

# KIC 007811537

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007811537-01	OBS	8145.02	244.587873	159.349398	465.8	9.897	7.8	7.3	1.12	6321	2.78	2.73
007811537-02	OBS	8145.01	16.933957	146.004604	262.8	4.542	7.2	7.6	1.12	6321	3.42	95.89

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007811537-01	OBS	FP	0.31	1	0	0	0	INDIV_TRANS_MARSHALL—CENT_FEW_DIFFS
007811537-02	OBS	FP	0.20	1	0	0	0	MOD_NONUNIQ_ALT—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.

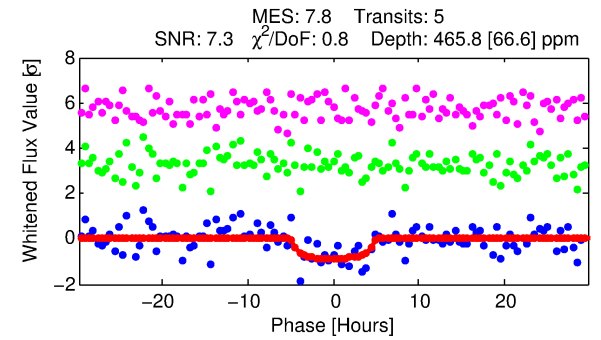
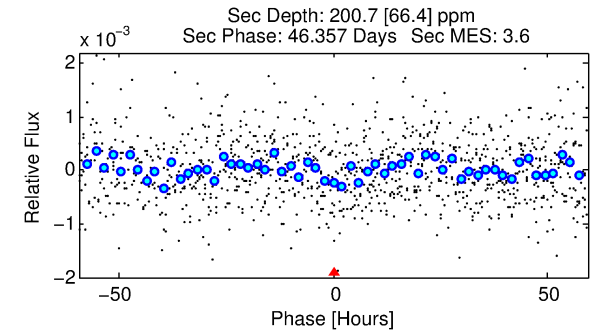
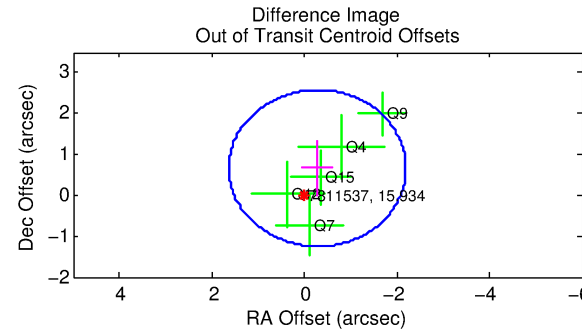
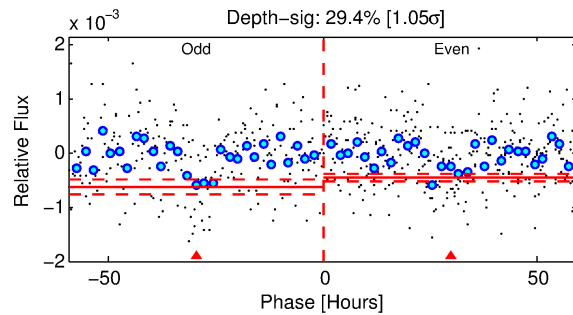
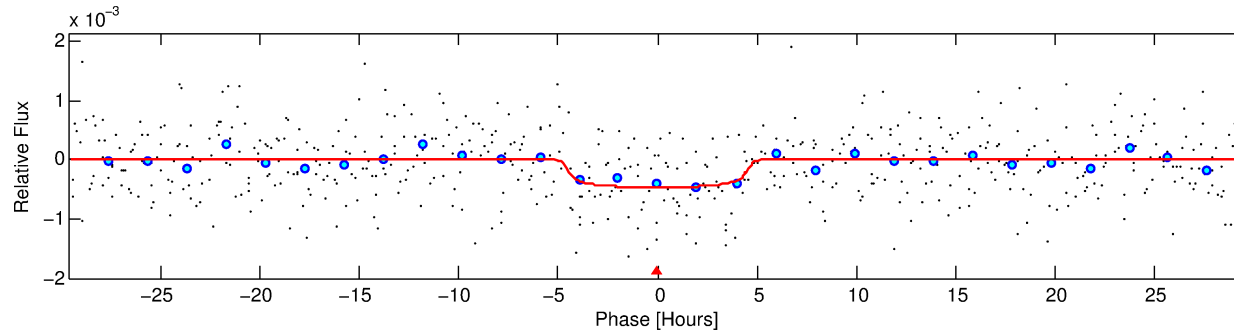
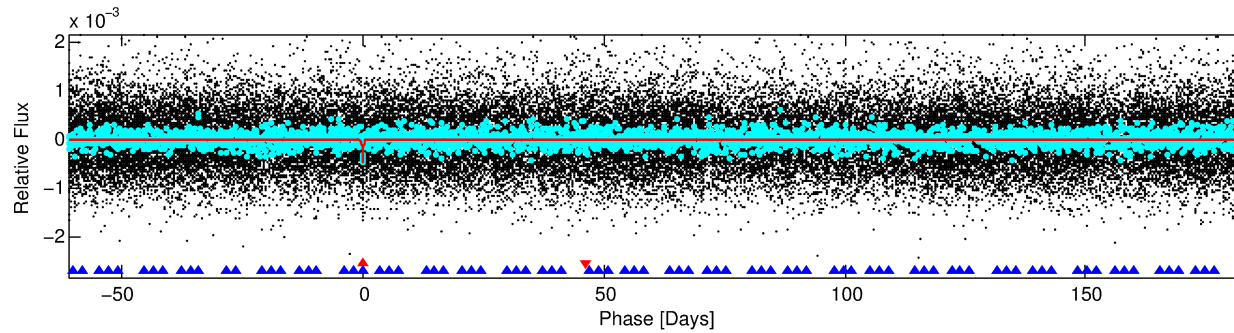
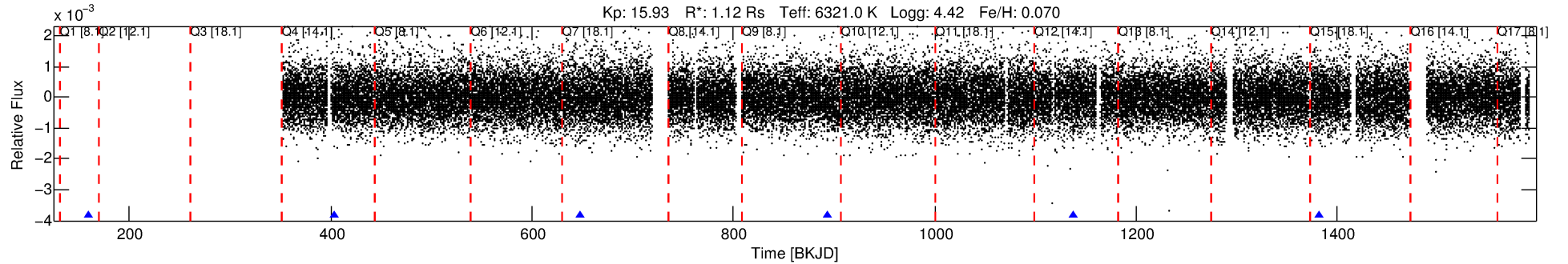
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007811537-01

No Significant Match Found

# DV One-Page Summary

KIC: 7811537 Candidate: 1 of 2 Period: 244.588 d



## DV Fit Results:

Period = 244.58787 [0.00963] d  
Epoch = 159.3494 [0.0312] BKJD  
Rp/R\* = 0.0227 [0.0059]  
a/R\* = 102.30 [135.33]  
b = 0.87 [0.38]  
Seff = 2.73 [1.13]  
Teq = 328 [34] K  
Rp = 2.78 [1.17] Re  
a = 0.8149 [0.2210] AU  
Ag = 9475.75 [6919.91] [1.37 $\sigma$ ]  
Teffp = 4998 [796] K [5.86 $\sigma$ ]

