

# KIC 007373687

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007373687-01	OBS	No	497.359915	365.743329	20464.8	52.254	37.6	48.1	0.80	5606	20.20	0.42
007373687-02	OBS	No	355.013583	471.458032	10353.4	52.452	21.5	26.6	0.80	5606	9.69	0.66

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007373687-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007373687-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_ZUMA—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

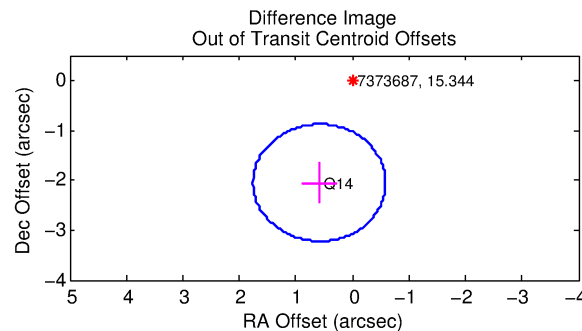
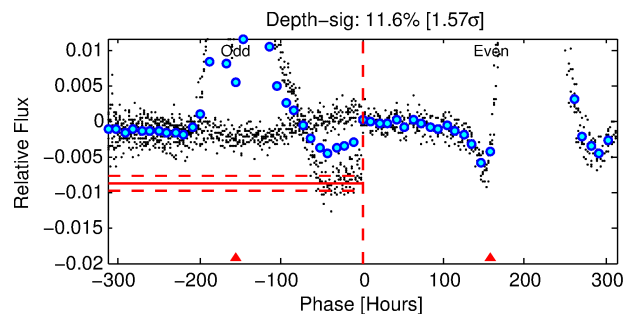
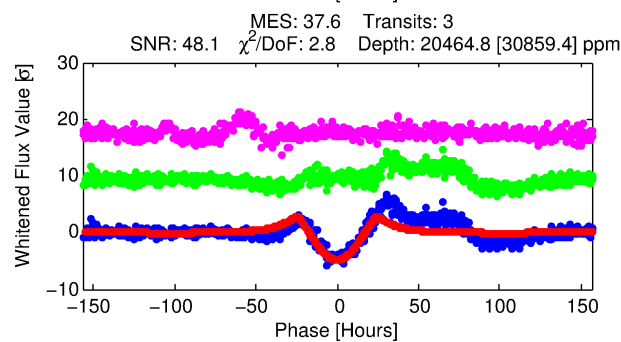
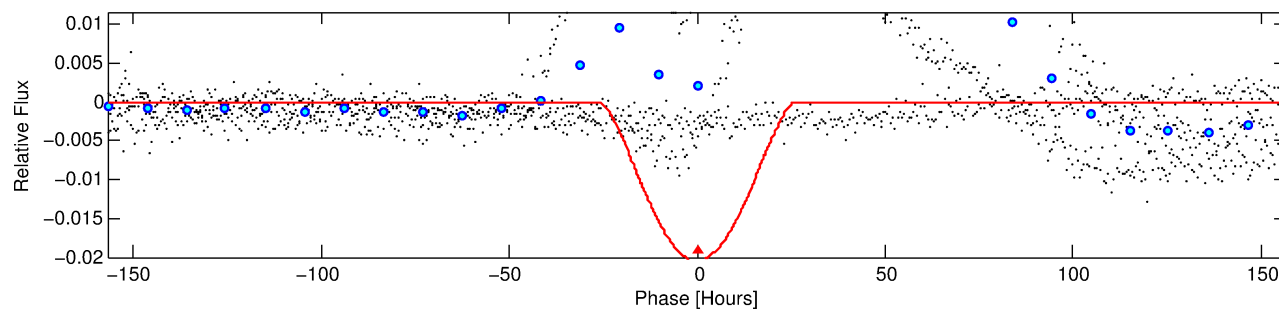
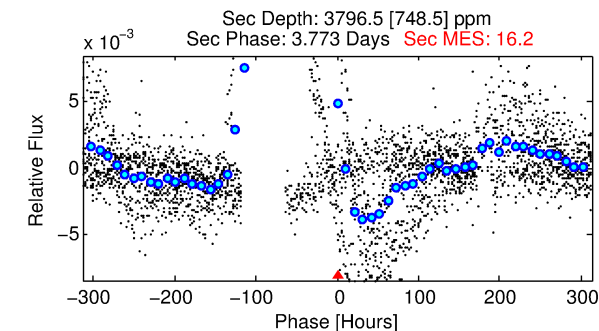
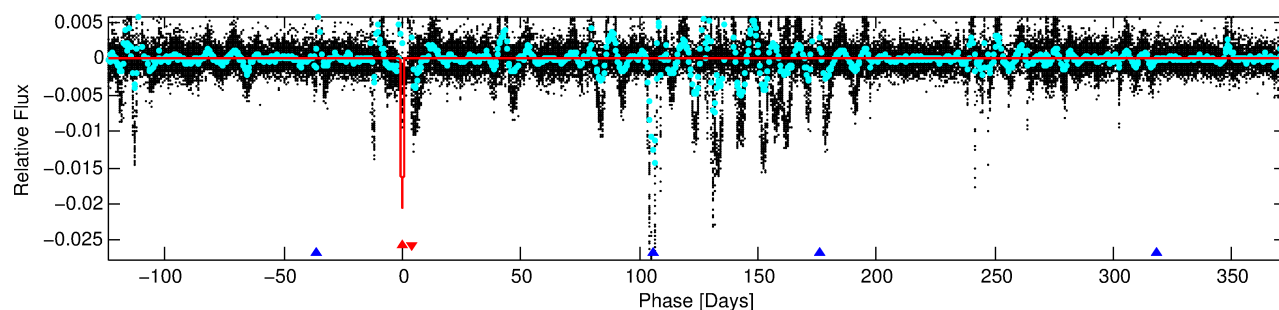
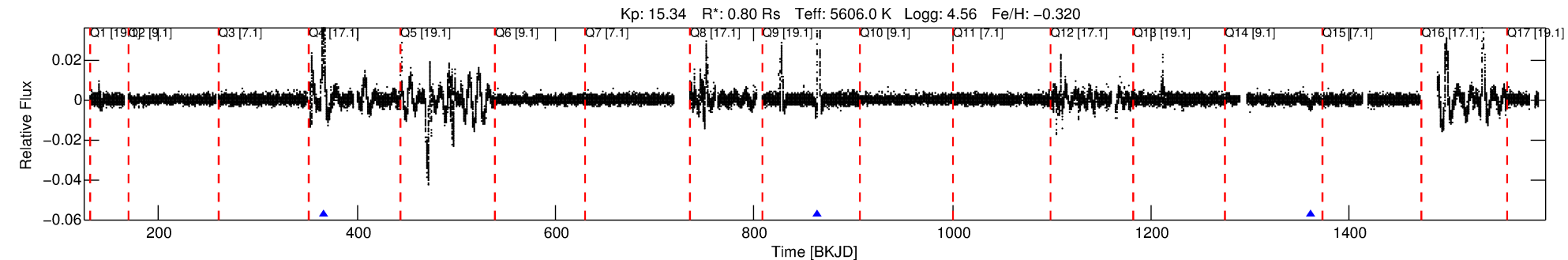
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007373687-01

No Significant Match Found

# DV One-Page Summary

KIC: 7373687 Candidate: 1 of 2 Period: 497.360 d



## DV Fit Results:

Period = 497.35991 [0.01892] d  
Epoch = 365.7433 [0.0260] BKJD  
Rp/R\* = 0.2314 [0.2242]  
a/R\* = 52.26 [4.75]  
b = 1.00 [0.53]  
Seff = 0.42 [0.13]  
Teq = 205 [16] K  
Rp = 20.20 [20.18] Re  
a = 1.1602 [0.2303] AU  
Ag = 6891.44 [13566.59] [0.51σ]  
Teff = 2893 [1412] K [1.90σ]

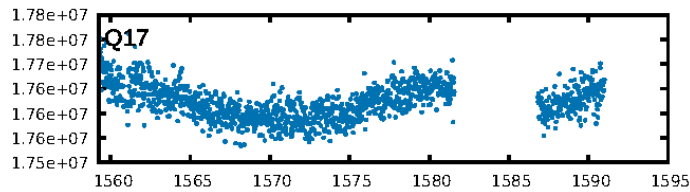
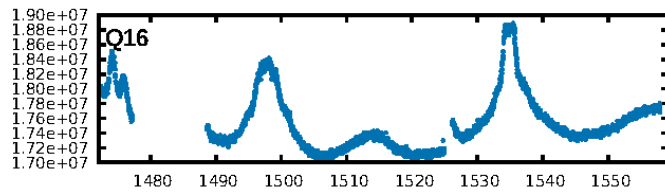
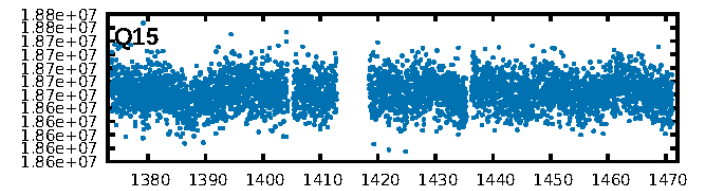
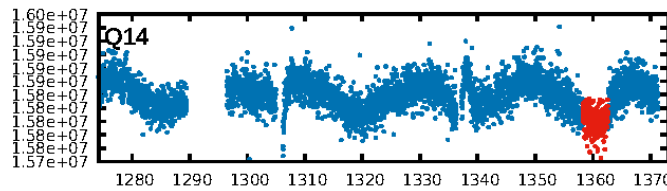
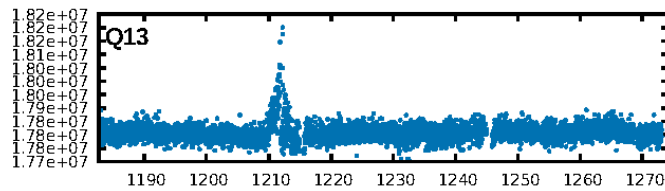
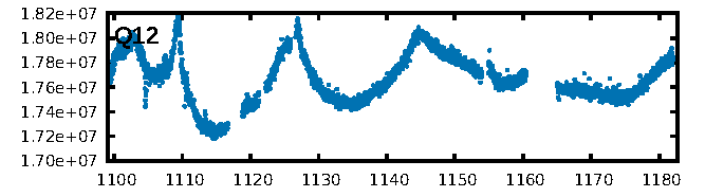
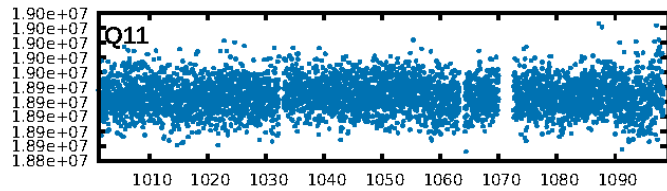
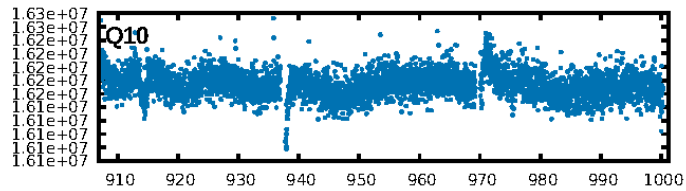
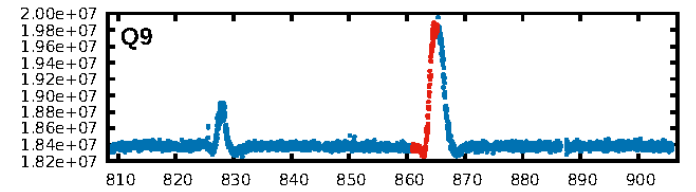
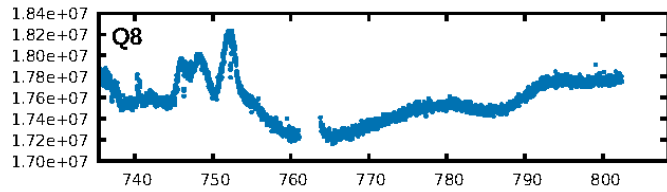
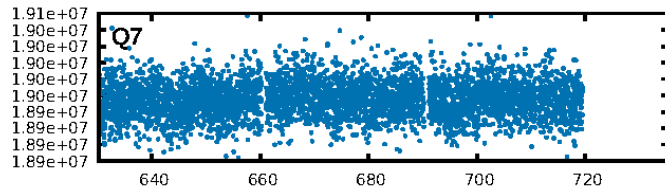
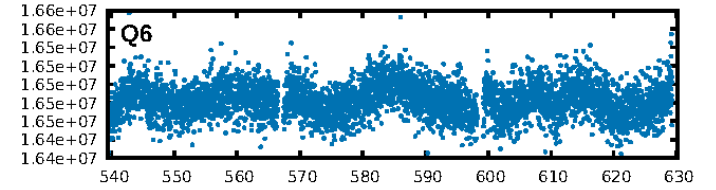
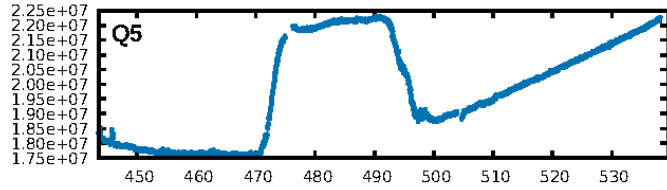
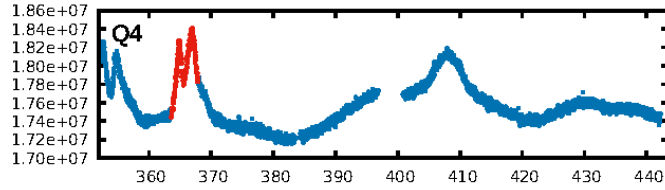
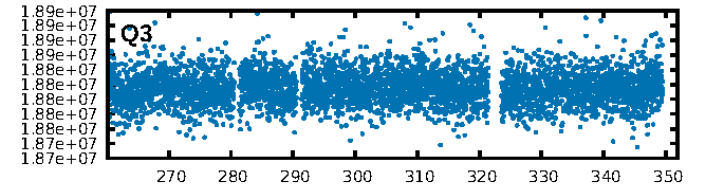
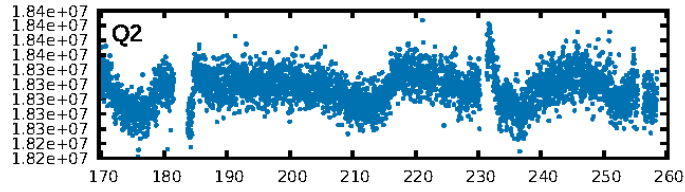
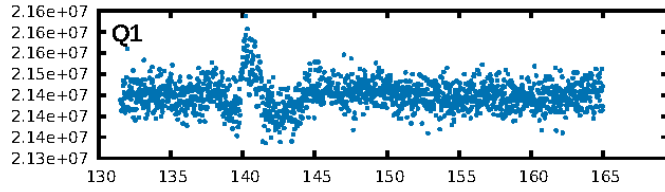
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [46.14σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.0%  
Bootstrap-pfa: 2.41e-38  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 4.214  
Centroid-sig: 84.3%  
Centroid-so: 0.412 arcsec [5.24σ]  
OotOffset-rm: 2.135 arcsec [5.47σ]  
KicOffset-rm: 2.135 arcsec [5.42σ]  
OotOffset-st: 1/0/0/0 [1]  
KicOffset-st: 1/0/0/0 [1]  
DiffImageQuality-fgm: 1.00 [1/1]  
DiffImageOverlap-fno: 1.00 [3/3]

