

# KIC 005372310

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005372310-01	OBS	No	5.745287	134.428563	97.2	18.448	9.3	9.9	0.82	5555	0.90	172.22
005372310-02	OBS	No	420.474047	412.302974	637.7	10.768	9.2	7.0	0.82	5555	2.19	0.56

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005372310-01	OBS	FP	0.00	1	0	0	0	LPP_DV
005372310-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT— 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.

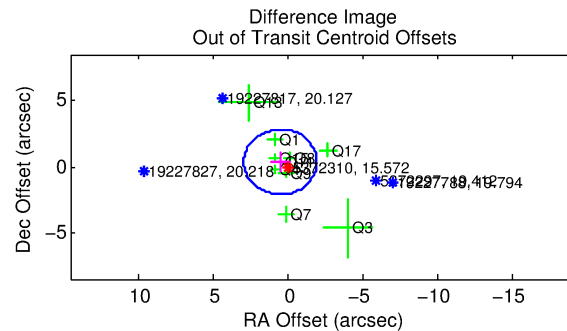
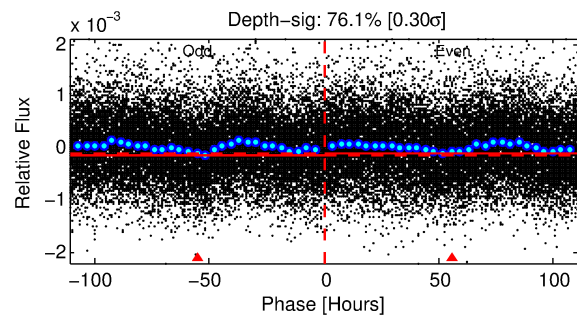
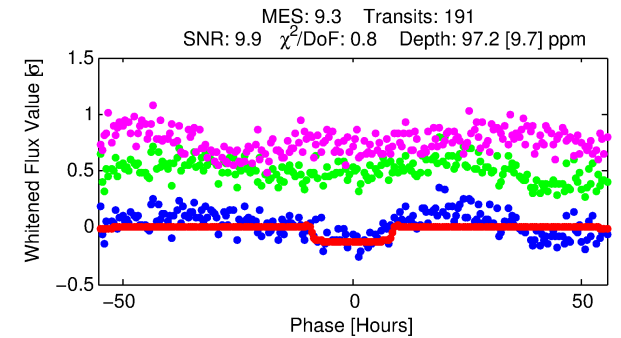
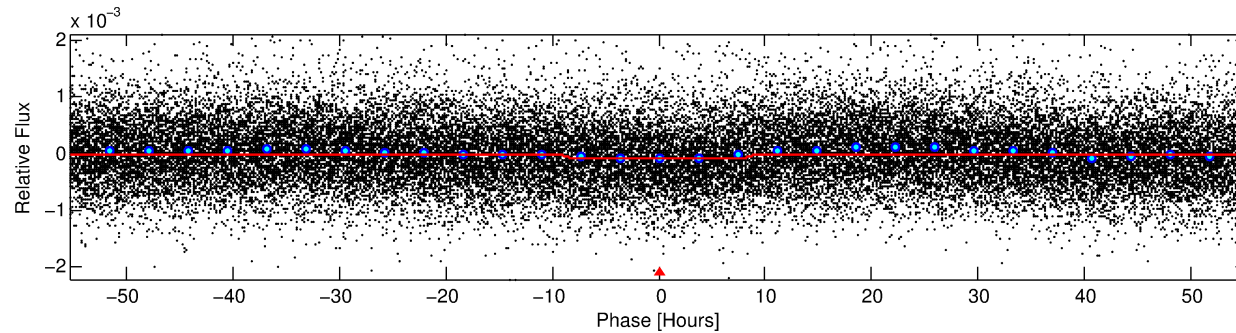
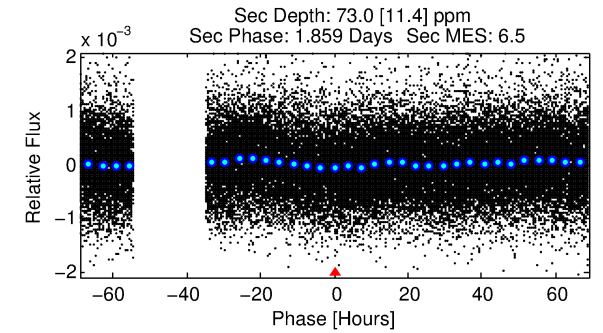
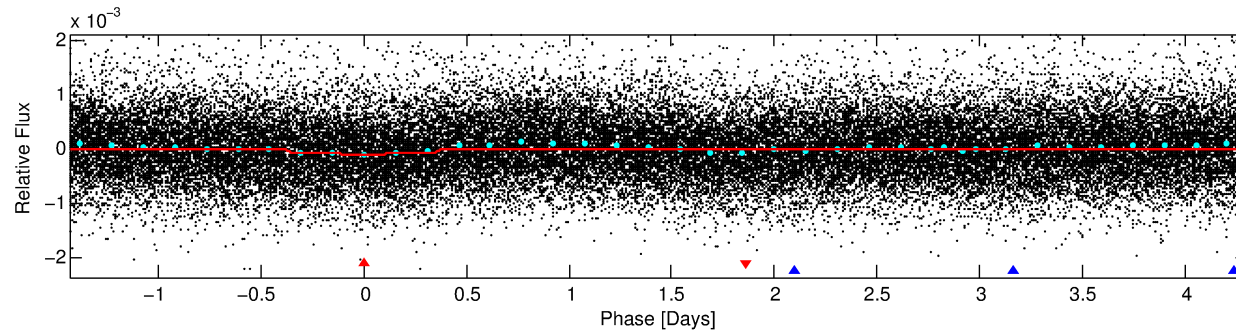
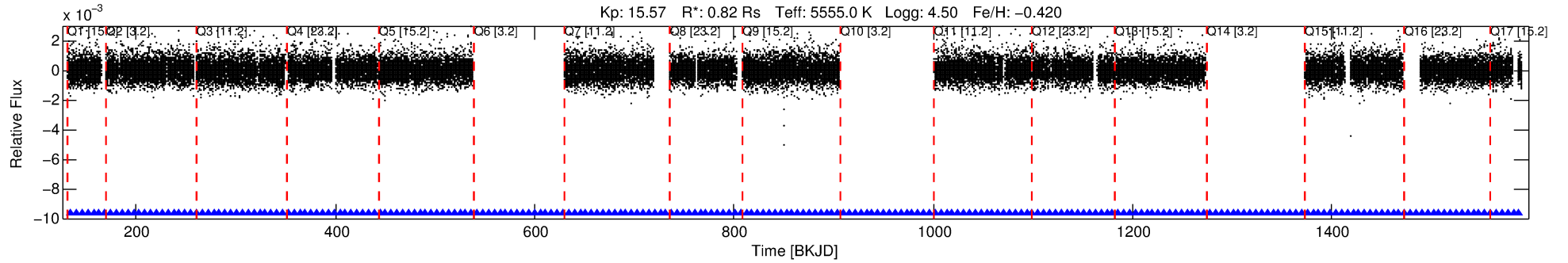
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005372310-01

No Significant Match Found

# DV One-Page Summary

KIC: 5372310 Candidate: 1 of 2 Period: 5.745 d



## DV Fit Results:

Period = 5.74529 [0.00015] d  
Epoch = 134.4286 [0.0188] BKJD  
Rp/R\* = 0.0101 [0.0026]  
a/R\* = 1.68 [1.28]  
b = 0.81 [0.49]  
Seff = 172.21 [48.69]  
Teq = 924 [65] K  
Rp = 0.90 [0.30] Re  
a = 0.0576 [0.0099] AU  
Ag = 163.98 [98.10] [1.66σ]  
Teffp = 5111 [719] K [5.80σ]

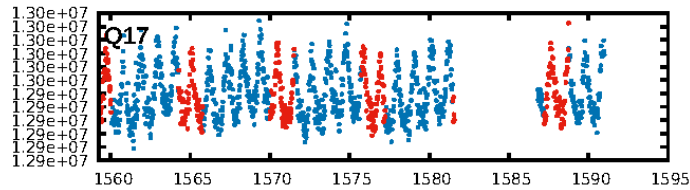
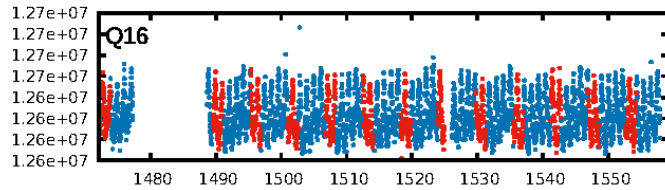
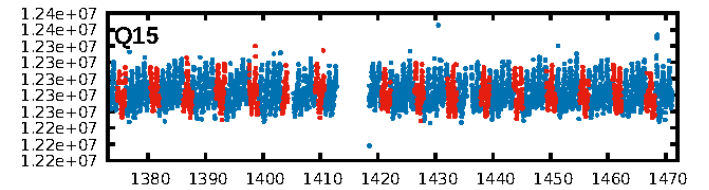
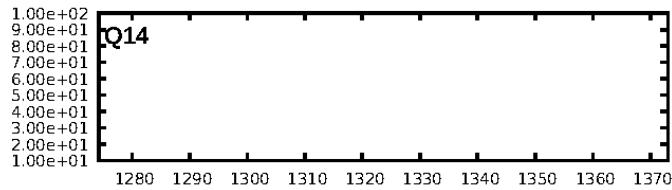
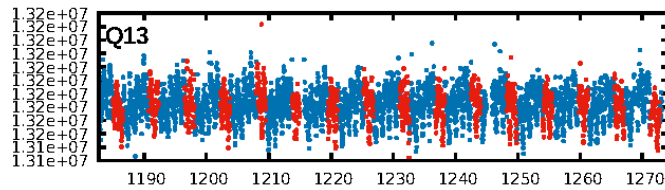
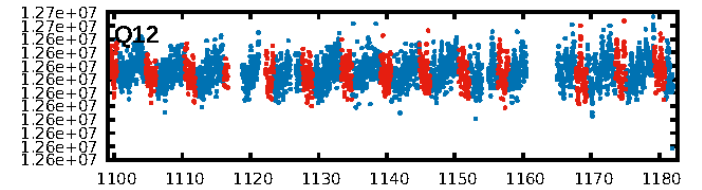
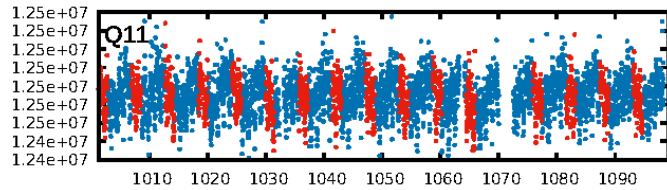
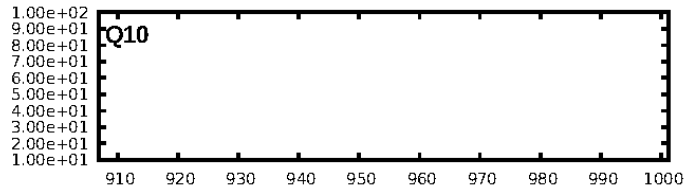
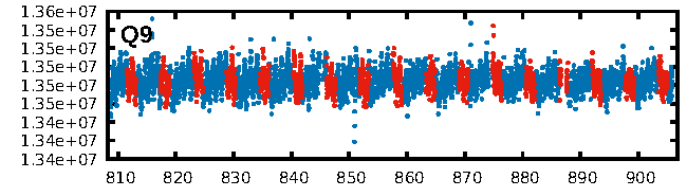
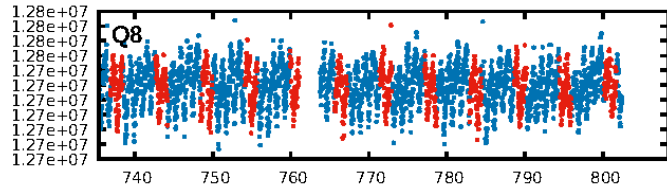
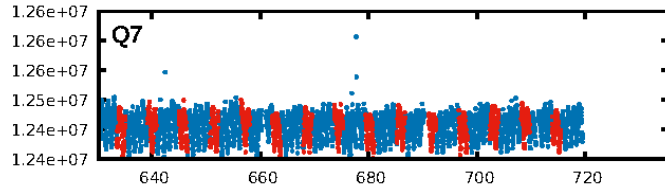
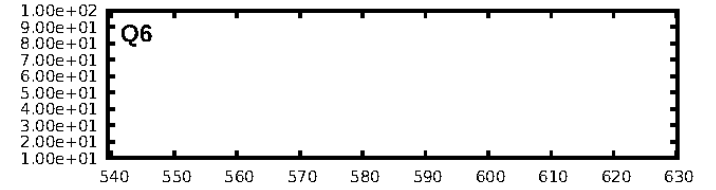
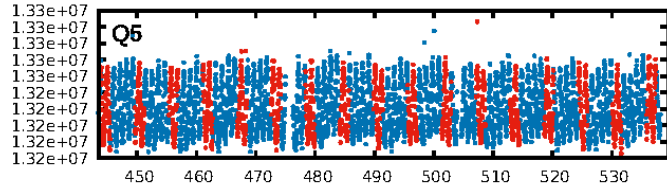
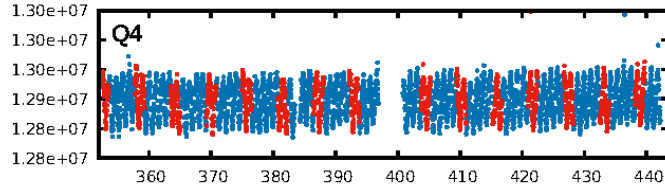
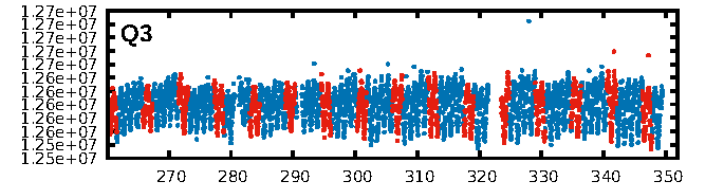
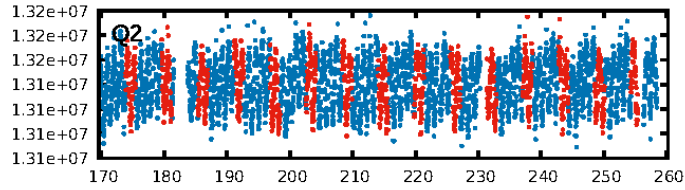
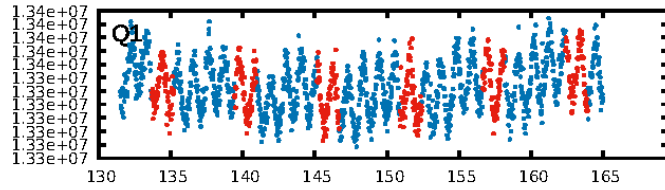
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [465.97σ]  
ModelChiSquare2-sig: 100.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 6.23e-19  
RollingBand-fgt: 1.00 [180/180]  
GhostDiagnostic-chr: -85.95  
Centroid-sig: 12.5%  
Centroid-so: 1.502 arcsec [1.29σ]  
OotOffset-rm: 0.582 arcsec [0.71σ]  
KicOffset-rm: 0.569 arcsec [0.62σ]  
OotOffset-st: 0/4/2/4 [10]  
KicOffset-st: 0/4/2/4 [10]  
DiffImageQuality-fgm: 0.70 [7/10]  
DiffImageOverlap-fno: 1.00 [14/14]

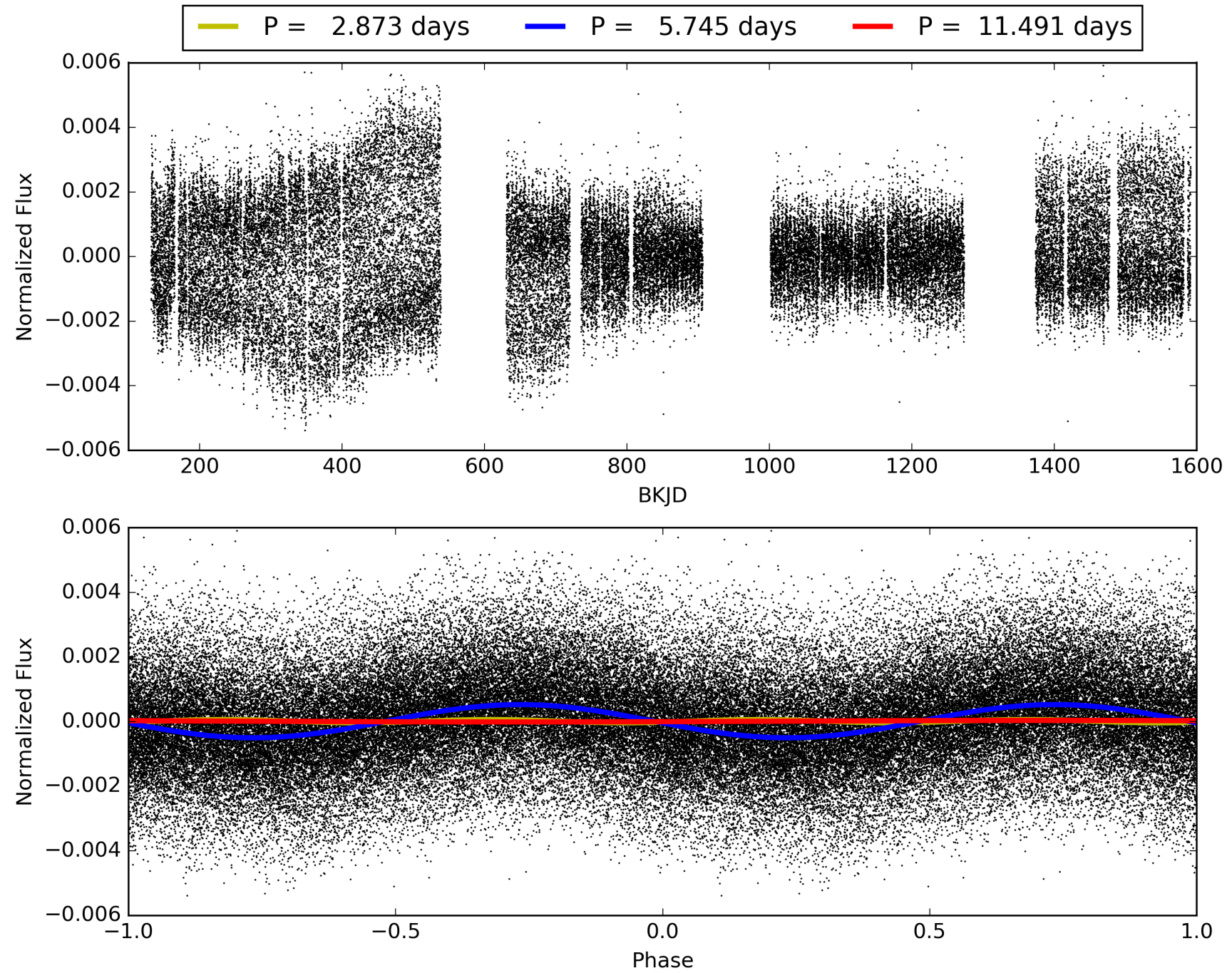
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:59:35 Z

