

# KIC 007418359

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007418359-02	OBS	No	356.129865	255.122001	464.5	6.663	50.2	32.5	1.48	6441	3.34	3.16
007418359-03	OBS	No	368.127609	194.421511	386.9	3.851	38.7	32.6	1.48	6441	3.11	3.02

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007418359-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007418359-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—CENT_SATURATED

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

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

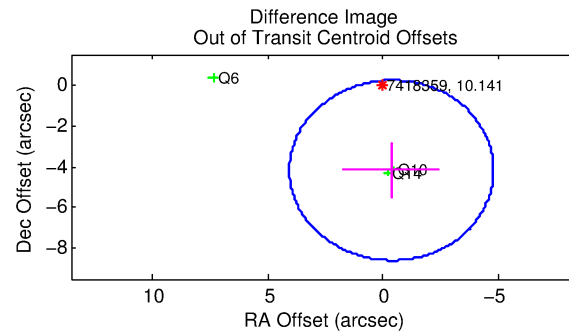
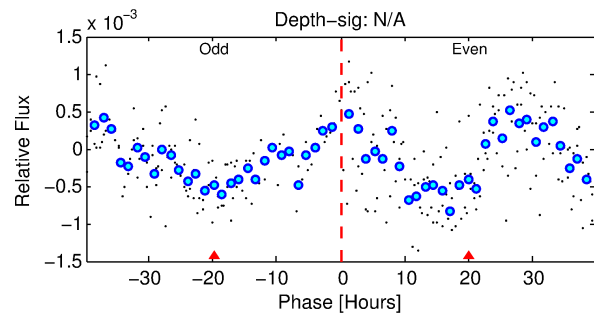
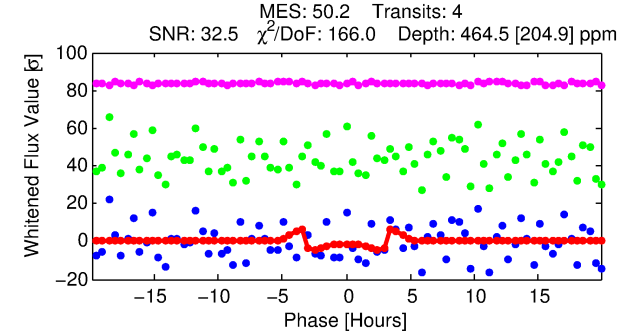
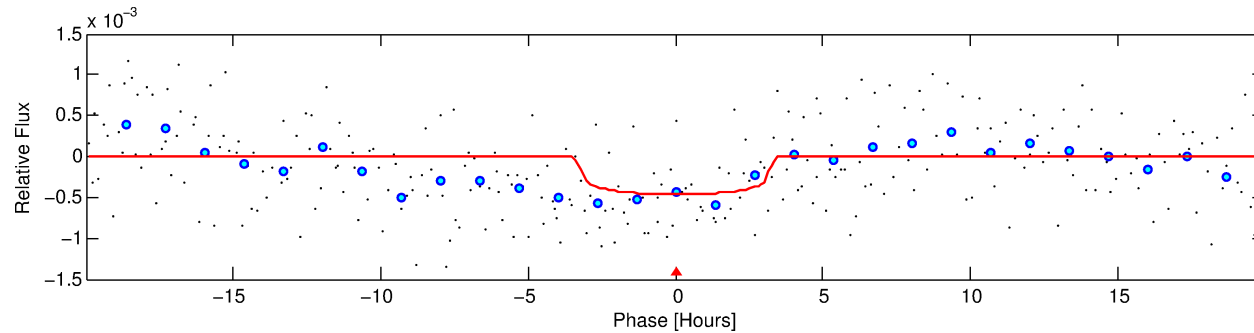
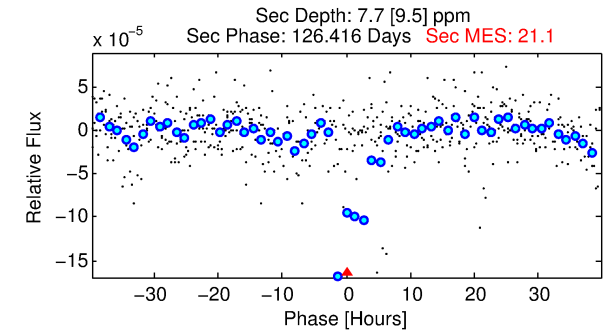
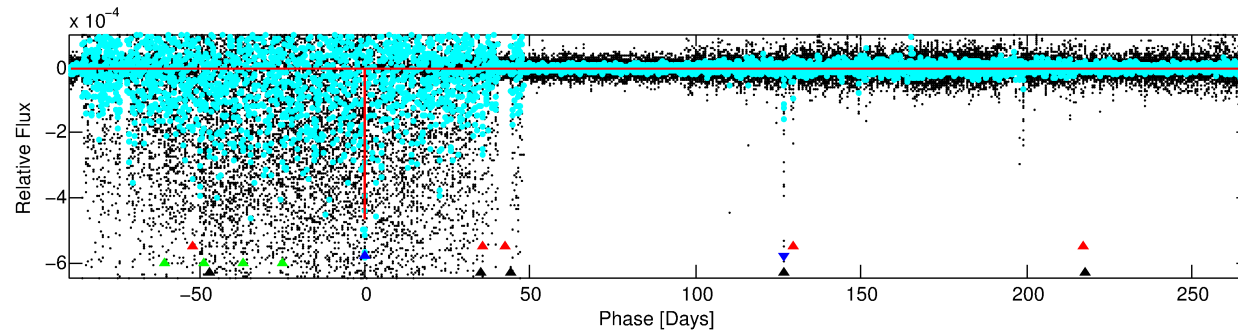
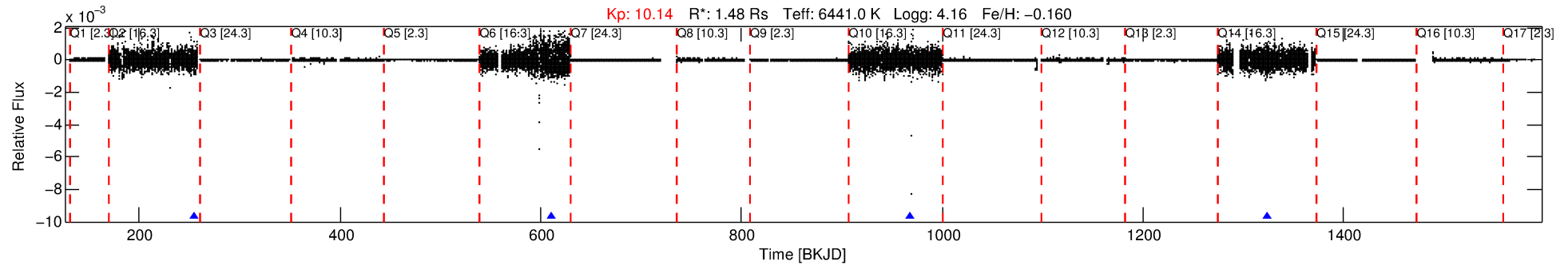
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 007418359-02

No Significant Match Found

# DV One-Page Summary

KIC: 7418359 Candidate: 2 of 4 Period: 356.130 d



## DV Fit Results:

Period = 356.12986 [0.00795] d  
Epoch = 255.1220 [0.0144] BKJD  
Rp/R\* = 0.0206 [0.0256]  
a/R\* = 342.10 [2164.50]  
b = 0.58 [7.20]  
Seff = 3.16 [1.16]  
Teq = 340 [31] K  
Rp = 3.34 [4.26] Re  
a = 1.0359 [0.2554] AU  
Ag = 410.27 [1145.93] [0.36σ]  
Teffp = 2365 [1639] K [1.24σ]

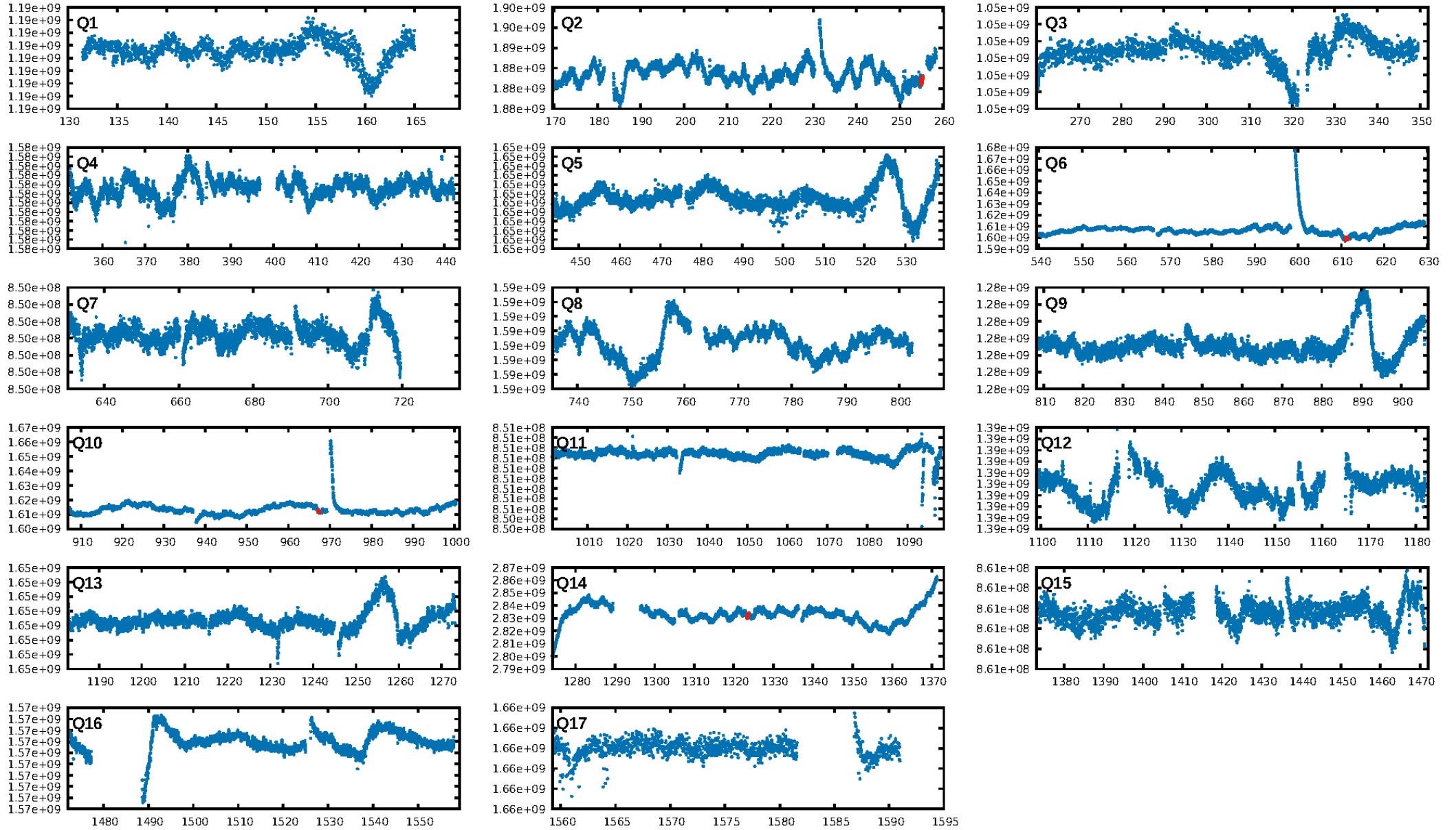
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [67.19σ]  
LongPeriod-sig: 100.0% [37.42σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.0%  
Bootstrap-pfa: 3.77e-06  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: N/A  
Centroid-sig: 0.0%  
Centroid-so: 2.966 arcsec [2.69σ]  
OotOffset-rm: 4.195 arcsec [2.85σ]  
OotOffset-st: 3/0/0/0 [3]  
KicOffset-rm: 3.850 arcsec [5.87σ]  
KicOffset-st: 3/0/0/0 [3]  
DiffImageQuality-fgm: 0.00 [0/3]  
DiffImageOverlap-fno: 1.00 [3/3]

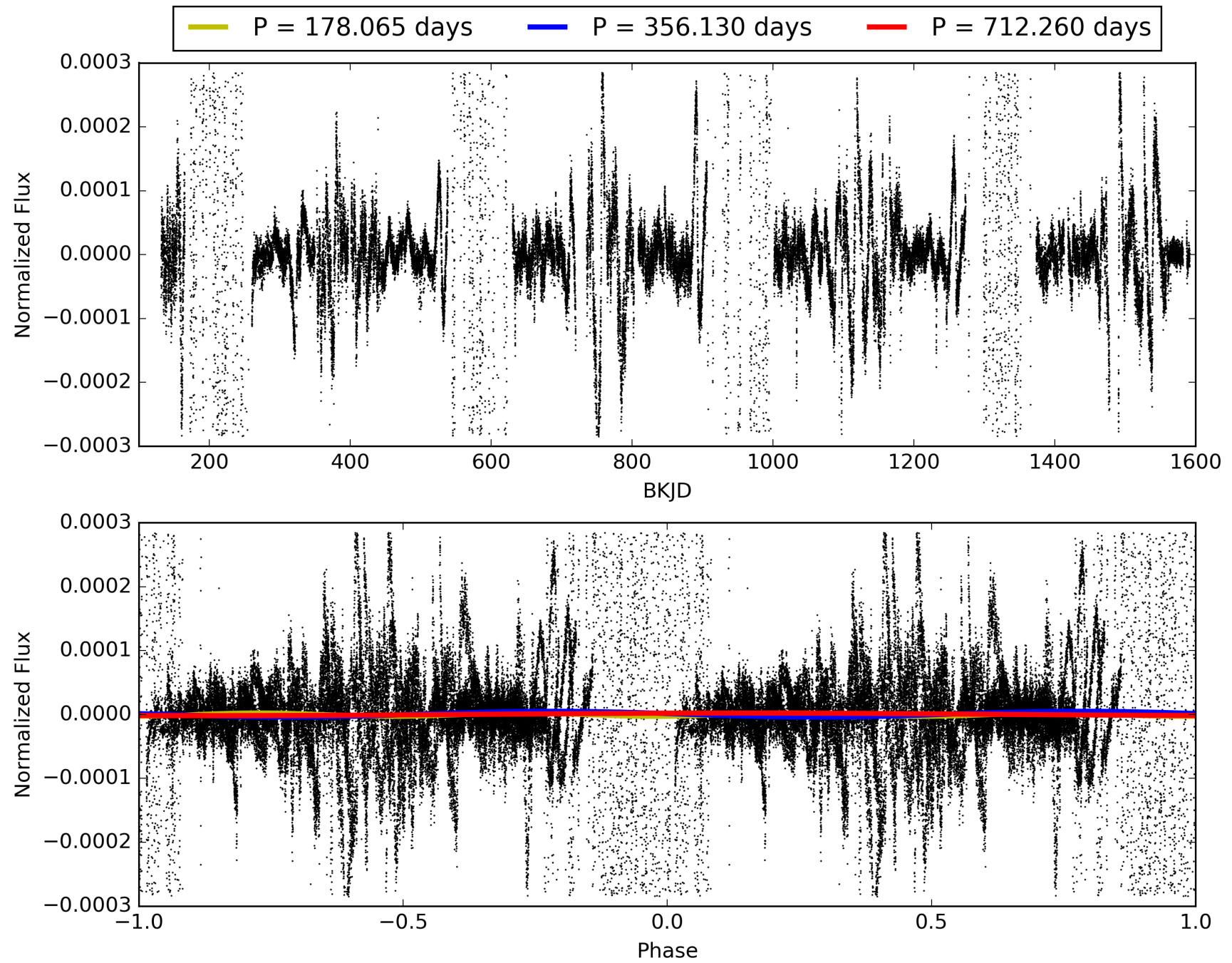
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 07:29:30 Z