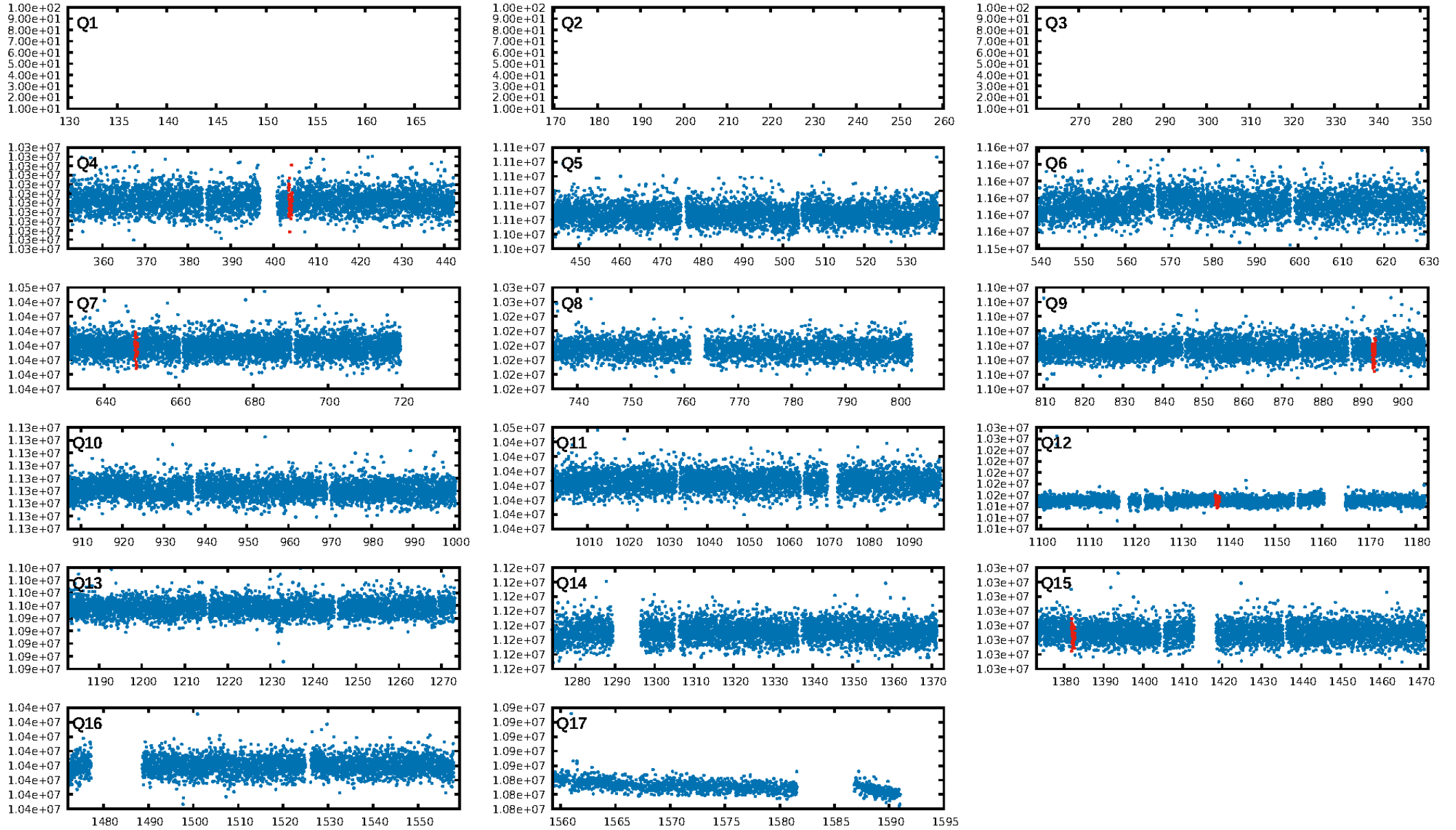
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [501.73 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 70.8%  
ModelChiSquareGof-sig: 99.8%  
Bootstrap-pfa: 1.09e-15  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: -1.705  
Centroid-sig: 99.7%  
Centroid-so: 0.149 arcsec [0.06 $\sigma$ ]  
OotOffset-rm: 0.720 arcsec [1.13 $\sigma$ ]  
KicOffset-rm: 0.723 arcsec [1.17 $\sigma$ ]  
OotOffset-st: 0/2/2/1 [5]  
KicOffset-st: 0/2/2/1 [5]  
DiffImageQuality-fgm: 1.00 [5/5]  
DiffImageOverlap-fno: 0.80 [4/5]

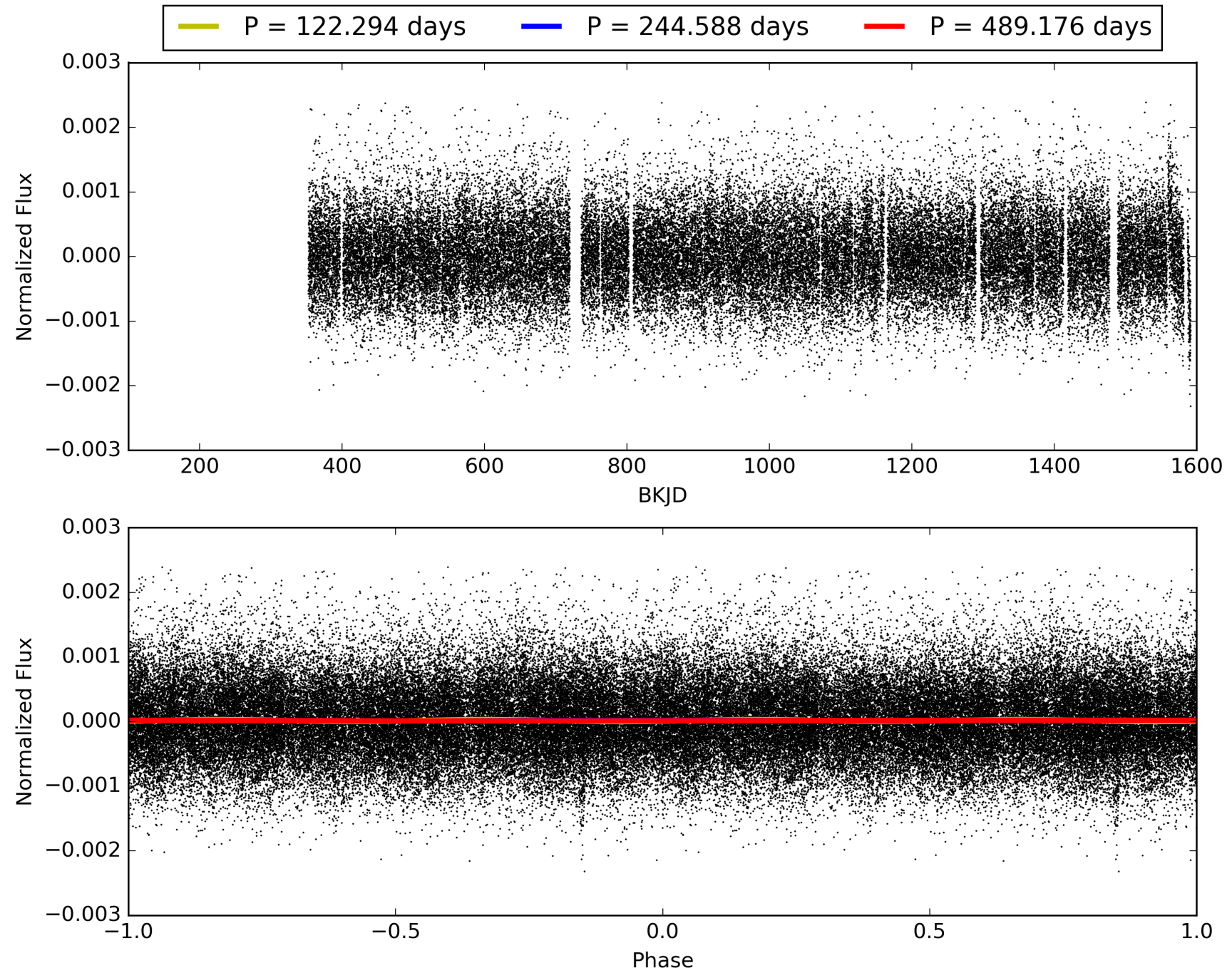
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 02:05:11 Z