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

## TCE 005372310-01, PDC Light Curves



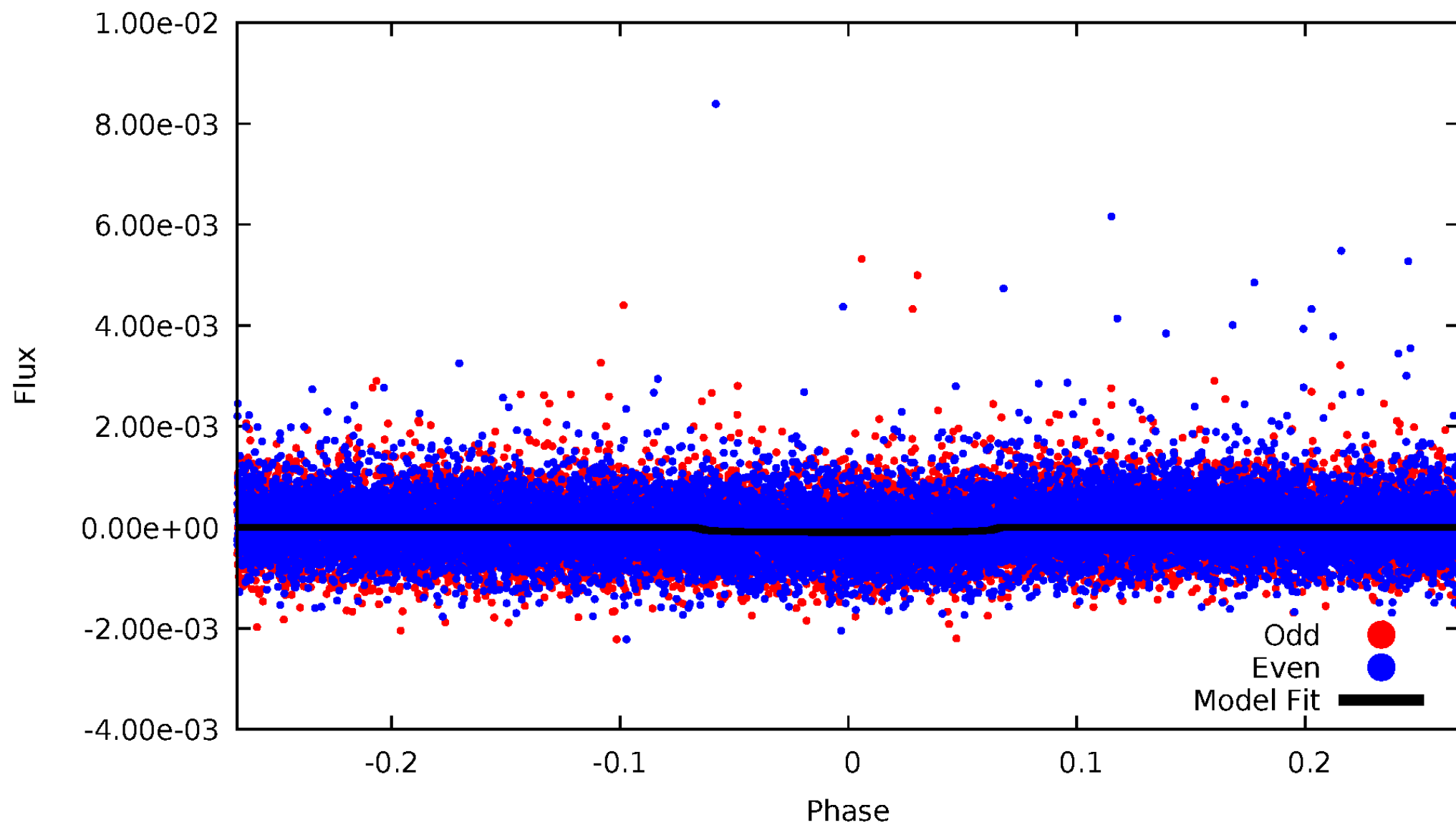
TCE 005372310-01





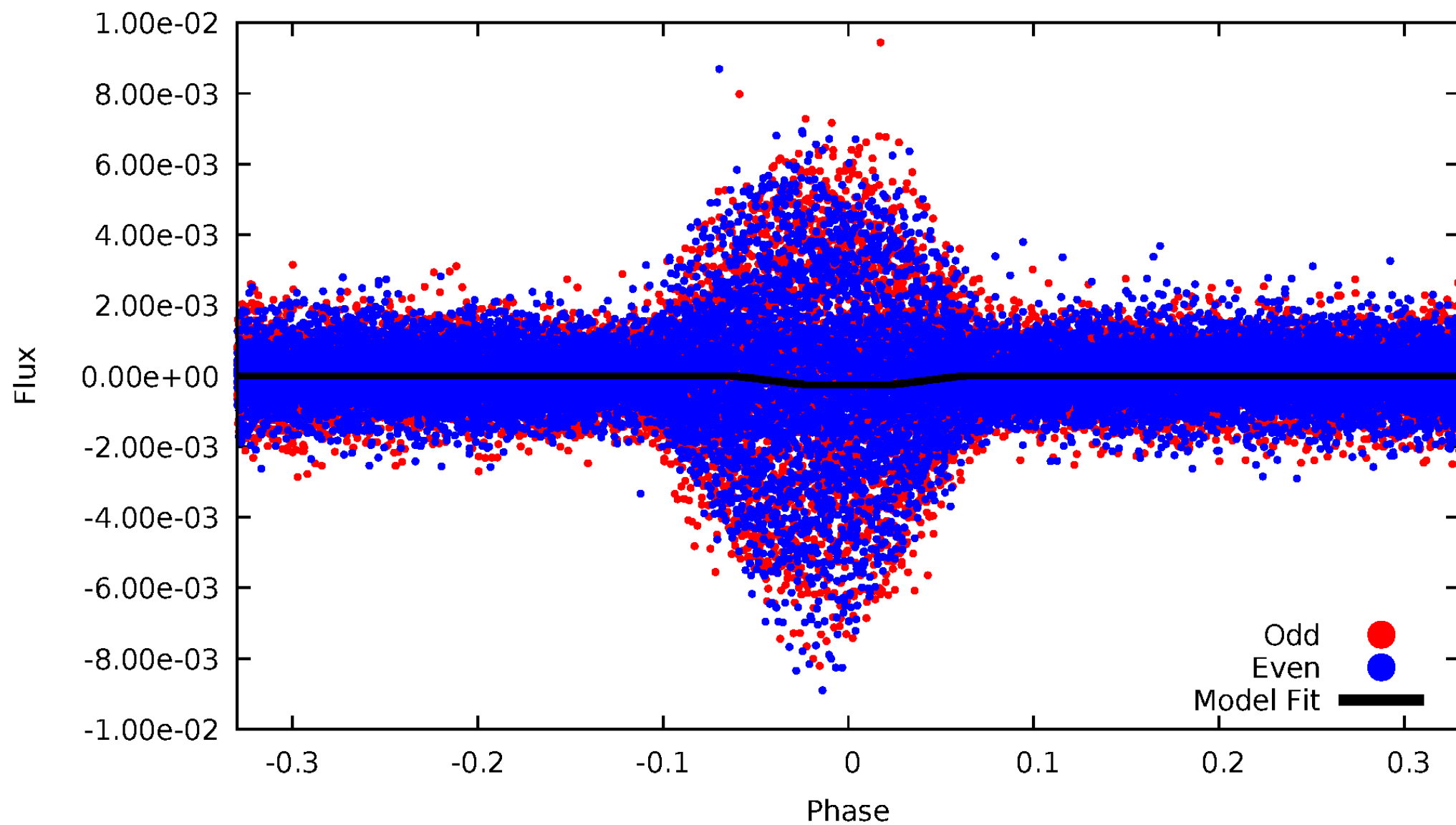
# DV Odd/Even

TCE 005372310-01

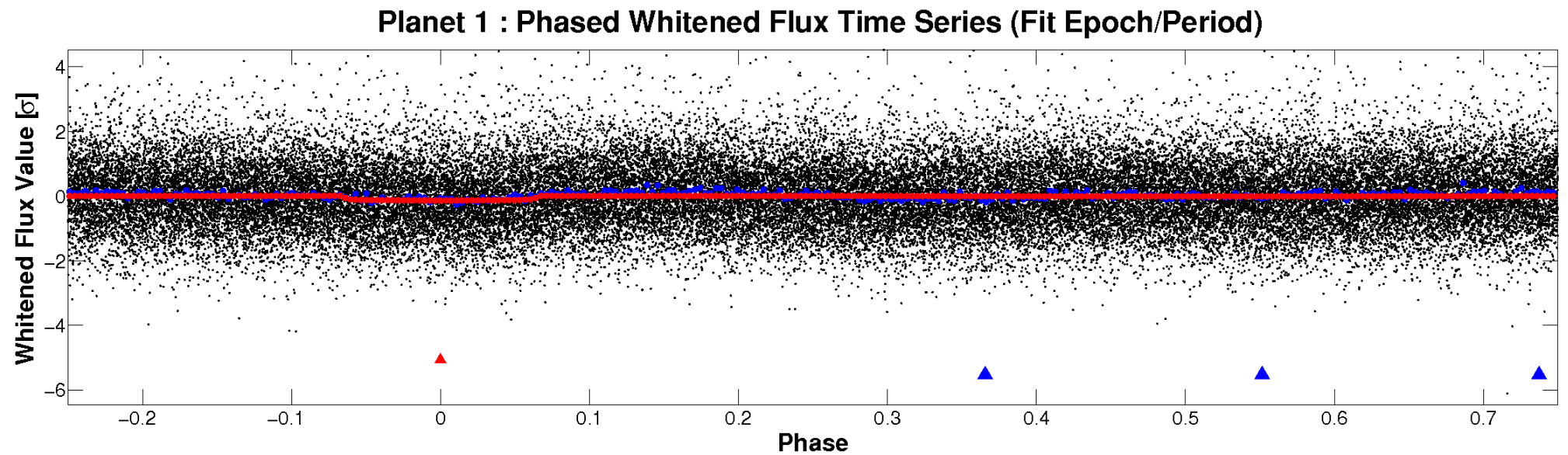
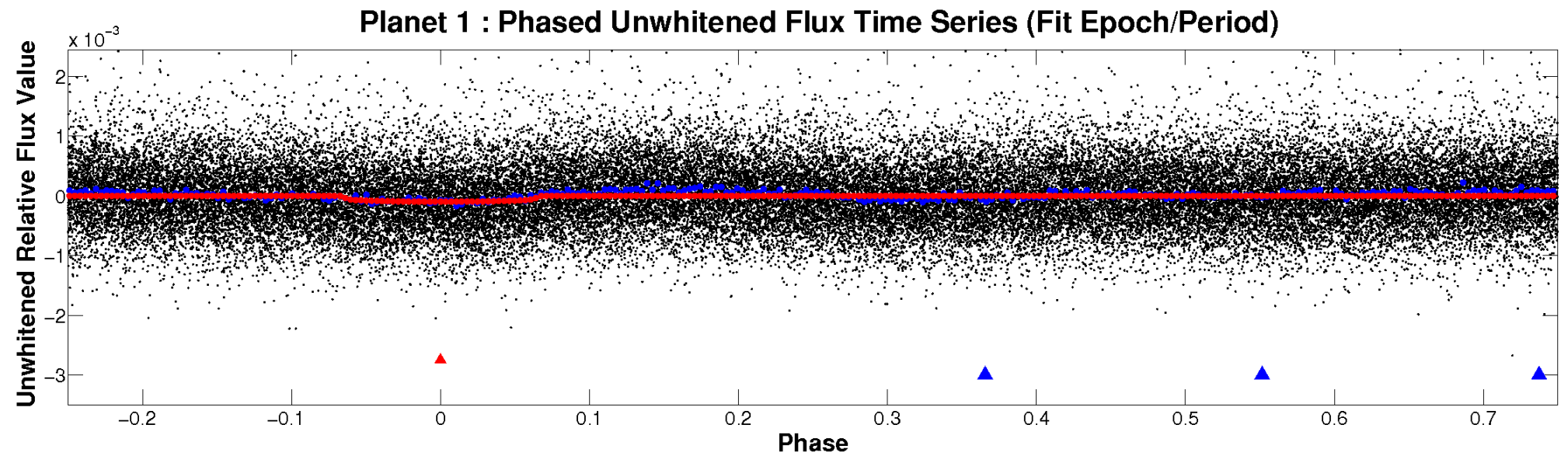


# ALT Odd/Even

TCE 005372310-01

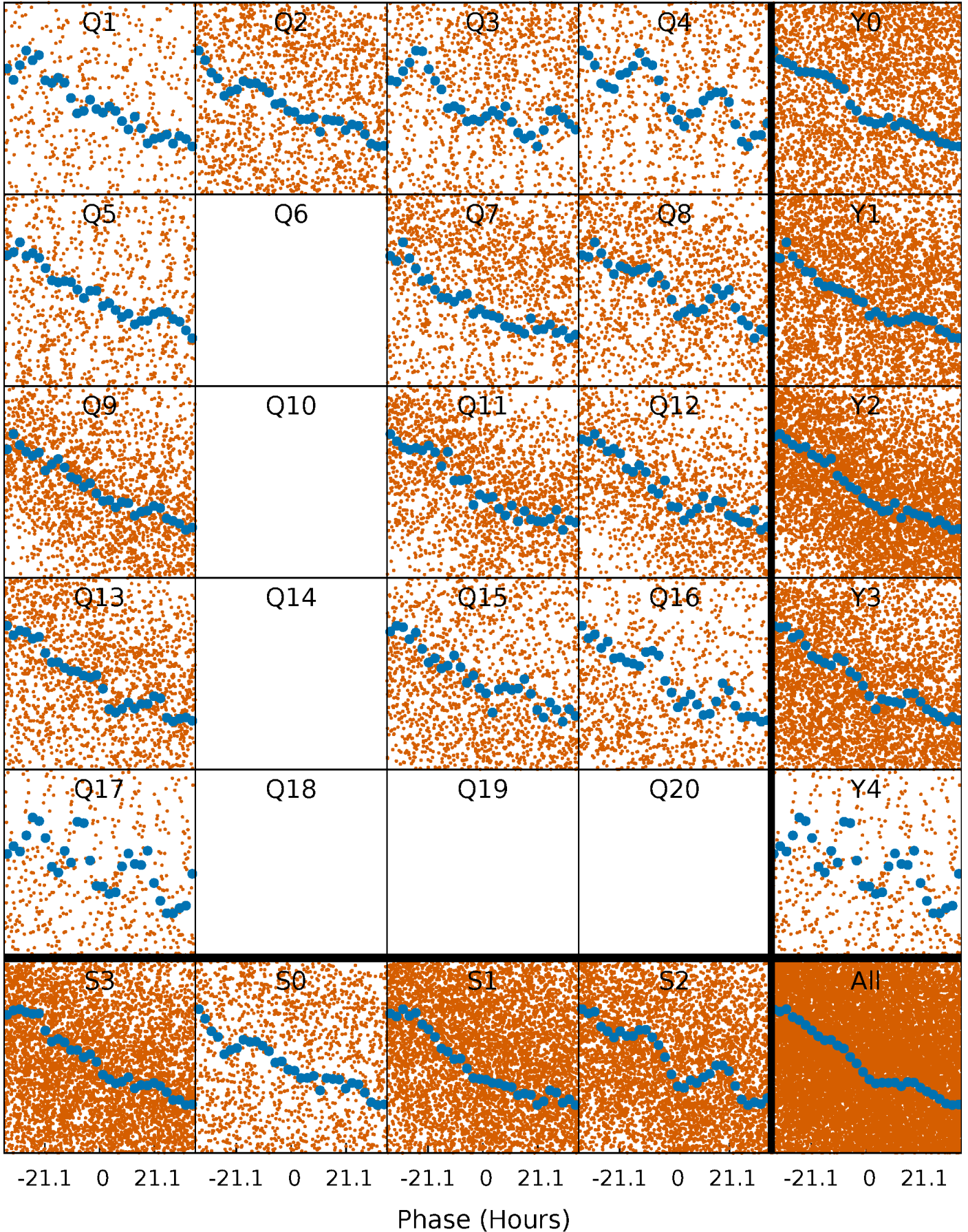


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

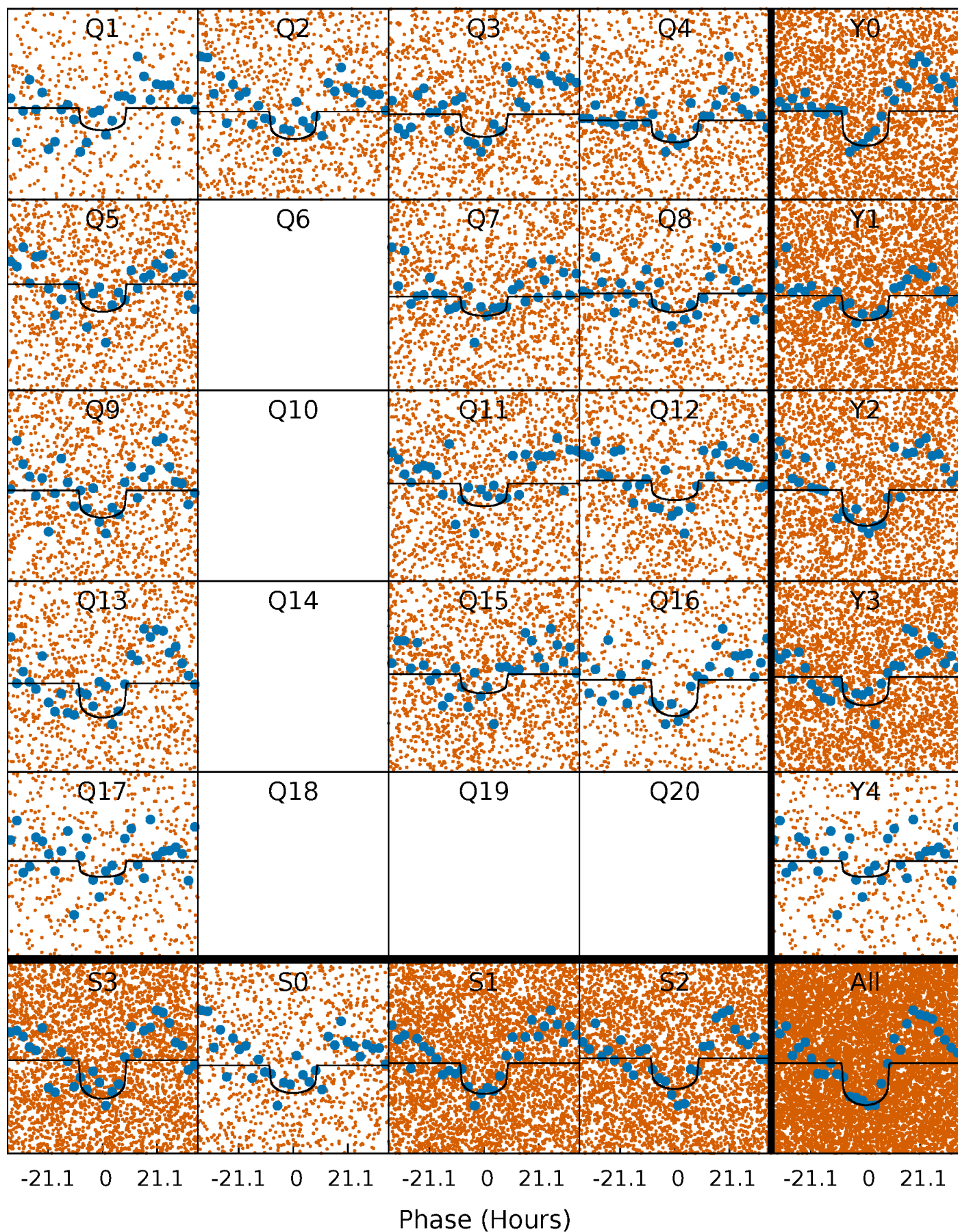
TCE 005372310-01 P= 5.745287 Days  $T_0=134.428563$  (BKJD)