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

# TCE 007418359-02, PDC Light Curves

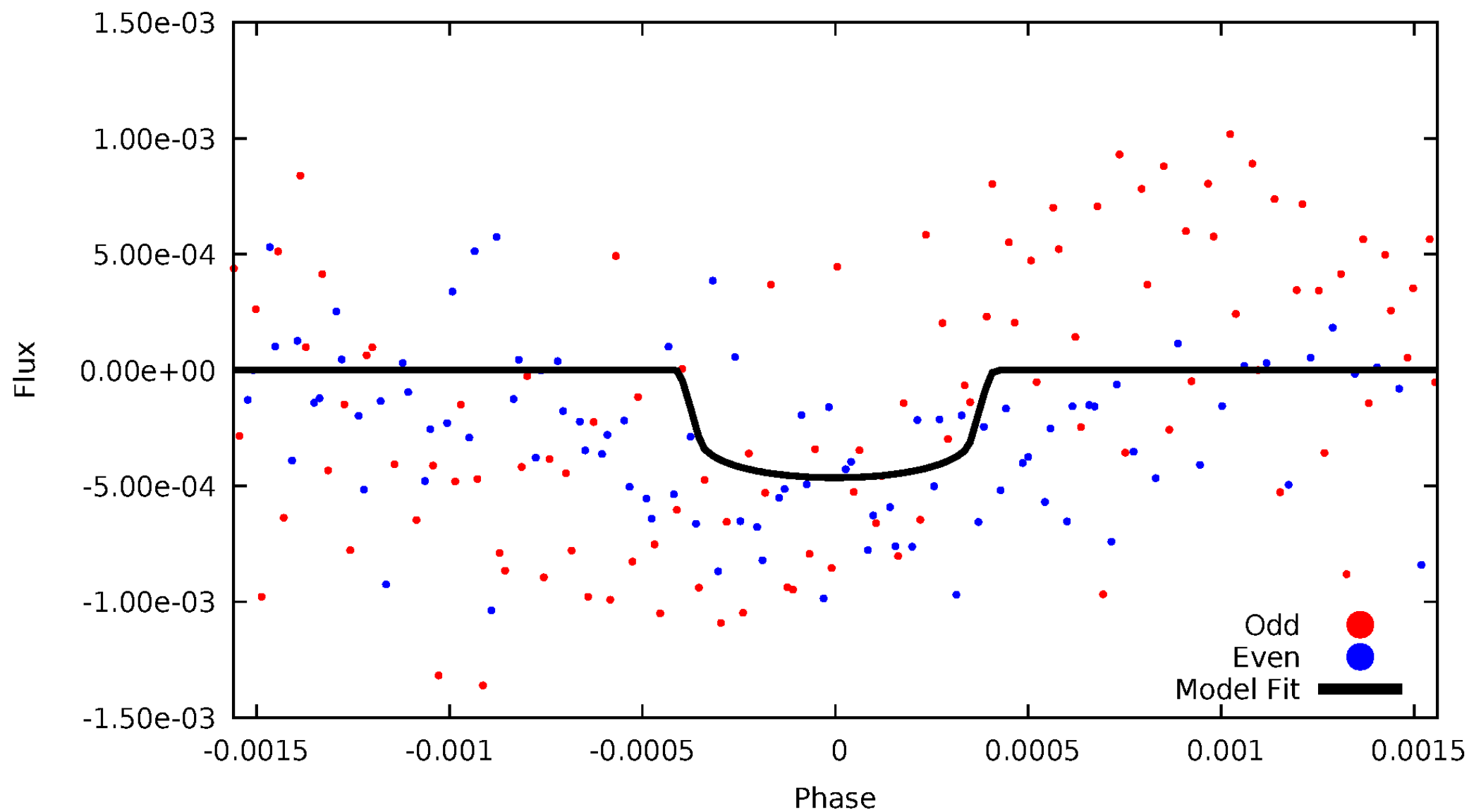


# TCE 007418359-02



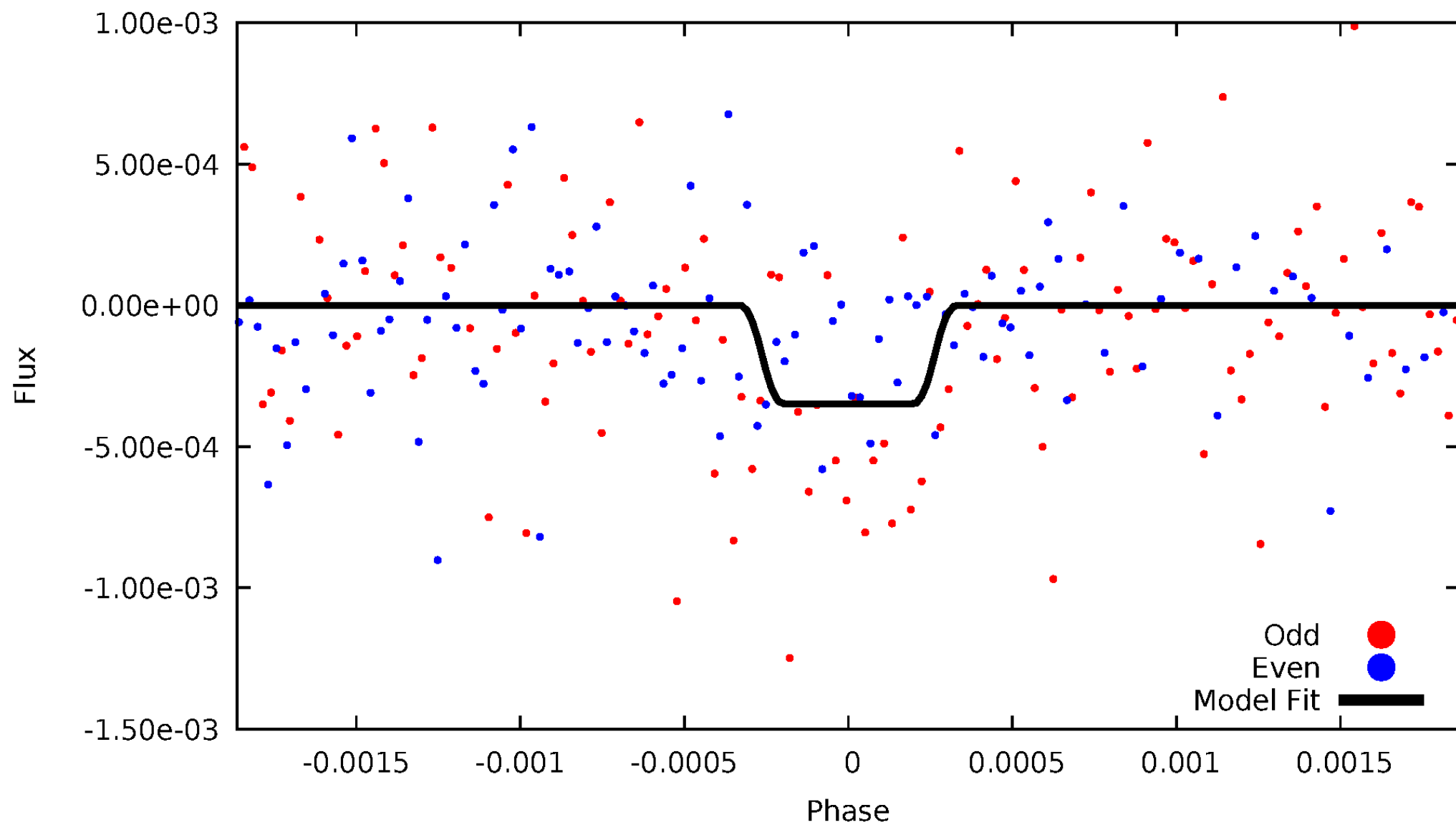
# DV Odd/Even

TCE 007418359-02



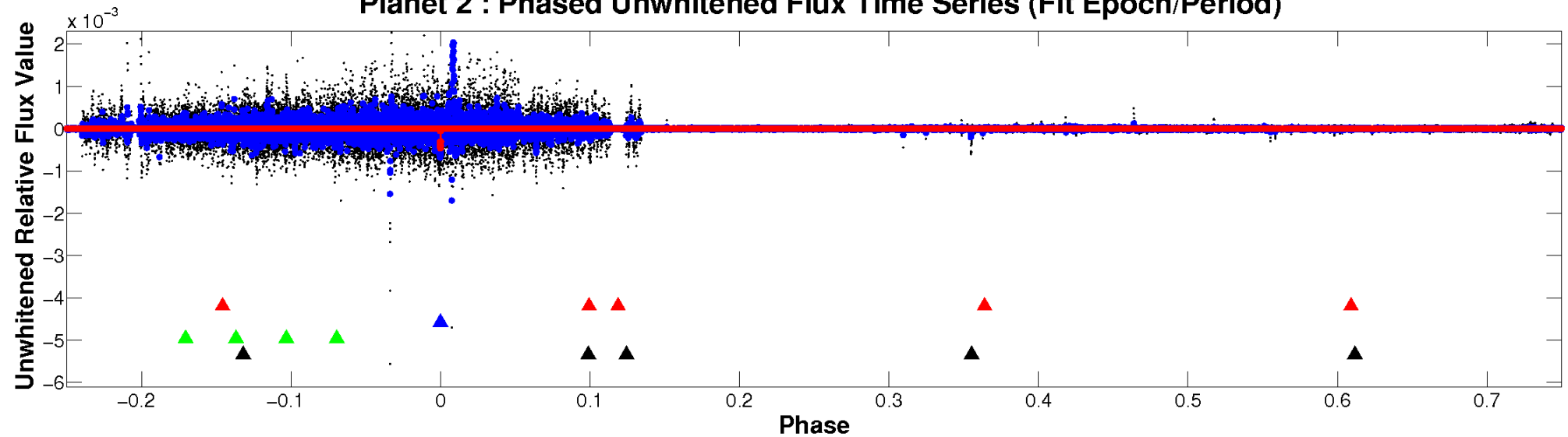
# ALT Odd/Even

TCE 007418359-02

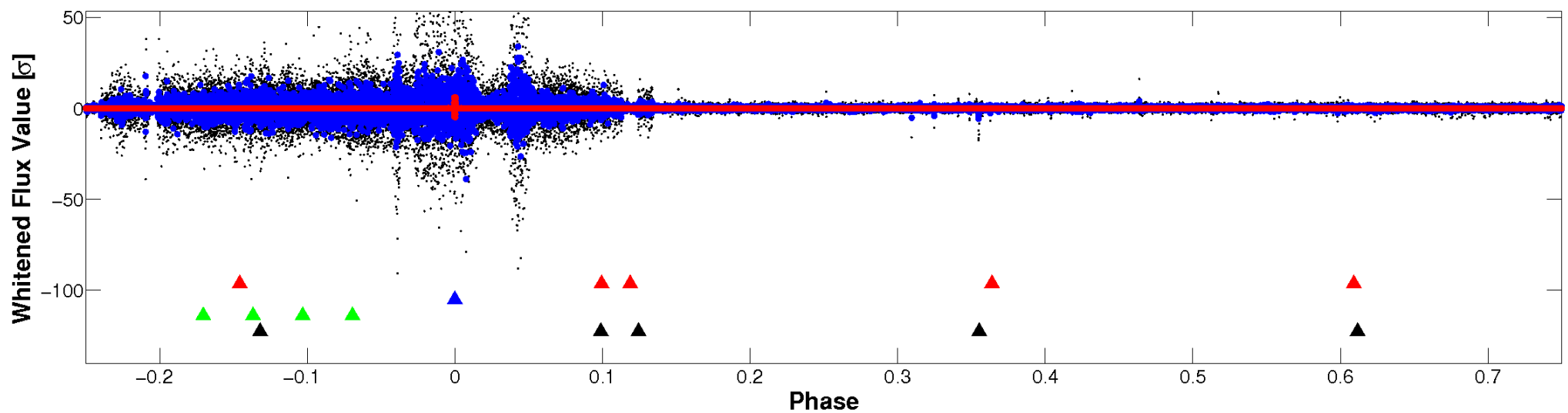


# Non-Whitened Vs. Whitened Light Curve

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

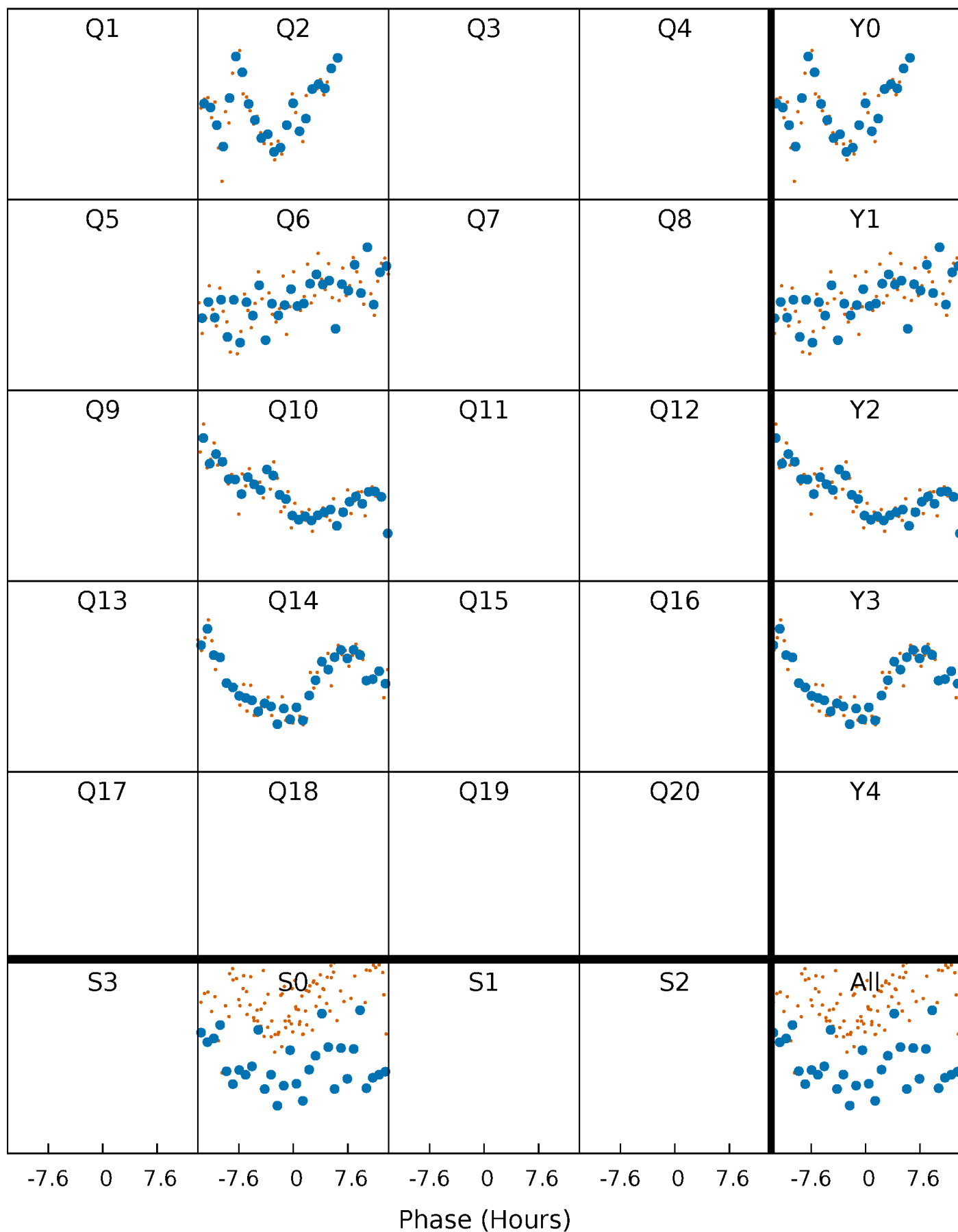


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

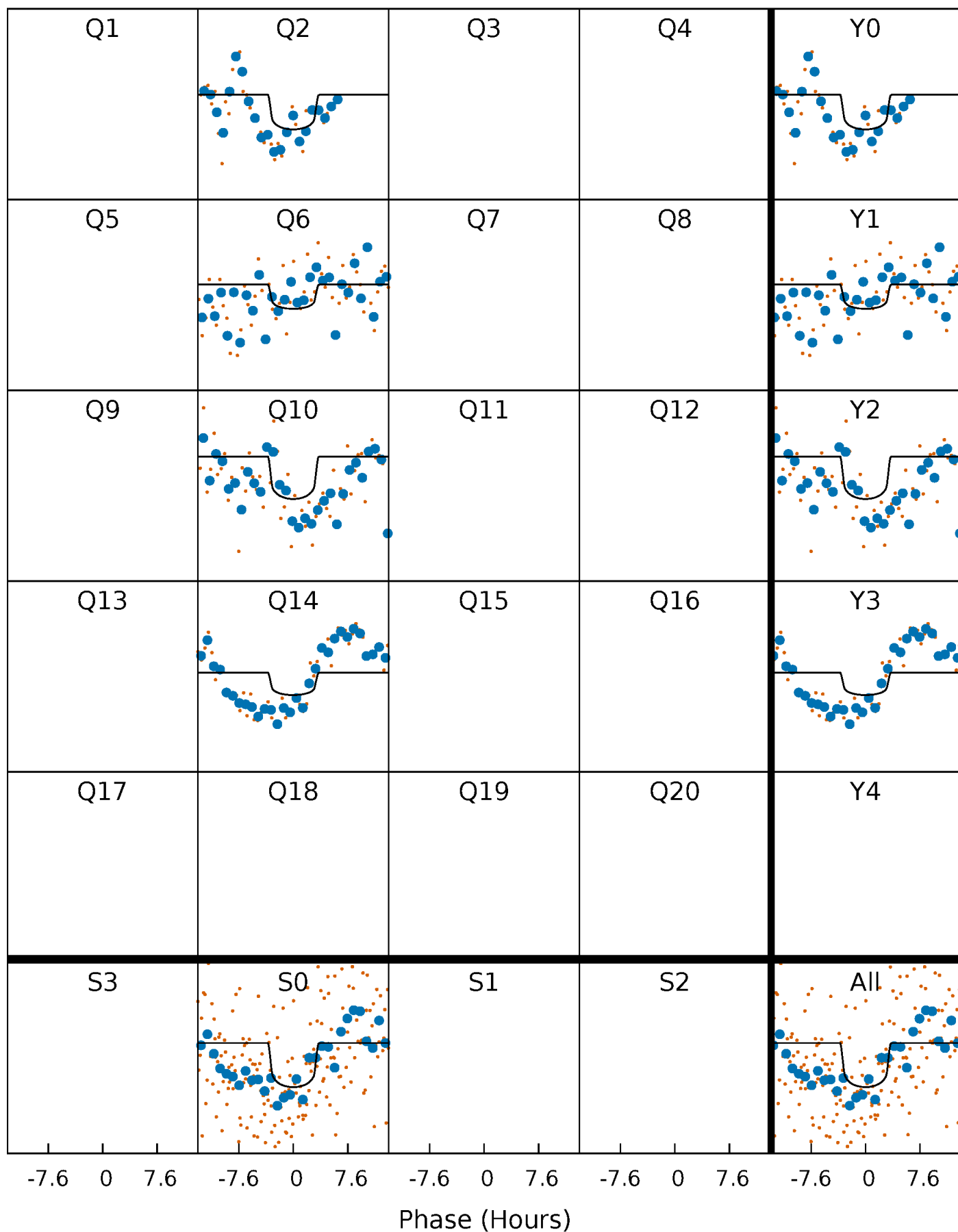
TCE 007418359-02 P=356.129865 Days  $T_0=255.122001$  (BKJD)