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

# TCE 007811537-01, PDC Light Curves

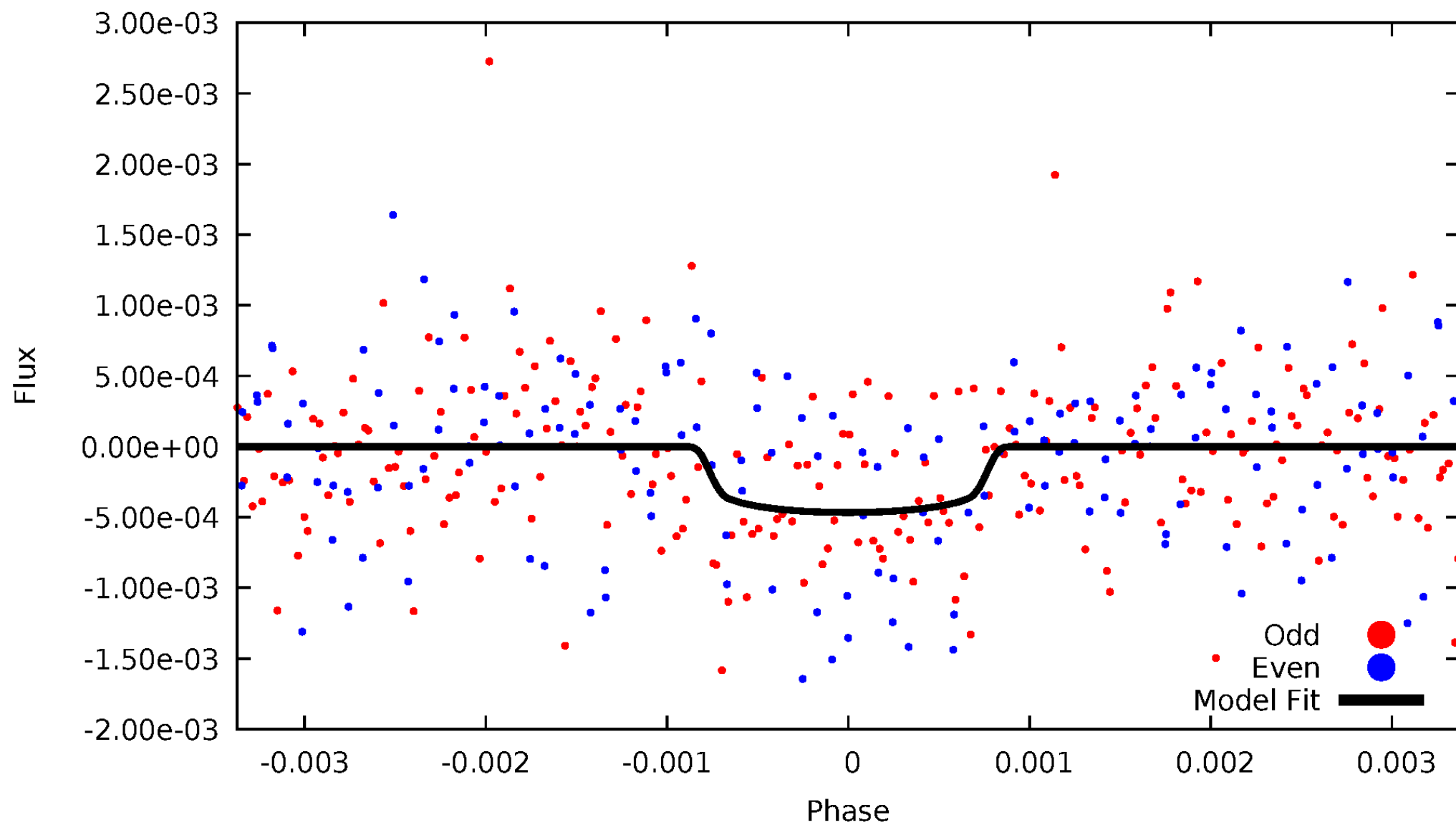


TCE 007811537-01



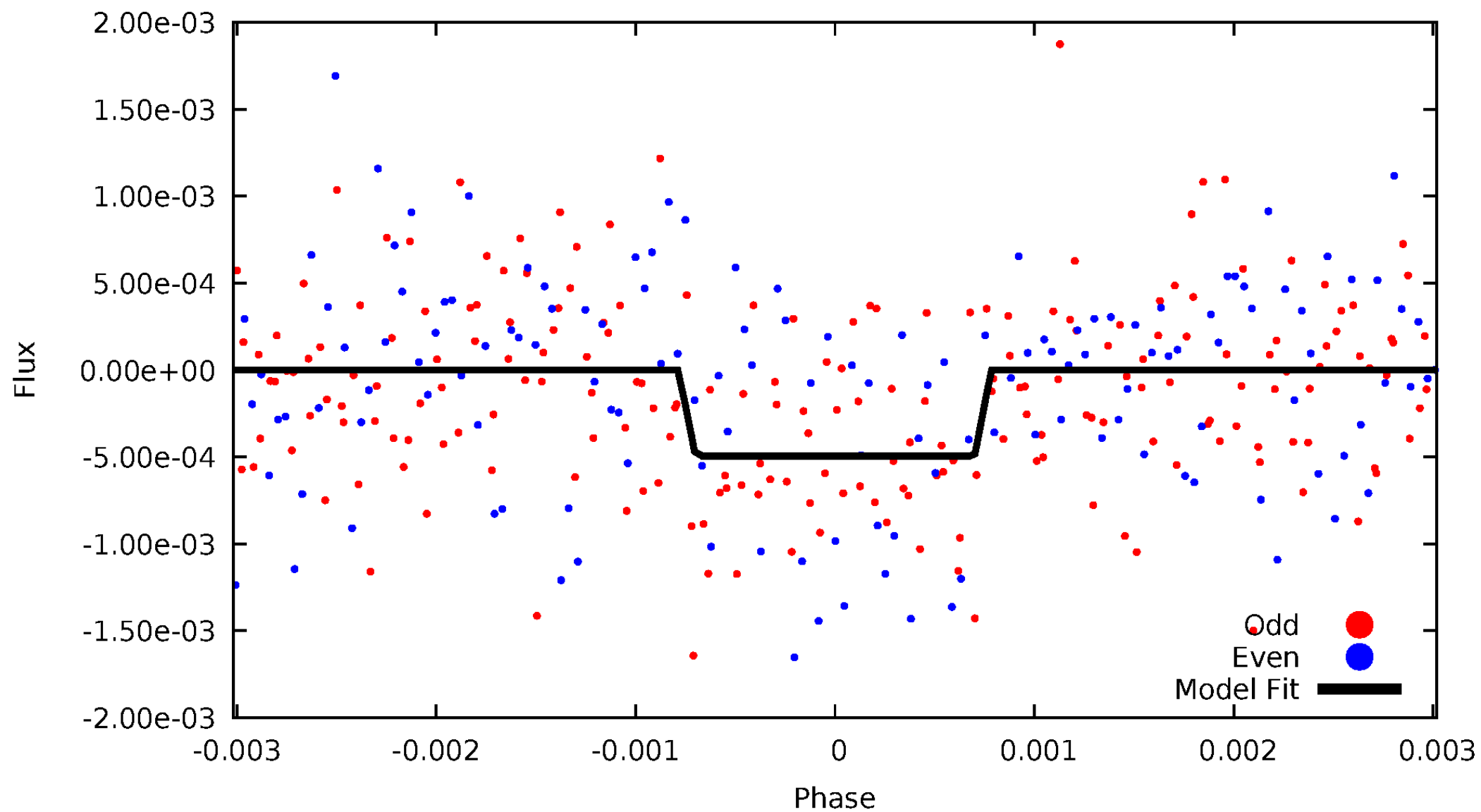
# DV Odd/Even

TCE 007811537-01



# ALT Odd/Even

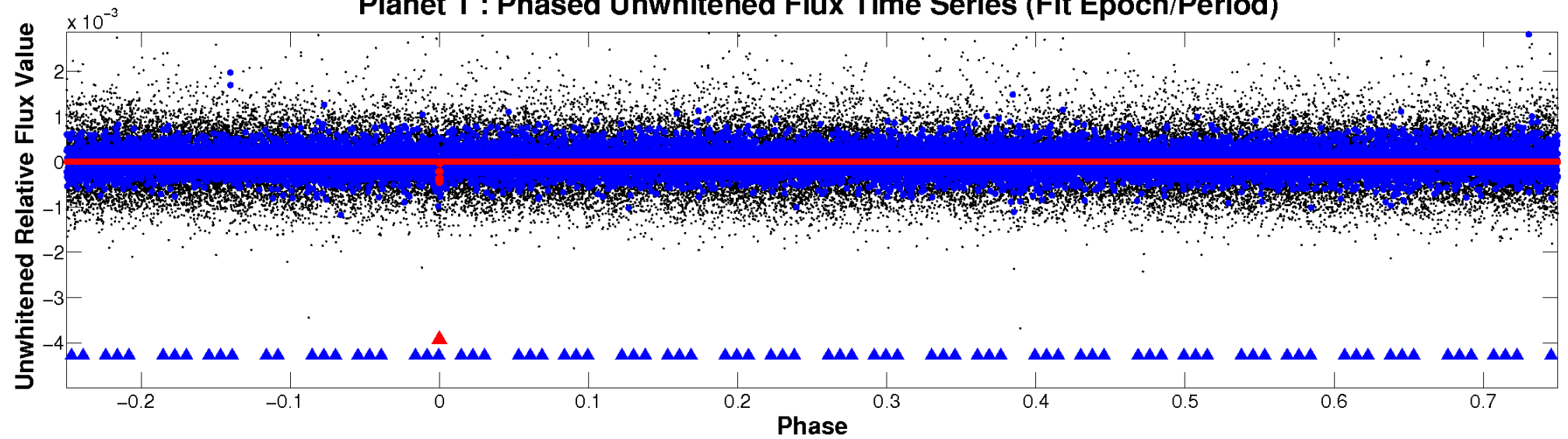