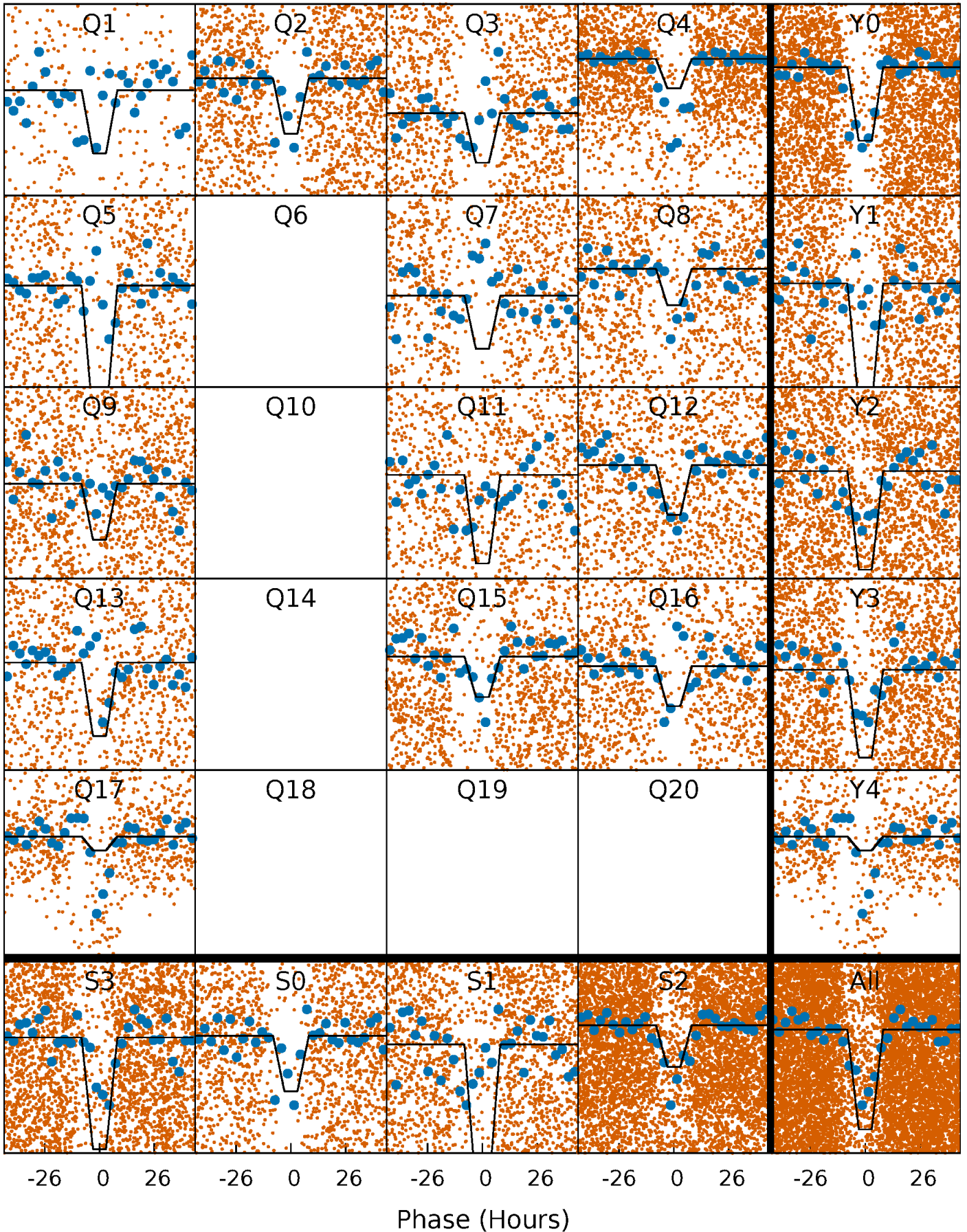
# DV Quarter-Phased Transit Curves

TCE 005372310-01 P= 5.745287 Days  $T_0=134.428563$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 005372310-01 P= 5.745672 Days  $T_0=134.476738$  (BKJD)

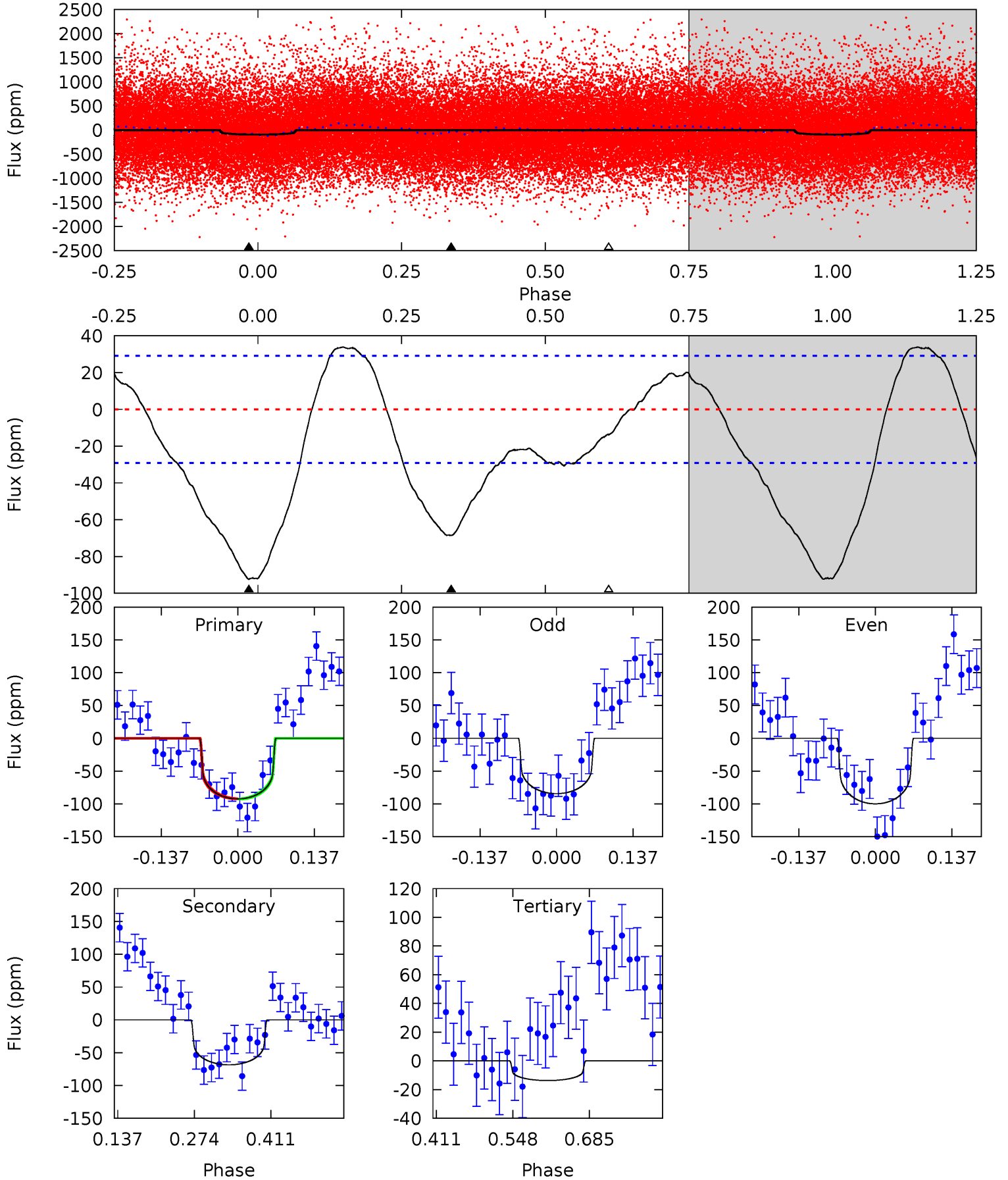




# DV Model-Shift Uniqueness Test

005372310-01, P = 5.745287 Days, E = 128.683276 Days

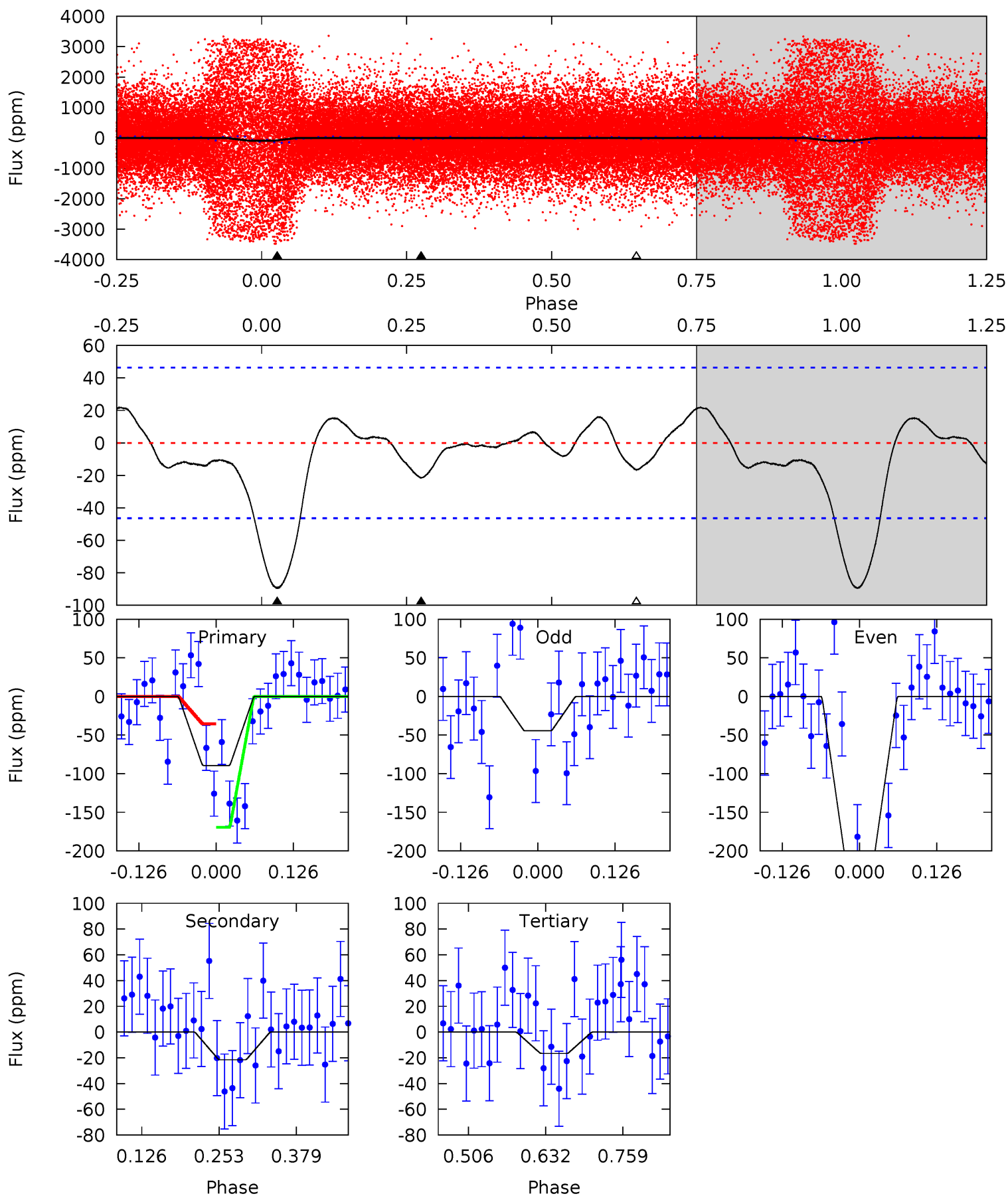
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.3	10.6	2.12	0	4.50	1.49	3.29	12.1	14.3	8.46	10.6	1.21	0.94	0.27	0.04



# Alt Model-Shift Uniqueness Test

005372310-01, P = 5.745672 Days, E = 128.731066 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.70	2.09	1.62	0	4.52	1.53	1.06	7.08	8.70	0.48	2.09	8.33	13.8	0.20	6.42





### Stellar Parameters For KIC 005372310

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5555^{+194}_{-175}$	$4.500^{+0.096}_{-0.132}$	$-0.420^{+0.300}_{-0.300}$	$0.819^{+0.171}_{-0.105}$	$0.774^{+0.106}_{-0.062}$	$1.986^{+0.882}_{-0.765}$
	+3%/-3%	+2%/-3%	+71%/-71%	+21%/-13%	+14%/-8%	+44%/-39%
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 005372310-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-68 \pm 6$	$0.92^{+0.26}_{-0.25}$	$1302^{+75}_{-70}$	$5097^{+784}_{-515}$	$149^{+133}_{-59}$
Alt.	$-21 \pm 10$	$1.45^{+0.26}_{-0.25}$	$1298^{+79}_{-64}$	$3444^{+319}_{-357}$	$18^{+13}_{-9}$

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

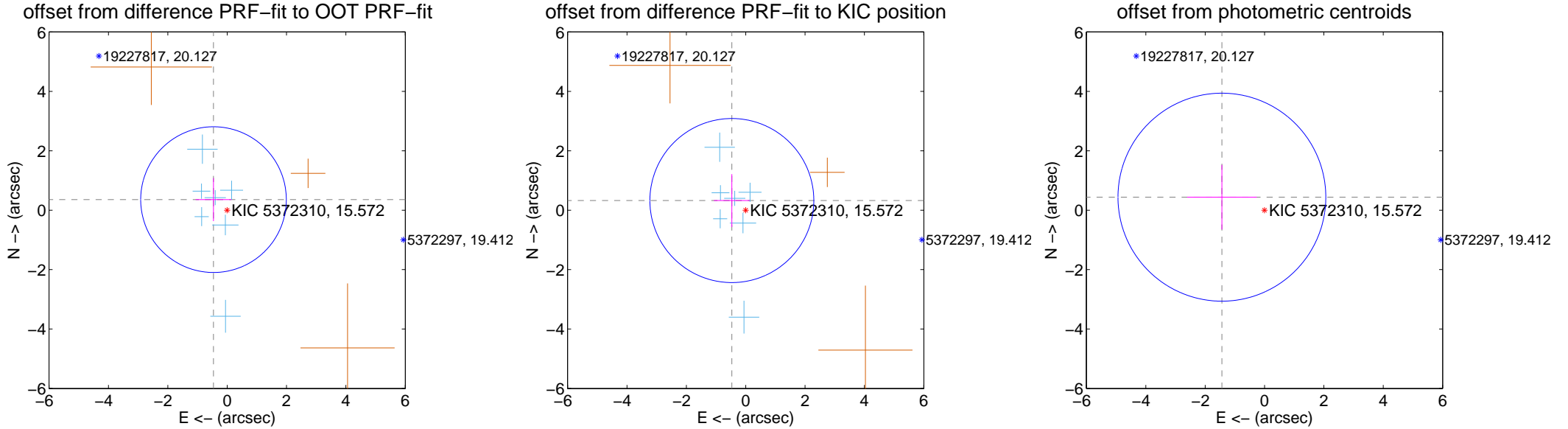
## DV Centroid Data

Supplemental centroid analysis for 005372310-01. Kepler magnitude: 15.57. Transit SNR 9.88

There are 7 quarters with good PRF difference image offsets

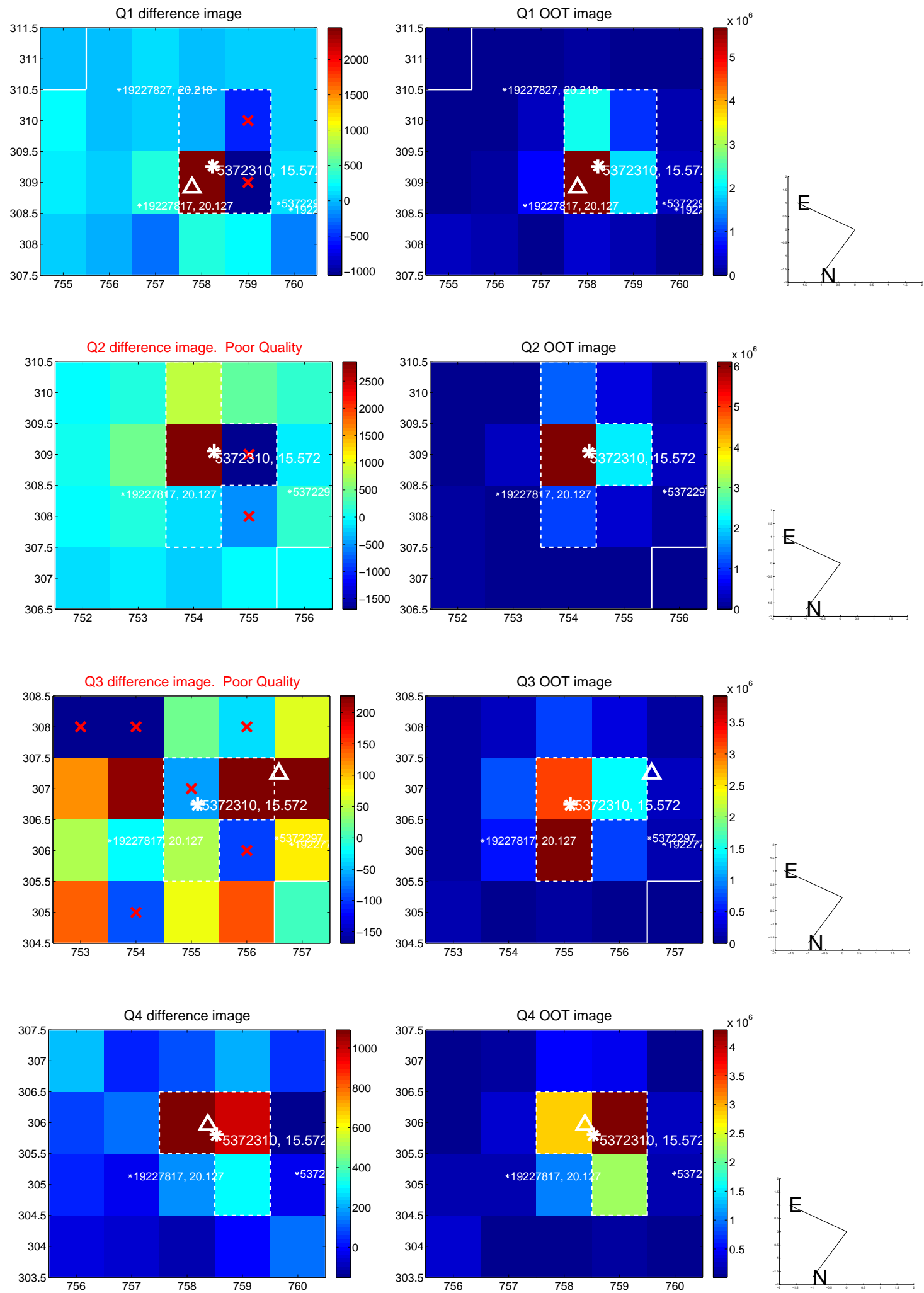
The direct PRF centroid is offset from the target star catalog position by about 0.04 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.582 \pm 0.818$	0.71	$0.460 \pm 0.601$	$0.356 \pm 0.725$
PRF-fit source offset from KIC position	$0.569 \pm 0.920$	0.62	$0.467 \pm 0.606$	$0.325 \pm 0.891$
photometric centroid source offset	$1.50 \pm 1.17$	1.29	$1.44 \pm 1.17$	$0.44 \pm 1.09$