# DV Quarter-Phased Transit Curves

TCE 007418359-02 P=356.129865 Days  $T_0=255.122001$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

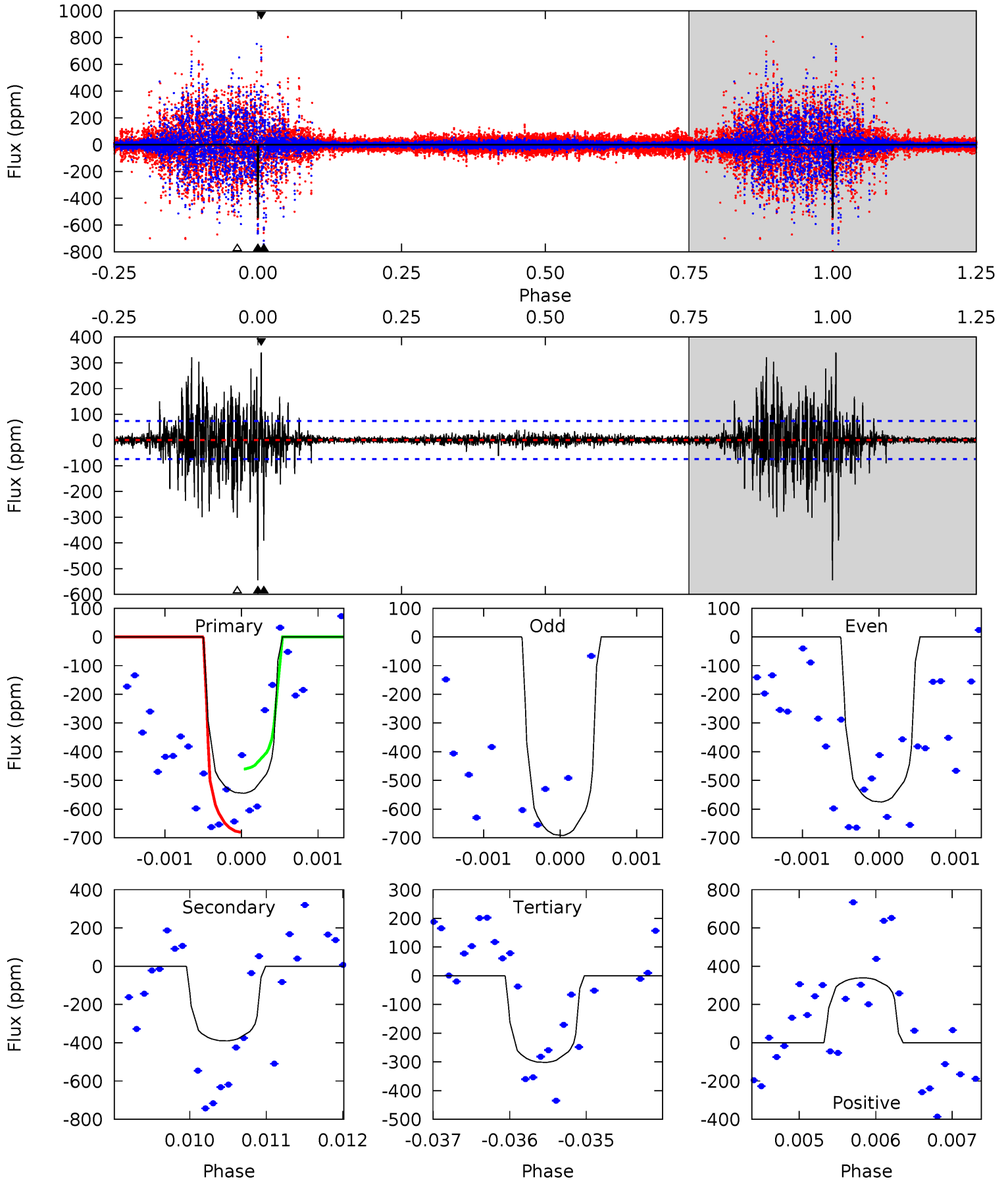
TCE 007418359-02 P=356.122895 Days  $T_0=255.153291$  (BKJD)



# DV Model-Shift Uniqueness Test

007418359-02, P = 356.129865 Days, E = 255.122001 Days

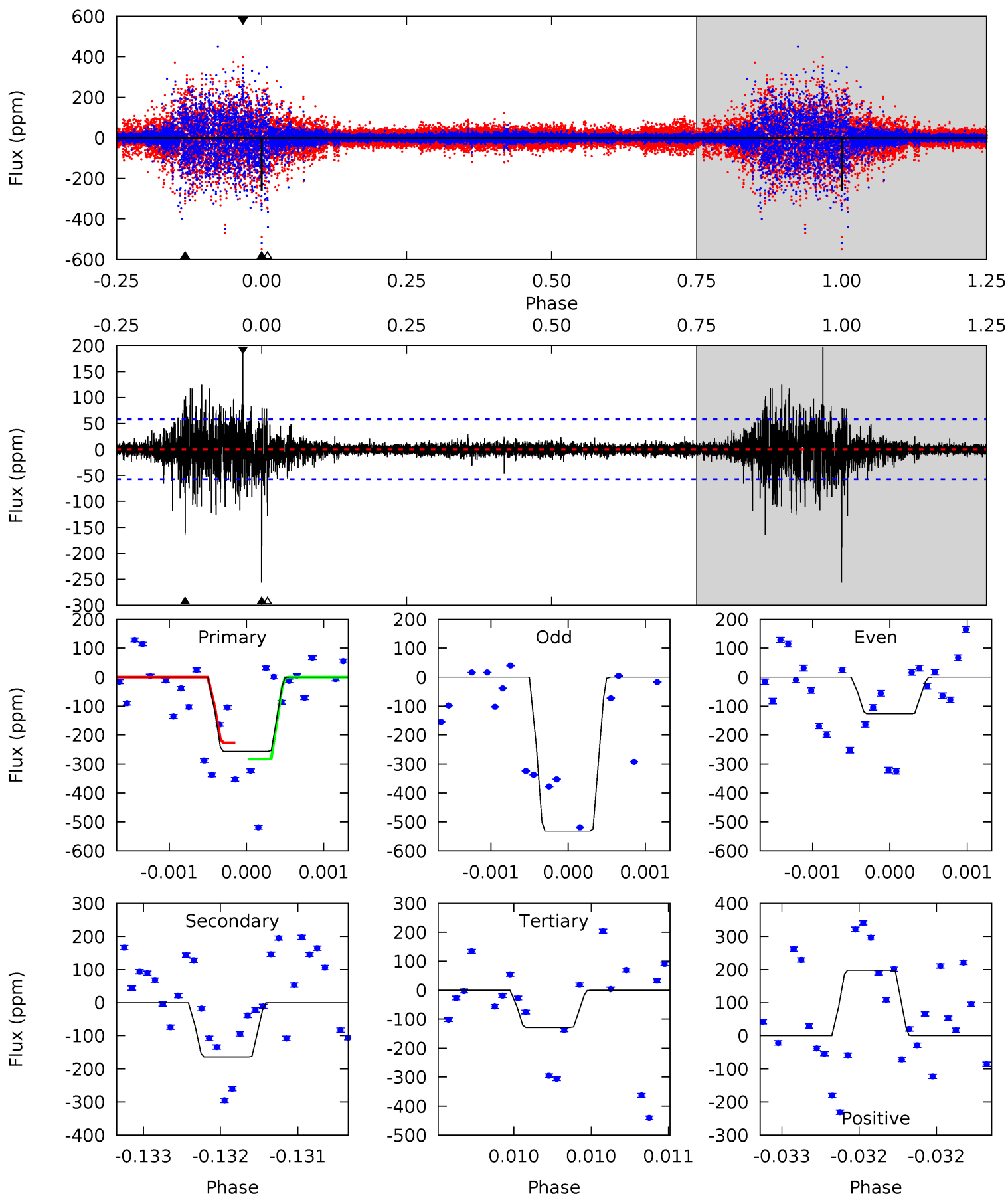
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
40.5	29.0	22.4	25.2	5.49	3.34	2.27	18.0	15.3	6.55	3.78	2.45	0.93	0.38	8.18



# Alt Model-Shift Uniqueness Test

007418359-02, P = 356.122895 Days, E = 255.153291 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
24.5	15.7	12.3	18.9	5.53	3.41	1.20	12.3	5.62	3.43	-3.23	2.31	0.98	0.44	0



### Stellar Parameters For KIC 007418359

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6441^{+146}_{-162}$	$4.164^{+0.190}_{-0.171}$	$-0.160^{+0.250}_{-0.300}$	$1.482^{+0.442}_{-0.362}$	$1.168^{+0.192}_{-0.157}$	$0.506^{+0.520}_{-0.261}$
	+2%/-3%	+5%/-4%	+156%/-188%	+30%/-24%	+16%/-13%	+103%/-52%
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 007418359-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-390 \pm 13$	$4.27^{+3.94}_{-2.83}$	$474^{+33}_{-31}$	$5573^{+4808}_{-1290}$	$12489^{+99676}_{-9052}$
Alt.	$-164 \pm 10$	$4.25^{+3.86}_{-2.72}$	$473^{+34}_{-31}$	$4582^{+3095}_{-900}$	$5333^{+36189}_{-3834}$

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

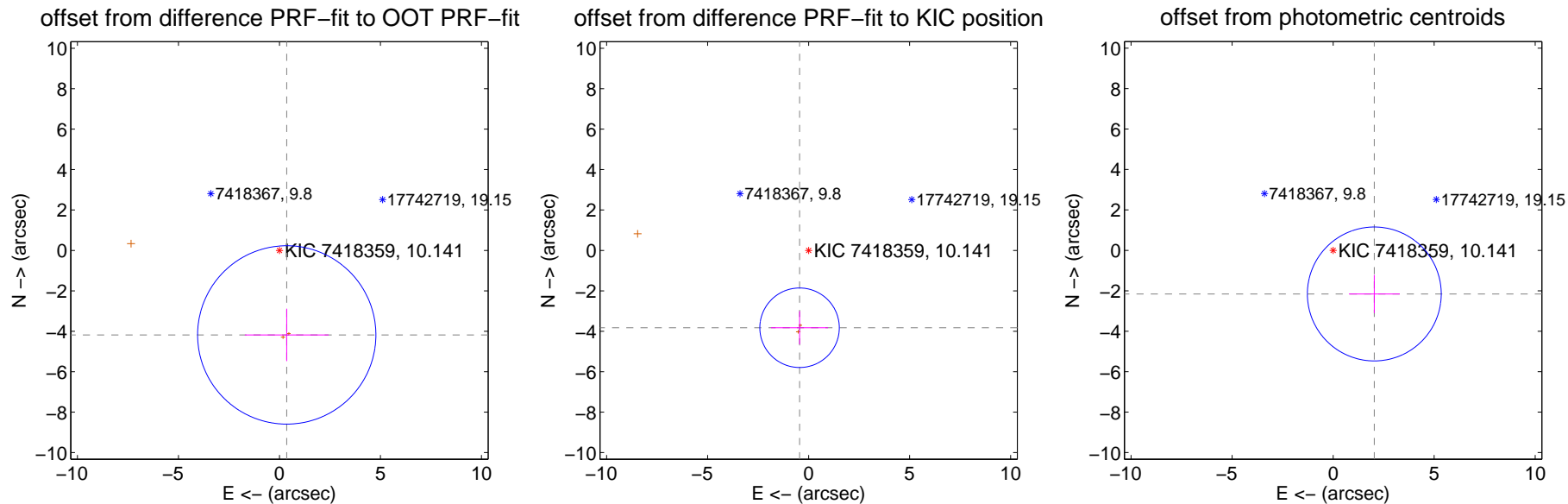
## DV Centroid Data

Supplemental centroid analysis for 007418359-02. **Kepler magnitude: 10.14.** Transit SNR 32.47

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

The direct PRF centroid is offset from the target star catalog position by about 0.74 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$4.195 \pm 1.470$	2.85	$-0.361 \pm 2.073$	$-4.179 \pm 1.297$
PRF-fit source offset from KIC position	<b><math>3.850 \pm 0.655</math></b>	<b>5.87</b>	$0.448 \pm 1.410$	$-3.824 \pm 0.823$
photometric centroid source offset	$2.97 \pm 1.10$	2.69	$-2.04 \pm 1.26$	$-2.16 \pm 0.94$



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

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



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

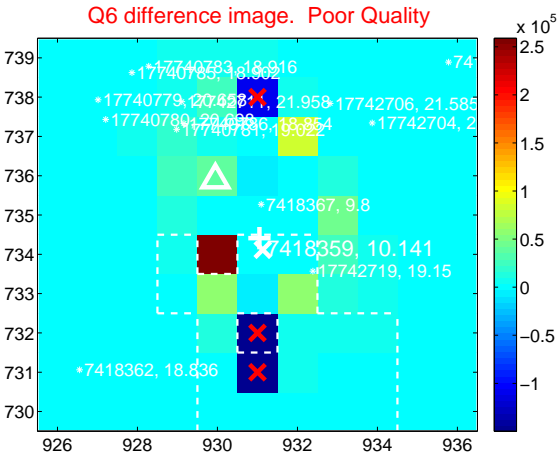
Q5 no difference image



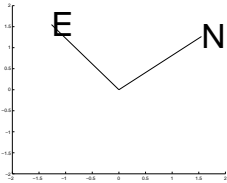
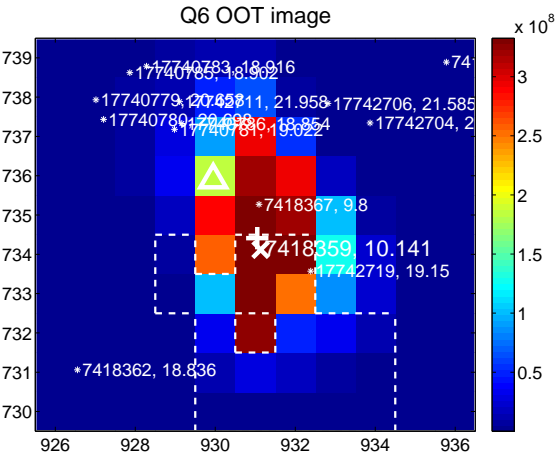
Q5 no OOT image



