

# KIC 003456972

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003456972-02	OBS	No	665.509508	220.725314	1951.8	7.454	15.3	8.7	0.73	5119	3.40	0.19
003456972-03	OBS	No	265.906986	269.154923	1060.4	3.601	13.7	5.8	0.73	5119	2.52	0.63
003456972-04	OBS	No	538.351744	363.953765	1598.2	3.025	13.9	8.9	0.73	5119	2.94	0.25
003456972-05	OBS	No	258.351842	364.922983	1903.4	12.356	13.2	8.4	0.73	5119	3.49	0.66
003456972-06	OBS	No	370.329878	326.686867	1818.0	1.846	11.9	10.4	0.73	5119	3.08	0.41
003456972-07	OBS	No	322.179264	449.394130	1840.6	4.506	12.8	8.9	0.73	5119	3.17	0.49

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003456972-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
003456972-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
003456972-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS— HALO_GHOST
003456972-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV
003456972-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—MOD_POS_ALT—INCONSISTENT_TRANS— CENT_FEW_DIFFS
003456972-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL_SKYE—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_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.

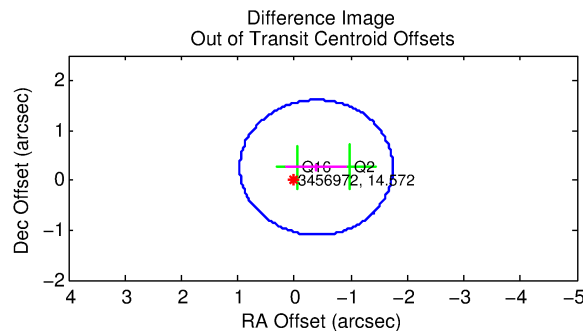
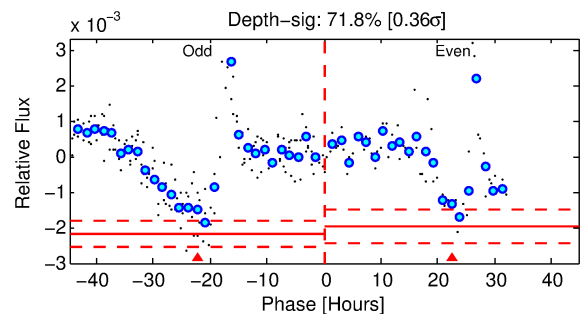
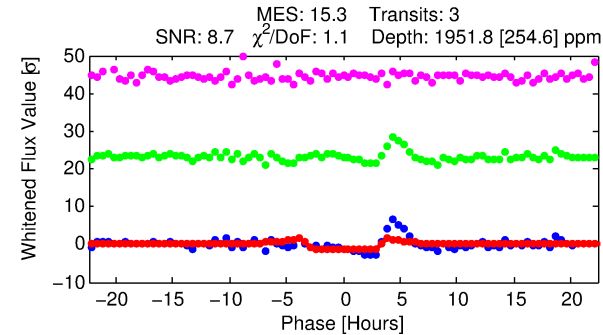
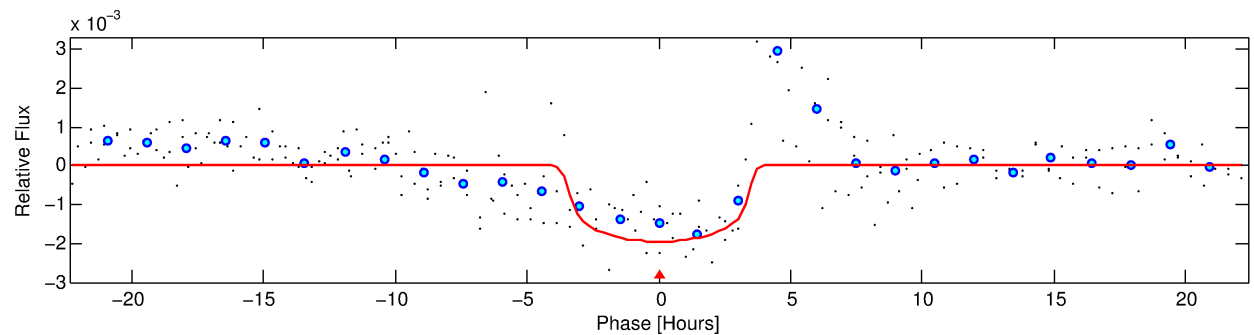
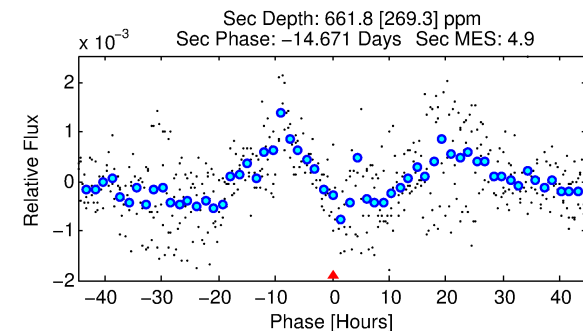
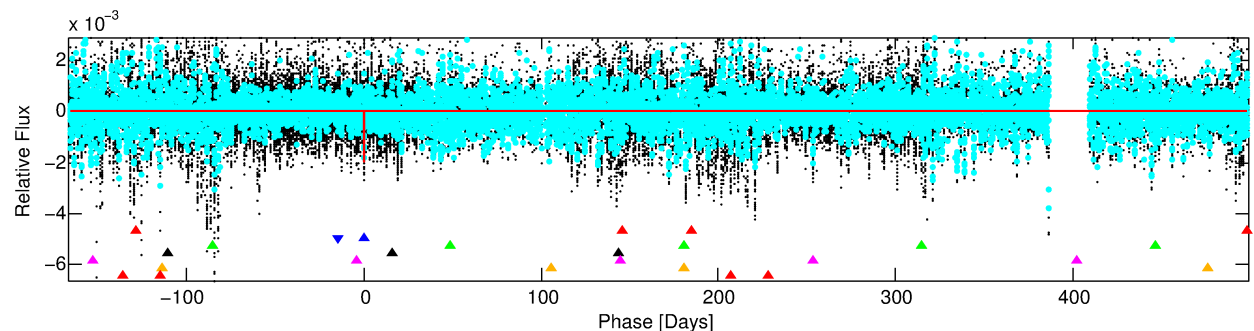
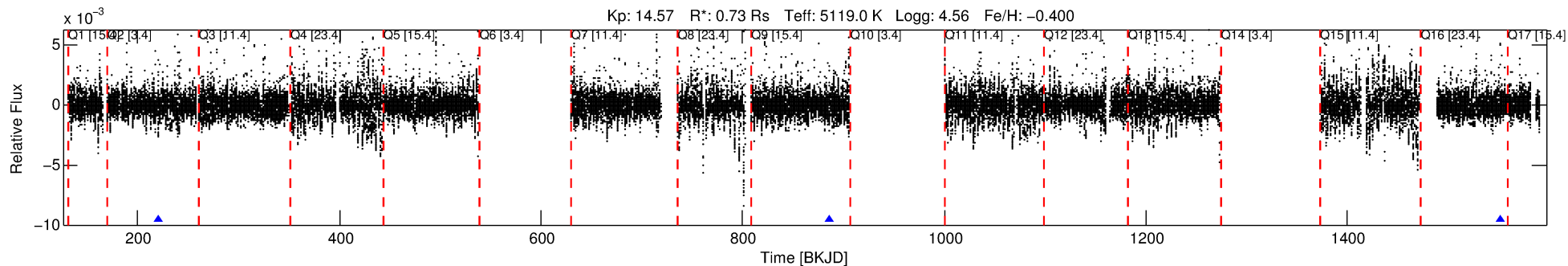
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 003456972-02

No Significant Match Found

# DV One-Page Summary

KIC: 3456972 Candidate: 2 of 7 Period: 665.510 d



## DV Fit Results:

Period = 665.50951 [0.00597] d  
Epoch = 220.7253 [0.0090] BKJD  
Rp/R\* = 0.0429 [0.0123]  
a/R\* = 539.14 [540.80]  
b = 0.68 [0.80]  
Seff = 0.19 [0.04]  
Teq = 168 [8] K  
Rp = 3.40 [1.07] Re  
a = 1.3208 [0.1378] AU  
Ag = 54864.45 [39408.75] [1.39 $\sigma$ ]  
Teffp = 3965 [706] K [5.37 $\sigma$ ]

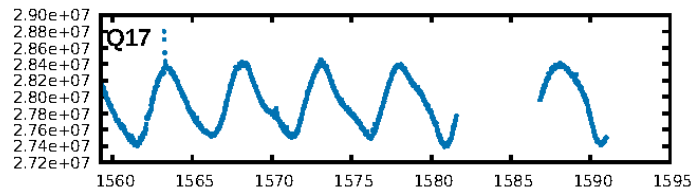
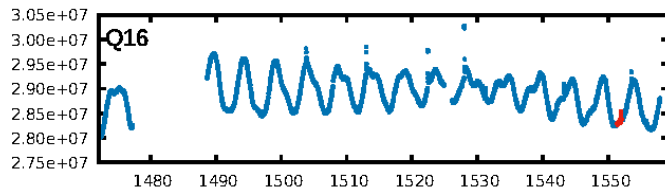
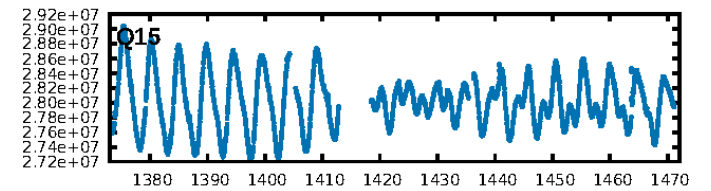
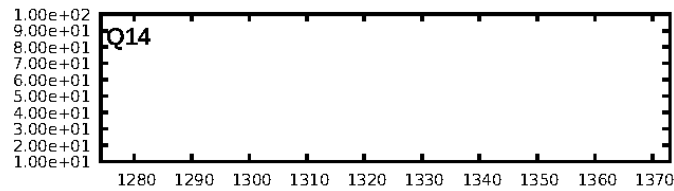
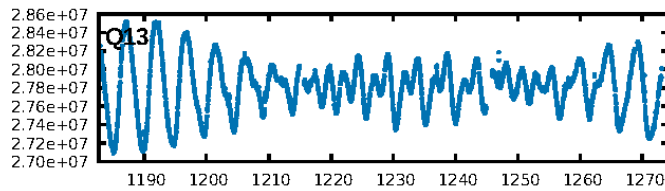
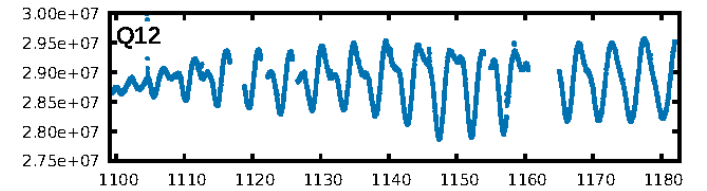
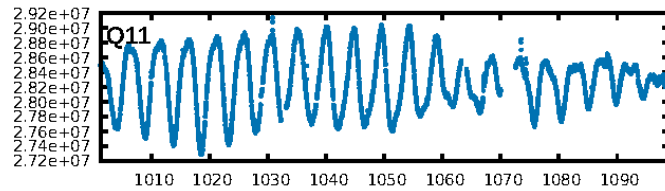
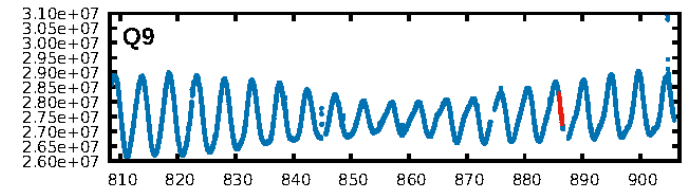
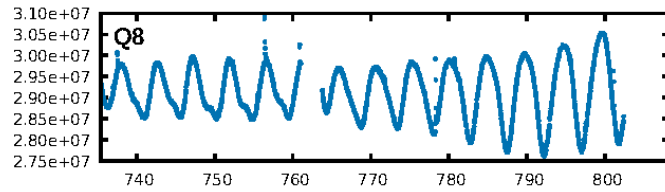
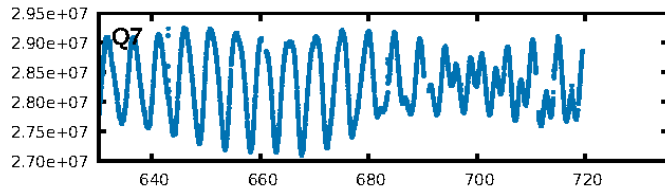
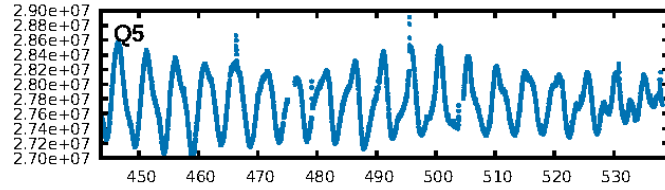
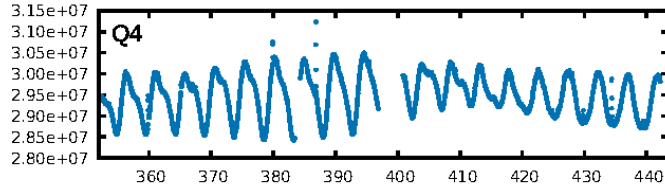
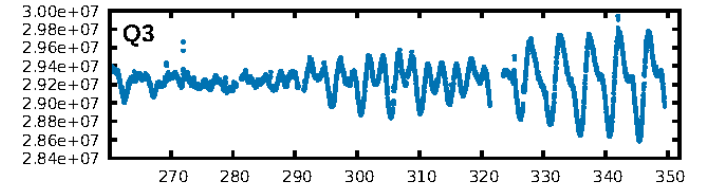
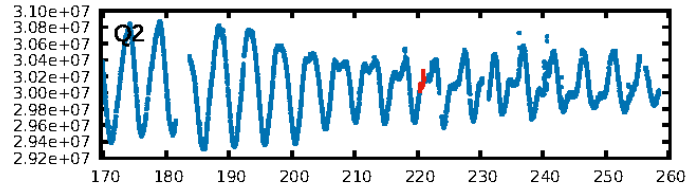
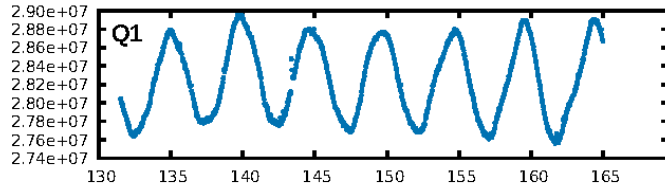
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [379.39 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 68.6%  
ModelChiSquareGof-sig: 92.6%  
Bootstrap-pfa: 2.72e-13  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 3.674  
Centroid-sig: 11.0%  
Centroid-so: 0.429 arcsec [0.72 $\sigma$ ]  
OotOffset-rm: 0.463 arcsec [1.03 $\sigma$ ]  
OotOffset-st: 1/0/1/0 [2]  
KicOffset-rm: 0.524 arcsec [1.40 $\sigma$ ]  
KicOffset-st: 1/0/1/0 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 1.00 [2/2]

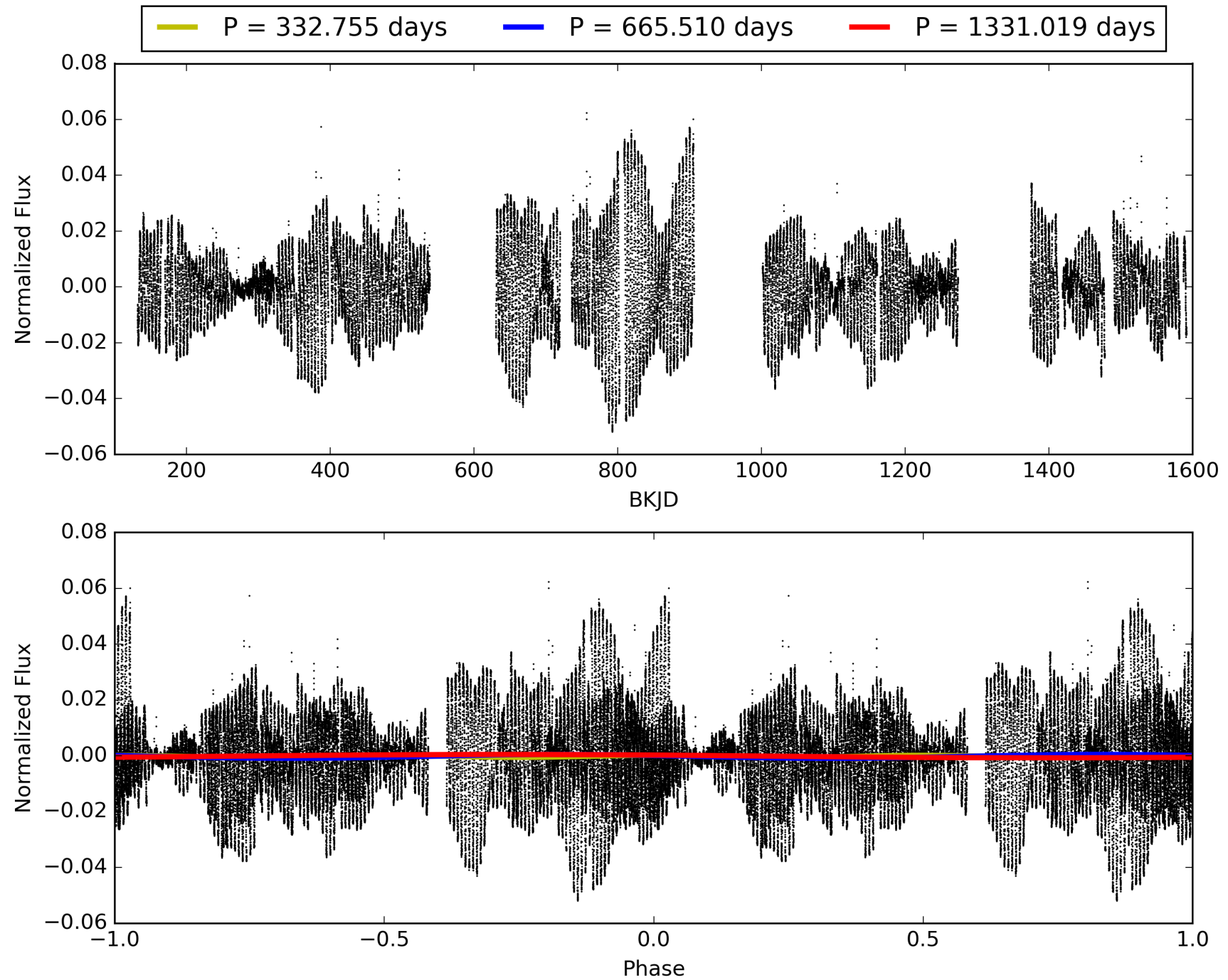
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This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 003456972-02, PDC Light Curves



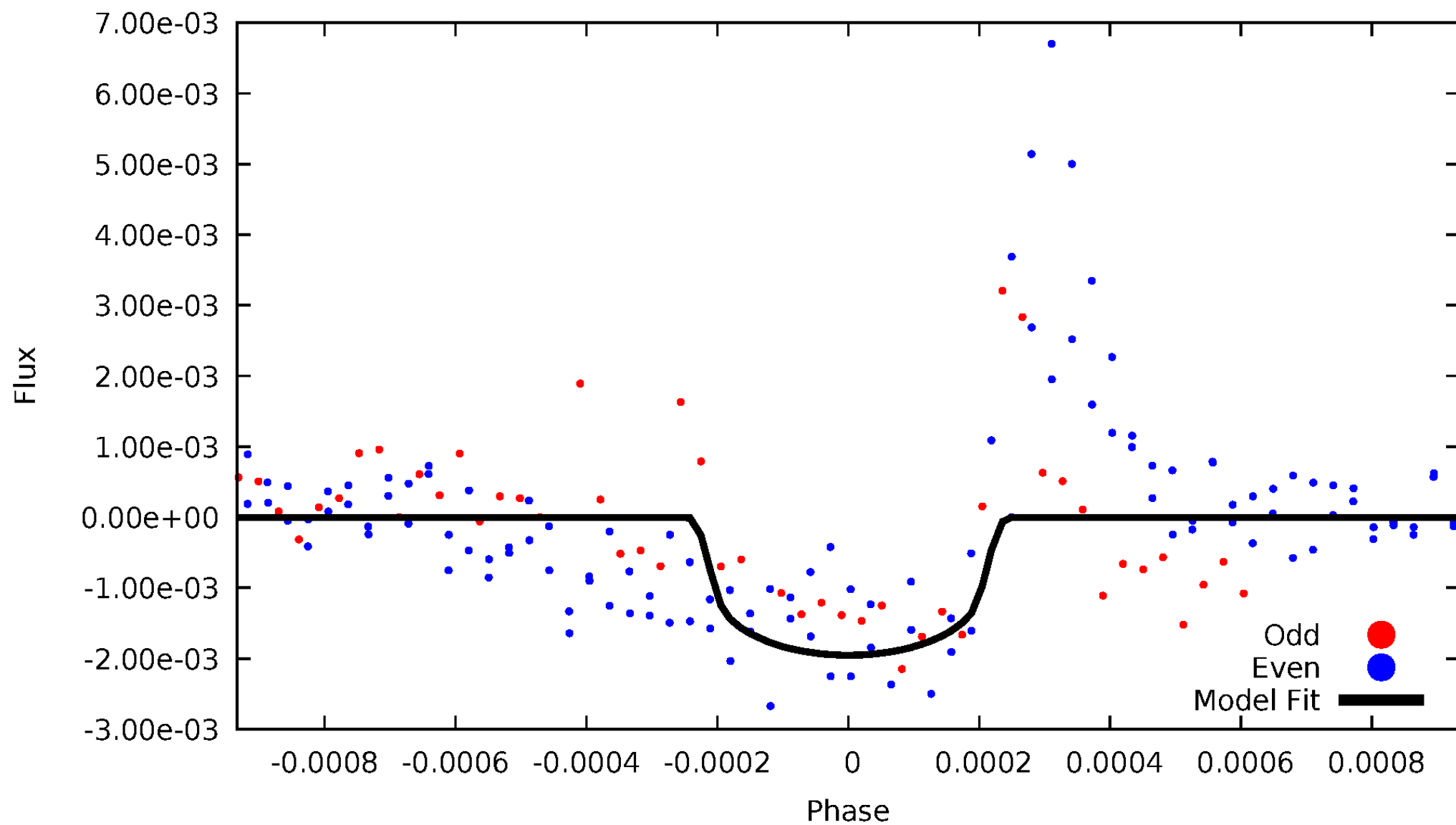
TCE 003456972-02





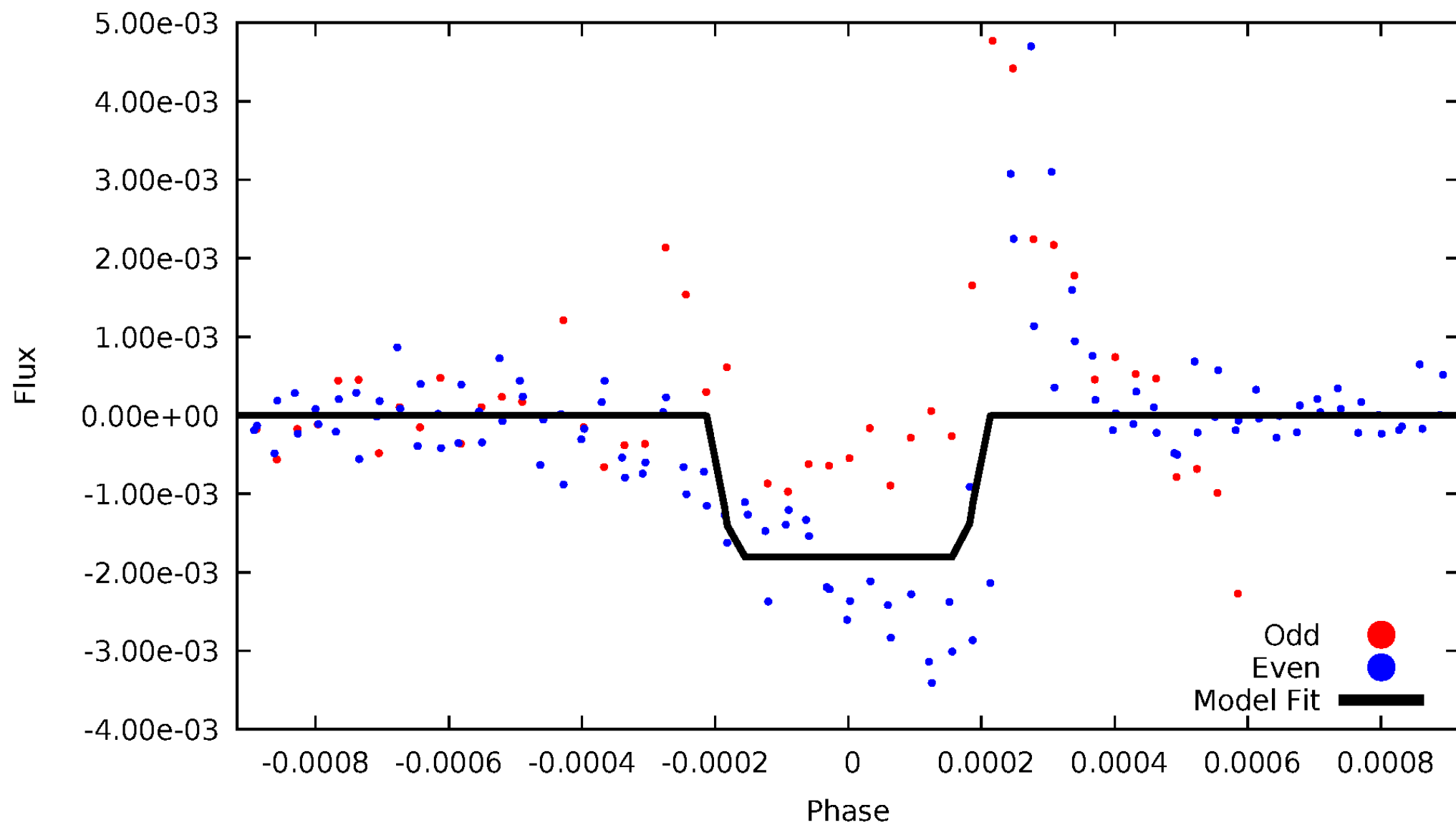
# DV Odd/Even

TCE 003456972-02



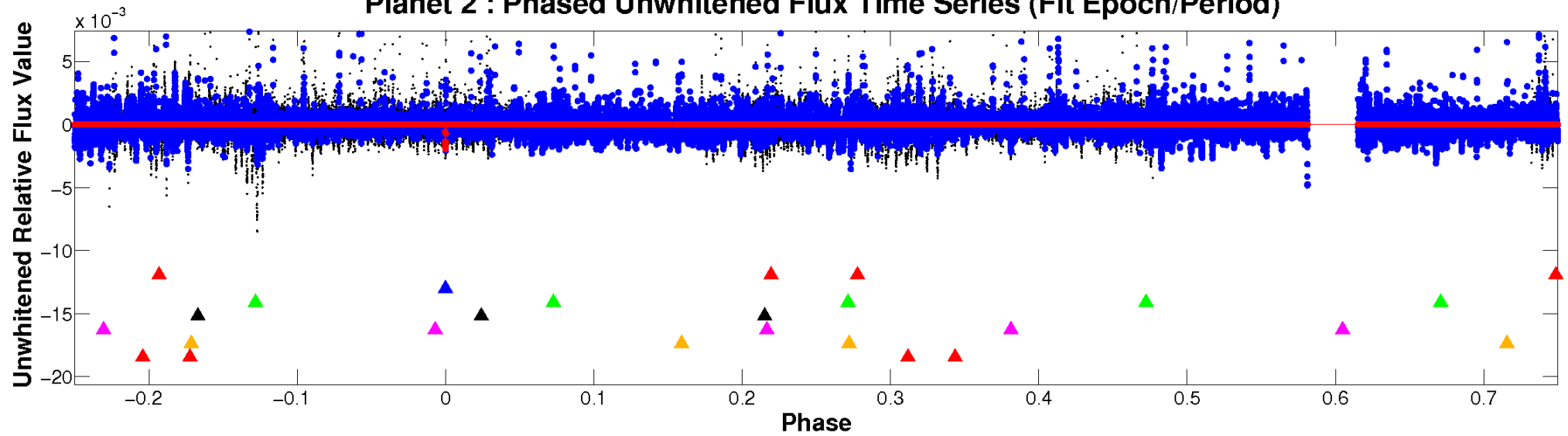
# ALT Odd/Even

TCE 003456972-02

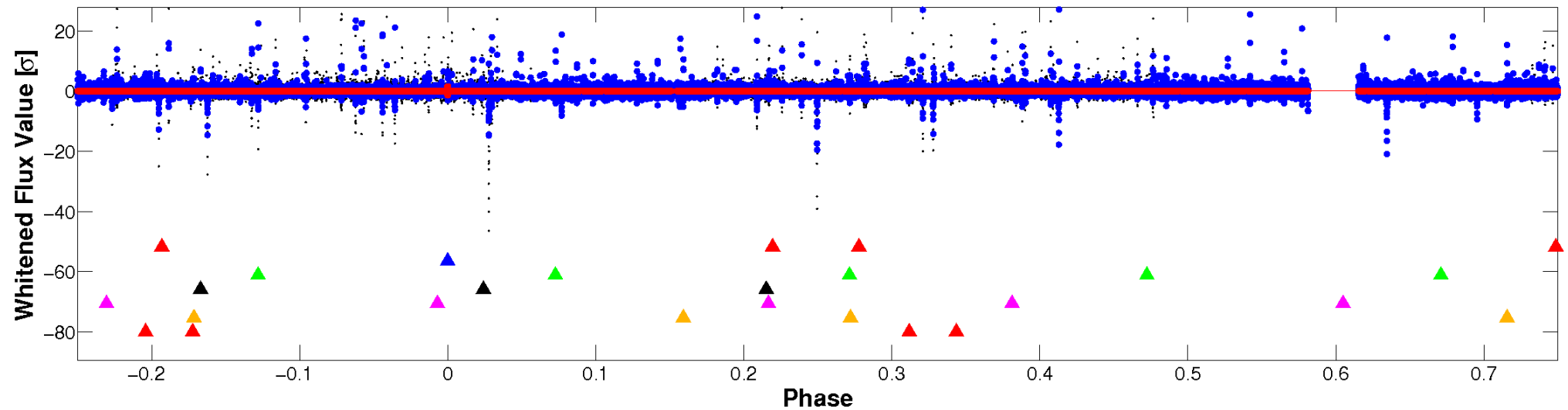


# Non-Whitened Vs. Whitened Light Curve

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

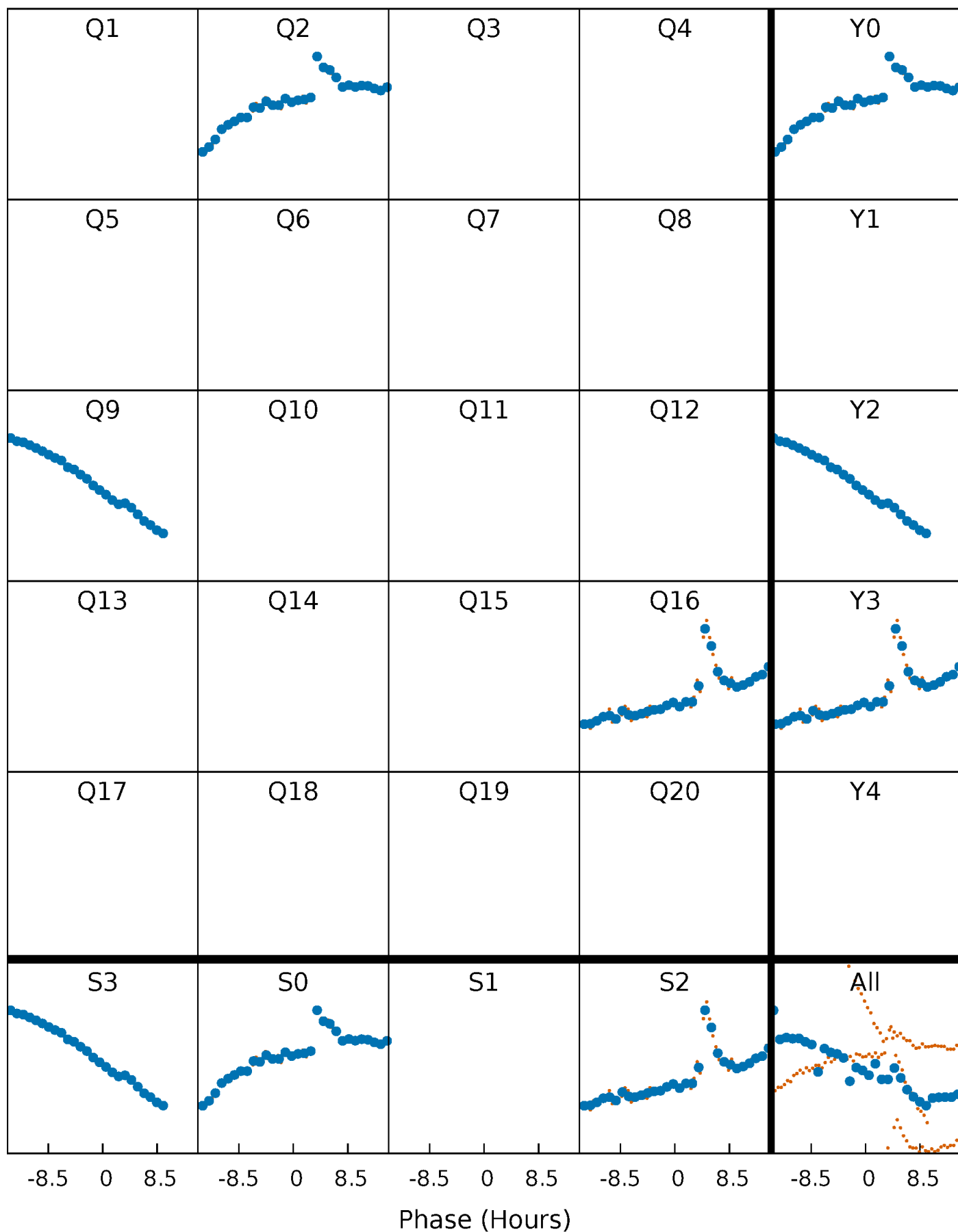


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



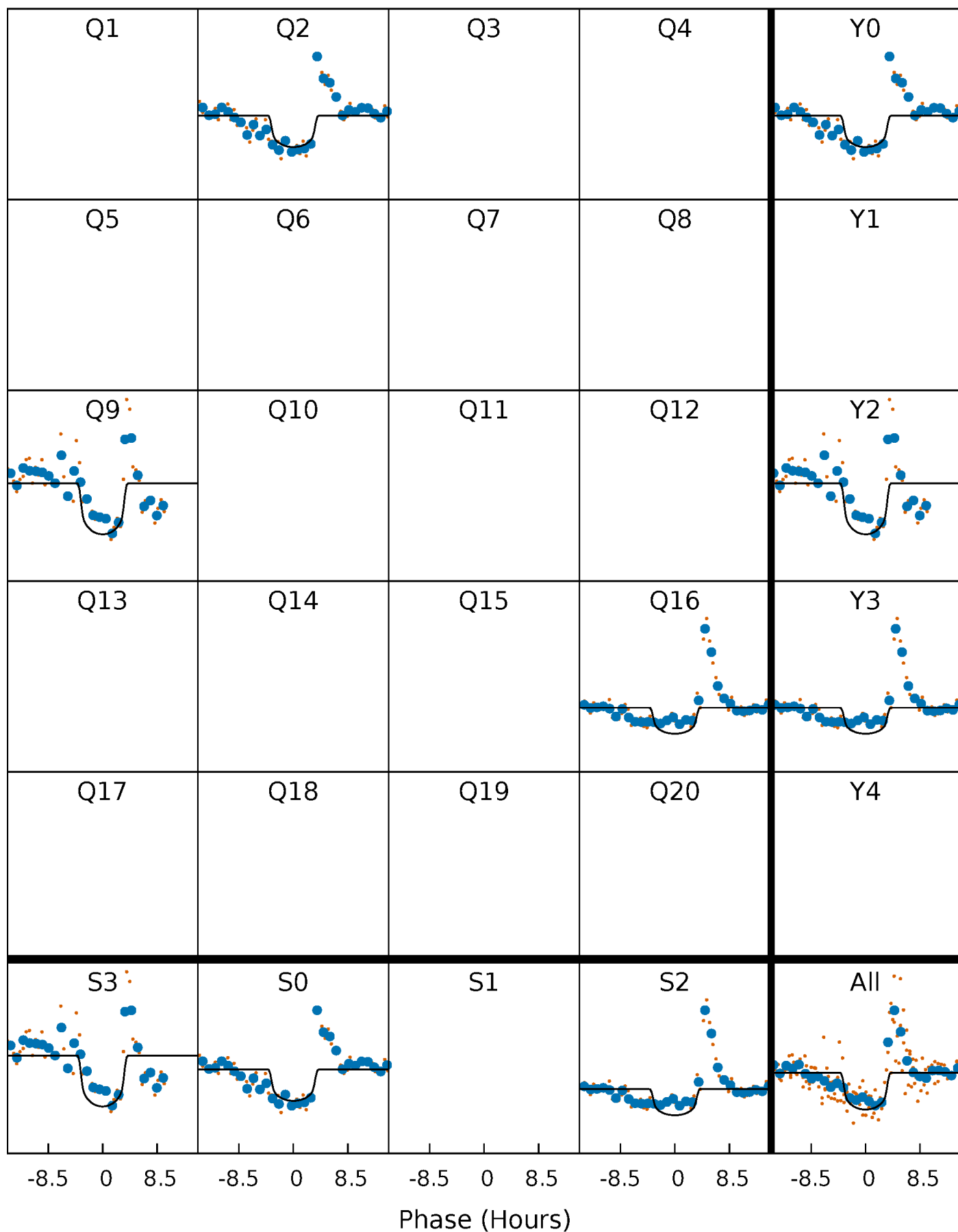
# PDC Quarter-Phased Transit Curves

TCE 003456972-02 P=665.509508 Days  $T_0=220.725314$  (BKJD)



# DV Quarter-Phased Transit Curves

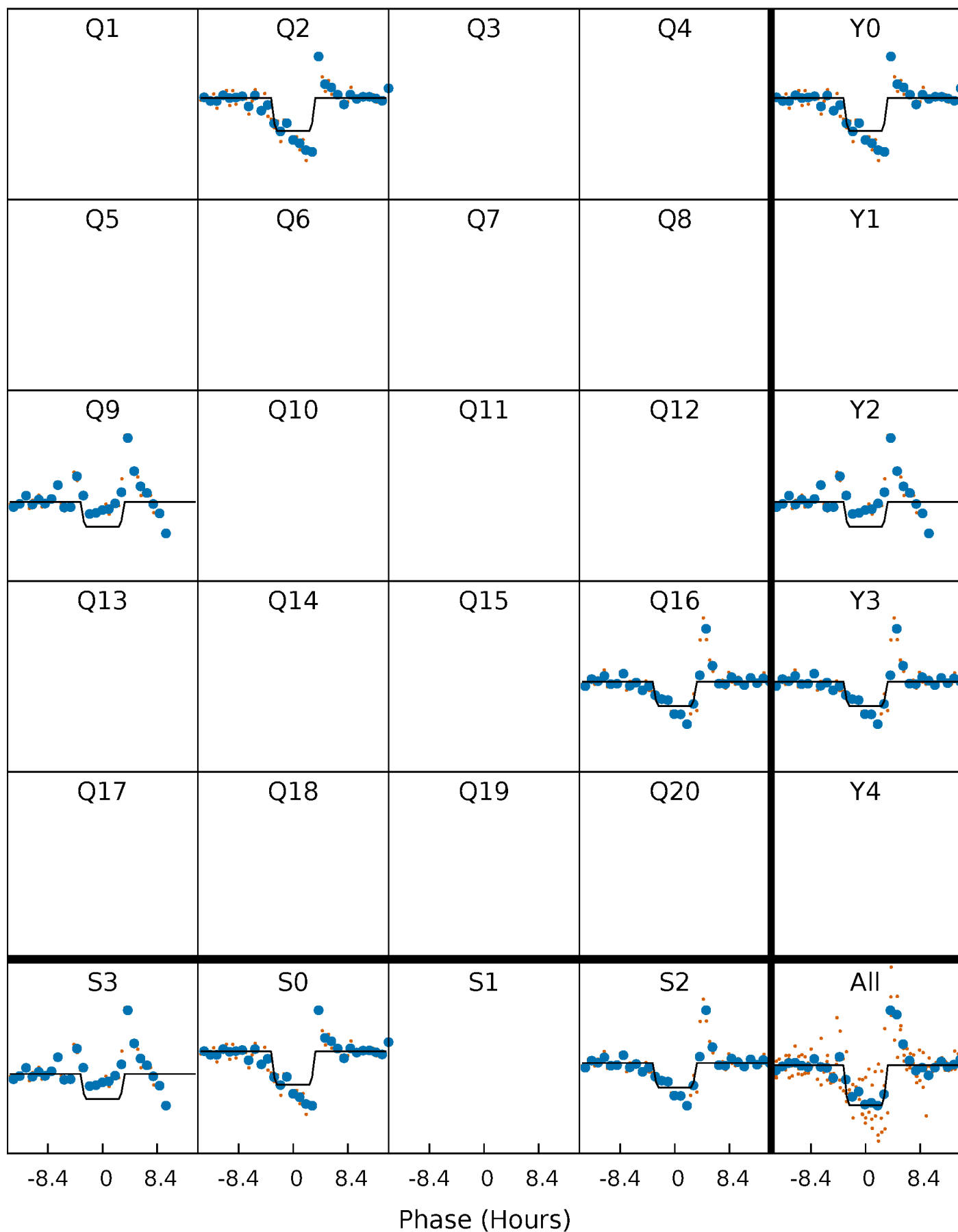
TCE 003456972-02     $P=665.509508$  Days     $T_0=220.725314$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

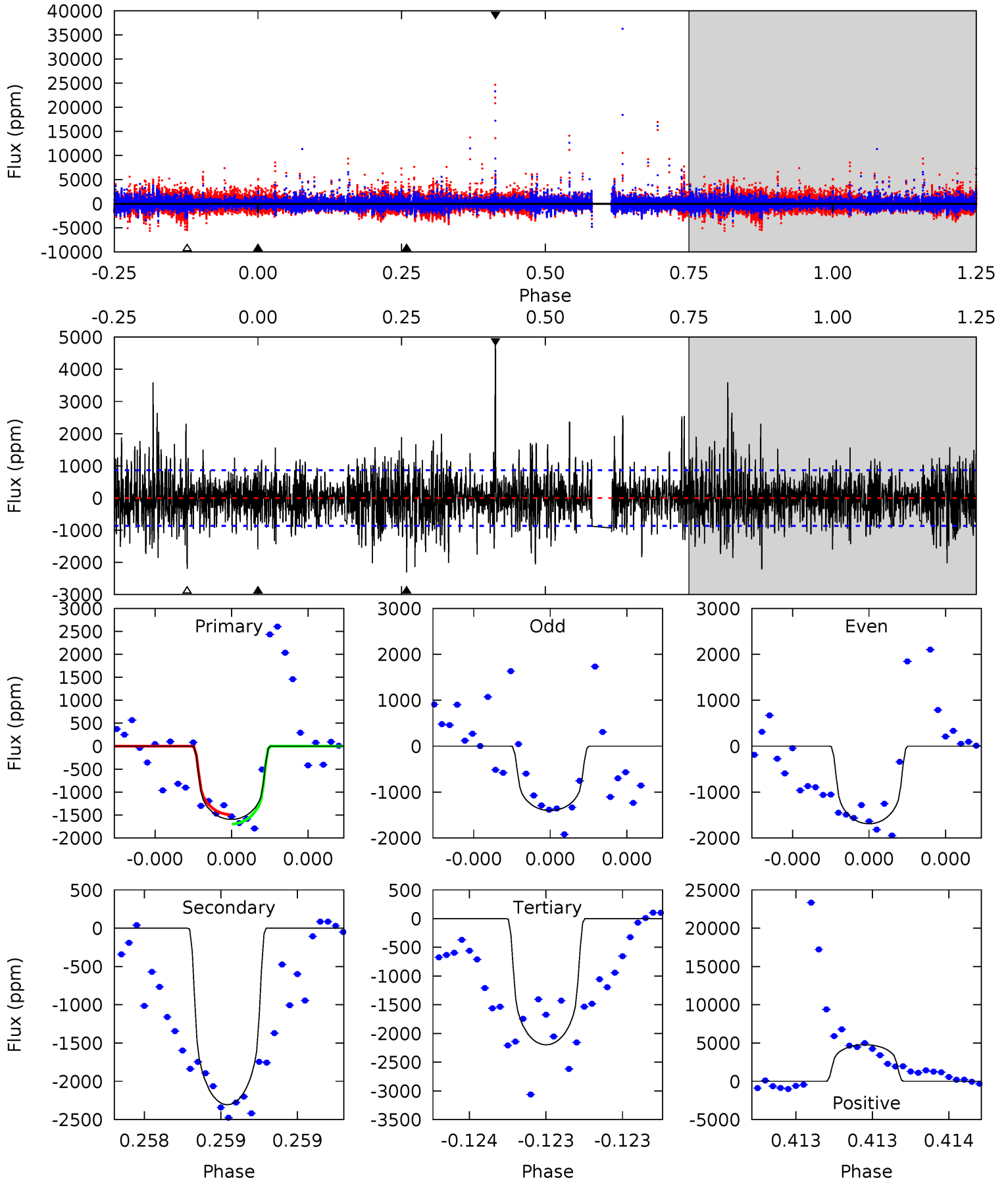
TCE 003456972-02     $P=665.521049$  Days     $T_0=220.726264$  (BKJD)



# DV Model-Shift Uniqueness Test

003456972-02, P = 665.509508 Days, E = 220.725314 Days

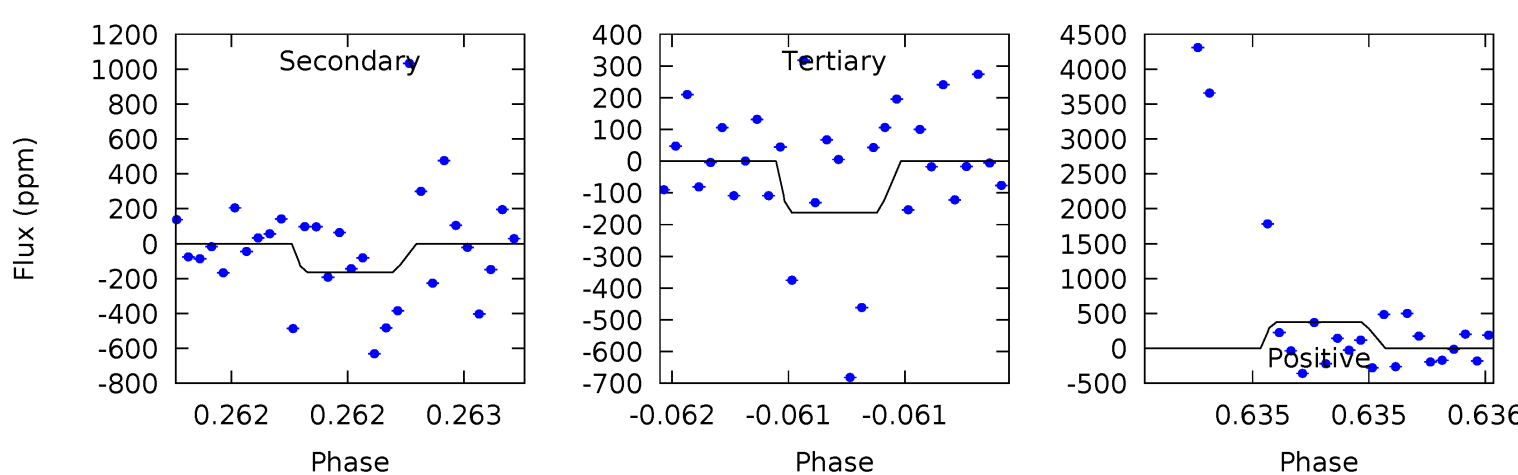
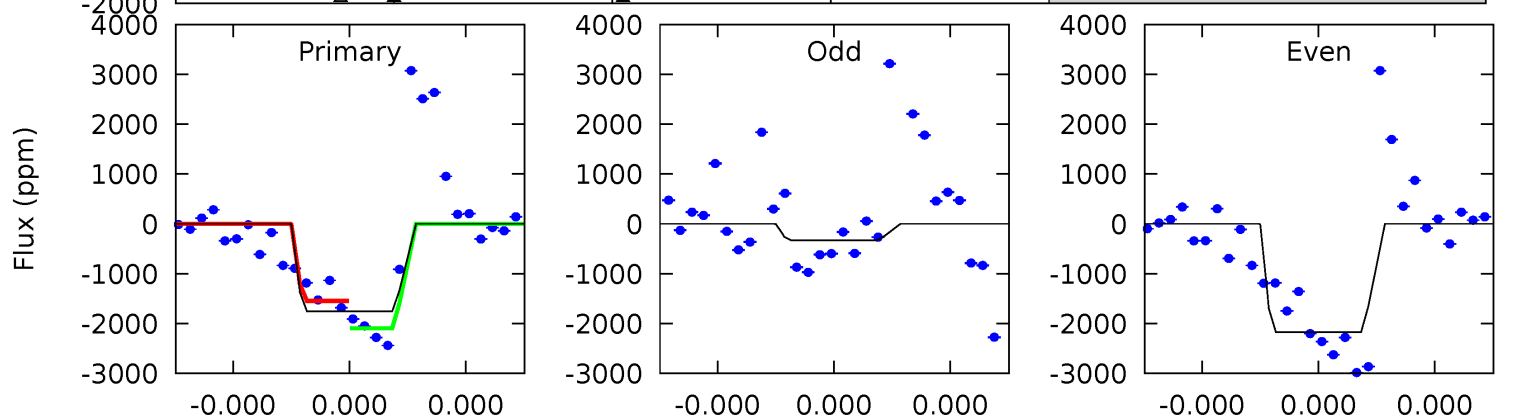
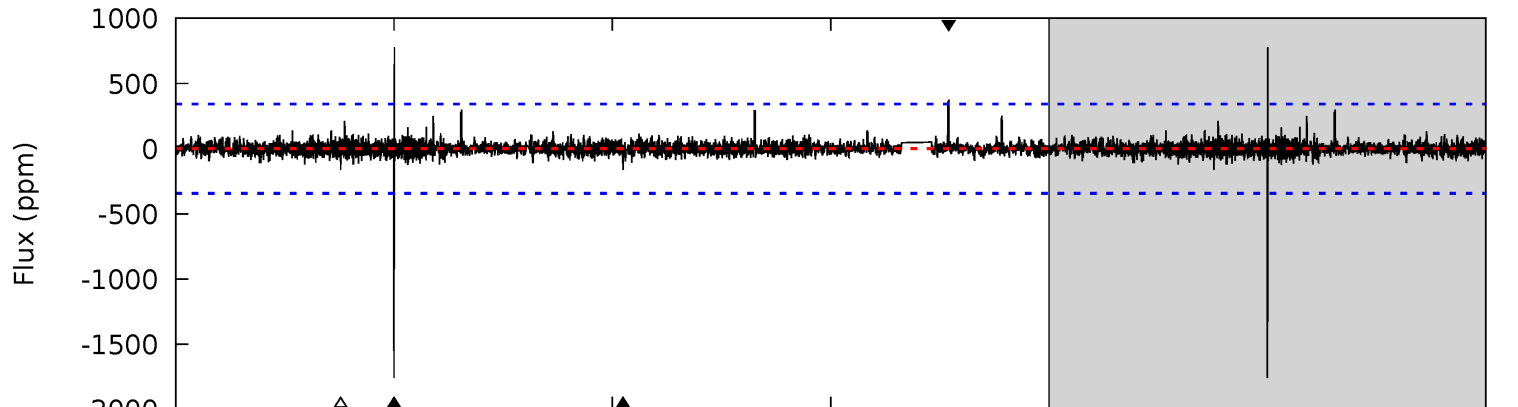
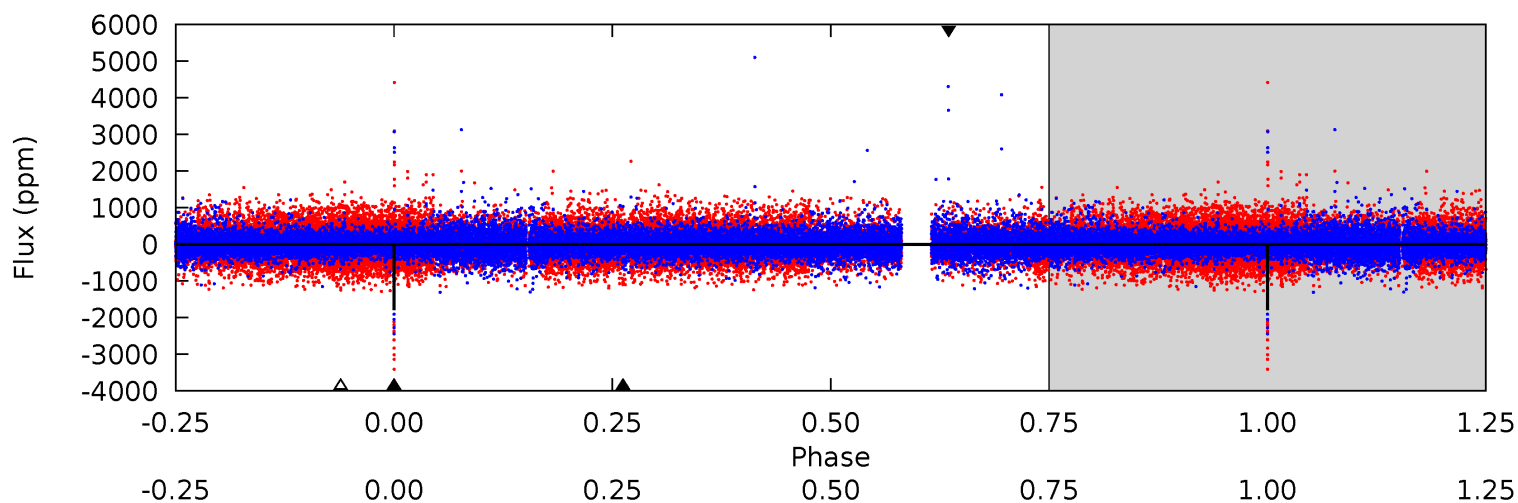
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.3	14.9	14.2	30.8	5.58	3.49	3.73	-3.89	-20.6	0.70	-16.0	0.68	1.11	0.67	0.66



# Alt Model-Shift Uniqueness Test

003456972-02, P = 665.521049 Days, E = 220.726264 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
28.8	2.69	2.66	6.13	5.60	3.52	0.56	26.1	22.7	0.03	-3.45	15.1	0.78	0.31	4.39



### Stellar Parameters For KIC 003456972

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5119^{+153}_{-153}$	$4.556^{+0.080}_{-0.080}$	$-0.400^{+0.300}_{-0.300}$	$0.727^{+0.092}_{-0.083}$	$0.693^{+0.101}_{-0.043}$	$2.544^{+0.847}_{-0.580}$
	+3%/-3%	+2%/-2%	+75%/-75%	+13%/-11%	+15%/-6%	+33%/-23%
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 003456972-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-2306 \pm 155$	$3.48^{+0.99}_{-0.95}$	$235^{+10}_{-10}$	$5334^{+858}_{-529}$	$184827^{+172796}_{-75084}$
Alt.	$-164 \pm 61$	$3.36^{+1.08}_{-1.03}$	$235^{+10}_{-9}$	$3337^{+407}_{-335}$	$14160^{+15773}_{-7202}$

$T_{\text{max}}$  = 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

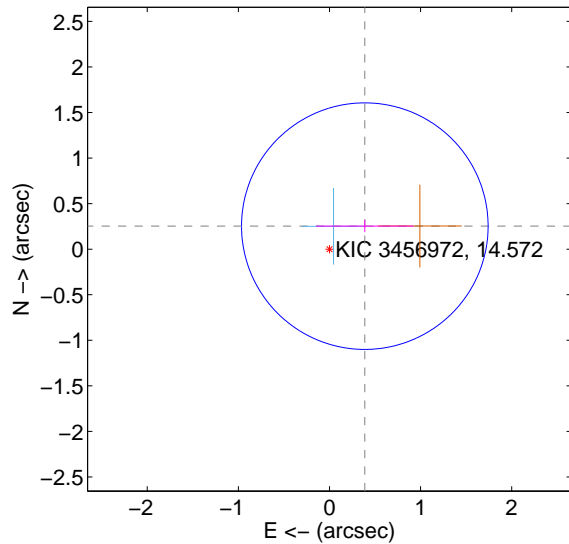
Supplemental centroid analysis for 003456972-02. Kepler magnitude: 14.57. Transit SNR 8.72

There are 1 quarters with good PRF difference image offsets

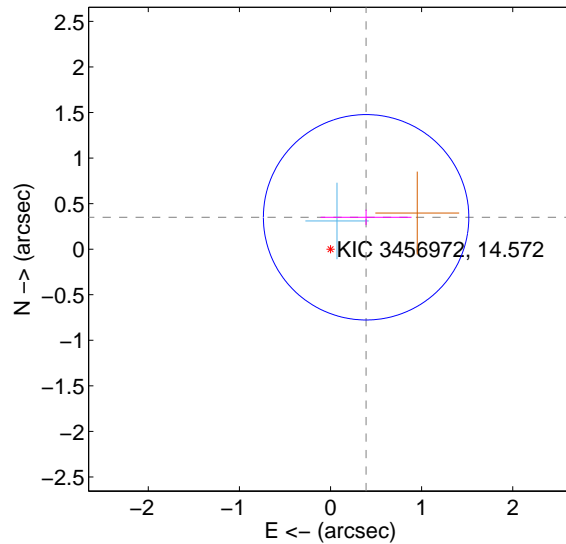
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.463 \pm 0.451$	1.03	$-0.388 \pm 0.536$	$0.253 \pm 0.067$
PRF-fit source offset from KIC position	$0.524 \pm 0.376$	1.40	$-0.390 \pm 0.499$	$0.350 \pm 0.084$
photometric centroid source offset	$0.43 \pm 0.59$	0.72	$0.20 \pm 0.67$	$0.38 \pm 0.57$