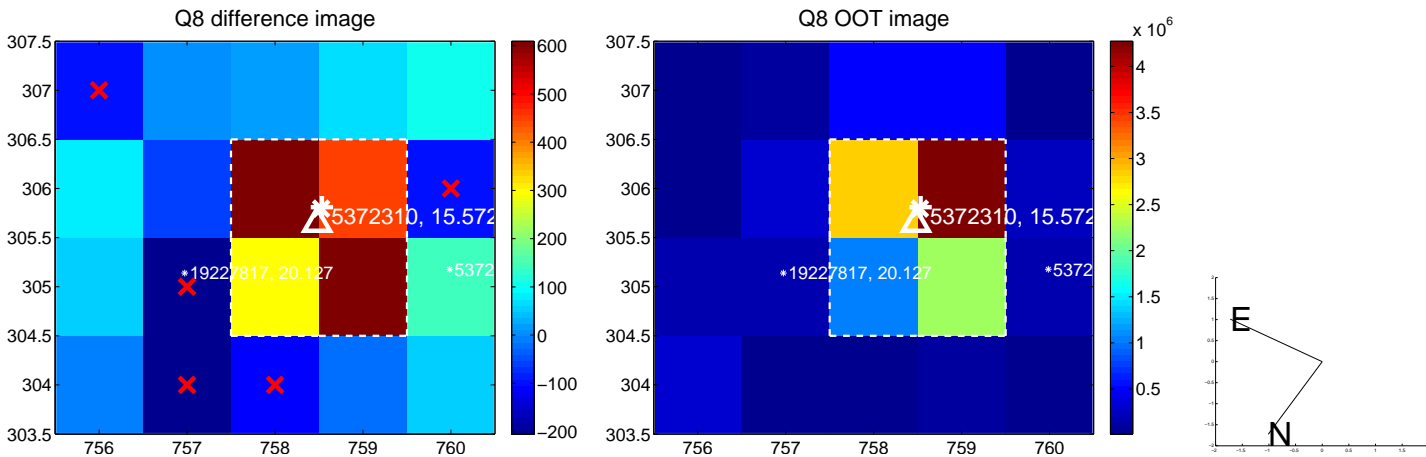
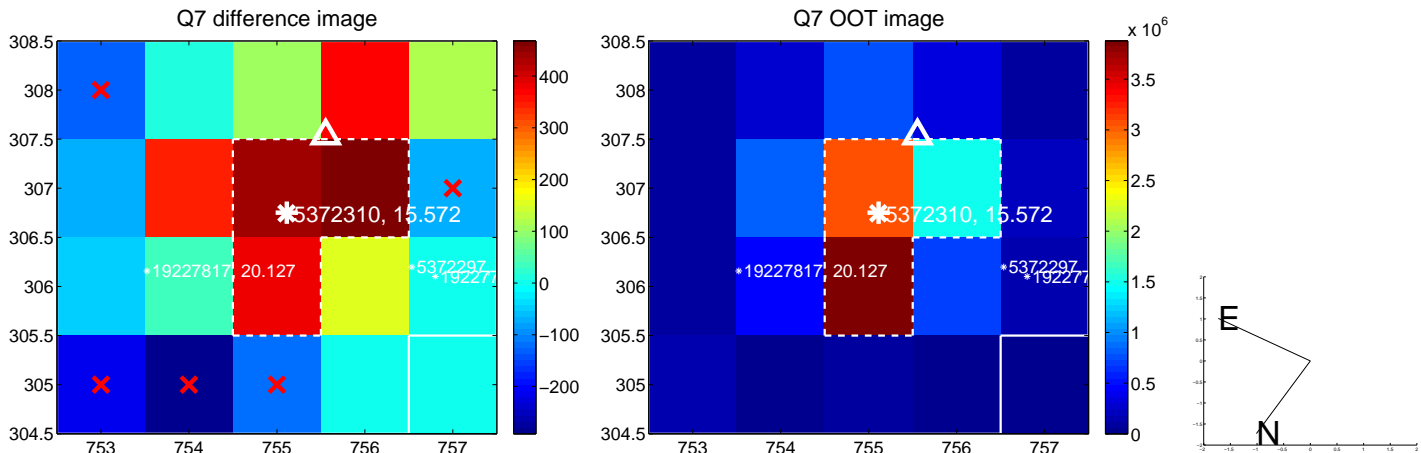
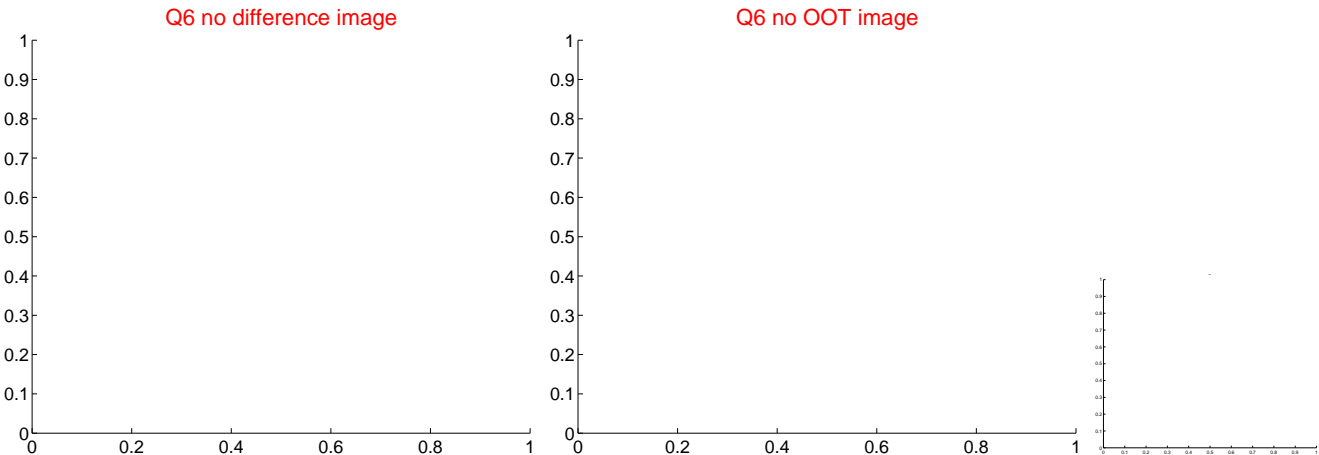
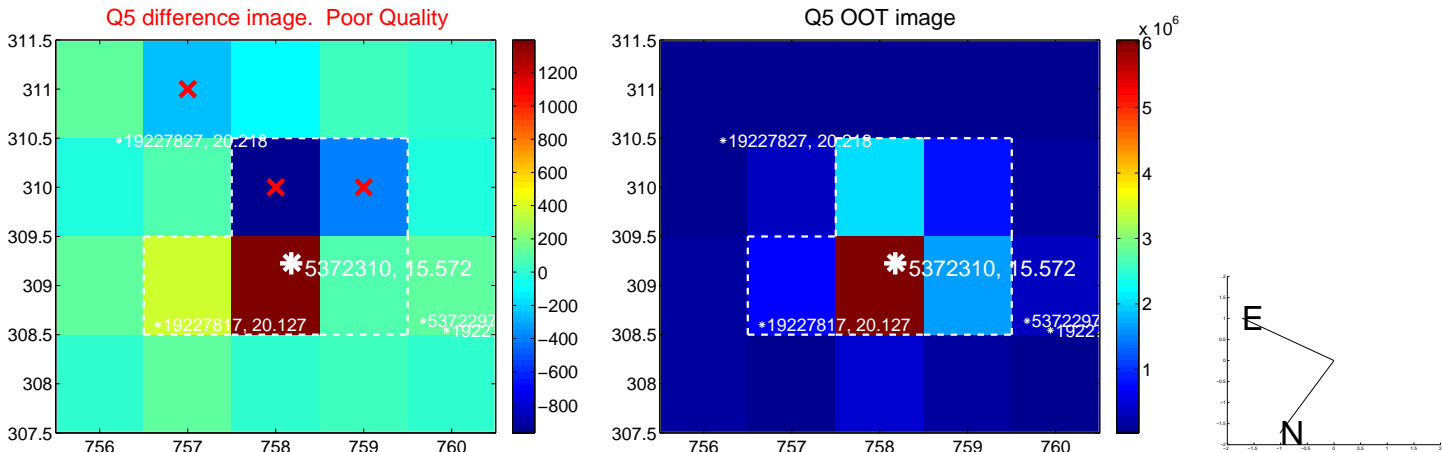


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

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

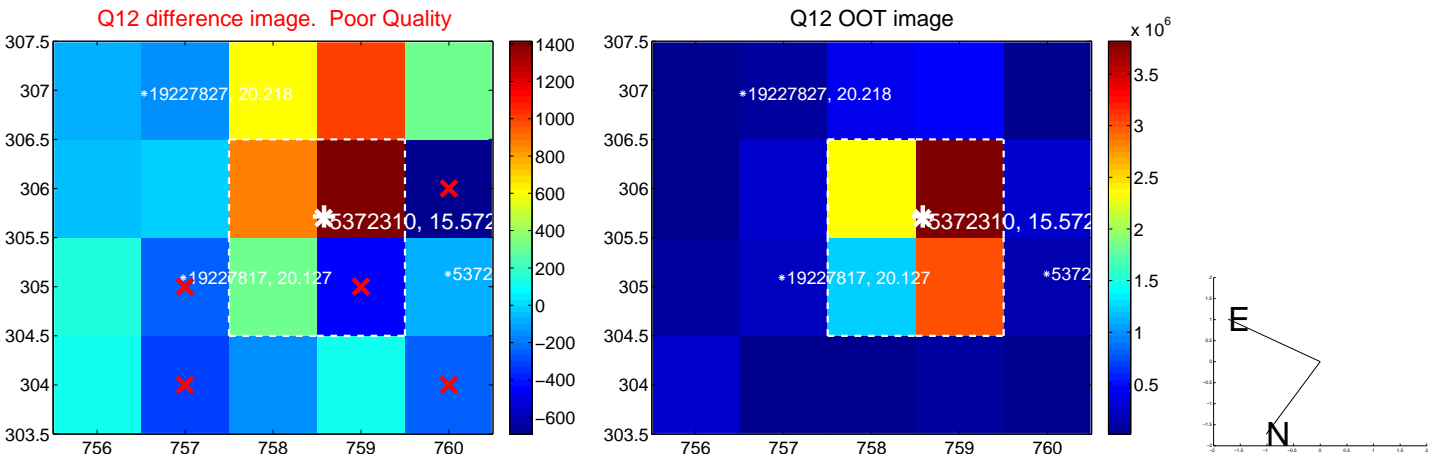
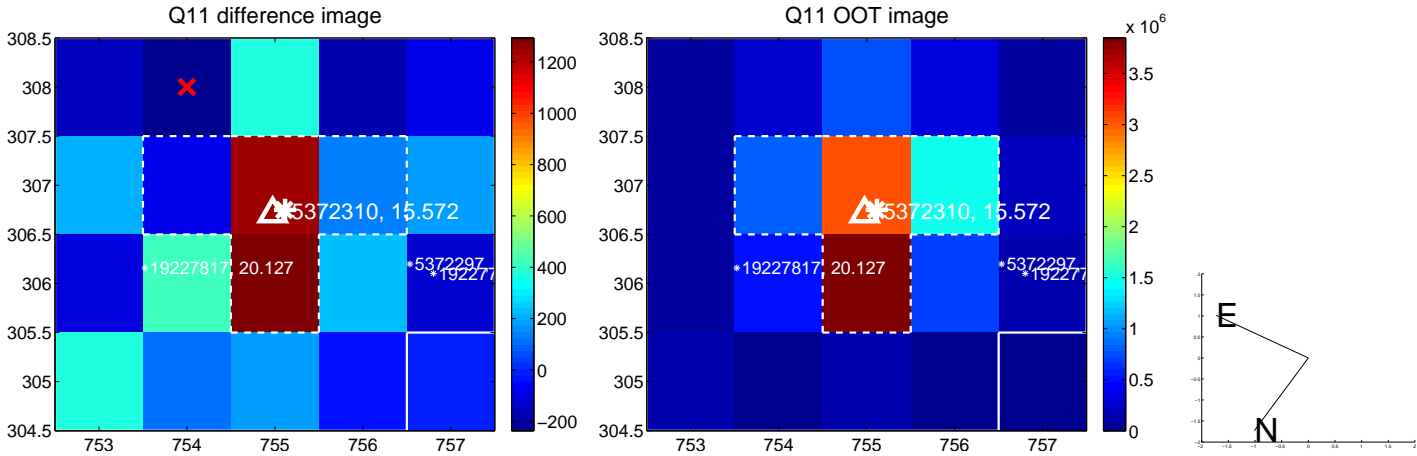
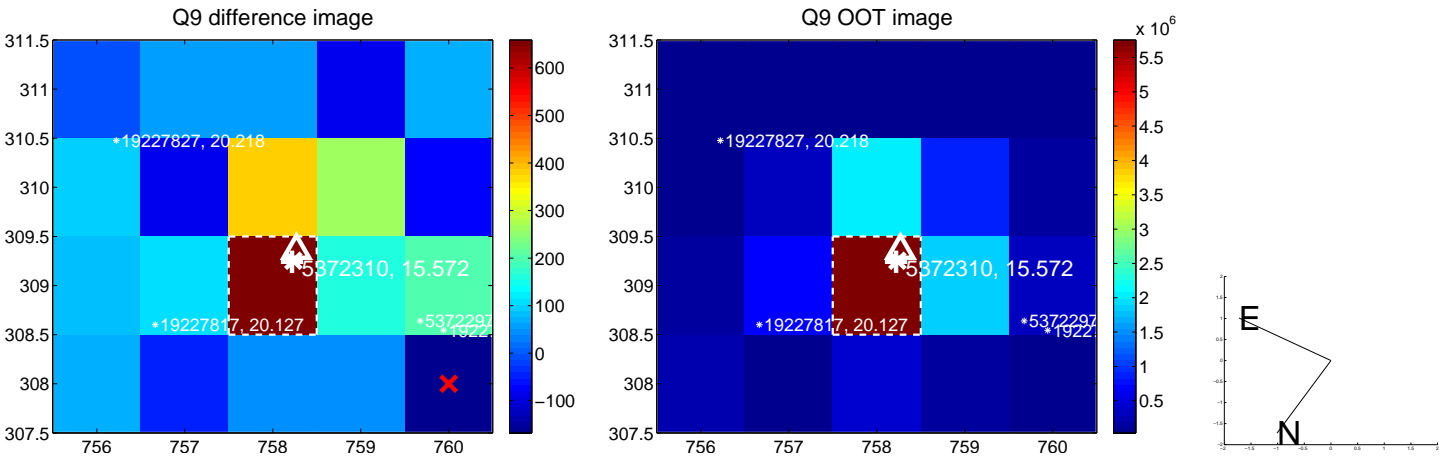


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

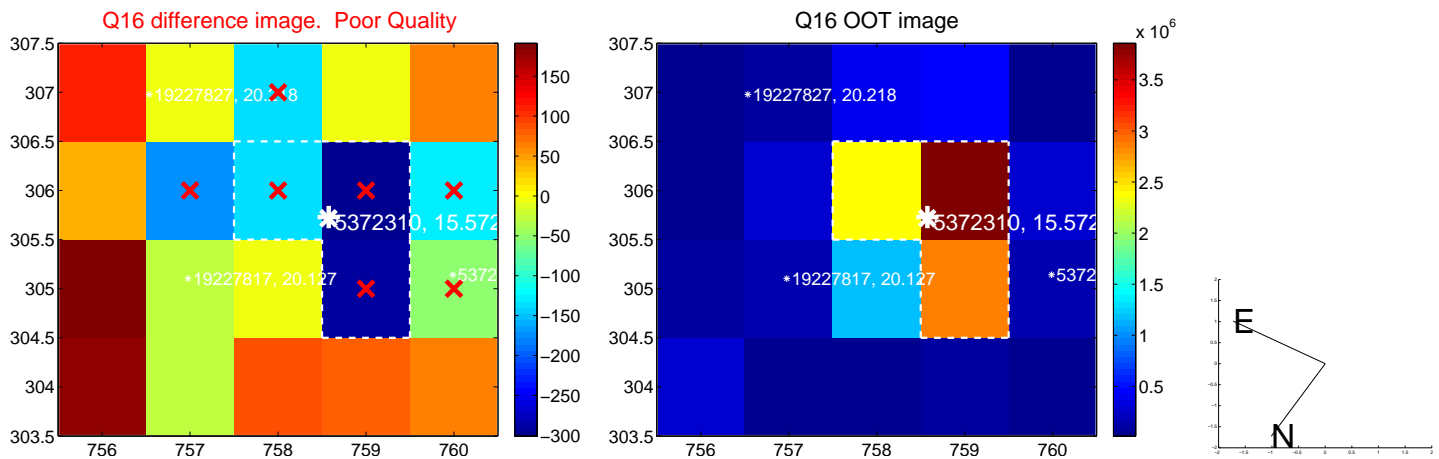
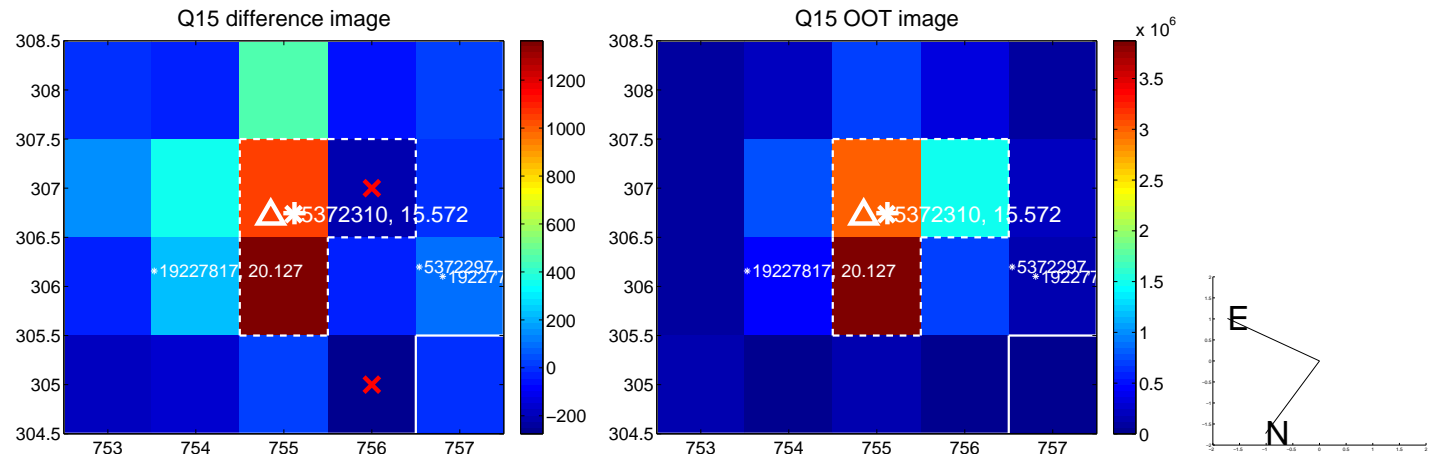
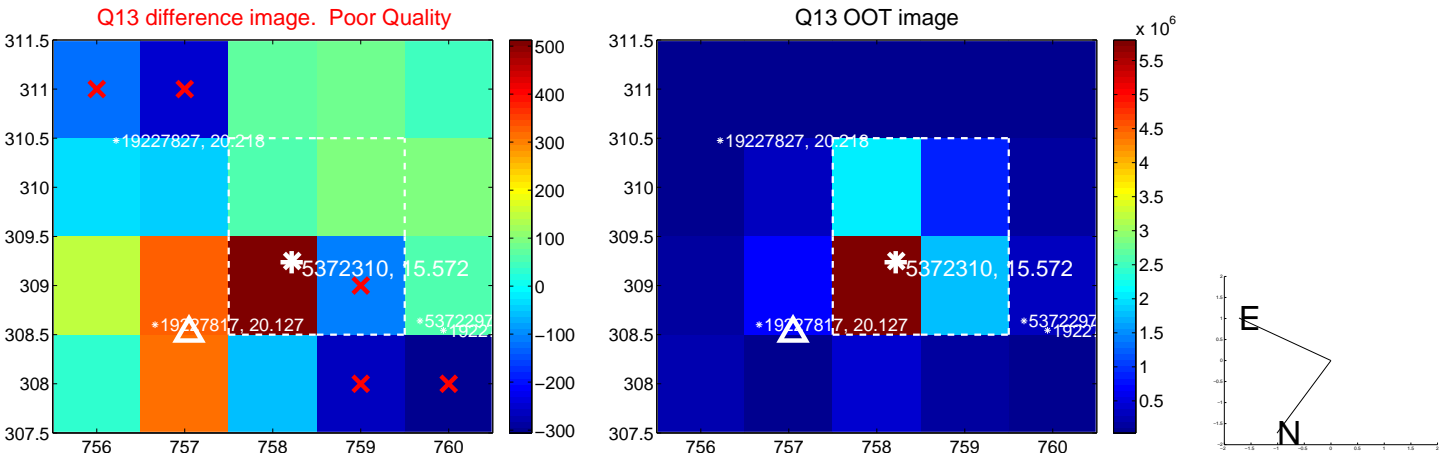




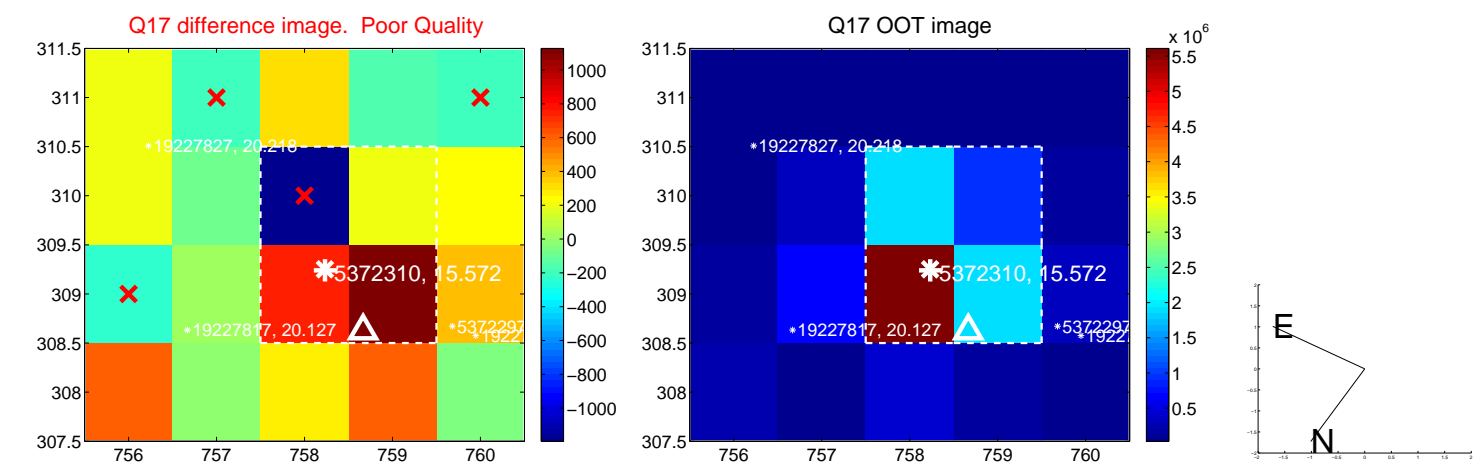
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