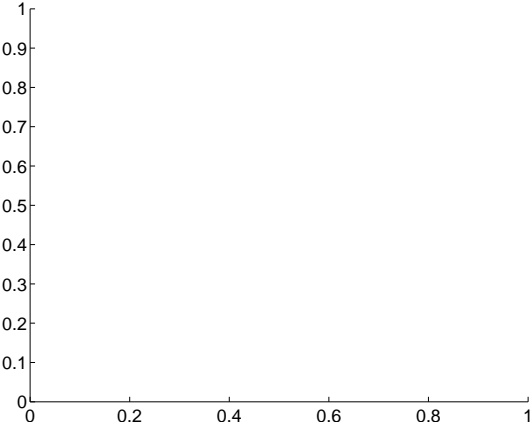
Q6 difference image. Poor Quality



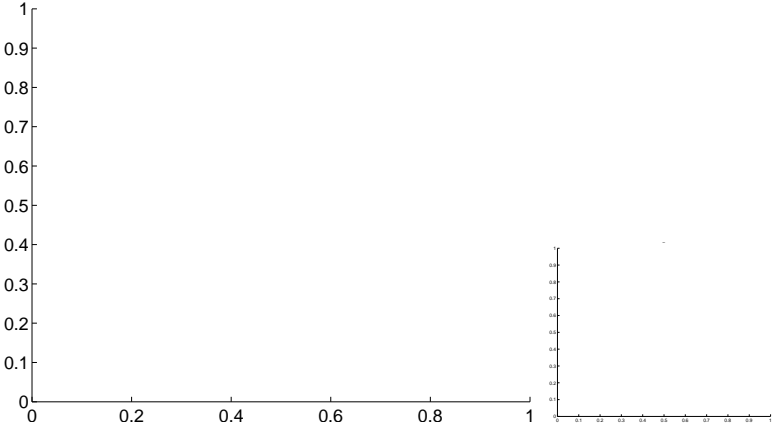
Q6 OOT image



Q7 no difference image



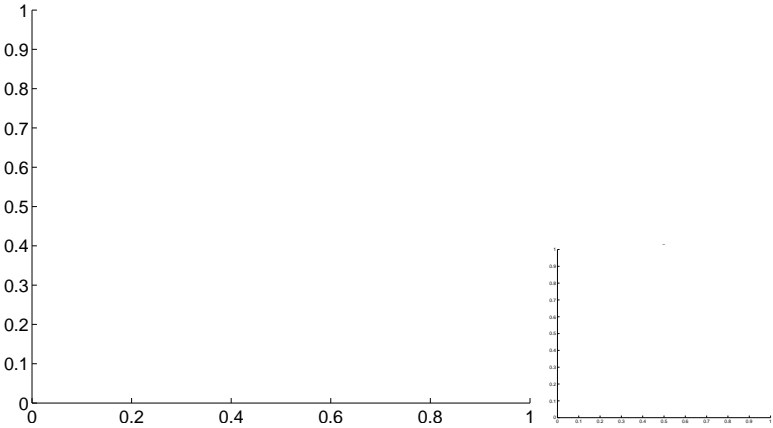
Q7 no OOT image



Q8 no difference image

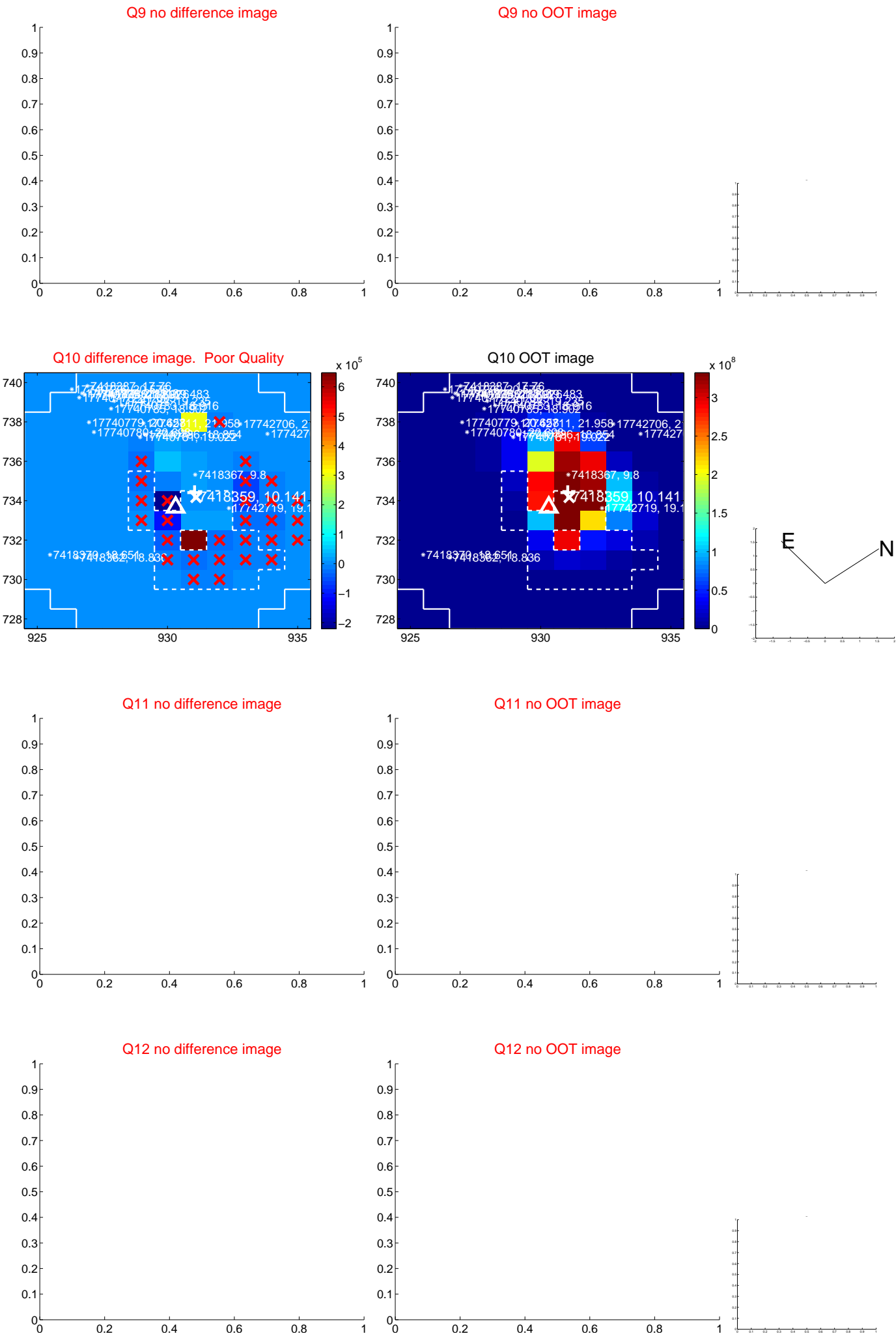


Q8 no OOT image

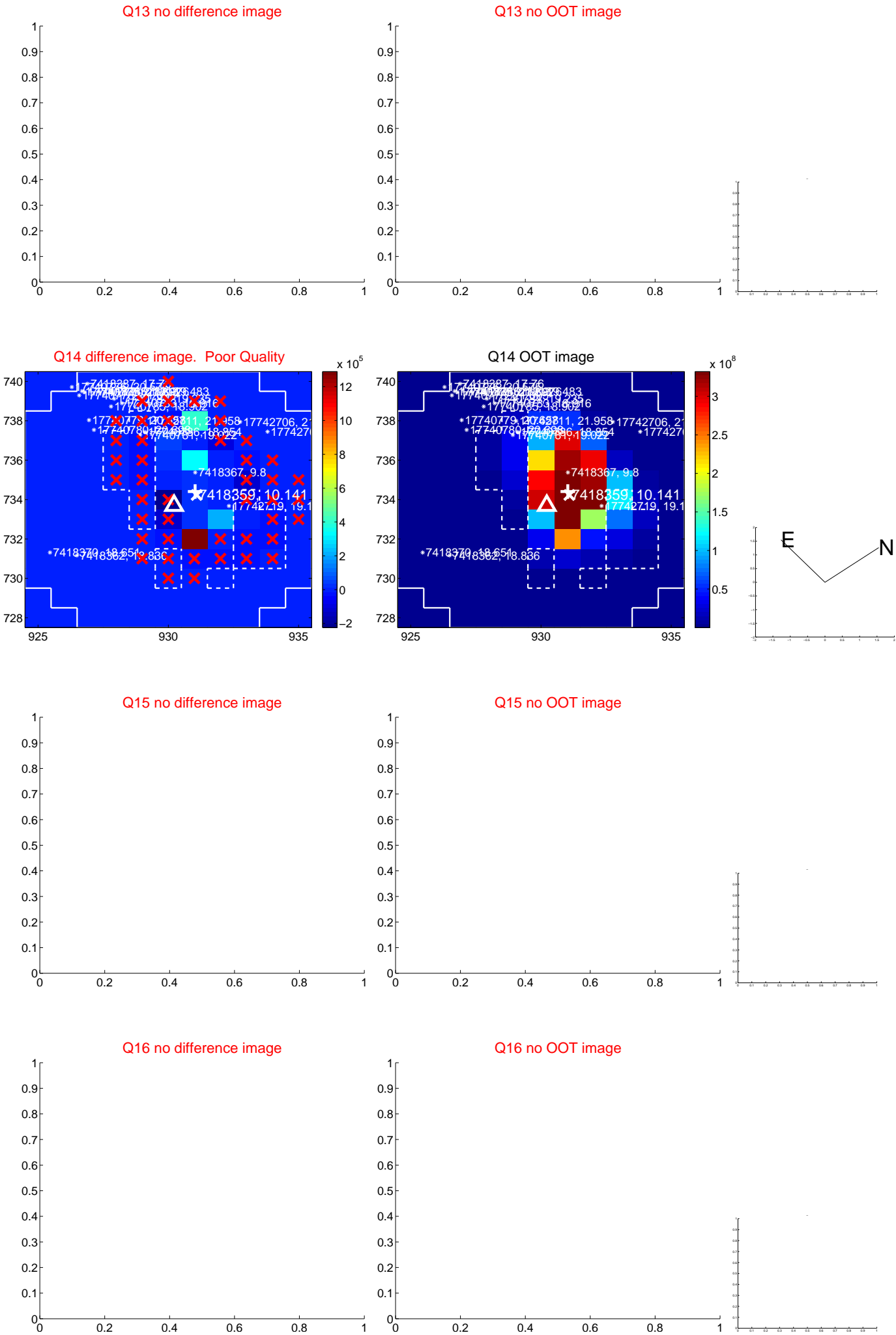




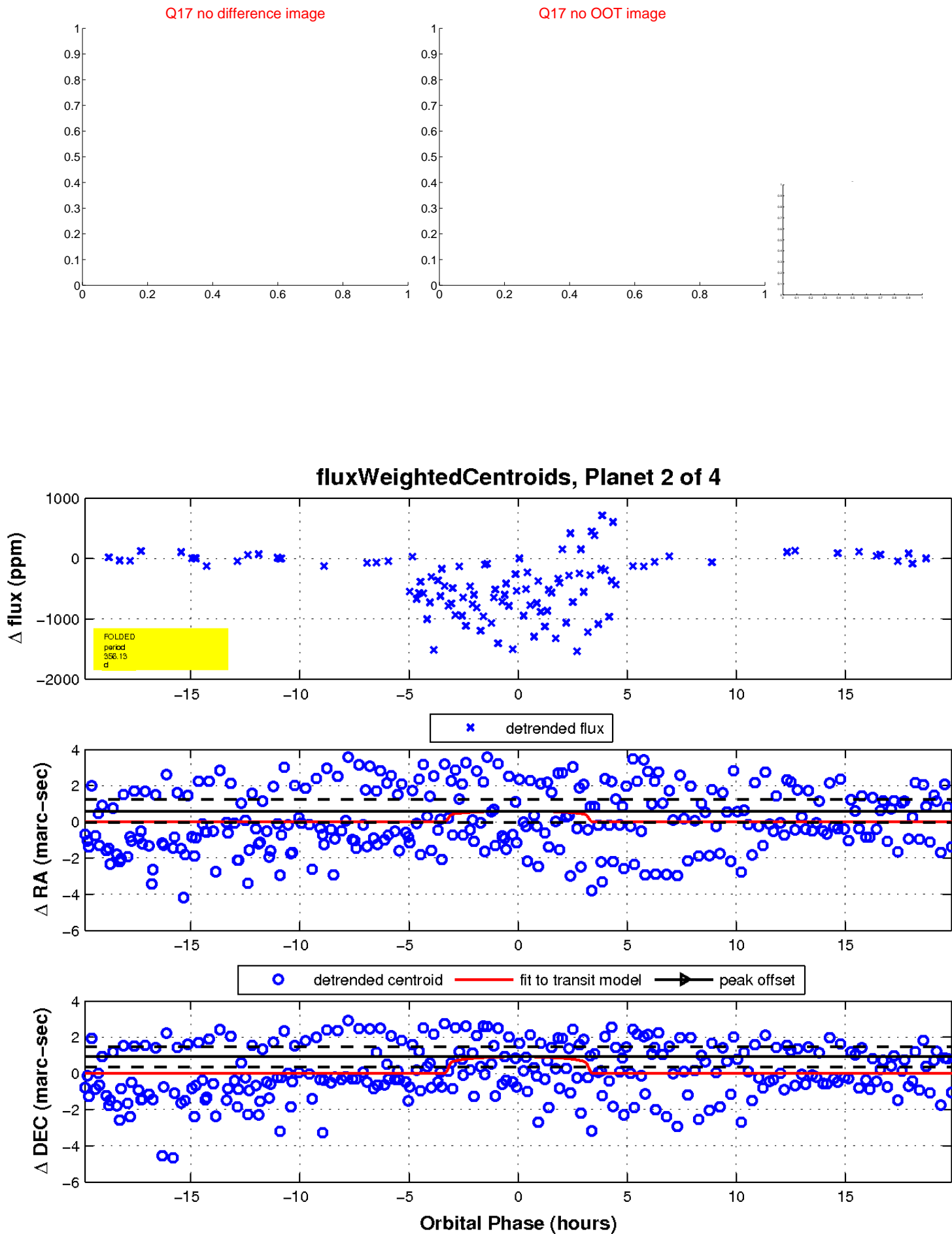
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



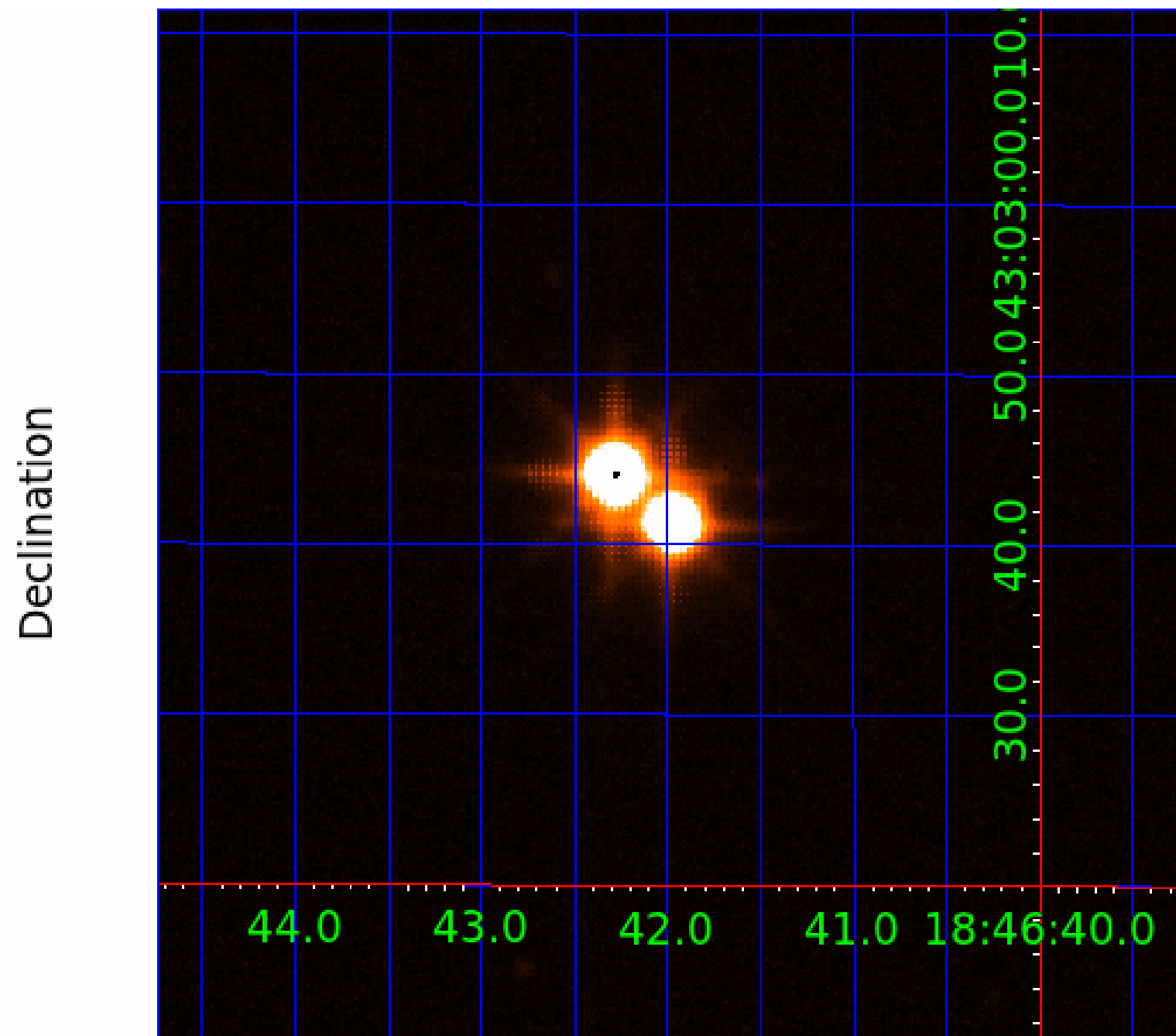
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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



UKIRT Image



# KIC 007418359

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007418359-02	OBS	No	356.129865	255.122001	464.5	6.663	50.2	32.5	1.48	6441	3.34	3.16
007418359-03	OBS	No	368.127609	194.421511	386.9	3.851	38.7	32.6	1.48	6441	3.11	3.02

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007418359-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_SATURATED
007418359-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—CENT_SATURATED

