

# KIC 010534155

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010534155-01	OBS	4345.01	4.327095	133.411169	100.6	1.182	12.5	15.4	1.46	5776	1.74	903.06
010534155-02	OBS	No	480.682349	234.348714	304.9	15.771	7.4	6.9	1.46	5776	2.70	1.69

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010534155-01	OBS	PC	0.99	0	0	0	0	NO_COMMENT
010534155-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—ALL_TRANS_CHASES—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.

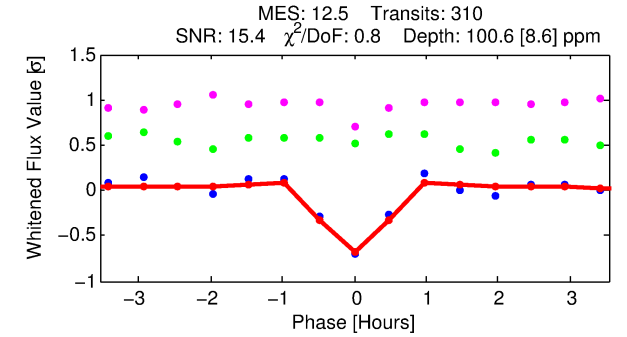
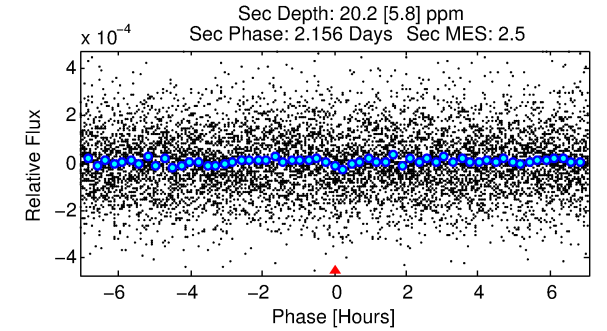
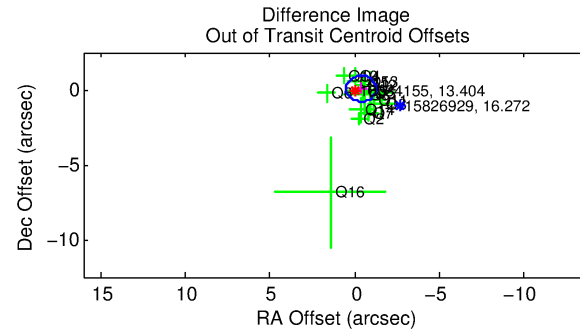
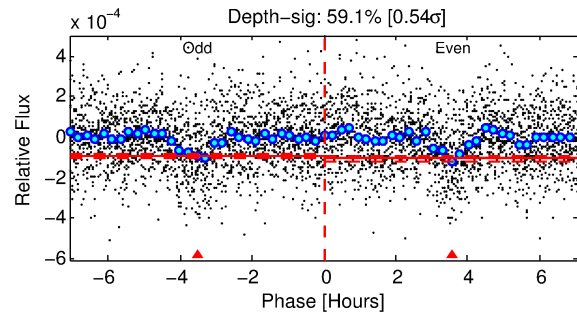
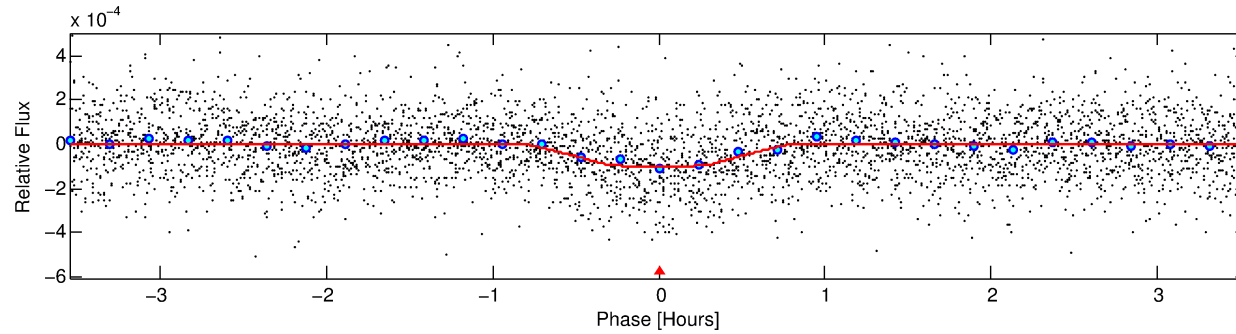
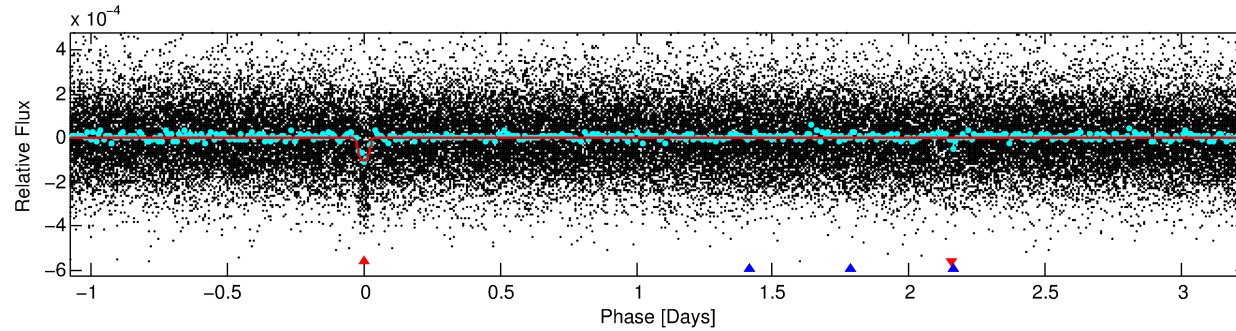
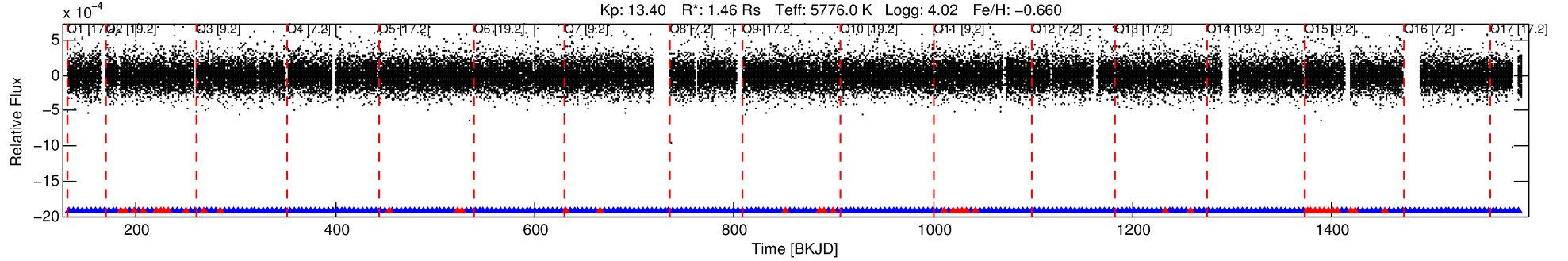
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010534155-01

No Significant Match Found

# DV One-Page Summary

KIC: 10534155 Candidate: 1 of 2 Period: 4.327 d  
KOI: K04345.01 Corr: 0.914



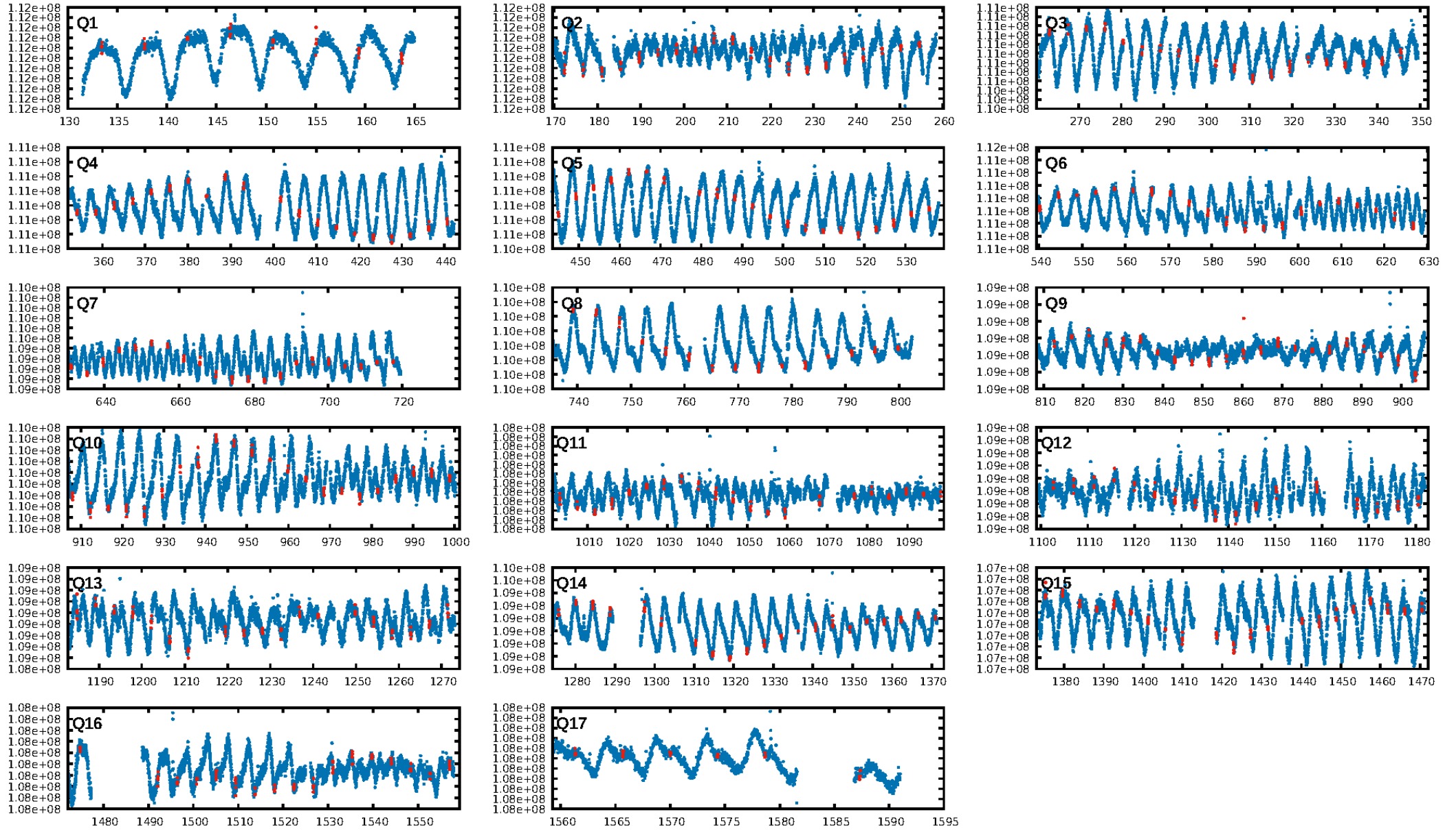
## DV Fit Results:

Period = 4.32709 [0.00001] d  
Epoch = 133.4112 [0.0016] BKJD  
Rp/R\* = 0.0110 [0.0048]  
a/R\* = 12.52 [28.90]  
b = 0.91 [0.46]  
Seff = 903.06 [776.65]  
Teq = 1398 [301] K  
Rp = 1.74 [1.11] Re  
a = 0.0484 [0.0242] AU  
Ag = 8.60 [10.84] [0.70 $\sigma$ ]  
Teffp = 3701 [867] K [2.51 $\sigma$ ]

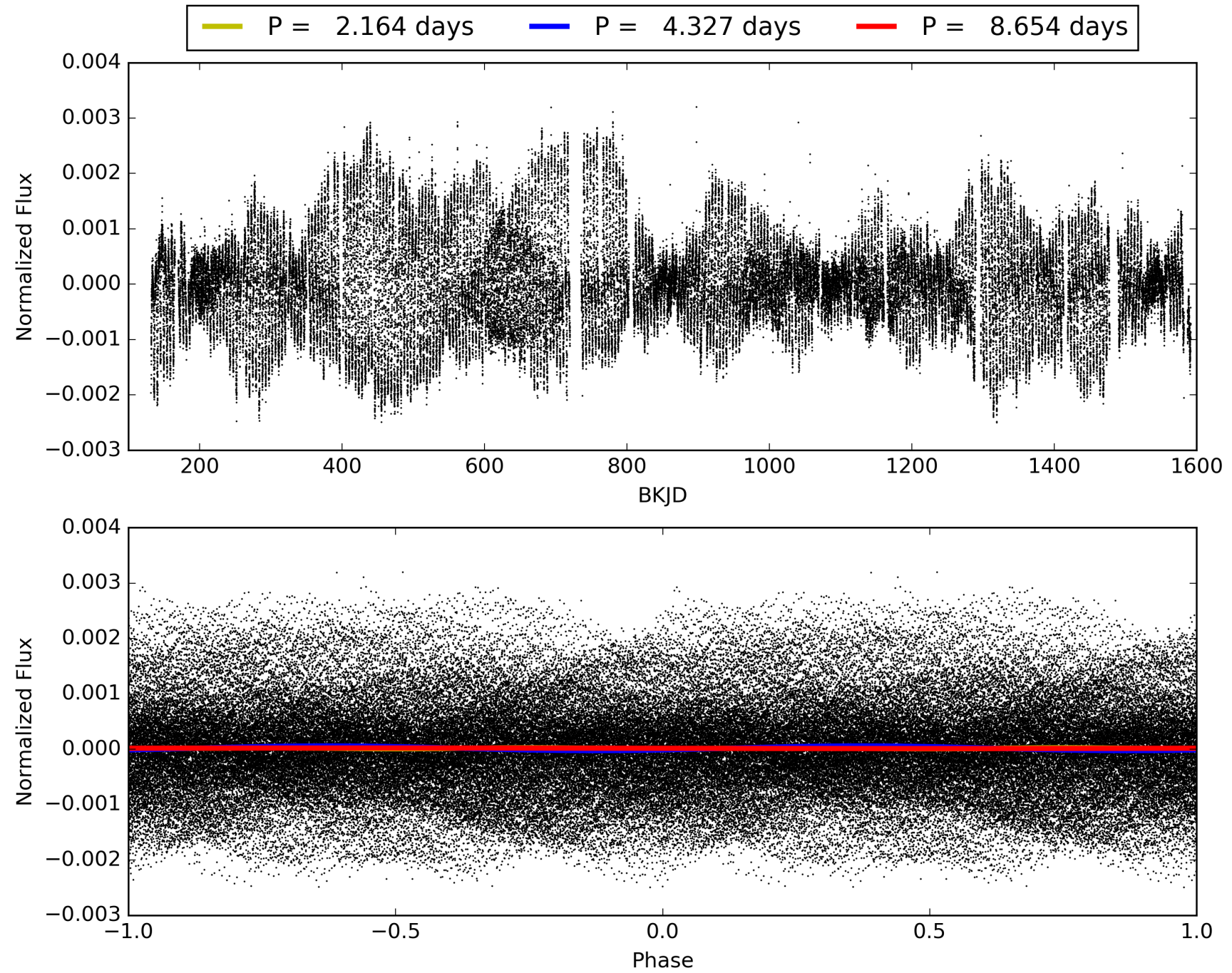
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [722.89 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.17e-32  
RollingBand-fgt: 0.87 [257/296]  
GhostDiagnostic-chr: 2.469  
Centroid-sig: 0.0%  
Centroid-so: 2.138 arcsec [2.92 $\sigma$ ]  
OotOffset-rm: 0.392 arcsec [1.36 $\sigma$ ]  
KicOffset-rm: 0.431 arcsec [1.13 $\sigma$ ]  
OotOffset-st: 4/4/4/3 [15]  
KicOffset-st: 4/4/4/3 [15]  
DiffImageQuality-fgm: 0.93 [14/15]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 010534155-01, PDC Light Curves