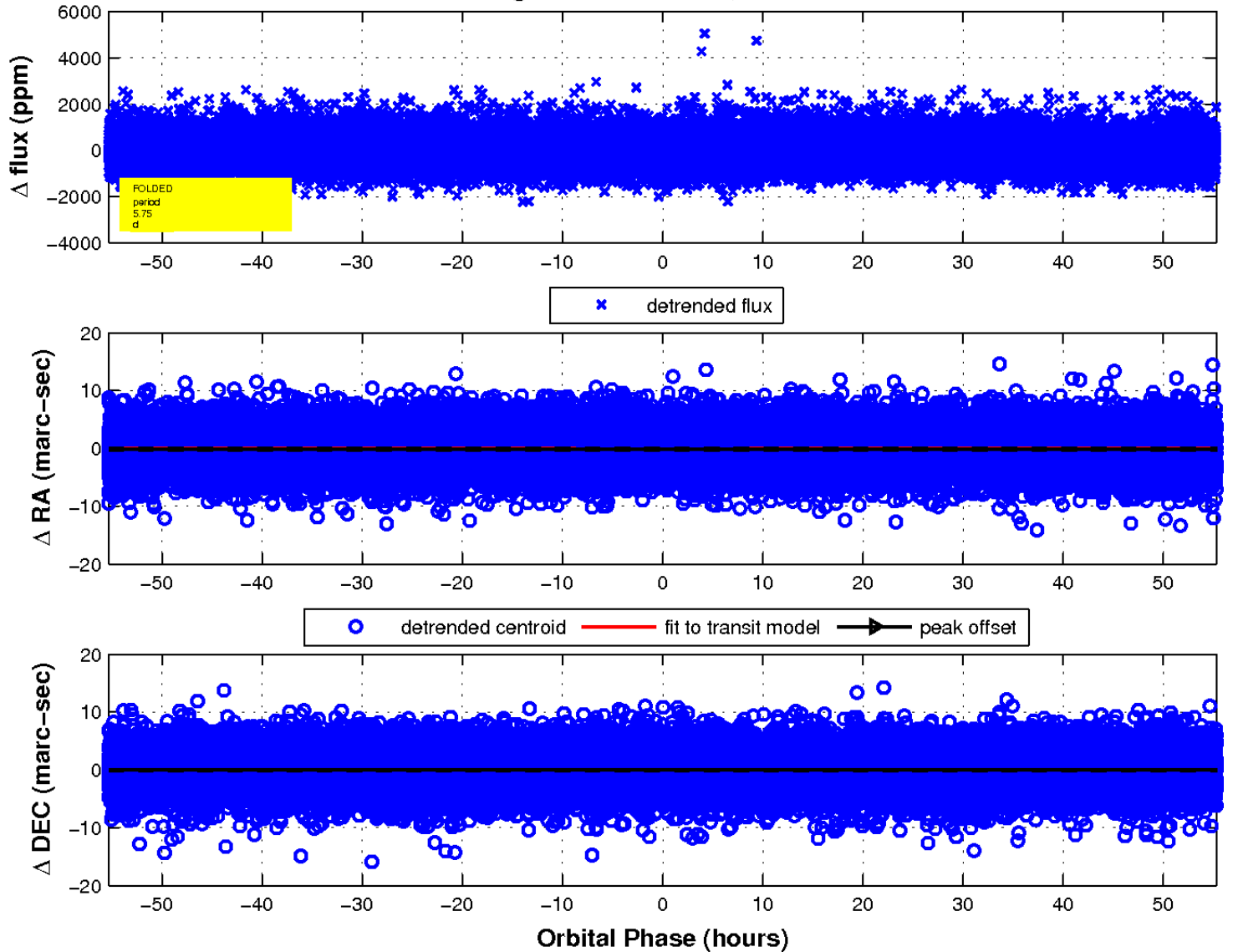
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

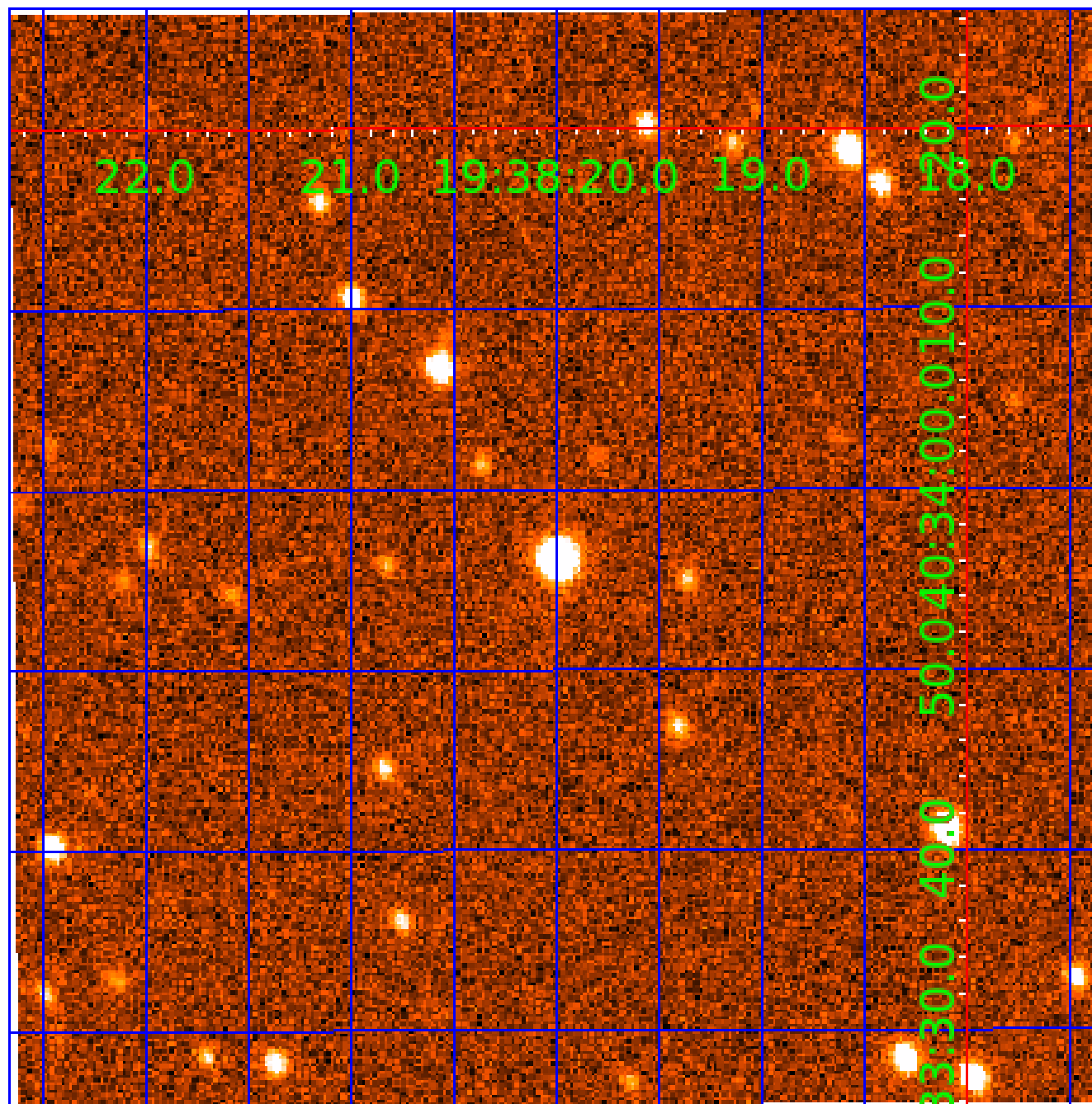


fluxWeightedCentroids, Planet 1 of 2



# UKIRT Image

Declination





# KIC 005372310

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005372310-01	OBS	No	5.745287	134.428563	97.2	18.448	9.3	9.9	0.82	5555	0.90	172.22
005372310-02	OBS	No	420.474047	412.302974	637.7	10.768	9.2	7.0	0.82	5555	2.19	0.56

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005372310-01	OBS	FP	0.00	1	0	0	0	LPP_DV
005372310-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT— 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.

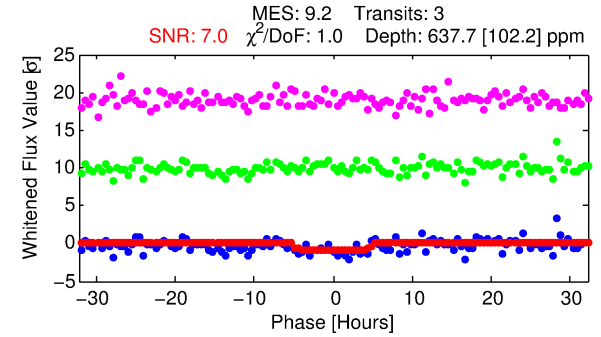
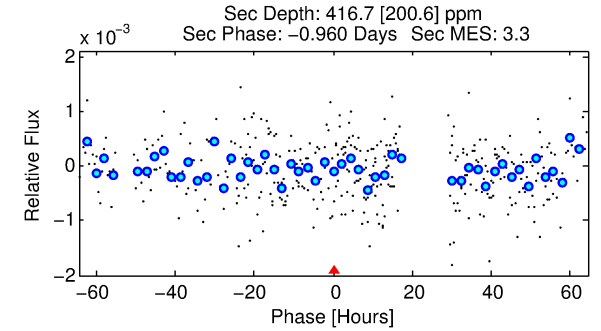
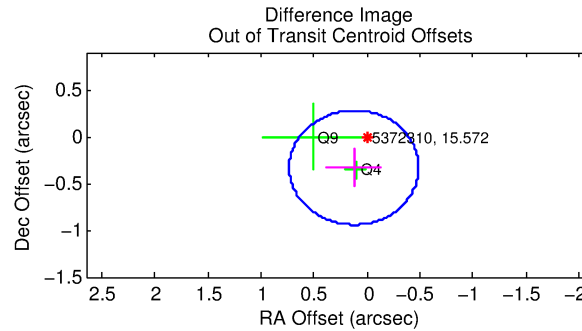
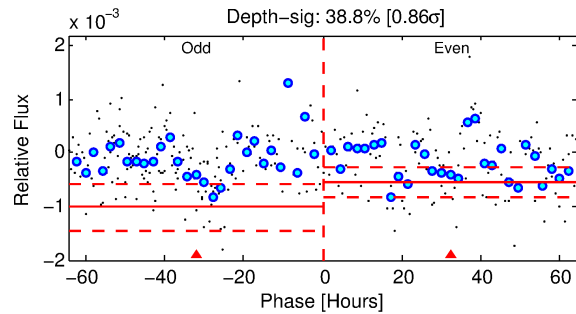
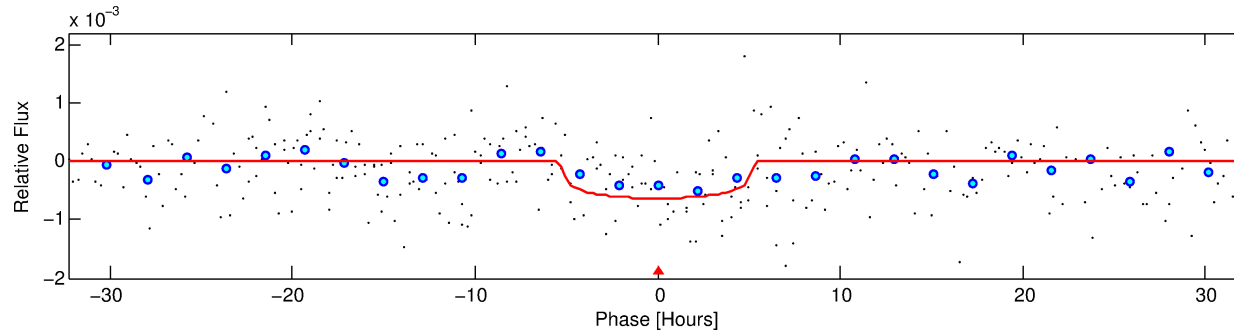
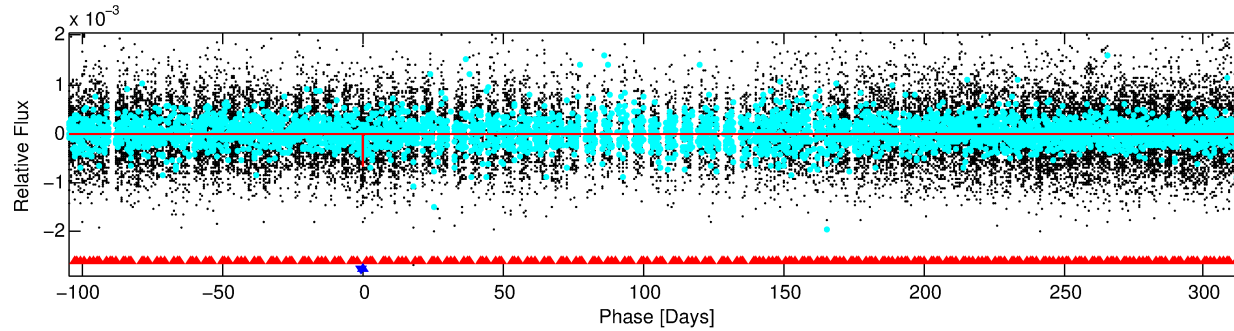
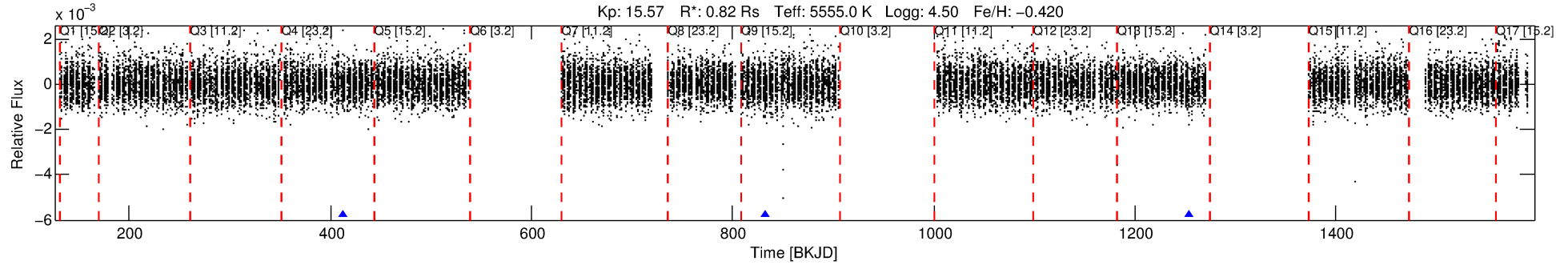
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005372310-02

No Significant Match Found

# DV One-Page Summary

KIC: 5372310 Candidate: 2 of 2 Period: 420.474 d



## DV Fit Results:

Period = 420.47405 [0.01637] d  
Epoch = 412.3030 [0.0212] BKJD  
Rp/R\* = 0.0245 [0.0179]  
a/R\* = 231.38 [735.92]  
b = 0.67 [2.65]  
Seff = 0.56 [0.16]  
Teq = 221 [16] K  
Rp = 2.19 [1.66] Re  
a = 1.0086 [0.1736] AU  
Ag = 48716.55 [75900.22] [0.64 $\sigma$ ]  
Teffp = 5073 [1959] K [2.48 $\sigma$ ]

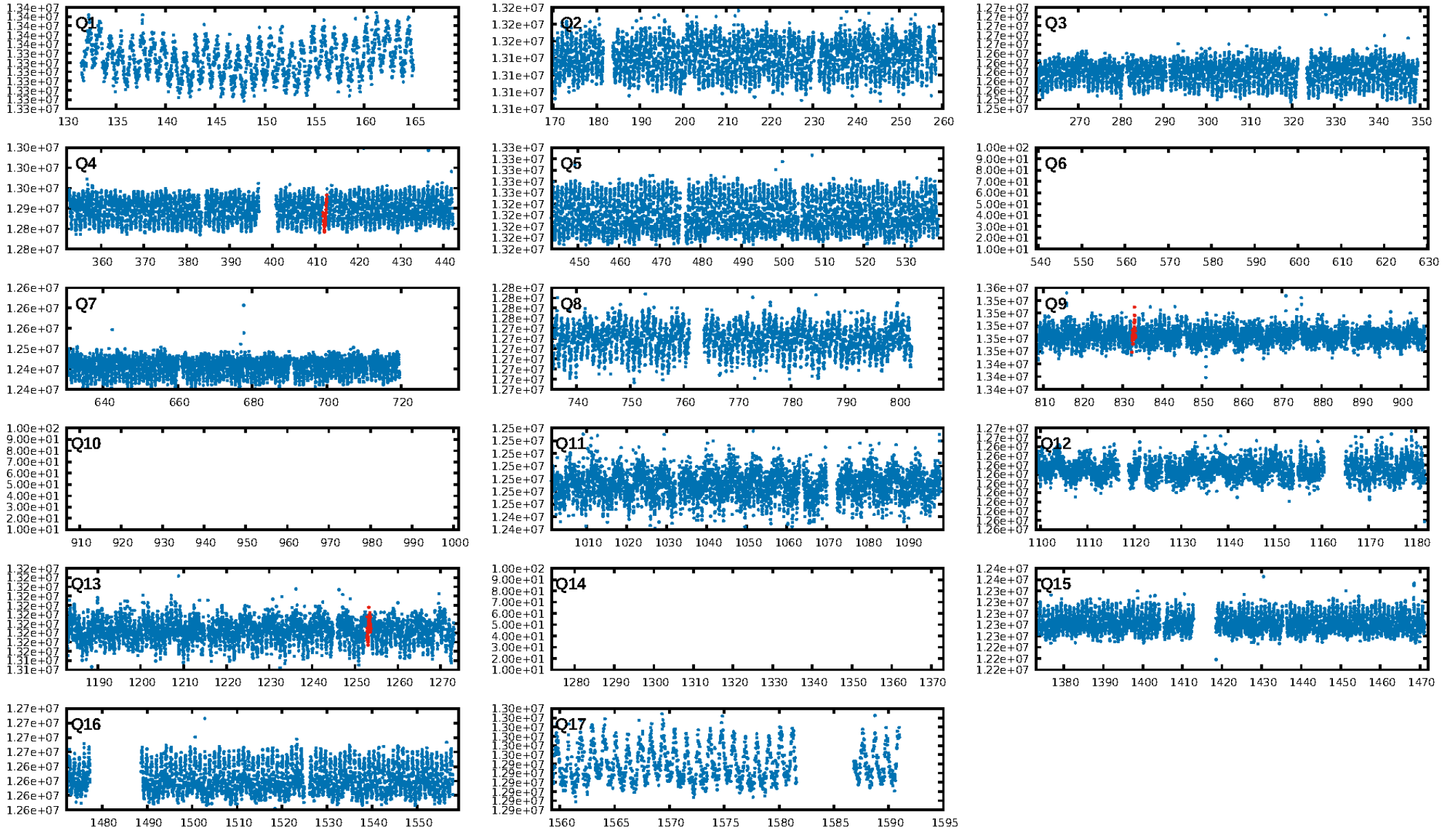
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [465.97 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 1.0%  
ModelChiSquareGof-sig: 99.3%  
Bootstrap-pfa: 3.69e-15  
RollingBand-fgt: 1.00 [3/3]  
**GhostDiagnostic-chr: -1.465**  
Centroid-sig: 76.7%  
Centroid-so: 0.545 arcsec [0.35 $\sigma$ ]  
OotOffset-rm: 0.354 arcsec [1.74 $\sigma$ ]  
OotOffset-st: 0/0/1/1 [2]  
KicOffset-rm: 0.432 arcsec [2.15 $\sigma$ ]  
KicOffset-st: 0/0/1/1 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 1.00 [3/3]