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

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

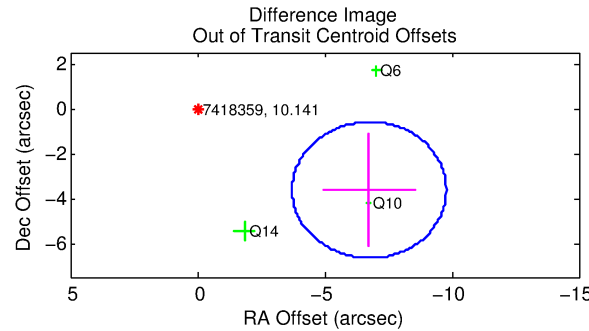
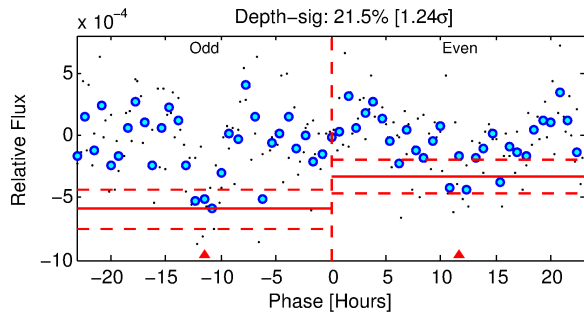
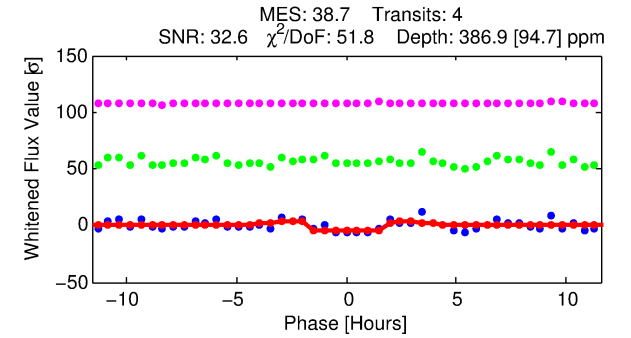
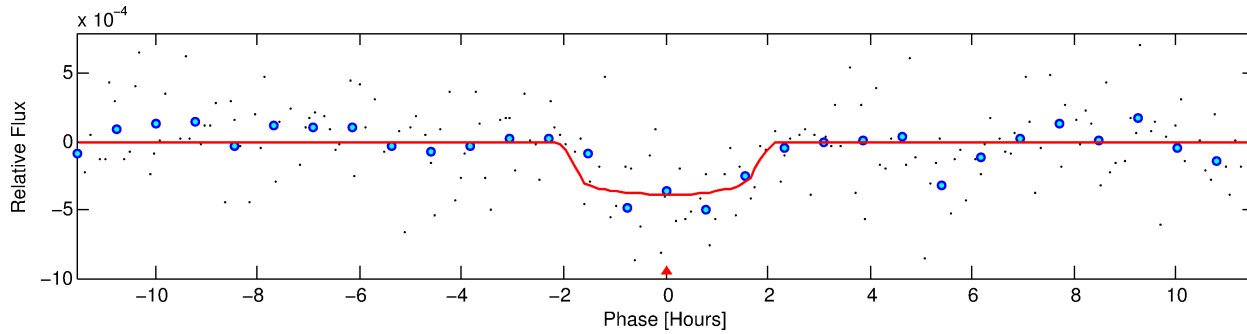
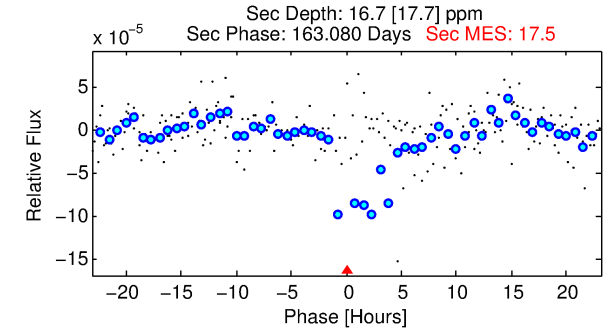
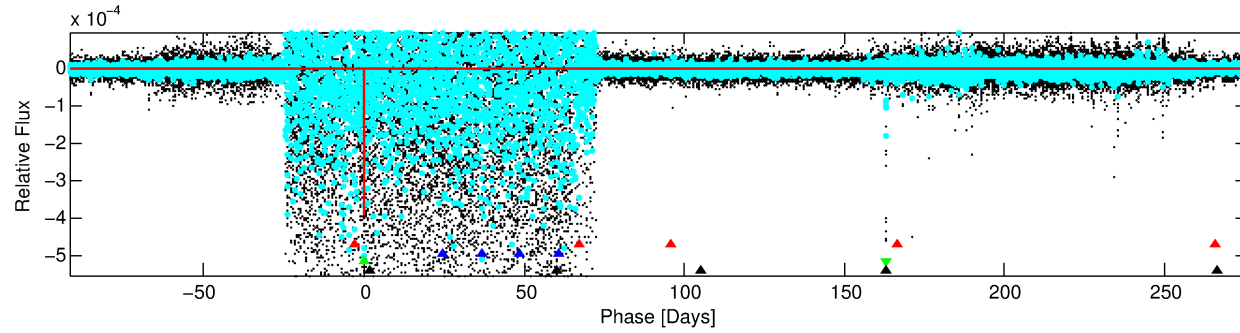
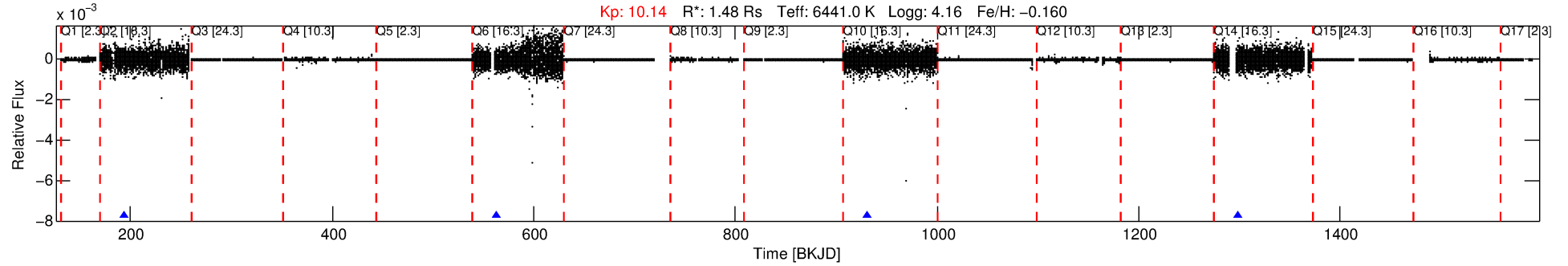
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 007418359-03

No Significant Match Found

# DV One-Page Summary

KIC: 7418359 Candidate: 3 of 4 Period: 368.128 d



## DV Fit Results:

Period = 368.12761 [0.00612] d  
Epoch = 194.4215 [0.0100] BKJD  
 $R_p/R^* = 0.0193$  [0.0334]  
 $a/R^* = 546.76$  [5072.97]  
 $b = 0.69$  [7.04]  
 $S_{\text{eff}} = 3.02$  [1.11]  
 $T_{\text{eq}} = 336$  [31] K  
 $R_p = 3.11$  [5.48]  $R_e$   
 $a = 1.0591$  [0.2611] AU  
 $A_g = 1060.28$  [3867.05] [0.27 $\sigma$ ]  
 $T_{\text{eff}} = 2966$  [2692] K [0.98 $\sigma$ ]

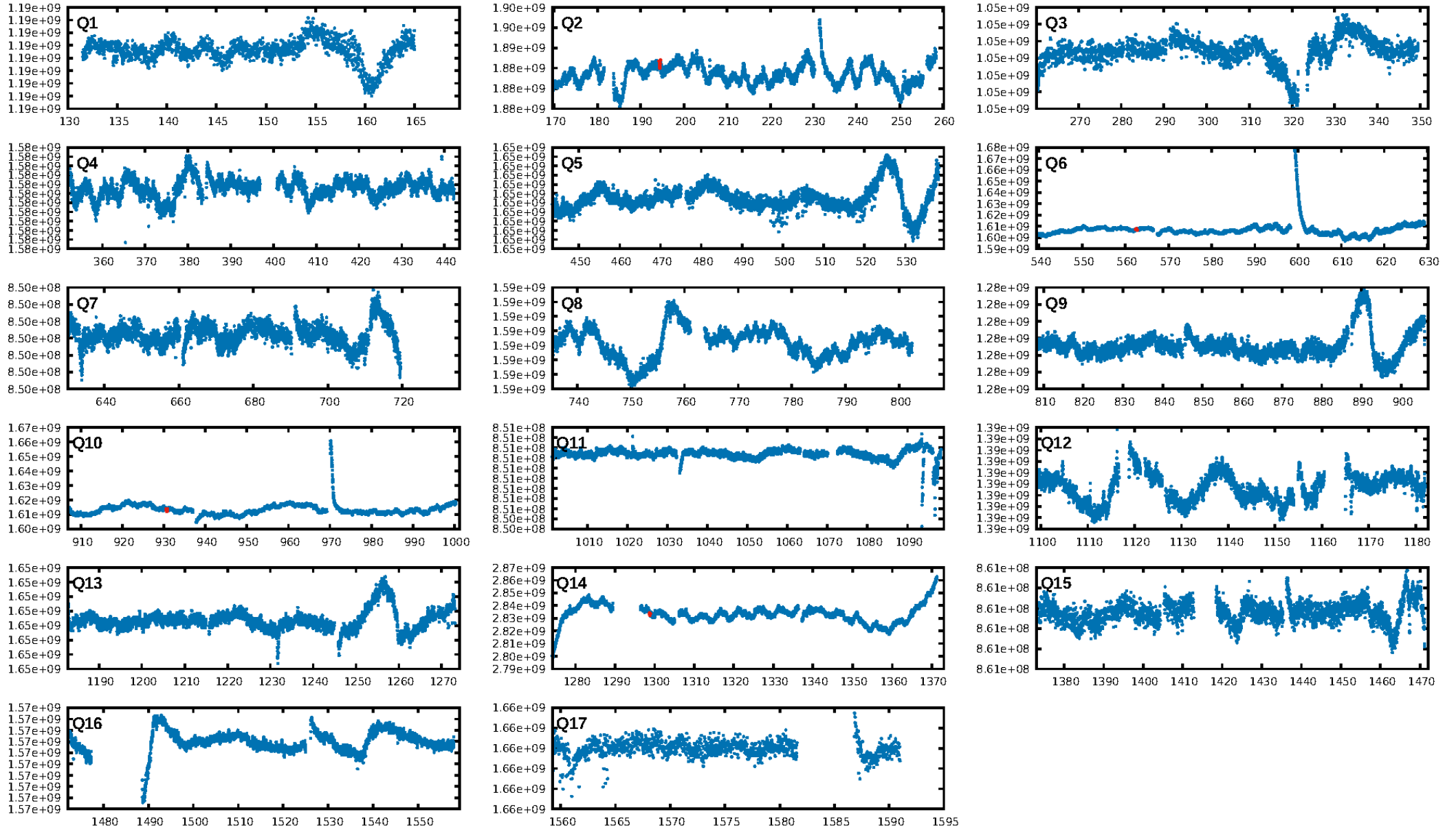
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [37.42 $\sigma$ ]  
LongPeriod-sig: N/A  
**ModelChiSquare2-sig: 0.0%**  
**ModelChiSquareGof-sig: 0.0%**  
**Bootstrap-pfa: 1.46e-04**  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: N/A  
Centroid-sig: 5.6%  
Centroid-so: 1.466 arcsec [1.22 $\sigma$ ]  
**OotOffset-rm: 7.665 arcsec [7.59 $\sigma$ ]**  
**KicOffset-rm: 7.189 arcsec [9.74 $\sigma$ ]**  
OotOffset-st: 3/0/0/0 [3]  
KicOffset-st: 3/0/0/0 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
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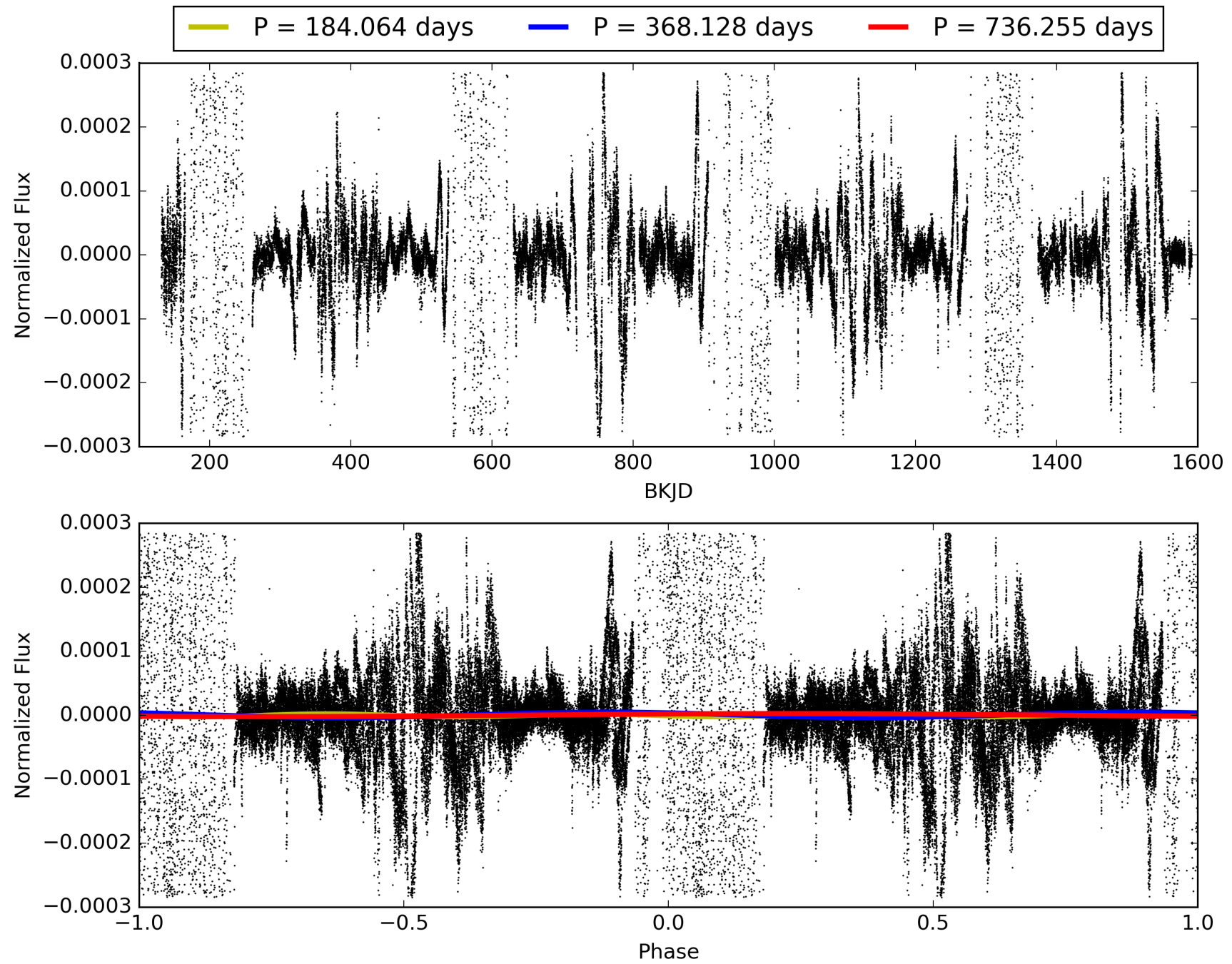
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 07:29:44 Z