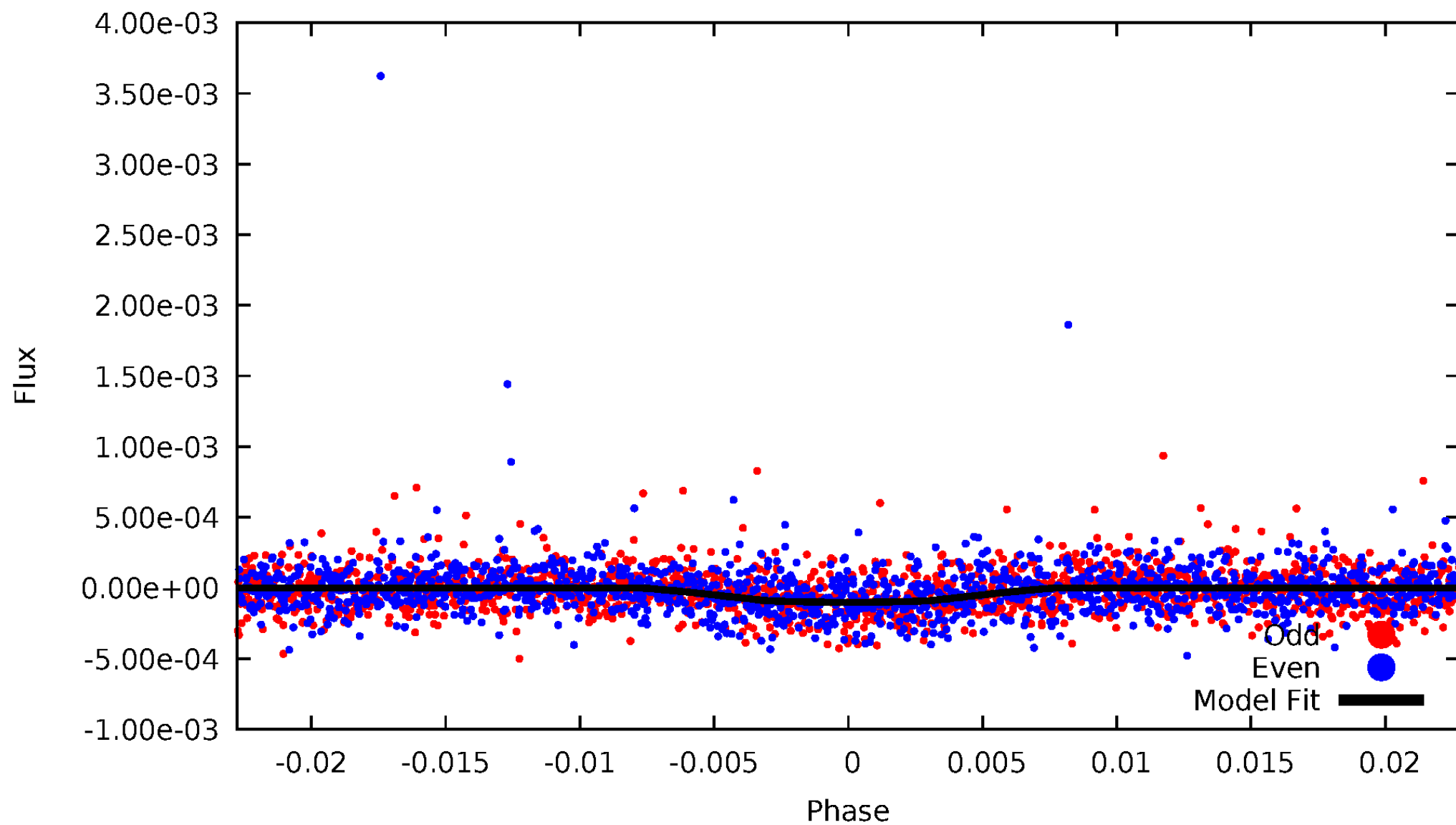


# TCE 010534155-01



# DV Odd/Even

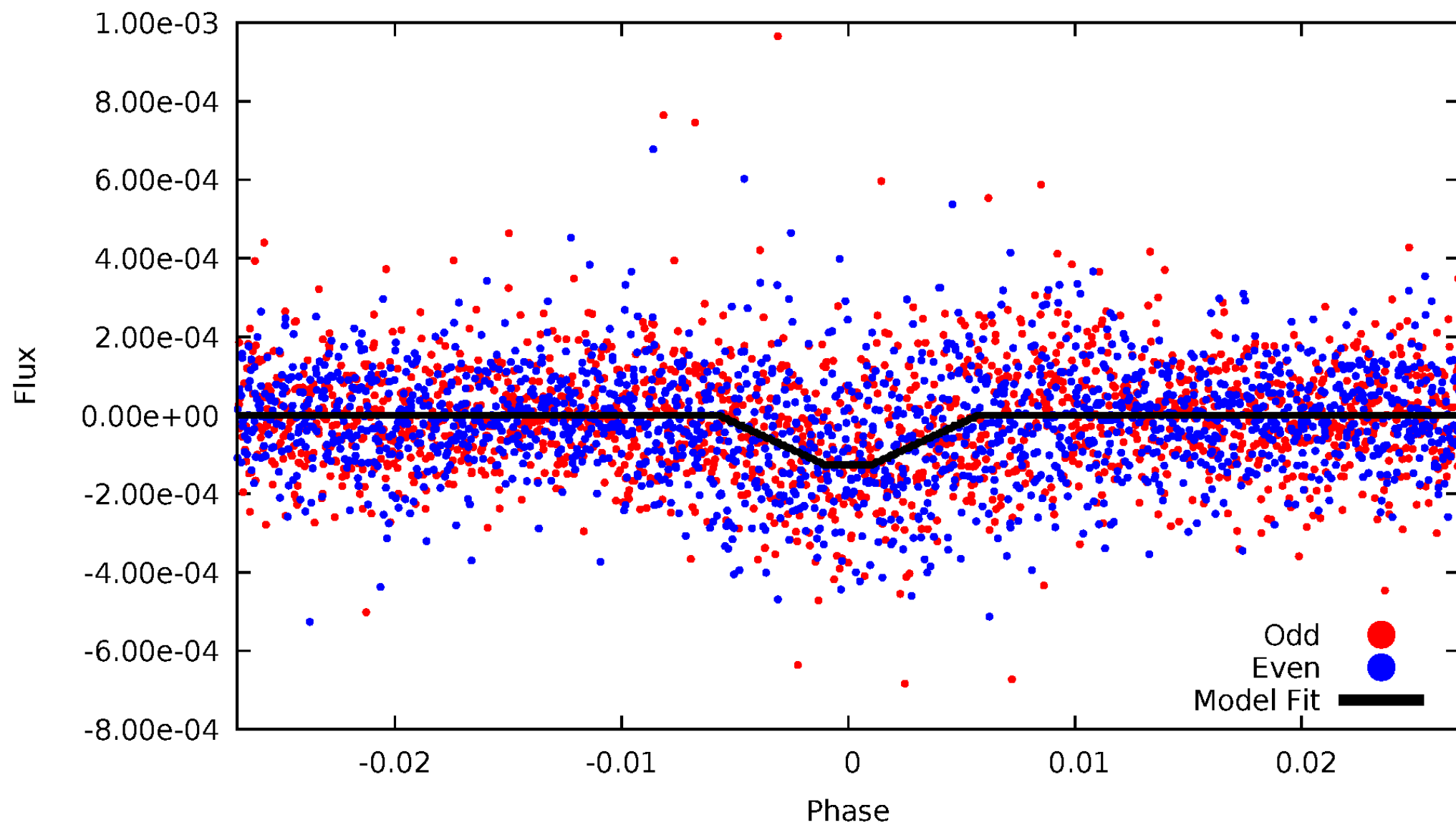
TCE 010534155-01





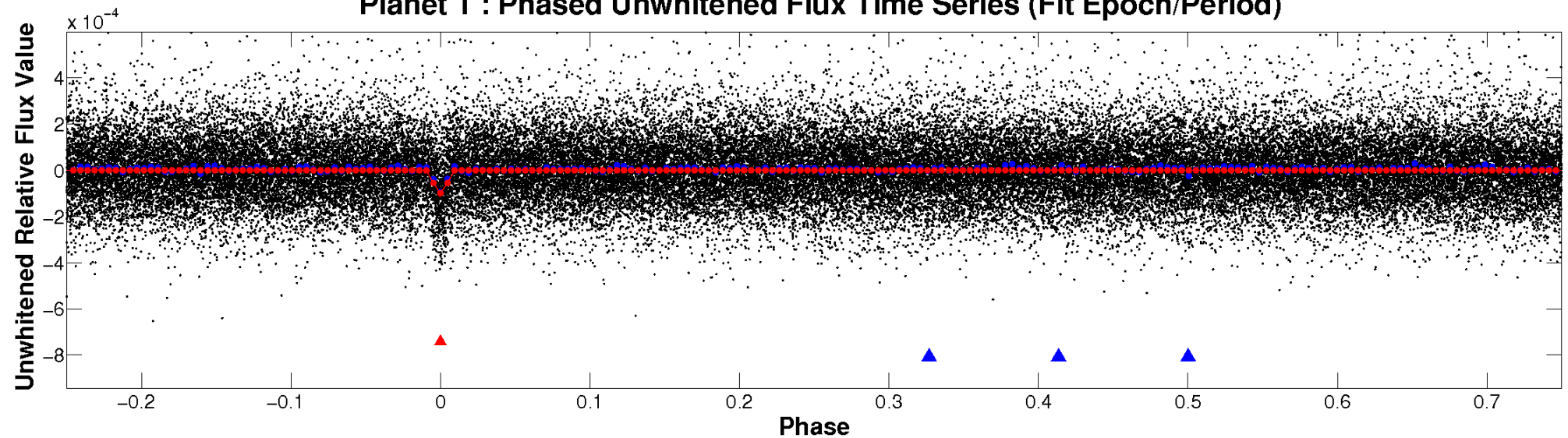
# ALT Odd/Even

TCE 010534155-01

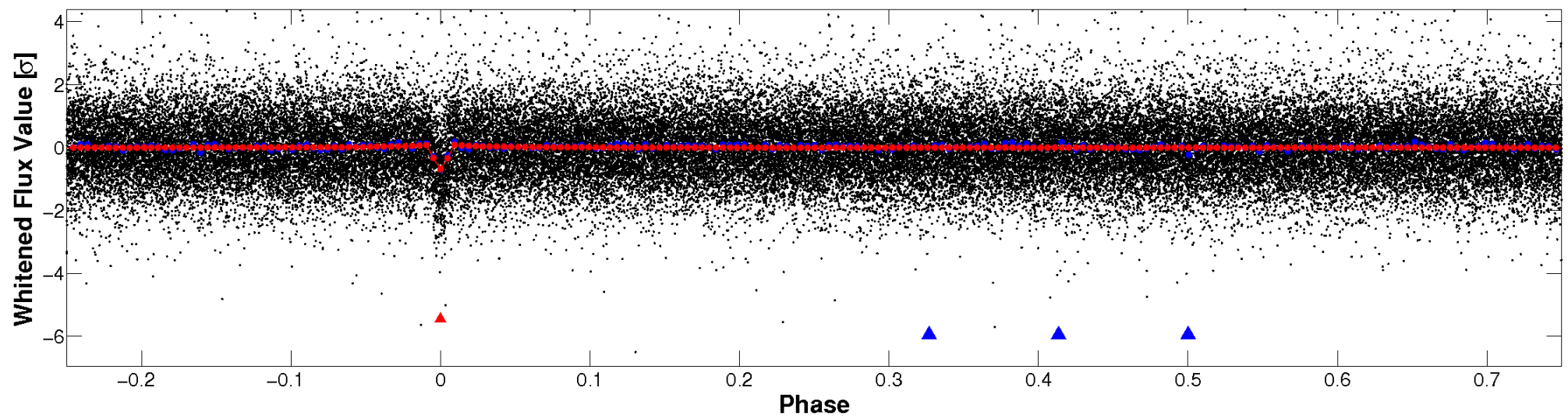


# Non-Whitened Vs. Whitened Light Curve

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

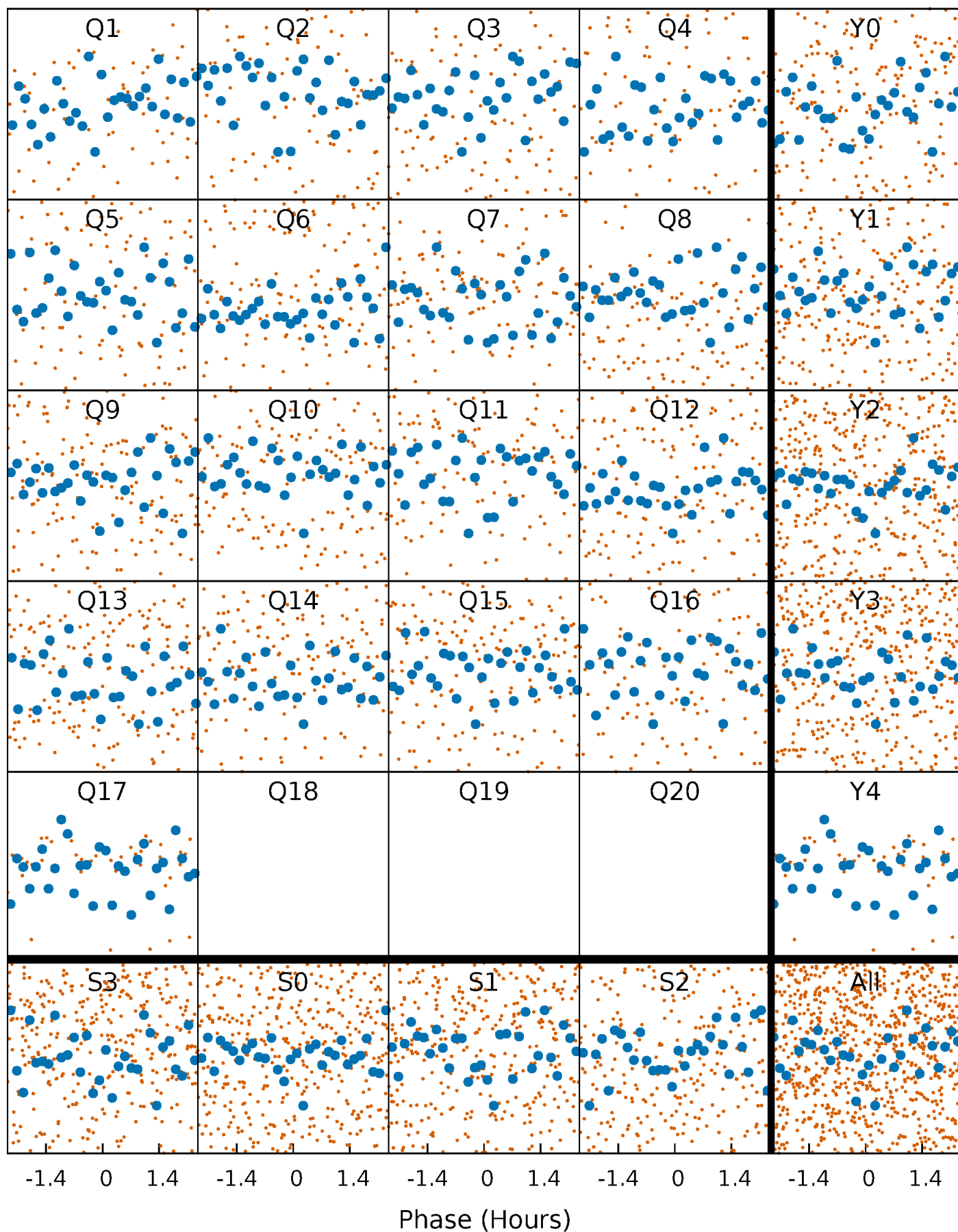


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

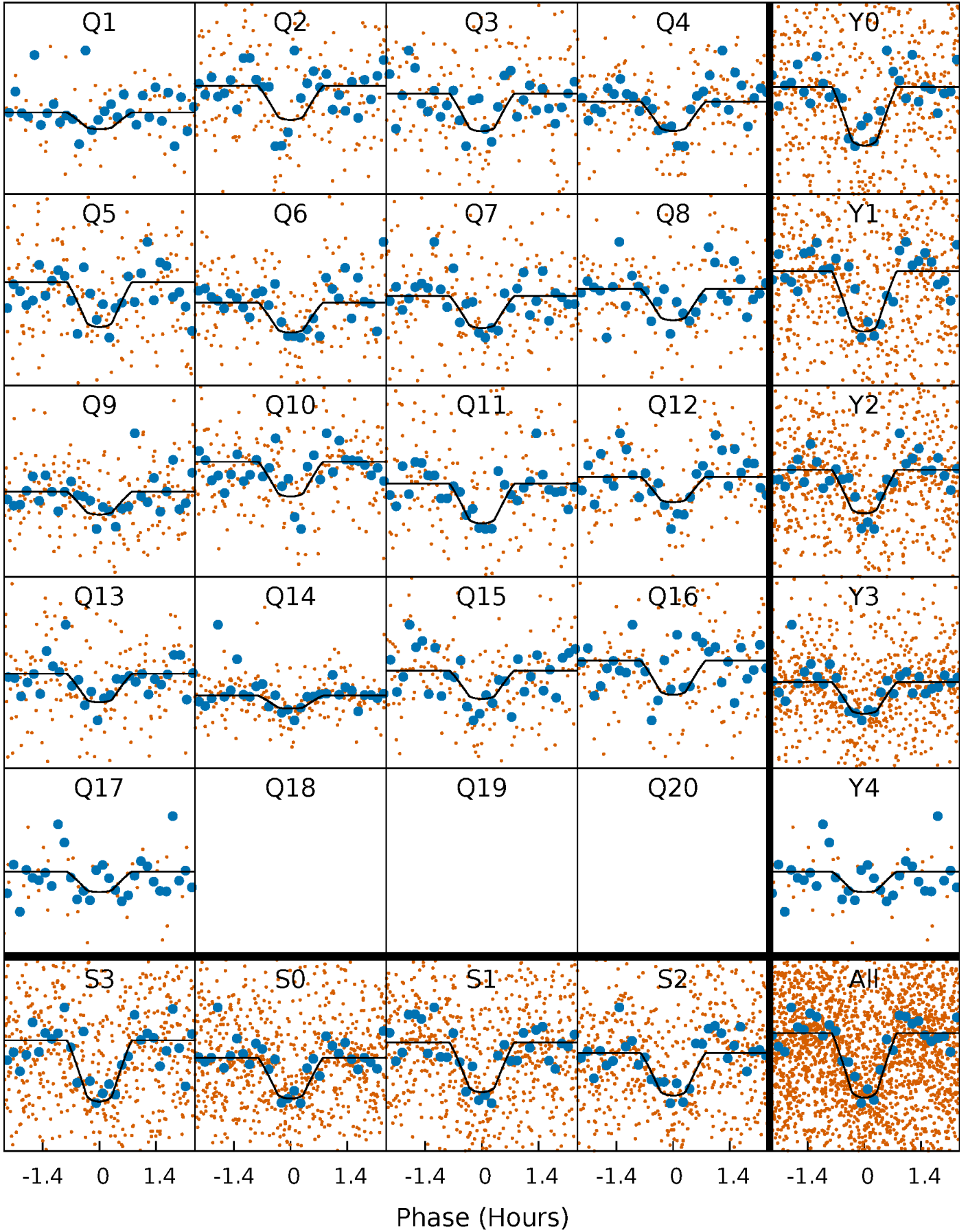
TCE 010534155-01 P= 4.327095 Days  $T_0=133.411169$  (BKJD)