TCE 007811537-01



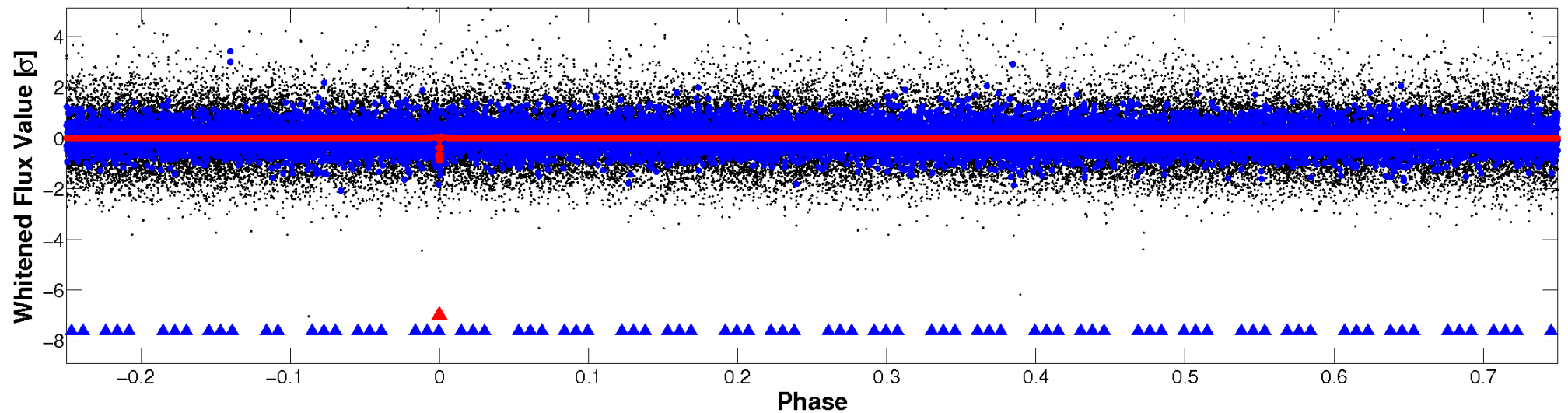


# Non-Whitened Vs. Whitened Light Curve

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

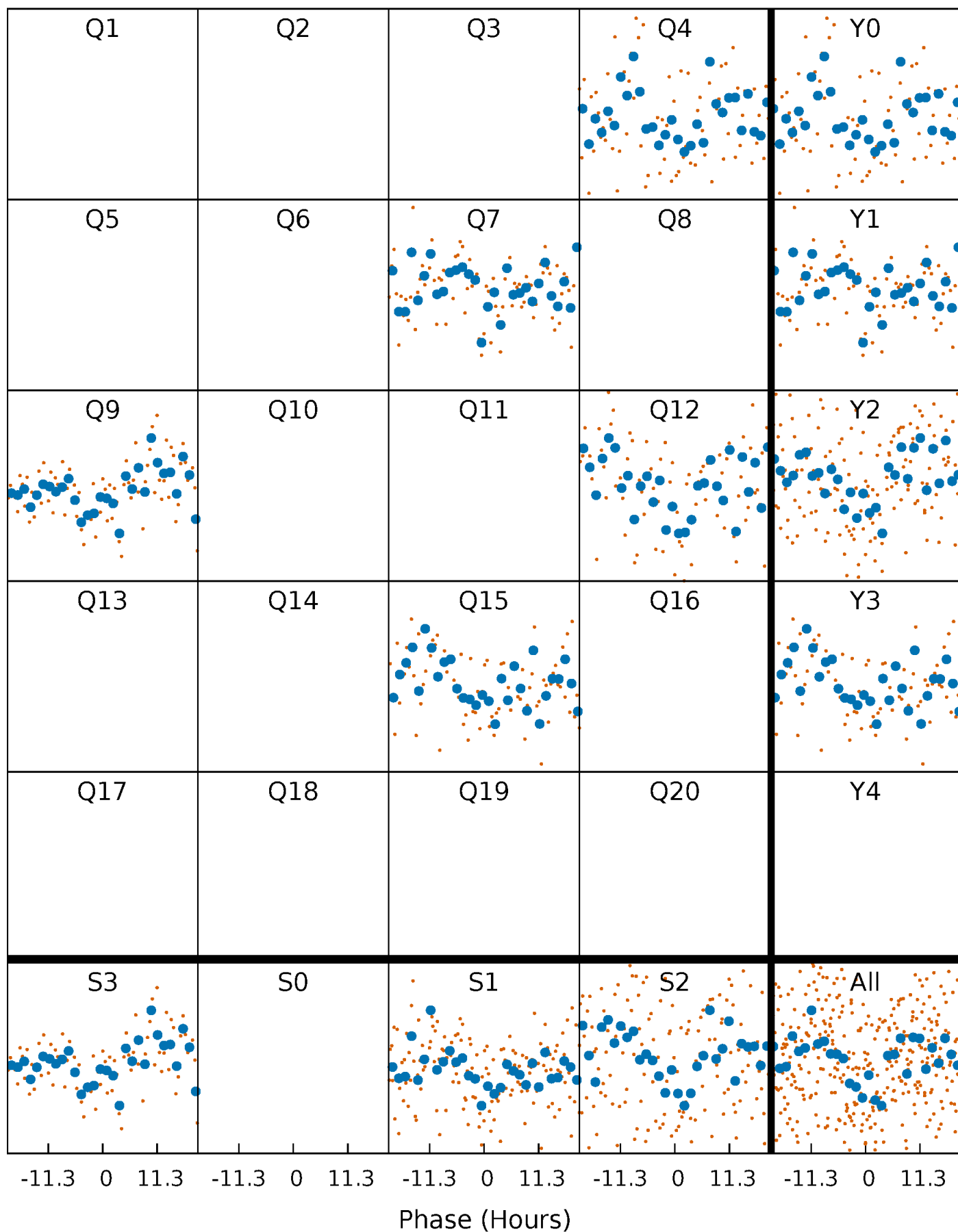


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