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

# TCE 007418359-03, PDC Light Curves



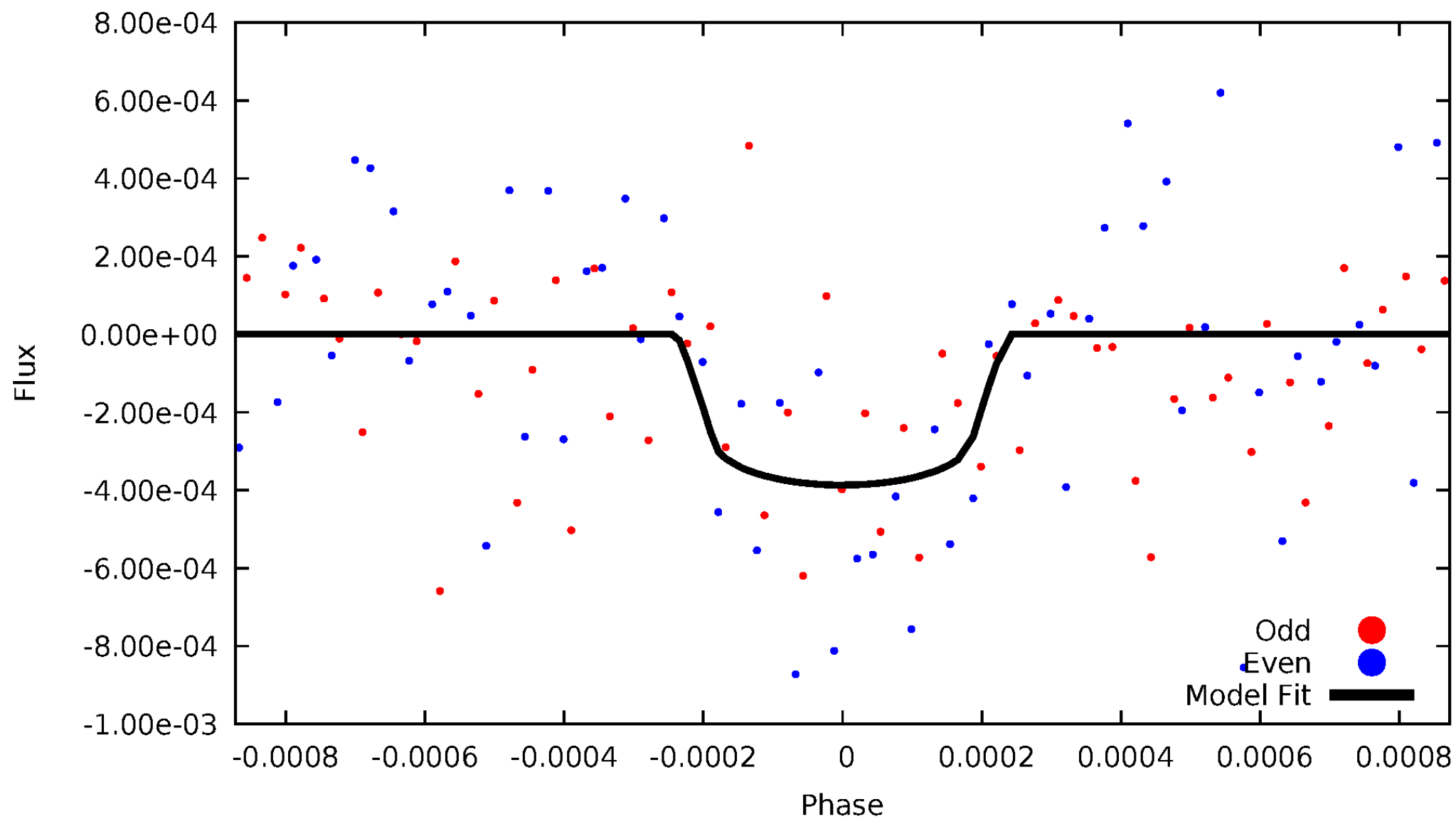
TCE 007418359-03





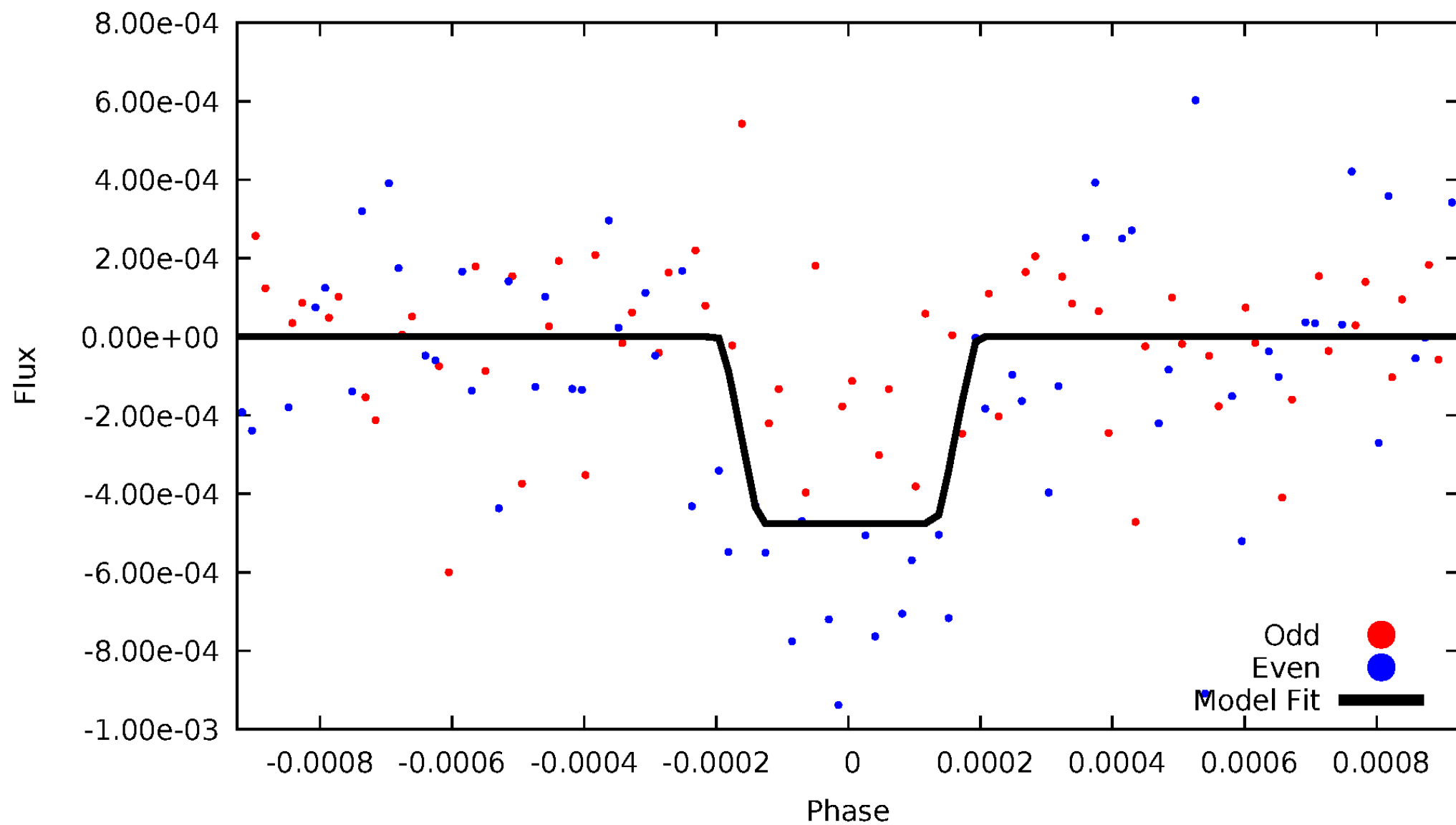
# DV Odd/Even

TCE 007418359-03



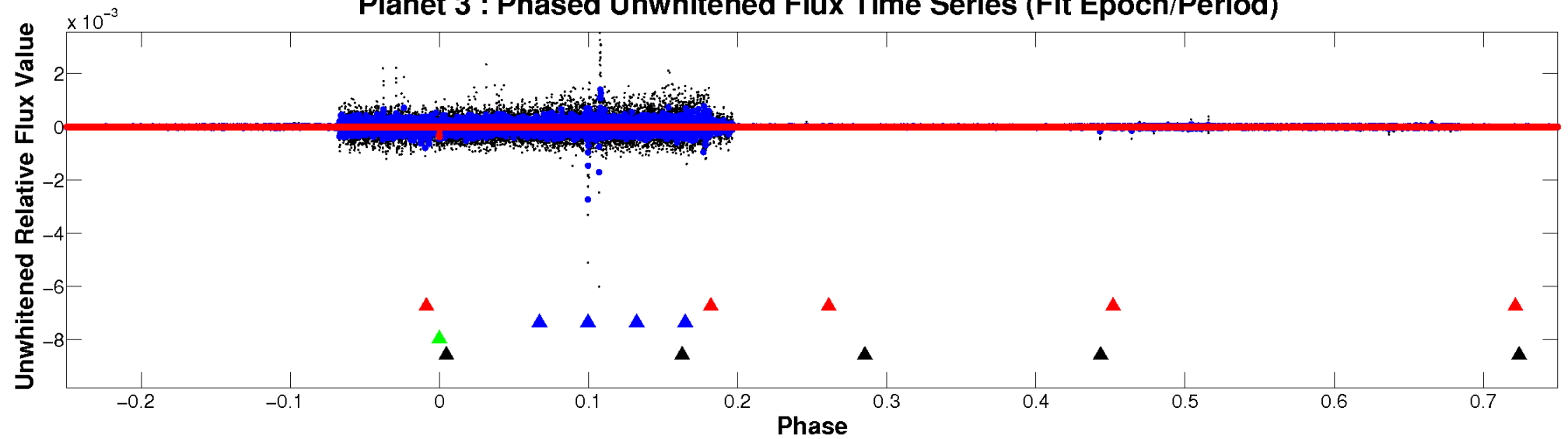
# ALT Odd/Even

TCE 007418359-03

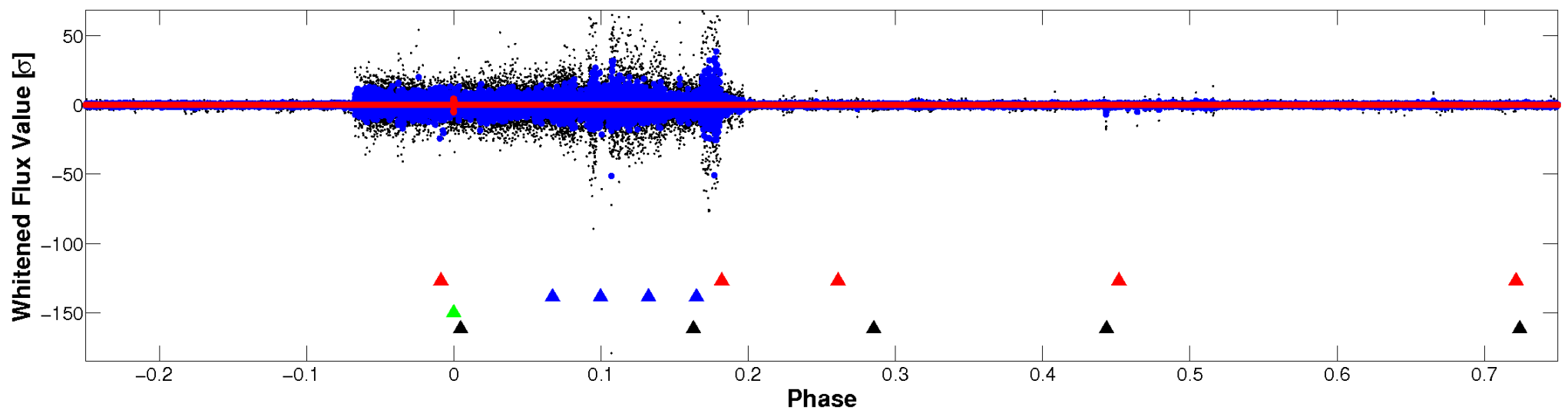


# Non-Whitened Vs. Whitened Light Curve

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

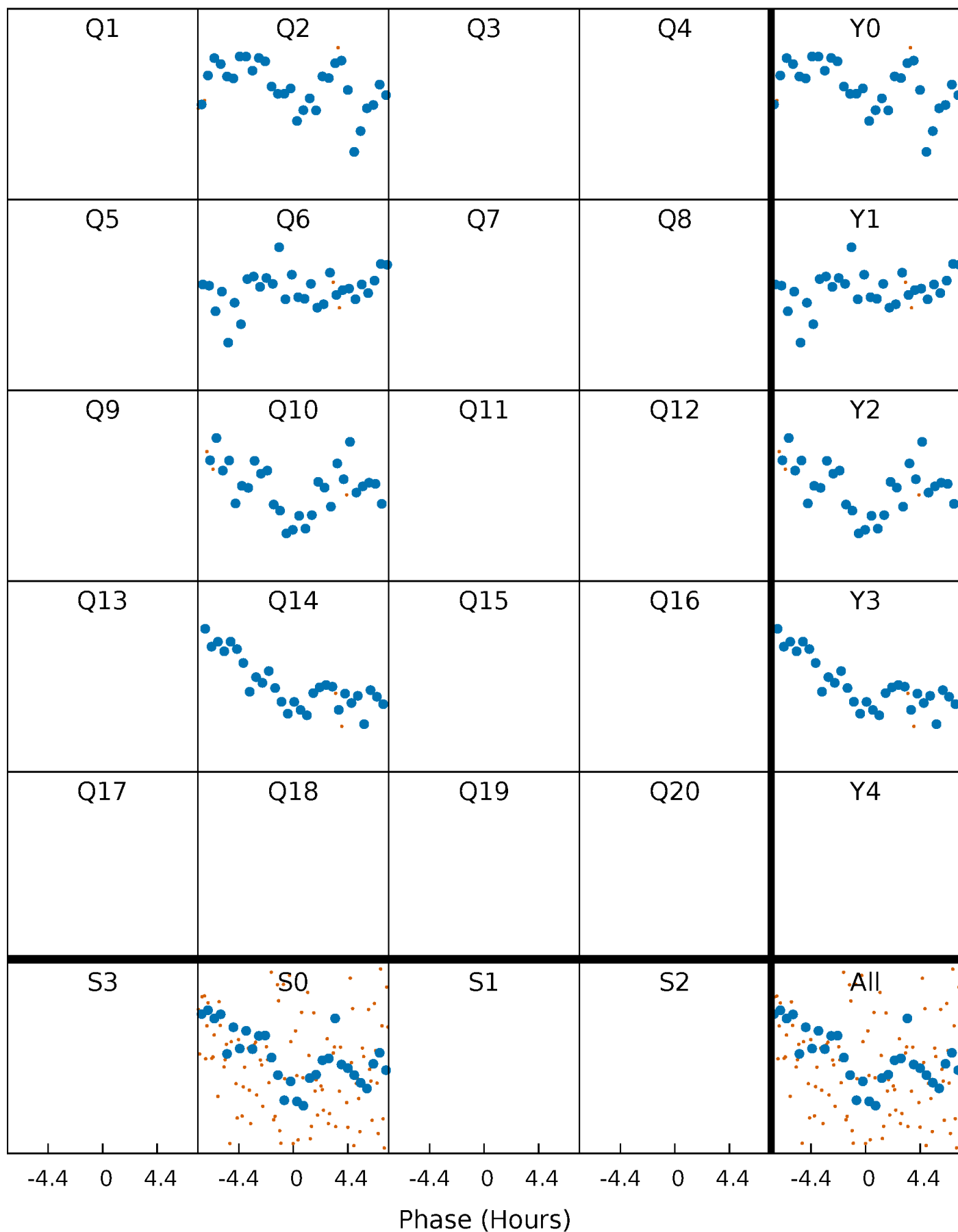


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



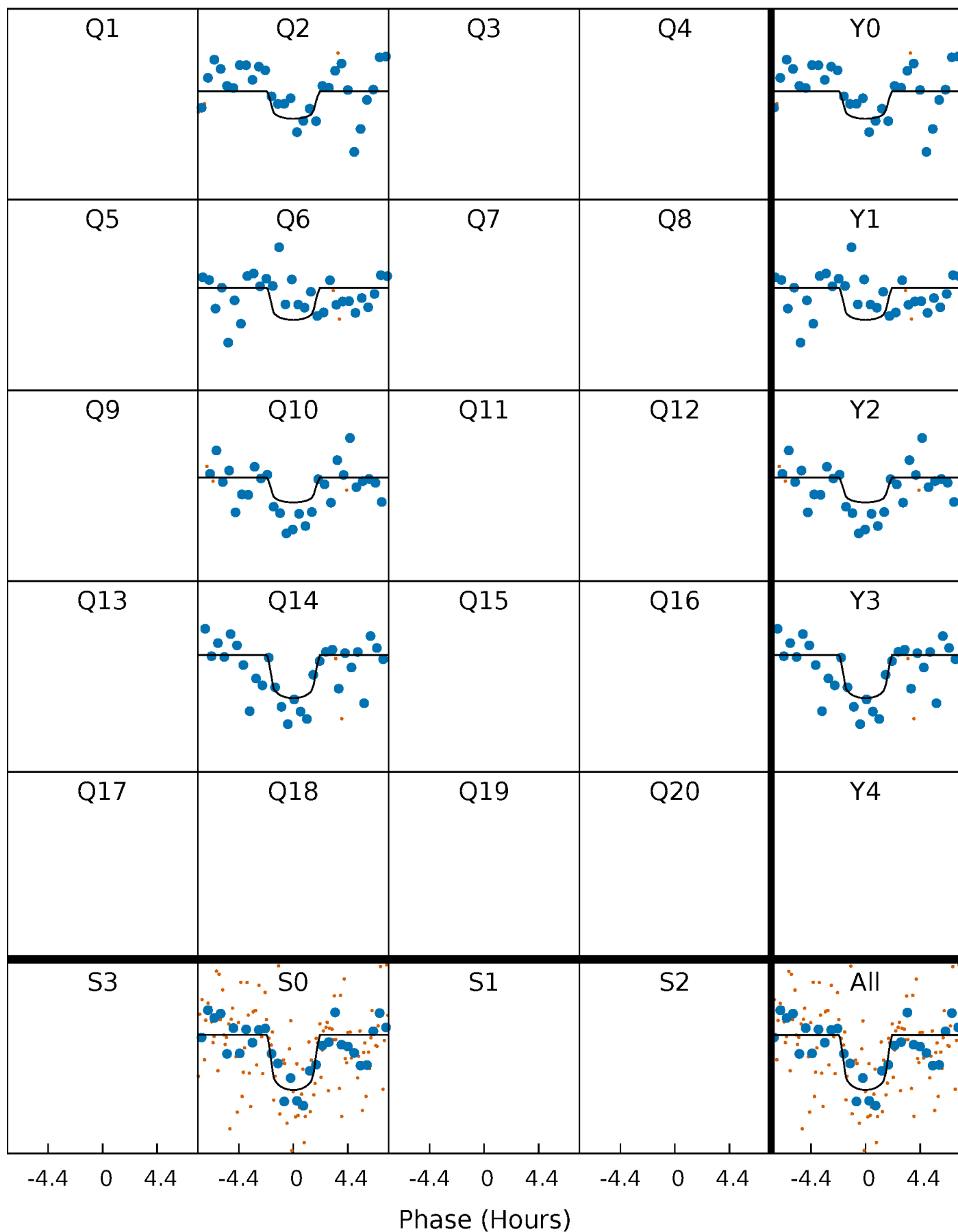
# PDC Quarter-Phased Transit Curves

TCE 007418359-03 P=368.127610 Days  $T_0=194.421511$  (BKJD)