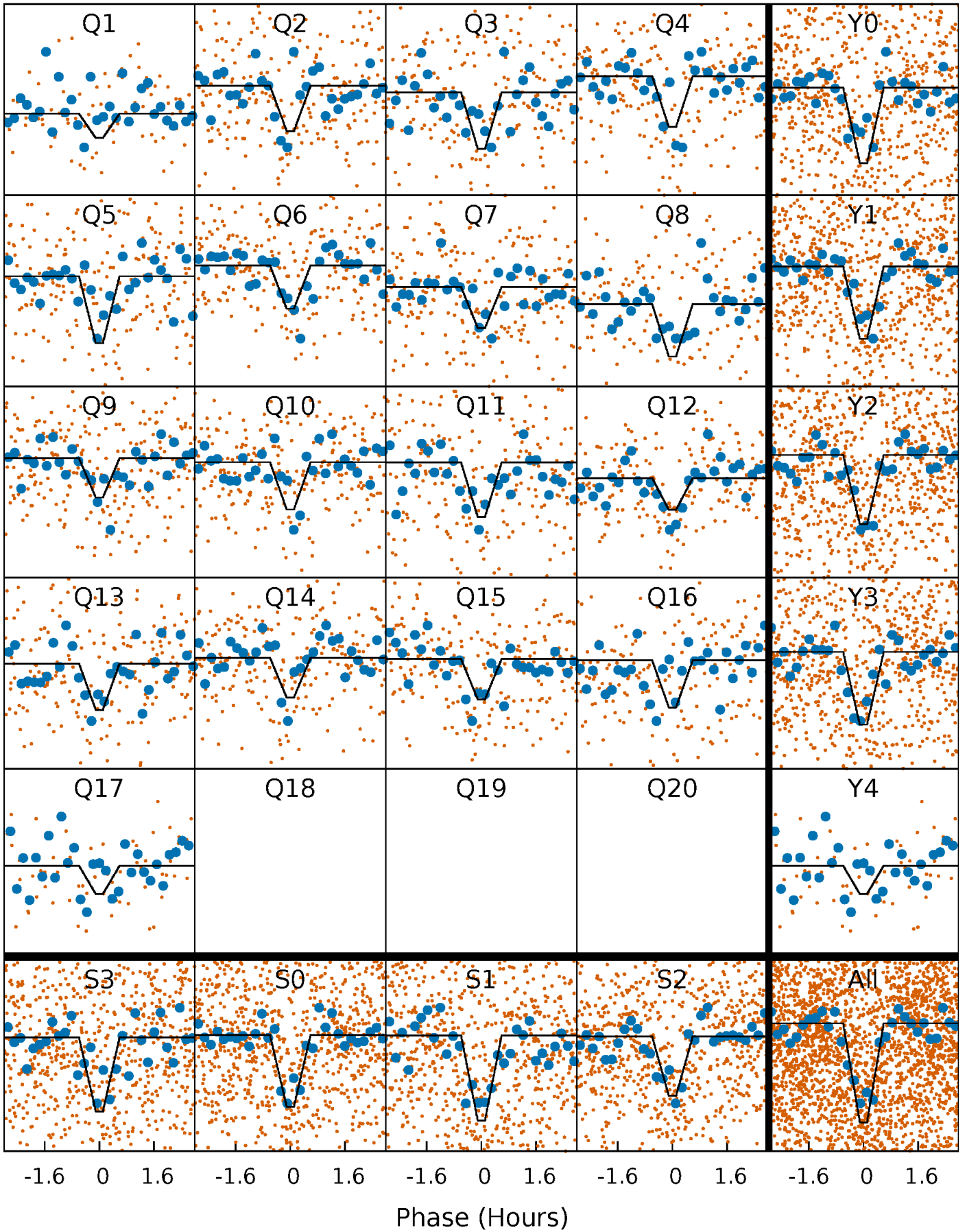
# DV Quarter-Phased Transit Curves

TCE 010534155-01   P= 4.327095 Days    $T_0=133.411169$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

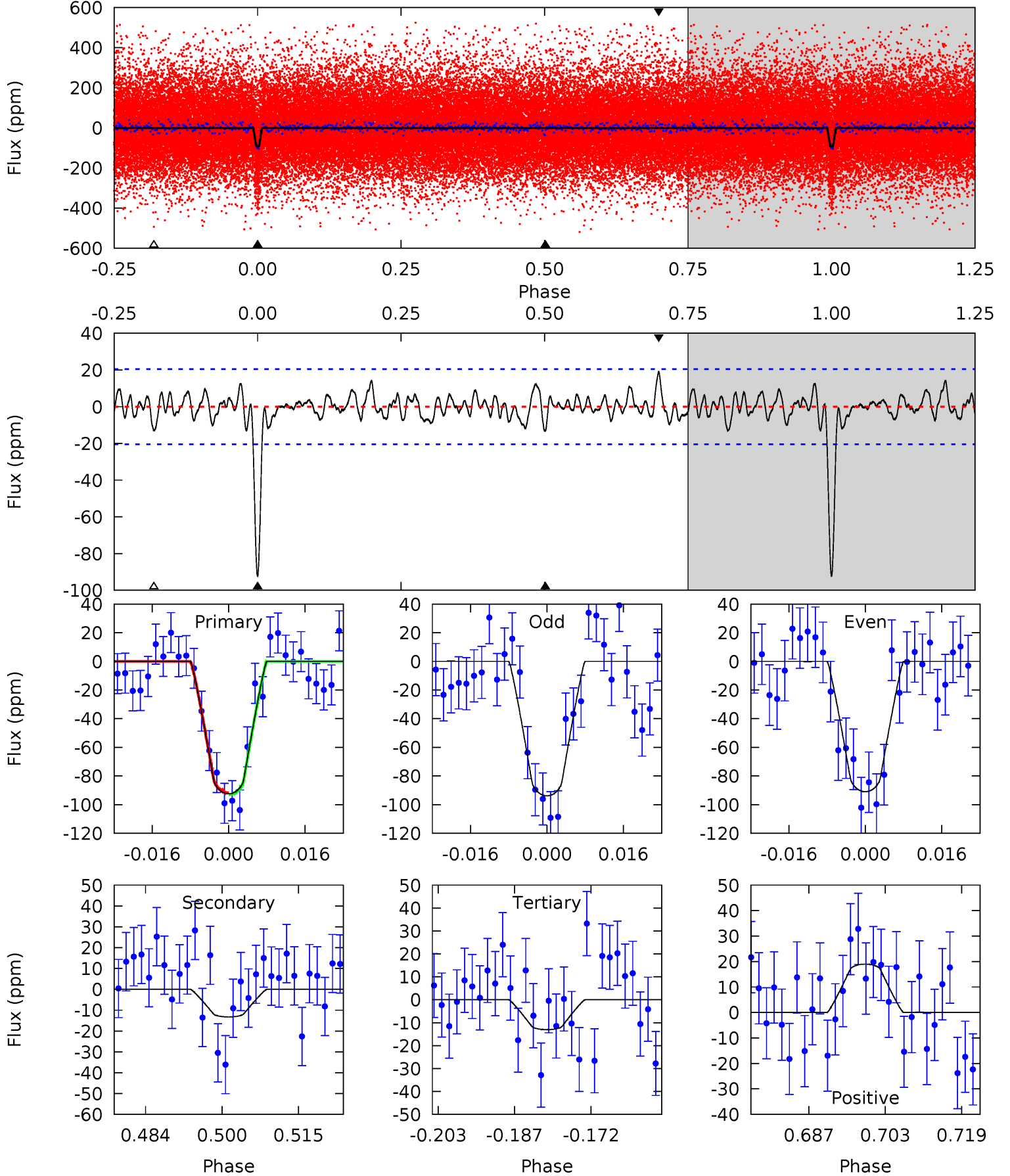
TCE 010534155-01 P= 4.327109 Days  $T_0=133.409854$  (BKJD)



# DV Model-Shift Uniqueness Test

010534155-01, P = 4.327095 Days, E = 129.084074 Days

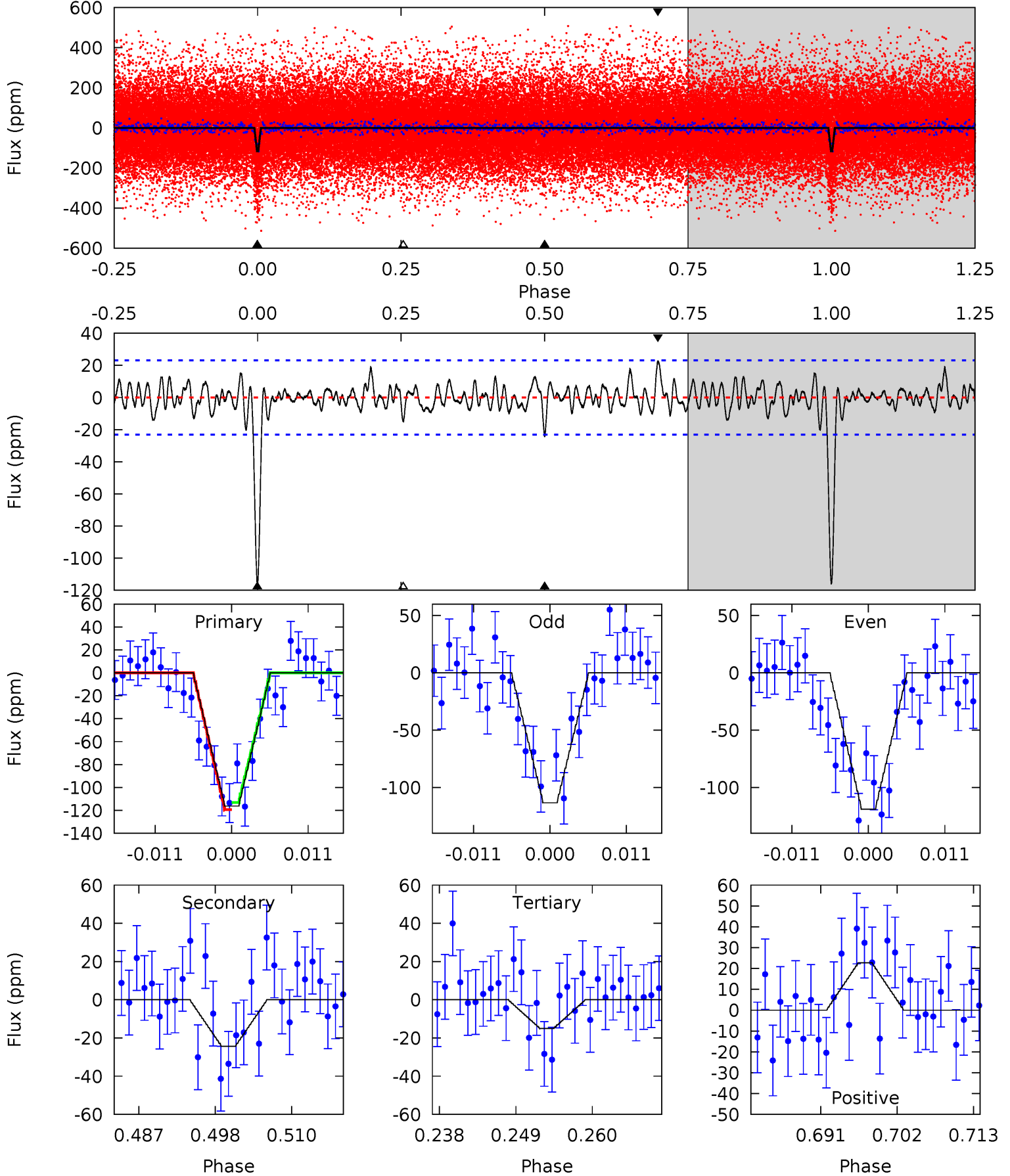
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
22.3	3.20	3.15	4.59	4.94	2.42	1.25	19.2	17.7	0.05	-1.39	0.35	0.89	0.17	0.15



# Alt Model-Shift Uniqueness Test

010534155-01, P = 4.327109 Days, E = 129.082745 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
25.2	5.28	3.25	4.92	5.00	2.53	1.35	21.9	20.3	2.03	0.36	0.61	0.92	0.16	0.68



### Stellar Parameters For KIC 010534155

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5776^{+174}_{-157}$	$4.018^{+0.518}_{-0.222}$	$-0.660^{+0.350}_{-0.250}$	$1.455^{+0.544}_{-0.665}$	$0.804^{+0.103}_{-0.060}$	$0.367^{+1.942}_{-0.200}$
	+3%/-3%	+13%/-6%	+53%/-38%	+37%/-46%	+13%/-7%	+528%/-55%
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 010534155-01 / KOI 4345.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-13 \pm 4$	$1.62^{+0.85}_{-0.73}$	$1917^{+213}_{-268}$	$3696^{+819}_{-508}$	$6.413^{+15.011}_{-3.955}$
Alt.	$-24 \pm 5$	$1.71^{+0.94}_{-0.83}$	$1928^{+198}_{-255}$	$4027^{+1073}_{-473}$	$11^{+30}_{-6}$

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



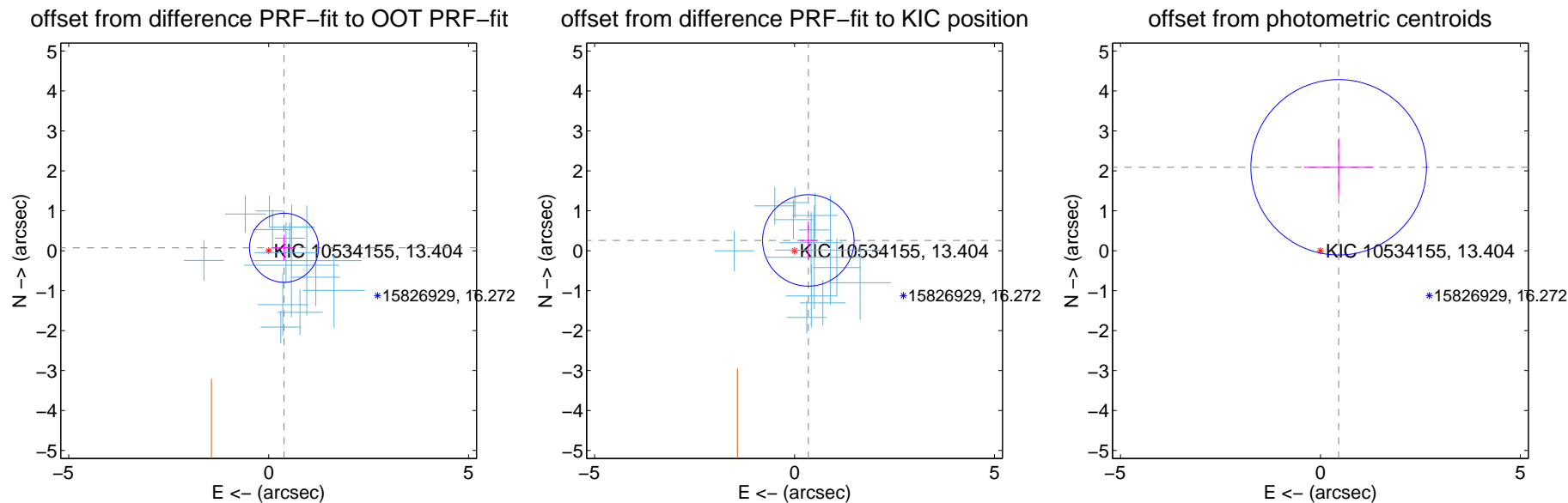
## DV Centroid Data

Supplemental centroid analysis for 010534155-01. Kepler magnitude: 13.40. Transit SNR 15.38

There are 14 quarters with good PRF difference image offsets

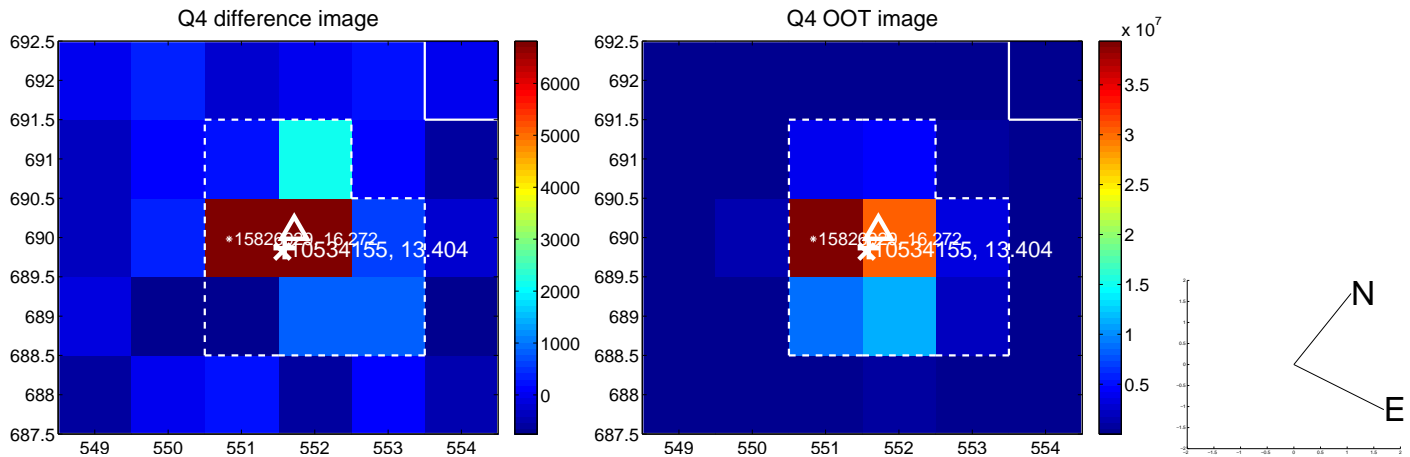
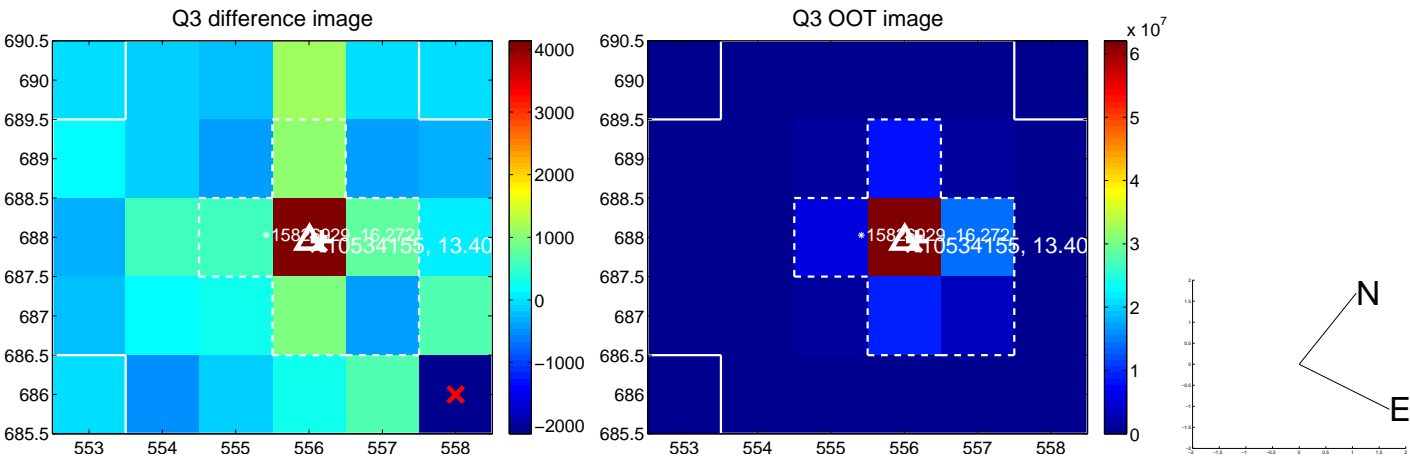
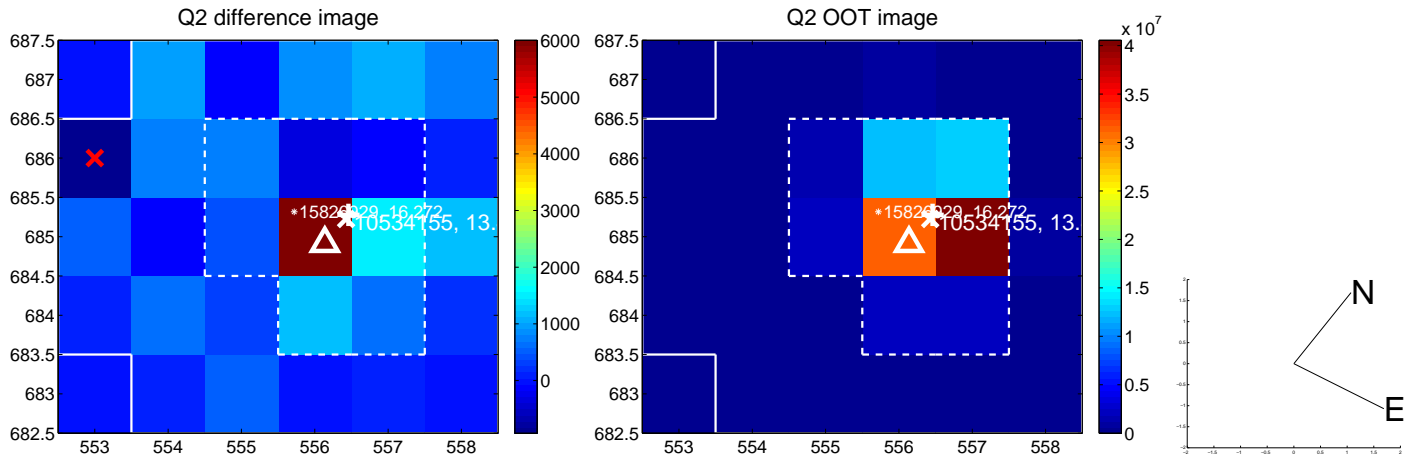
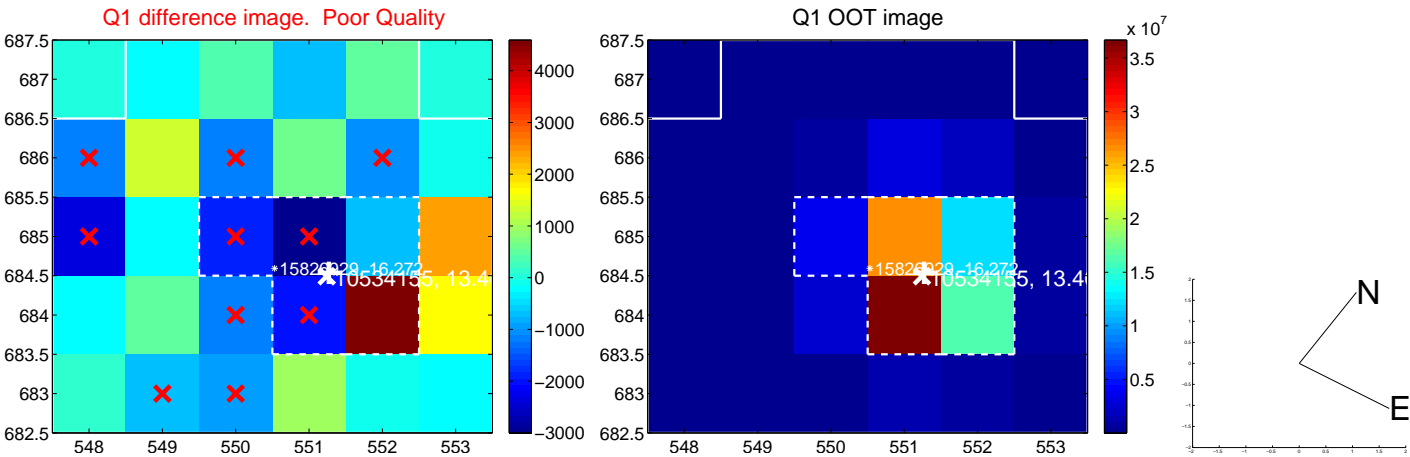
The direct PRF centroid is offset from the target star catalog position by about 0.26 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.392 \pm 0.288$	1.36	$-0.385 \pm 0.287$	$0.074 \pm 0.316$
PRF-fit source offset from KIC position	$0.431 \pm 0.381$	1.13	$-0.345 \pm 0.215$	$0.258 \pm 0.478$
photometric centroid source offset	$2.14 \pm 0.73$	2.92	$-0.46 \pm 0.87$	$2.09 \pm 0.72$