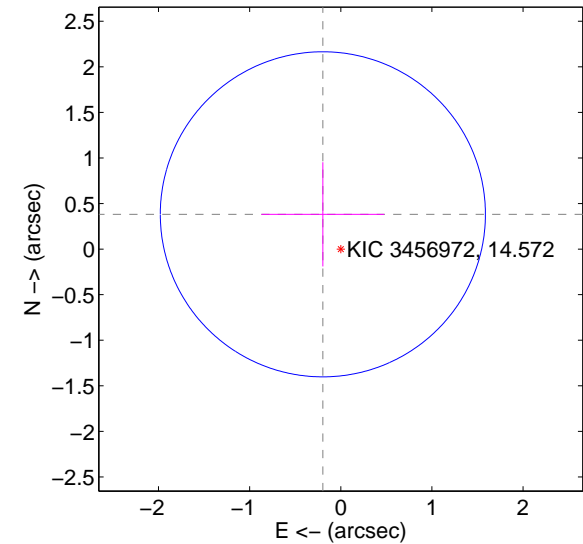
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



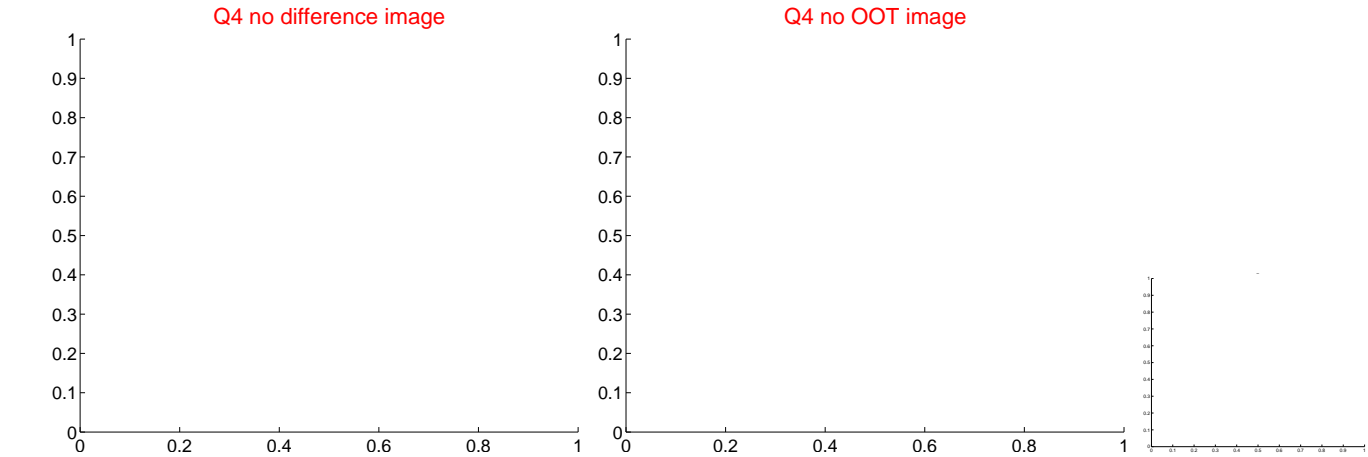
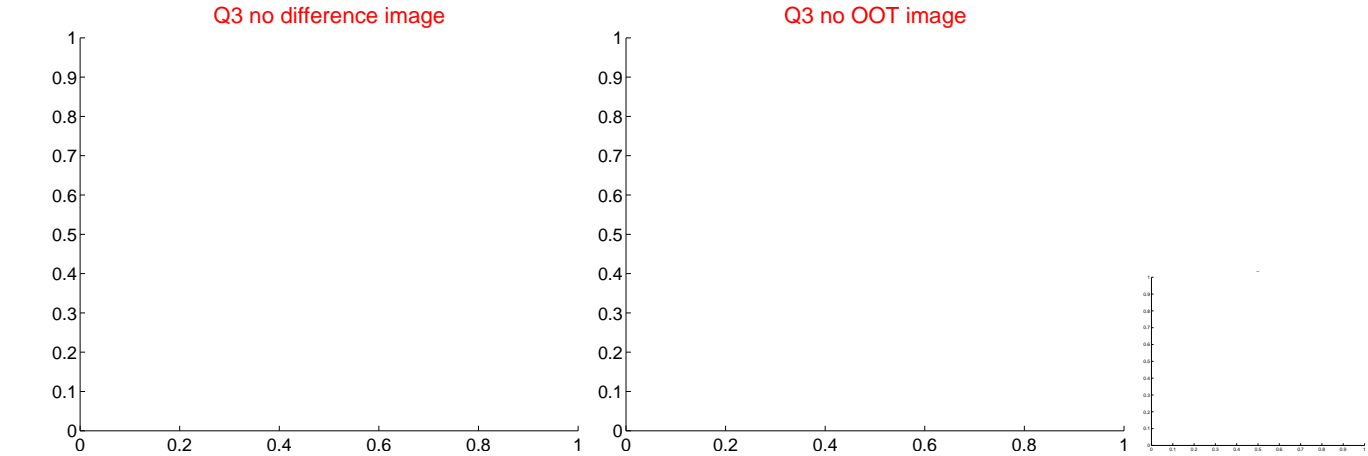
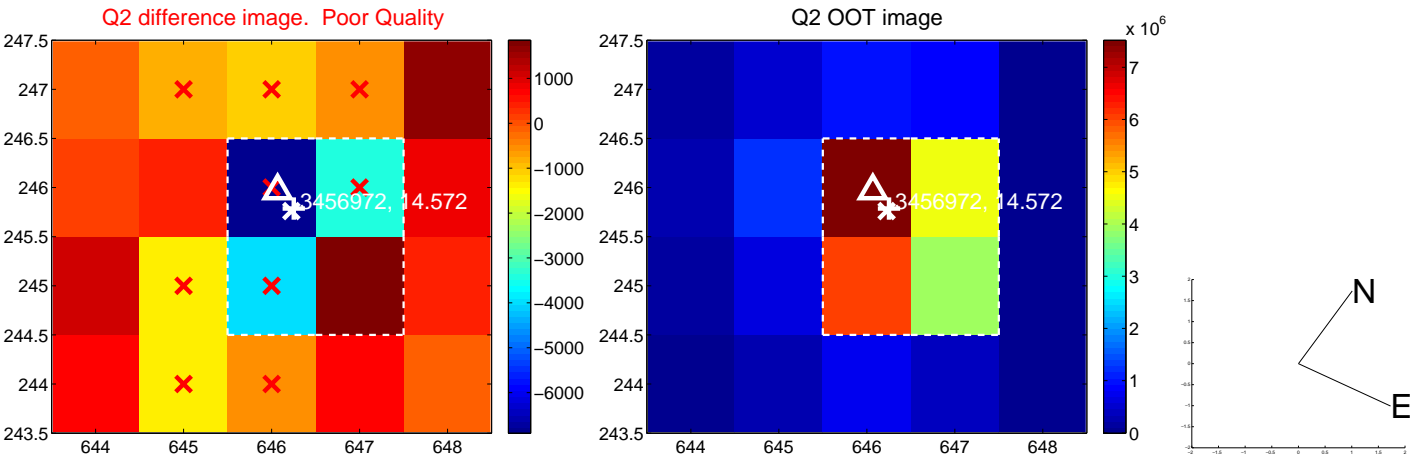
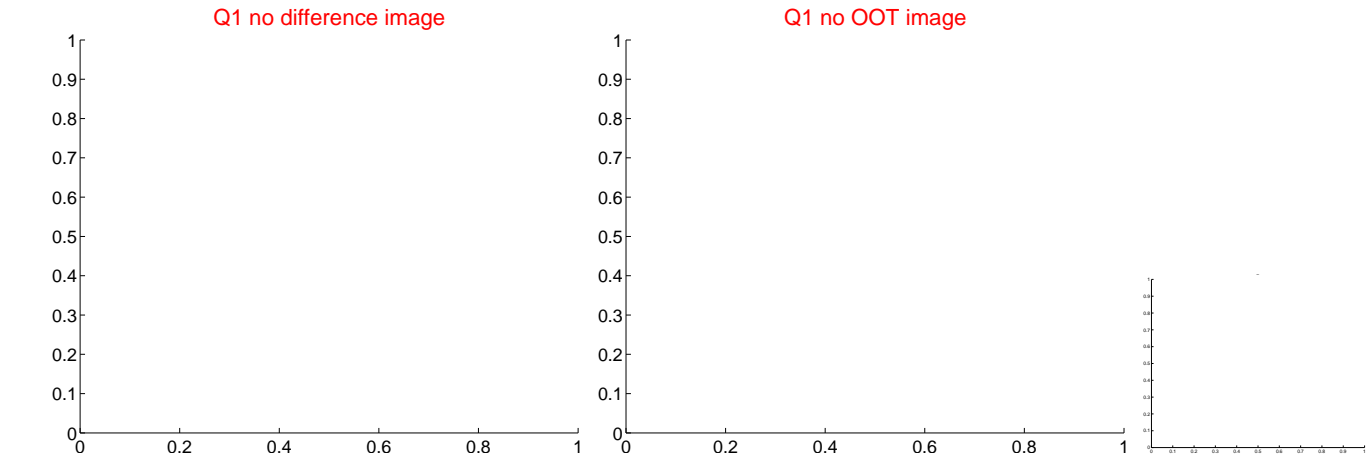
offset from photometric centroids



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



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



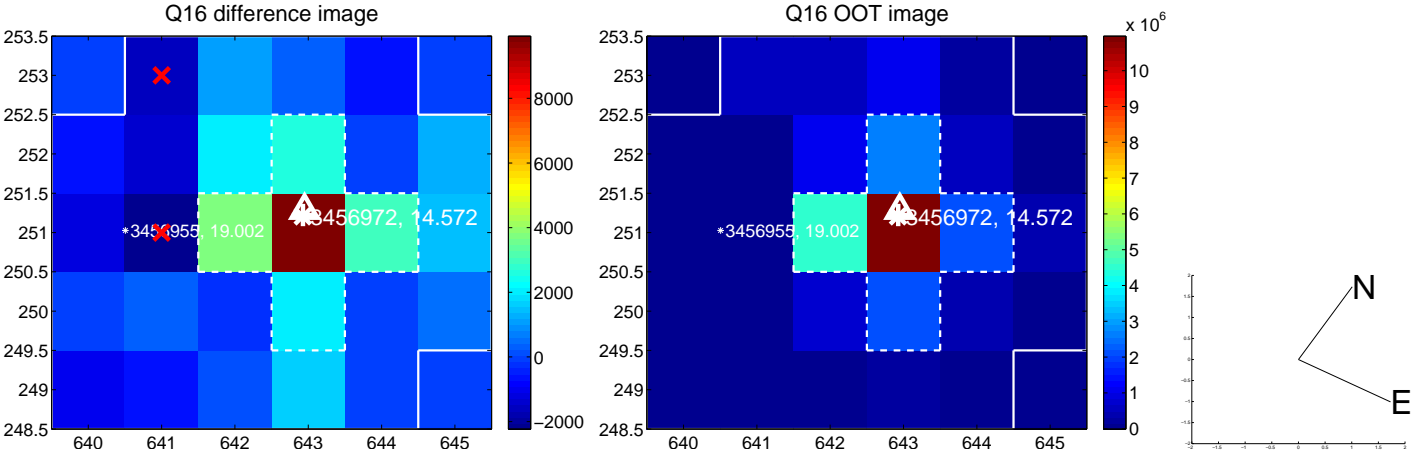
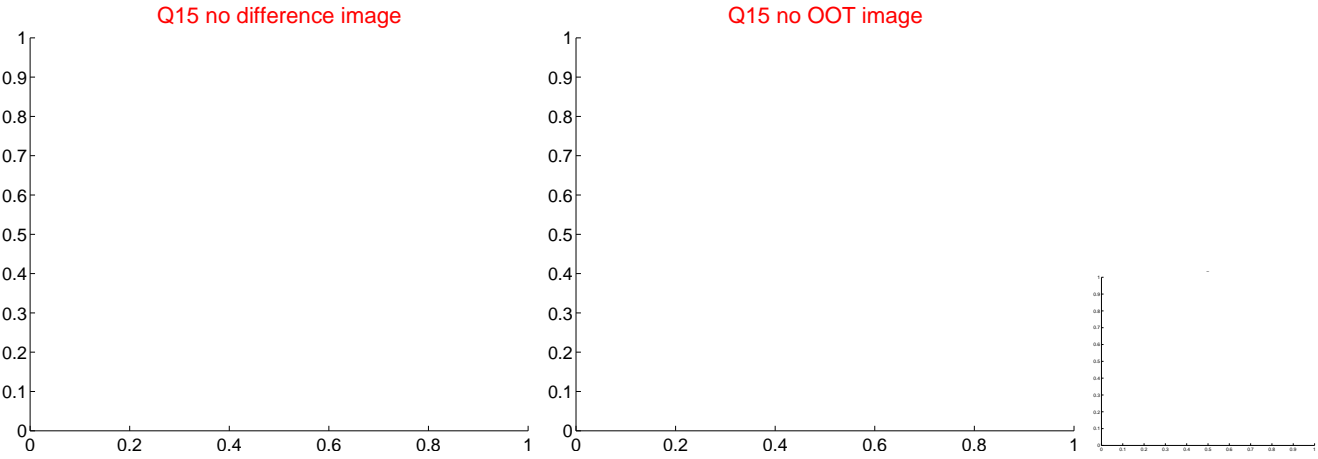
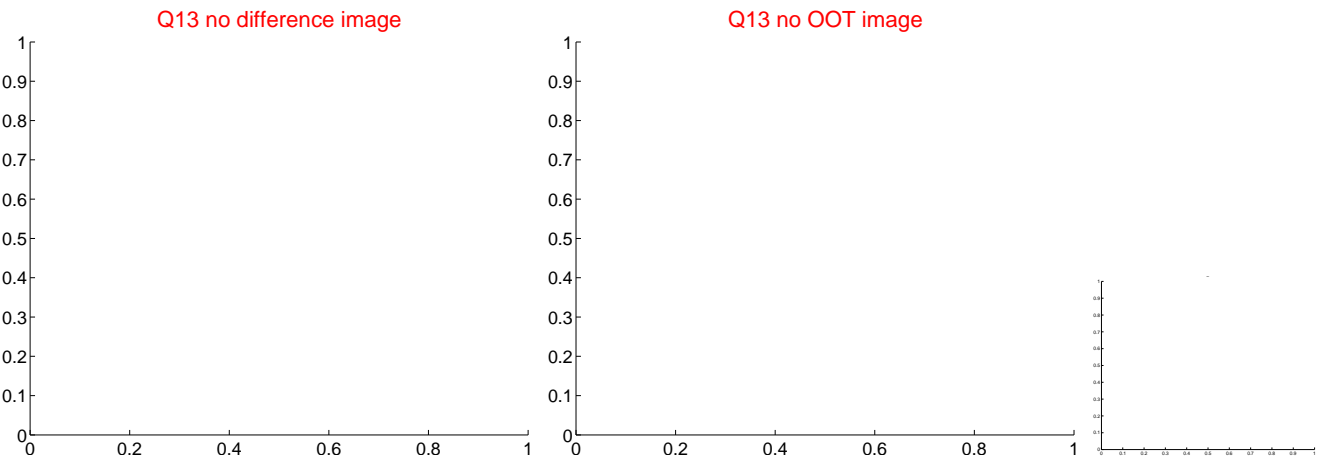
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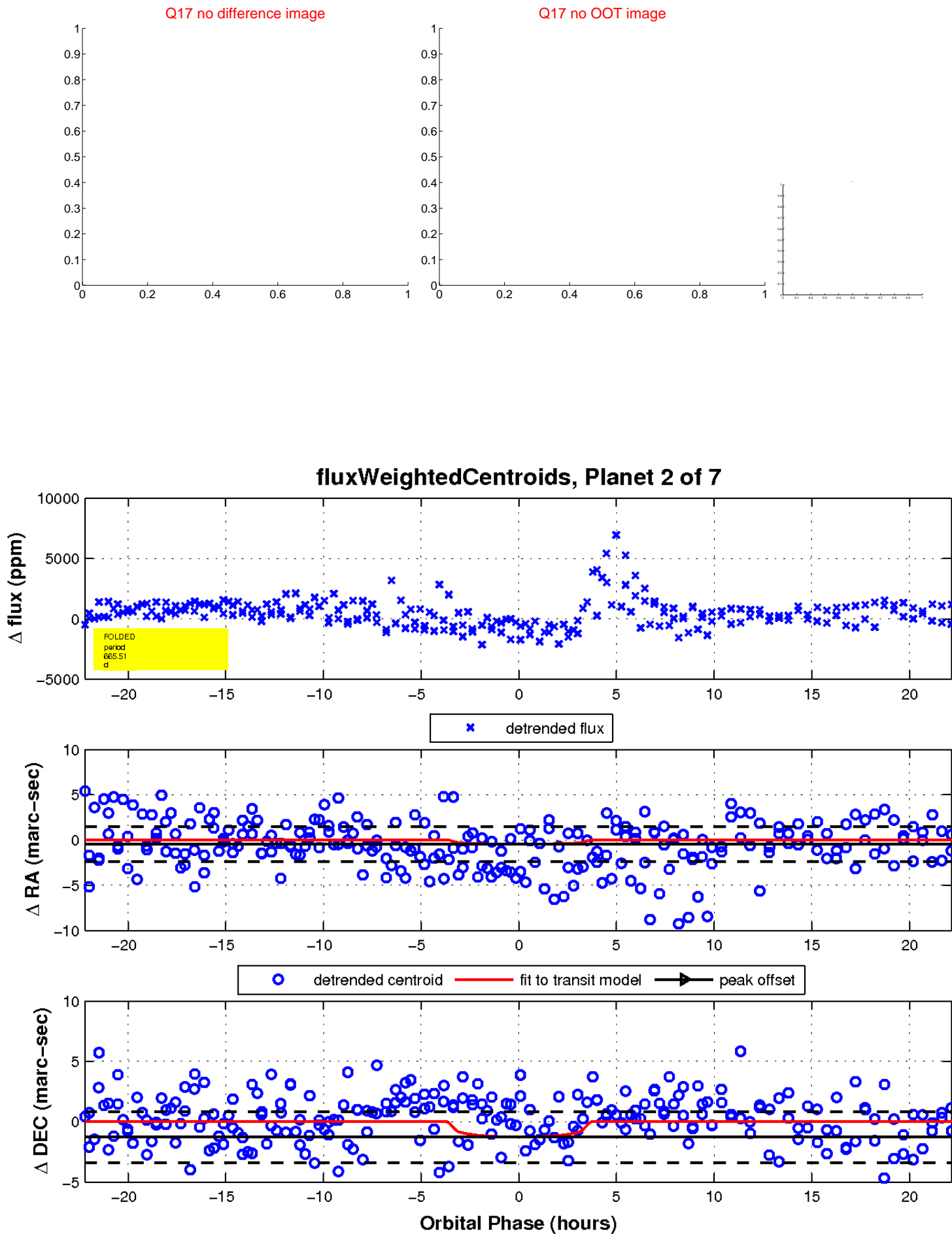
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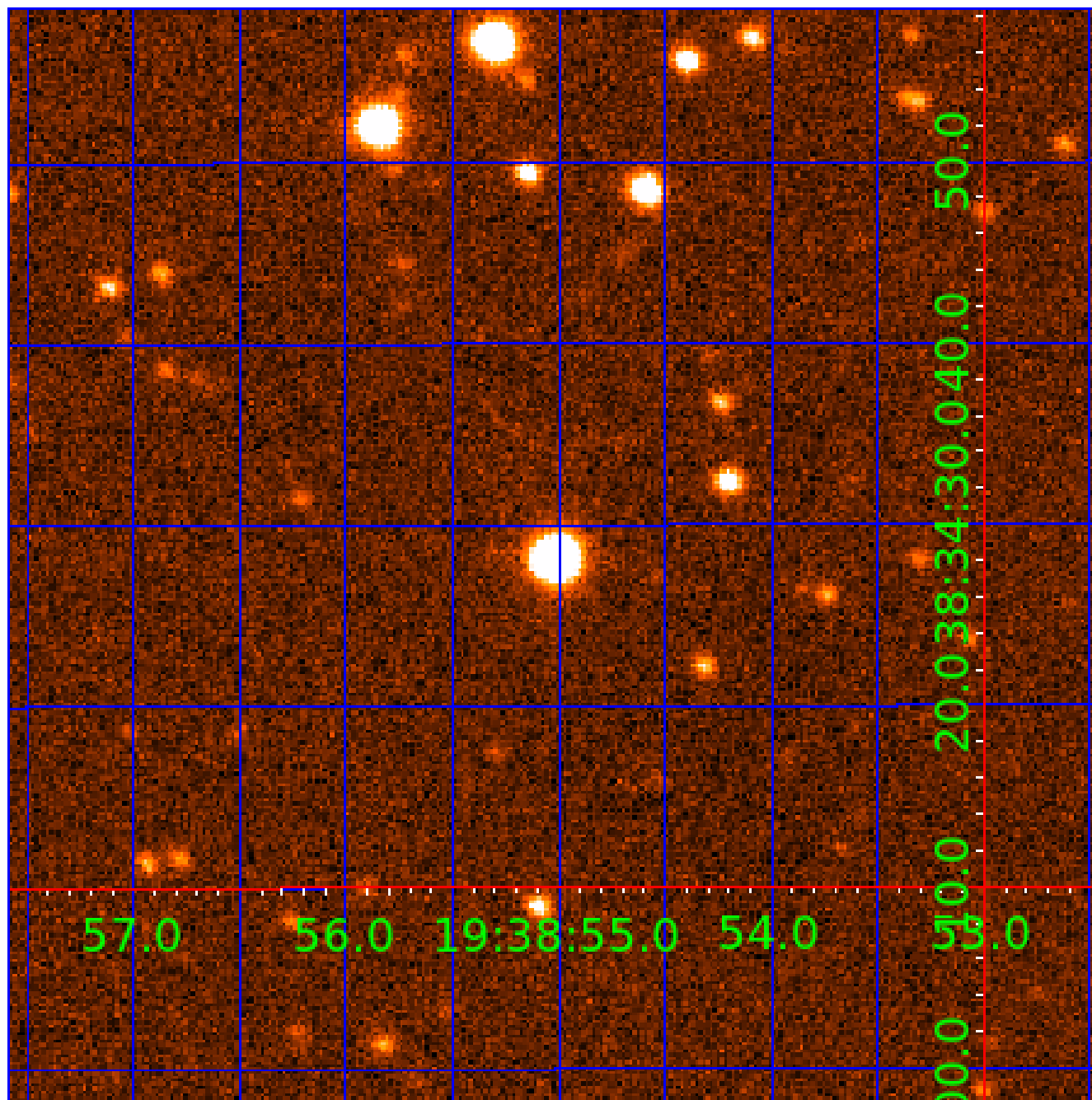
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



# KIC 003456972

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003456972-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS—HALO_GHOST
003456972-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV
003456972-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
003456972-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL_SKYE—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_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.

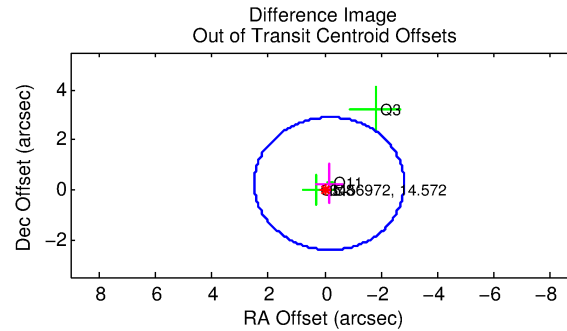
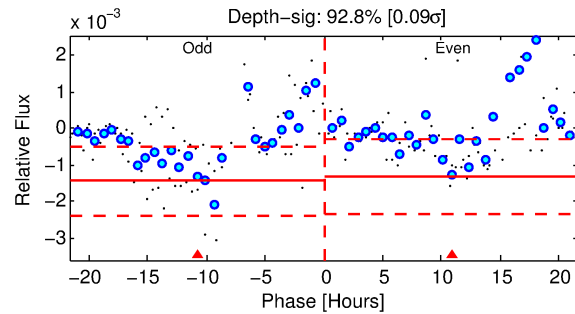
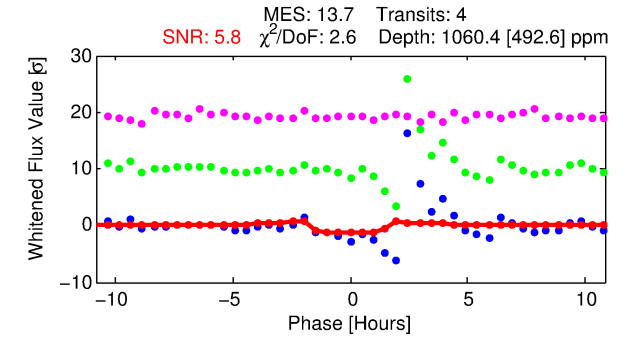
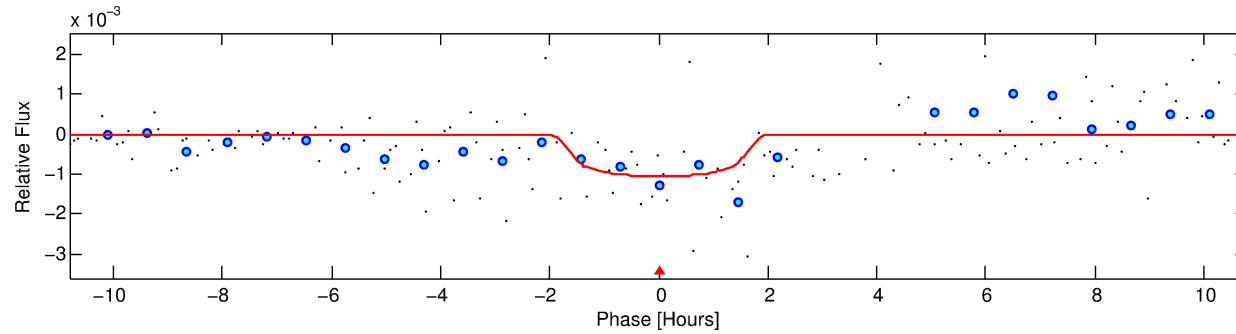
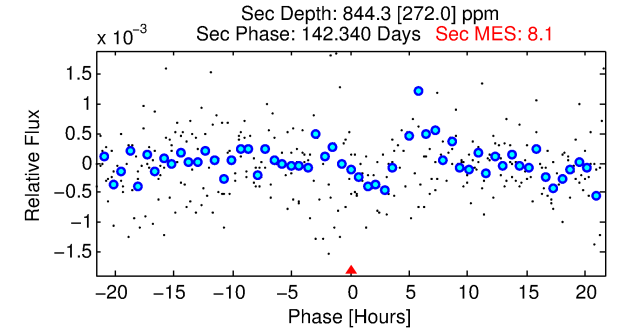
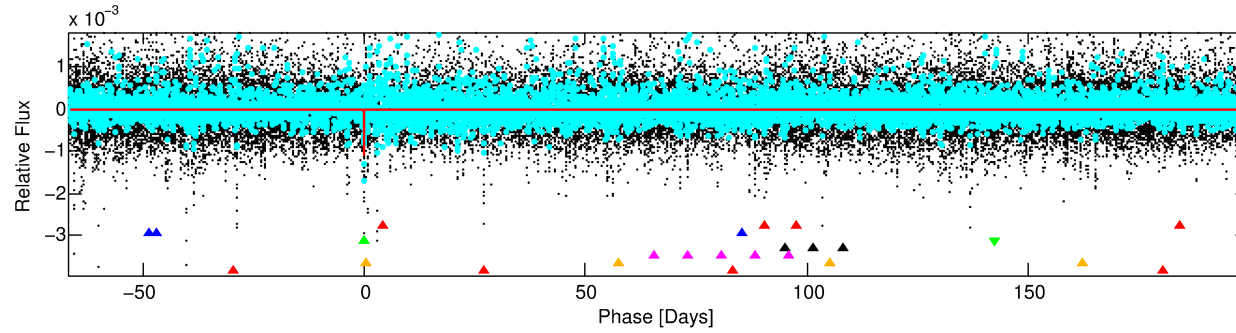
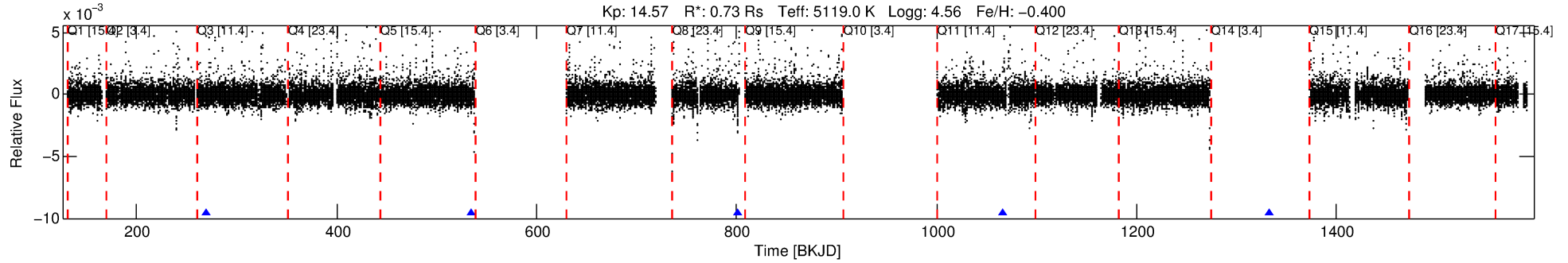
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 003456972-03

No Significant Match Found

# DV One-Page Summary

KIC: 3456972 Candidate: 3 of 7 Period: 265.907 d



## DV Fit Results:

Period = 265.90699 [0.01006] d  
Epoch = 269.1549 [0.0194] BKJD  
Rp/R\* = 0.0318 [0.0838]  
a/R\* = 431.63 [4225.14]  
b = 0.69 [7.51]  
Seff = 0.63 [0.12]  
Teq = 227 [11] K  
Rp = 2.52 [6.66] Re  
a = 0.7165 [0.0748] AU  
Ag = 37578.29 [198906.60] [0.19 $\sigma$ ]  
Teffp = 4897 [6479] K [0.72 $\sigma$ ]

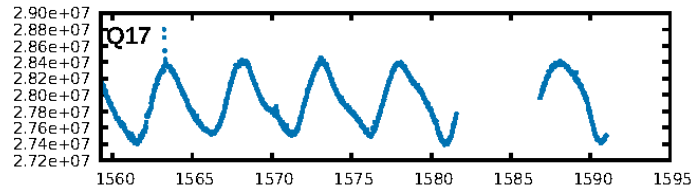
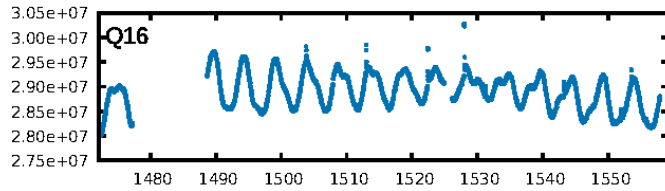
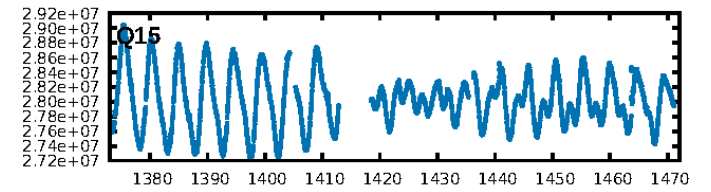
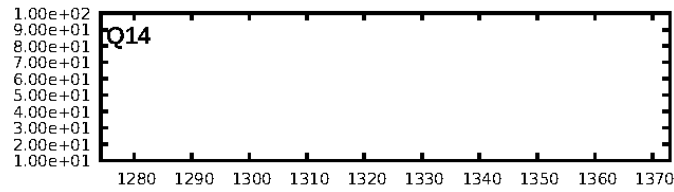
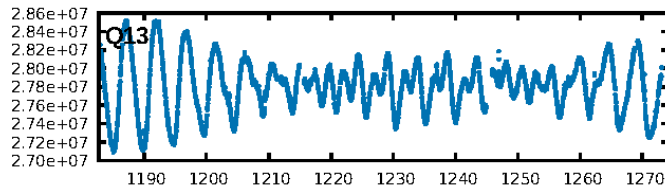
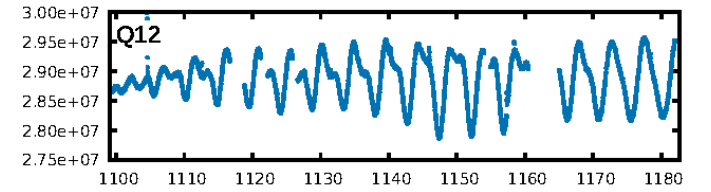
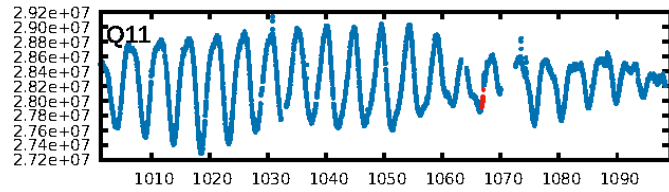
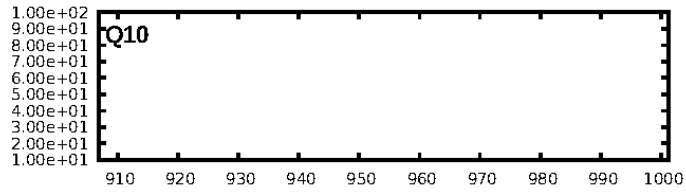
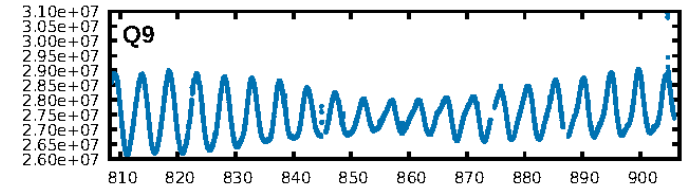
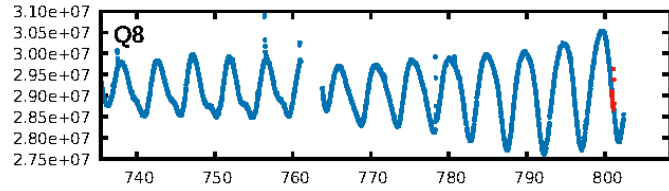
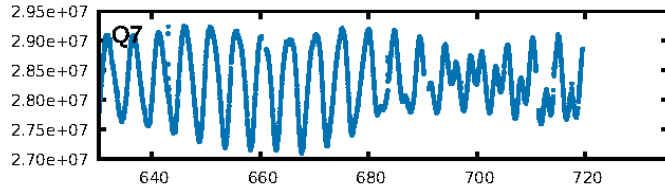
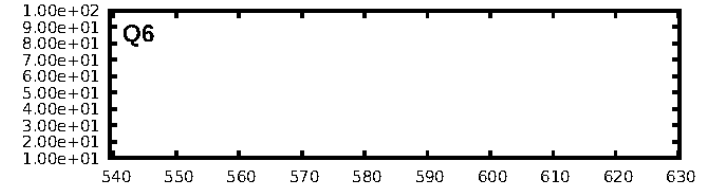
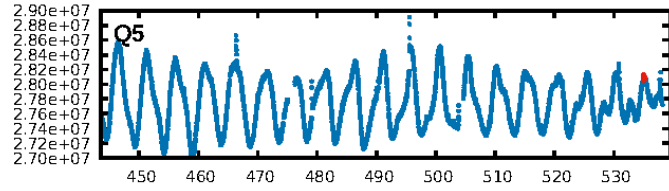
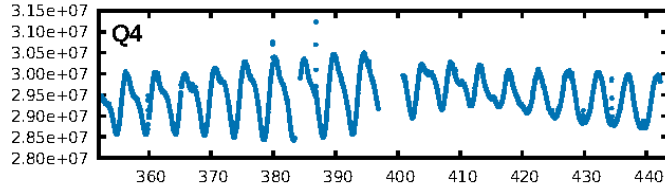
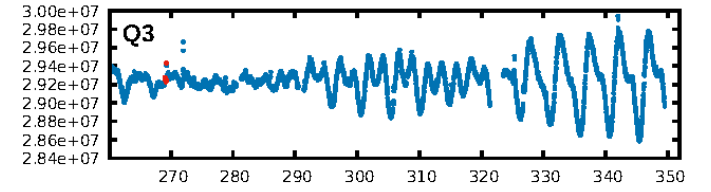
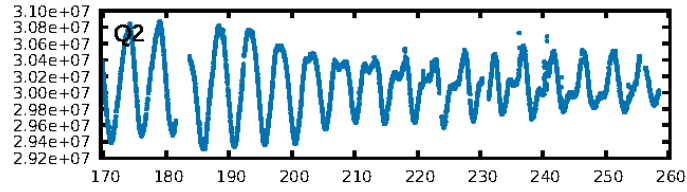
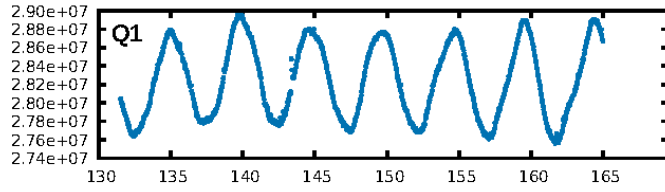
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [14.09 $\sigma$ ]  
LongPeriod-sig: 100.0% [234.13 $\sigma$ ]  
**ModelChiSquare2-sig: 0.0%**  
ModelChiSquareGof-sig: 1.2%  
**Bootstrap-pfa: 1.36e-12**  
RollingBand-fgt: 1.00 [4/4]  
**GhostDiagnostic-chr: 0.8231**  
Centroid-sig: 31.1%  
Centroid-so: 1.371 arcsec [1.05 $\sigma$ ]  
OotOffset-rm: 0.293 arcsec [0.33 $\sigma$ ]  
OotOffset-st: 0/2/1/1 [4]  
KicOffset-rm: 0.366 arcsec [0.60 $\sigma$ ]  
KicOffset-st: 0/2/1/1 [4]  
DiffImageQuality-fgm: 0.50 [2/4]  
DiffImageOverlap-fno: 1.00 [4/4]

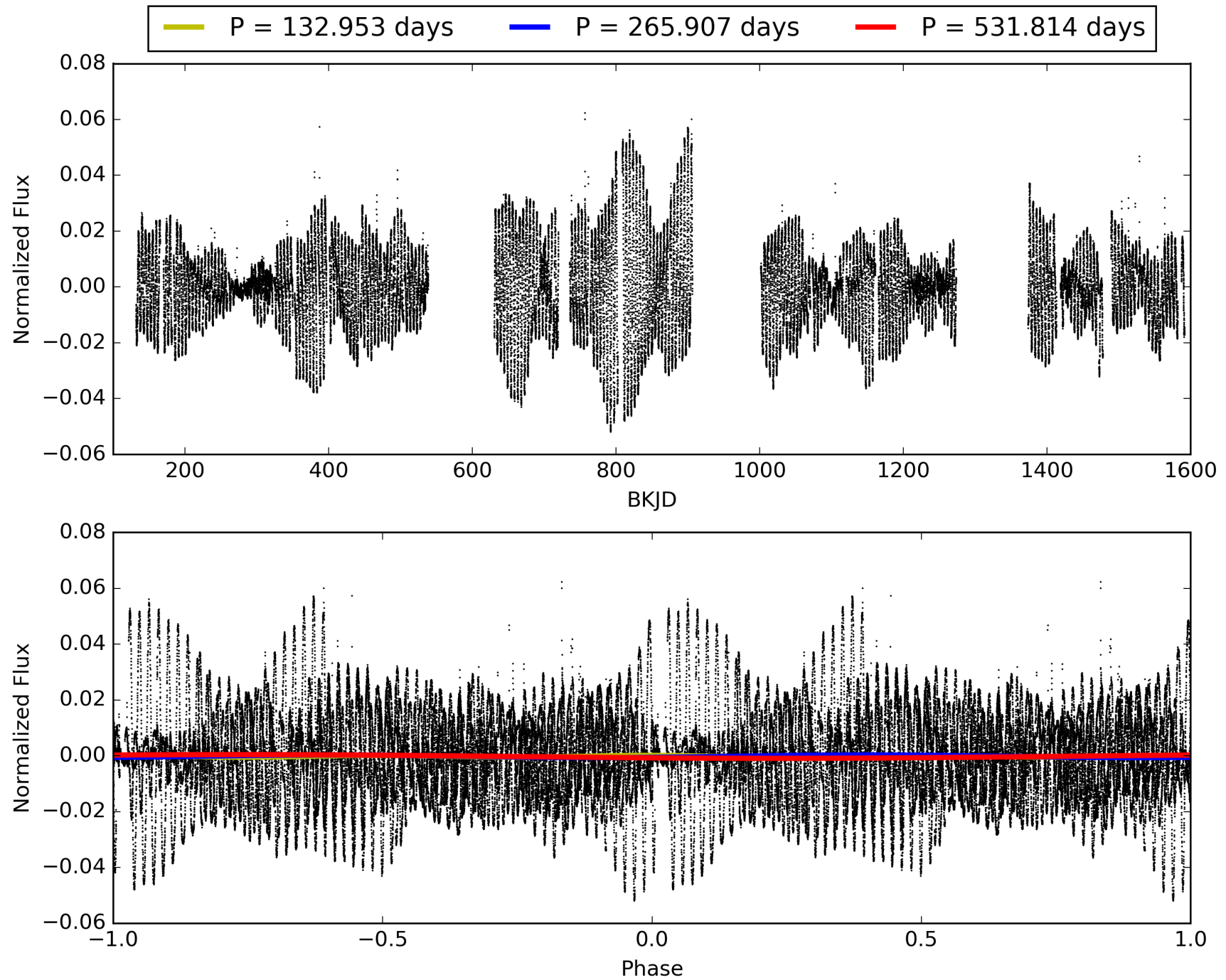
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 21:15:22 Z

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

# TCE 003456972-03, PDC Light Curves



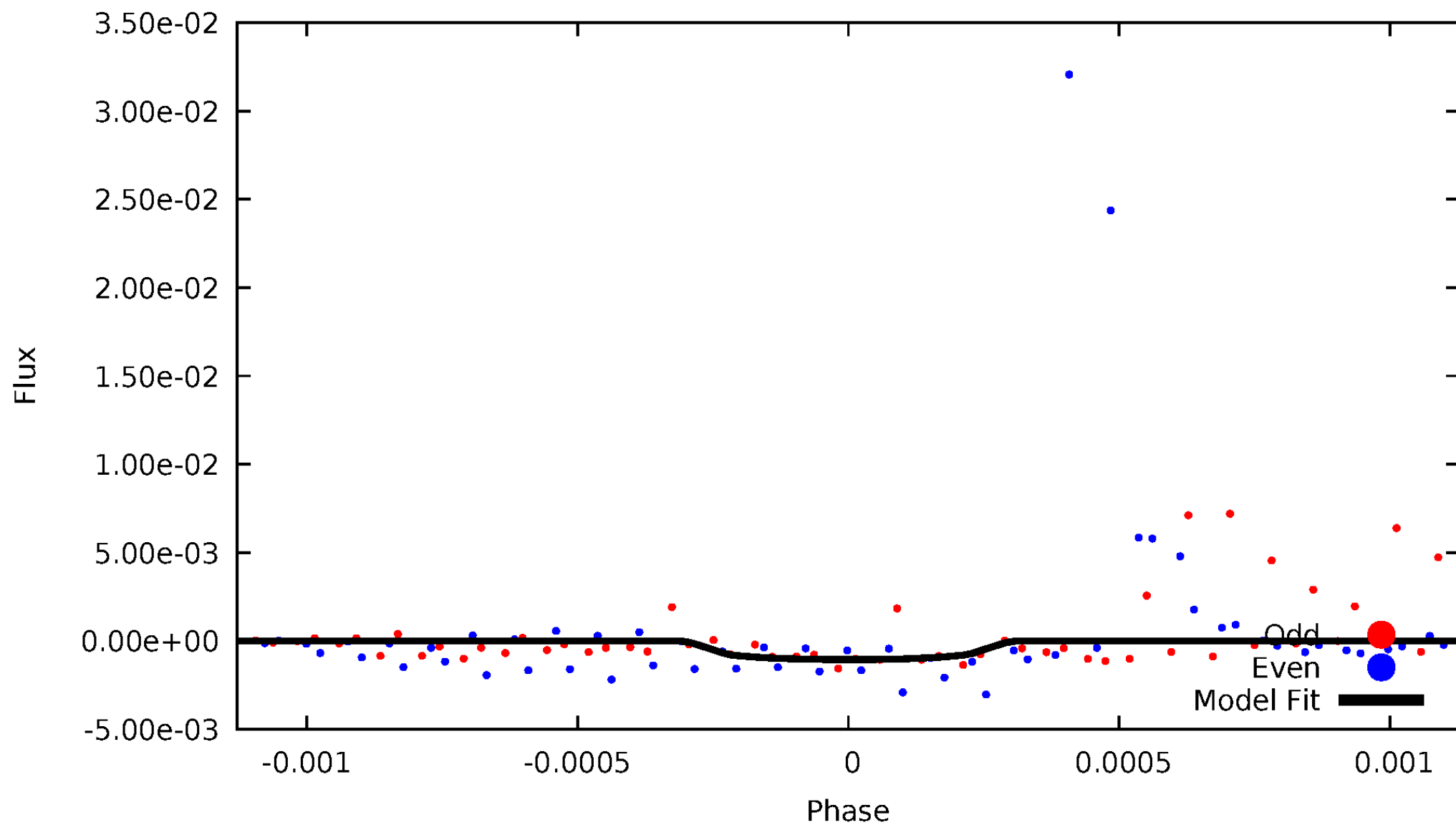
# TCE 003456972-03





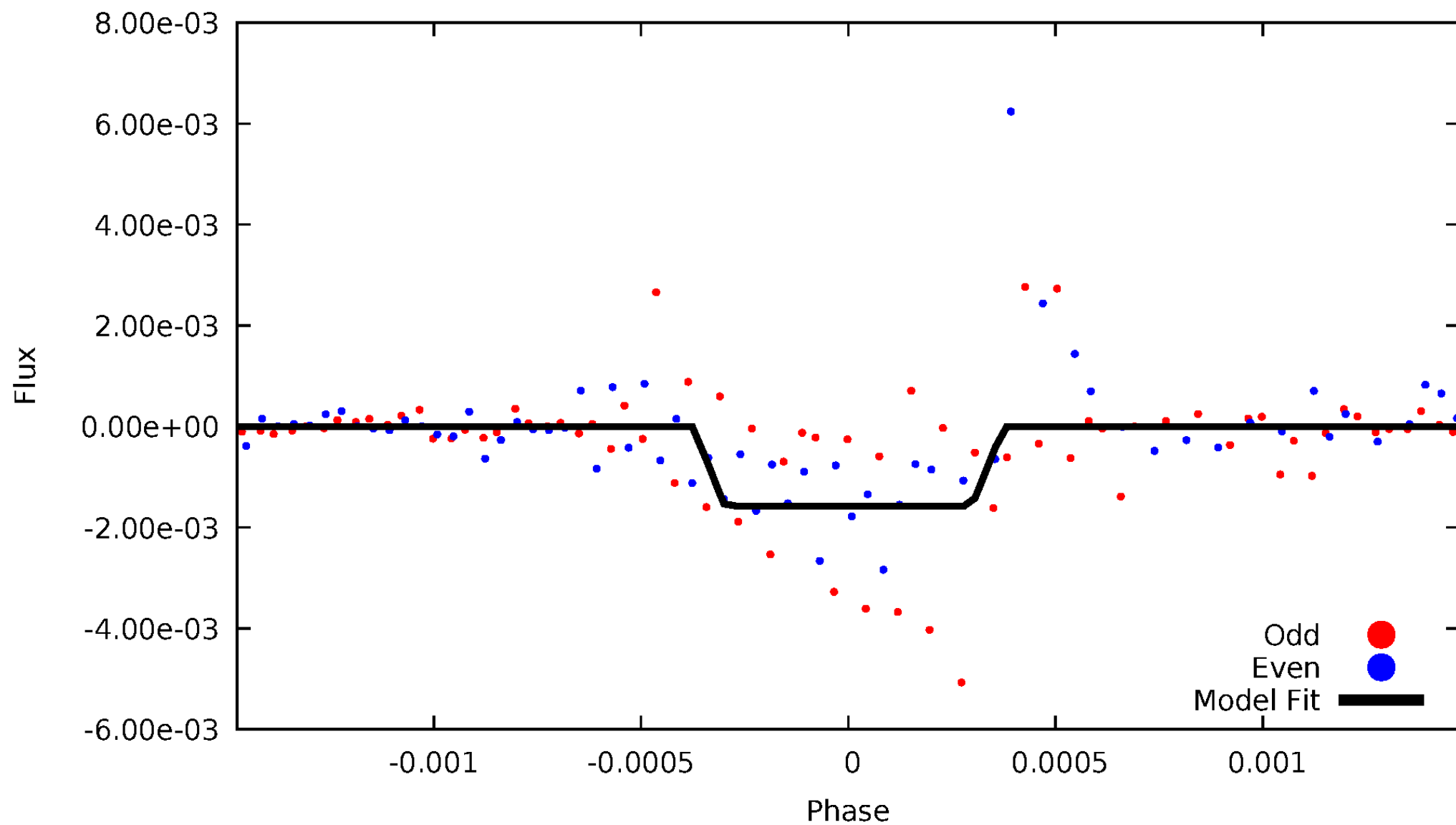
# DV Odd/Even

TCE 003456972-03



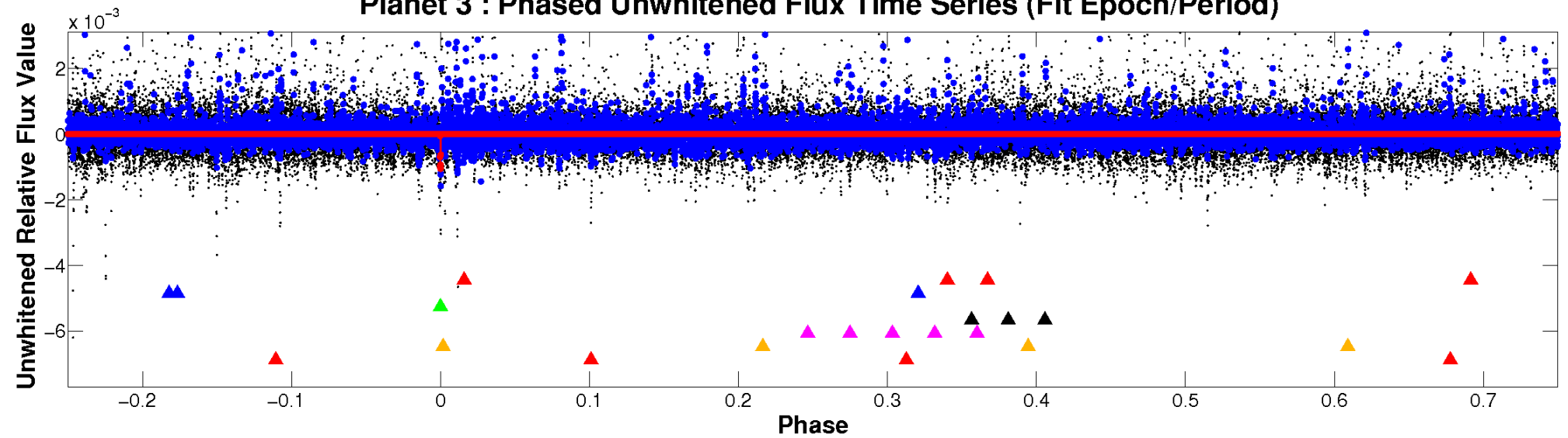
# ALT Odd/Even

TCE 003456972-03

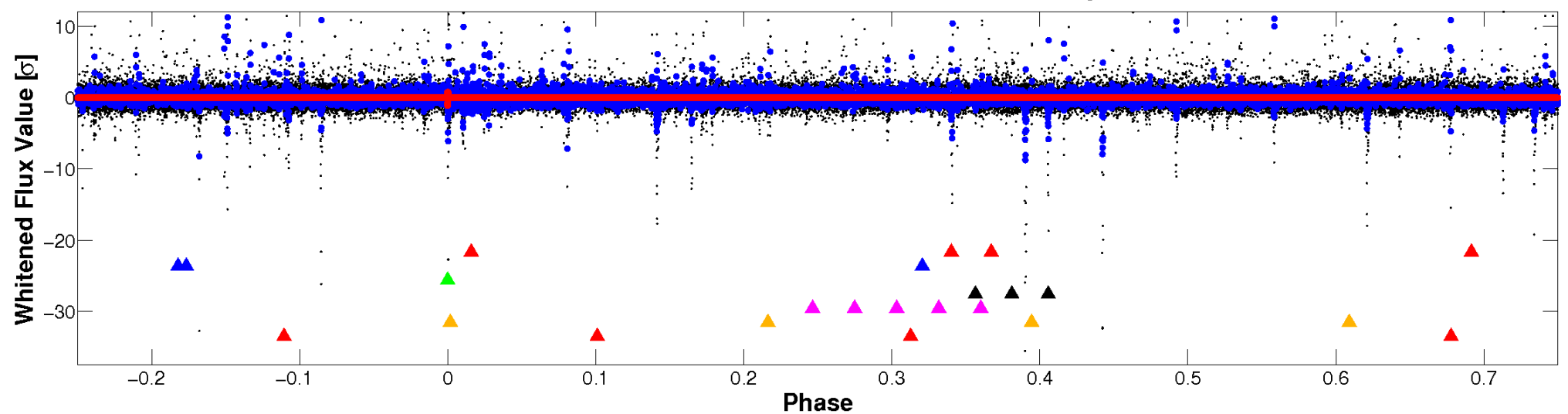


# Non-Whitened Vs. Whitened Light Curve

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

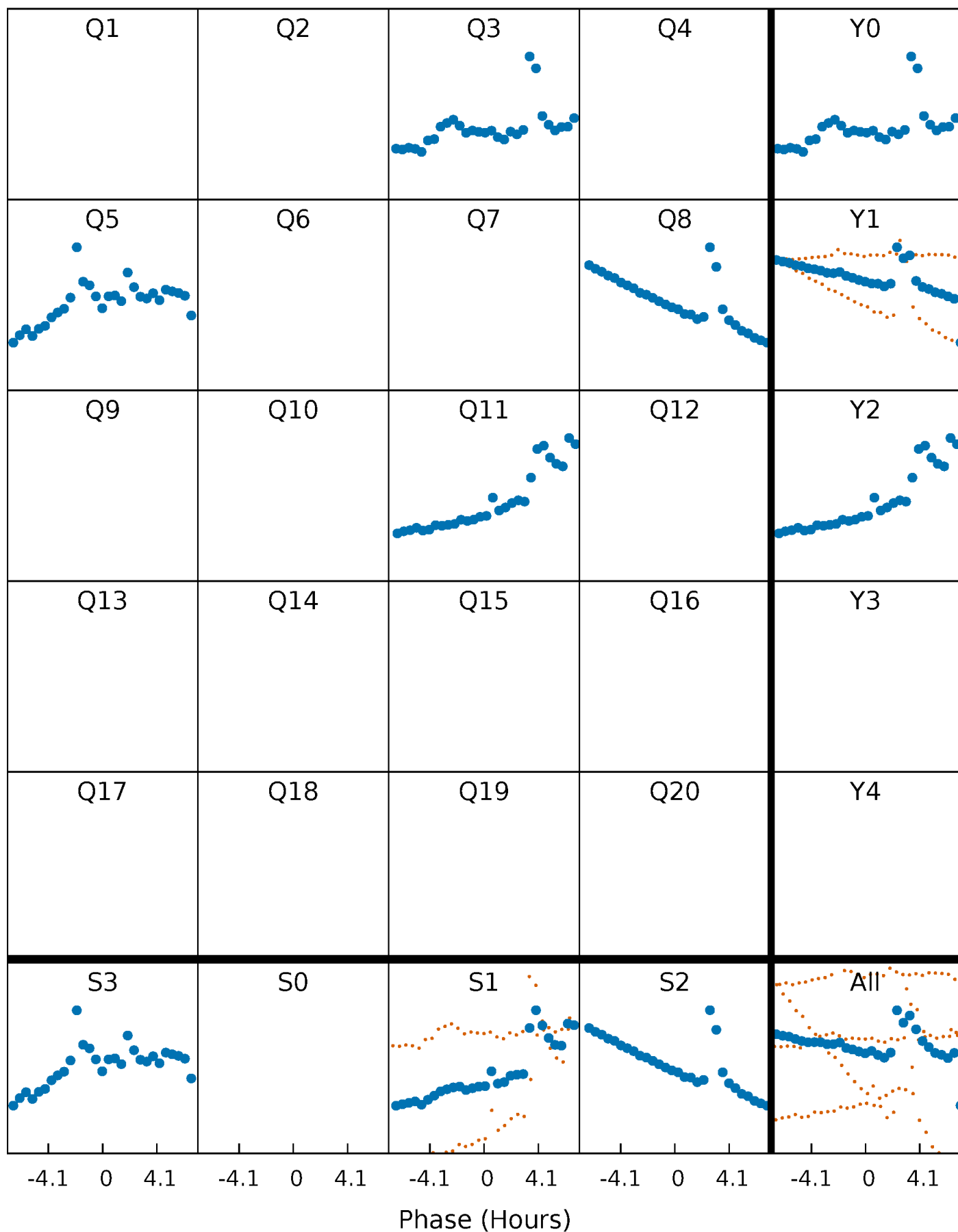


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



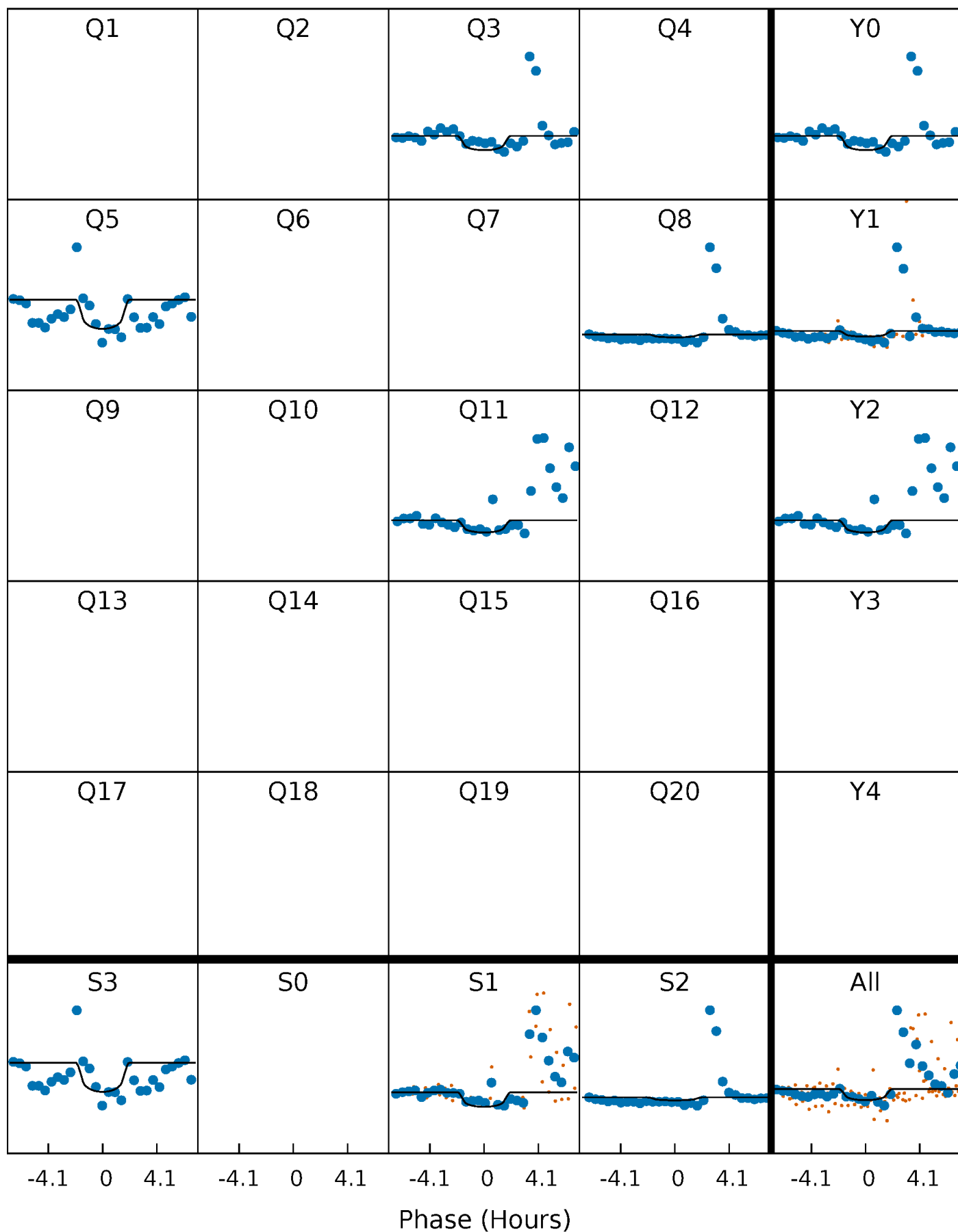
# PDC Quarter-Phased Transit Curves

TCE 003456972-03     $P=265.906986$  Days     $T_0=269.154923$  (BKJD)