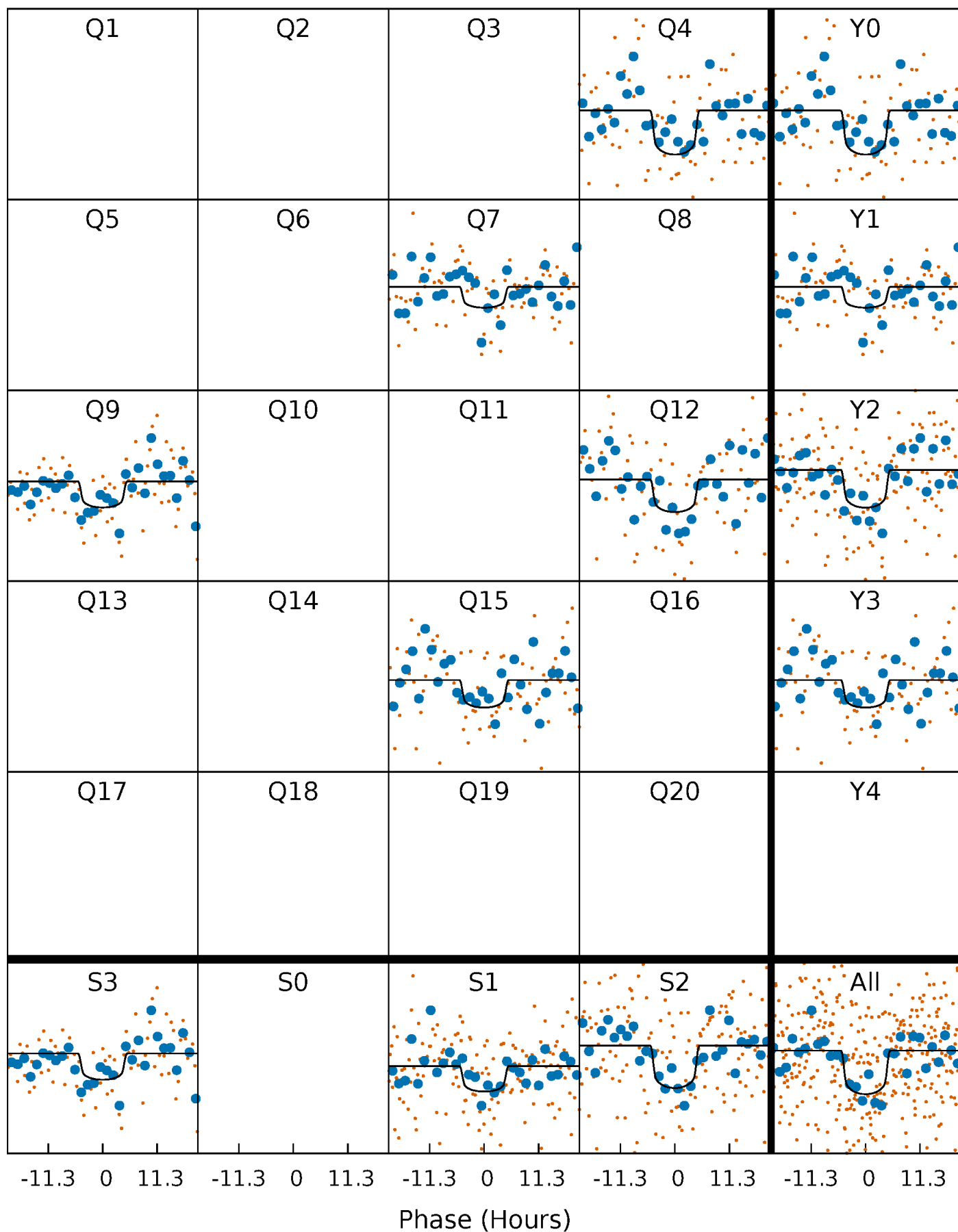
TCE 007811537-01 P=244.587873 Days  $T_0=159.349398$  (BKJD)





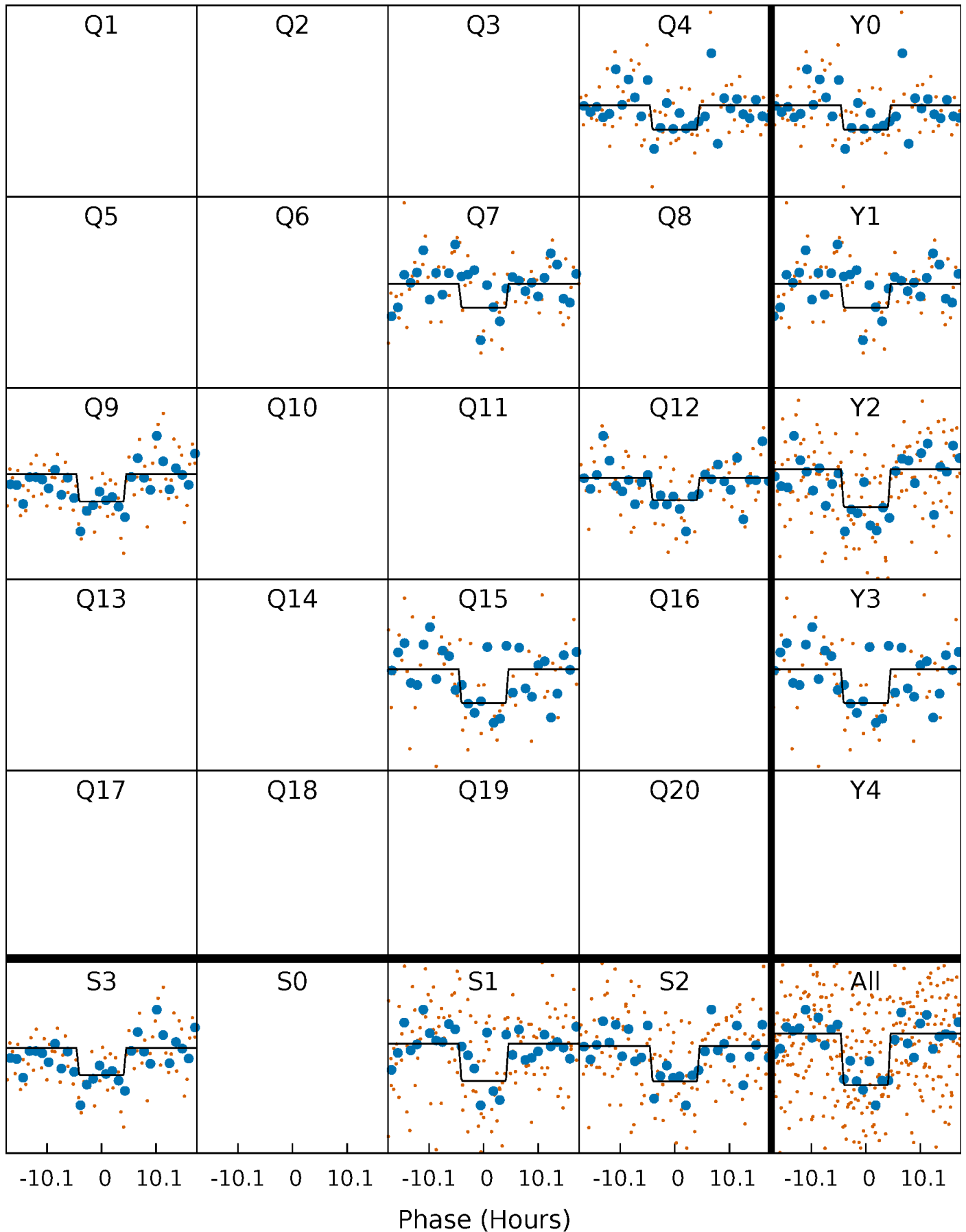
# DV Quarter-Phased Transit Curves

TCE 007811537-01 P=244.587873 Days  $T_0=159.349398$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