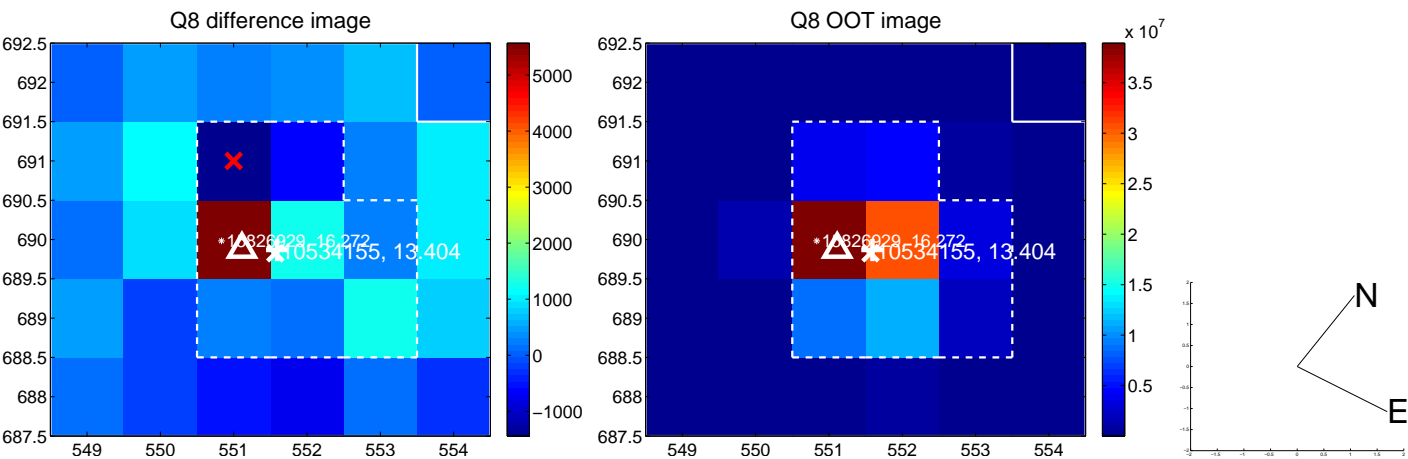
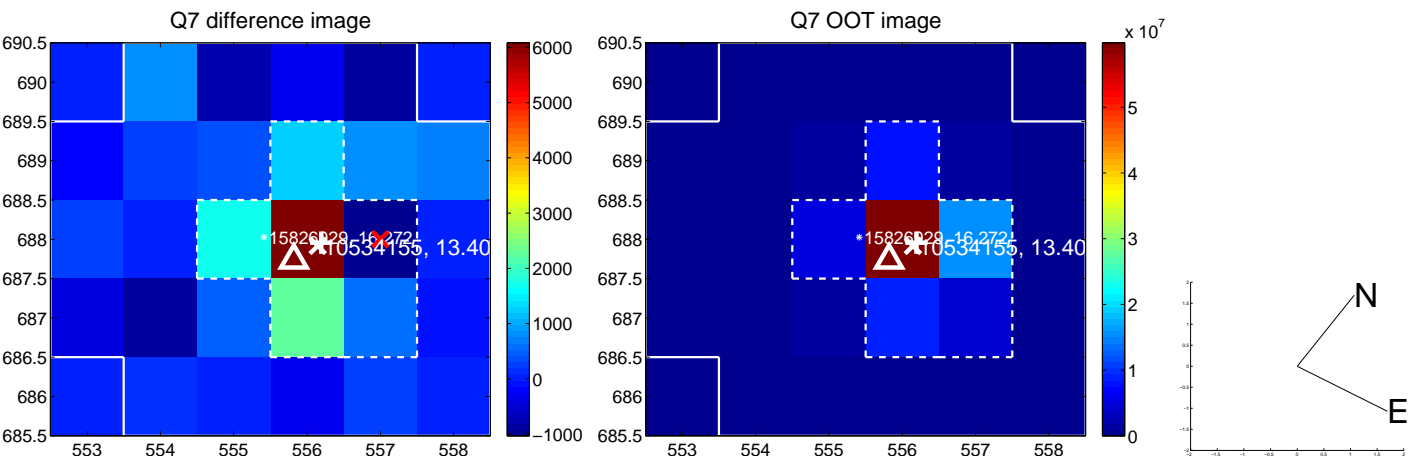
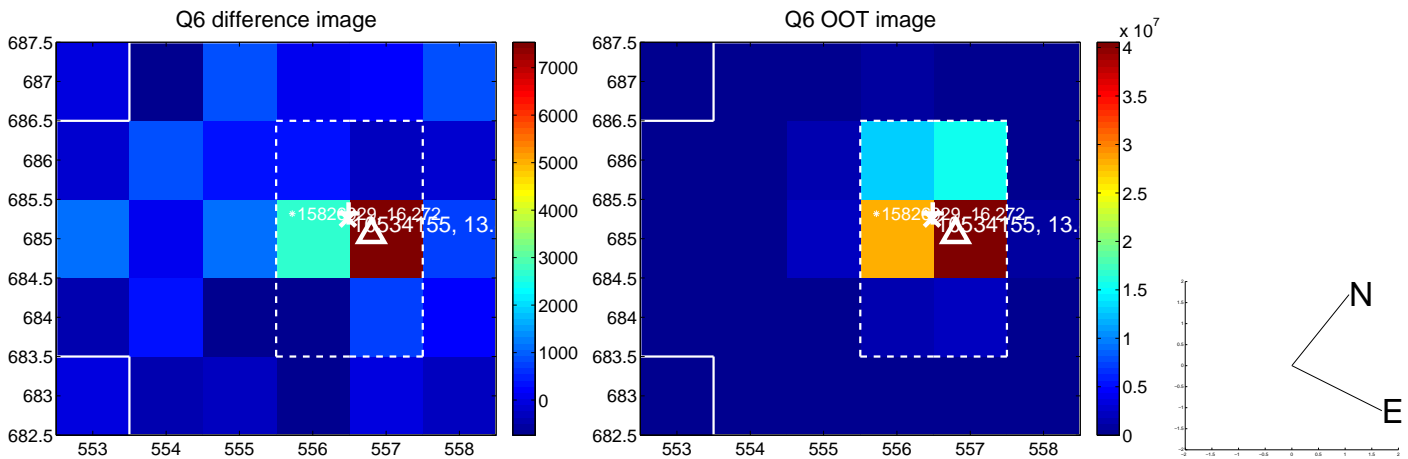
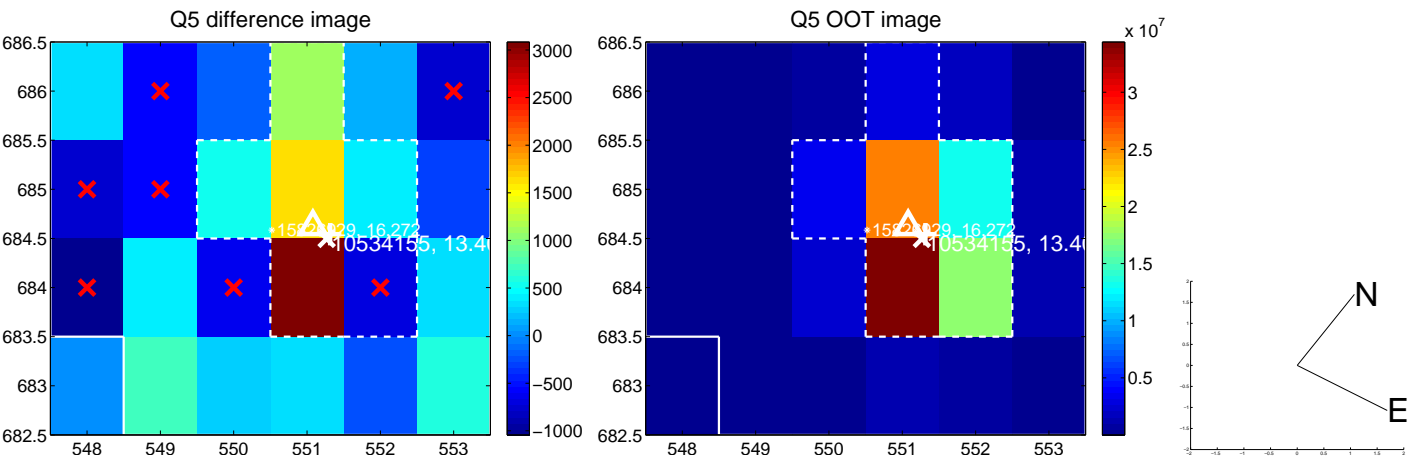


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

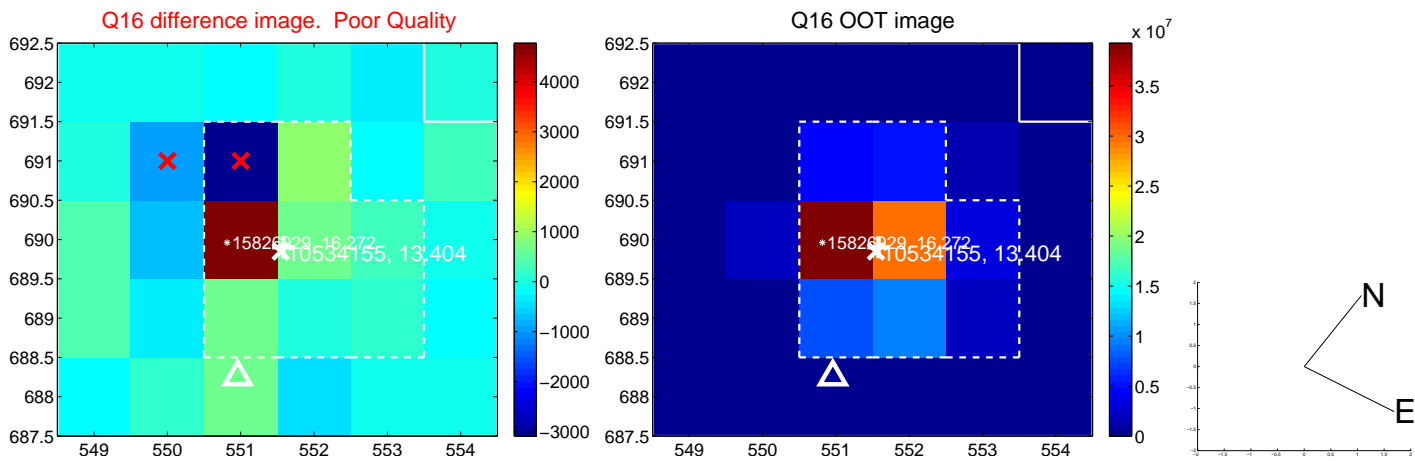
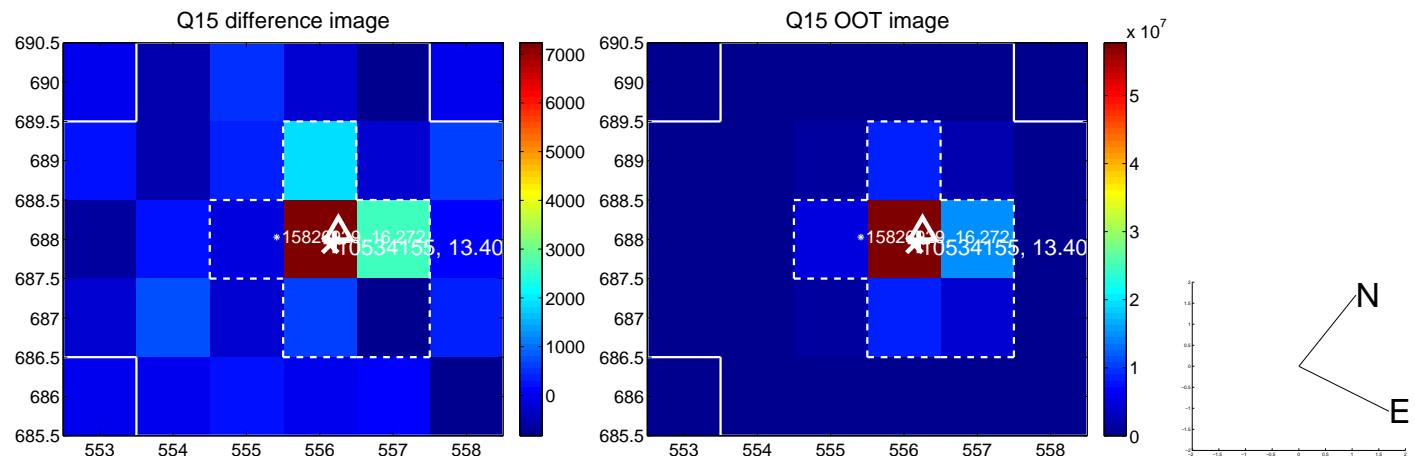
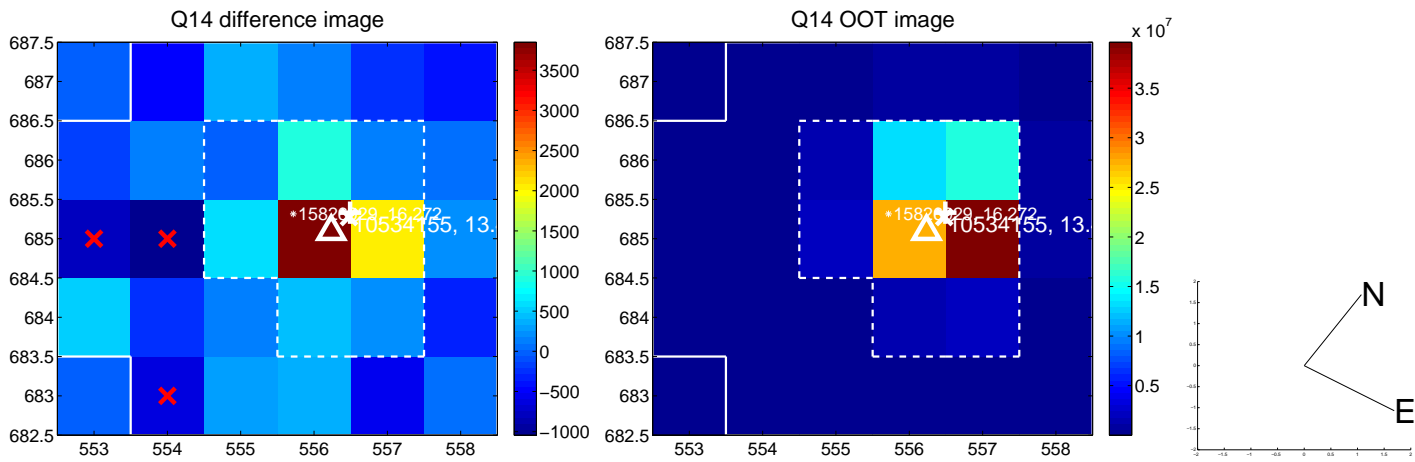
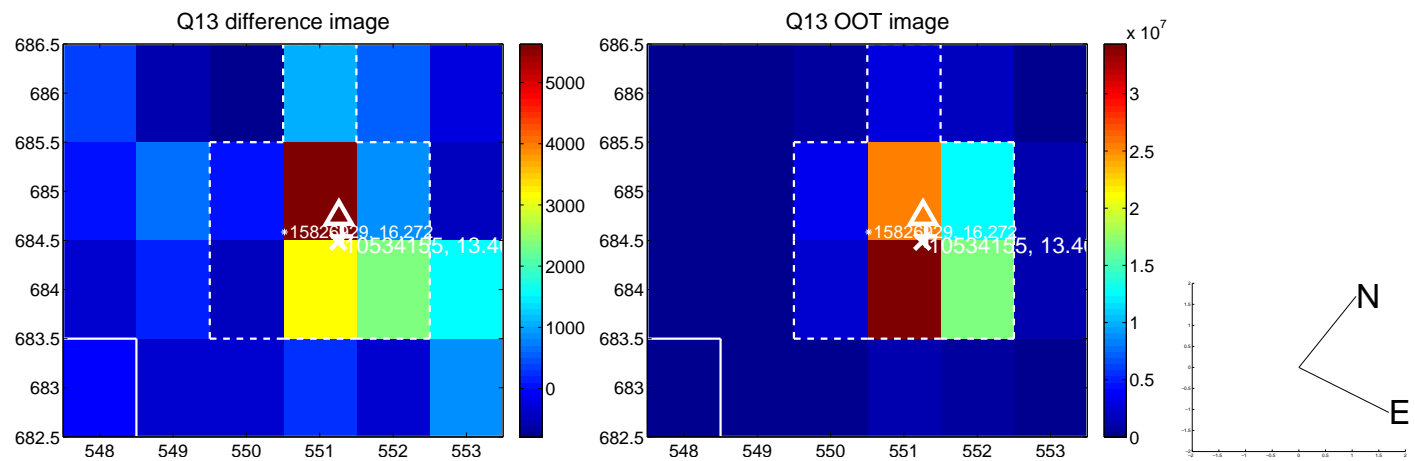