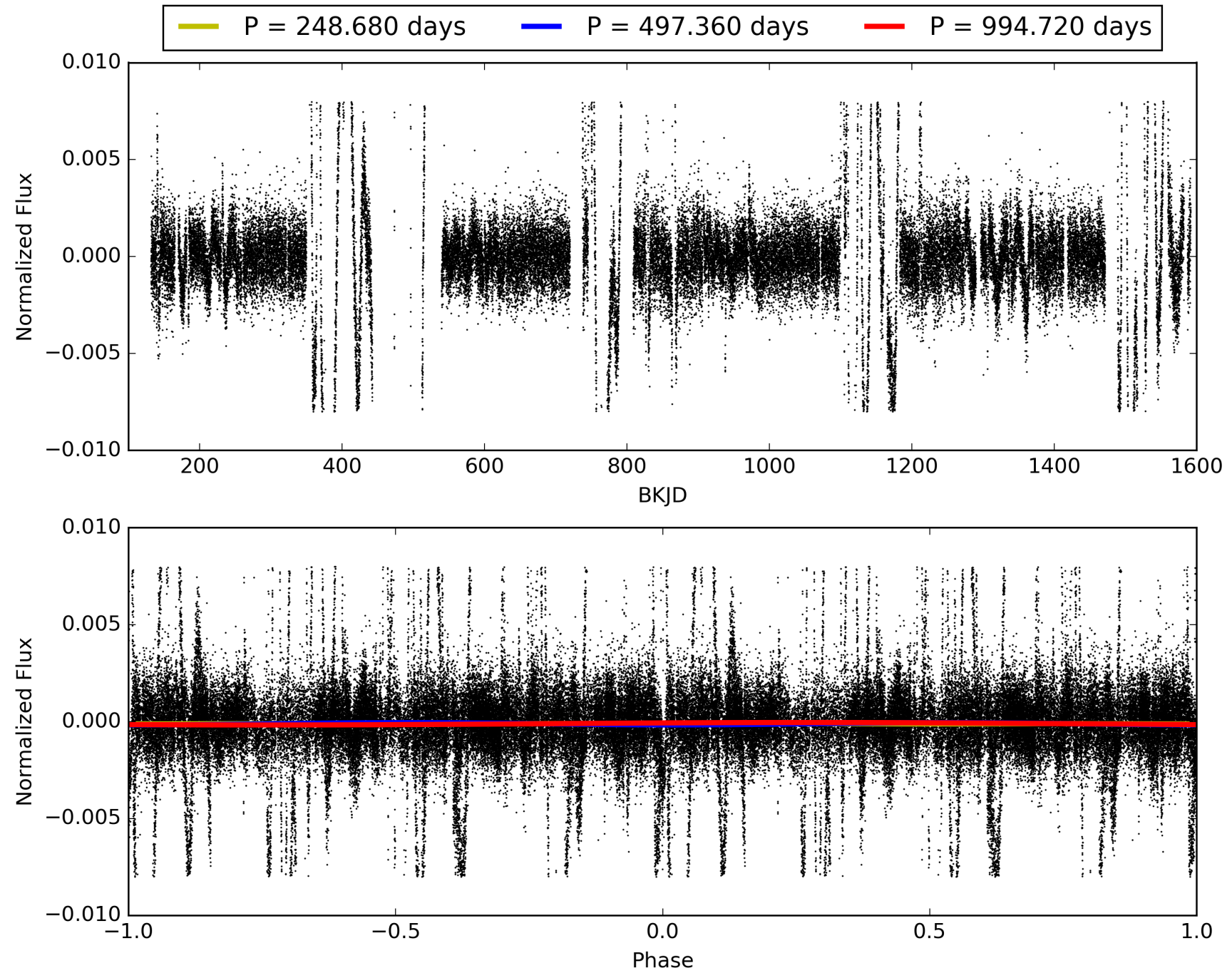
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This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 007373687-01, PDC Light Curves

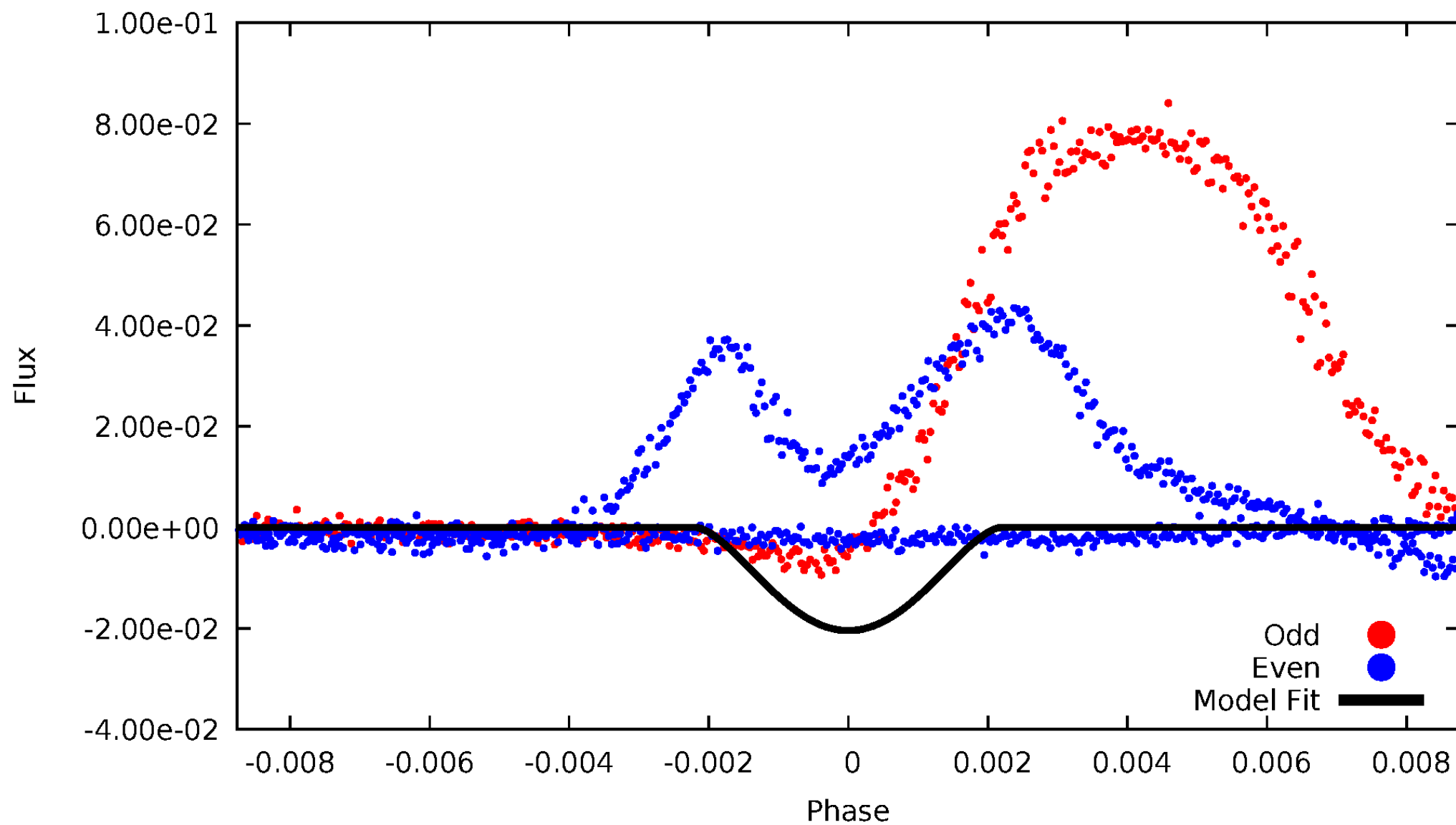


TCE 007373687-01



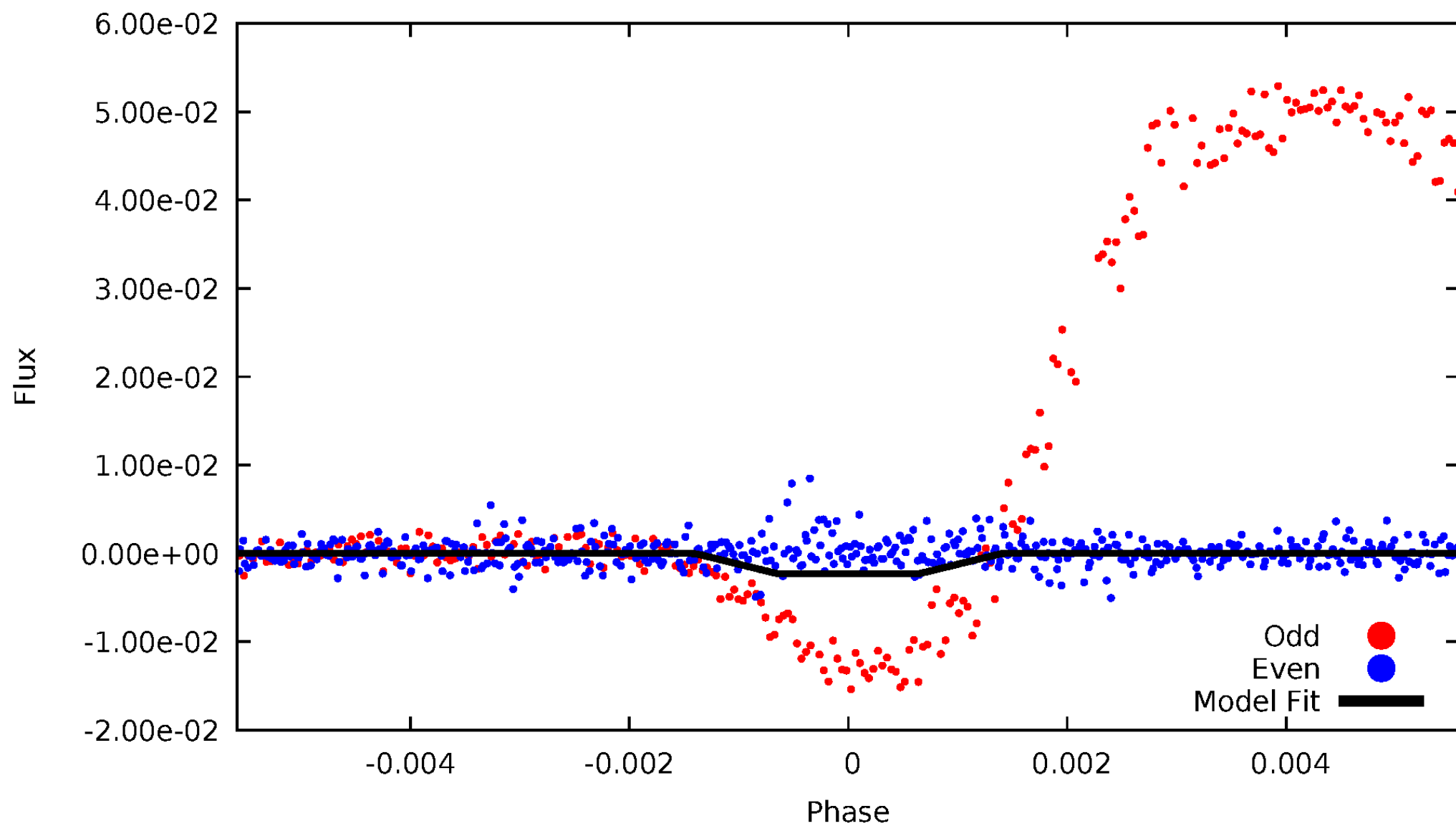
# DV Odd/Even

TCE 007373687-01



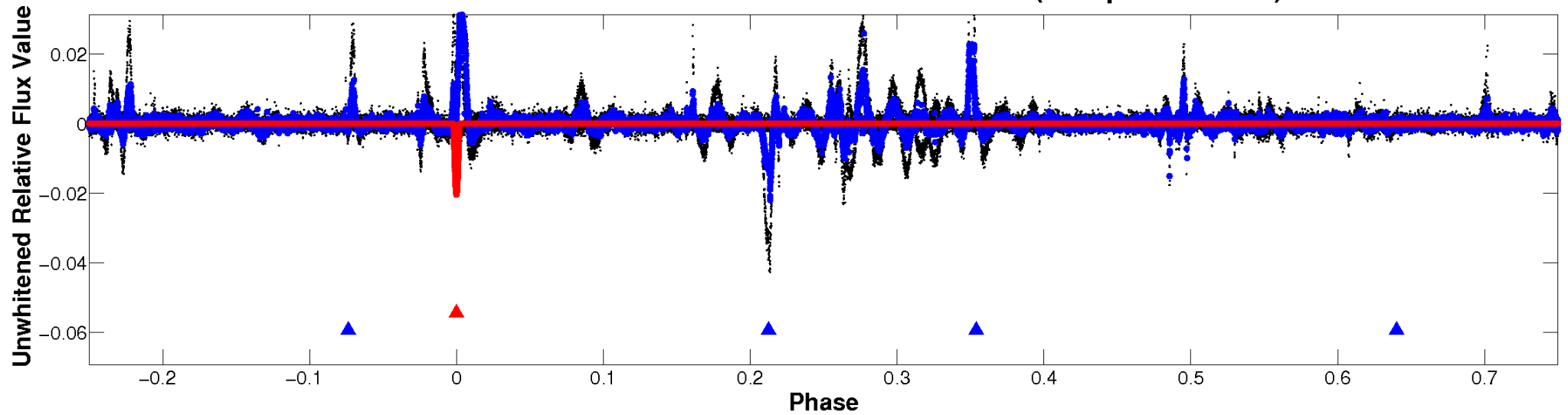
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TCE 007373687-01