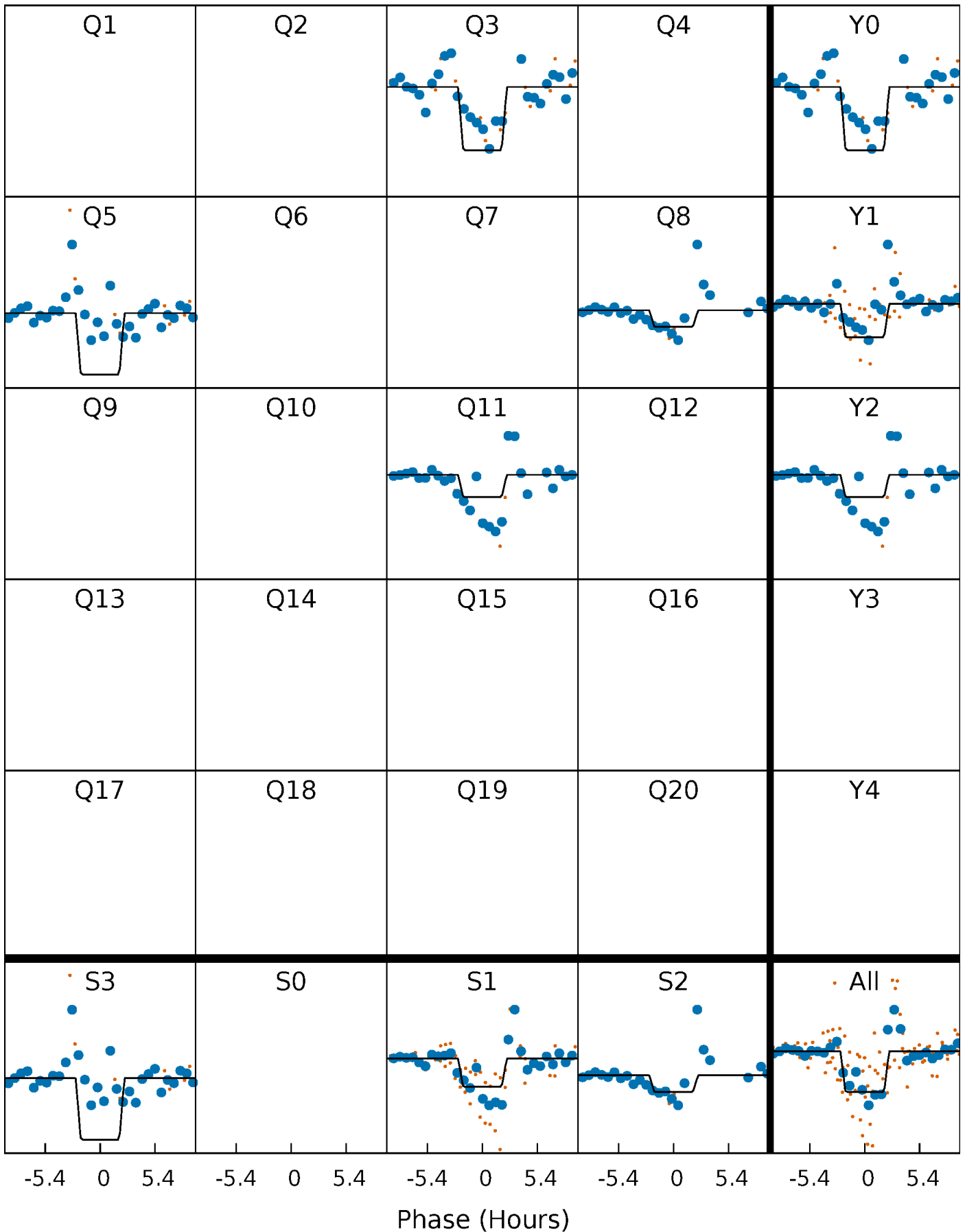
# DV Quarter-Phased Transit Curves

TCE 003456972-03     $P=265.906986$  Days     $T_0=269.154923$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

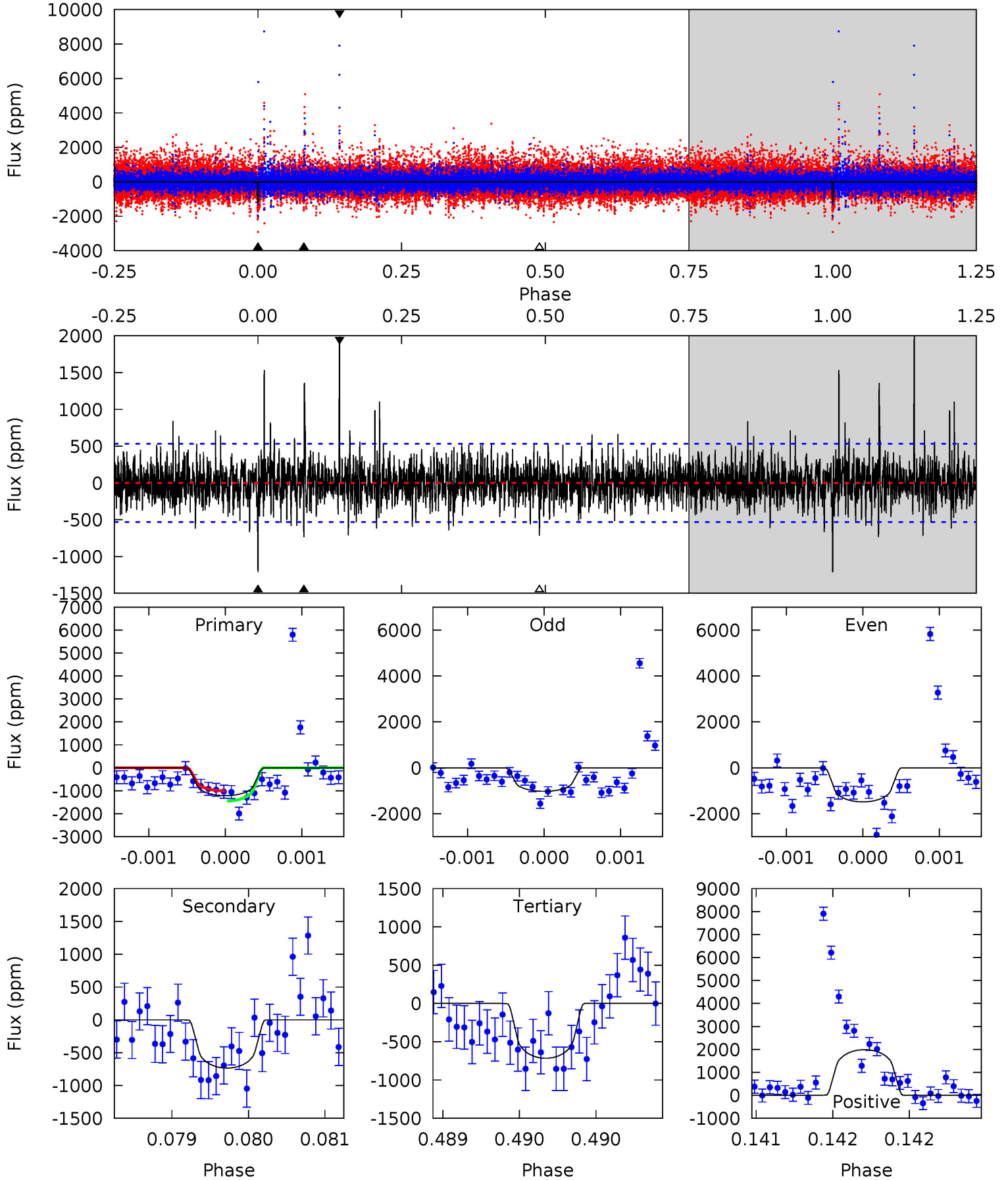
TCE 003456972-03     $P=265.915539$  Days     $T_0=269.182889$  (BKJD)



# DV Model-Shift Uniqueness Test

003456972-03, P = 265.906986 Days, E = 3.247937 Days

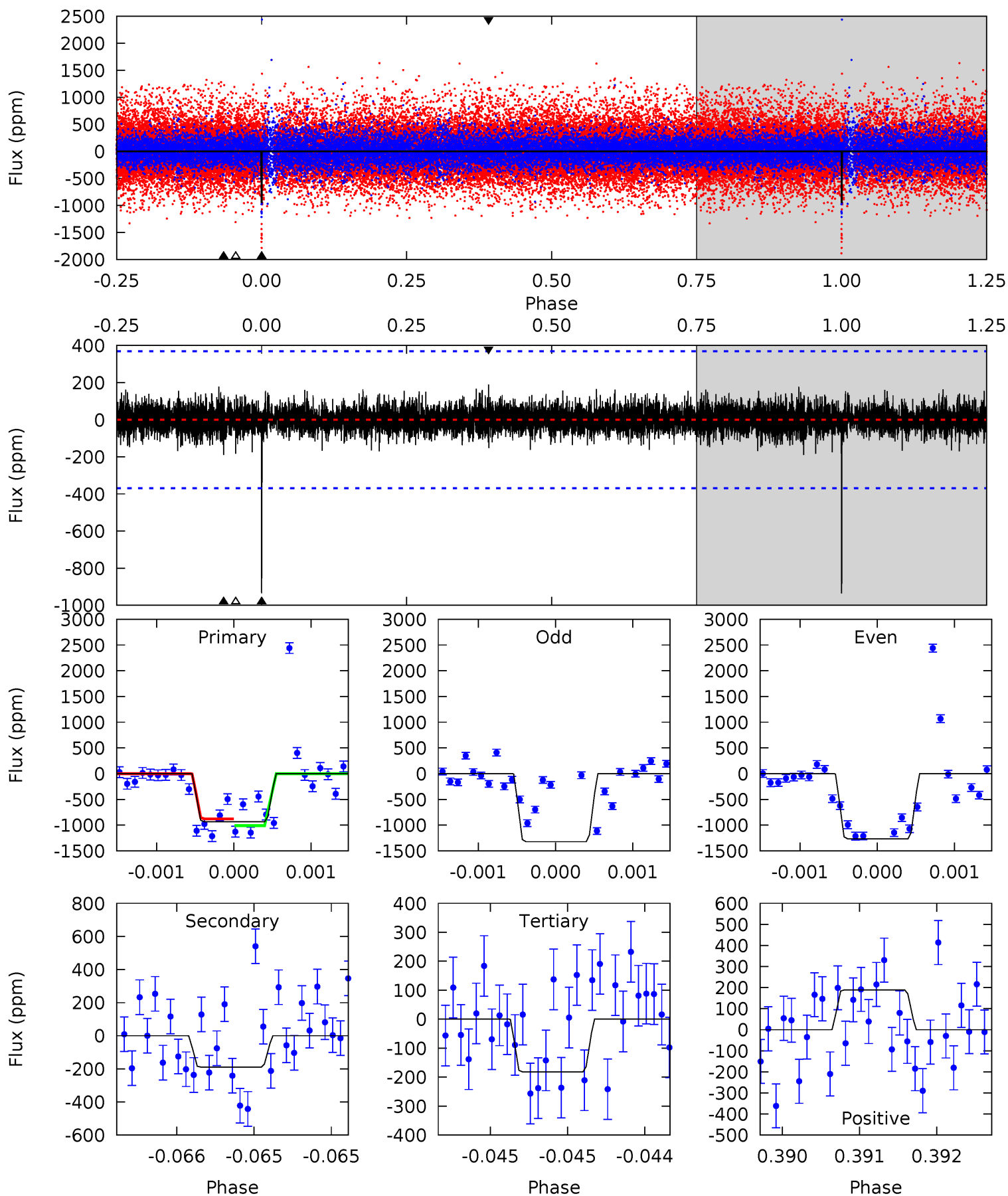
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.6	7.65	7.45	20.7	5.53	3.42	2.03	5.17	-8.06	0.20	-13.0	2.10	1.28	0.62	2.31



# Alt Model-Shift Uniqueness Test

003456972-03, P = 265.915539 Days, E = 3.267350 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
14.0	2.84	2.73	2.83	5.52	3.39	0.66	11.3	11.1	0.11	0.01	0.44	1.07	0.17	0.88





### Stellar Parameters For KIC 003456972

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5119^{+153}_{-153}$	$4.556^{+0.080}_{-0.080}$	$-0.400^{+0.300}_{-0.300}$	$0.727^{+0.092}_{-0.083}$	$0.693^{+0.101}_{-0.043}$	$2.544^{+0.847}_{-0.580}$
	+3%/-3%	+2%/-2%	+75%/-75%	+13%/-11%	+15%/-6%	+33%/-23%
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 003456972-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-735 \pm 96$	$6.04^{+5.64}_{-4.19}$	$318^{+15}_{-14}$	$3486^{+2026}_{-609}$	$5669^{+50953}_{-4171}$
Alt.	$-190 \pm 67$	$5.75^{+5.55}_{-4.18}$	$318^{+14}_{-14}$	$2902^{+1482}_{-497}$	$1644^{+19459}_{-1265}$

$T_{\text{max}}$  = 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

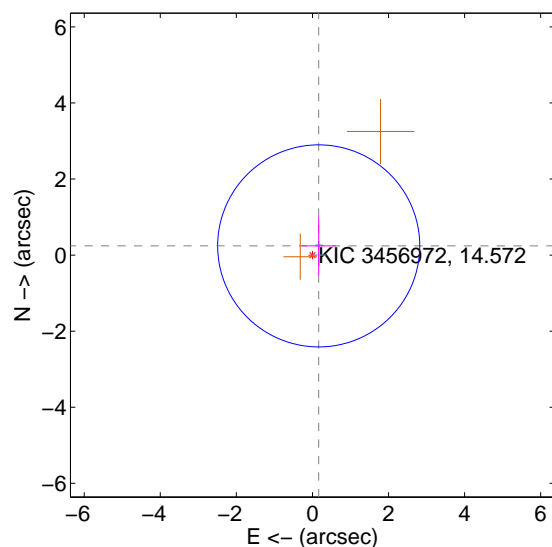
Supplemental centroid analysis for 003456972-03. Kepler magnitude: 14.57. Transit SNR 5.77

There are 2 quarters with good PRF difference image offsets

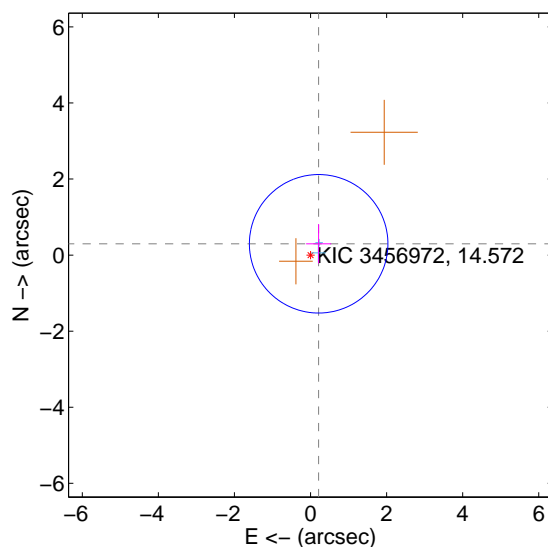
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.293 \pm 0.886$	0.33	$-0.165 \pm 0.451$	$0.242 \pm 0.770$
PRF-fit source offset from KIC position	$0.366 \pm 0.607$	0.60	$-0.214 \pm 0.330$	$0.297 \pm 0.519$
photometric centroid source offset	$1.37 \pm 1.31$	1.05	$-1.20 \pm 1.33$	$-0.67 \pm 1.25$

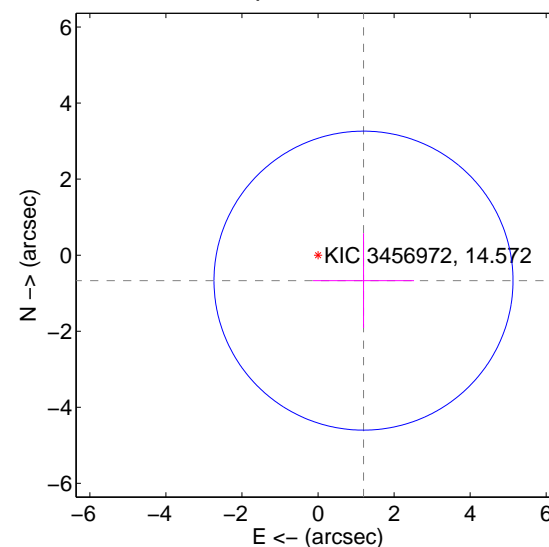
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

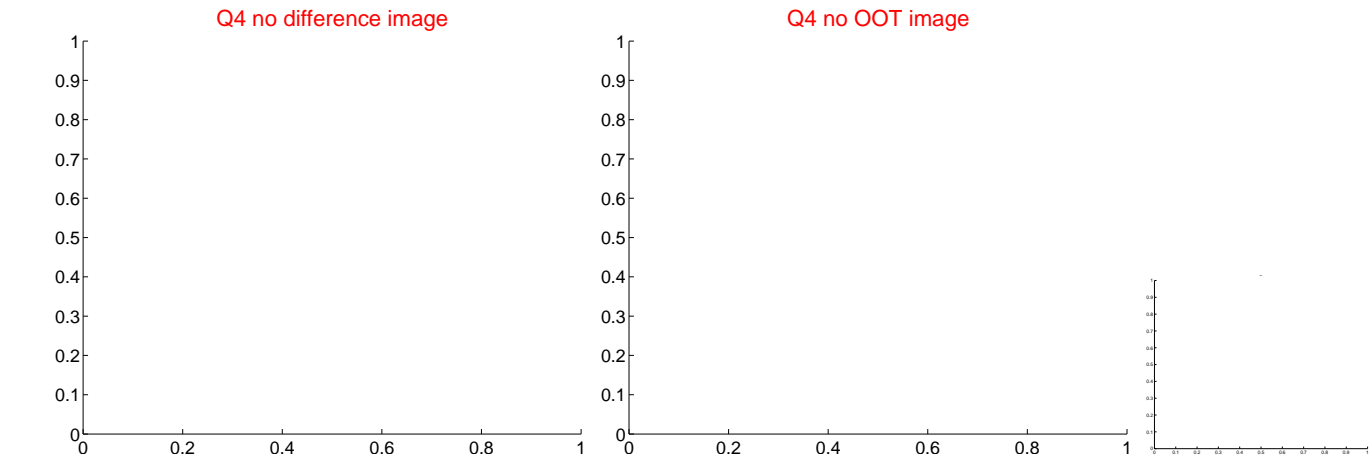
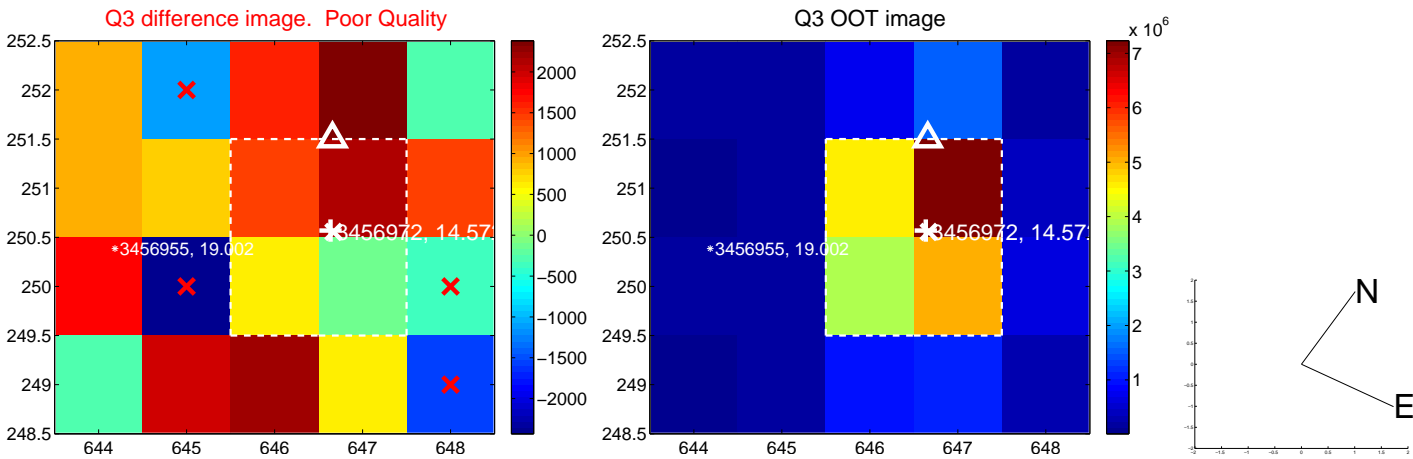
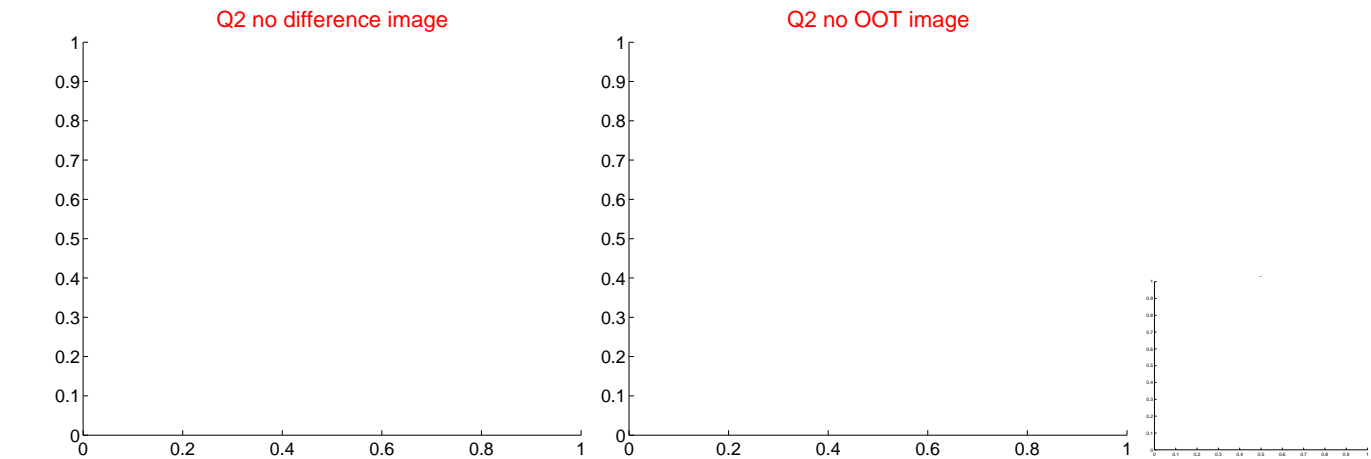
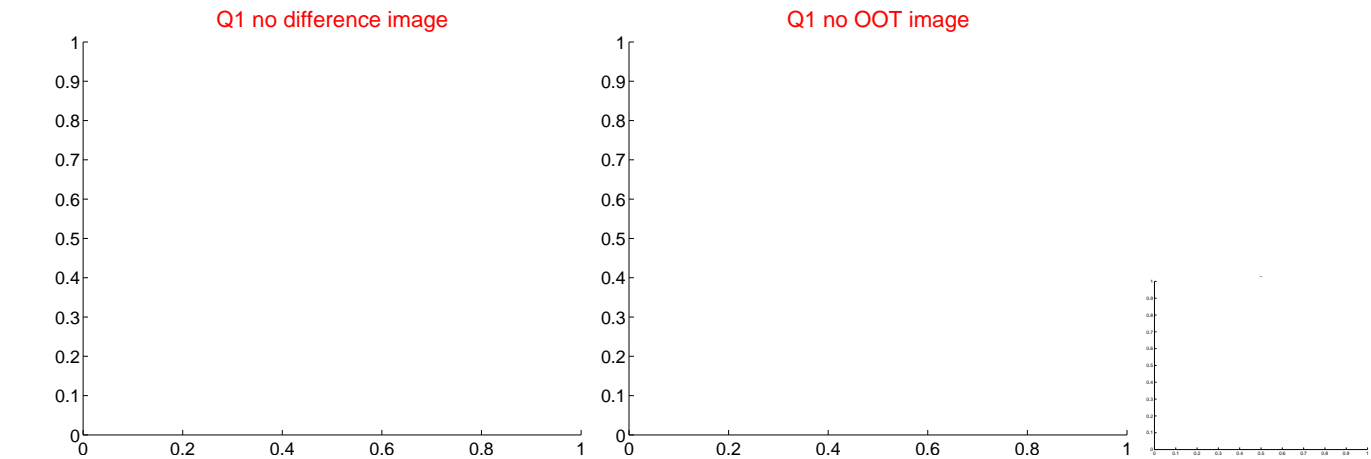


offset from photometric centroids

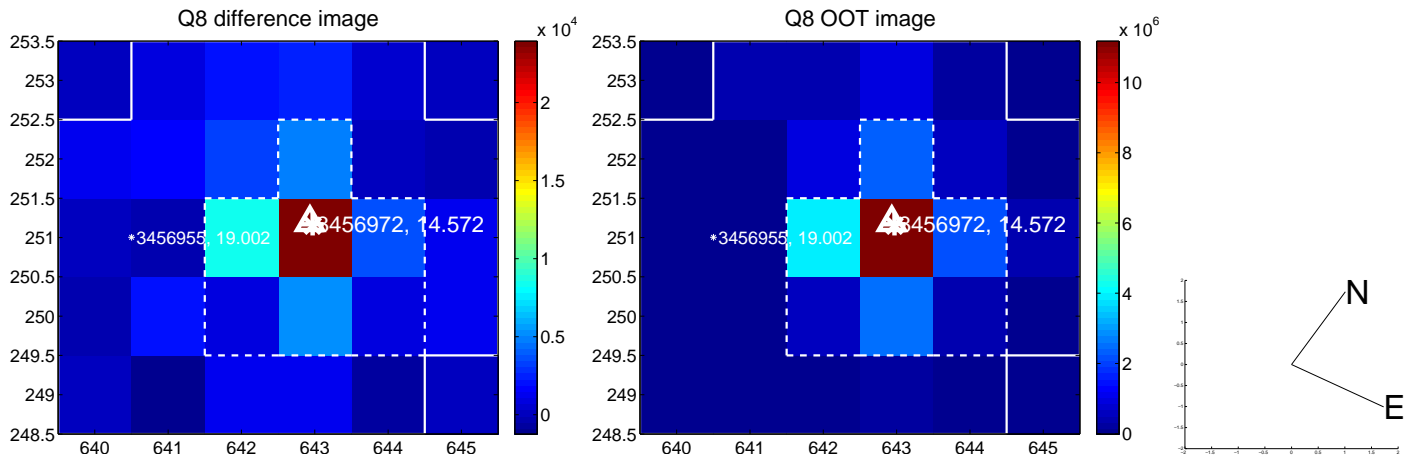
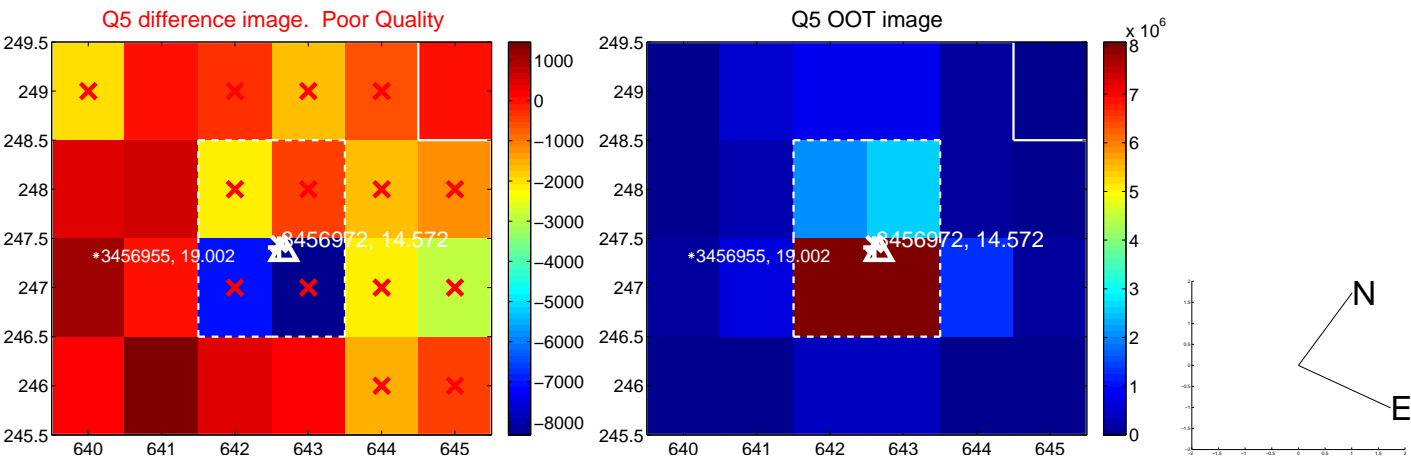


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

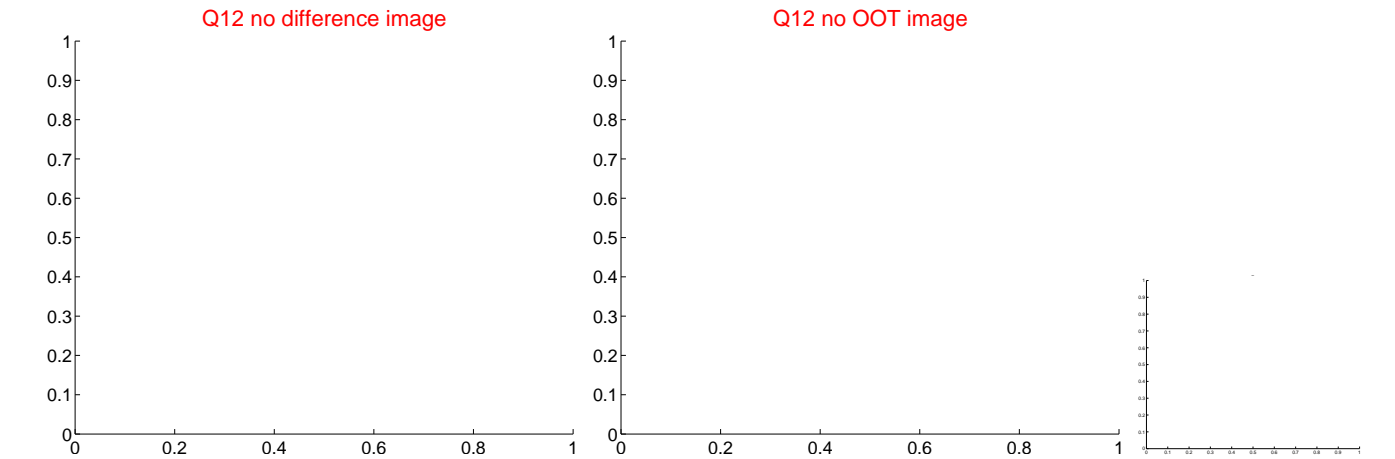
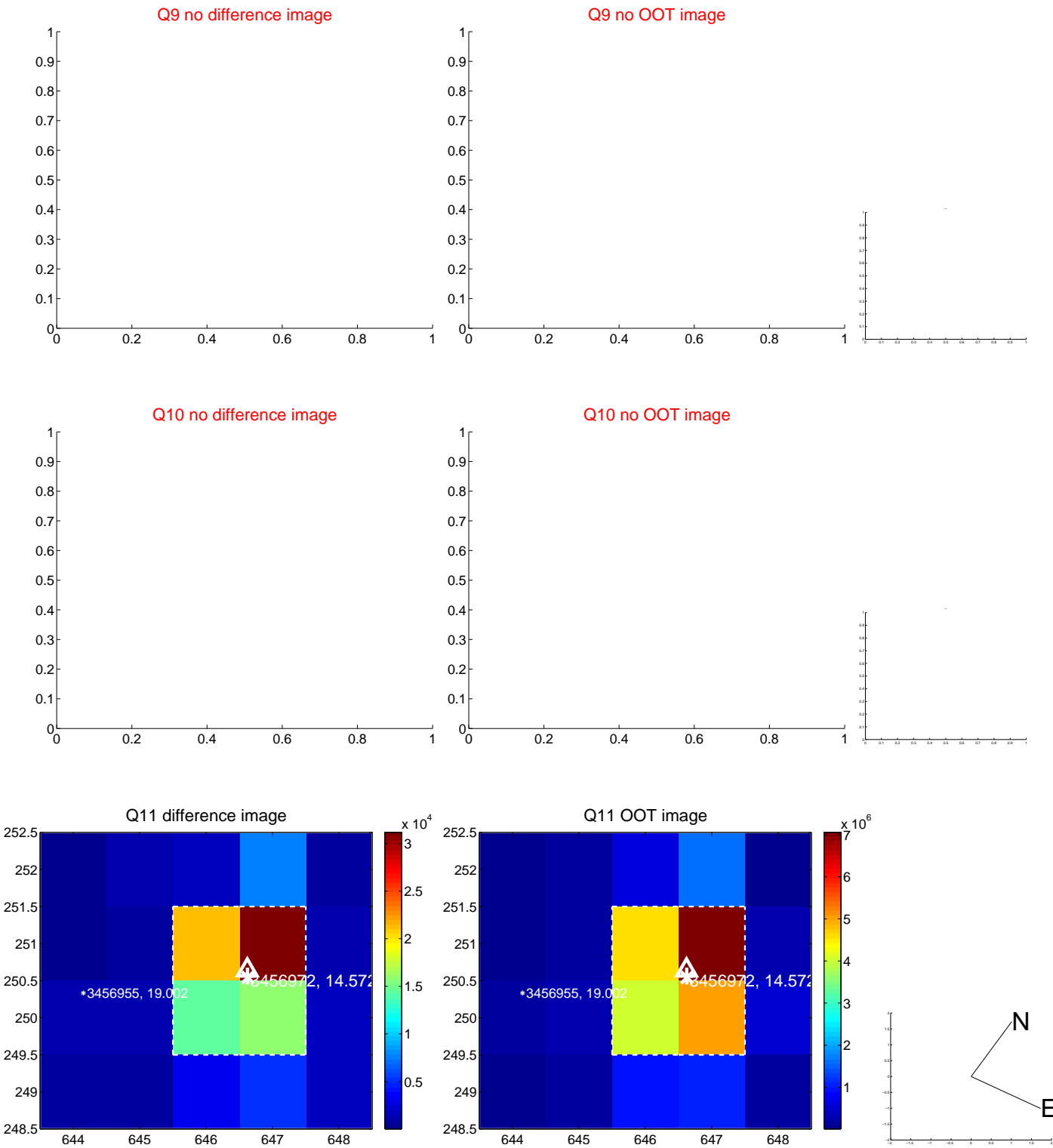
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



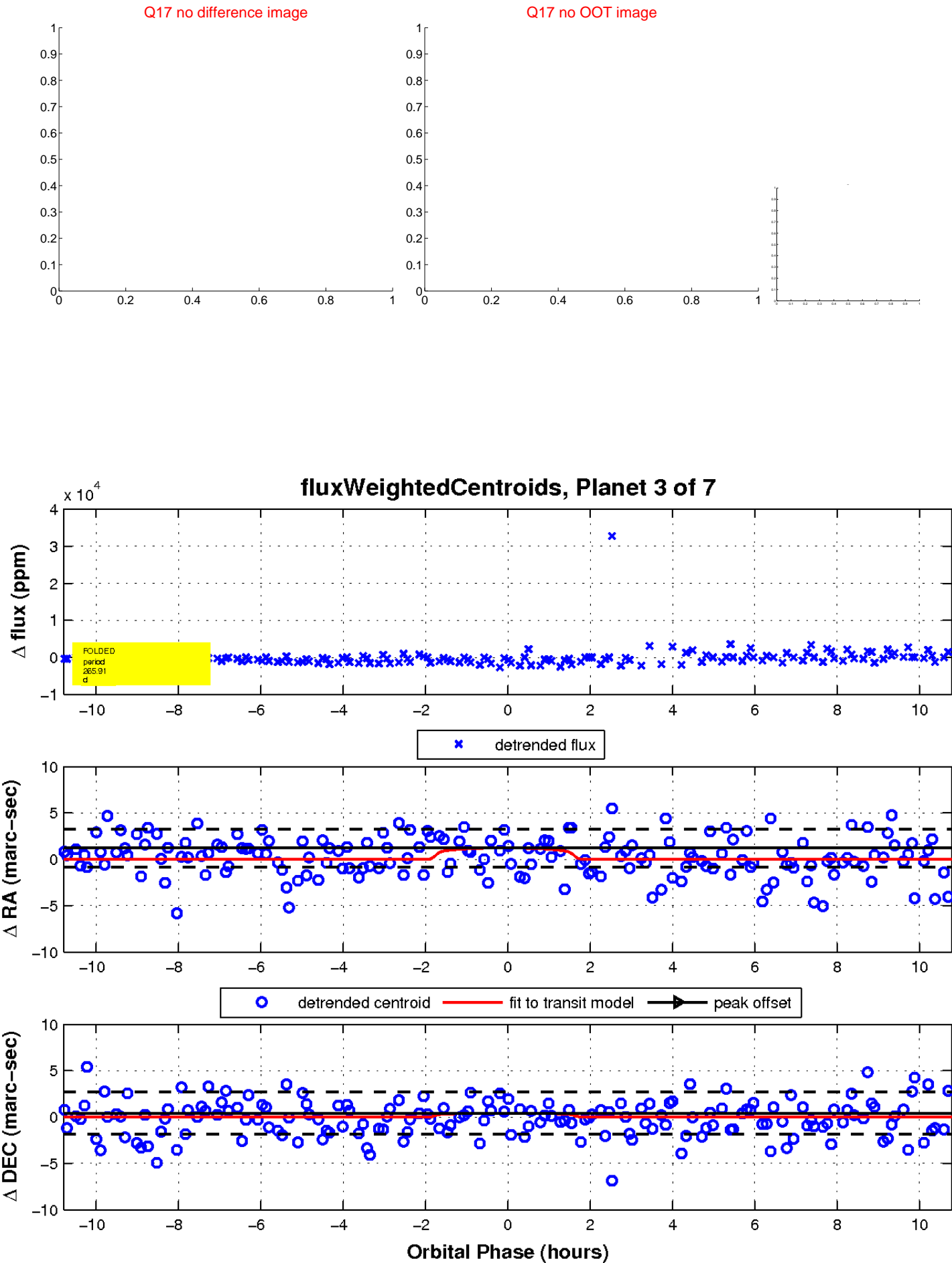
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

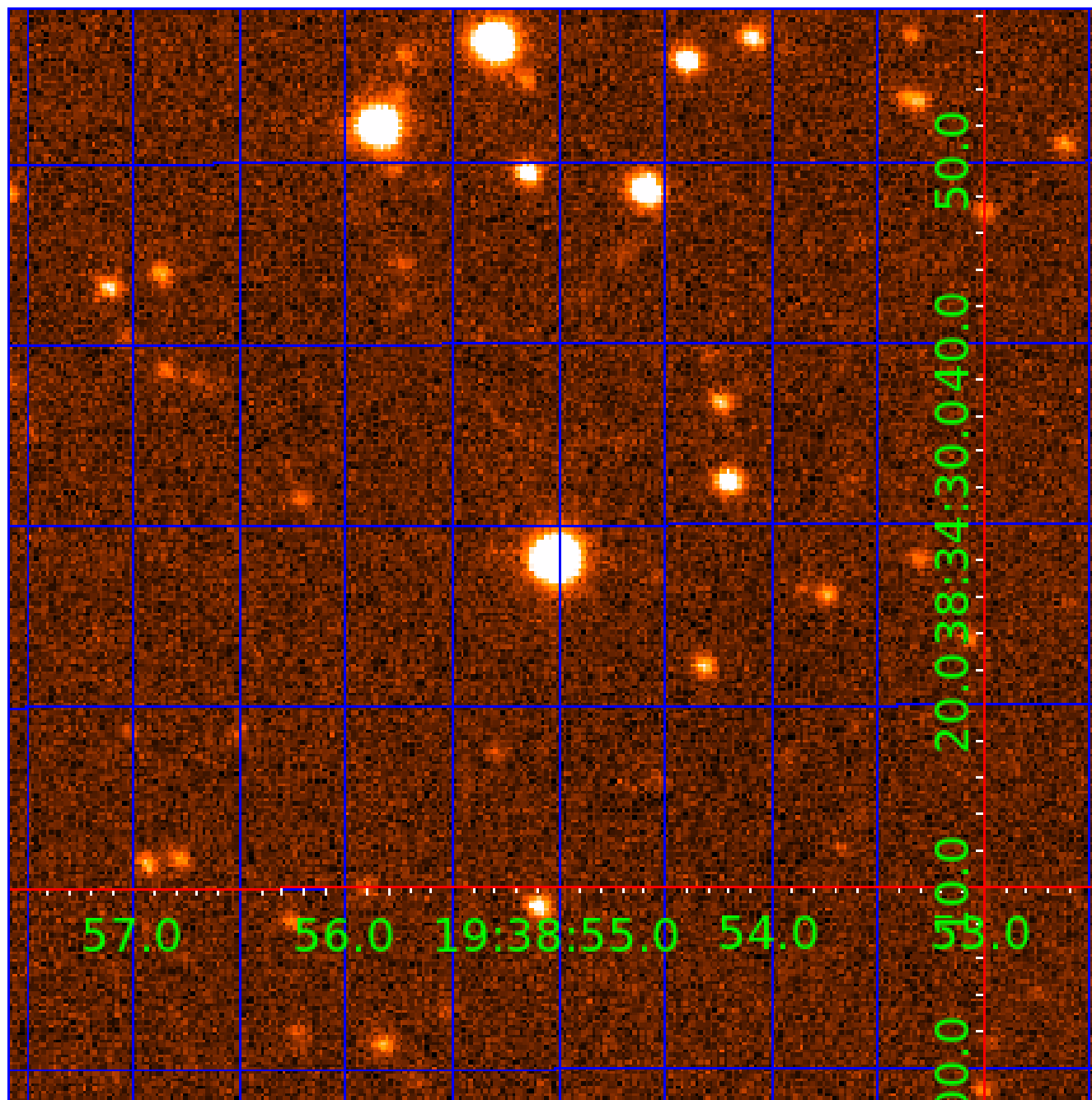


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 003456972

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003456972-02	OBS	No	665.509508	220.725314	1951.8	7.454	15.3	8.7	0.73	5119	3.40	0.19
003456972-03	OBS	No	265.906986	269.154923	1060.4	3.601	13.7	5.8	0.73	5119	2.52	0.63
003456972-04	OBS	No	538.351744	363.953765	1598.2	3.025	13.9	8.9	0.73	5119	2.94	0.25
003456972-05	OBS	No	258.351842	364.922983	1903.4	12.356	13.2	8.4	0.73	5119	3.49	0.66
003456972-06	OBS	No	370.329878	326.686867	1818.0	1.846	11.9	10.4	0.73	5119	3.08	0.41
003456972-07	OBS	No	322.179264	449.394130	1840.6	4.506	12.8	8.9	0.73	5119	3.17	0.49

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003456972-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
003456972-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
003456972-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS— HALO_GHOST
003456972-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV
003456972-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—MOD_POS_ALT—INCONSISTENT_TRANS— CENT_FEW_DIFFS
003456972-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL_SKYE—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_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.

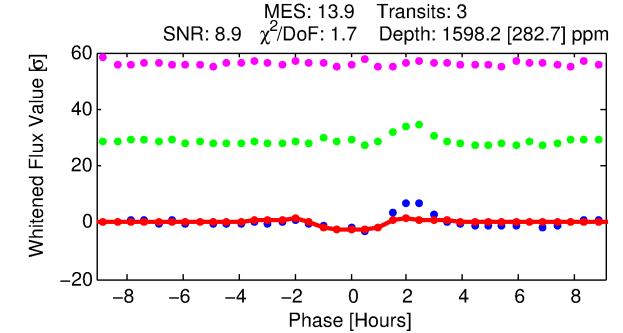
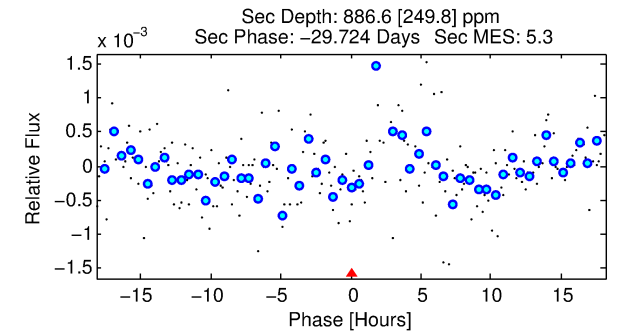
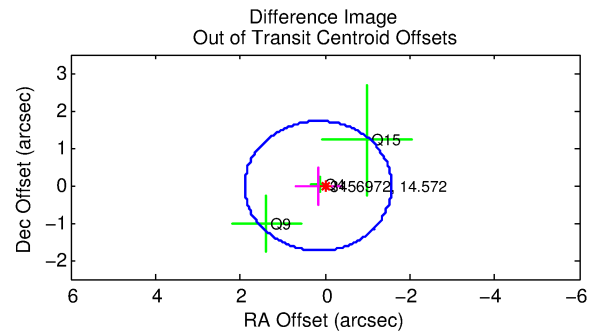
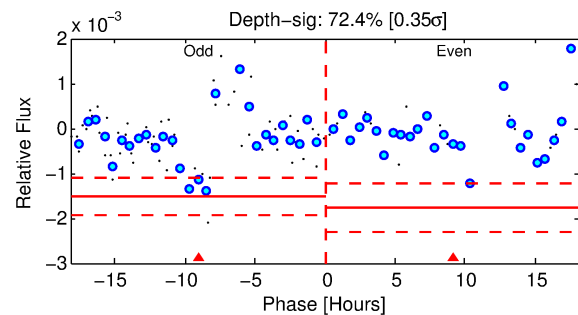
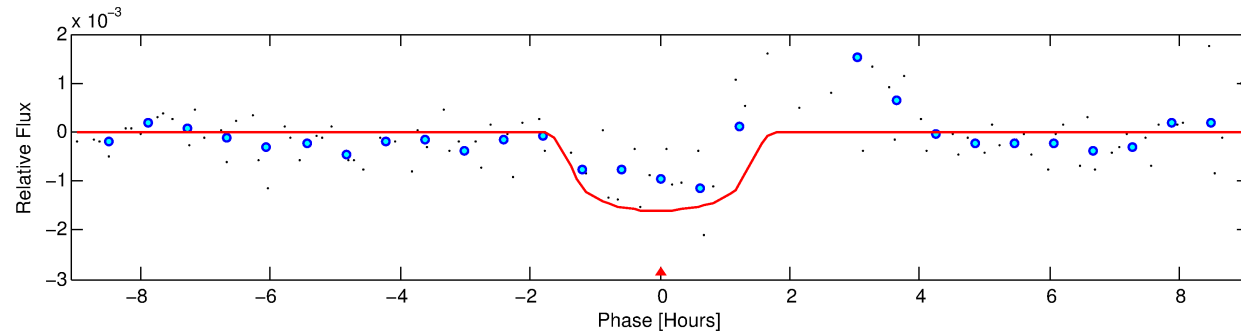
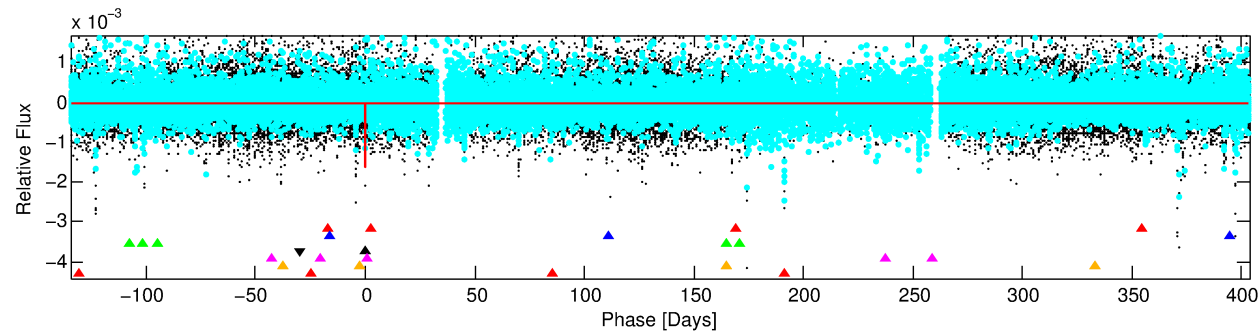
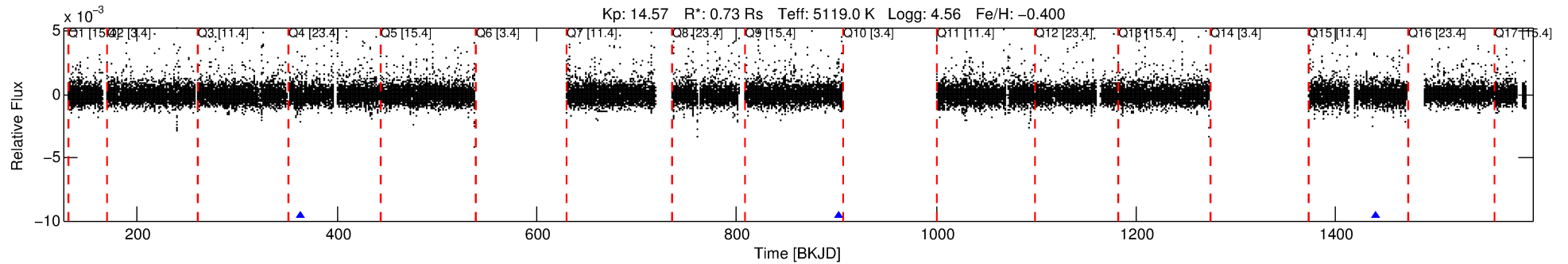
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 003456972-04

No Significant Match Found

# DV One-Page Summary

KIC: 3456972 Candidate: 4 of 7 Period: 538.352 d



## DV Fit Results:

Period = 538.35174 [0.00590] d  
Epoch = 363.9538 [0.0076] BKJD  
Rp/R\* = 0.0371 [0.0959]  
a/R\* = 1246.25 [11846.25]  
b = 0.49 [15.29]  
Seff = 0.25 [0.05]  
Teq = 180 [9] K  
Rp = 2.94 [7.62] Re  
a = 1.1466 [0.1196] AU  
Ag = 74034.93 [383587.54] [0.19 $\sigma$ ]  
Teffp = 4586 [5939] K [0.74 $\sigma$ ]

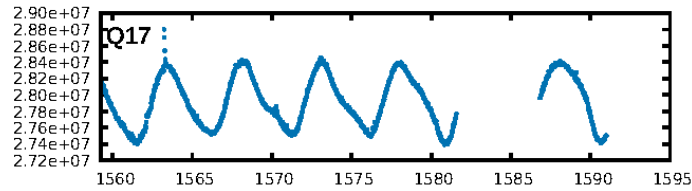
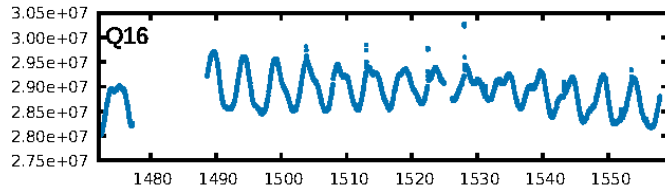
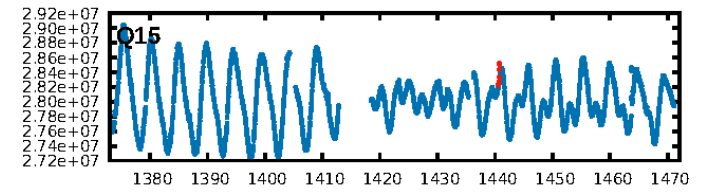
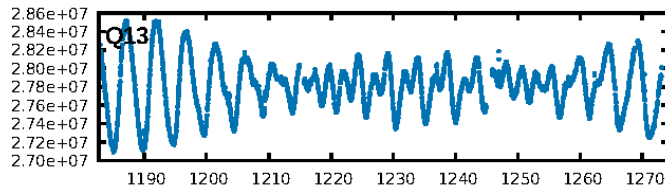
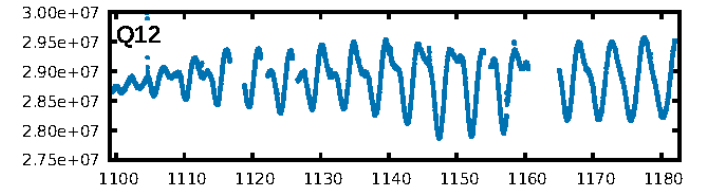
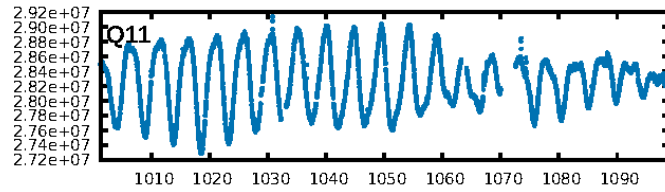
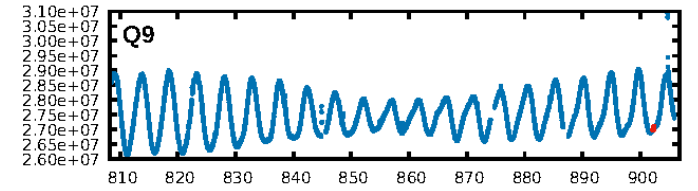
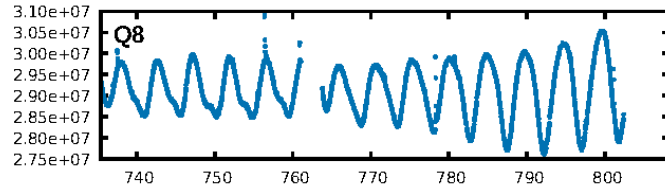
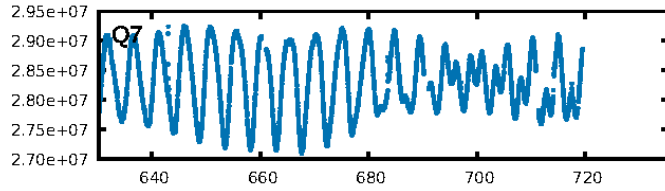
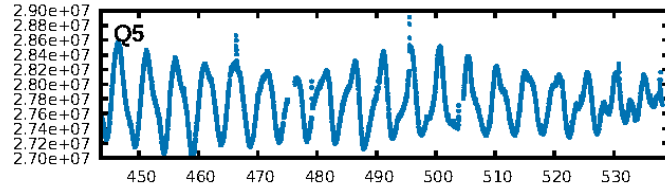
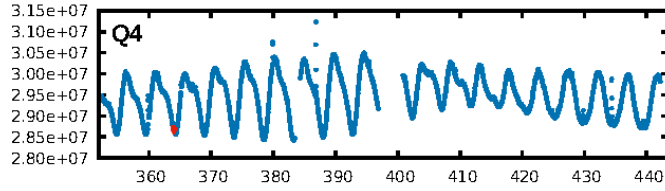
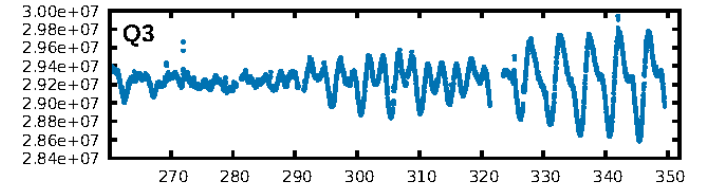
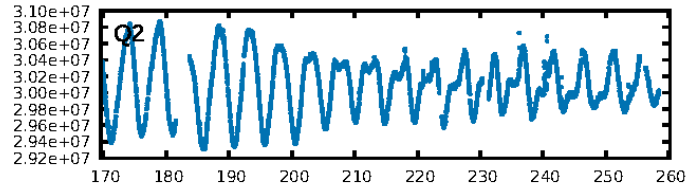
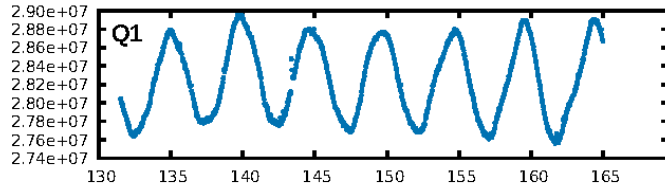
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [1137.97 $\sigma$ ]  
LongPeriod-sig: 100.0% [379.39 $\sigma$ ]  
ModelChiSquare2-sig: 67.9%  
ModelChiSquareGof-sig: 71.9%  
**Bootstrap-pfa: 1.17e-11**  
RollingBand-fgt: 1.00 [3/3]  
**GhostDiagnostic-chr: -0.09626**  
Centroid-sig: 18.2%  
Centroid-so: 1.221 arcsec [1.06 $\sigma$ ]  
OotOffset-rm: 0.160 arcsec [0.28 $\sigma$ ]  
OotOffset-st: 0/1/1/1 [3]  
KicOffset-rm: 0.128 arcsec [0.27 $\sigma$ ]  
KicOffset-st: 0/1/1/1 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