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



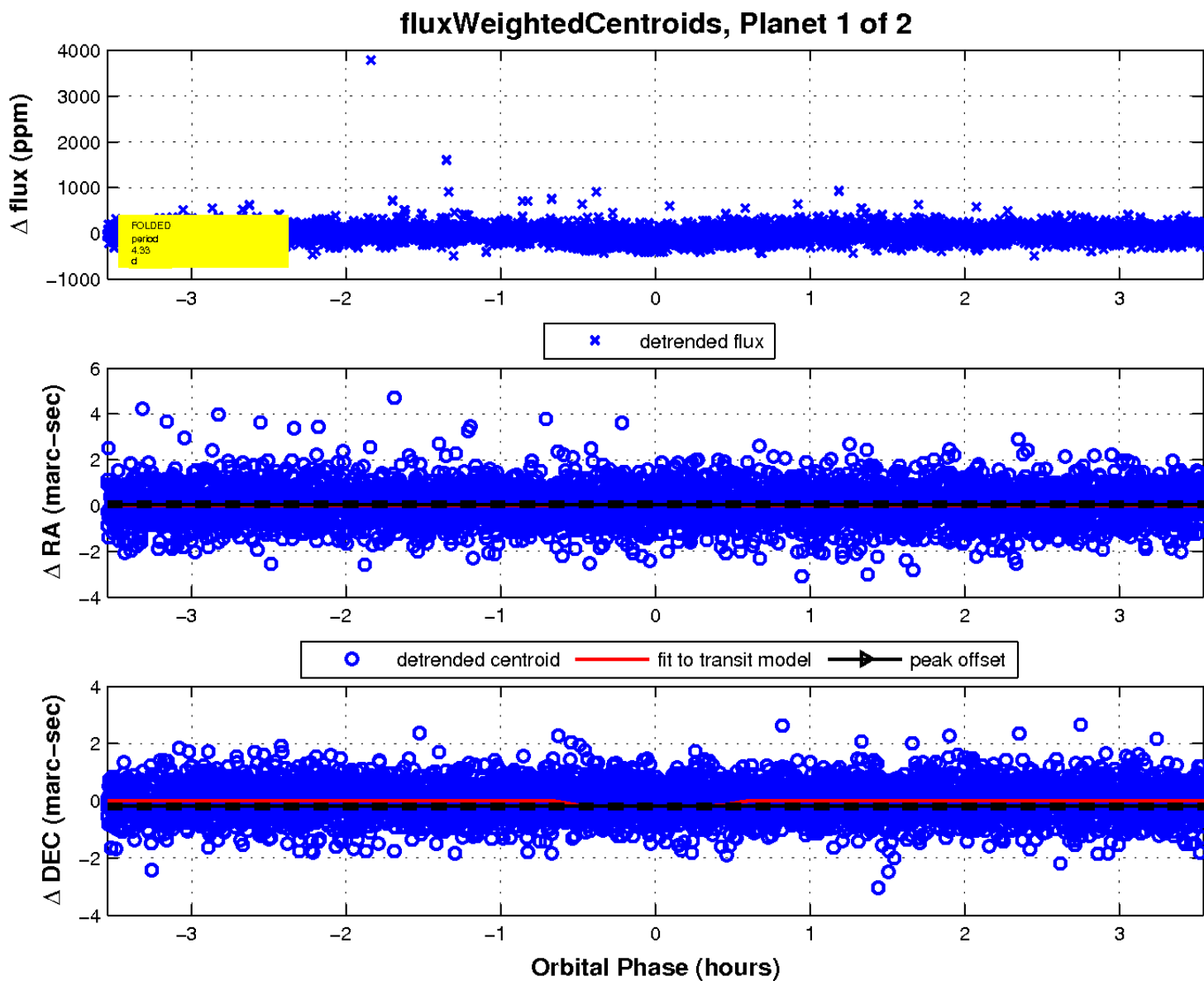
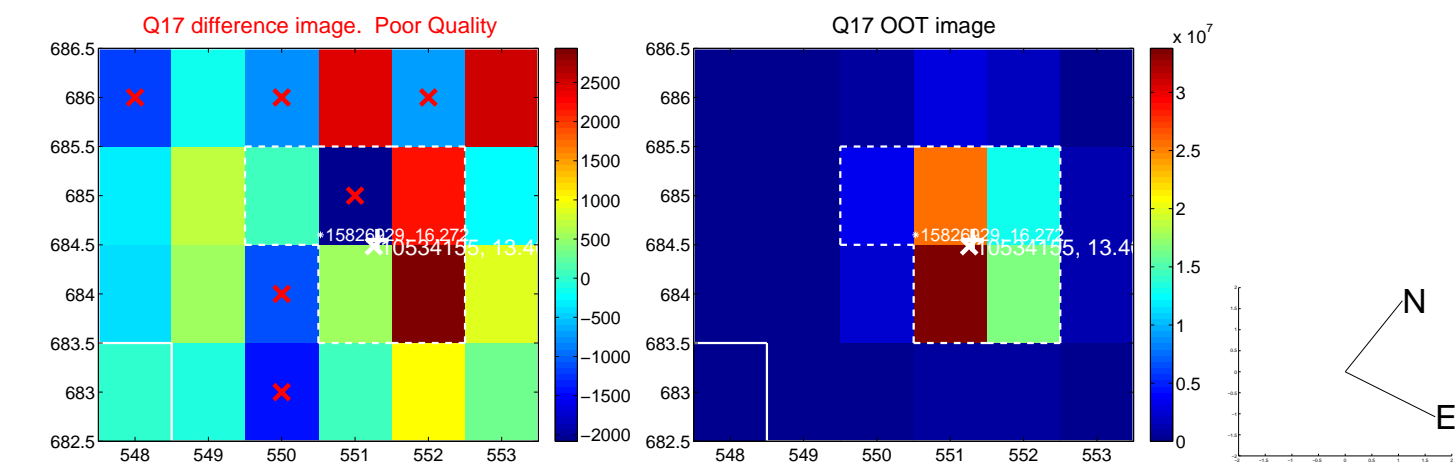


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



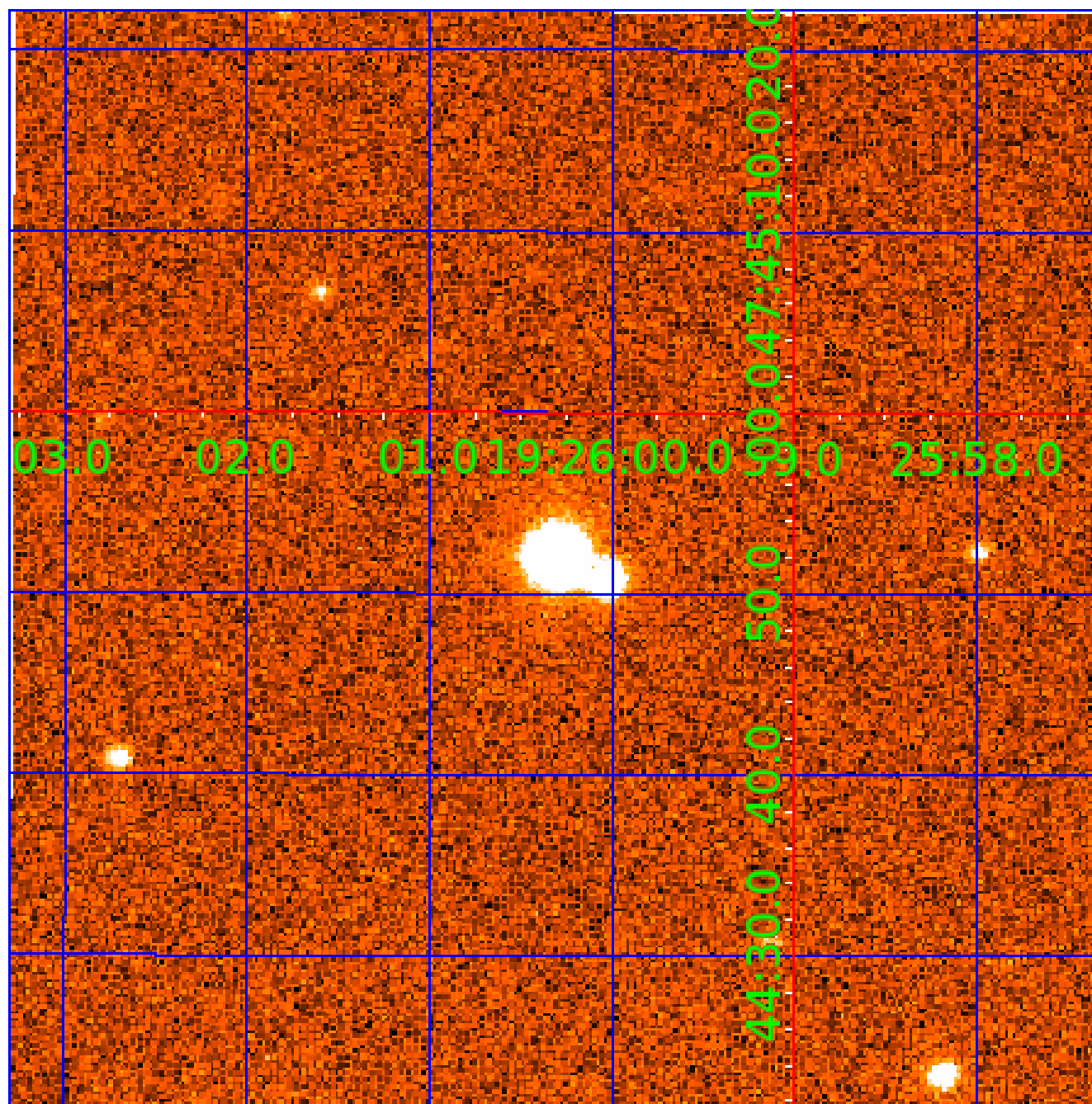


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



# UKIRT Image

Declination



# KIC 010534155

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010534155-01	OBS	4345.01	4.327095	133.411169	100.6	1.182	12.5	15.4	1.46	5776	1.74	903.06
010534155-02	OBS	No	480.682349	234.348714	304.9	15.771	7.4	6.9	1.46	5776	2.70	1.69

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010534155-01	OBS	PC	0.99	0	0	0	0	NO_COMMENT
010534155-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—ALL_TRANS_CHASES—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.

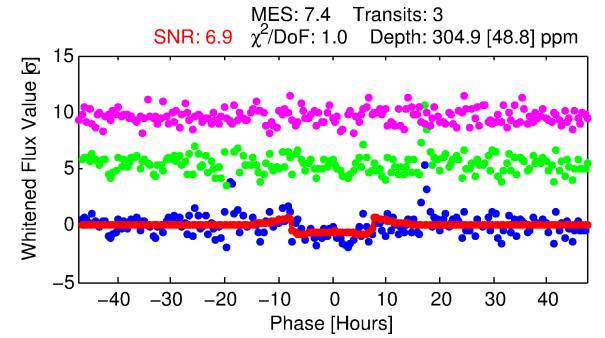
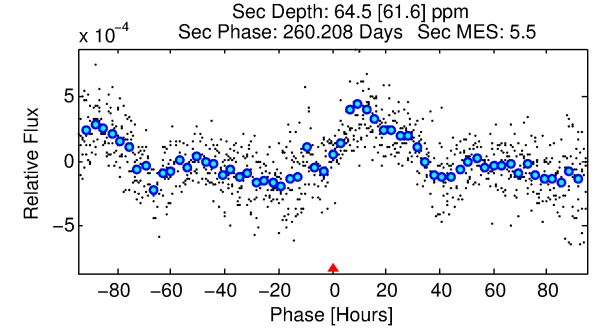
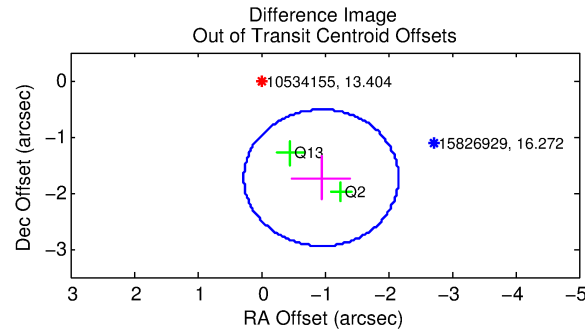
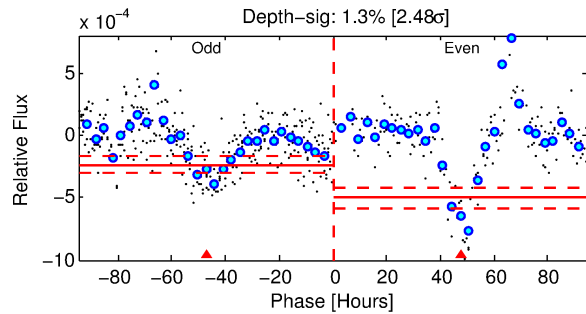
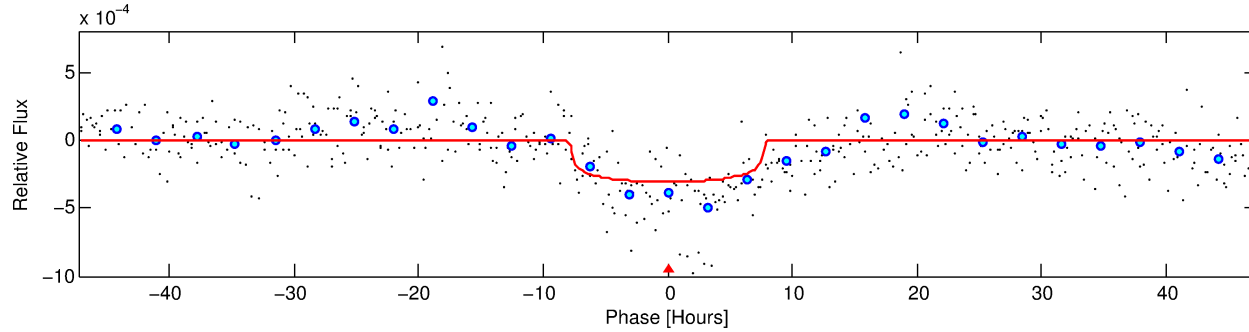
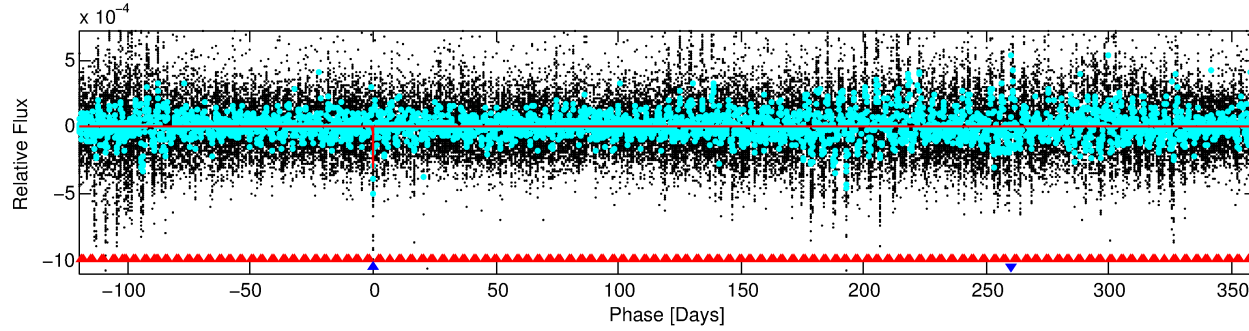
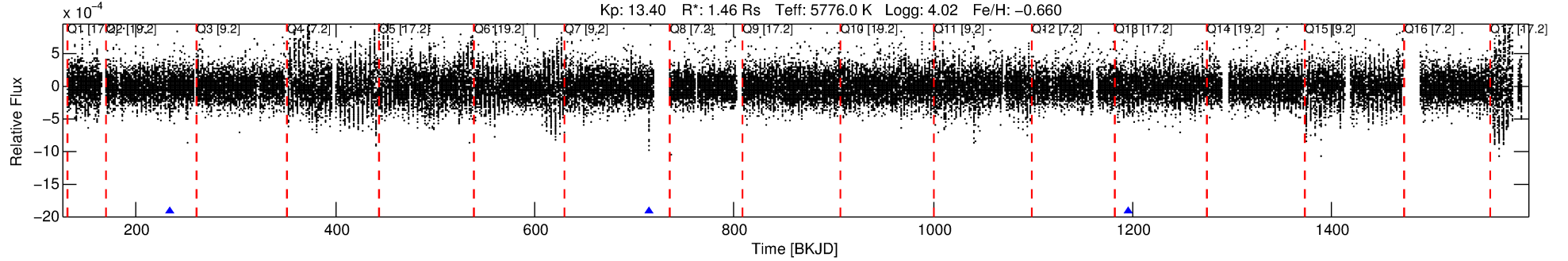
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010534155-02