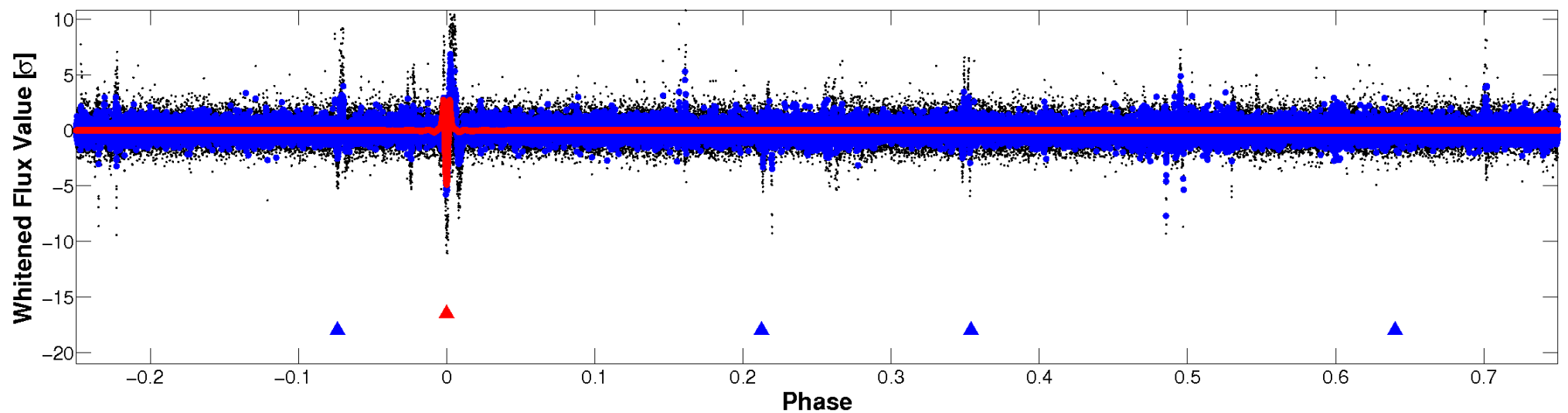


# Non-Whitened Vs. Whitened Light Curve

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

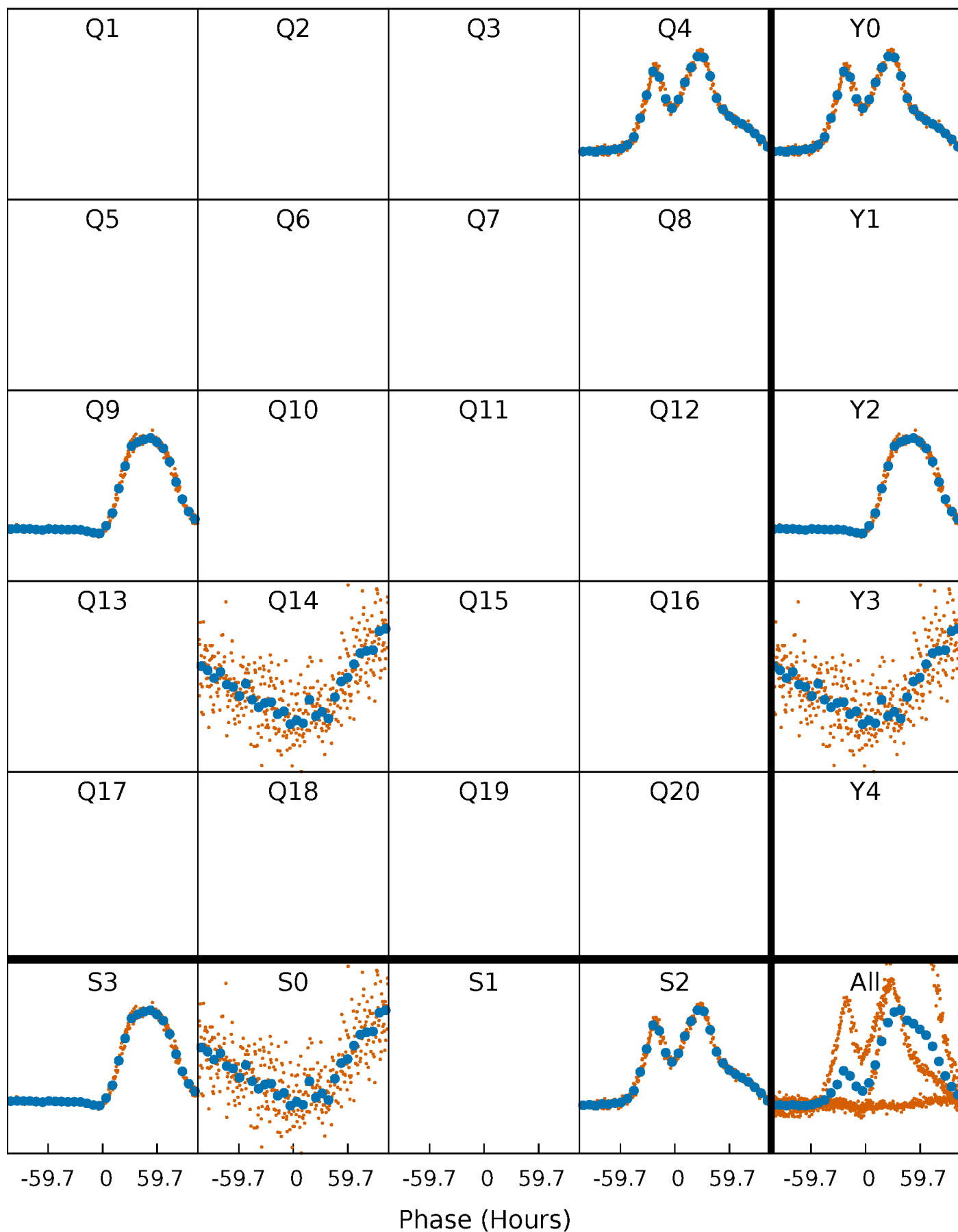


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

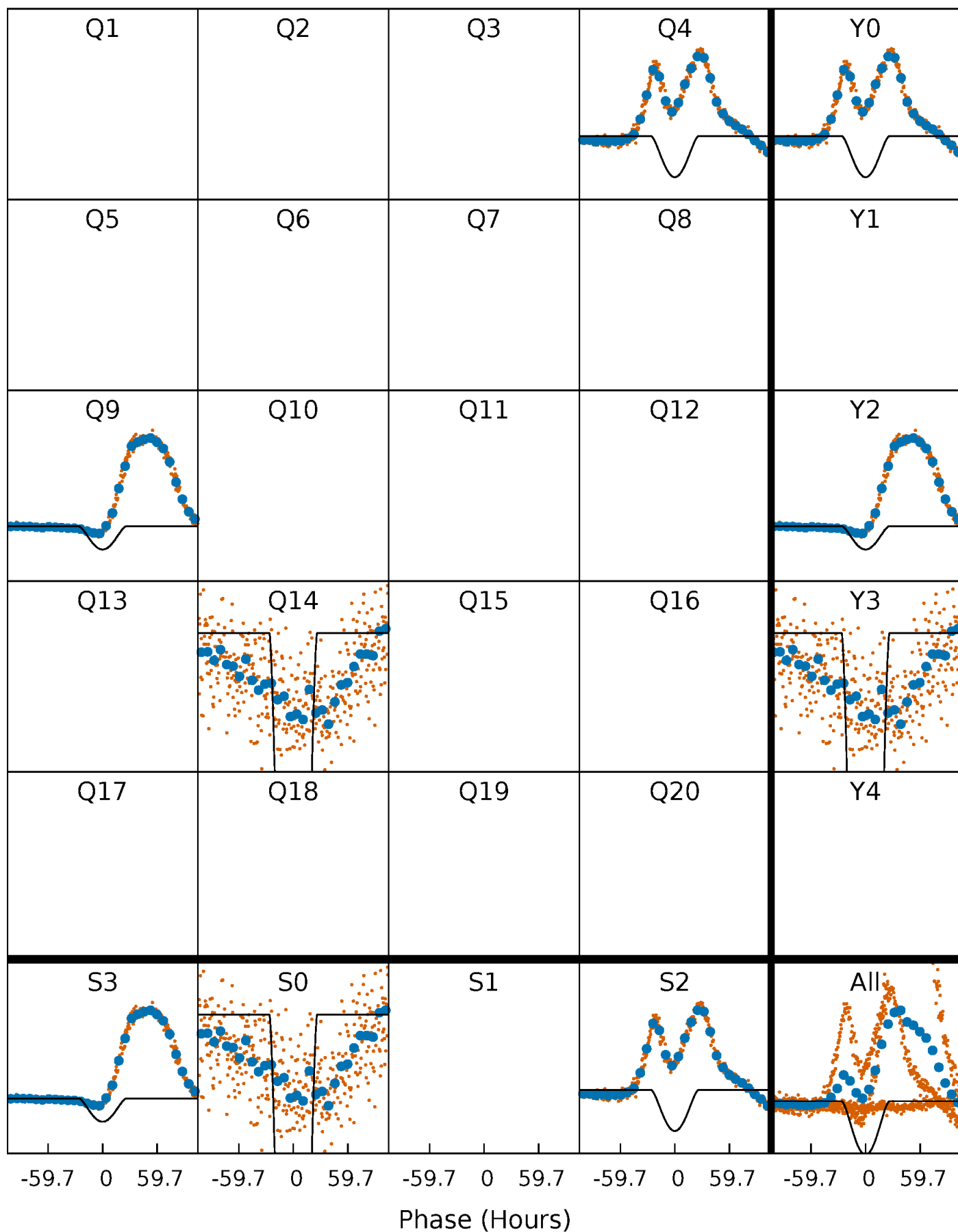
TCE 007373687-01 P=497.359915 Days  $T_0=365.743329$  (BKJD)





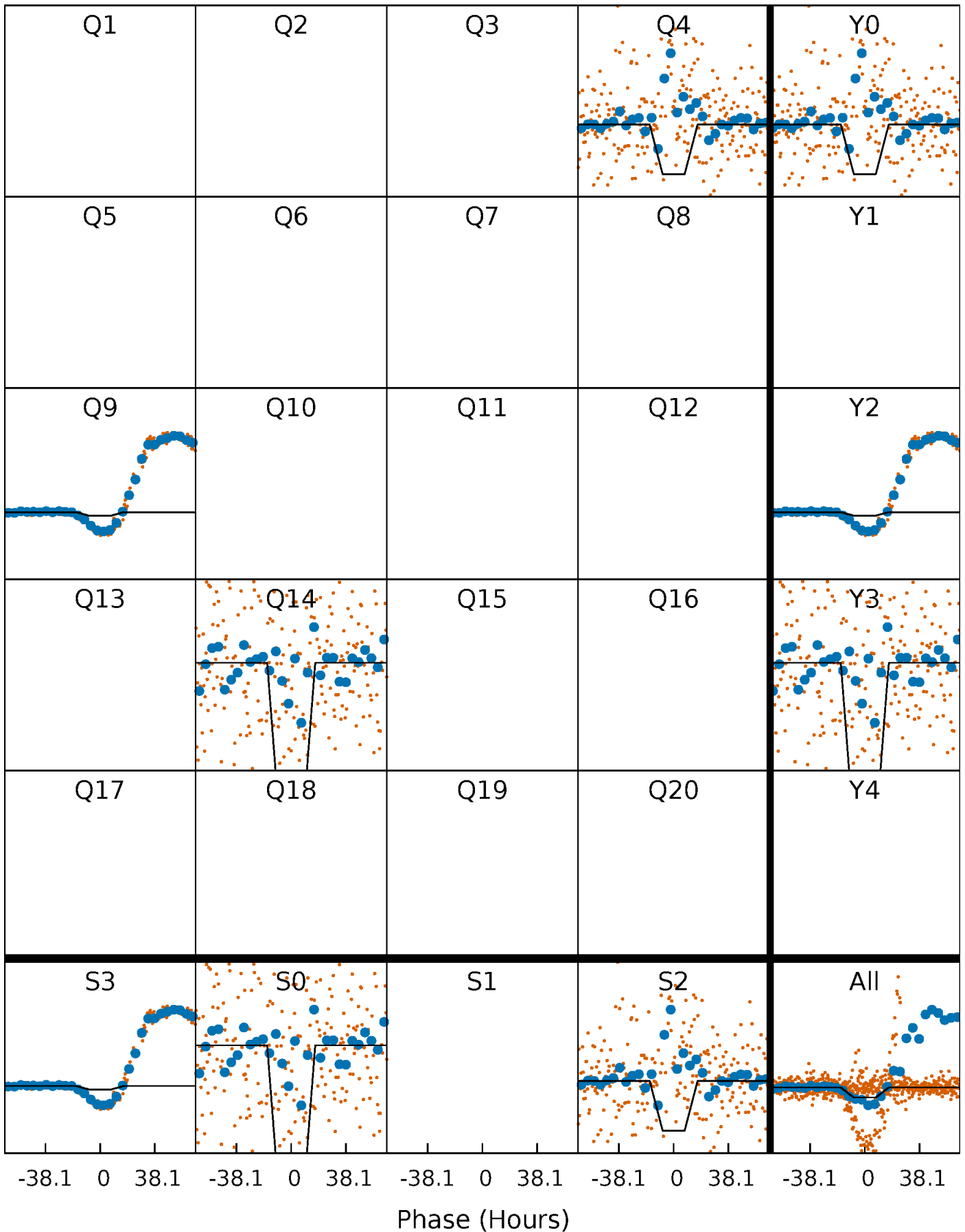
# DV Quarter-Phased Transit Curves

TCE 007373687-01 P=497.359915 Days  $T_0=365.743329$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

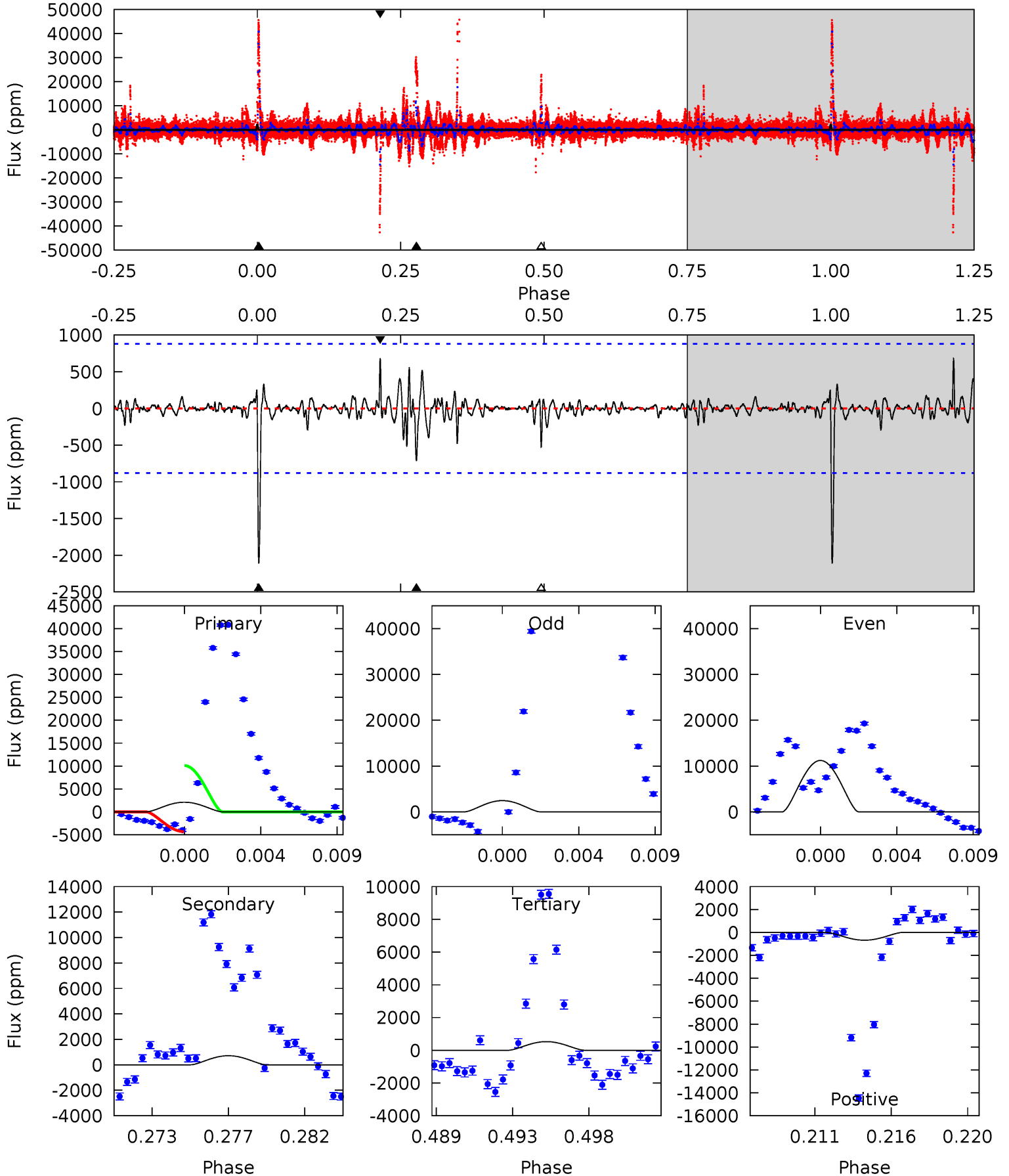
TCE 007373687-01 P=497.516319 Days  $T_0=365.485797$  (BKJD)



# DV Model-Shift Uniqueness Test

007373687-01, P = 497.359915 Days, E = 365.743329 Days

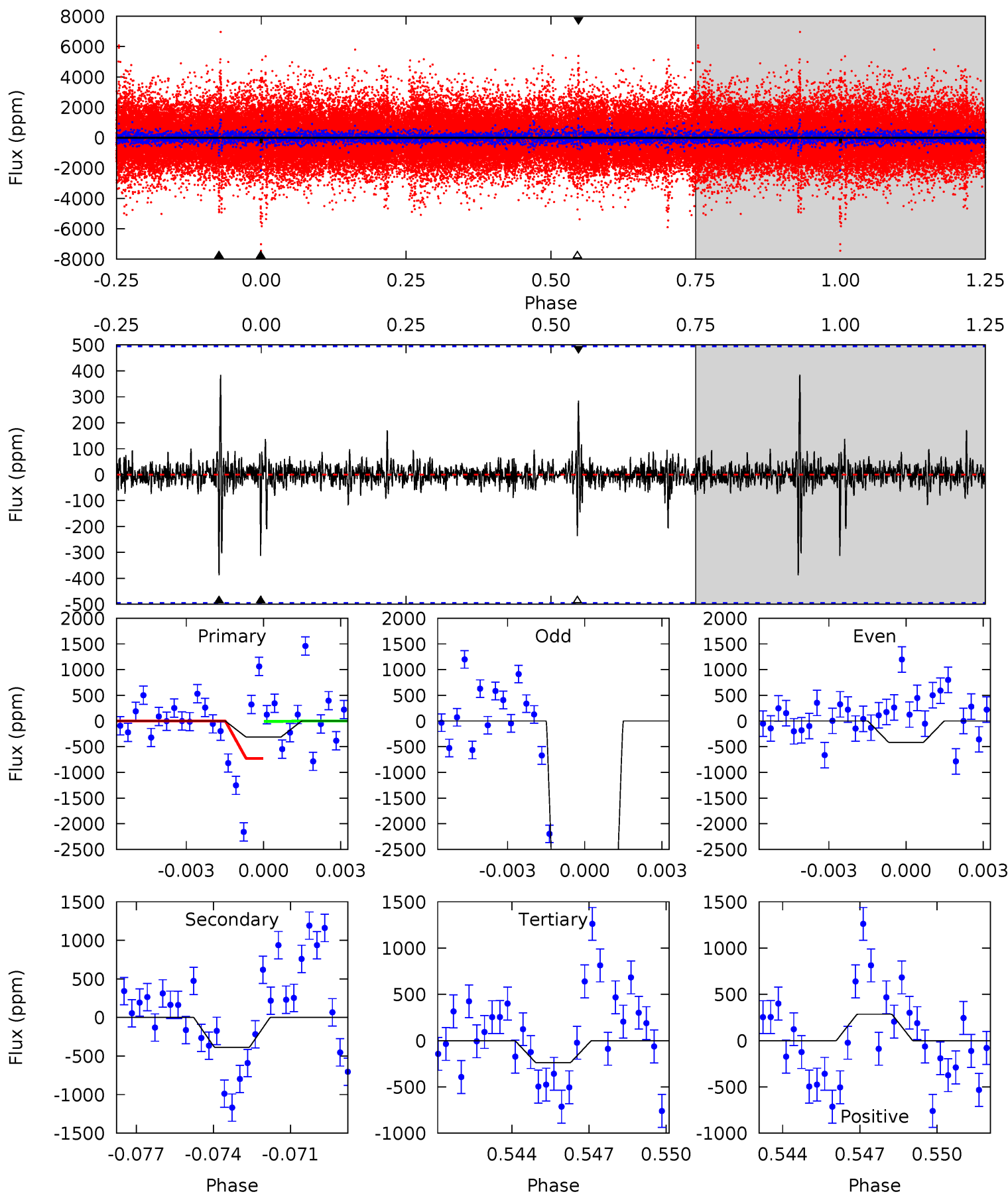
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.4	4.21	3.10	4.00	5.18	2.85	0.57	9.30	8.40	1.11	0.21	26.1	3.32	0.24	0



# Alt Model-Shift Uniqueness Test

007373687-01, P = 497.516319 Days, E = 365.485797 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
3.33	4.12	2.52	3.03	5.26	2.99	0.39	0.81	0.31	1.60	1.10	28.5	11.0	0.50	3.83



