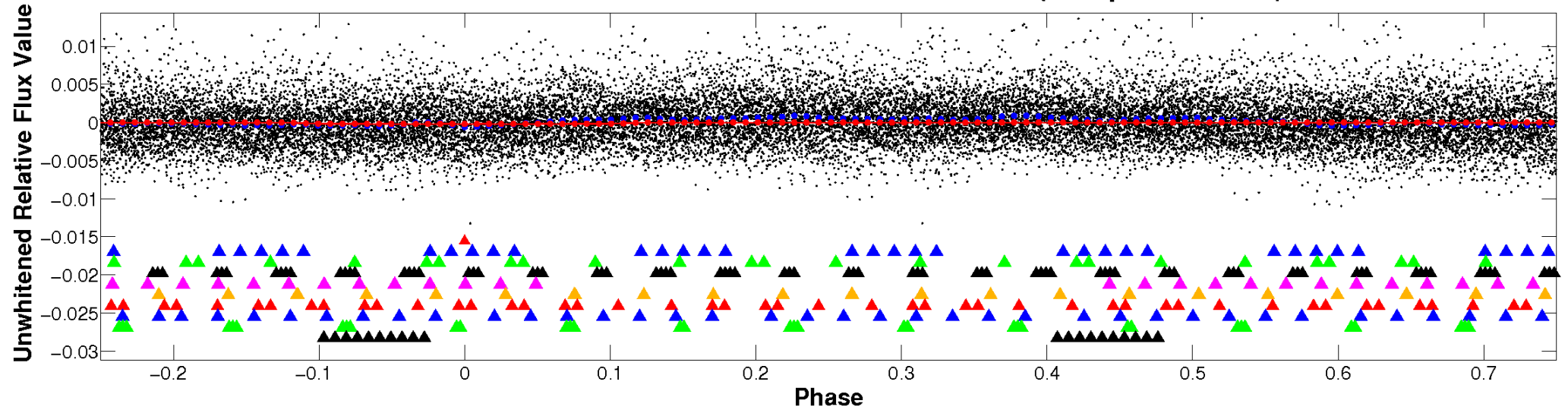
# ALT Odd/Even

TCE 002167444-01

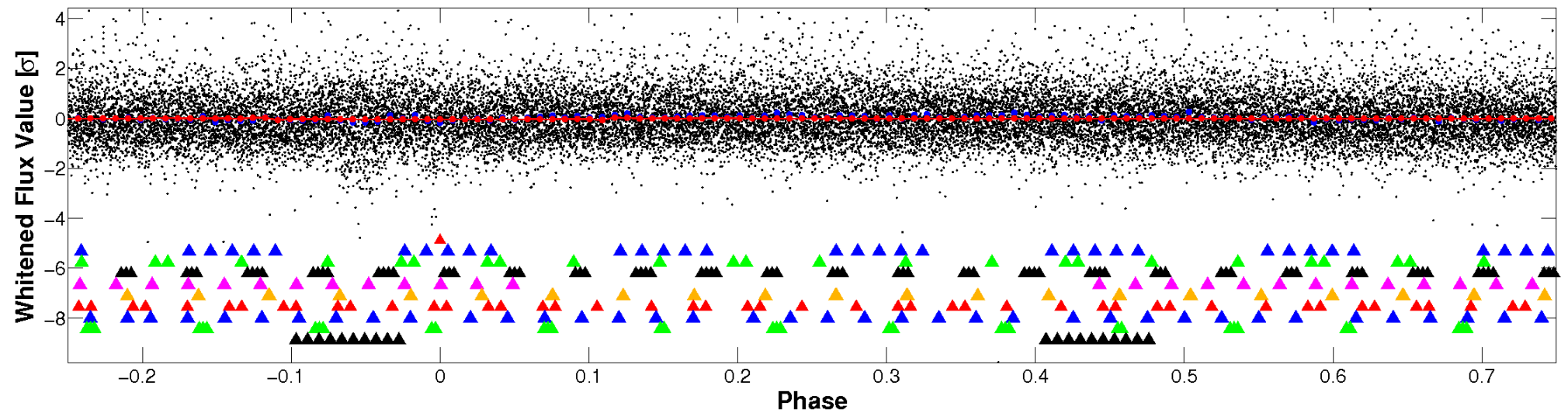


# Non-Whitened Vs. Whitened Light Curve

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

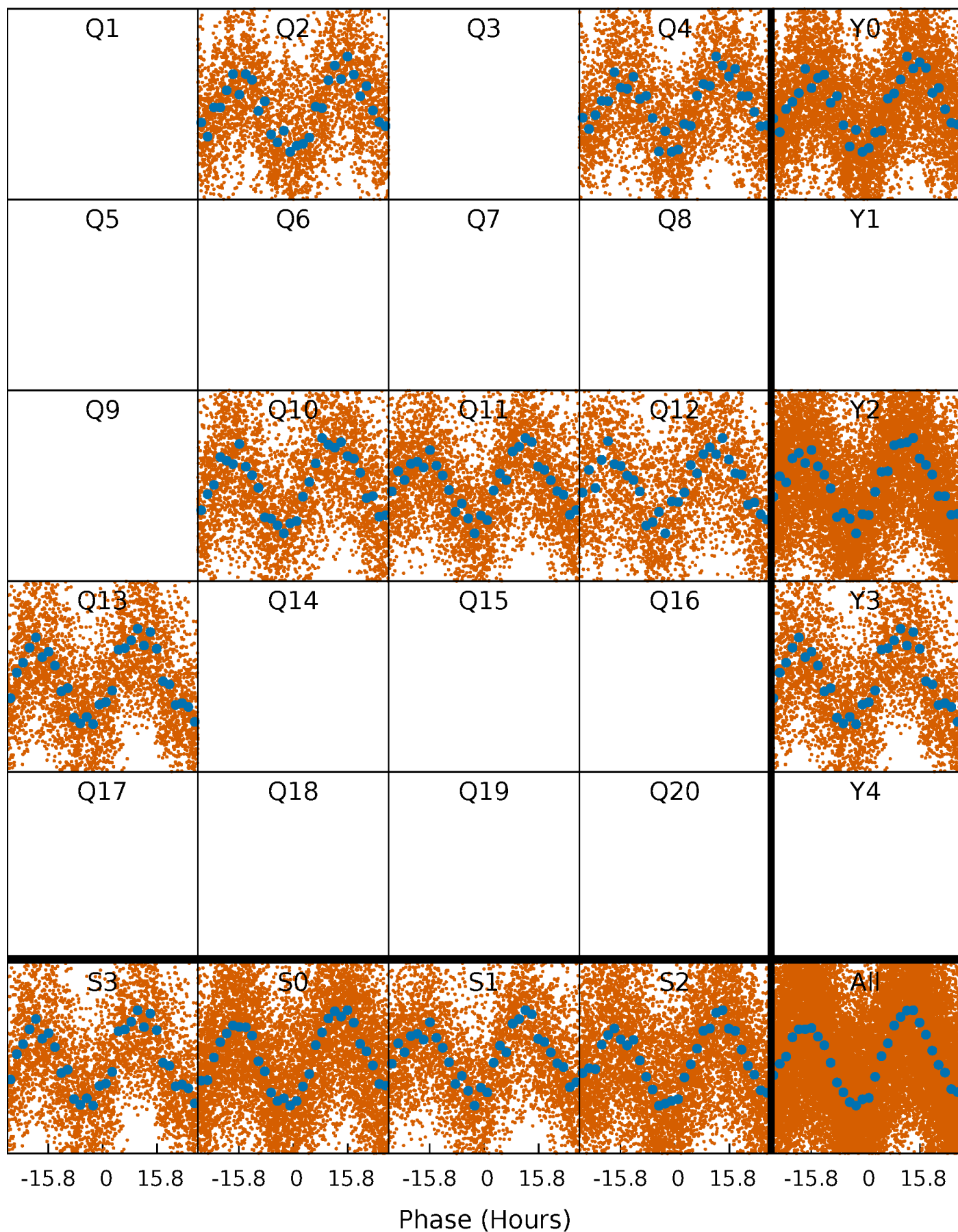


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

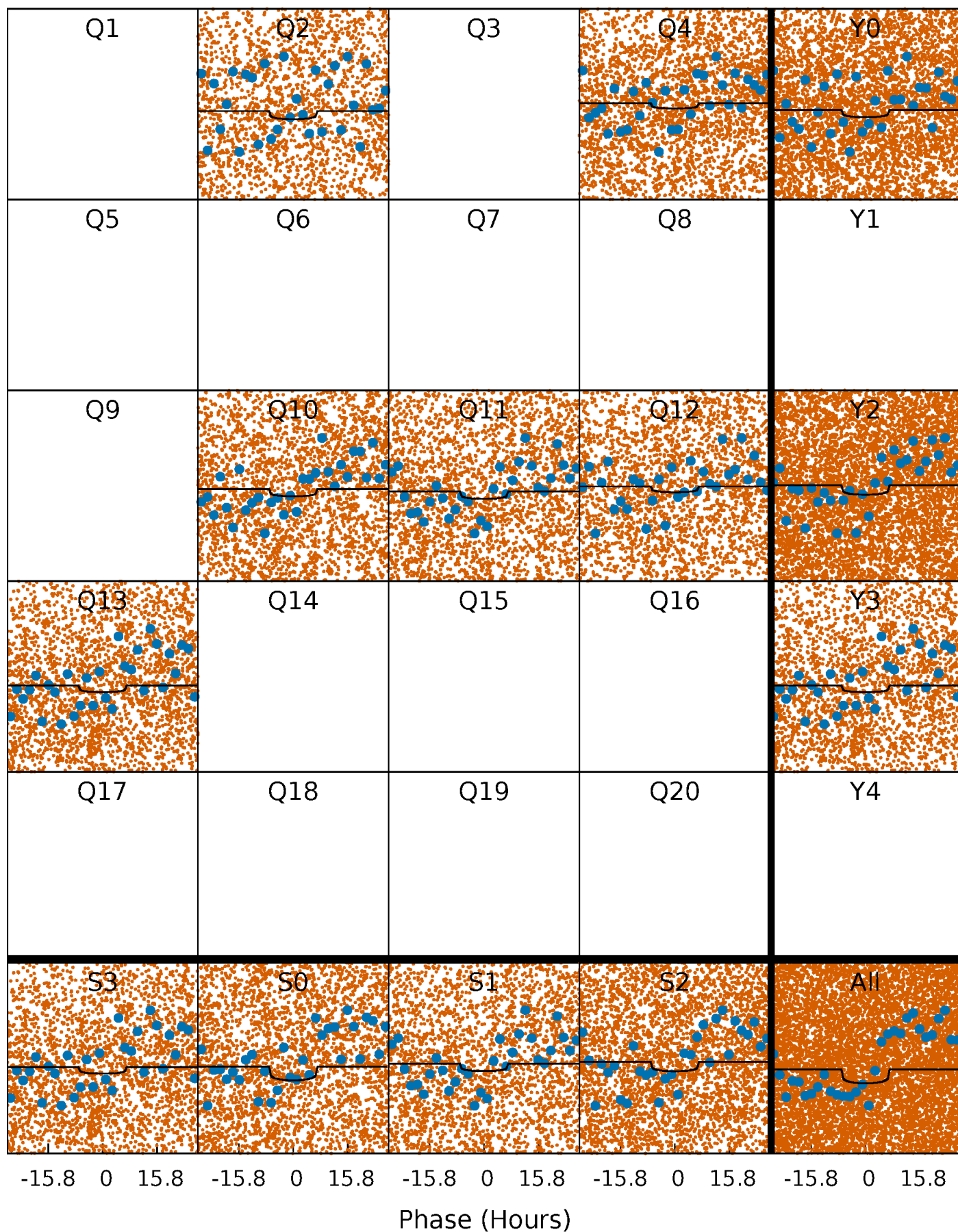
TCE 002167444-01 P= 2.436132 Days  $T_0=133.461910$  (BKJD)





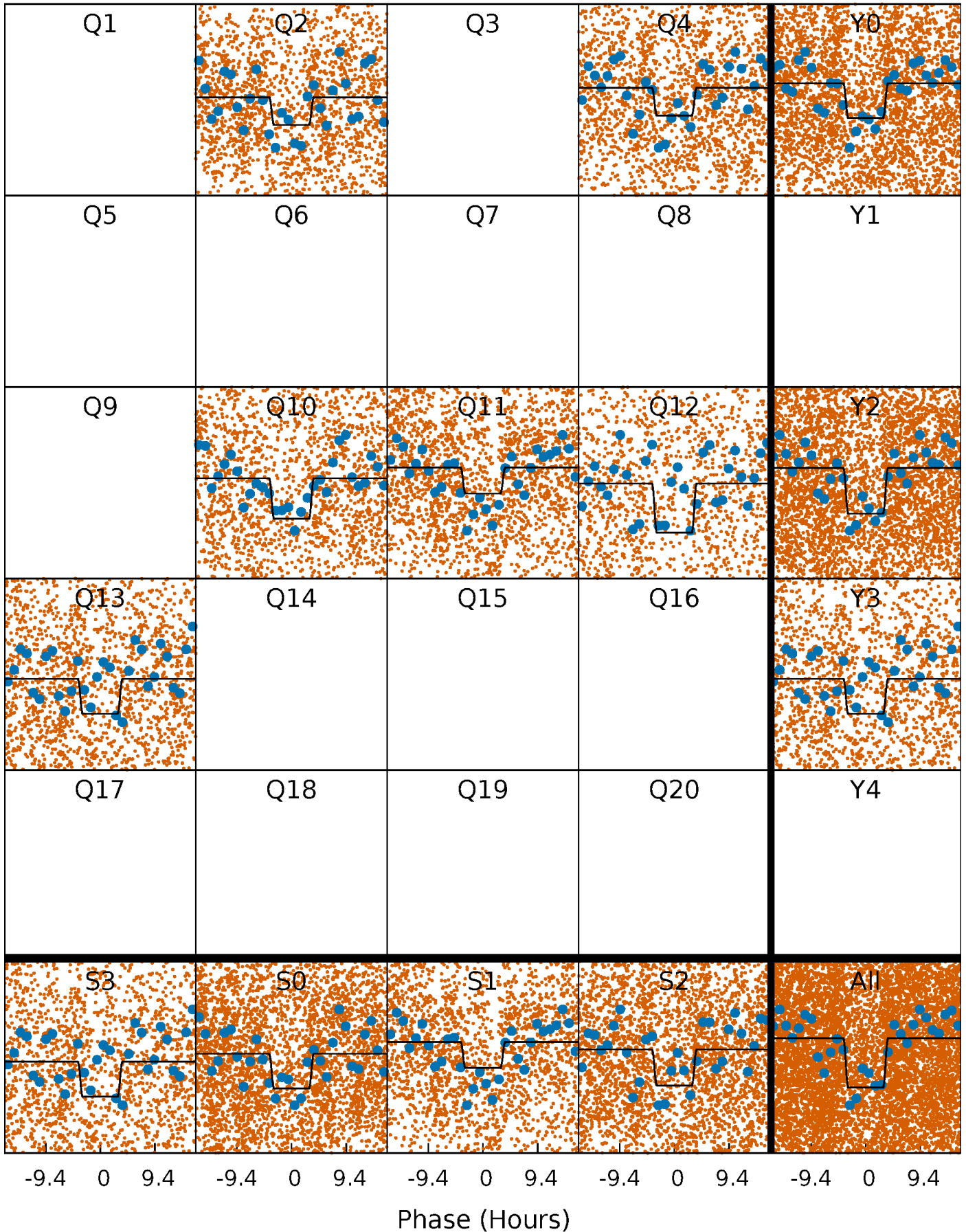
# DV Quarter-Phased Transit Curves

TCE 002167444-01 P= 2.436132 Days  $T_0=133.461910$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

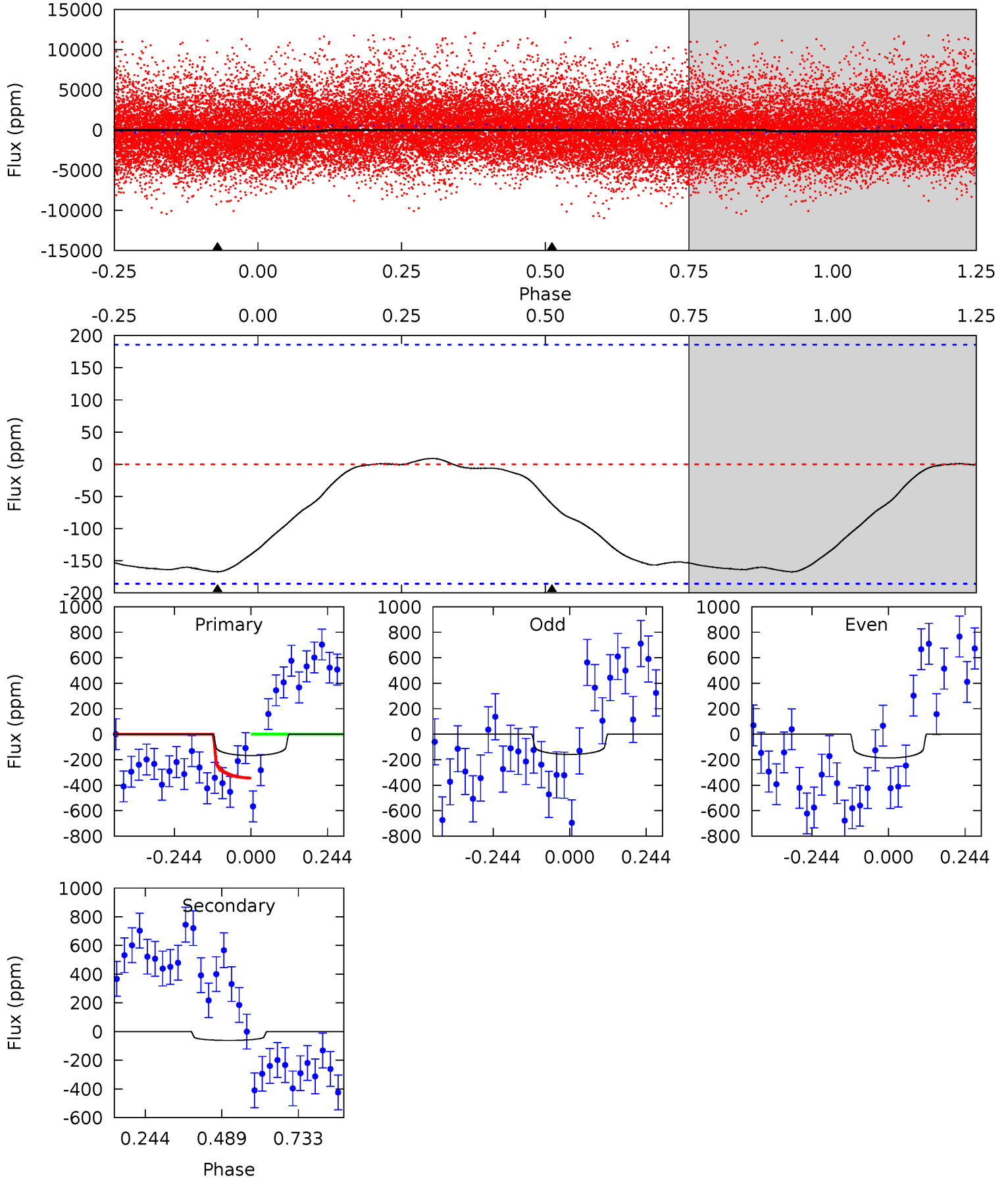
TCE 002167444-01 P= 2.435701 Days  $T_0=133.597466$  (BKJD)



# DV Model-Shift Uniqueness Test

002167444-01, P = 2.436132 Days, E = 133.461910 Days

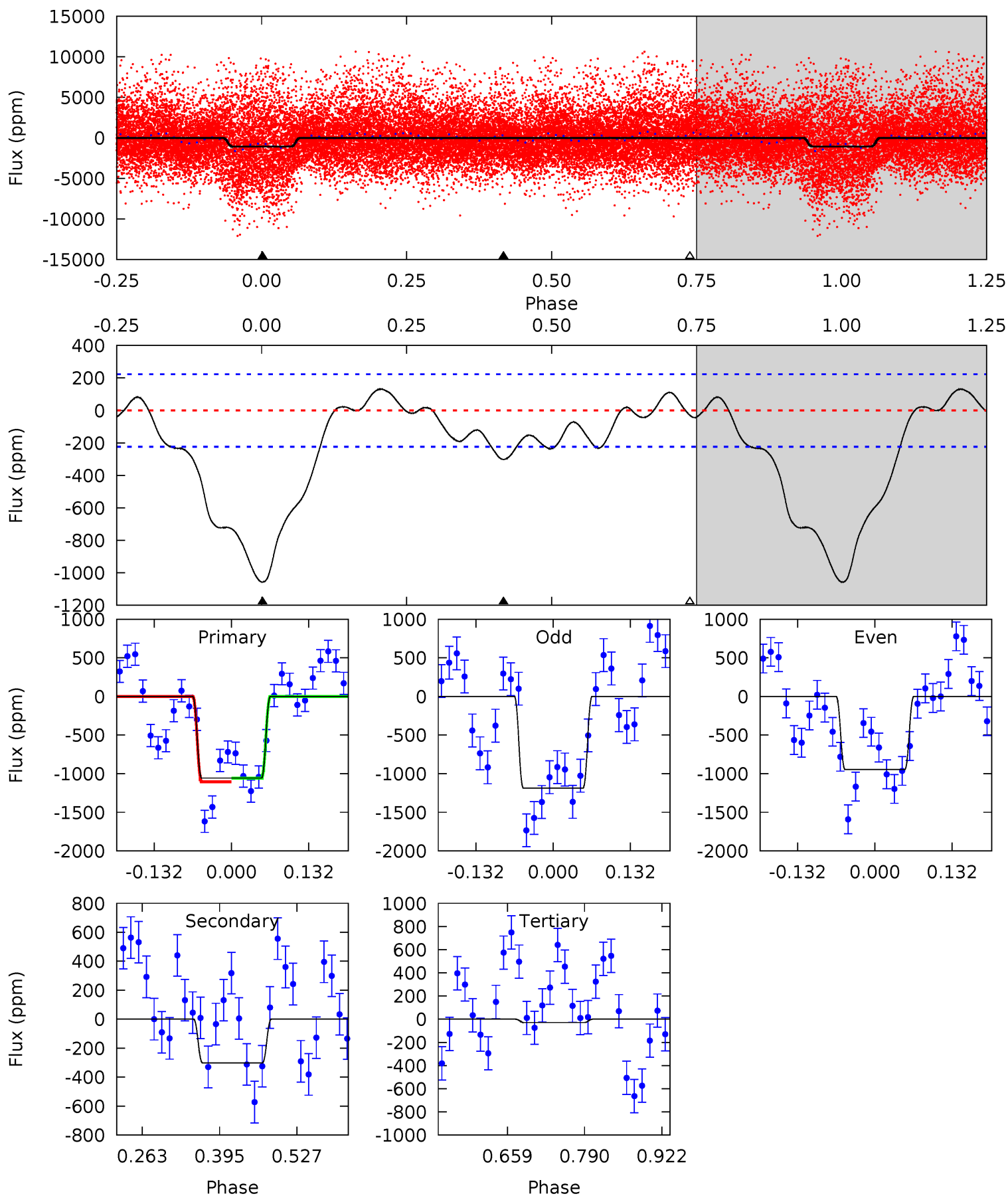
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
3.94	1.45	0	0	4.37	1.16	0.04	3.94	3.94	1.45	1.45	0.34	0.65	0.05	4.36



# Alt Model-Shift Uniqueness Test

002167444-01, P = 2.435701 Days, E = 133.597466 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
21.3	6.09	0.59	0	4.51	1.51	2.12	20.8	21.3	5.51	6.09	2.43	0.95	0.11	0.48





### Stellar Parameters For KIC 002167444

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7239^{+230}_{-374}$	$4.129^{+0.128}_{-0.192}$	$0.020^{+0.200}_{-0.350}$	$1.781^{+0.563}_{-0.375}$	$1.558^{+0.212}_{-0.259}$	$0.388^{+0.254}_{-0.195}$
	+3%/-5%	+3%/-5%	+1000%/-1750%	+32%/-21%	+14%/-17%	+65%/-50%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 002167444-01 / KOI 6261.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-62 \pm 42$	$2.56^{+1.10}_{-1.00}$	$2945^{+245}_{-201}$	$5402^{+1607}_{-1307}$	$7.770^{+14.982}_{-5.562}$
Alt.	$-302 \pm 50$	$6.29^{+1.39}_{-1.25}$	$2959^{+261}_{-211}$	$5270^{+557}_{-469}$	$6.842^{+4.068}_{-2.352}$

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

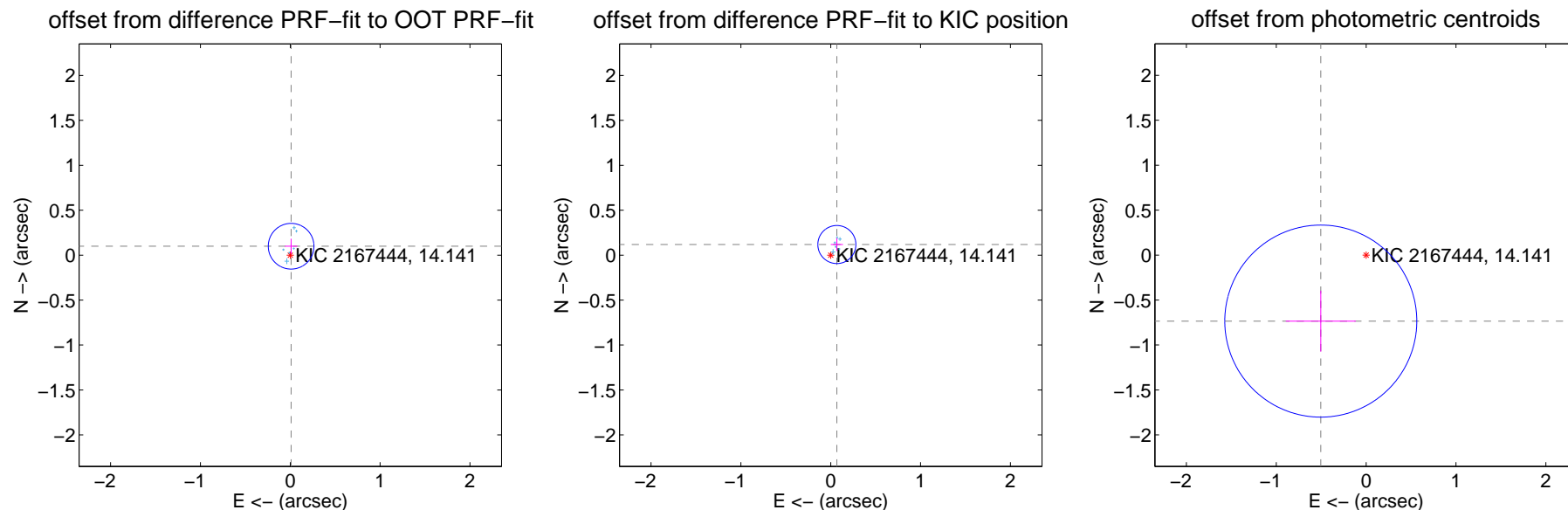
## DV Centroid Data

Supplemental centroid analysis for 002167444-01. Kepler magnitude: 14.14. Transit SNR 2.74

There are 6 quarters with good PRF difference image offsets

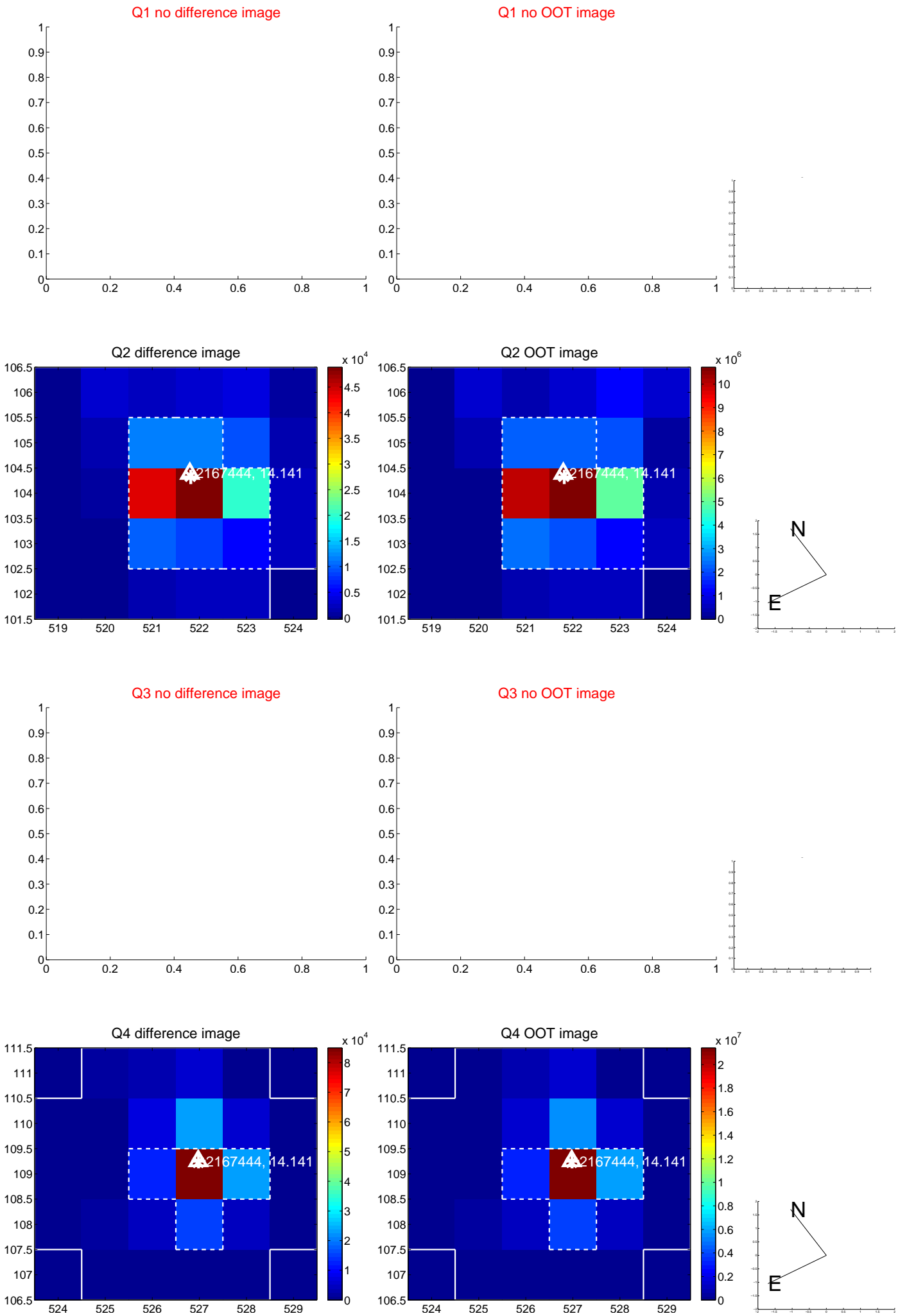
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.100 \pm 0.085$	1.18	$-0.010 \pm 0.069$	$0.099 \pm 0.084$
PRF-fit source offset from KIC position	$0.137 \pm 0.071$	1.93	$-0.068 \pm 0.068$	$0.118 \pm 0.072$
photometric centroid source offset	$0.89 \pm 0.36$	2.50	$0.50 \pm 0.39$	$-0.73 \pm 0.34$



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.

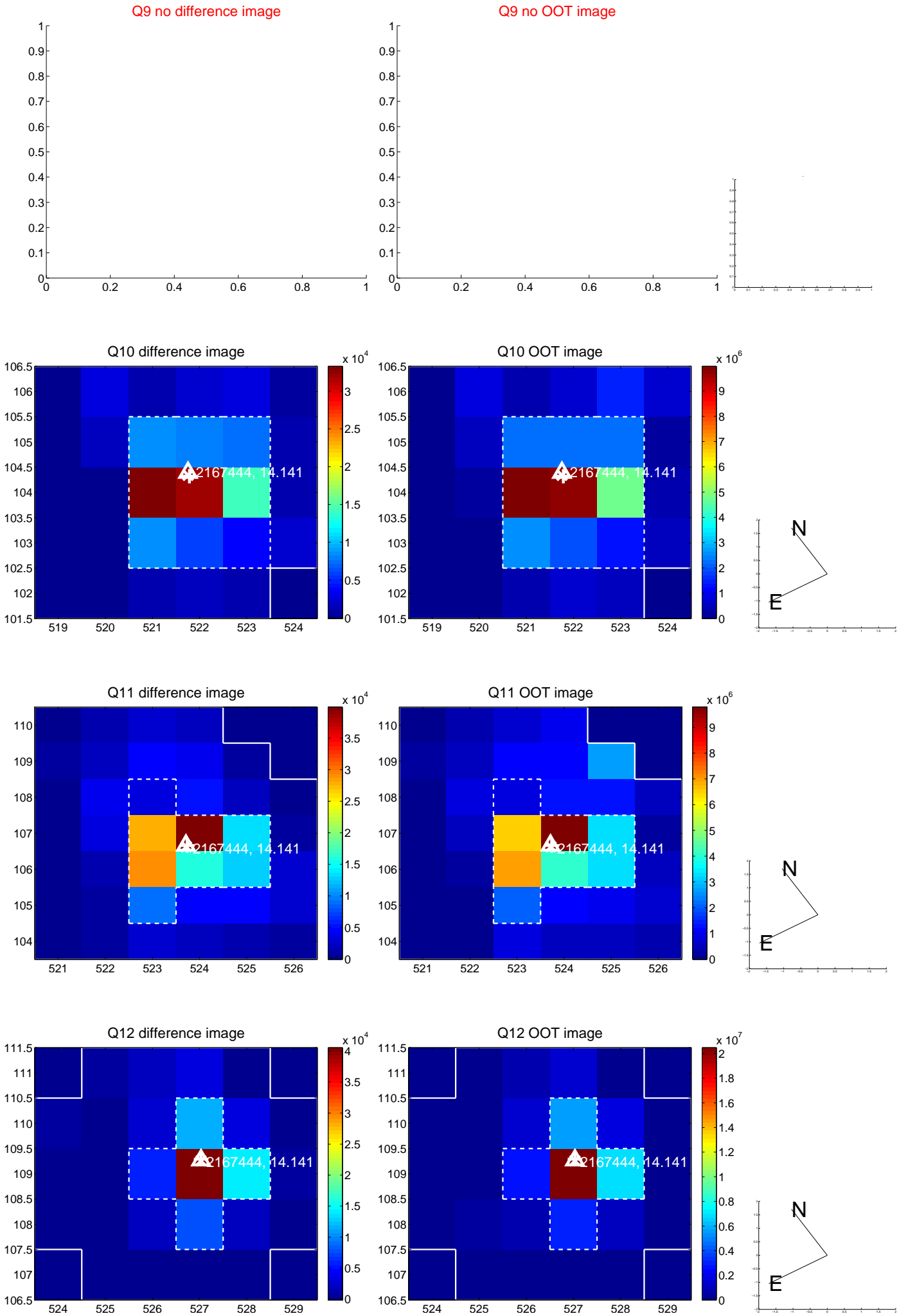


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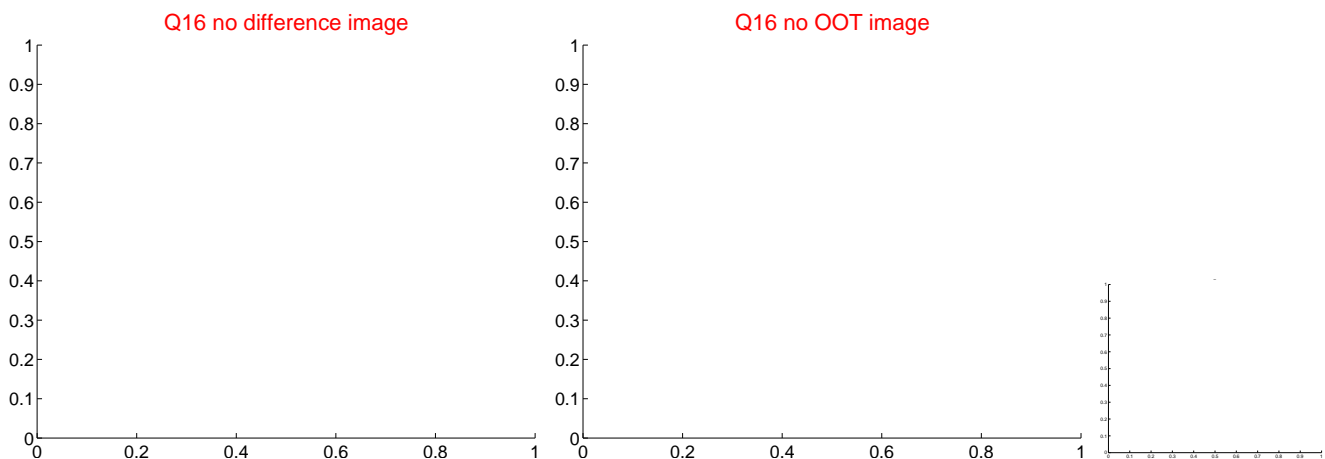
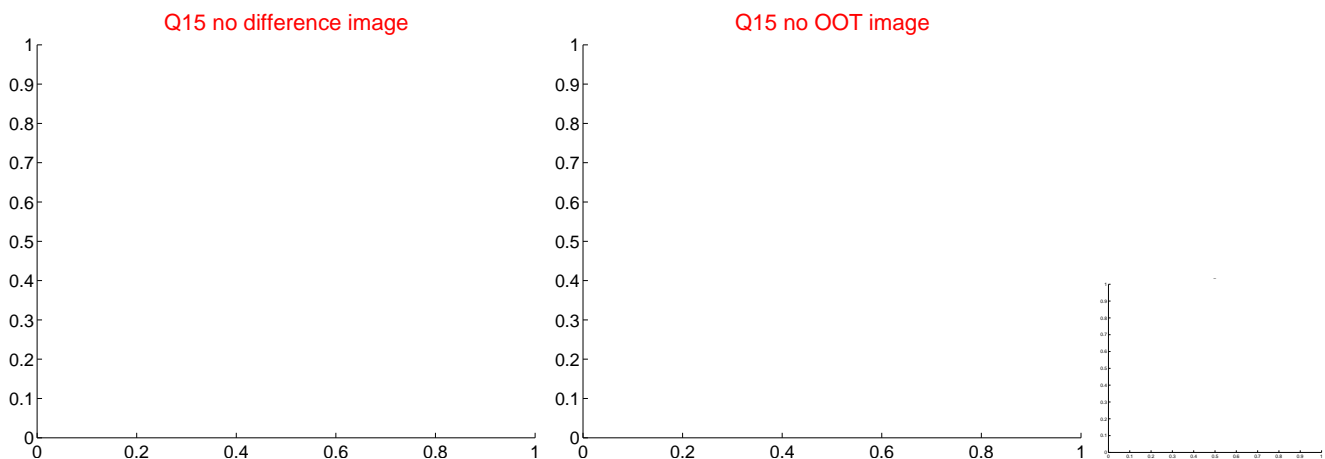
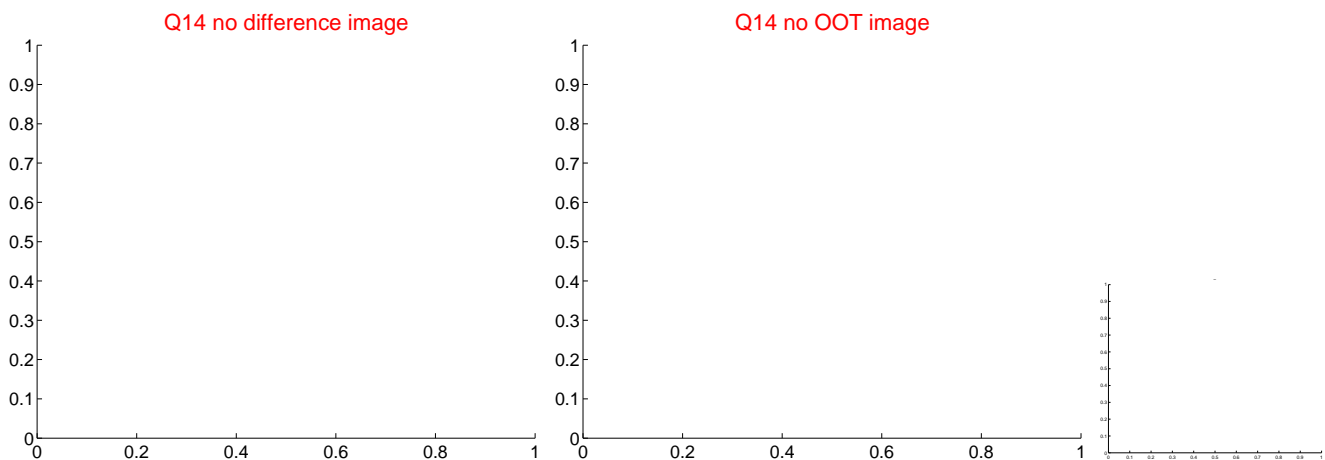
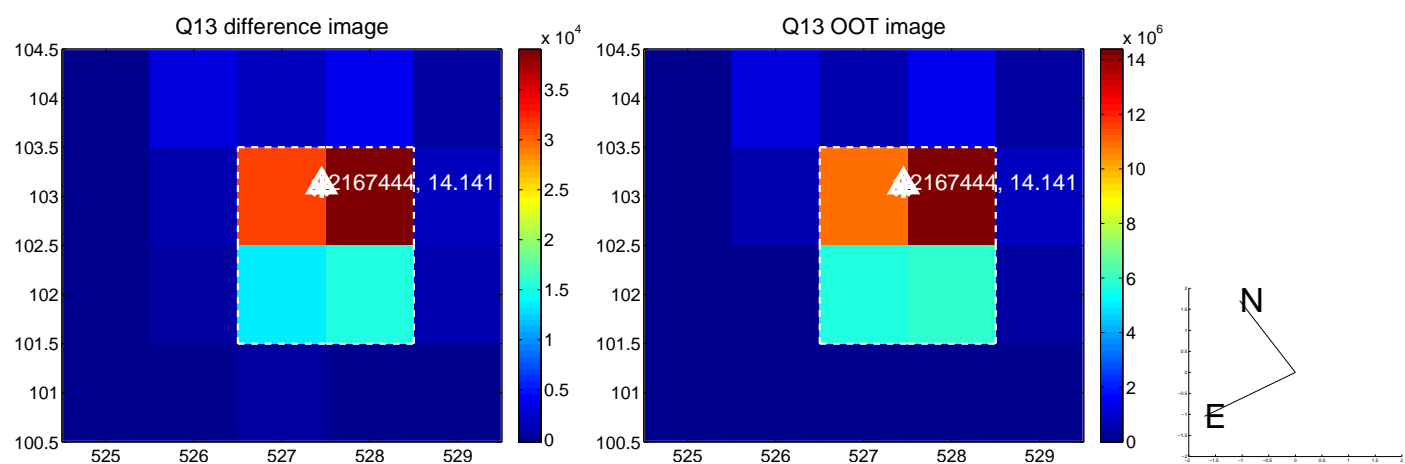




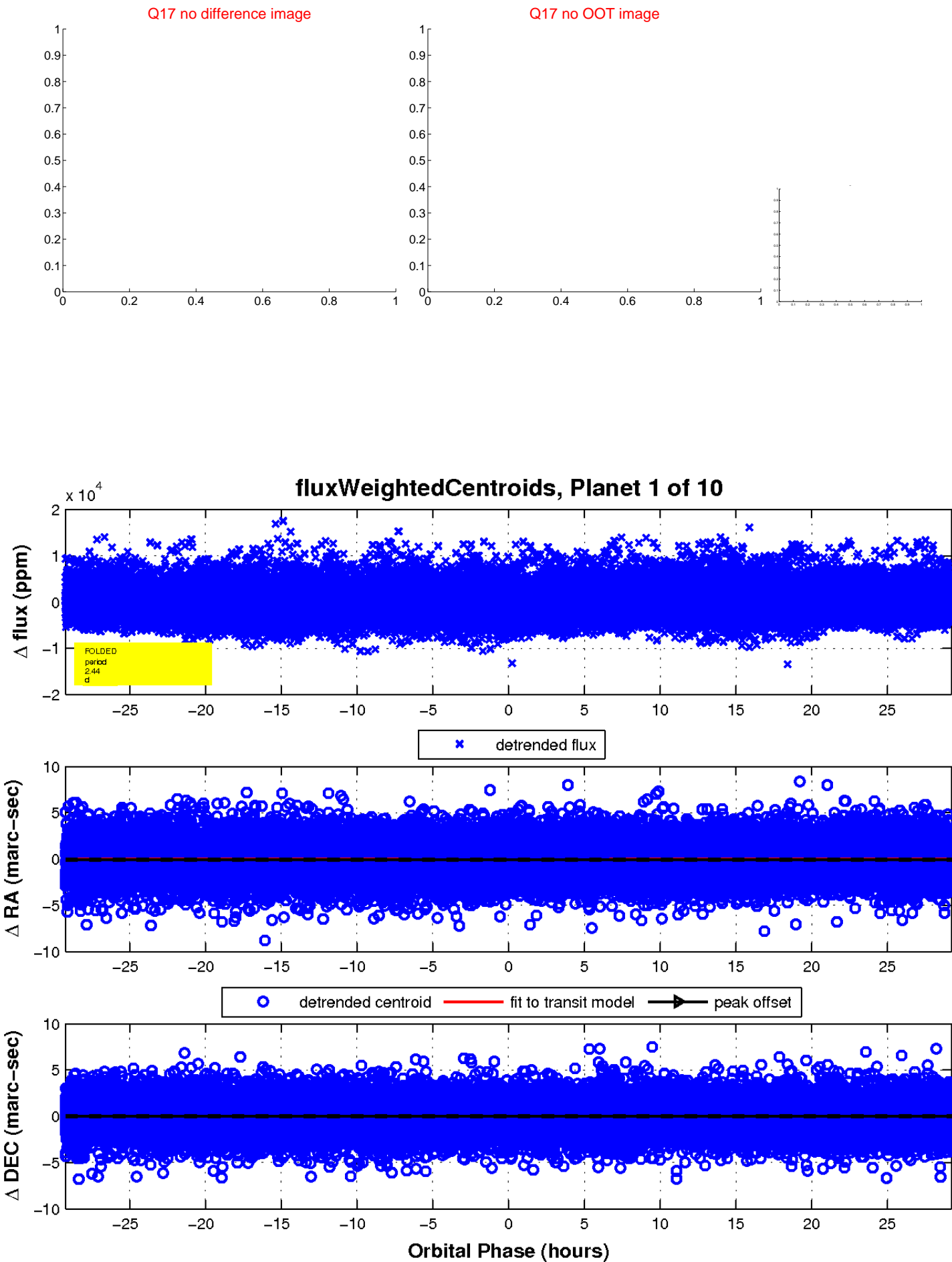
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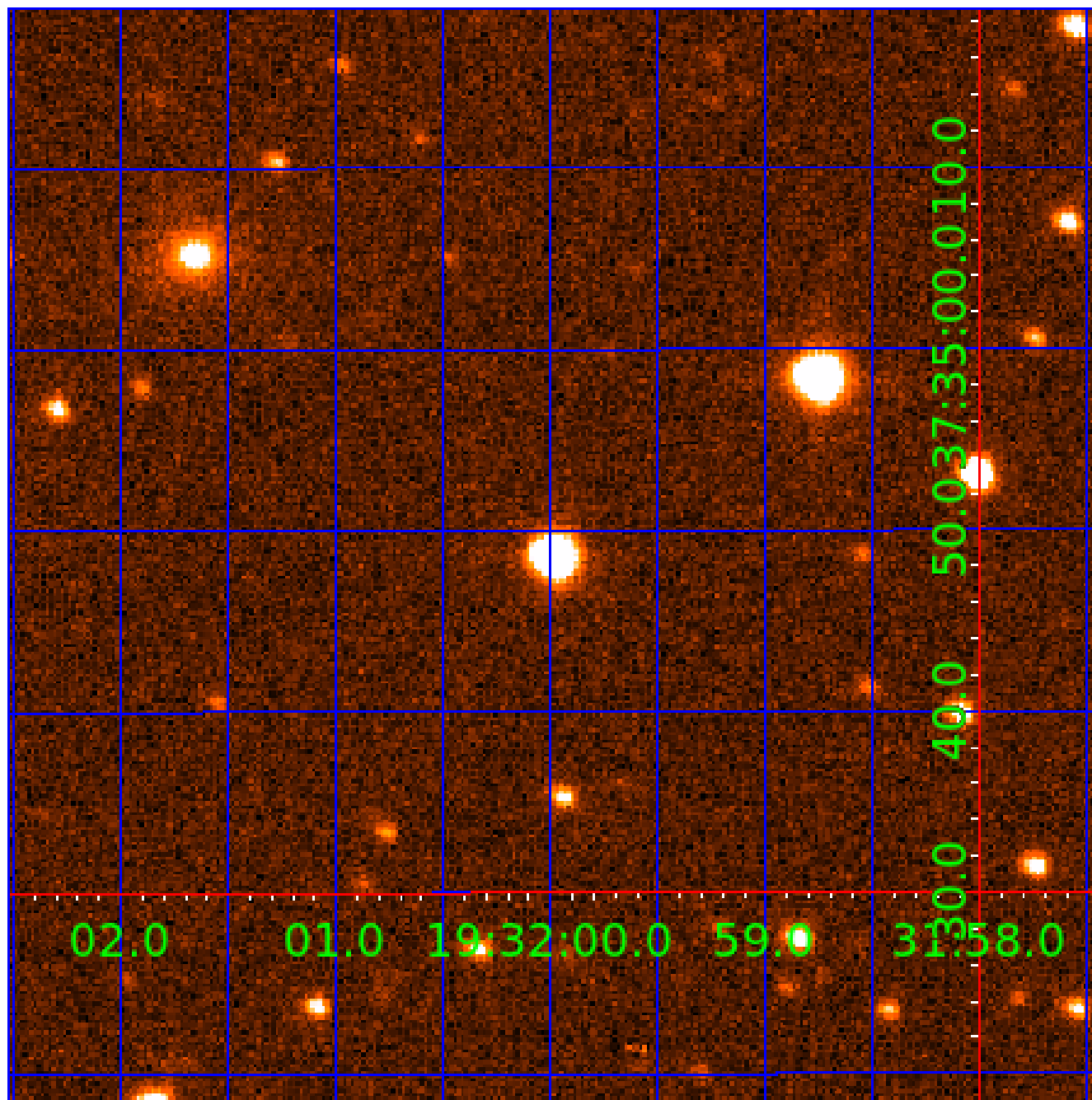


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UKIRT Image

Declination





# KIC 002167444

## Q1-17 DR25 TCE Parameters

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002167444-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-03	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT
002167444-04	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
002167444-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-07	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-10	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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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 002167444-02

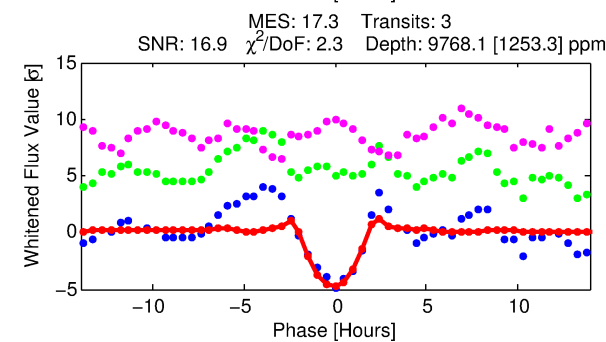
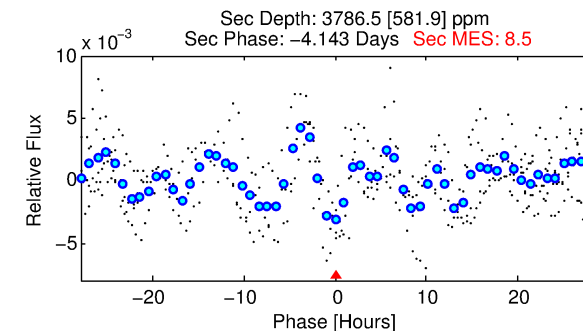
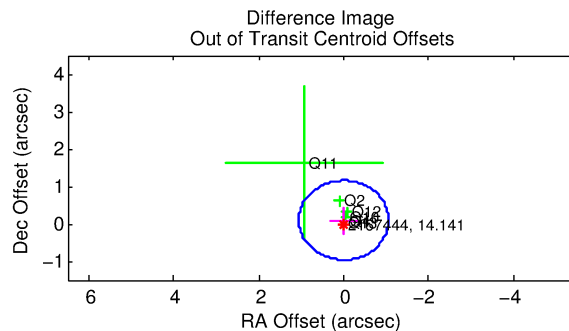
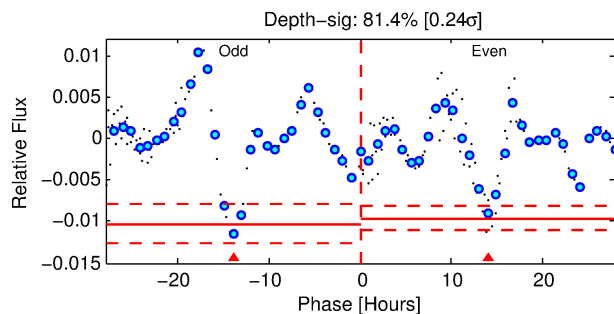
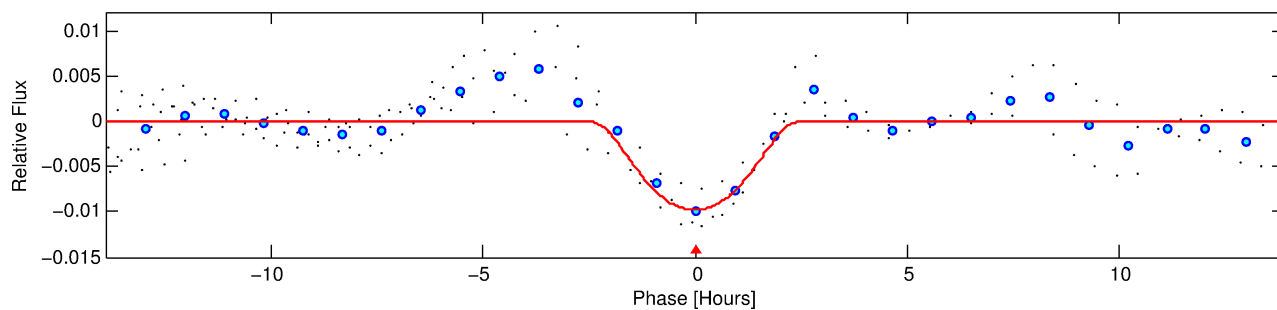
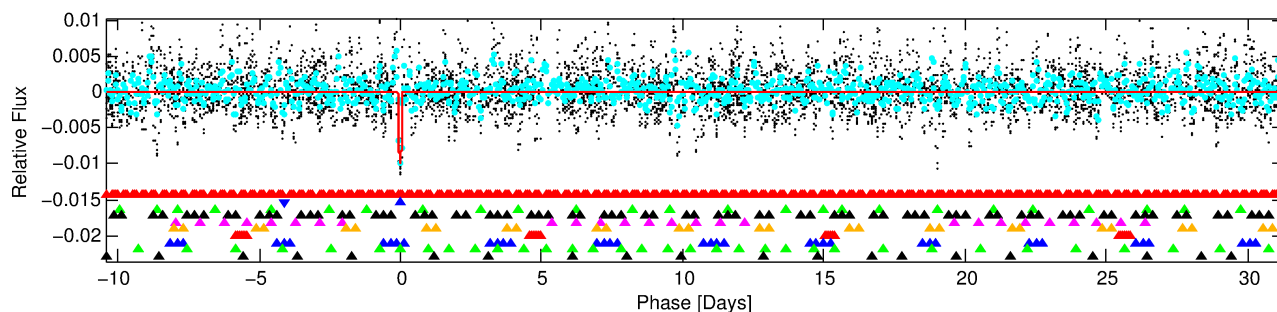
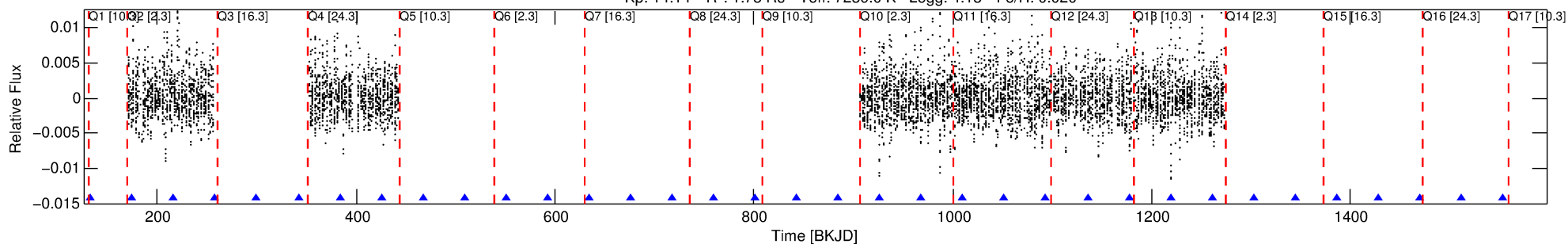
No Significant Match Found

# DV One-Page Summary

KIC: 2167444 Candidate: 2 of 10 Period: 41.767 d

KOI: K06261 Corr: No Ephemeris Match

Kp: 14.14 R\*: 1.78 Rs Teff: 7239.0 K Logg: 4.13 Fe/H: 0.020



## DV Fit Results:

Period = 41.76730 [0.00148] d  
Epoch = 133.0511 [0.0345] BKJD  
Rp/R\* = 0.1153 [0.0531]  
a/R\* = 42.82 [8.37]  
b = 0.92 [0.12]  
Seff = 104.62 [43.64]  
Teq = 816 [85] K  
**Rp = 22.40 [12.51] Re**  
**a = 0.2731 [0.0702] AU**  
Ag = 309.74 [310.26] [1.00σ]  
**Teff = 5290 [1265] K [3.53σ]**

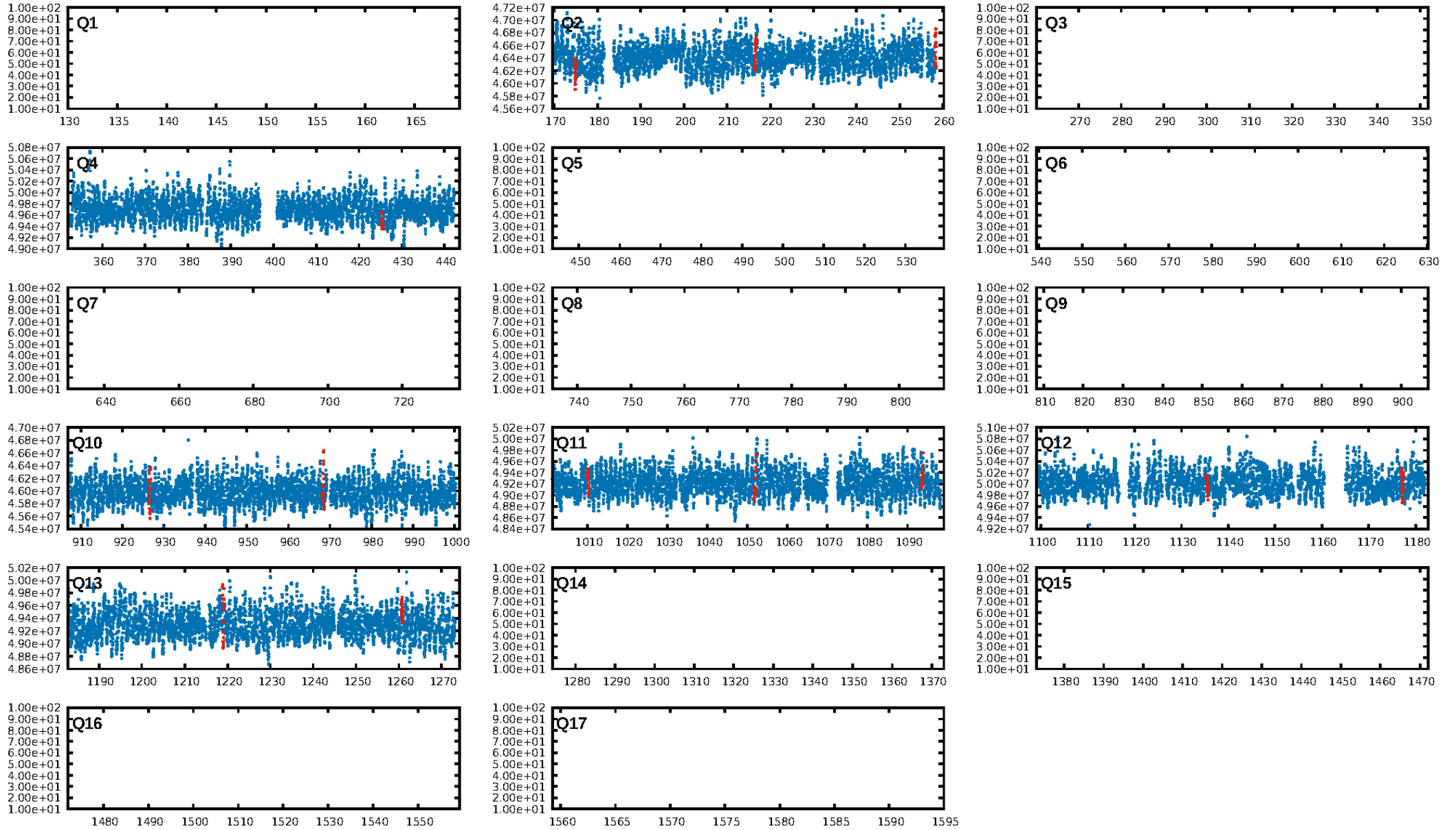
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [12.33σ]  
LongPeriod-sig: 100.0% [5.87σ]  
ModelChiSquare2-sig: 2.5%  
ModelChiSquareGof-sig: 38.5%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -9.488  
Centroid-sig: 49.4%  
**Centroid-so: 0.794 arcsec [13.92σ]**  
OotOffset-rm: 0.096 arcsec [0.27σ]  
KicOffset-rm: 0.331 arcsec [0.94σ]  
OotOffset-st: 2/1/2/1 [6]  
KicOffset-st: 2/1/2/1 [6]  
DiffImageQuality-fgm: 0.83 [5/6]  
DiffImageOverlap-fno: 0.33 [2/6]

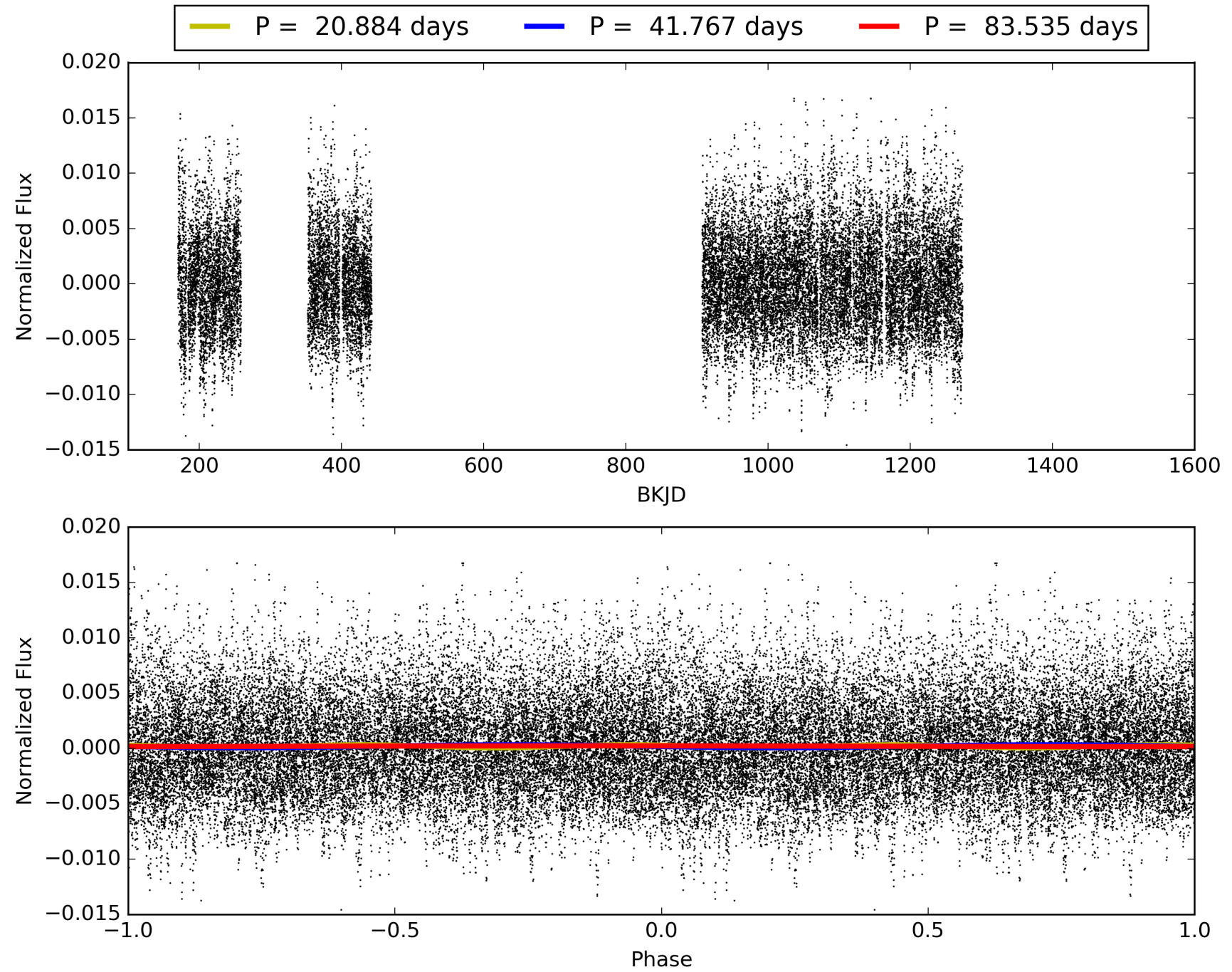
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 03:46:53 Z

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

# TCE 002167444-02, PDC Light Curves

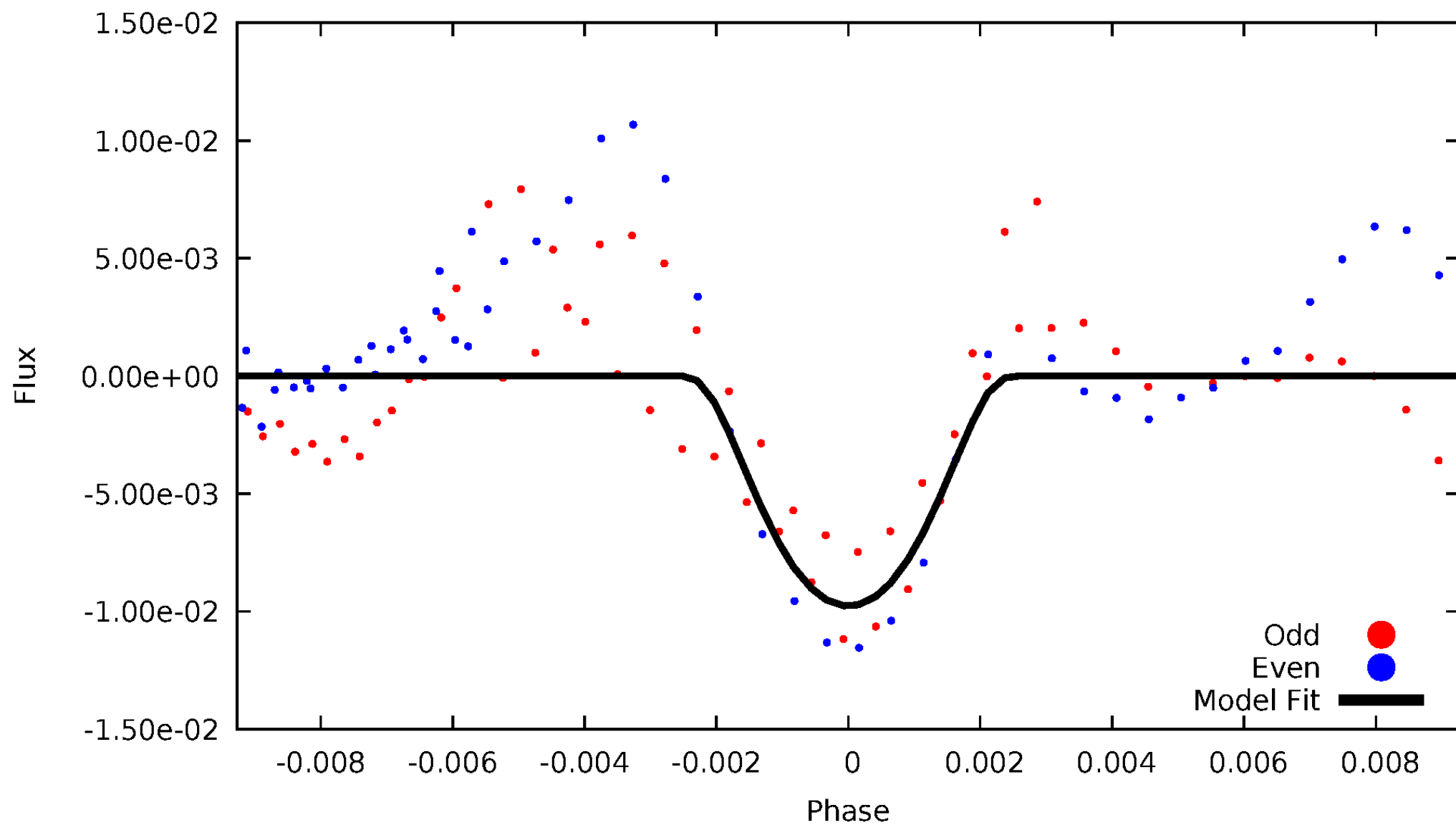


# TCE 002167444-02



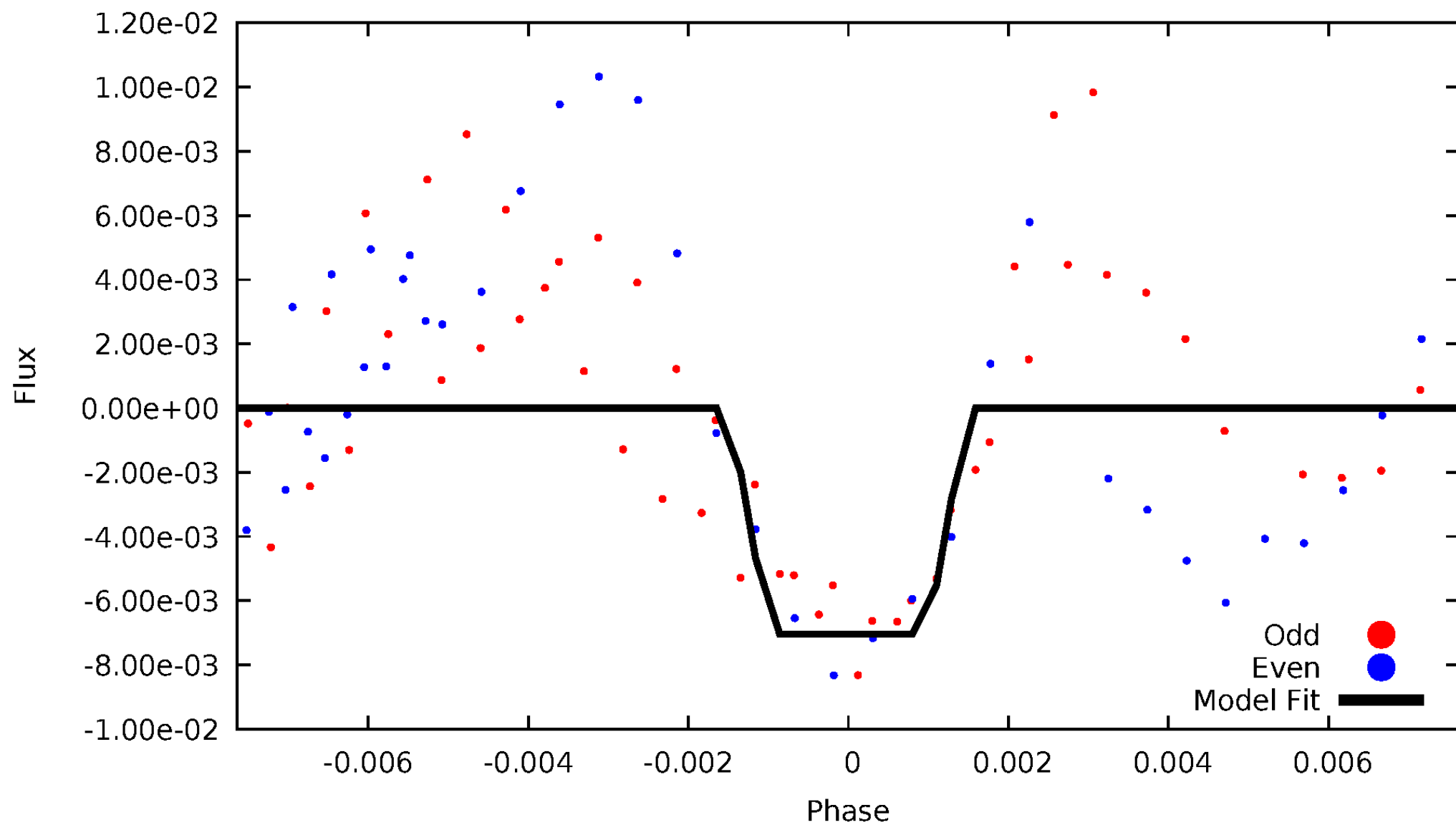
# DV Odd/Even

TCE 002167444-02



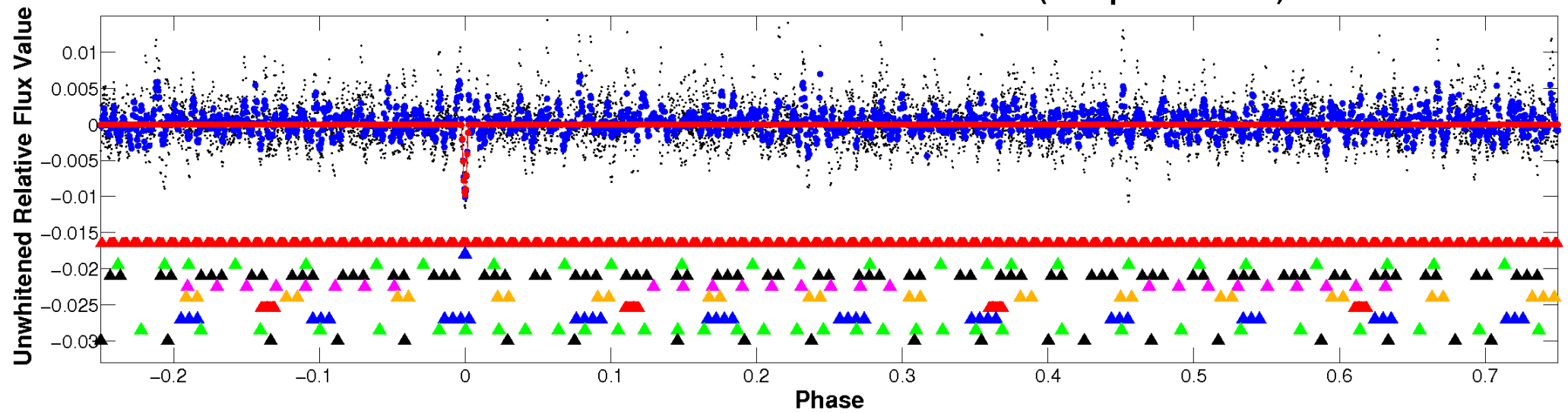
# ALT Odd/Even

TCE 002167444-02

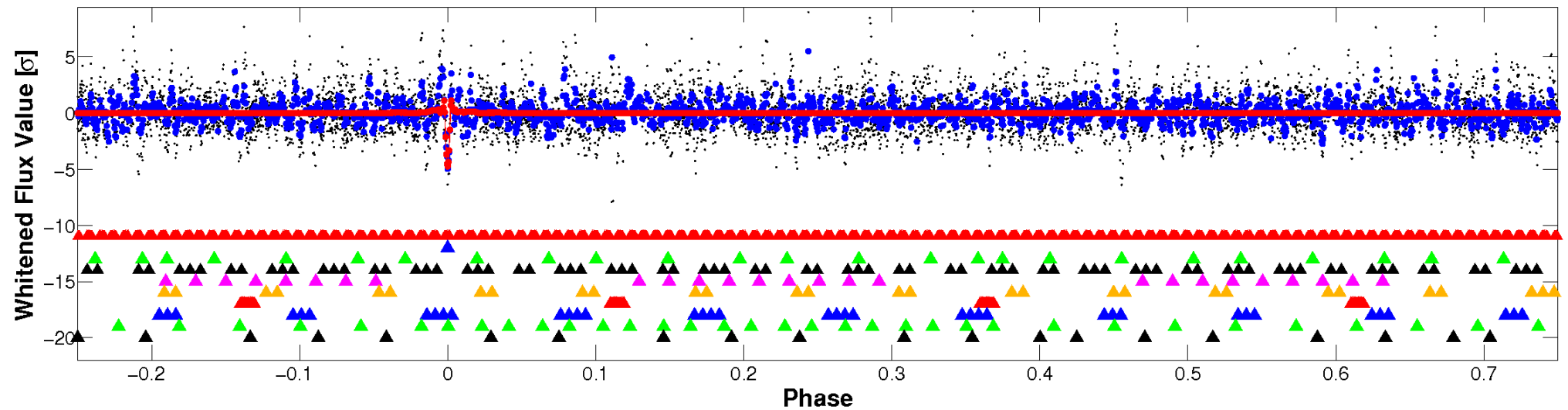


# Non-Whitened Vs. Whitened Light Curve

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



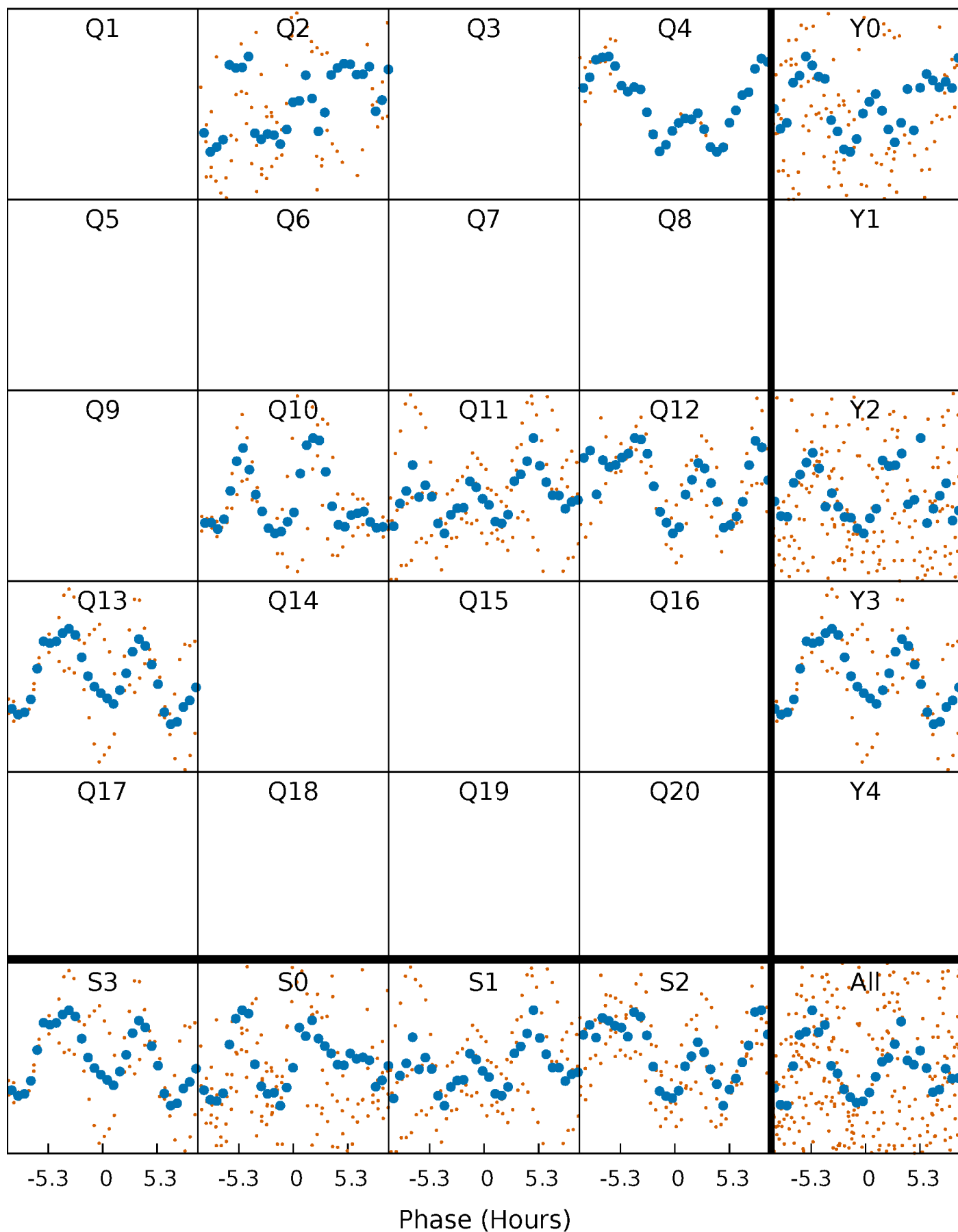
## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)