No Significant Match Found

# DV One-Page Summary

KIC: 10534155 Candidate: 2 of 2 Period: 480.682 d  
KOI: K04345 Corr: No Ephemeris Match



## DV Fit Results:

Period = 480.68235 [0.01069] d  
Epoch = 234.3487 [0.0128] BKJD  
Rp/R\* = 0.0170 [0.0040]  
a/R\* = 175.54 [184.37]  
b = 0.68 [0.83]  
Seff = 1.69 [1.45]  
Teq = 291 [63] K  
Rp = 2.70 [1.39] Re  
a = 1.1173 [0.5597] AU  
Ag = 6062.99 [8276.13] [0.73 $\sigma$ ]  
Teffp = 3967 [1065] K [3.45 $\sigma$ ]

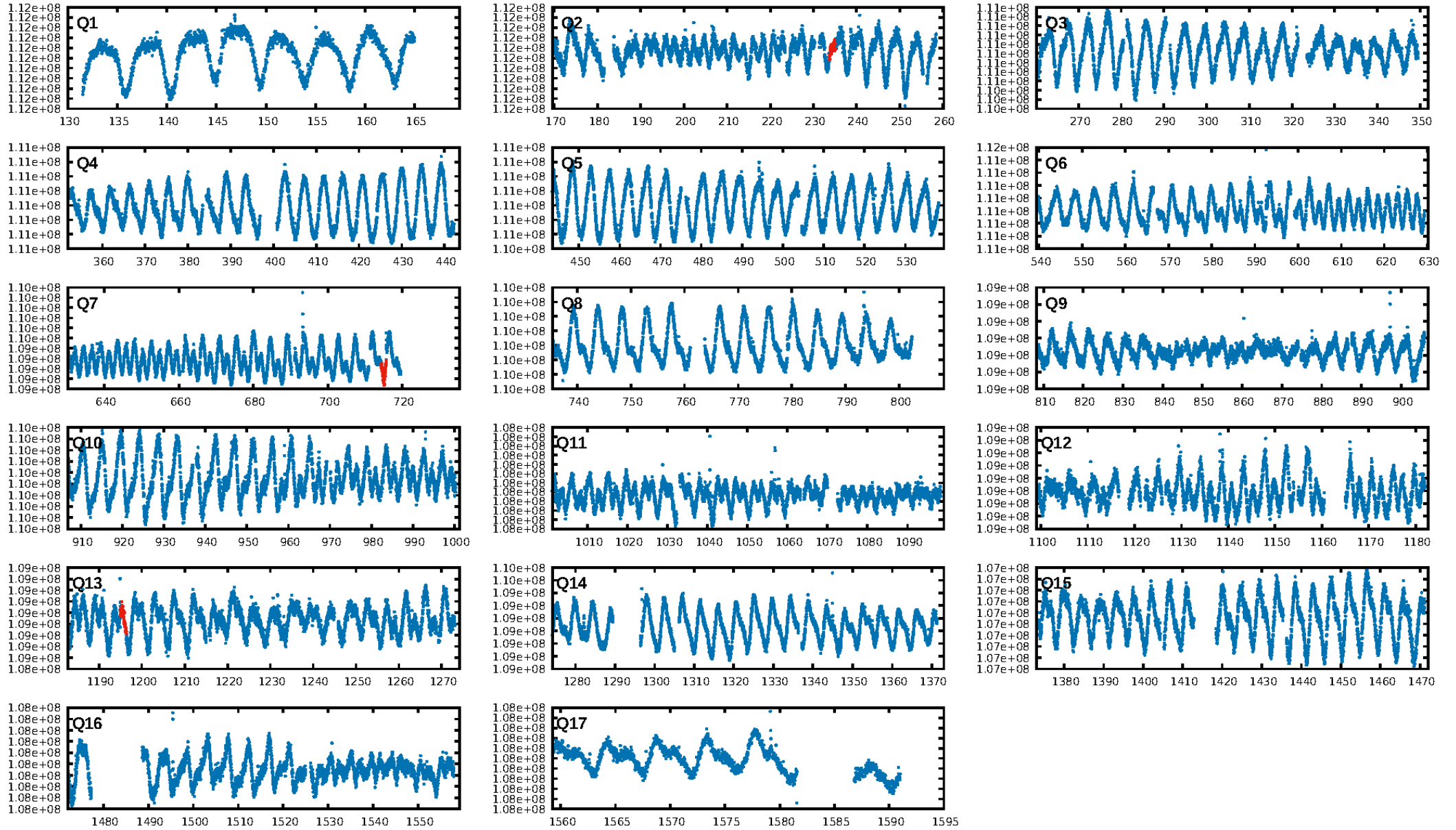
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [722.89 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 28.9%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 3.36e-08  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -0.3764  
Centroid-sig: 9.9%  
Centroid-so: 2.307 arcsec [1.67 $\sigma$ ]  
OotOffset-rm: 1.977 arcsec [4.88 $\sigma$ ]  
KicOffset-rm: 1.743 arcsec [3.36 $\sigma$ ]  
OotOffset-st: 1/0/0/1 [2]  
KicOffset-st: 1/0/0/1 [2]  
DiffImageQuality-fgm: 0.00 [0/2]  
DiffImageOverlap-fno: 1.00 [2/2]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 04:53:15 Z

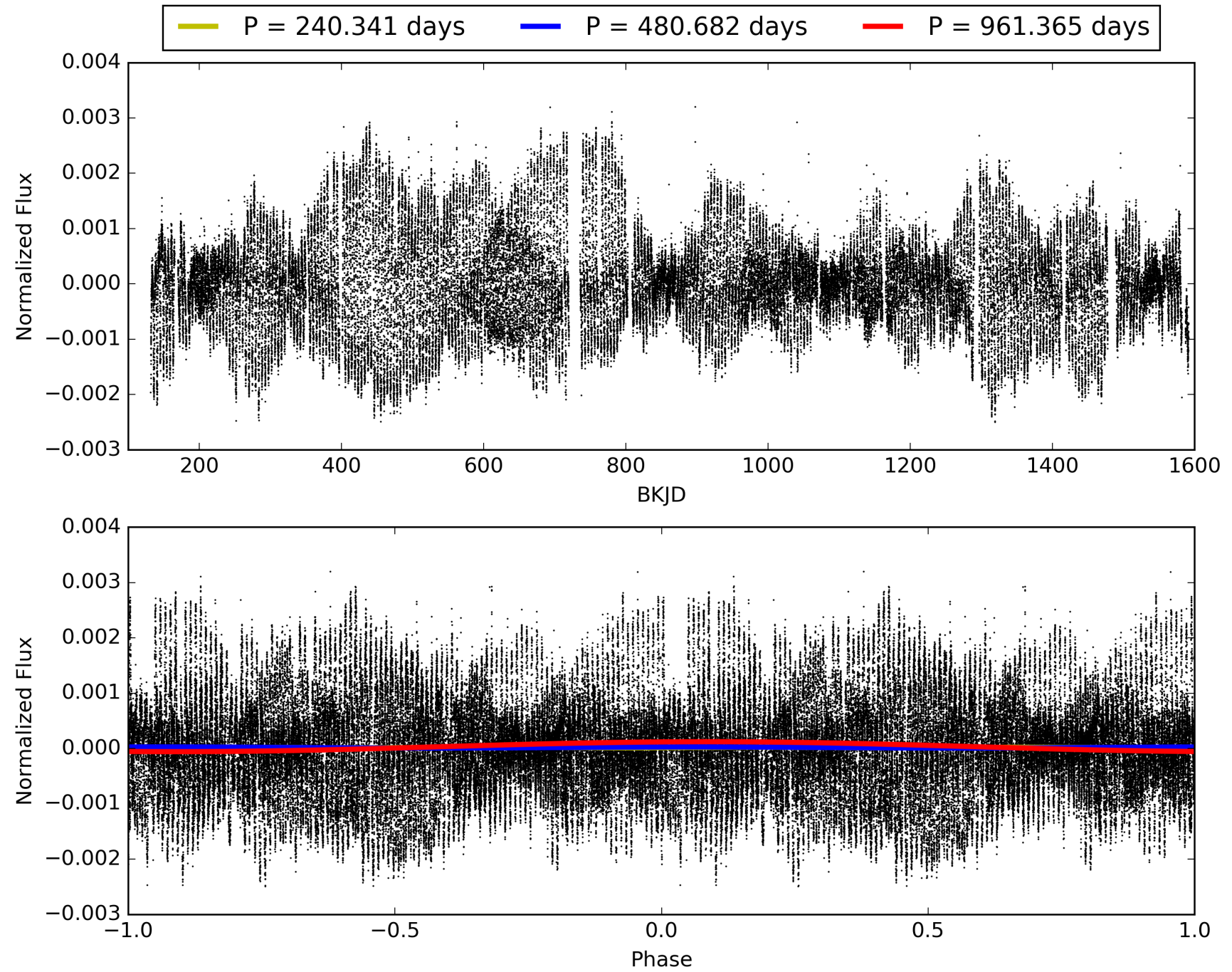
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010534155-02, PDC Light Curves