### Stellar Parameters For KIC 007373687

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5606^{+169}_{-169}$	$4.557^{+0.050}_{-0.150}$	$-0.320^{+0.300}_{-0.300}$	$0.800^{+0.194}_{-0.077}$	$0.841^{+0.097}_{-0.078}$	$2.319^{+0.489}_{-0.964}$
	+3%/-3%	+1%/-3%	+94%/-94%	+24%/-10%	+12%/-9%	+21%/-42%
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 007373687-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-716 \pm 170$	$24.23^{+20.58}_{-15.10}$	$292^{+17}_{-12}$	$2570^{+808}_{-338}$	$850^{+5205}_{-589}$
Alt.	$-388 \pm 94$	$14.73^{+14.70}_{-9.56}$	$291^{+17}_{-13}$	$2694^{+1007}_{-419}$	$1233^{+9796}_{-944}$

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

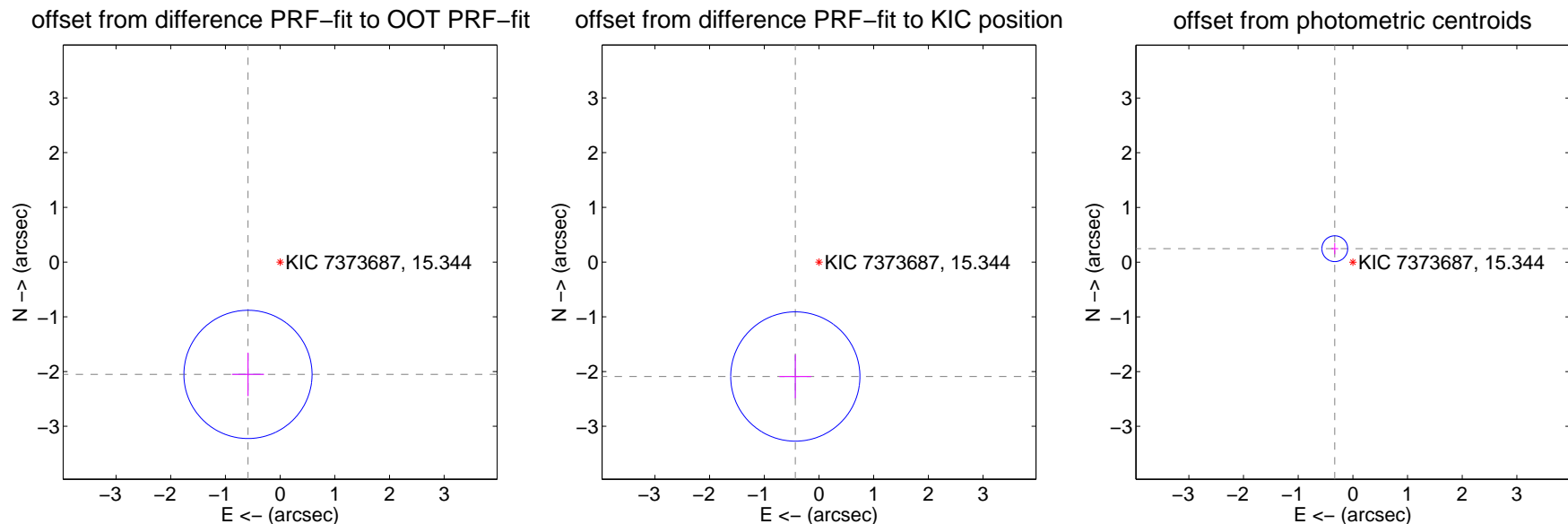
## DV Centroid Data

Supplemental centroid analysis for 007373687-01. Kepler magnitude: 15.34. Transit SNR 48.14

There are 1 quarters with good PRF difference image offsets

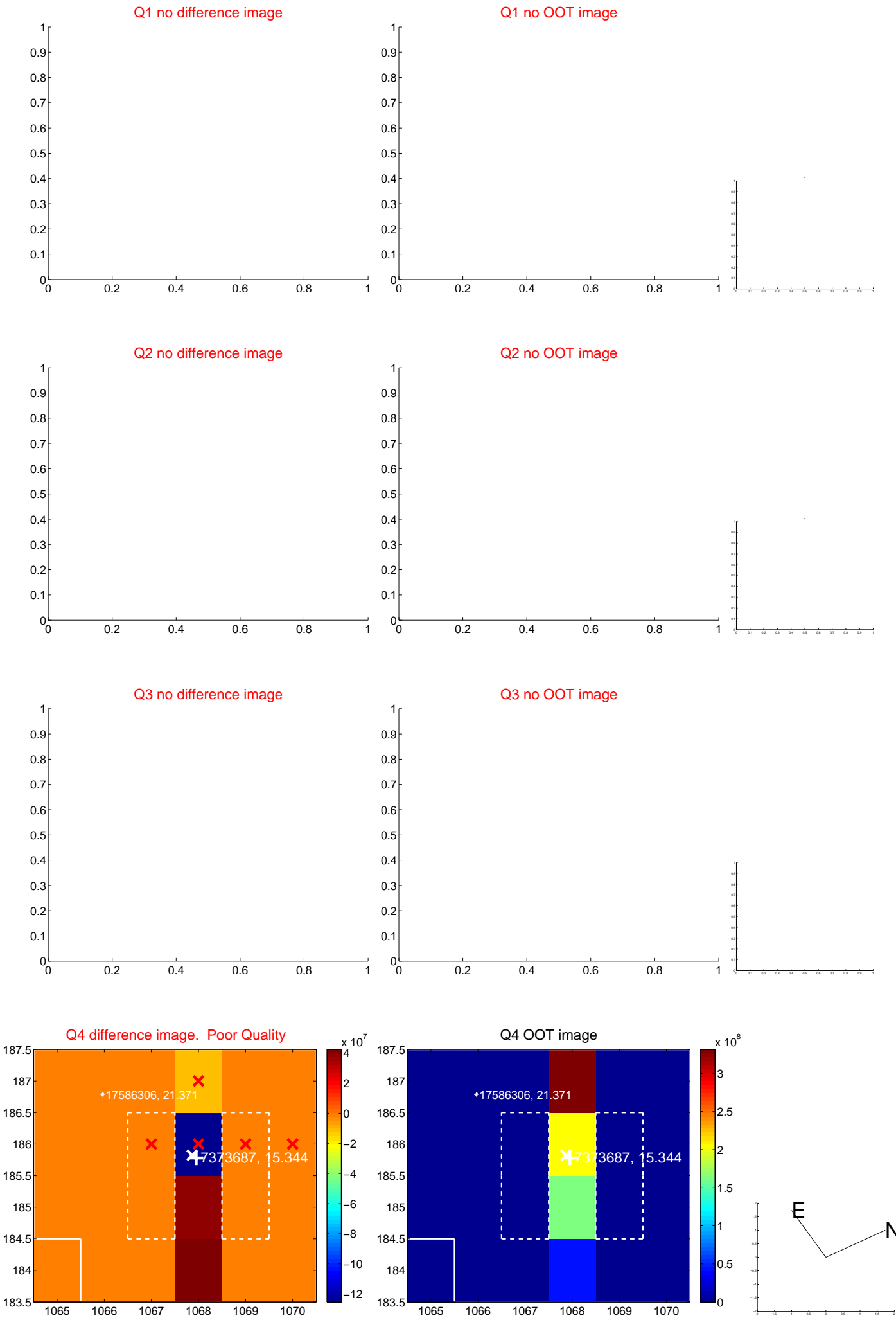
The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.135 \pm 0.391$	5.47	$0.588 \pm 0.293$	$-2.052 \pm 0.398$
PRF-fit source offset from KIC position	$2.135 \pm 0.394$	5.42	$0.433 \pm 0.293$	$-2.091 \pm 0.398$
photometric centroid source offset	$0.41 \pm 0.08$	5.24	$0.33 \pm 0.06$	$0.25 \pm 0.10$



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.

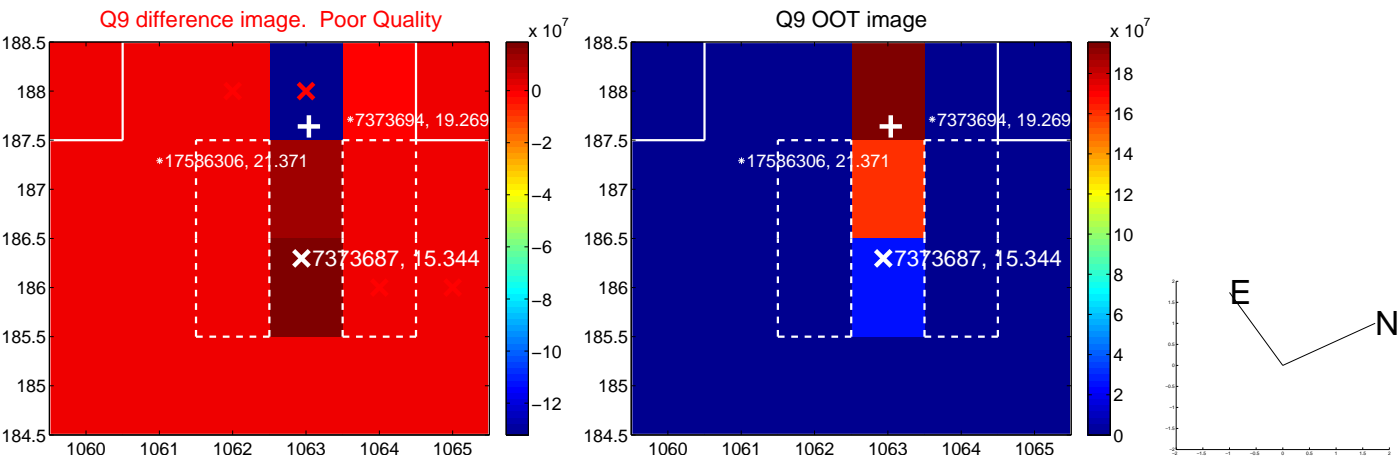


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white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.

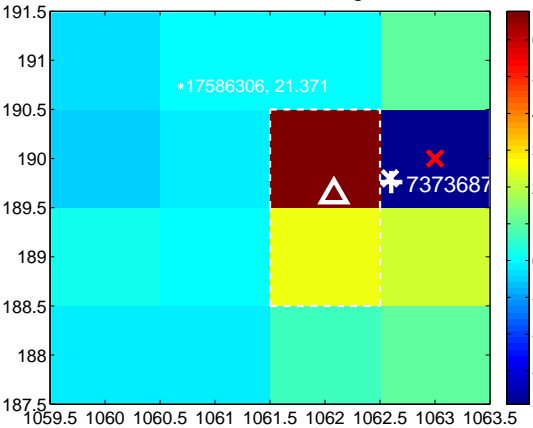
Q13 no difference image



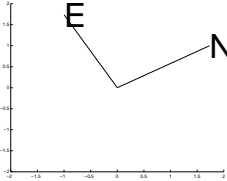
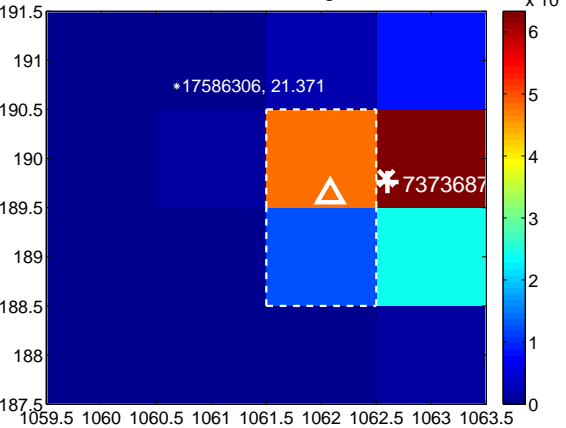
Q13 no OOT image