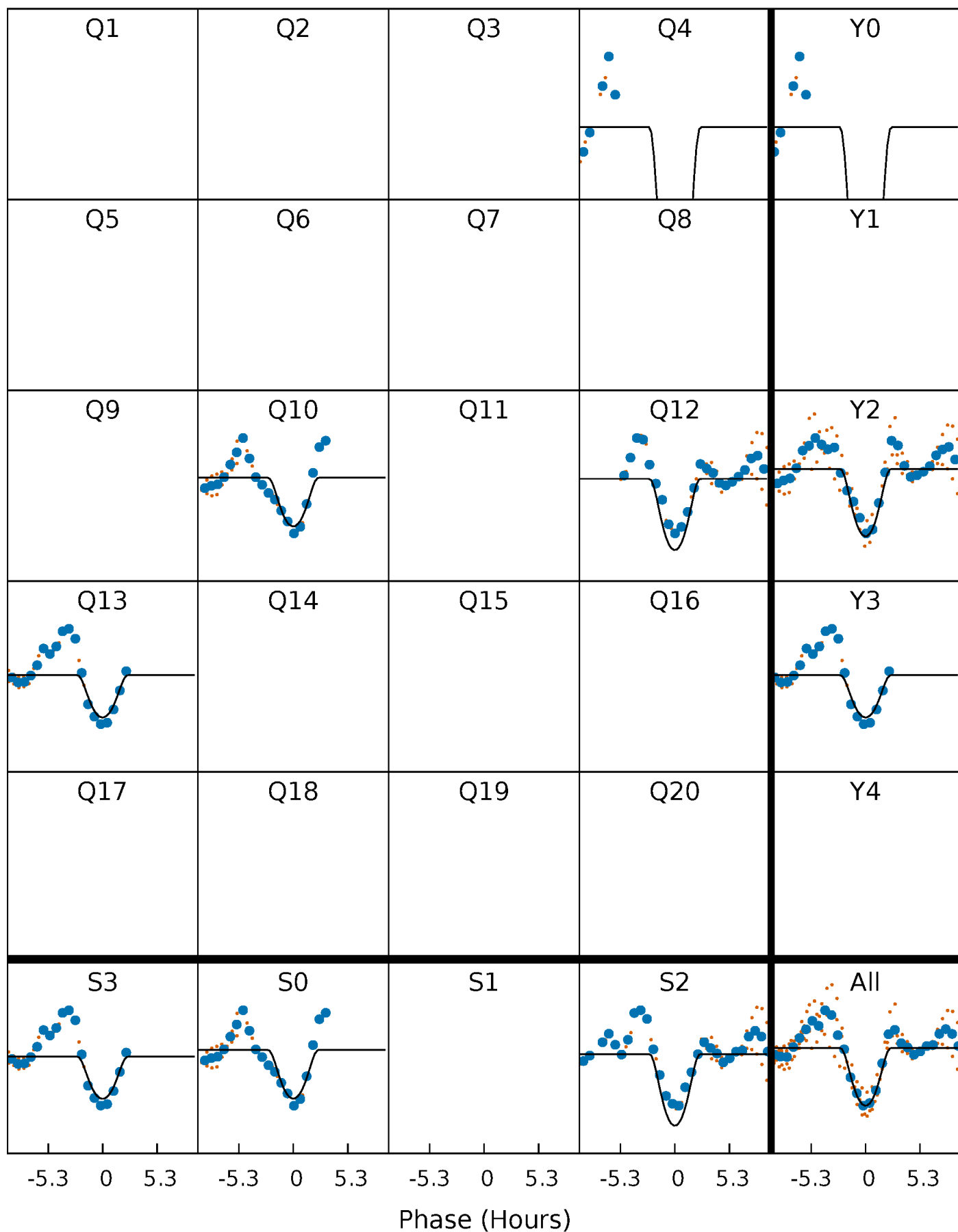
# PDC Quarter-Phased Transit Curves

TCE 002167444-02   P= 41.767300 Days    $T_0=133.051118$  (BKJD)



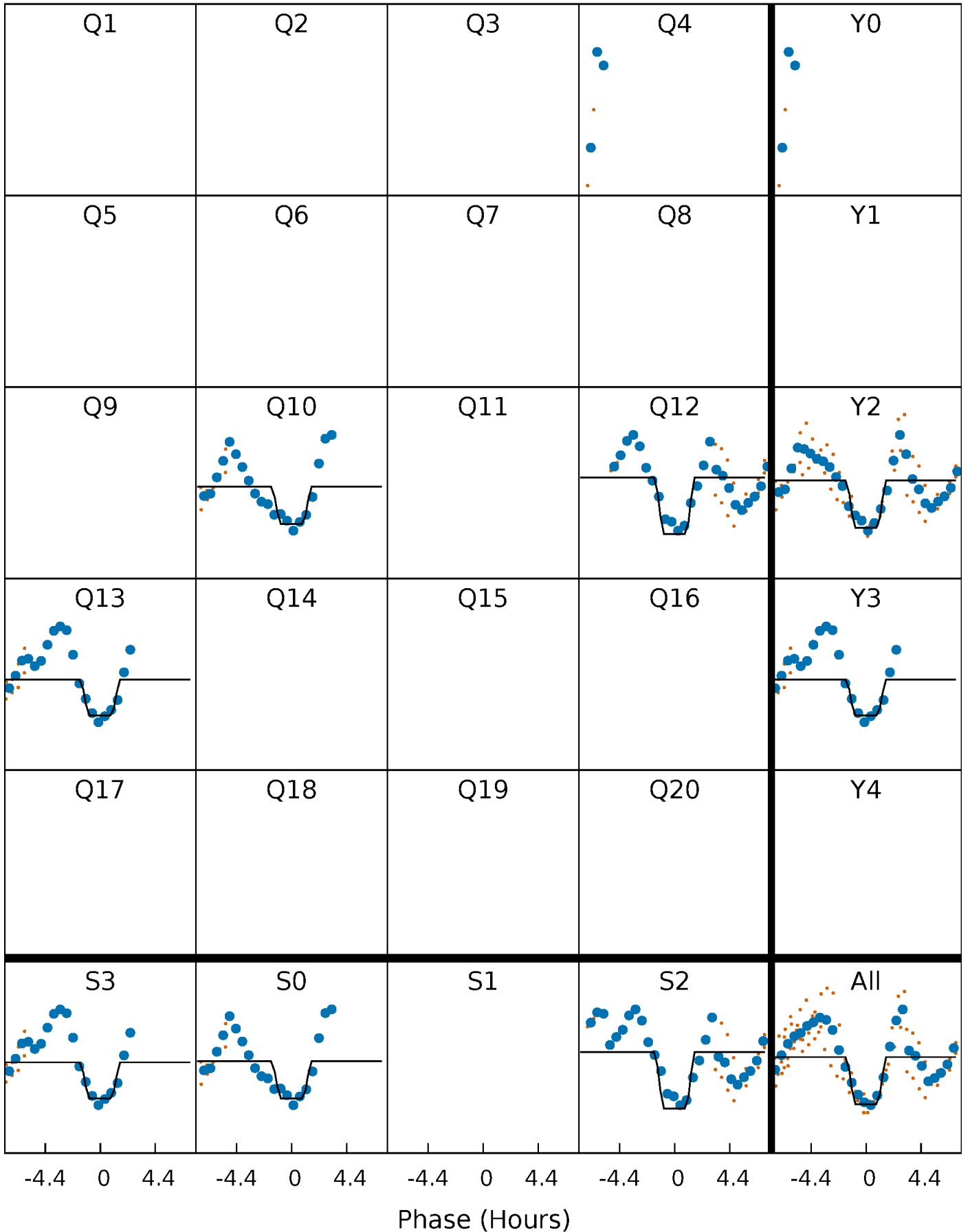
# DV Quarter-Phased Transit Curves

TCE 002167444-02   P= 41.767300 Days    $T_0=133.051118$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

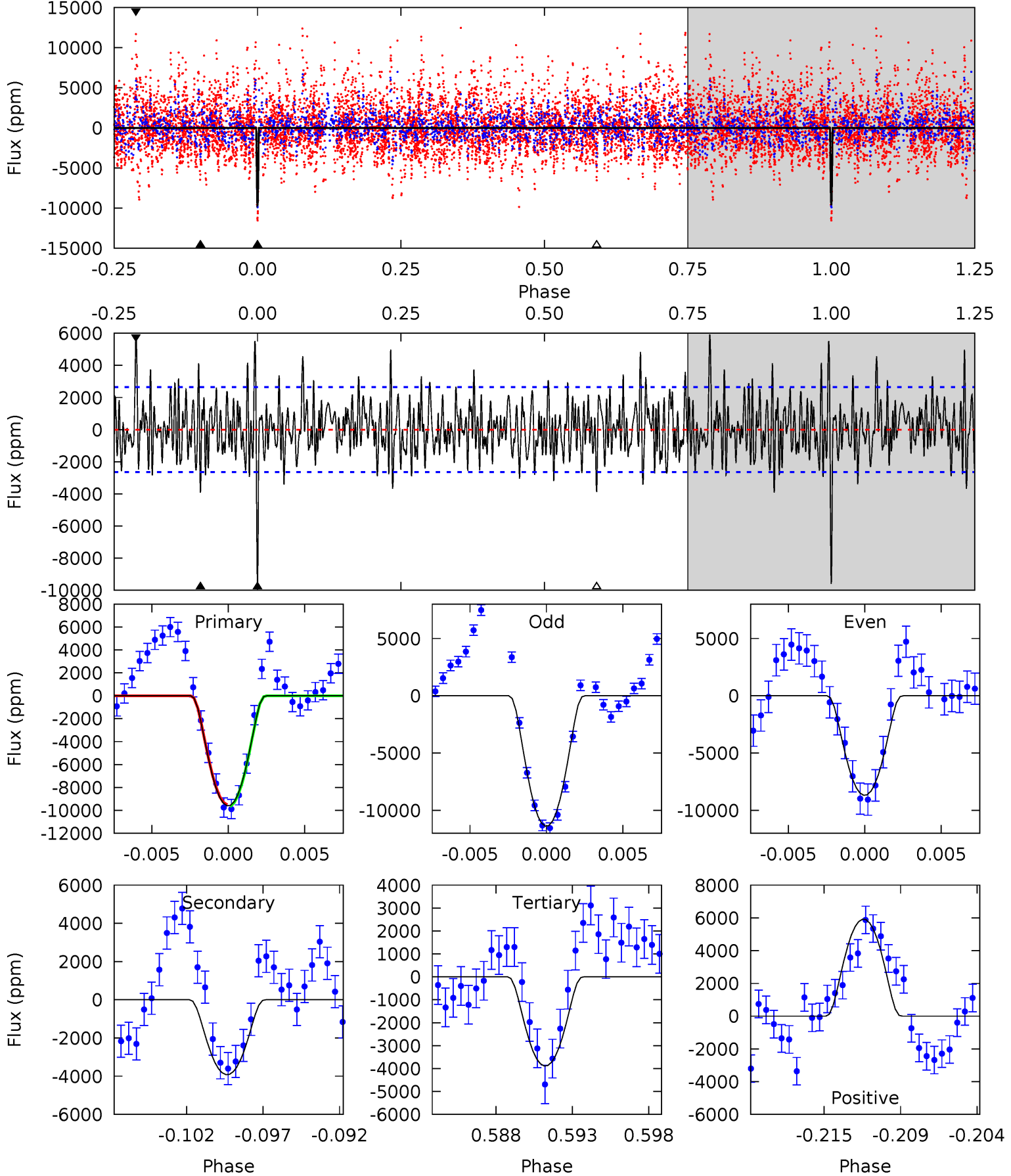
TCE 002167444-02     $P = 41.767594$  Days     $T_0 = 133.037392$  (BKJD)



# DV Model-Shift Uniqueness Test

002167444-02, P = 41.767300 Days, E = 133.051118 Days

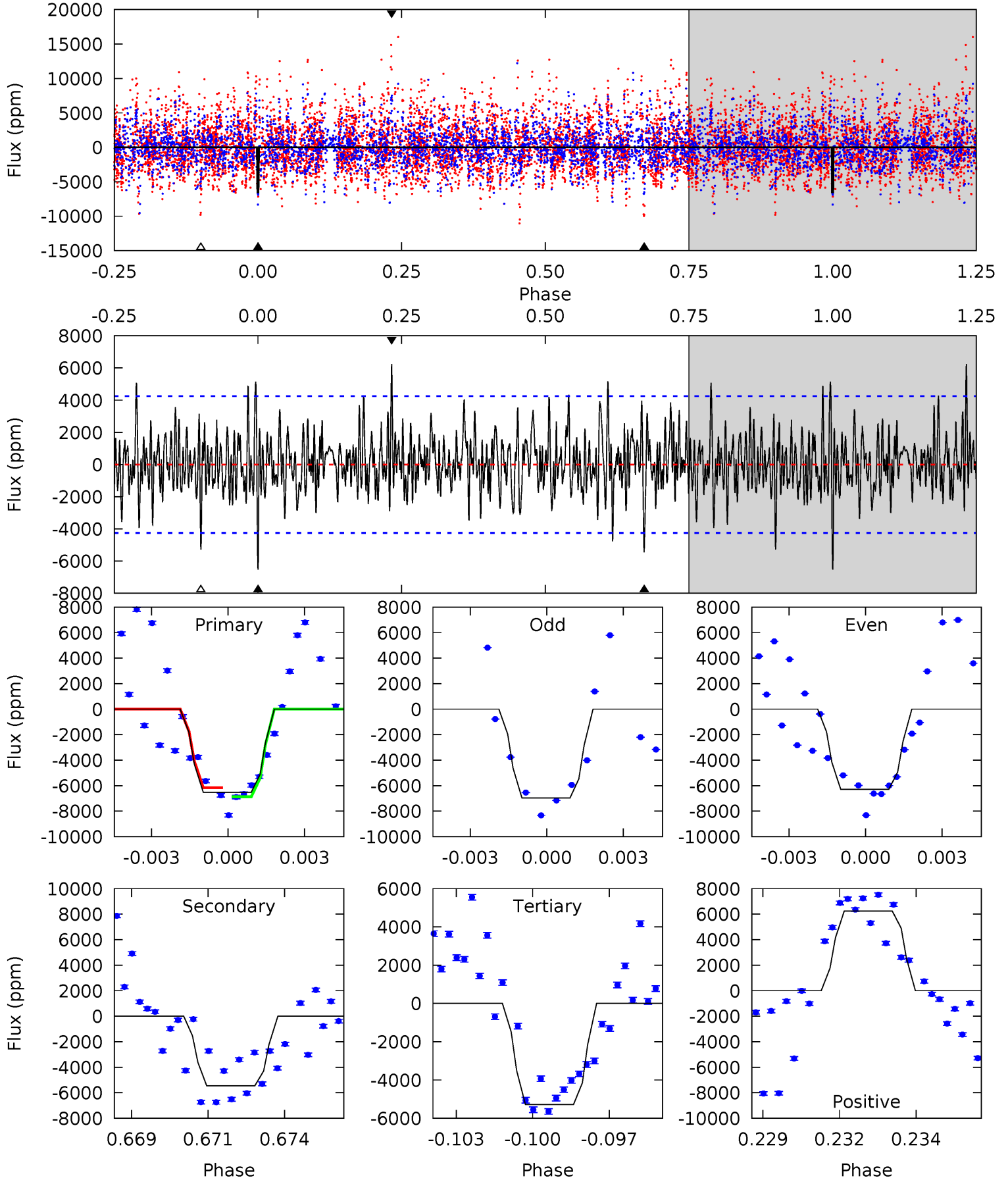
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
18.7	7.64	7.58	11.5	5.15	2.80	2.70	11.1	7.18	0.07	-3.90	2.45	0.91	0.38	0.13



# Alt Model-Shift Uniqueness Test

002167444-02, P = 41.767594 Days, E = 133.037392 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.09	6.78	6.55	7.74	5.28	3.01	1.84	1.54	0.35	0.22	-0.96	0.39	0.95	0.49	0.44



### Stellar Parameters For KIC 002167444

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7239^{+230}_{-374}$	$4.129^{+0.128}_{-0.192}$	$0.020^{+0.200}_{-0.350}$	$1.781^{+0.563}_{-0.375}$	$1.558^{+0.212}_{-0.259}$	$0.388^{+0.254}_{-0.195}$
	+3%/-5%	+3%/-5%	+1000%/-1750%	+32%/-21%	+14%/-17%	+65%/-50%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 002167444-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	-3921±513	$23.20^{+11.46}_{-11.04}$	$1144^{+90}_{-82}$	$5252^{+1973}_{-773}$	$297^{+745}_{-166}$
Alt.	-5456±805	$18.18^{+10.88}_{-9.90}$	$1150^{+88}_{-87}$	$6445^{+3784}_{-1363}$	$679^{+2331}_{-420}$

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

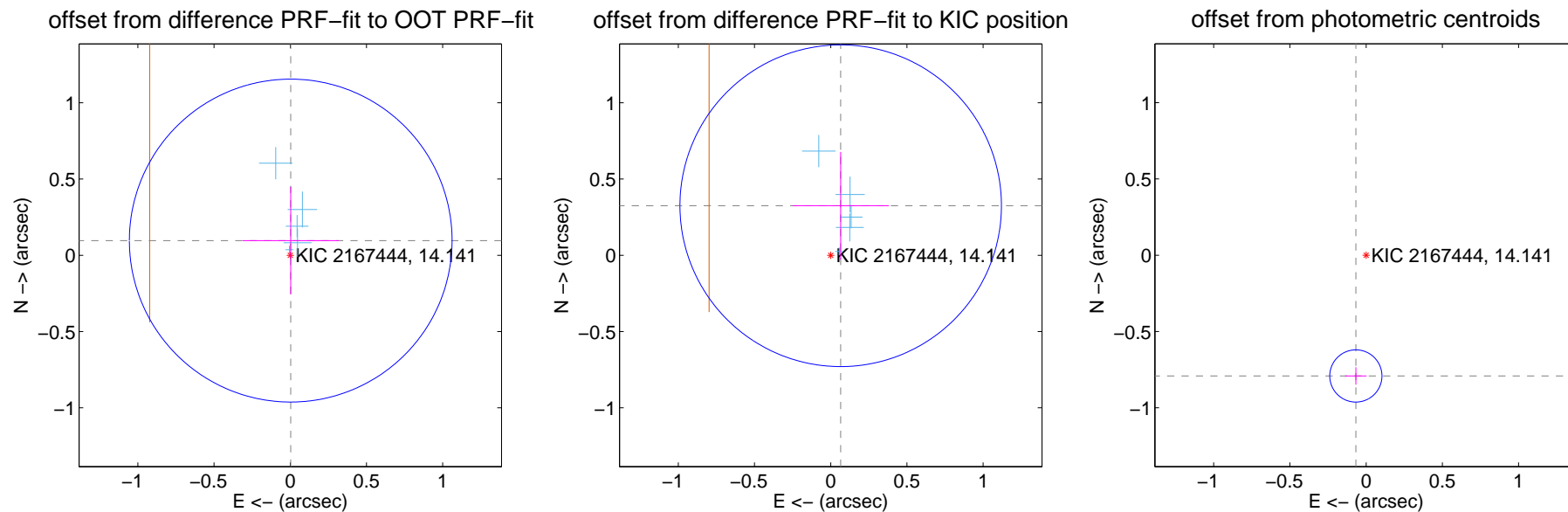
## DV Centroid Data

Supplemental centroid analysis for 002167444-02. Kepler magnitude: 14.14. Transit SNR 16.91

There are 5 quarters with good PRF difference image offsets

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

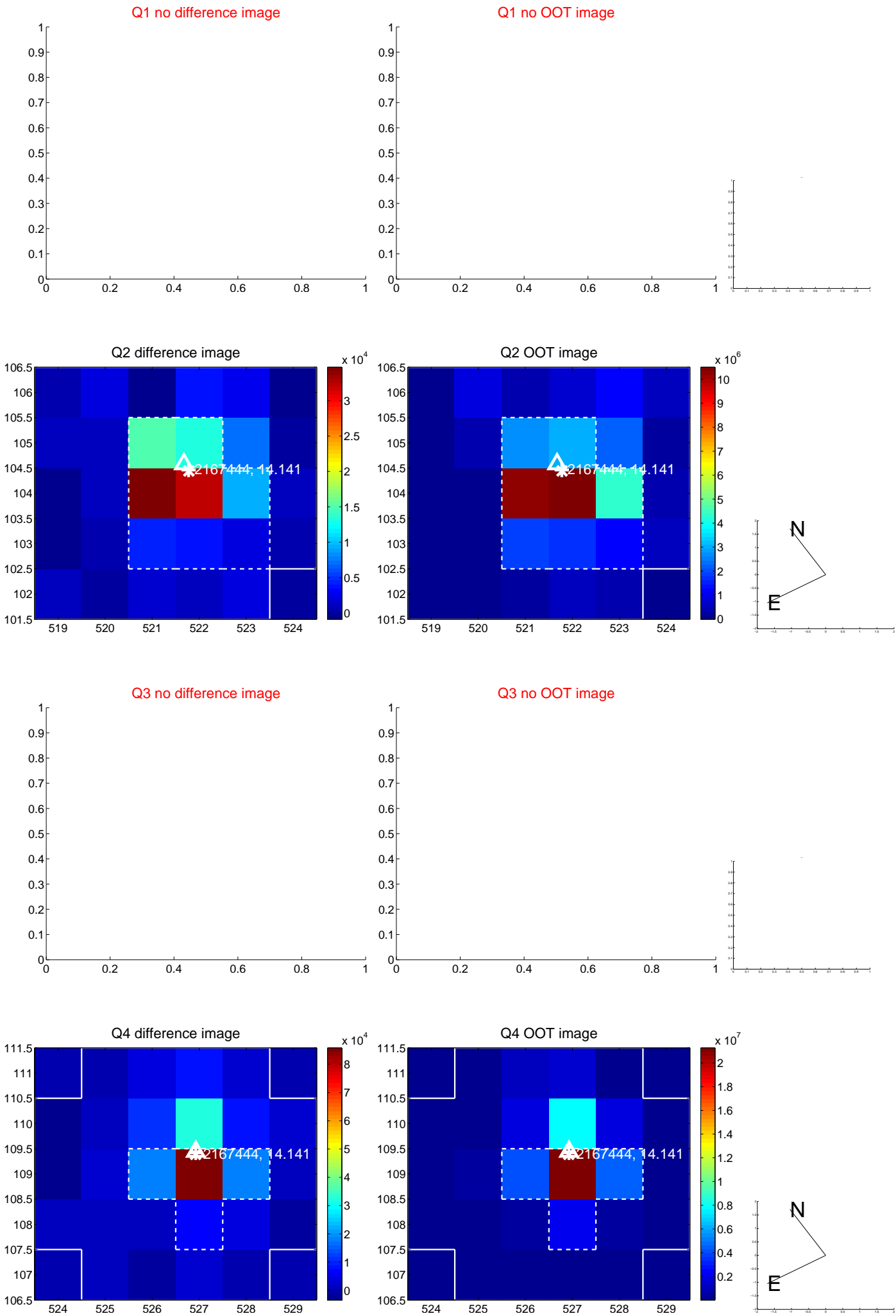
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.096 \pm 0.353$	0.27	$-0.003 \pm 0.316$	$0.096 \pm 0.353$
PRF-fit source offset from KIC position	$0.331 \pm 0.351$	0.94	$-0.065 \pm 0.316$	$0.325 \pm 0.353$
photometric centroid source offset	$0.79 \pm 0.06$	13.92	$0.07 \pm 0.07$	$-0.79 \pm 0.06$



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.



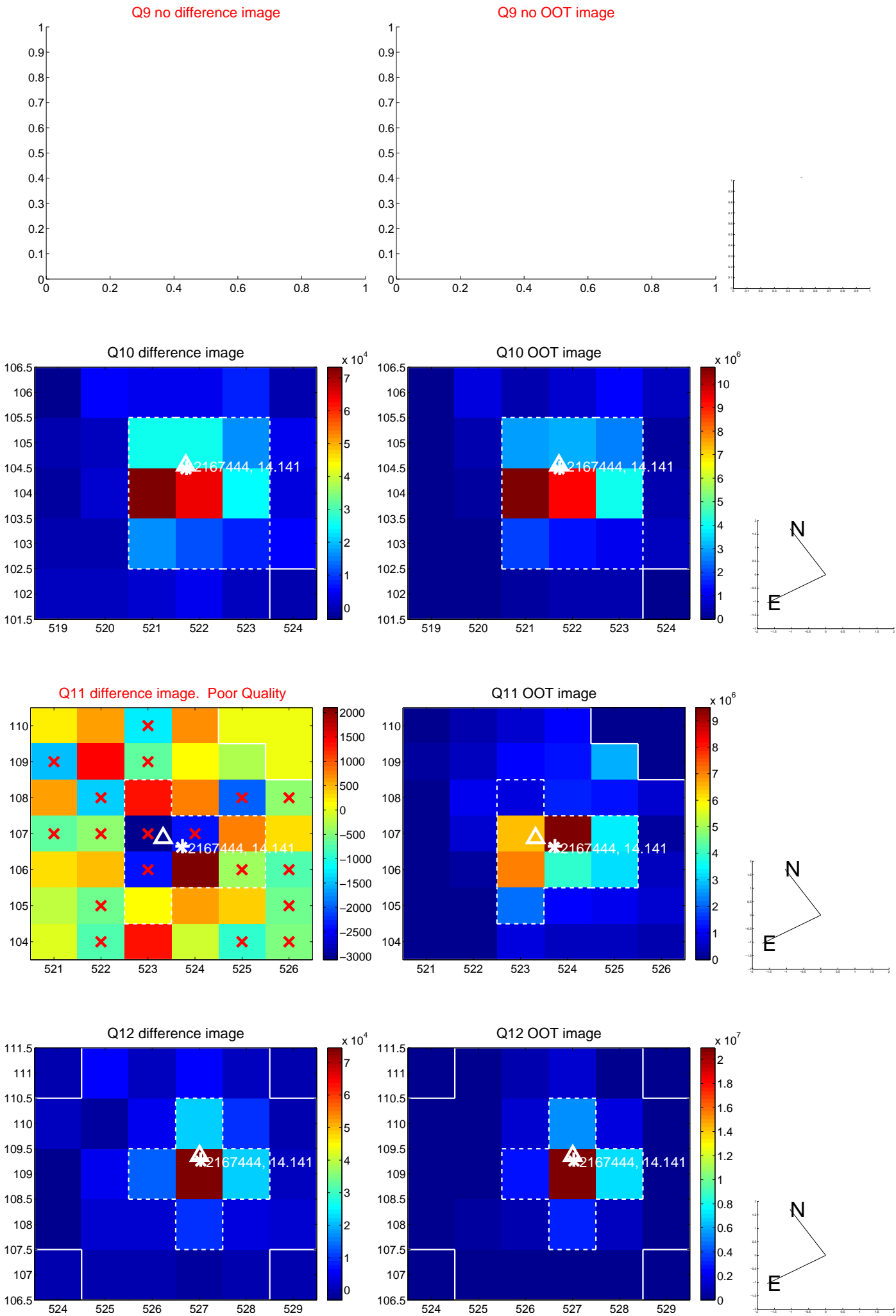
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



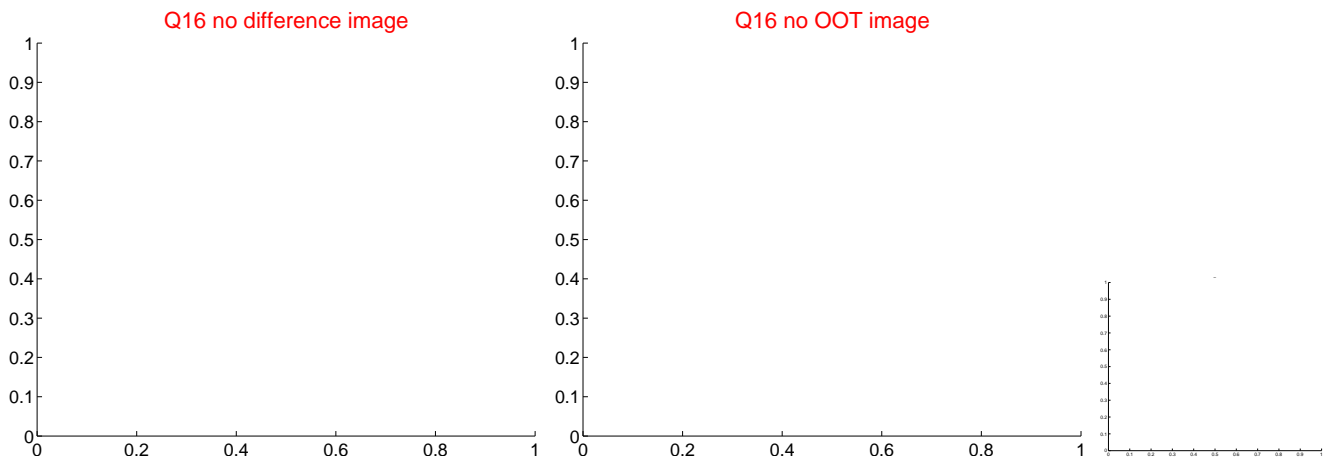
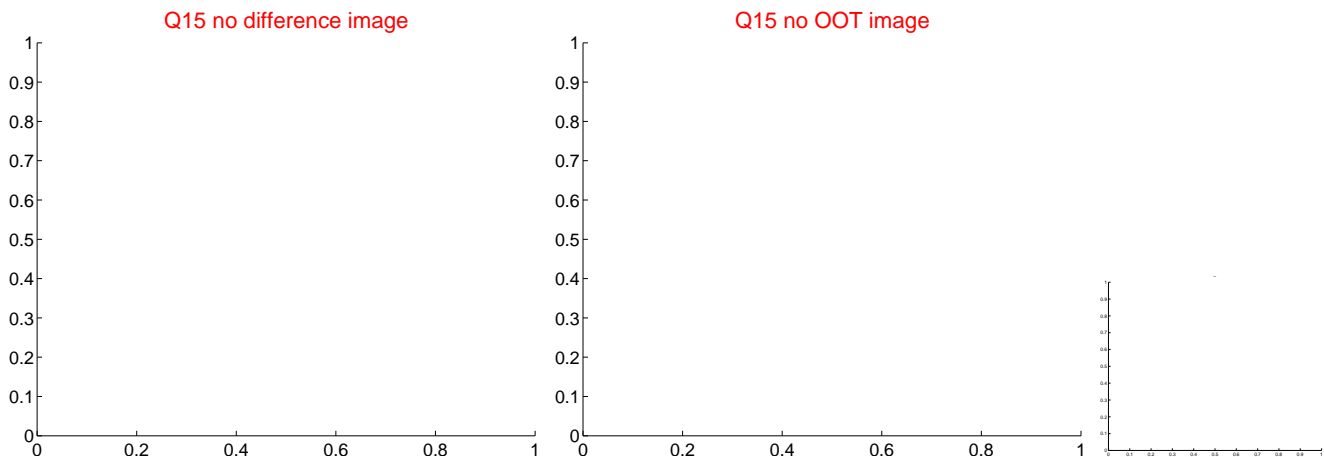
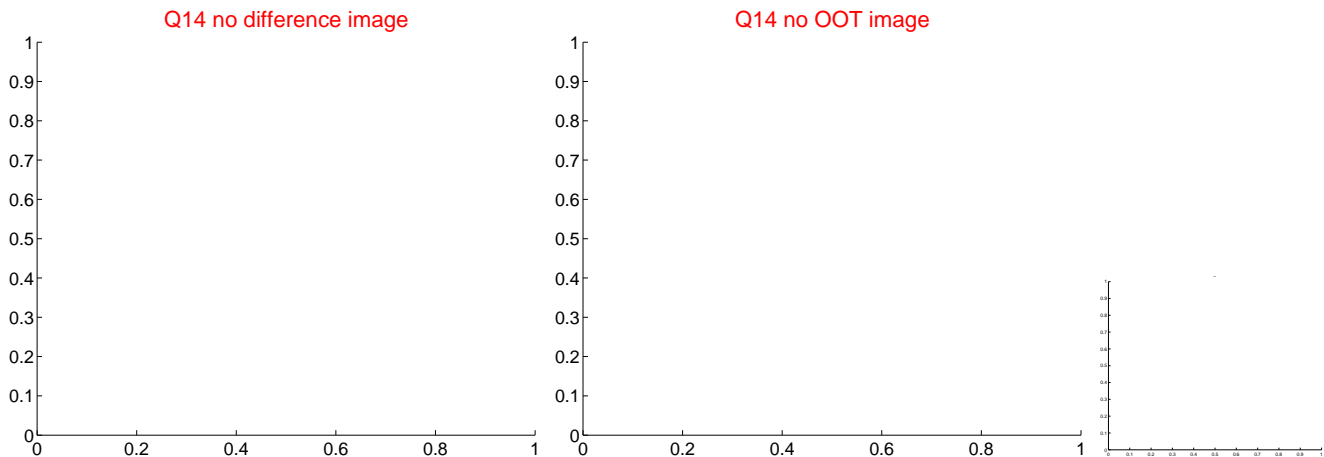
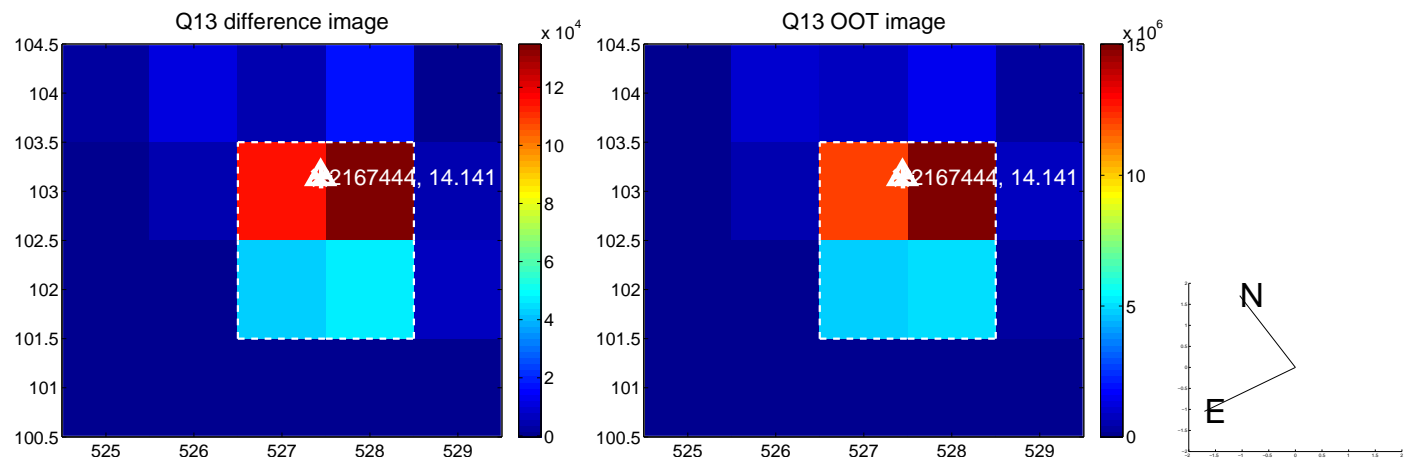
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



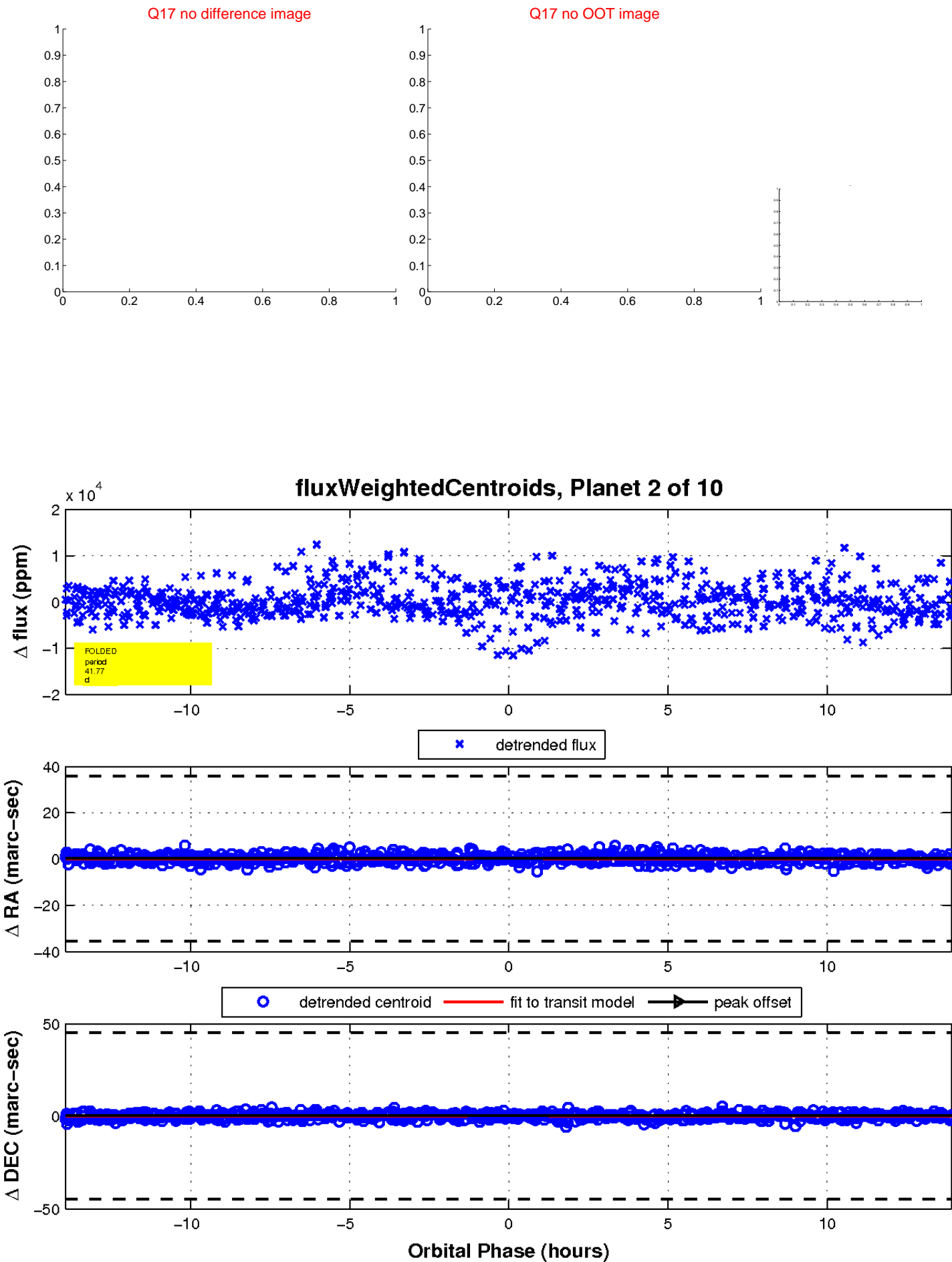
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

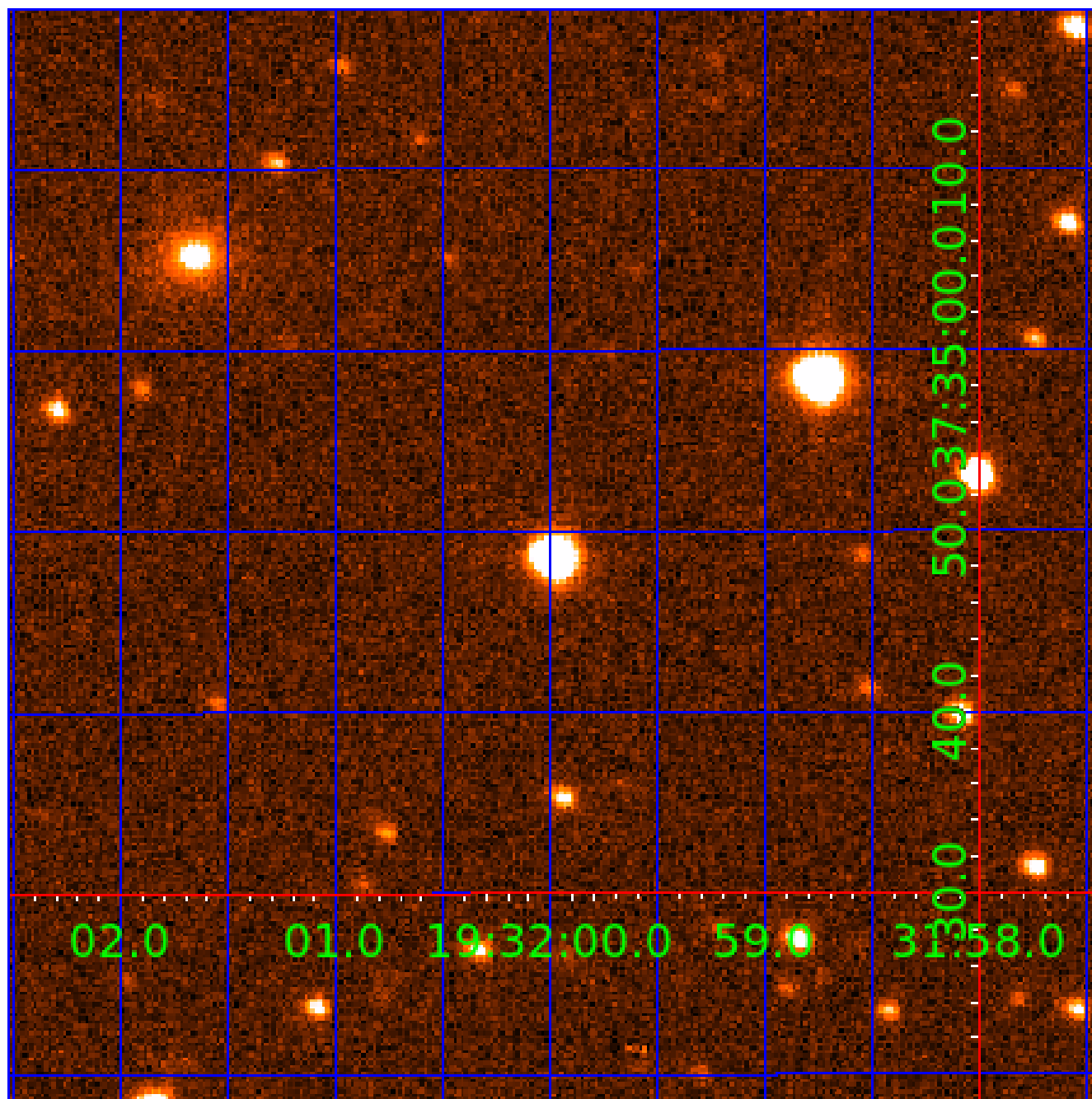


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 002167444

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002167444-01	OBS	6261.01	2.436132	133.461910	183.6	13.847	14.6	2.7	1.78	7239	2.51	4625.06
002167444-02	OBS	No	41.767300	133.051118	9768.1	4.645	17.3	16.9	1.78	7239	22.40	104.62
002167444-03	OBS	No	59.957046	148.015307	8629.5	5.029	16.6	16.0	1.78	7239	24.89	64.61
002167444-04	OBS	No	18.853189	138.257909	6213.5	4.514	13.9	16.2	1.78	7239	23.94	302.14
002167444-05	OBS	No	55.971983	138.453394	7128.2	4.837	13.9	13.2	1.78	7239	26.48	70.81
002167444-06	OBS	No	50.694800	164.270937	6960.6	4.426	13.0	14.1	1.78	7239	19.97	80.80
002167444-07	OBS	No	31.334397	148.069009	5987.4	4.388	12.8	12.3	1.78	7239	24.13	153.47
002167444-09	OBS	No	43.476060	133.067820	6087.2	5.222	12.2	12.2	1.78	7239	17.15	99.17
002167444-10	OBS	No	71.875232	162.459931	4760.8	4.459	11.4	11.0	1.78	7239	19.78	50.73

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002167444-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV
002167444-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-03	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT
002167444-04	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
002167444-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-07	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-10	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

**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 002167444-03

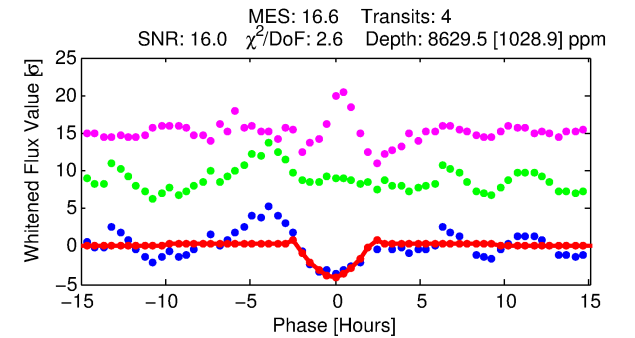
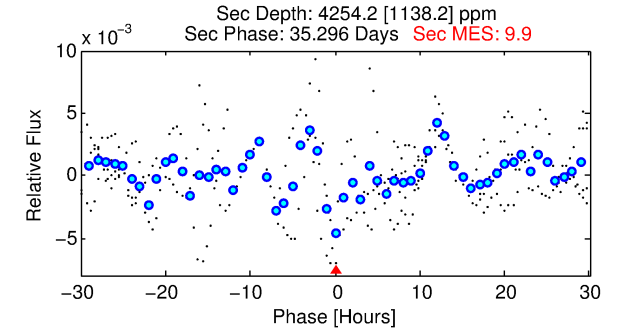
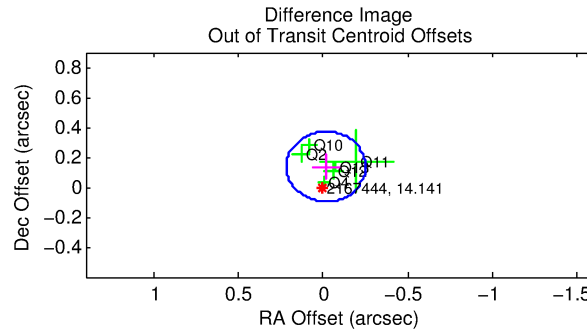
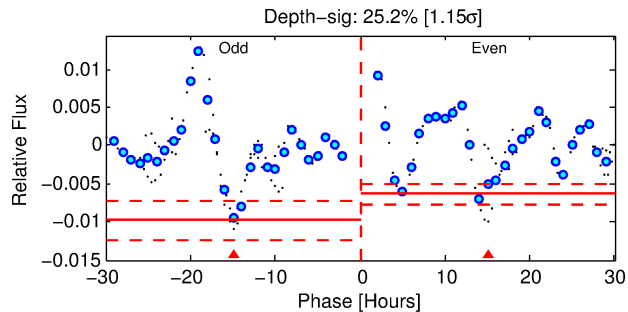
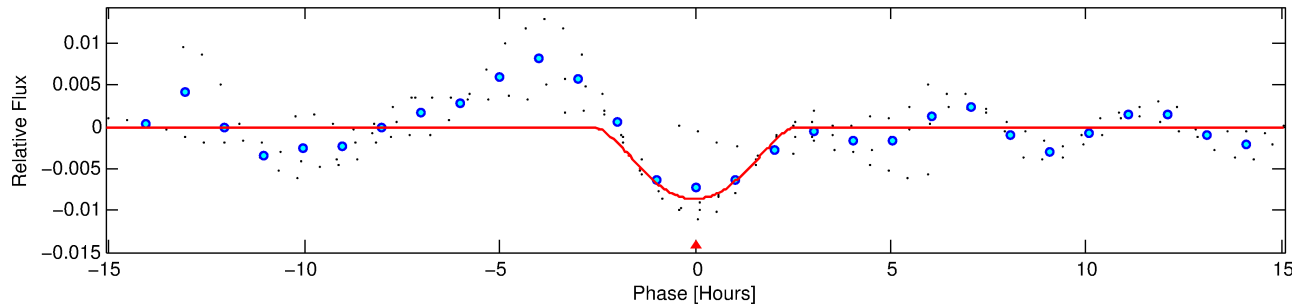
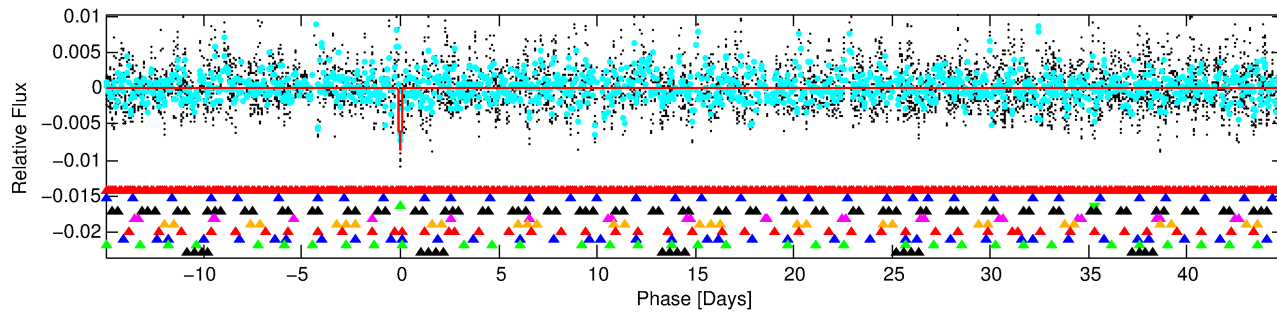
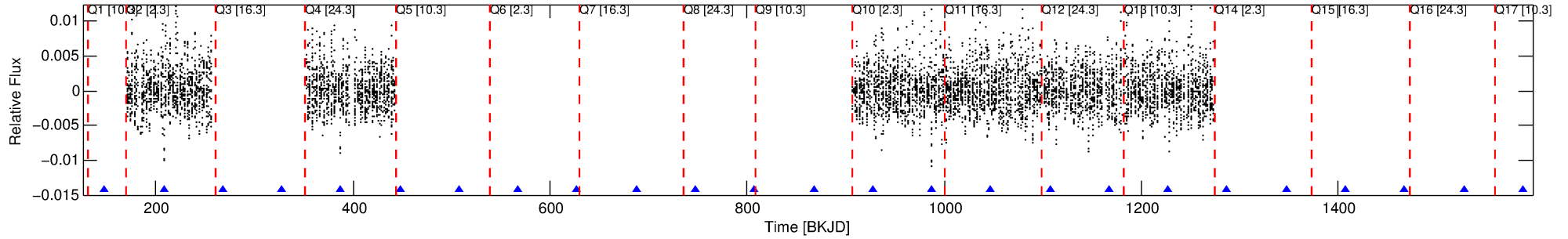
No Significant Match Found

# DV One-Page Summary

KIC: 2167444 Candidate: 3 of 10 Period: 59.957 d

KOI: K06261 Corr: No Ephemeris Match

Kp: 14.14 R\*: 1.78 Rs Teff: 7239.0 K Logg: 4.13 Fe/H: 0.020



## DV Fit Results:

Period = 59.95705 [0.00093] d  
Epoch = 148.0153 [0.0100] BKJD  
Rp/R\* = 0.1280 [0.1766]  
a/R\* = 52.92 [16.77]  
b = 0.97 [0.29]  
Seff = 64.60 [26.95]  
Teq = 723 [75] K  
Rp = 24.89 [35.21] Re  
a = 0.3476 [0.0894] AU  
Ag = 456.51 [1275.86] [0.36σ]  
Teff = 5166 [3589] K [1.24σ]

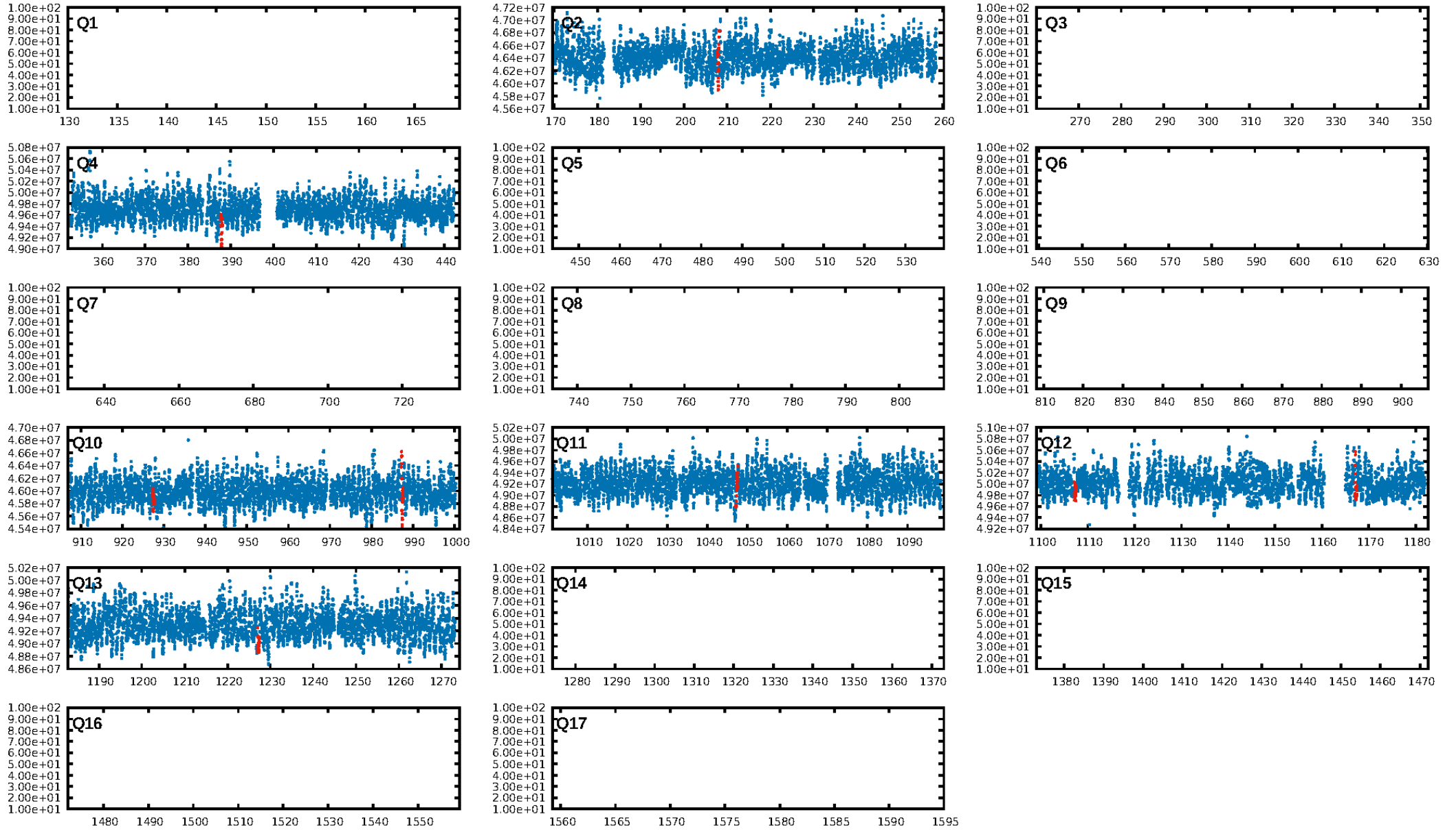
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [13.71σ]  
LongPeriod-sig: 100.0% [42.55σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 66.9%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 0.5809  
Centroid-sig: 34.2%  
Centroid-so: 0.712 arcsec [8.91σ]  
OotOffset-rm: 0.137 arcsec [1.76σ]  
KicOffset-rm: 0.159 arcsec [2.05σ]  
OotOffset-st: 2/1/2/1 [6]  
KicOffset-st: 2/1/2/1 [6]  
DiffImageQuality-fgm: 0.83 [5/6]  
DiffImageOverlap-fno: 0.67 [4/6]

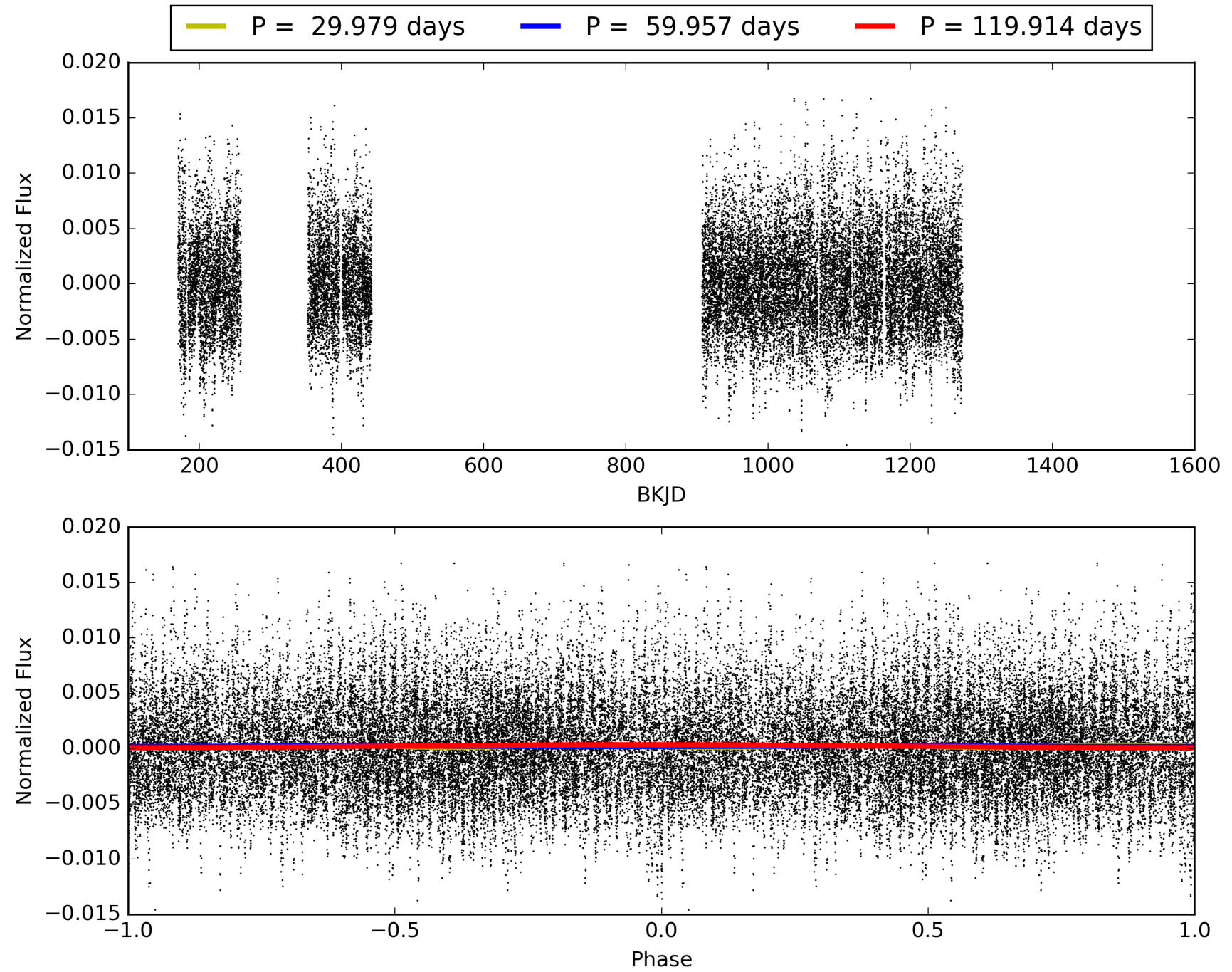
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 03:46:56 Z

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

# TCE 002167444-03, PDC Light Curves

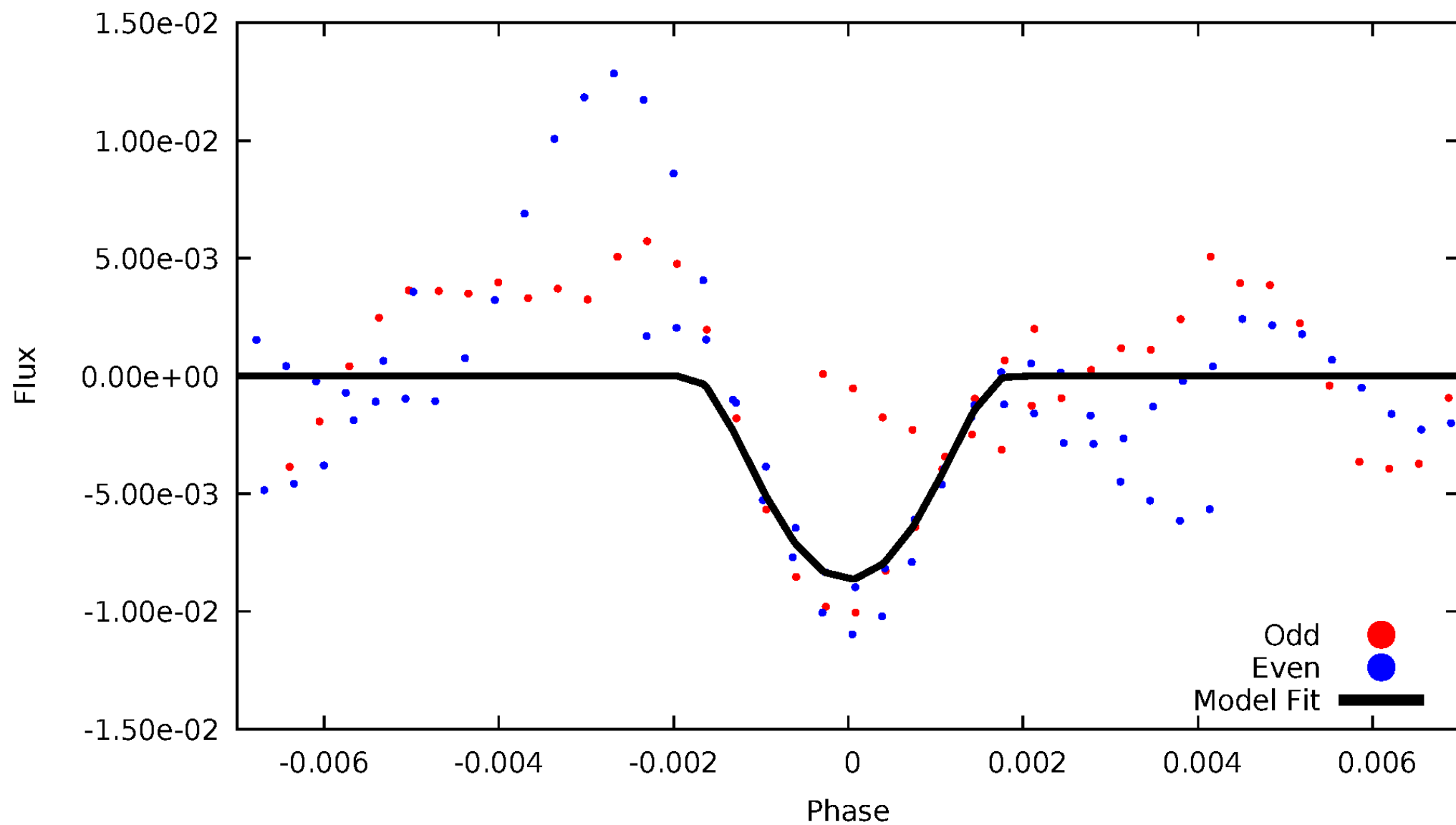


# TCE 002167444-03



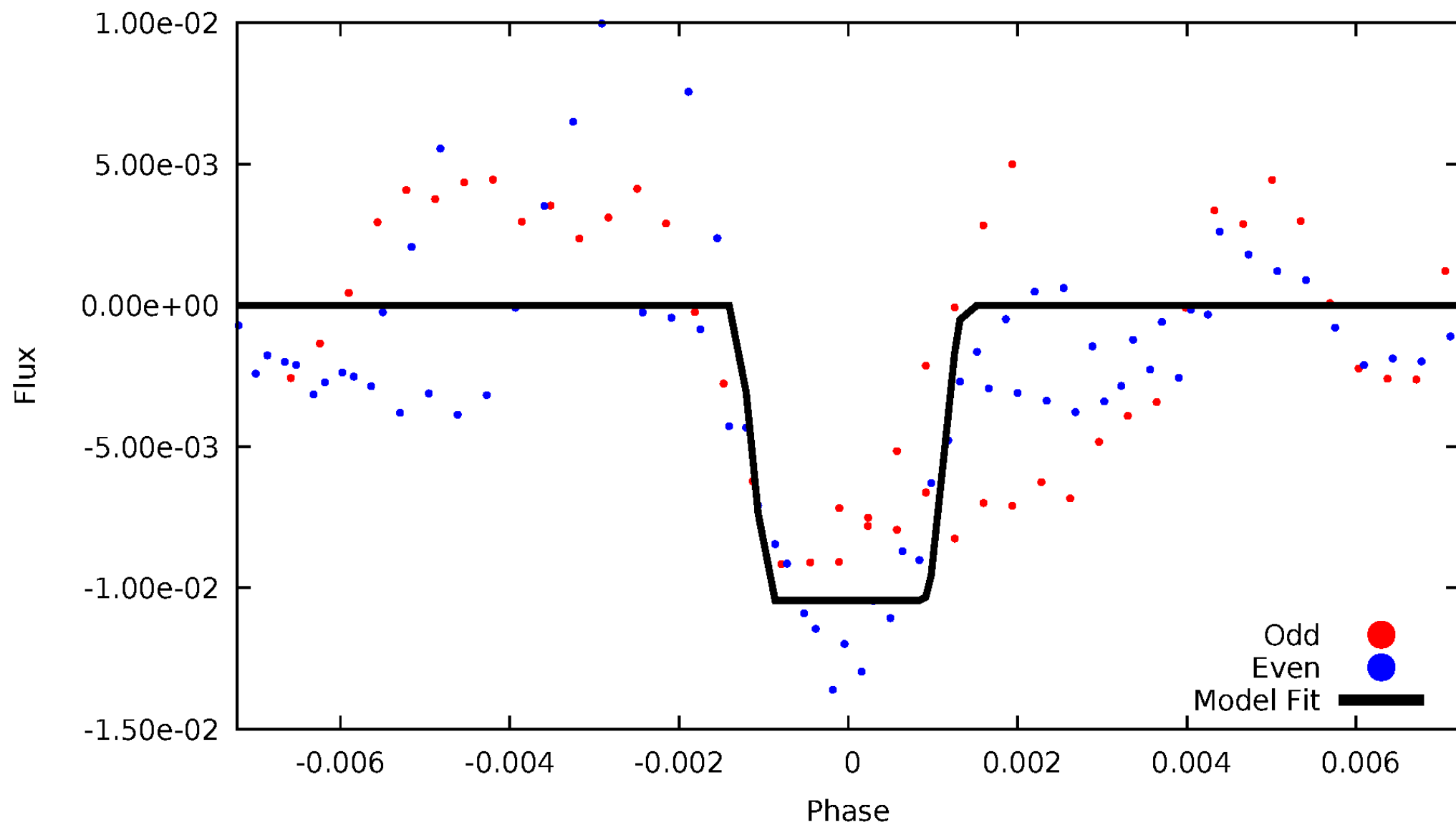
# DV Odd/Even

TCE 002167444-03



# ALT Odd/Even

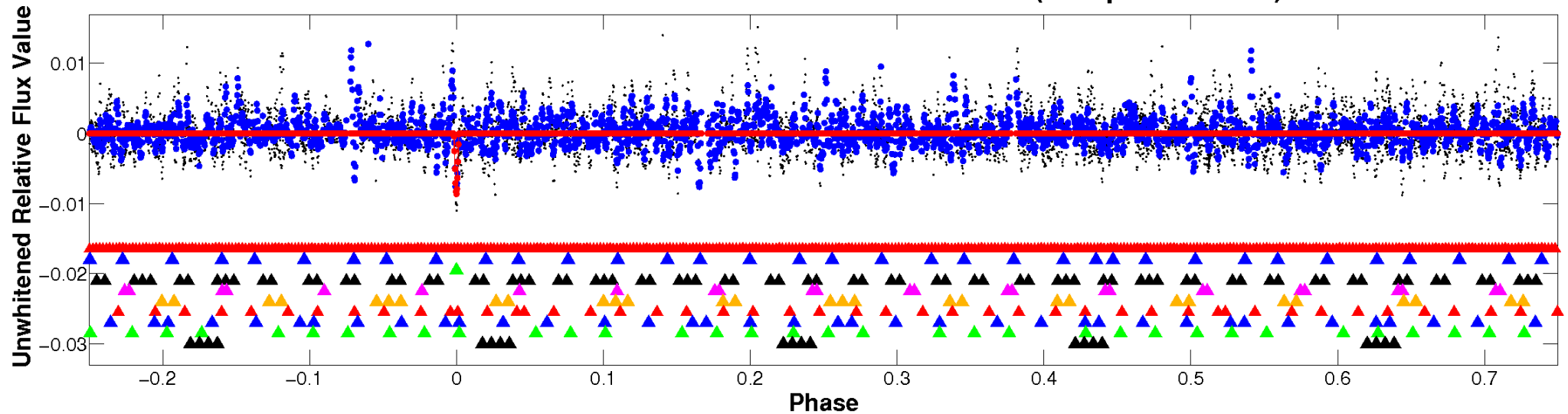
TCE 002167444-03



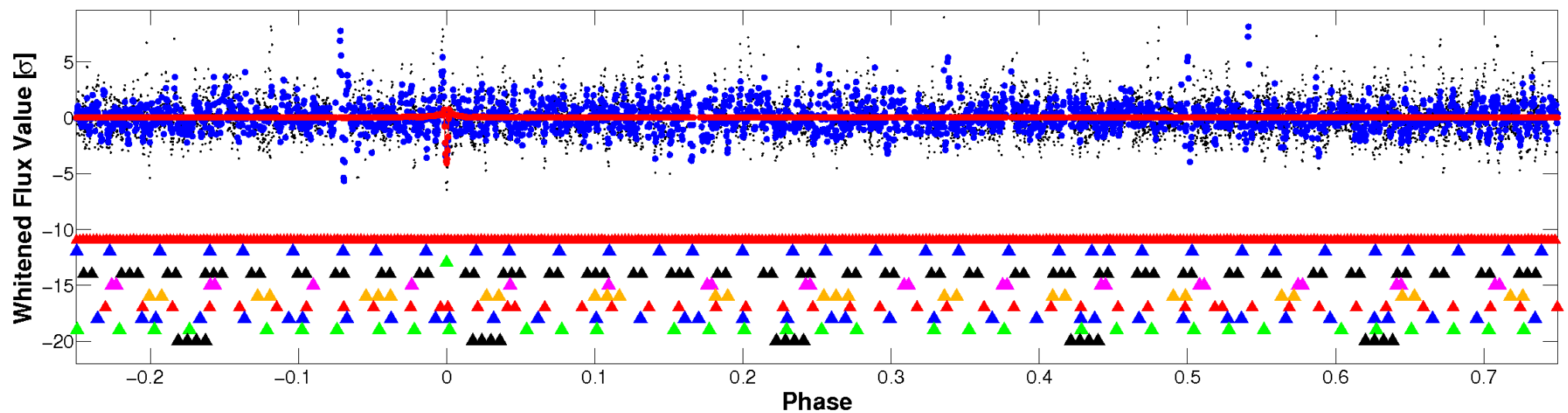


# Non-Whitened Vs. Whitened Light Curve

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

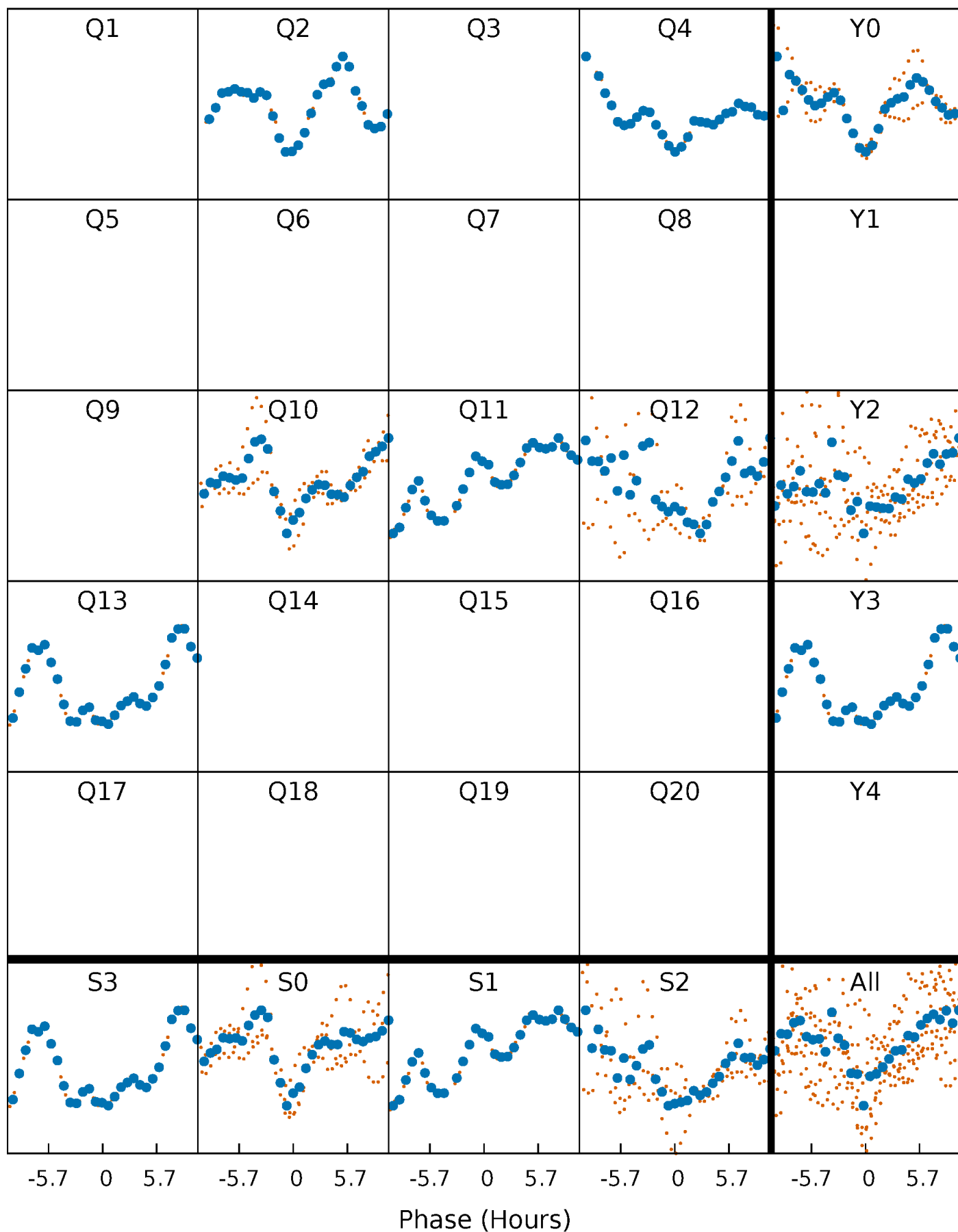


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



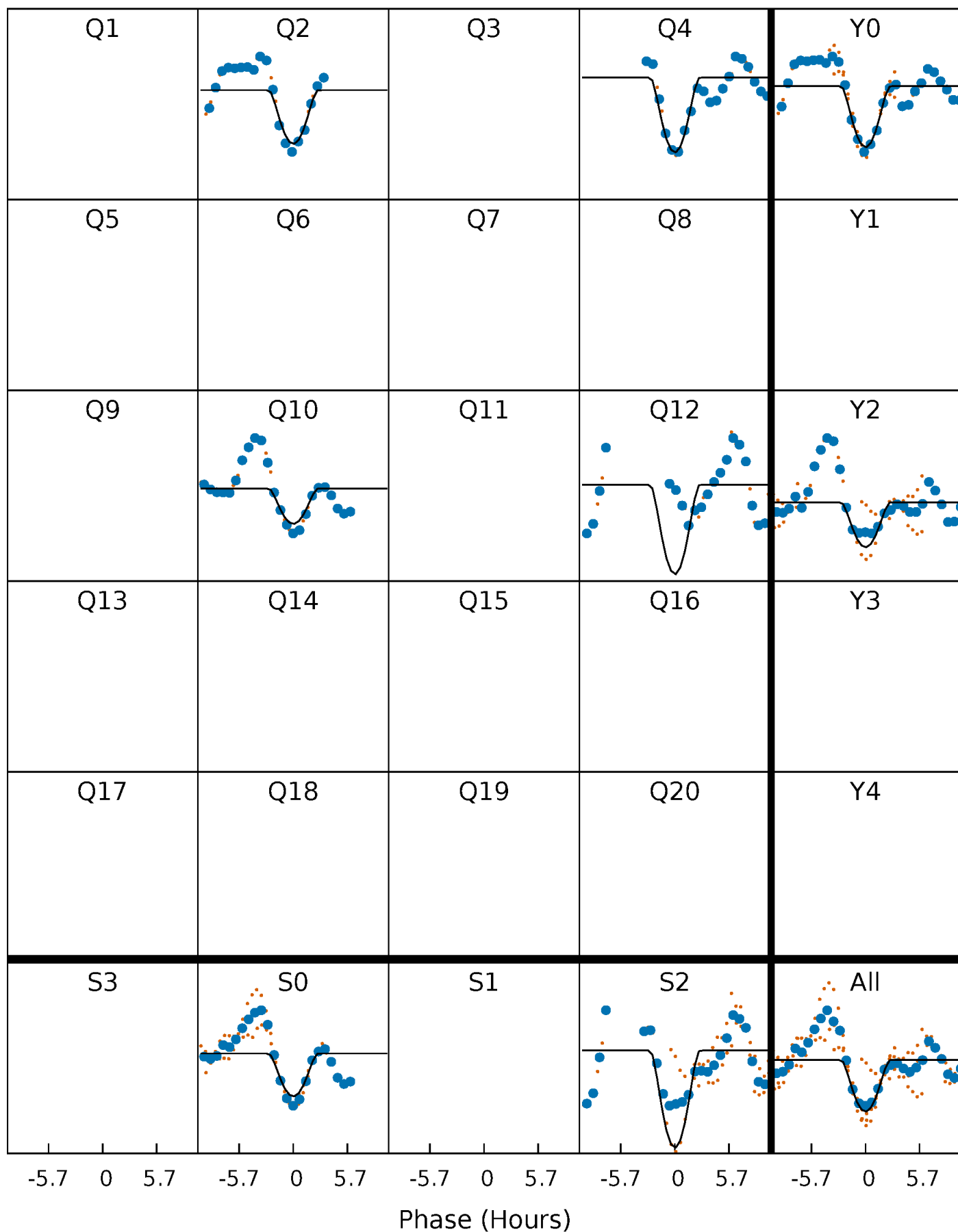
# PDC Quarter-Phased Transit Curves

TCE 002167444-03   P= 59.957046 Days    $T_0=148.015307$  (BKJD)