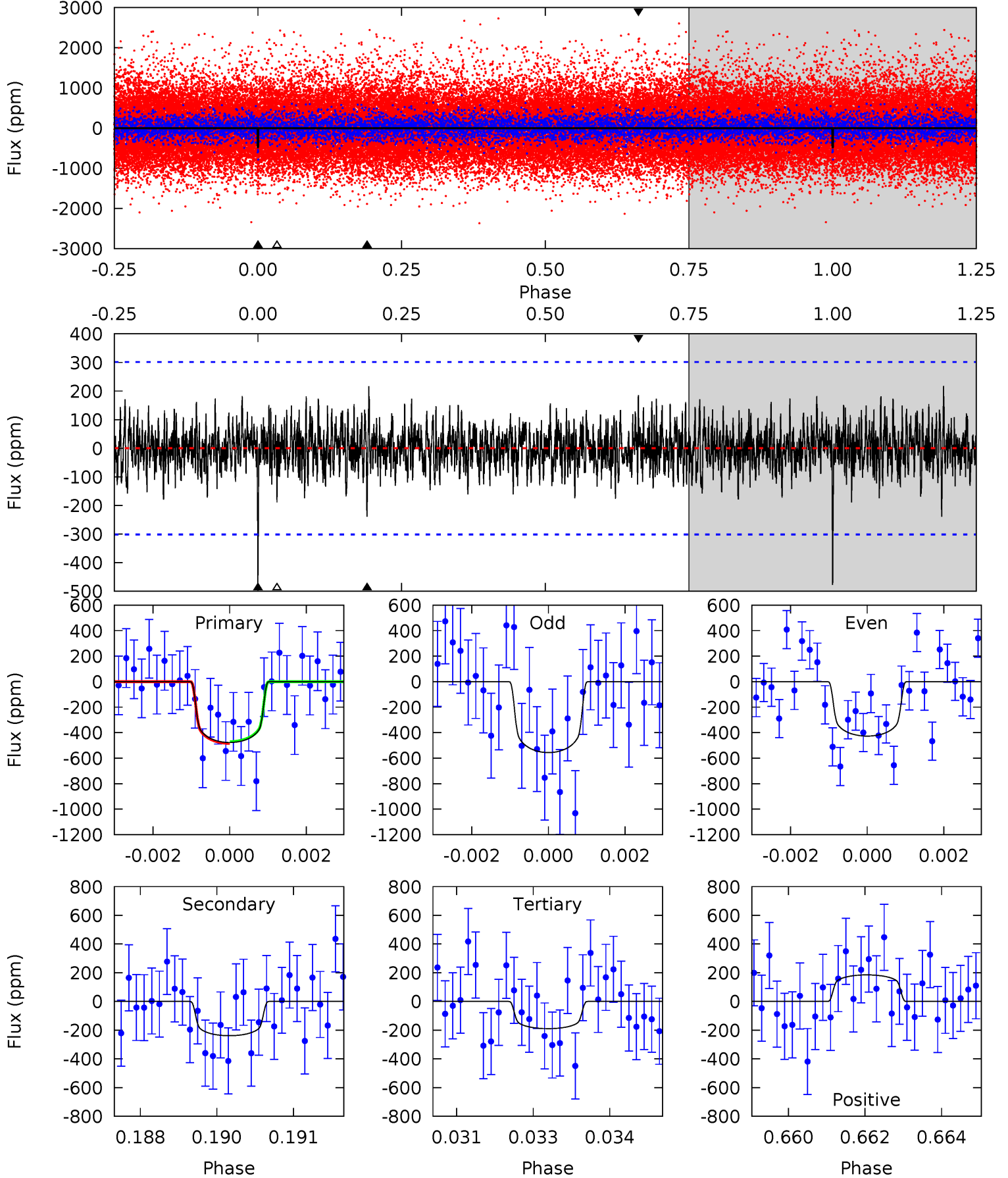
TCE 007811537-01 P=244.582902 Days  $T_0=159.357448$  (BKJD)



# DV Model-Shift Uniqueness Test

007811537-01, P = 244.587873 Days, E = 159.349398 Days

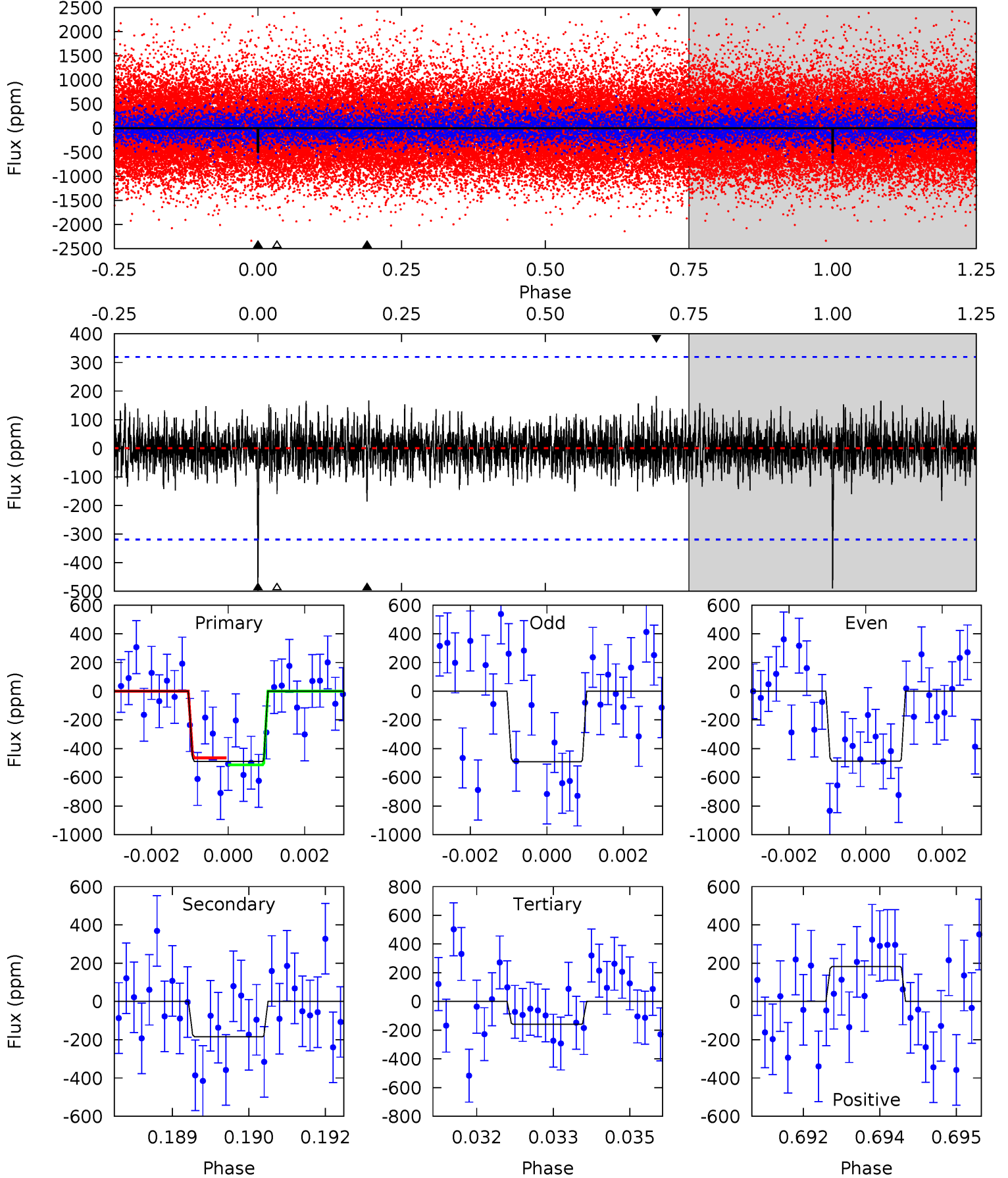
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.47	4.24	3.36	3.29	5.35	3.13	1.06	5.11	5.18	0.88	0.95	1.12	0.96	0.31	0.12