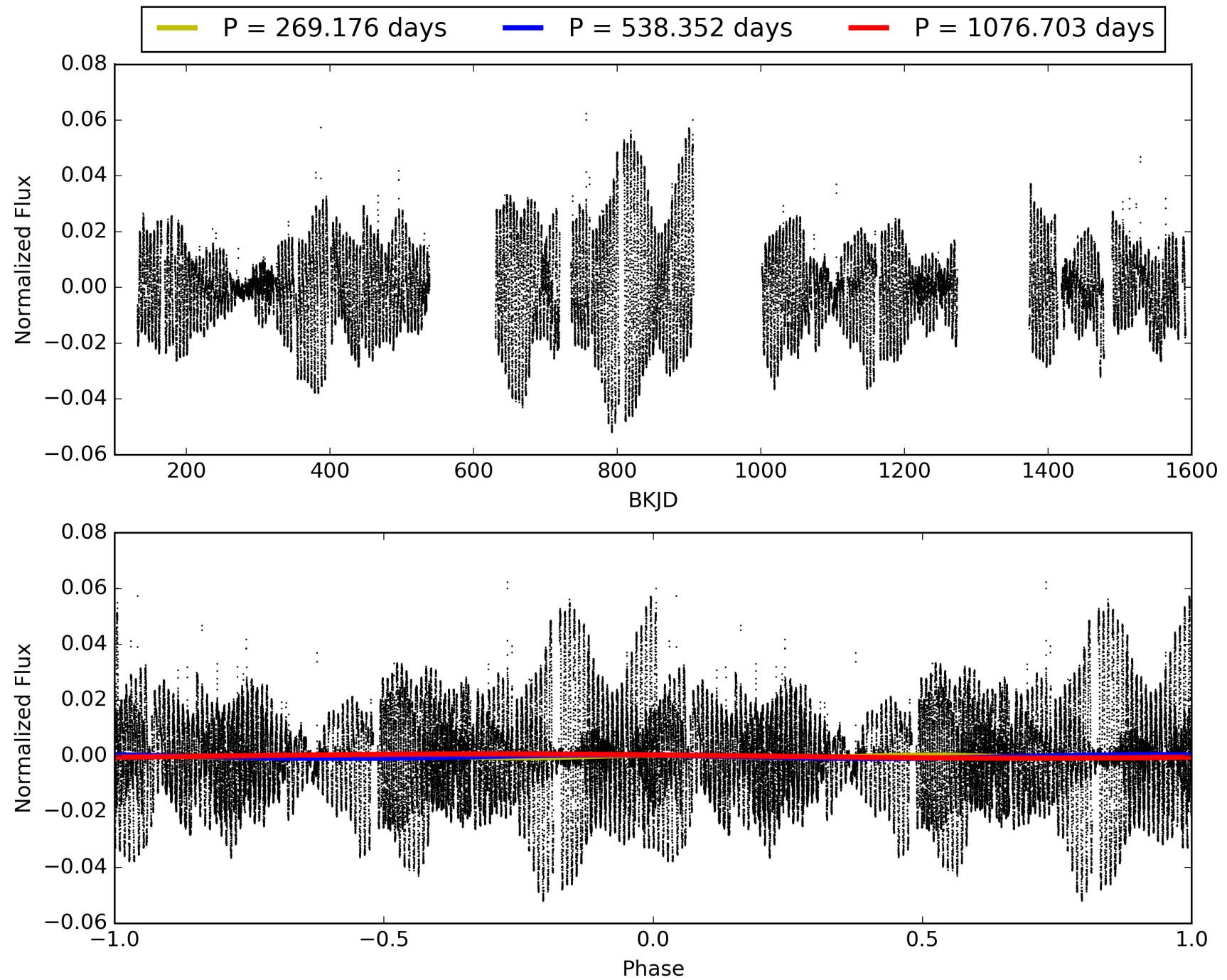
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 21:15:41 Z

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

# TCE 003456972-04, PDC Light Curves

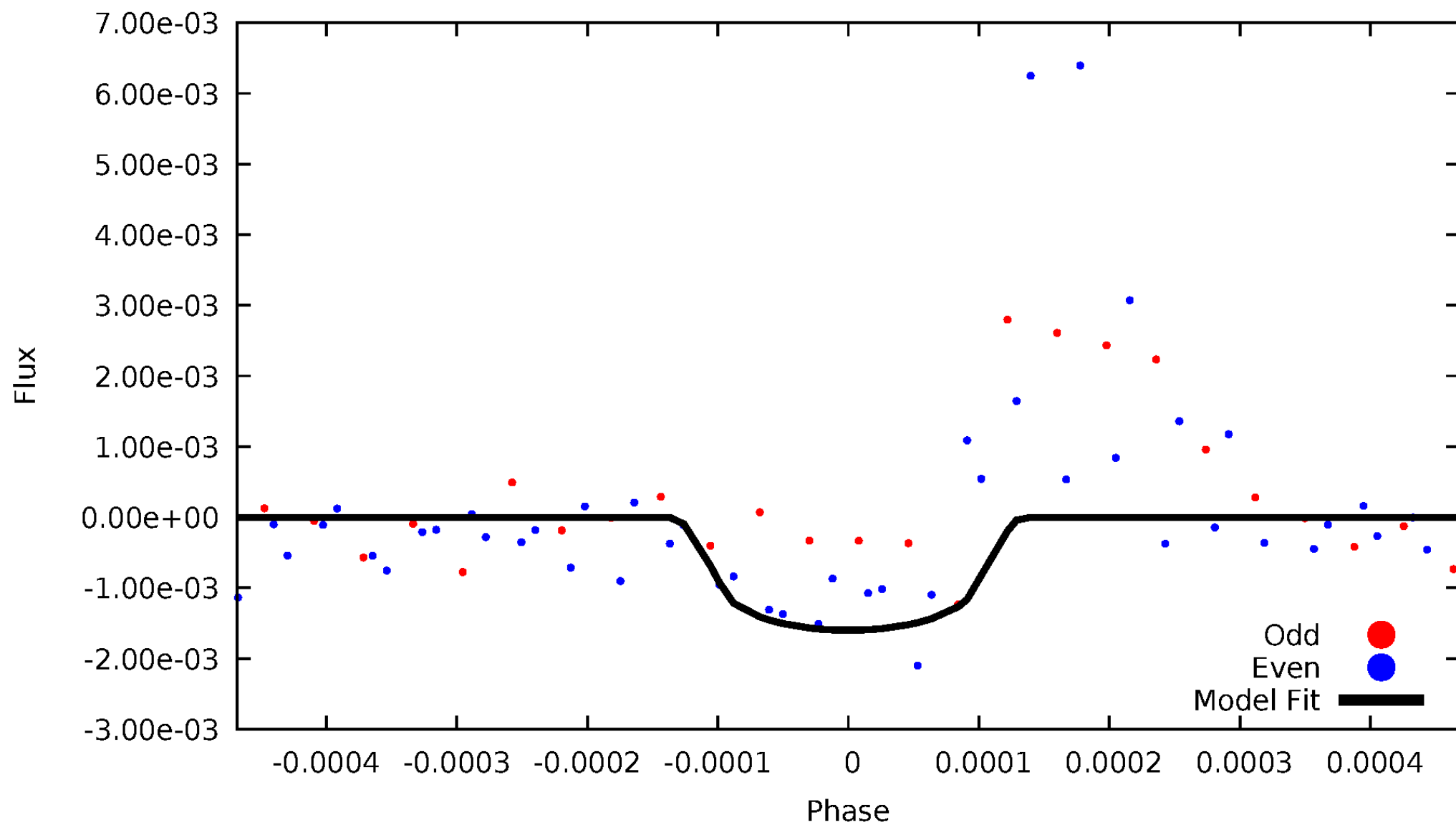


# TCE 003456972-04



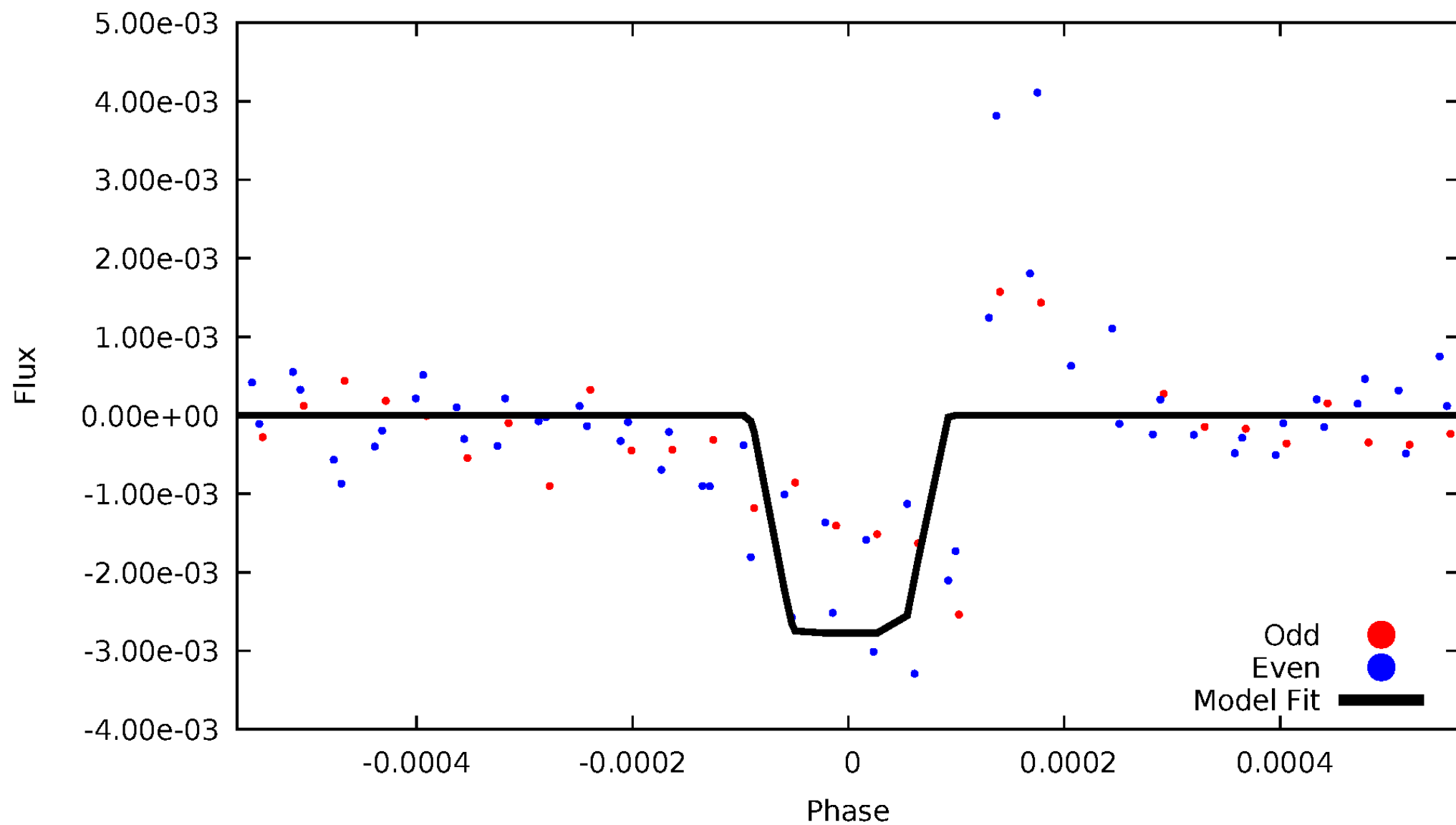
# DV Odd/Even

TCE 003456972-04



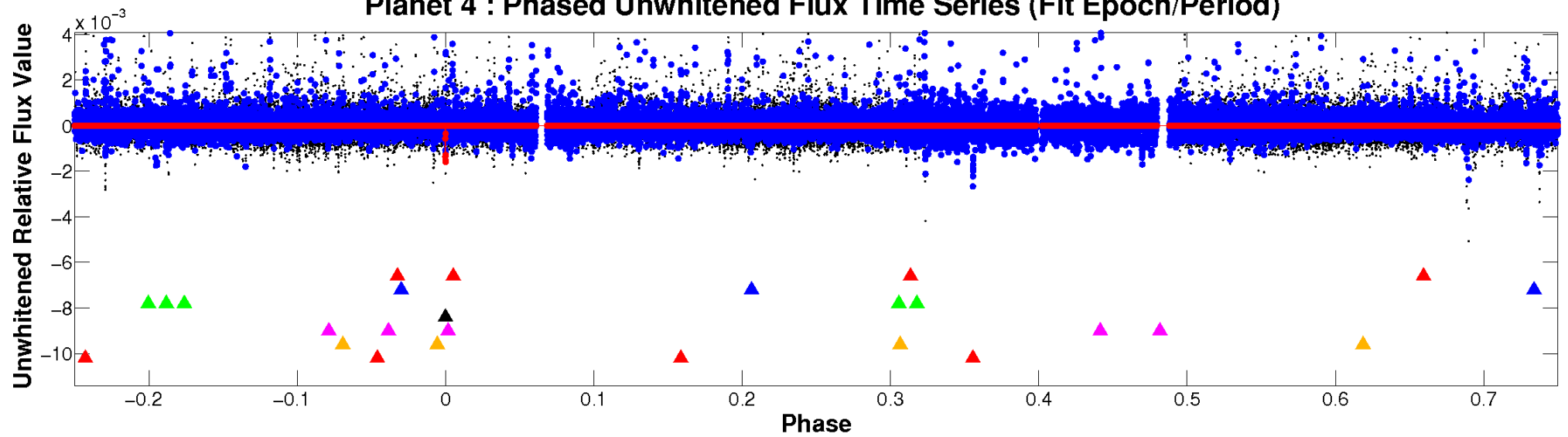
# ALT Odd/Even

TCE 003456972-04

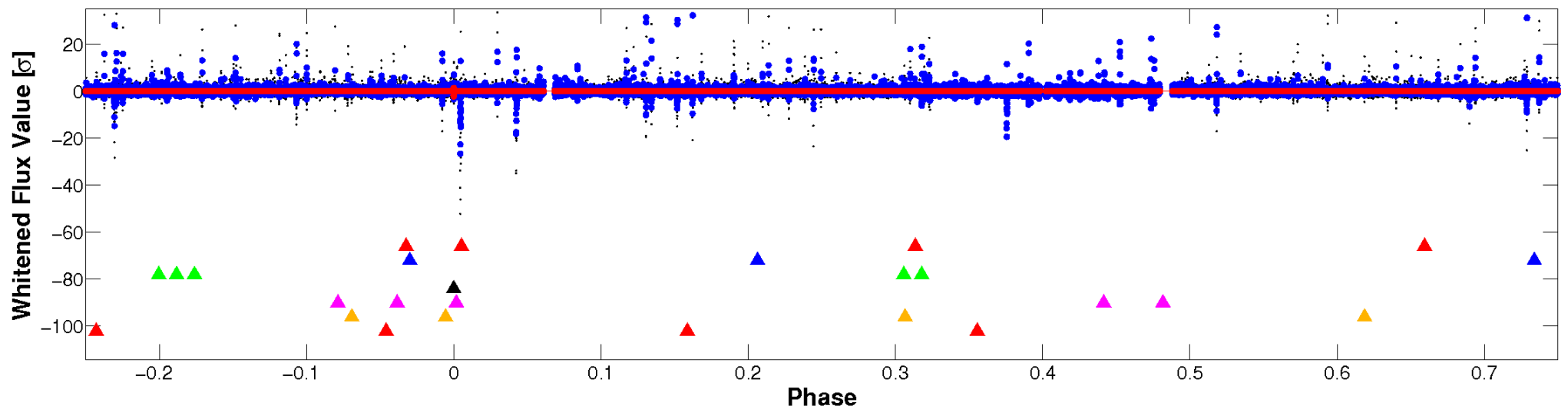


# Non-Whitened Vs. Whitened Light Curve

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

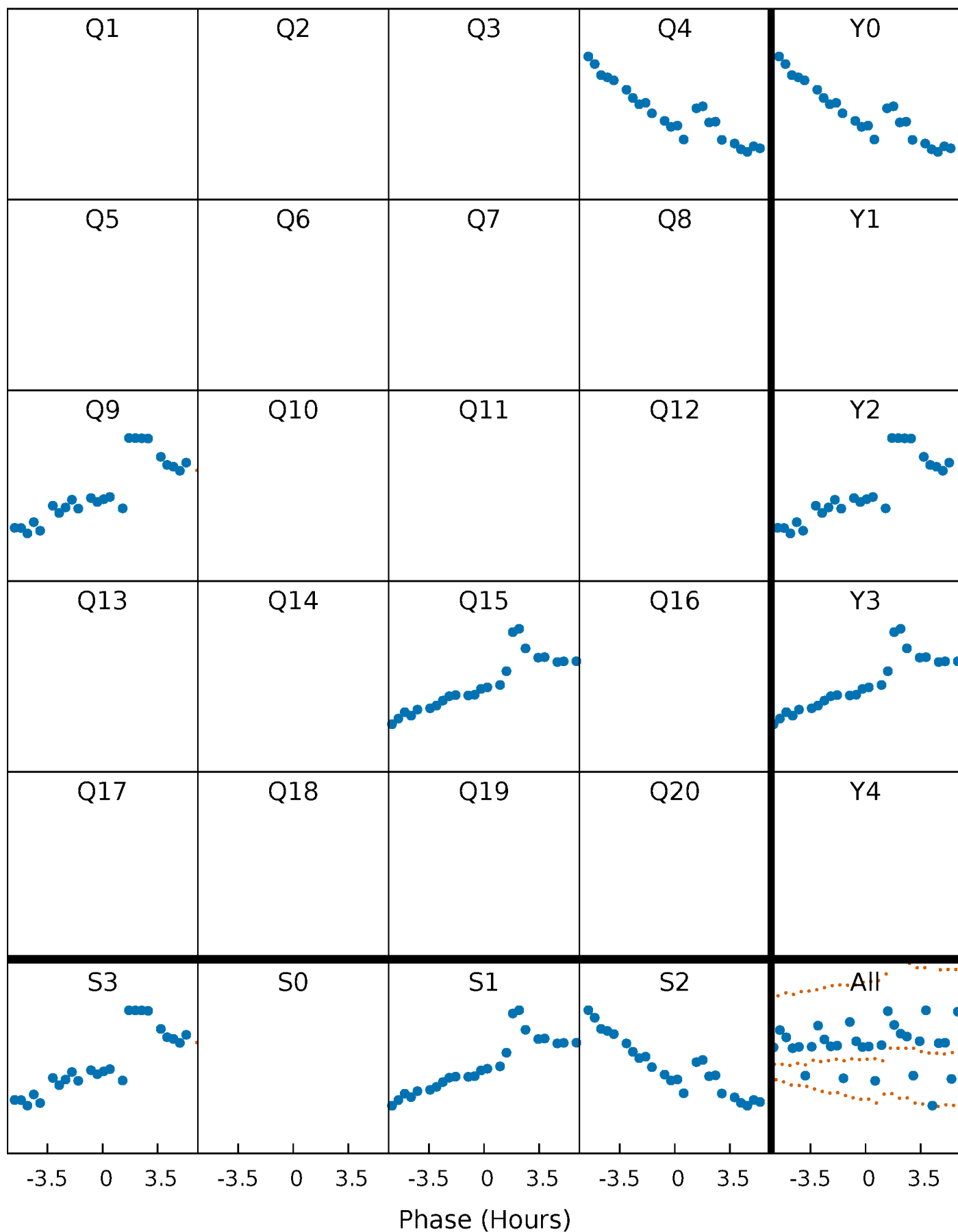


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

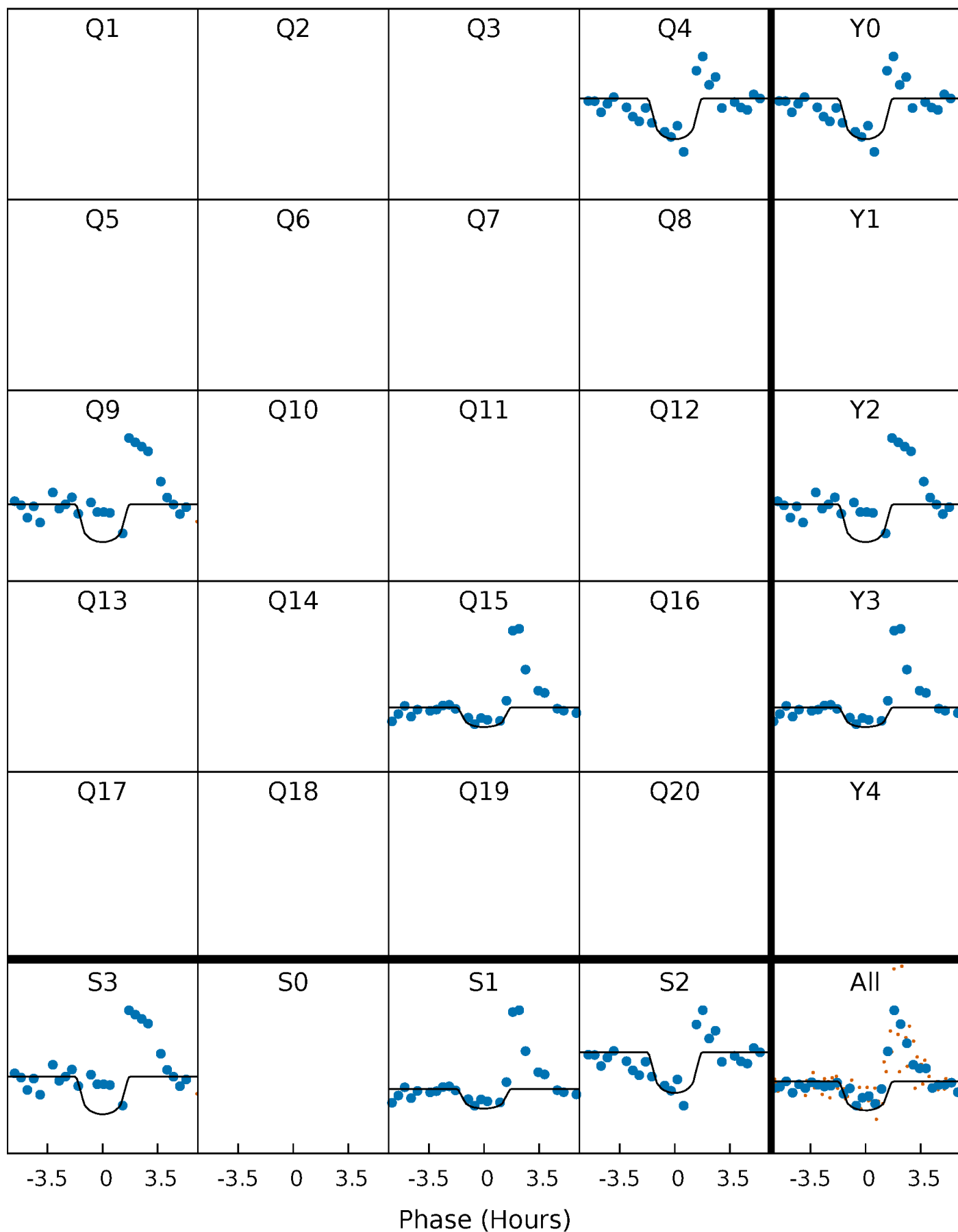
TCE 003456972-04     $P=538.351744$  Days     $T_0=363.953764$  (BKJD)





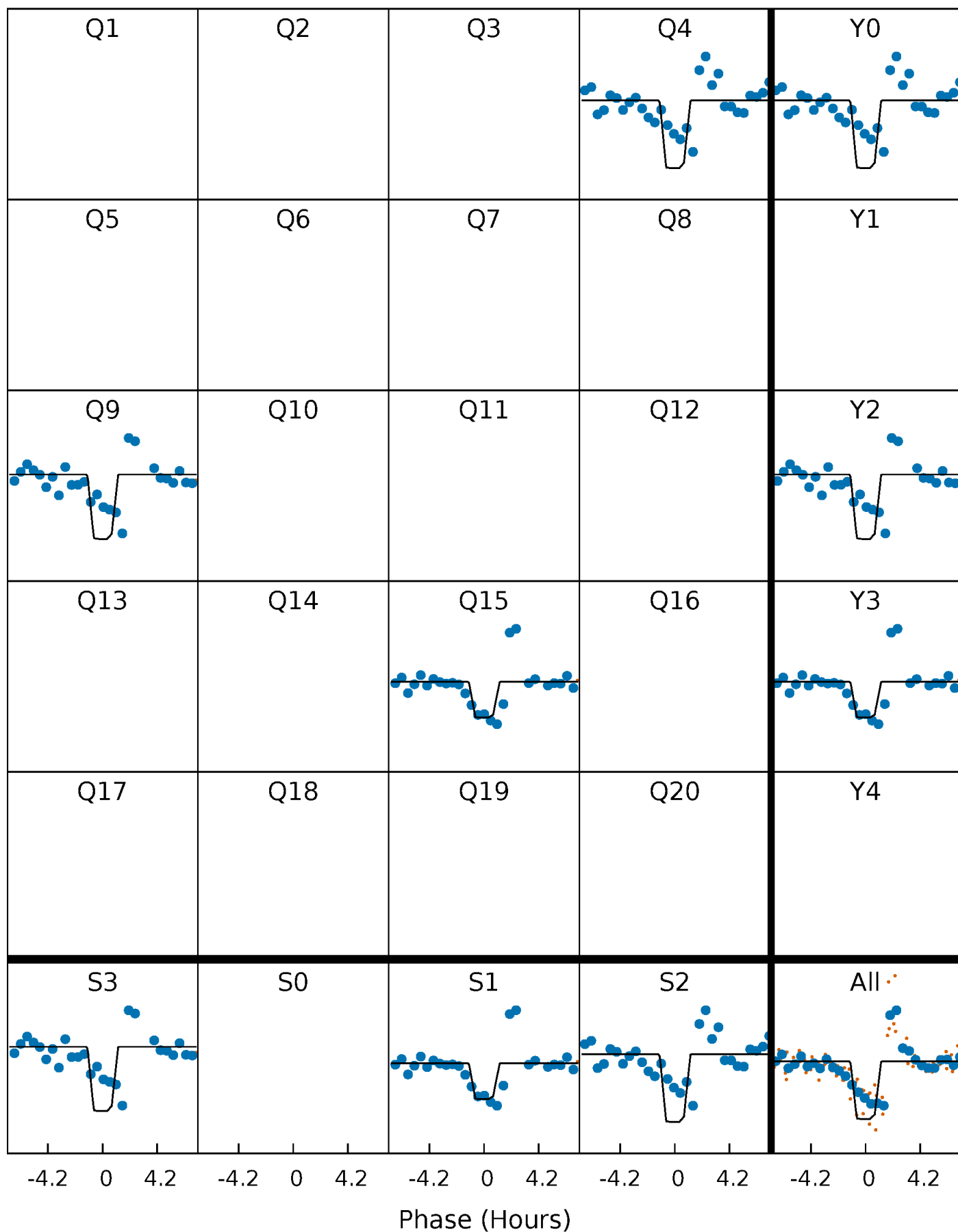
# DV Quarter-Phased Transit Curves

TCE 003456972-04     $P=538.351744$  Days     $T_0=363.953764$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

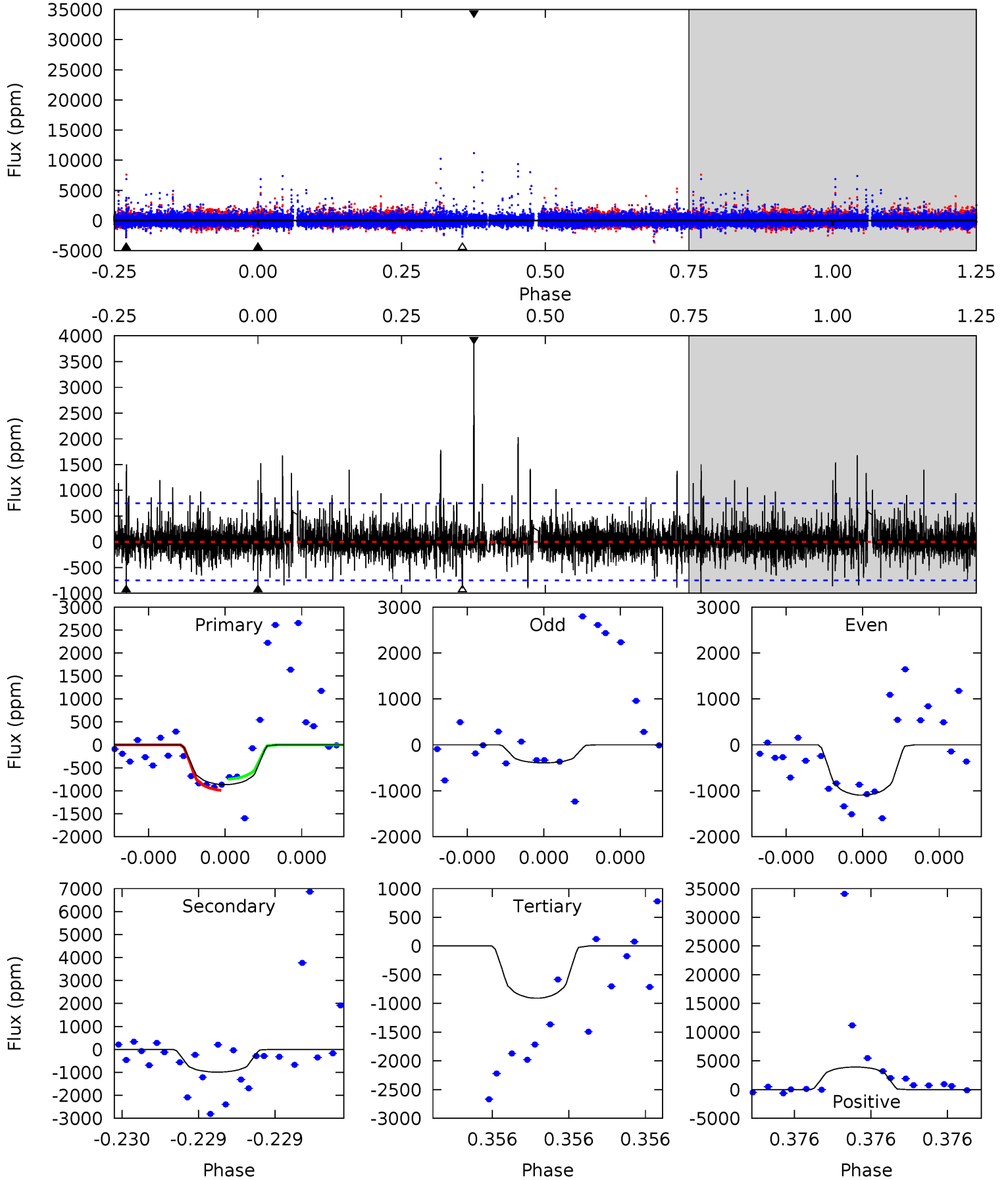
TCE 003456972-04 P=538.363005 Days  $T_0=363.932531$  (BKJD)



# DV Model-Shift Uniqueness Test

003456972-04, P = 538.351744 Days, E = 363.953764 Days

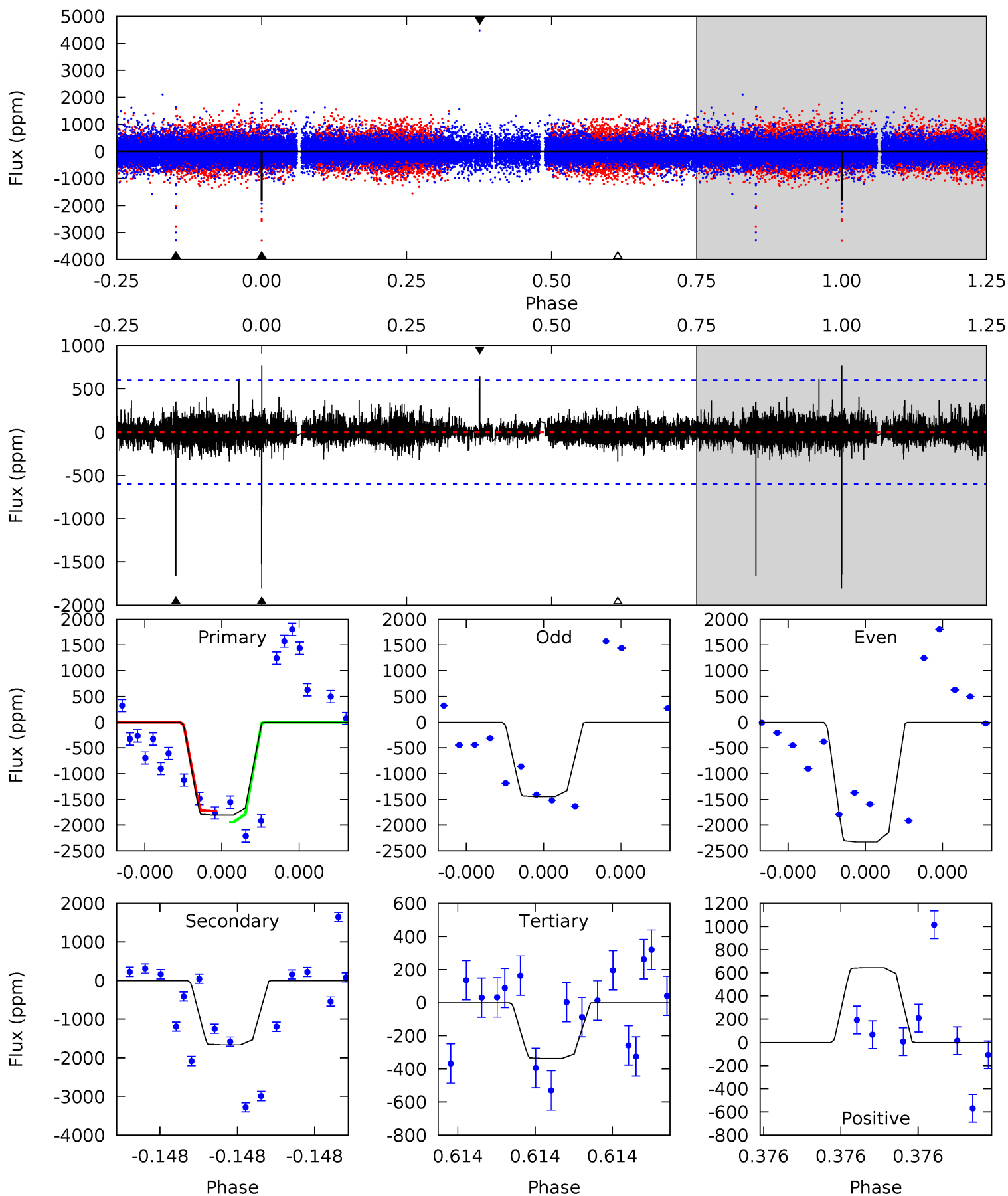
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.59	7.54	6.91	29.9	5.70	3.68	1.66	-0.33	-23.3	0.62	-22.4	1.47	0.86	0.80	0.92



# Alt Model-Shift Uniqueness Test

003456972-04, P = 538.363005 Days, E = 363.932531 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
17.3	15.9	3.22	6.19	5.75	3.75	0.72	14.1	11.1	12.7	9.74	4.06	1.35	0.30	1.06



### Stellar Parameters For KIC 003456972

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5119^{+153}_{-153}$	$4.556^{+0.080}_{-0.080}$	$-0.400^{+0.300}_{-0.300}$	$0.727^{+0.092}_{-0.083}$	$0.693^{+0.101}_{-0.043}$	$2.544^{+0.847}_{-0.580}$
	+3%/-3%	+2%/-2%	+75%/-75%	+13%/-11%	+15%/-6%	+33%/-23%
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 003456972-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-989 \pm 131$	$6.39^{+6.24}_{-4.59}$	$252^{+10}_{-9}$	$3615^{+2354}_{-681}$	$17620^{+202606}_{-13159}$
Alt.	$-1662 \pm 104$	$7.43^{+6.54}_{-4.80}$	$251^{+10}_{-10}$	$3732^{+1946}_{-647}$	$22015^{+167522}_{-15631}$

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

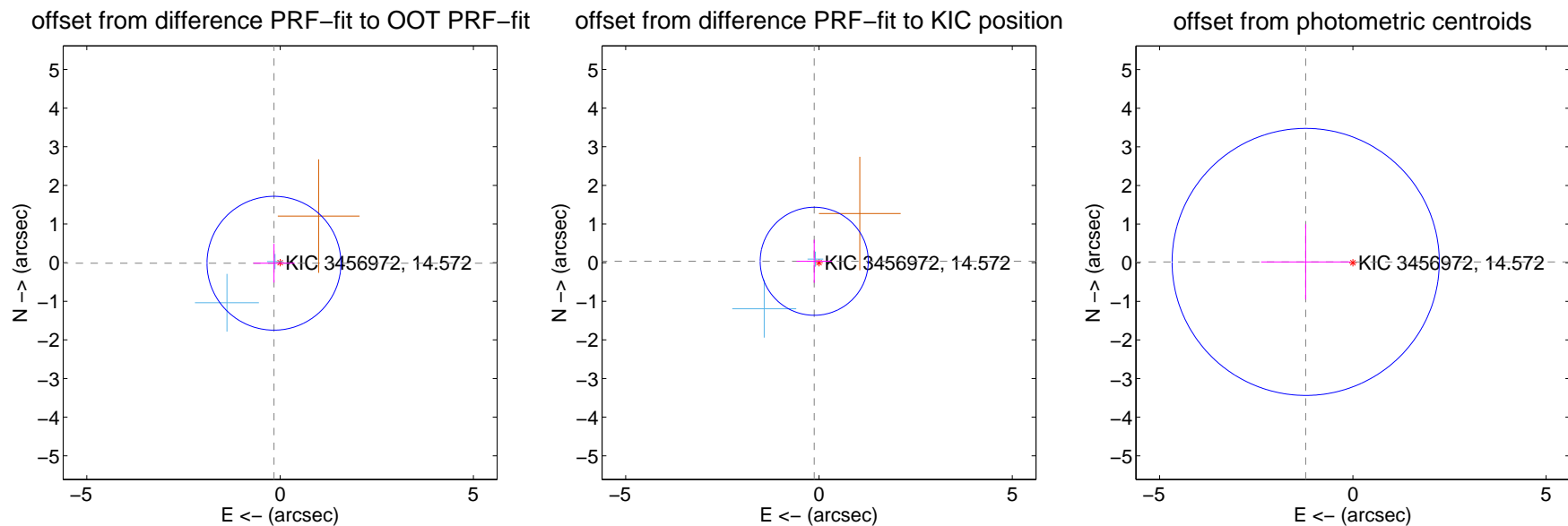
## DV Centroid Data

Supplemental centroid analysis for 003456972-04. Kepler magnitude: 14.57. Transit SNR 8.90

There are 2 quarters with good PRF difference image offsets

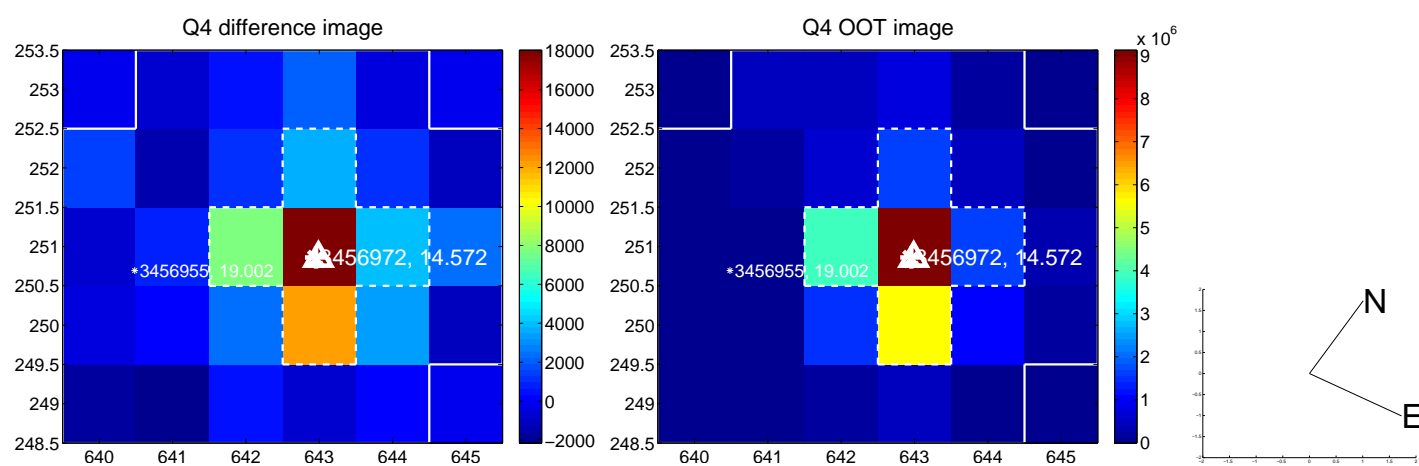
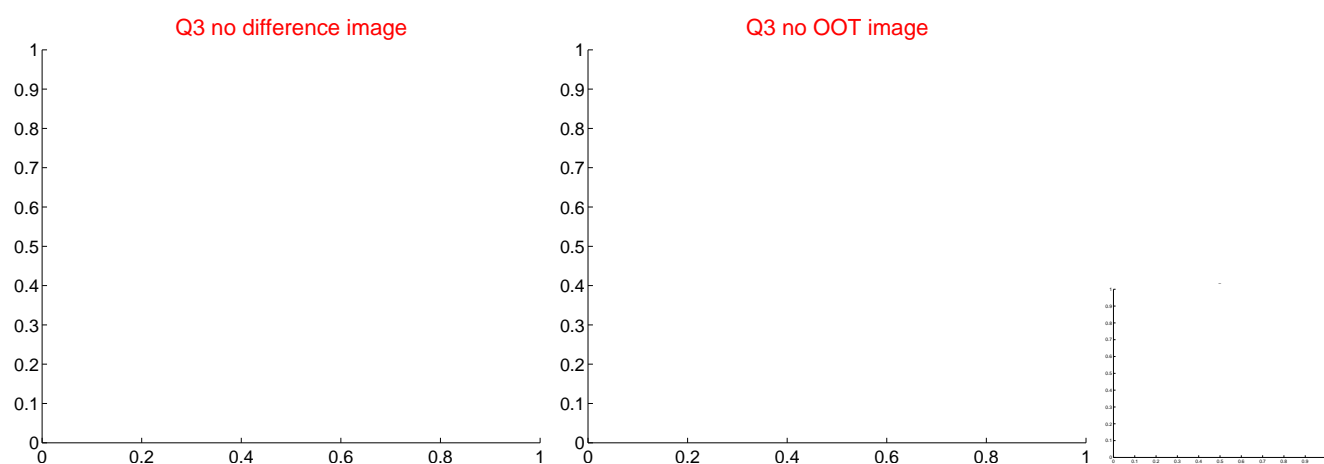
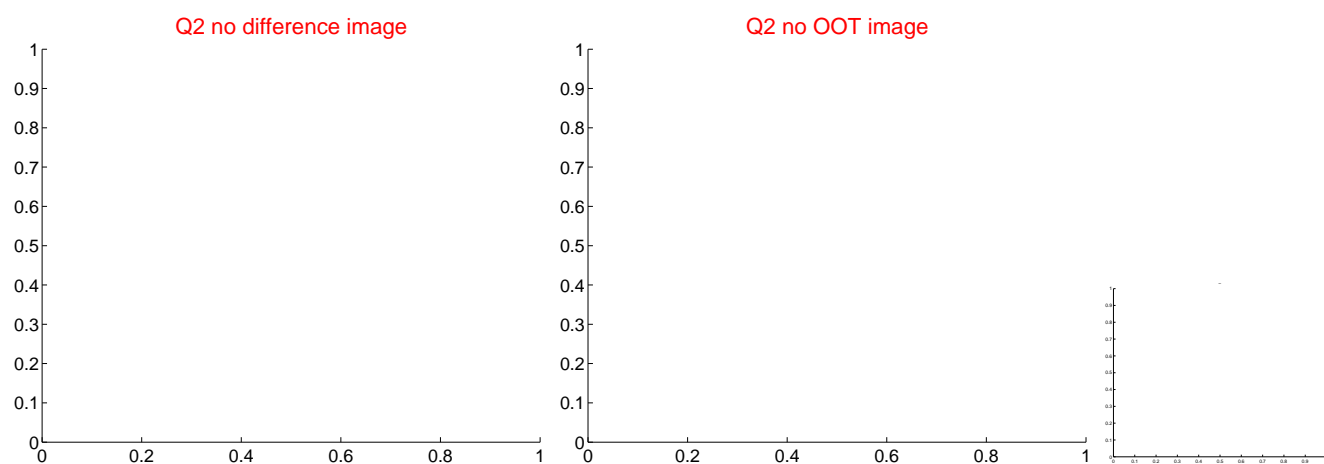
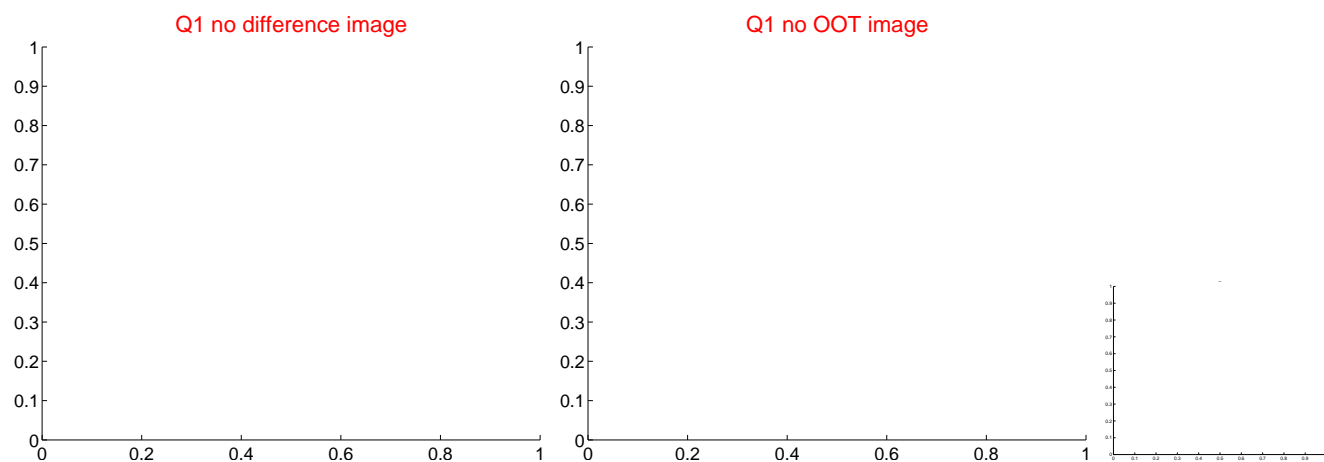
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.160 \pm 0.577$	0.28	$0.159 \pm 0.533$	$-0.015 \pm 0.502$
PRF-fit source offset from KIC position	$0.128 \pm 0.466$	0.27	$0.123 \pm 0.458$	$0.036 \pm 0.557$
photometric centroid source offset	$1.22 \pm 1.15$	1.06	$1.22 \pm 1.15$	$0.02 \pm 0.97$



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

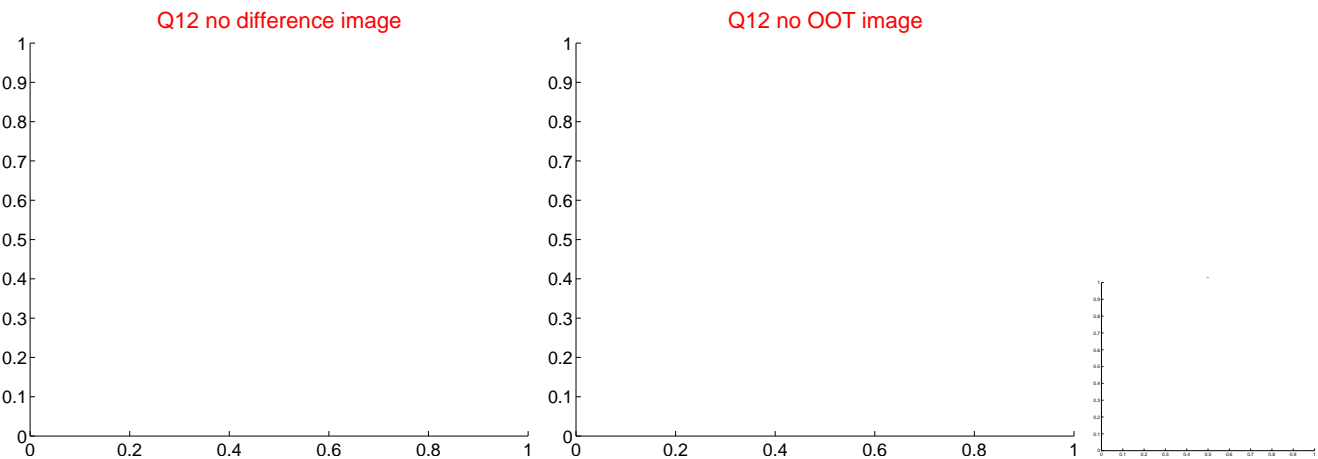
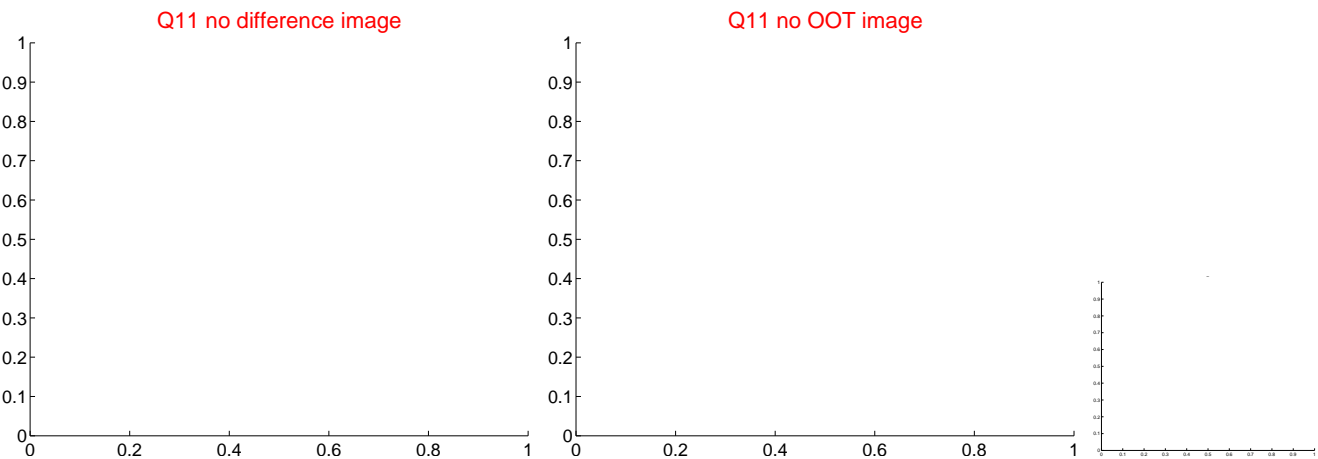
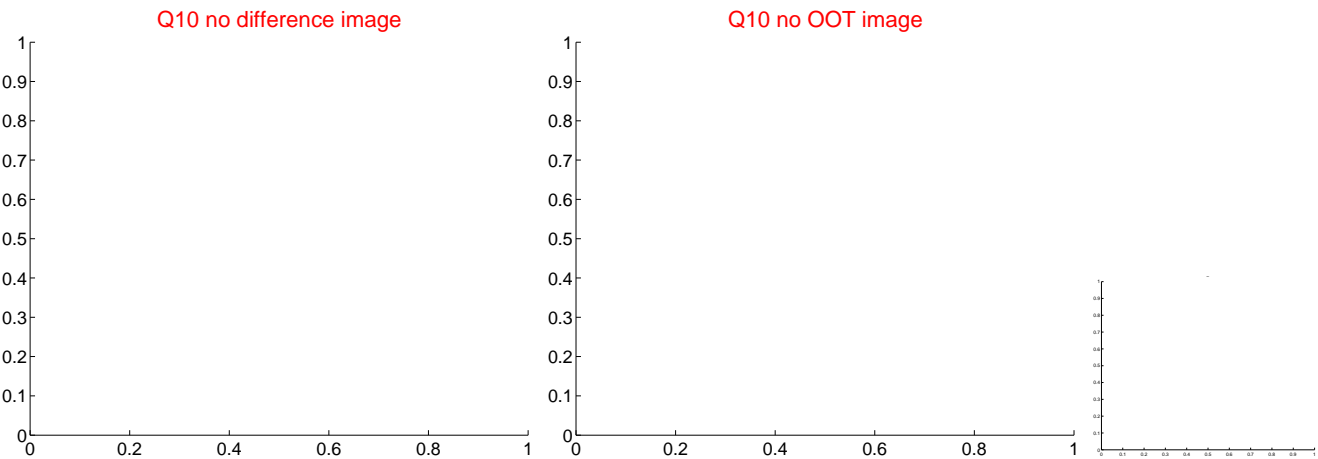
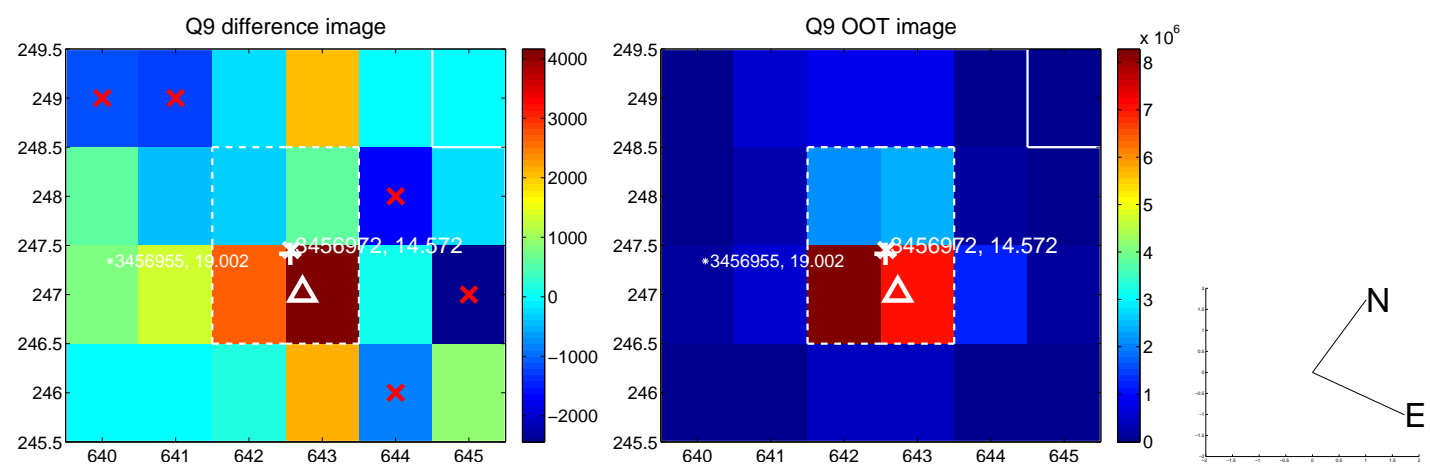


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





white ×: 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.