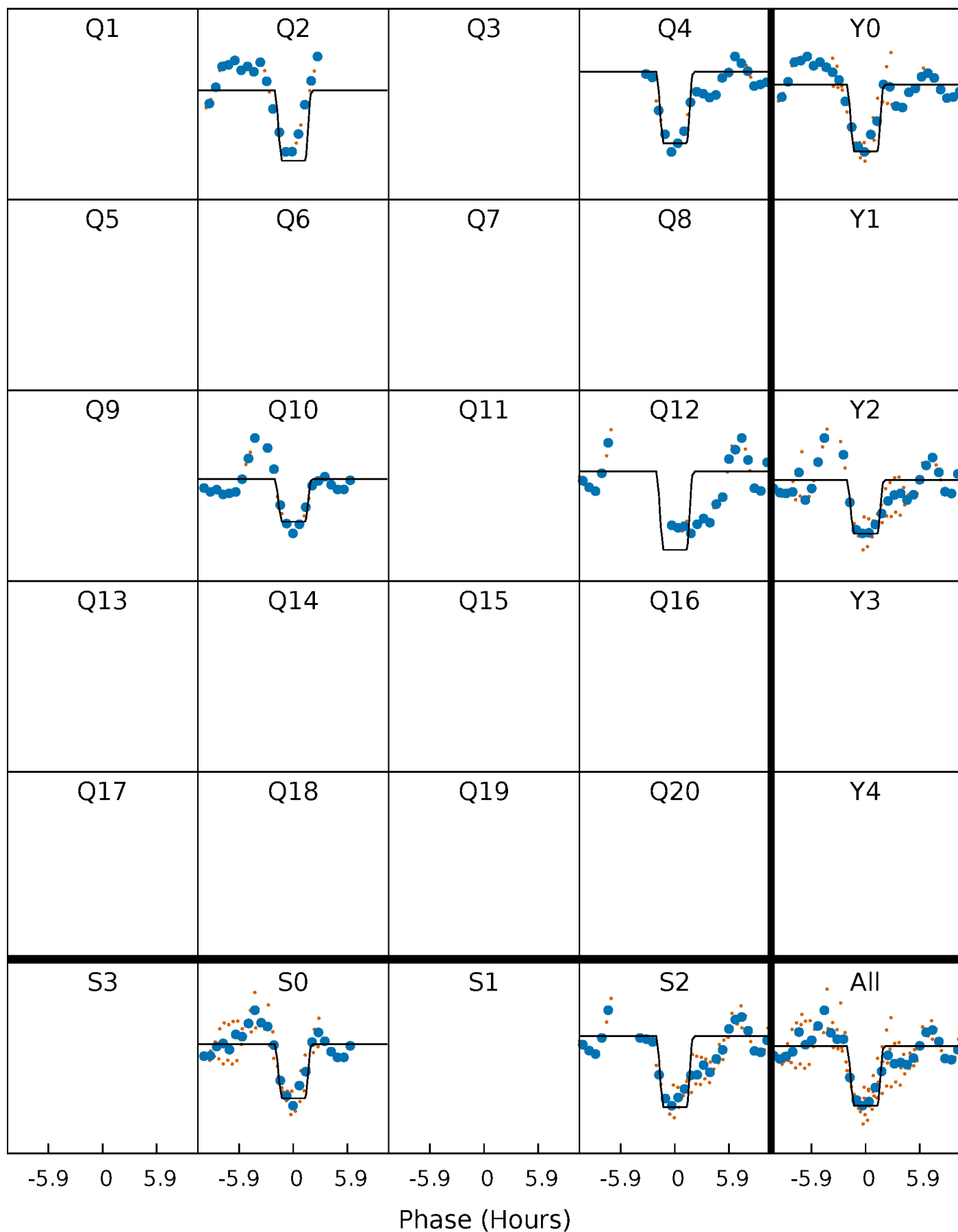
# DV Quarter-Phased Transit Curves

TCE 002167444-03 P= 59.957046 Days  $T_0=148.015307$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

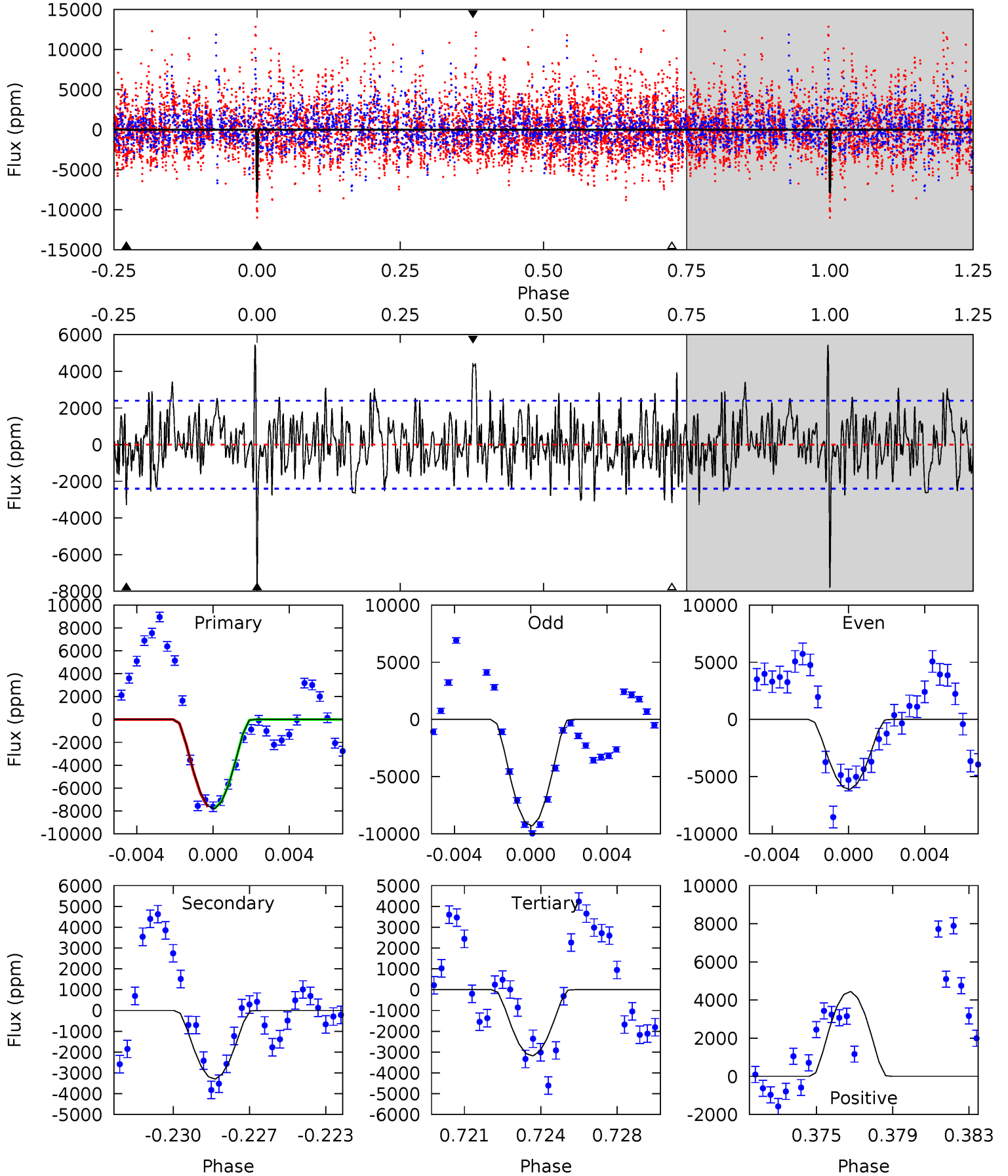
TCE 002167444-03   P= 59.955639 Days    $T_0=148.028291$  (BKJD)



# DV Model-Shift Uniqueness Test

002167444-03, P = 59.957046 Days, E = 148.015307 Days

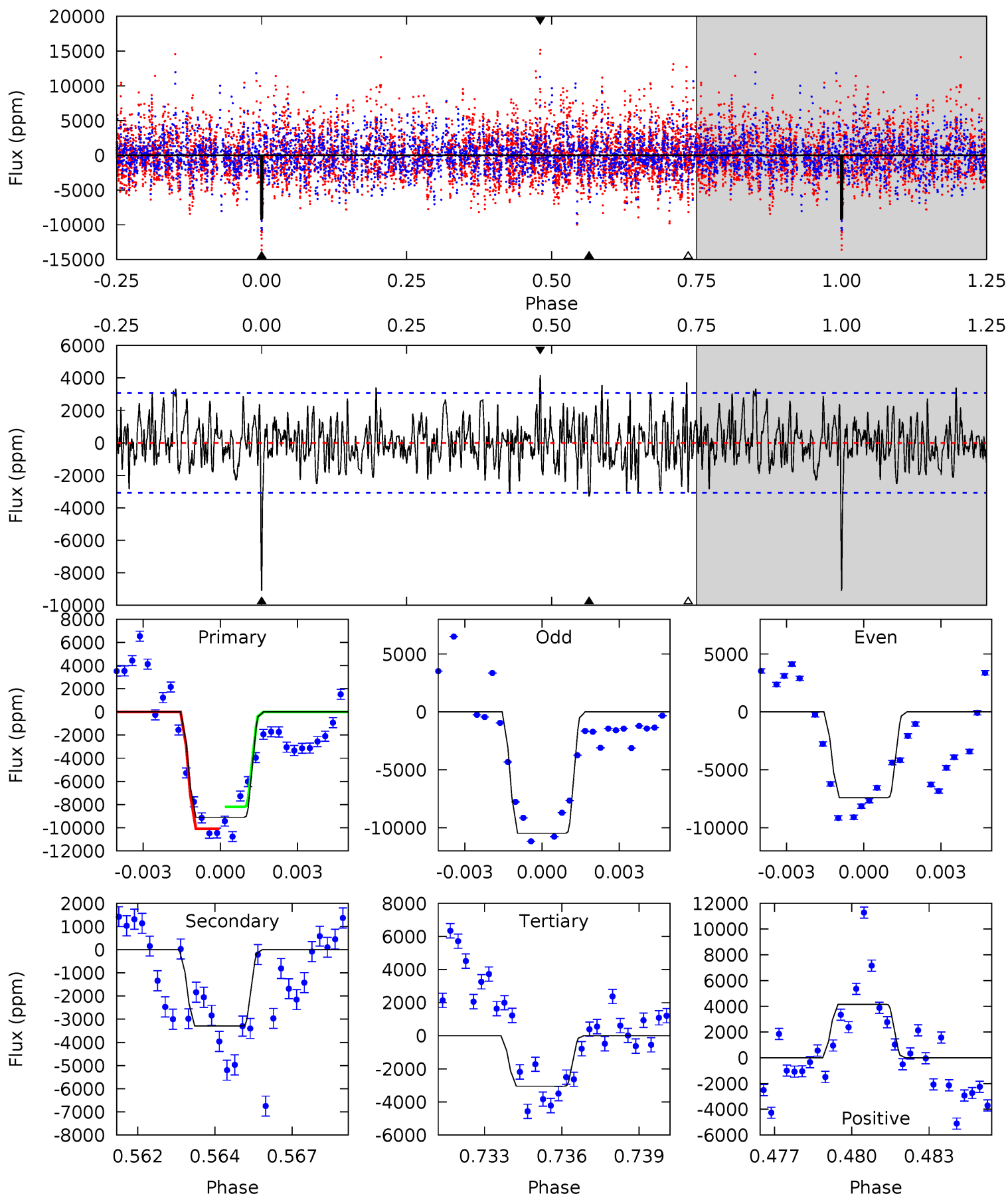
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
17.0	7.15	6.91	9.65	5.21	2.90	2.55	10.0	7.30	0.24	-2.50	3.44	0.84	0.41	0.16



# Alt Model-Shift Uniqueness Test

002167444-03, P = 59.955639 Days, E = 148.028291 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
15.6	5.64	5.22	7.12	5.27	3.00	2.00	10.4	8.46	0.42	-1.48	2.59	1.02	0.31	1.60



### Stellar Parameters For KIC 002167444

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7239^{+230}_{-374}$	$4.129^{+0.128}_{-0.192}$	$0.020^{+0.200}_{-0.350}$	$1.781^{+0.563}_{-0.375}$	$1.558^{+0.212}_{-0.259}$	$0.388^{+0.254}_{-0.195}$
	+3%/-5%	+3%/-5%	+1000%/-1750%	+32%/-21%	+14%/-17%	+65%/-50%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 002167444-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-3292 \pm 460$	$36.27^{+30.82}_{-23.95}$	$1016^{+83}_{-72}$	$4191^{+2585}_{-747}$	$163^{+1319}_{-118}$
Alt.	$-3294 \pm 584$	$33.02^{+31.57}_{-21.86}$	$1015^{+78}_{-72}$	$4379^{+2775}_{-915}$	$198^{+1414}_{-148}$

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

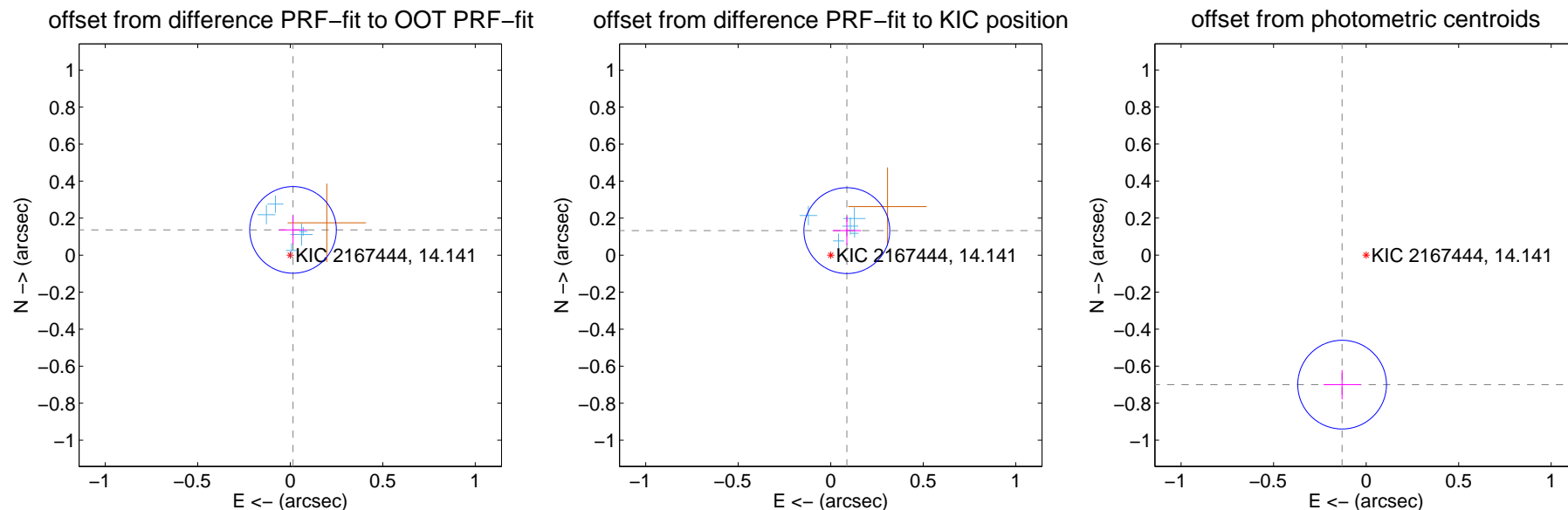
## DV Centroid Data

Supplemental centroid analysis for 002167444-03. Kepler magnitude: 14.14. Transit SNR 15.95

There are 5 quarters with good PRF difference image offsets

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

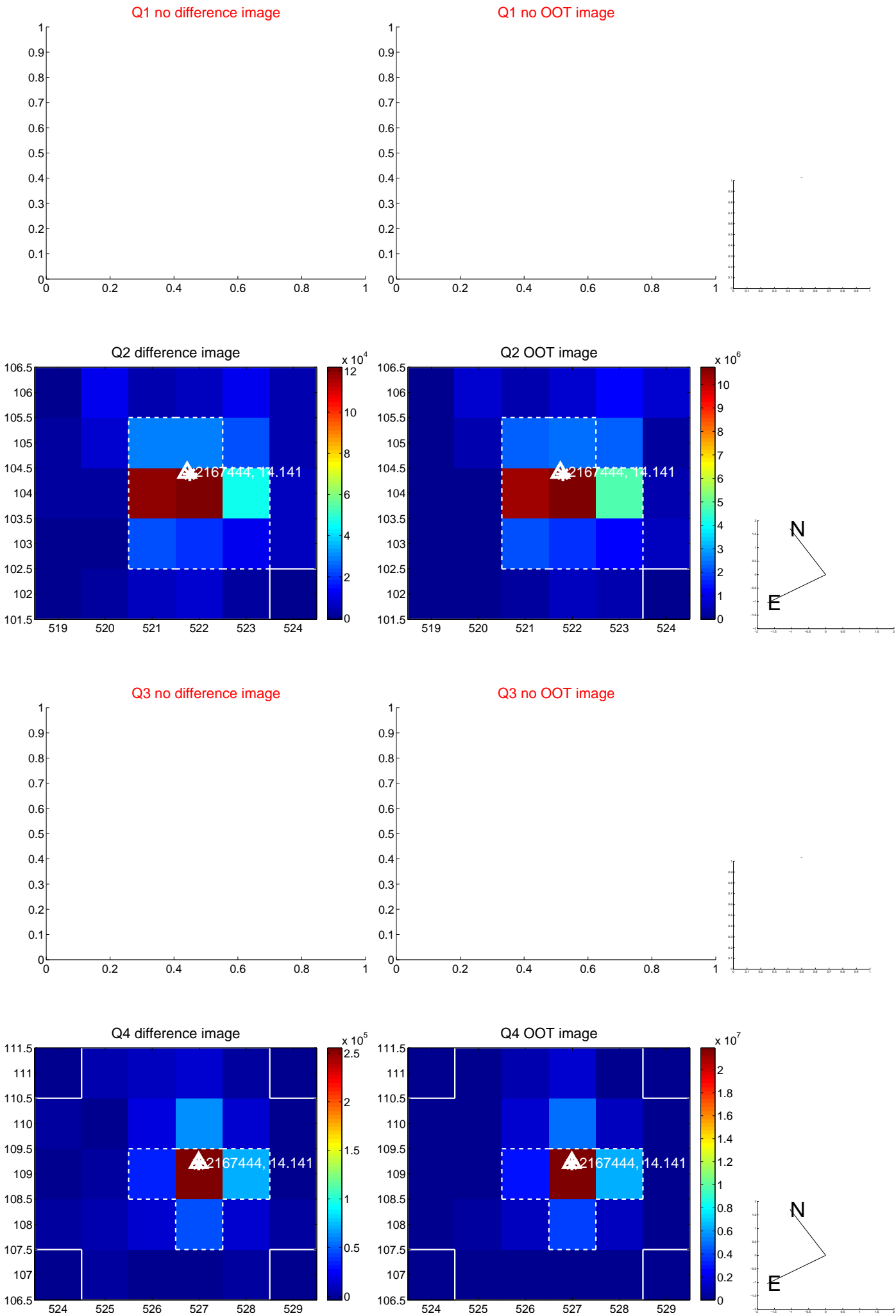
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.137 \pm 0.078$	1.76	$-0.015 \pm 0.076$	$0.136 \pm 0.078$
PRF-fit source offset from KIC position	$0.159 \pm 0.077$	2.05	$-0.087 \pm 0.077$	$0.133 \pm 0.077$
photometric centroid source offset	$0.71 \pm 0.08$	8.91	$0.13 \pm 0.10$	$-0.70 \pm 0.08$



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.



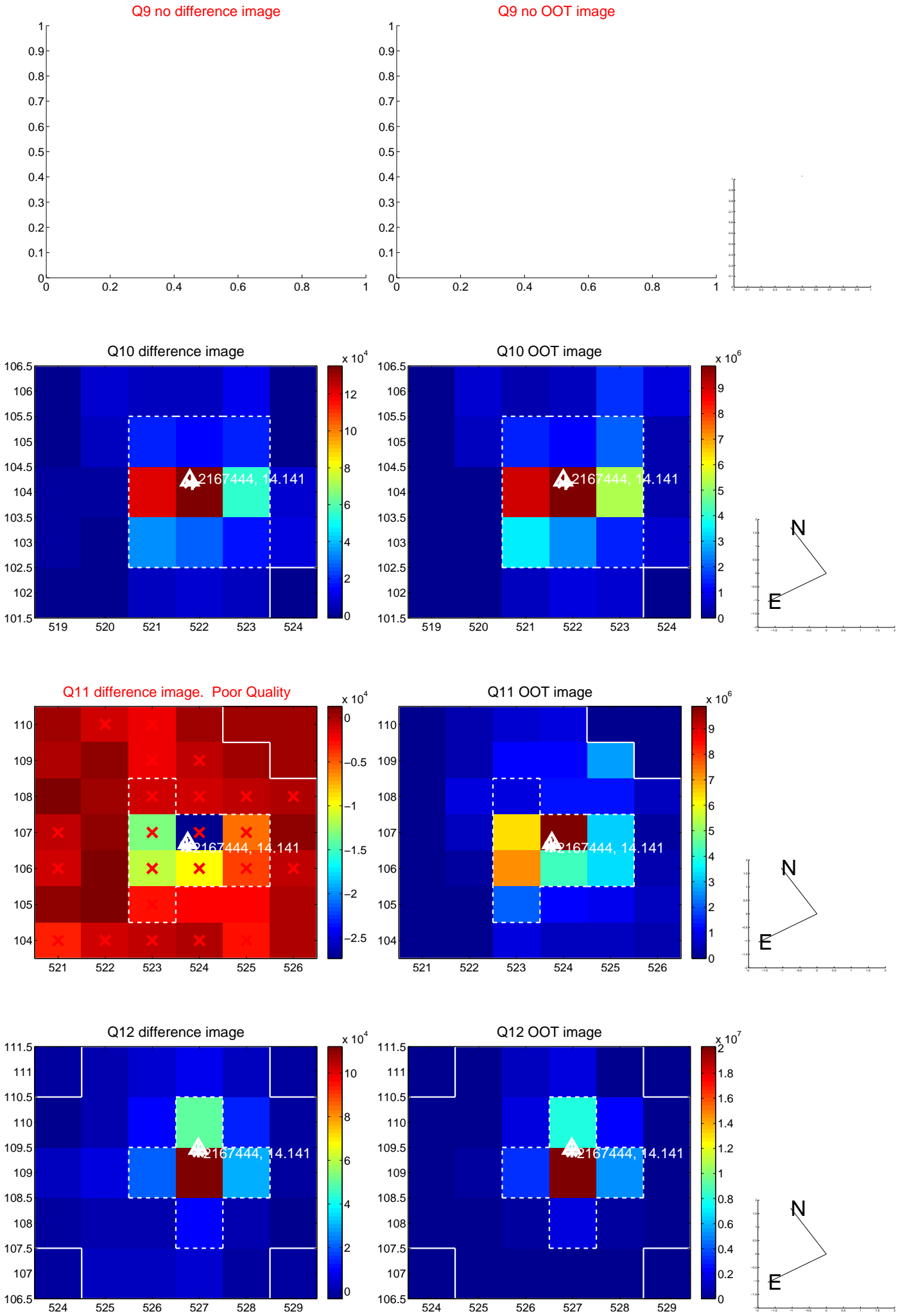
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



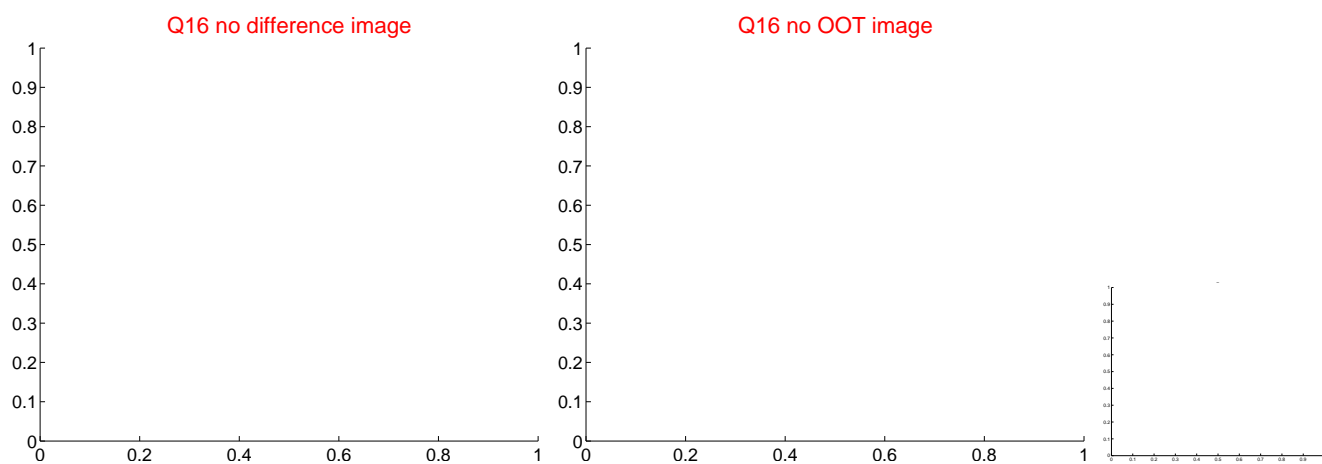
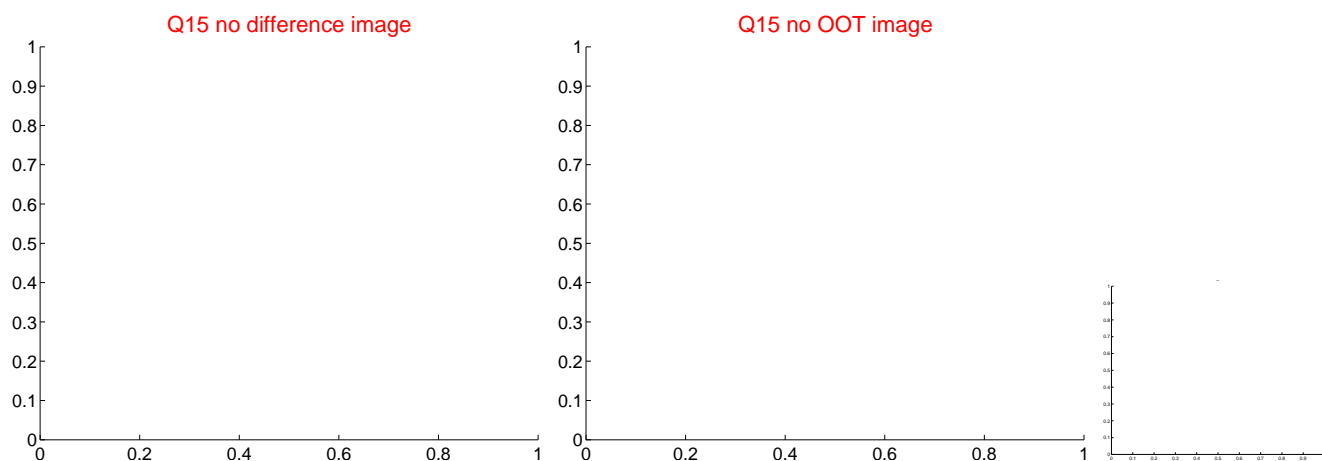
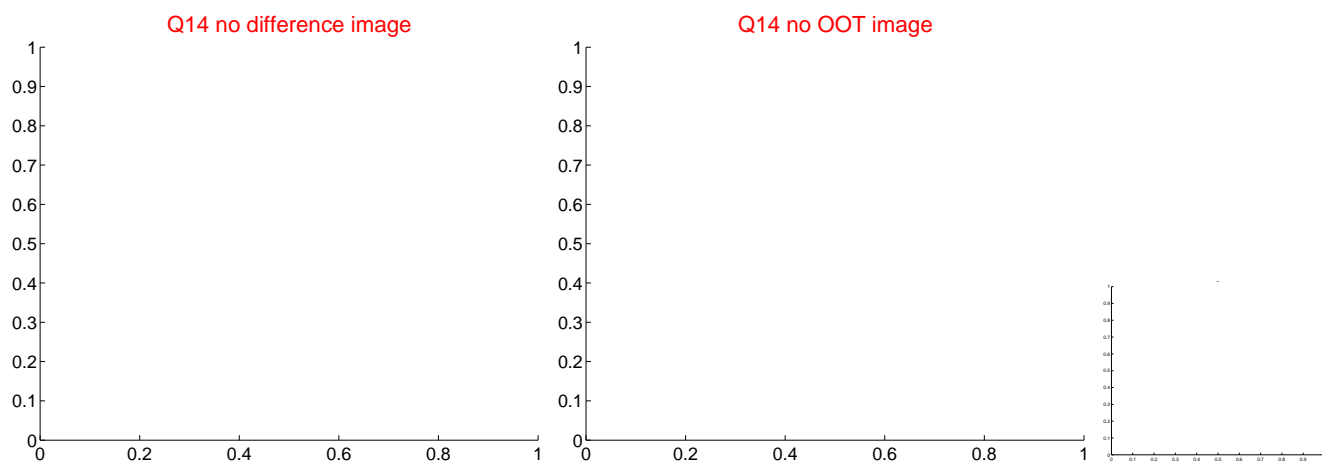
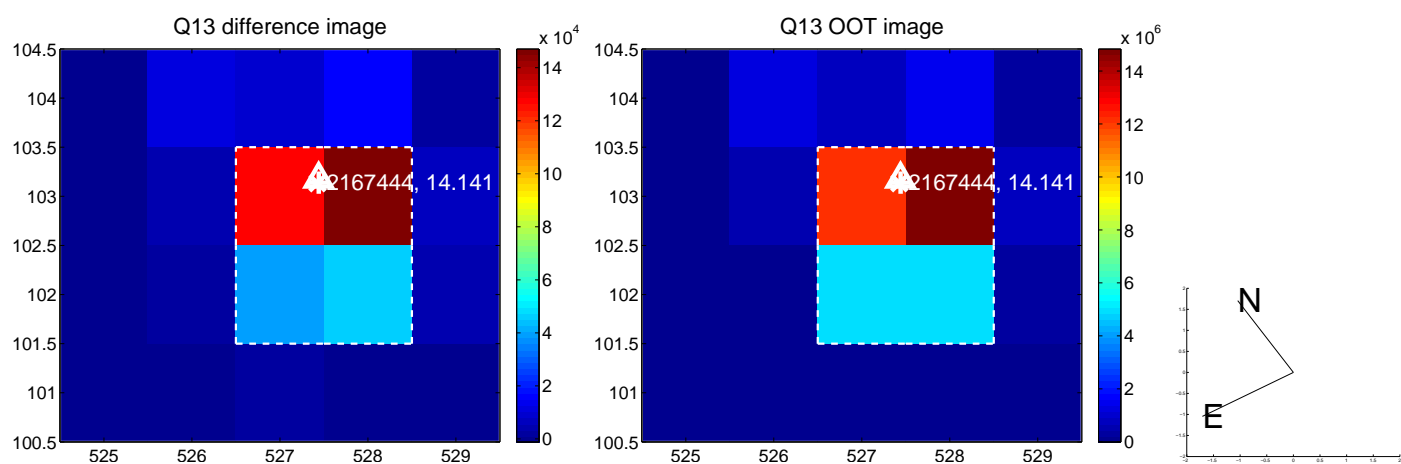
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



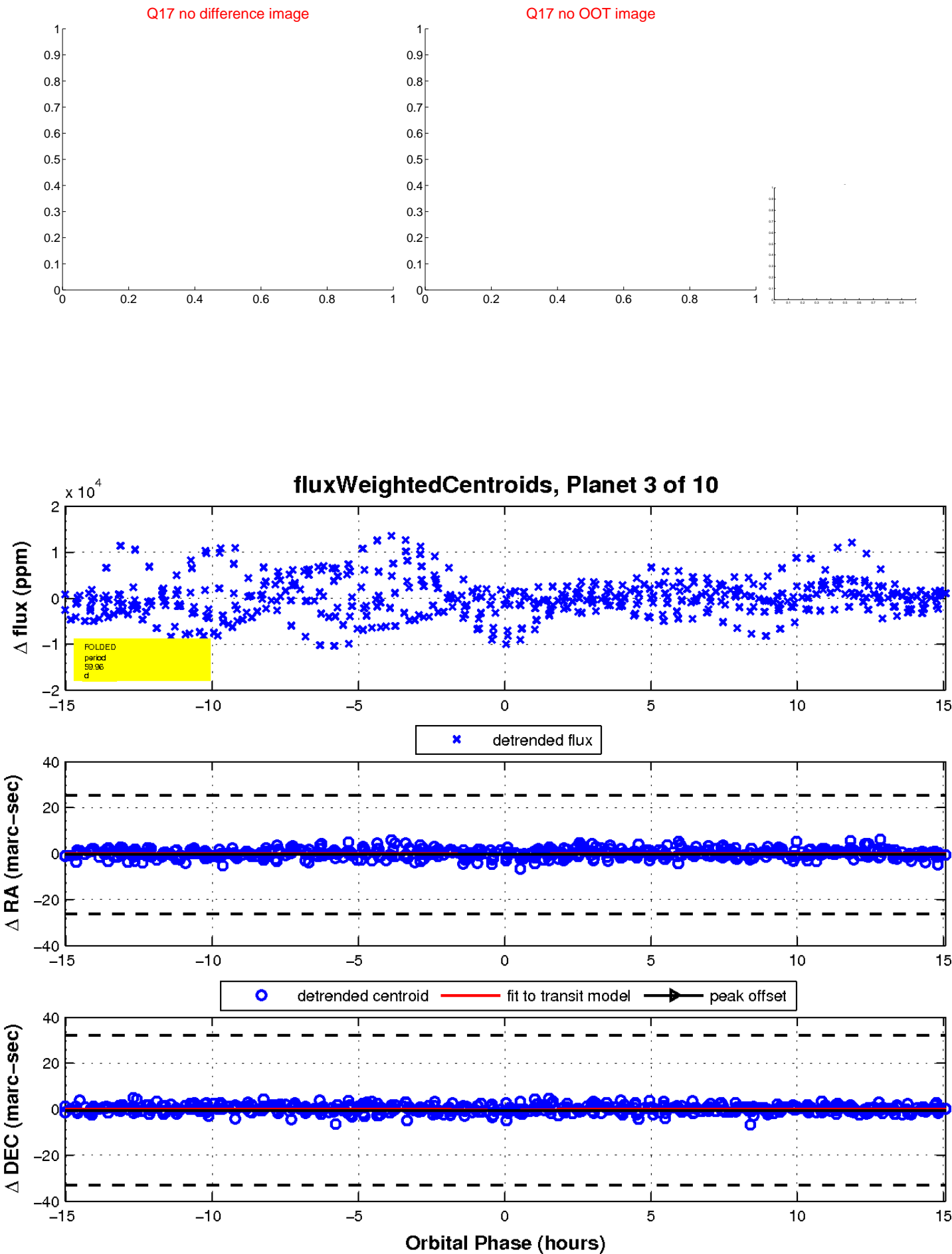
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

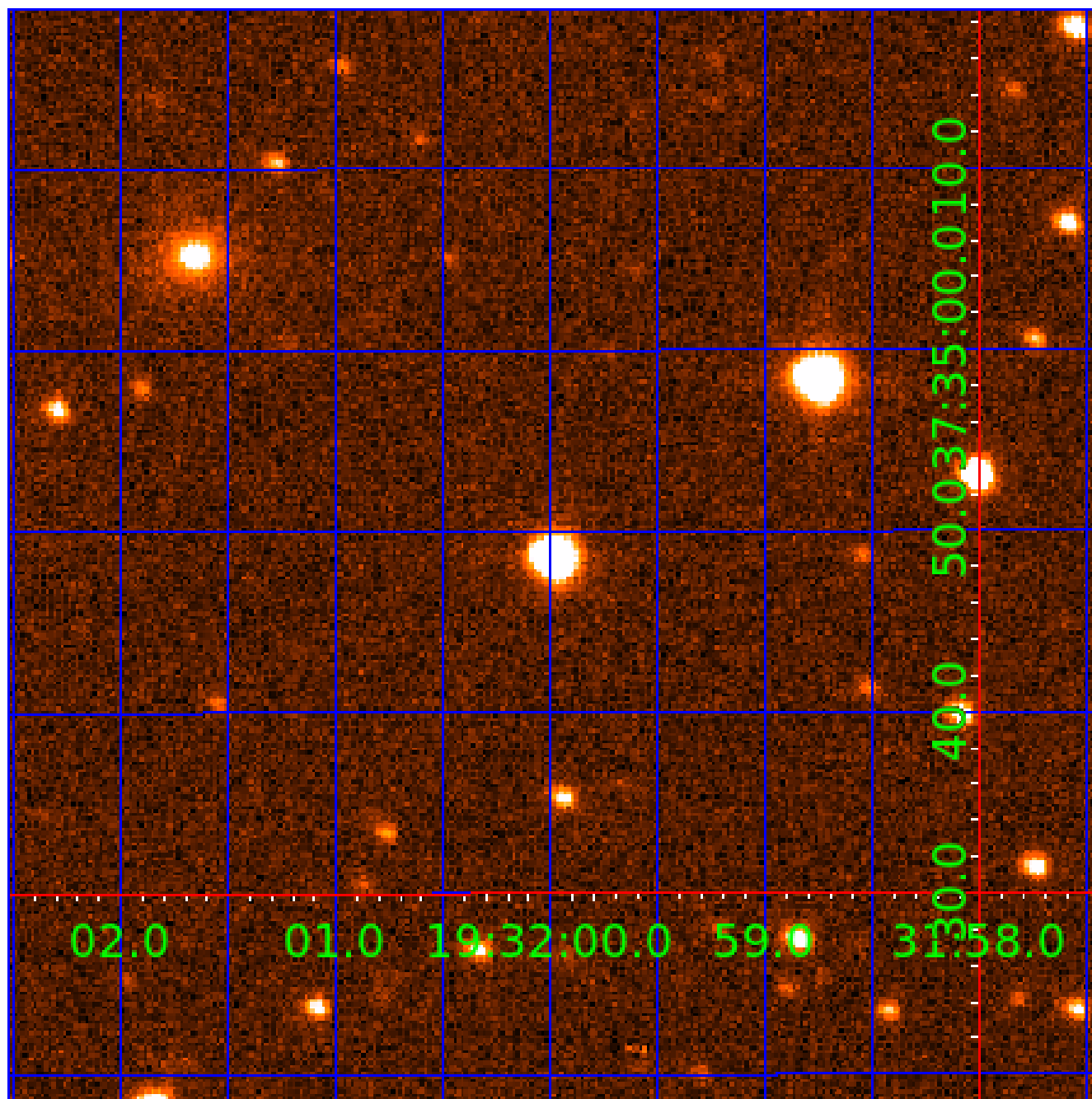


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 002167444

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002167444-01	OBS	6261.01	2.436132	133.461910	183.6	13.847	14.6	2.7	1.78	7239	2.51	4625.06
002167444-02	OBS	No	41.767300	133.051118	9768.1	4.645	17.3	16.9	1.78	7239	22.40	104.62
002167444-03	OBS	No	59.957046	148.015307	8629.5	5.029	16.6	16.0	1.78	7239	24.89	64.61
002167444-04	OBS	No	18.853189	138.257909	6213.5	4.514	13.9	16.2	1.78	7239	23.94	302.14
002167444-05	OBS	No	55.971983	138.453394	7128.2	4.837	13.9	13.2	1.78	7239	26.48	70.81
002167444-06	OBS	No	50.694800	164.270937	6960.6	4.426	13.0	14.1	1.78	7239	19.97	80.80
002167444-07	OBS	No	31.334397	148.069009	5987.4	4.388	12.8	12.3	1.78	7239	24.13	153.47
002167444-09	OBS	No	43.476060	133.067820	6087.2	5.222	12.2	12.2	1.78	7239	17.15	99.17
002167444-10	OBS	No	71.875232	162.459931	4760.8	4.459	11.4	11.0	1.78	7239	19.78	50.73

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002167444-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV
002167444-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-03	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT
002167444-04	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
002167444-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-07	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-10	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

**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.

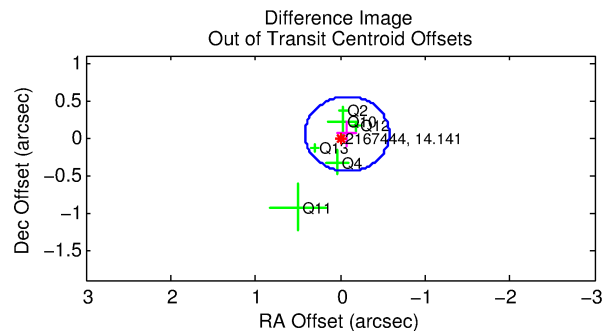
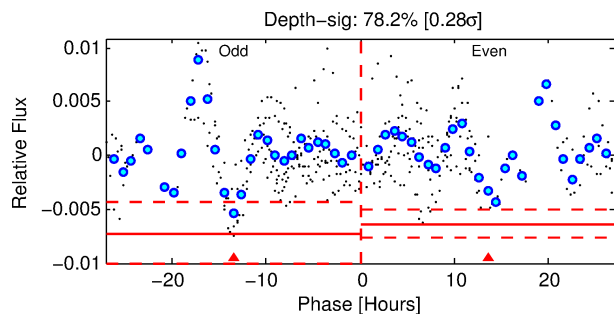
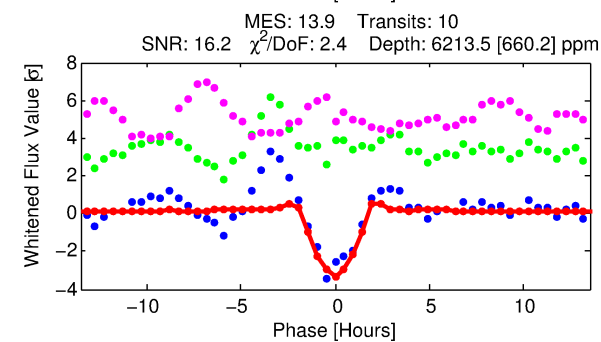
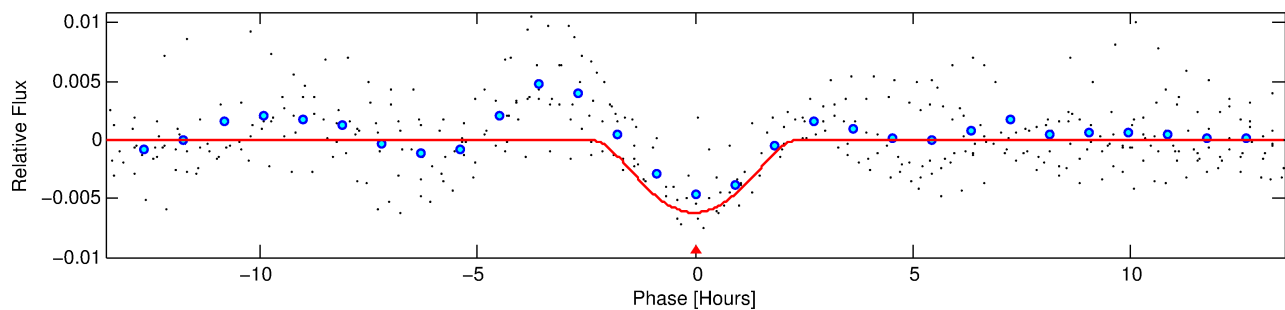
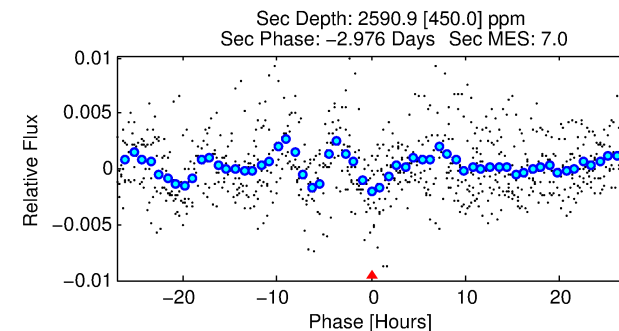
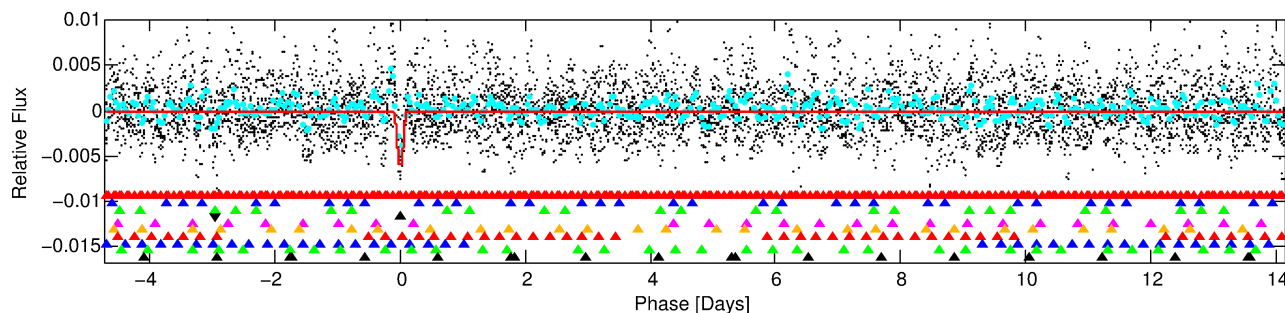
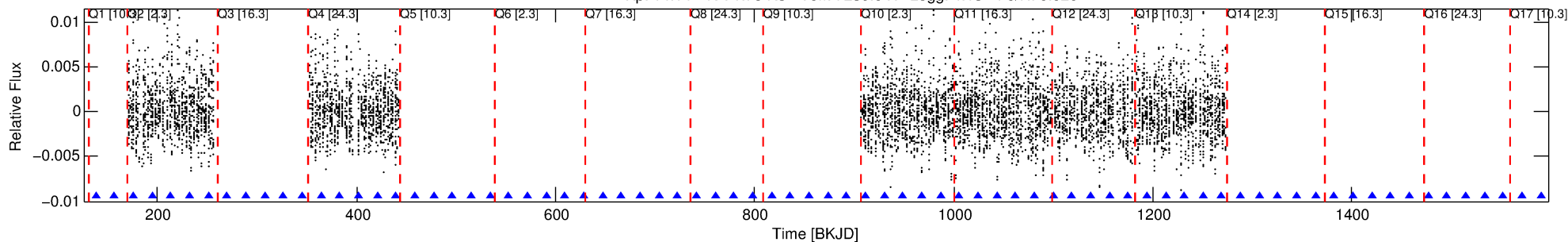
Ephemeris Match Information For 002167444-04

No Significant Match Found

# DV One-Page Summary

KIC: 2167444 Candidate: 4 of 10 Period: 18.853 d  
KOI: K06261 Corr: No Ephemeris Match

Kp: 14.14 R\*: 1.78 Rs Teff: 7239.0 K Logg: 4.13 Fe/H: 0.020



## DV Fit Results:

Period = 18.85319 [0.00019] d  
Epoch = 138.2579 [0.0081] BKJD  
Rp/R\* = 0.1232 [0.2300]  
a/R\* = 16.78 [5.92]  
b = 0.99 [0.34]  
Seff = 302.14 [126.03]  
Teff = 1063 [111] K  
Rp = 23.94 [45.34] Re  
a = 0.1607 [0.0413] AU  
Ag = 64.25 [241.35] [0.26σ]  
Teffp = 4653 [4357] K [0.82σ]

## DV Diagnostic Results:

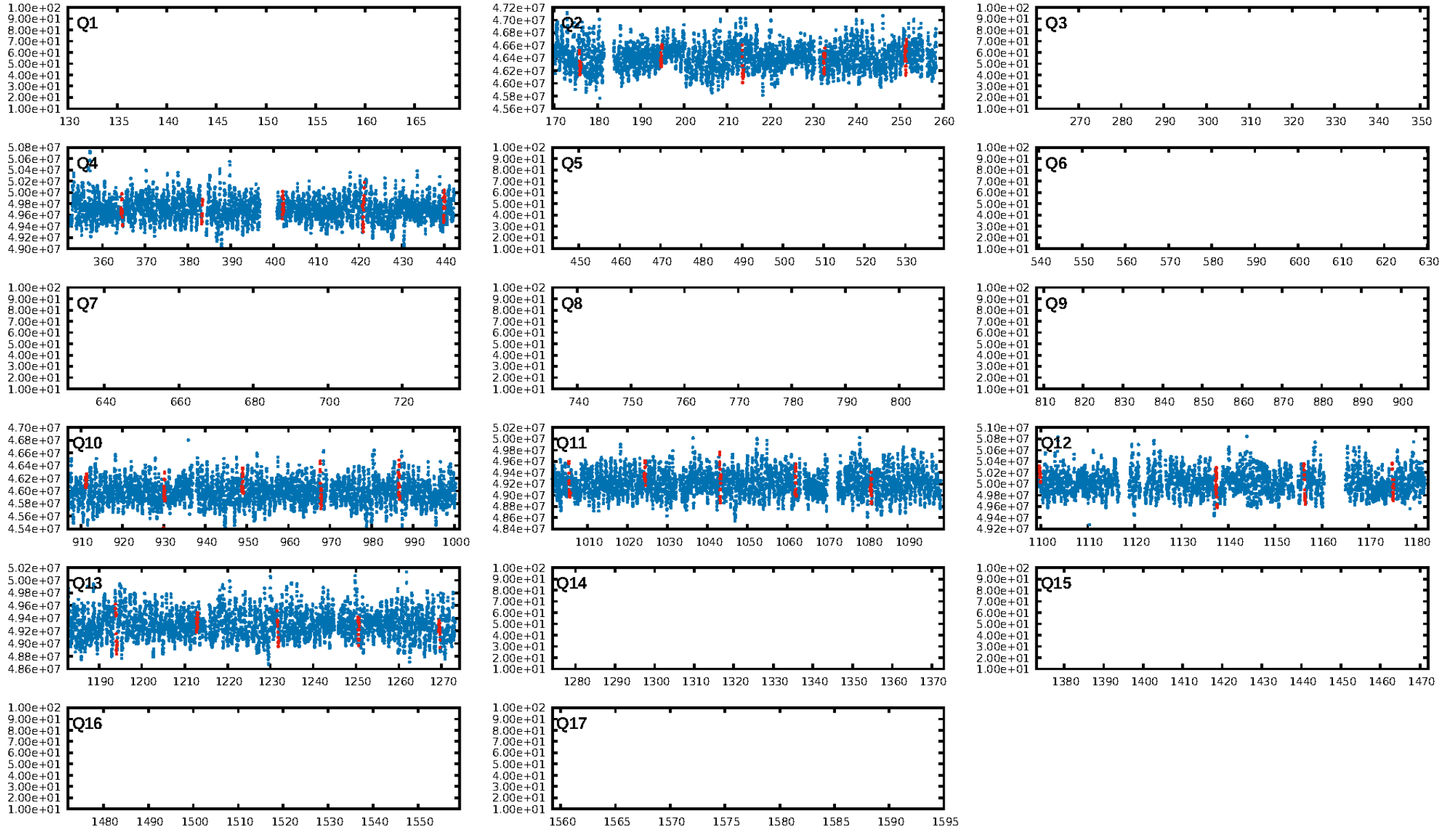
ShortPeriod-sig: 100.0% [27.05σ]  
LongPeriod-sig: 100.0% [47.58σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 70.2%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [10/10]  
GhostDiagnostic-chr: 4.742  
Centroid-sig: 8.9%  
Centroid-so: 0.721 arcsec [11.67σ]  
OotOffset-rm: 0.094 arcsec [0.57σ]  
KicOffset-rm: 0.147 arcsec [0.92σ]  
OotOffset-st: 2/1/2/1 [6]  
KicOffset-st: 2/1/2/1 [6]  
DiffImageQuality-fgm: 0.83 [5/6]  
DiffImageOverlap-fno: 1.00 [6/6]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 03:47:00 Z

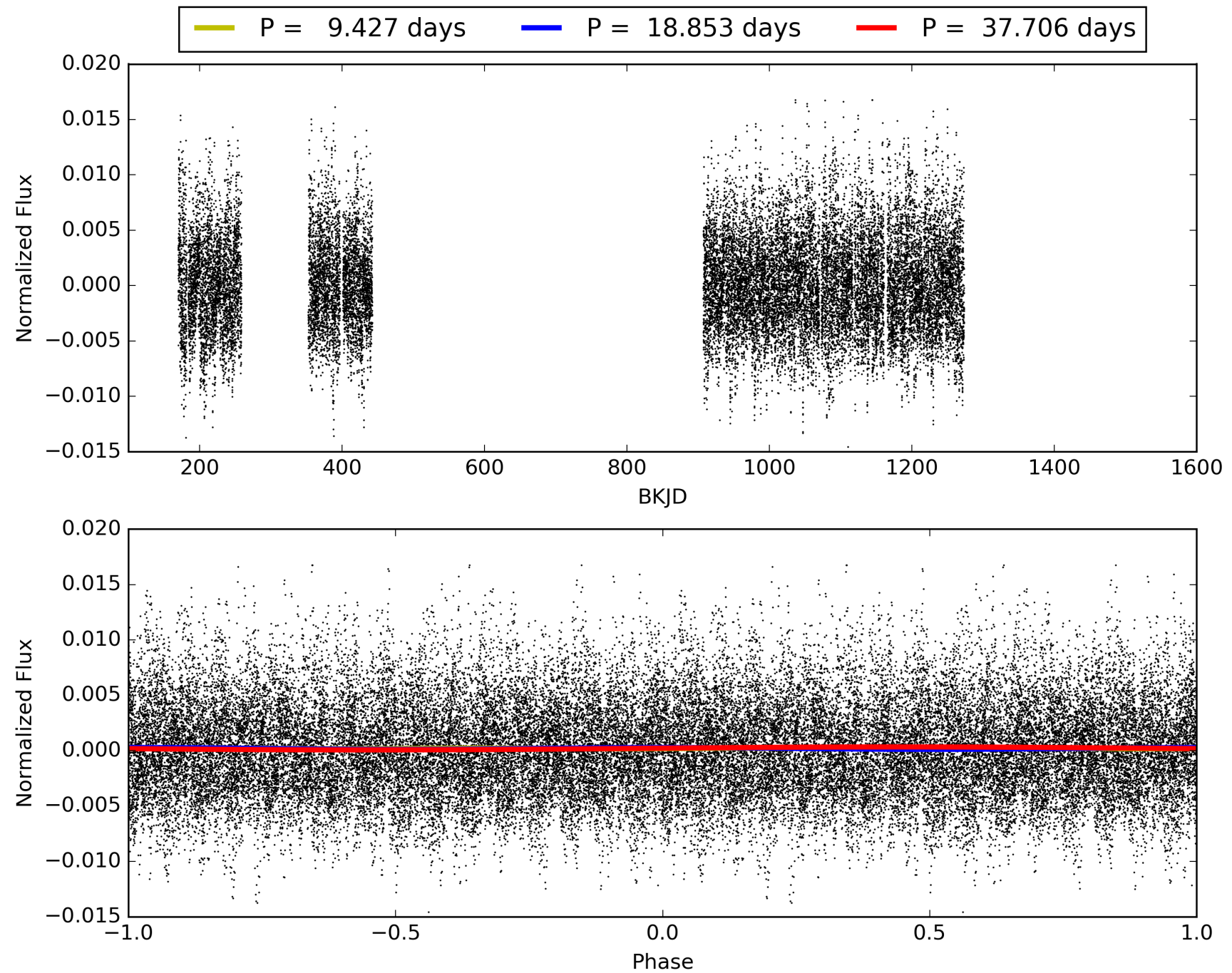
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 002167444-04, PDC Light Curves

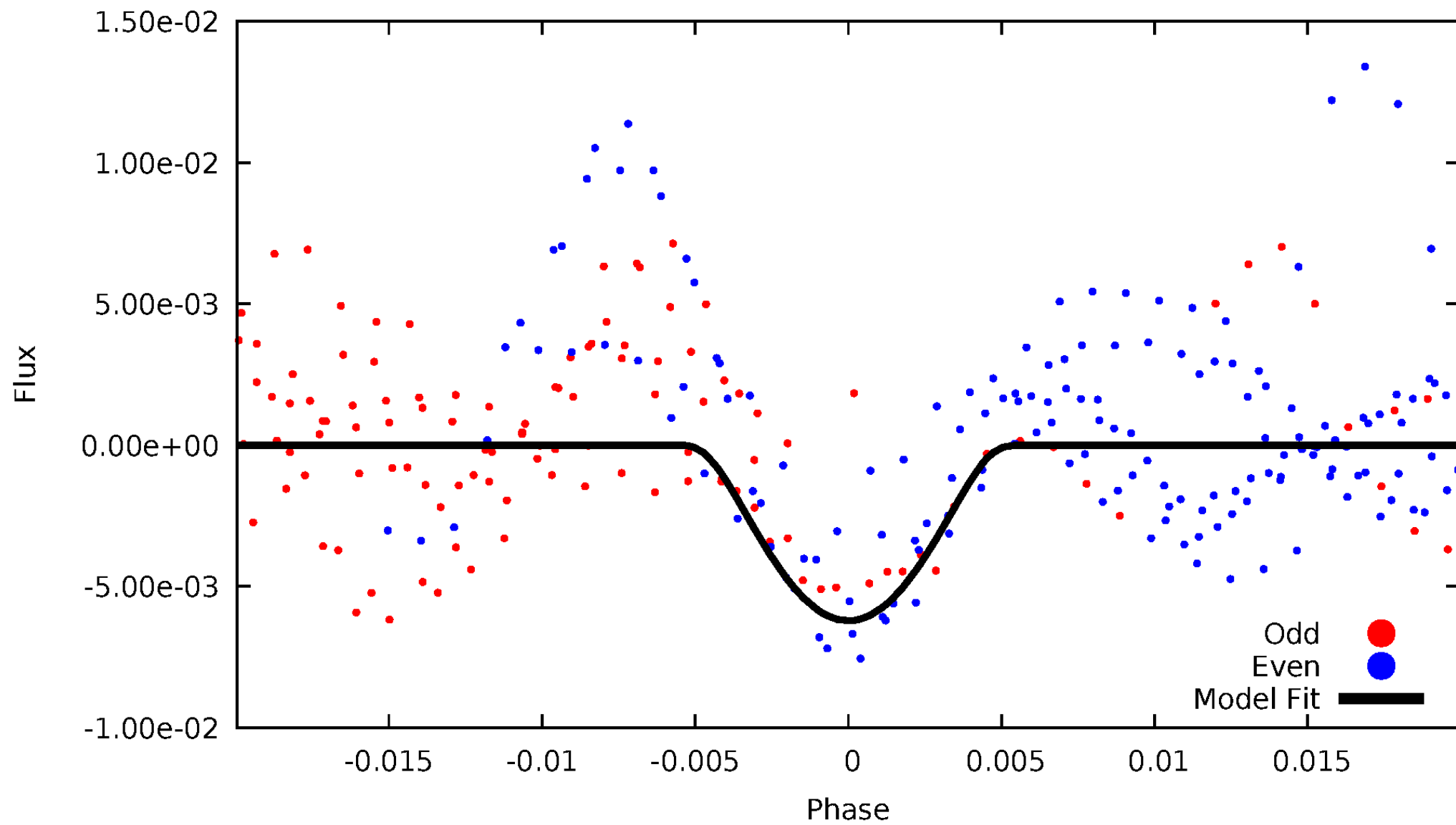


# TCE 002167444-04



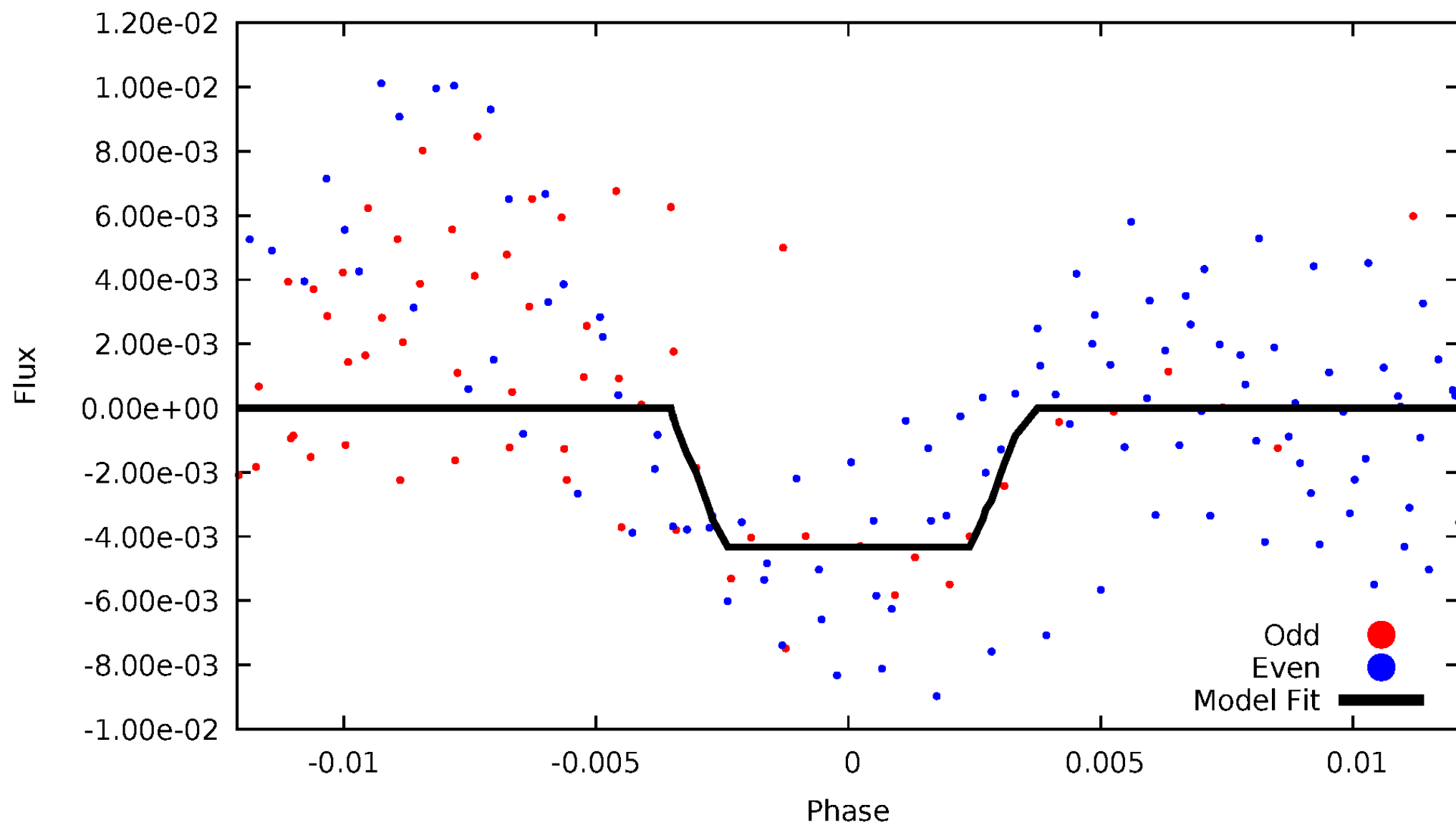
# DV Odd/Even

TCE 002167444-04



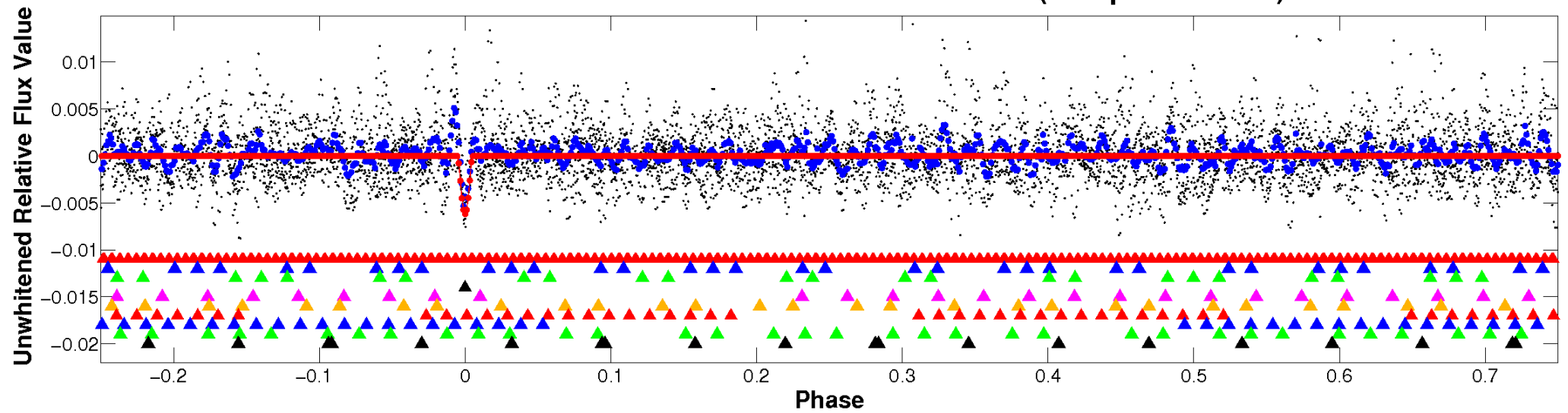
# ALT Odd/Even

TCE 002167444-04

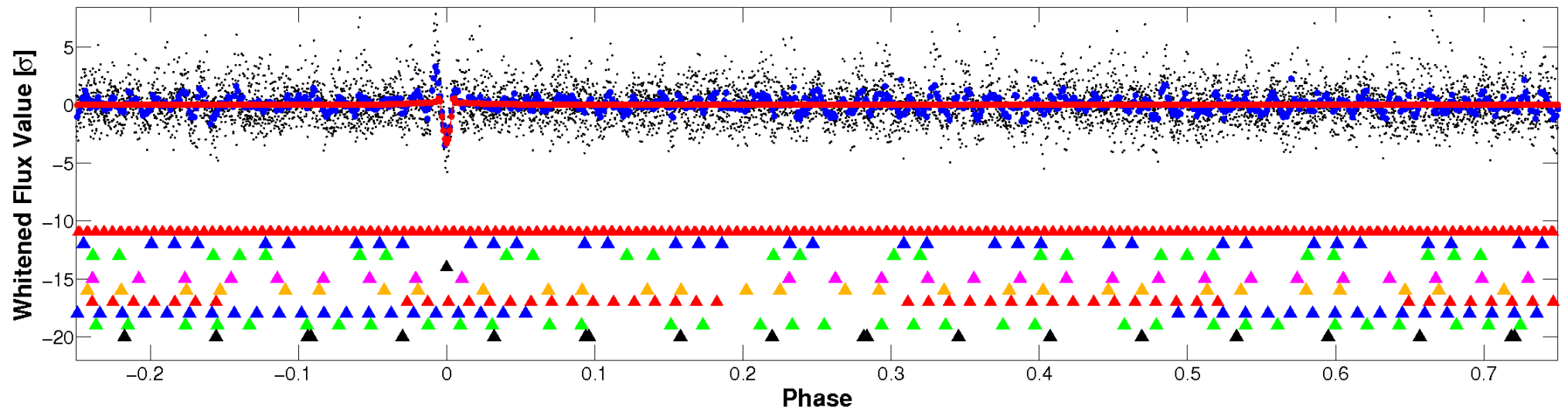


# Non-Whitened Vs. Whitened Light Curve

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



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



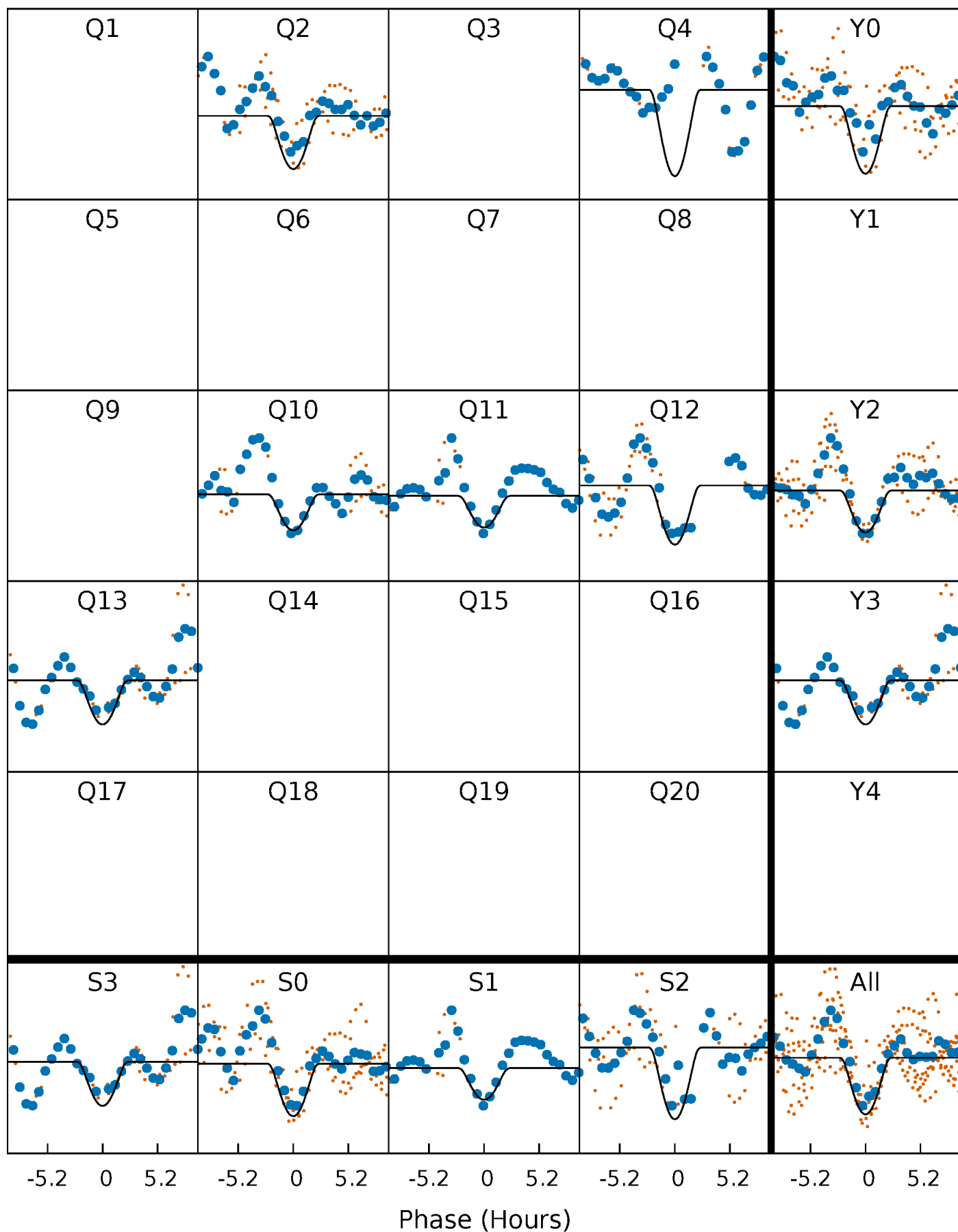
# PDC Quarter-Phased Transit Curves

TCE 002167444-04 P= 18.853189 Days  $T_0=138.257909$  (BKJD)



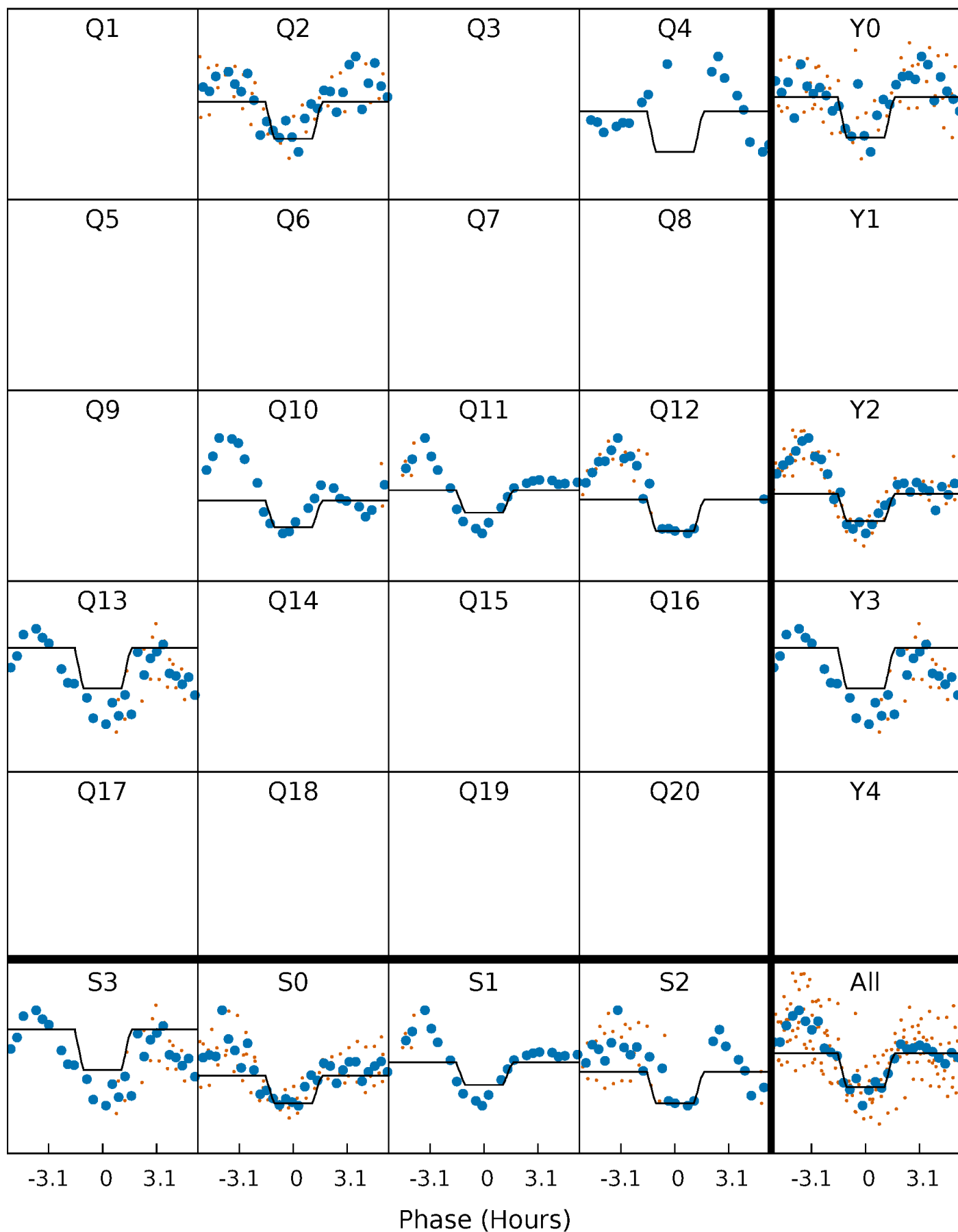
# DV Quarter-Phased Transit Curves

TCE 002167444-04 P= 18.853189 Days  $T_0=138.257909$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 002167444-04 P= 18.852727 Days  $T_0=138.291799$  (BKJD)