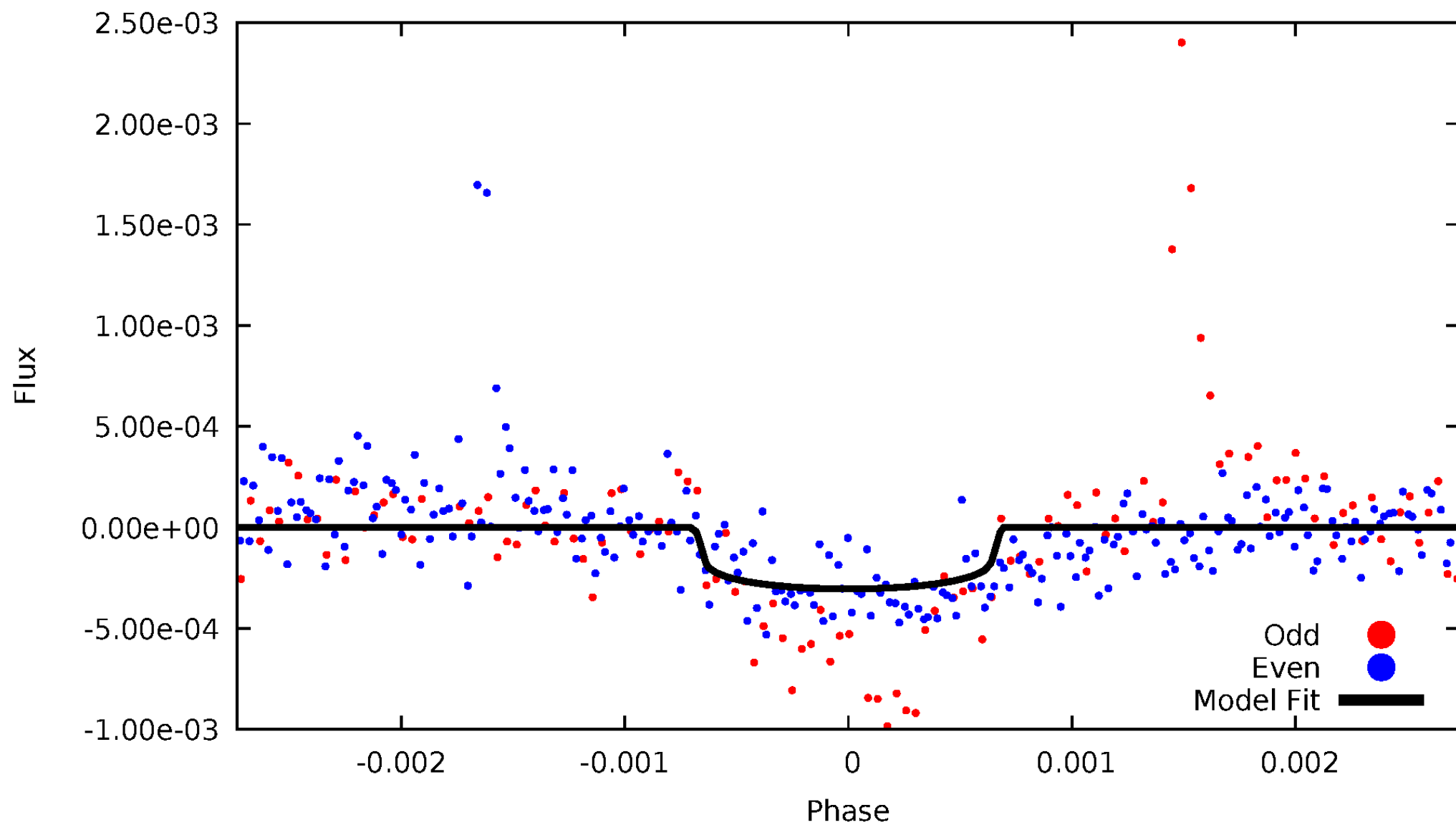


# TCE 010534155-02



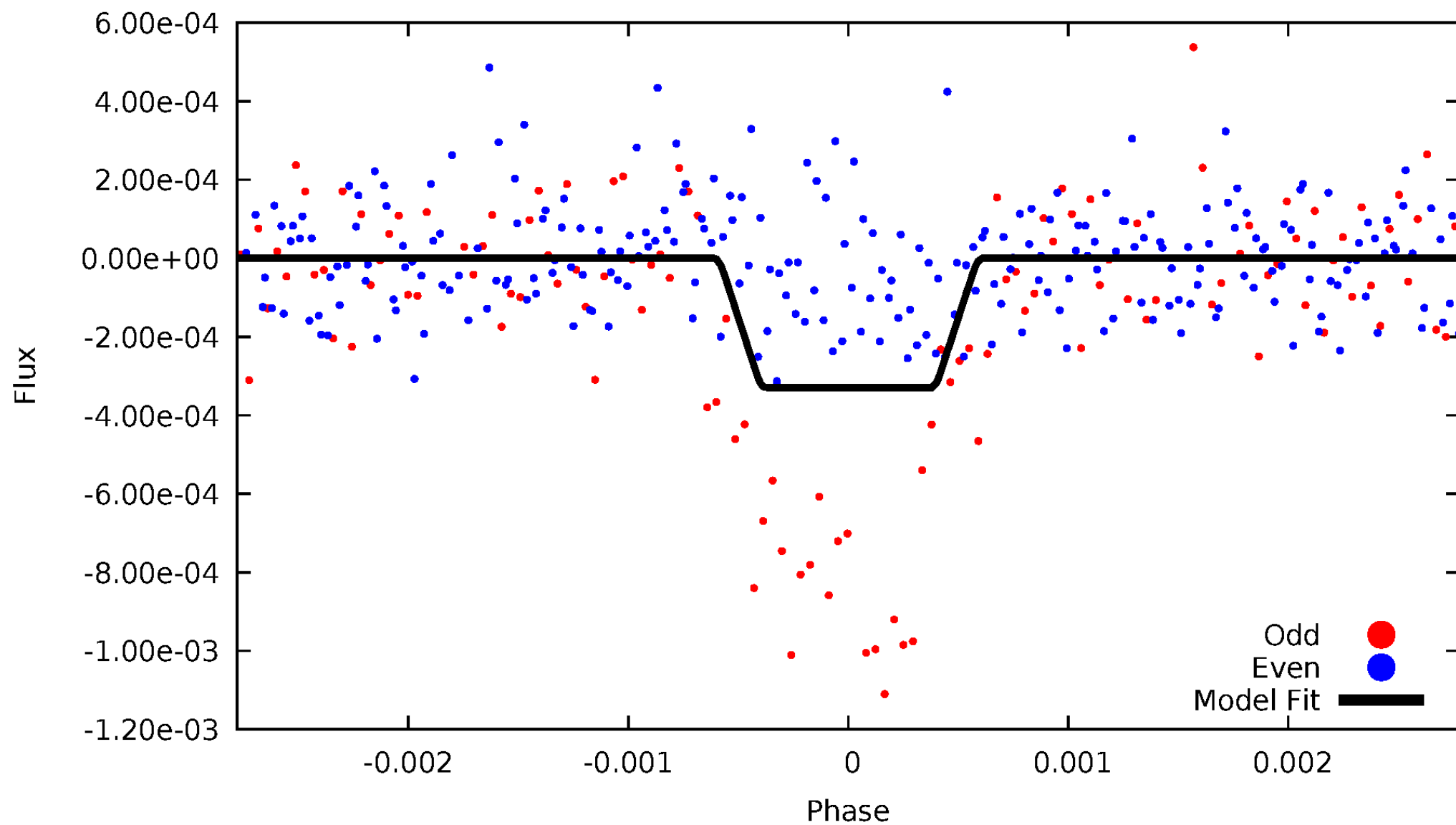
# DV Odd/Even

TCE 010534155-02



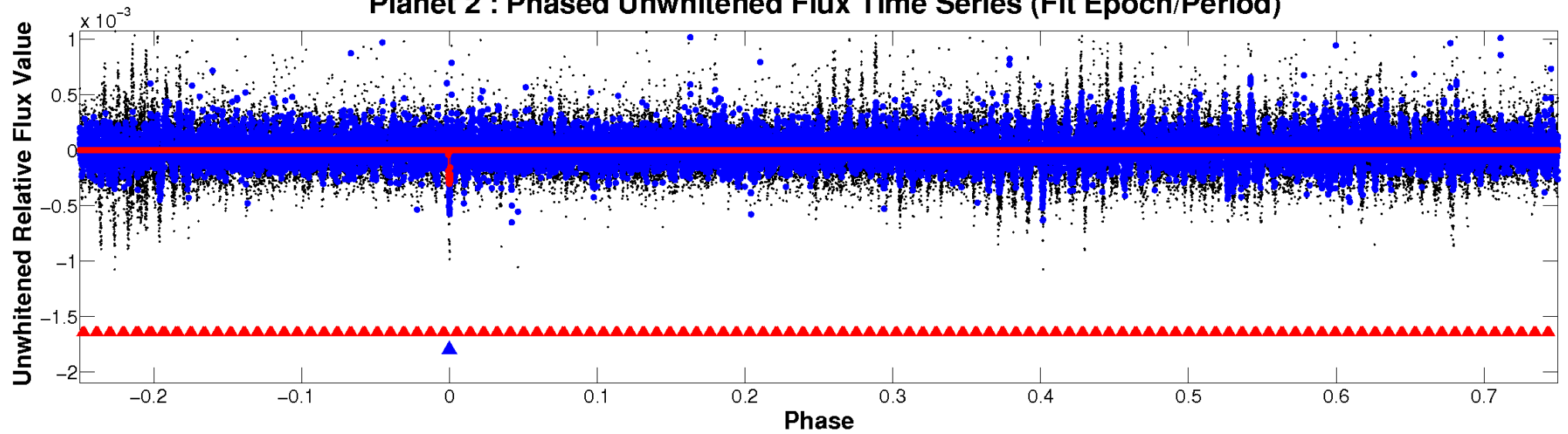
# ALT Odd/Even

TCE 010534155-02

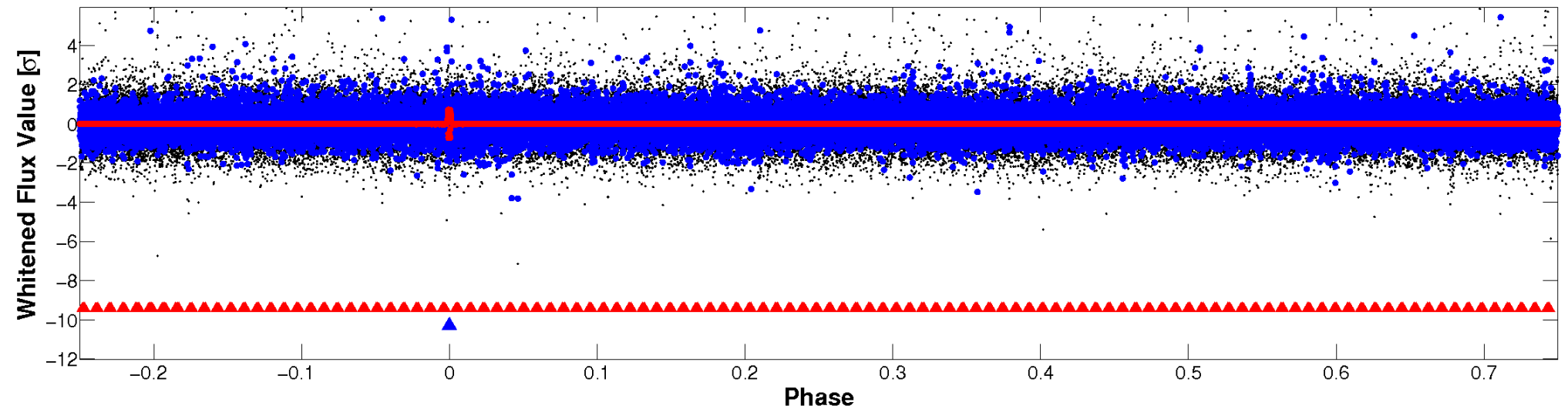


# Non-Whitened Vs. Whitened Light Curve

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

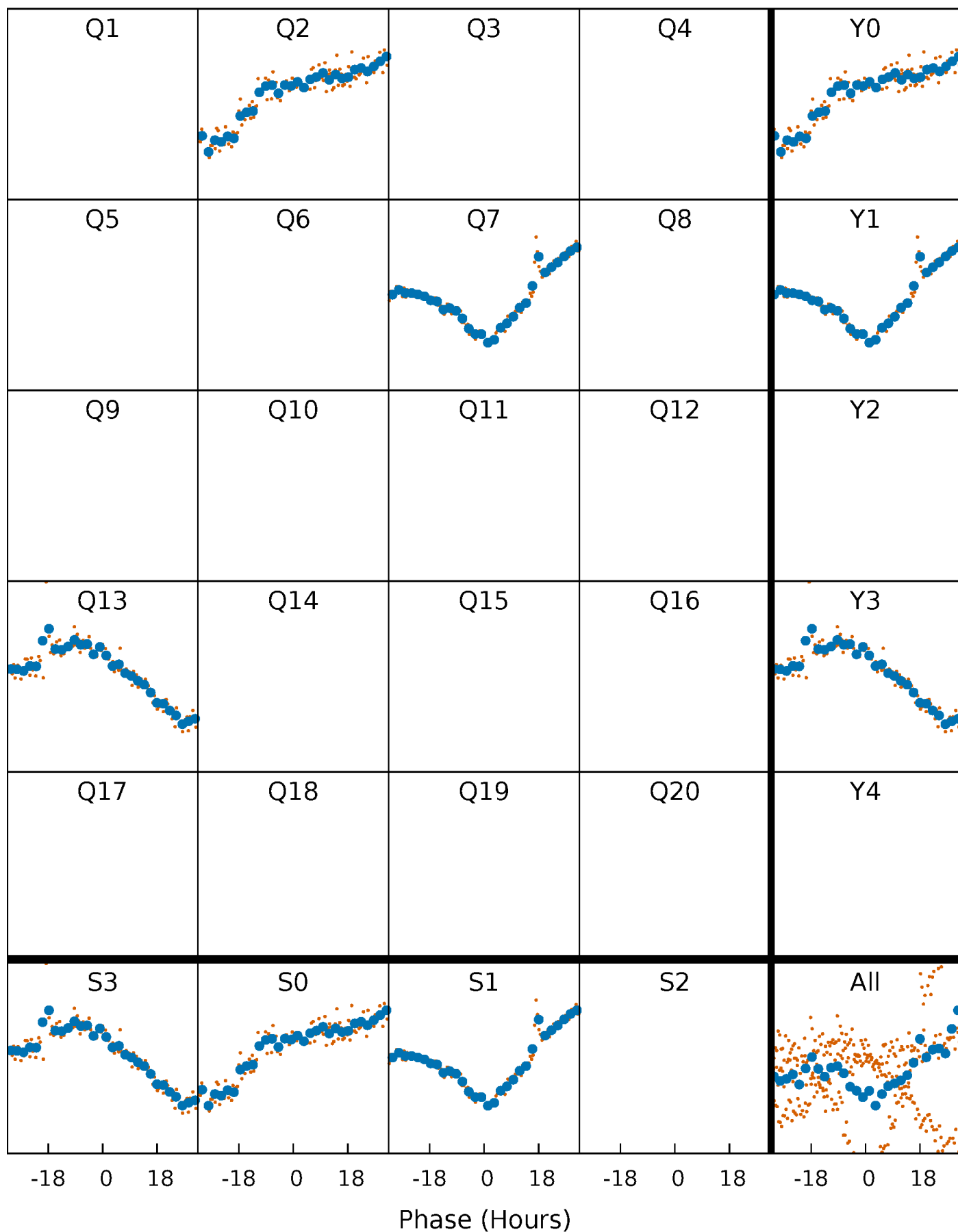


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

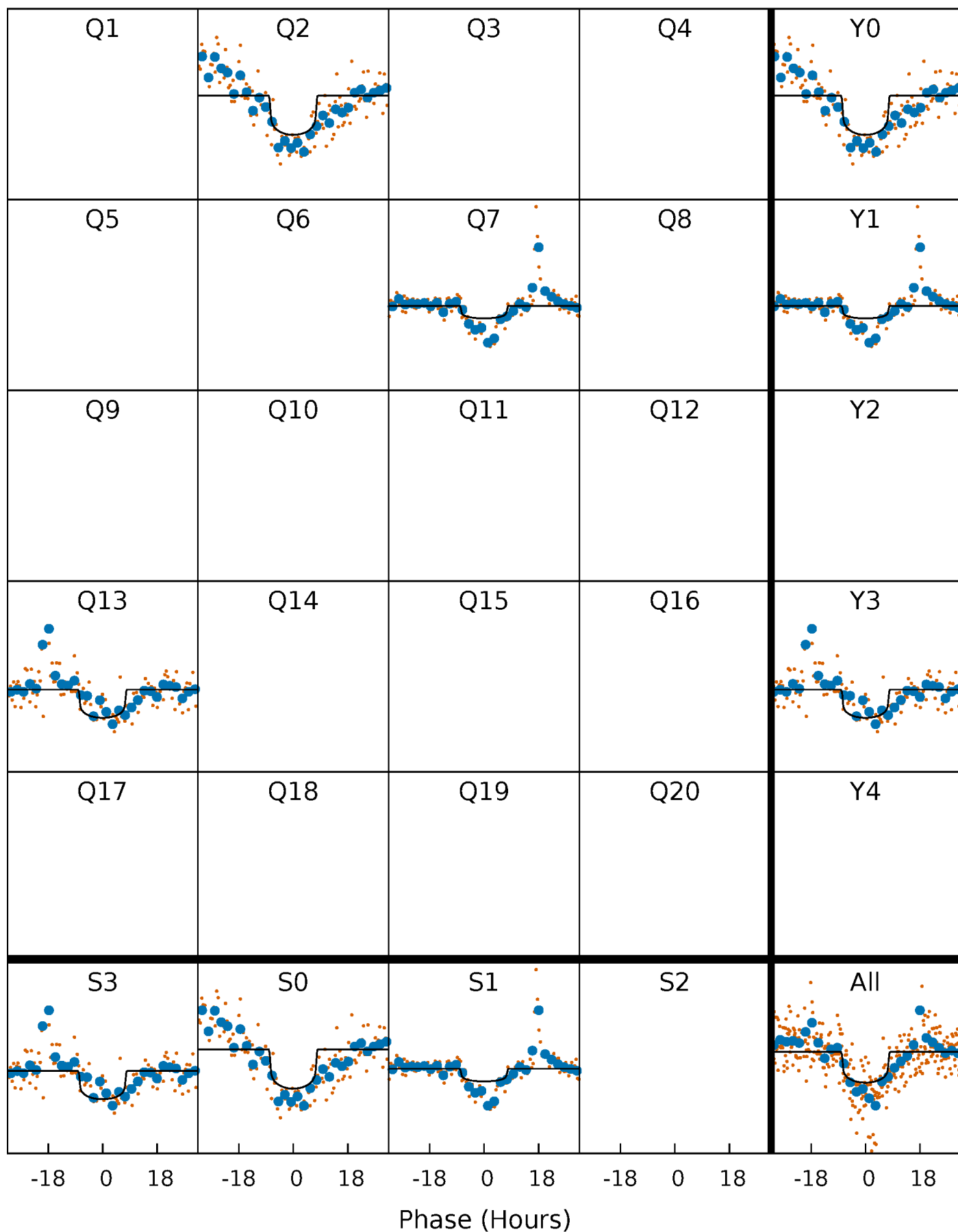
TCE 010534155-02     $P=480.682349$  Days     $T_0=234.348714$  (BKJD)





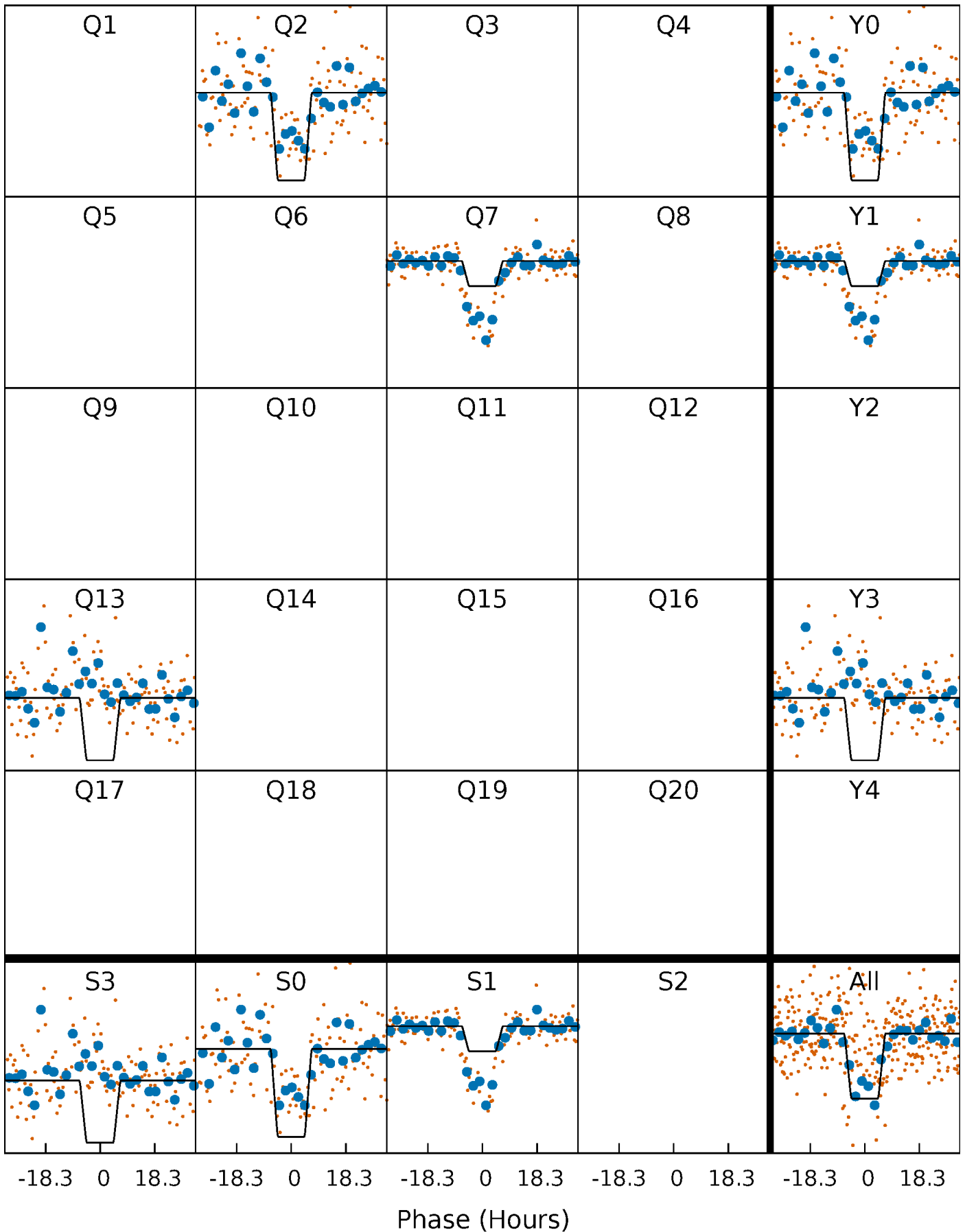
# DV Quarter-Phased Transit Curves

TCE 010534155-02     $P=480.682349$  Days     $T_0=234.348714$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

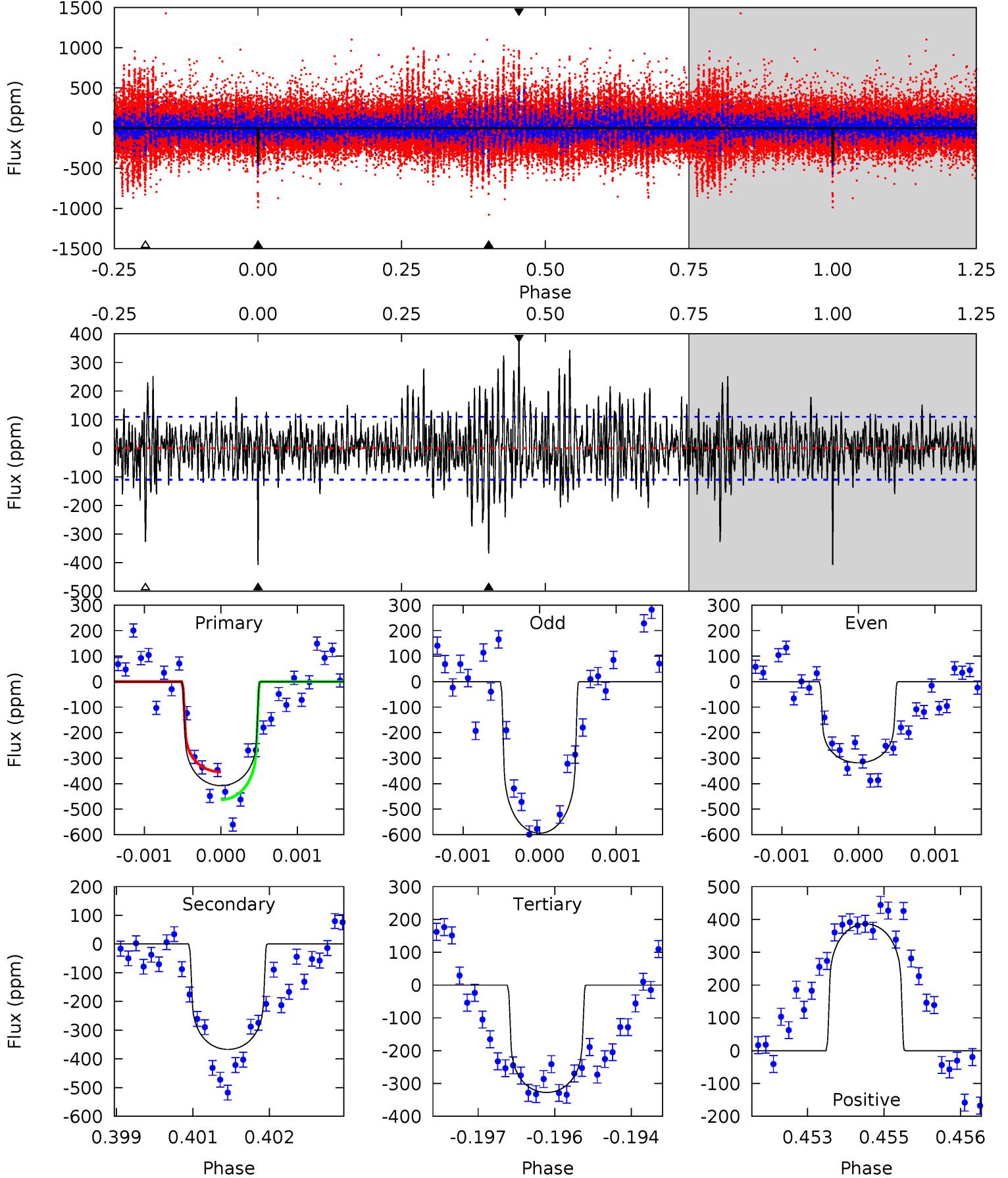
TCE 010534155-02     $P=480.706310$  Days     $T_0=234.328586$  (BKJD)