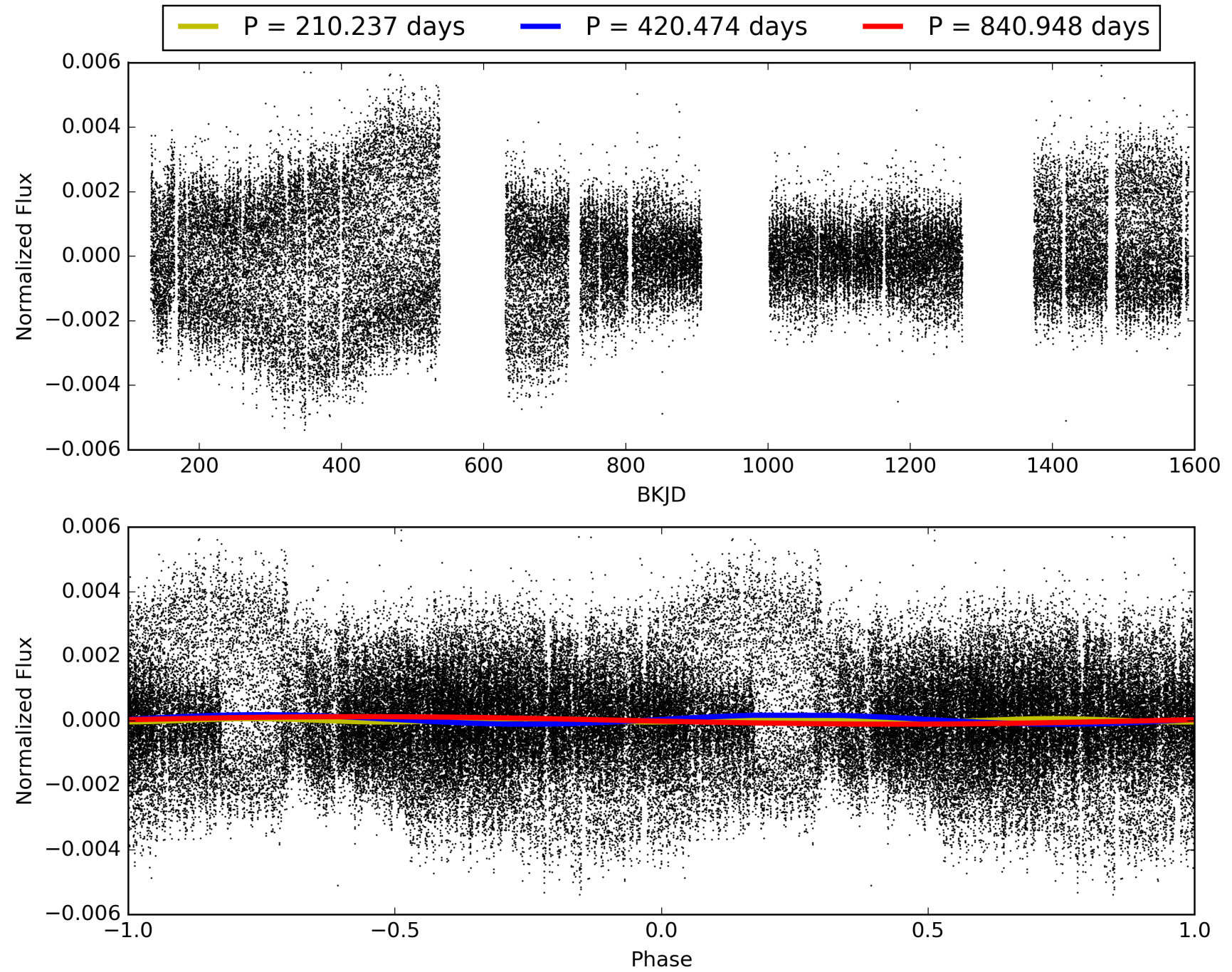
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:59:45 Z