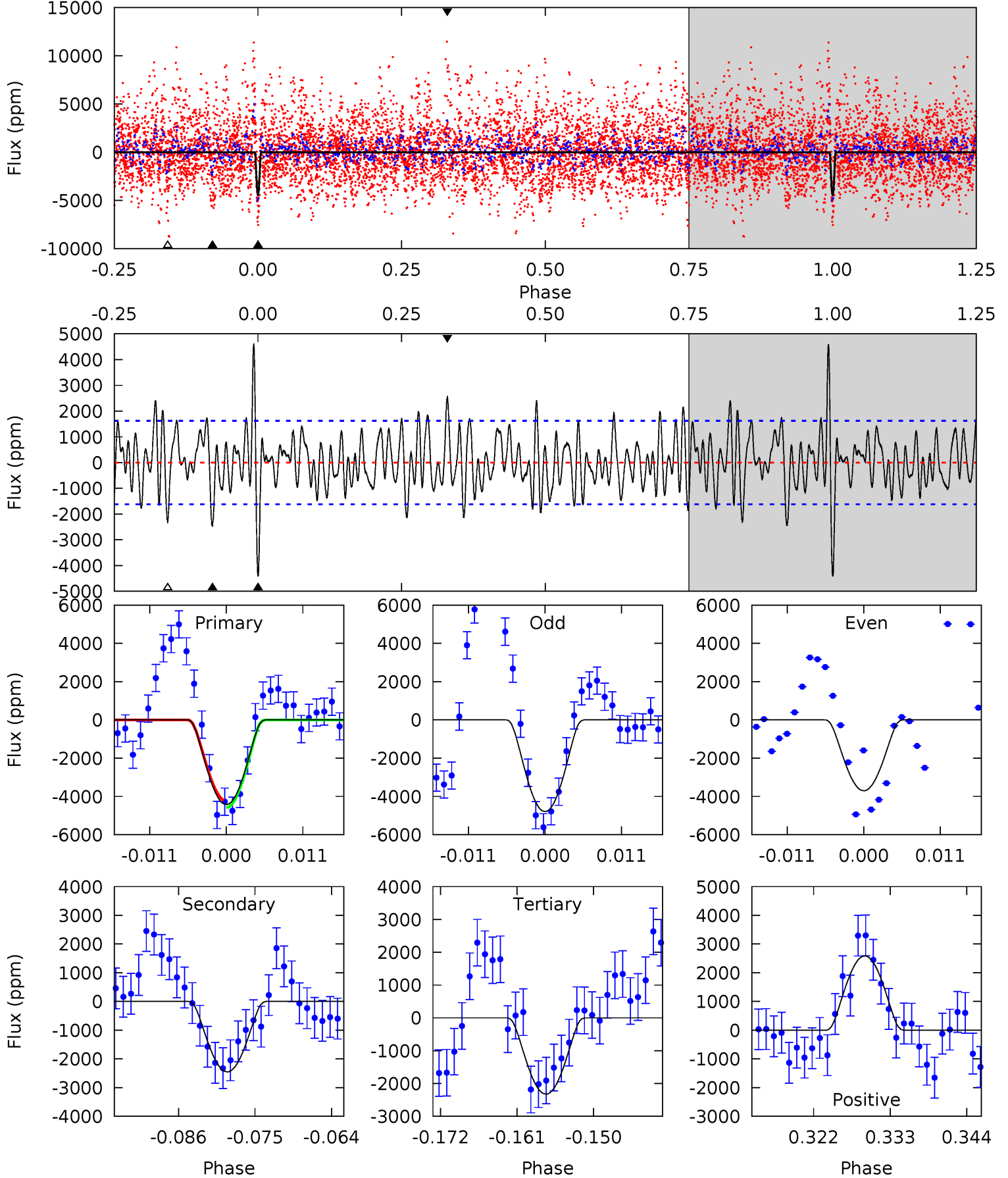




# DV Model-Shift Uniqueness Test

002167444-04, P = 18.853189 Days, E = 138.257909 Days

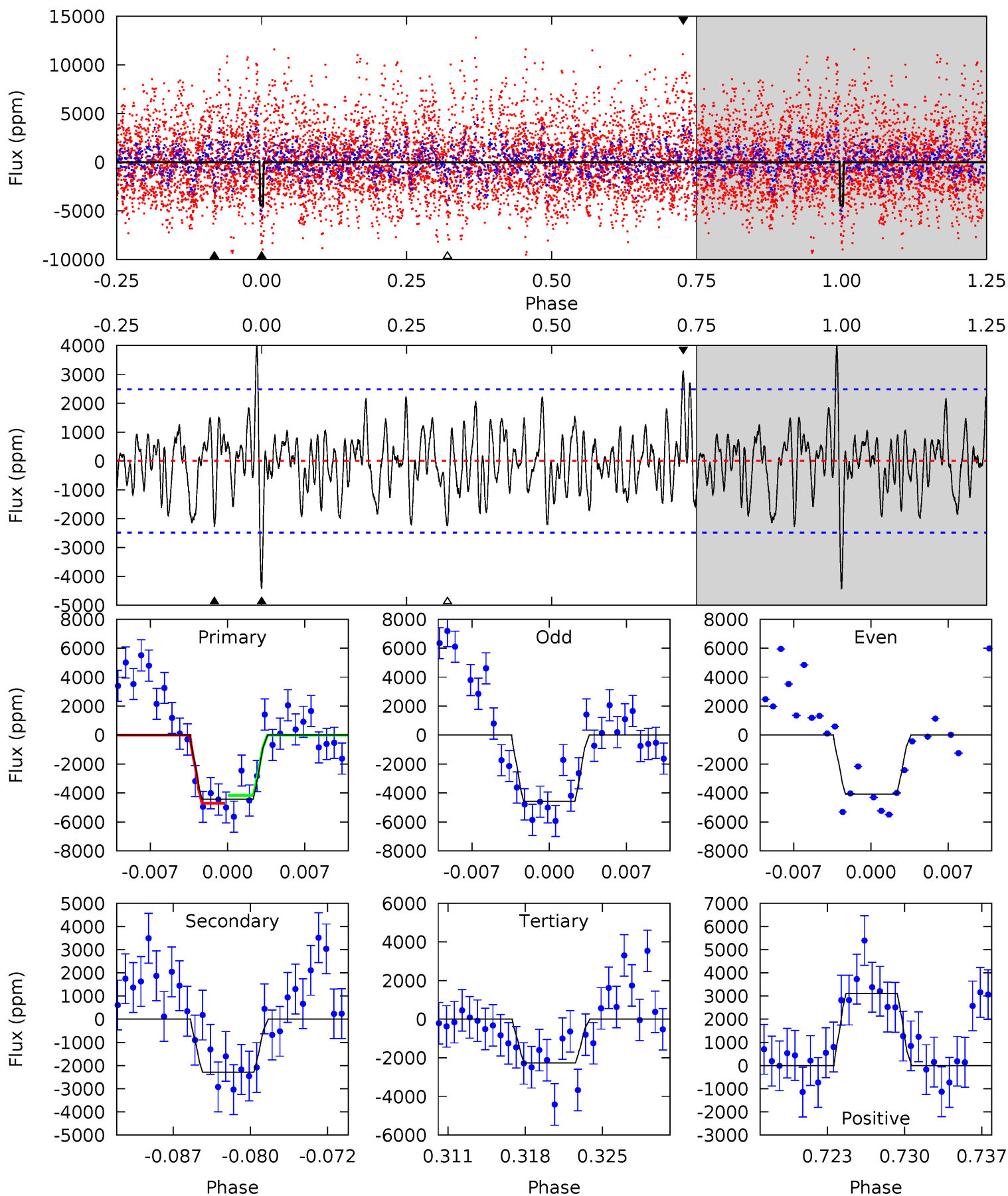
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.7	7.59	7.19	8.00	5.01	2.55	2.72	6.49	5.69	0.40	-0.41	1.66	0.49	0.51	0.60



# Alt Model-Shift Uniqueness Test

002167444-04, P = 18.852727 Days, E = 138.291799 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
9.05	4.68	4.62	6.35	5.09	2.69	1.89	4.43	2.70	0.06	-1.67	0.50	0.85	0.47	0.57



### Stellar Parameters For KIC 002167444

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7239^{+230}_{-374}$	$4.129^{+0.128}_{-0.192}$	$0.020^{+0.200}_{-0.350}$	$1.781^{+0.563}_{-0.375}$	$1.558^{+0.212}_{-0.259}$	$0.388^{+0.254}_{-0.195}$
	+3%/-5%	+3%/-5%	+1000%/-1750%	+32%/-21%	+14%/-17%	+65%/-50%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 002167444-04 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-2454 \pm 323$	$41.25^{+42.01}_{-27.88}$	$1498^{+114}_{-107}$	$3825^{+2277}_{-750}$	$20^{+168}_{-15}$
Alt.	$-2286 \pm 488$	$35.86^{+34.89}_{-25.11}$	$1493^{+118}_{-105}$	$3982^{+2467}_{-821}$	$26^{+237}_{-20}$

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

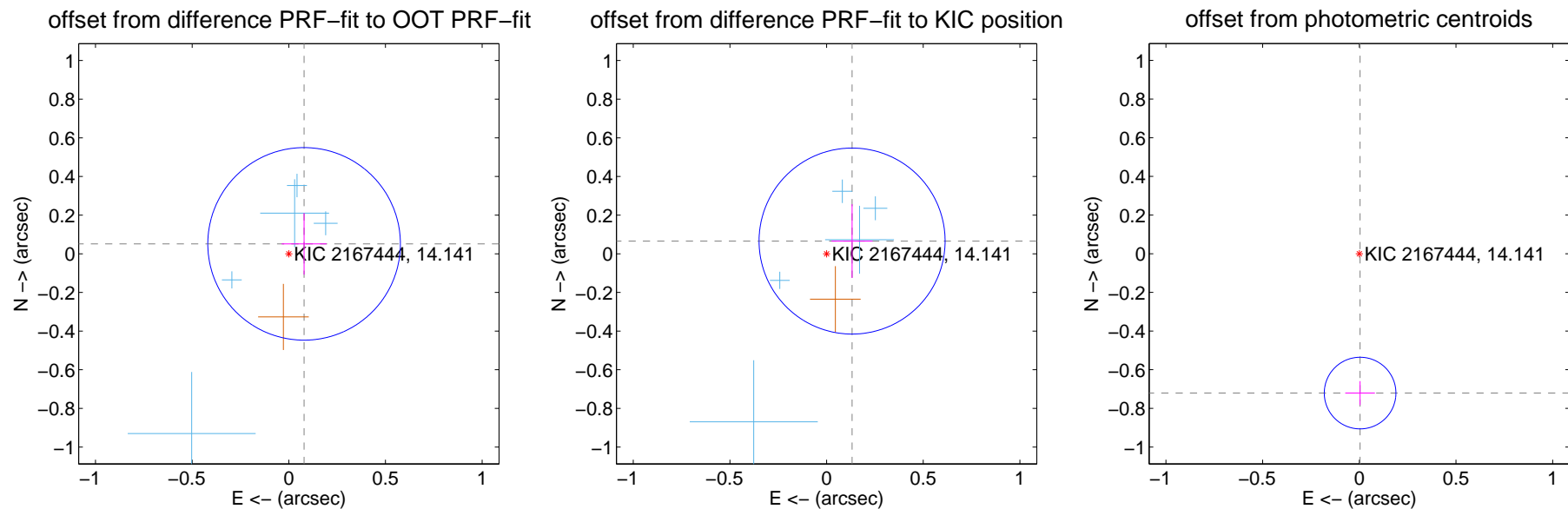
## DV Centroid Data

Supplemental centroid analysis for 002167444-04. Kepler magnitude: 14.14. Transit SNR 16.19

There are 5 quarters with good PRF difference image offsets

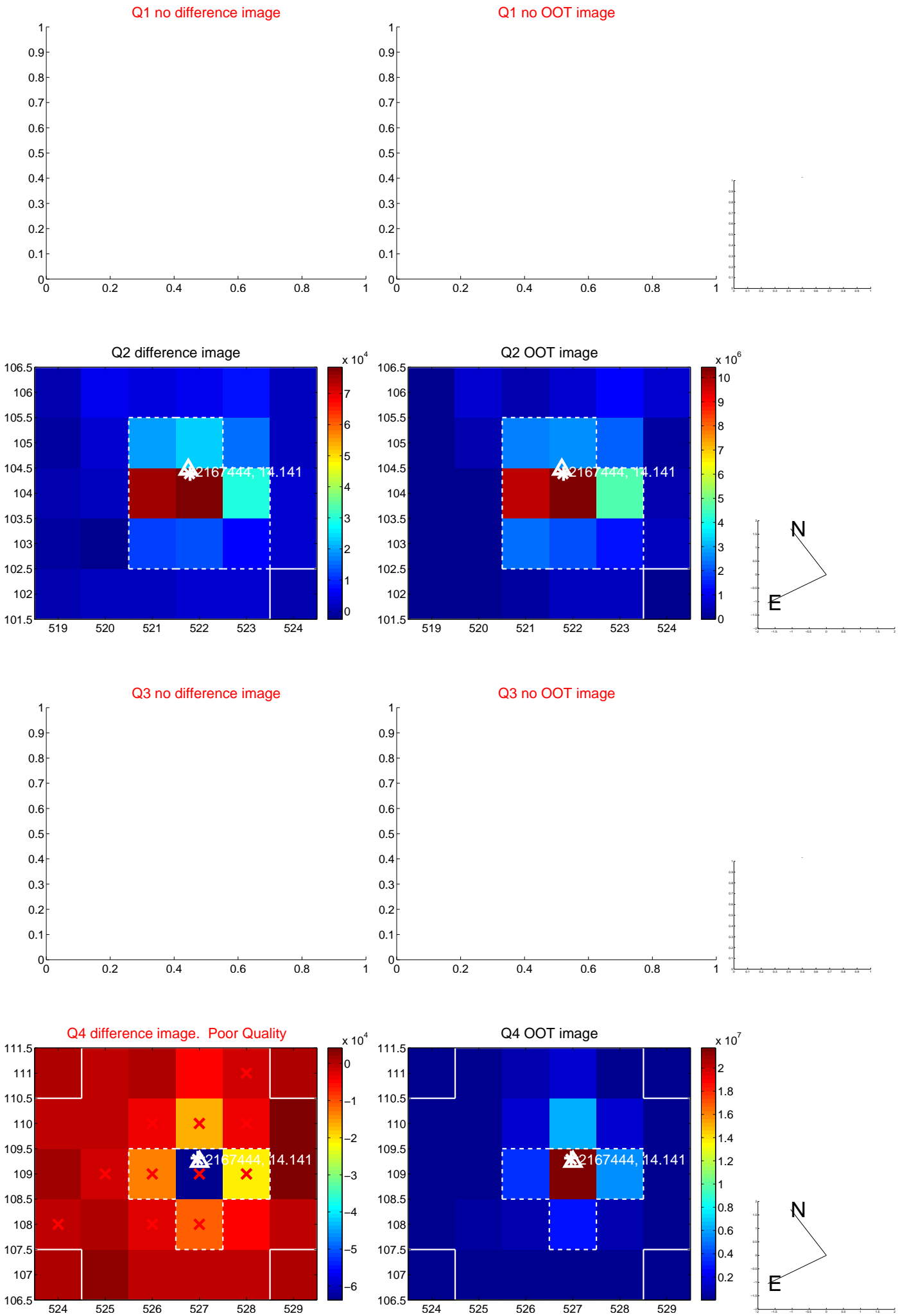
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.094 \pm 0.166$	0.57	$-0.079 \pm 0.116$	$0.051 \pm 0.159$
PRF-fit source offset from KIC position	$0.147 \pm 0.160$	0.92	$-0.132 \pm 0.106$	$0.066 \pm 0.191$
photometric centroid source offset	$0.72 \pm 0.06$	11.67	$-0.00 \pm 0.08$	$-0.72 \pm 0.06$

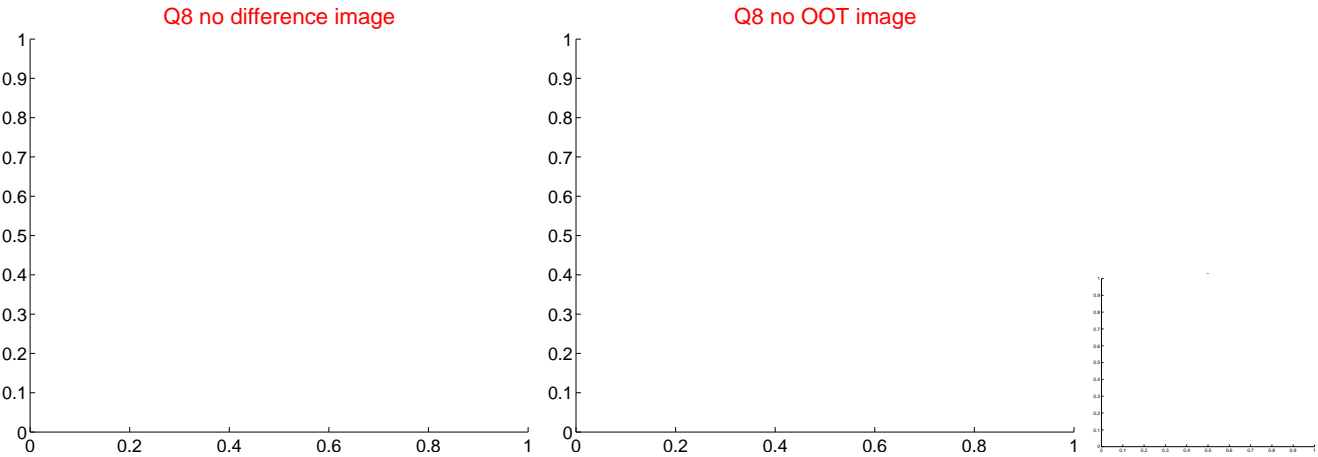
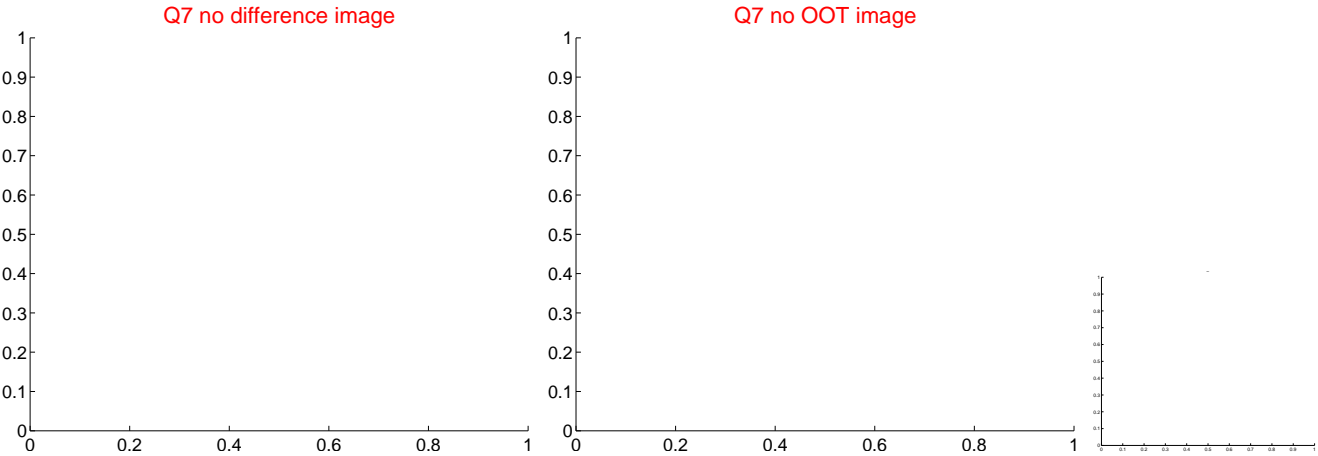
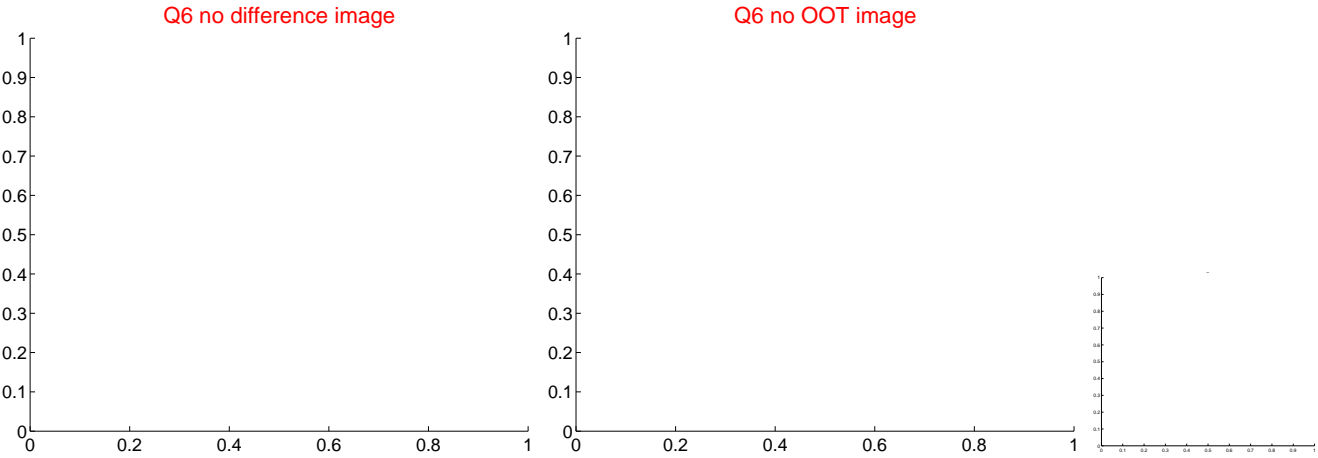
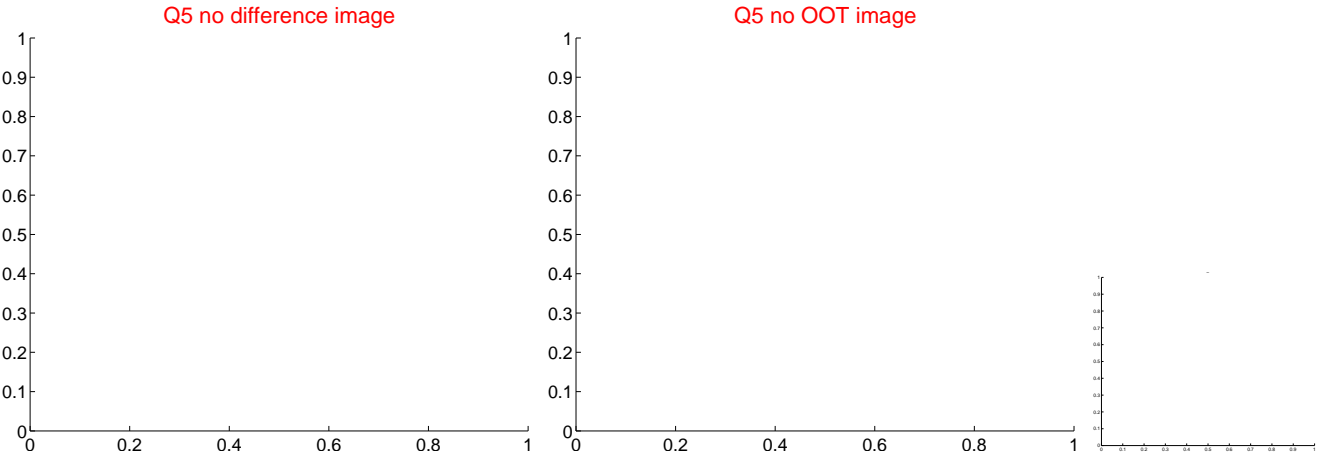


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

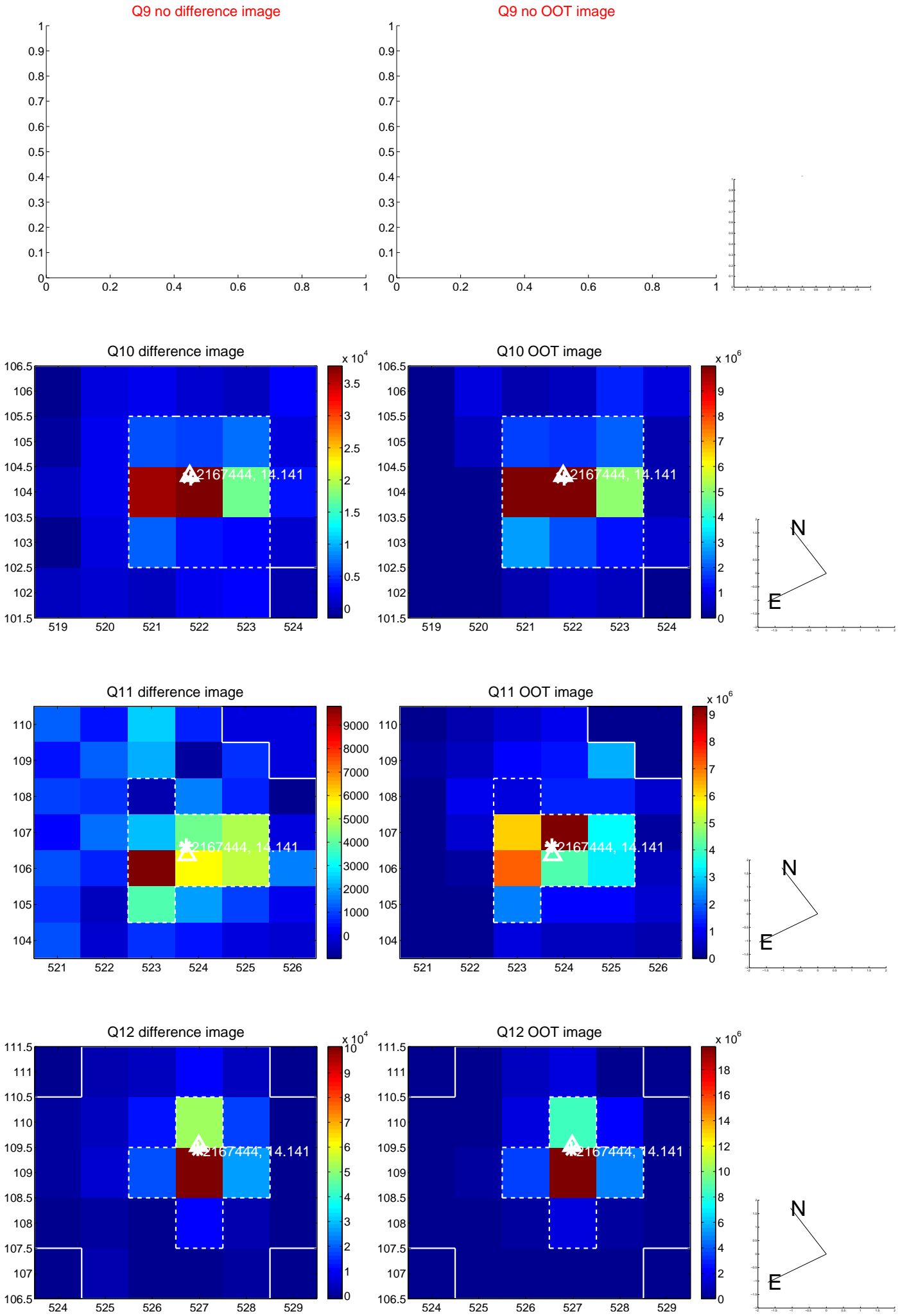
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



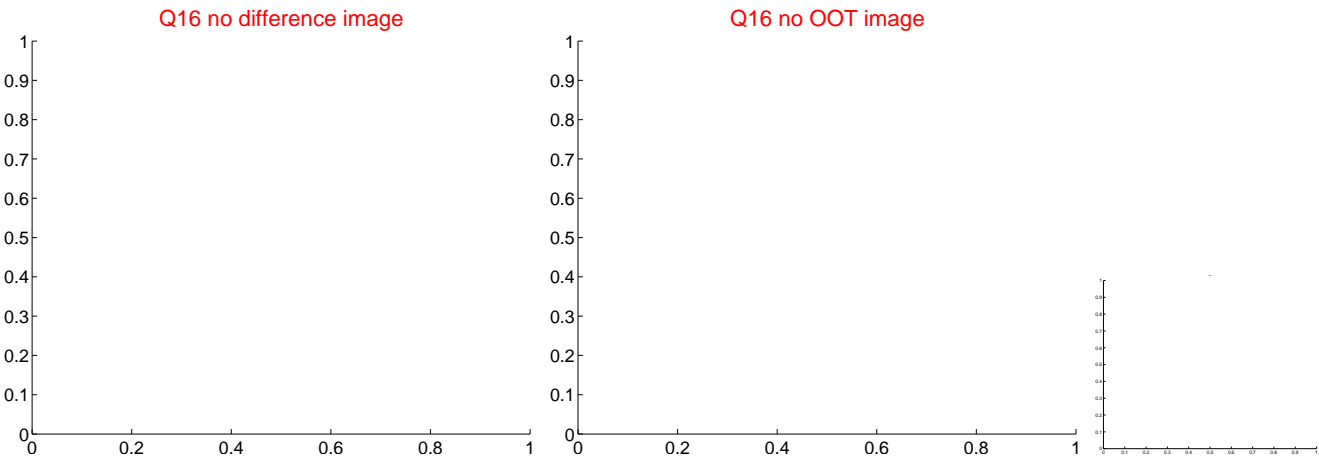
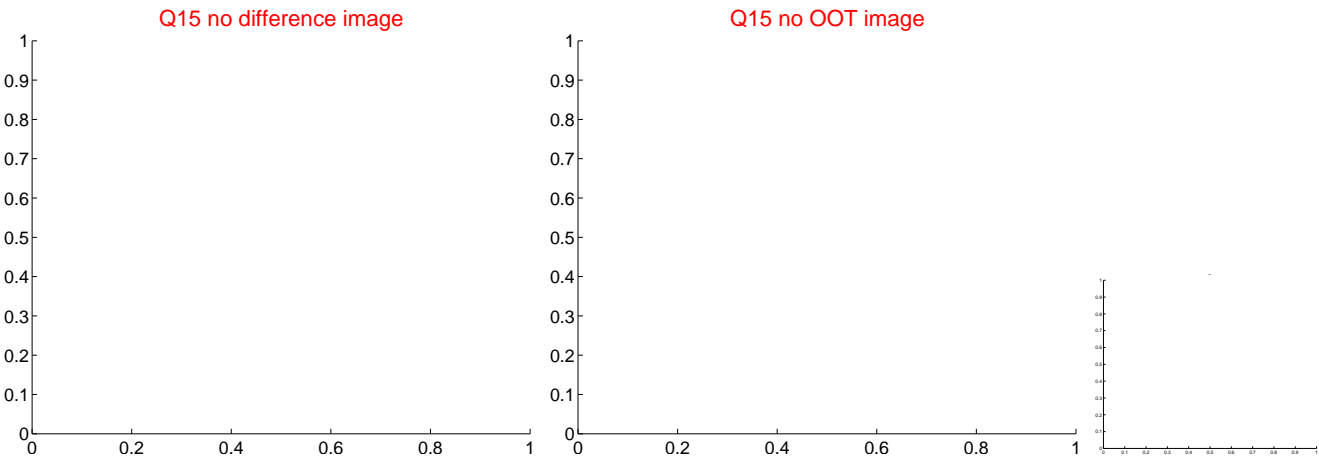
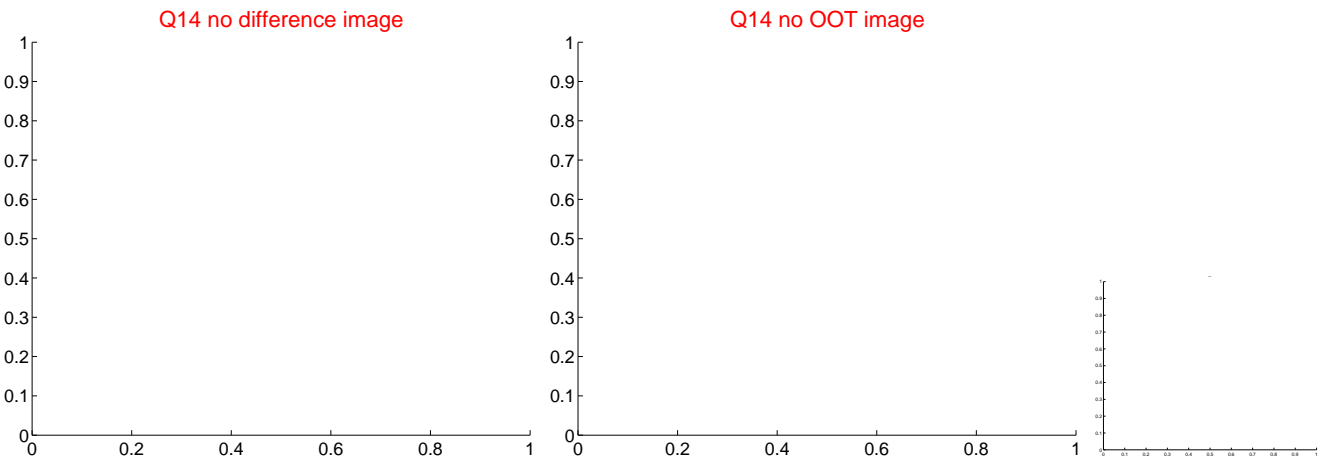
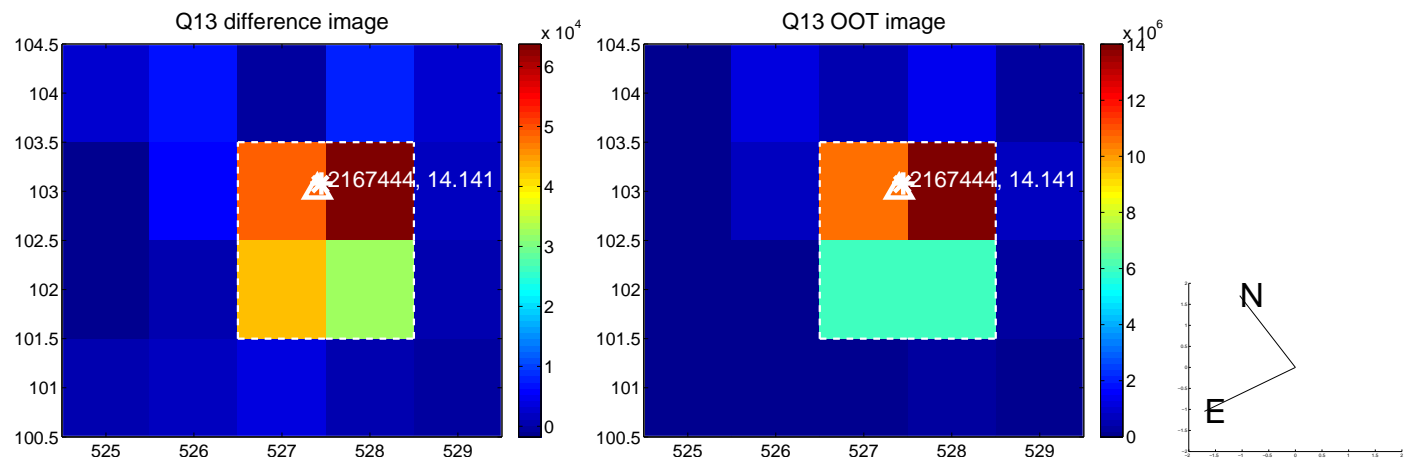
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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.

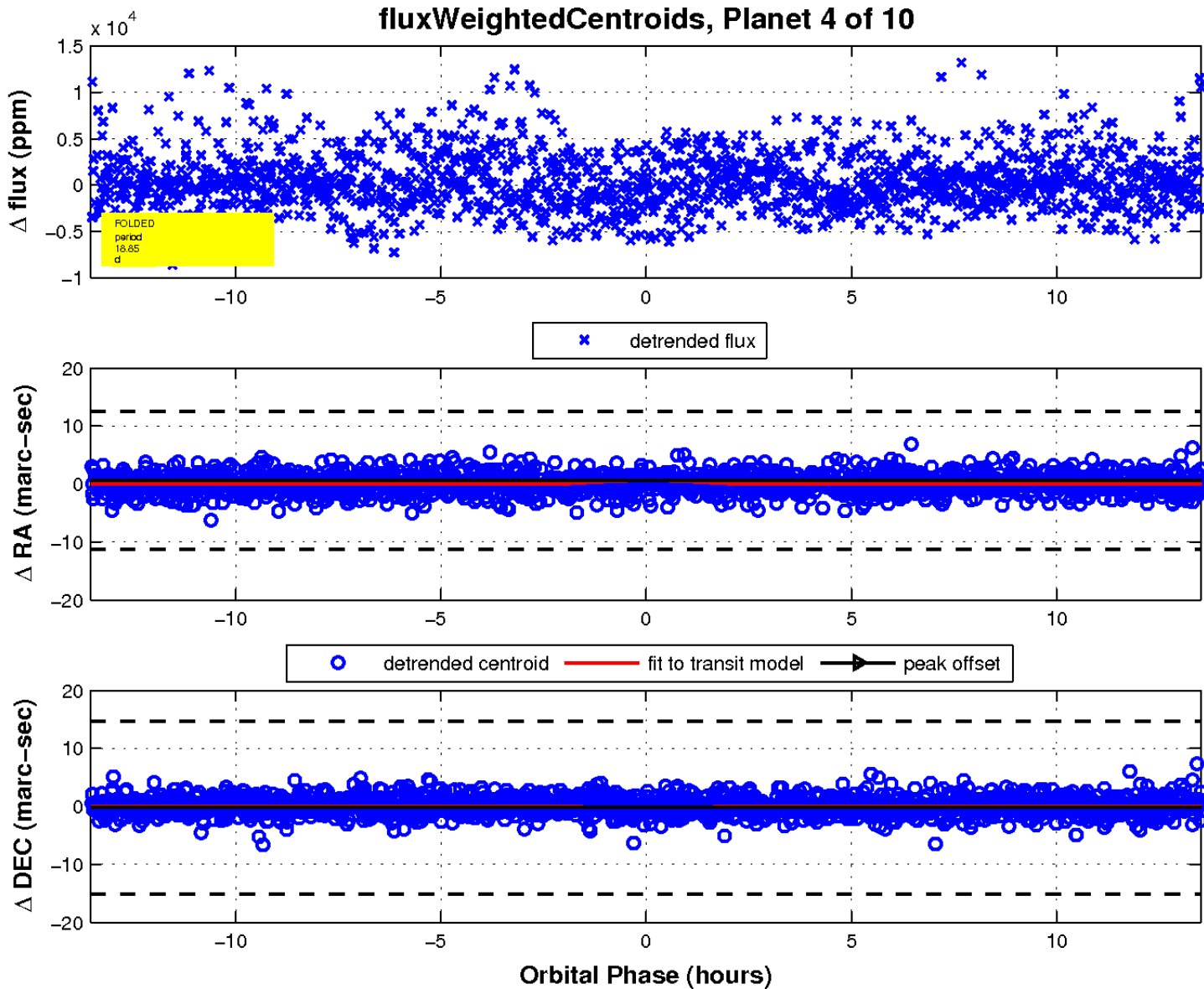




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

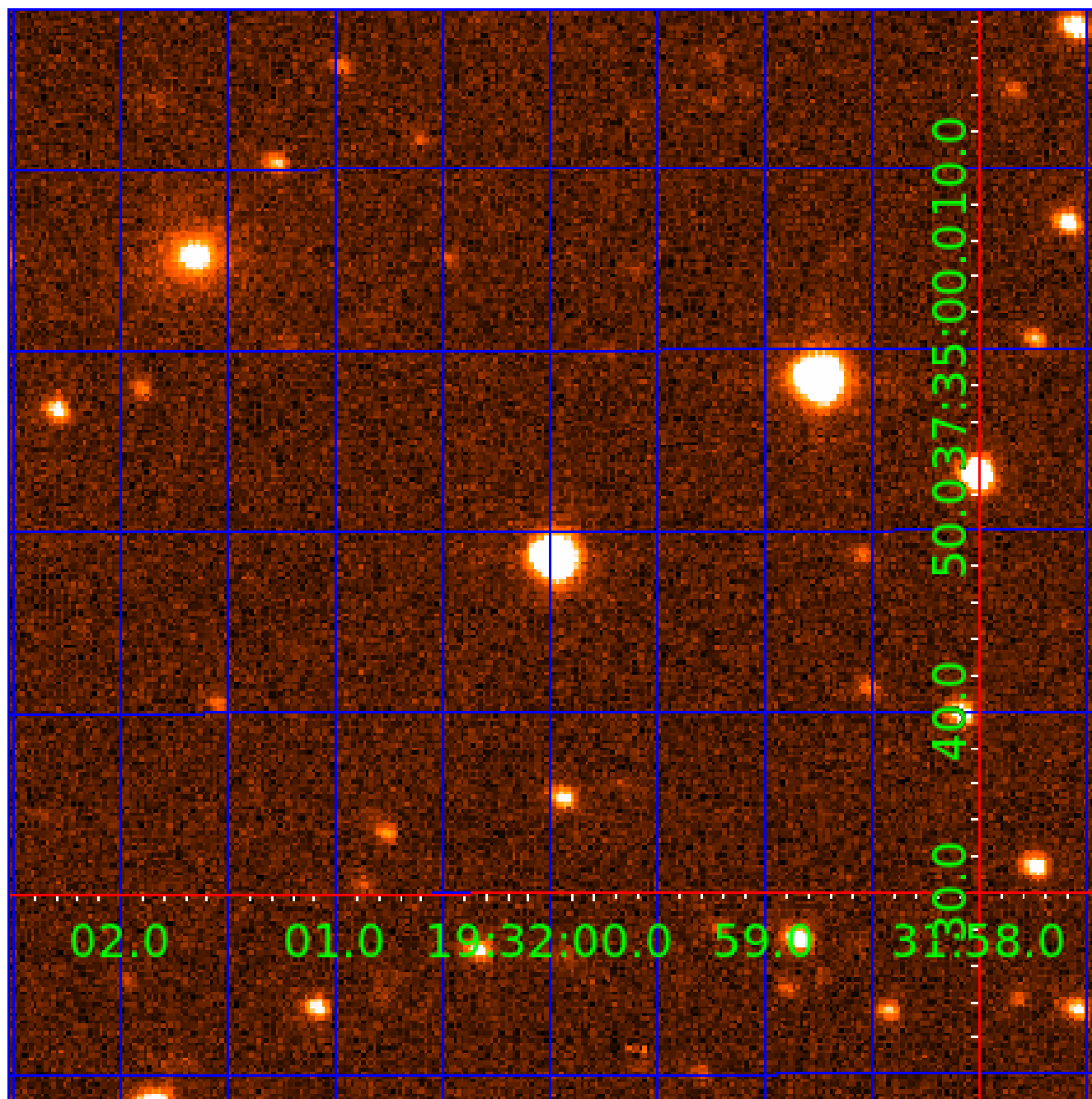
Q17 no difference image

Q17 no OOT image



UKIRT Image

Declination



# KIC 002167444

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002167444-01	OBS	6261.01	2.436132	133.461910	183.6	13.847	14.6	2.7	1.78	7239	2.51	4625.06
002167444-02	OBS	No	41.767300	133.051118	9768.1	4.645	17.3	16.9	1.78	7239	22.40	104.62
002167444-03	OBS	No	59.957046	148.015307	8629.5	5.029	16.6	16.0	1.78	7239	24.89	64.61
002167444-04	OBS	No	18.853189	138.257909	6213.5	4.514	13.9	16.2	1.78	7239	23.94	302.14
002167444-05	OBS	No	55.971983	138.453394	7128.2	4.837	13.9	13.2	1.78	7239	26.48	70.81
002167444-06	OBS	No	50.694800	164.270937	6960.6	4.426	13.0	14.1	1.78	7239	19.97	80.80
002167444-07	OBS	No	31.334397	148.069009	5987.4	4.388	12.8	12.3	1.78	7239	24.13	153.47
002167444-09	OBS	No	43.476060	133.067820	6087.2	5.222	12.2	12.2	1.78	7239	17.15	99.17
002167444-10	OBS	No	71.875232	162.459931	4760.8	4.459	11.4	11.0	1.78	7239	19.78	50.73

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002167444-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV
002167444-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-03	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT
002167444-04	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
002167444-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-07	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-10	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

**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.

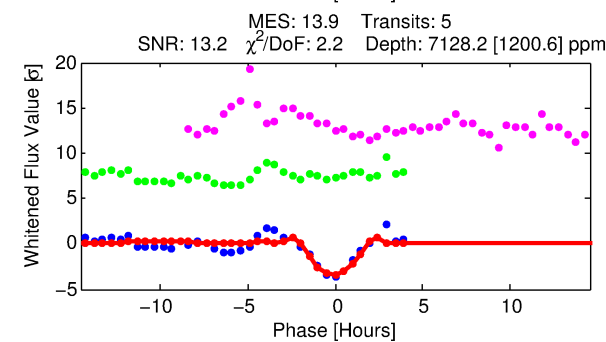
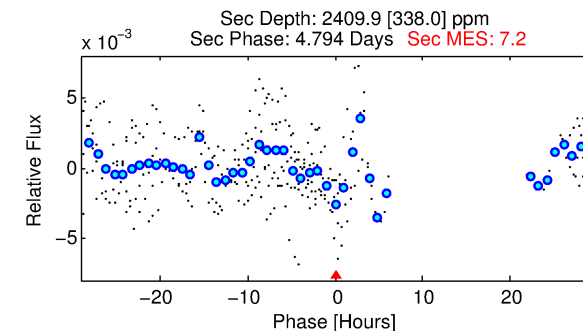
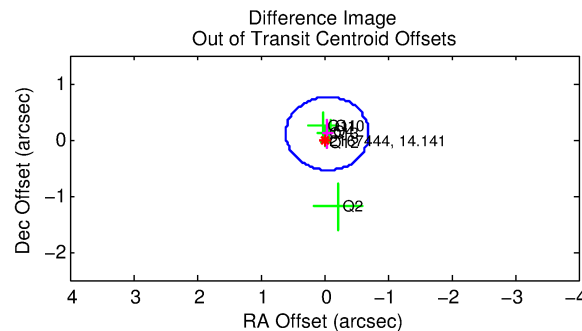
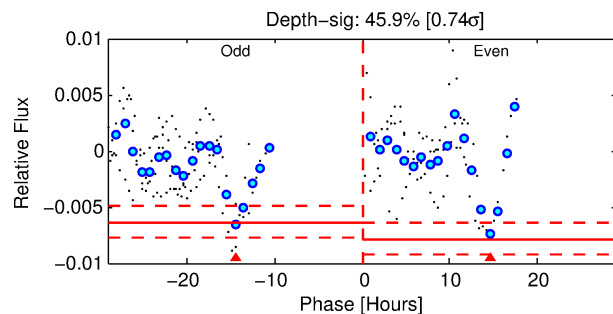
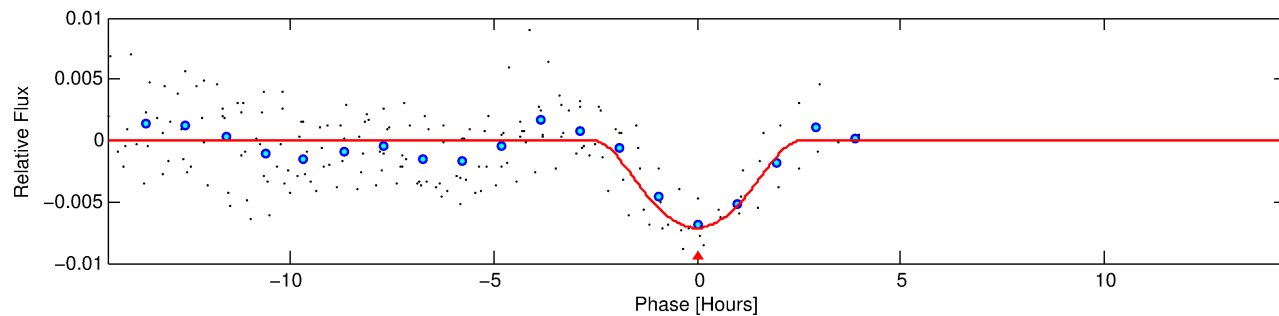
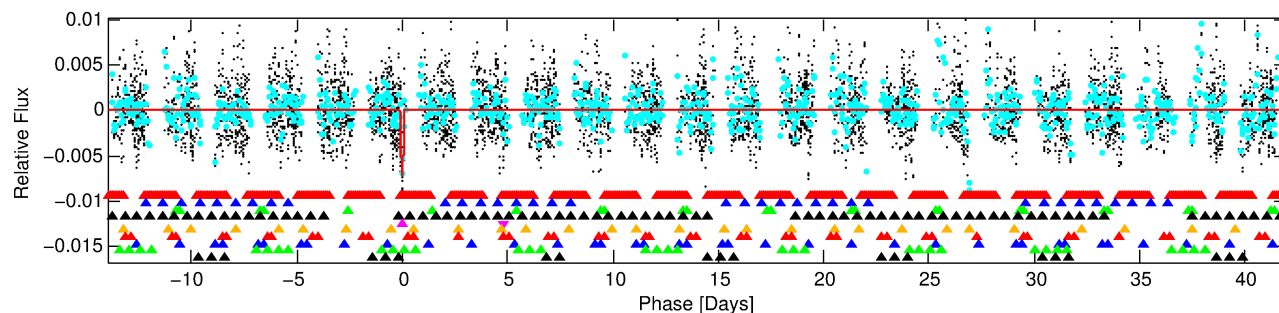
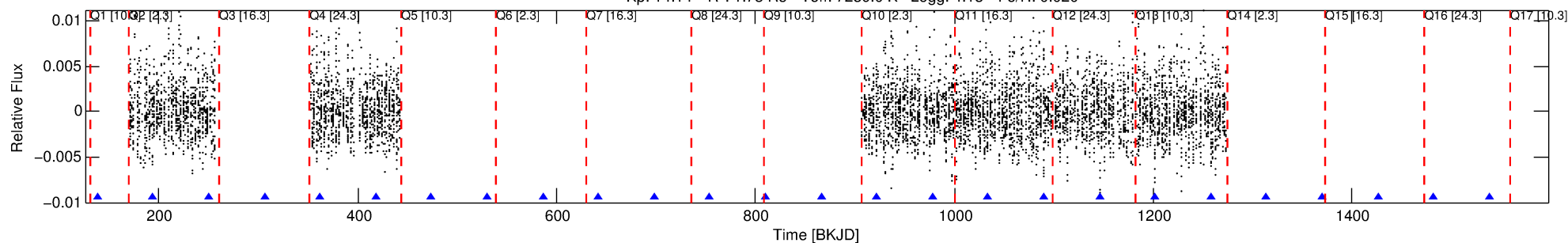
Ephemeris Match Information For 002167444-05

No Significant Match Found

# DV One-Page Summary

KIC: 2167444 Candidate: 5 of 10 Period: 55.972 d  
KOI: K06261 Corr: No Ephemeris Match

Kp: 14.14 R\*: 1.78 Rs Teff: 7239.0 K Logg: 4.13 Fe/H: 0.020



## DV Fit Results:

Period = 55.97198 [0.00391] d  
Epoch = 138.4534 [0.0734] BKJD  
Rp/R\* = 0.1362 [0.3520]  
a/R\* = 47.78 [20.79]  
b = 1.00 [0.49]  
Seff = 70.81 [29.54]  
Teq = 740 [77] K  
Rp = 26.48 [68.93] Re  
a = 0.3320 [0.0854] AU  
Ag = 208.42 [1080.08] [0.19σ]  
Teff = 4345 [5620] K [0.64σ]

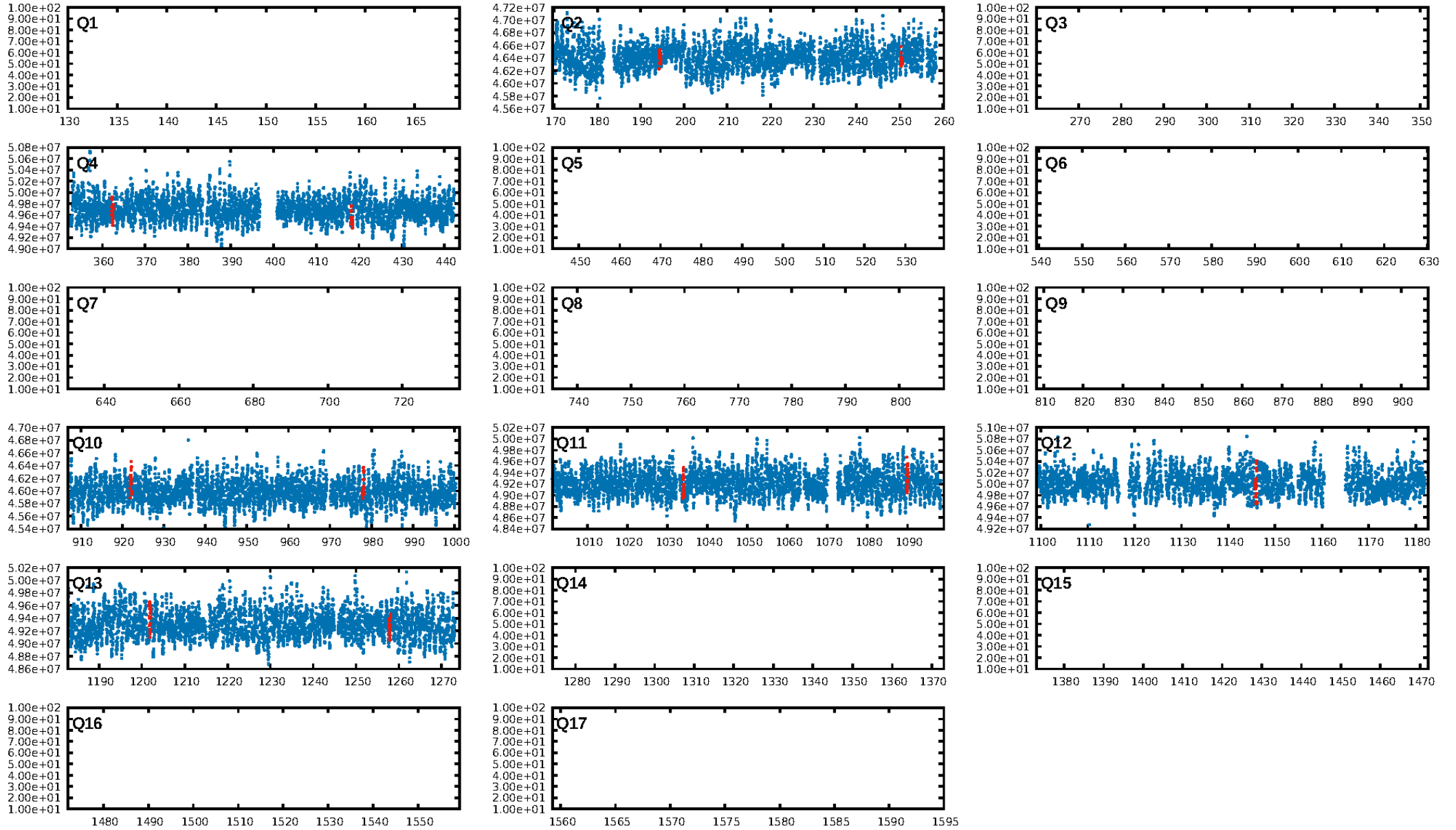
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [19.32σ]  
LongPeriod-sig: 100.0% [13.71σ]  
ModelChiSquare2-sig: 2.3%  
ModelChiSquareGof-sig: 74.2%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 4.883  
Centroid-sig: 2.5%  
Centroid-so: 0.677 arcsec [8.31σ]  
OotOffset-rm: 0.118 arcsec [0.54σ]  
KicOffset-rm: 0.158 arcsec [1.09σ]  
OotOffset-st: 2/1/2/1 [6]  
KicOffset-st: 2/1/2/1 [6]  
DiffImageQuality-fgm: 0.67 [4/6]  
DiffImageOverlap-fno: 0.50 [3/6]

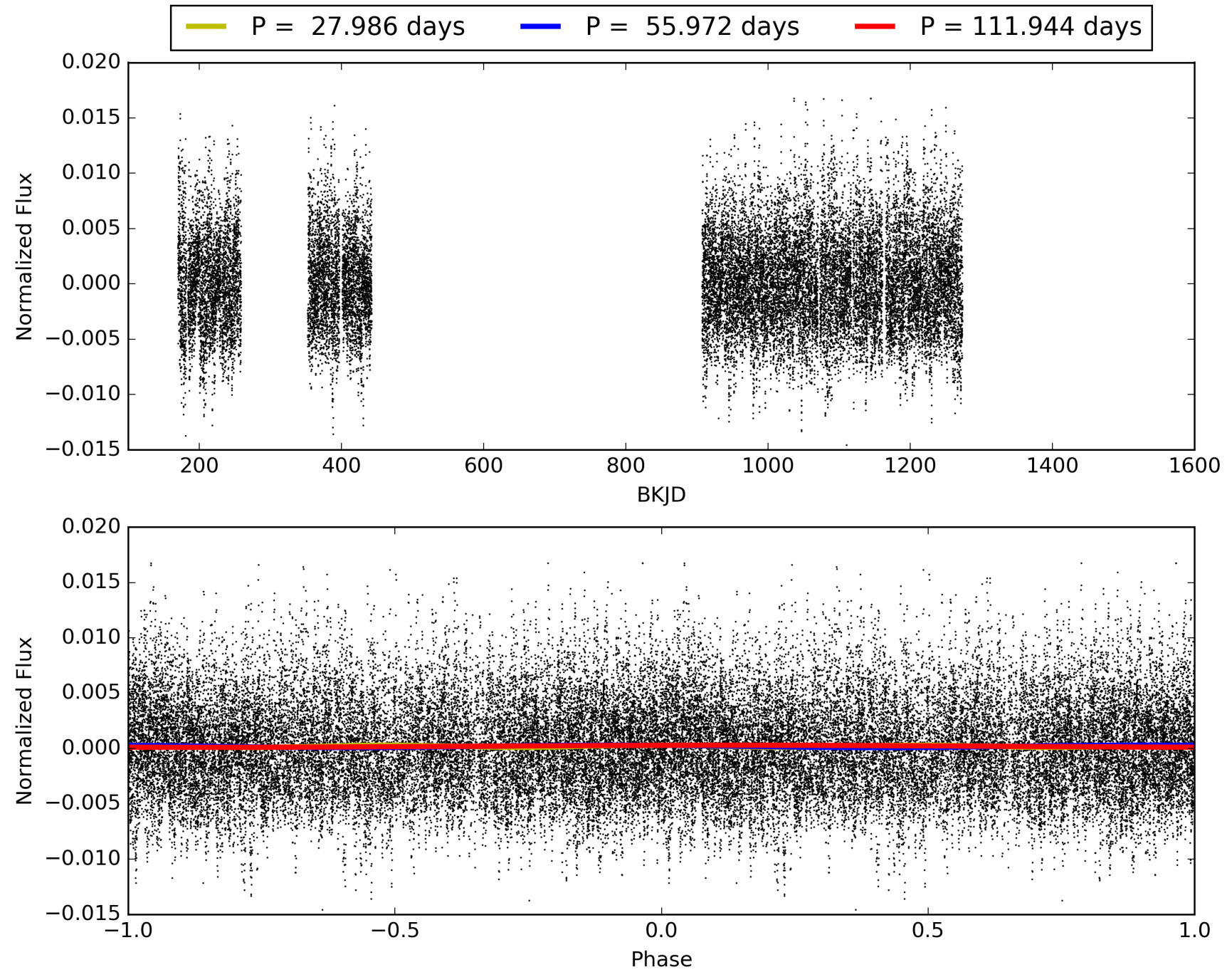
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 03:47:03 Z

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

# TCE 002167444-05, PDC Light Curves

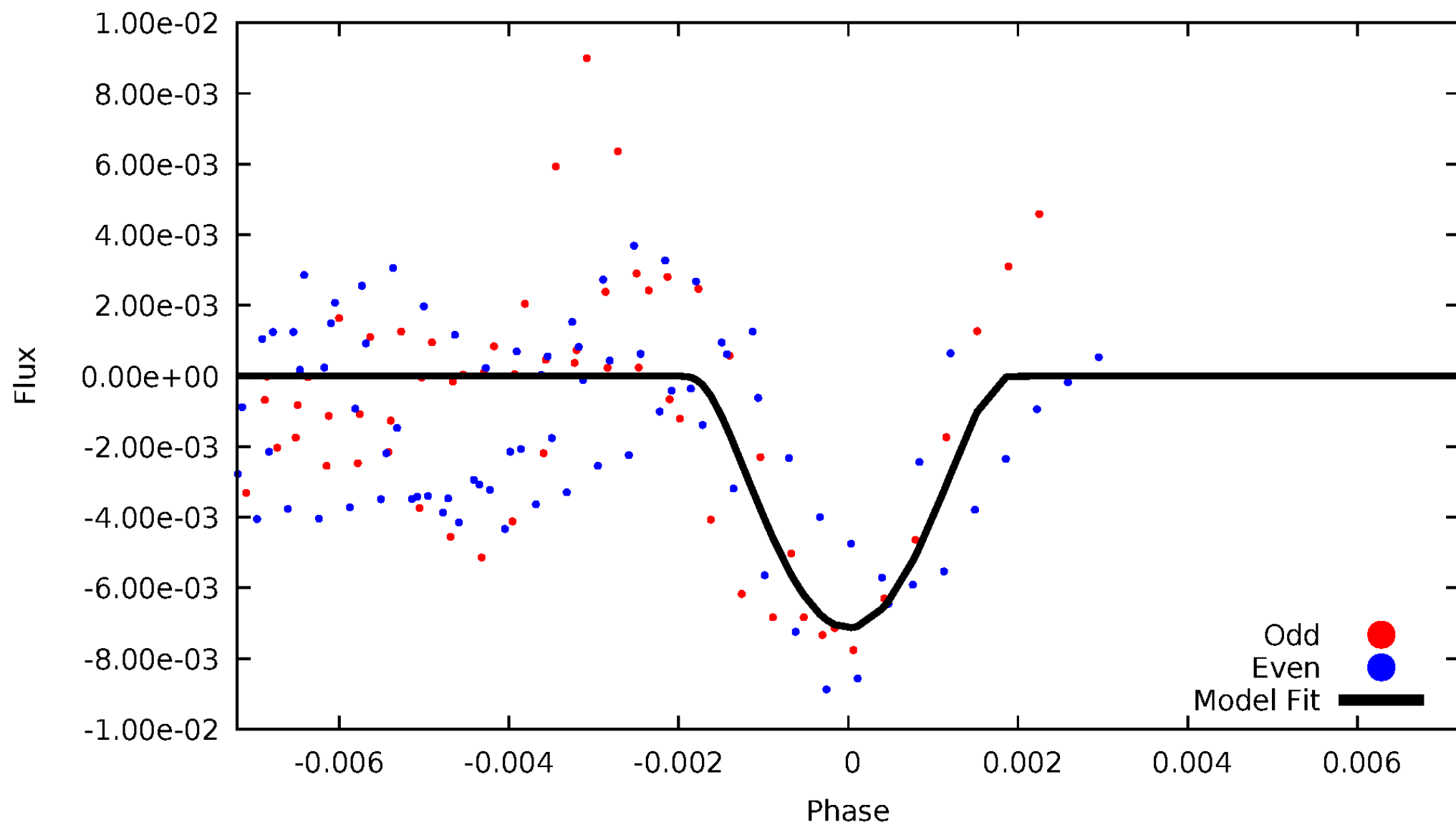


# TCE 002167444-05



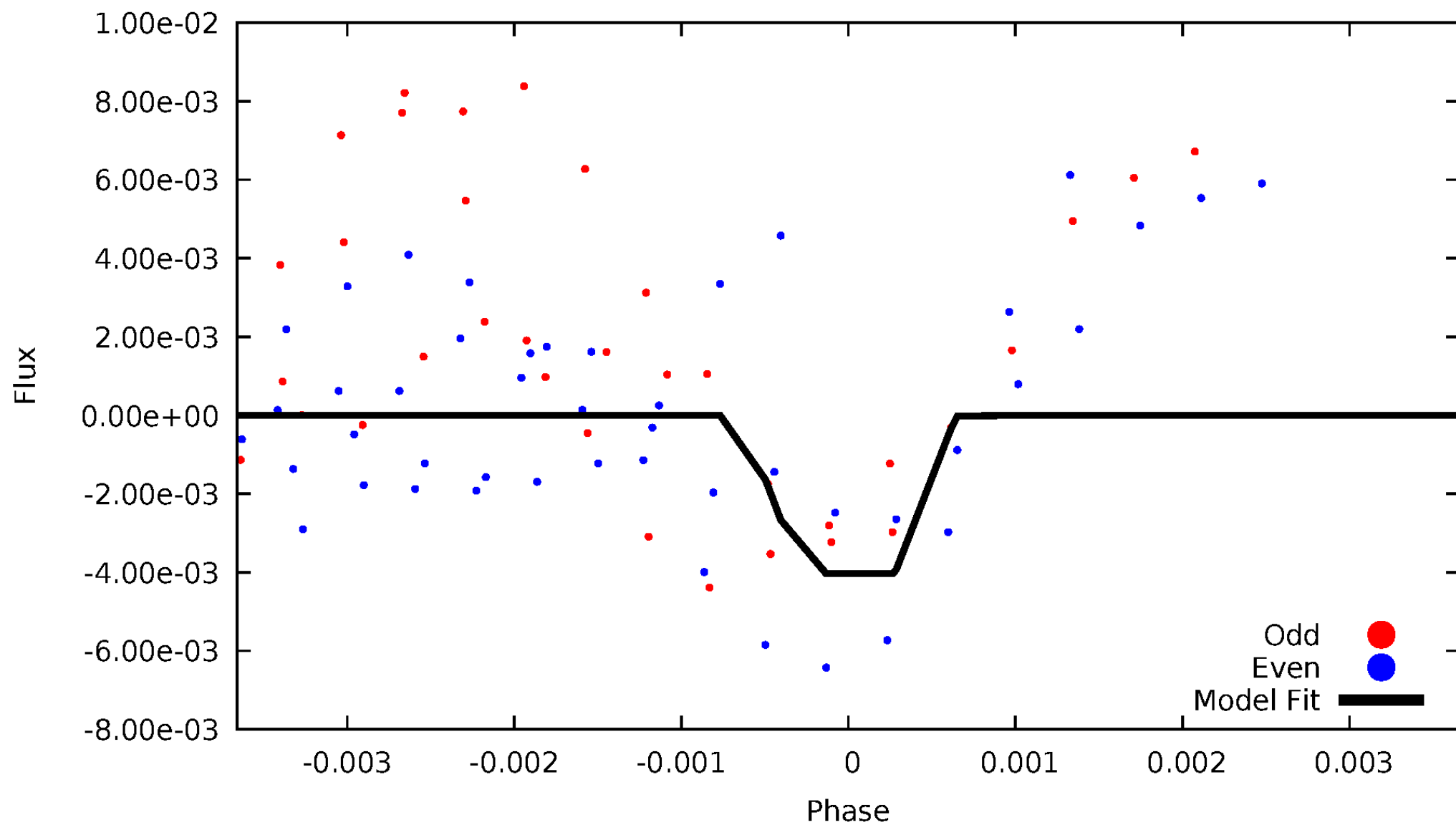
# DV Odd/Even

TCE 002167444-05



# ALT Odd/Even

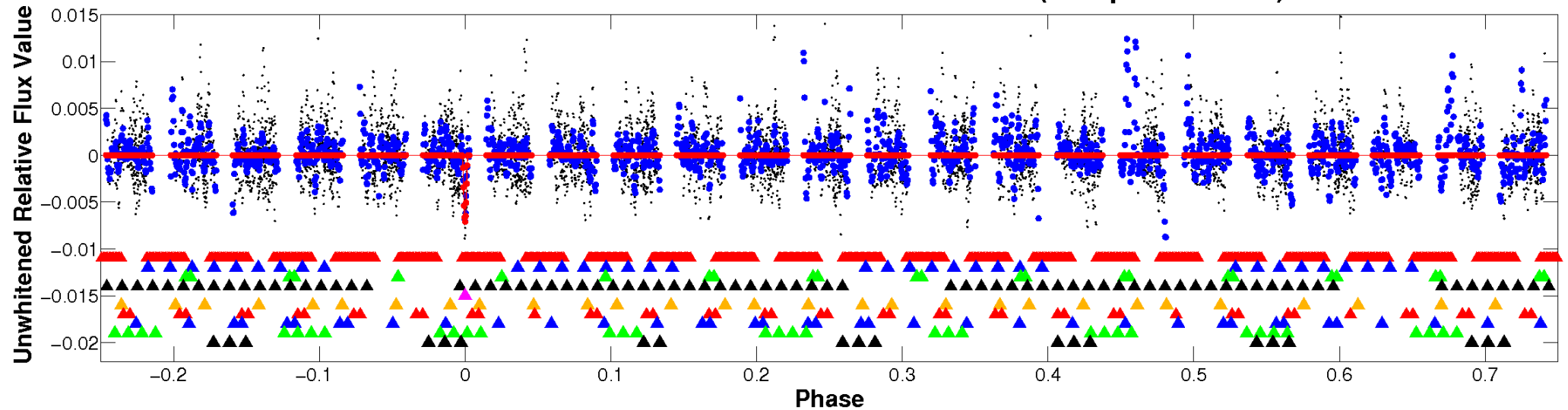
TCE 002167444-05



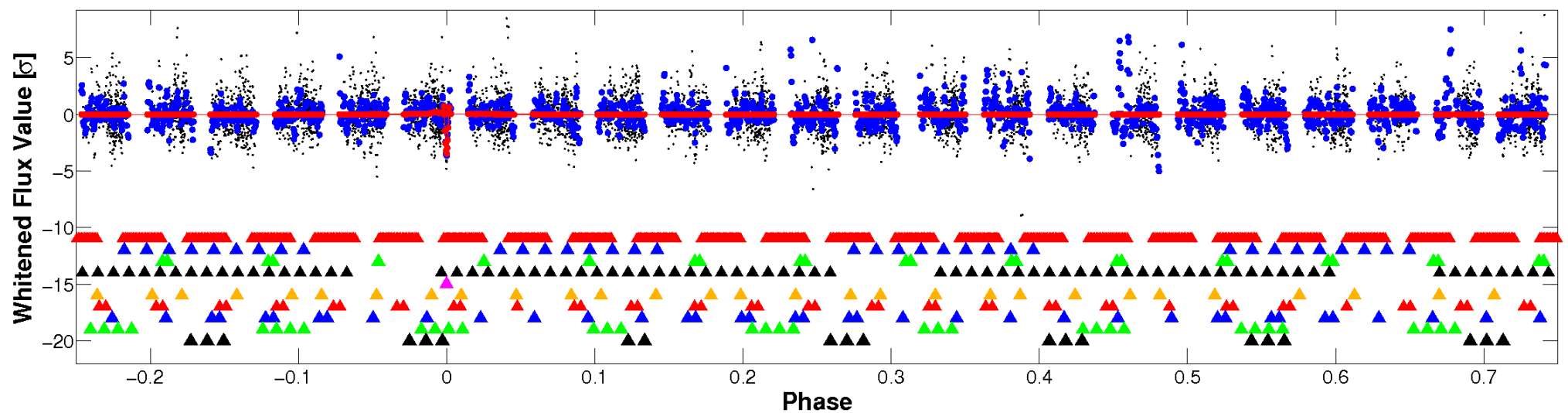


# Non-Whitened Vs. Whitened Light Curve

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

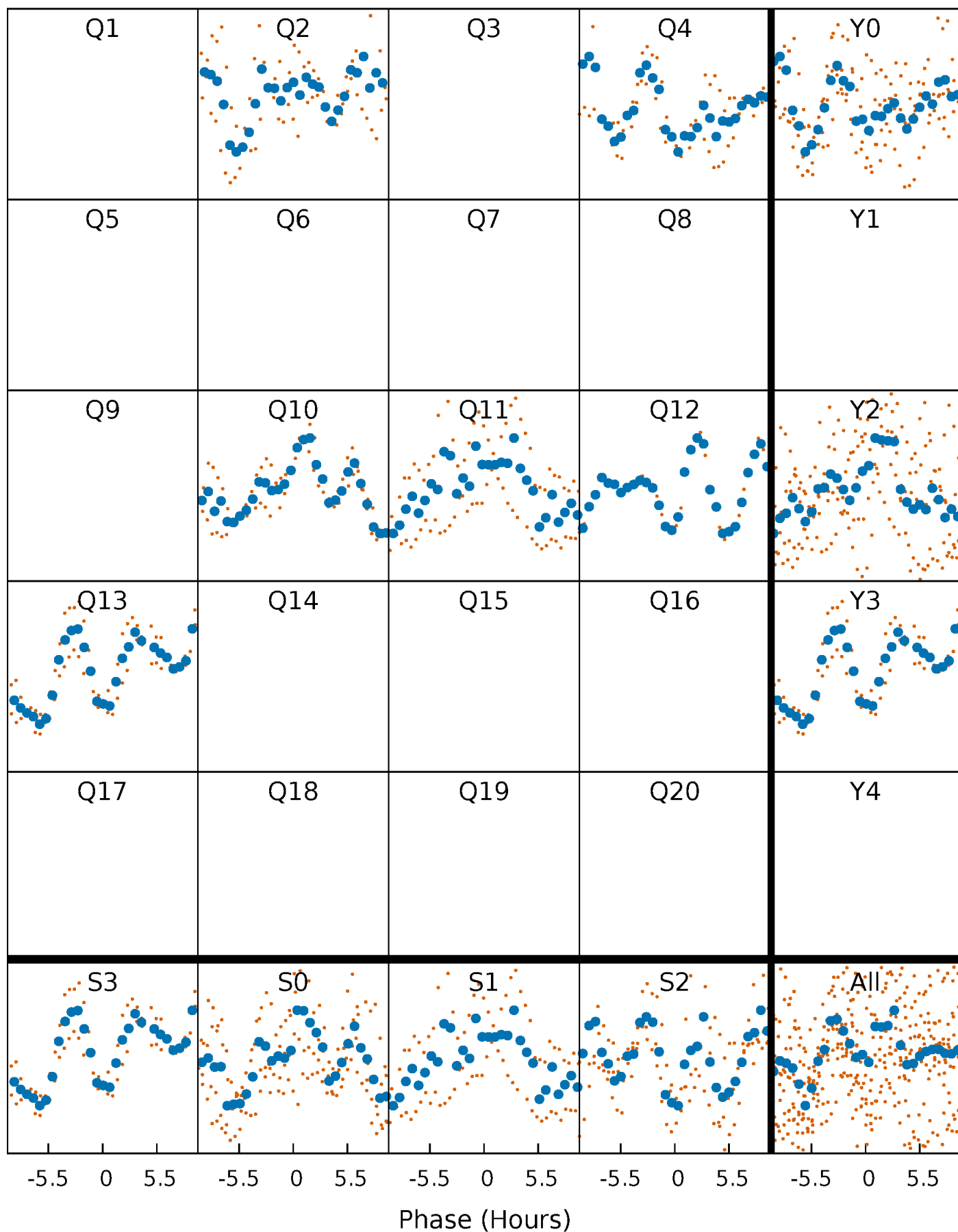


## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



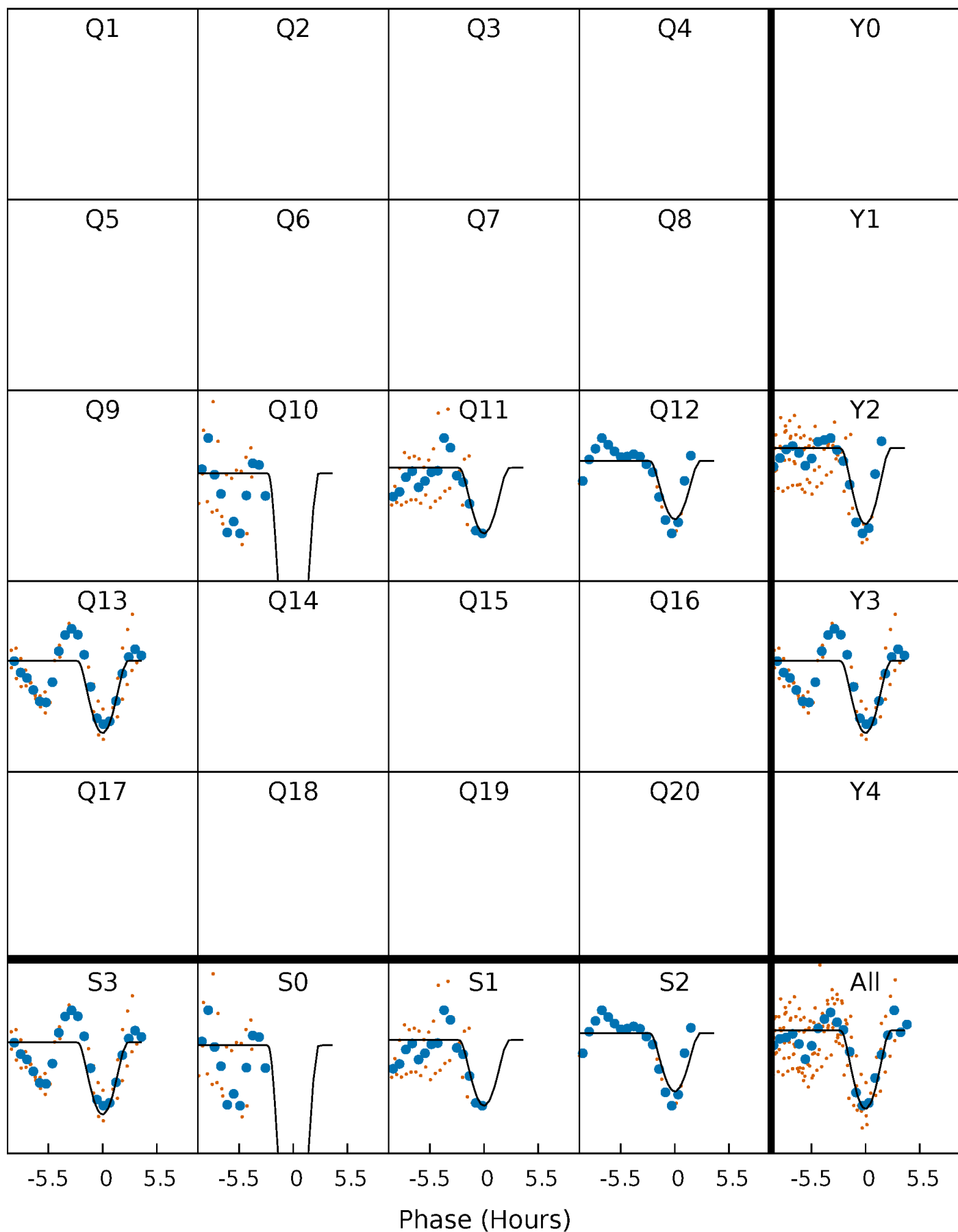
# PDC Quarter-Phased Transit Curves

TCE 002167444-05     $P = 55.971983$  Days     $T_0 = 138.453394$  (BKJD)



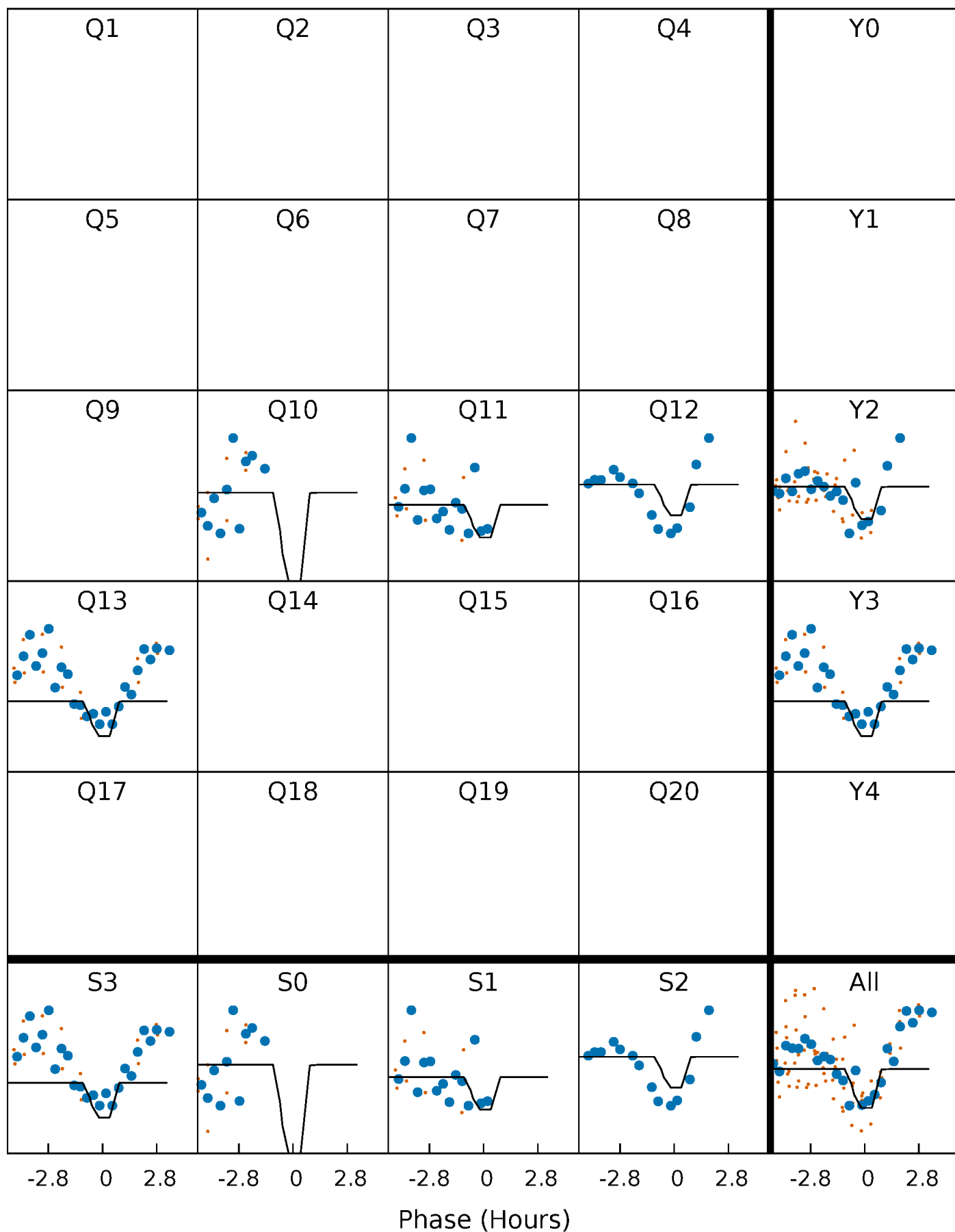
# DV Quarter-Phased Transit Curves

TCE 002167444-05     $P = 55.971983$  Days     $T_0 = 138.453394$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