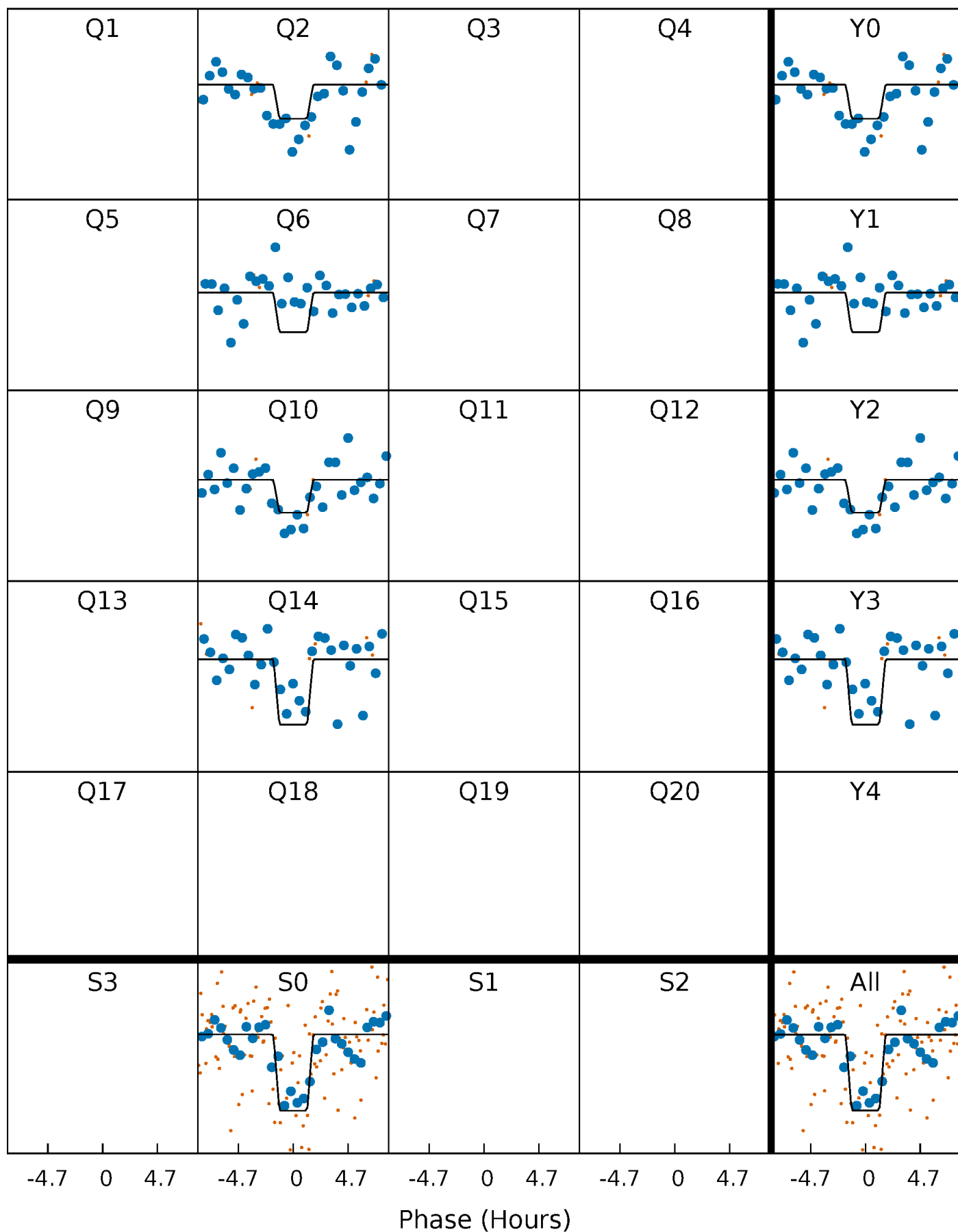
# DV Quarter-Phased Transit Curves

TCE 007418359-03     $P=368.127610$  Days     $T_0=194.421511$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

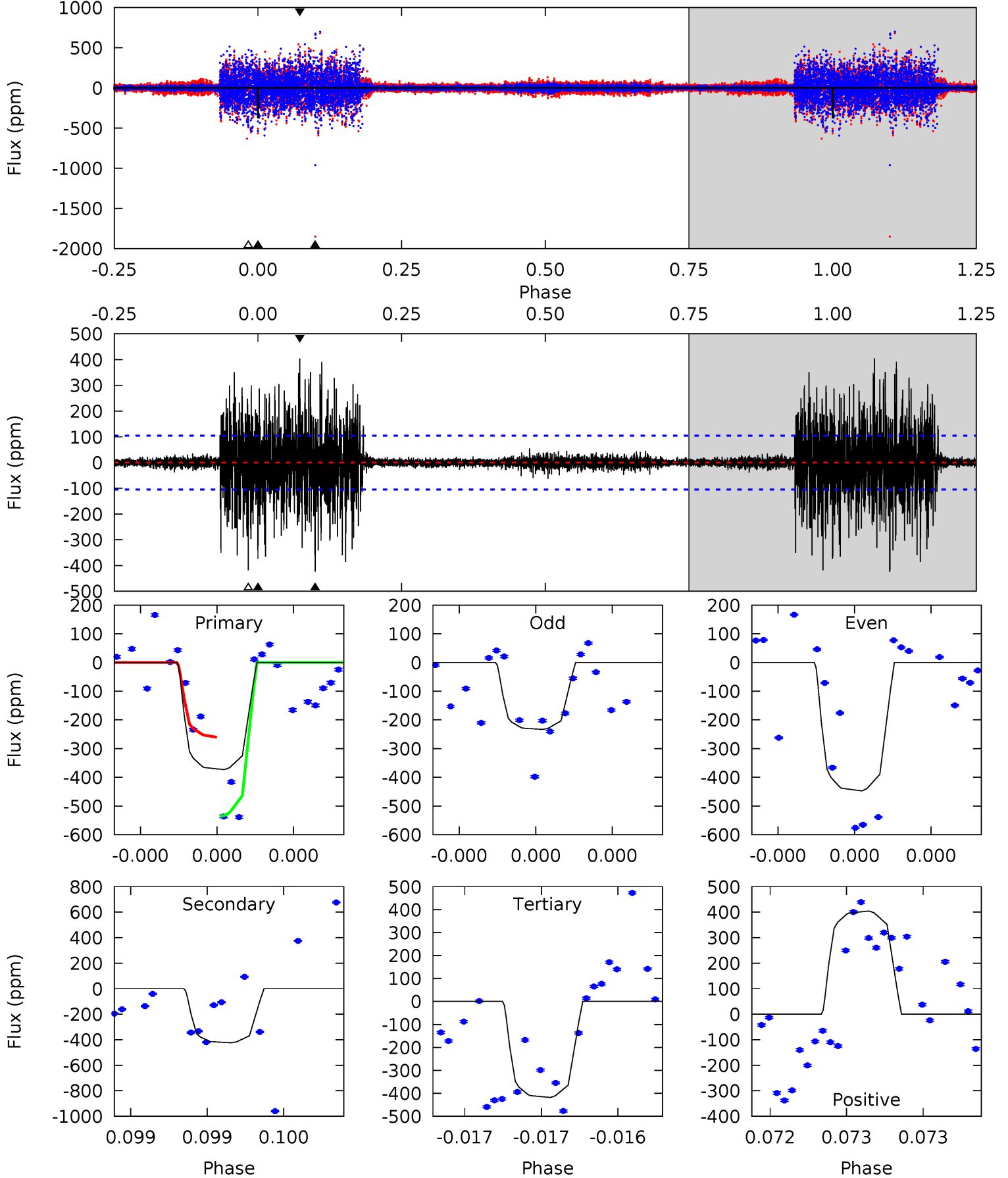
TCE 007418359-03 P=368.124206 Days  $T_0=194.434744$  (BKJD)



# DV Model-Shift Uniqueness Test

007418359-03, P = 368.127610 Days, E = 194.421511 Days

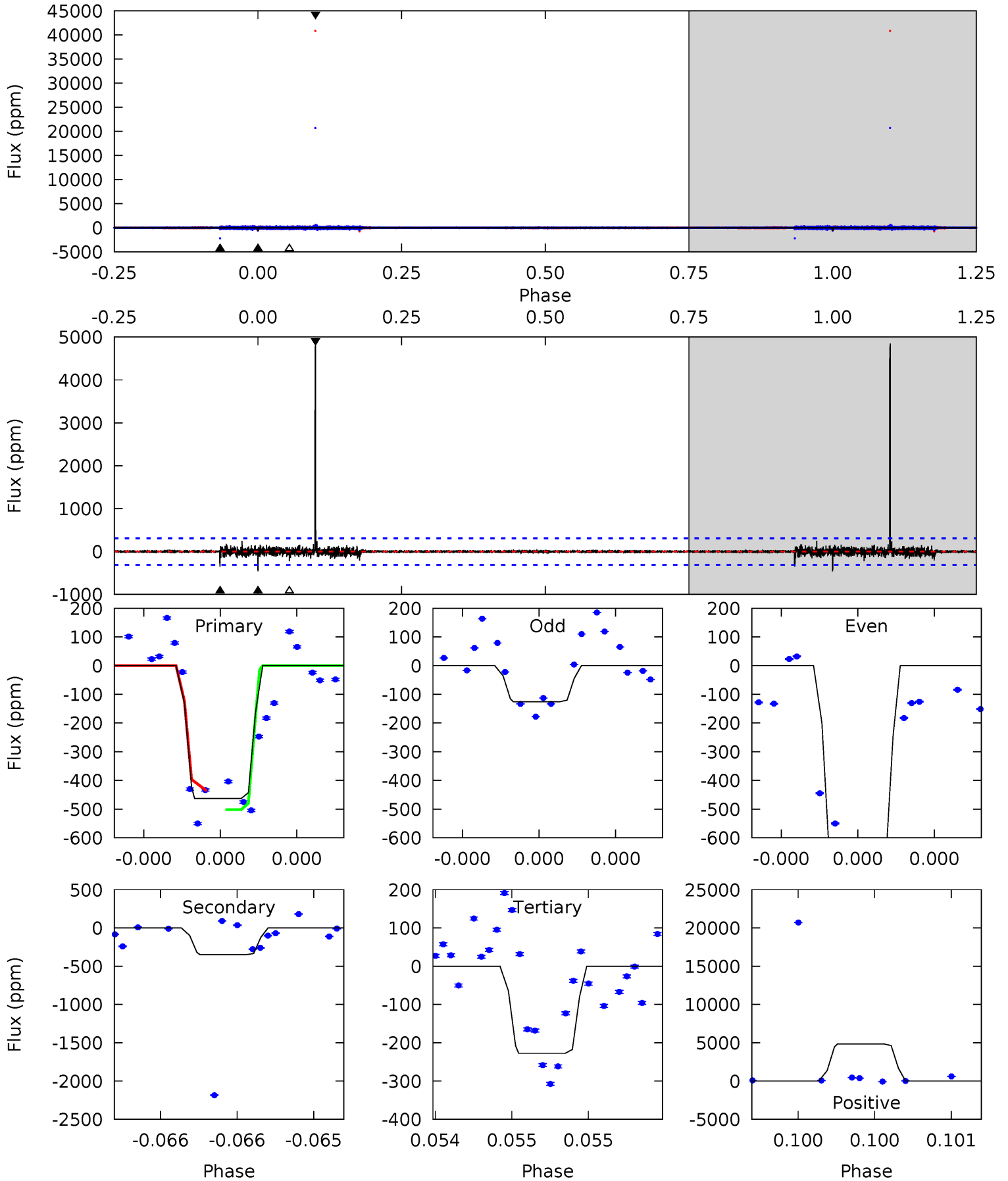
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
19.9	22.6	22.3	21.6	5.59	3.50	2.22	-2.39	-1.67	0.30	1.03	4.68	0.97	0.49	7.55



# Alt Model-Shift Uniqueness Test

007418359-03, P = 368.124206 Days, E = 194.434744 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
8.42	6.34	4.14	88.2	5.62	3.56	1.19	4.28	-79.8	2.21	-81.8	3.34	0.89	0.91	0





### Stellar Parameters For KIC 007418359

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6441^{+146}_{-162}$	$4.164^{+0.190}_{-0.171}$	$-0.160^{+0.250}_{-0.300}$	$1.482^{+0.442}_{-0.362}$	$1.168^{+0.192}_{-0.157}$	$0.506^{+0.520}_{-0.261}$
	+2%/-3%	+5%/-4%	+156%/-188%	+30%/-24%	+16%/-13%	+103%/-52%
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 007418359-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-424 \pm 19$	$4.89^{+4.64}_{-3.31}$	$469^{+36}_{-32}$	$5345^{+5127}_{-1222}$	$10902^{+96602}_{-7963}$
Alt.	$-349 \pm 55$	$5.42^{+4.18}_{-3.66}$	$467^{+36}_{-32}$	$4853^{+3696}_{-909}$	$7425^{+59087}_{-5093}$

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

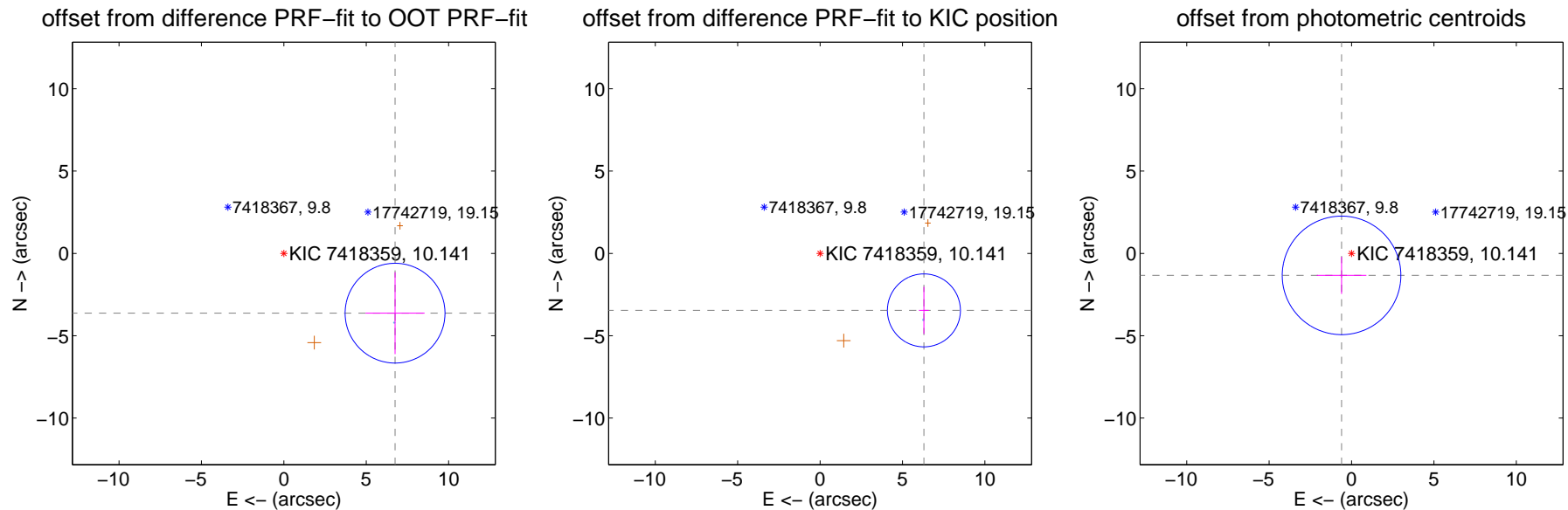
## DV Centroid Data

Supplemental centroid analysis for 007418359-03. **Kepler magnitude: 10.14.** Transit SNR 32.64