# DV Model-Shift Uniqueness Test

010534155-02, P = 480.682349 Days, E = 234.348714 Days

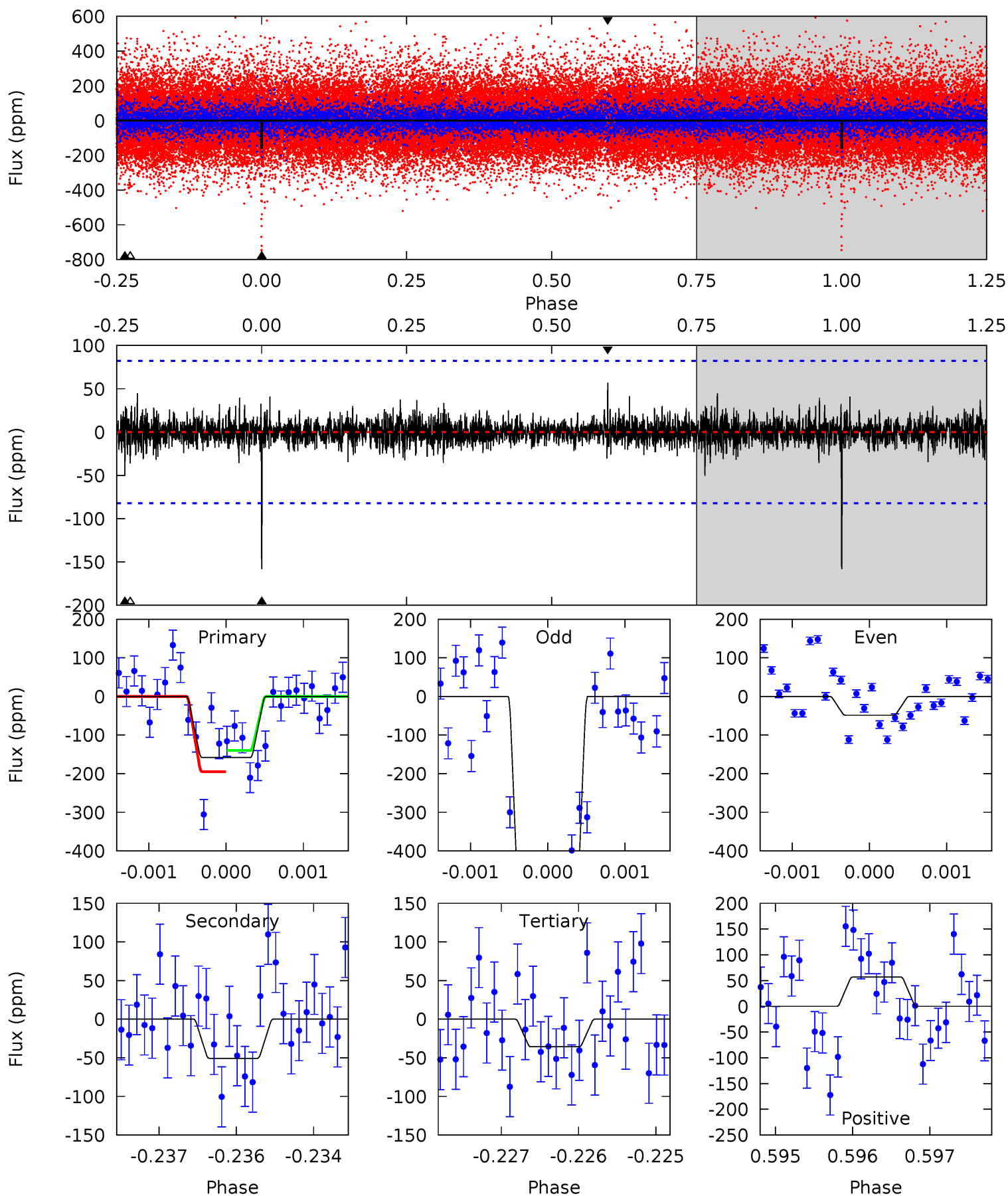
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
20.0	18.0	16.1	19.0	5.39	3.20	4.00	3.94	1.04	1.95	-0.95	6.20	1.03	0.49	2.68



# Alt Model-Shift Uniqueness Test

010534155-02, P = 480.706310 Days, E = 234.328586 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
10.4	3.34	2.36	3.74	5.42	3.24	0.61	8.07	6.68	0.98	-0.40	24.7	1.62	0.26	1.84



### Stellar Parameters For KIC 010534155

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5776^{+174}_{-157}$	$4.018^{+0.518}_{-0.222}$	$-0.660^{+0.350}_{-0.250}$	$1.455^{+0.544}_{-0.665}$	$0.804^{+0.103}_{-0.060}$	$0.367^{+1.942}_{-0.200}$
	+3%/-3%	+13%/-6%	+53%/-38%	+37%/-46%	+13%/-7%	+528%/-55%
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 010534155-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-367 \pm 20$	$2.57^{+0.93}_{-0.83}$	$399^{+43}_{-53}$	$6137^{+944}_{-619}$	$38782^{+47681}_{-17815}$
Alt.	$-51 \pm 15$	$2.74^{+0.97}_{-0.91}$	$404^{+39}_{-55}$	$3964^{+466}_{-357}$	$4705^{+5916}_{-2343}$

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

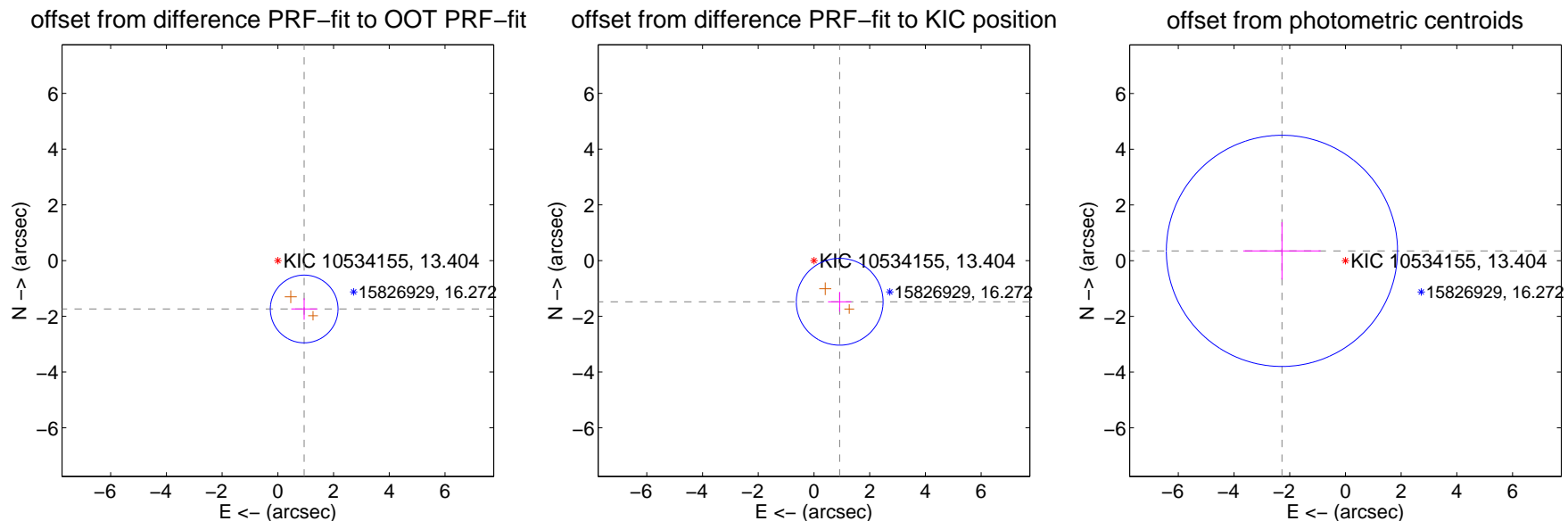
## DV Centroid Data

Supplemental centroid analysis for 010534155-02. Kepler magnitude: 13.40. Transit SNR 6.92

There are 0 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.30 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.977 \pm 0.405$	4.88	$-0.946 \pm 0.463$	$-1.736 \pm 0.386$
PRF-fit source offset from KIC position	$1.743 \pm 0.519$	3.36	$-0.923 \pm 0.418$	$-1.478 \pm 0.356$
photometric centroid source offset	$2.31 \pm 1.38$	1.67	$2.28 \pm 1.39$	$0.35 \pm 1.03$



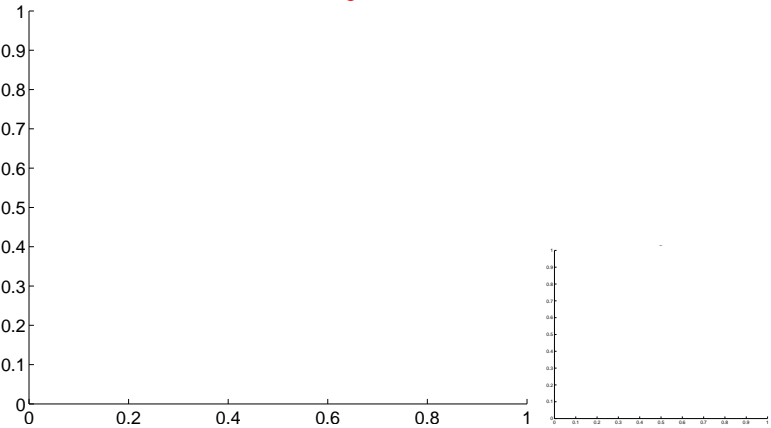
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

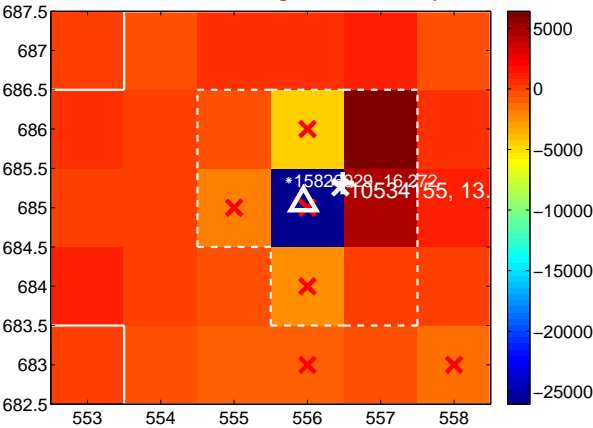
Q1 no difference image



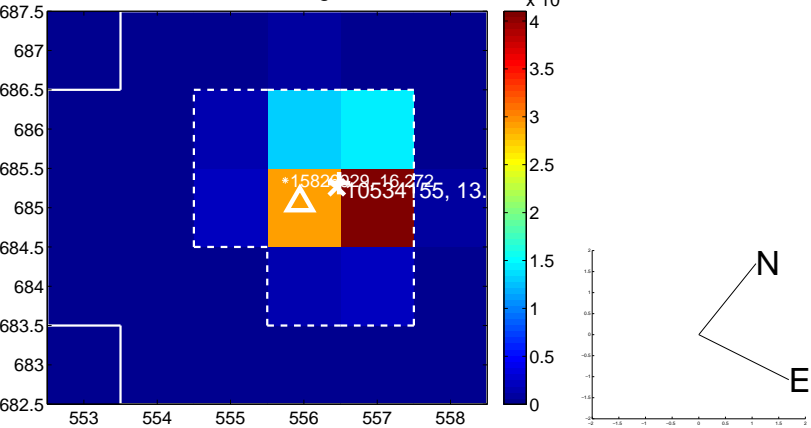
Q1 no OOT image



Q2 difference image. Poor Quality



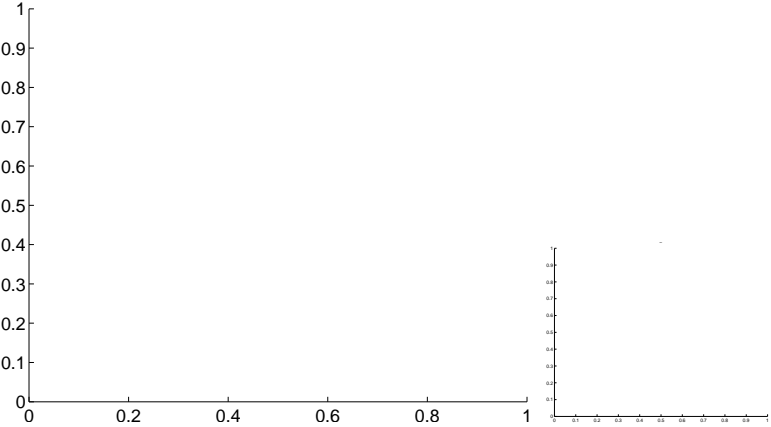
Q2 OOT image



Q3 no difference image



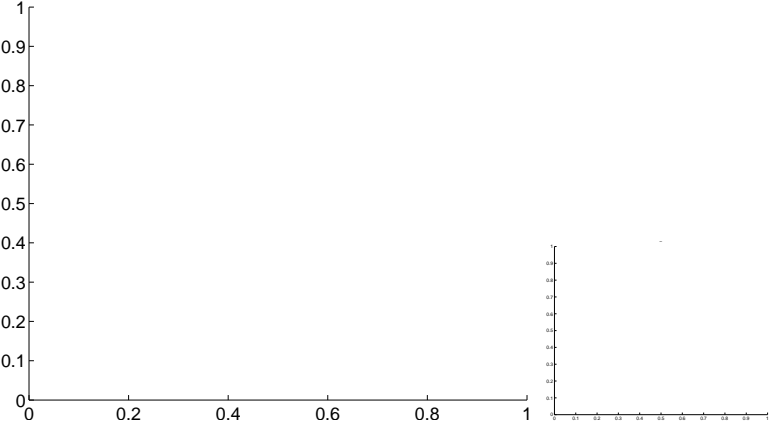
Q3 no OOT image



Q4 no difference image



Q4 no OOT image





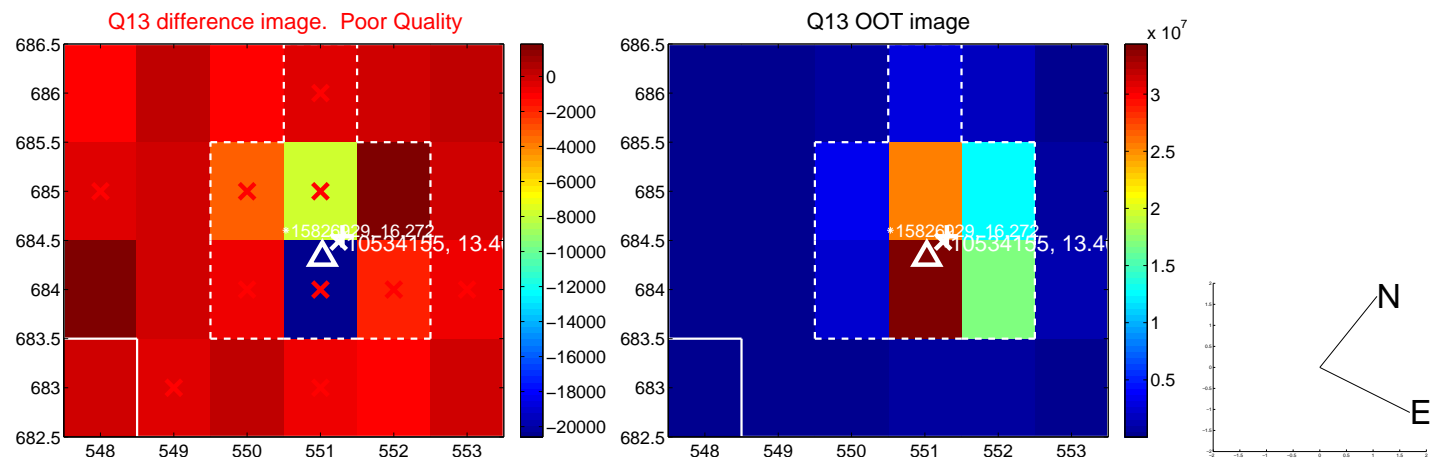
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



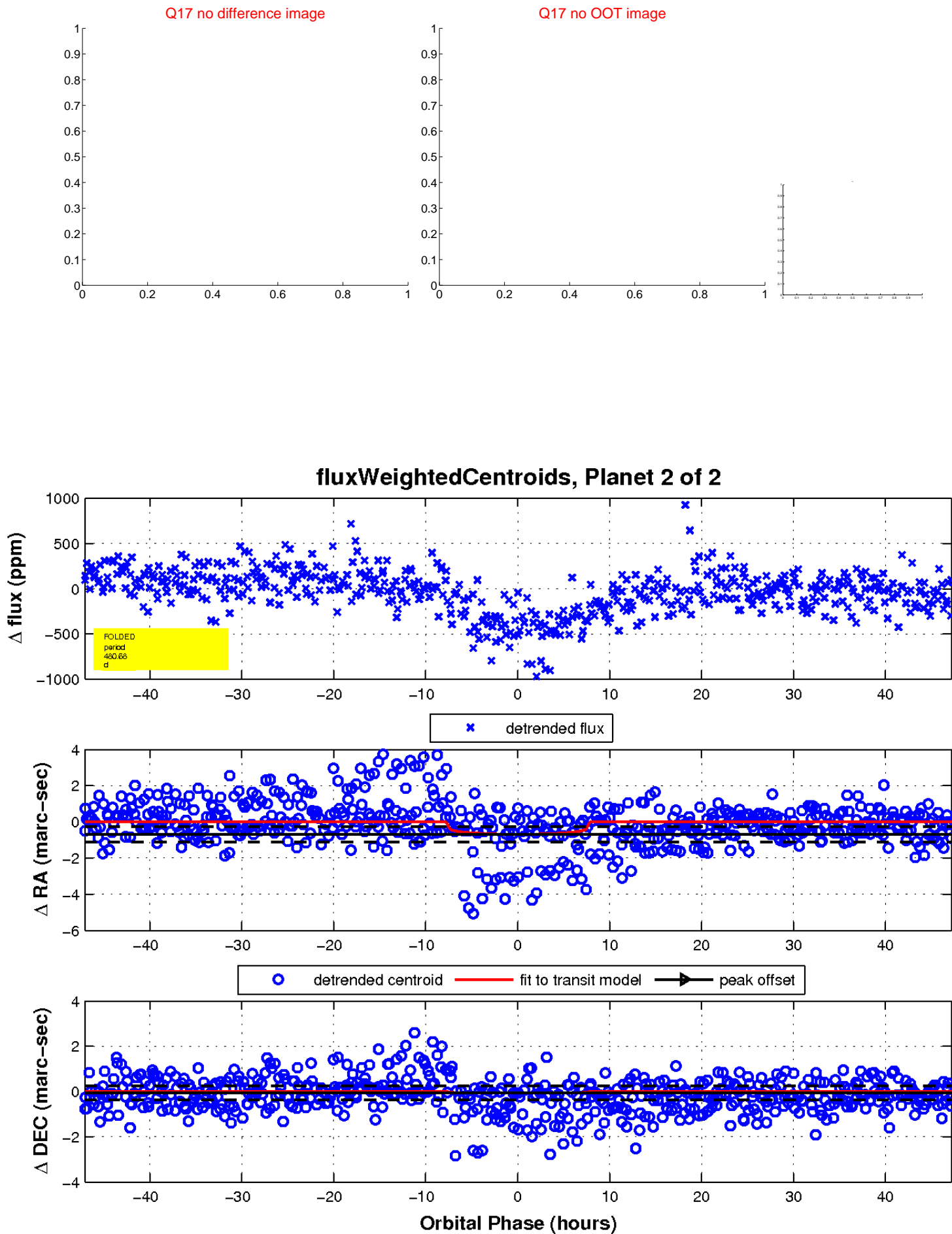
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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UKIRT Image