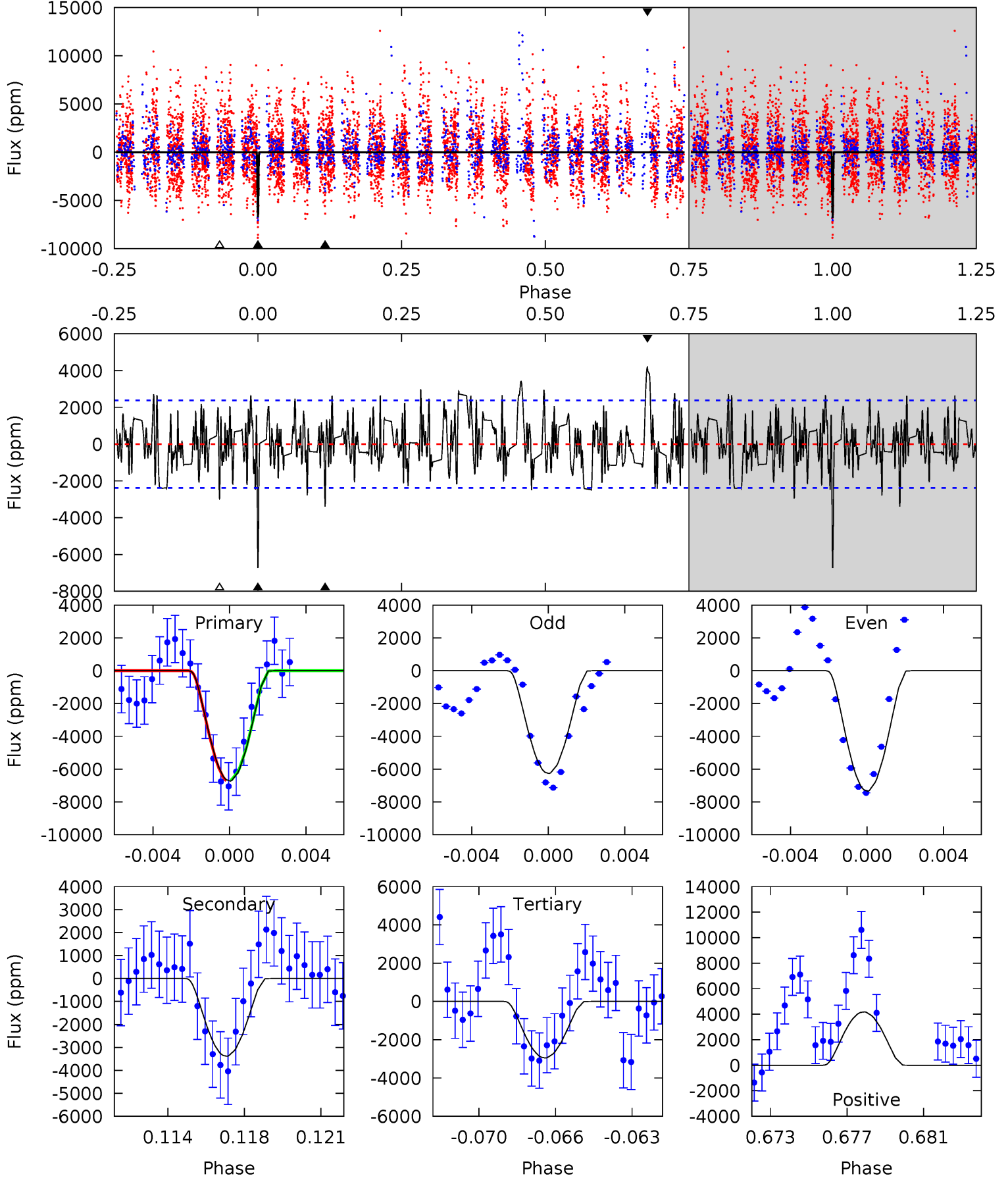
TCE 002167444-05 P= 55.988747 Days  $T_0=138.144677$  (BKJD)



# DV Model-Shift Uniqueness Test

002167444-05, P = 55.971983 Days, E = 138.453394 Days

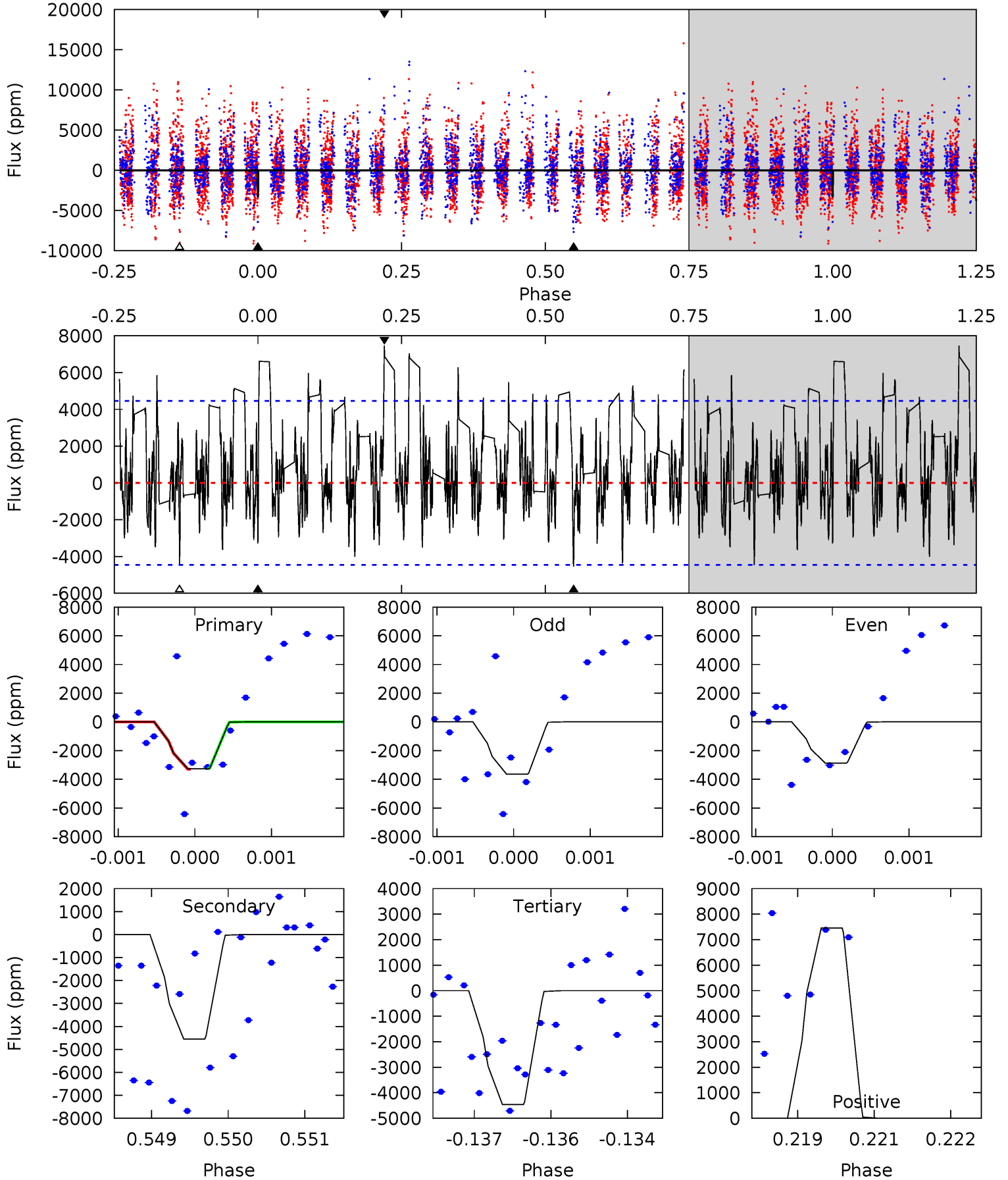
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.8	7.43	6.48	9.18	5.21	2.90	2.45	8.28	5.58	0.95	-1.75	1.15	0.76	0.38	0.04



# Alt Model-Shift Uniqueness Test

002167444-05, P = 55.988747 Days, E = 138.144677 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
3.96	5.49	5.39	9.00	5.39	3.19	2.02	-1.43	-5.05	0.10	-3.51	0.48	1.23	0.62	0.02



### Stellar Parameters For KIC 002167444

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7239^{+230}_{-374}$	$4.129^{+0.128}_{-0.192}$	$0.020^{+0.200}_{-0.350}$	$1.781^{+0.563}_{-0.375}$	$1.558^{+0.212}_{-0.259}$	$0.388^{+0.254}_{-0.195}$
	+3%/-5%	+3%/-5%	+1000%/-1750%	+32%/-21%	+14%/-17%	+65%/-50%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 002167444-05 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-3386 \pm 456$	$57.38^{+61.28}_{-38.00}$	$1042^{+84}_{-74}$	$3625^{+1898}_{-700}$	$60^{+468}_{-46}$
Alt.	$-4548 \pm 828$	$51.37^{+56.89}_{-37.06}$	$1038^{+90}_{-72}$	$3929^{+2949}_{-801}$	$97^{+1136}_{-75}$

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

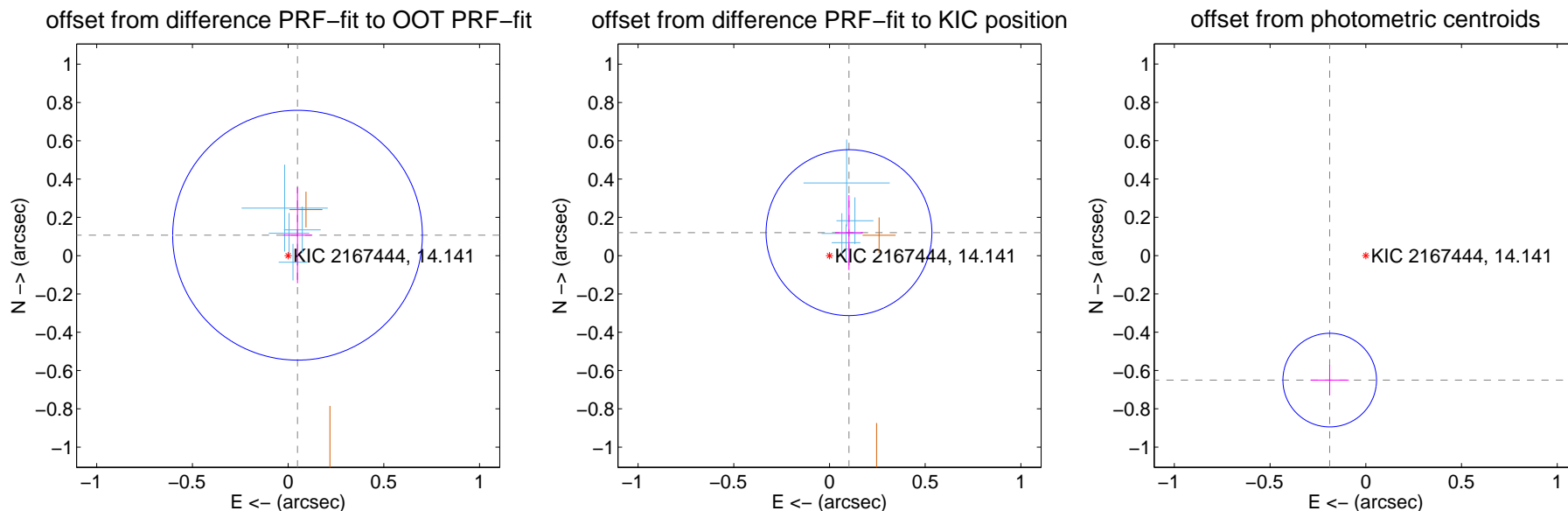
## DV Centroid Data

Supplemental centroid analysis for 002167444-05. Kepler magnitude: 14.14. Transit SNR 13.25

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

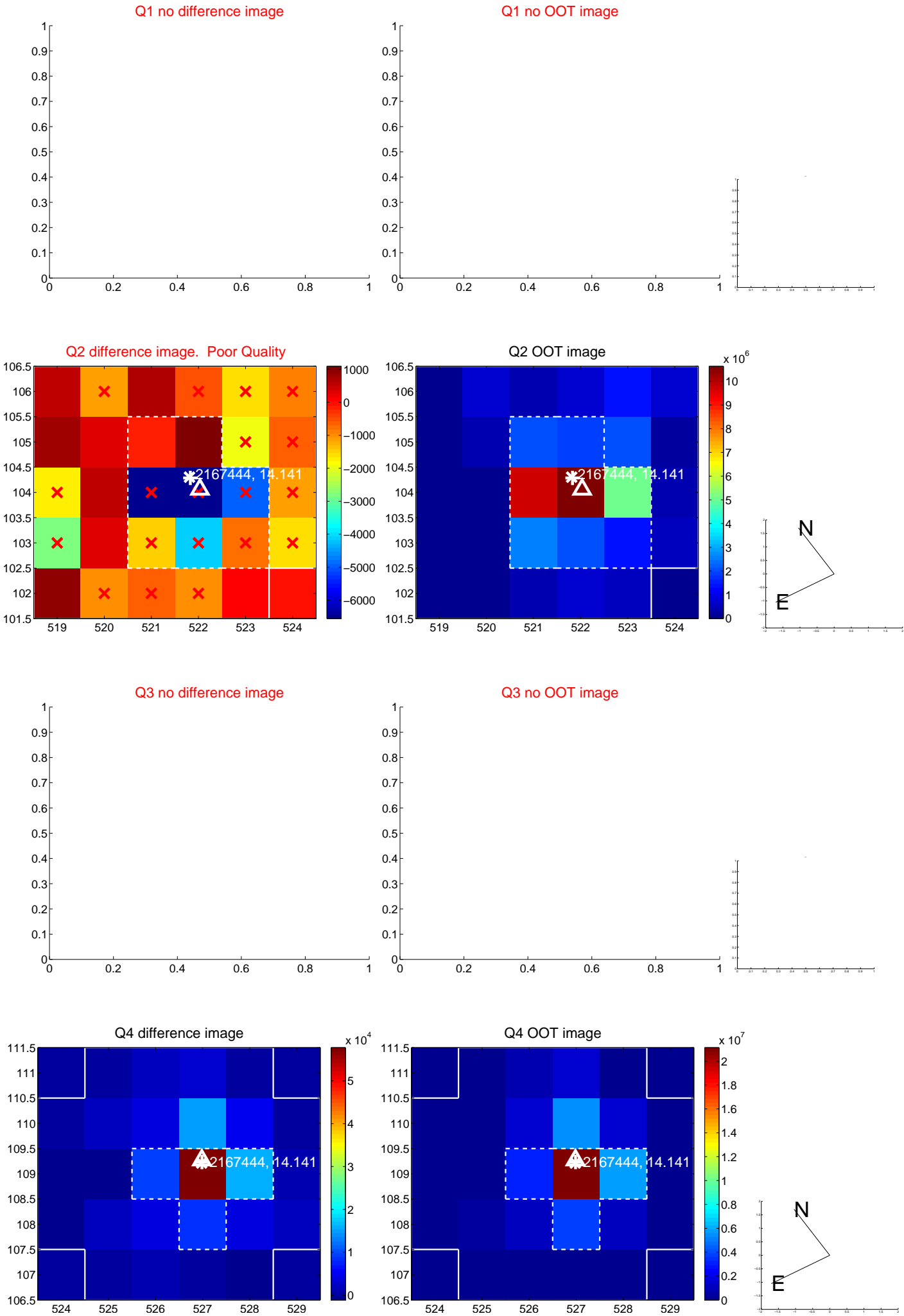
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.118 \pm 0.217$	0.54	$-0.049 \pm 0.075$	$0.107 \pm 0.251$
PRF-fit source offset from KIC position	$0.158 \pm 0.144$	1.09	$-0.102 \pm 0.073$	$0.120 \pm 0.195$
photometric centroid source offset	$0.68 \pm 0.08$	8.31	$0.19 \pm 0.10$	$-0.65 \pm 0.08$



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.



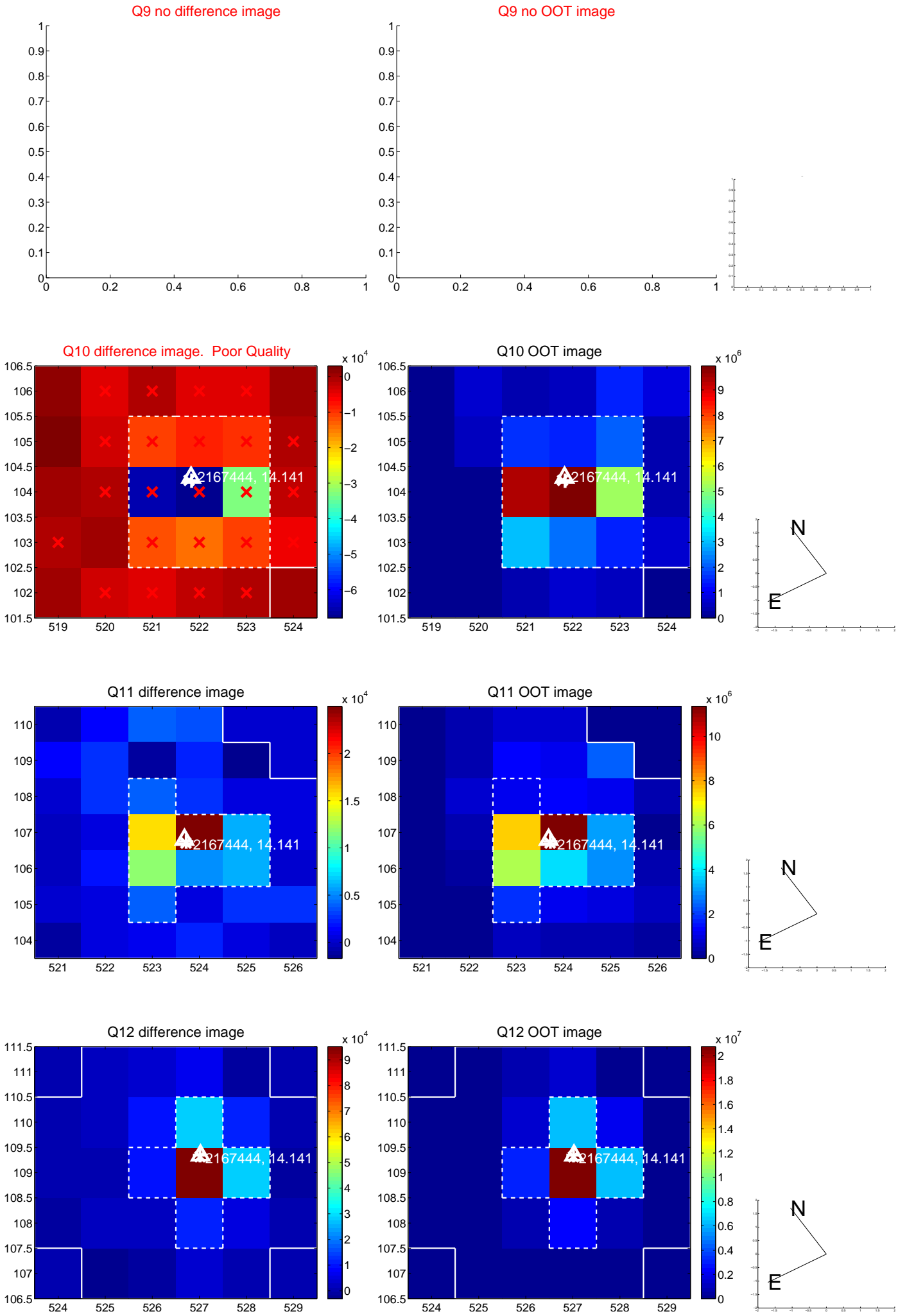
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



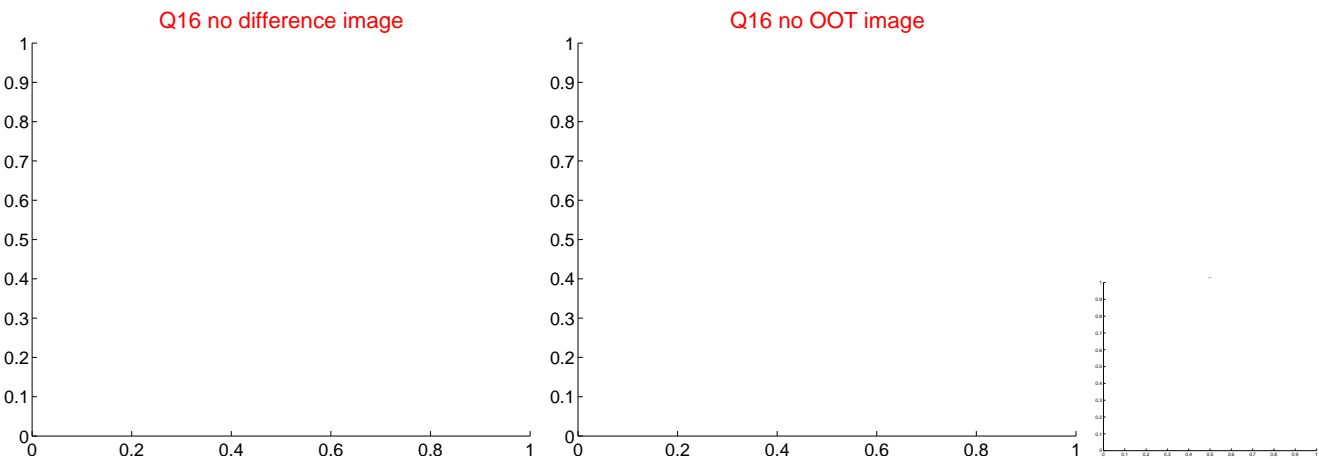
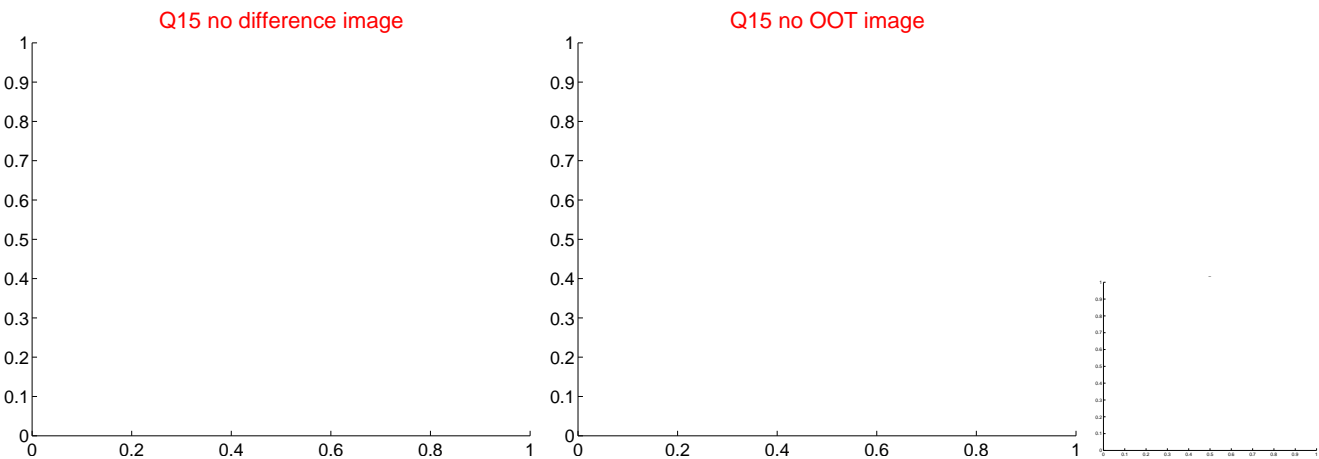
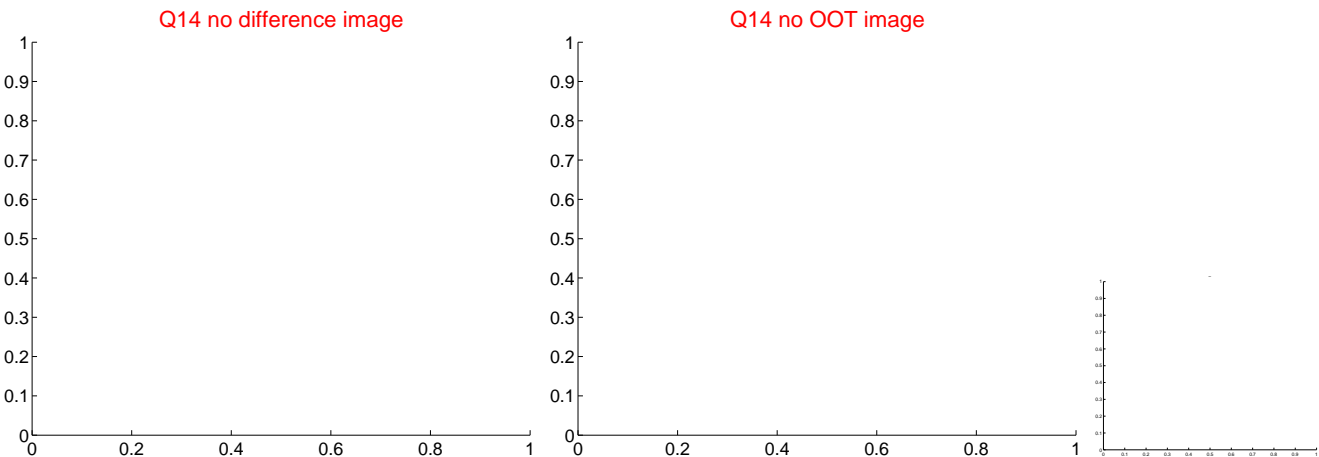
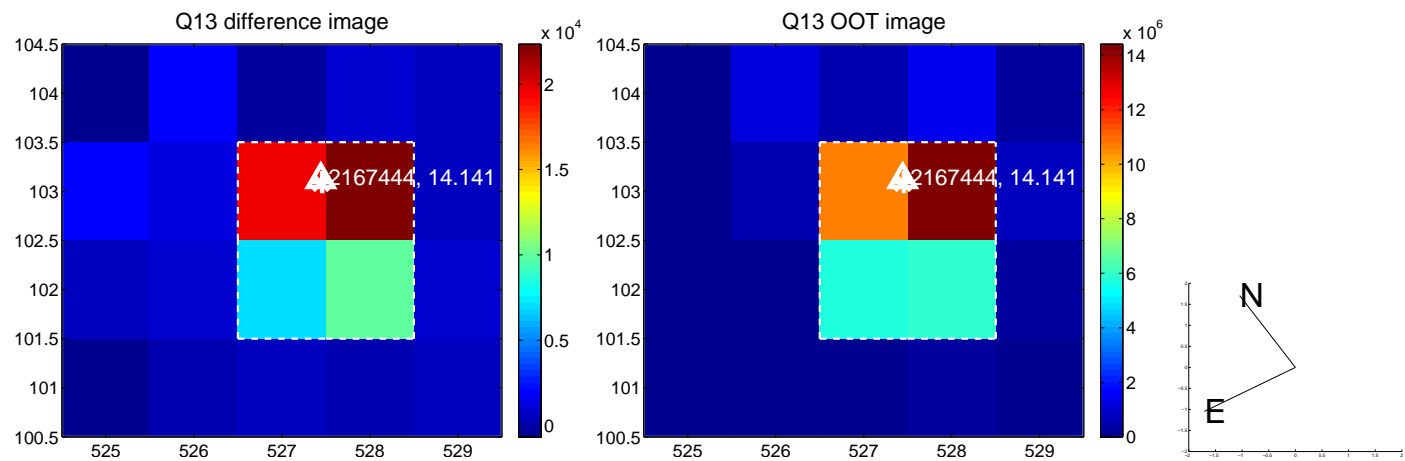
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



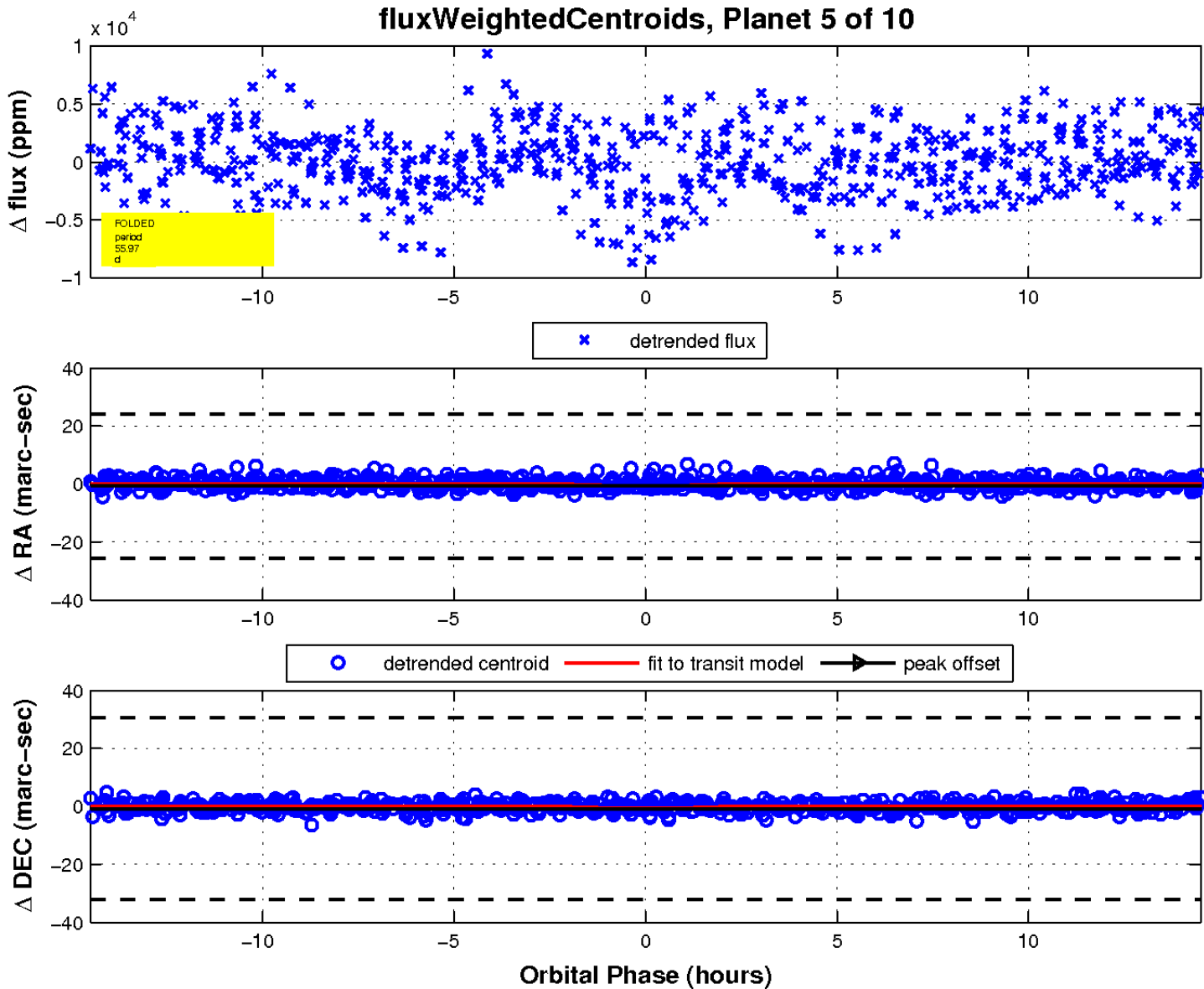
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

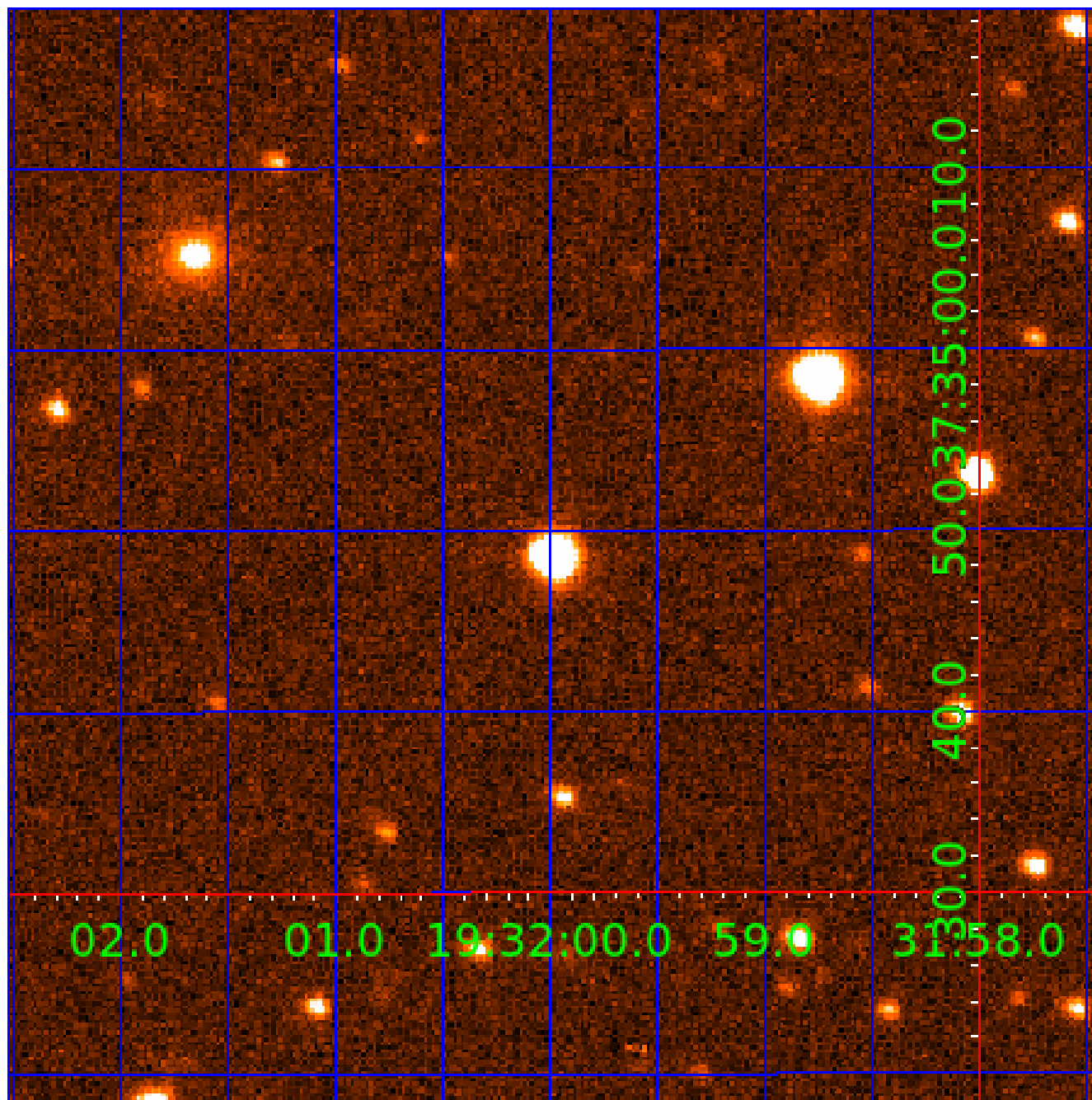
Q17 no difference image

Q17 no OOT image



UKIRT Image

Declination



# KIC 002167444

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002167444-01	OBS	6261.01	2.436132	133.461910	183.6	13.847	14.6	2.7	1.78	7239	2.51	4625.06
002167444-02	OBS	No	41.767300	133.051118	9768.1	4.645	17.3	16.9	1.78	7239	22.40	104.62
002167444-03	OBS	No	59.957046	148.015307	8629.5	5.029	16.6	16.0	1.78	7239	24.89	64.61
002167444-04	OBS	No	18.853189	138.257909	6213.5	4.514	13.9	16.2	1.78	7239	23.94	302.14
002167444-05	OBS	No	55.971983	138.453394	7128.2	4.837	13.9	13.2	1.78	7239	26.48	70.81
002167444-06	OBS	No	50.694800	164.270937	6960.6	4.426	13.0	14.1	1.78	7239	19.97	80.80
002167444-07	OBS	No	31.334397	148.069009	5987.4	4.388	12.8	12.3	1.78	7239	24.13	153.47
002167444-09	OBS	No	43.476060	133.067820	6087.2	5.222	12.2	12.2	1.78	7239	17.15	99.17
002167444-10	OBS	No	71.875232	162.459931	4760.8	4.459	11.4	11.0	1.78	7239	19.78	50.73

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002167444-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV
002167444-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-03	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT
002167444-04	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
002167444-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-07	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-10	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

**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 002167444-06

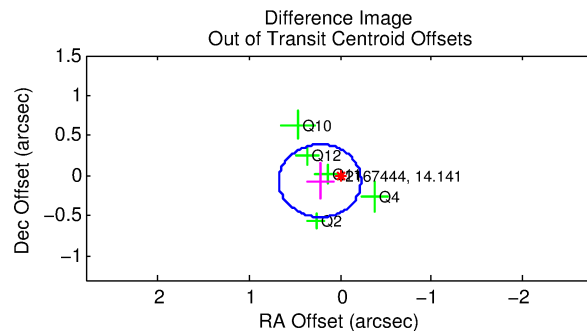
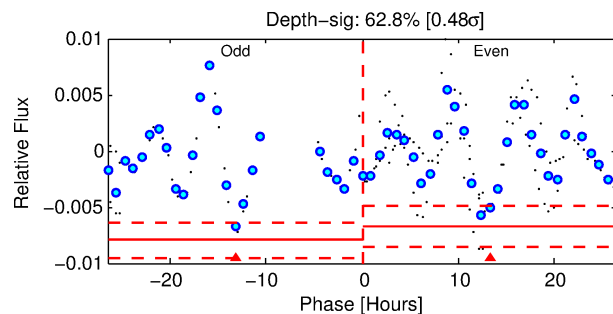
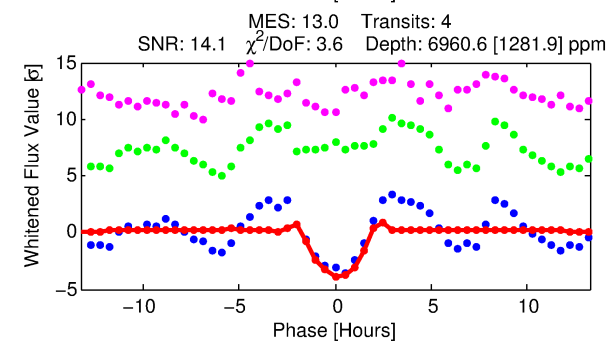
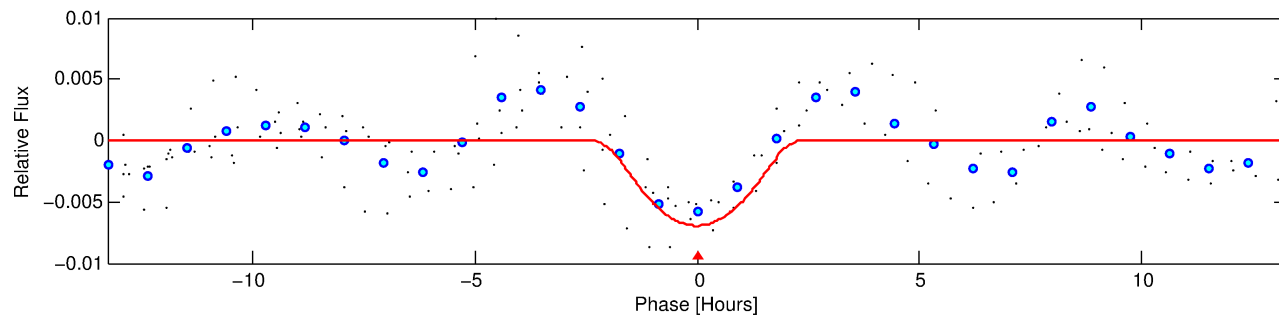
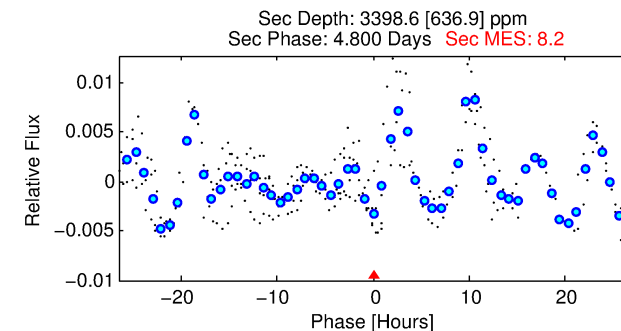
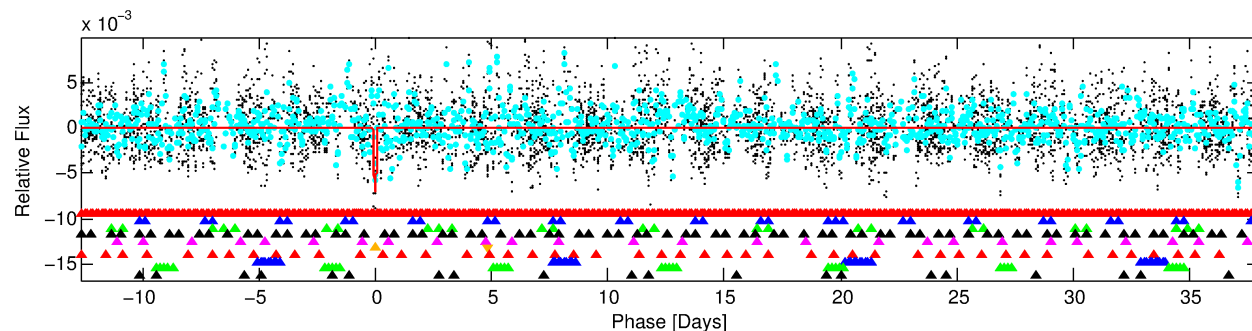
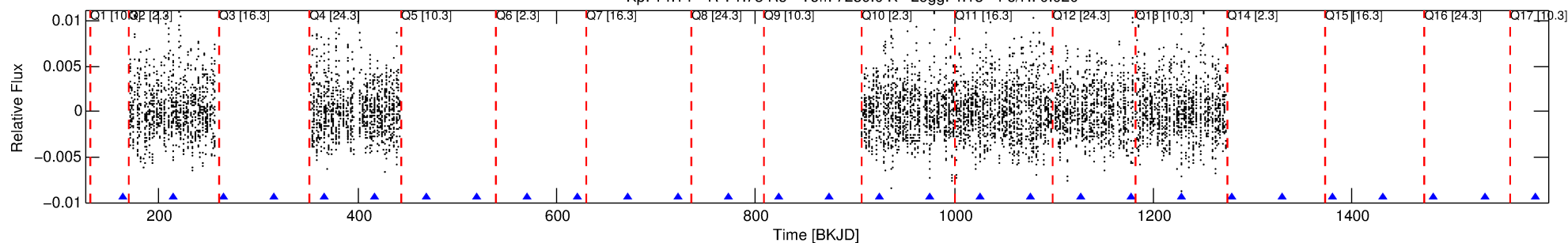
No Significant Match Found

# DV One-Page Summary

KIC: 2167444 Candidate: 6 of 10 Period: 50.695 d

KOI: K06261 Corr: No Ephemeris Match

Kp: 14.14 R\*: 1.78 Rs Teff: 7239.0 K Logg: 4.13 Fe/H: 0.020



## DV Fit Results:

Period = 50.69480 [0.00109] d  
Epoch = 164.2709 [0.0167] BKJD  
Rp/R\* = 0.1028 [0.0967]  
a/R\* = 49.61 [17.04]  
b = 0.95 [0.19]  
Seff = 80.80 [33.70]  
Teq = 765 [80] K  
Rp = 19.97 [19.83] Re  
a = 0.3108 [0.0799] AU  
Ag = 452.75 [872.17] [0.52σ]  
Teff = 5452 [2594] K [1.81σ]

## DV Diagnostic Results:

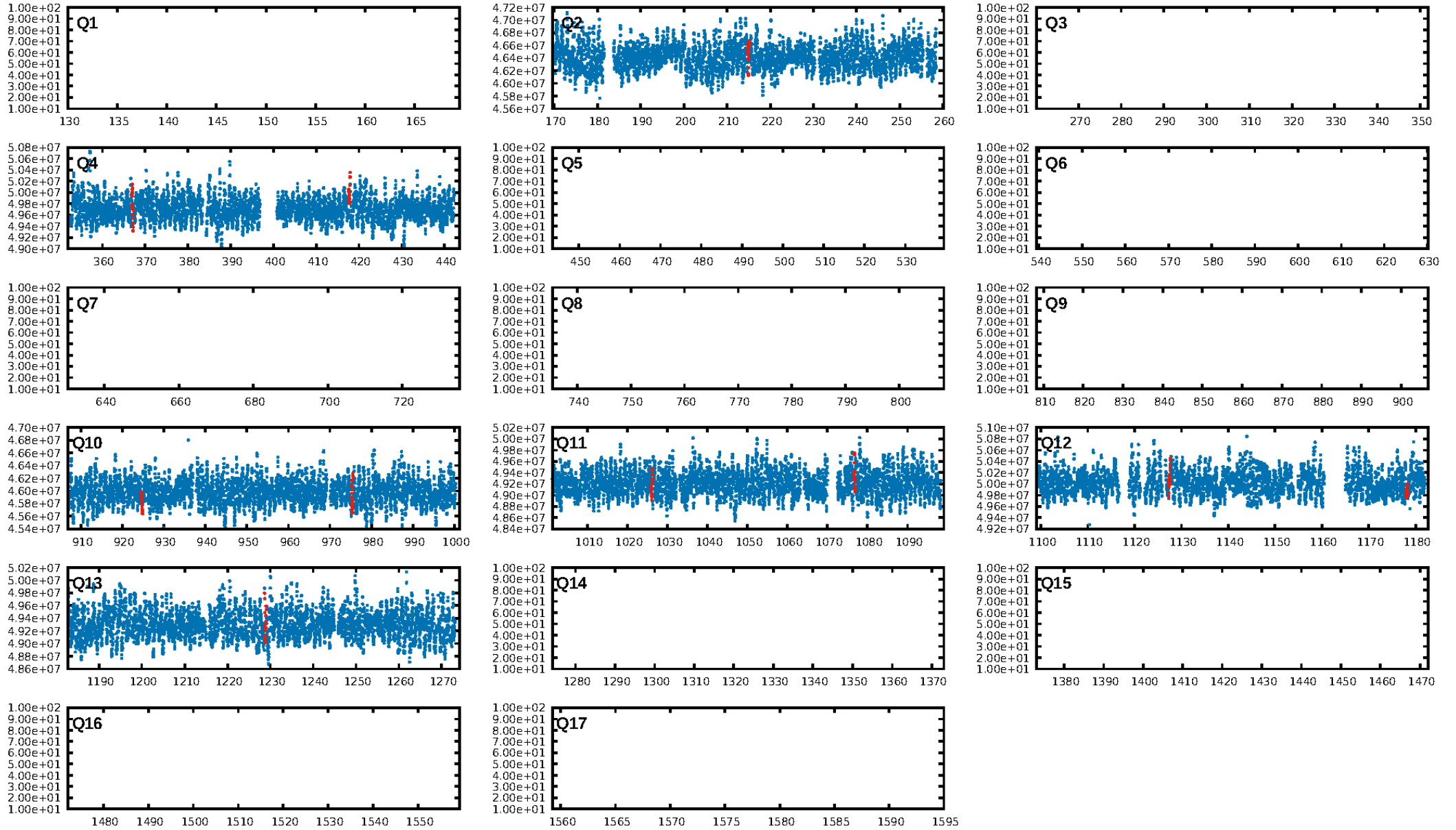
ShortPeriod-sig: 100.0% [25.31σ]  
LongPeriod-sig: 100.0% [19.32σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 2.7%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -65.77  
Centroid-sig: 1.0%  
Centroid-so: 0.622 arcsec [6.65σ]  
OotOffset-rm: 0.233 arcsec [1.54σ]  
KicOffset-rm: 0.168 arcsec [1.04σ]  
OotOffset-st: 2/1/2/0 [5]  
KicOffset-st: 2/1/2/0 [5]  
DiffImageQuality-fgm: 0.80 [4/5]  
DiffImageOverlap-fno: 0.80 [4/5]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 03:47:06 Z

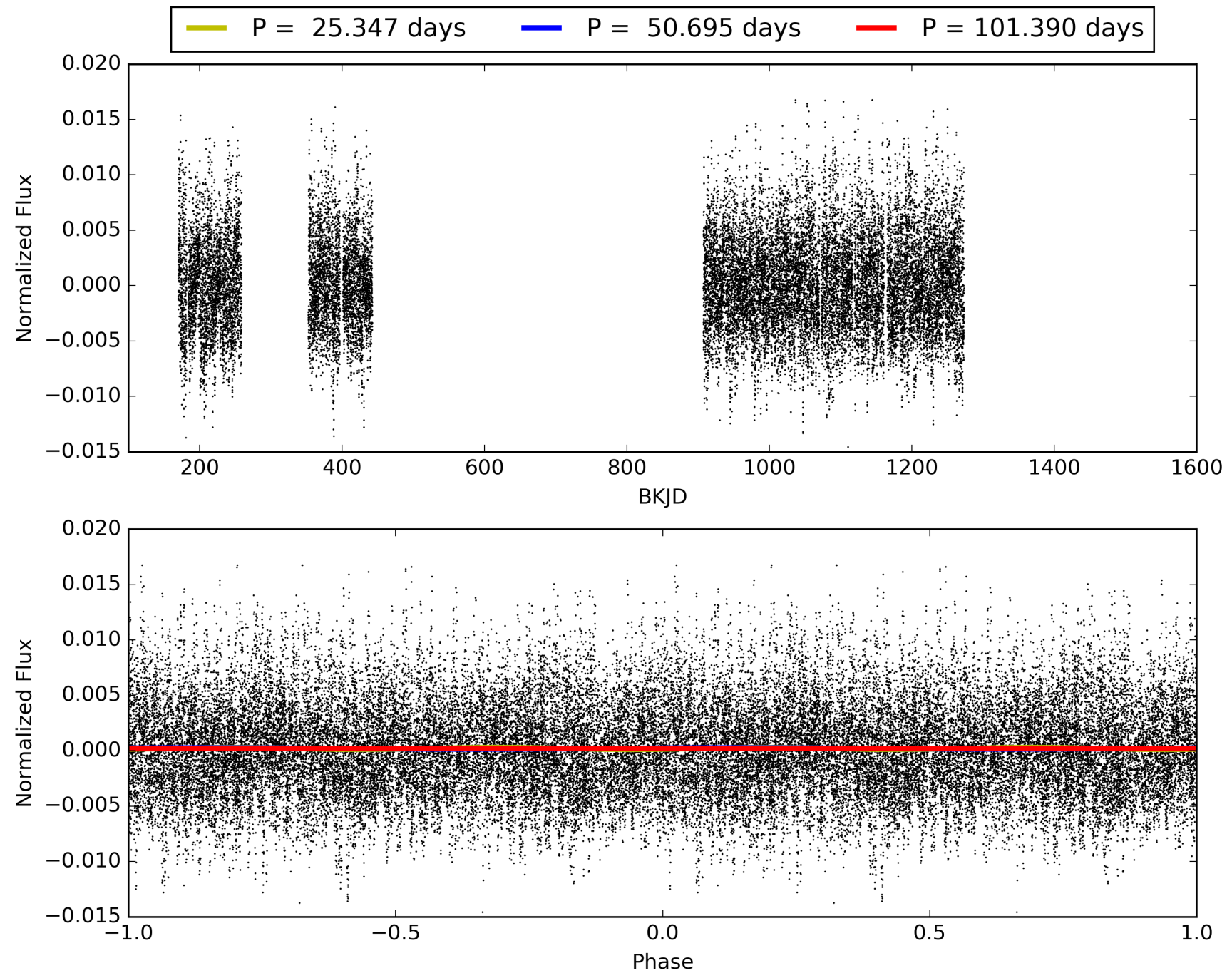
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 002167444-06, PDC Light Curves

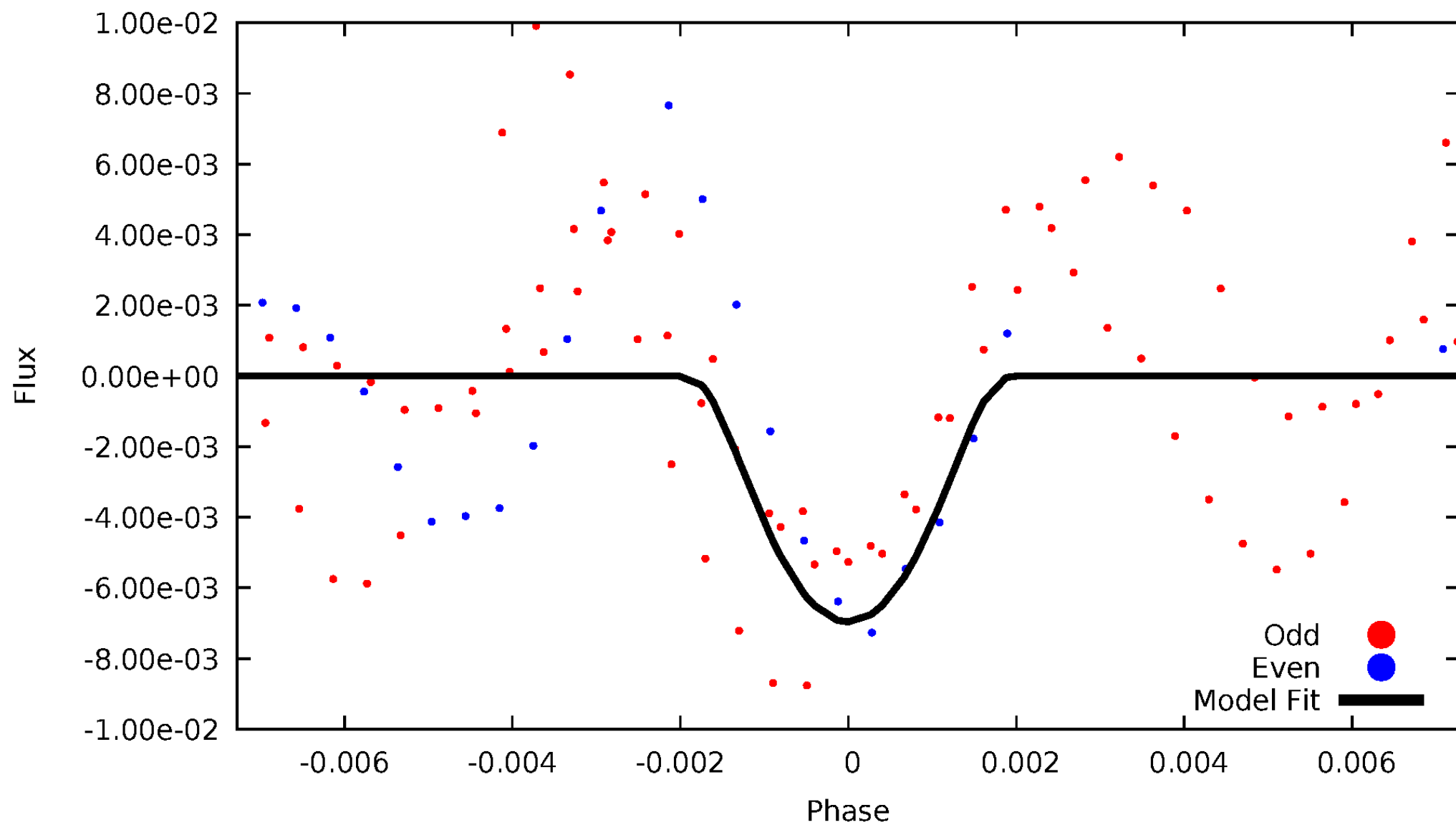


# TCE 002167444-06



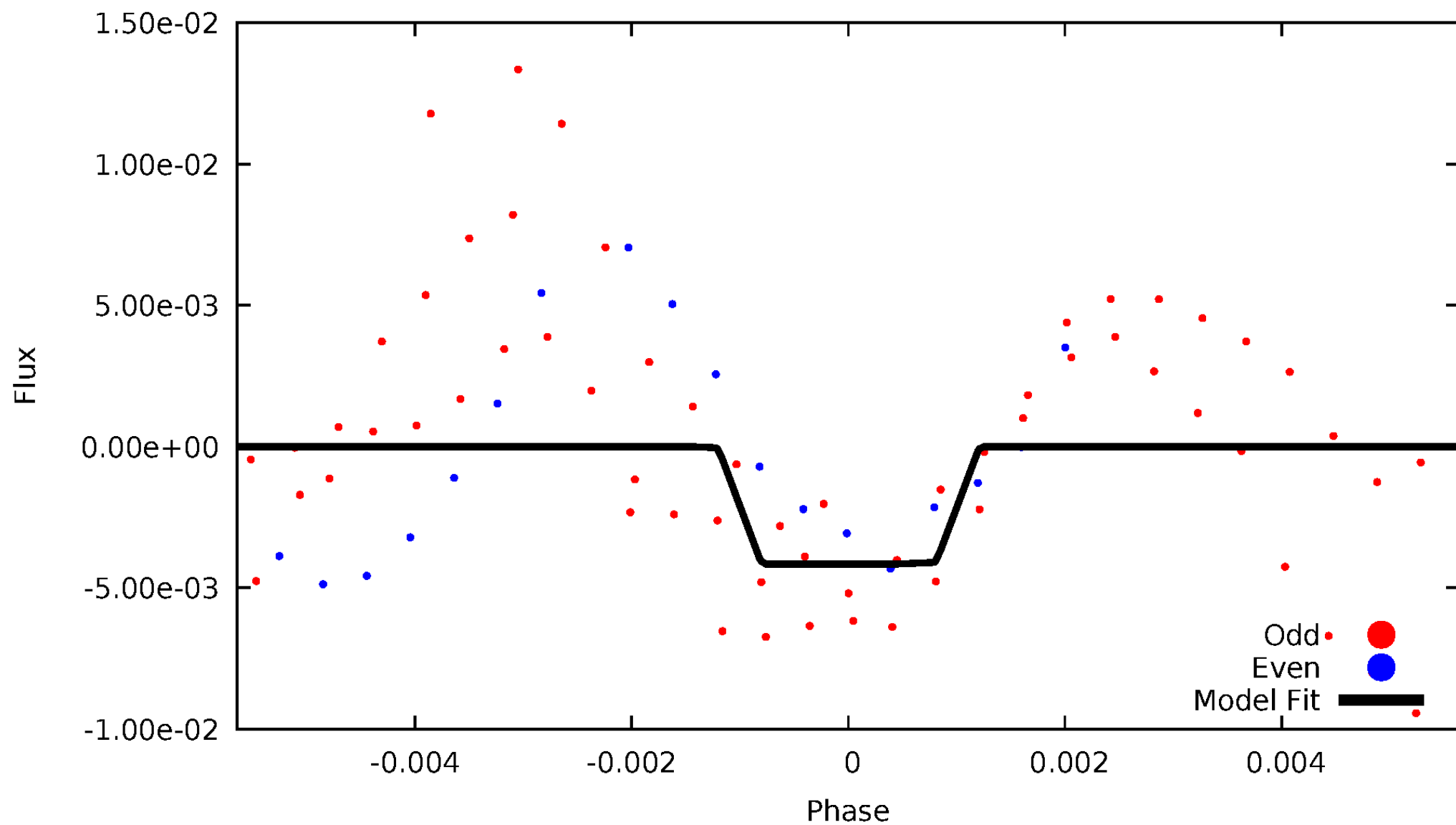
# DV Odd/Even

TCE 002167444-06



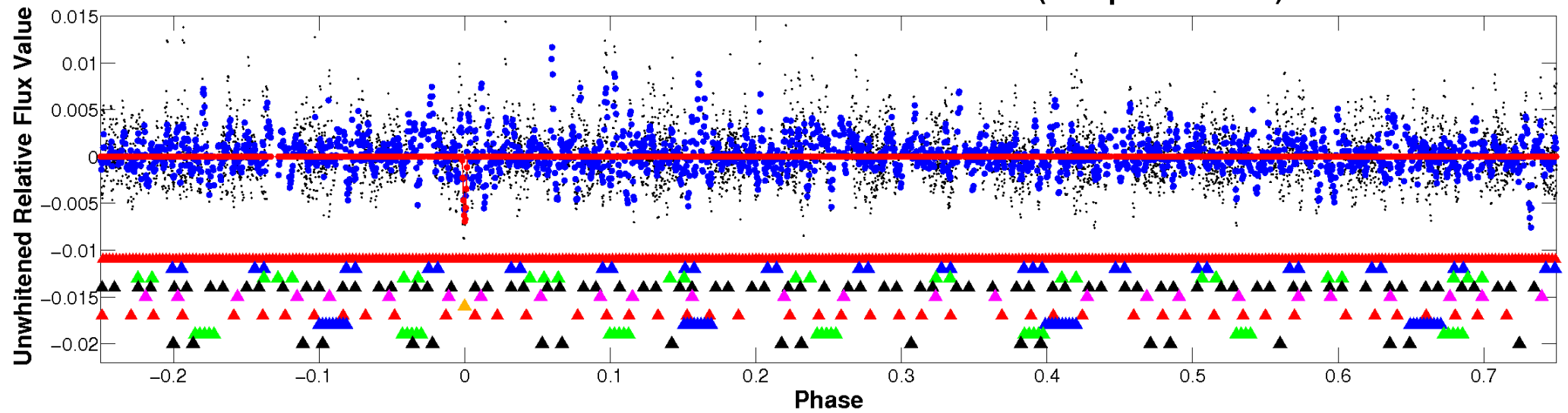
# ALT Odd/Even

TCE 002167444-06

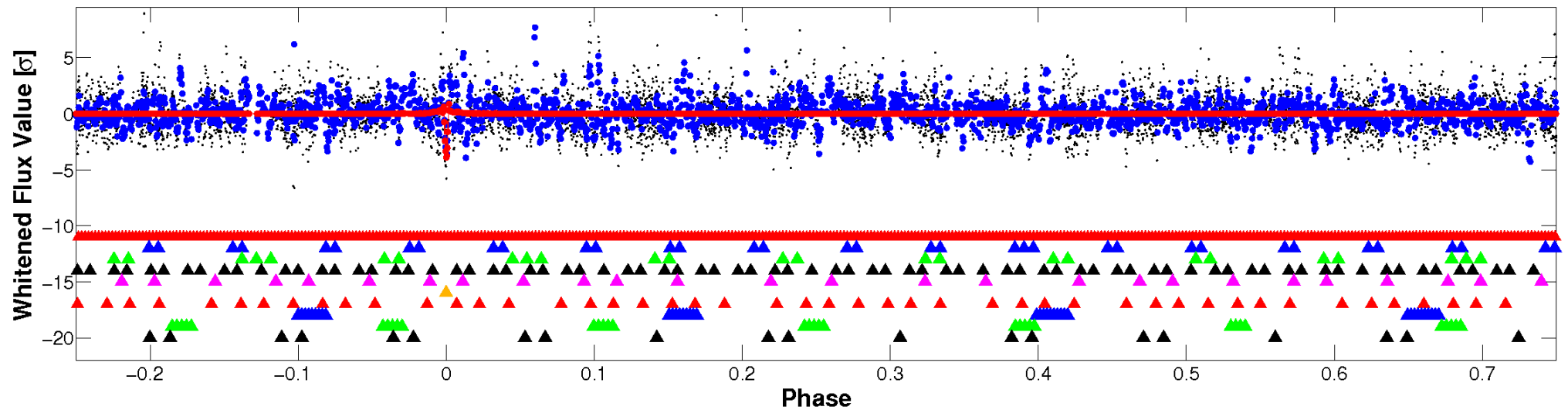


# Non-Whitened Vs. Whitened Light Curve

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

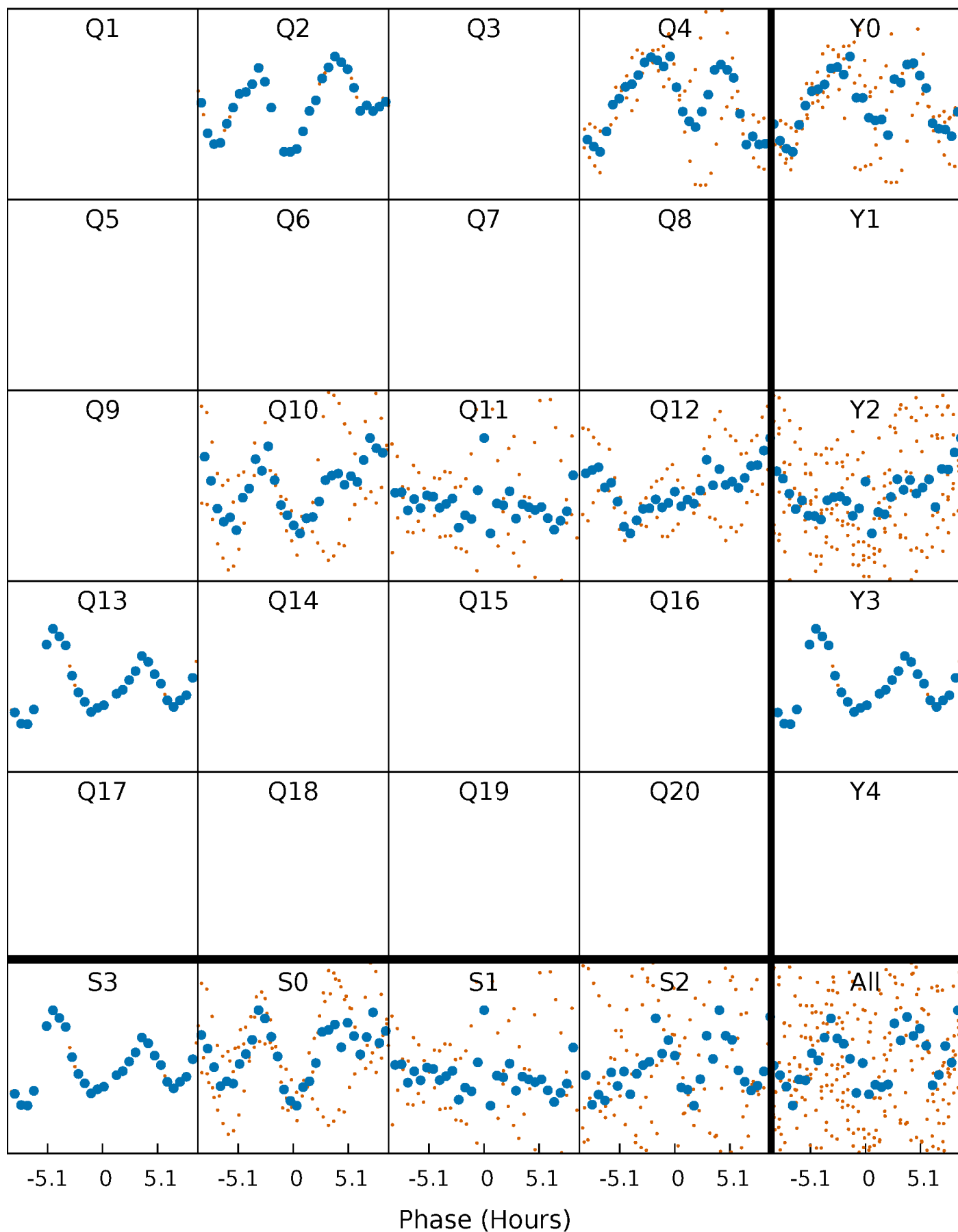


## Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)



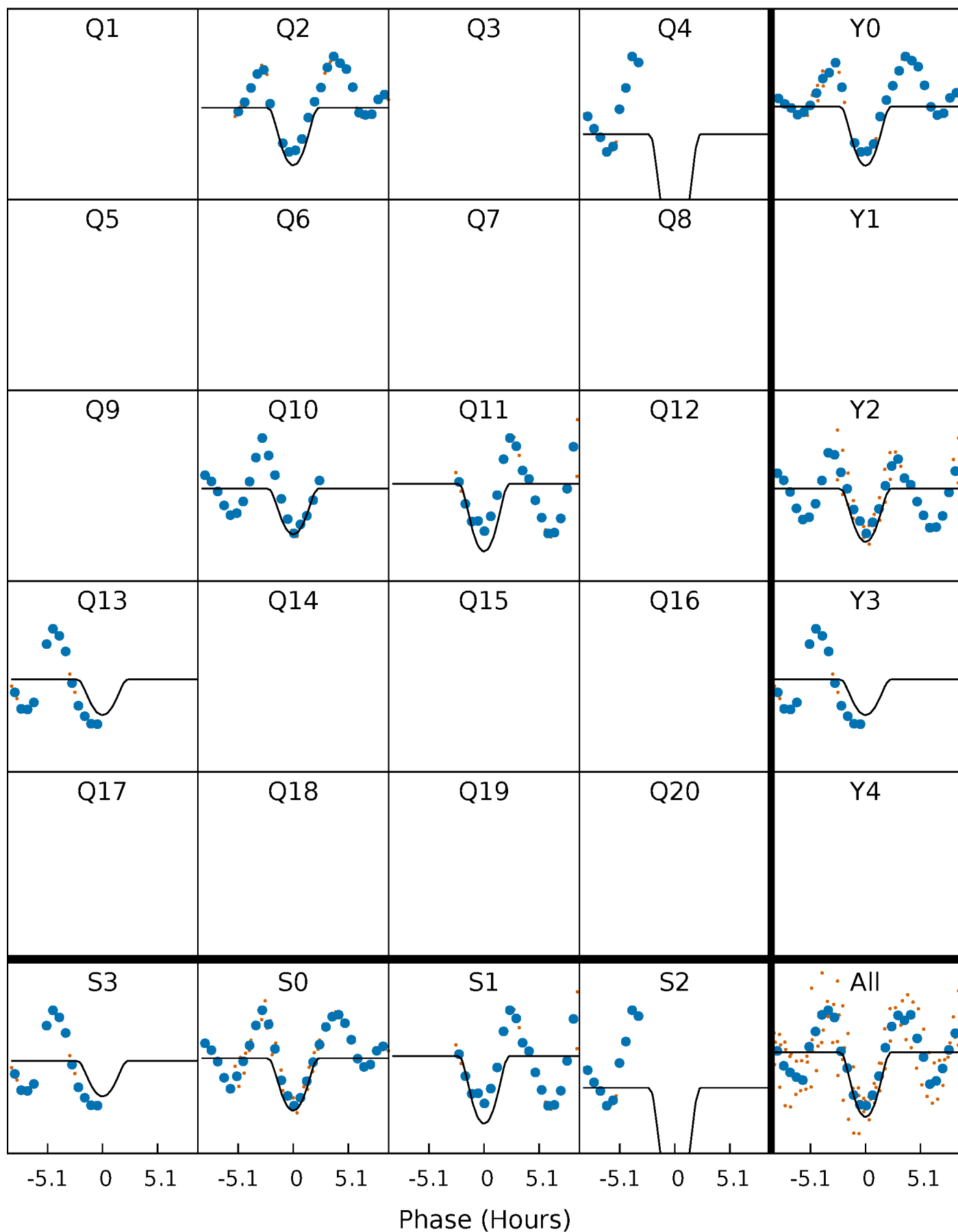
# PDC Quarter-Phased Transit Curves

TCE 002167444-06 P= 50.694800 Days  $T_0=164.270937$  (BKJD)



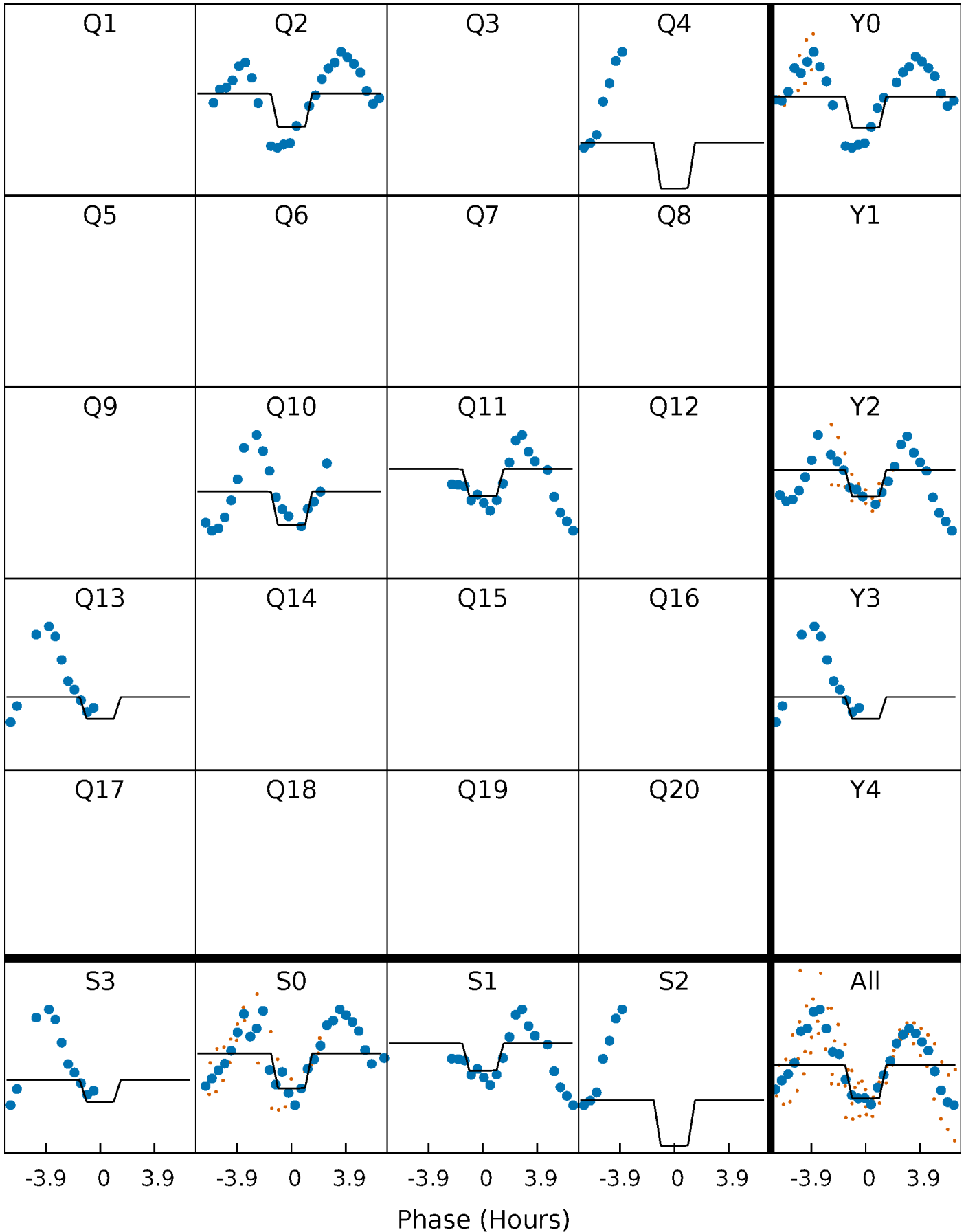
# DV Quarter-Phased Transit Curves

TCE 002167444-06 P= 50.694800 Days  $T_0=164.270937$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 002167444-06 P= 50.693223 Days  $T_0=164.290620$  (BKJD)