# Alt Model-Shift Uniqueness Test

007811537-01, P = 244.582902 Days, E = 159.357448 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
8.24	3.10	2.68	3.07	5.38	3.17	0.81	5.56	5.17	0.41	0.03	0.03	1.13	0.27	0.41



### Stellar Parameters For KIC 007811537

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6321^{+196}_{-239}$	$4.417^{+0.052}_{-0.208}$	$0.070^{+0.250}_{-0.300}$	$1.125^{+0.370}_{-0.123}$	$1.207^{+0.152}_{-0.169}$	$1.195^{+0.351}_{-0.648}$
	+3%/-4%	+1%/-5%	+357%/-429%	+33%/-11%	+13%/-14%	+29%/-54%
Source	KIC0	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 007811537-01 / KOI 8145.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-239 \pm 56$	$2.86^{+0.92}_{-0.77}$	$468^{+37}_{-24}$	$5278^{+936}_{-614}$	$10007^{+10546}_{-4526}$
Alt.	$-184 \pm 59$	$2.88^{+0.92}_{-0.86}$	$470^{+35}_{-25}$	$4970^{+955}_{-553}$	$7618^{+9497}_{-3600}$

$T_{\text{max}}$  = 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

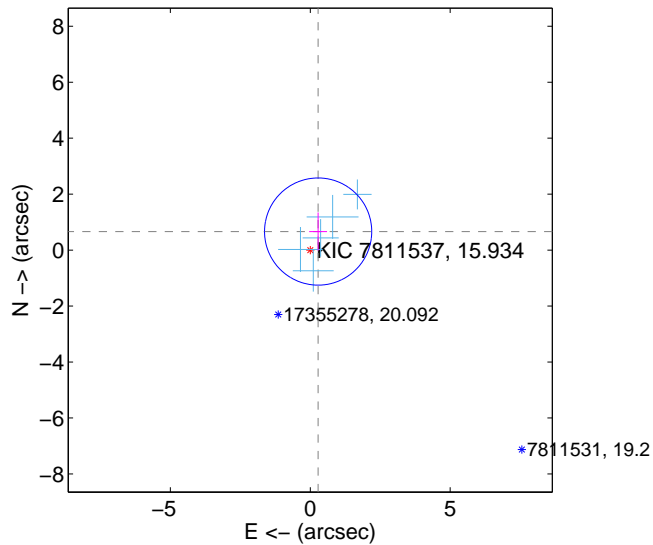
Supplemental centroid analysis for 007811537-01. Kepler magnitude: 15.93. Transit SNR 7.29

There are 5 quarters with good PRF difference image offsets

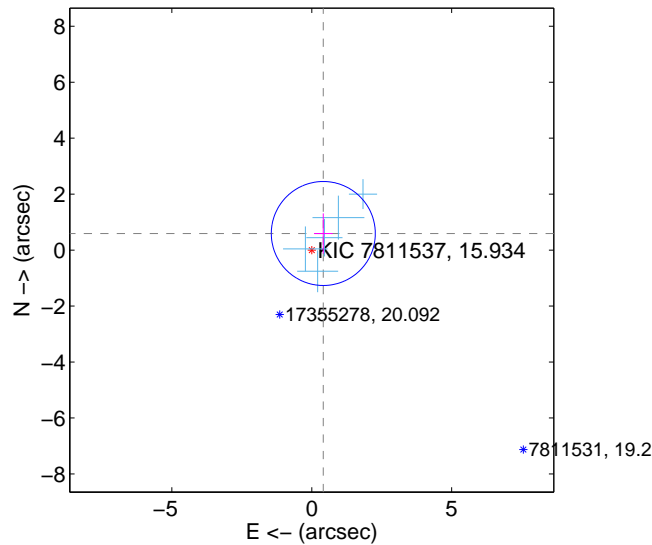
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.720 \pm 0.638$	1.13	$-0.281 \pm 0.319$	$0.663 \pm 0.680$
PRF-fit source offset from KIC position	$0.723 \pm 0.619$	1.17	$-0.413 \pm 0.334$	$0.593 \pm 0.718$
photometric centroid source offset	$0.15 \pm 2.35$	0.06	$0.08 \pm 2.22$	$0.13 \pm 2.40$

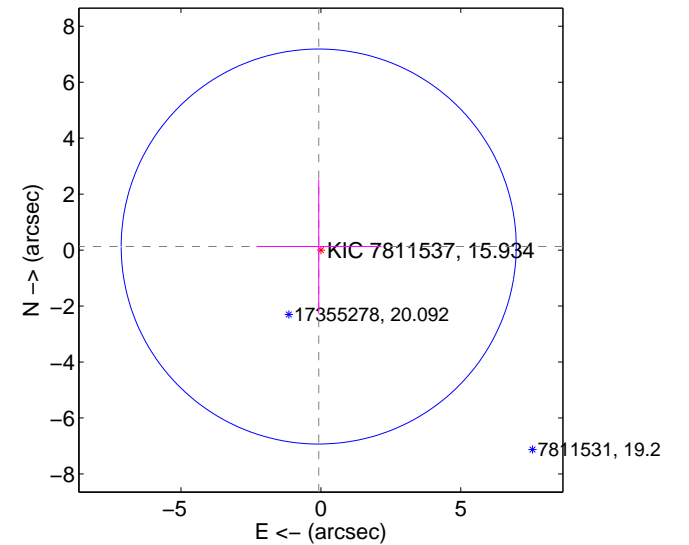
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