Q14 difference image



Q14 OOT image



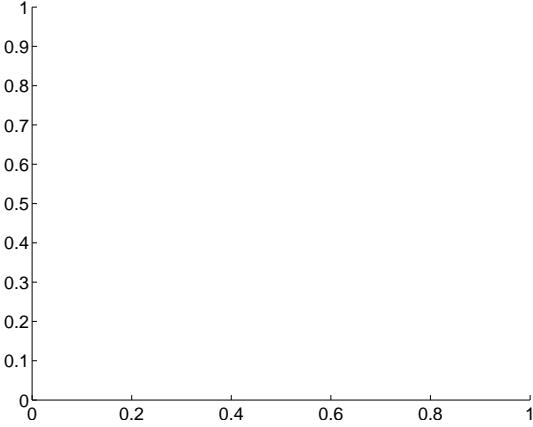
Q15 no difference image



Q15 no OOT image



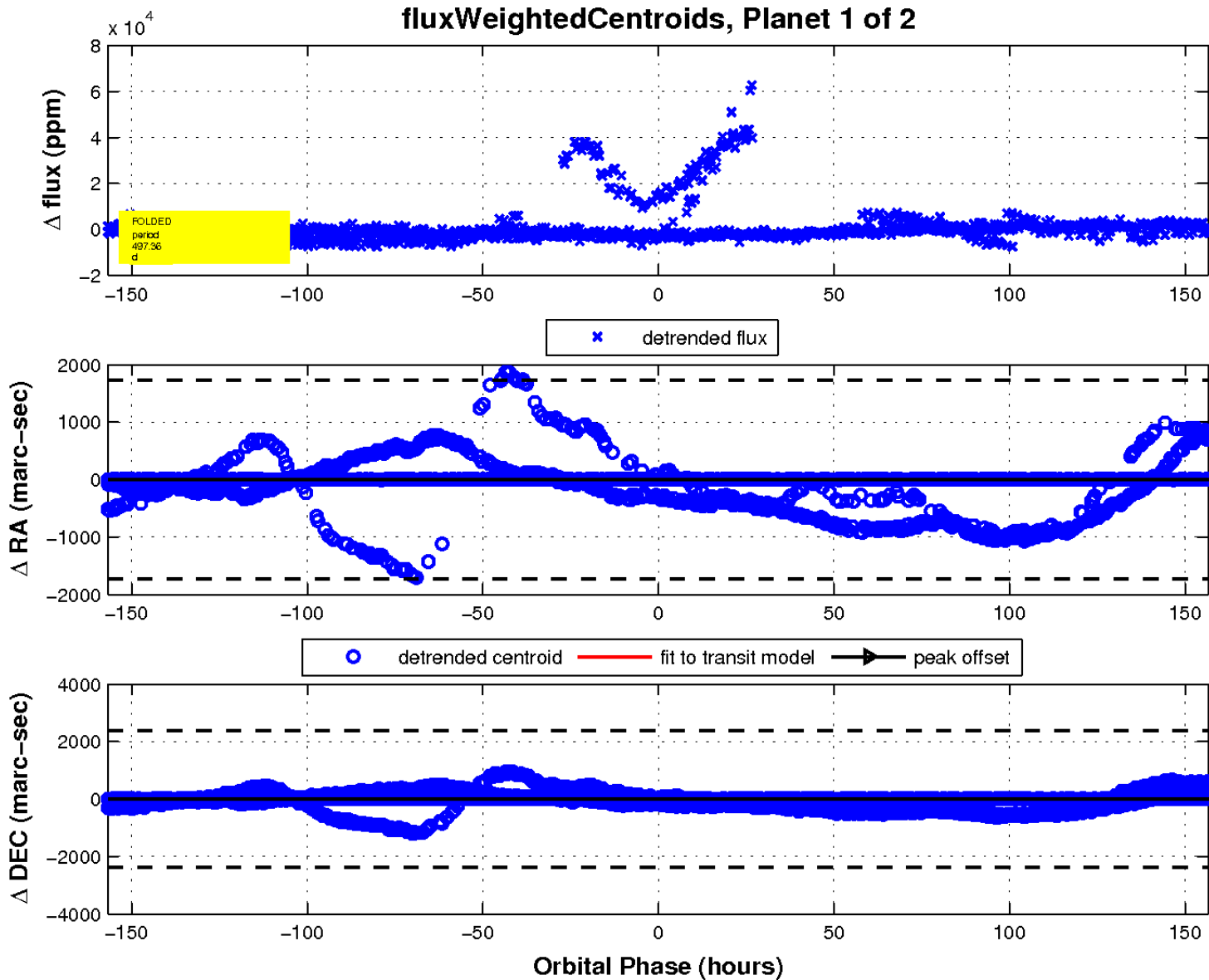
Q16 no difference image



Q16 no OOT image

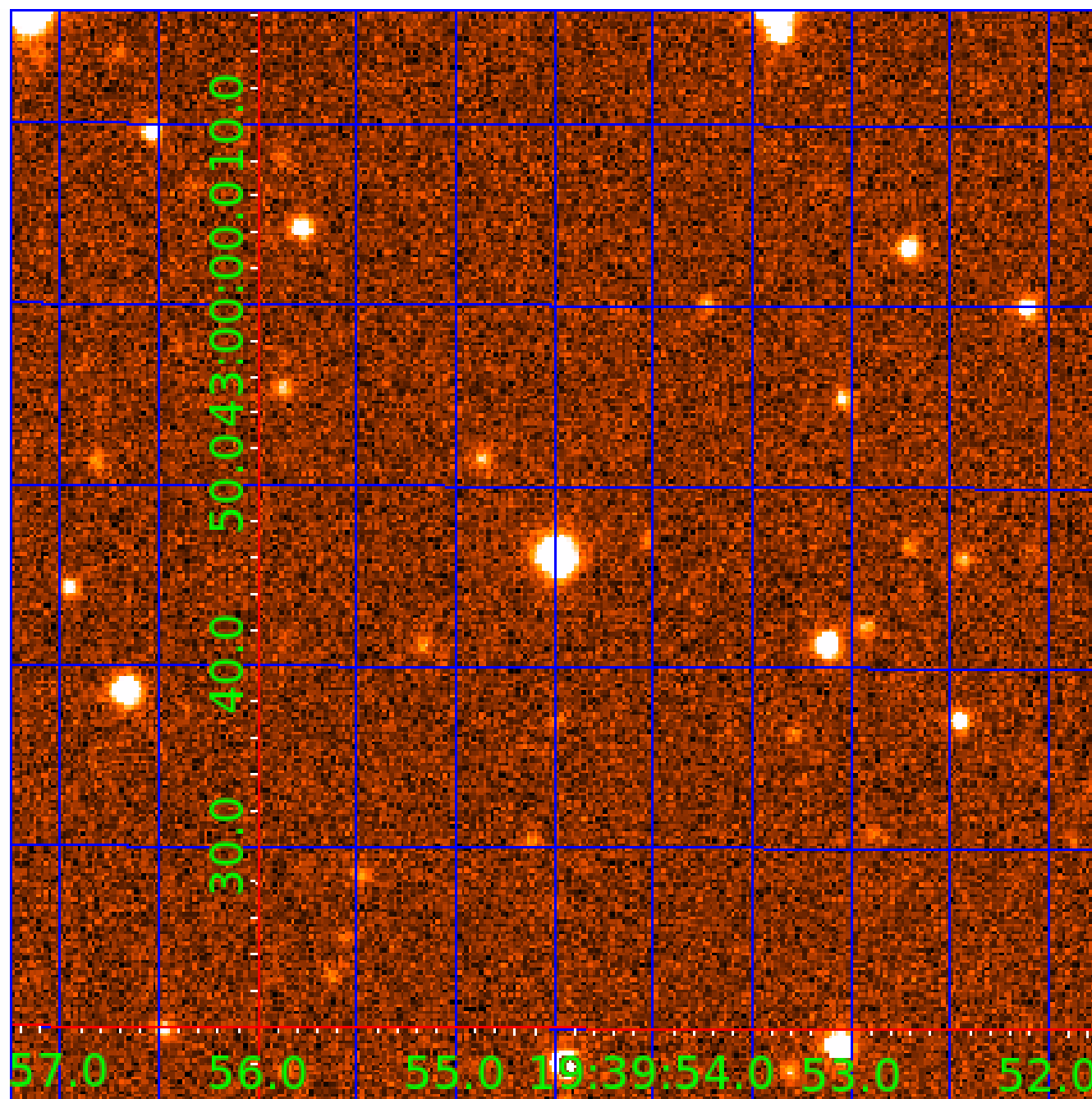


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



# UKIRT Image

Declination



# KIC 007373687

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007373687-01	OBS	No	497.359915	365.743329	20464.8	52.254	37.6	48.1	0.80	5606	20.20	0.42
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## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007373687-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007373687-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_ZUMA—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

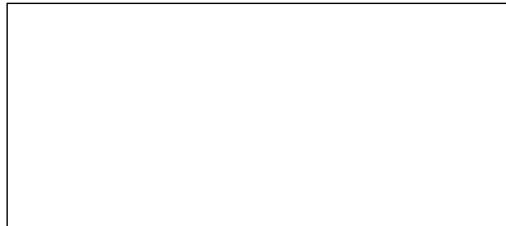
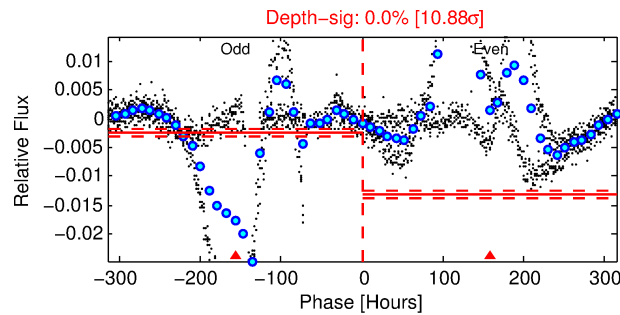
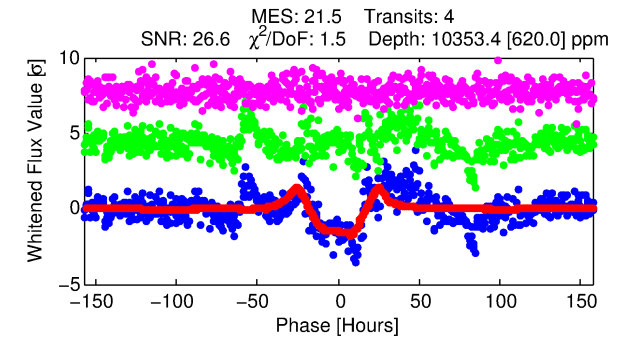
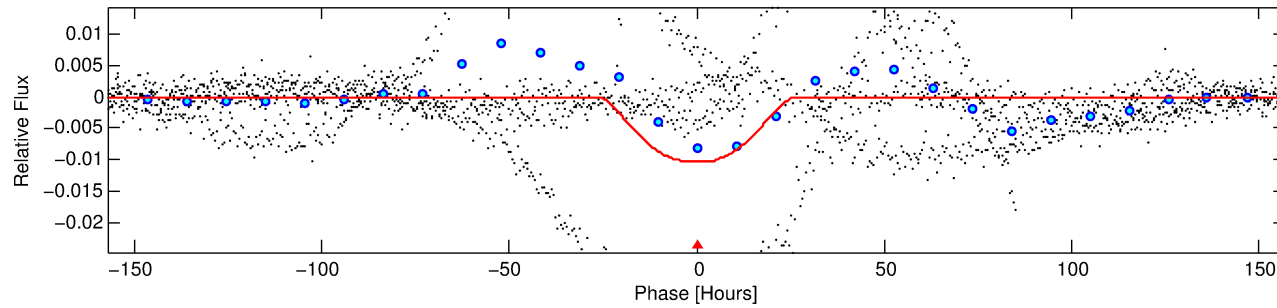
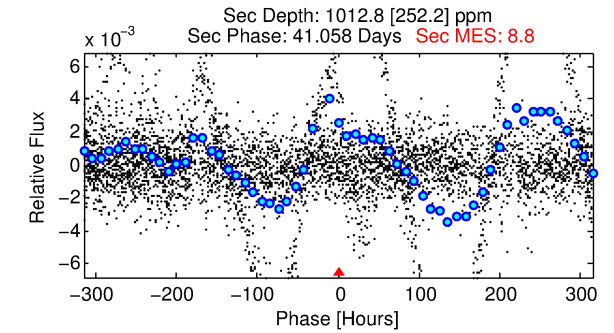
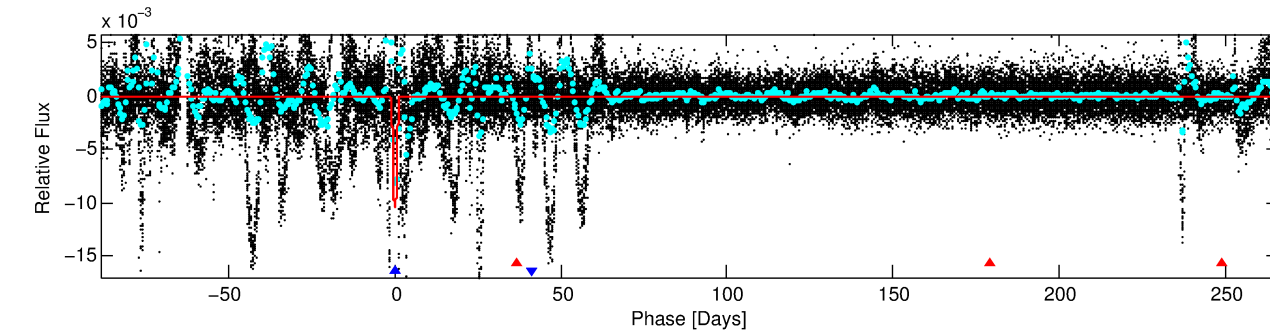
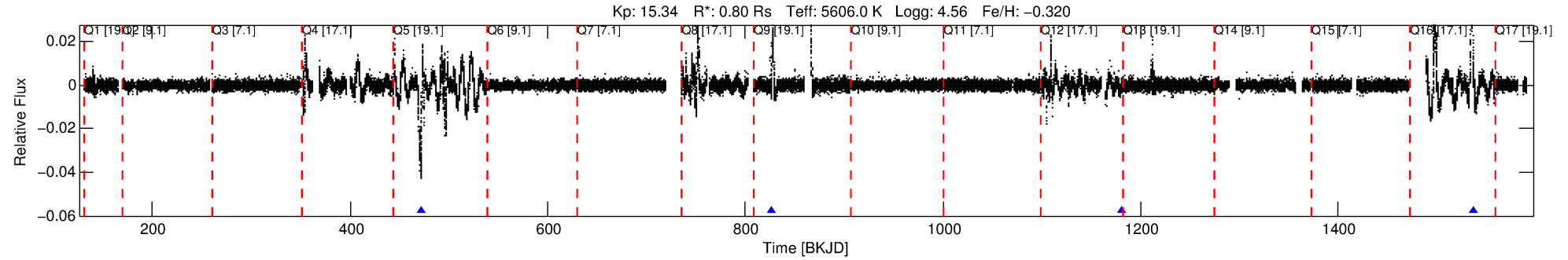
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007373687-02

No Significant Match Found

# DV One-Page Summary

KIC: 7373687 Candidate: 2 of 2 Period: 355.014 d



## DV Fit Results:

Period = 355.01358 [0.02038] d  
Epoch = 471.4580 [0.0340] BKJD  
Rp/R\* = 0.1110 [0.0044]  
a/R\* = 34.56 [1.34]  
b = 0.89 [0.01]  
Seff = 0.66 [0.20]  
Teq = 230 [18] K  
Rp = 9.69 [2.38] Re  
a = 0.9267 [0.1839] AU  
Ag = 5091.41 [1955.23] [2.60σ]  
Teff = 3001 [216] K [12.79σ]

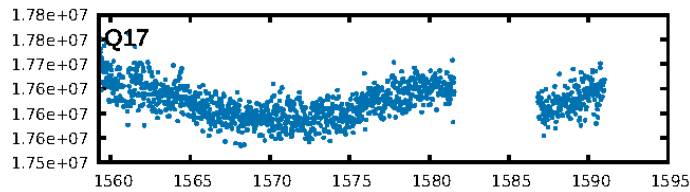
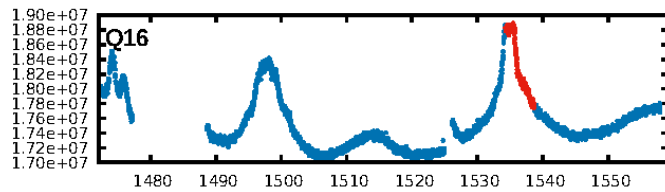
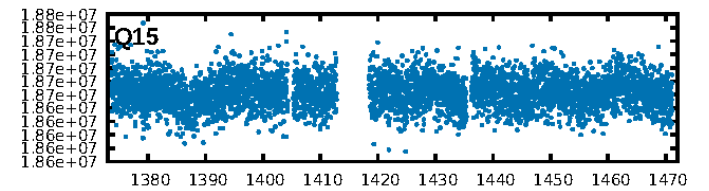
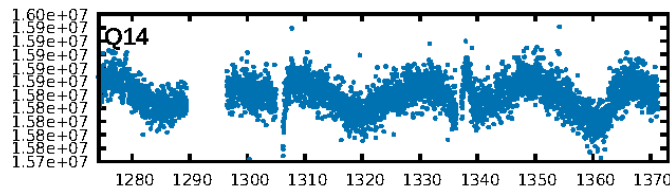
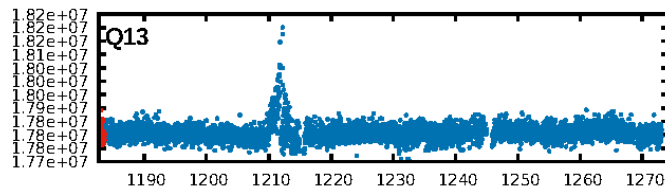
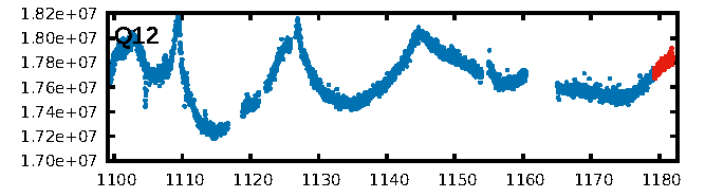
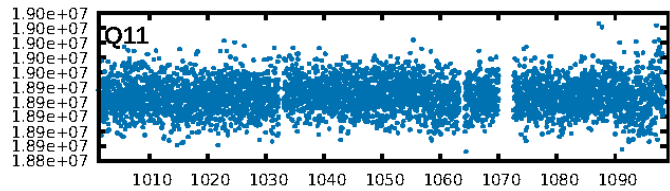
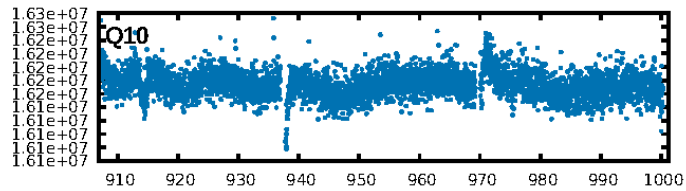
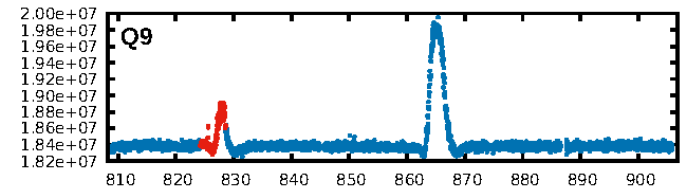
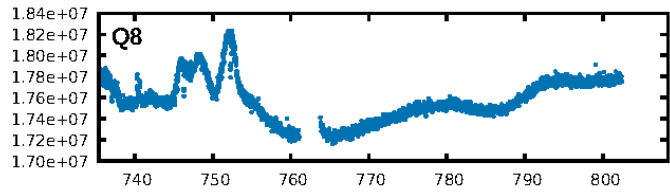
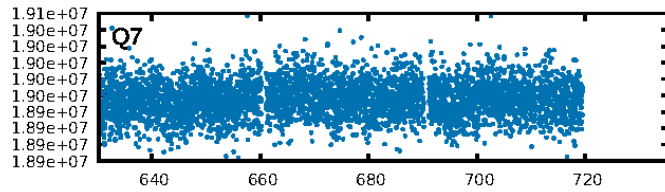
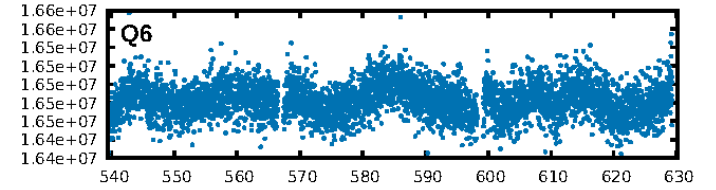
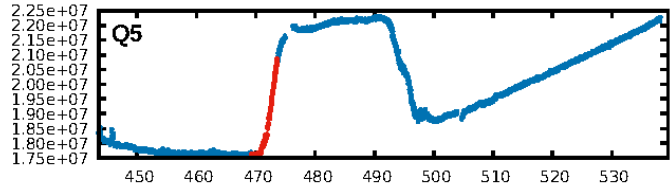
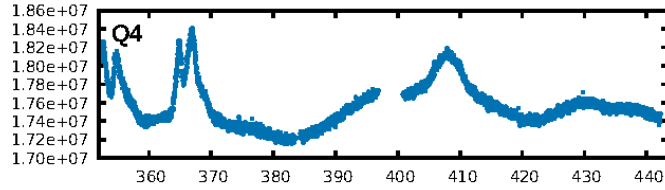
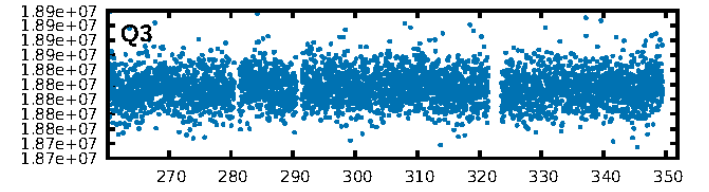
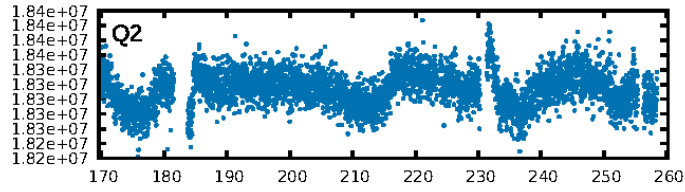
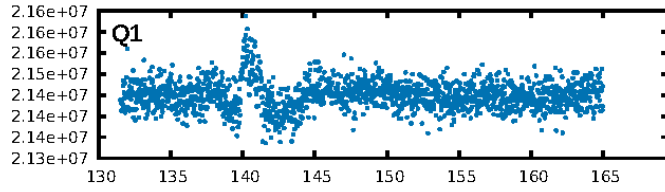
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [46.14σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.0%  
Bootstrap-pfa: 9.30e-19  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 0.7464  
Centroid-sig: 0.0%  
Centroid-so: 15.942 arcsec [2.54σ]  
OotOffset-rm: N/A  
KicOffset-rm: N/A  
OotOffset-st: 0/0/0 [0]  
KicOffset-st: 0/0/0 [0]  
DiffImageQuality-fgm: N/A  
DiffImageOverlap-fno: 1.00 [2/2]