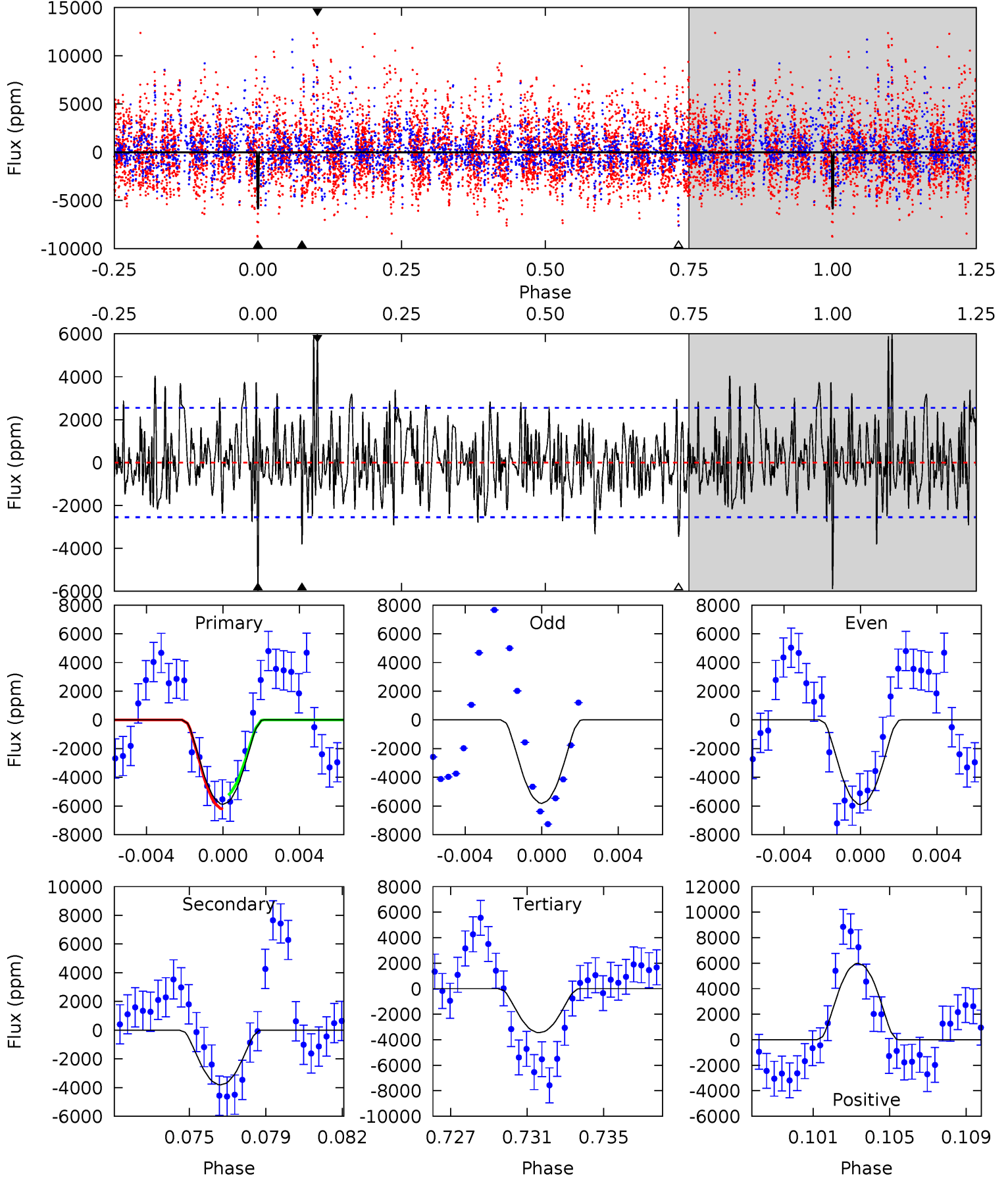




# DV Model-Shift Uniqueness Test

002167444-06, P = 50.694800 Days, E = 164.270937 Days

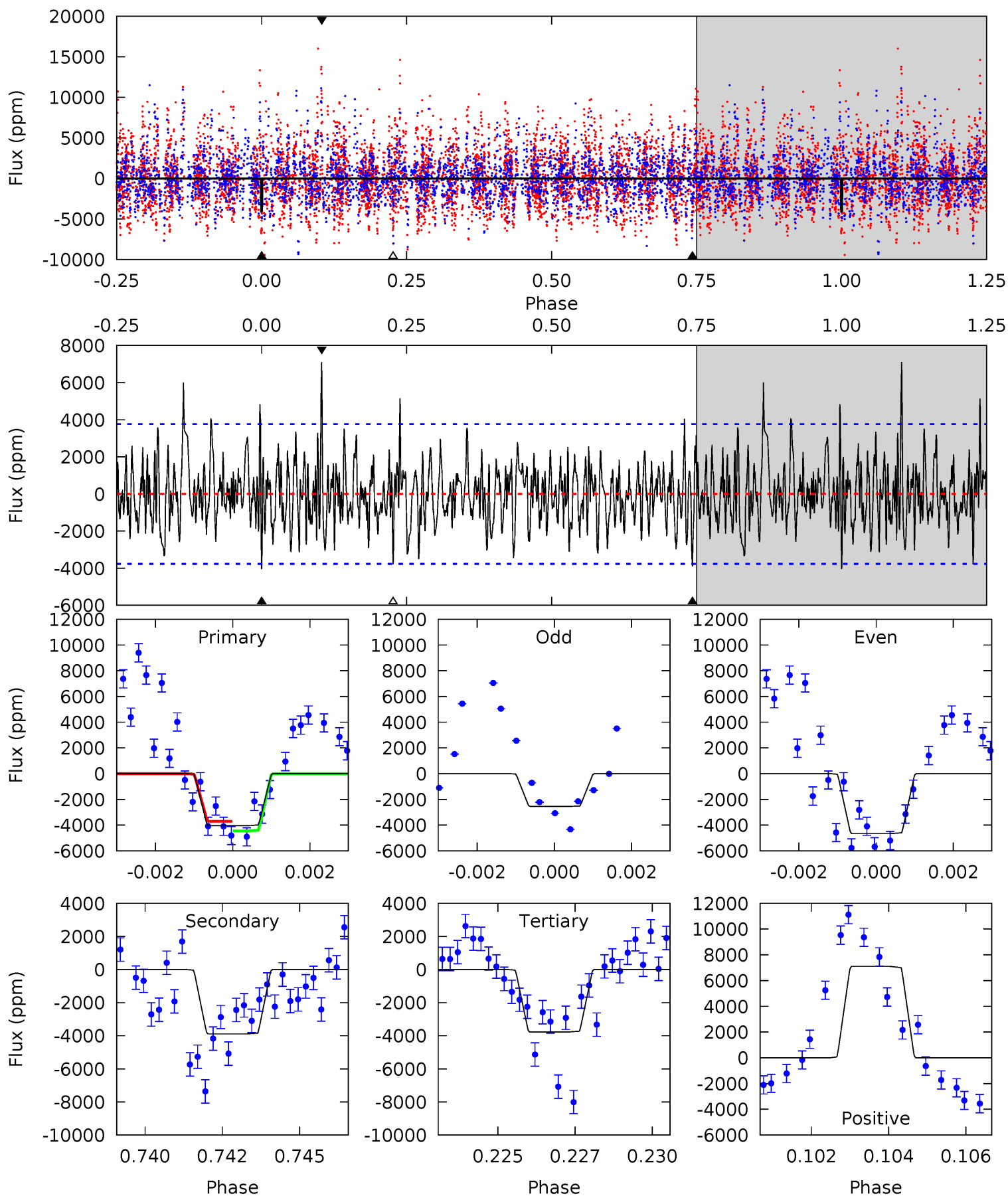
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.0	7.78	7.05	12.2	5.21	2.90	2.40	4.98	-0.22	0.74	-4.46	0.07	1.24	0.50	0.99



# Alt Model-Shift Uniqueness Test

002167444-06, P = 50.693223 Days, E = 164.290620 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.68	5.47	5.31	9.98	5.29	3.03	1.92	0.37	-4.30	0.16	-4.51	1.32	1.00	0.64	0.53



### Stellar Parameters For KIC 002167444

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7239^{+230}_{-374}$	$4.129^{+0.128}_{-0.192}$	$0.020^{+0.200}_{-0.350}$	$1.781^{+0.563}_{-0.375}$	$1.558^{+0.212}_{-0.259}$	$0.388^{+0.254}_{-0.195}$
	+3%/-5%	+3%/-5%	+1000%/-1750%	+32%/-21%	+14%/-17%	+65%/-50%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 002167444-06 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-3811 \pm 490$	$24.23^{+17.61}_{-15.49}$	$1072^{+86}_{-72}$	$5091^{+3807}_{-941}$	$342^{+2243}_{-229}$
Alt.	$-3894 \pm 712$	$20.25^{+16.21}_{-12.71}$	$1076^{+83}_{-80}$	$5663^{+4200}_{-1301}$	$502^{+3095}_{-349}$

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

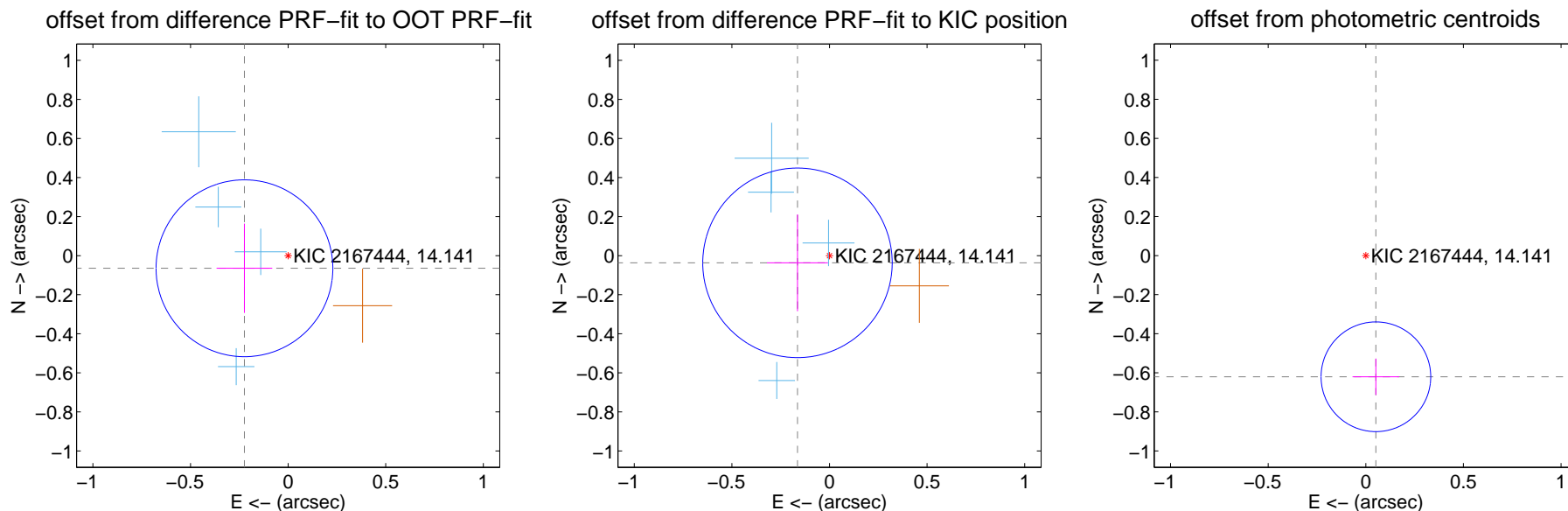
## DV Centroid Data

Supplemental centroid analysis for 002167444-06. Kepler magnitude: 14.14. Transit SNR 14.11

There are 4 quarters with good PRF difference image offsets

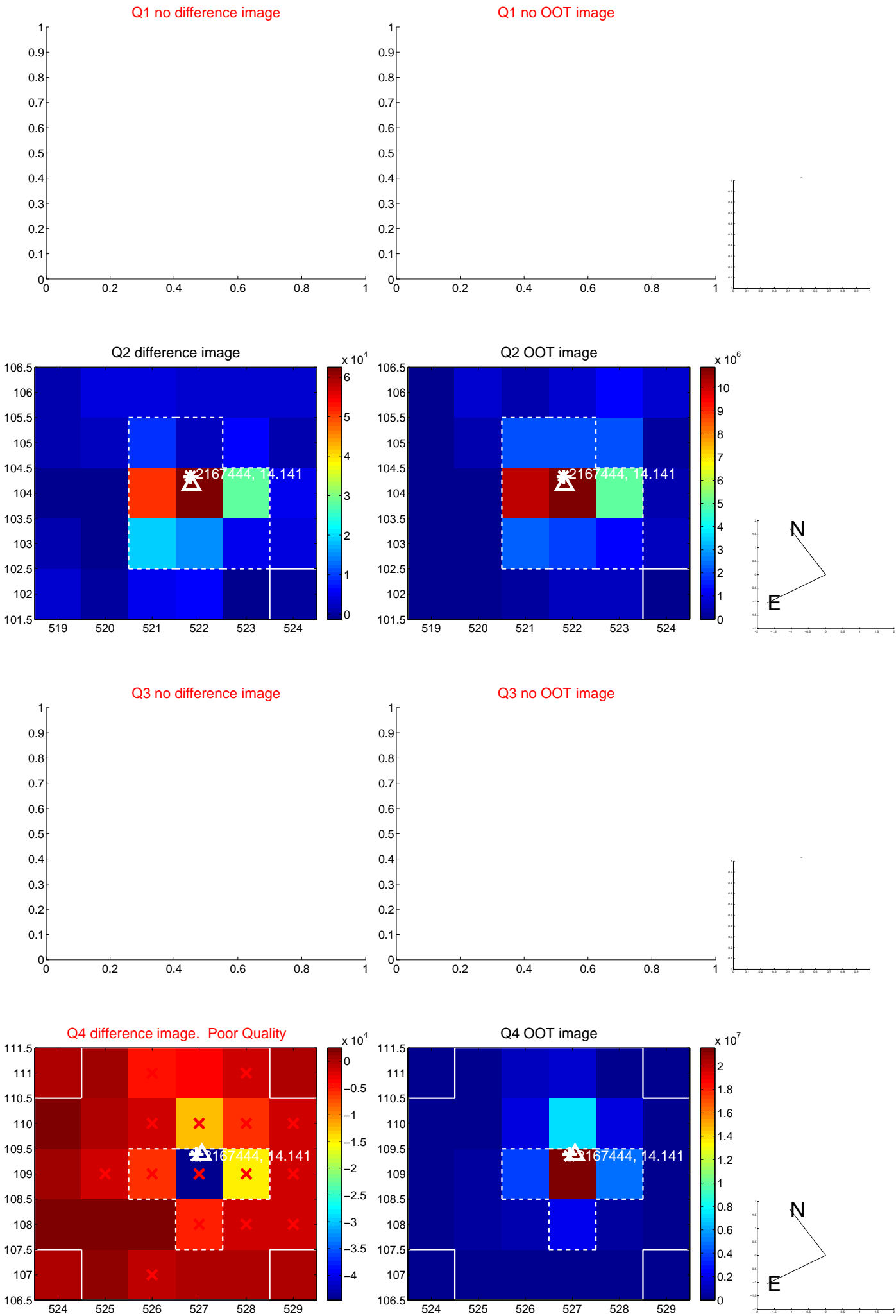
The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.233 \pm 0.151$	1.54	$0.224 \pm 0.143$	$-0.065 \pm 0.228$
PRF-fit source offset from KIC position	$0.168 \pm 0.162$	1.04	$0.164 \pm 0.156$	$-0.037 \pm 0.248$
photometric centroid source offset	$0.62 \pm 0.09$	6.65	$-0.05 \pm 0.12$	$-0.62 \pm 0.09$



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.

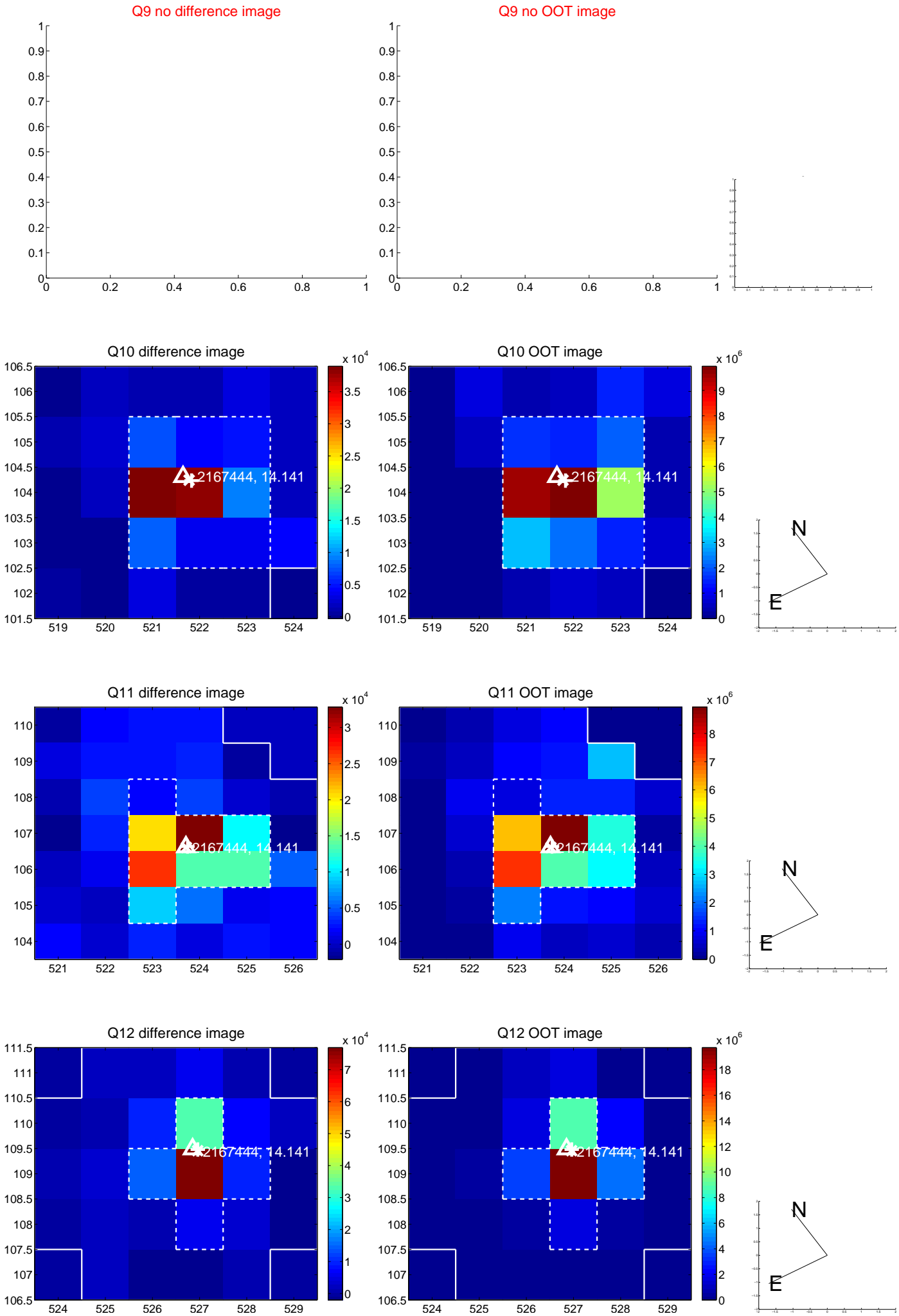
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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.

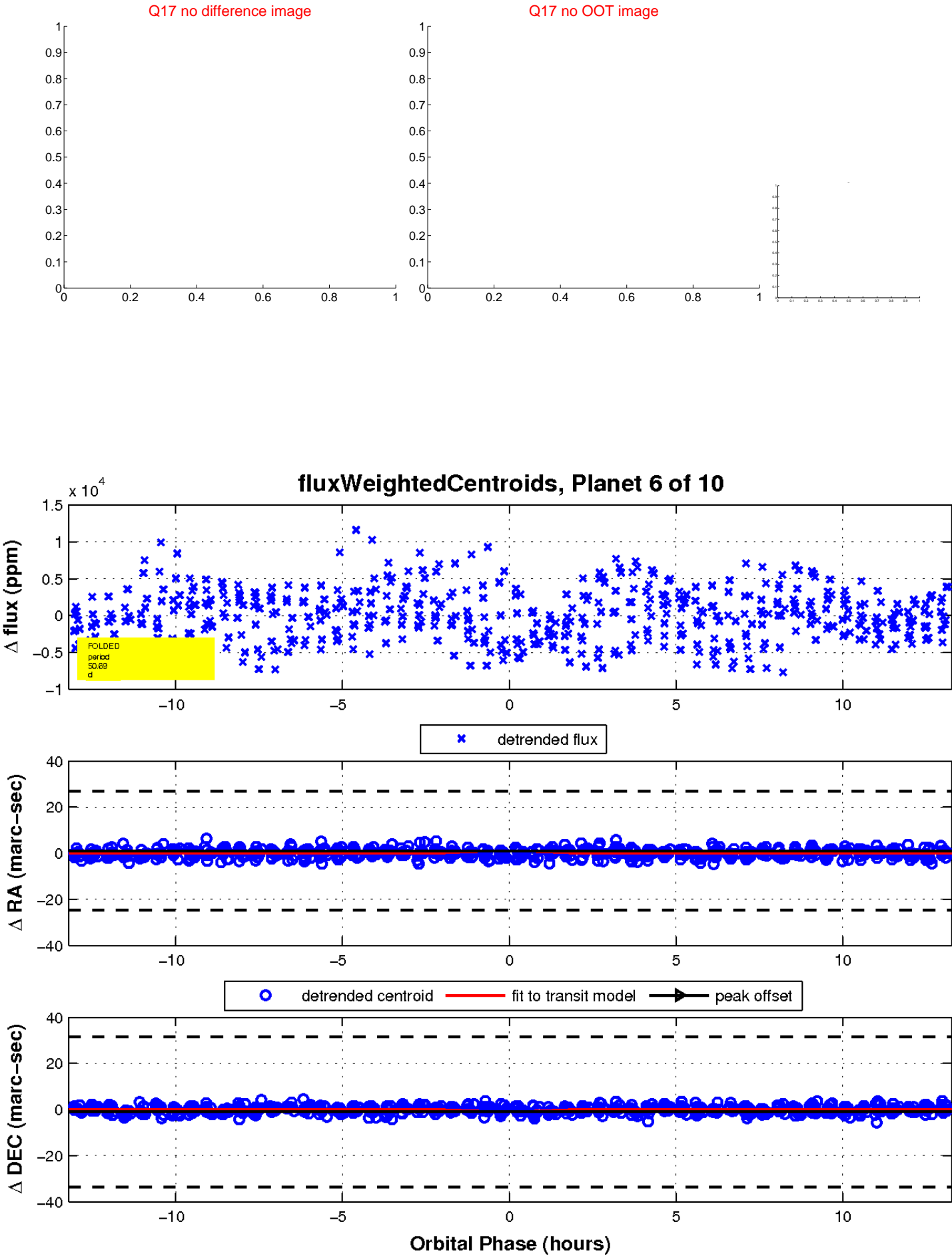


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



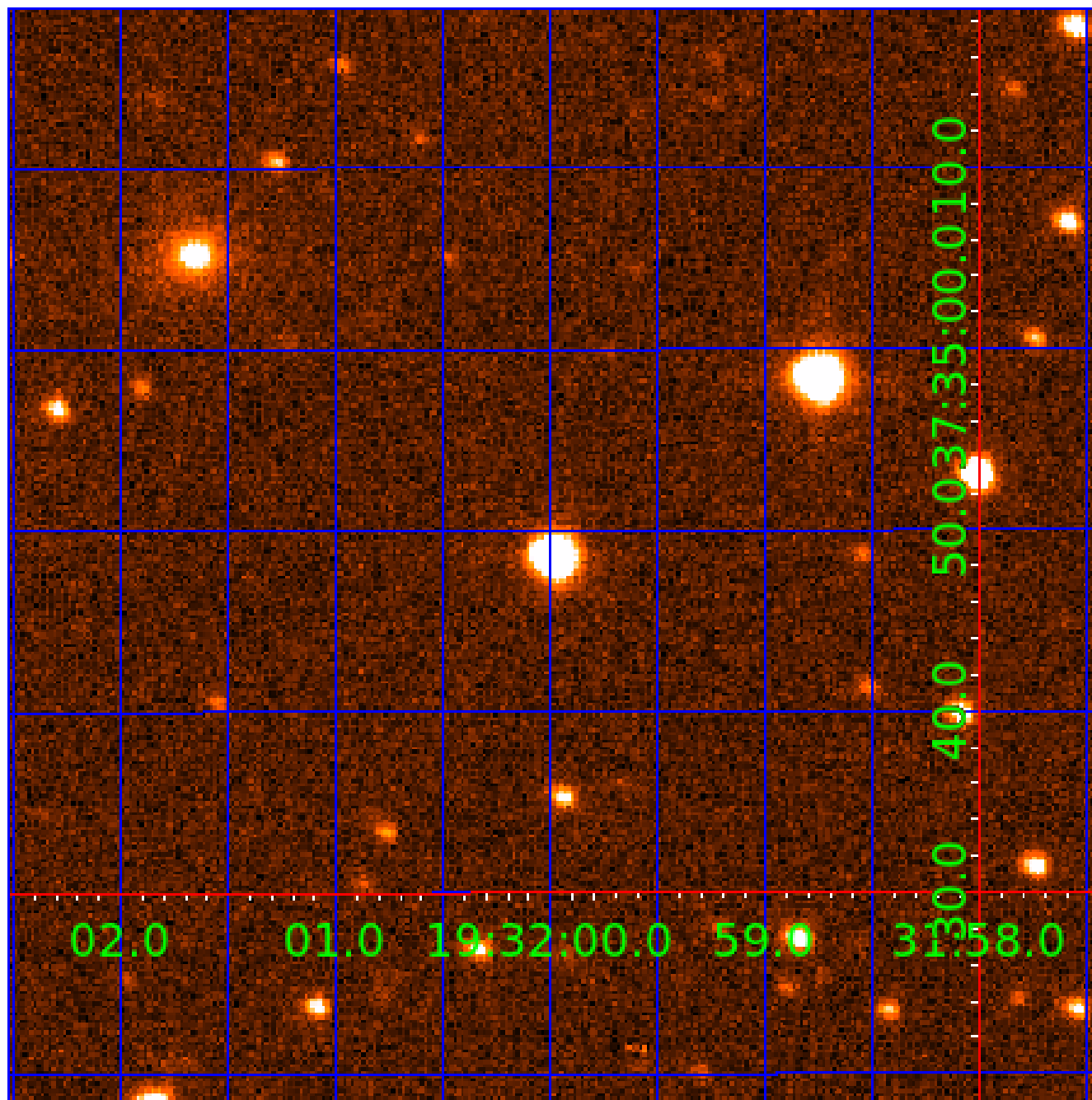


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 002167444

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002167444-01	OBS	6261.01	2.436132	133.461910	183.6	13.847	14.6	2.7	1.78	7239	2.51	4625.06
002167444-02	OBS	No	41.767300	133.051118	9768.1	4.645	17.3	16.9	1.78	7239	22.40	104.62
002167444-03	OBS	No	59.957046	148.015307	8629.5	5.029	16.6	16.0	1.78	7239	24.89	64.61
002167444-04	OBS	No	18.853189	138.257909	6213.5	4.514	13.9	16.2	1.78	7239	23.94	302.14
002167444-05	OBS	No	55.971983	138.453394	7128.2	4.837	13.9	13.2	1.78	7239	26.48	70.81
002167444-06	OBS	No	50.694800	164.270937	6960.6	4.426	13.0	14.1	1.78	7239	19.97	80.80
002167444-07	OBS	No	31.334397	148.069009	5987.4	4.388	12.8	12.3	1.78	7239	24.13	153.47
002167444-09	OBS	No	43.476060	133.067820	6087.2	5.222	12.2	12.2	1.78	7239	17.15	99.17
002167444-10	OBS	No	71.875232	162.459931	4760.8	4.459	11.4	11.0	1.78	7239	19.78	50.73

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002167444-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV
002167444-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-03	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT
002167444-04	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
002167444-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-07	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-10	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

**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 002167444-07

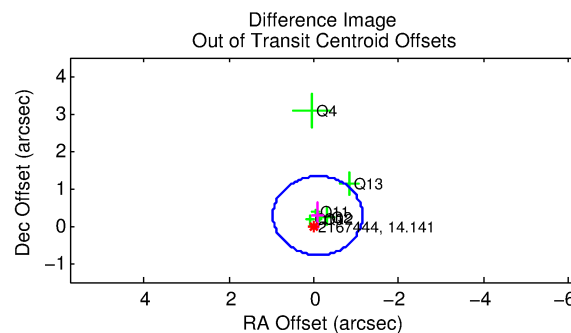
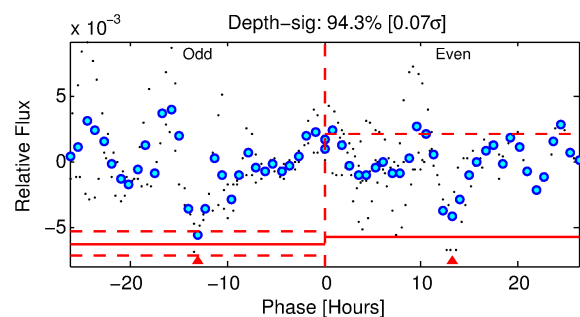
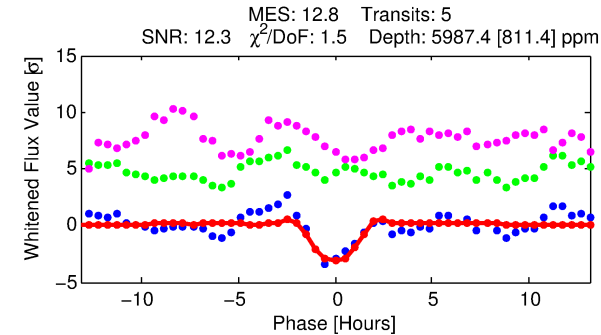
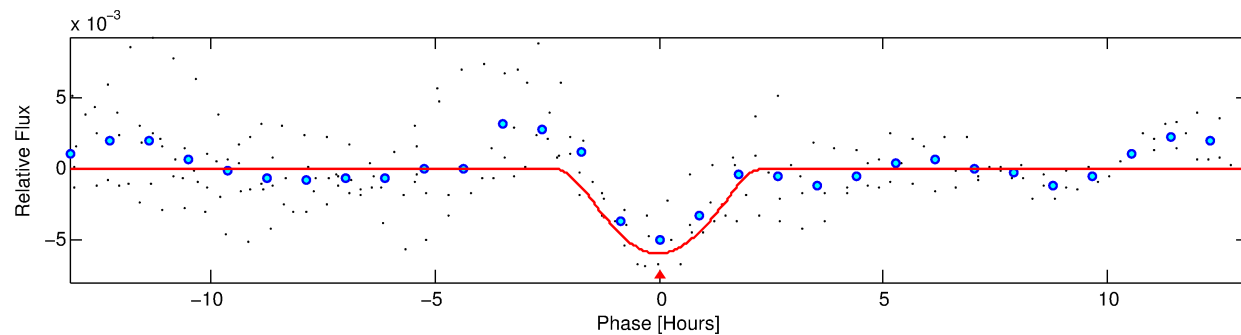
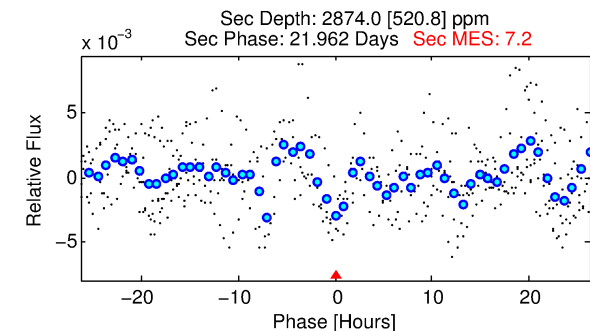
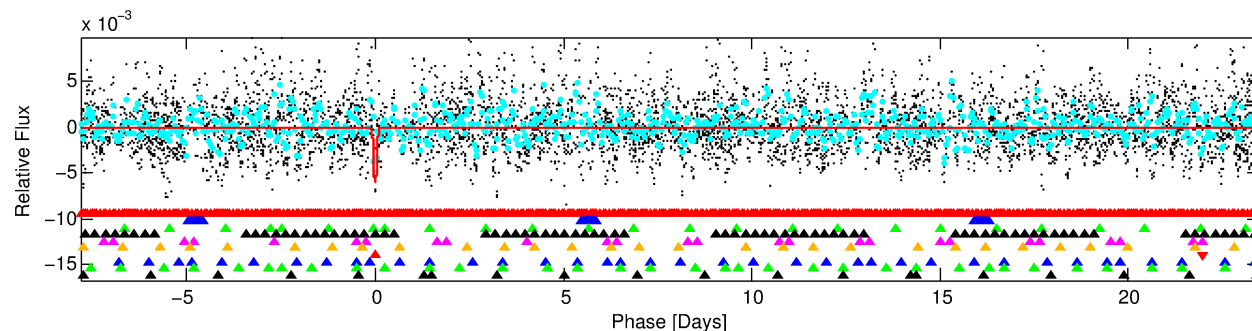
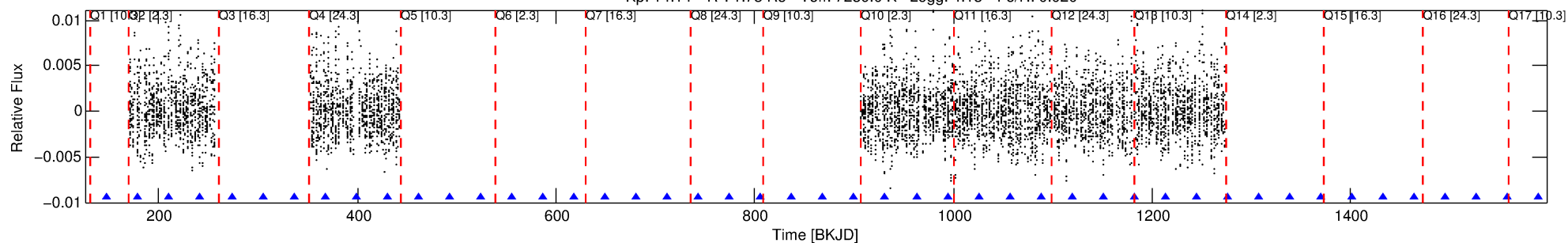
No Significant Match Found

# DV One-Page Summary

KIC: 2167444 Candidate: 7 of 10 Period: 31.334 d

KOI: K06261 Corr: No Ephemeris Match

Kp: 14.14 R\*: 1.78 Rs Teff: 7239.0 K Logg: 4.13 Fe/H: 0.020



## DV Fit Results:

Period = 31.33440 [0.00045] d  
Epoch = 148.0690 [0.0115] BKJD  
Rp/R\* = 0.1241 [0.3055]  
a/R\* = 28.28 [12.77]  
b = 1.00 [0.45]  
Seff = 153.47 [64.01]  
Teq = 897 [94] K  
Rp = 24.13 [59.86] Re  
a = 0.2255 [0.0580] AU  
Ag = 138.12 [682.04] [0.20σ]  
Teff = 4757 [5862] K [0.66σ]

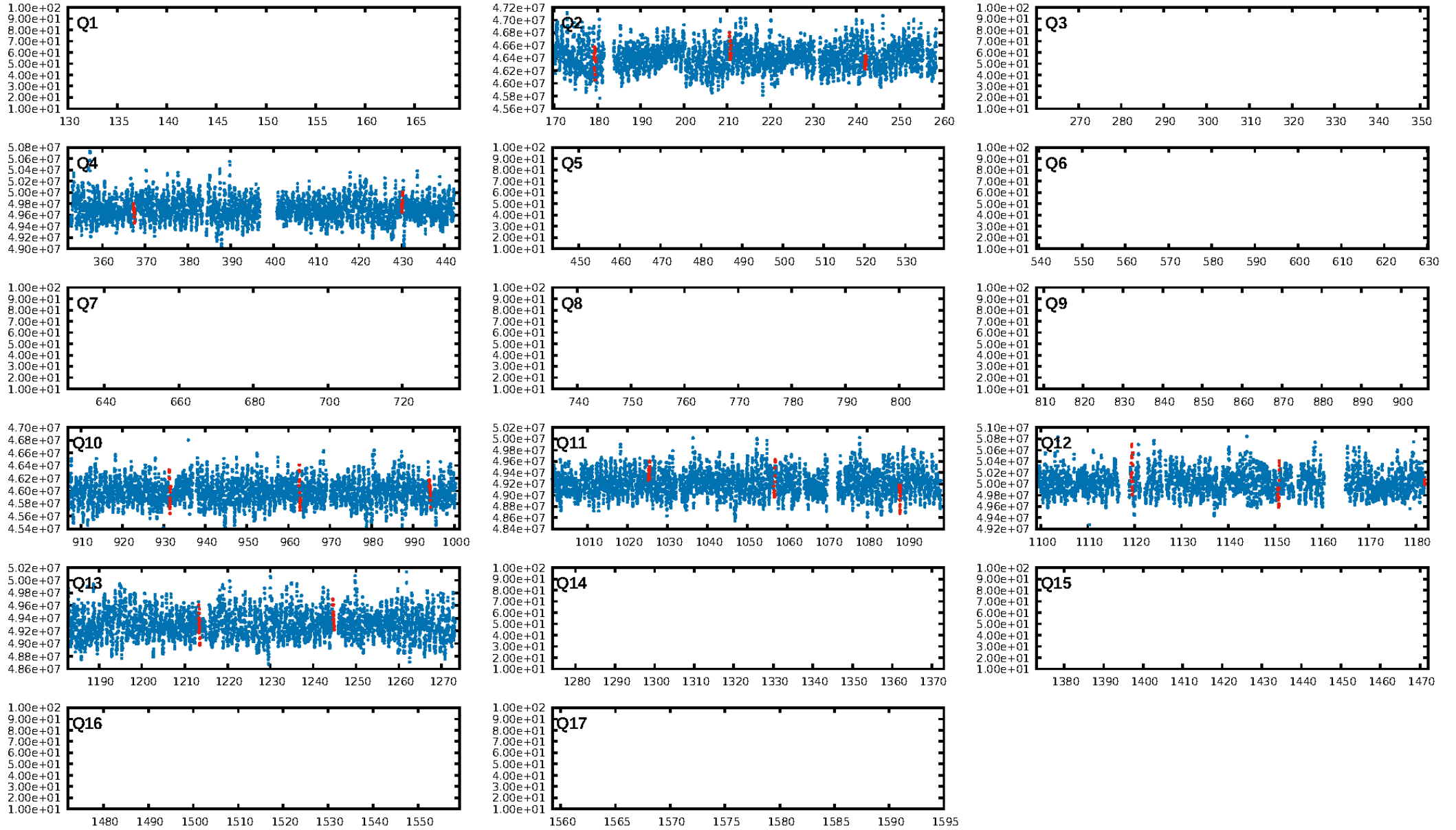
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [47.58σ]  
LongPeriod-sig: 100.0% [22.23σ]  
ModelChiSquare2-sig: 3.7%  
ModelChiSquareGof-sig: 93.4%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 1.3  
Centroid-sig: 17.6%  
Centroid-so: 0.853 arcsec [9.44σ]  
OotOffset-rm: 0.288 arcsec [0.82σ]  
KicOffset-rm: 0.397 arcsec [1.02σ]  
OotOffset-st: 2/1/2/1 [6]  
KicOffset-st: 2/1/2/1 [6]  
DiffImageQuality-fgm: 0.83 [5/6]  
DiffImageOverlap-fno: 0.67 [4/6]

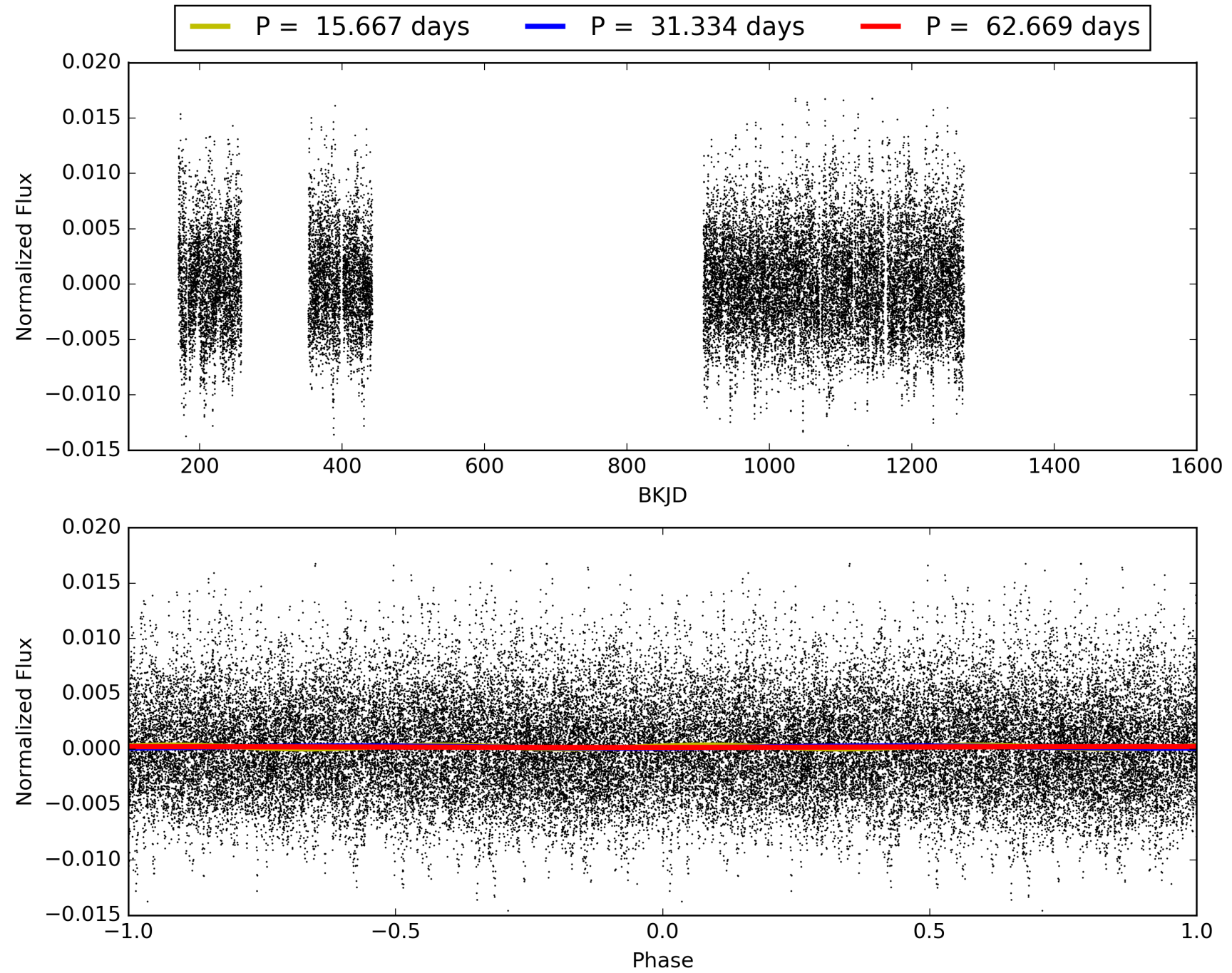
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 03:47:09 Z

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

# TCE 002167444-07, PDC Light Curves

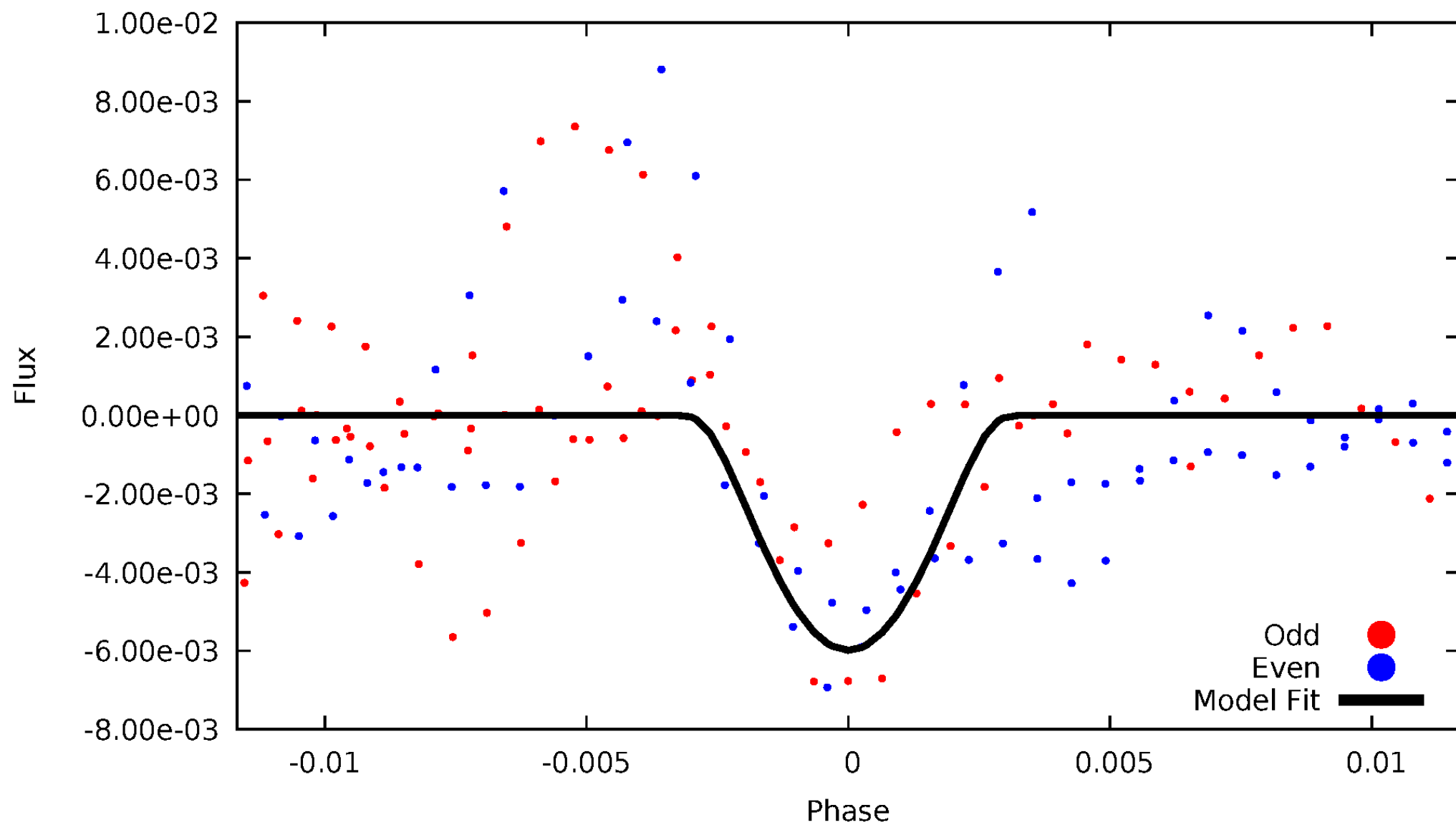


TCE 002167444-07



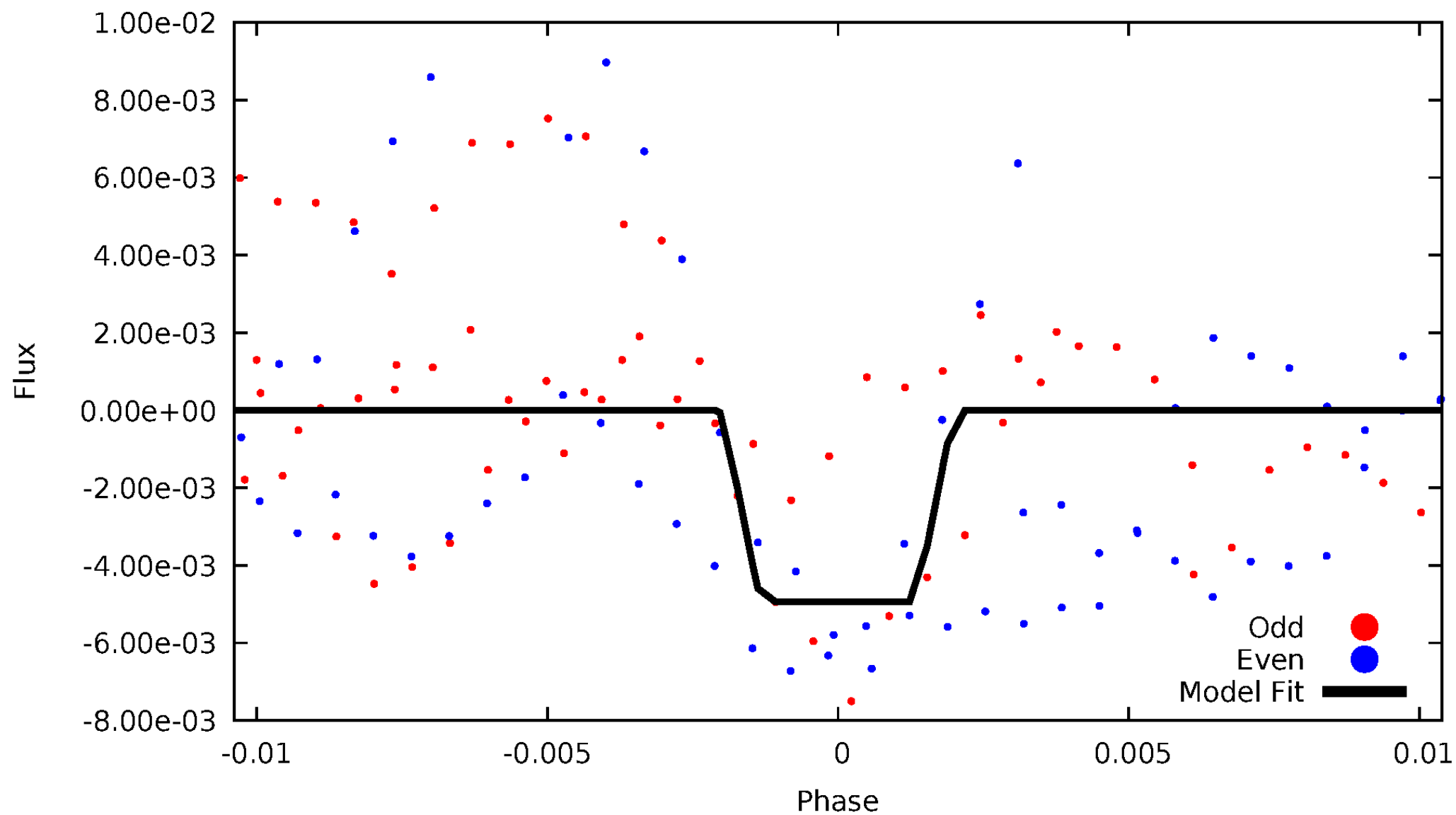
# DV Odd/Even

TCE 002167444-07



# ALT Odd/Even

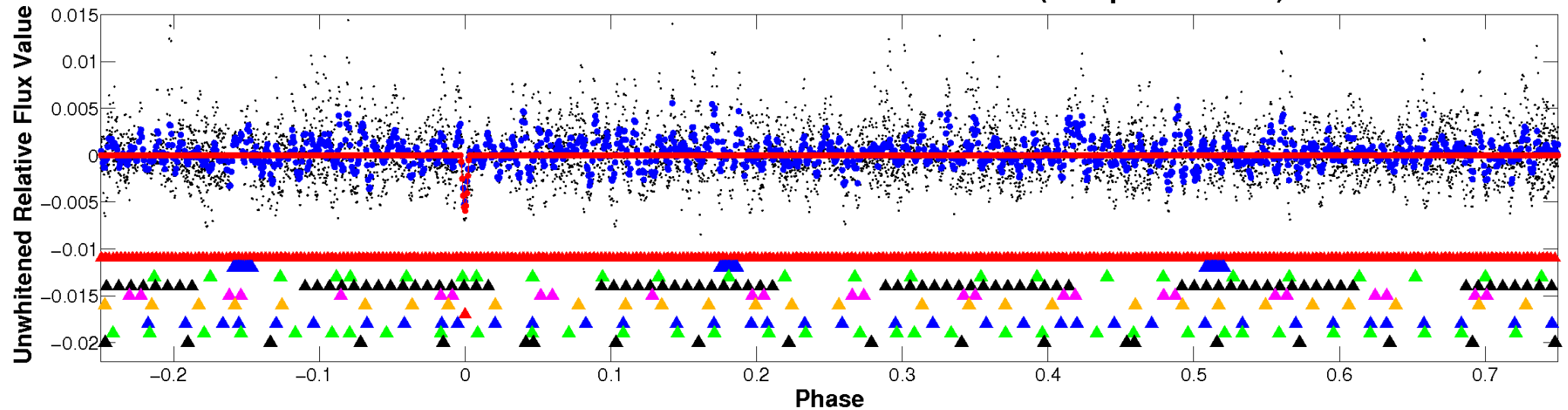
TCE 002167444-07



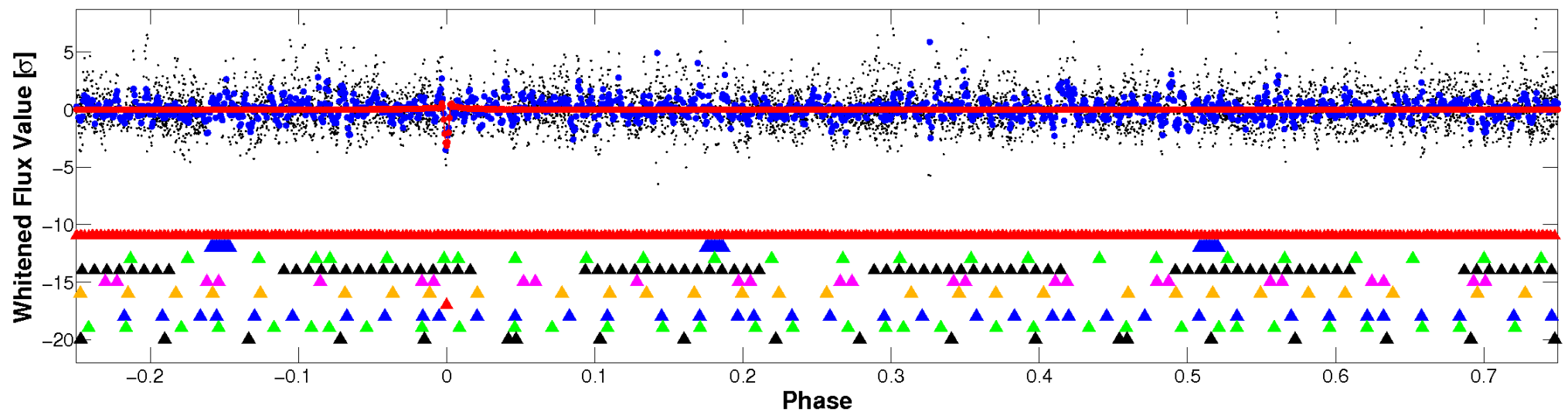


# Non-Whitened Vs. Whitened Light Curve

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

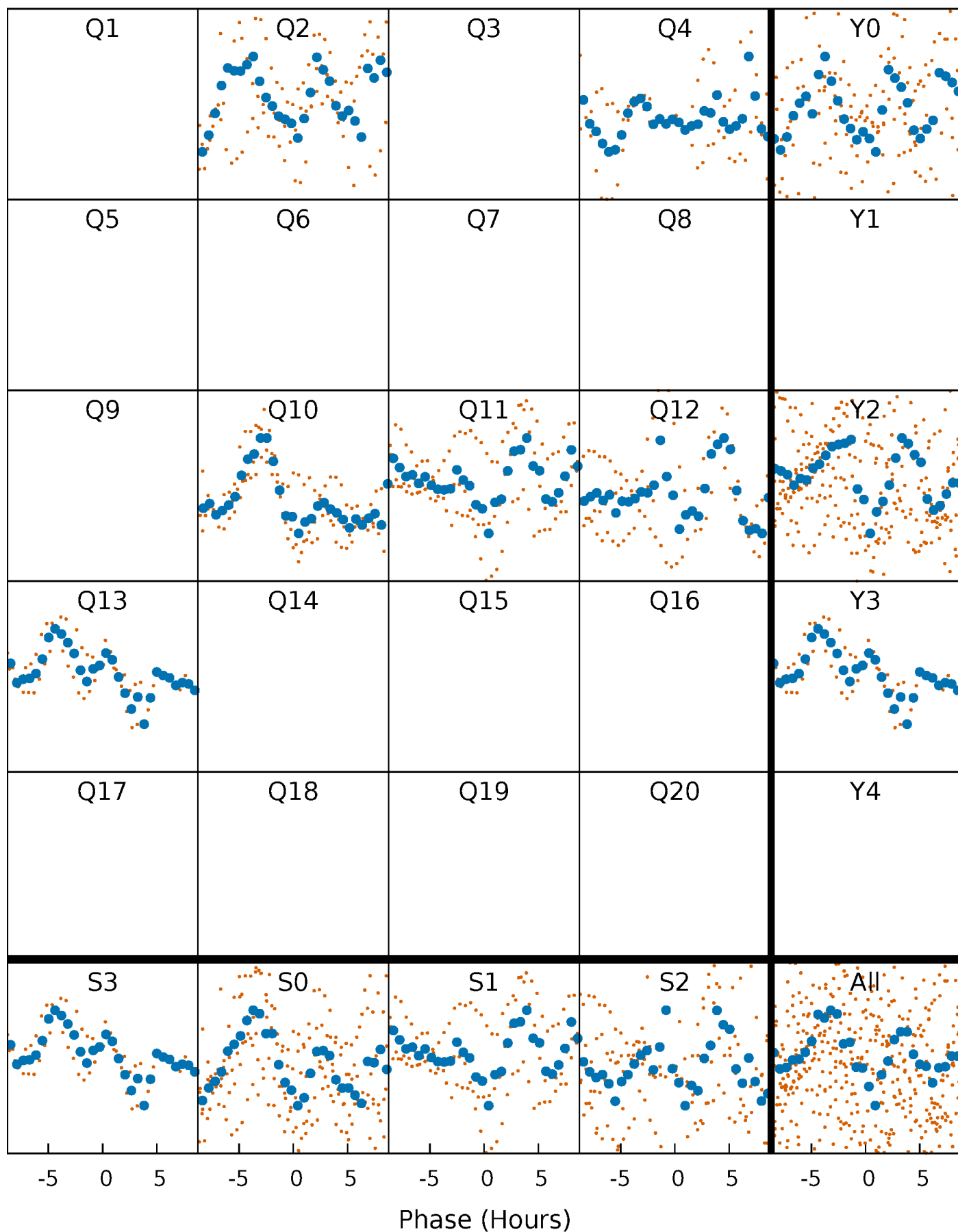


## Planet 7 : Phased Whitened Flux Time Series (Fit Epoch/Period)



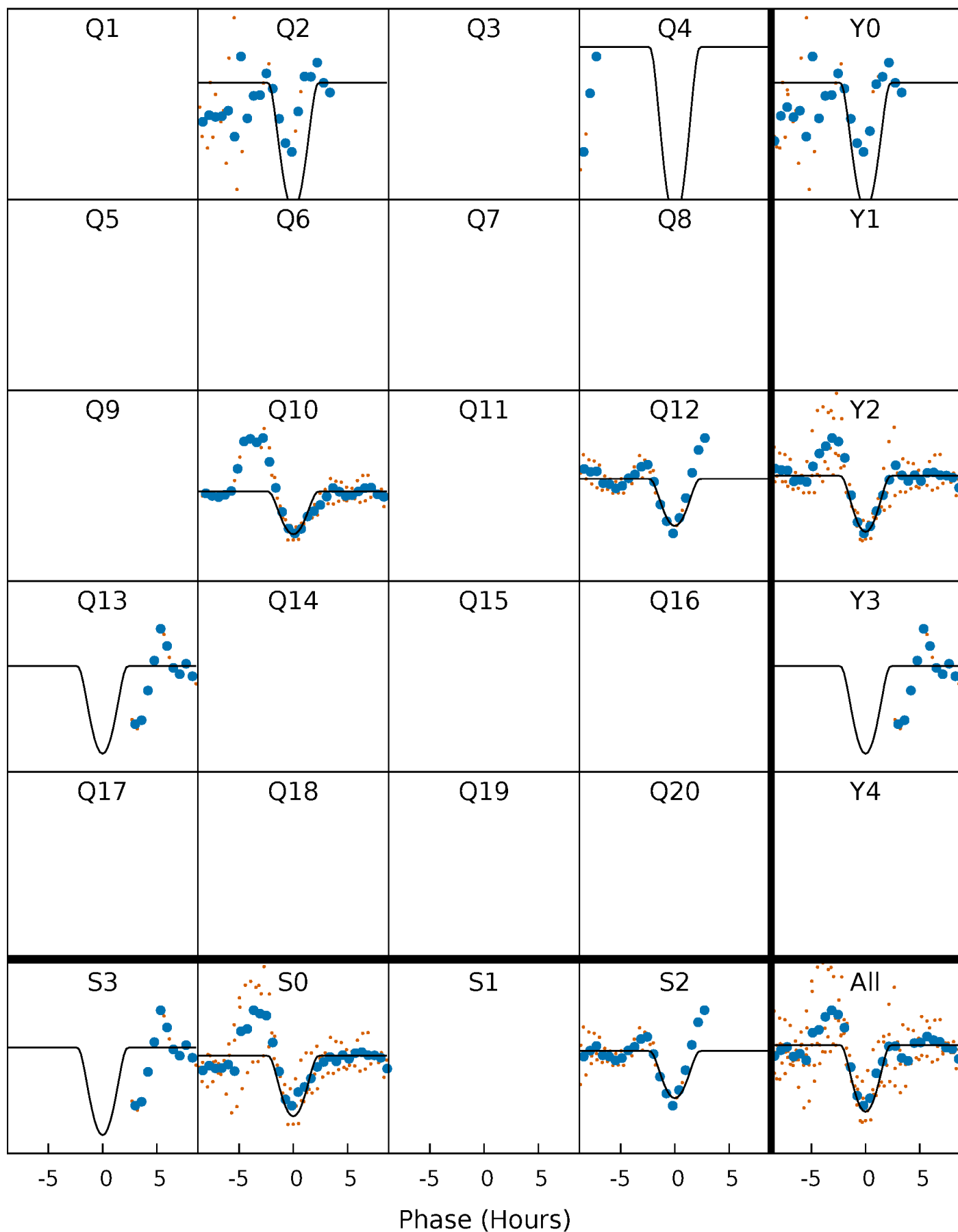
# PDC Quarter-Phased Transit Curves

TCE 002167444-07   P= 31.334397 Days    $T_0=148.069009$  (BKJD)



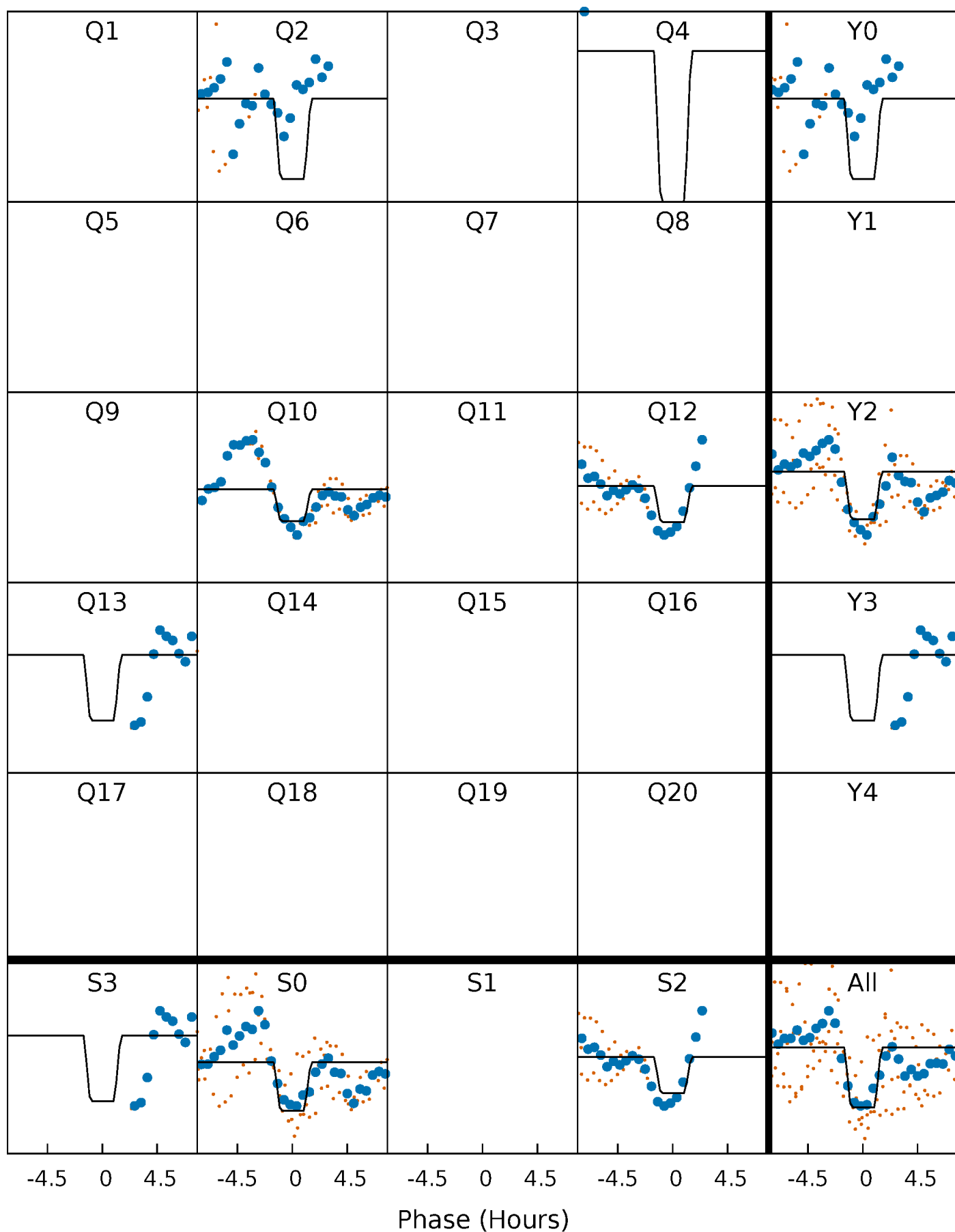
# DV Quarter-Phased Transit Curves

TCE 002167444-07   P= 31.334397 Days    $T_0=148.069009$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

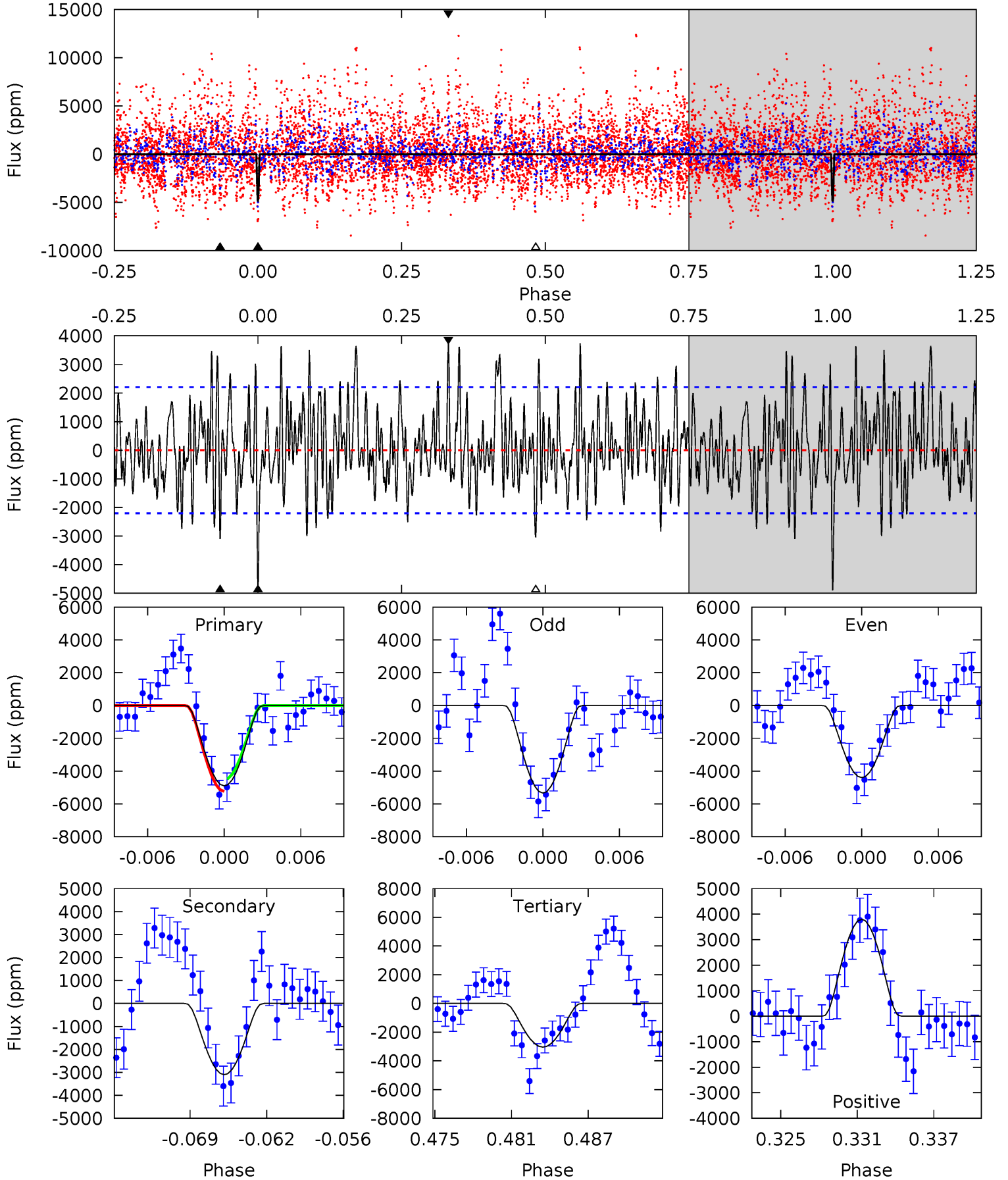
TCE 002167444-07 P= 31.334388 Days  $T_0=148.082379$  (BKJD)



# DV Model-Shift Uniqueness Test

002167444-07, P = 31.334397 Days, E = 148.069009 Days

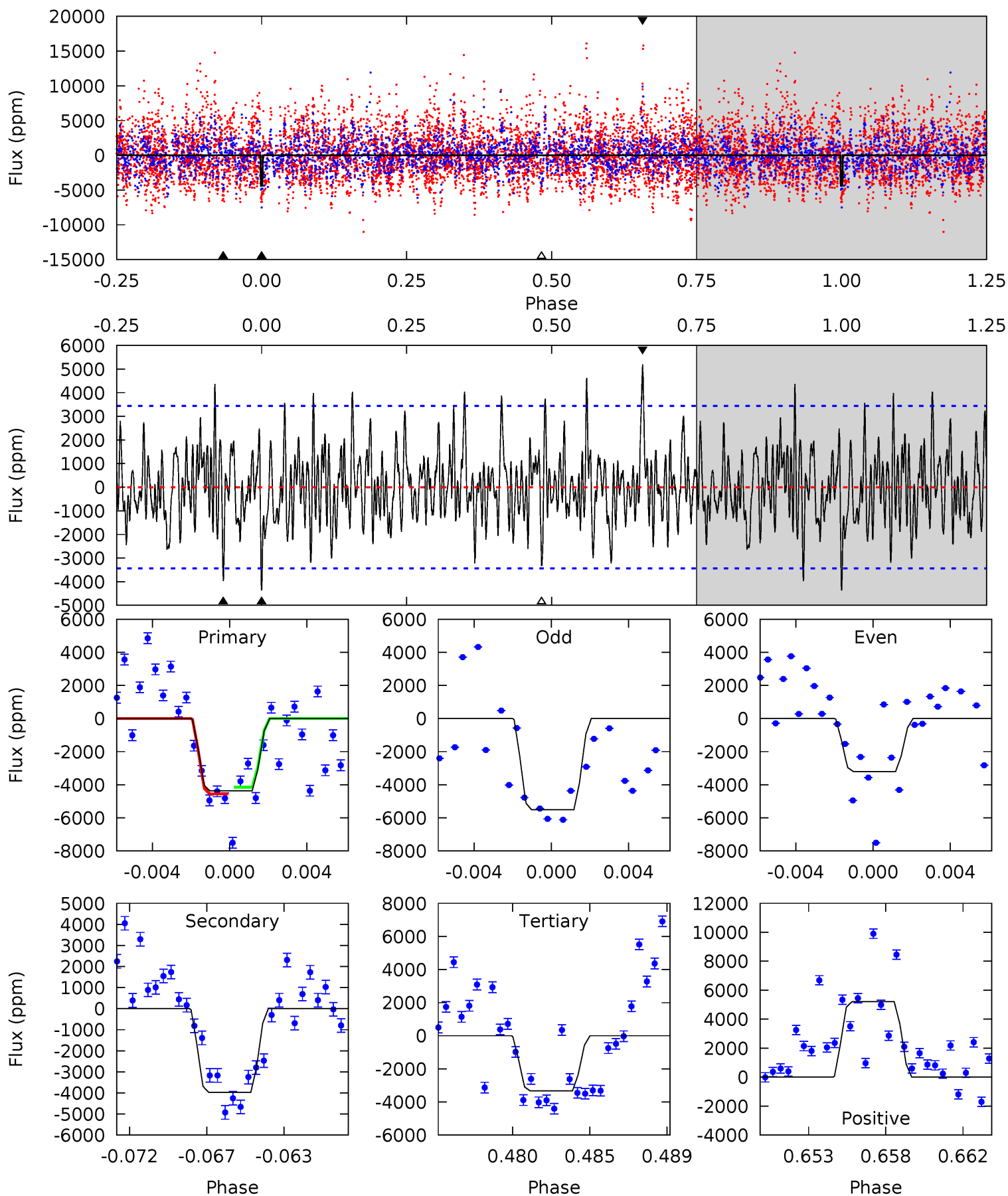
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.4	7.19	7.06	8.81	5.12	2.73	2.69	4.31	2.55	0.14	-1.62	1.08	0.91	0.44	0.88



# Alt Model-Shift Uniqueness Test

002167444-07, P = 31.334388 Days, E = 148.082379 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
6.59	5.99	5.03	7.85	5.19	2.86	1.95	1.56	-1.25	0.96	-1.86	1.74	0.79	0.54	0.31



### Stellar Parameters For KIC 002167444

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7239^{+230}_{-374}$	$4.129^{+0.128}_{-0.192}$	$0.020^{+0.200}_{-0.350}$	$1.781^{+0.563}_{-0.375}$	$1.558^{+0.212}_{-0.259}$	$0.388^{+0.254}_{-0.195}$
	+3%/-5%	+3%/-5%	+1000%/-1750%	+32%/-21%	+14%/-17%	+65%/-50%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 002167444-07 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-3101 \pm 431$	$51.49^{+49.20}_{-34.65}$	$1261^{+105}_{-87}$	$3688^{+2052}_{-689}$	$32^{+275}_{-24}$
Alt.	$-3968 \pm 663$	$48.23^{+44.26}_{-33.01}$	$1254^{+107}_{-90}$	$3976^{+2467}_{-828}$	$47^{+398}_{-34}$

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

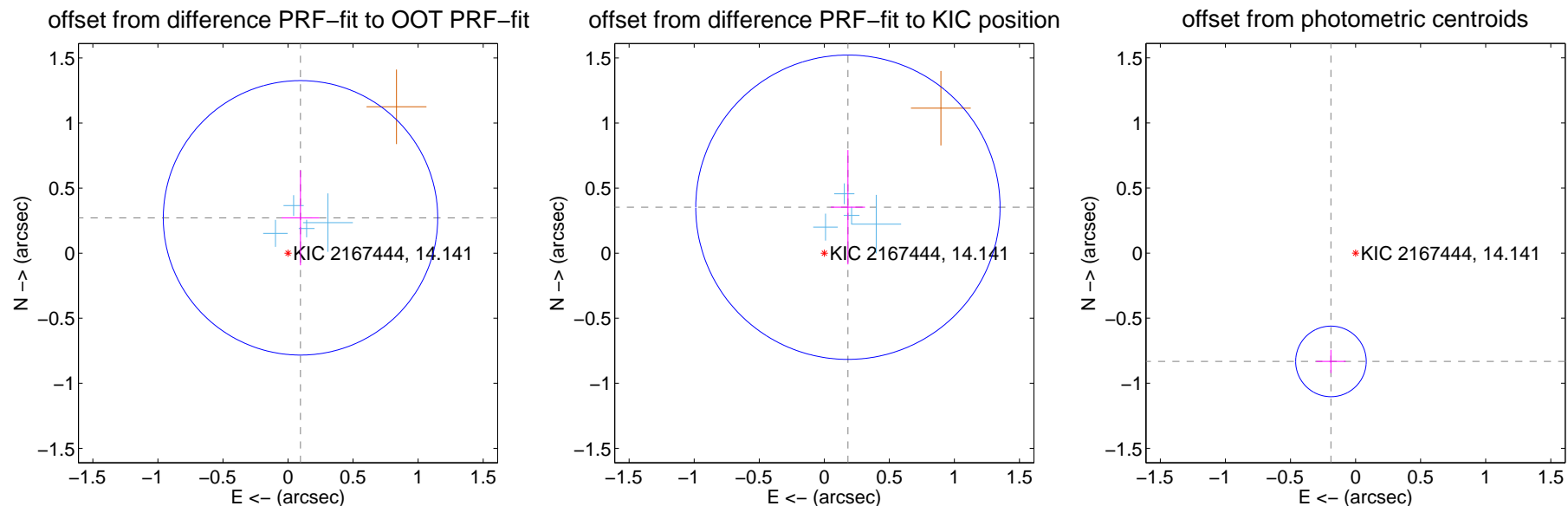
## DV Centroid Data

Supplemental centroid analysis for 002167444-07. Kepler magnitude: 14.14. Transit SNR 12.32

There are 5 quarters with good PRF difference image offsets

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

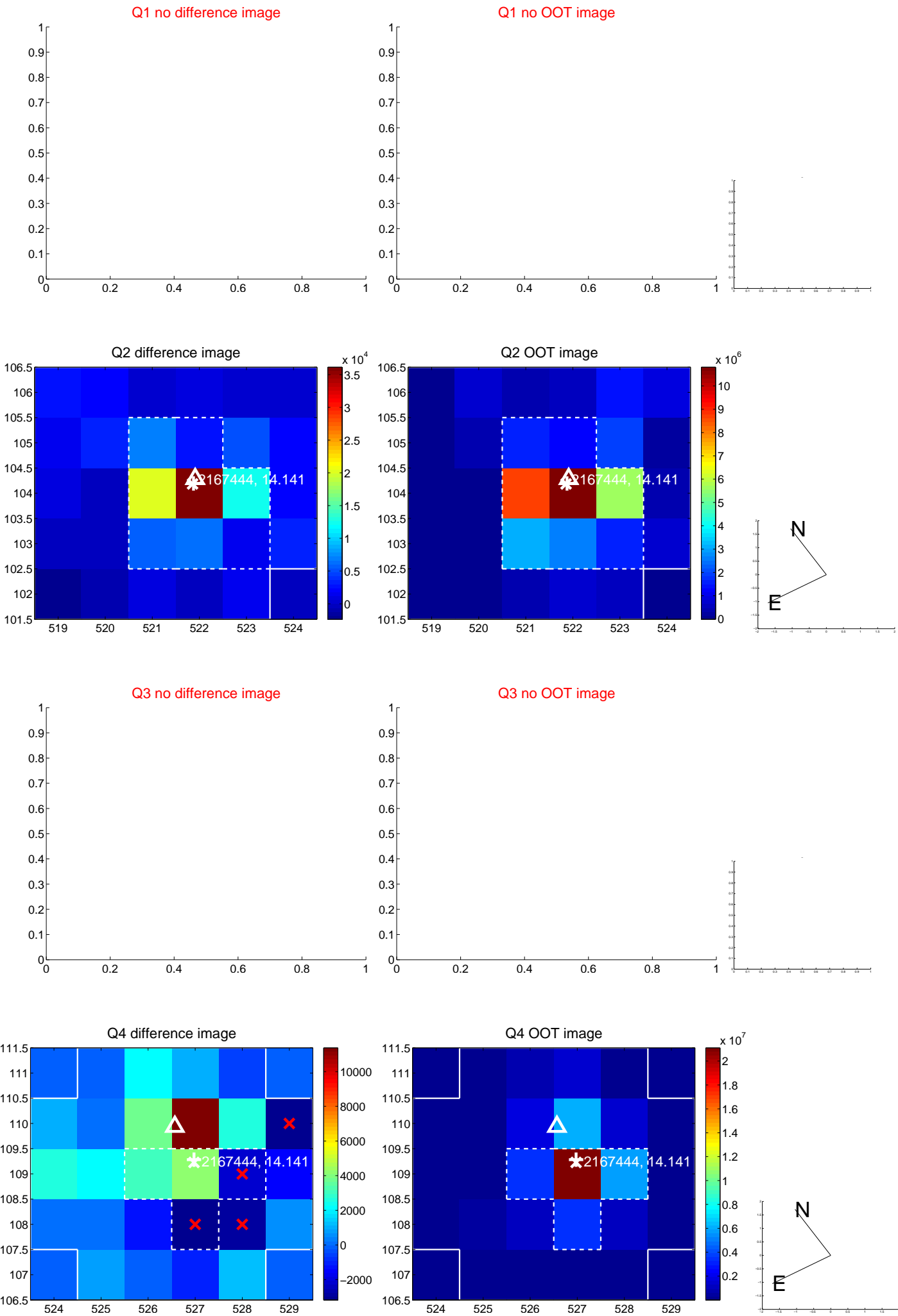
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.288 \pm 0.352$	0.82	$-0.096 \pm 0.144$	$0.271 \pm 0.365$
PRF-fit source offset from KIC position	$0.397 \pm 0.390$	1.02	$-0.181 \pm 0.131$	$0.353 \pm 0.440$
photometric centroid source offset	$0.85 \pm 0.09$	9.44	$0.19 \pm 0.11$	$-0.83 \pm 0.09$



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.