Q13 no difference image



Q13 no OOT image



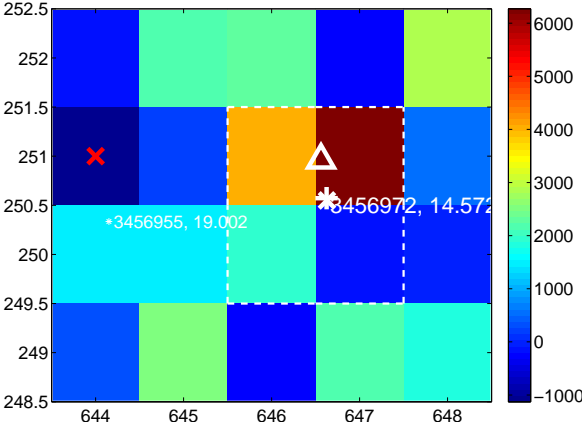
Q14 no difference image



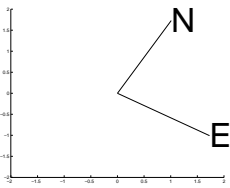
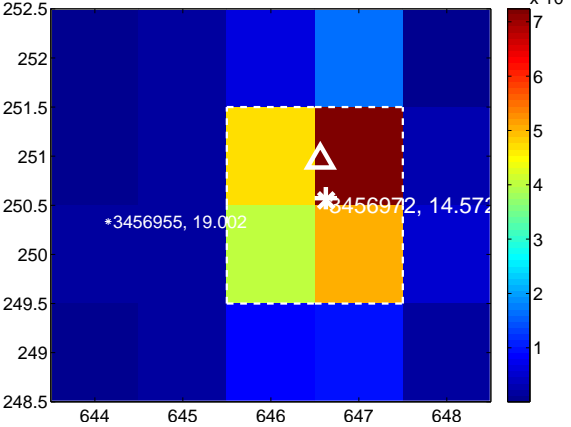
Q14 no OOT image



Q15 difference image. Poor Quality



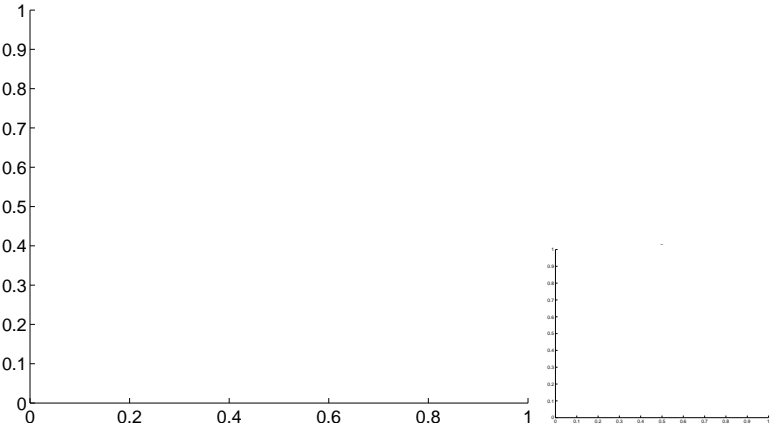
Q15 OOT image



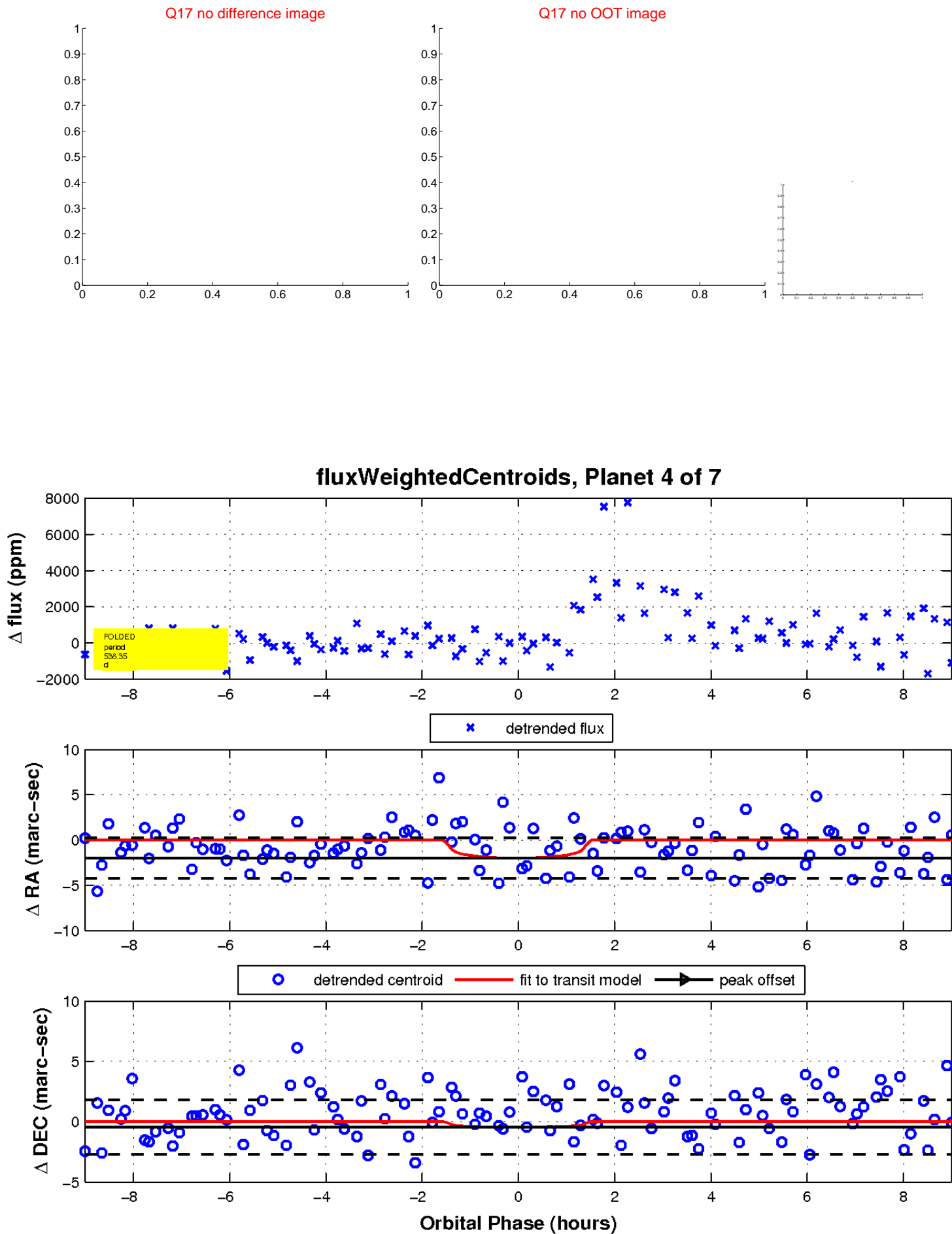
Q16 no difference image



Q16 no OOT image

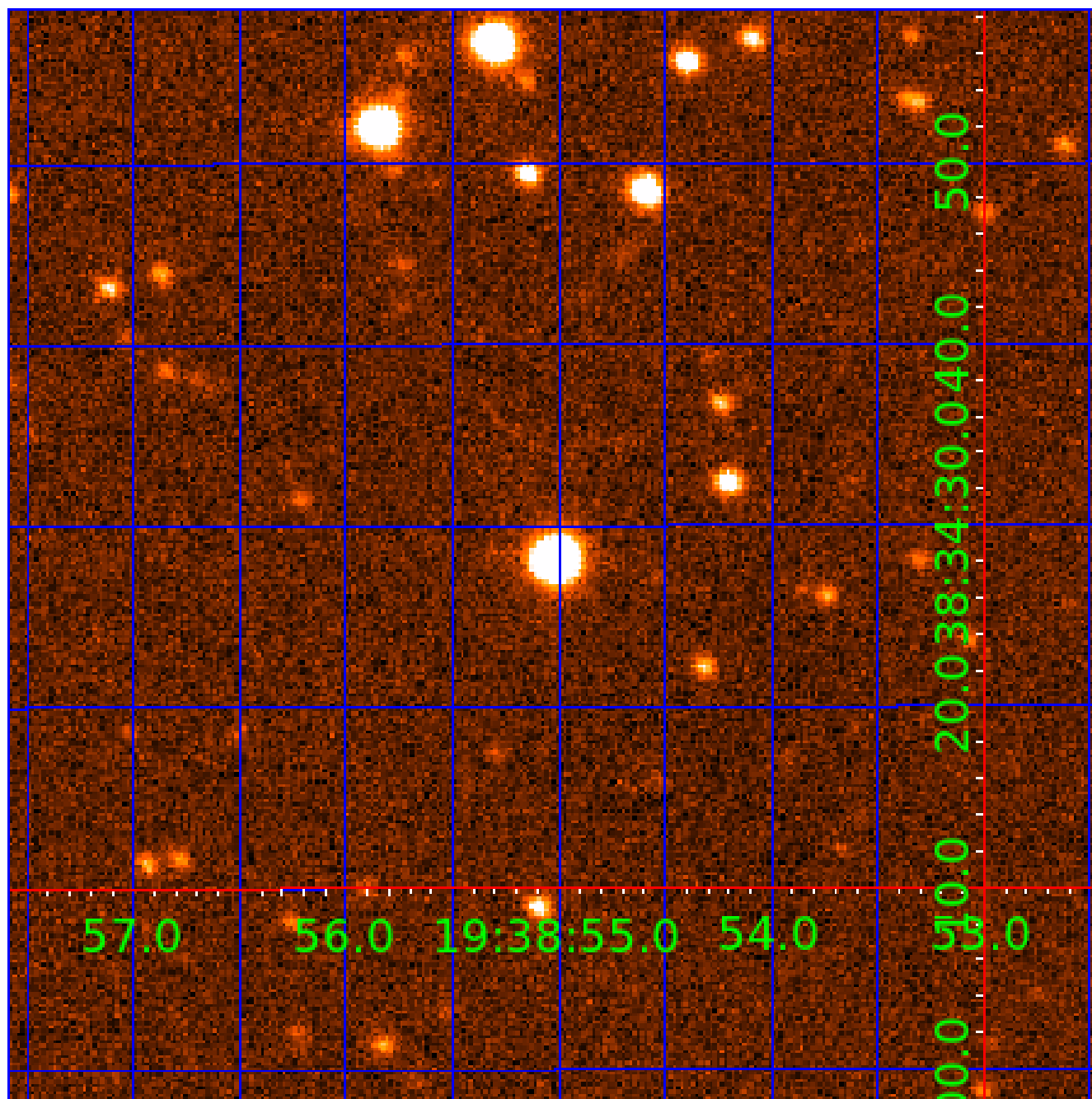


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 003456972

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003456972-02	OBS	No	665.509508	220.725314	1951.8	7.454	15.3	8.7	0.73	5119	3.40	0.19
003456972-03	OBS	No	265.906986	269.154923	1060.4	3.601	13.7	5.8	0.73	5119	2.52	0.63
003456972-04	OBS	No	538.351744	363.953765	1598.2	3.025	13.9	8.9	0.73	5119	2.94	0.25
003456972-05	OBS	No	258.351842	364.922983	1903.4	12.356	13.2	8.4	0.73	5119	3.49	0.66
003456972-06	OBS	No	370.329878	326.686867	1818.0	1.846	11.9	10.4	0.73	5119	3.08	0.41
003456972-07	OBS	No	322.179264	449.394130	1840.6	4.506	12.8	8.9	0.73	5119	3.17	0.49

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003456972-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
003456972-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
003456972-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS—HALO_GHOST
003456972-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV
003456972-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
003456972-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL_SKYE—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_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.

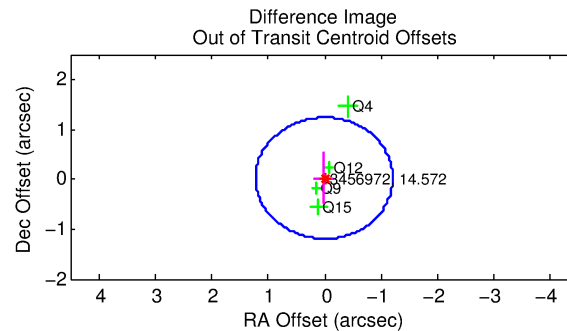
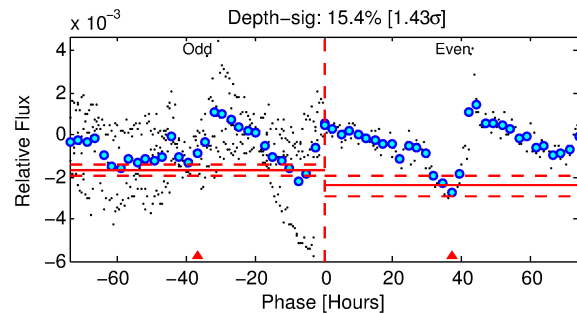
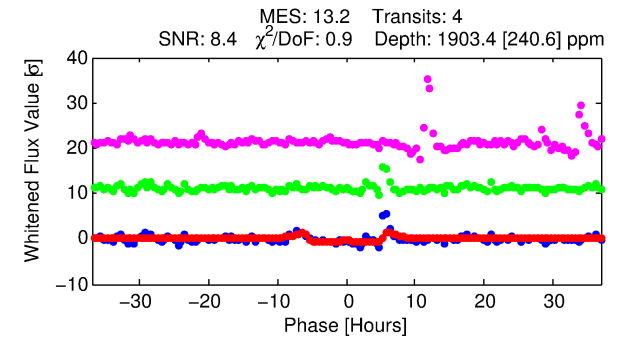
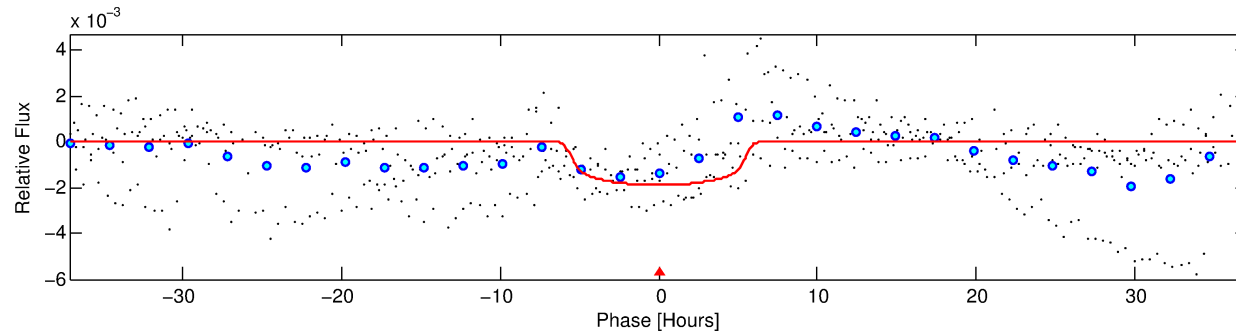
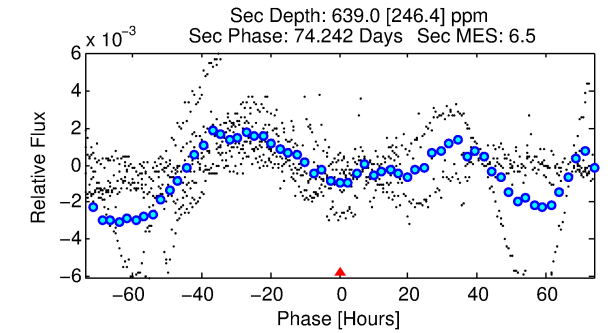
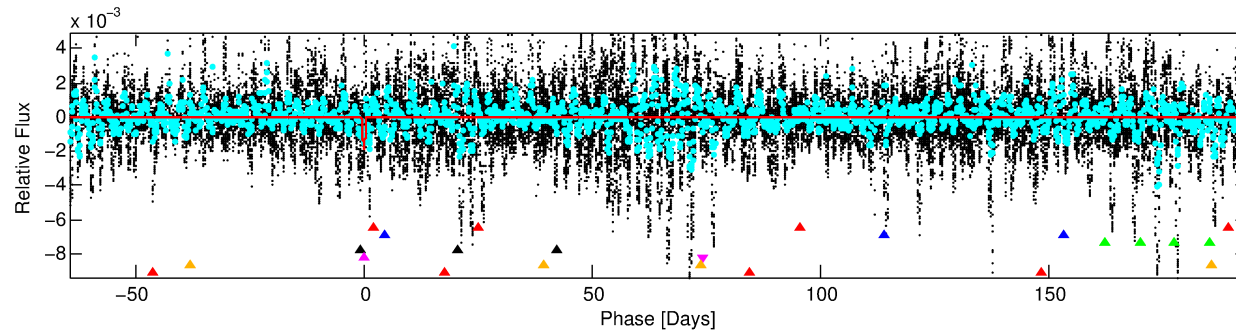
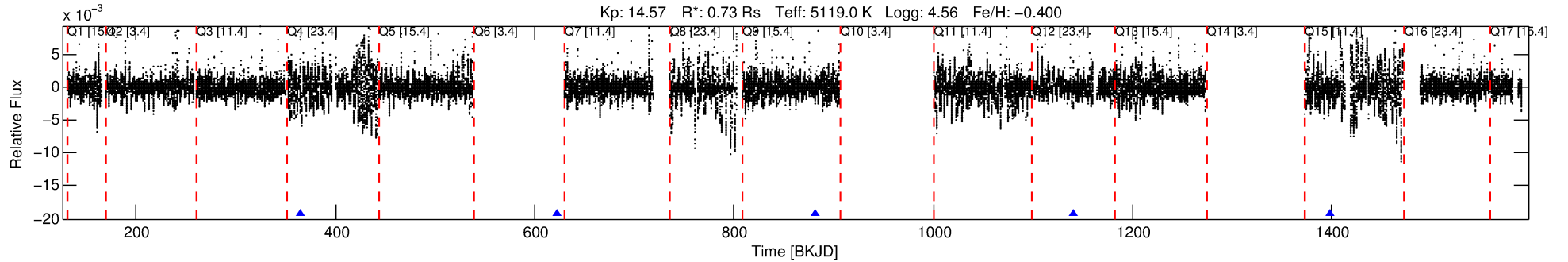
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 003456972-05

No Significant Match Found

# DV One-Page Summary

KIC: 3456972 Candidate: 5 of 7 Period: 258.352 d



## DV Fit Results:

Period = 258.35184 [0.00359] d  
Epoch = 364.9230 [0.0093] BKJD  
Rp/R\* = 0.0439 [0.0043]  
a/R\* = 112.37 [27.05]  
b = 0.77 [0.13]  
Seff = 0.66 [0.13]  
Teq = 230 [11] K  
Rp = 3.49 [0.56] Re  
a = 0.7028 [0.0733] AU  
Ag = 14294.12 [6551.92] [2.18 $\sigma$ ]  
Teffp = 3883 [436] K [8.37 $\sigma$ ]

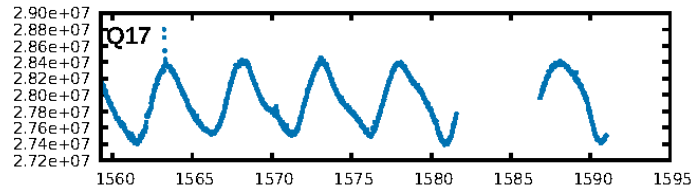
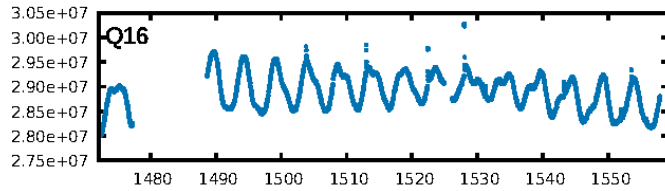
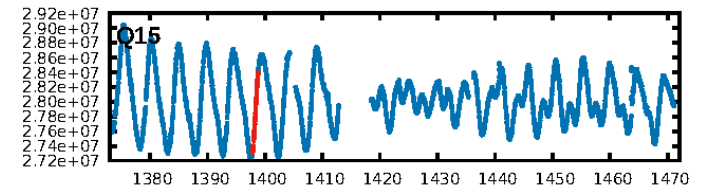
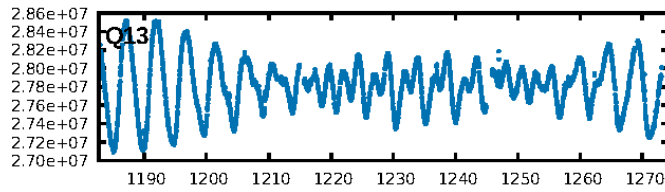
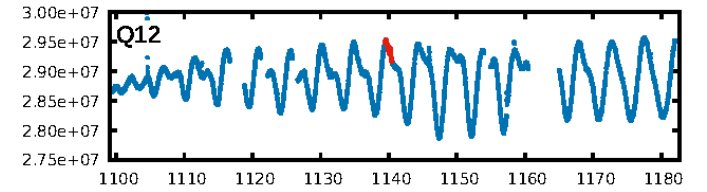
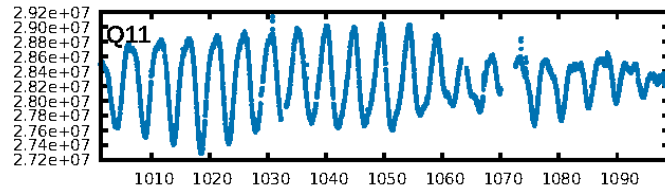
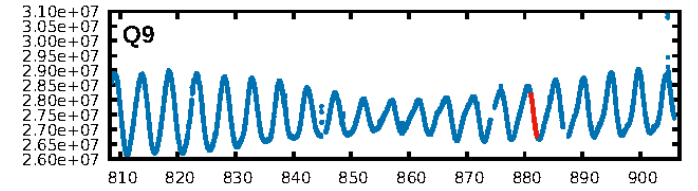
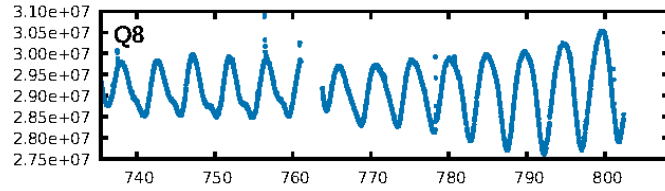
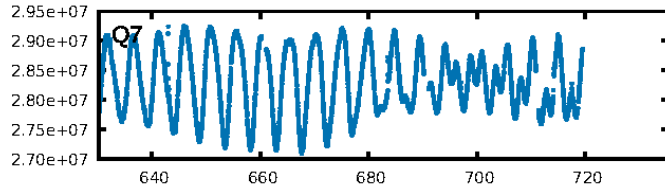
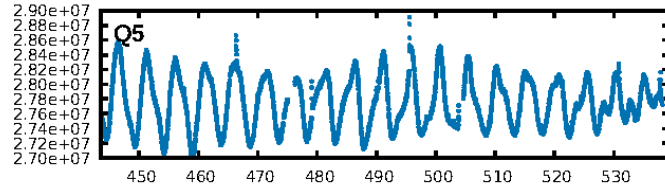
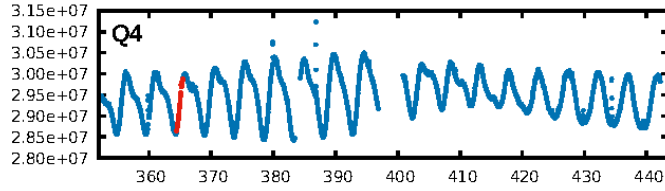
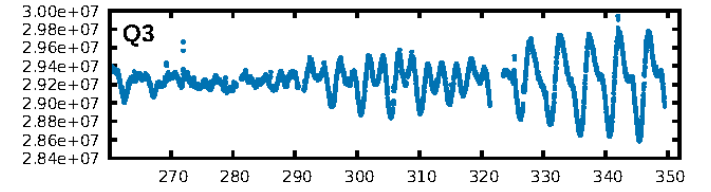
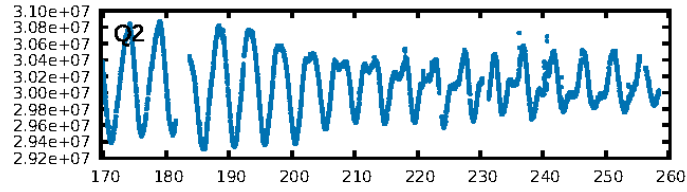
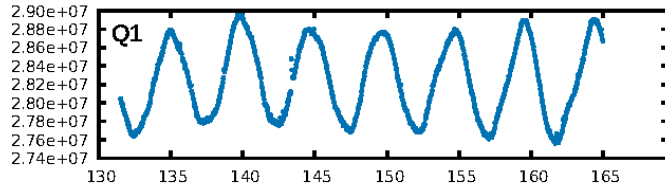
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [14.09 $\sigma$ ]  
ModelChiSquare2-sig: 2.7%  
ModelChiSquareGof-sig: 99.9%  
**Bootstrap-pfa: 1.15e-11**  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -16.15  
Centroid-sig: 54.5%  
Centroid-so: 0.043 arcsec [0.09 $\sigma$ ]  
OotOffset-rm: 0.021 arcsec [0.05 $\sigma$ ]  
KicOffset-rm: 0.035 arcsec [0.12 $\sigma$ ]  
OotOffset-st: 0/1/2/1 [4]  
KicOffset-st: 0/1/2/1 [4]  
DiffImageQuality-fgm: 0.75 [3/4]  
DiffImageOverlap-fno: 0.75 [3/4]

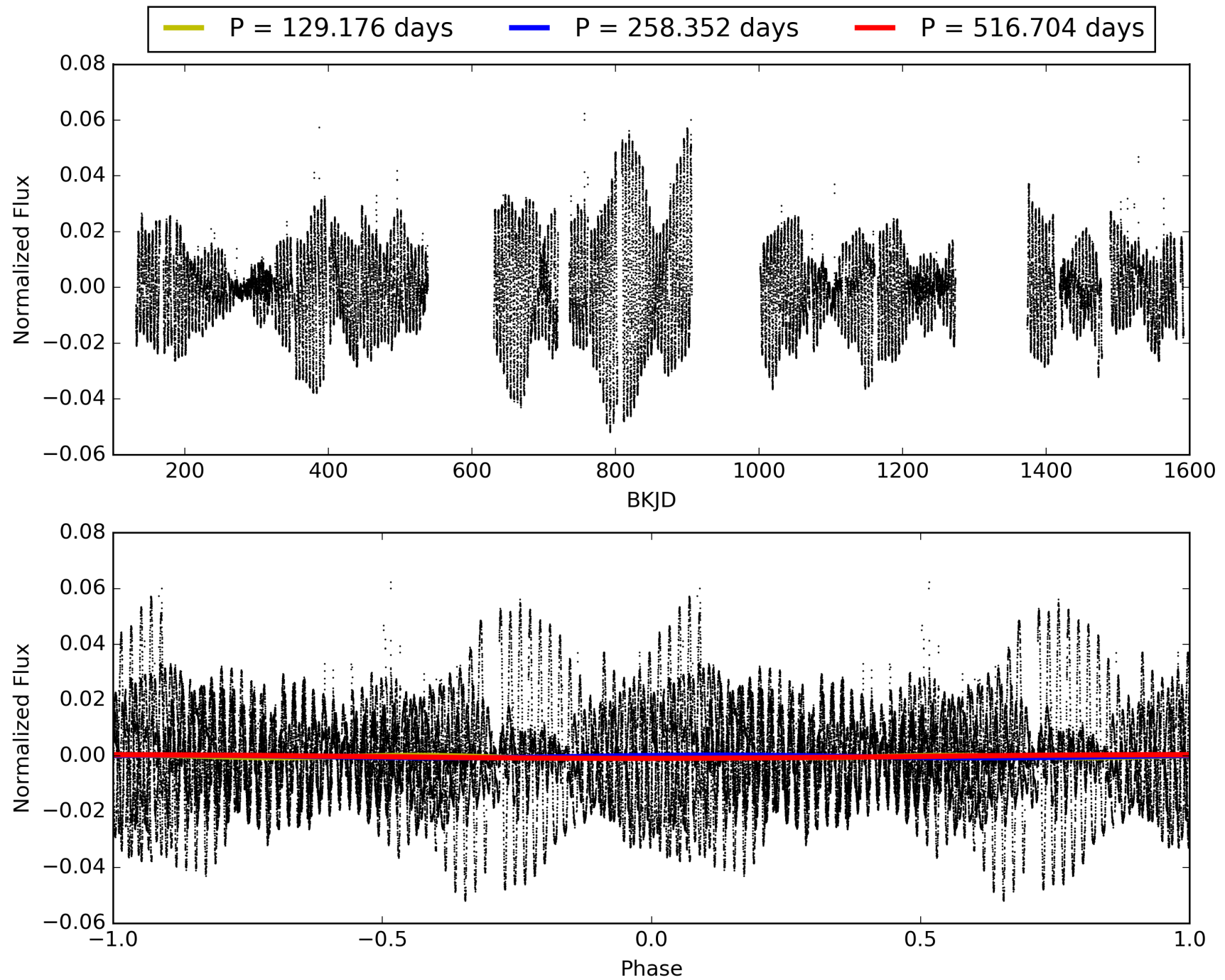
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 21:15:49 Z

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

# TCE 003456972-05, PDC Light Curves



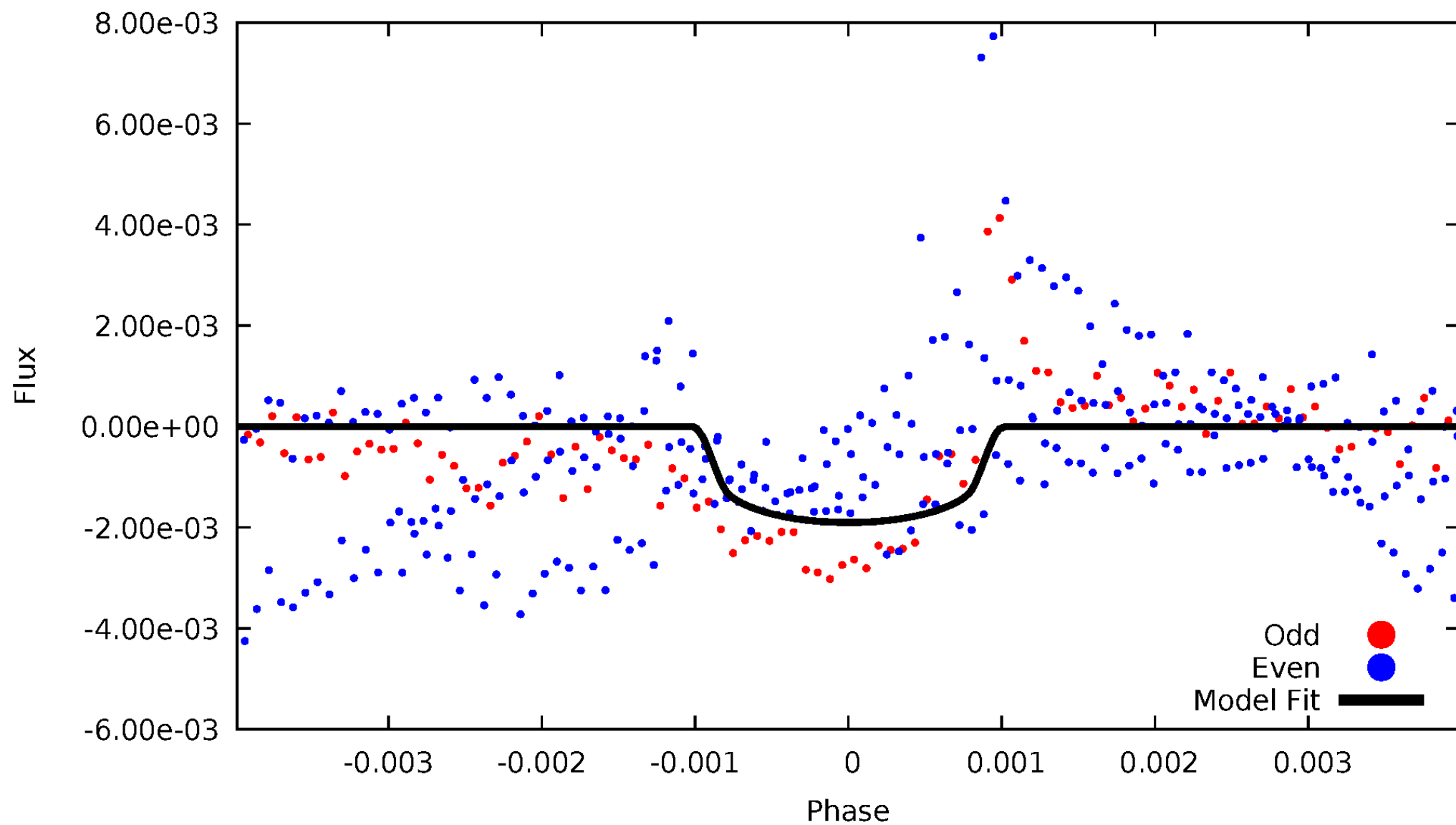
TCE 003456972-05





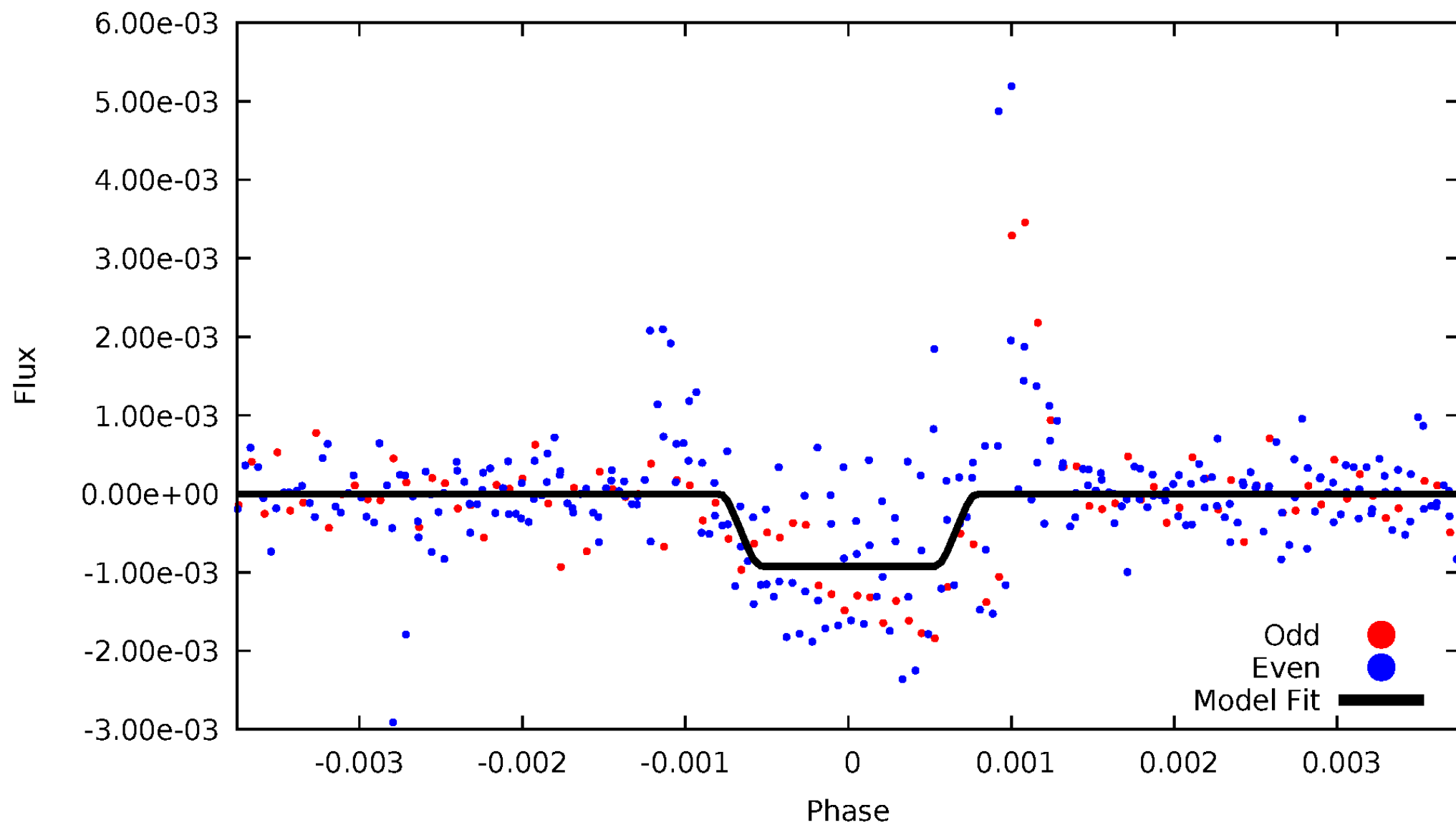
# DV Odd/Even

TCE 003456972-05



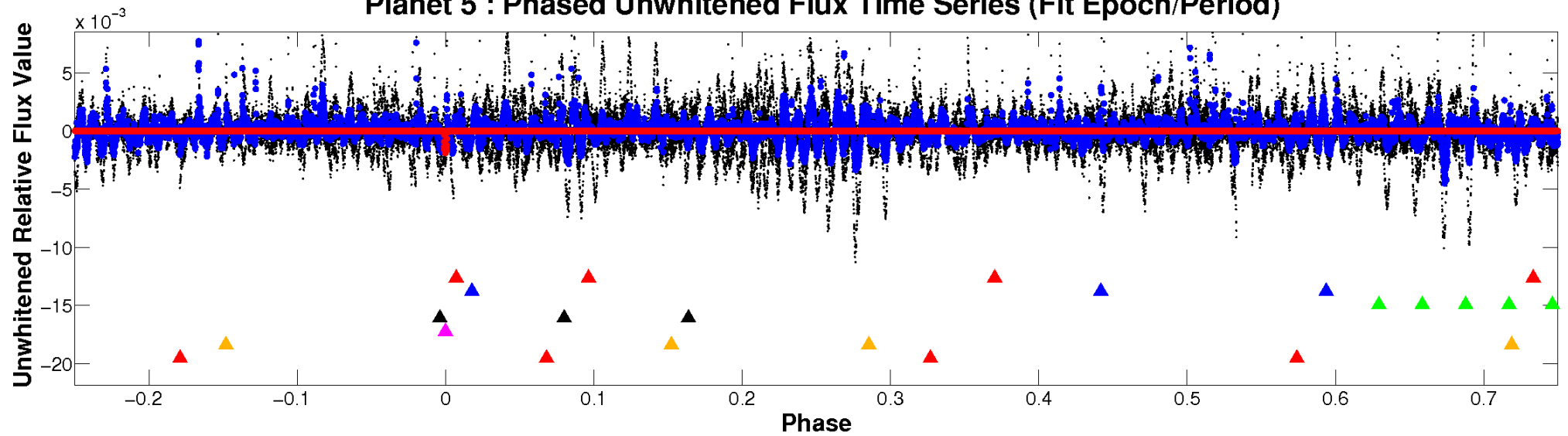
# ALT Odd/Even

TCE 003456972-05

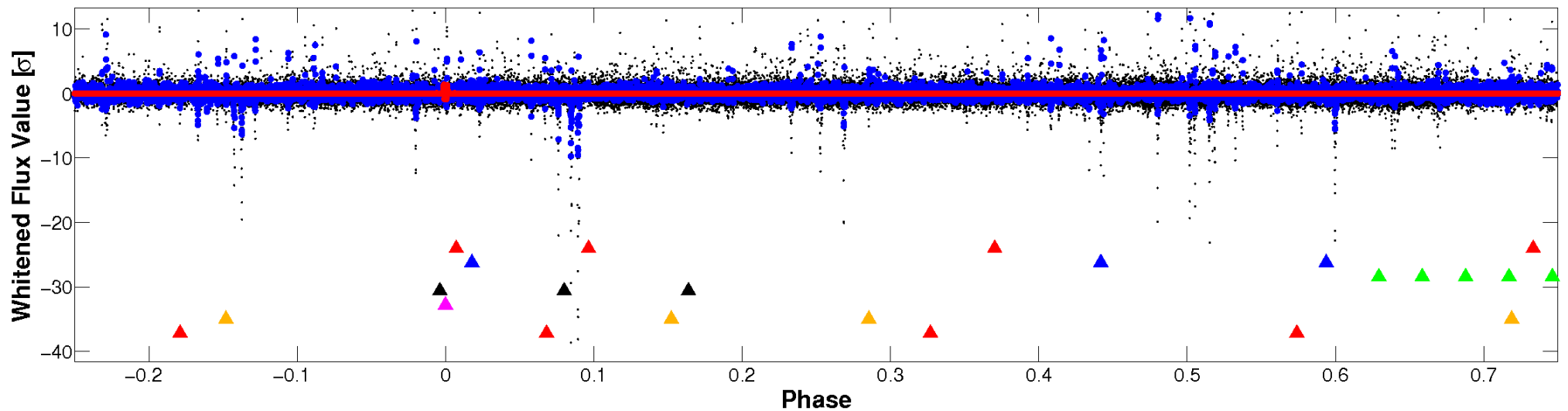


# Non-Whitened Vs. Whitened Light Curve

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

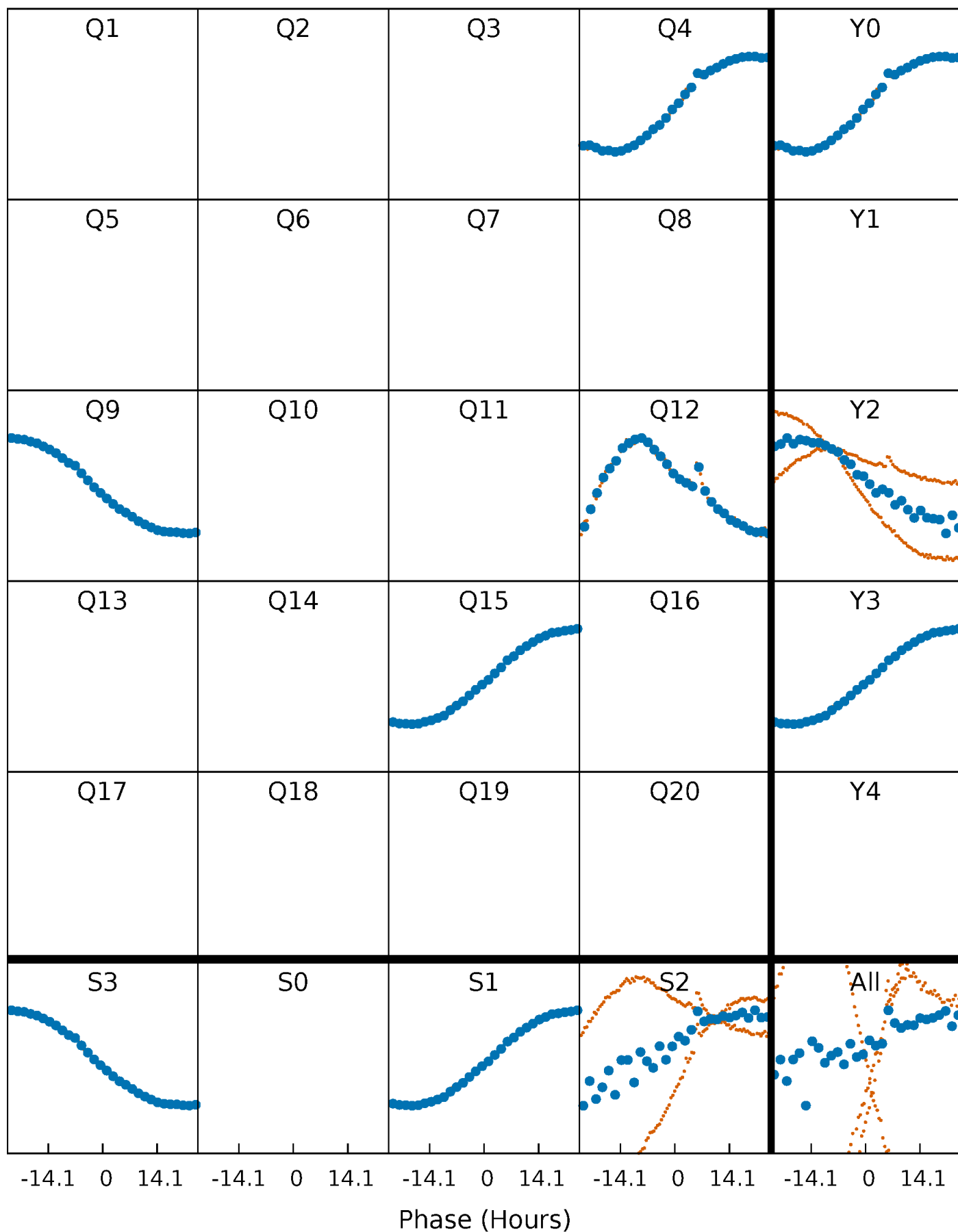


Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



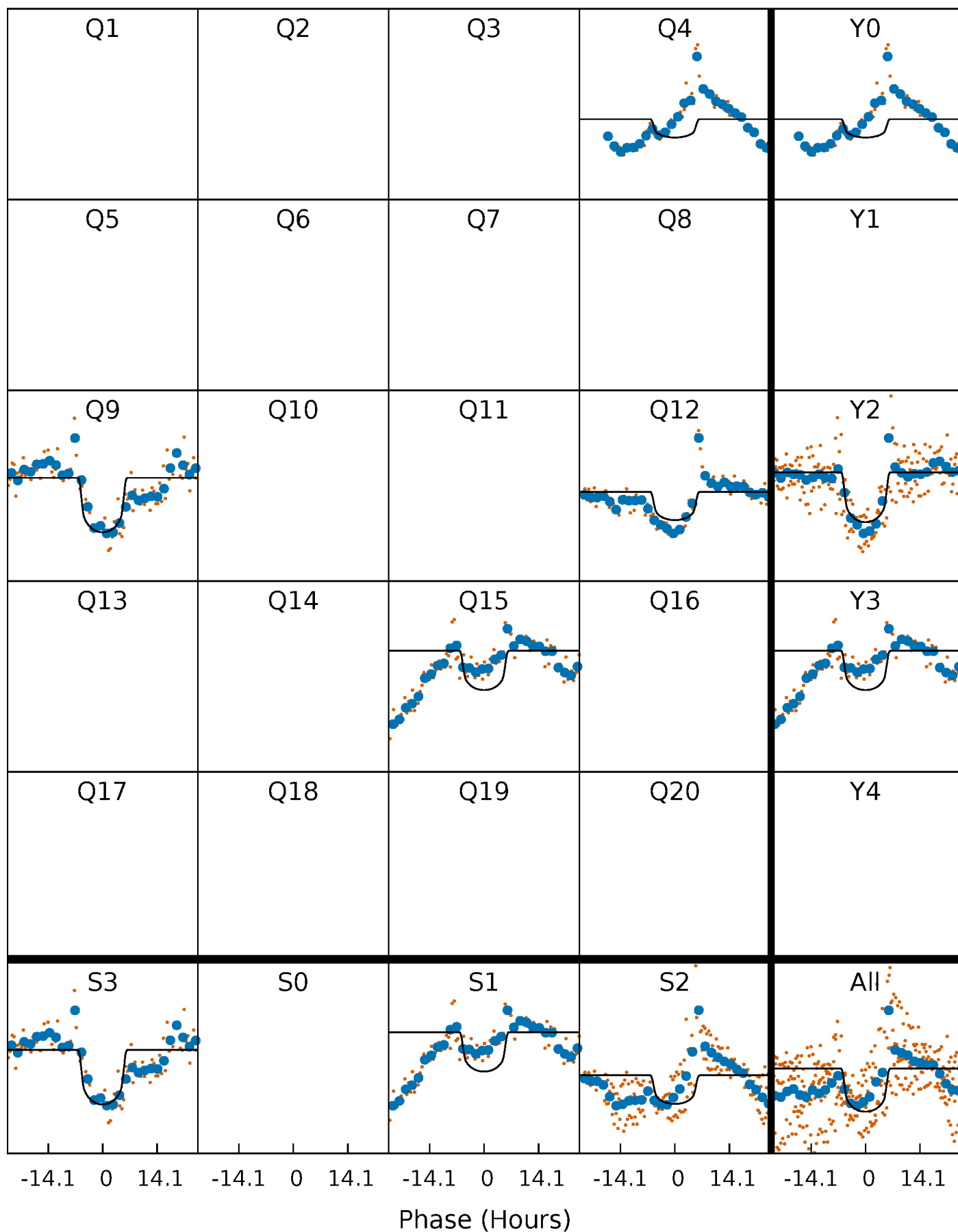
# PDC Quarter-Phased Transit Curves

TCE 003456972-05     $P=258.351842$  Days     $T_0=364.922983$  (BKJD)



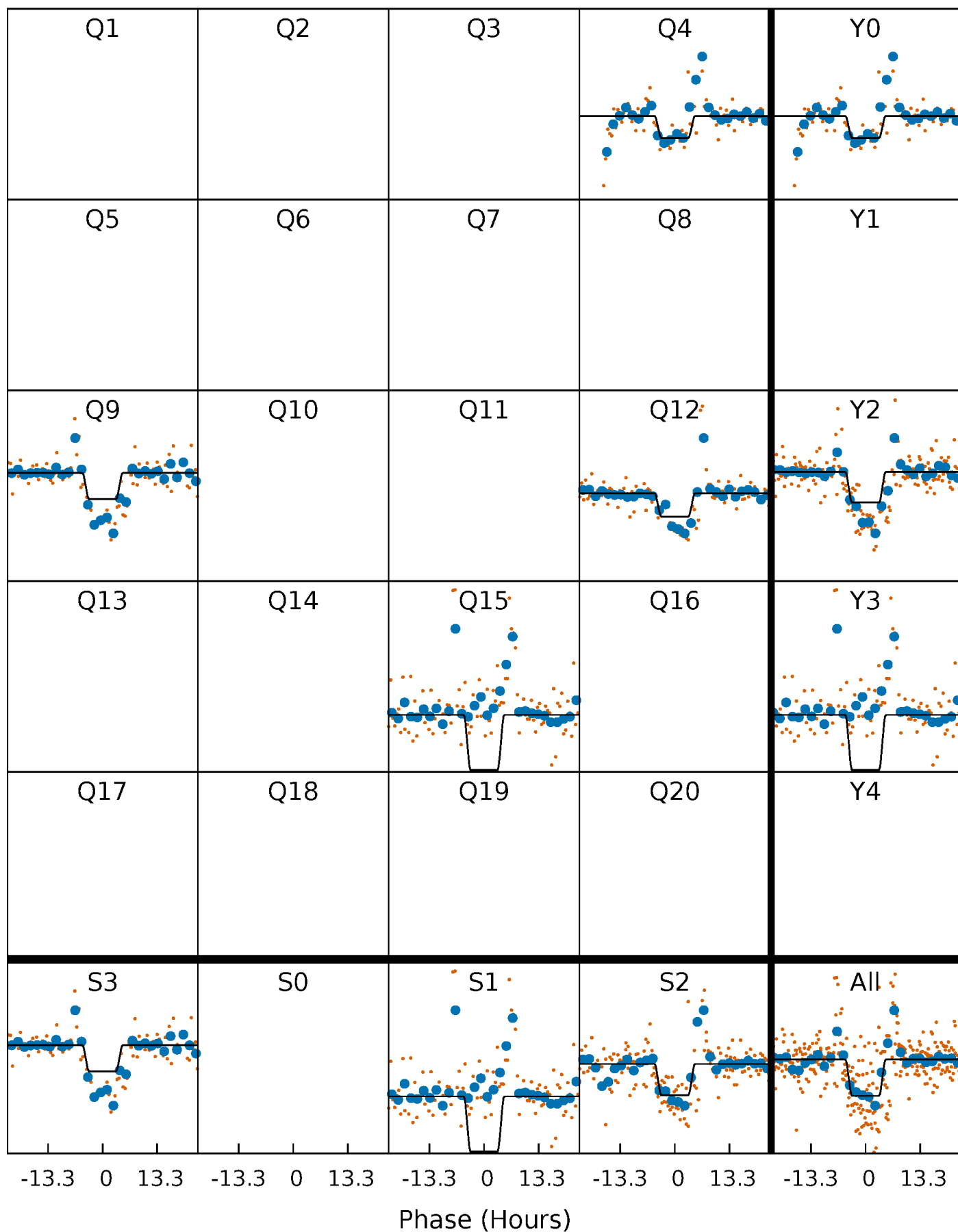
# DV Quarter-Phased Transit Curves

TCE 003456972-05     $P=258.351842$  Days     $T_0=364.922983$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

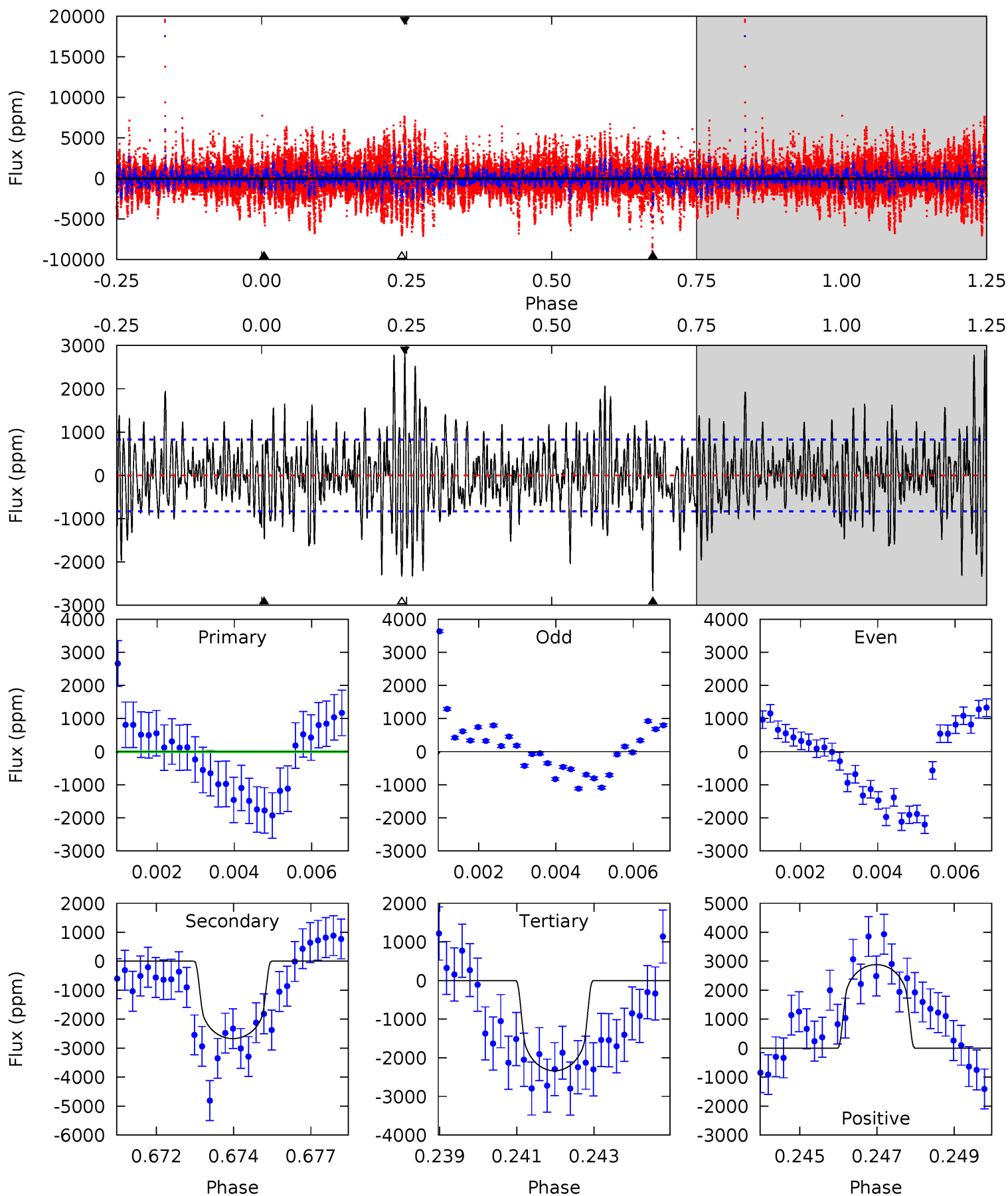
TCE 003456972-05     $P=258.348310$  Days     $T_0=364.908871$  (BKJD)