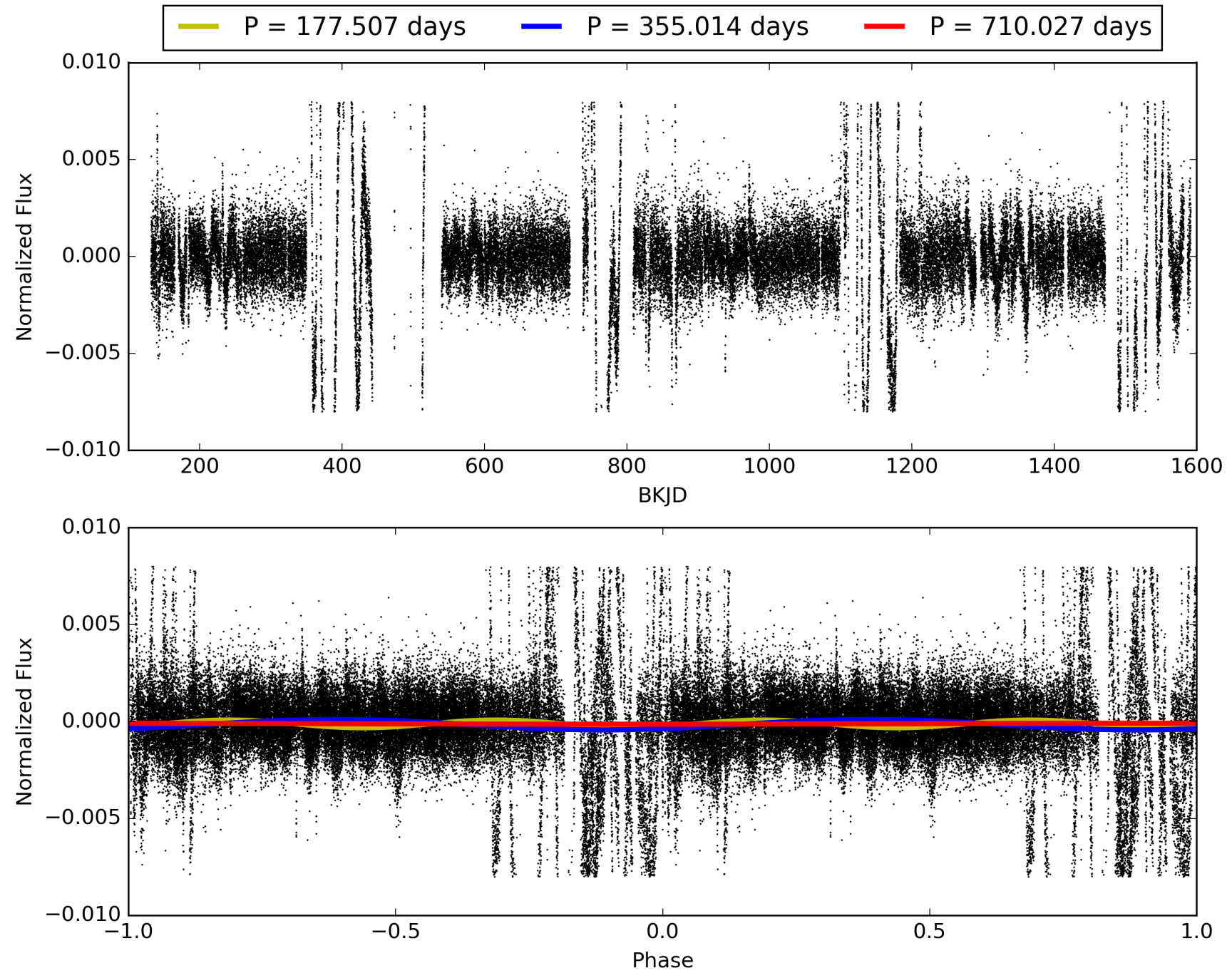
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 05:22:54 Z