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

# TCE 005372310-02, PDC Light Curves



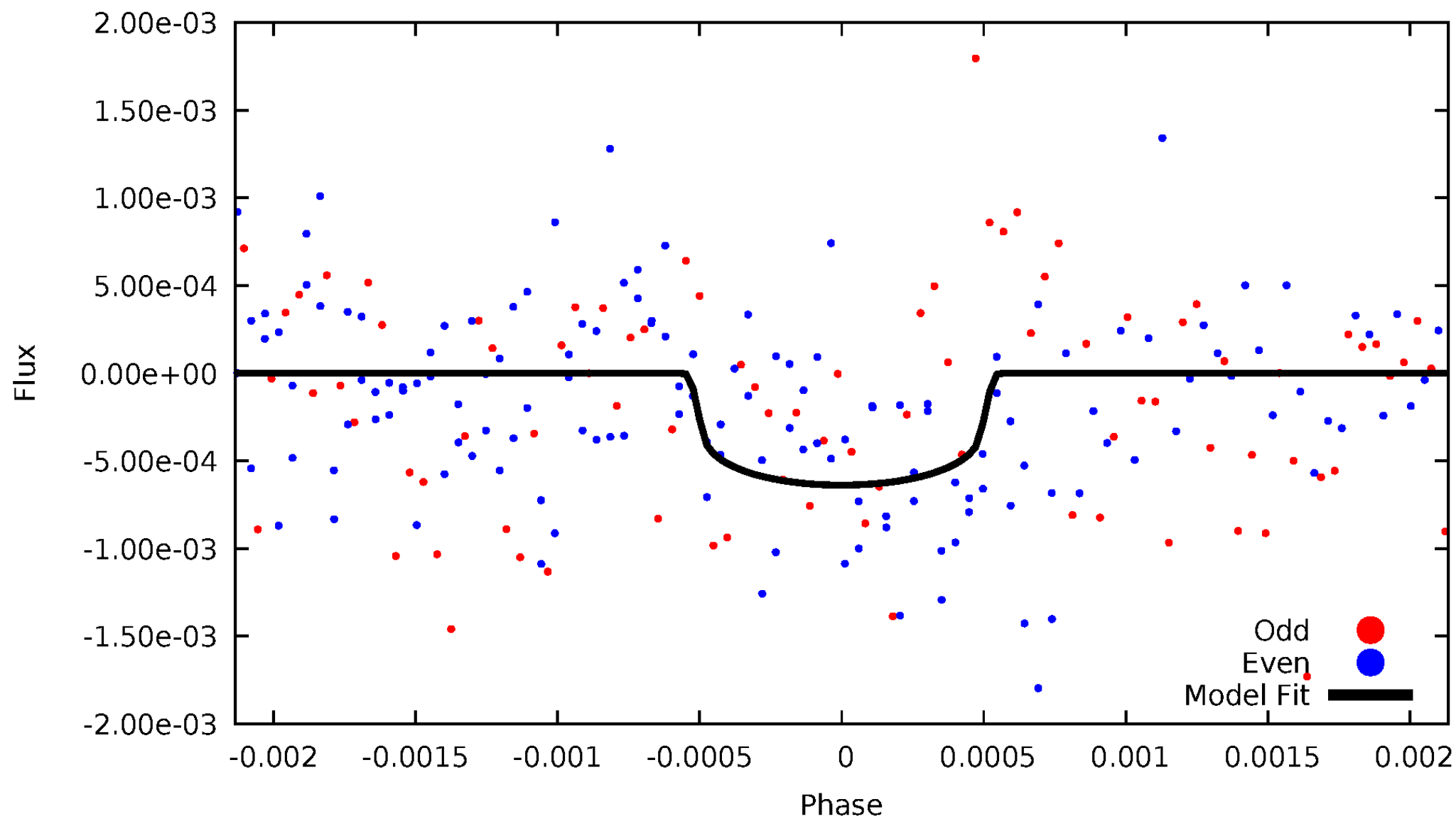
# TCE 005372310-02





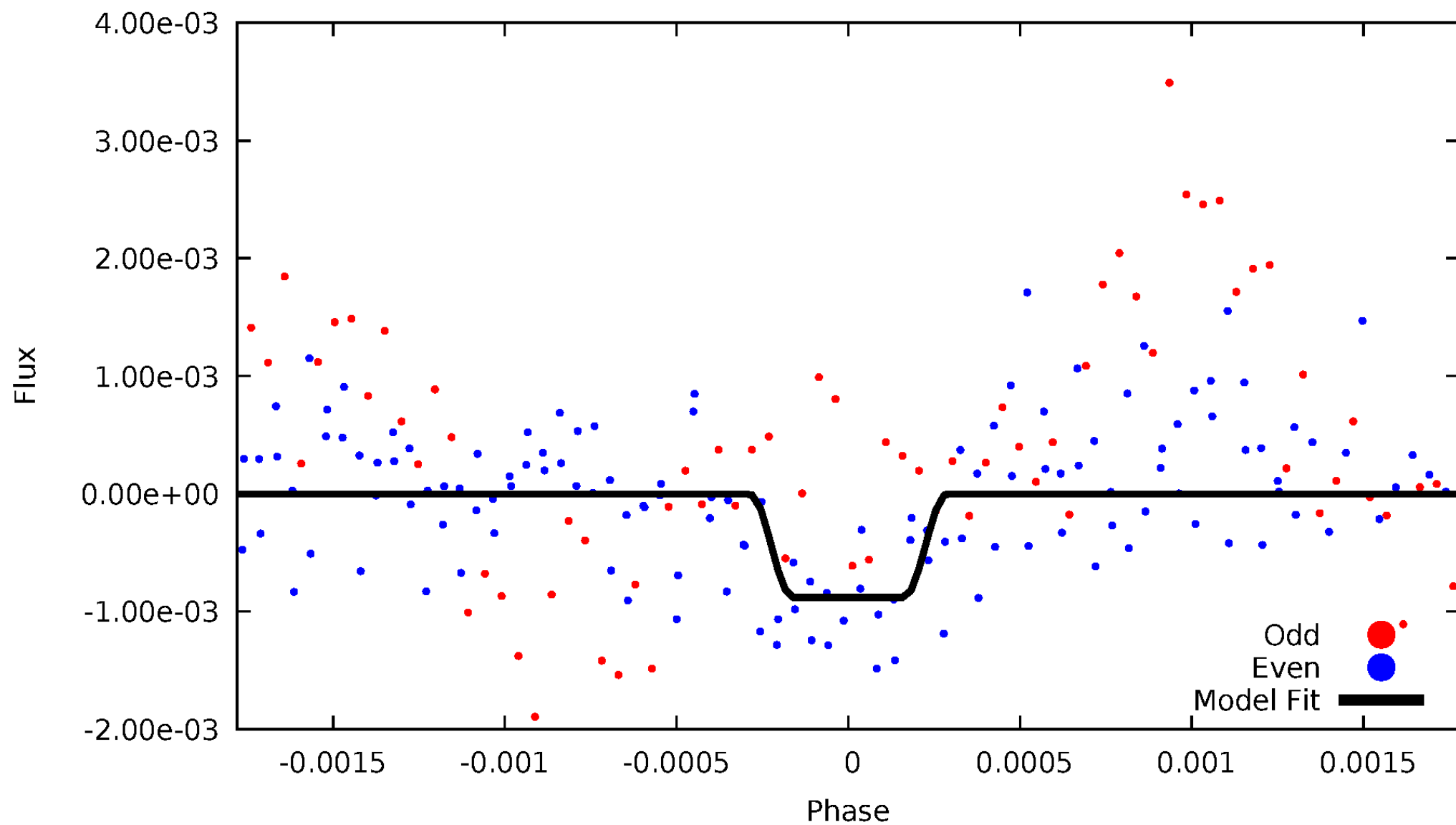
# DV Odd/Even

TCE 005372310-02



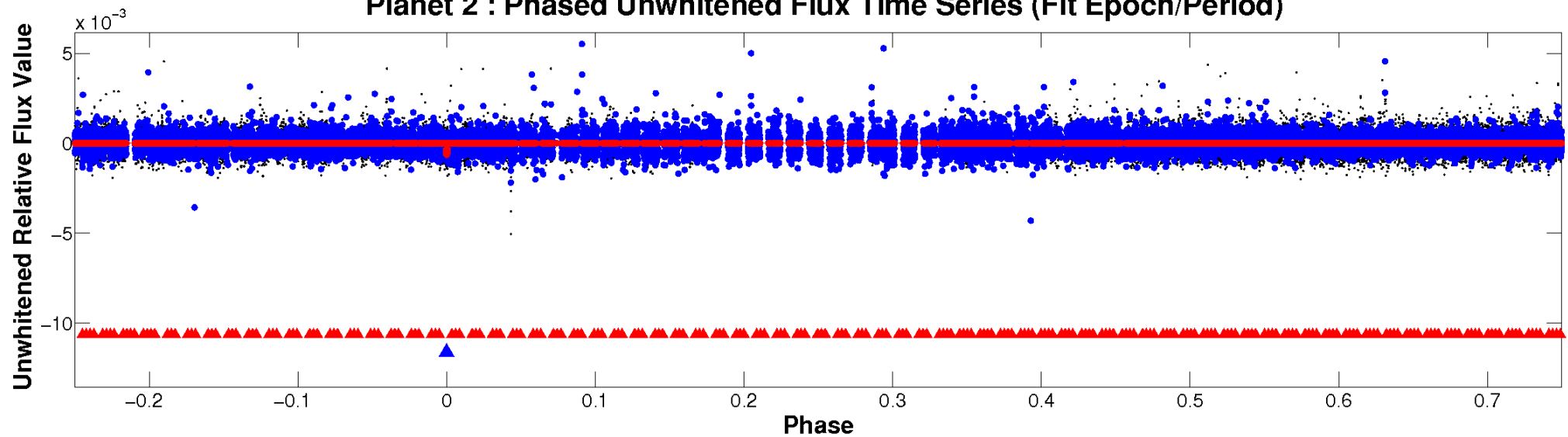
# ALT Odd/Even

TCE 005372310-02

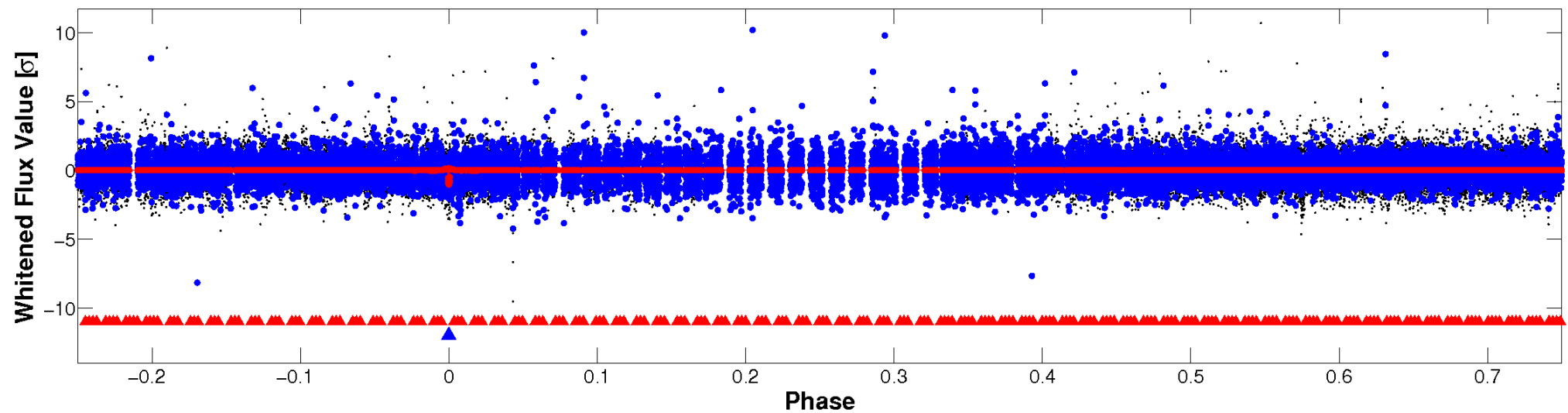


# Non-Whitened Vs. Whitened Light Curve

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

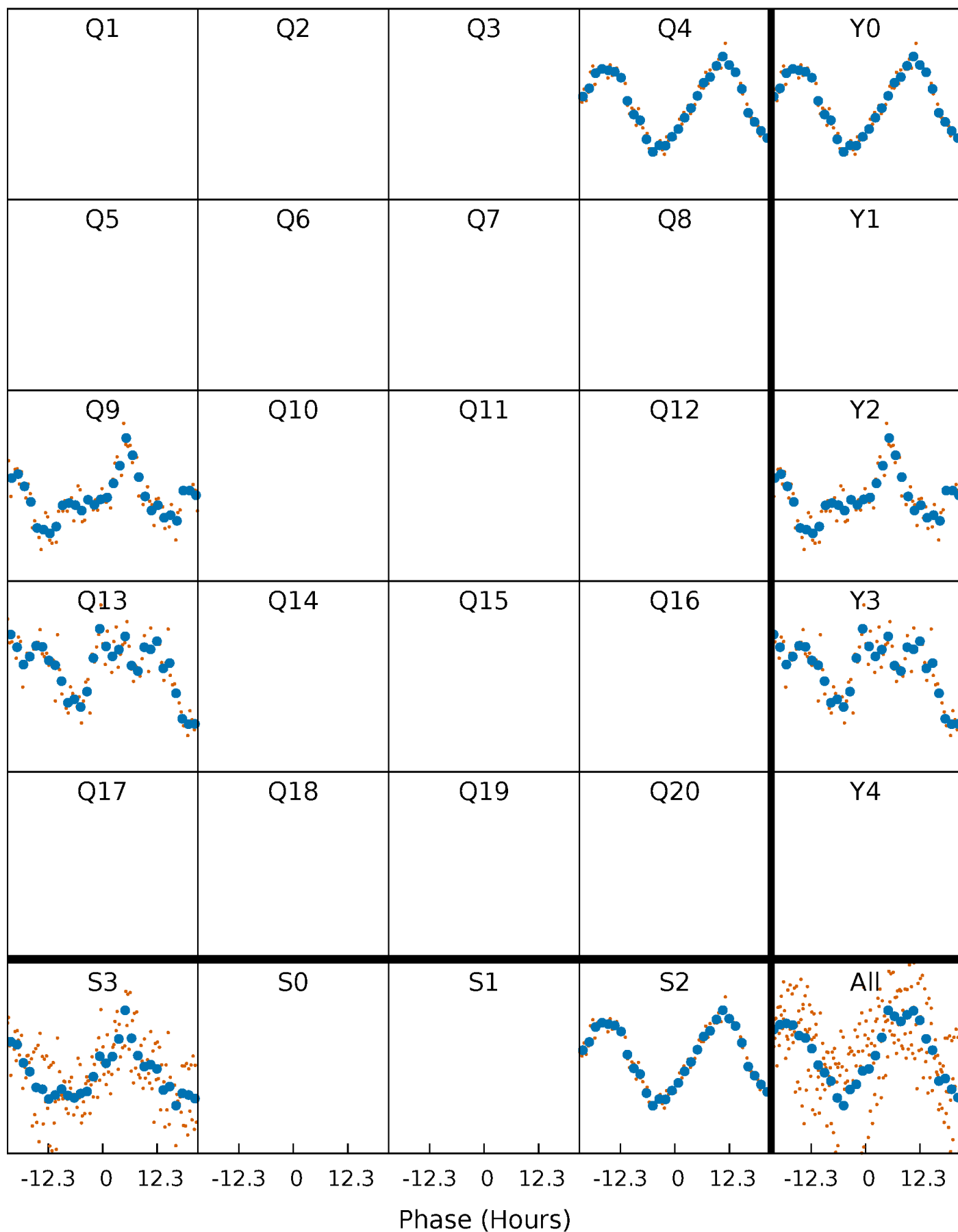


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



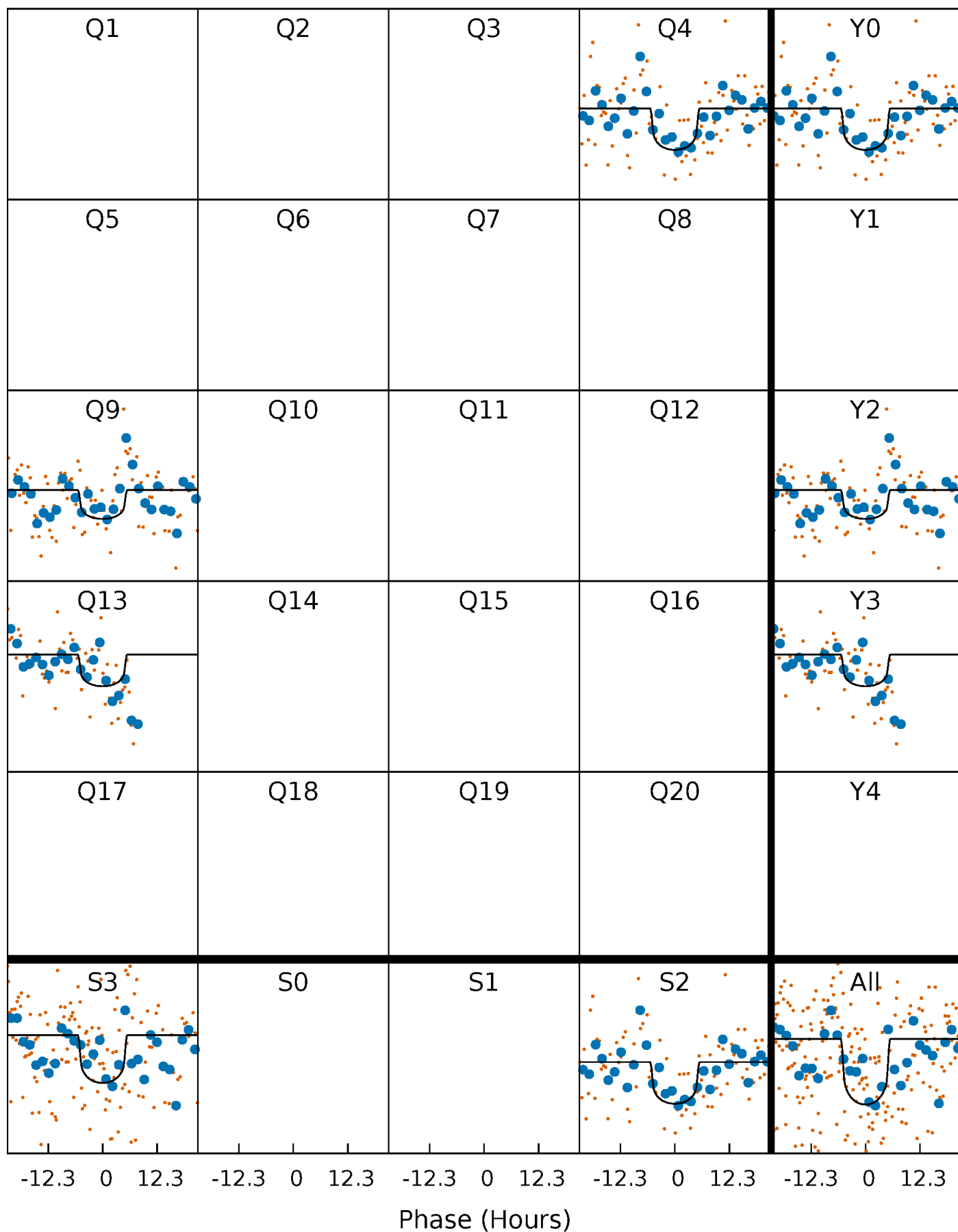
# PDC Quarter-Phased Transit Curves

TCE 005372310-02     $P=420.474047$  Days     $T_0=412.302974$  (BKJD)



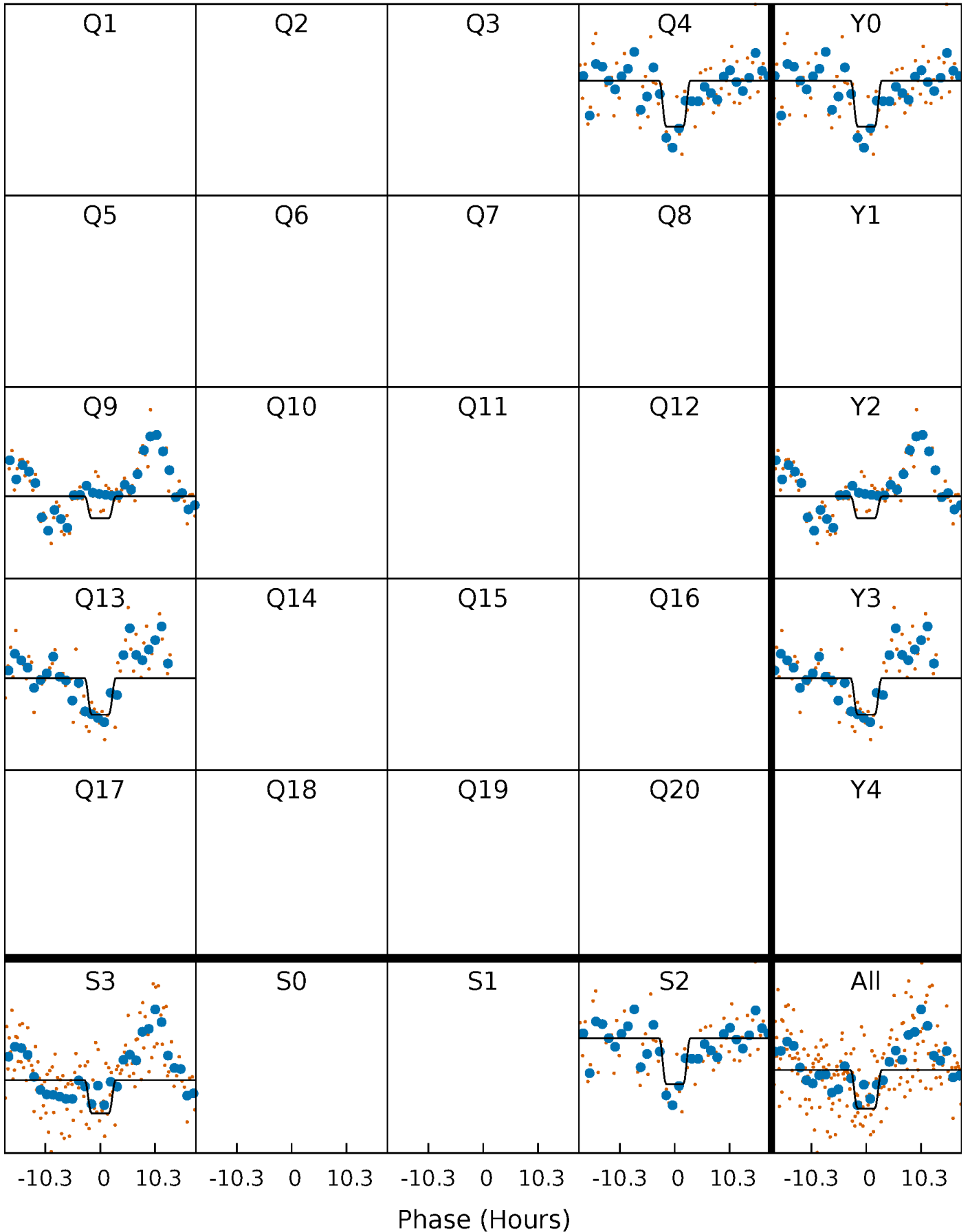
# DV Quarter-Phased Transit Curves

TCE 005372310-02     $P=420.474047$  Days     $T_0=412.302974$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 005372310-02 P=420.434119 Days  $T_0=412.148208$  (BKJD)

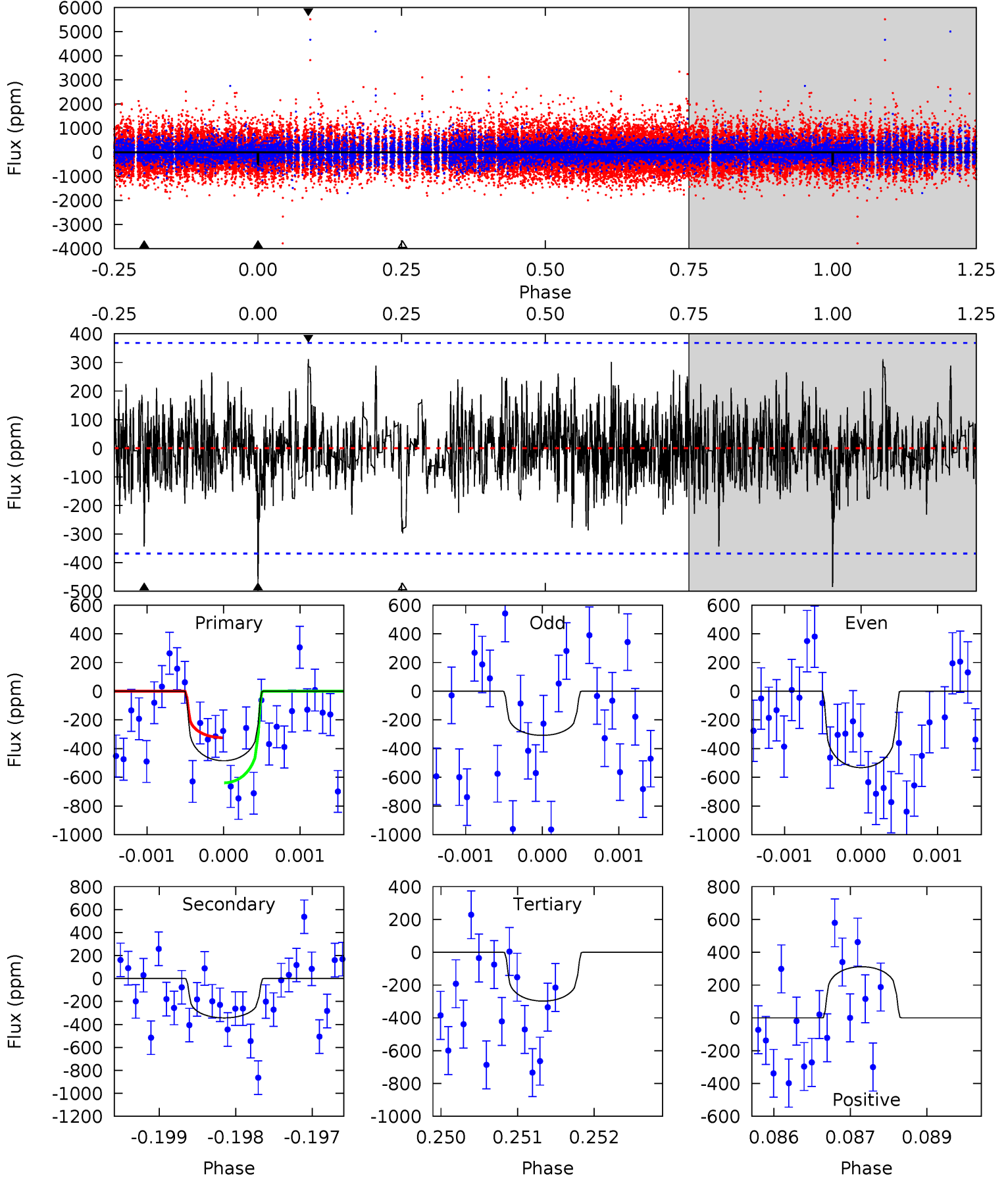




# DV Model-Shift Uniqueness Test

005372310-02, P = 420.474047 Days, E = 412.302974 Days

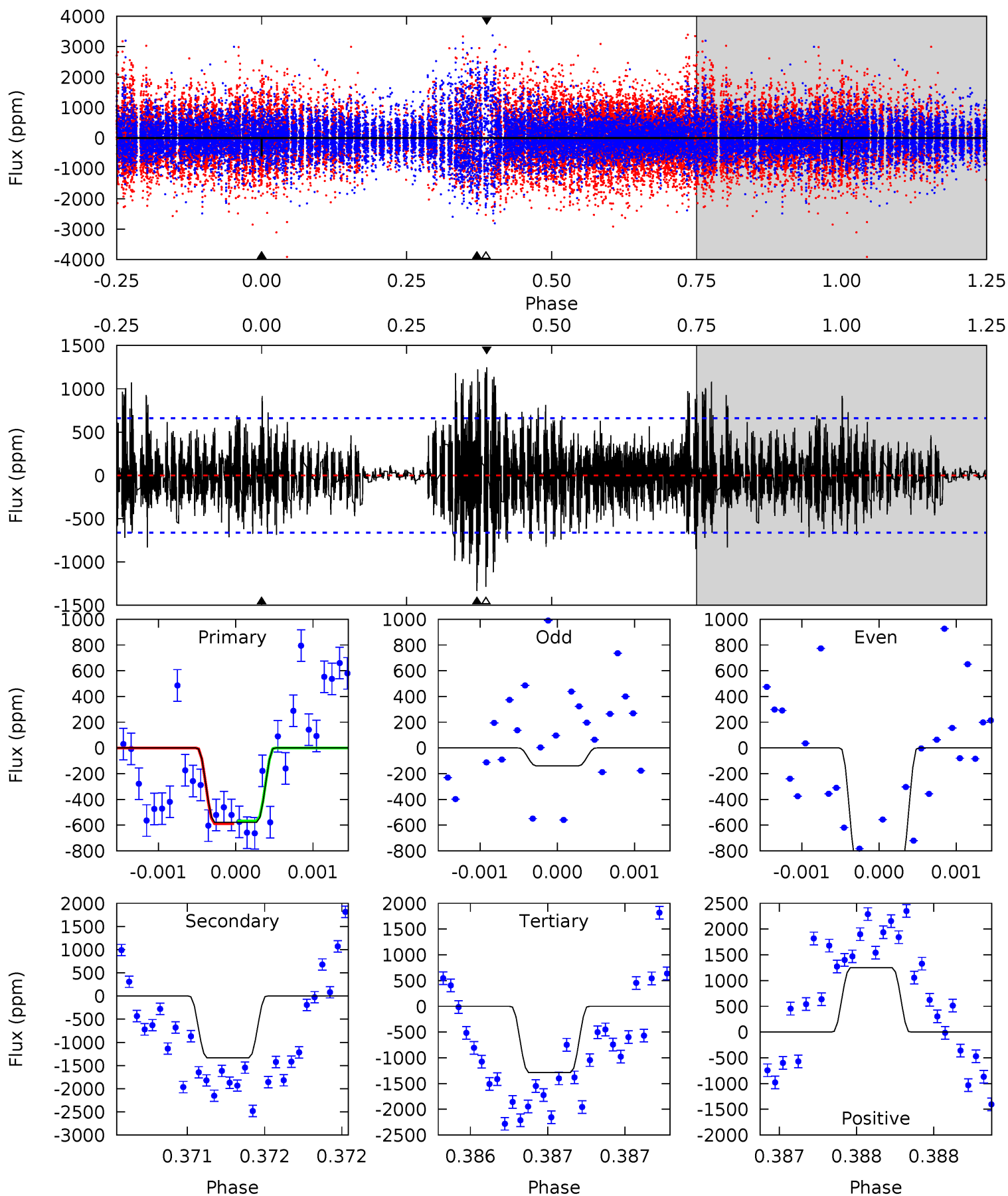
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.16	5.07	4.40	4.60	5.44	3.27	1.34	2.76	2.56	0.67	0.47	1.55	0.90	0.39	2.32



# Alt Model-Shift Uniqueness Test

005372310-02, P = 420.434119 Days, E = 412.148208 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
4.86	11.2	10.8	10.5	5.55	3.44	2.39	-5.93	-5.62	0.40	0.71	3.04	0.64	0.48	0.08



### Stellar Parameters For KIC 005372310

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5555^{+194}_{-175}$	$4.500^{+0.096}_{-0.132}$	$-0.420^{+0.300}_{-0.300}$	$0.819^{+0.171}_{-0.105}$	$0.774^{+0.106}_{-0.062}$	$1.986^{+0.882}_{-0.765}$
	+3%/-3%	+2%/-3%	+71%/-71%	+21%/-13%	+14%/-8%	+44%/-39%
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 005372310-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-343 \pm 68$	$2.34^{+1.52}_{-1.27}$	$309^{+18}_{-14}$	$4779^{+2100}_{-840}$	$34317^{+137686}_{-22326}$
Alt.	$-1332 \pm 119$	$2.80^{+1.53}_{-1.39}$	$310^{+16}_{-15}$	$6035^{+2934}_{-1079}$	$97660^{+291069}_{-57184}$

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

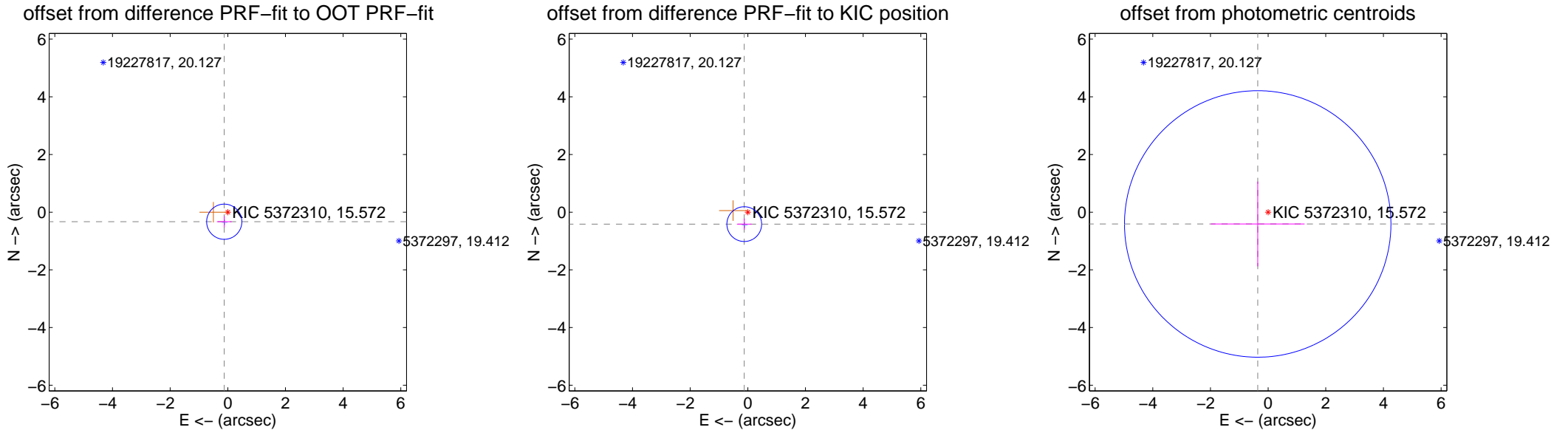
## DV Centroid Data

Supplemental centroid analysis for 005372310-02. Kepler magnitude: 15.57. Transit SNR 7.05

There are 1 quarters with good PRF difference image offsets

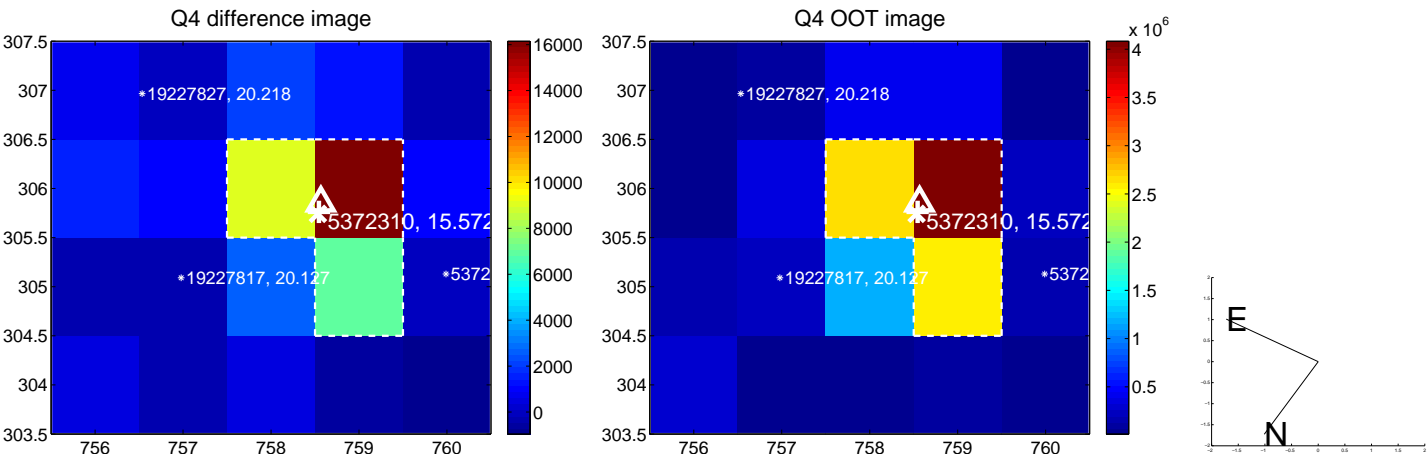
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.354 \pm 0.204$	1.74	$0.123 \pm 0.255$	$-0.331 \pm 0.195$
PRF-fit source offset from KIC position	$0.432 \pm 0.201$	2.15	$0.123 \pm 0.255$	$-0.414 \pm 0.195$
photometric centroid source offset	$0.54 \pm 1.54$	0.35	$0.36 \pm 1.63$	$-0.41 \pm 1.47$