# DV Model-Shift Uniqueness Test

003456972-05, P = 258.351842 Days, E = 106.571141 Days

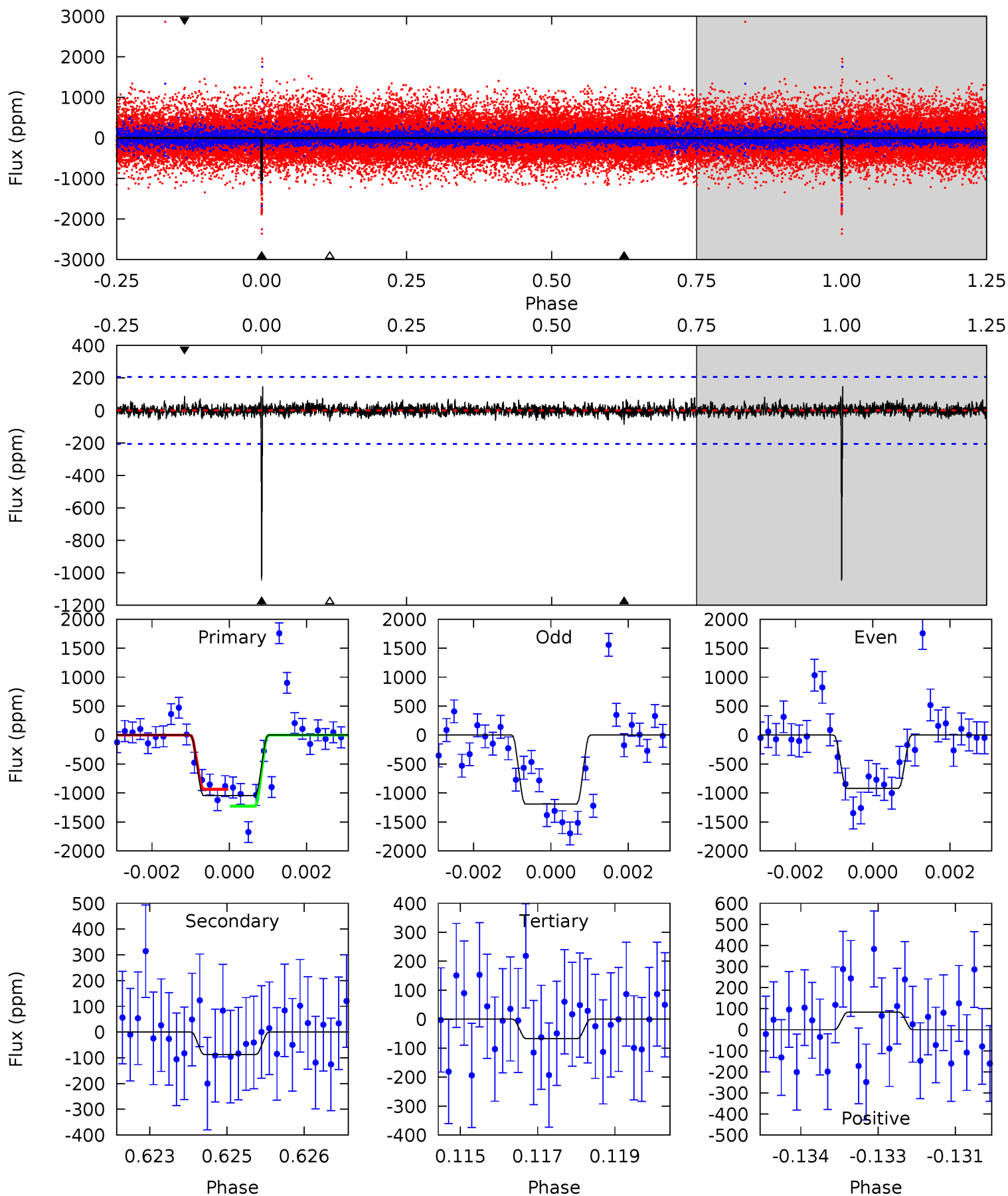
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.82	17.1	15.0	18.5	5.32	3.08	4.42	-7.19	-10.7	2.14	-1.37	4.13	0.91	0.52	2.92



# Alt Model-Shift Uniqueness Test

003456972-05, P = 258.348310 Days, E = 106.560561 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
27.2	2.28	1.75	2.17	5.37	3.16	0.50	25.5	25.1	0.53	0.11	3.21	0.89	0.12	3.75





### Stellar Parameters For KIC 003456972

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5119^{+153}_{-153}$	$4.556^{+0.080}_{-0.080}$	$-0.400^{+0.300}_{-0.300}$	$0.727^{+0.092}_{-0.083}$	$0.693^{+0.101}_{-0.043}$	$2.544^{+0.847}_{-0.580}$
	+3%/-3%	+2%/-2%	+75%/-75%	+13%/-11%	+15%/-6%	+33%/-23%
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 003456972-05 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-2670 \pm 156$	$3.54^{+0.41}_{-0.43}$	$322^{+13}_{-13}$	$5487^{+334}_{-264}$	$59518^{+15471}_{-12089}$
Alt.	$-88 \pm 38$	$2.42^{+0.45}_{-0.34}$	$322^{+13}_{-13}$	$3338^{+263}_{-293}$	$4020^{+2457}_{-1921}$

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

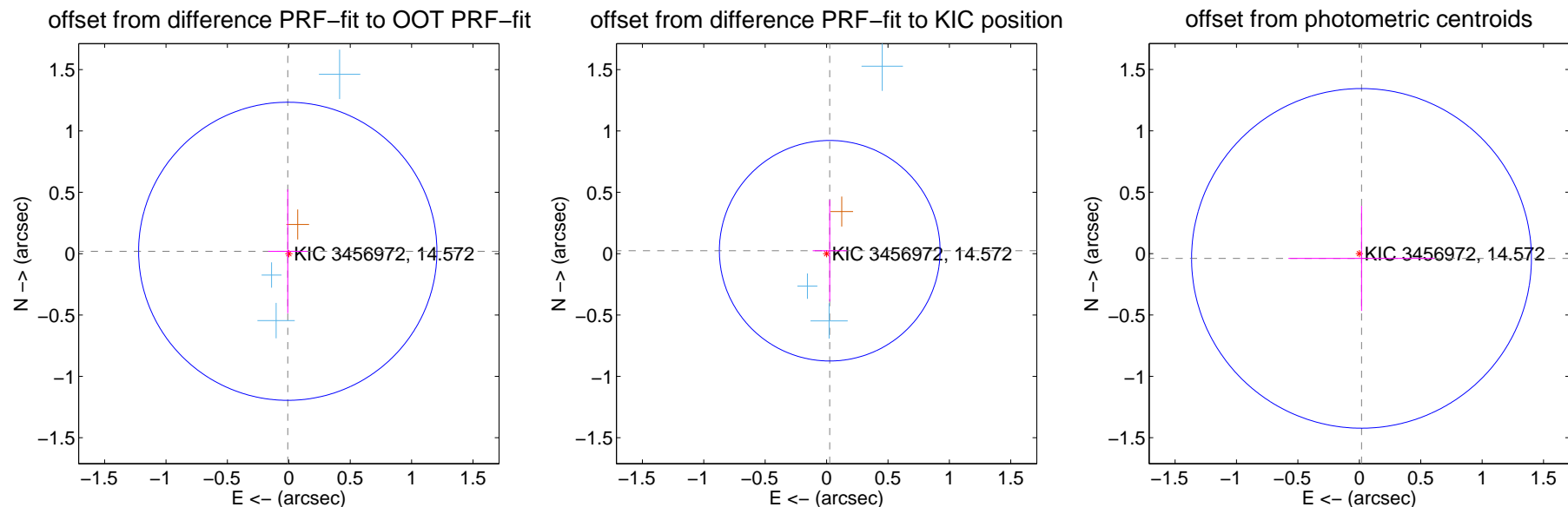
## DV Centroid Data

Supplemental centroid analysis for 003456972-05. Kepler magnitude: 14.57. Transit SNR 8.41

There are 3 quarters with good PRF difference image offsets

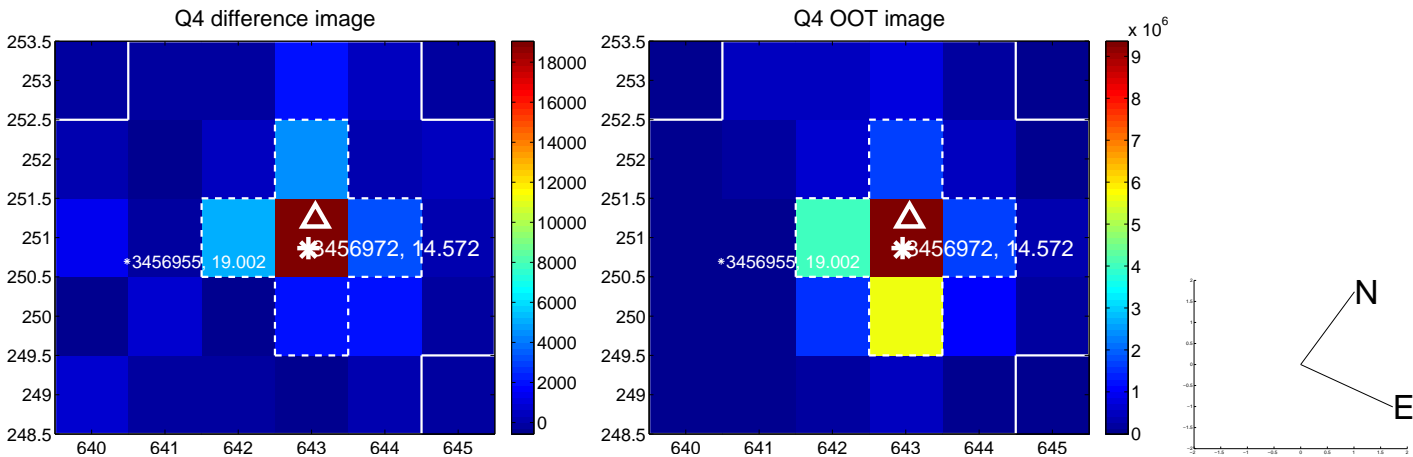
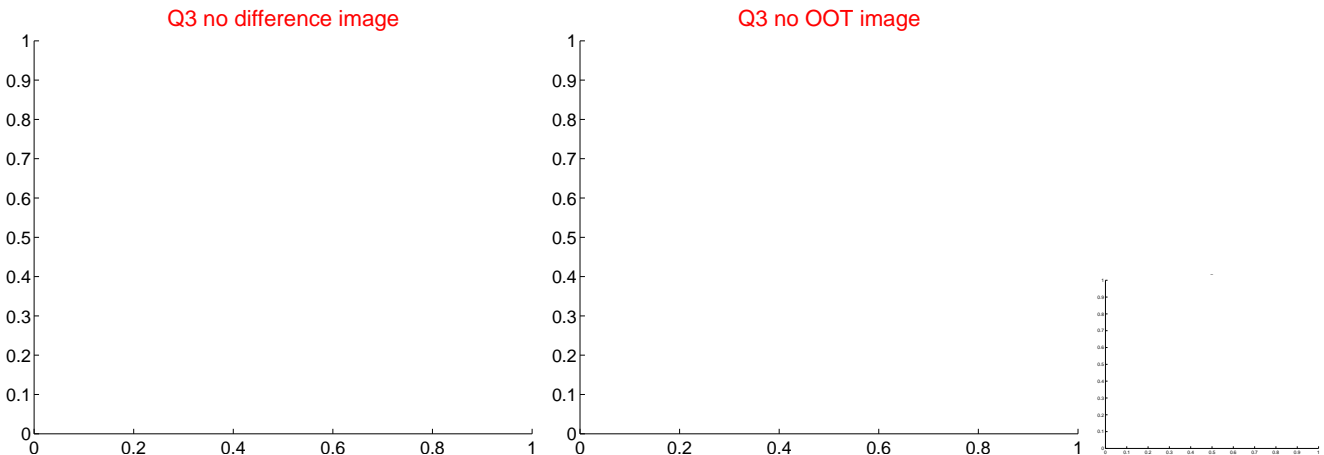
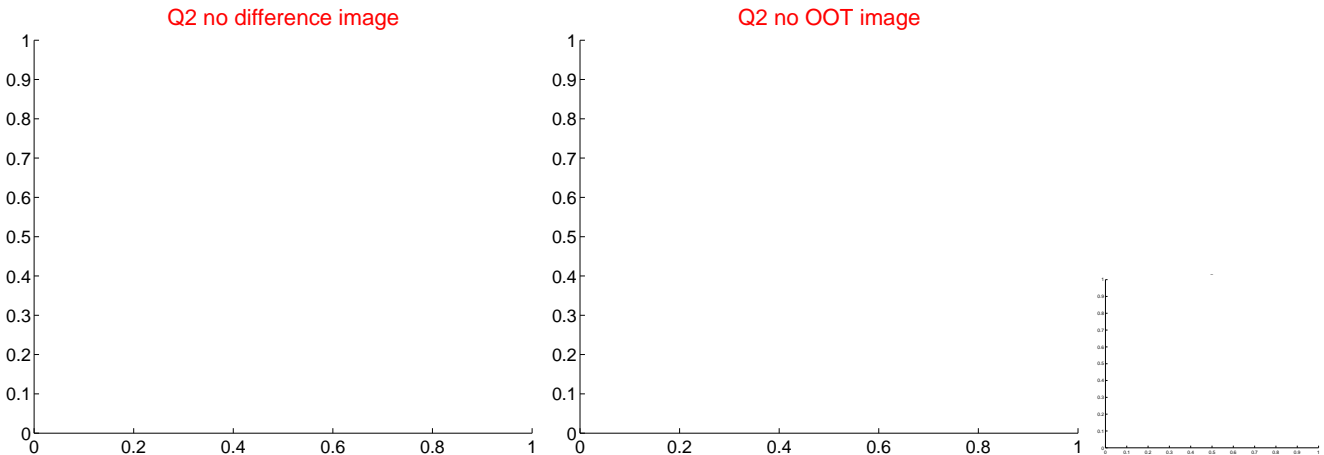
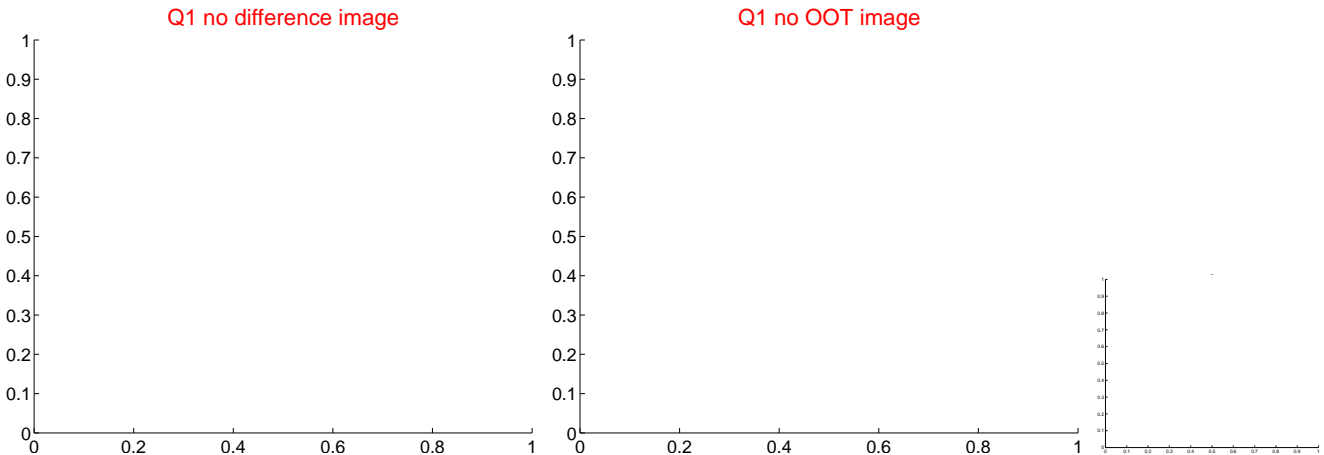
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.021 \pm 0.405$	0.05	$0.009 \pm 0.159$	$0.019 \pm 0.504$
PRF-fit source offset from KIC position	$0.035 \pm 0.299$	0.12	$-0.026 \pm 0.139$	$0.024 \pm 0.414$
photometric centroid source offset	$0.04 \pm 0.46$	0.09	$-0.02 \pm 0.59$	$-0.04 \pm 0.43$



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.

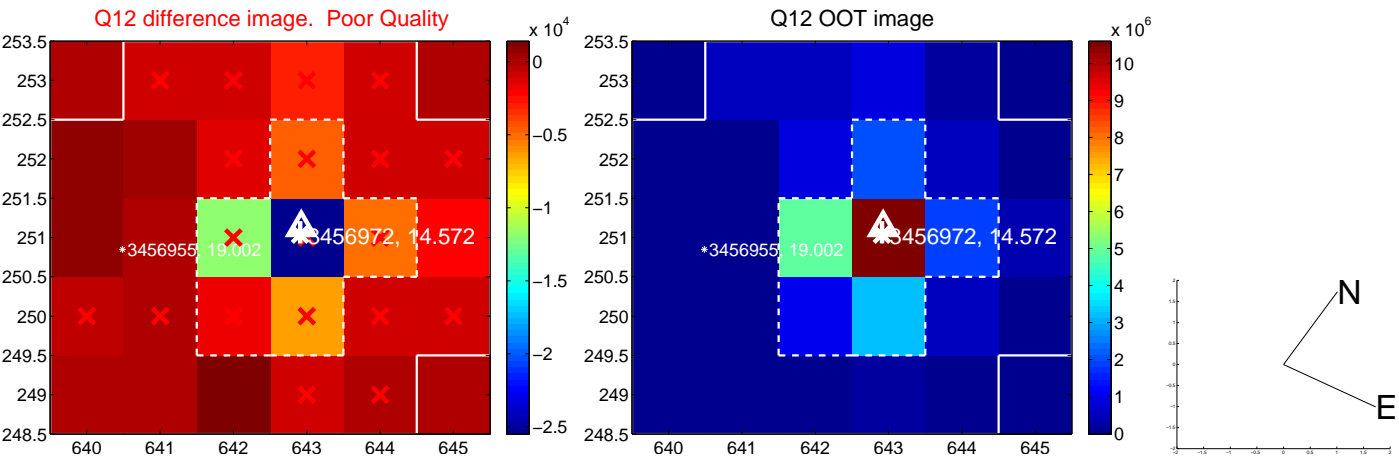
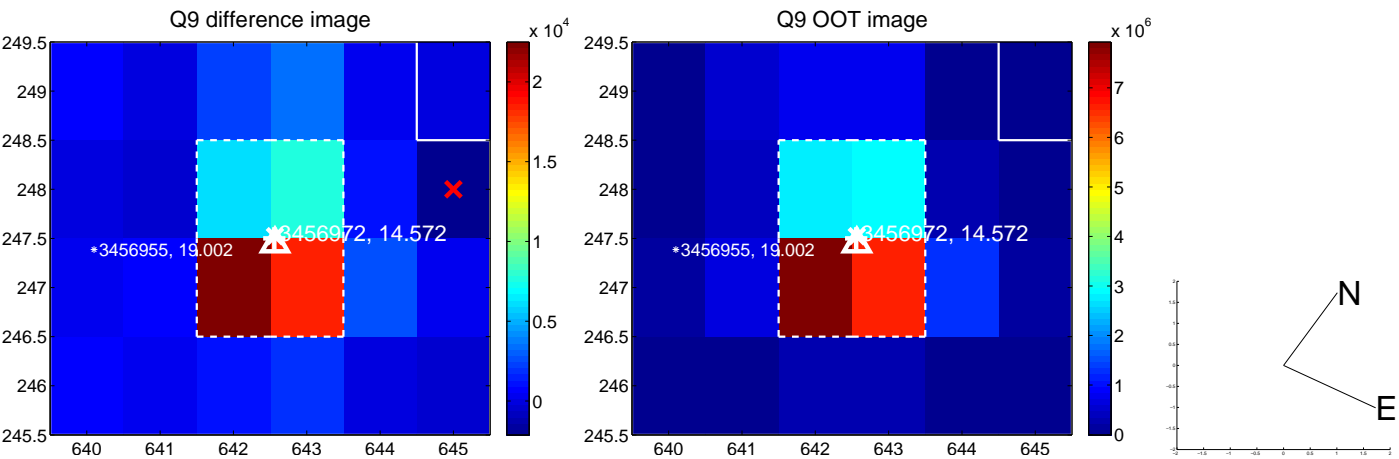
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



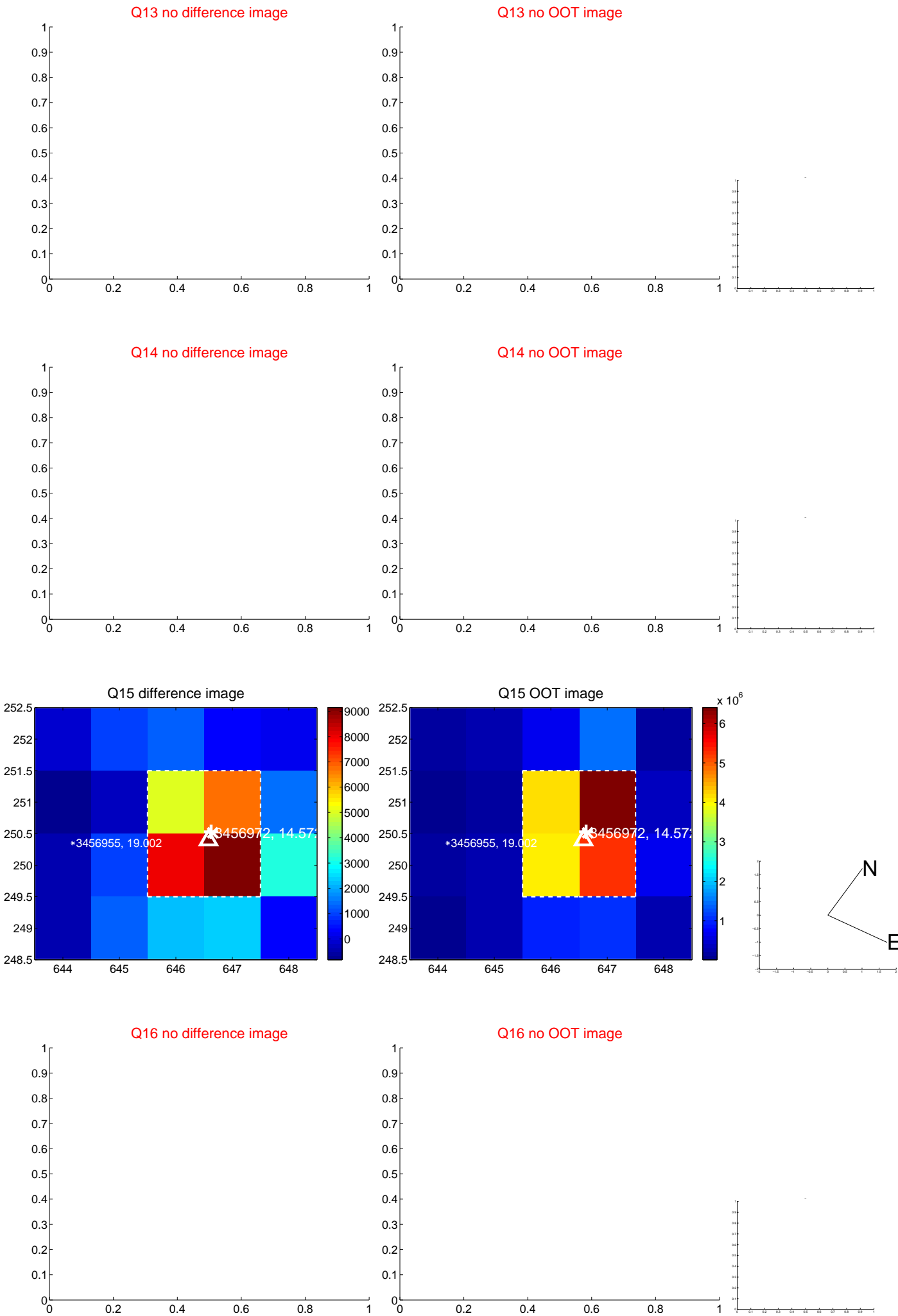
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



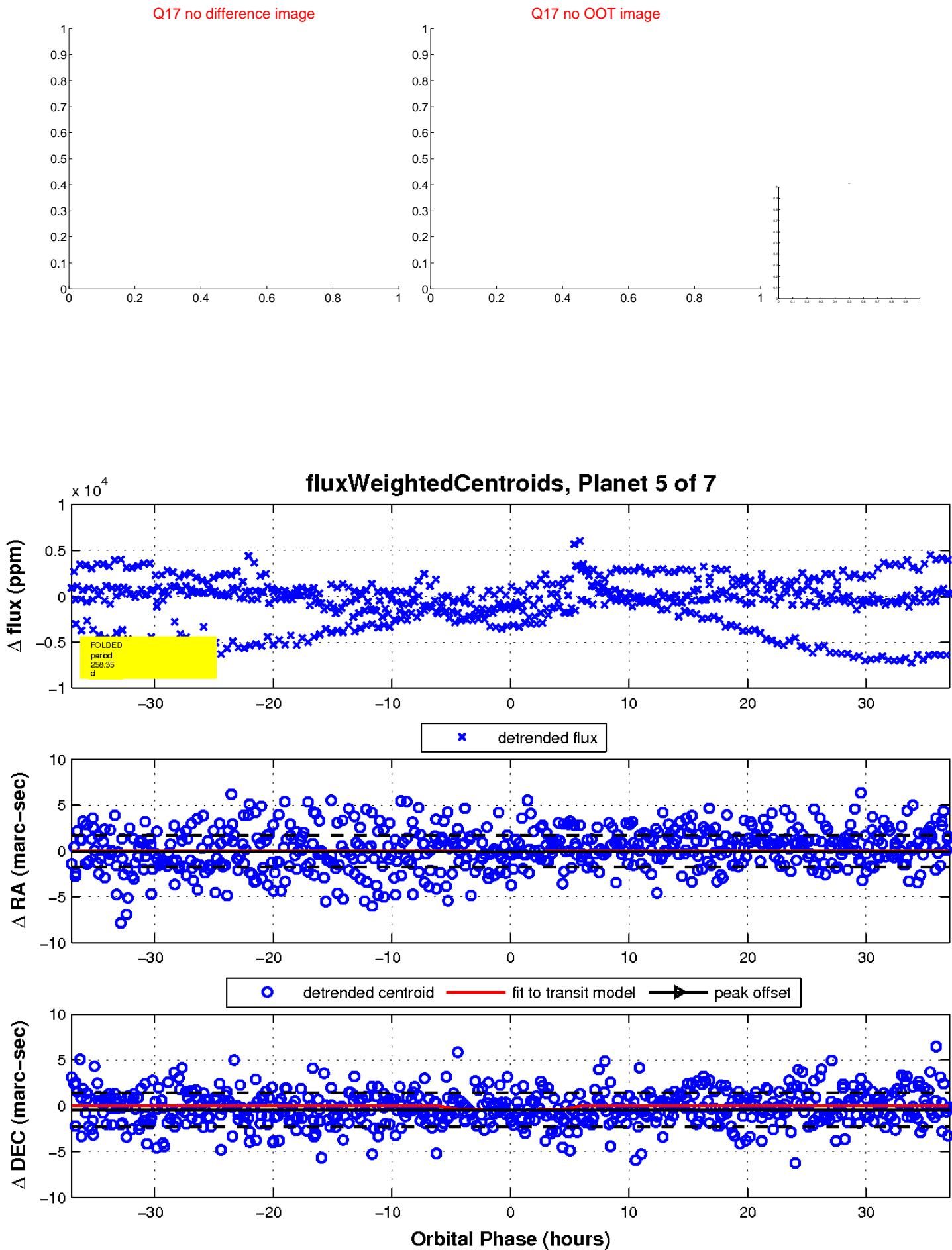
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

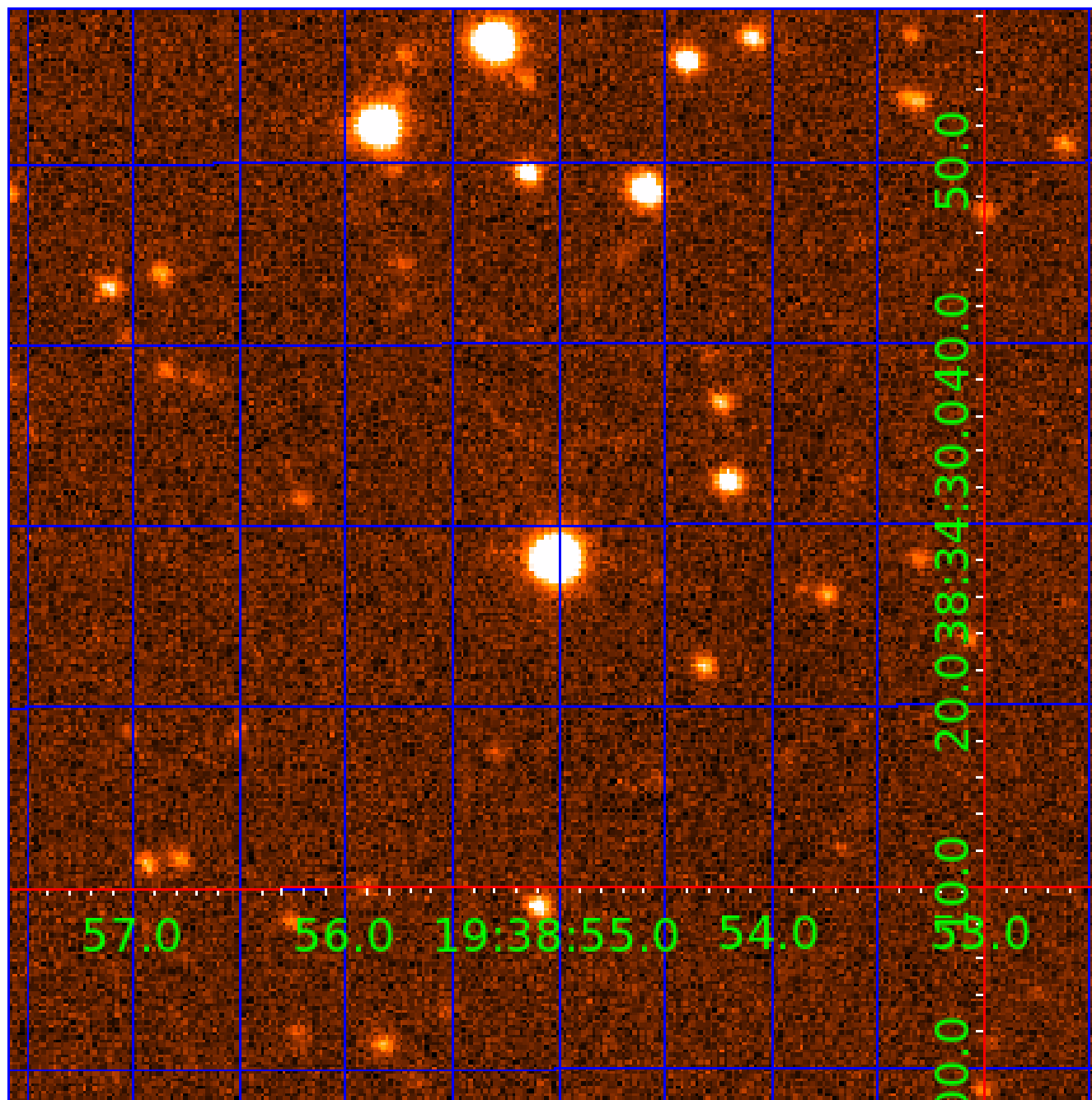


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 003456972

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003456972-02	OBS	No	665.509508	220.725314	1951.8	7.454	15.3	8.7	0.73	5119	3.40	0.19
003456972-03	OBS	No	265.906986	269.154923	1060.4	3.601	13.7	5.8	0.73	5119	2.52	0.63
003456972-04	OBS	No	538.351744	363.953765	1598.2	3.025	13.9	8.9	0.73	5119	2.94	0.25
003456972-05	OBS	No	258.351842	364.922983	1903.4	12.356	13.2	8.4	0.73	5119	3.49	0.66
003456972-06	OBS	No	370.329878	326.686867	1818.0	1.846	11.9	10.4	0.73	5119	3.08	0.41
003456972-07	OBS	No	322.179264	449.394130	1840.6	4.506	12.8	8.9	0.73	5119	3.17	0.49

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003456972-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
003456972-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
003456972-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS— HALO_GHOST
003456972-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV
003456972-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—MOD_POS_ALT—INCONSISTENT_TRANS— CENT_FEW_DIFFS
003456972-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL_SKYE—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_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.

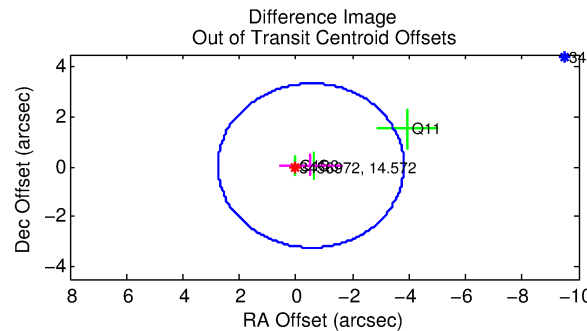
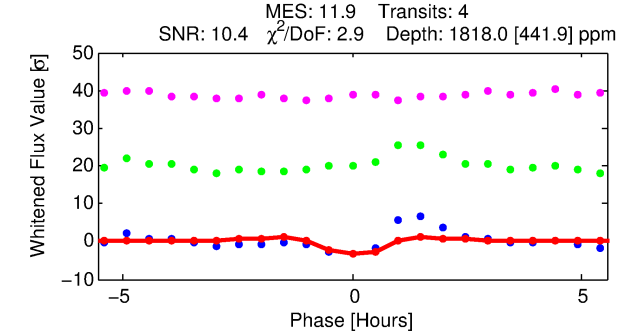
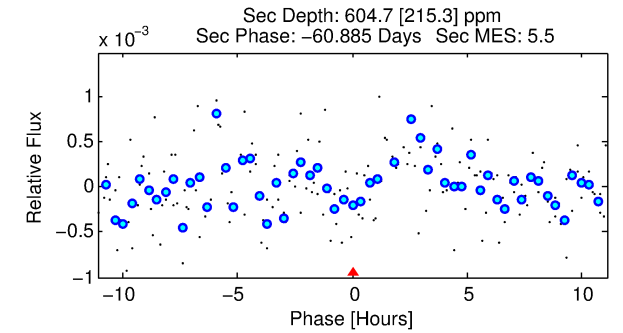
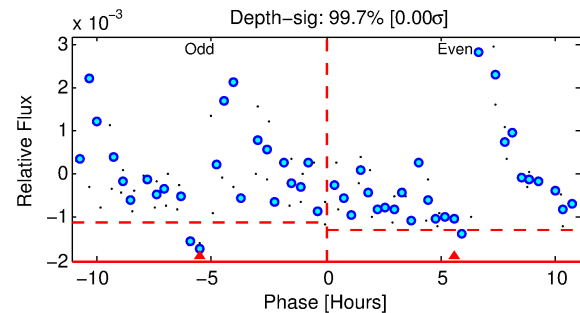
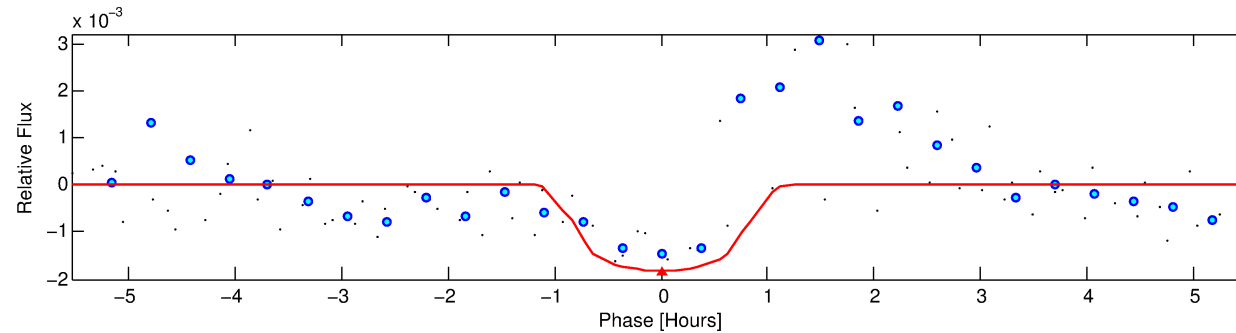
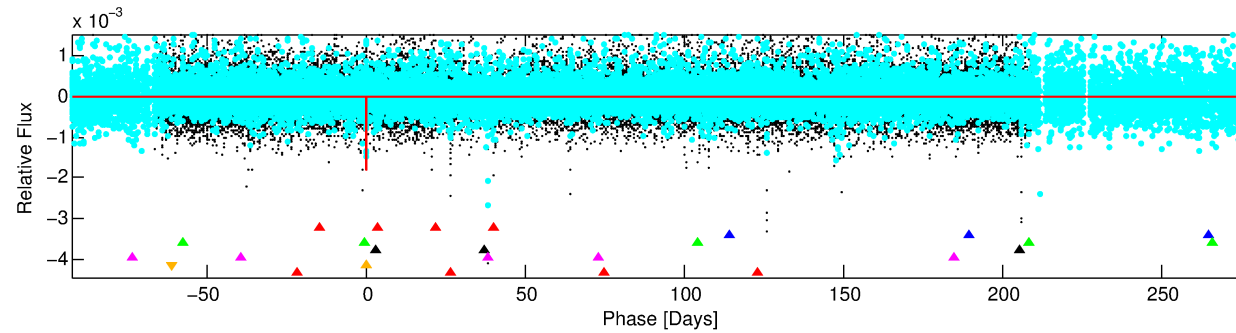
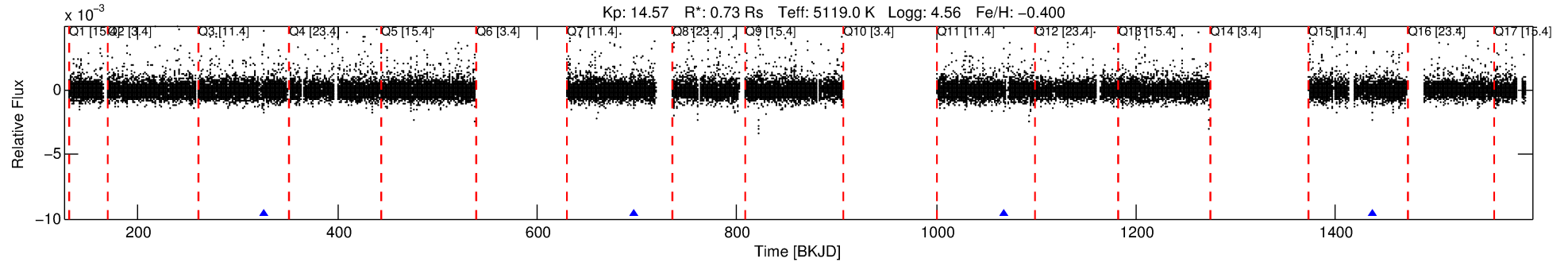
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 003456972-06

No Significant Match Found

# DV One-Page Summary

KIC: 3456972 Candidate: 6 of 7 Period: 370.330 d



## DV Fit Results:

Period = 370.32988 [0.00414] d  
Epoch = 326.6869 [0.0084] BKJD  
Rp/R\* = 0.0388 [0.1339]  
a/R\* = 1520.04 [19390.35]  
b = 0.31 [37.96]  
Seff = 0.41 [0.08]  
Teq = 204 [10] K  
Rp = 3.08 [10.63] Re  
a = 0.8935 [0.0932] AU  
Ag = 28058.56 [194123.69] [0.14σ]  
Teffp = 4076 [7050] K [0.55σ]

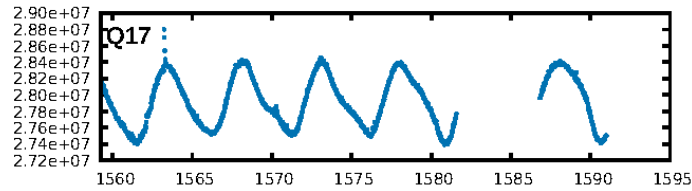
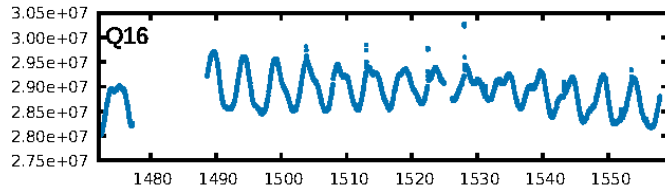
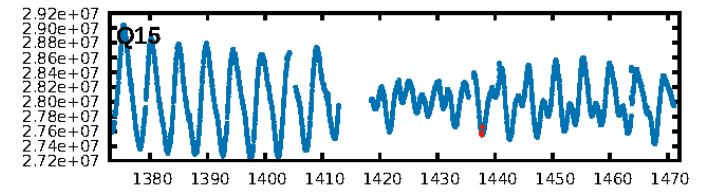
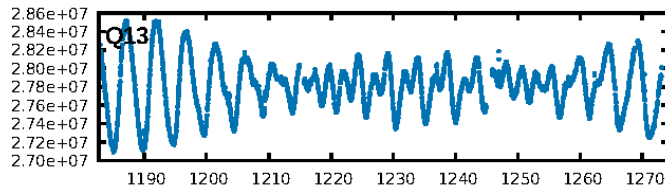
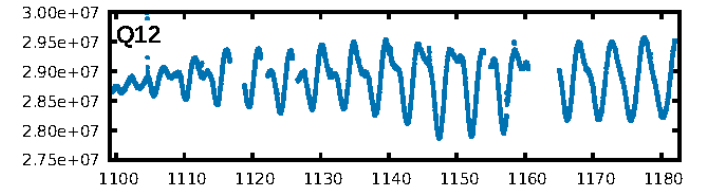
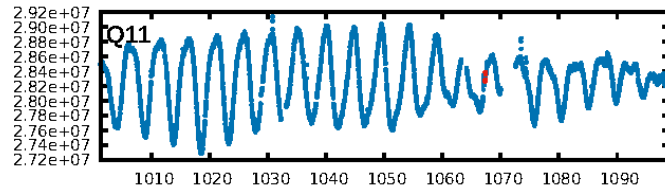
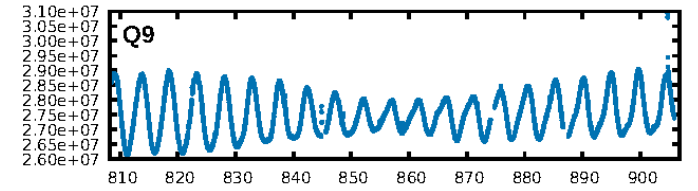
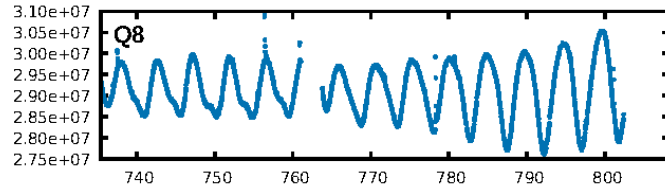
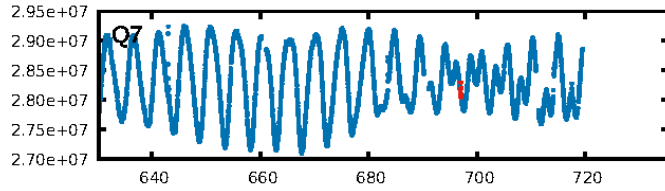
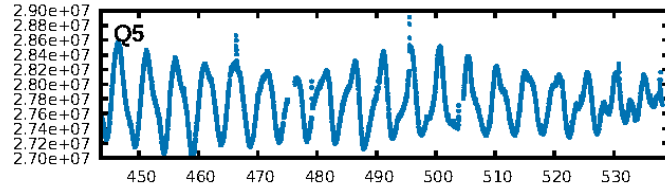
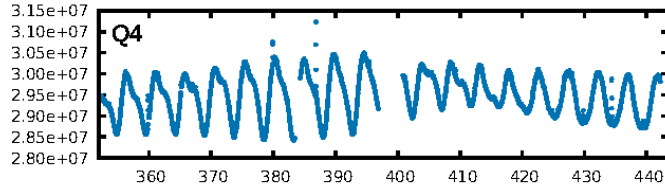
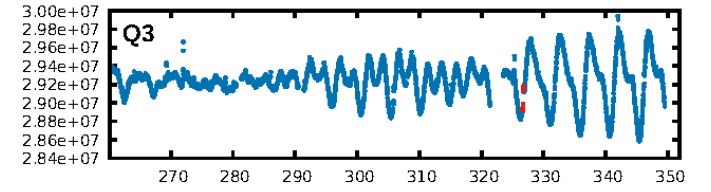
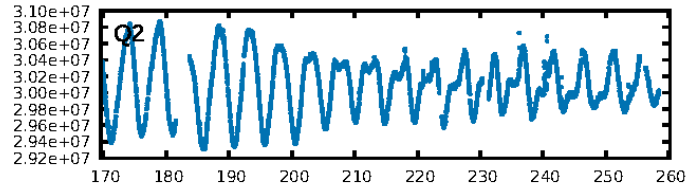
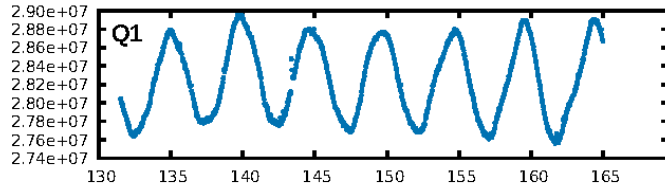
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [62.29σ]  
LongPeriod-sig: 100.0% [1137.97σ]  
ModelChiSquare2-sig: 40.8%  
ModelChiSquareGof-sig: 83.4%  
**Bootstrap-pfa: 3.85e-10**  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 1.599  
Centroid-sig: 97.1%  
Centroid-so: 0.362 arcsec [0.36σ]  
OotOffset-rm: 0.535 arcsec [0.49σ]  
OotOffset-st: 0/3/0/0 [3]  
KicOffset-rm: 0.598 arcsec [0.44σ]  
KicOffset-st: 0/3/0/0 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [4/4]

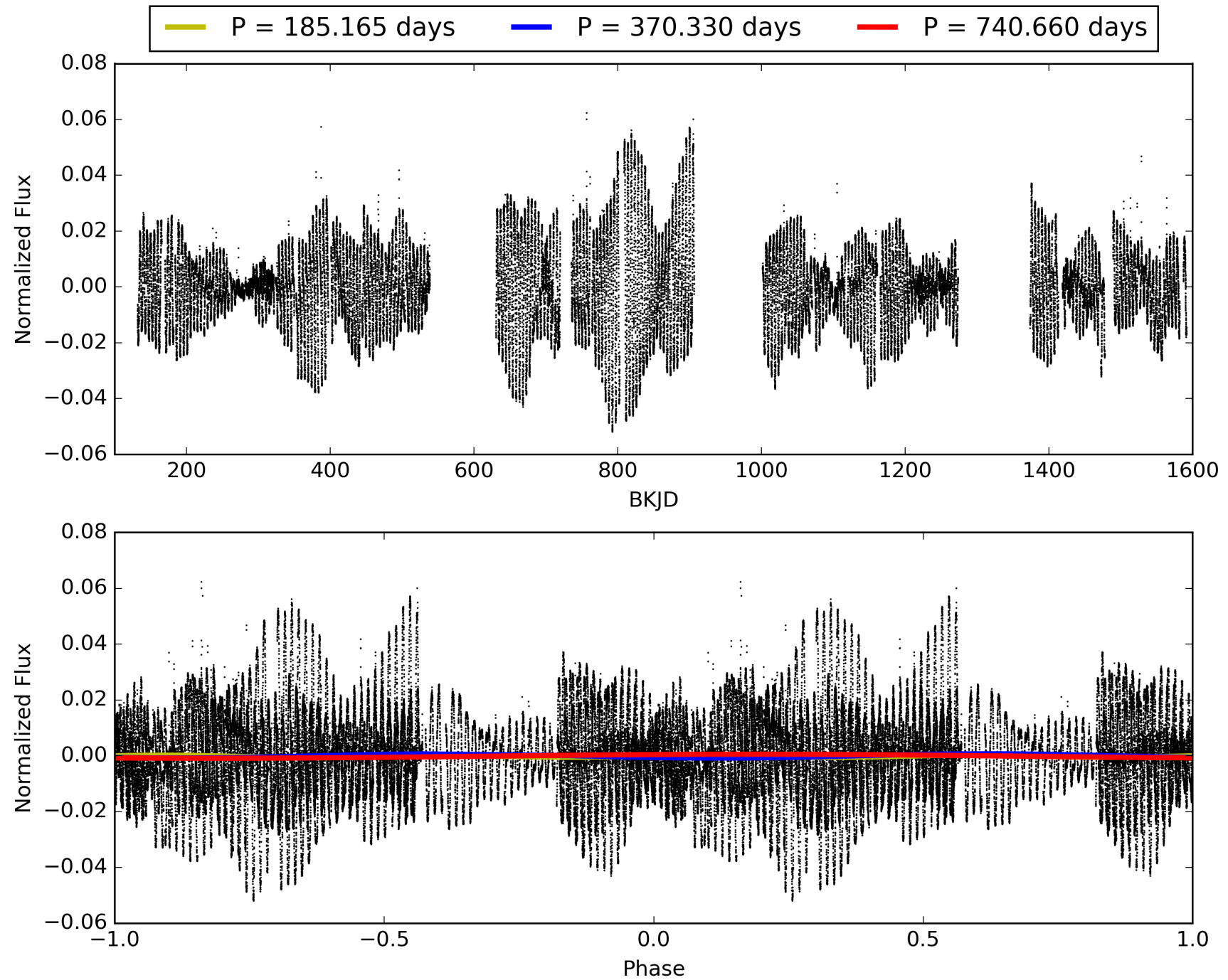
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 21:16:09 Z