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

# TCE 007373687-02, PDC Light Curves



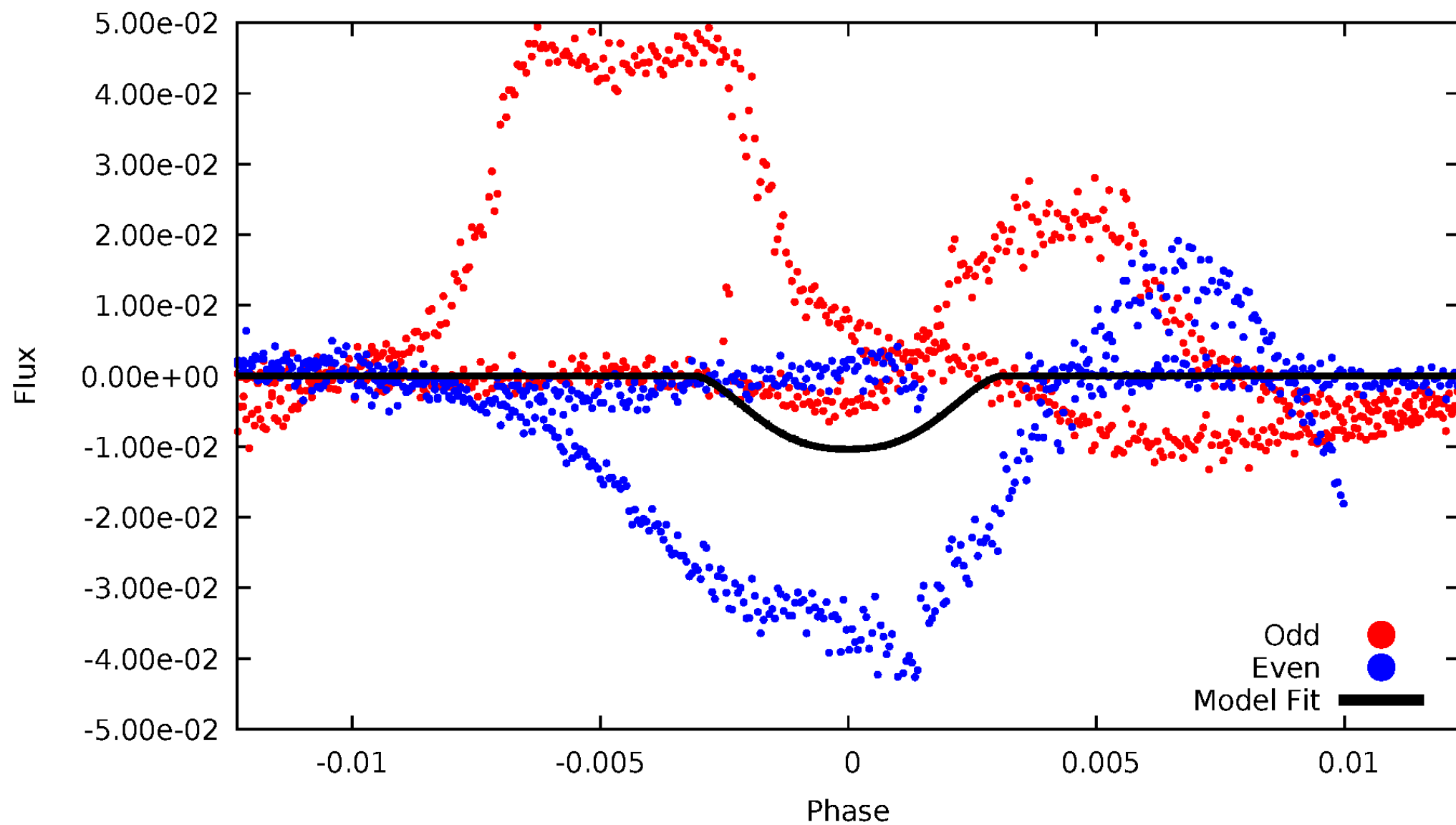
TCE 007373687-02





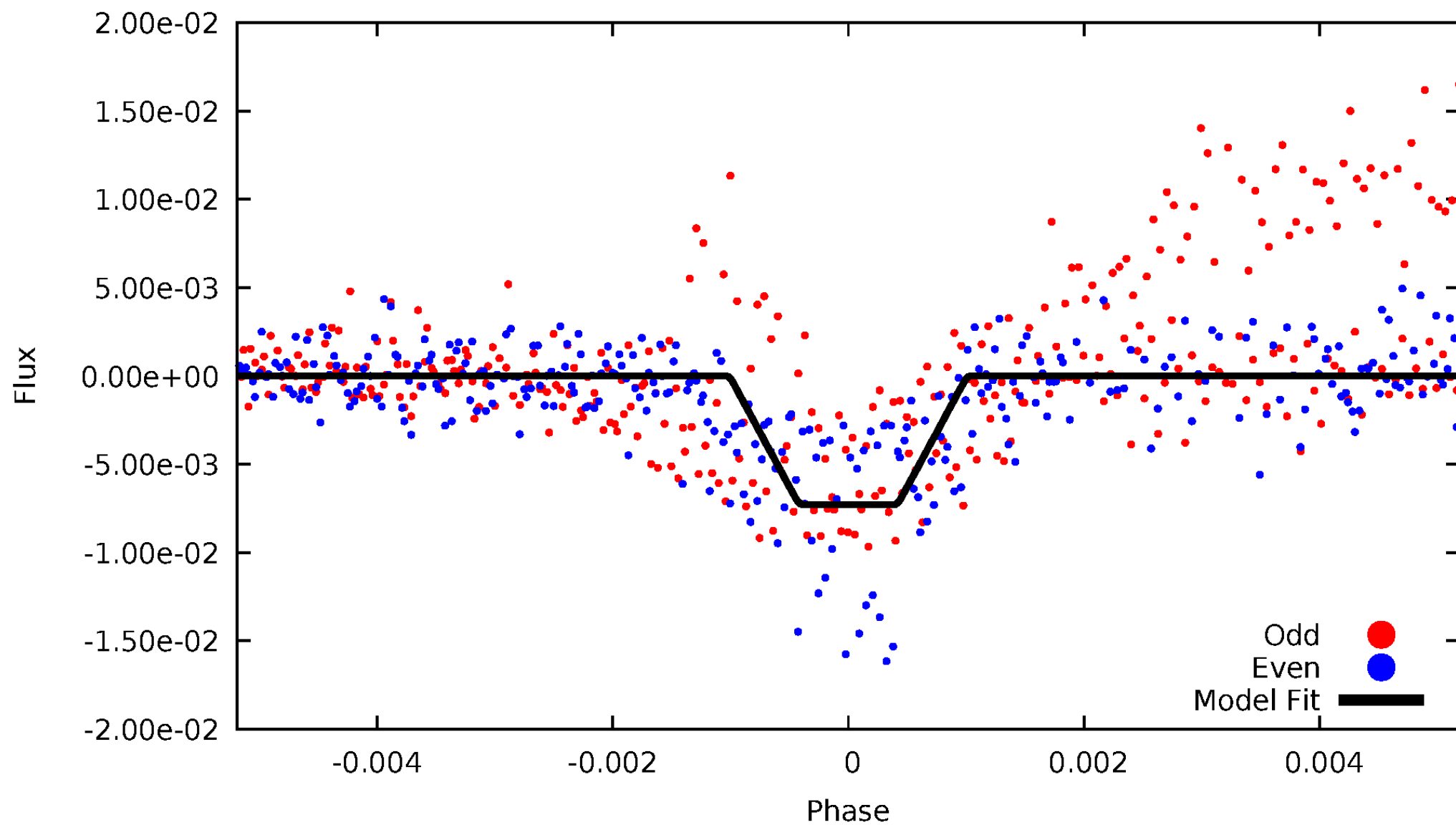
# DV Odd/Even

TCE 007373687-02



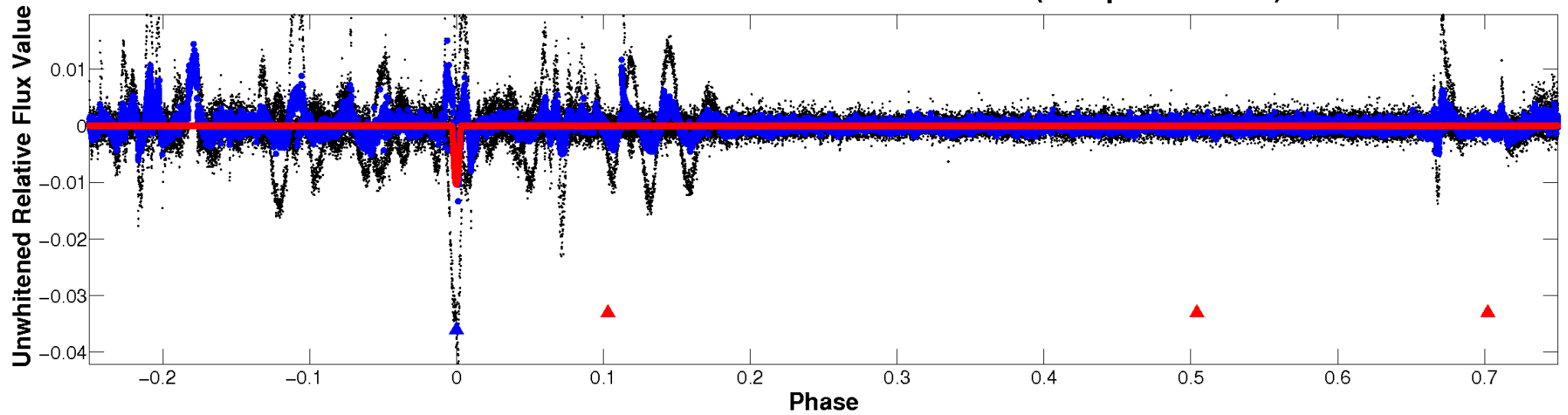
# ALT Odd/Even

TCE 007373687-02

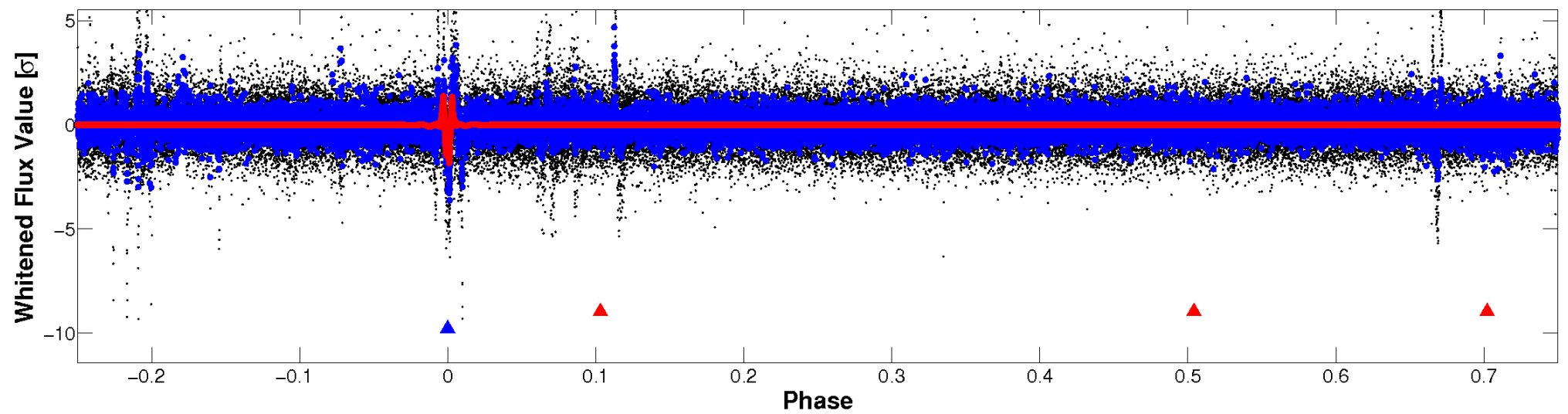


# Non-Whitened Vs. Whitened Light Curve

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

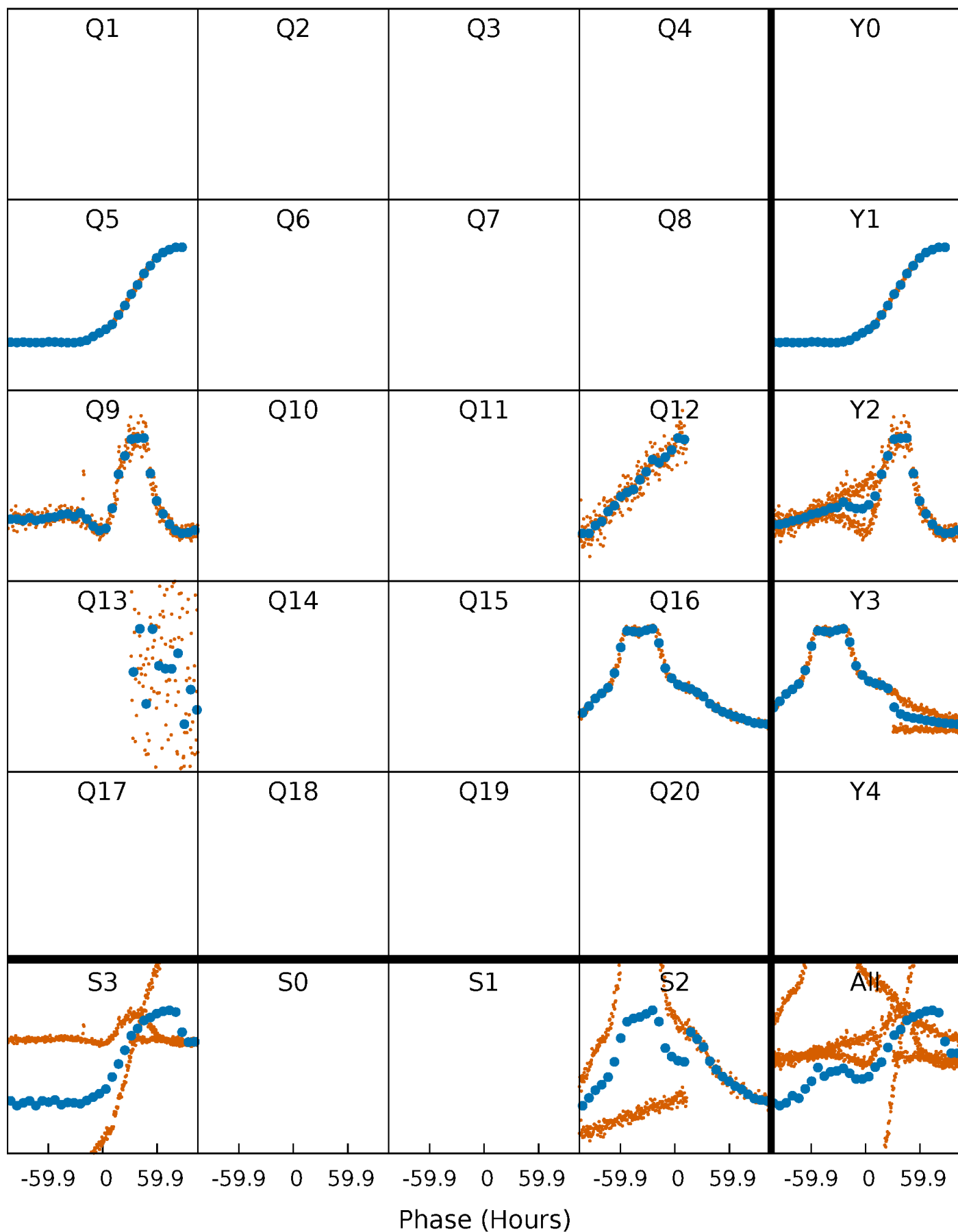


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



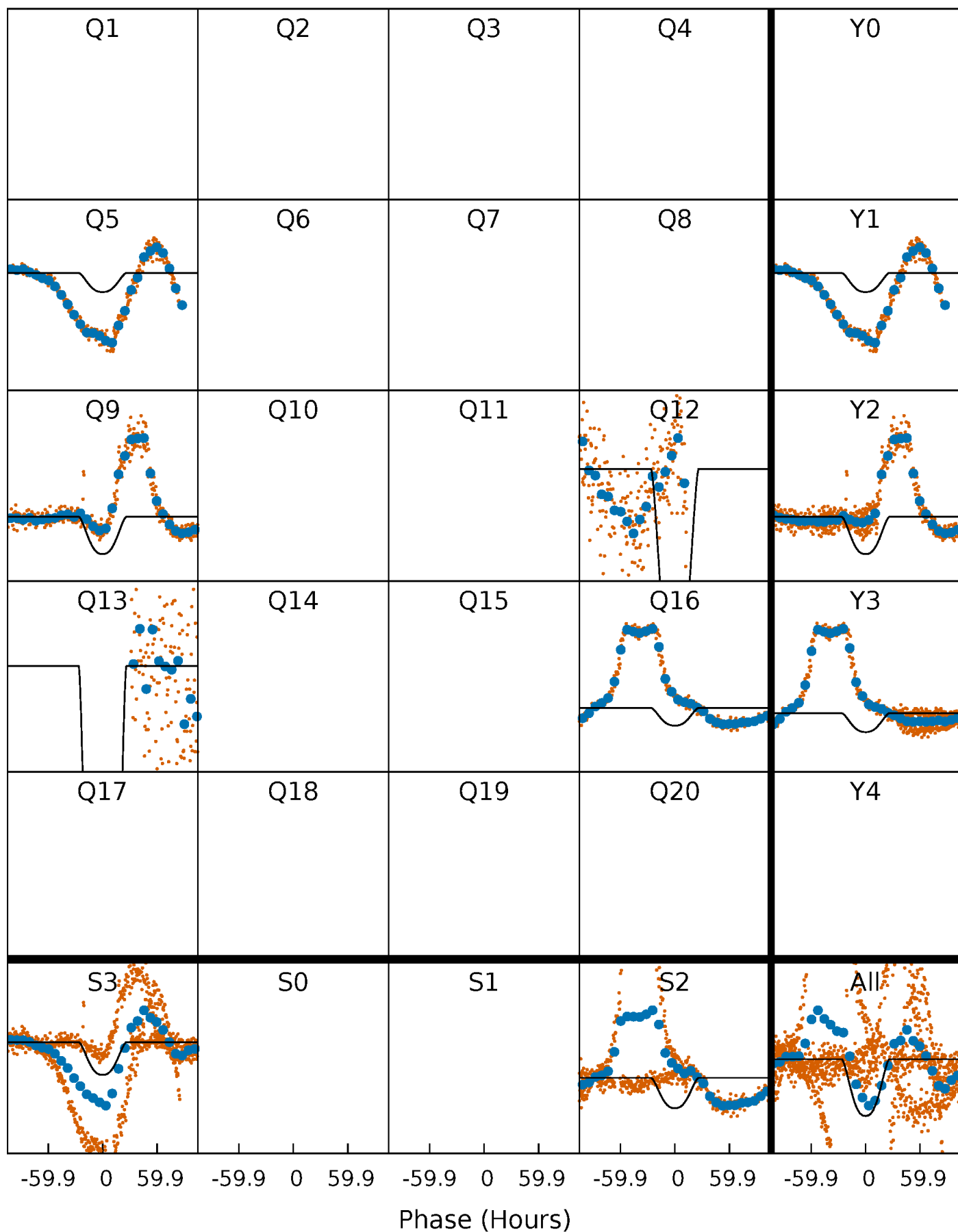
# PDC Quarter-Phased Transit Curves

TCE 007373687-02     $P=355.013583$  Days     $T_0=471.458032$  (BKJD)



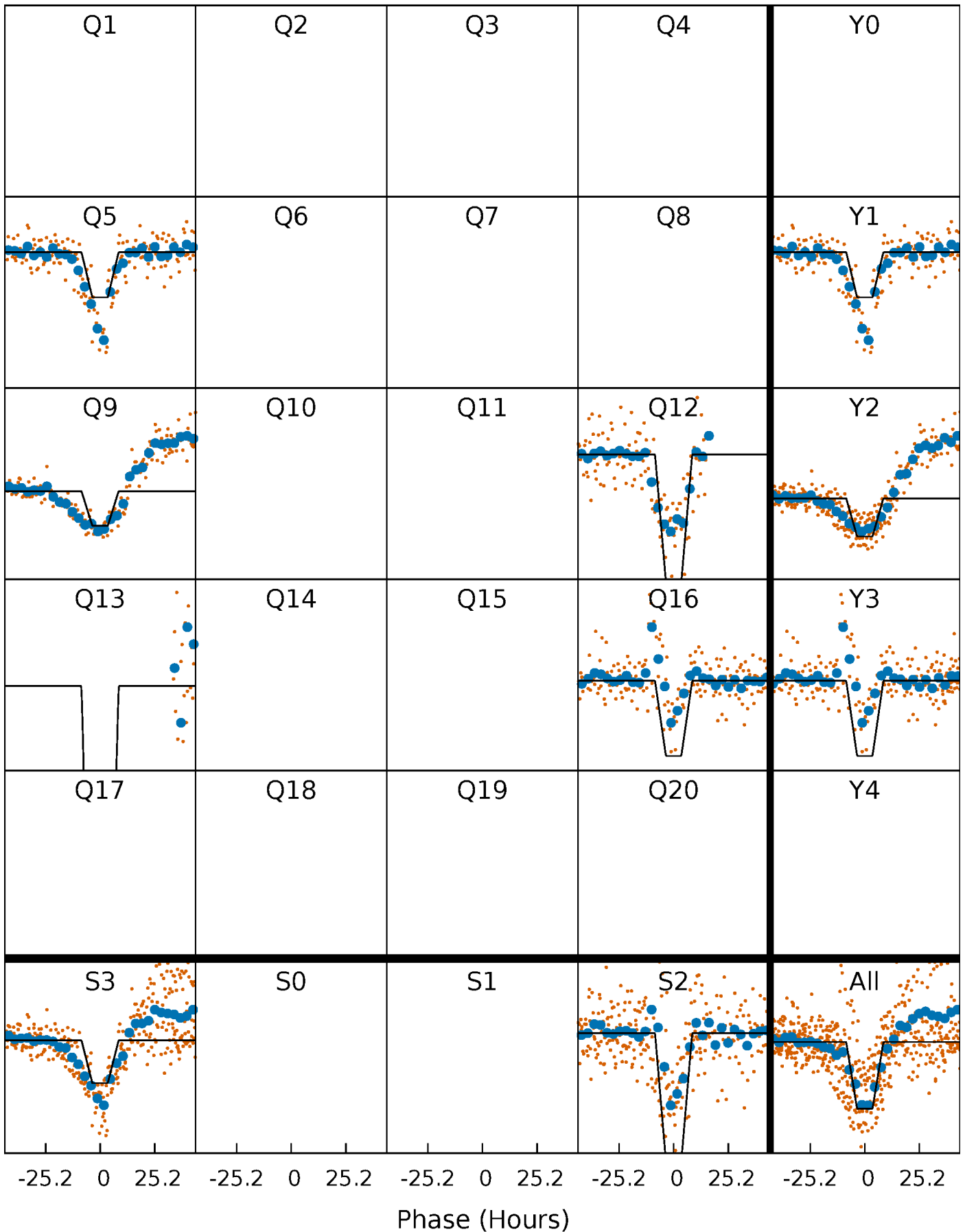
# DV Quarter-Phased Transit Curves

TCE 007373687-02     $P=355.013583$  Days     $T_0=471.458032$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

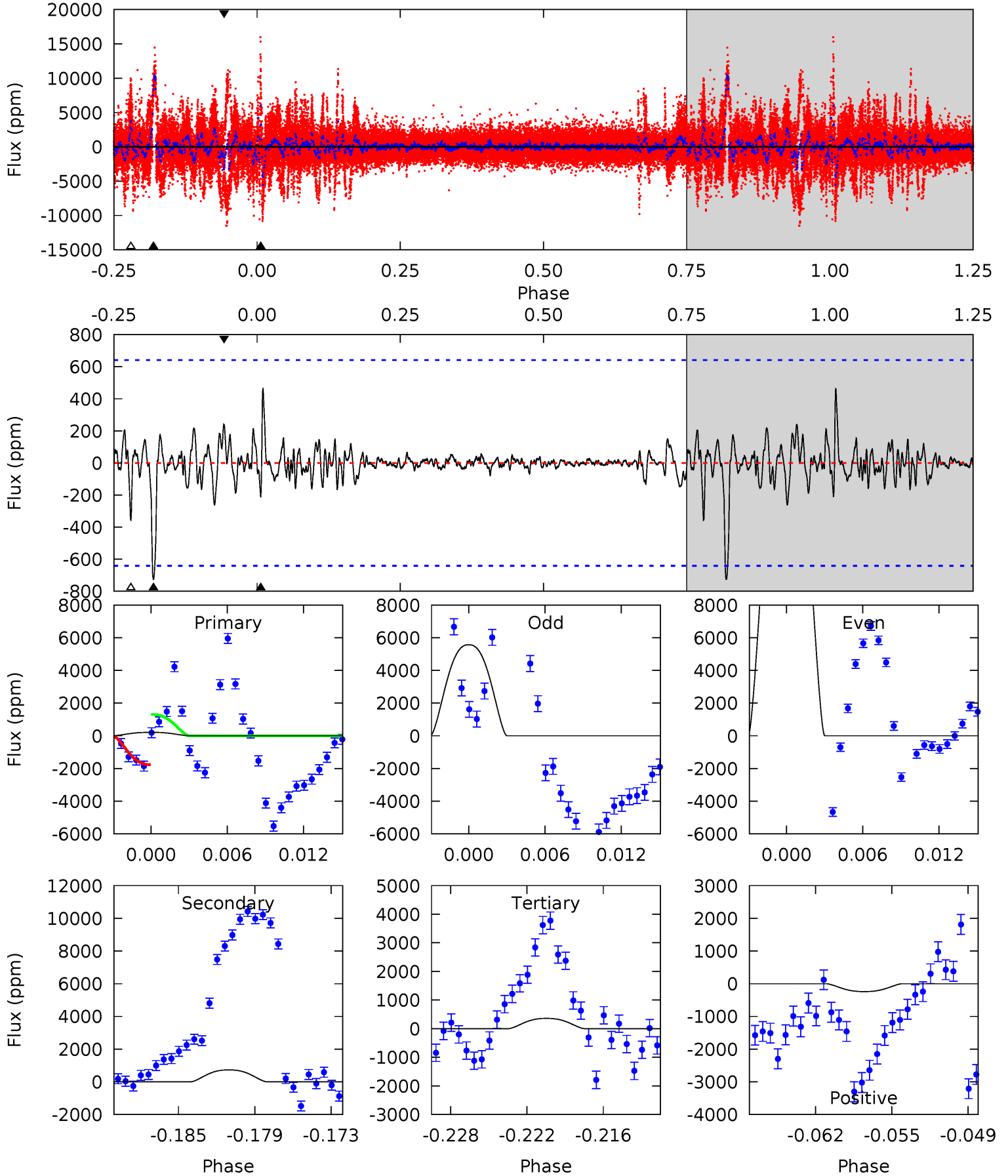
TCE 007373687-02 P=354.781091 Days  $T_0=471.820122$  (BKJD)



# DV Model-Shift Uniqueness Test

007373687-02, P = 355.013583 Days, E = 116.444449 Days

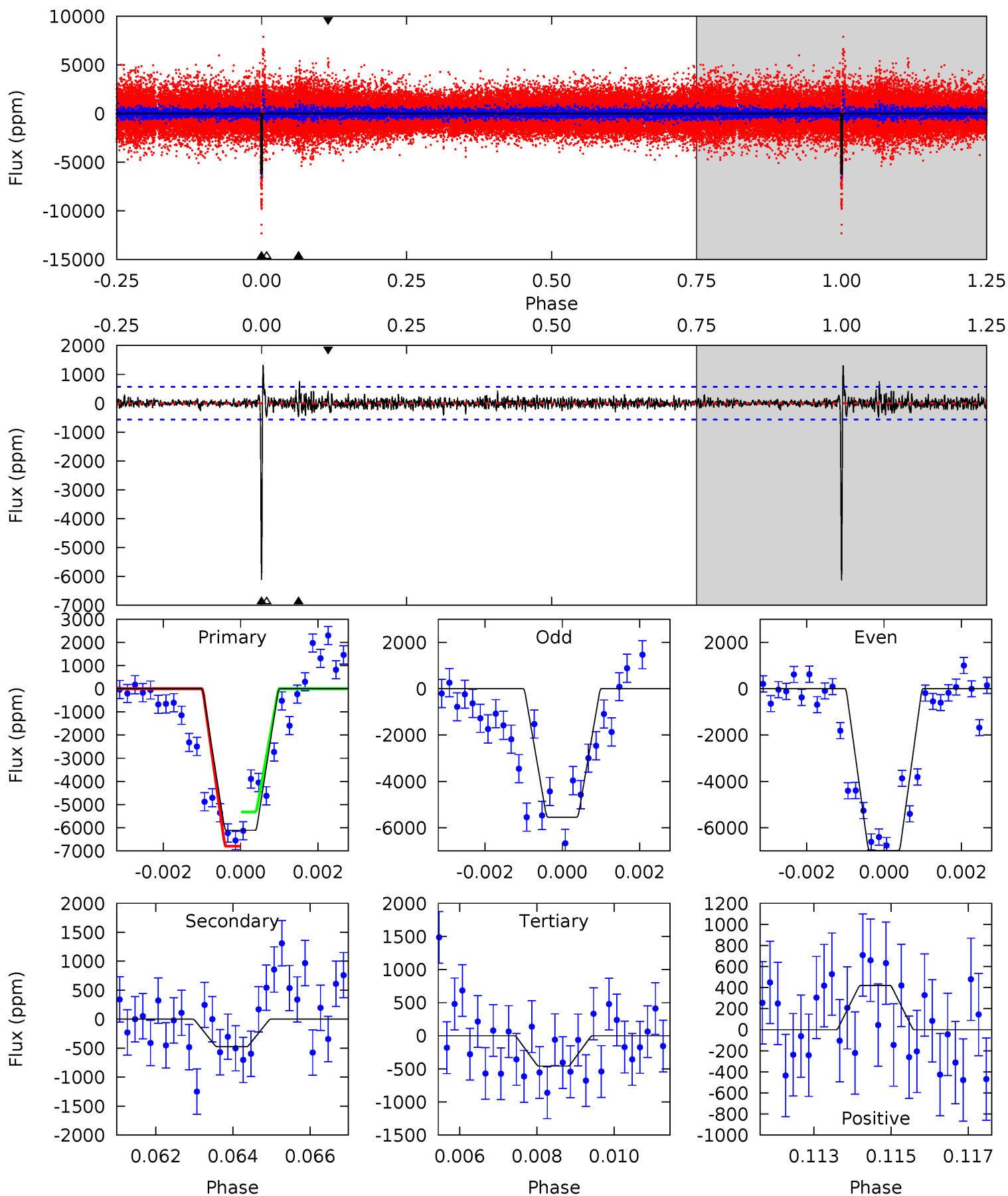
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1.68	5.80	2.86	1.92	5.12	2.74	0.51	-1.18	-0.25	2.94	3.87	52.8	69.9	0.39	0