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

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

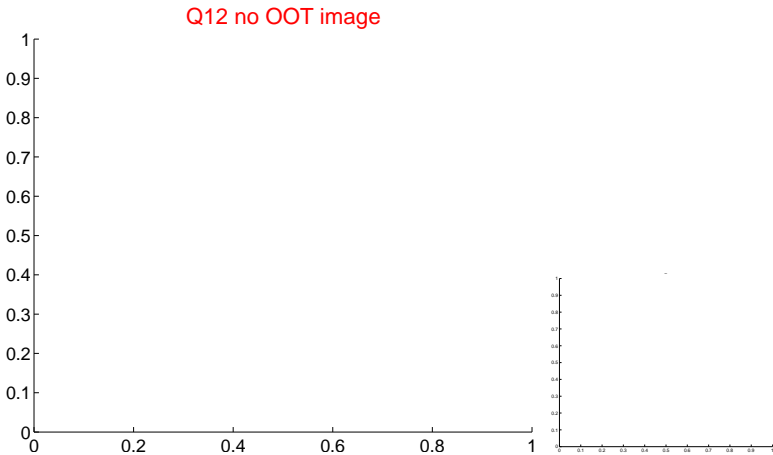
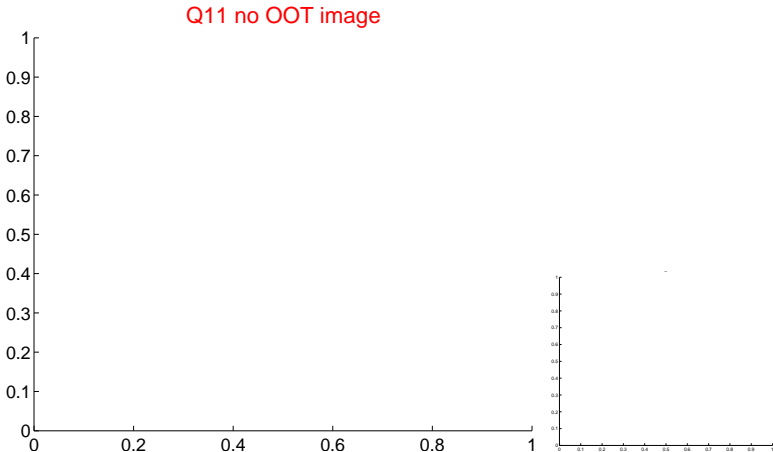
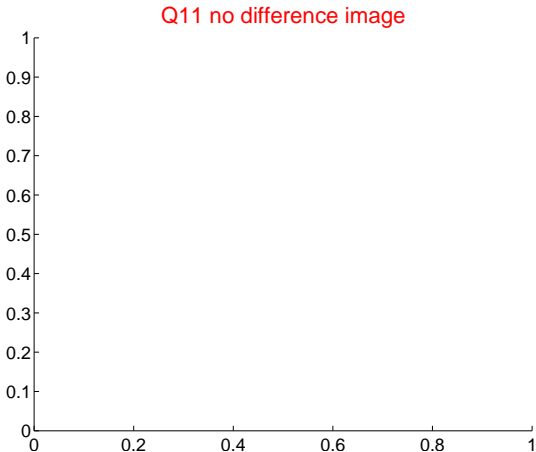
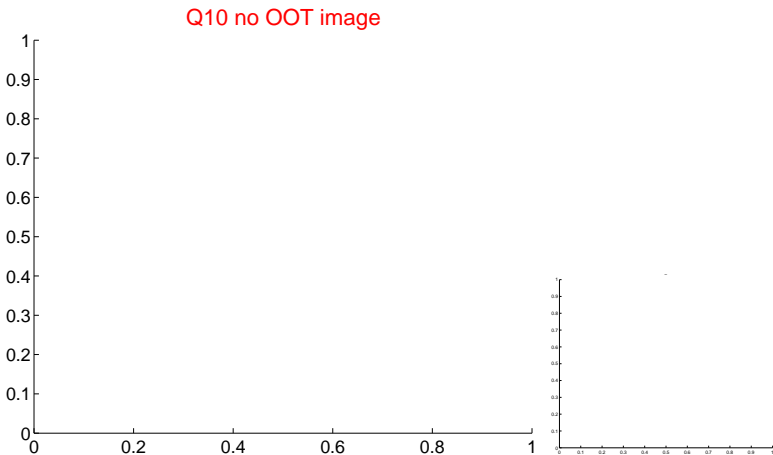
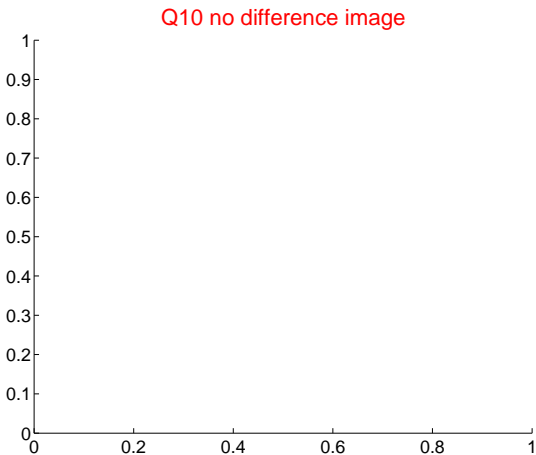
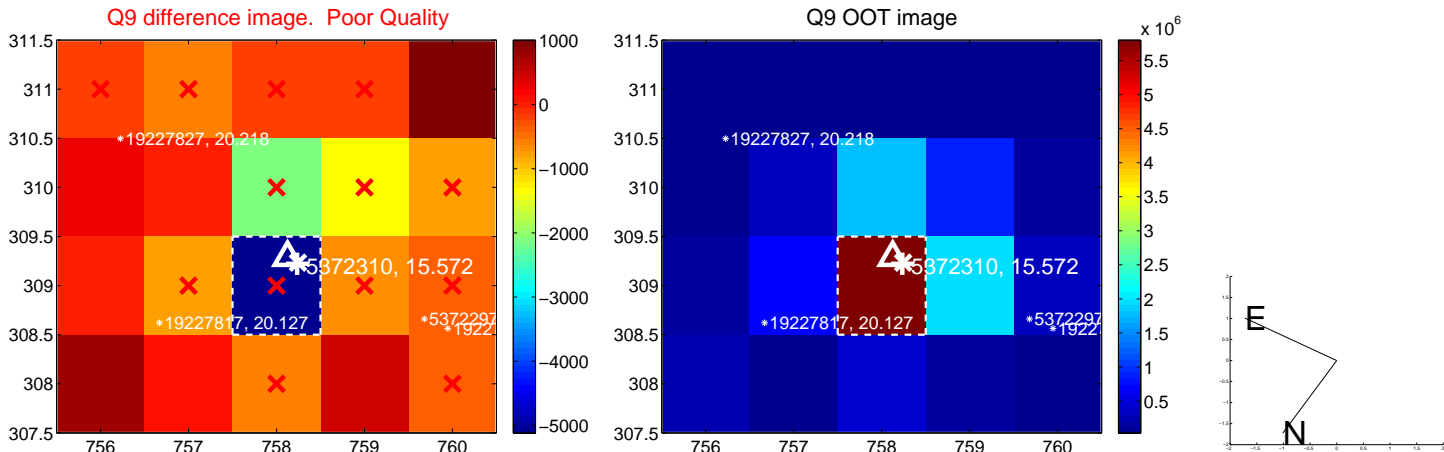


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

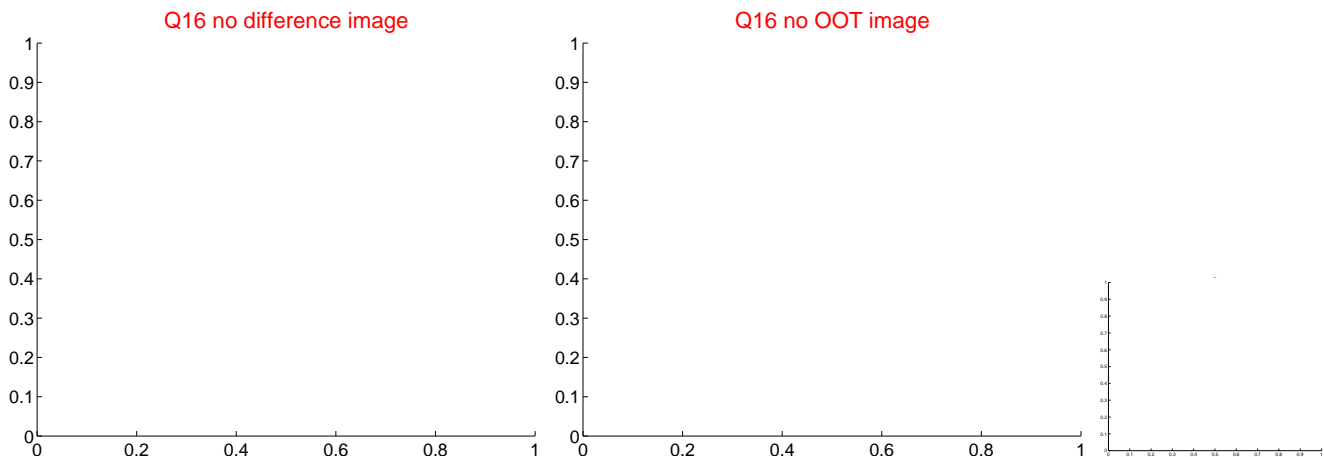
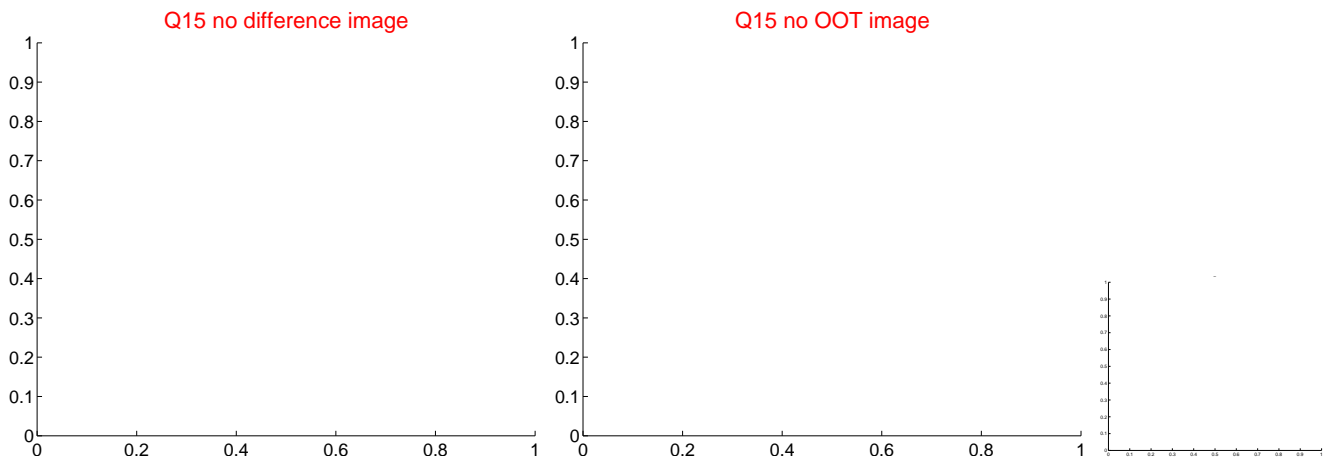
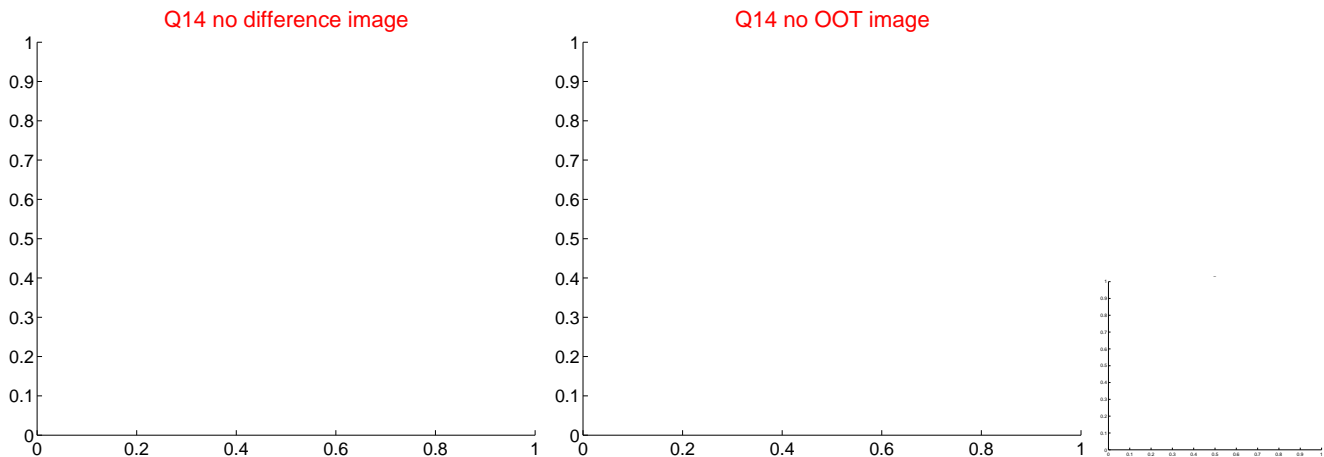
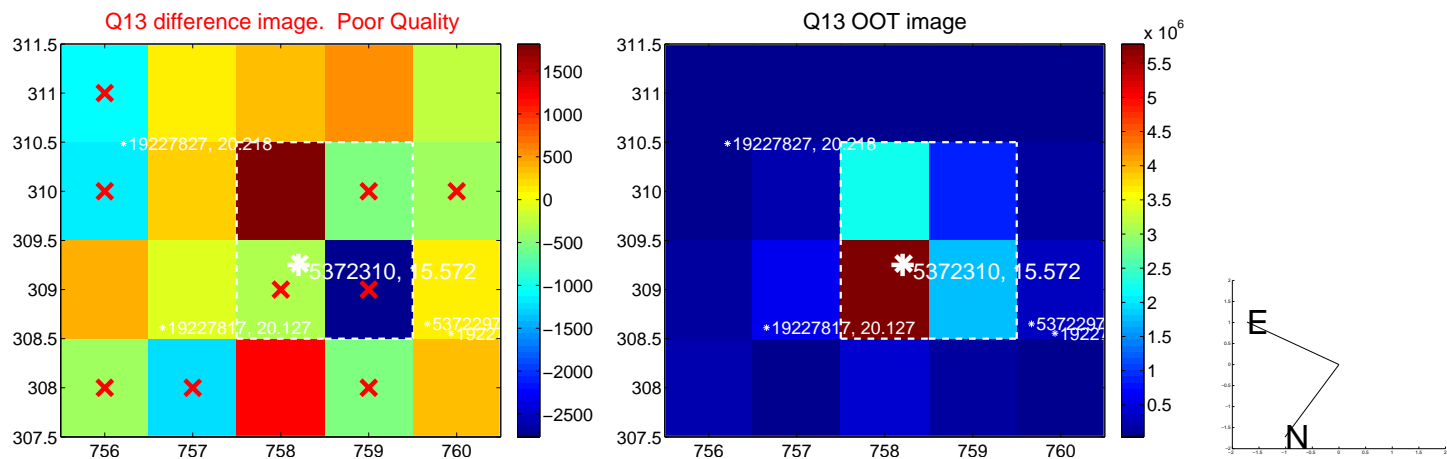




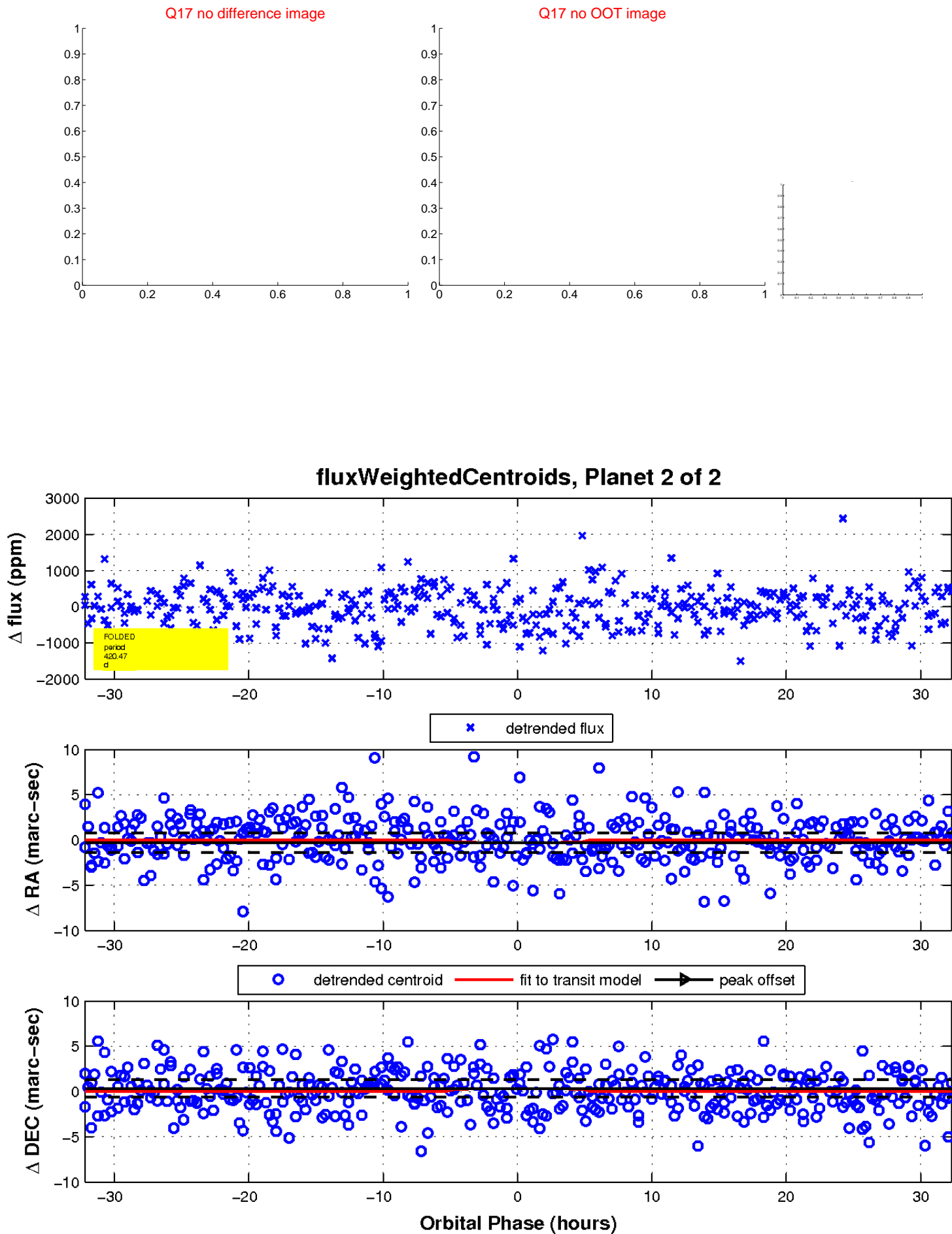
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



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