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

# TCE 003456972-06, PDC Light Curves

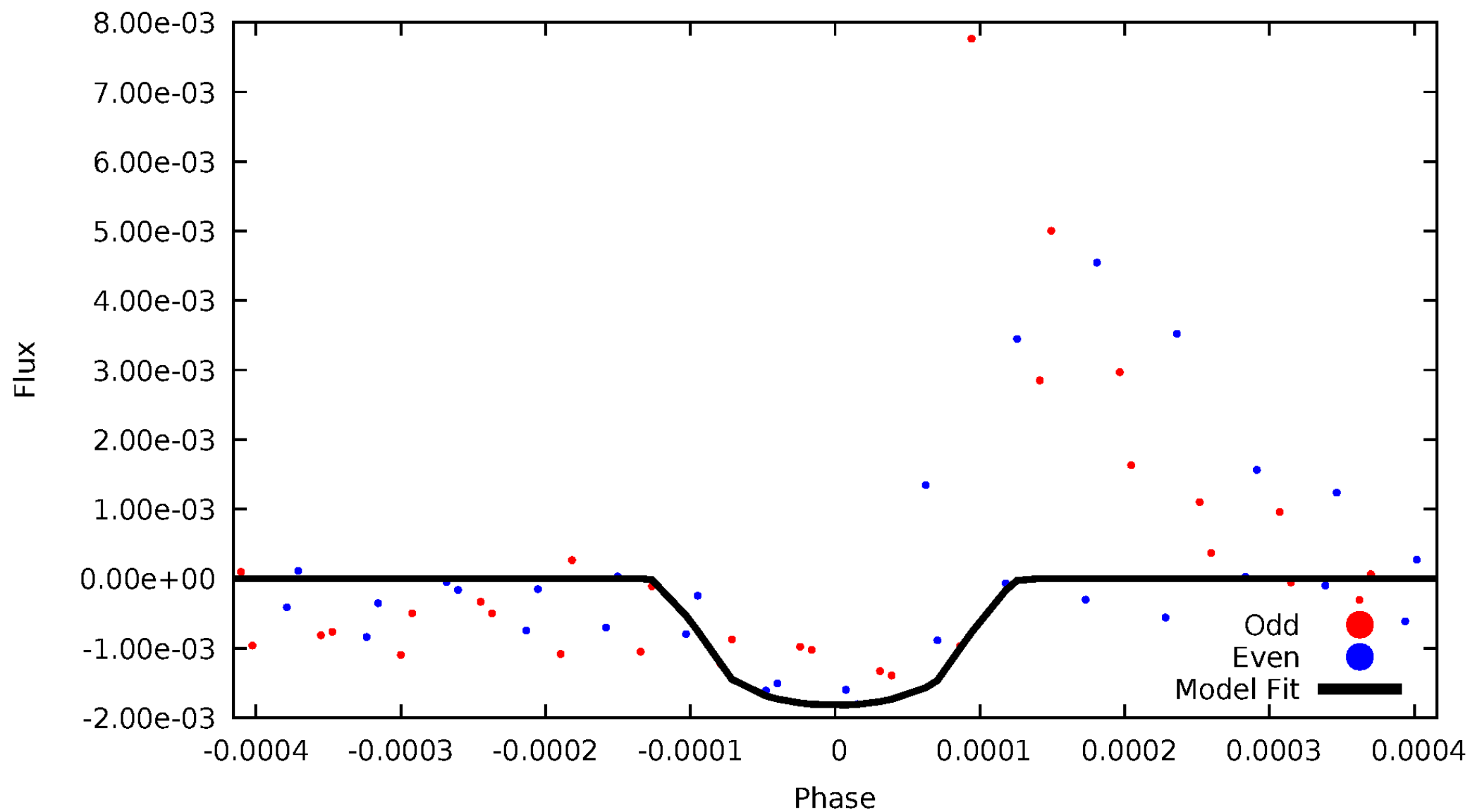


# TCE 003456972-06



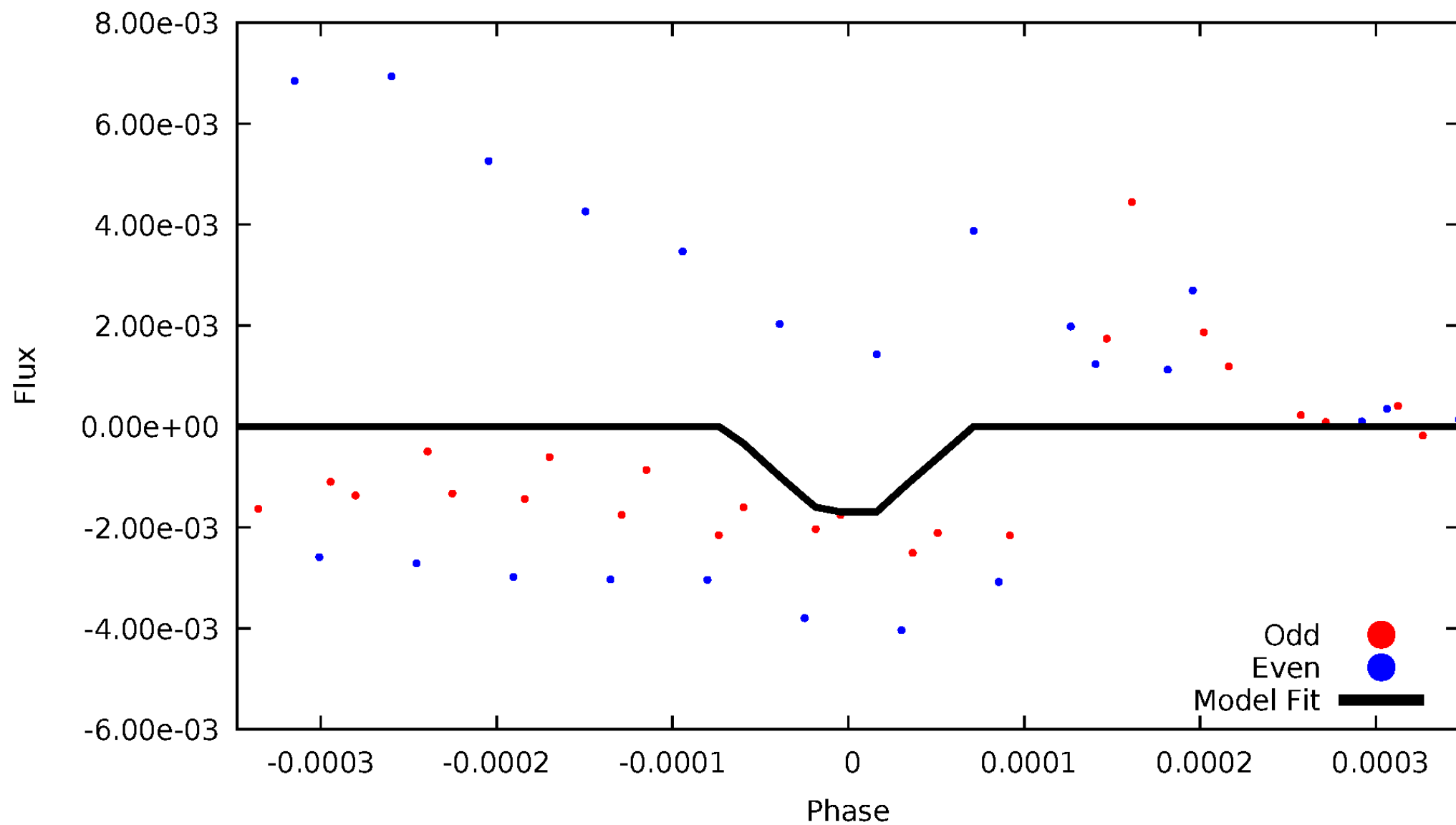
# DV Odd/Even

TCE 003456972-06



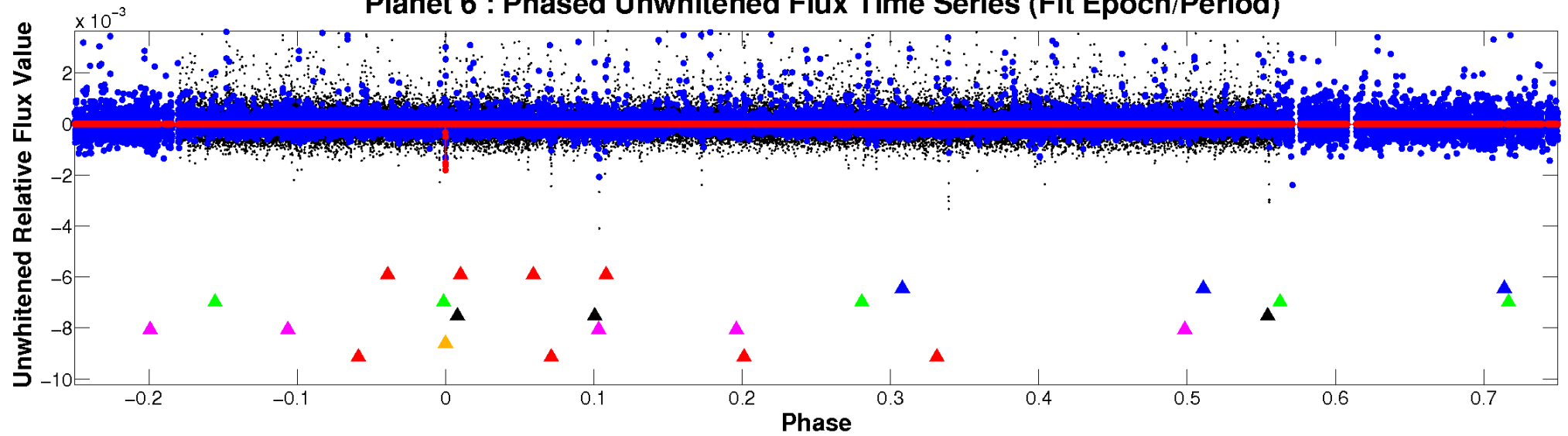
# ALT Odd/Even

TCE 003456972-06

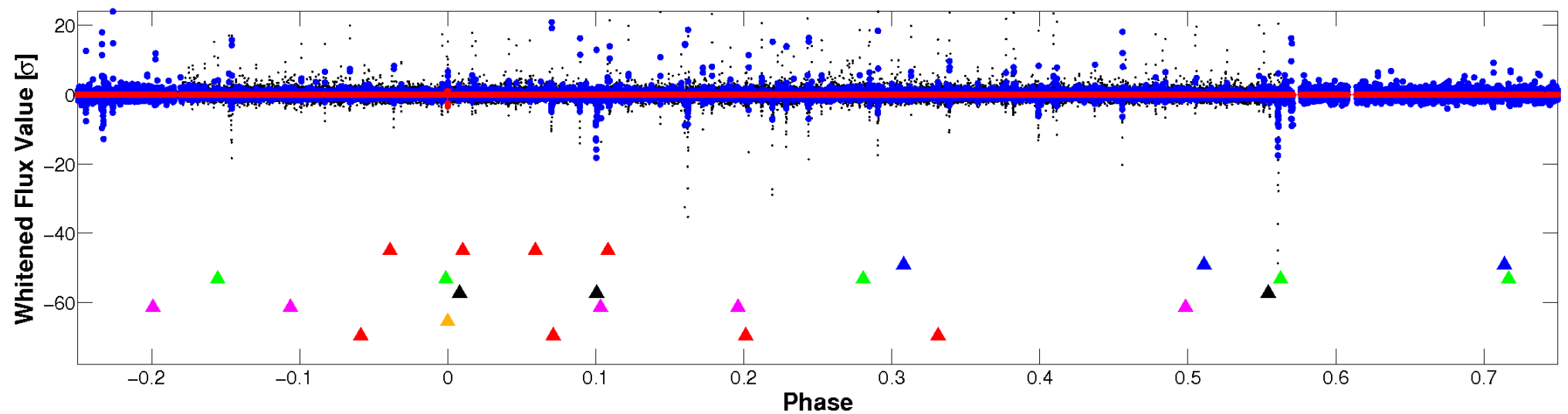


# Non-Whitened Vs. Whitened Light Curve

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

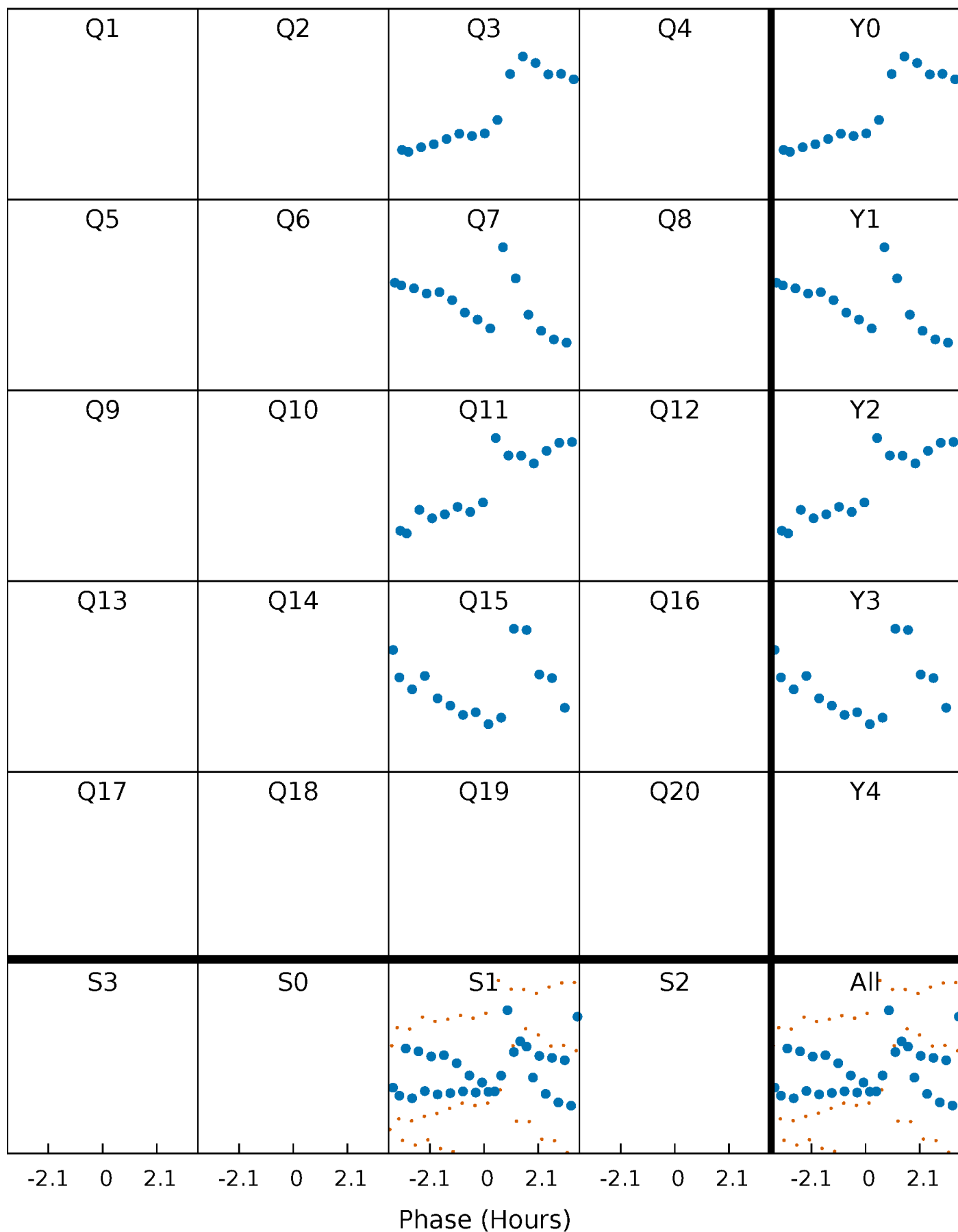


## Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

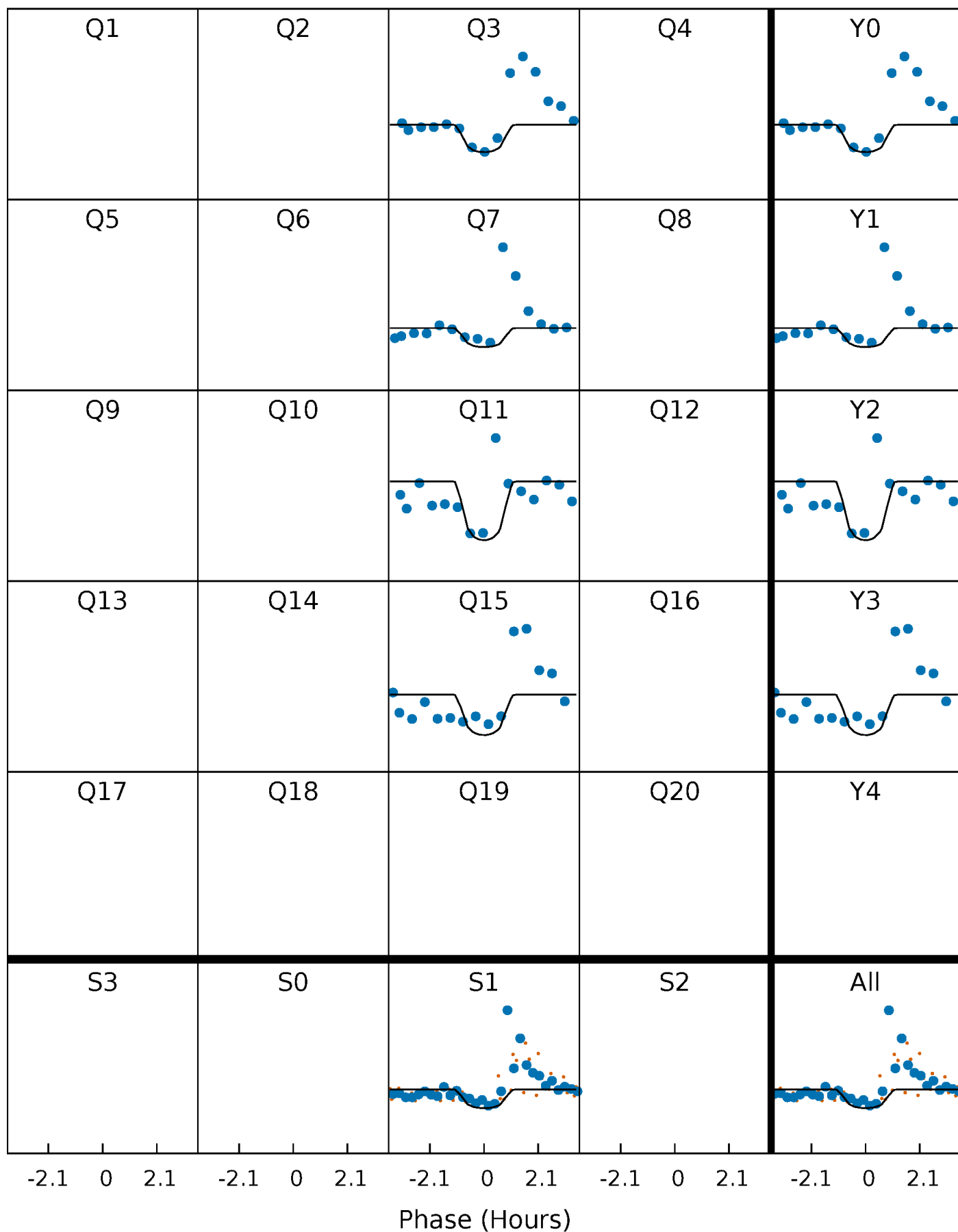
TCE 003456972-06     $P=370.329878$  Days     $T_0=326.686867$  (BKJD)





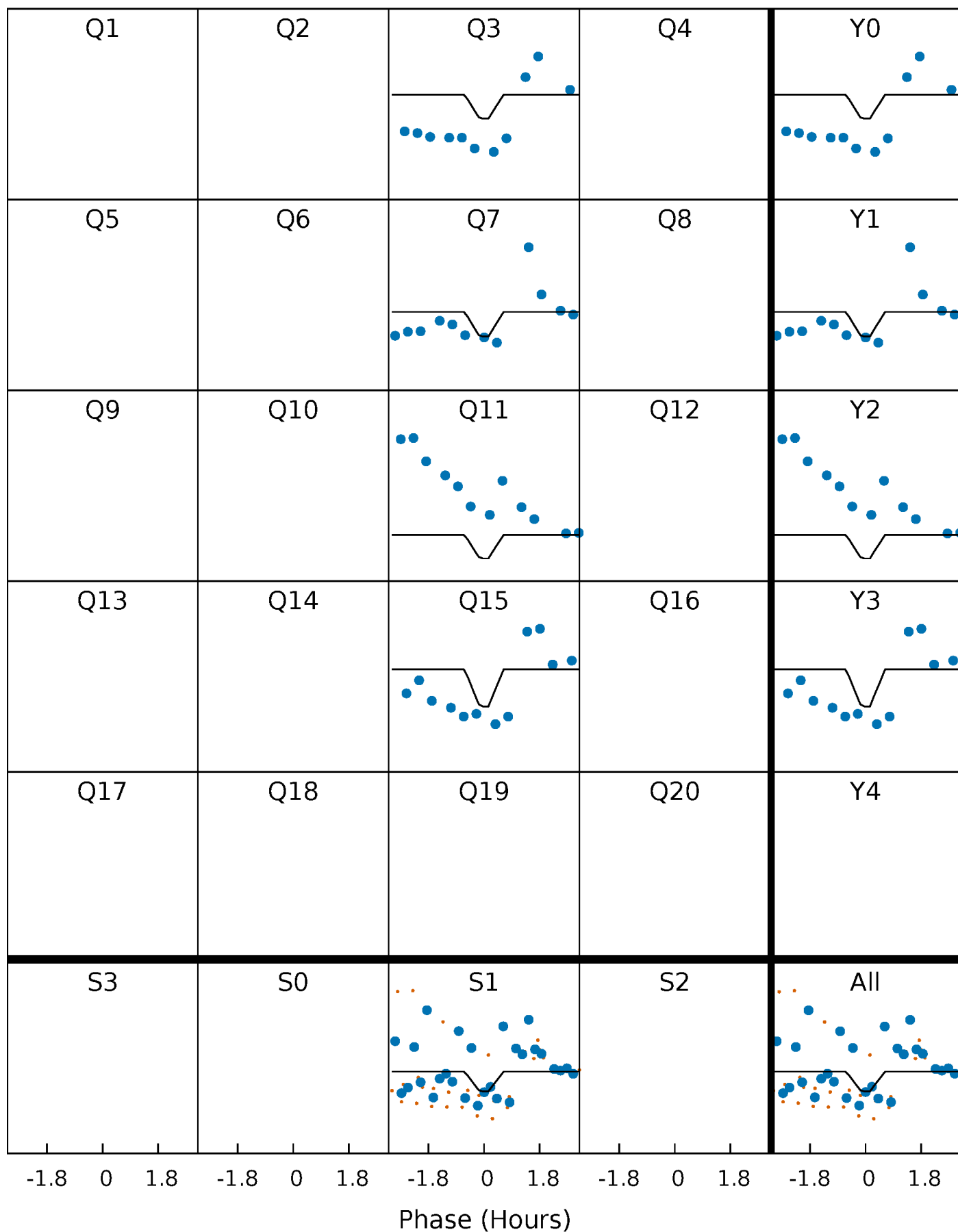
# DV Quarter-Phased Transit Curves

TCE 003456972-06     $P=370.329878$  Days     $T_0=326.686867$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

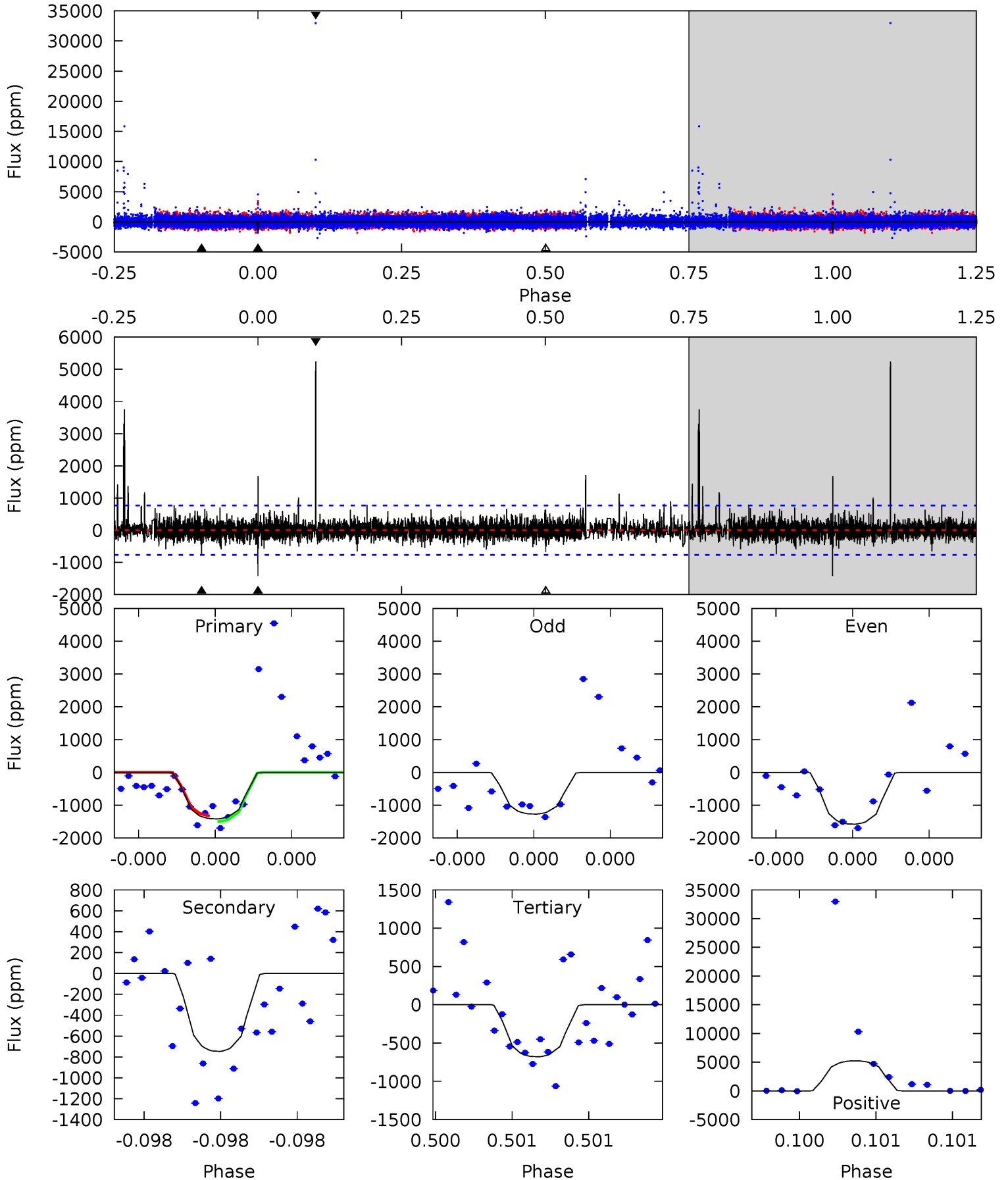
TCE 003456972-06 P=370.331030 Days  $T_0=326.681347$  (BKJD)



# DV Model-Shift Uniqueness Test

003456972-06, P = 370.329878 Days, E = 326.686867 Days

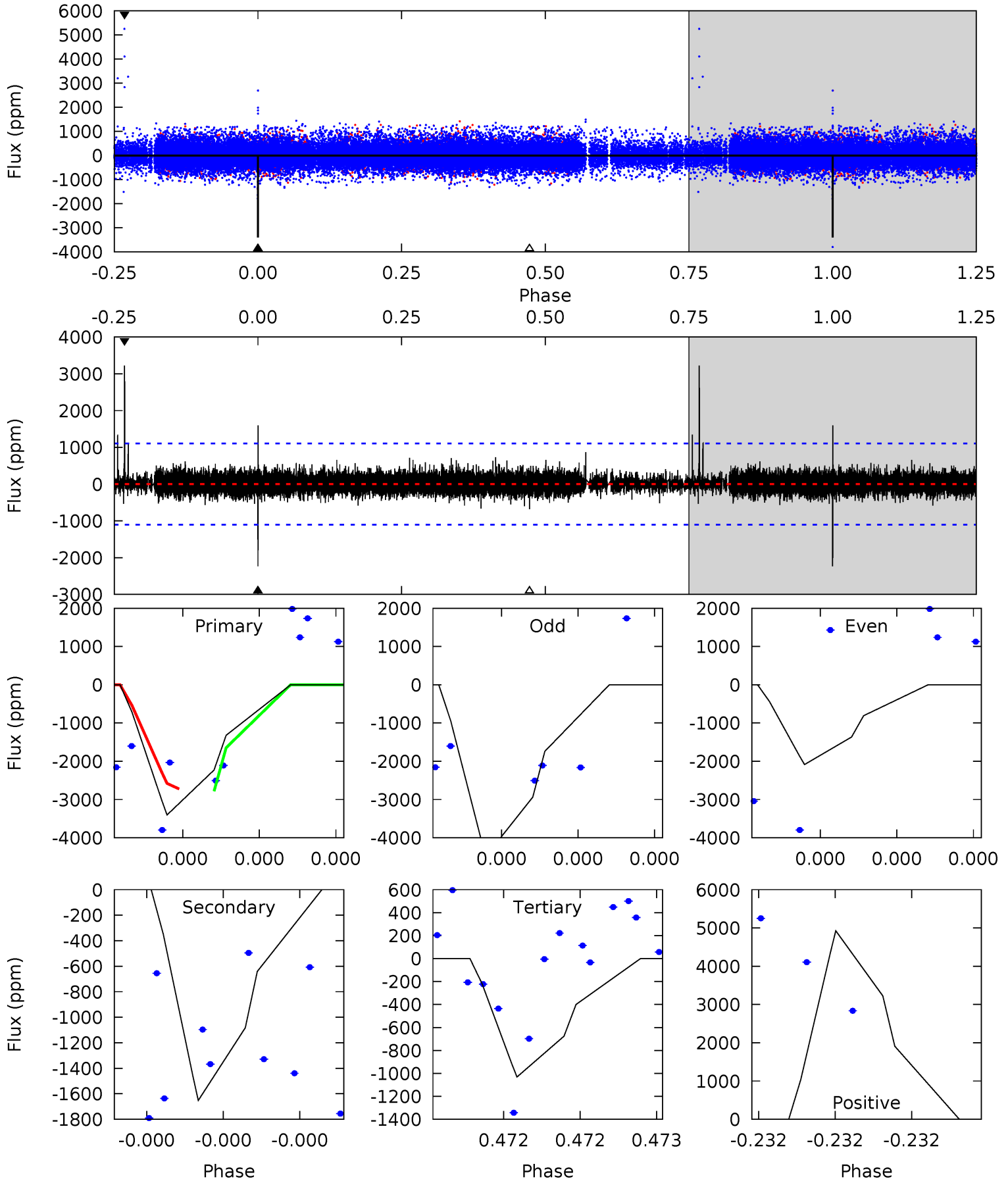
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.5	5.55	5.05	39.0	5.71	3.69	1.45	5.49	-28.5	0.50	-33.4	1.04	0.82	0.79	0.66



# Alt Model-Shift Uniqueness Test

003456972-06, P = 370.331030 Days, E = 326.681347 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
11.8	5.75	3.59	17.1	5.87	3.92	0.78	8.26	-5.29	2.16	-11.4	3.95	0.79	0.59	0.15



### Stellar Parameters For KIC 003456972

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5119^{+153}_{-153}$	$4.556^{+0.080}_{-0.080}$	$-0.400^{+0.300}_{-0.300}$	$0.727^{+0.092}_{-0.083}$	$0.693^{+0.101}_{-0.043}$	$2.544^{+0.847}_{-0.580}$
	+3%/-3%	+2%/-2%	+75%/-75%	+13%/-11%	+15%/-6%	+33%/-23%
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 003456972-06 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-746 \pm 134$	$8.50^{+8.35}_{-5.81}$	$286^{+11}_{-12}$	$3189^{+1407}_{-560}$	$4691^{+38150}_{-3537}$
Alt.	$-1082 \pm 188$	$7.99^{+9.25}_{-5.41}$	$286^{+12}_{-12}$	$3401^{+1811}_{-678}$	$7490^{+65866}_{-5889}$

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

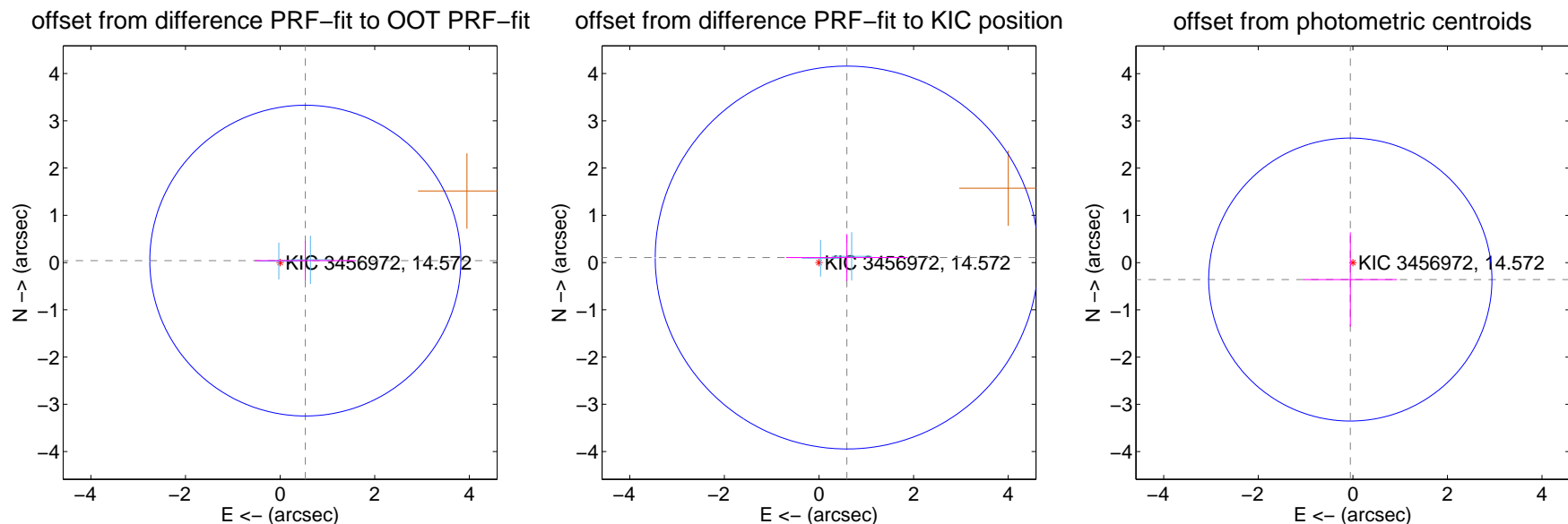
## DV Centroid Data

Supplemental centroid analysis for 003456972-06. Kepler magnitude: 14.57. Transit SNR 10.41

There are 2 quarters with good PRF difference image offsets

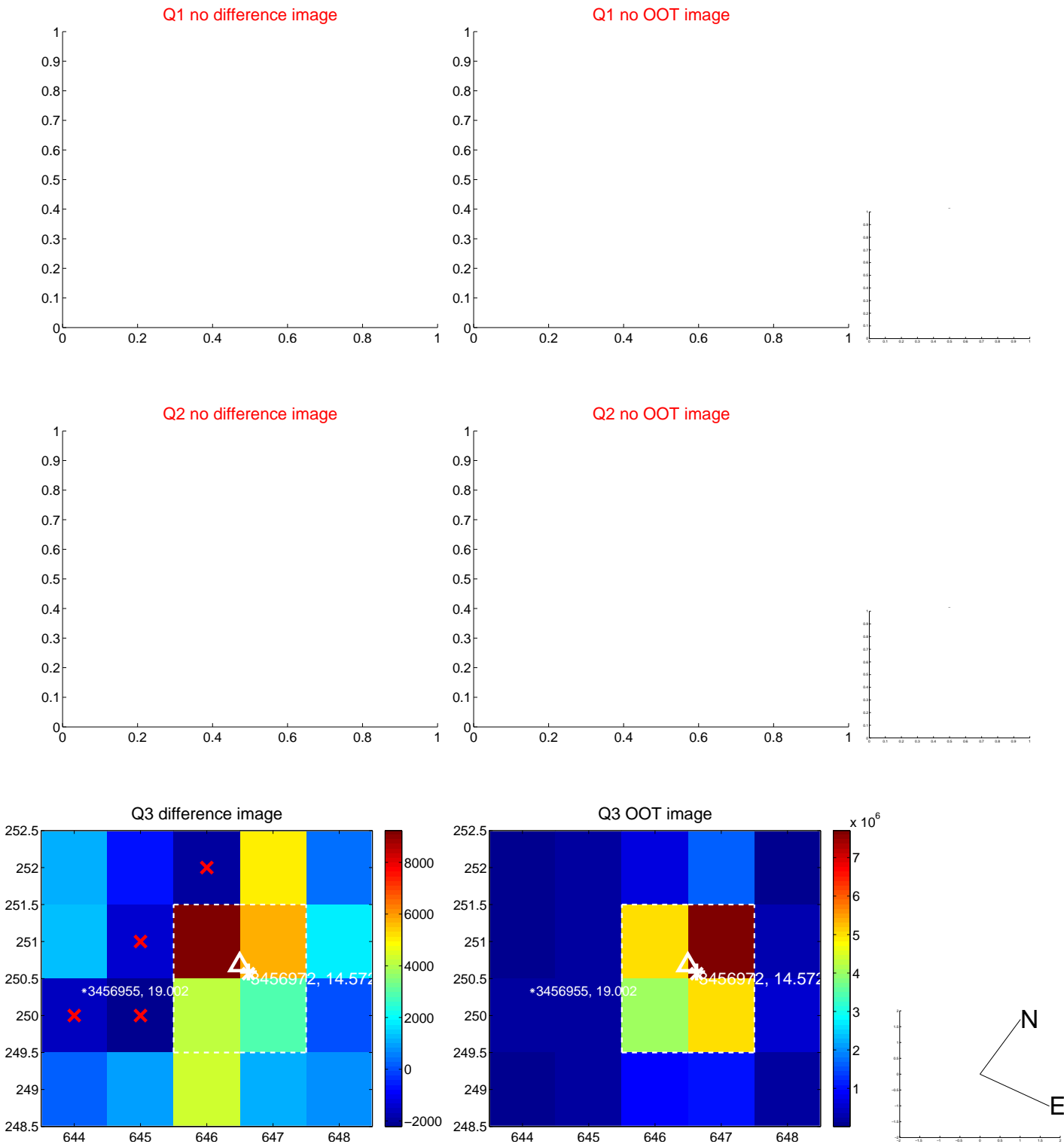
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.535 \pm 1.096$	0.49	$-0.533 \pm 1.068$	$0.041 \pm 0.416$
PRF-fit source offset from KIC position	$0.598 \pm 1.350$	0.44	$-0.588 \pm 1.284$	$0.106 \pm 0.496$
photometric centroid source offset	$0.36 \pm 1.00$	0.36	$0.05 \pm 0.99$	$-0.36 \pm 1.00$

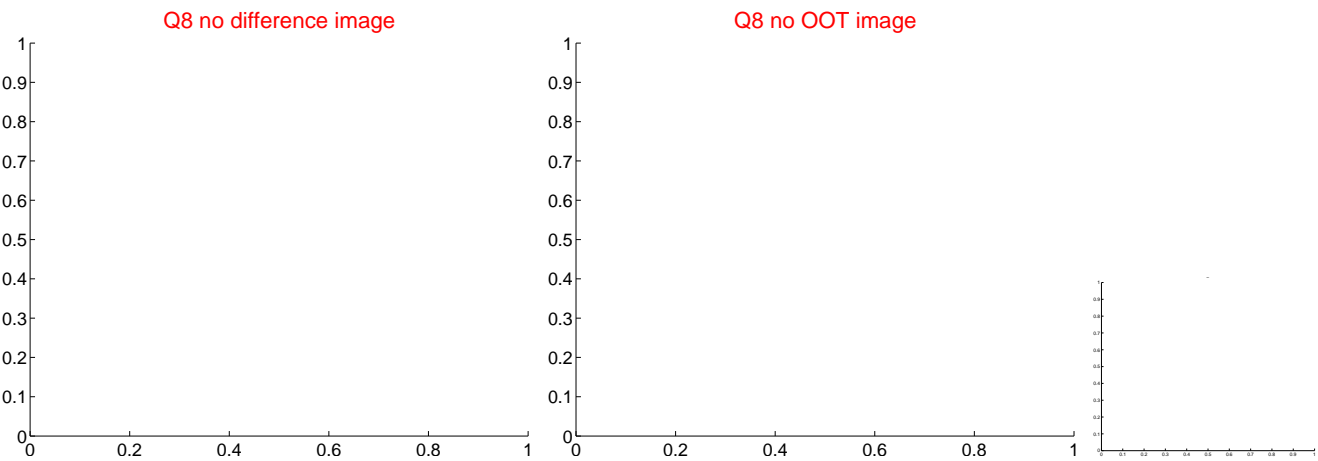
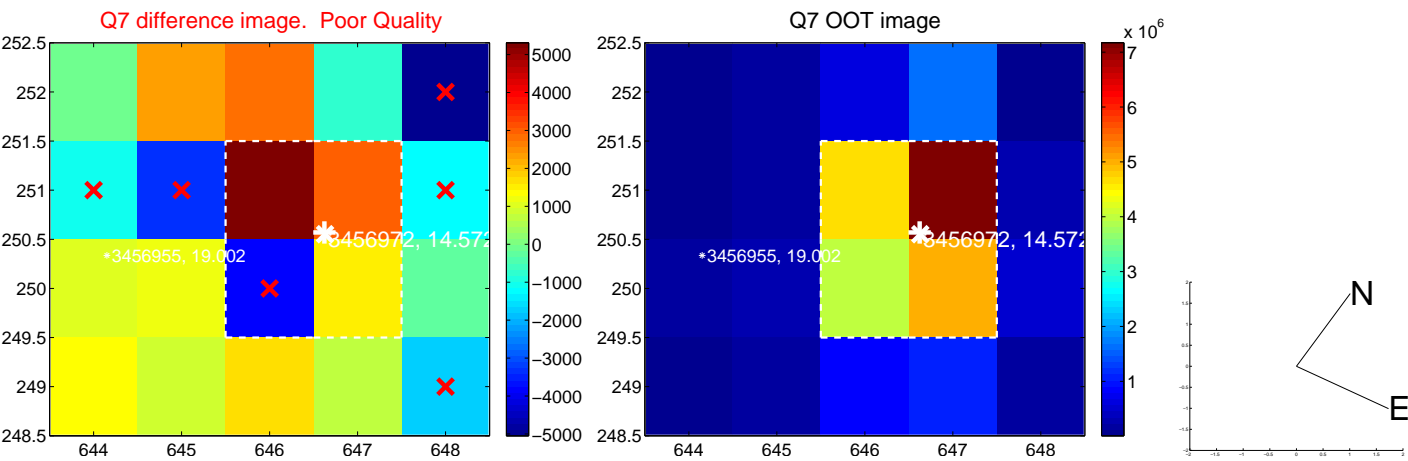
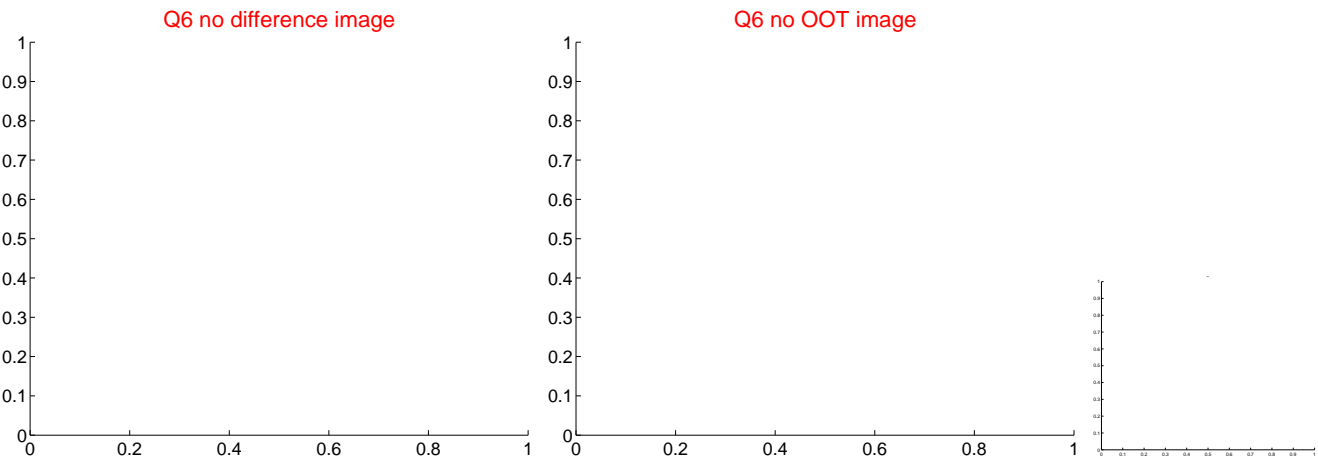
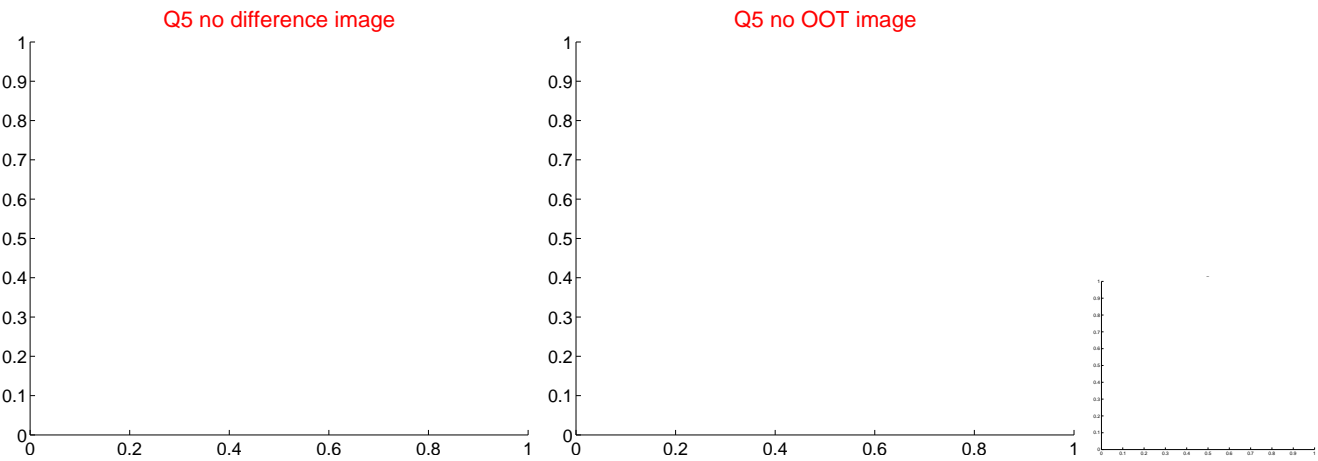


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

Q9 no difference image



Q9 no OOT image



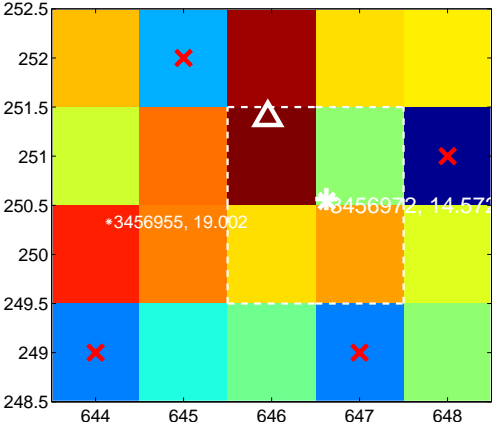
Q10 no difference image



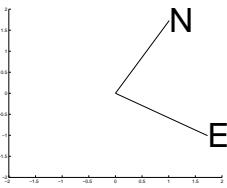
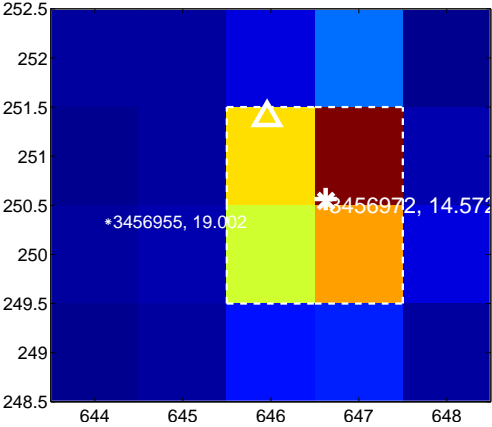
Q10 no OOT image



Q11 difference image. Poor Quality



Q11 OOT image



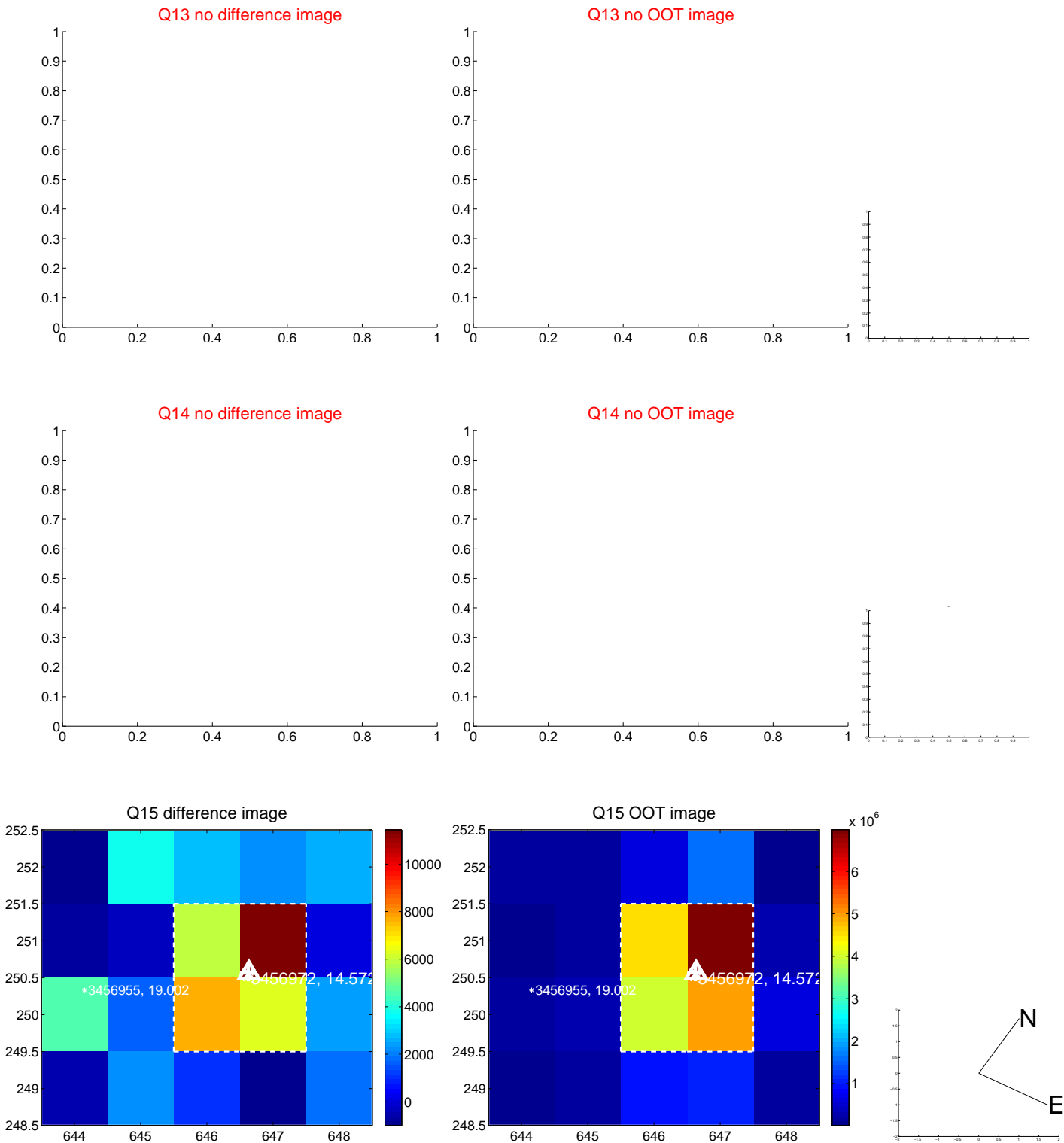
Q12 no difference image



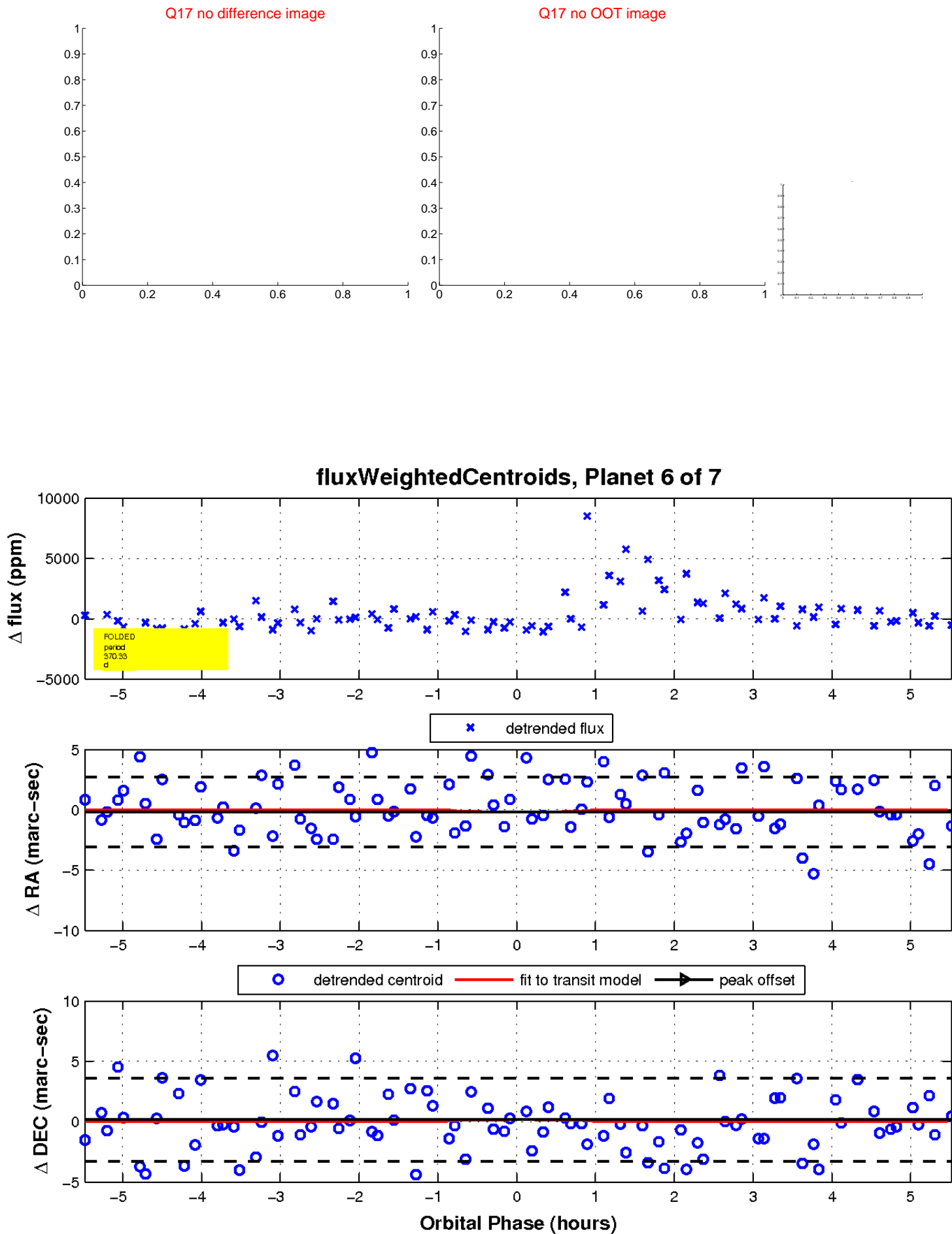
Q12 no OOT image



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

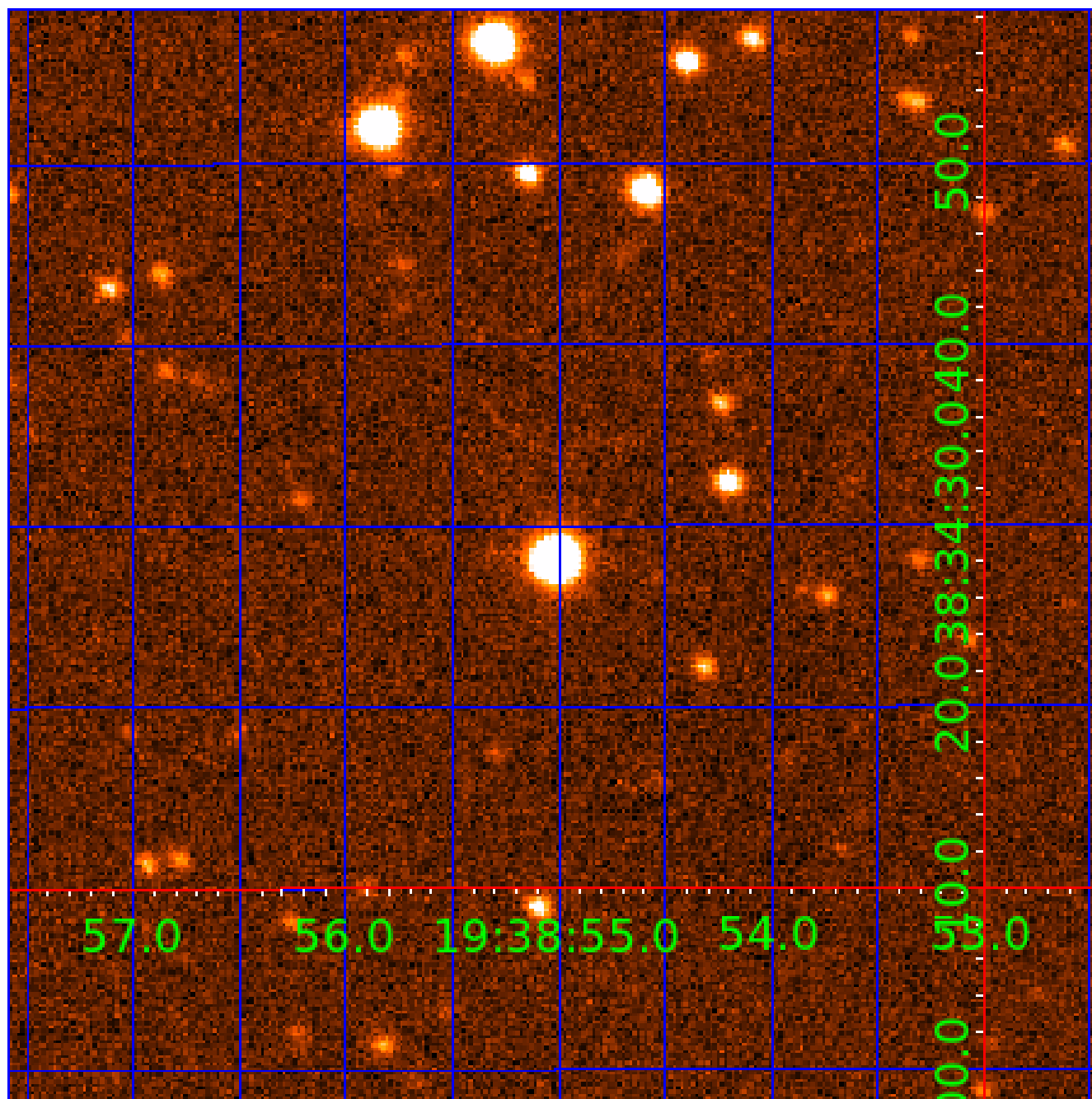


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 003456972

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003456972-02	OBS	No	665.509508	220.725314	1951.8	7.454	15.3	8.7	0.73	5119	3.40	0.19
003456972-03	OBS	No	265.906986	269.154923	1060.4	3.601	13.7	5.8	0.73	5119	2.52	0.63
003456972-04	OBS	No	538.351744	363.953765	1598.2	3.025	13.9	8.9	0.73	5119	2.94	0.25
003456972-05	OBS	No	258.351842	364.922983	1903.4	12.356	13.2	8.4	0.73	5119	3.49	0.66
003456972-06	OBS	No	370.329878	326.686867	1818.0	1.846	11.9	10.4	0.73	5119	3.08	0.41
003456972-07	OBS	No	322.179264	449.394130	1840.6	4.506	12.8	8.9	0.73	5119	3.17	0.49

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003456972-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
003456972-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
003456972-04	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS— HALO_GHOST
003456972-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV
003456972-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—MOD_POS_ALT—INCONSISTENT_TRANS— CENT_FEW_DIFFS
003456972-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL_SKYE—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_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.