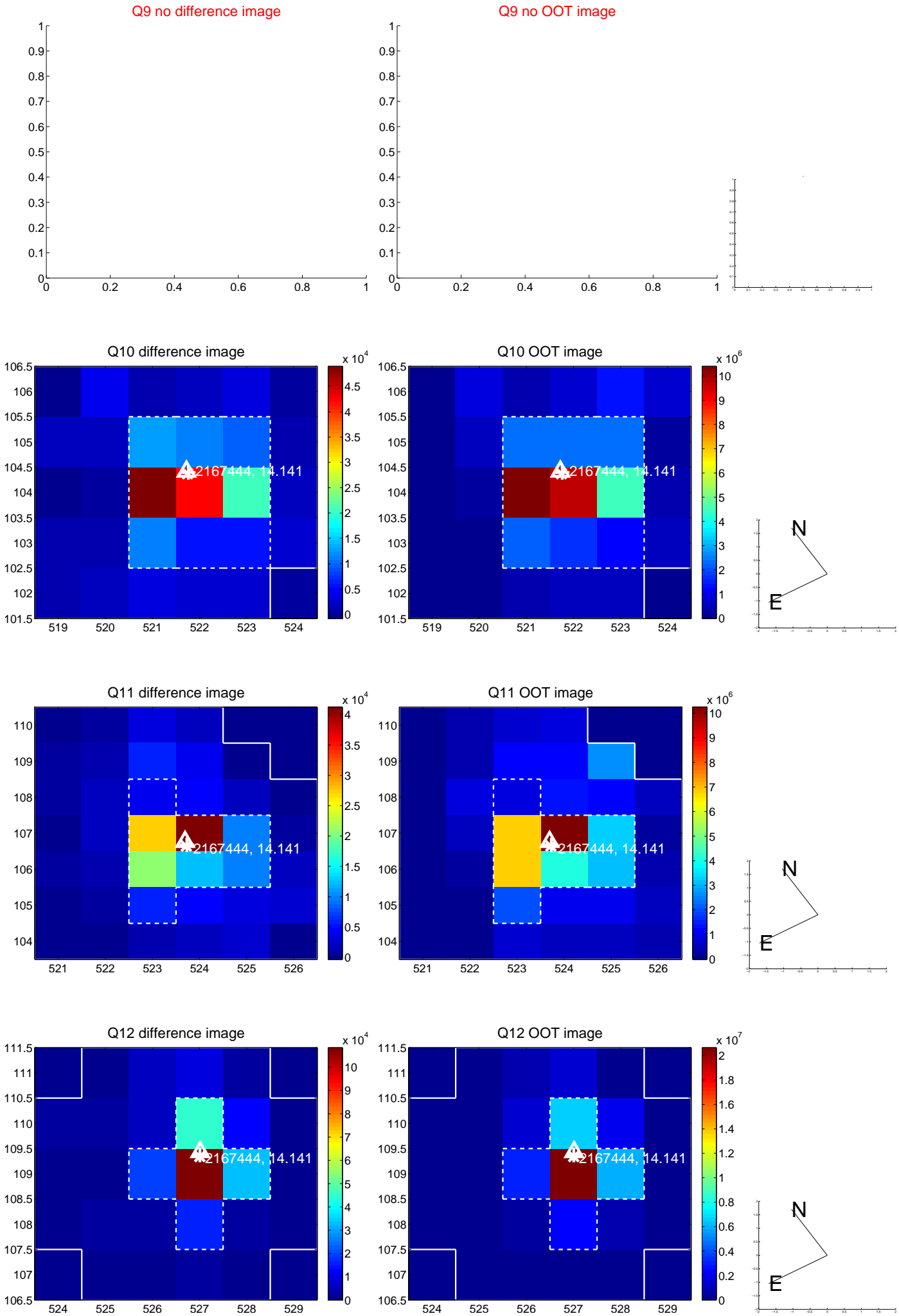
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



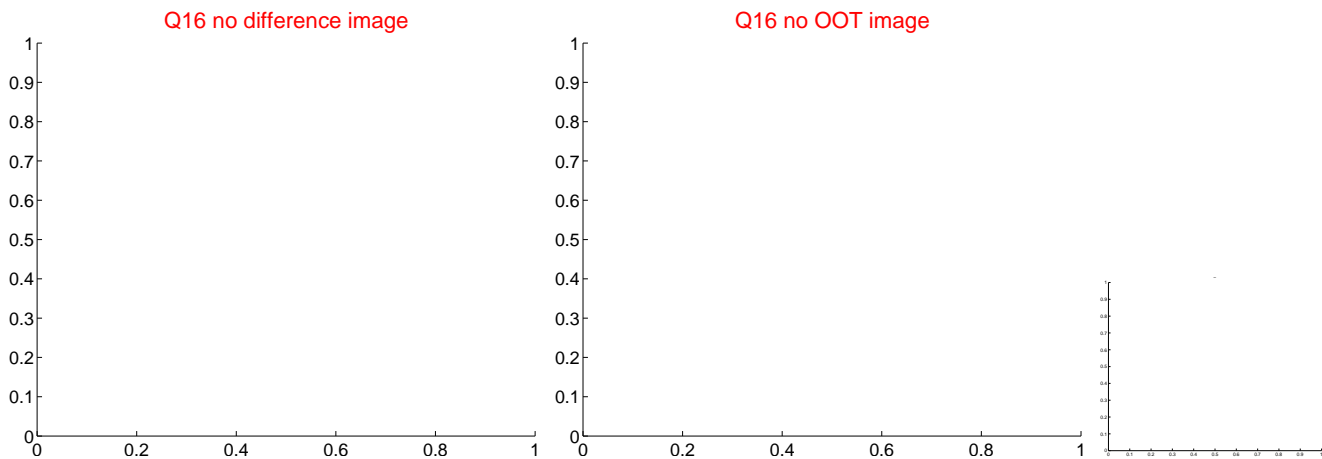
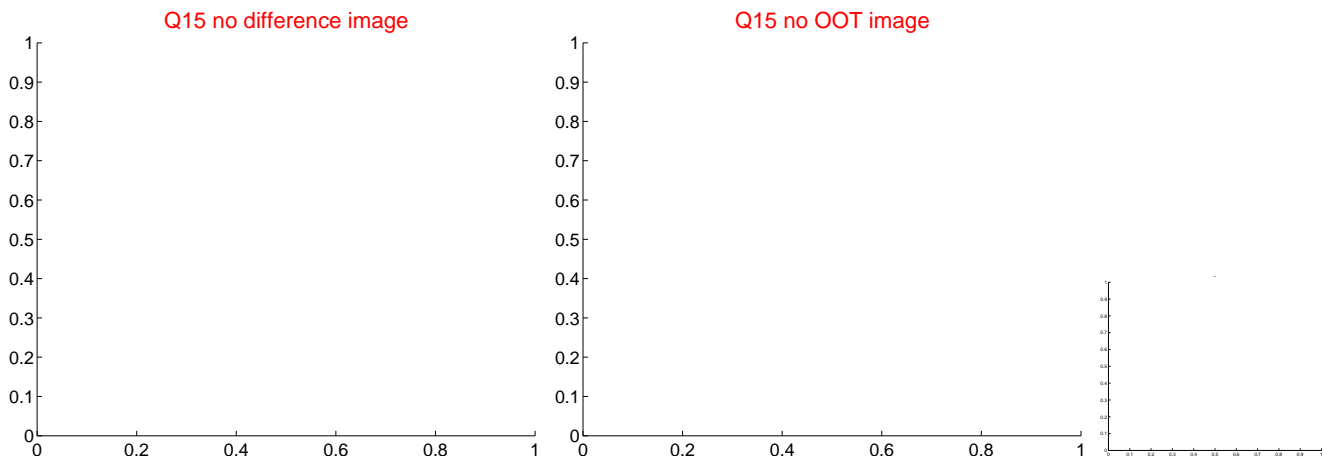
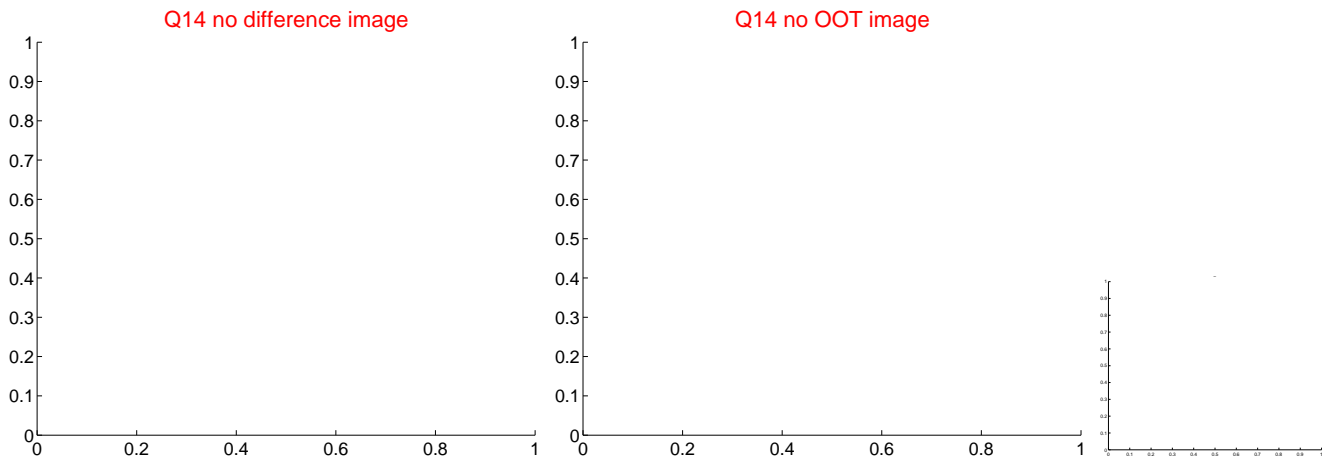
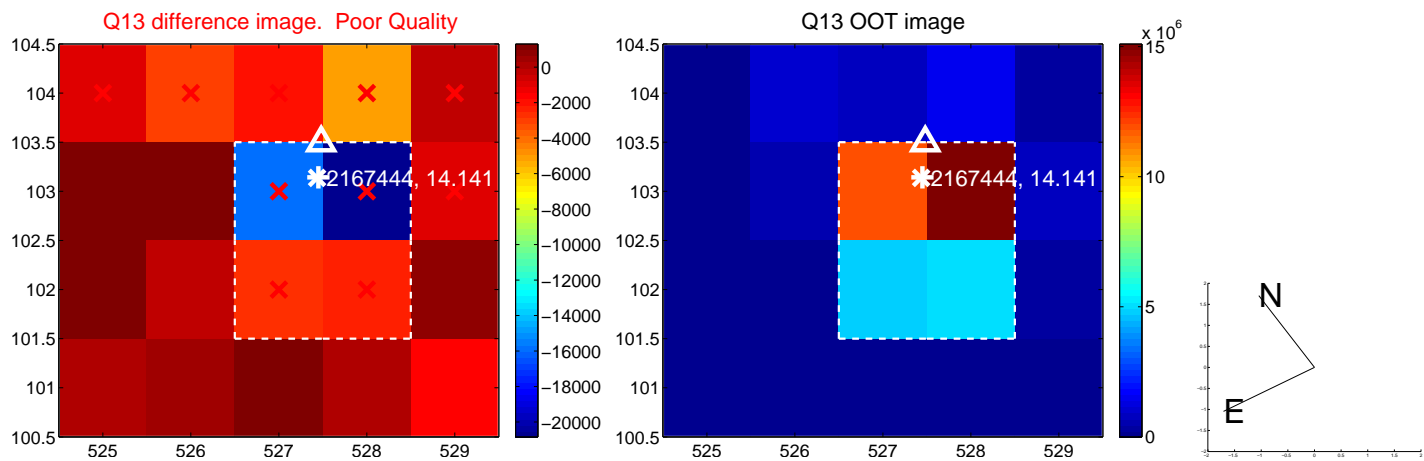
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



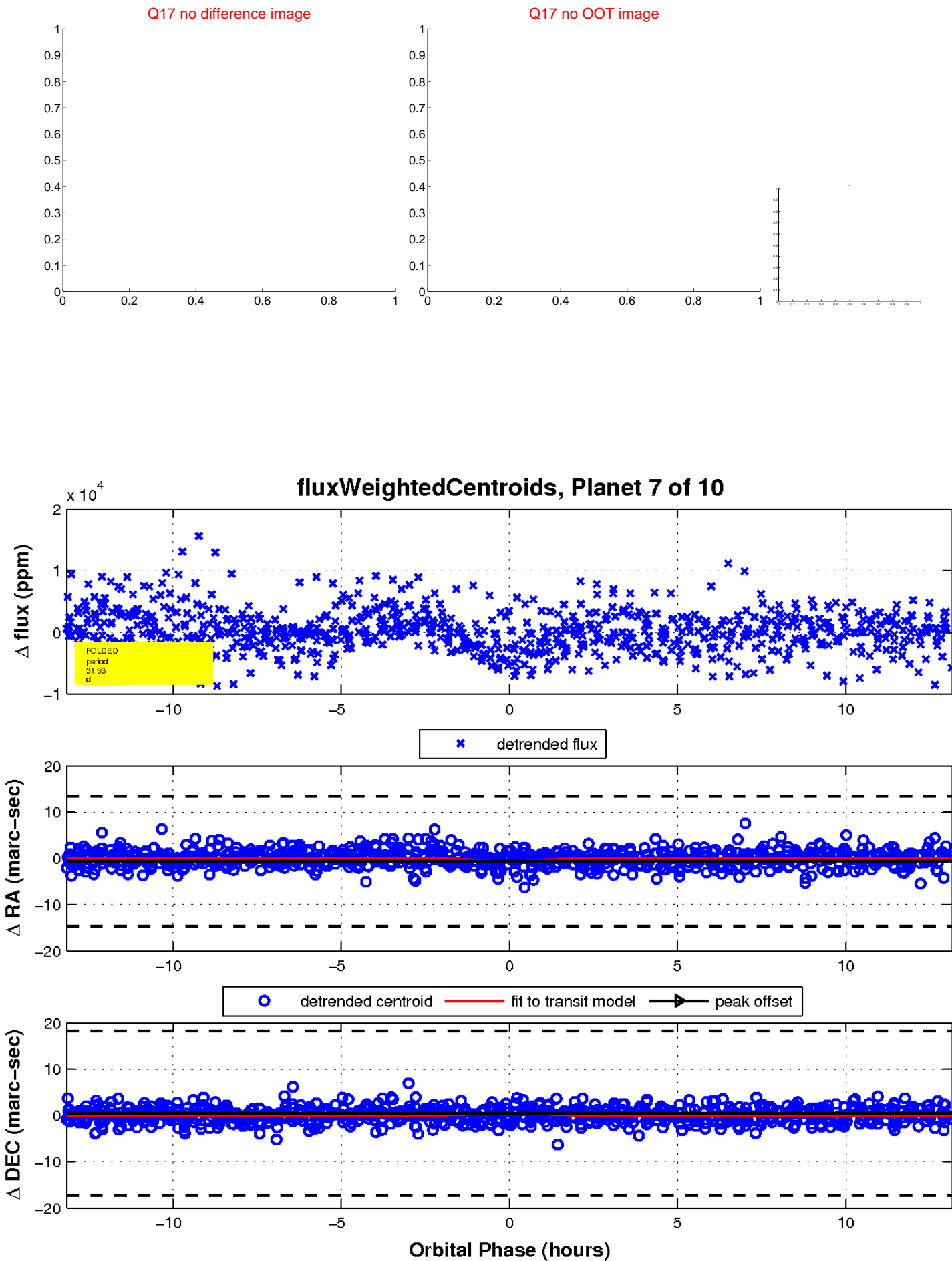
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

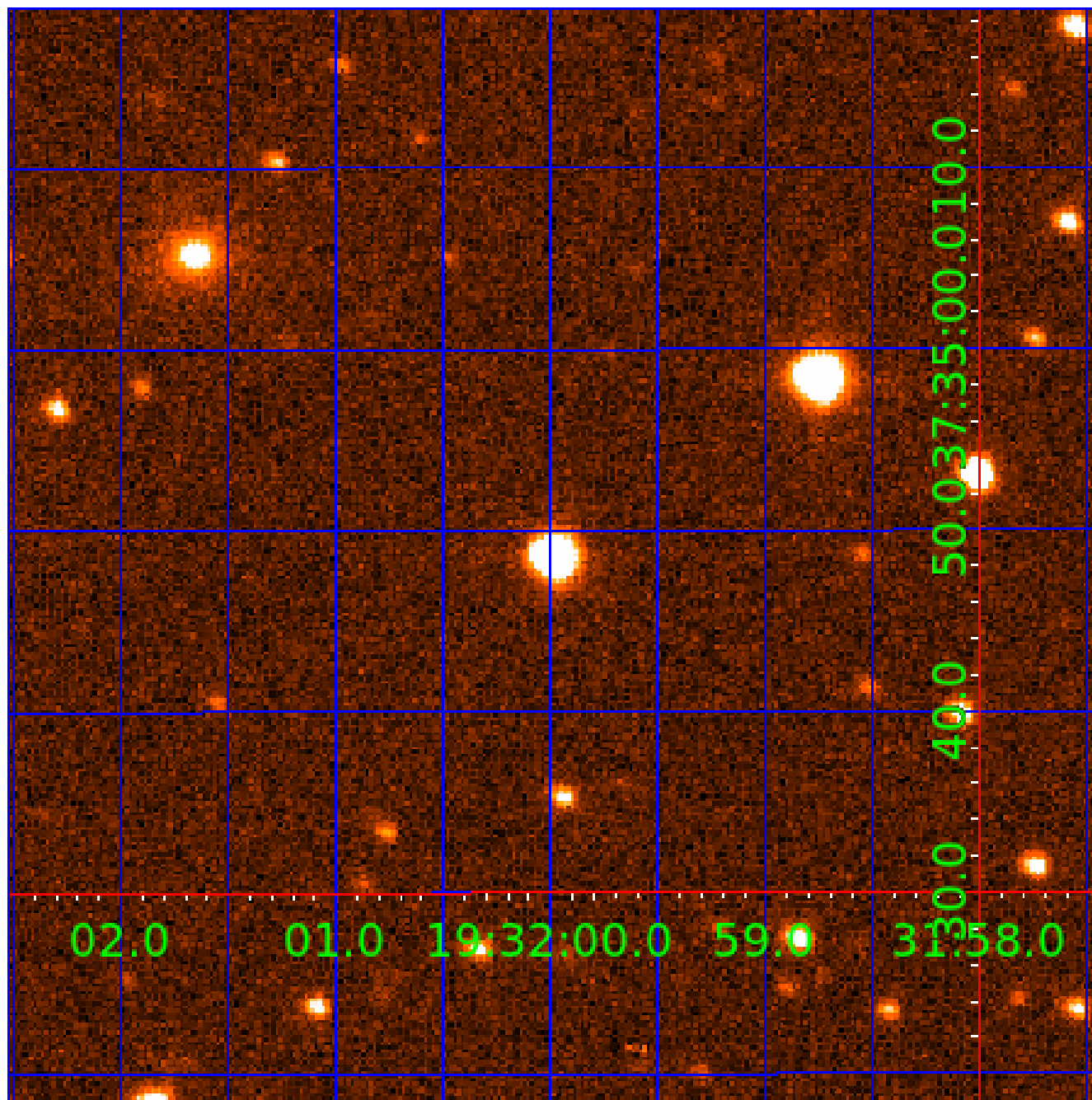


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 002167444

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002167444-01	OBS	6261.01	2.436132	133.461910	183.6	13.847	14.6	2.7	1.78	7239	2.51	4625.06
002167444-02	OBS	No	41.767300	133.051118	9768.1	4.645	17.3	16.9	1.78	7239	22.40	104.62
002167444-03	OBS	No	59.957046	148.015307	8629.5	5.029	16.6	16.0	1.78	7239	24.89	64.61
002167444-04	OBS	No	18.853189	138.257909	6213.5	4.514	13.9	16.2	1.78	7239	23.94	302.14
002167444-05	OBS	No	55.971983	138.453394	7128.2	4.837	13.9	13.2	1.78	7239	26.48	70.81
002167444-06	OBS	No	50.694800	164.270937	6960.6	4.426	13.0	14.1	1.78	7239	19.97	80.80
002167444-07	OBS	No	31.334397	148.069009	5987.4	4.388	12.8	12.3	1.78	7239	24.13	153.47
002167444-09	OBS	No	43.476060	133.067820	6087.2	5.222	12.2	12.2	1.78	7239	17.15	99.17
002167444-10	OBS	No	71.875232	162.459931	4760.8	4.459	11.4	11.0	1.78	7239	19.78	50.73

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002167444-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV
002167444-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-03	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT
002167444-04	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
002167444-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-07	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-10	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

**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 002167444-09

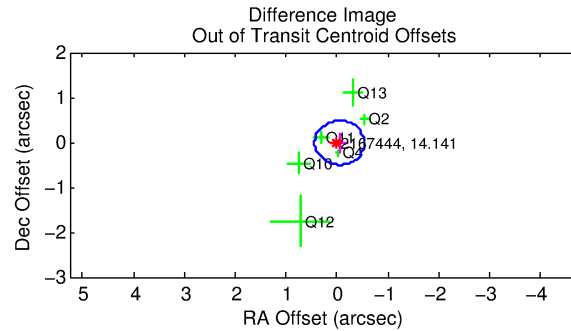
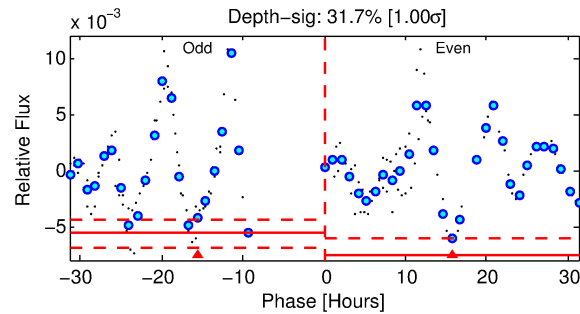
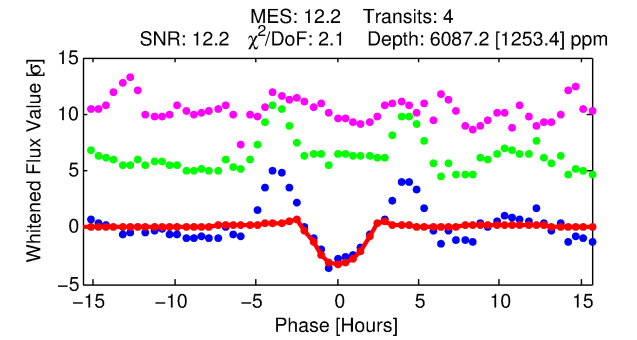
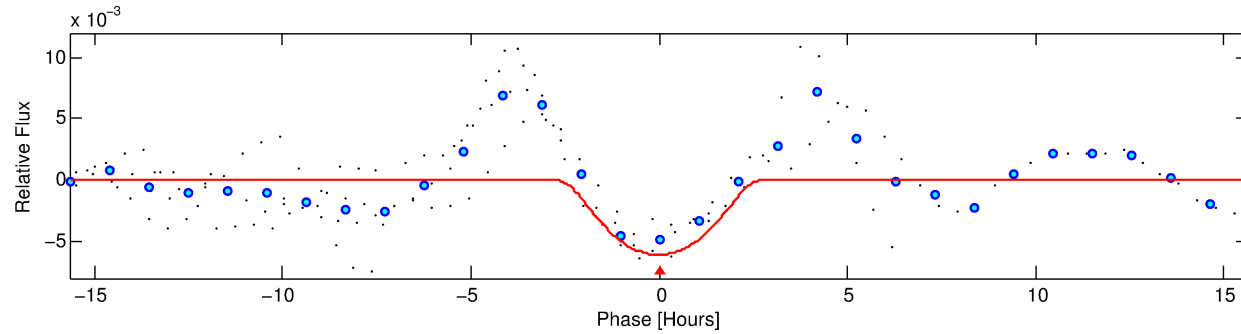
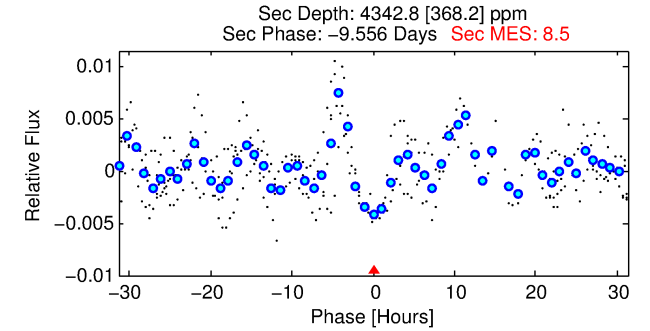
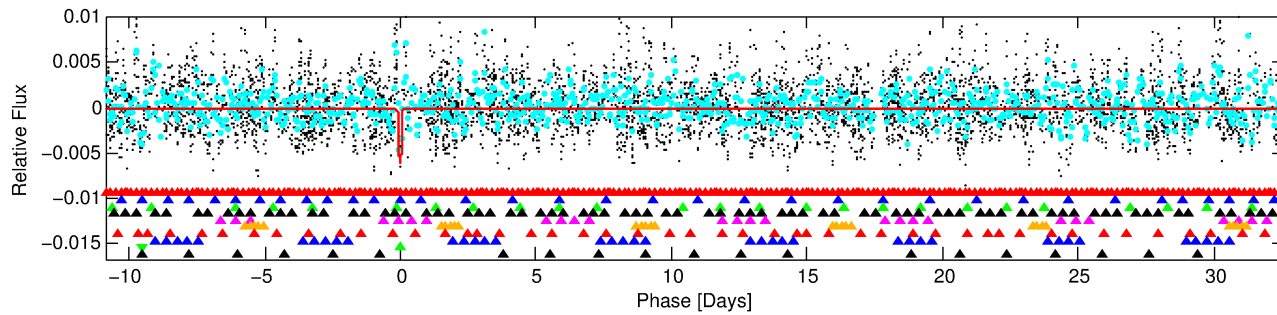
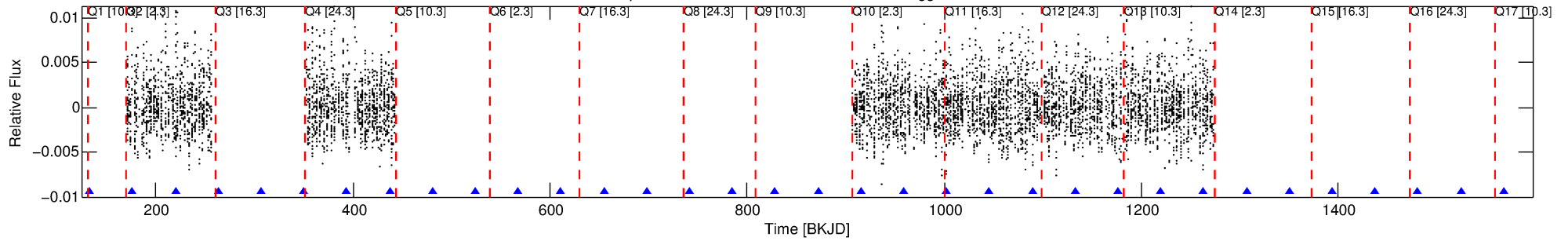
No Significant Match Found

# DV One-Page Summary

KIC: 2167444 Candidate: 9 of 10 Period: 43.476 d

KOI: K06261 Corr: No Ephemeris Match

Kp: 14.14 R\*: 1.78 Rs Teff: 7239.0 K Logg: 4.13 Fe/H: 0.020



## DV Fit Results:

Period = 43.47606 [0.00088] d  
Epoch = 133.0678 [0.0151] BKJD  
Rp/R\* = 0.0882 [0.0411]  
a/R\* = 36.07 [10.93]  
b = 0.93 [0.11]  
Seff = 99.17 [41.37]  
Teq = 805 [84] K  
Rp = 17.15 [9.66] Re  
a = 0.2805 [0.0721] AU  
Ag = 639.39 [642.05] [0.99σ]  
Teff = 6256 [1500] K [3.63σ]

## DV Diagnostic Results:

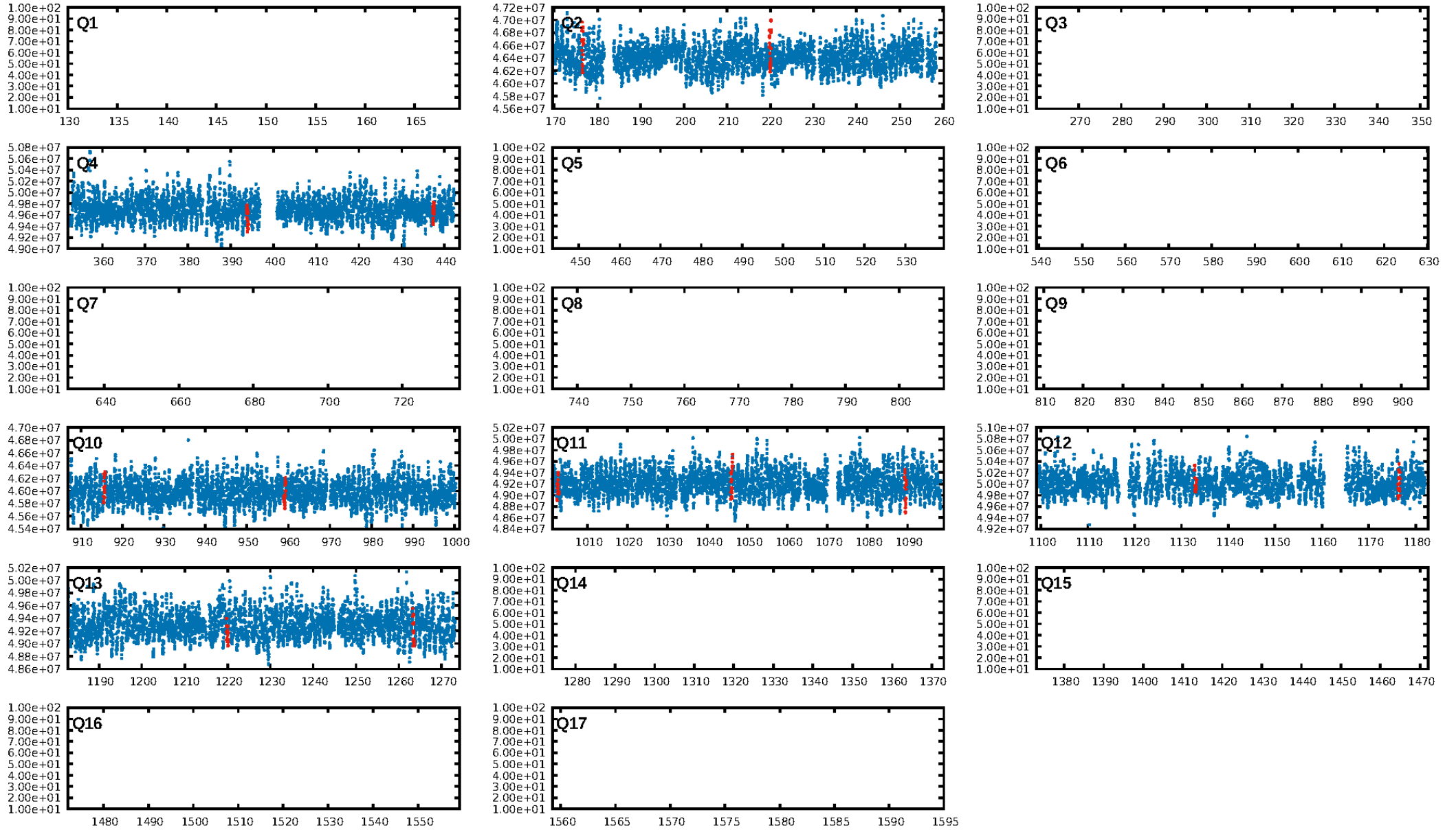
ShortPeriod-sig: 100.0% [5.87σ]  
LongPeriod-sig: 100.0% [25.31σ]  
ModelChiSquare2-sig: 38.7%  
ModelChiSquareGof-sig: 99.8%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 1.27  
Centroid-sig: 82.1%  
Centroid-so: 0.750 arcsec [9.21σ]  
OotOffset-rm: 0.052 arcsec [0.32σ]  
KicOffset-rm: 0.170 arcsec [0.54σ]  
OotOffset-st: 2/1/2/1 [6]  
KicOffset-st: 2/1/2/1 [6]  
DiffImageQuality-fgm: 1.00 [6/6]  
DiffImageOverlap-fno: 0.33 [2/6]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 03:47:15 Z

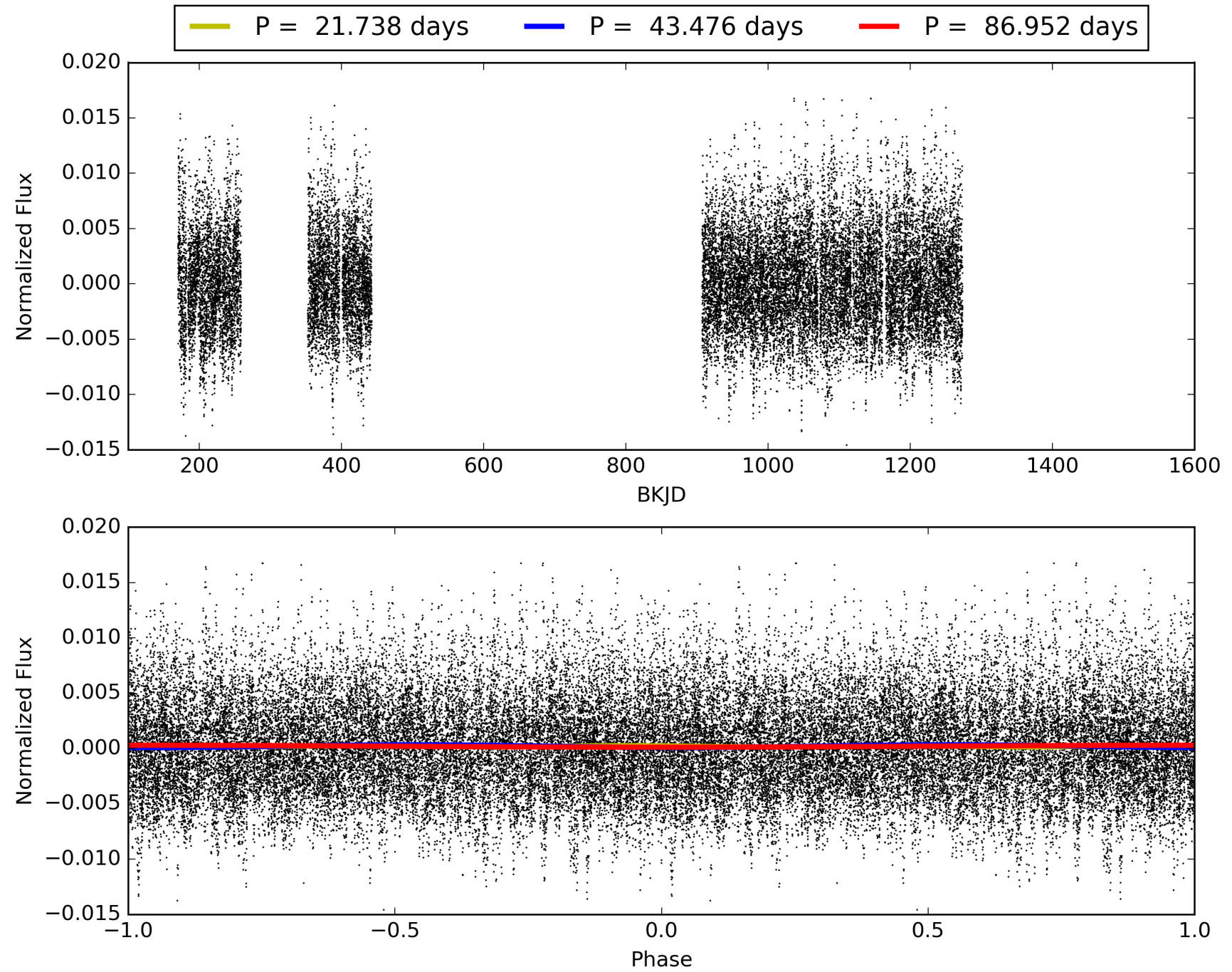
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 002167444-09, PDC Light Curves

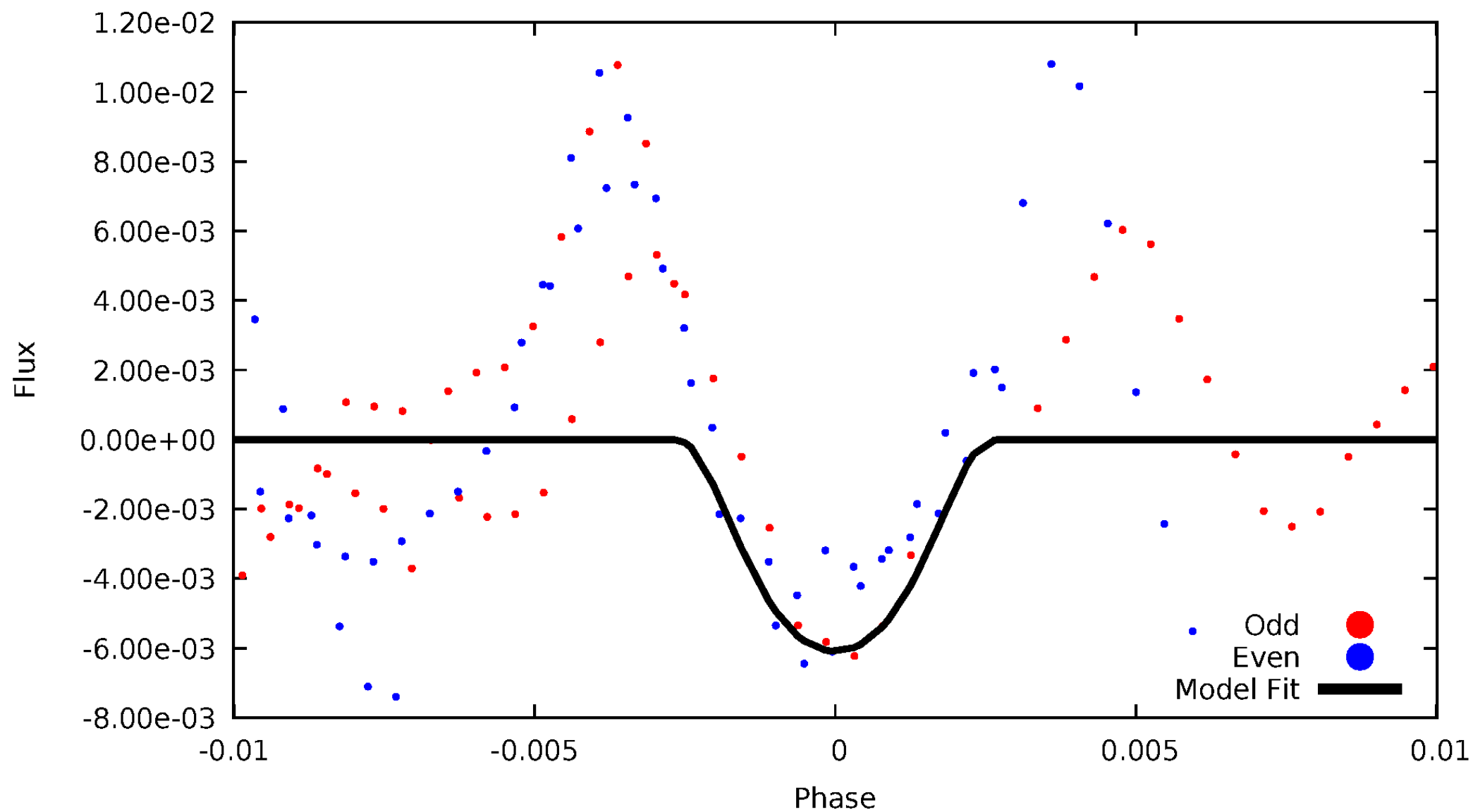


# TCE 002167444-09



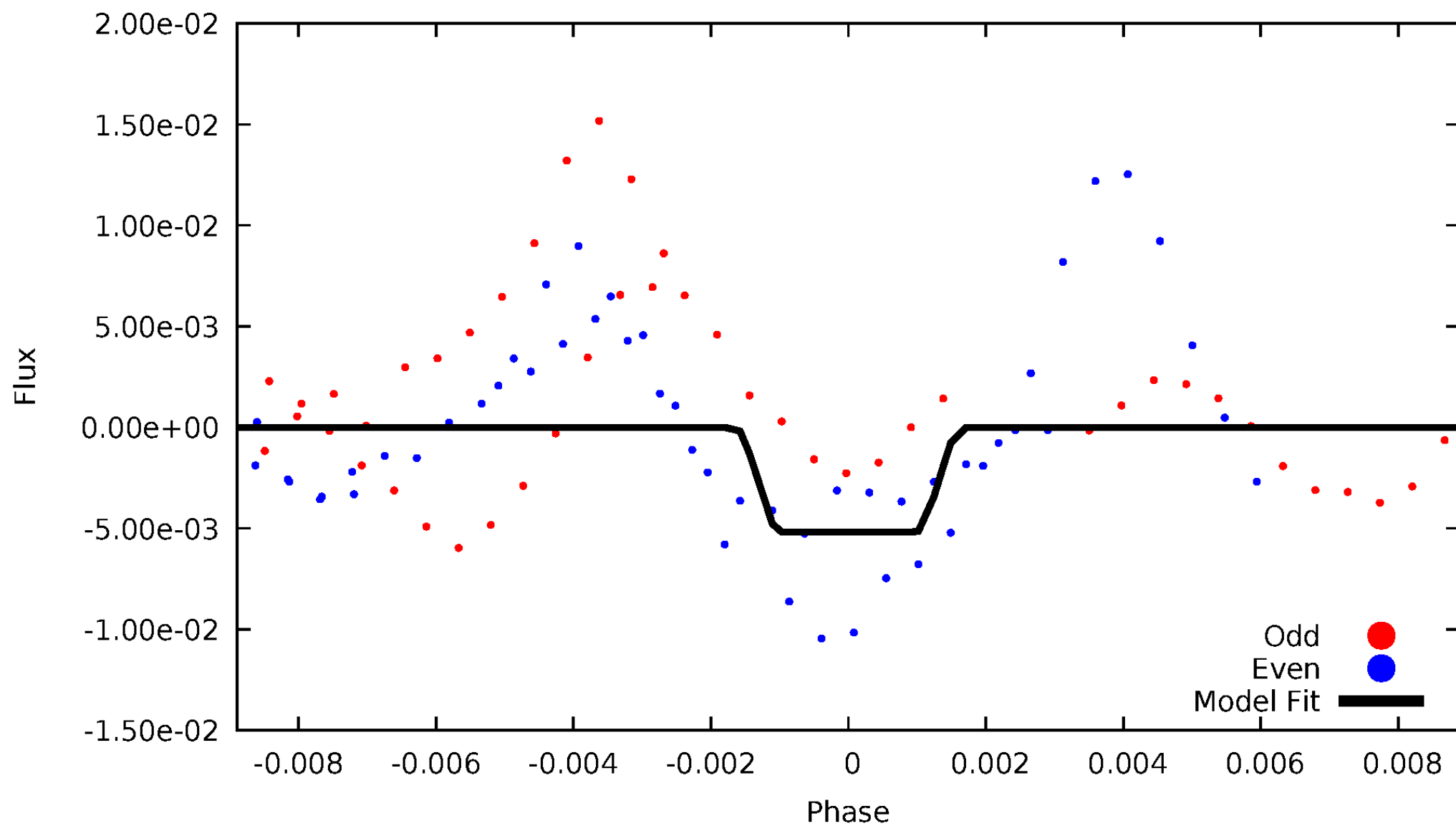
# DV Odd/Even

TCE 002167444-09



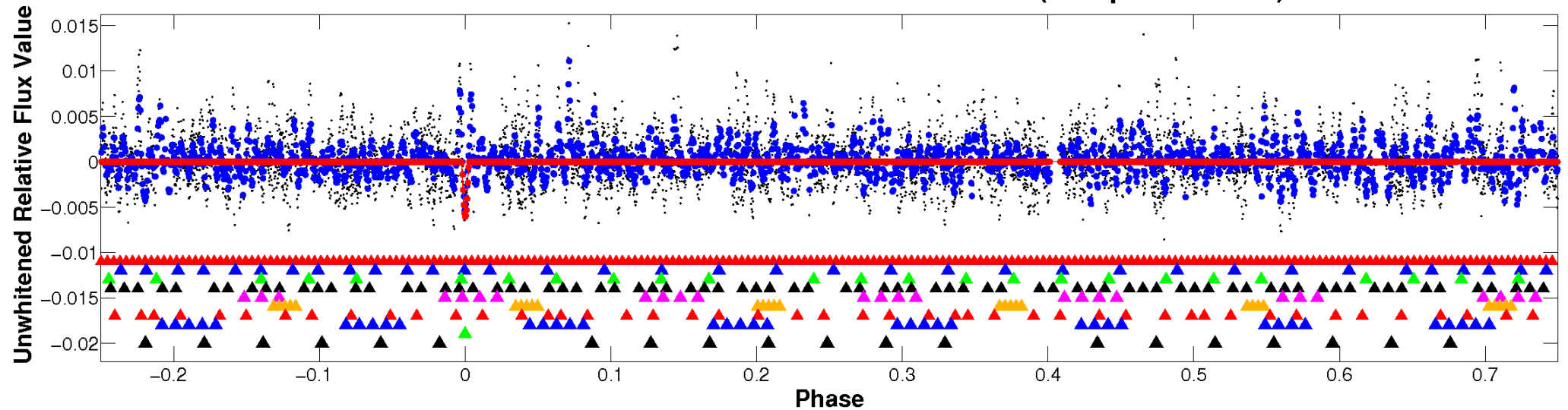
# ALT Odd/Even

TCE 002167444-09

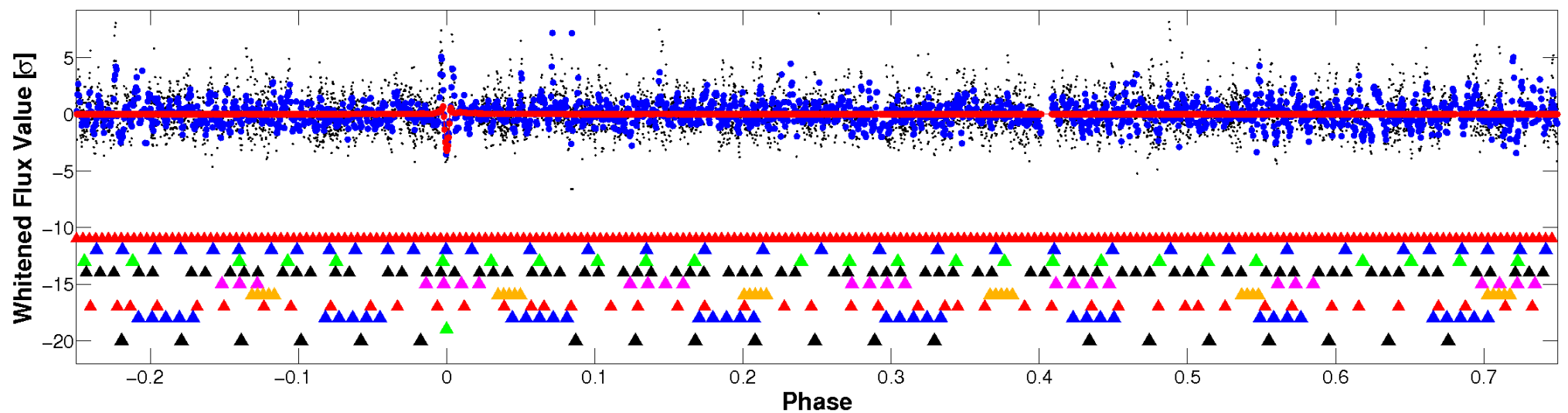


# Non-Whitened Vs. Whitened Light Curve

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

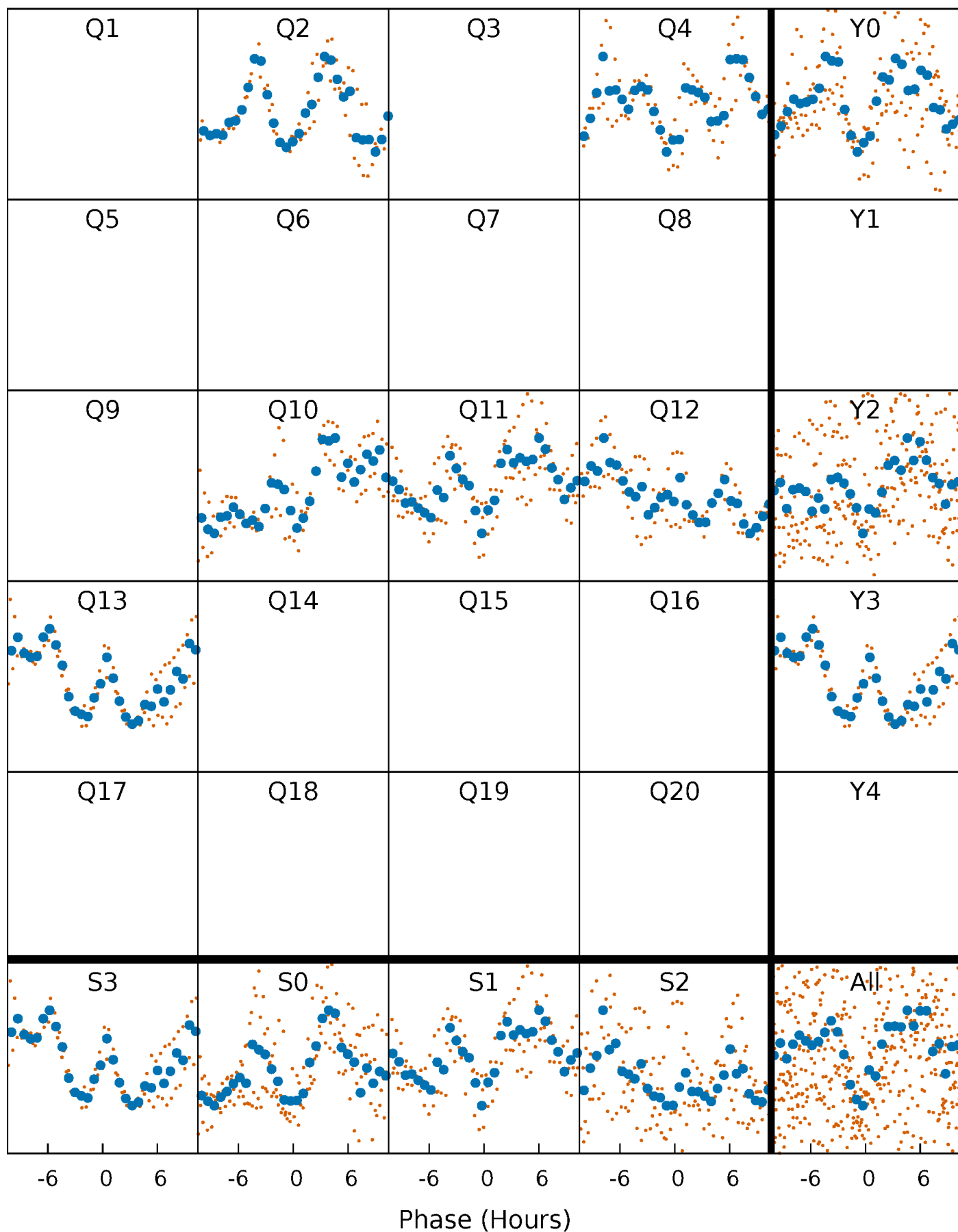


## Planet 9 : Phased Whitened Flux Time Series (Fit Epoch/Period)



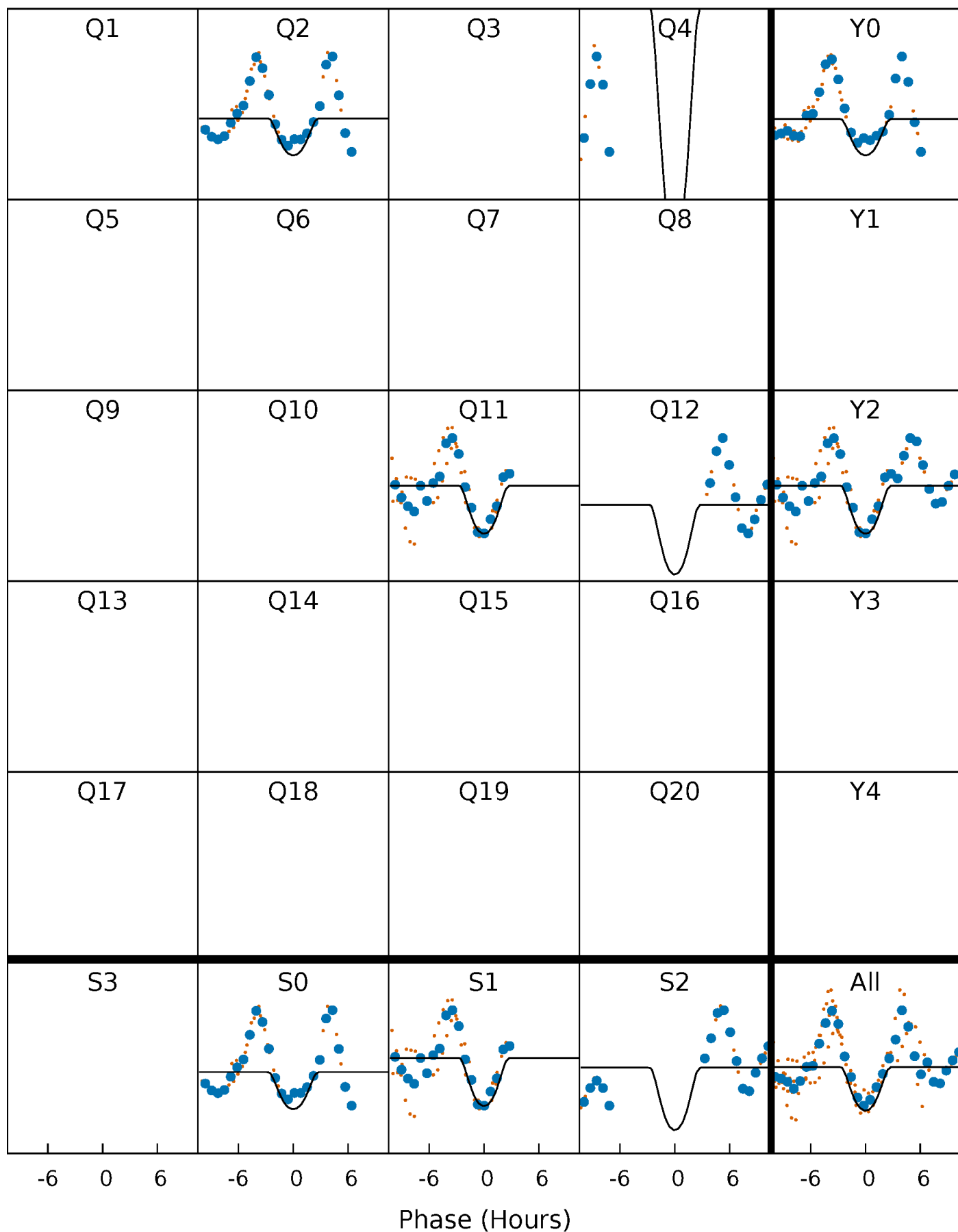
# PDC Quarter-Phased Transit Curves

TCE 002167444-09   P= 43.476060 Days    $T_0=133.067820$  (BKJD)



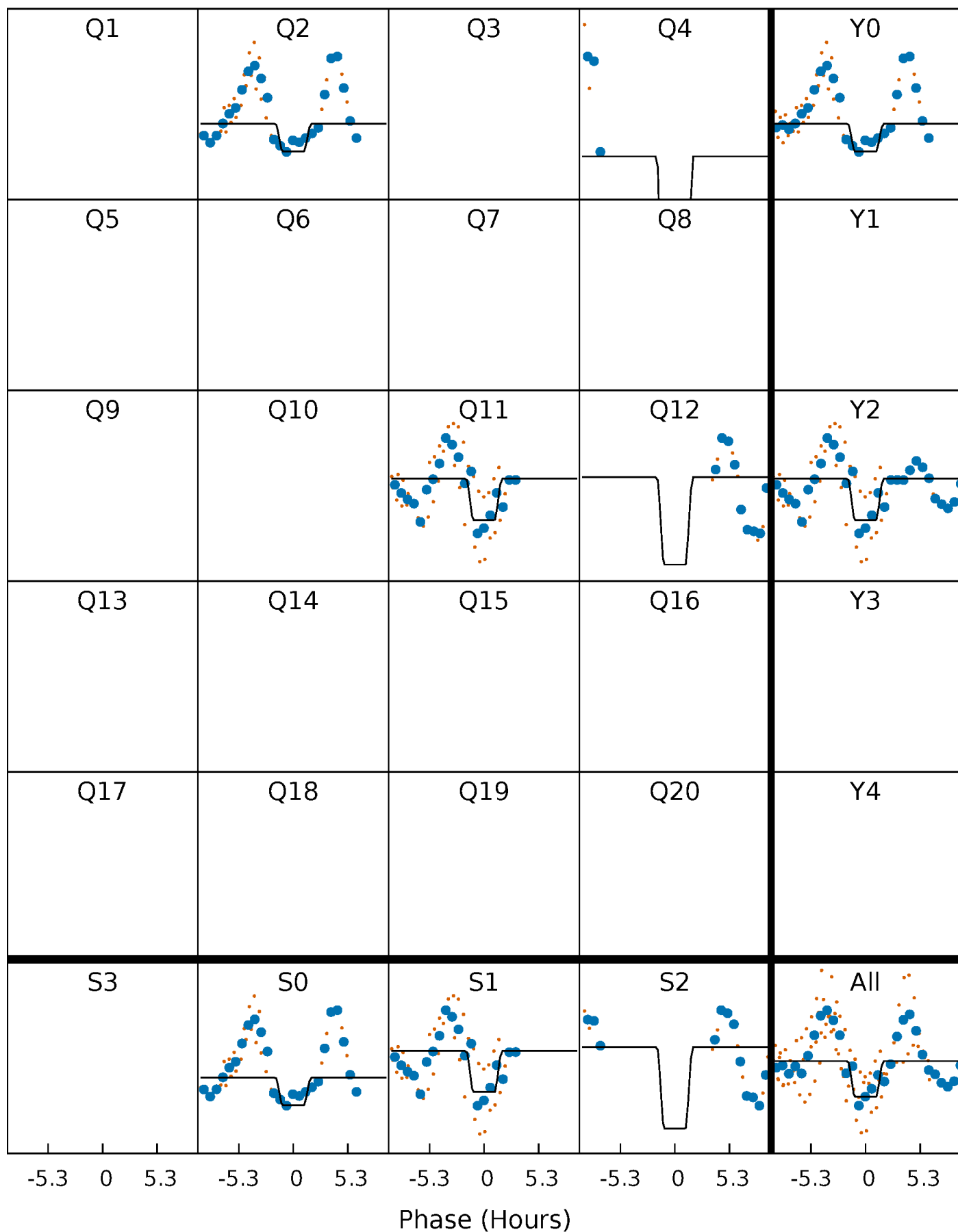
# DV Quarter-Phased Transit Curves

TCE 002167444-09   P= 43.476060 Days    $T_0=133.067820$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 002167444-09     $P = 43.475780$  Days     $T_0 = 133.068418$  (BKJD)

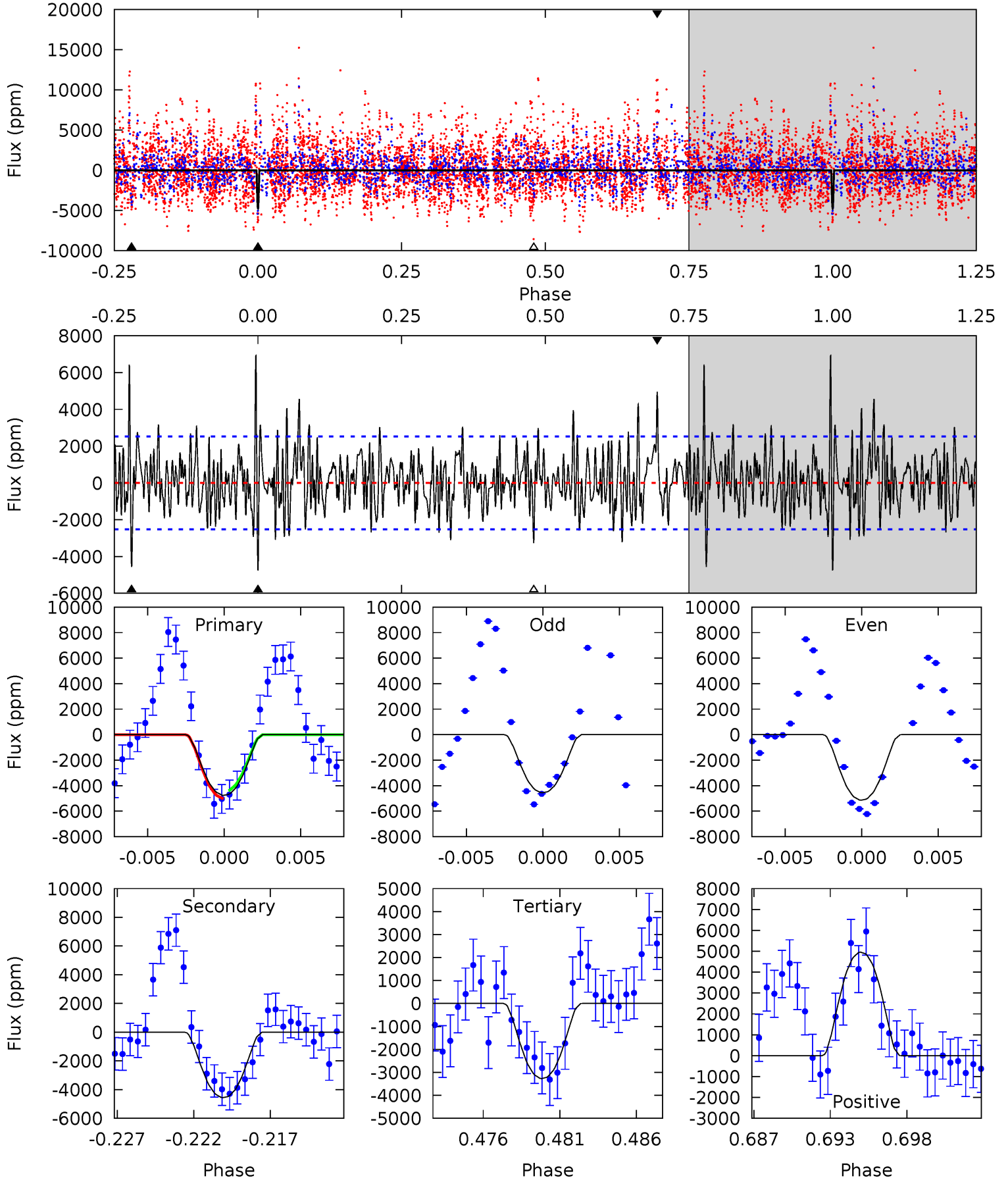




# DV Model-Shift Uniqueness Test

002167444-09, P = 43.476060 Days, E = 133.067820 Days

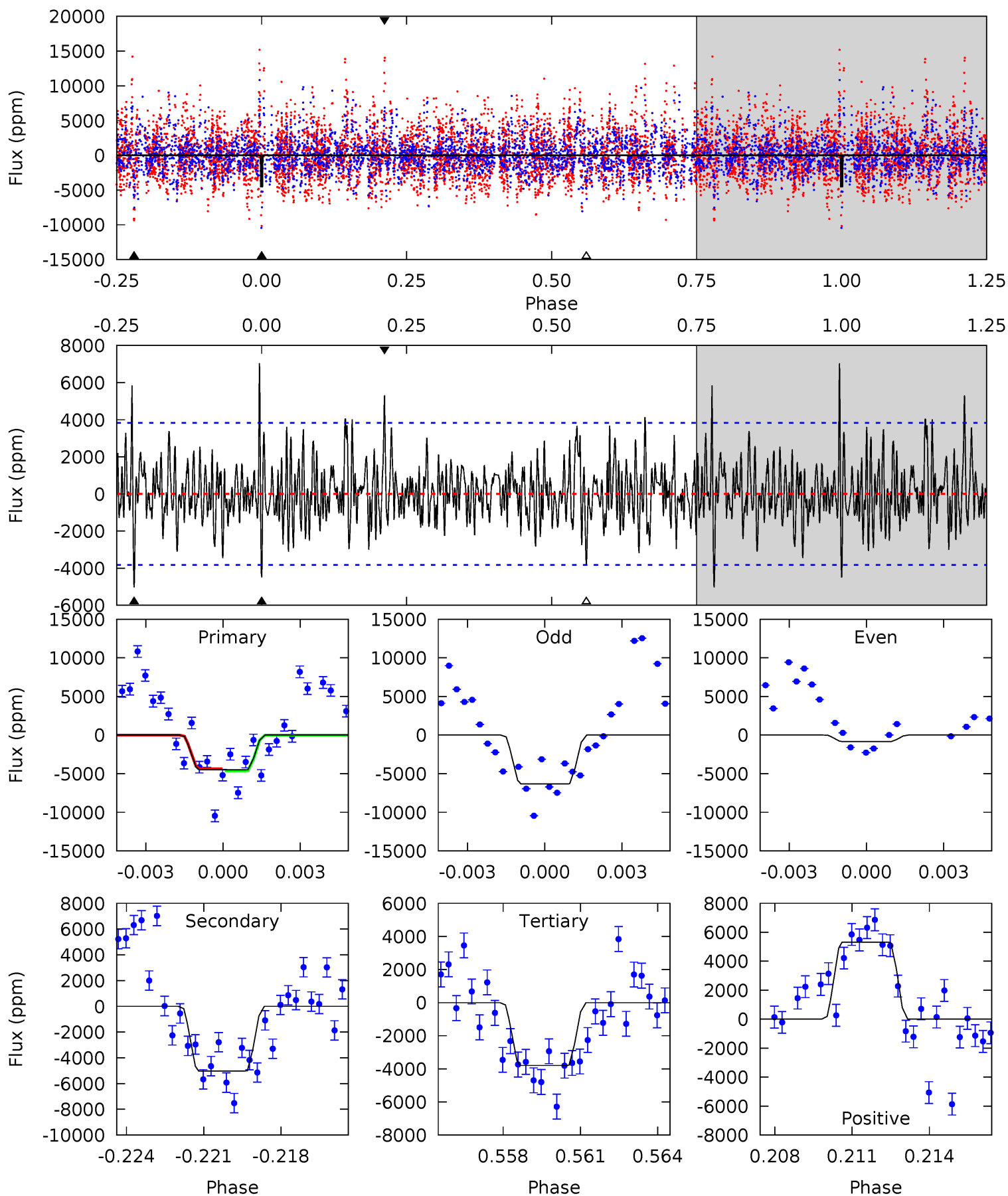
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.69	9.29	6.67	10.1	5.15	2.79	2.57	3.03	-0.41	2.63	-0.81	0.54	0.92	0.59	0.62



# Alt Model-Shift Uniqueness Test

002167444-09, P = 43.475780 Days, E = 133.068418 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
6.15	6.89	5.20	7.28	5.24	2.95	1.85	0.95	-1.13	1.69	-0.39	3.56	1.15	0.58	0.17



### Stellar Parameters For KIC 002167444

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7239^{+230}_{-374}$	$4.129^{+0.128}_{-0.192}$	$0.020^{+0.200}_{-0.350}$	$1.781^{+0.563}_{-0.375}$	$1.558^{+0.212}_{-0.259}$	$0.388^{+0.254}_{-0.195}$
	+3%/-5%	+3%/-5%	+1000%/-1750%	+32%/-21%	+14%/-17%	+65%/-50%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 002167444-09 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-4562 \pm 491$	$18.06^{+8.78}_{-8.71}$	$1131^{+91}_{-81}$	$6147^{+2828}_{-1012}$	$607^{+1693}_{-336}$
Alt.	$-5032 \pm 731$	$14.80^{+8.77}_{-7.69}$	$1127^{+95}_{-75}$	$7027^{+4192}_{-1461}$	$1029^{+3352}_{-637}$

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

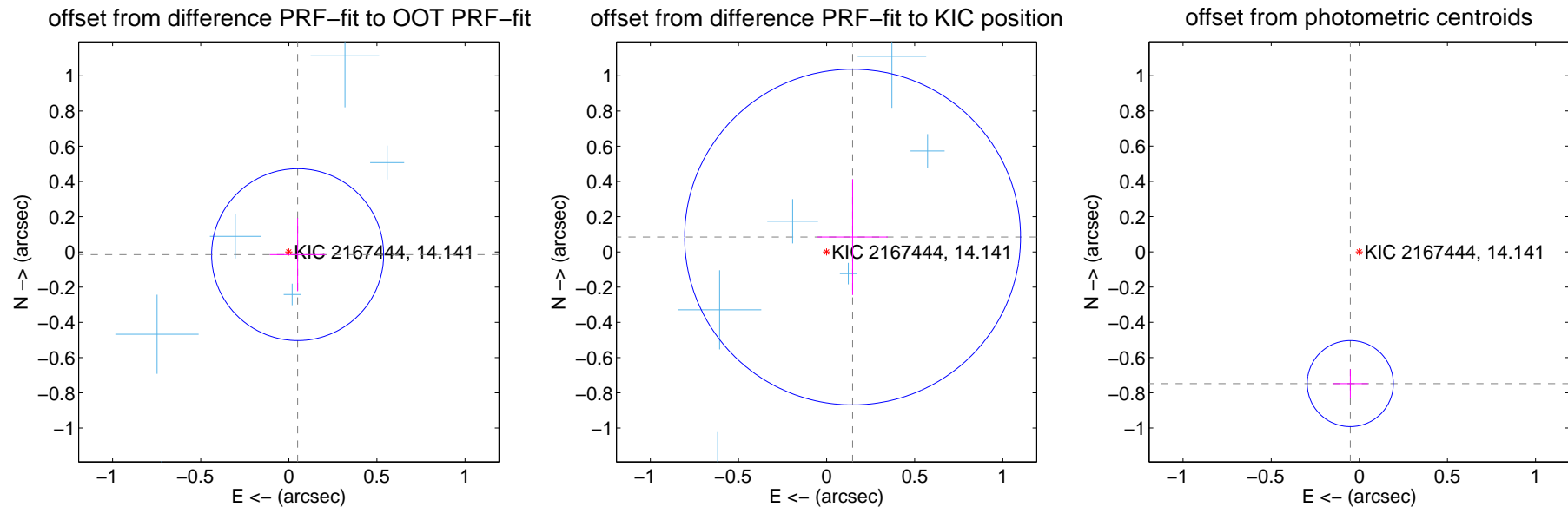
## DV Centroid Data

Supplemental centroid analysis for 002167444-09. Kepler magnitude: 14.14. Transit SNR 12.25

There are 6 quarters with good PRF difference image offsets

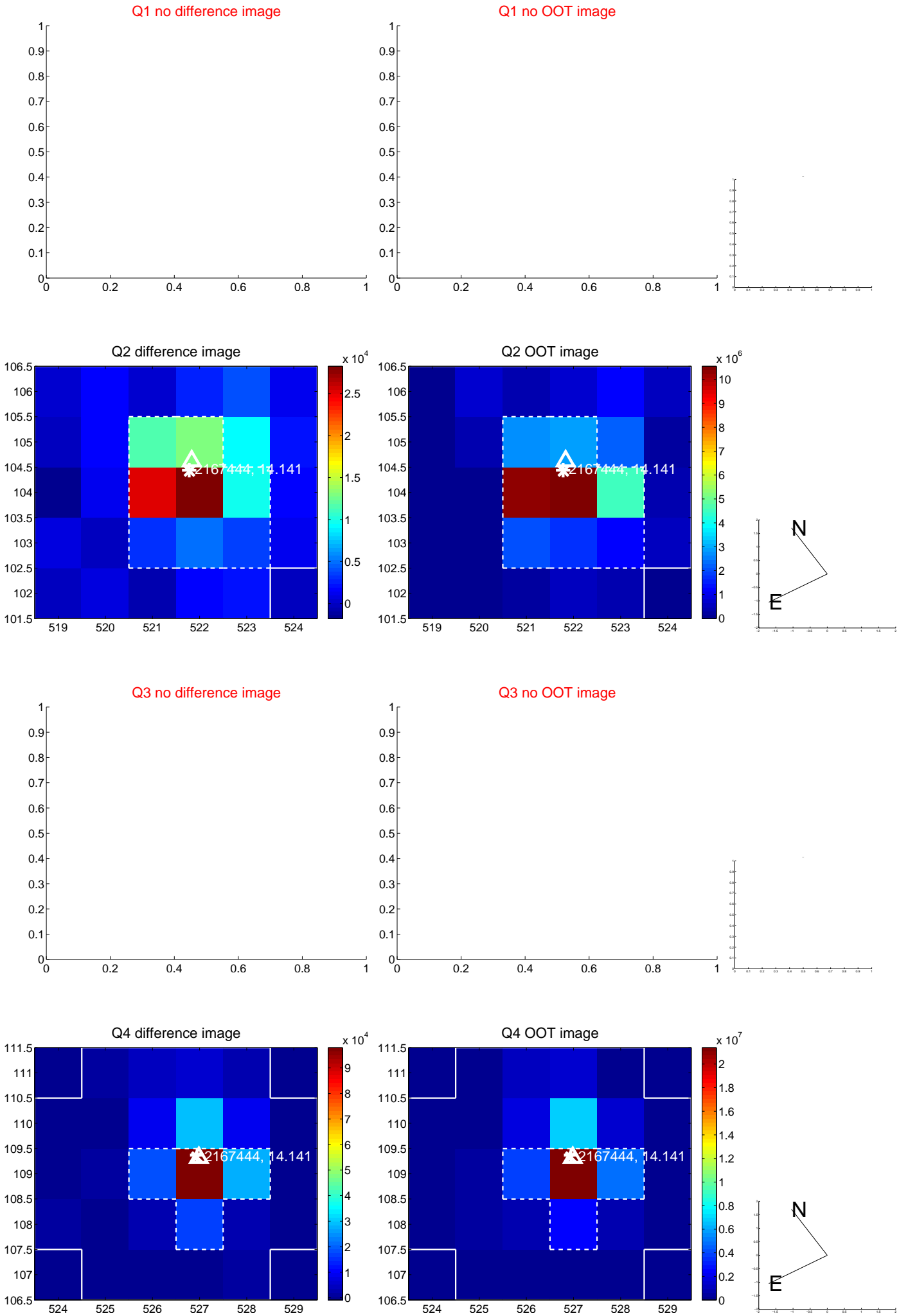
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.052 \pm 0.163$	0.32	$-0.050 \pm 0.158$	$-0.015 \pm 0.208$
PRF-fit source offset from KIC position	$0.170 \pm 0.318$	0.54	$-0.148 \pm 0.199$	$0.084 \pm 0.329$
photometric centroid source offset	$0.75 \pm 0.08$	9.21	$0.05 \pm 0.10$	$-0.75 \pm 0.08$



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

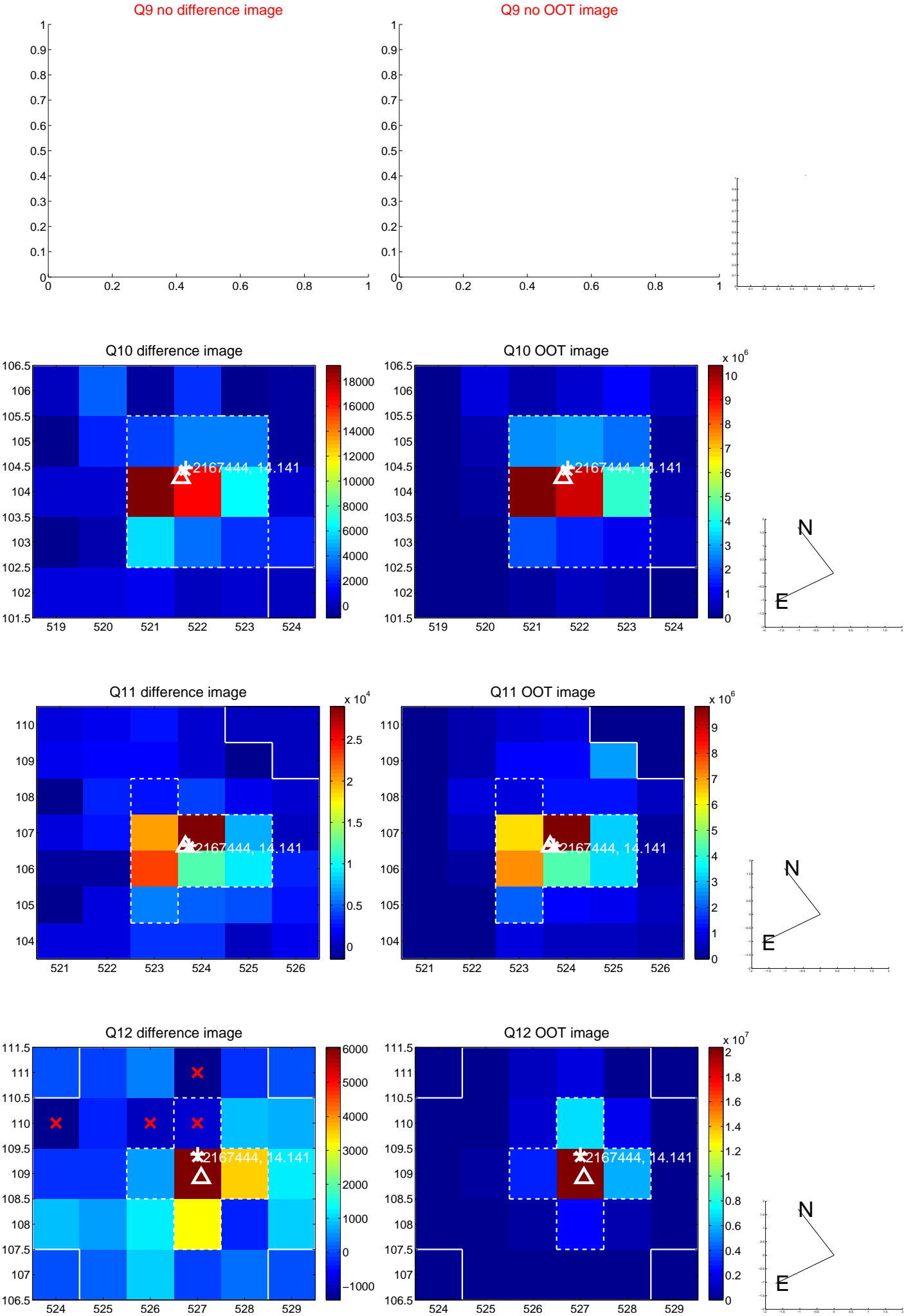
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