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

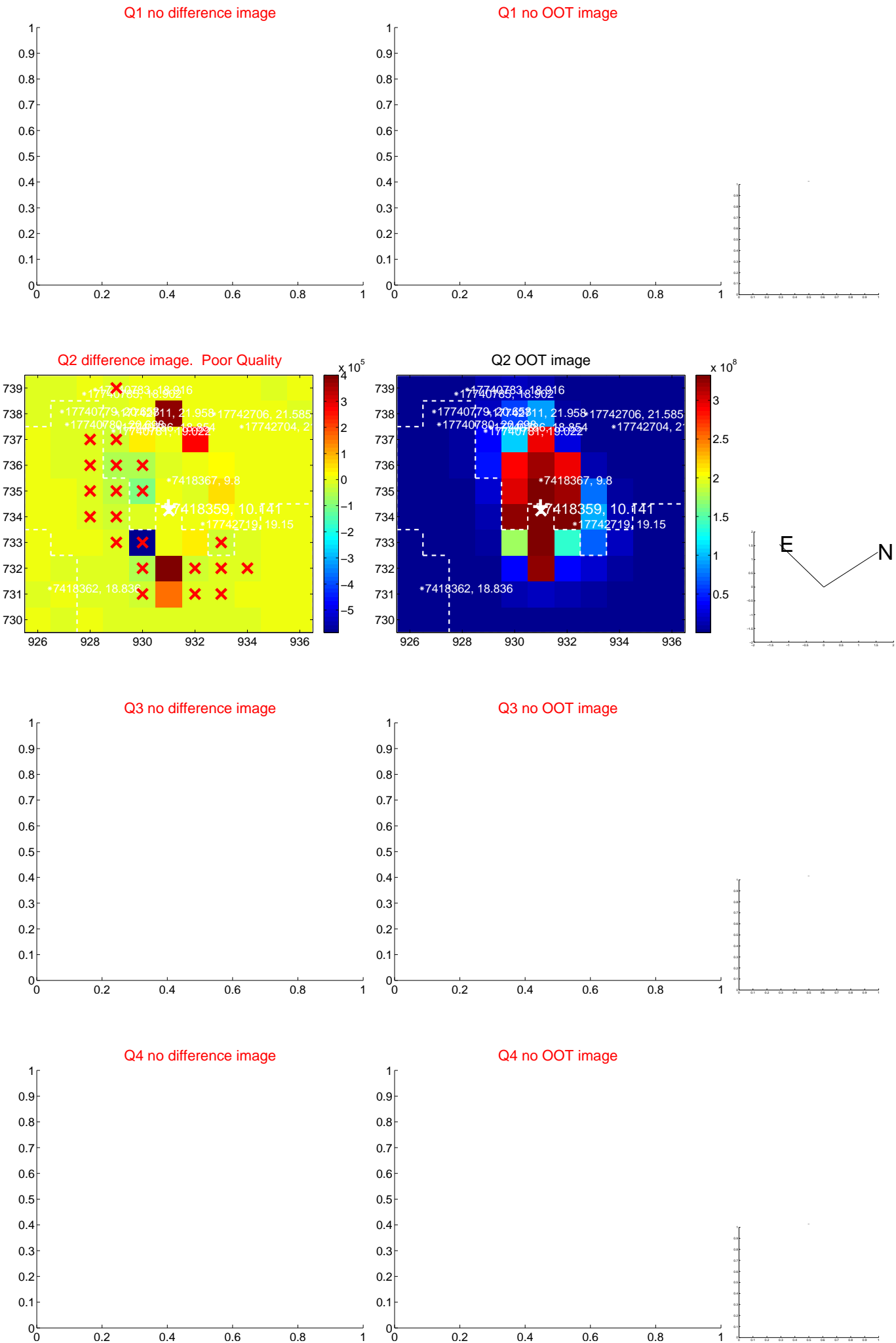
The direct PRF centroid is offset from the target star catalog position by about 0.43 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>7.665 \pm 1.010</math></b>	<b>7.59</b>	$-6.751 \pm 1.792$	$-3.631 \pm 2.487$
PRF-fit source offset from KIC position	<b><math>7.189 \pm 0.738</math></b>	<b>9.74</b>	$-6.302 \pm 0.301$	$-3.461 \pm 1.433$
photometric centroid source offset	$1.47 \pm 1.20$	1.22	$0.61 \pm 1.51$	$-1.33 \pm 1.13$

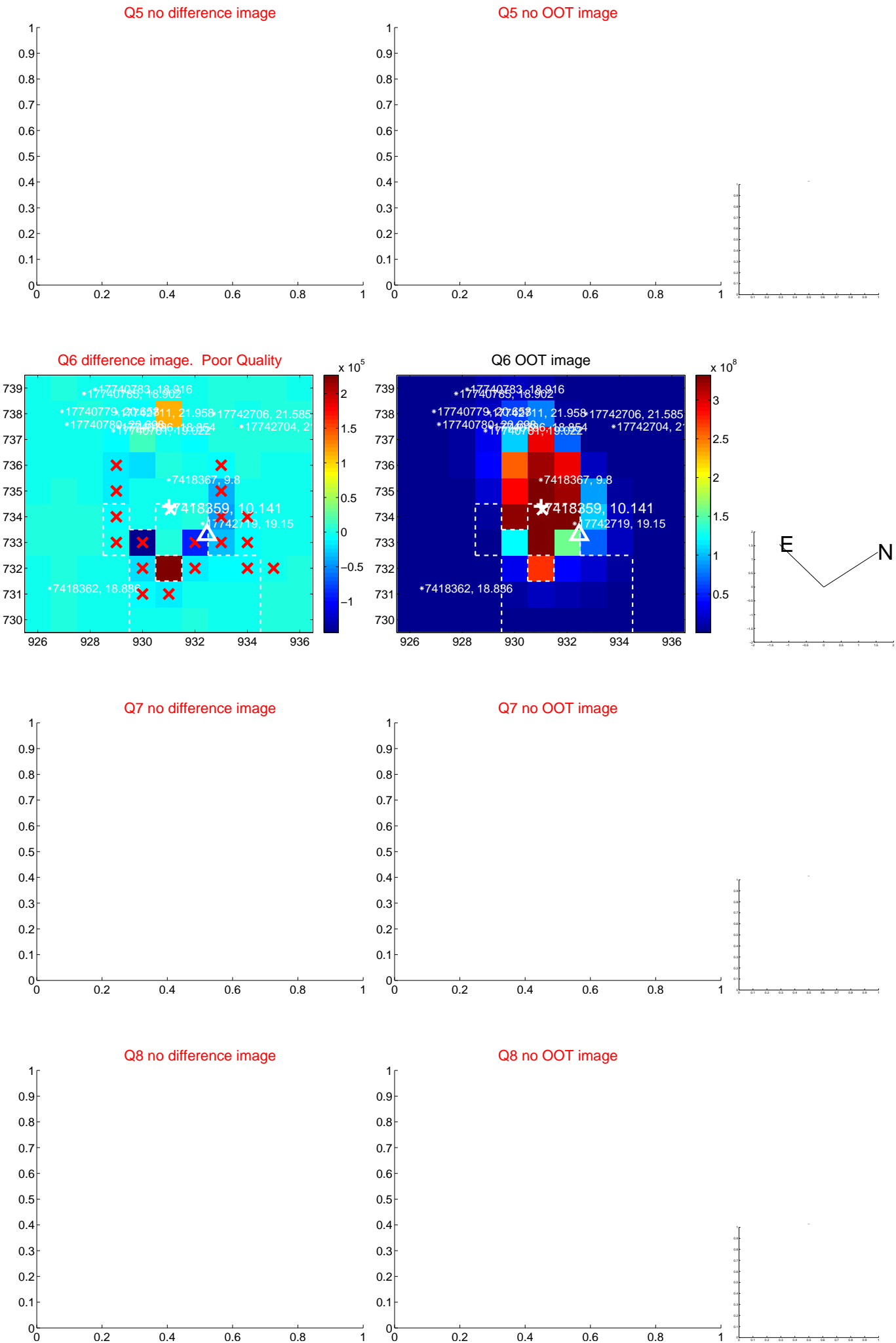


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

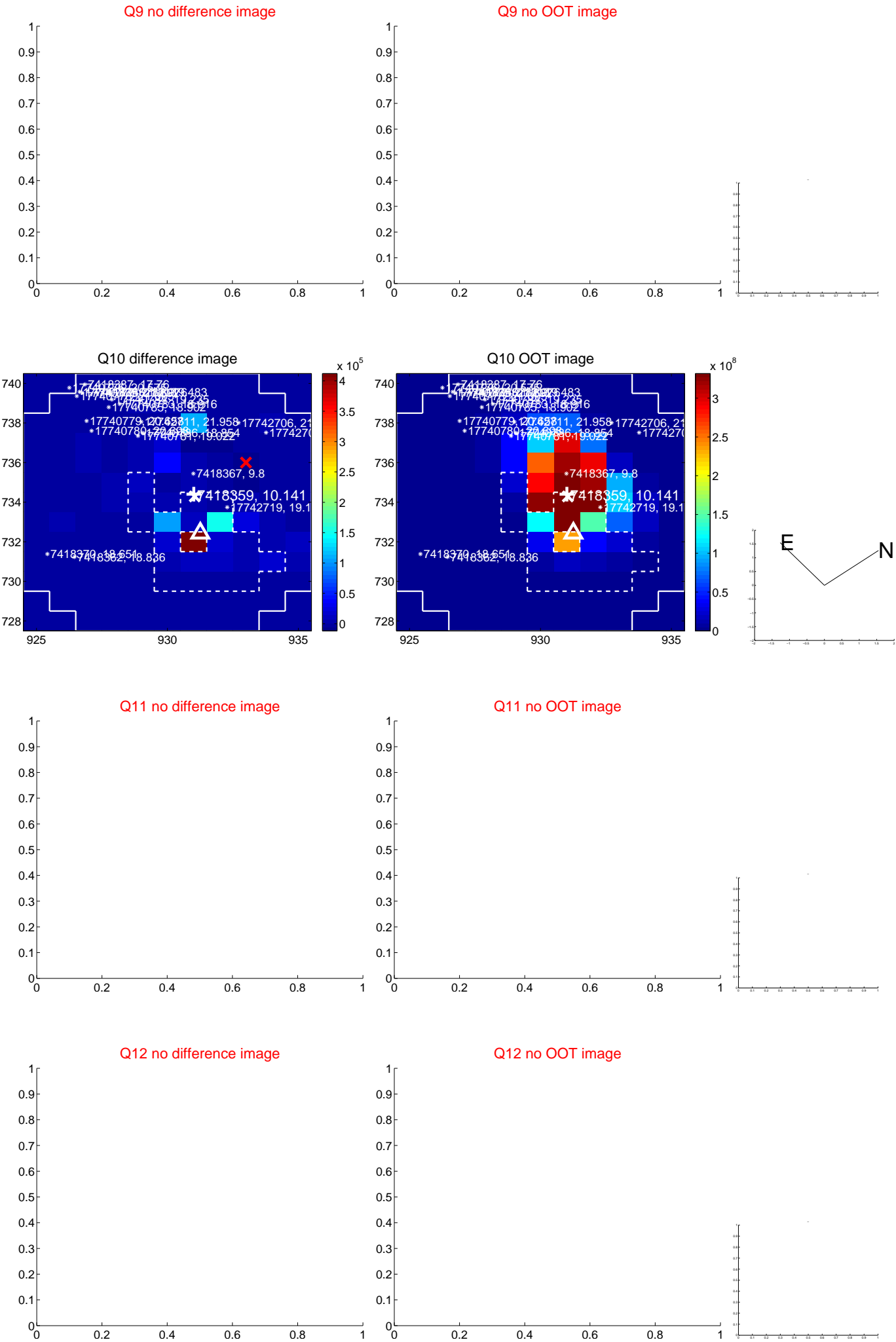
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



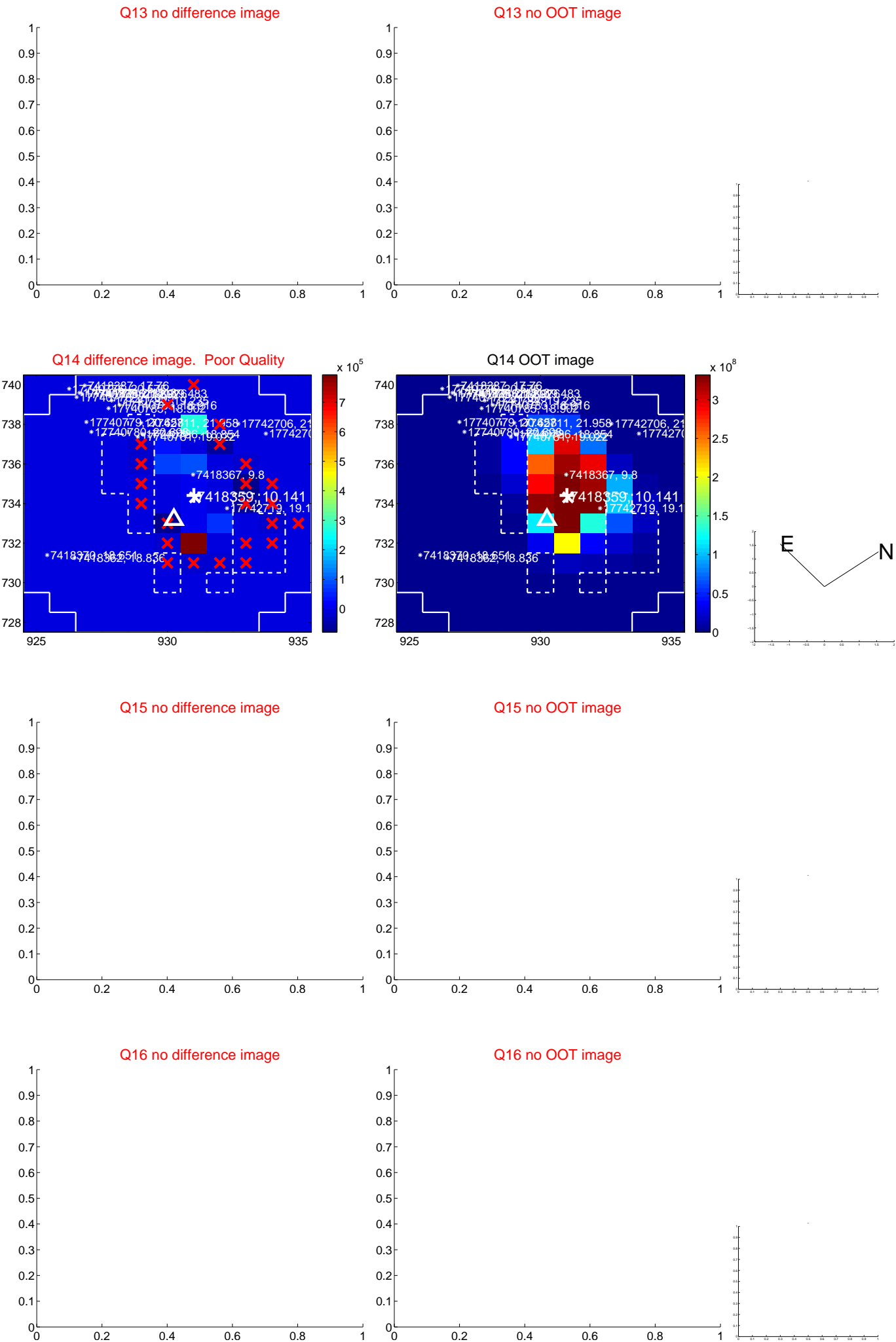
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



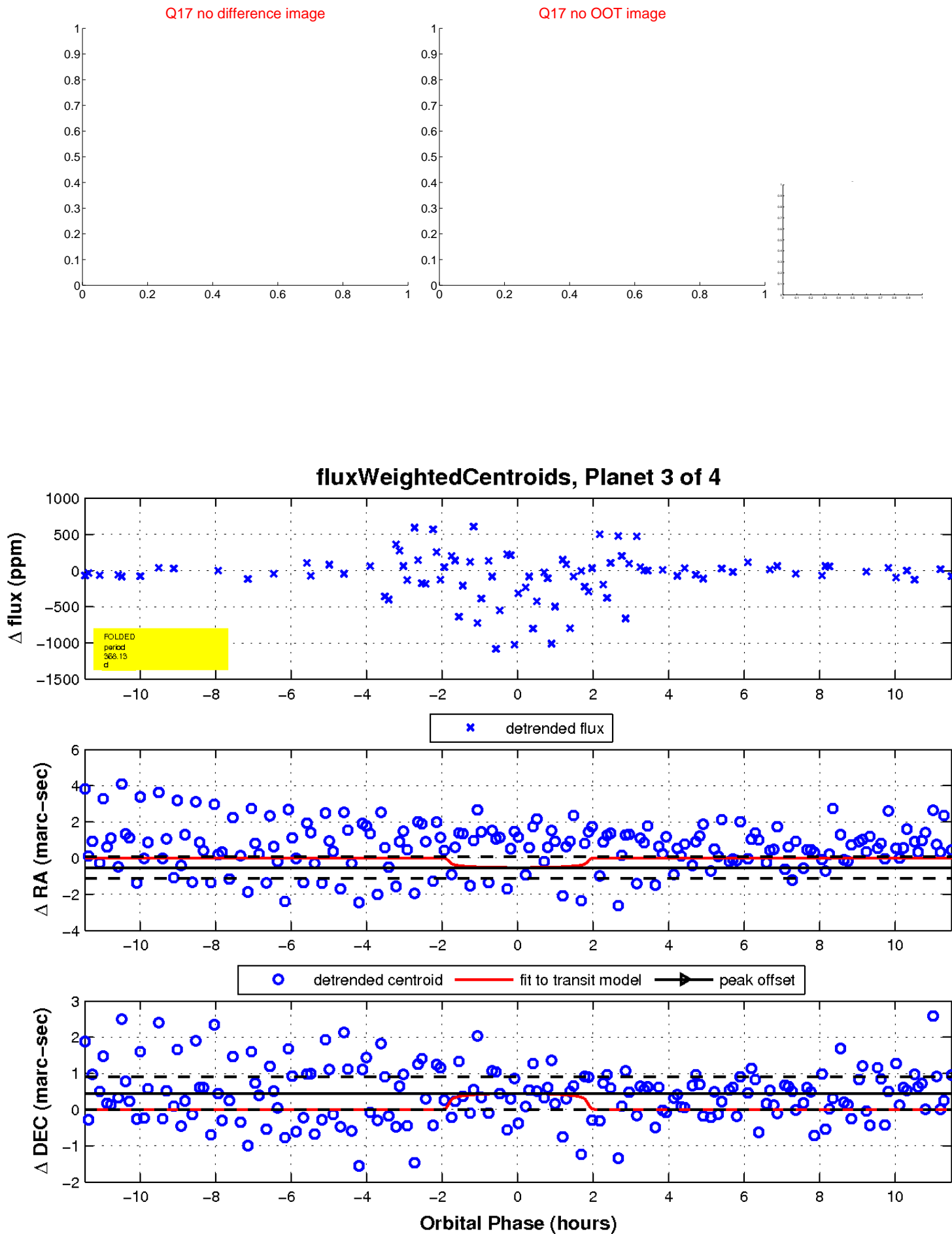
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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