# Alt Model-Shift Uniqueness Test

007373687-02, P = 354.781091 Days, E = 117.039031 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
57.3	4.47	4.30	3.95	5.32	3.08	1.04	53.0	53.3	0.17	0.52	6.93	1.02	0.18	6.83





### Stellar Parameters For KIC 007373687

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5606^{+169}_{-169}$	$4.557^{+0.050}_{-0.150}$	$-0.320^{+0.300}_{-0.300}$	$0.800^{+0.194}_{-0.077}$	$0.841^{+0.097}_{-0.078}$	$2.319^{+0.489}_{-0.964}$
	+3%/-3%	+1%/-3%	+94%/-94%	+24%/-10%	+12%/-9%	+21%/-42%
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 007373687-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-726 \pm 125$	$9.94^{+1.32}_{-0.82}$	$325^{+20}_{-15}$	$3312^{+106}_{-122}$	$3426^{+887}_{-843}$
Alt.	$-476 \pm 107$	$7.62^{+1.05}_{-0.66}$	$326^{+21}_{-14}$	$3368^{+137}_{-152}$	$3793^{+1225}_{-1194}$

$T_{max}$  = 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

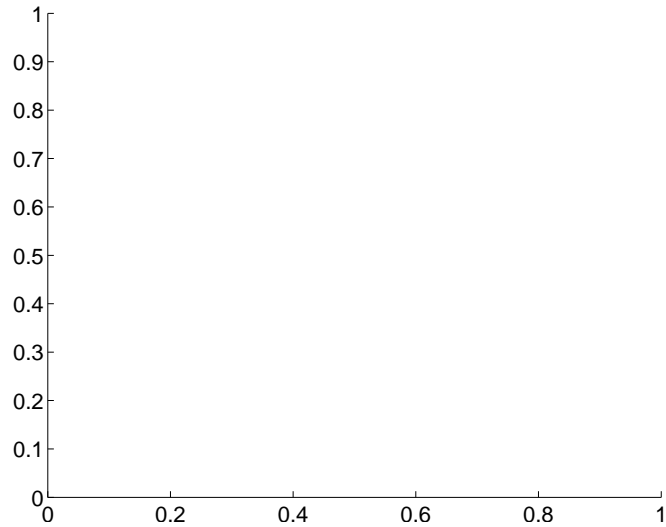
Supplemental centroid analysis for 007373687-02. Kepler magnitude: 15.34. Transit SNR 26.63

There are 0 quarters with good PRF difference image offsets

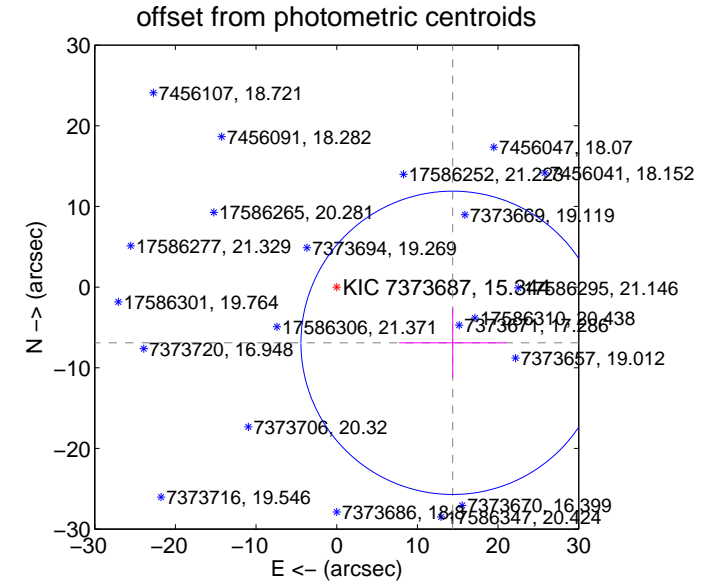
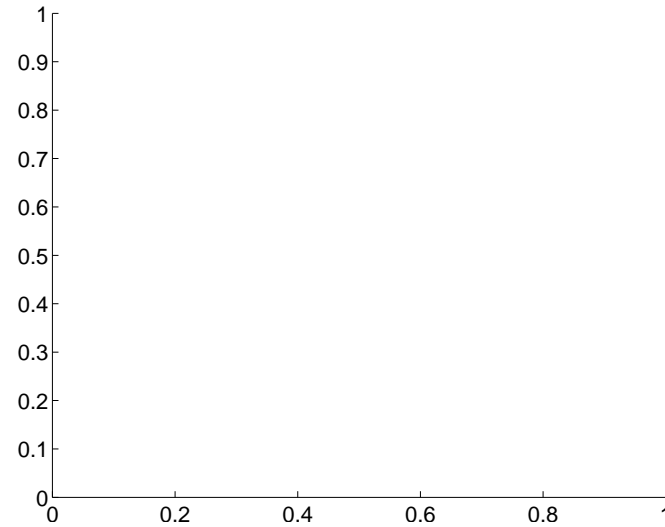
The direct PRF centroid is offset from the target star catalog position by about NaN arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	—	—	—	—
PRF-fit source offset from KIC position	—	—	—	—
photometric centroid source offset	$15.94 \pm 6.27$	2.54	$-14.37 \pm 6.64$	$-6.91 \pm 4.28$

There is no PRF-fit offset from OOT-fit



There is no PRF-fit offset from KIC

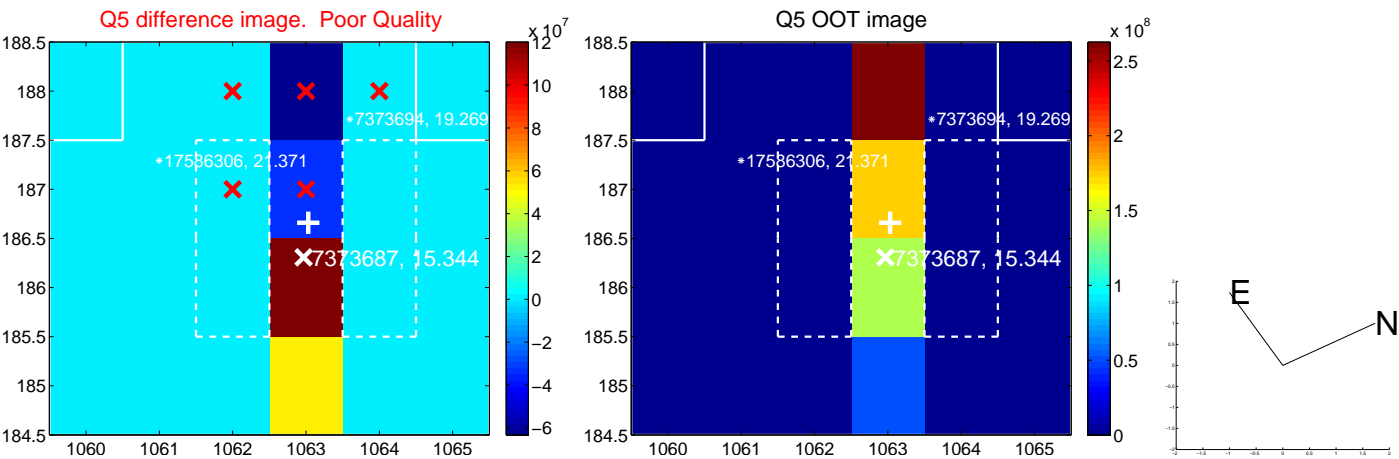


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

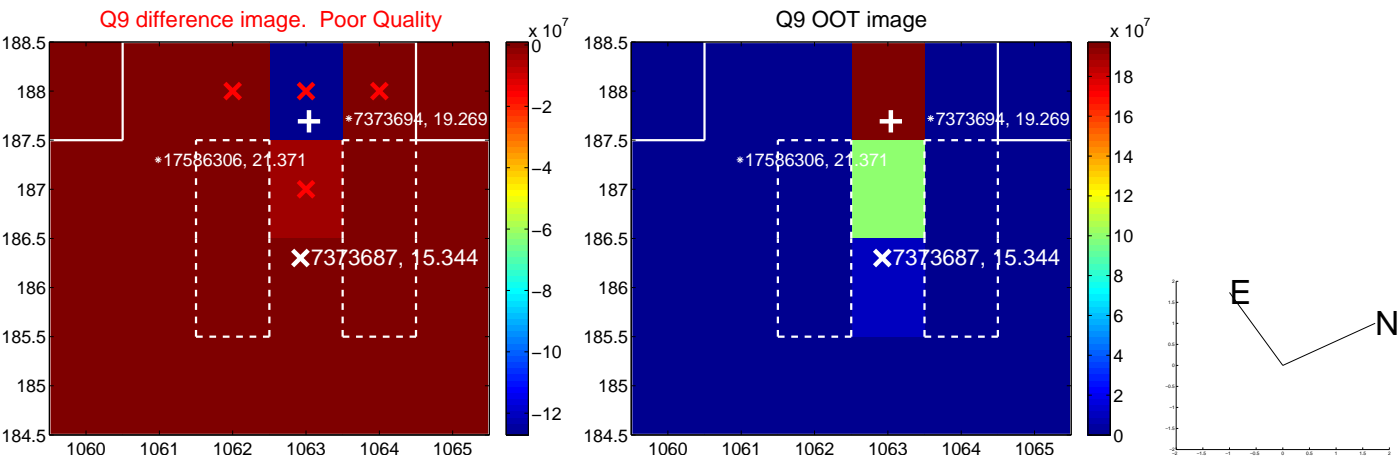
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



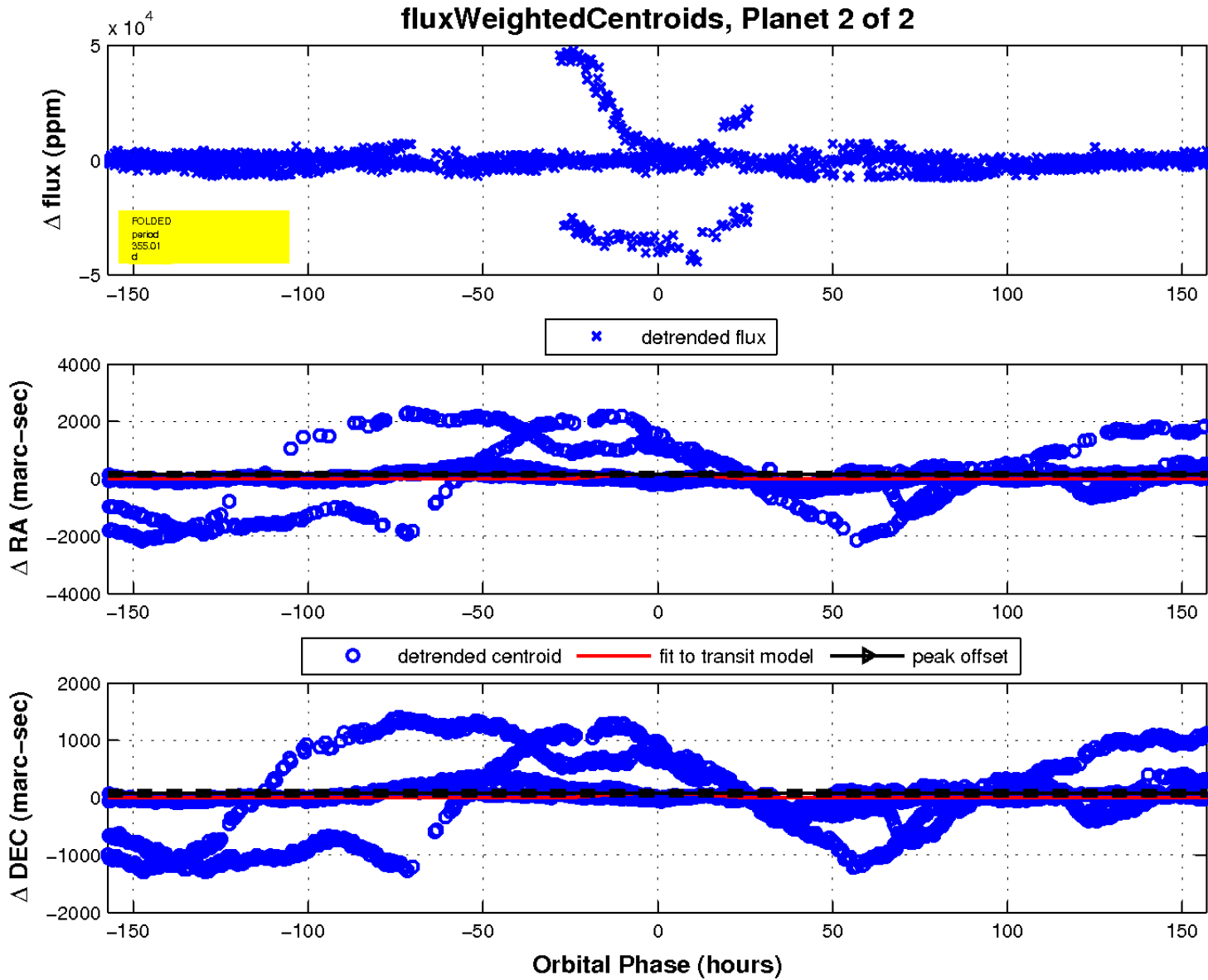
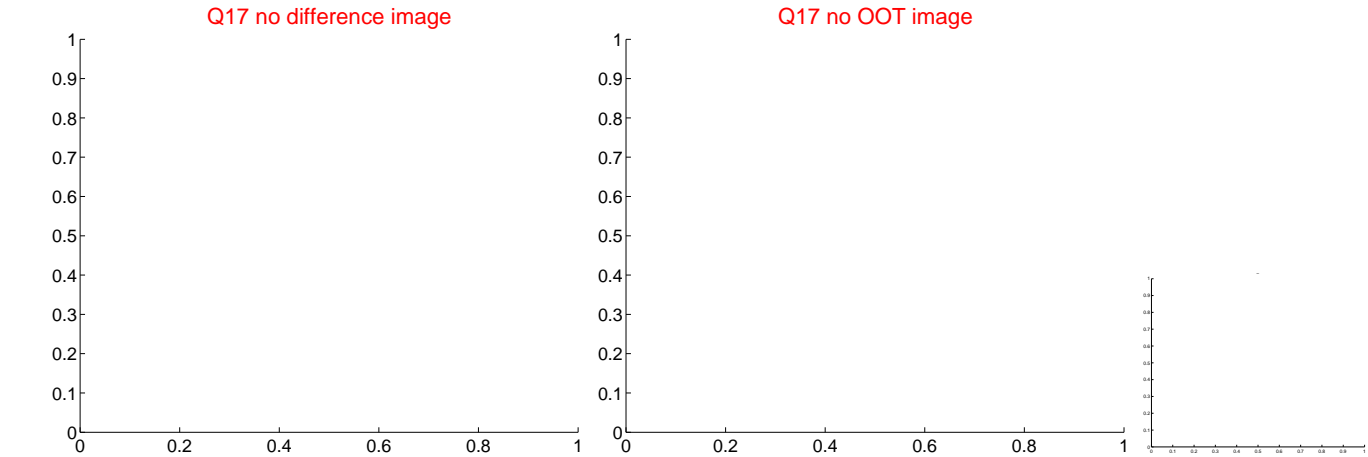
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