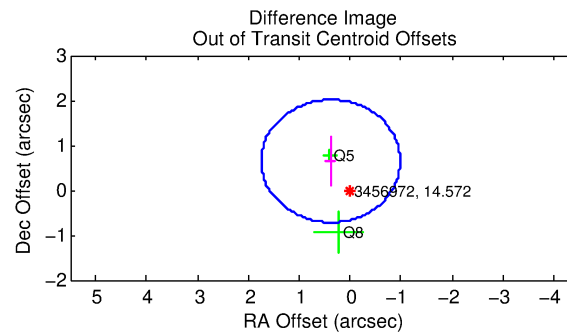
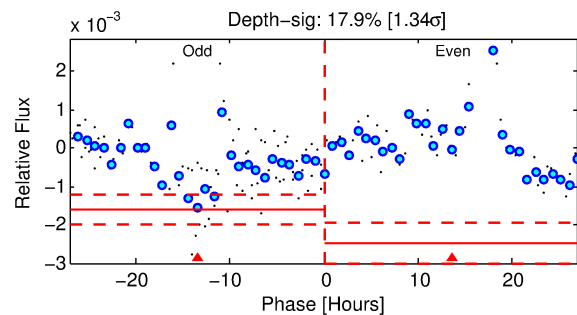
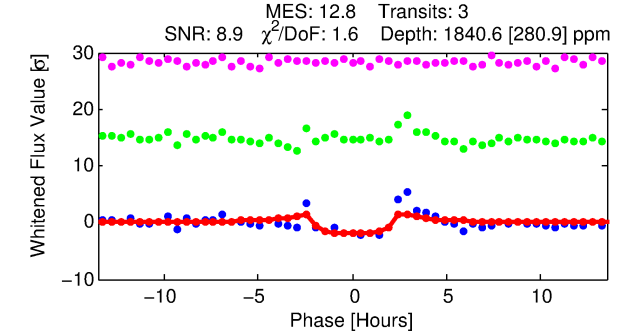
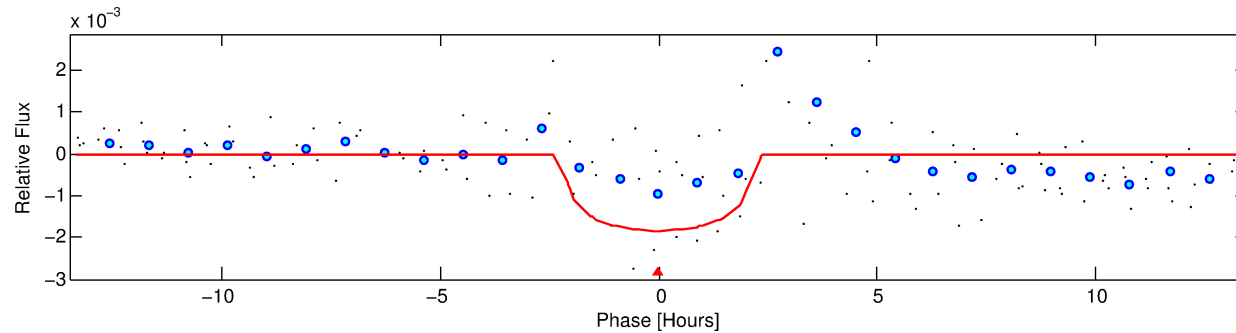
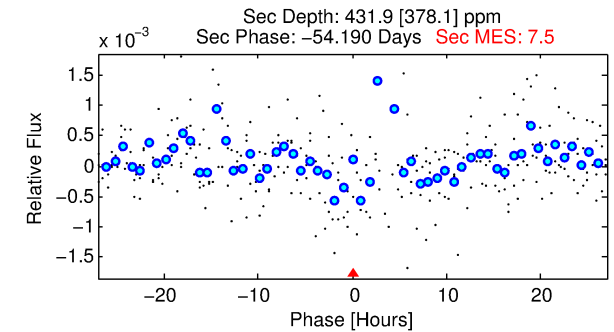
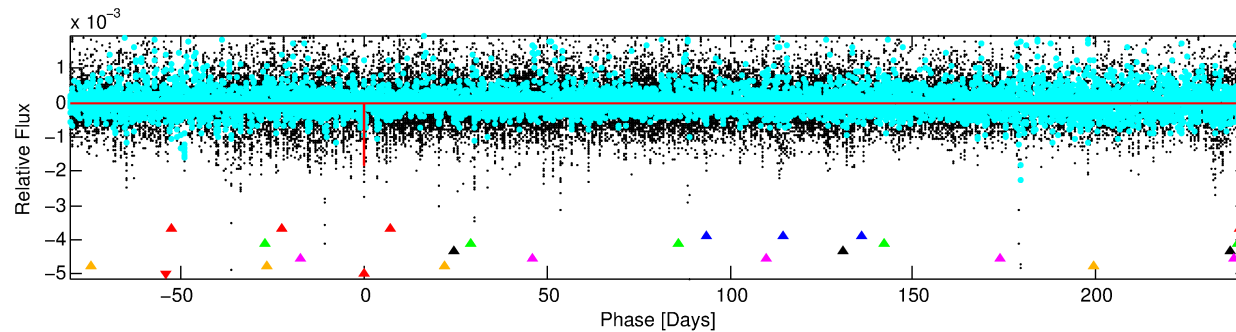
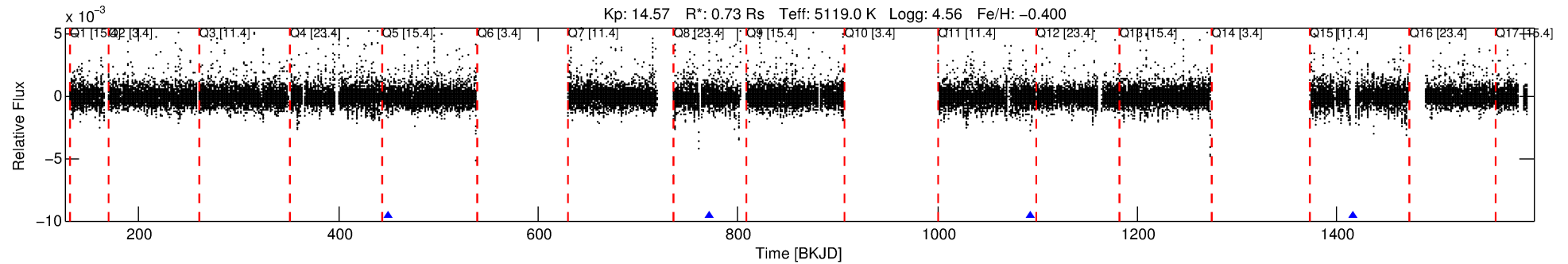
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 003456972-07

No Significant Match Found

# DV One-Page Summary

KIC: 3456972 Candidate: 7 of 7 Period: 322.179 d



## DV Fit Results:

Period = 322.17926 [0.00714] d  
Epoch = 449.3941 [0.0076] BKJD  
Rp/R\* = 0.0400 [0.0402]  
a/R\* = 493.19 [1807.82]  
b = 0.52 [5.28]  
Seff = 0.49 [0.09]  
Teq = 213 [10] K  
Rp = 3.17 [3.21] Re  
a = 0.8143 [0.0850] AU  
Ag = 15666.92 [34419.87] [0.46 $\sigma$ ]  
Teffp = 3691 [2026] K [1.72 $\sigma$ ]

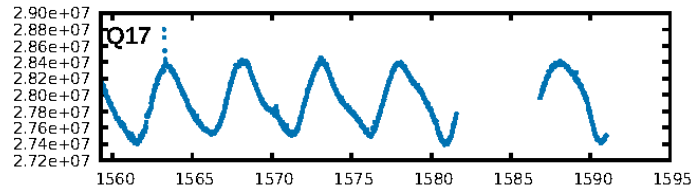
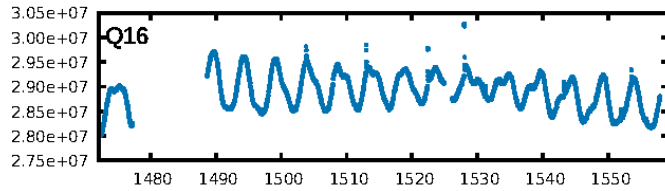
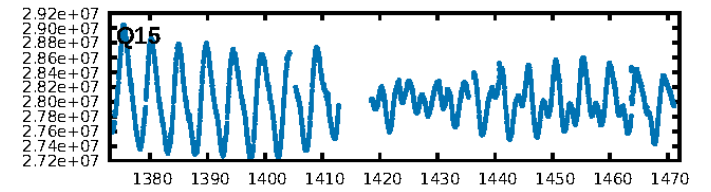
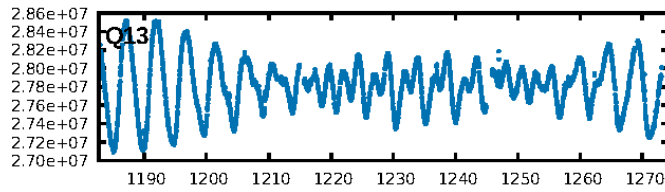
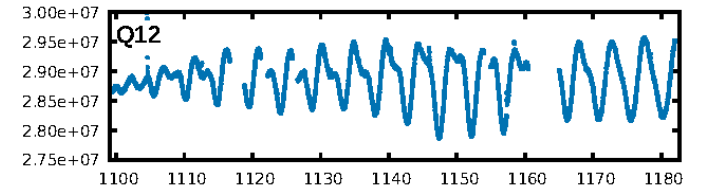
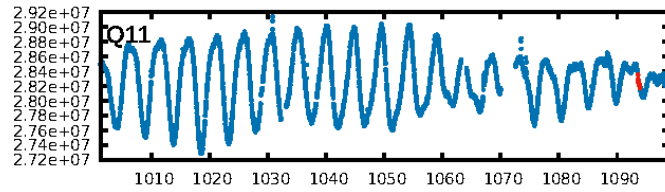
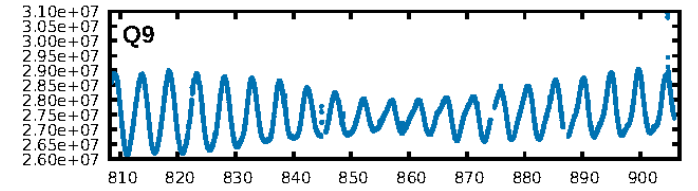
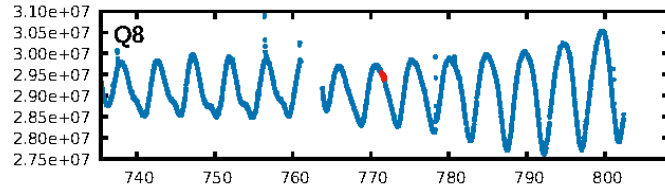
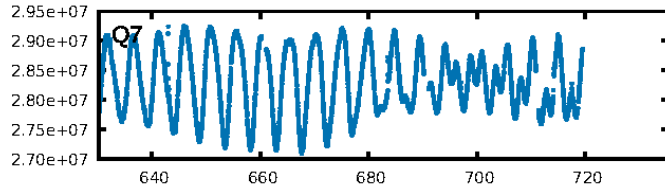
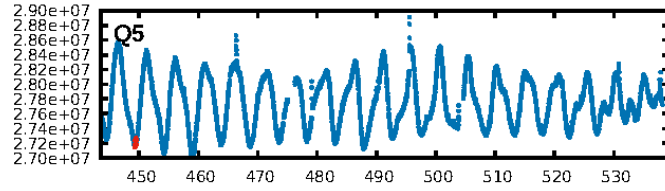
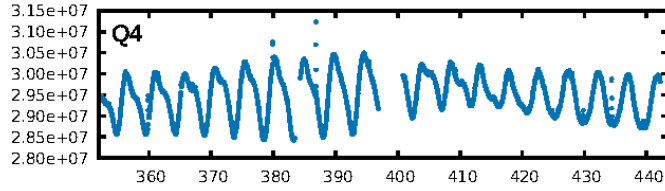
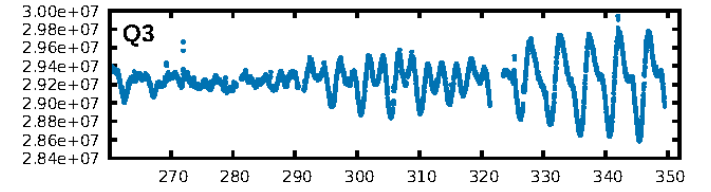
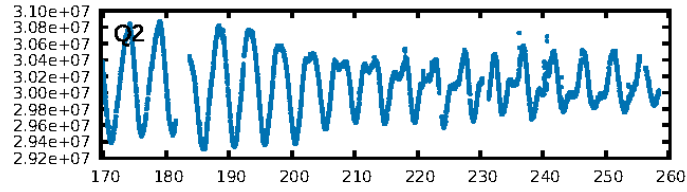
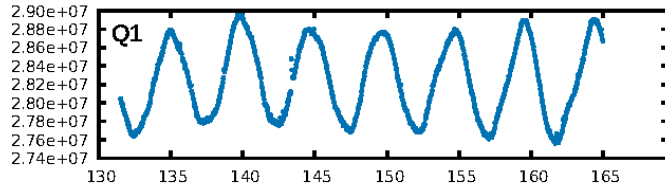
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [234.13 $\sigma$ ]  
LongPeriod-sig: 100.0% [88.57 $\sigma$ ]  
ModelChiSquare2-sig: 2.2%  
ModelChiSquareGof-sig: 68.2%  
**Bootstrap-pfa: 2.62e-11**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 9.822  
Centroid-sig: 23.5%  
Centroid-so: 0.869 arcsec [1.02 $\sigma$ ]  
OotOffset-rm: 0.750 arcsec [1.65 $\sigma$ ]  
OotOffset-st: 0/0/1/1 [2]  
KicOffset-rm: 0.767 arcsec [1.19 $\sigma$ ]  
KicOffset-st: 0/0/1/1 [2]  
DiffImageQuality-fgm: 1.00 [2/2]  
DiffImageOverlap-fno: 1.00 [2/2]

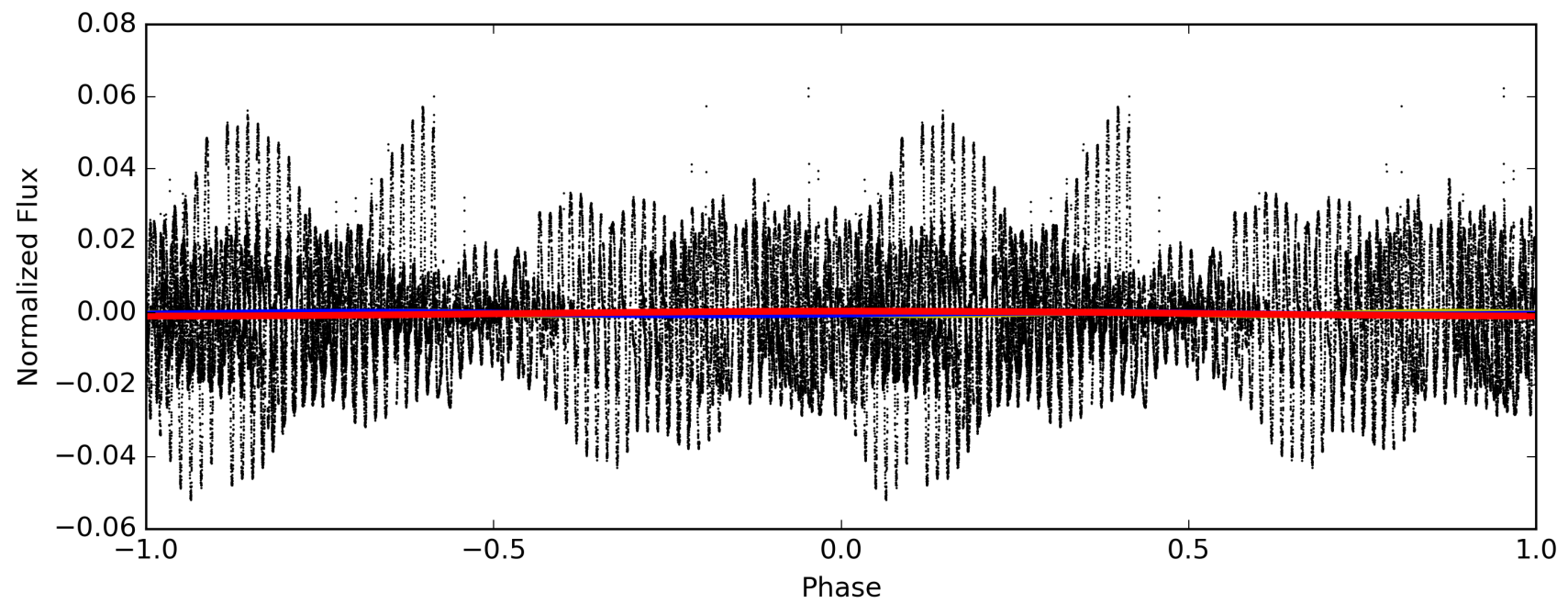
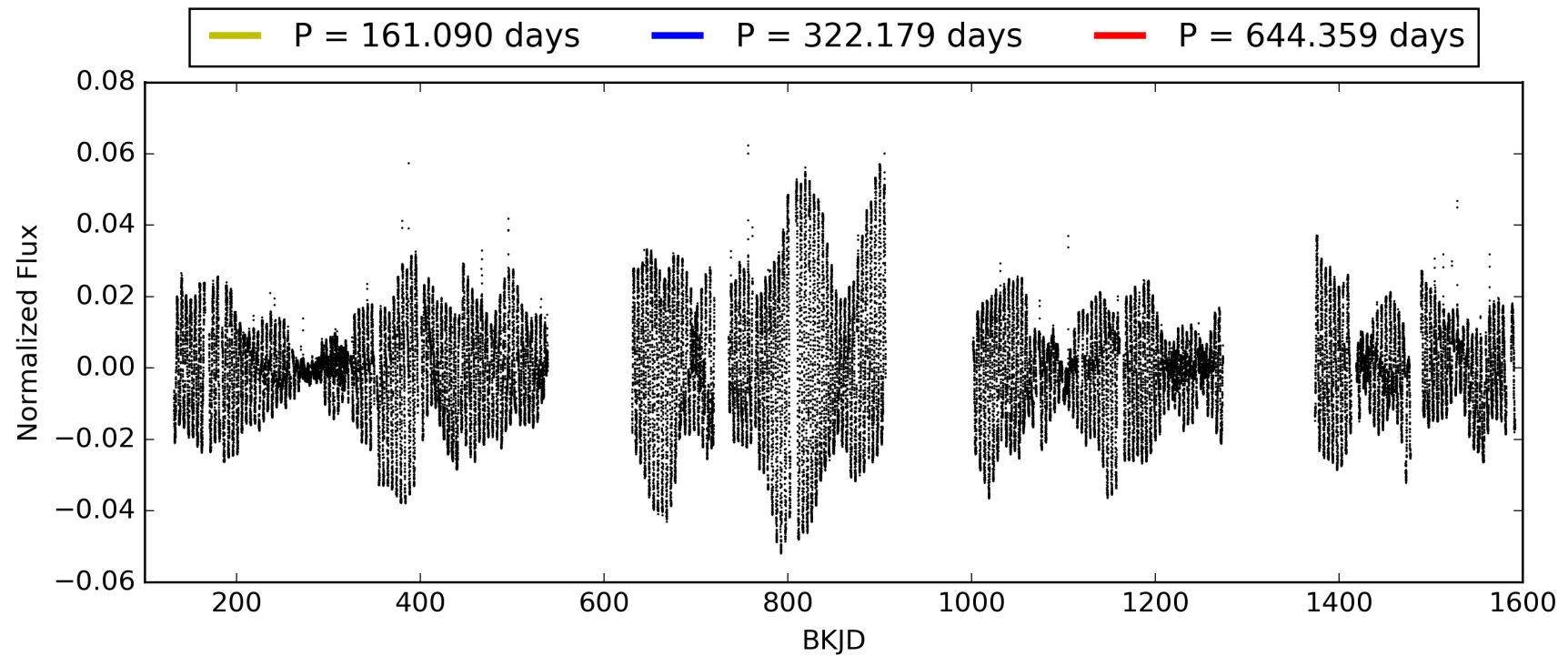
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 21:16:21 Z

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

# TCE 003456972-07, PDC Light Curves



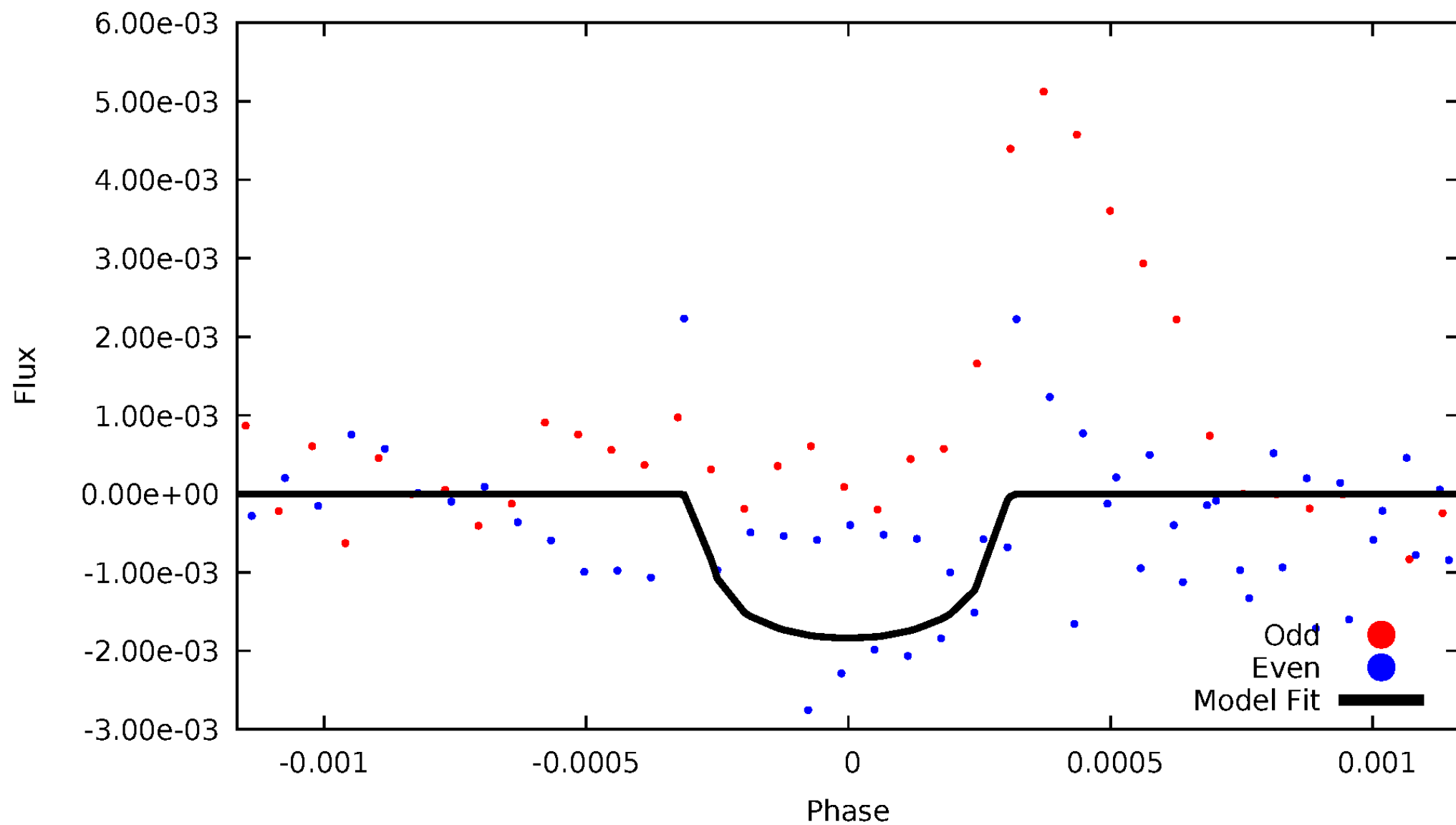
TCE 003456972-07





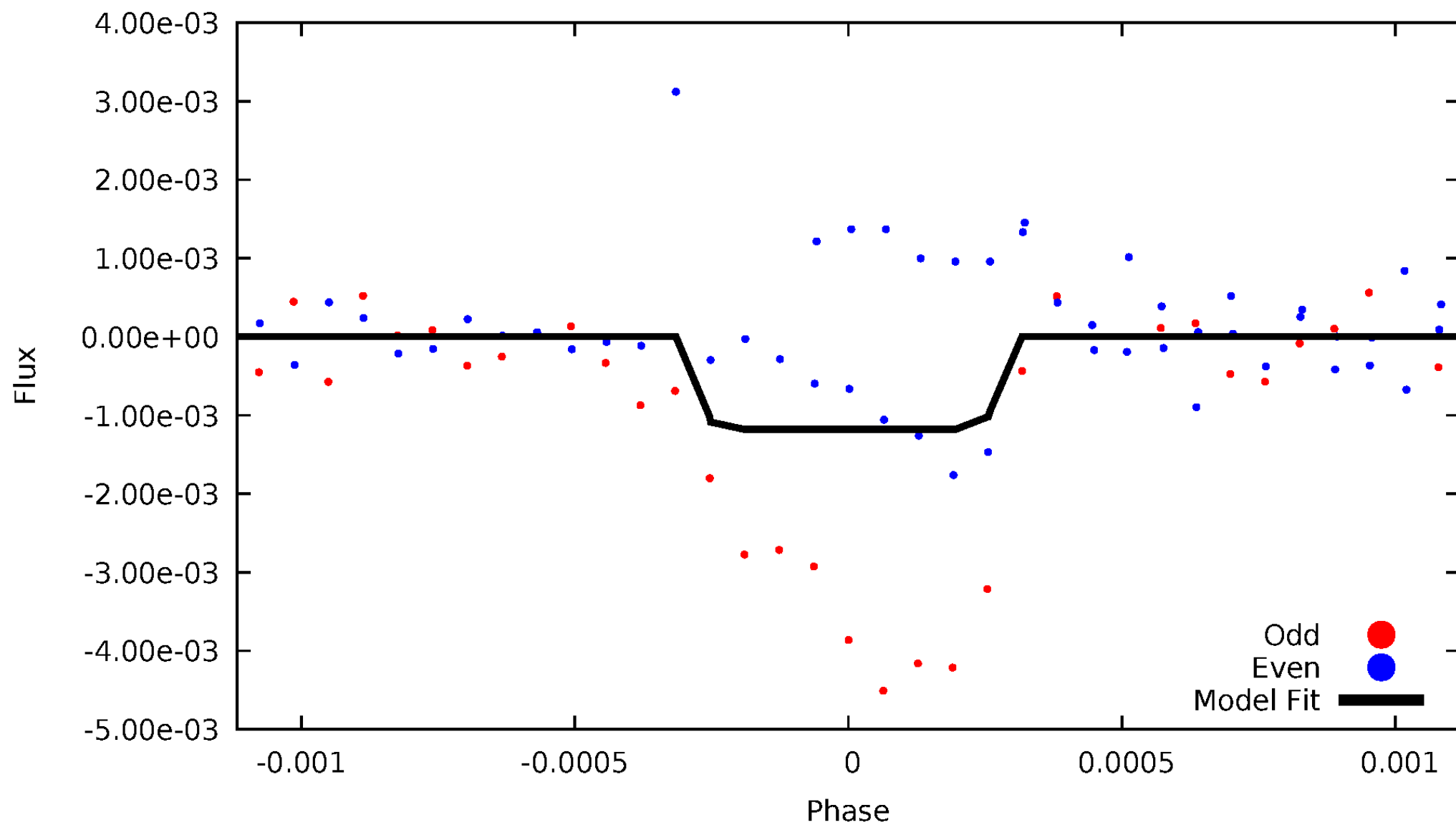
# DV Odd/Even

TCE 003456972-07



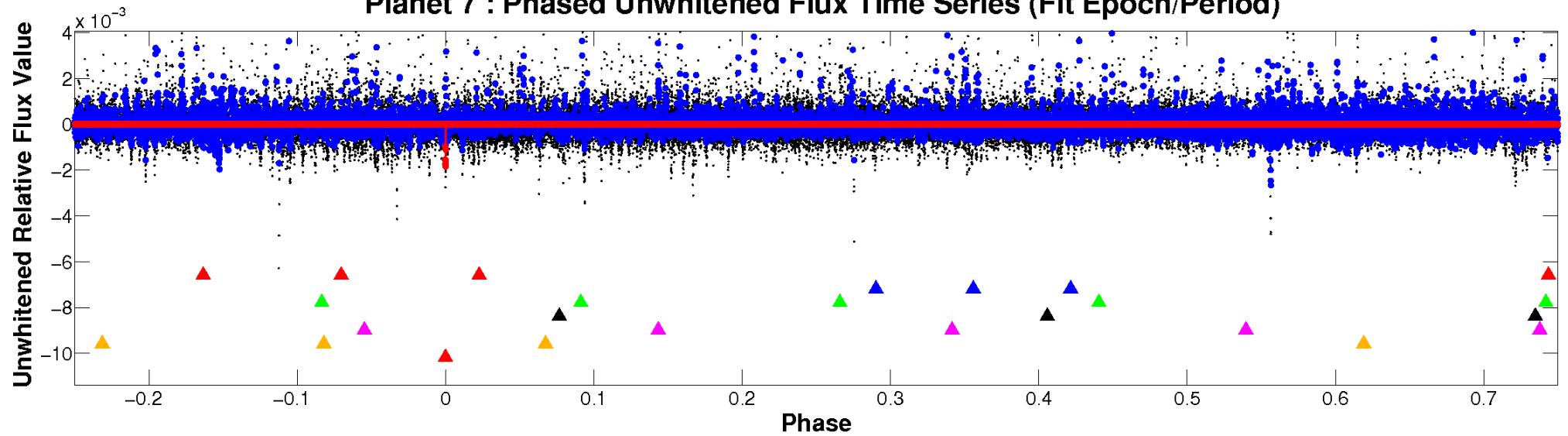
# ALT Odd/Even

TCE 003456972-07

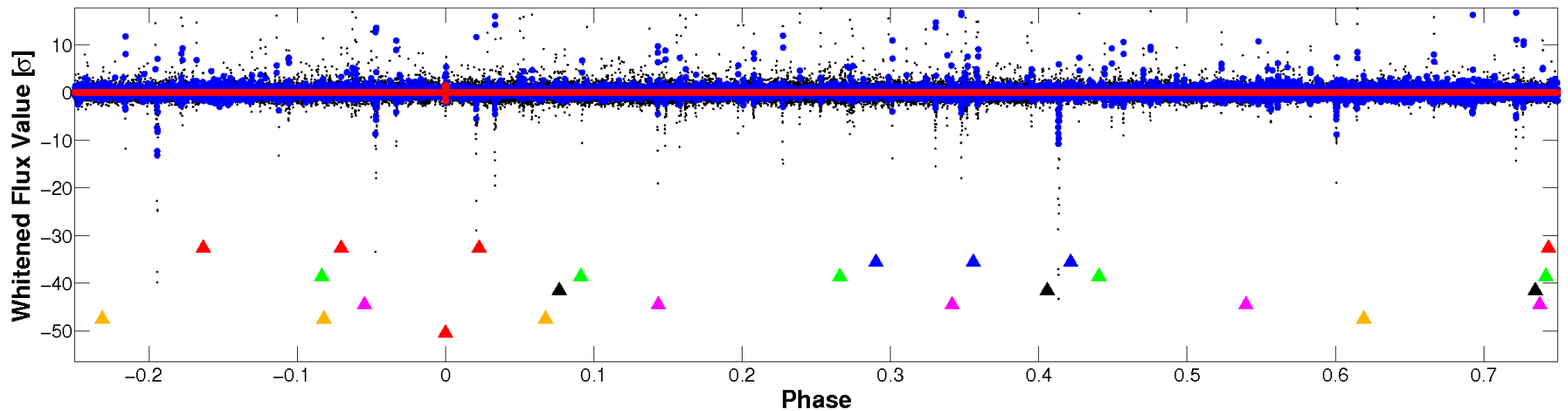


# Non-Whitened Vs. Whitened Light Curve

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

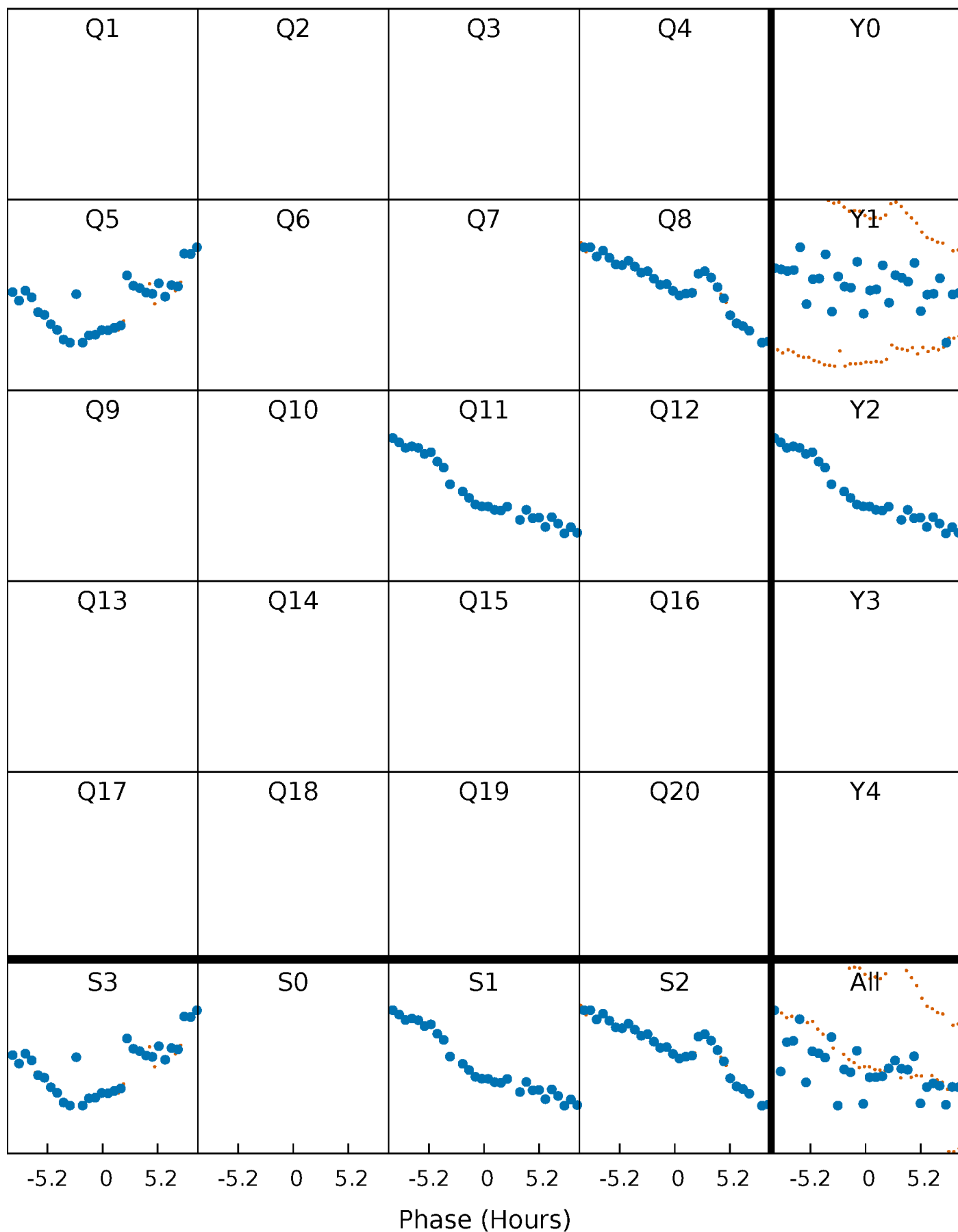


Planet 7 : Phased Whitened Flux Time Series (Fit Epoch/Period)



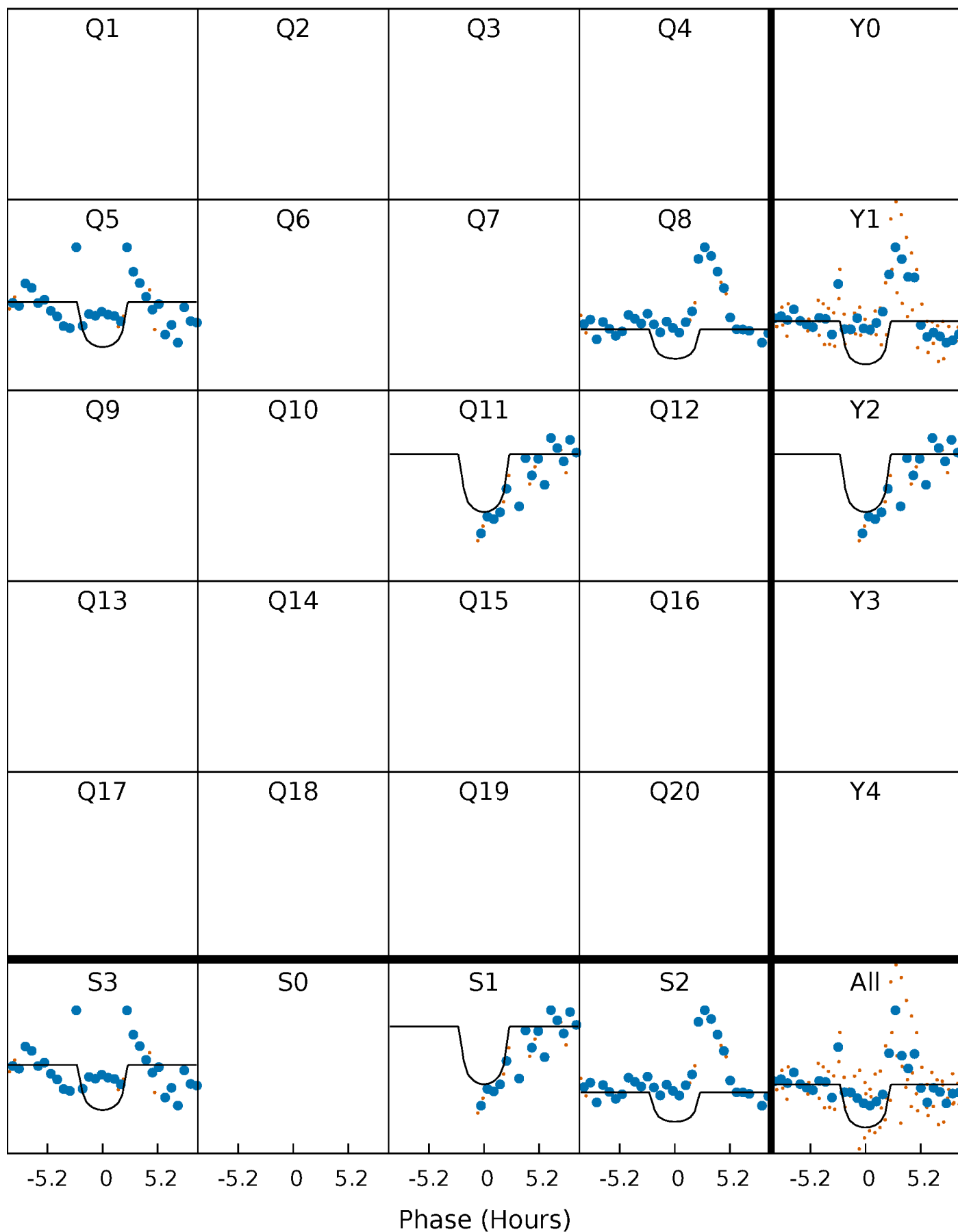
# PDC Quarter-Phased Transit Curves

TCE 003456972-07     $P=322.179264$  Days     $T_0=449.394130$  (BKJD)



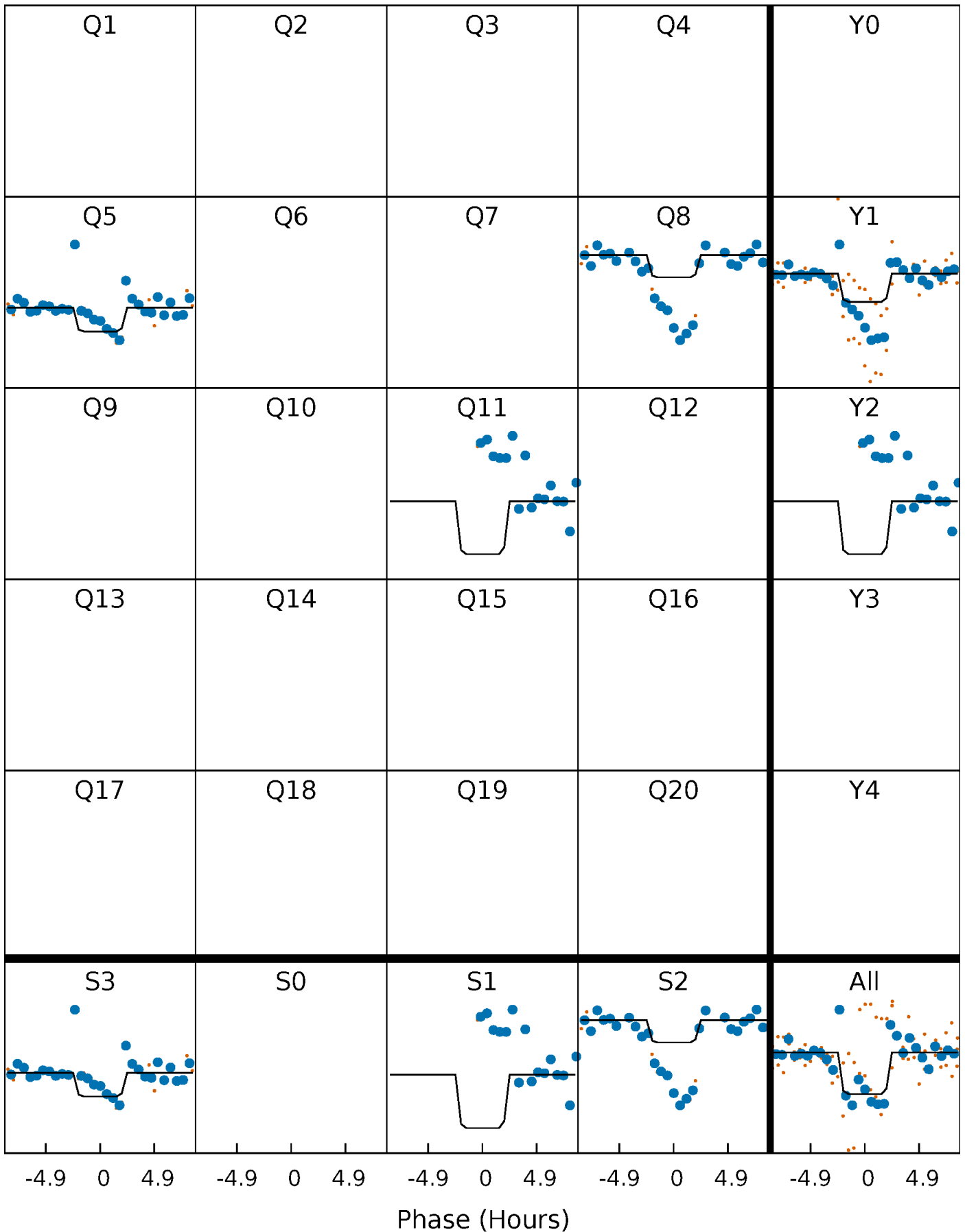
# DV Quarter-Phased Transit Curves

TCE 003456972-07     $P=322.179264$  Days     $T_0=449.394130$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

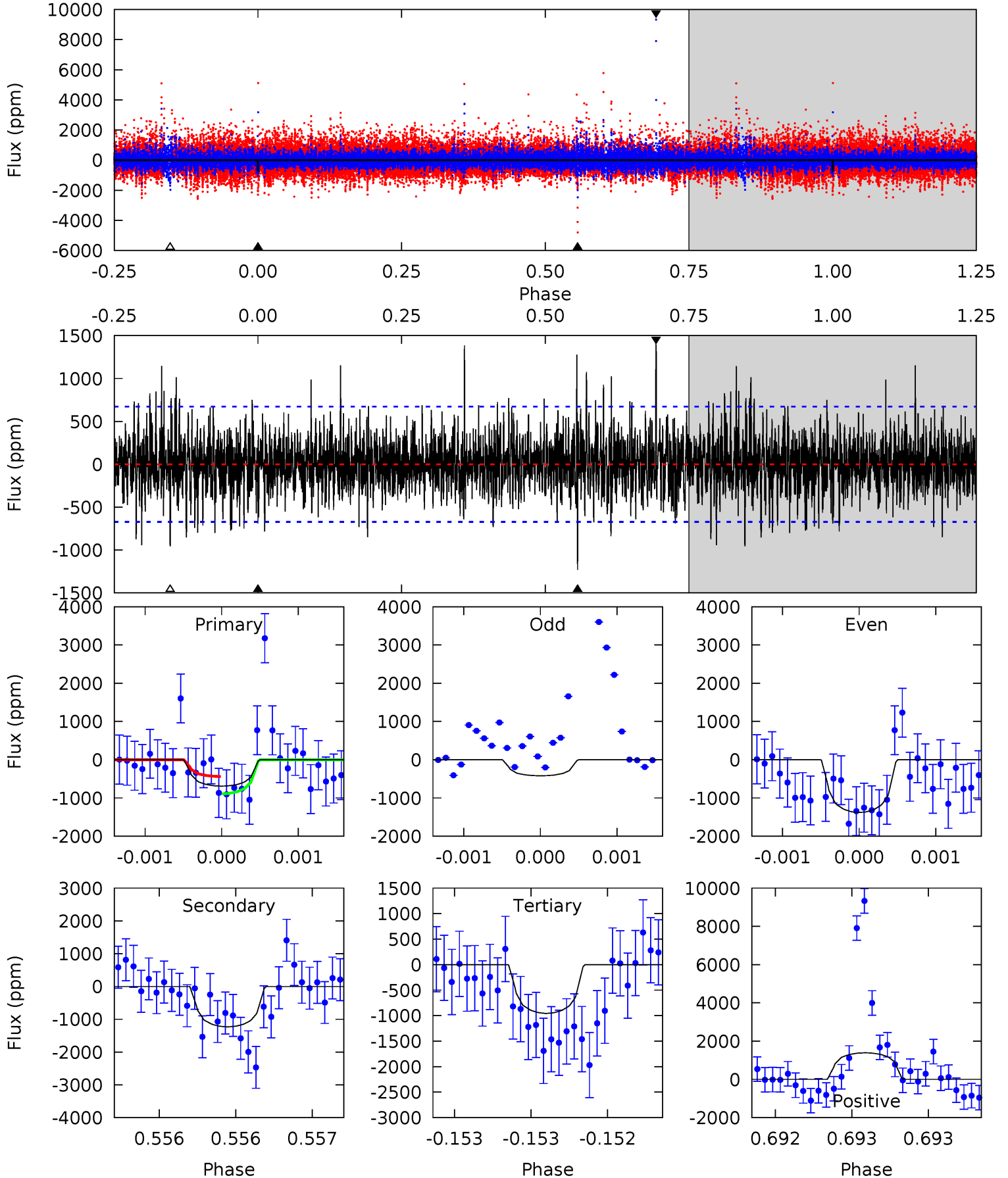
TCE 003456972-07     $P=322.175941$  Days     $T_0=449.394706$  (BKJD)



# DV Model-Shift Uniqueness Test

003456972-07, P = 322.179264 Days, E = 127.214866 Days

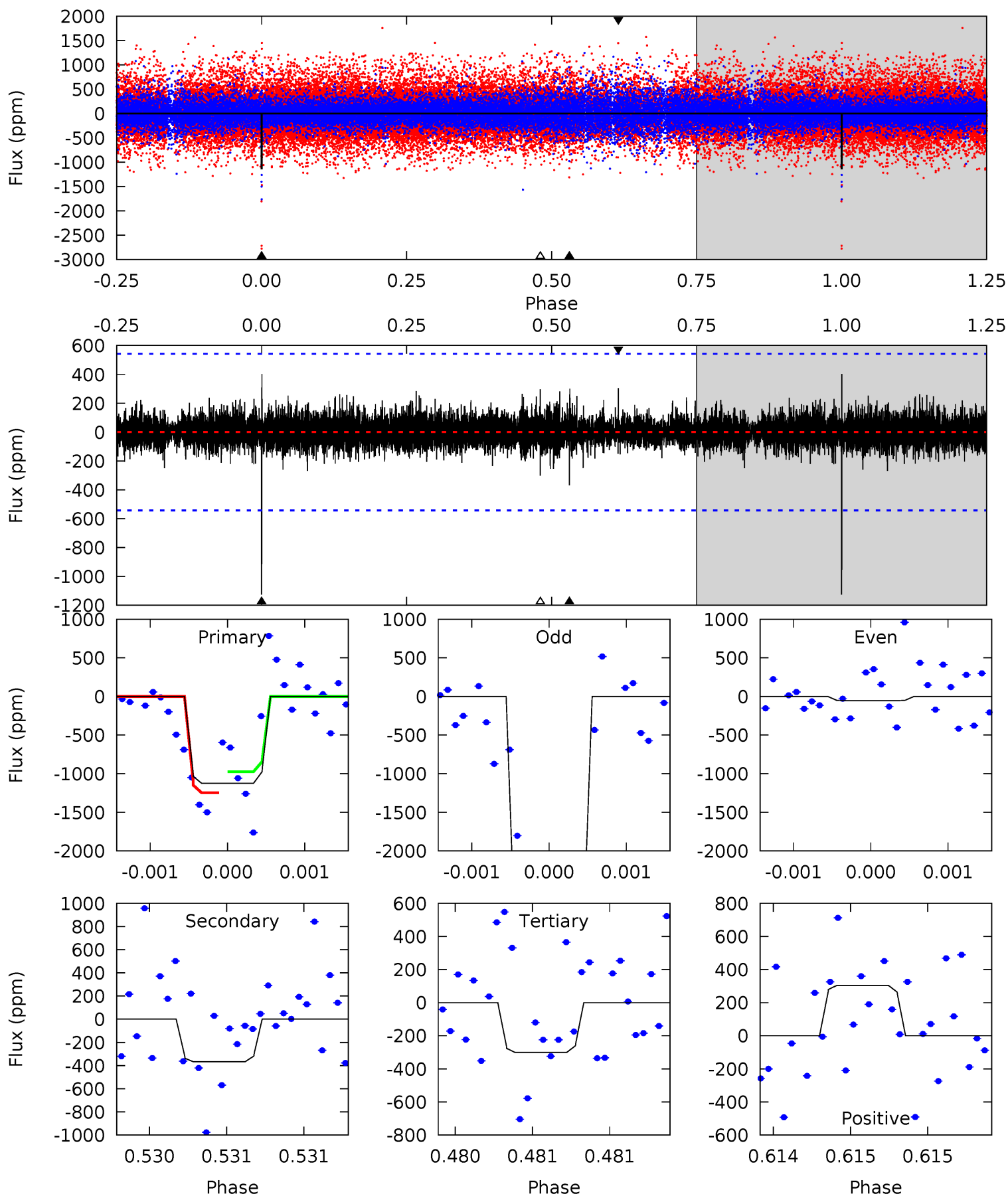
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.68	10.1	7.87	11.4	5.53	3.42	2.01	-2.19	-5.76	2.26	-1.31	3.63	1.24	0.53	1.81



# Alt Model-Shift Uniqueness Test

003456972-07, P = 322.175941 Days, E = 127.218765 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
11.5	3.75	3.07	3.11	5.55	3.45	0.64	8.43	8.40	0.68	0.65	23.1	1.24	0.26	0





### Stellar Parameters For KIC 003456972

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5119^{+153}_{-153}$	$4.556^{+0.080}_{-0.080}$	$-0.400^{+0.300}_{-0.300}$	$0.727^{+0.092}_{-0.083}$	$0.693^{+0.101}_{-0.043}$	$2.544^{+0.847}_{-0.580}$
	+3%/-3%	+2%/-2%	+75%/-75%	+13%/-11%	+15%/-6%	+33%/-23%
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 003456972-07 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-1230 \pm 121$	$3.74^{+3.23}_{-2.37}$	$299^{+14}_{-13}$	$4521^{+2793}_{-884}$	$32208^{+205352}_{-23103}$
Alt.	$-367 \pm 98$	$3.57^{+2.72}_{-2.40}$	$298^{+13}_{-12}$	$3715^{+2062}_{-660}$	$10586^{+83756}_{-7576}$

$T_{\text{max}}$  = 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

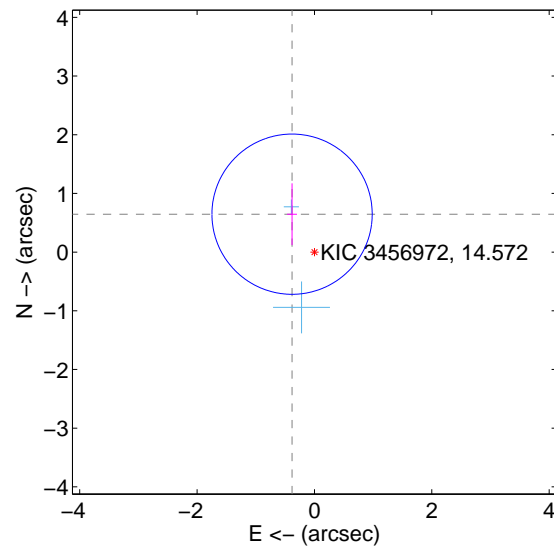
Supplemental centroid analysis for 003456972-07. Kepler magnitude: 14.57. Transit SNR 8.88

There are 2 quarters with good PRF difference image offsets

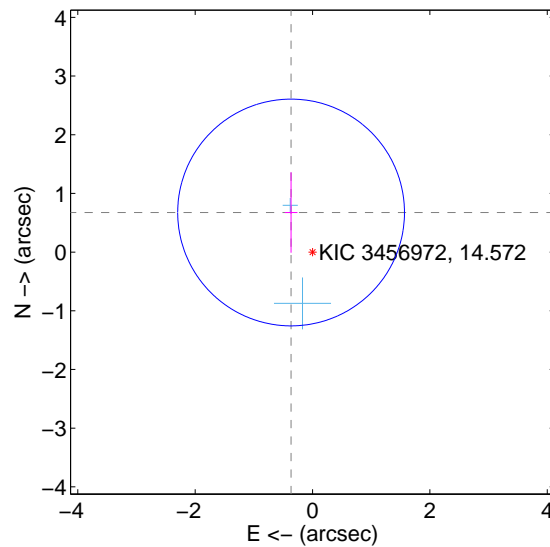
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.750 \pm 0.455$	1.65	$0.381 \pm 0.083$	$0.646 \pm 0.526$
PRF-fit source offset from KIC position	$0.767 \pm 0.644$	1.19	$0.365 \pm 0.108$	$0.675 \pm 0.686$
photometric centroid source offset	$0.87 \pm 0.86$	1.02	$0.87 \pm 0.86$	$0.08 \pm 0.79$

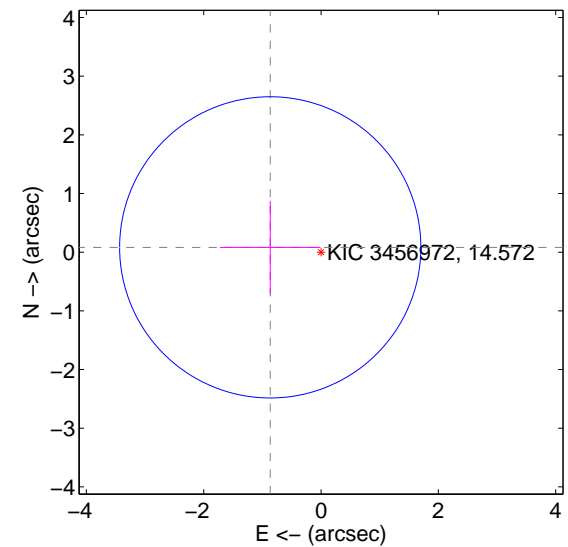
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids

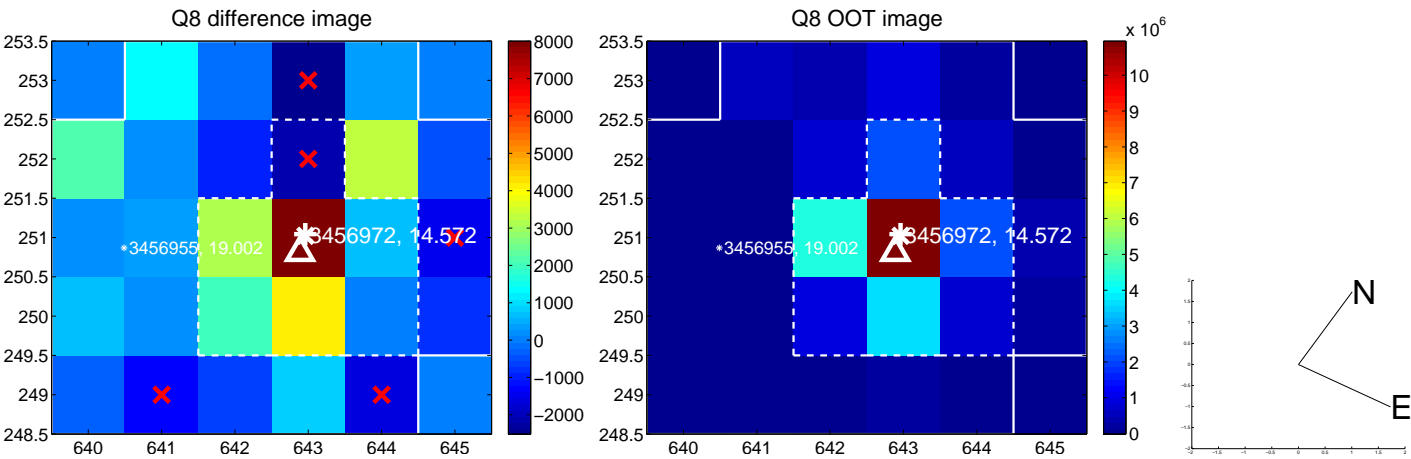
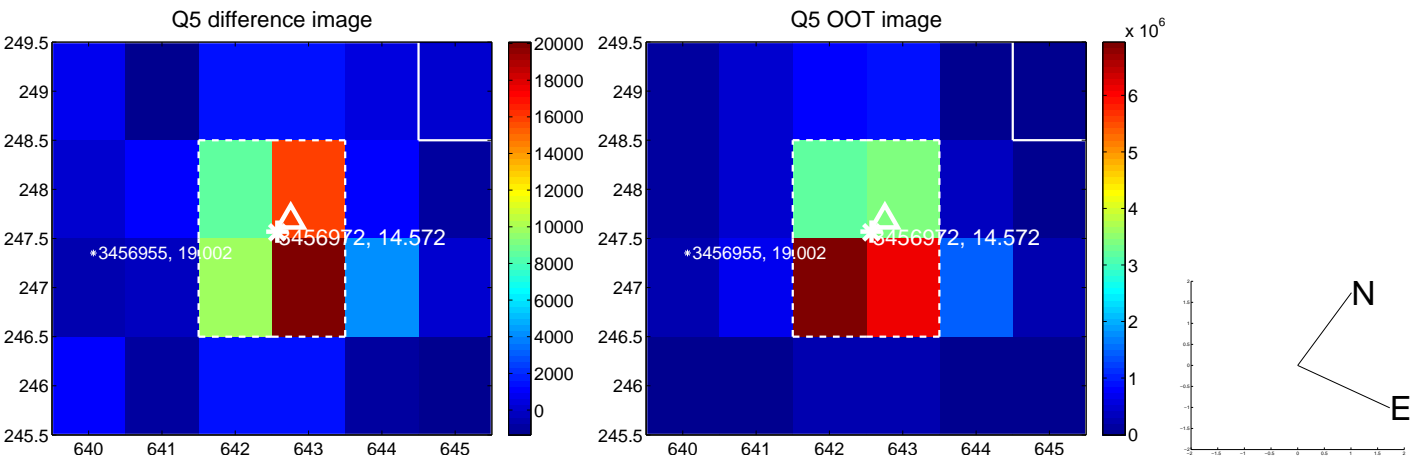


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

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



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



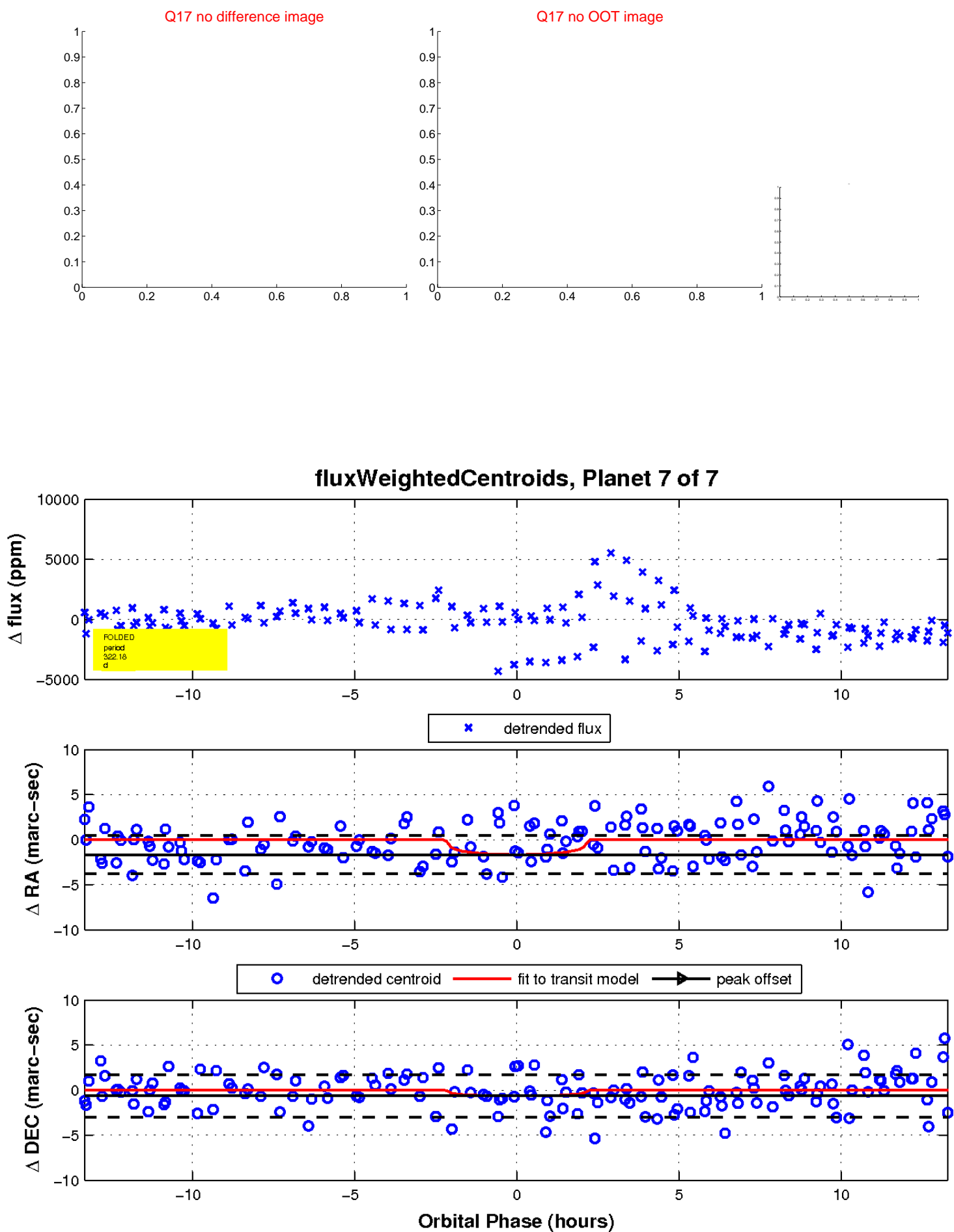
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



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



UKIRT Image

Declination