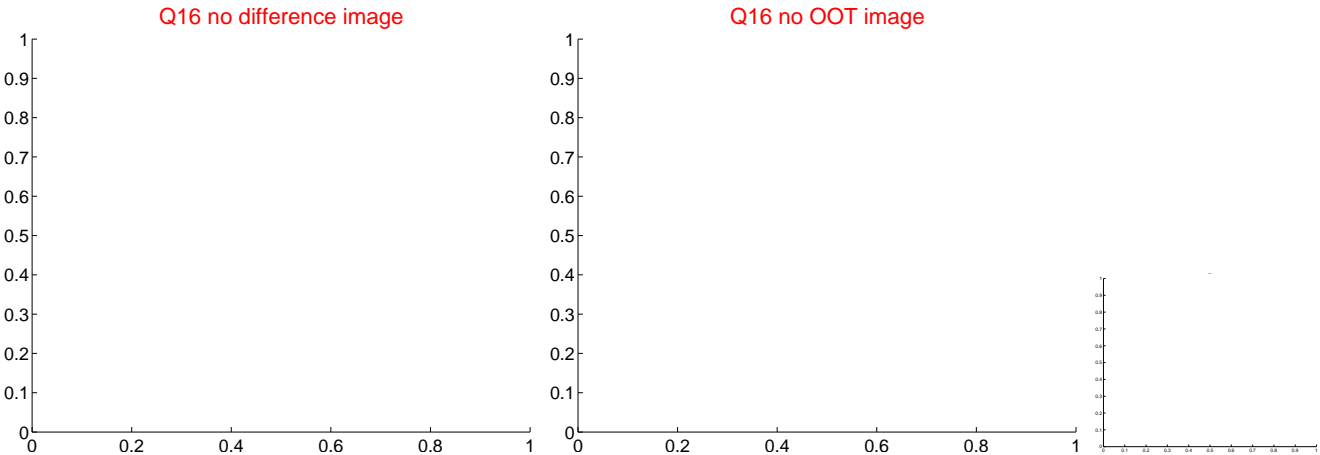
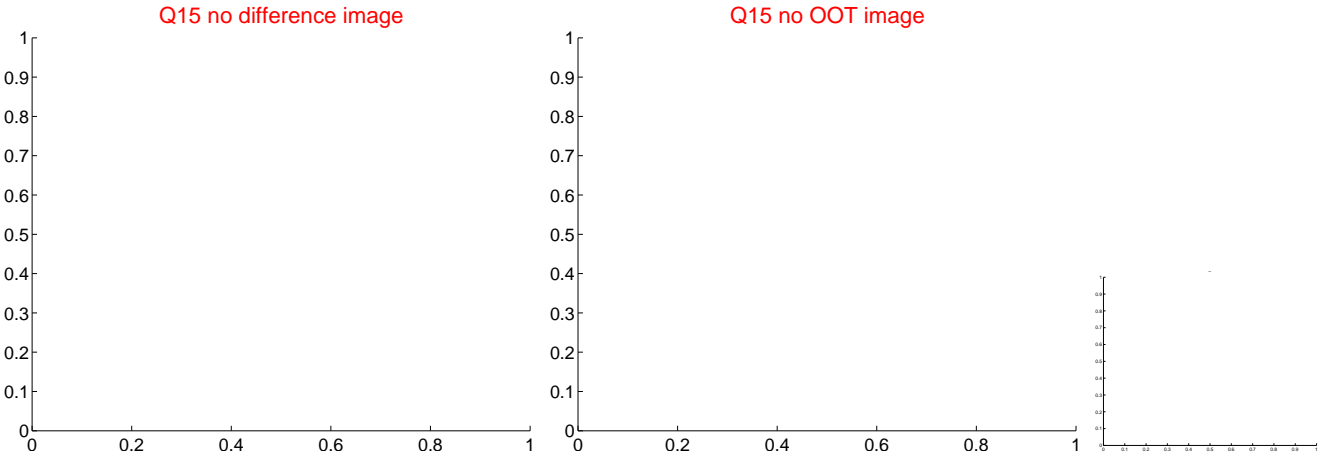
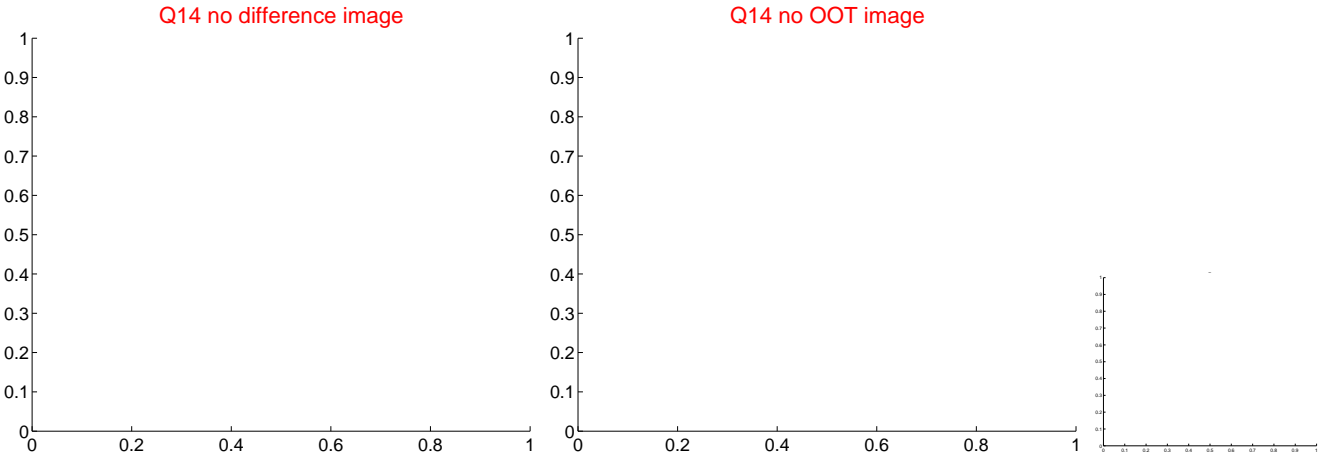
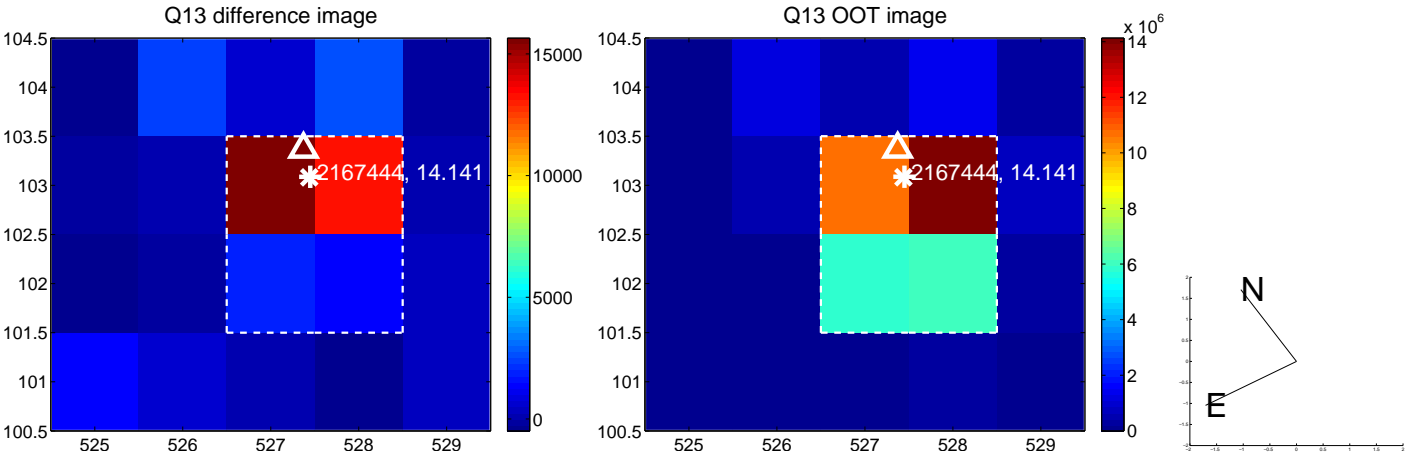
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

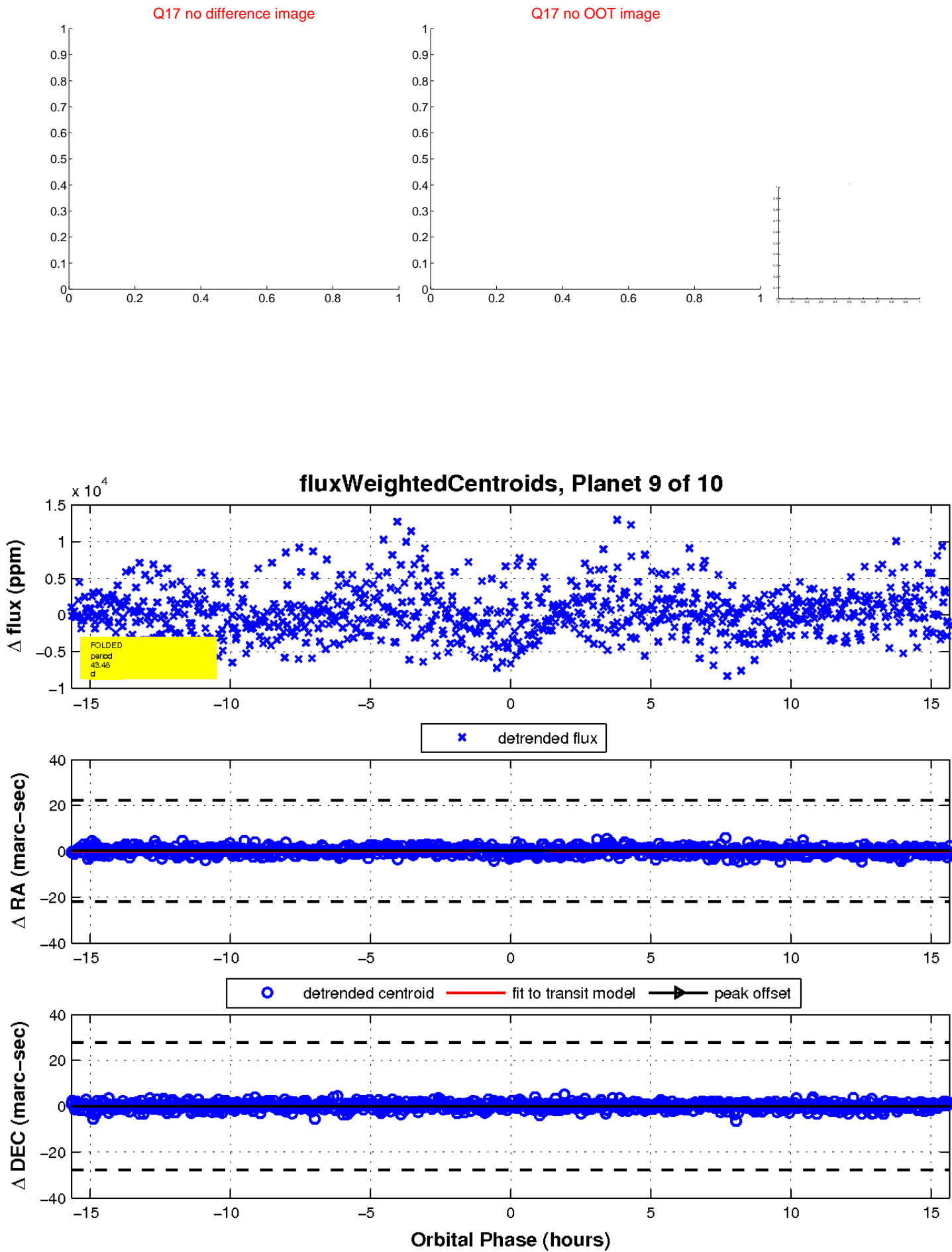


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



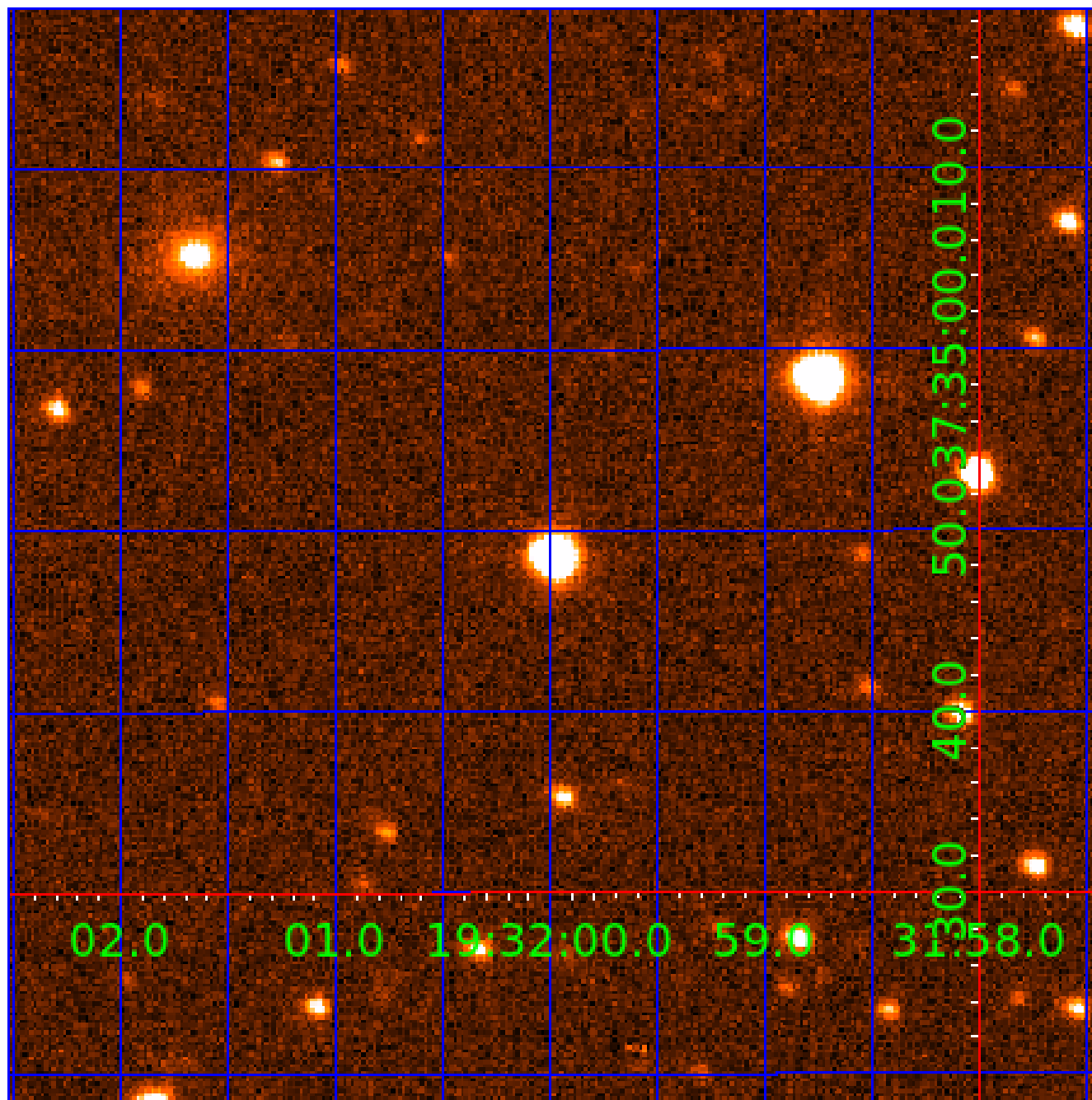


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 002167444

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002167444-01	OBS	6261.01	2.436132	133.461910	183.6	13.847	14.6	2.7	1.78	7239	2.51	4625.06
002167444-02	OBS	No	41.767300	133.051118	9768.1	4.645	17.3	16.9	1.78	7239	22.40	104.62
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002167444-09	OBS	No	43.476060	133.067820	6087.2	5.222	12.2	12.2	1.78	7239	17.15	99.17
002167444-10	OBS	No	71.875232	162.459931	4760.8	4.459	11.4	11.0	1.78	7239	19.78	50.73

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002167444-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV
002167444-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-03	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT
002167444-04	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
002167444-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-07	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
002167444-10	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

**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 002167444-10

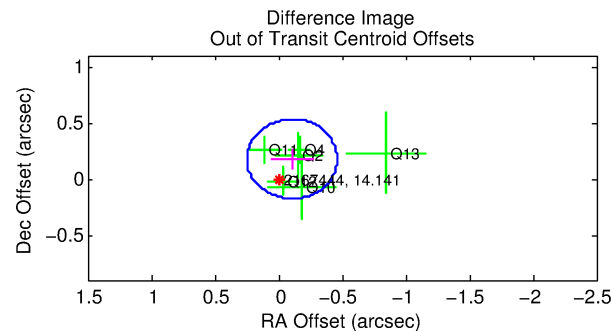
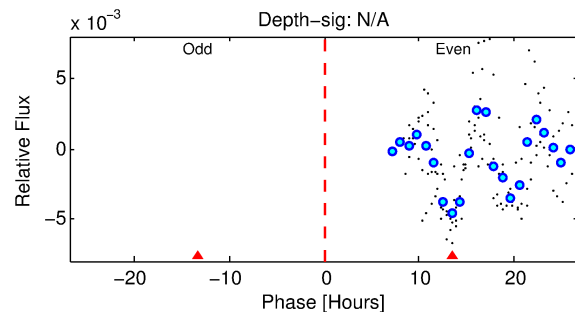
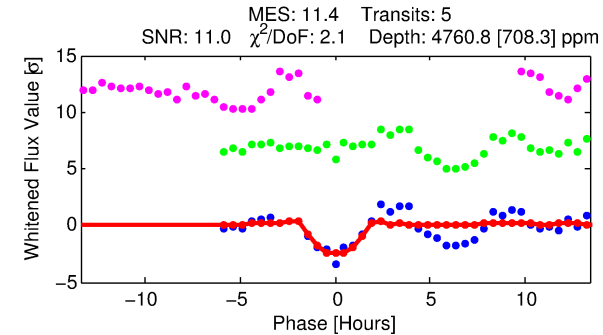
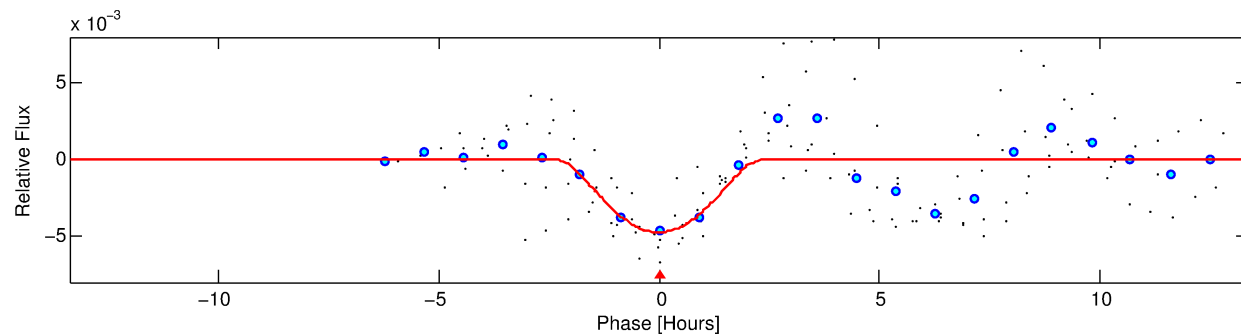
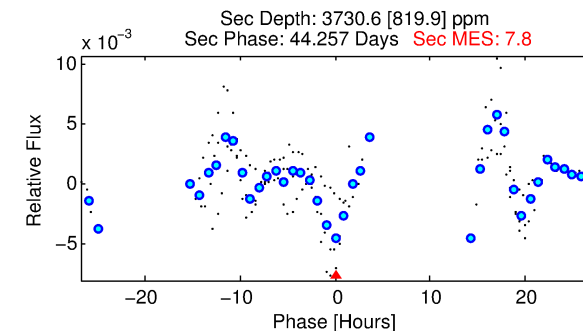
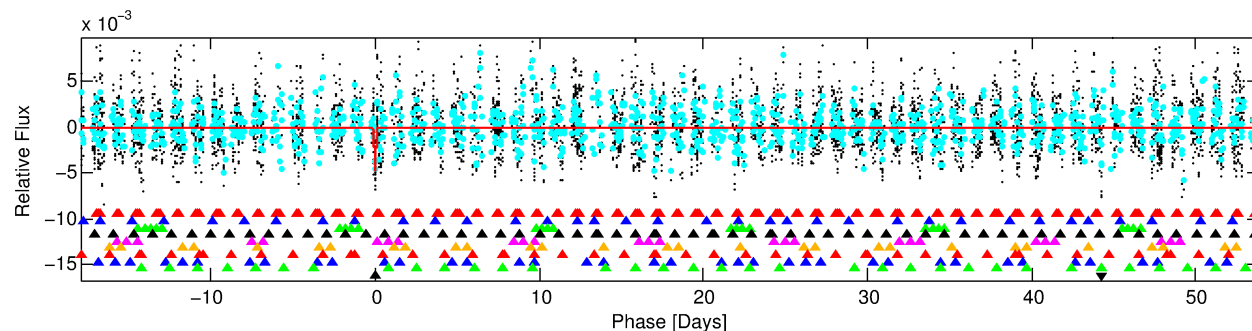
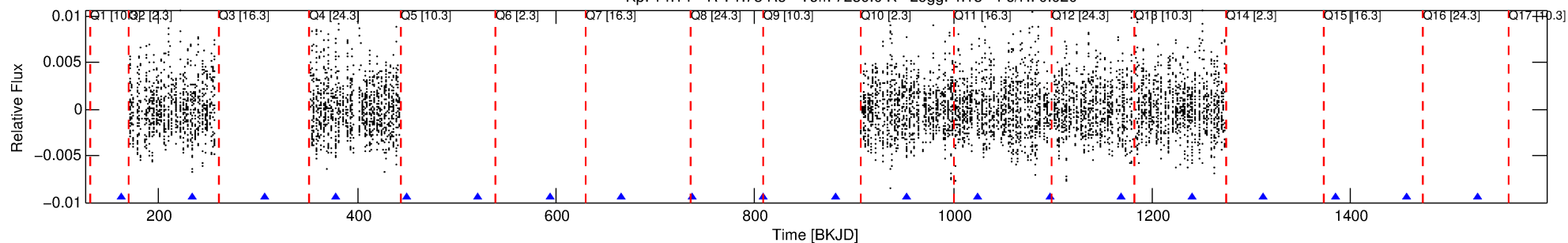
No Significant Match Found

# DV One-Page Summary

KIC: 2167444 Candidate: 10 of 10 Period: 71.875 d

KOI: K06261 Corr: No Ephemeris Match

Kp: 14.14 R\*: 1.78 Rs Teff: 7239.0 K Logg: 4.13 Fe/H: 0.020



## DV Fit Results:

Period = 71.87523 [0.00111] d  
Epoch = 162.4599 [0.0125] BKJD  
Rp/R\* = 0.1018 [0.1974]  
a/R\* = 61.22 [26.40]  
b = 0.98 [0.31]  
Seff = 50.73 [21.16]  
Teq = 681 [71] K  
Rp = 19.78 [38.88] Re  
a = 0.3922 [0.1009] AU  
Ag = 806.85 [3148.88] [0.26σ]  
Teff = 5608 [5455] K [0.90σ]

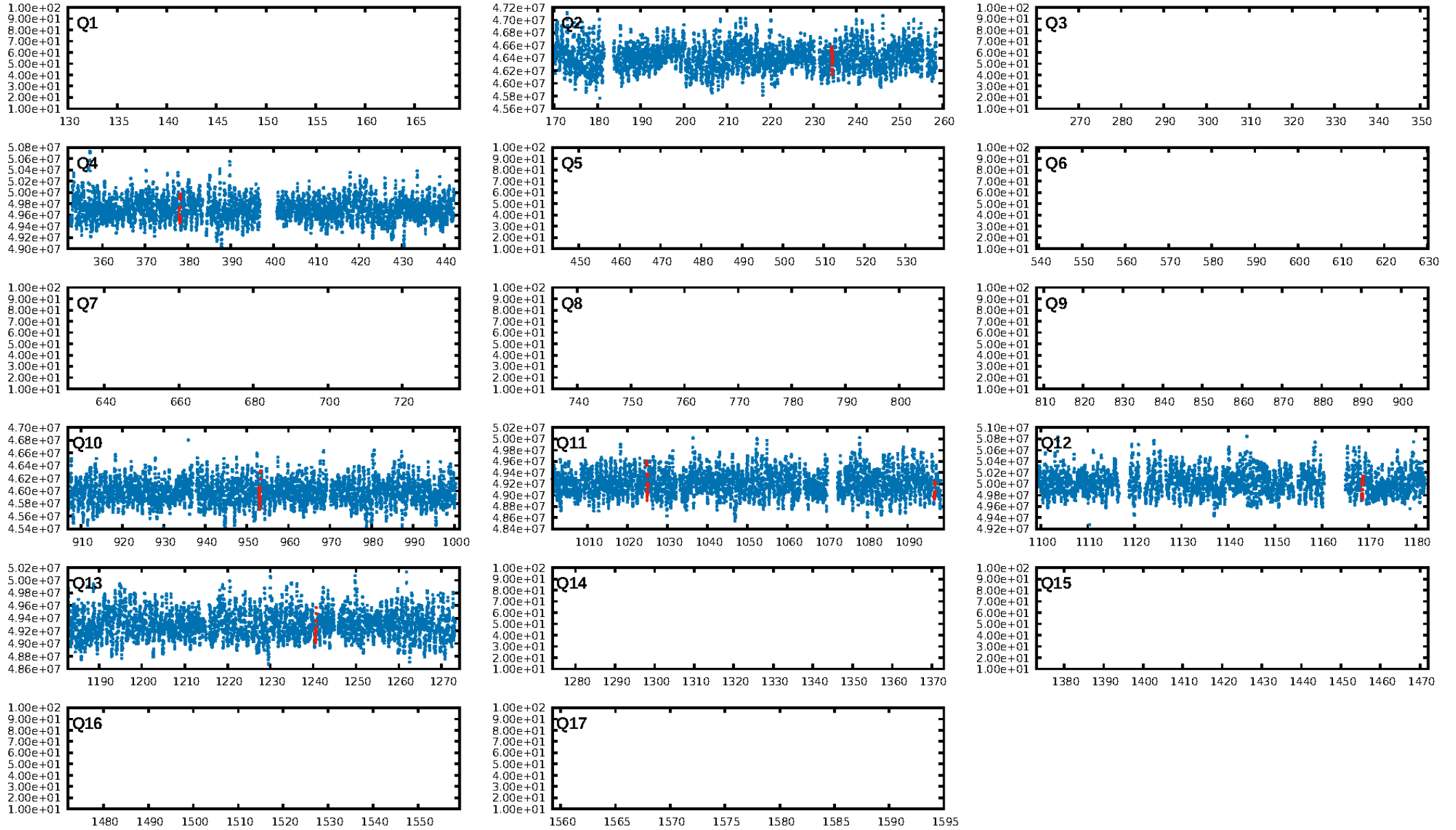
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [42.55σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.1%  
ModelChiSquareGof-sig: 25.2%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 5.389  
Centroid-sig: 30.4%  
Centroid-so: 0.794 arcsec [4.73σ]  
OotOffset-rm: 0.207 arcsec [1.75σ]  
KicOffset-rm: 0.256 arcsec [2.22σ]  
OotOffset-st: 2/1/2/1 [6]  
KicOffset-st: 2/1/2/1 [6]  
DiffImageQuality-fgm: 1.00 [6/6]  
DiffImageOverlap-fno: 0.67 [4/6]

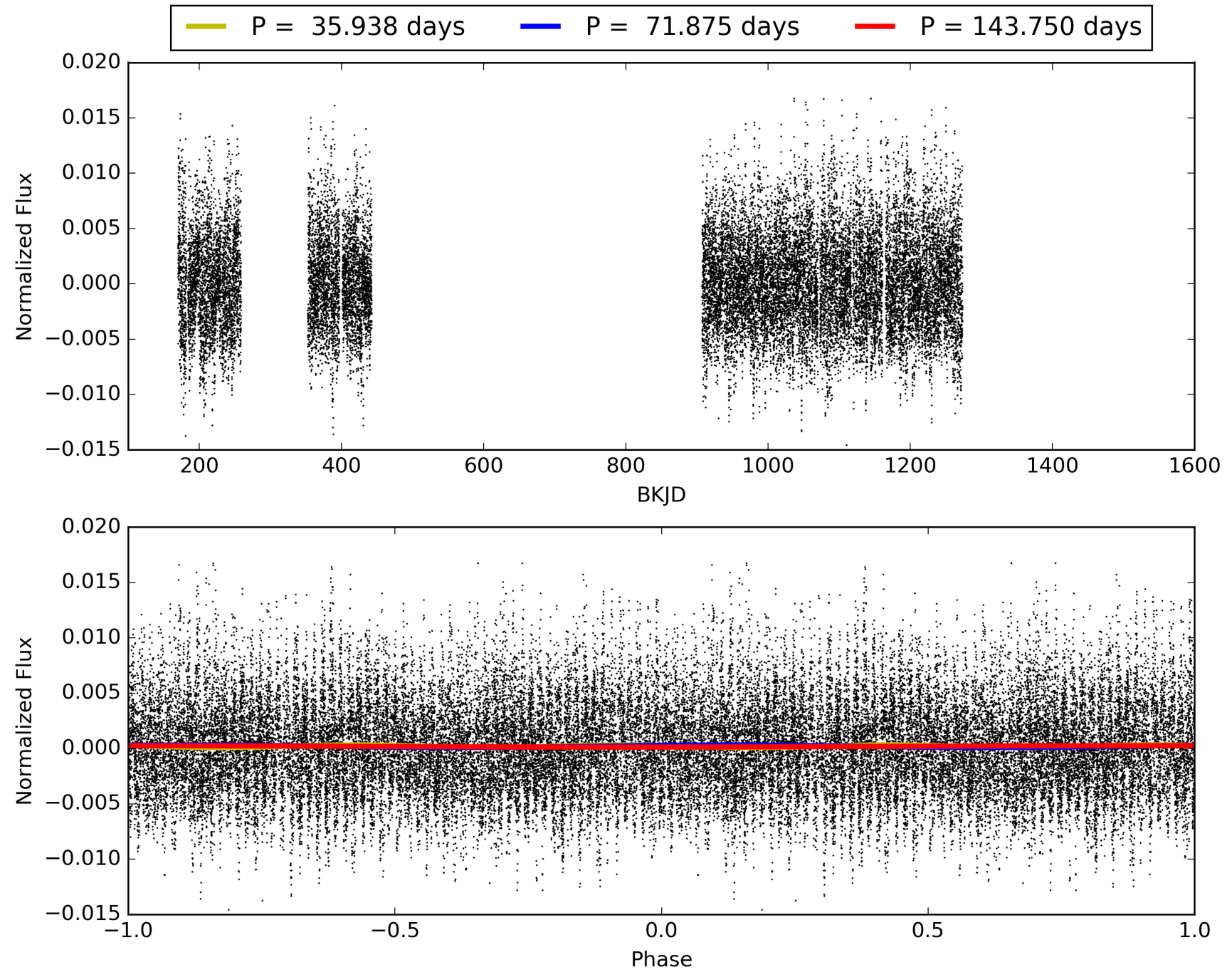
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 03:47:18 Z

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

# TCE 002167444-10, PDC Light Curves

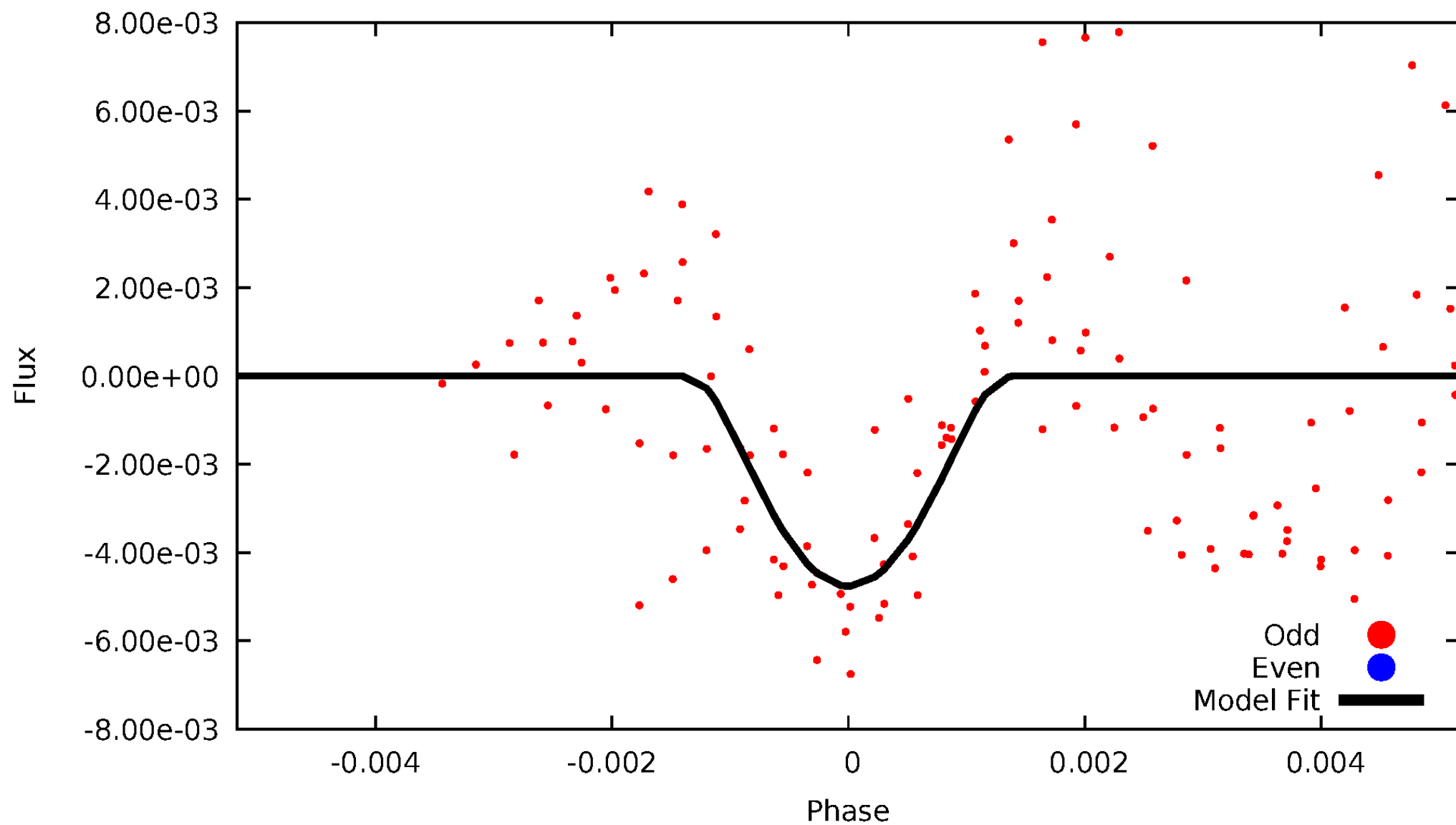


# TCE 002167444-10



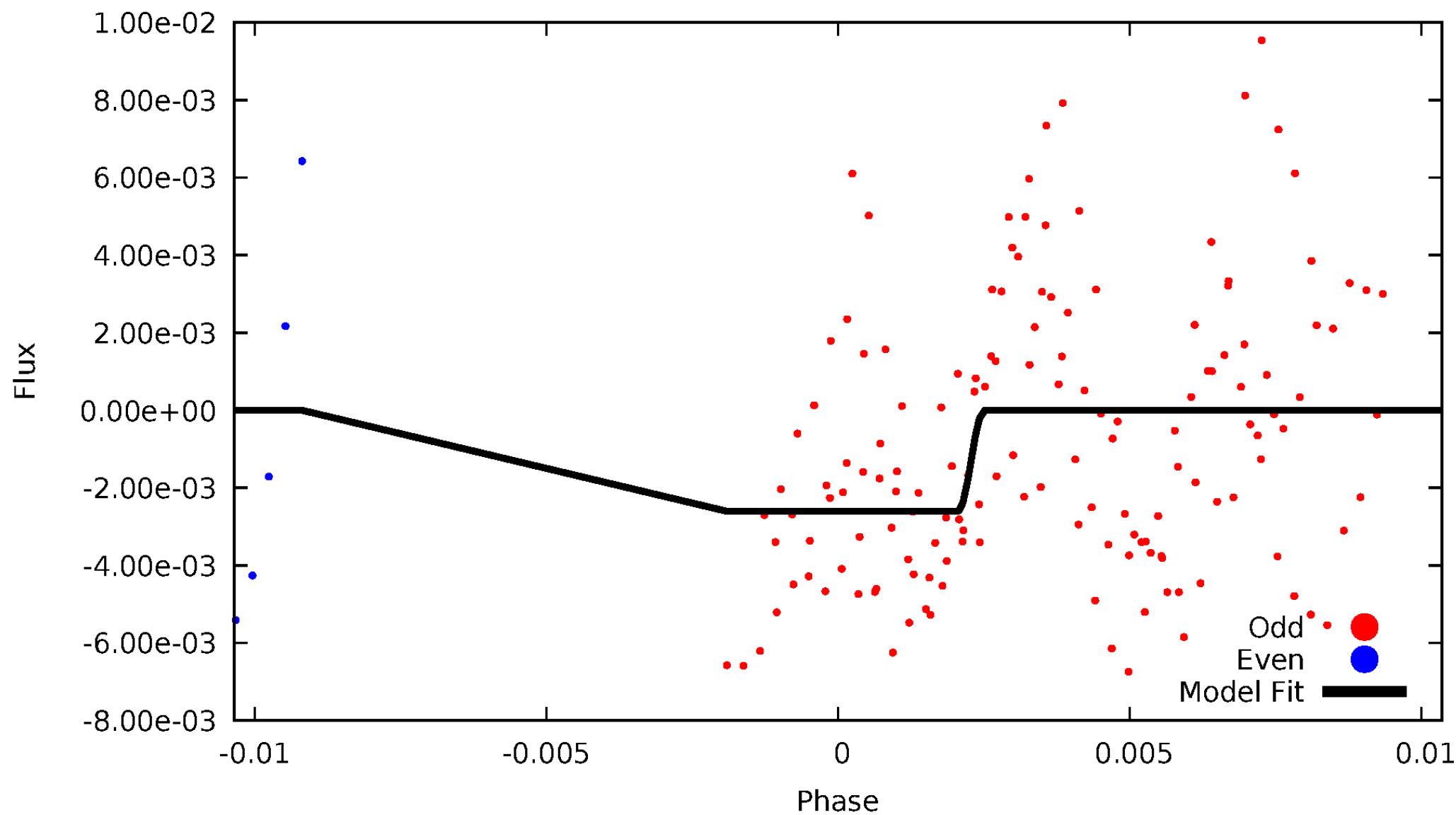
# DV Odd/Even

TCE 002167444-10



# ALT Odd/Even

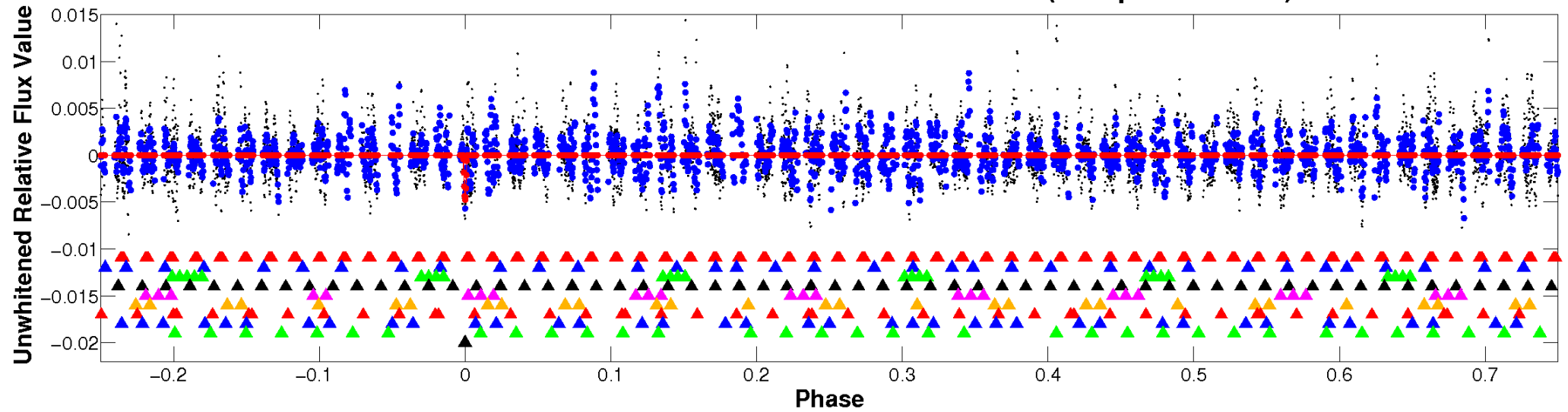
TCE 002167444-10



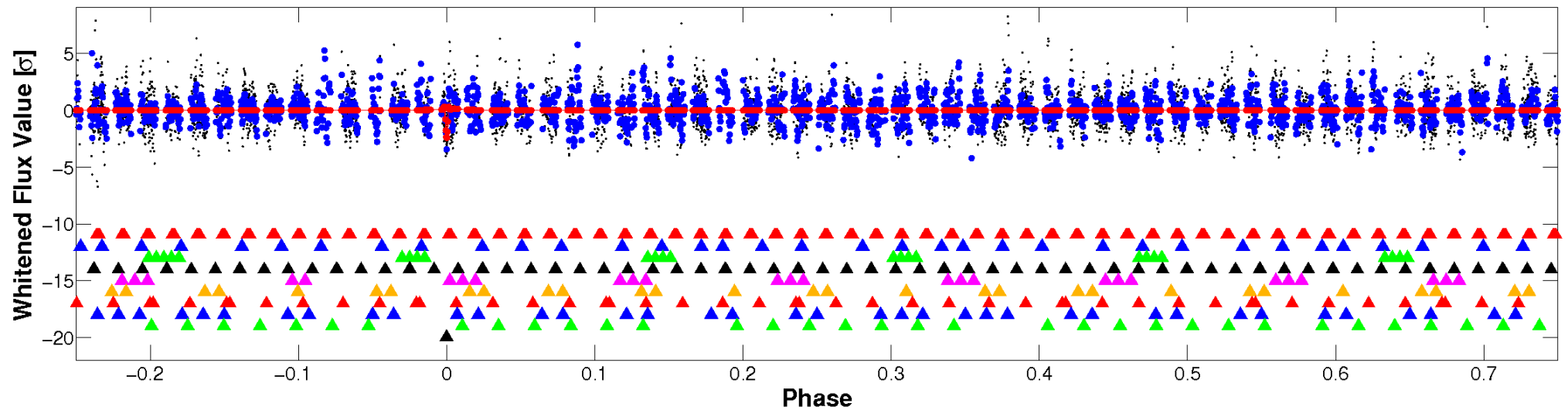


# Non-Whitened Vs. Whitened Light Curve

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

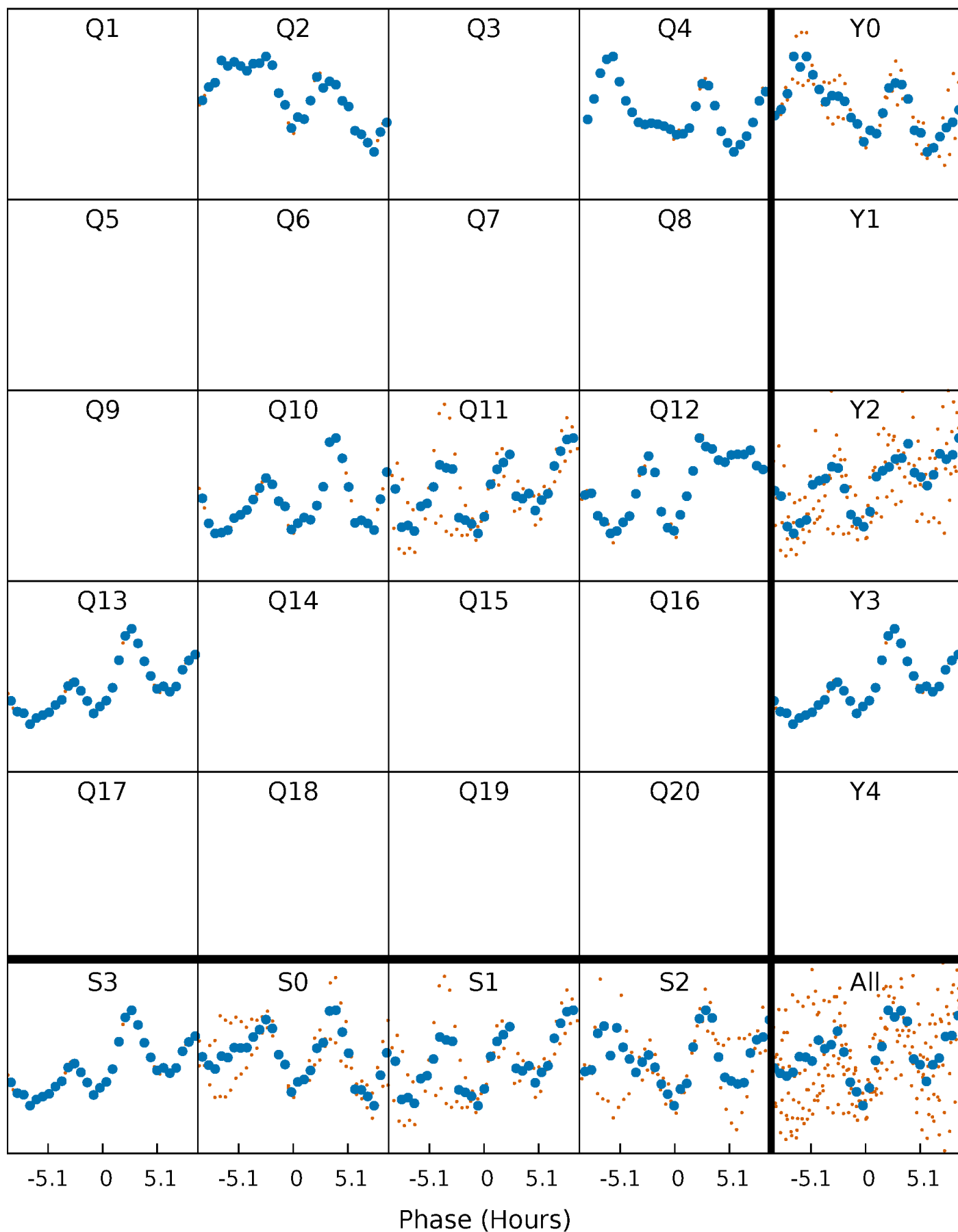


Planet 10 : Phased Whitened Flux Time Series (Fit Epoch/Period)



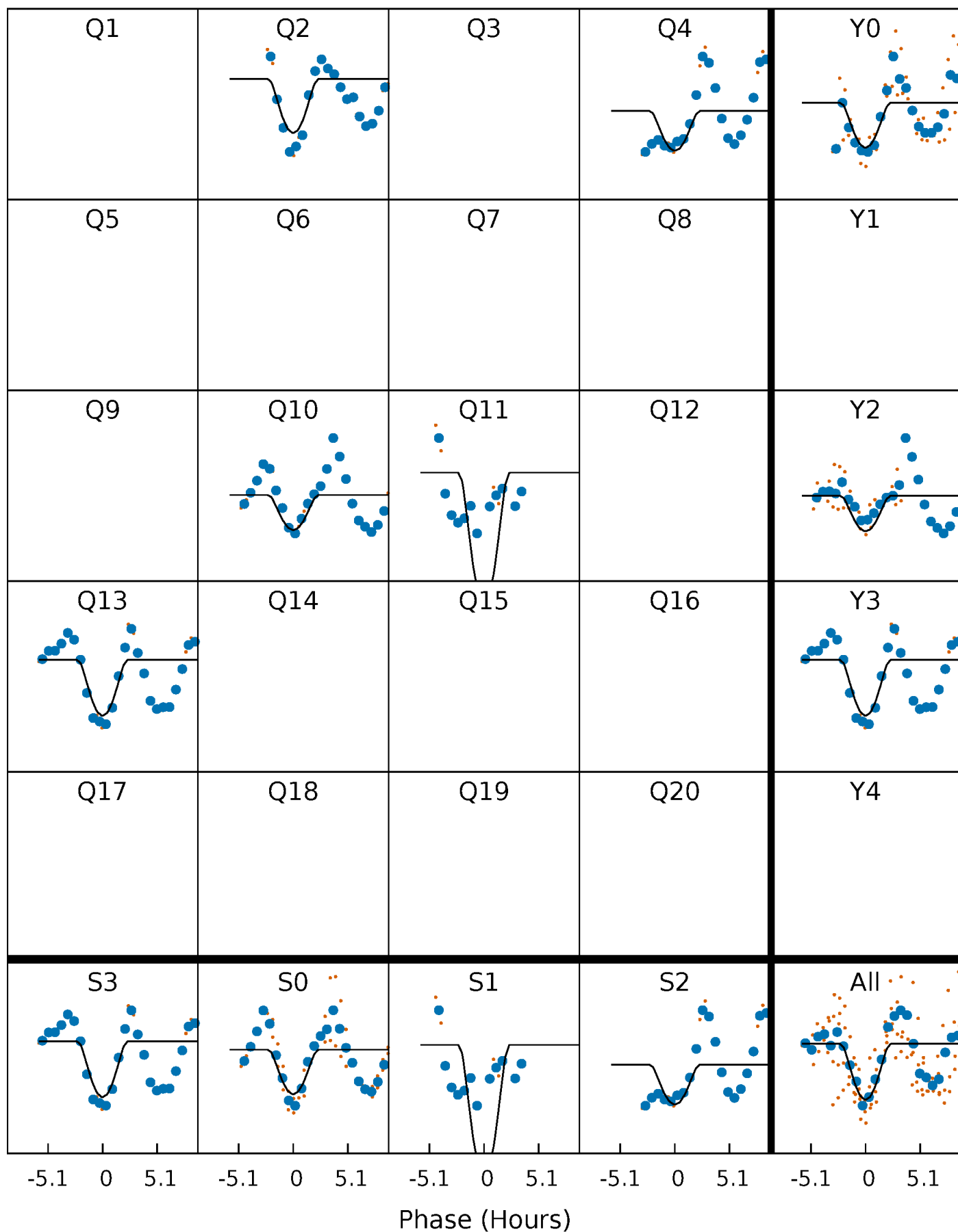
# PDC Quarter-Phased Transit Curves

TCE 002167444-10   P= 71.875232 Days    $T_0=162.459931$  (BKJD)



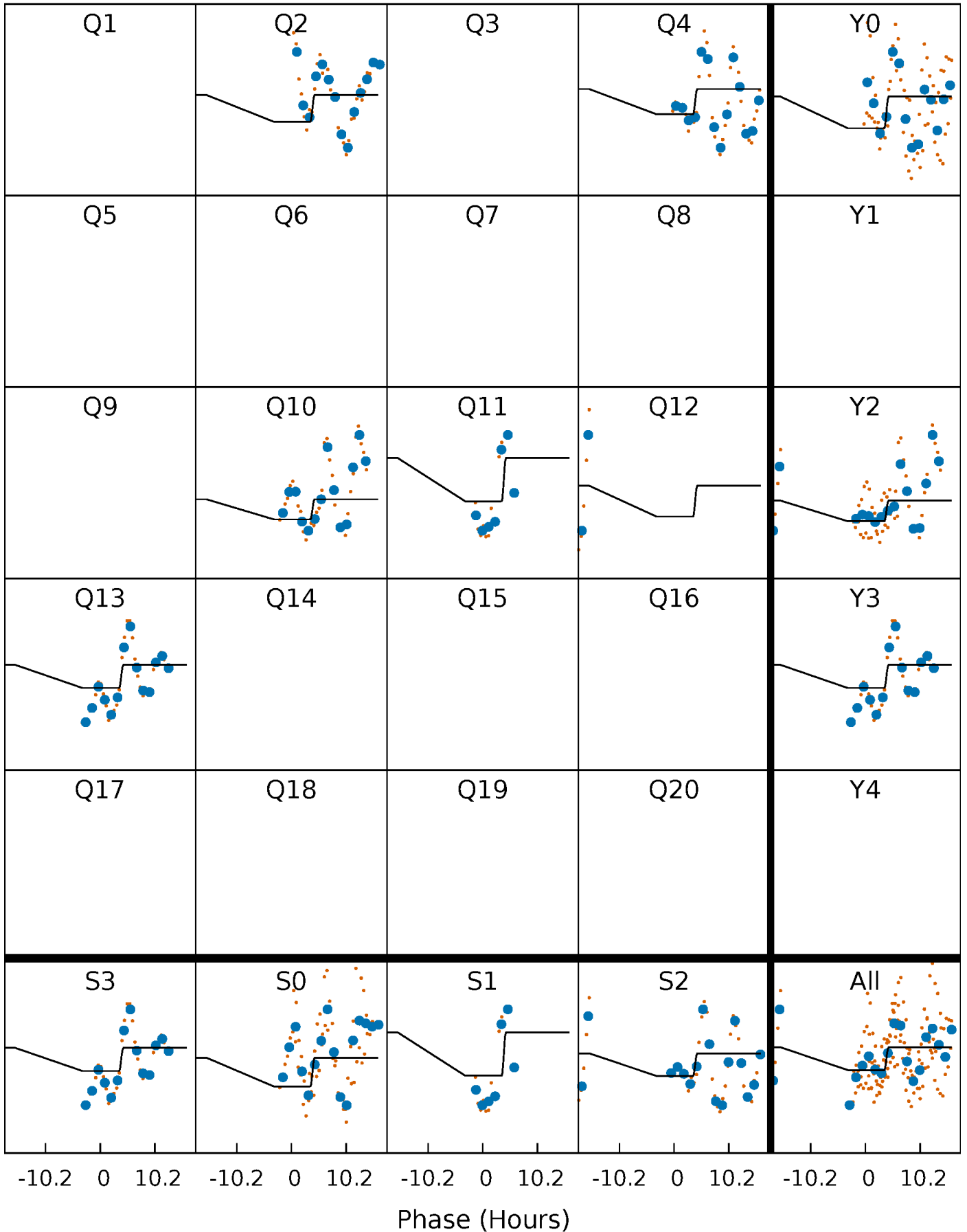
# DV Quarter-Phased Transit Curves

TCE 002167444-10 P= 71.875232 Days  $T_0=162.459931$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

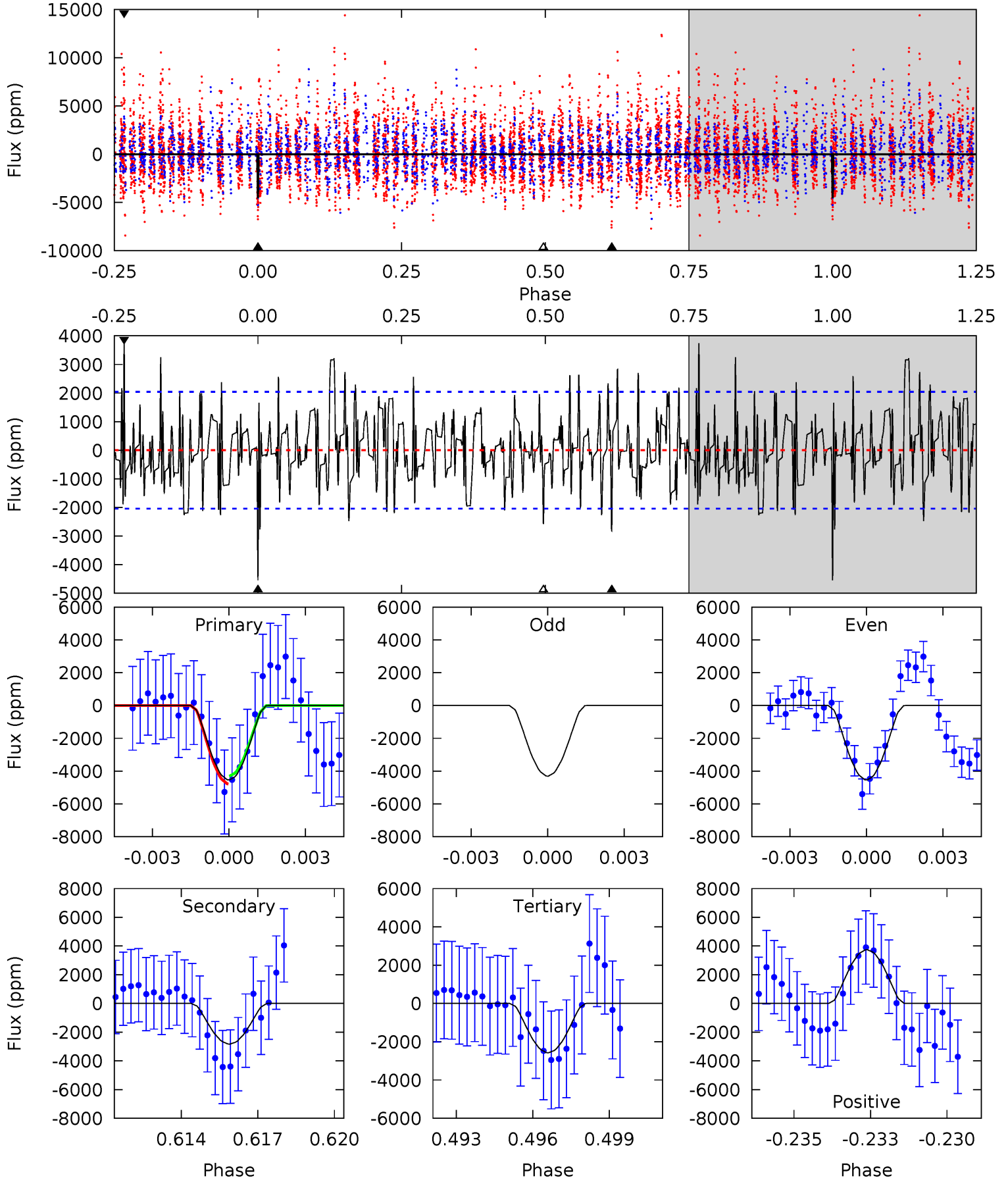
TCE 002167444-10   P= 71.875825 Days    $T_0=162.341000$  (BKJD)



# DV Model-Shift Uniqueness Test

002167444-10, P = 71.875232 Days, E = 162.459931 Days

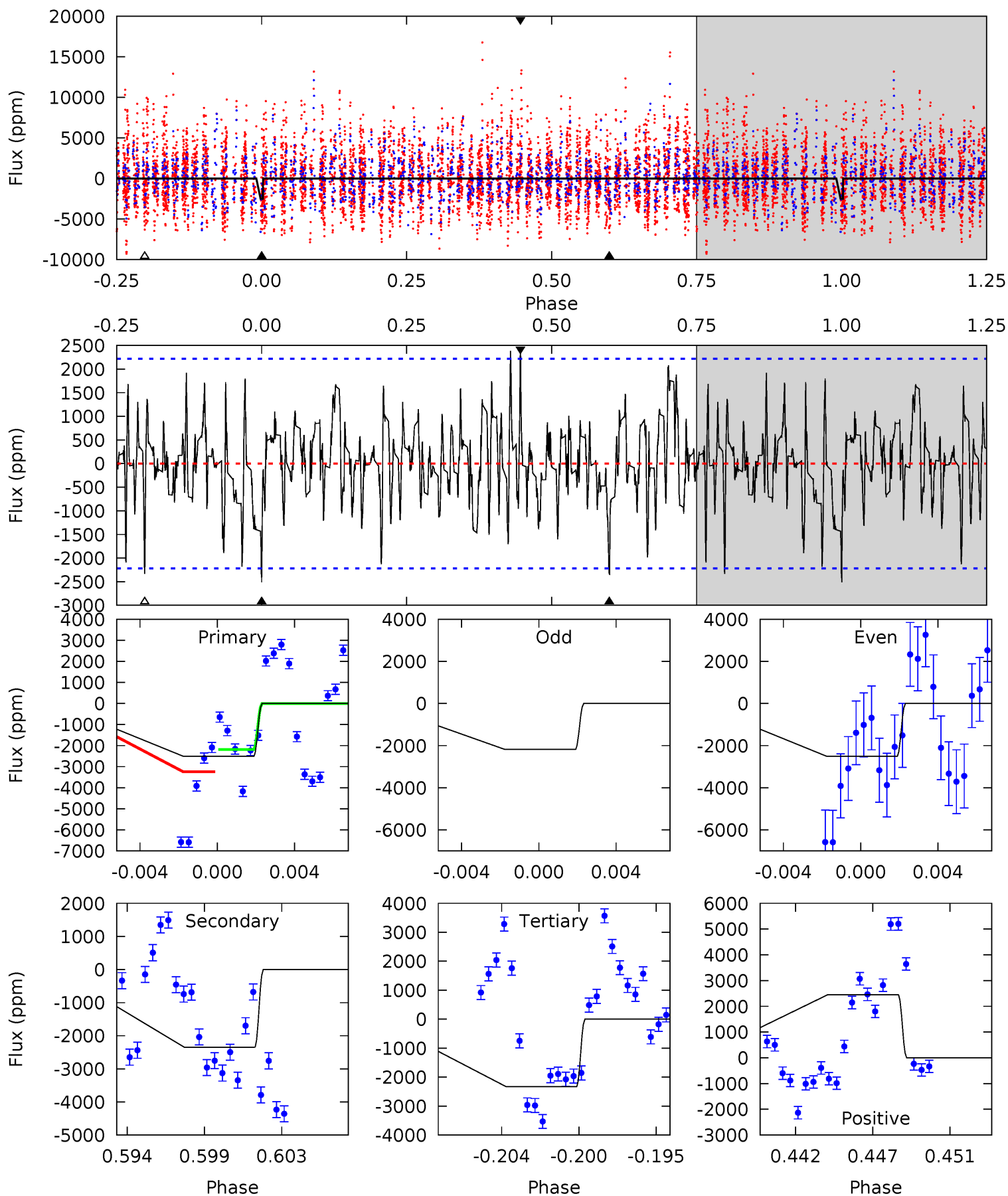
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.7	7.29	6.64	9.63	5.27	2.99	2.68	5.07	2.07	0.65	-2.35	0.35	0.96	0.45	0.62



# Alt Model-Shift Uniqueness Test

002167444-10, P = 71.875825 Days, E = 162.341000 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.86	5.49	5.44	5.73	5.18	2.85	1.85	0.42	0.13	0.04	-0.24	0.49	0.88	0.49	1.12



### Stellar Parameters For KIC 002167444

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7239^{+230}_{-374}$	$4.129^{+0.128}_{-0.192}$	$0.020^{+0.200}_{-0.350}$	$1.781^{+0.563}_{-0.375}$	$1.558^{+0.212}_{-0.259}$	$0.388^{+0.254}_{-0.195}$
	+3%/-5%	+3%/-5%	+1000%/-1750%	+32%/-21%	+14%/-17%	+65%/-50%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 002167444-10 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-2826 \pm 388$	$37.75^{+33.99}_{-22.54}$	$956^{+73}_{-69}$	$4071^{+1888}_{-775}$	$166^{+851}_{-121}$
Alt.	$-2349 \pm 428$	$31.21^{+32.48}_{-21.55}$	$958^{+79}_{-67}$	$4241^{+3034}_{-911}$	$207^{+1955}_{-159}$

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

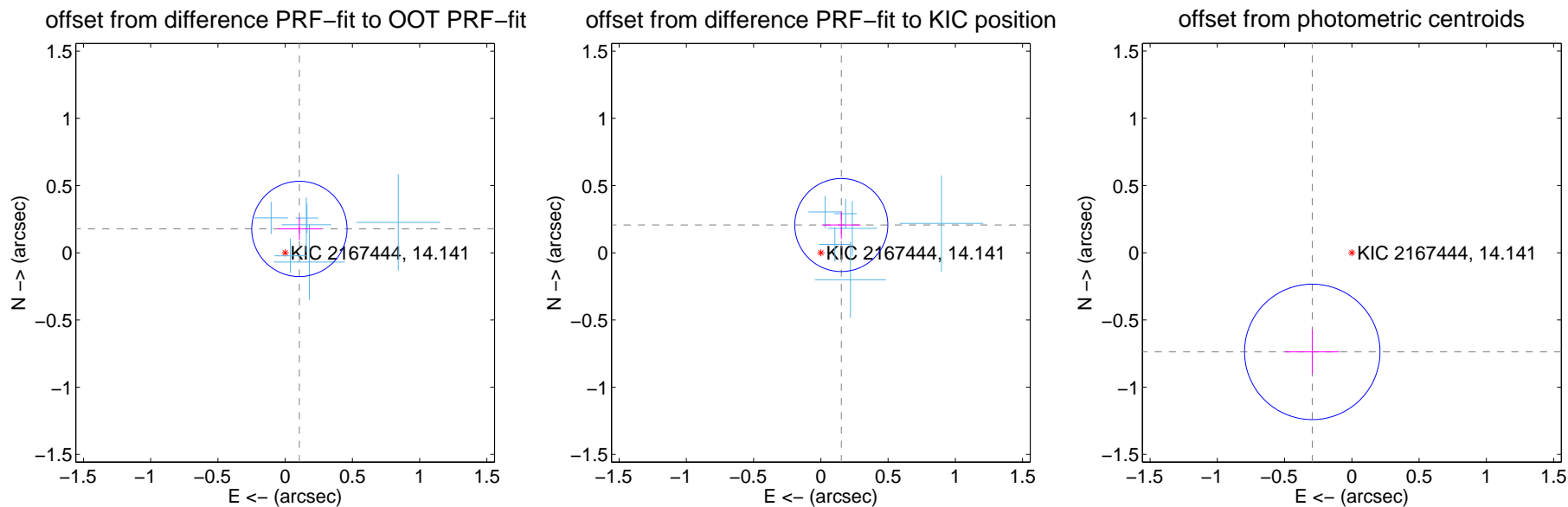
## DV Centroid Data

Supplemental centroid analysis for 002167444-10. Kepler magnitude: 14.14. Transit SNR 11.03

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

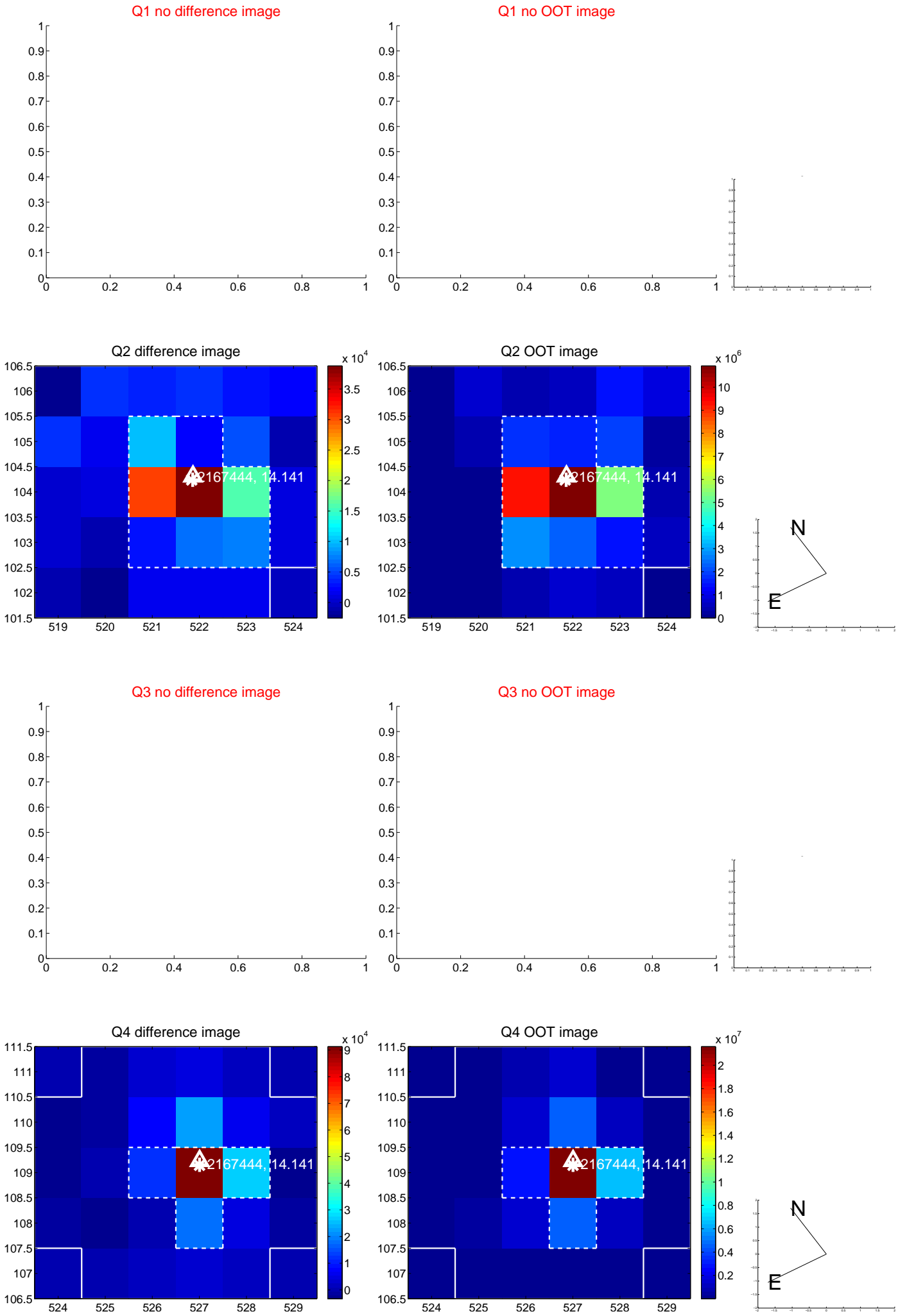
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.207 \pm 0.118$	1.75	$-0.106 \pm 0.163$	$0.178 \pm 0.082$
PRF-fit source offset from KIC position	$0.256 \pm 0.115$	2.22	$-0.152 \pm 0.144$	$0.206 \pm 0.101$
photometric centroid source offset	$0.79 \pm 0.17$	4.73	$0.29 \pm 0.20$	$-0.74 \pm 0.16$



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.



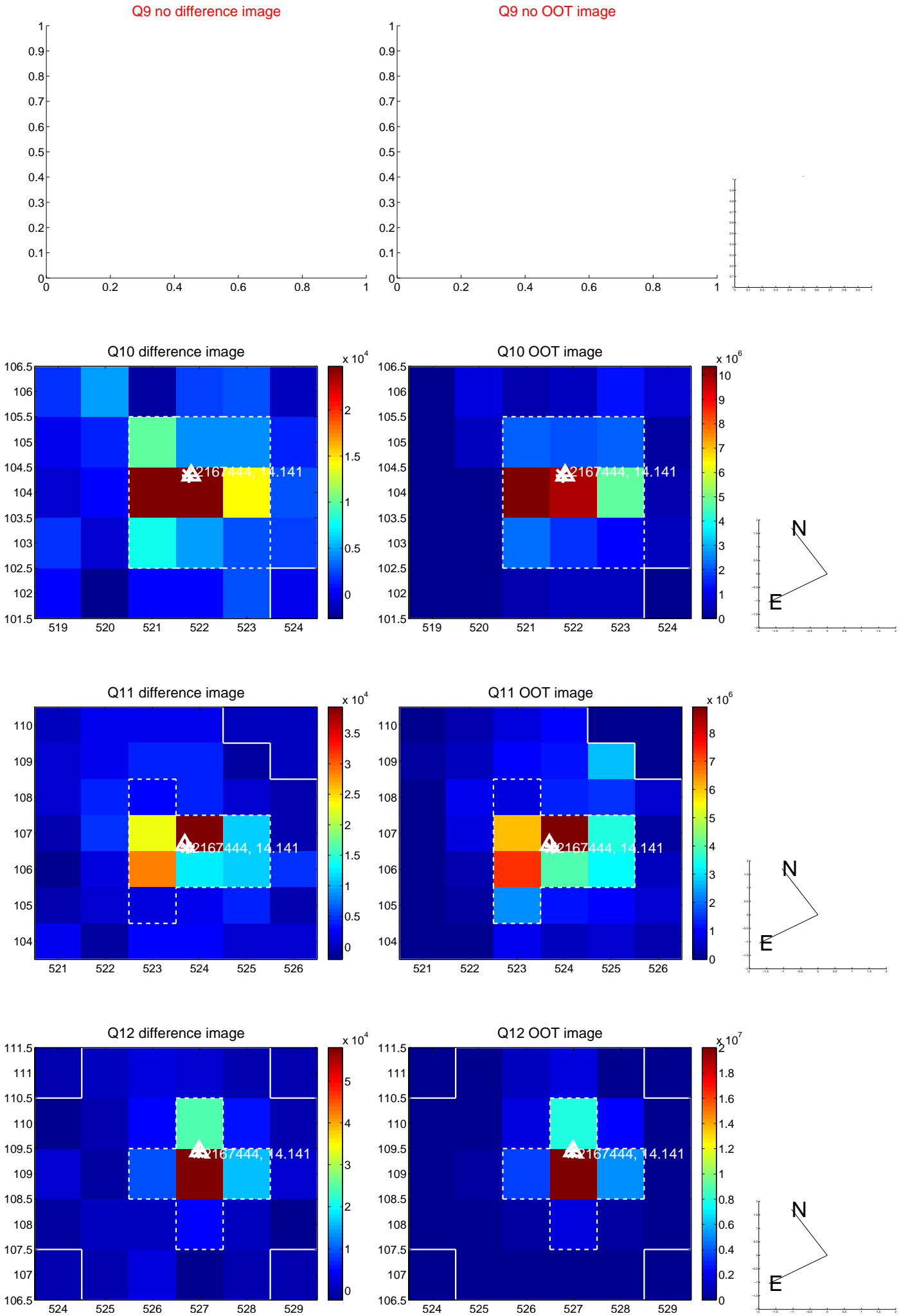
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



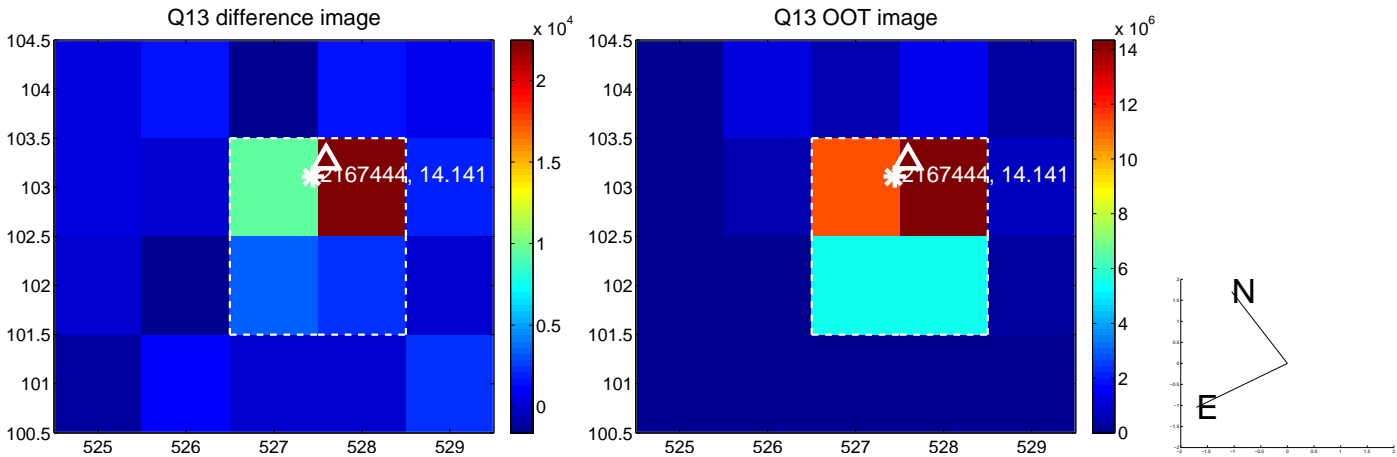
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



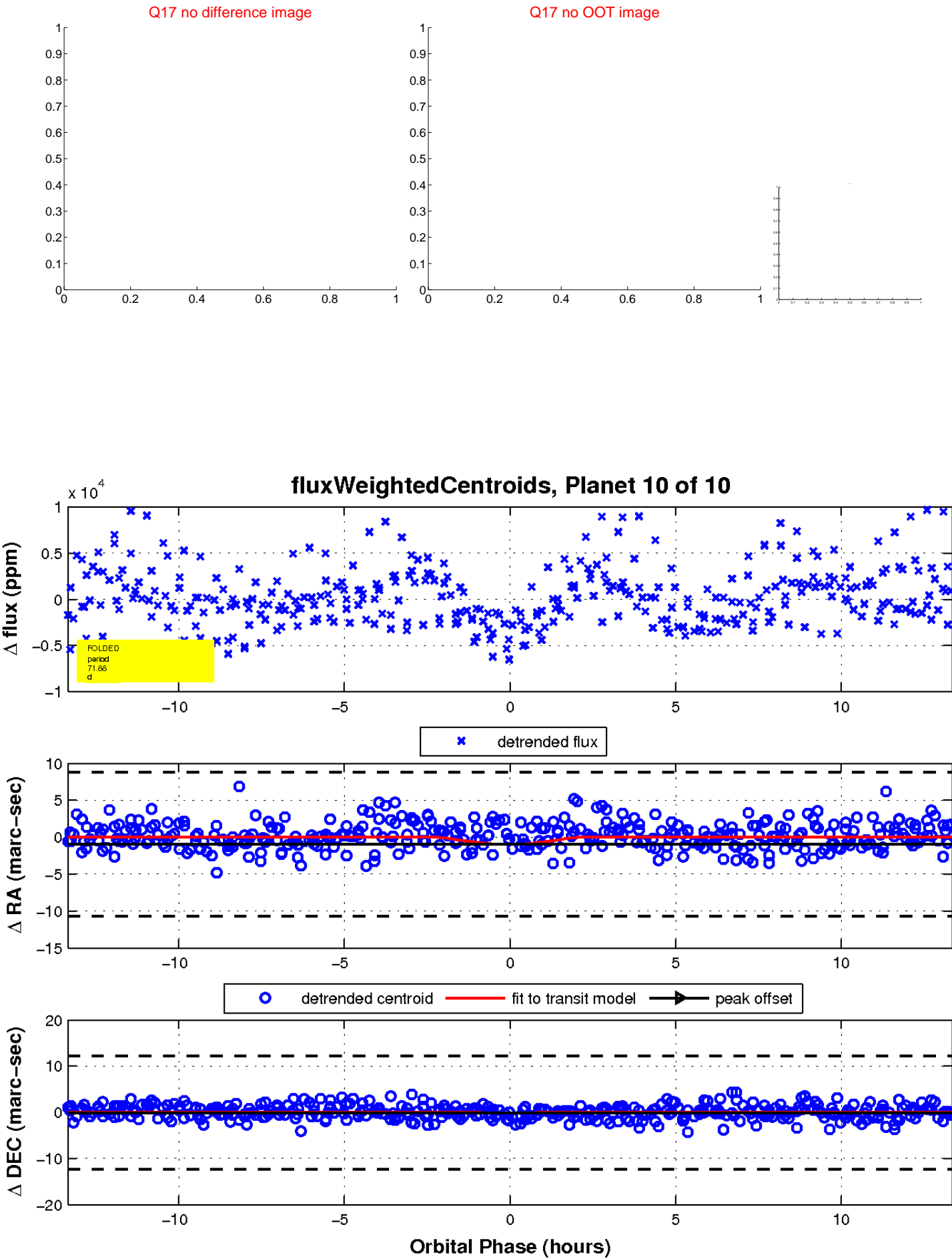
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