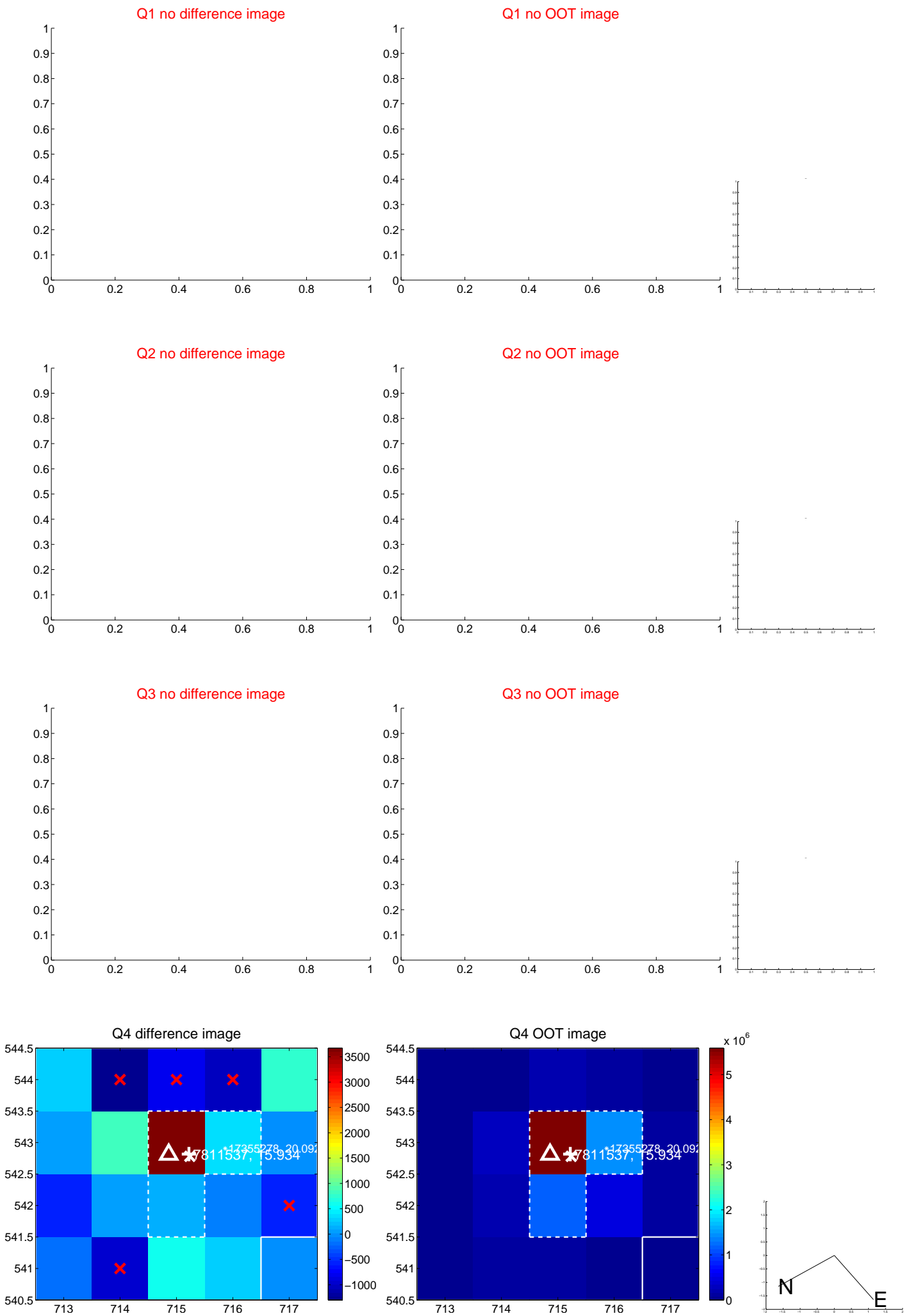


offset from photometric centroids



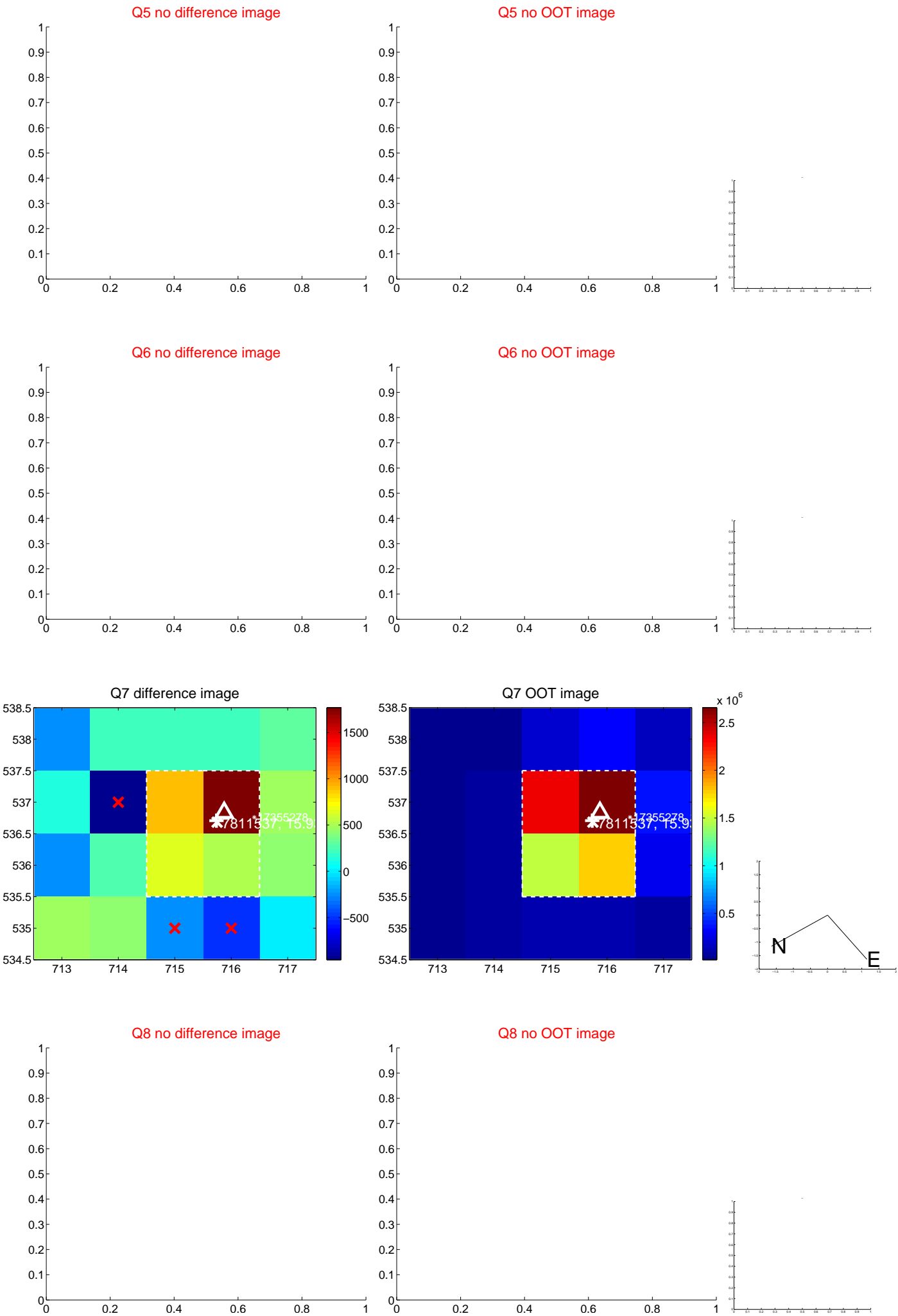
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

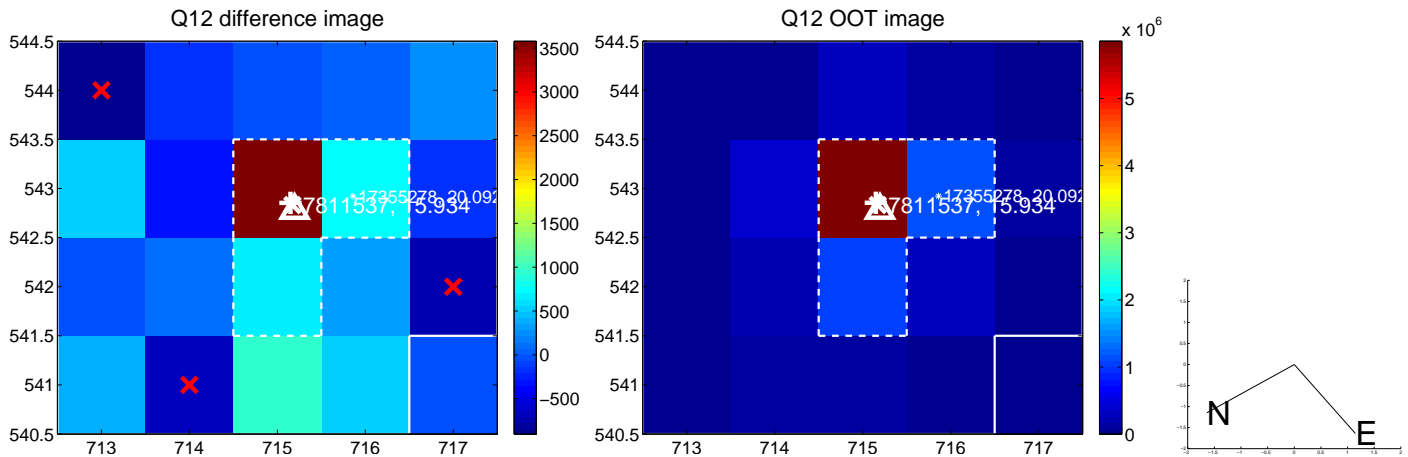
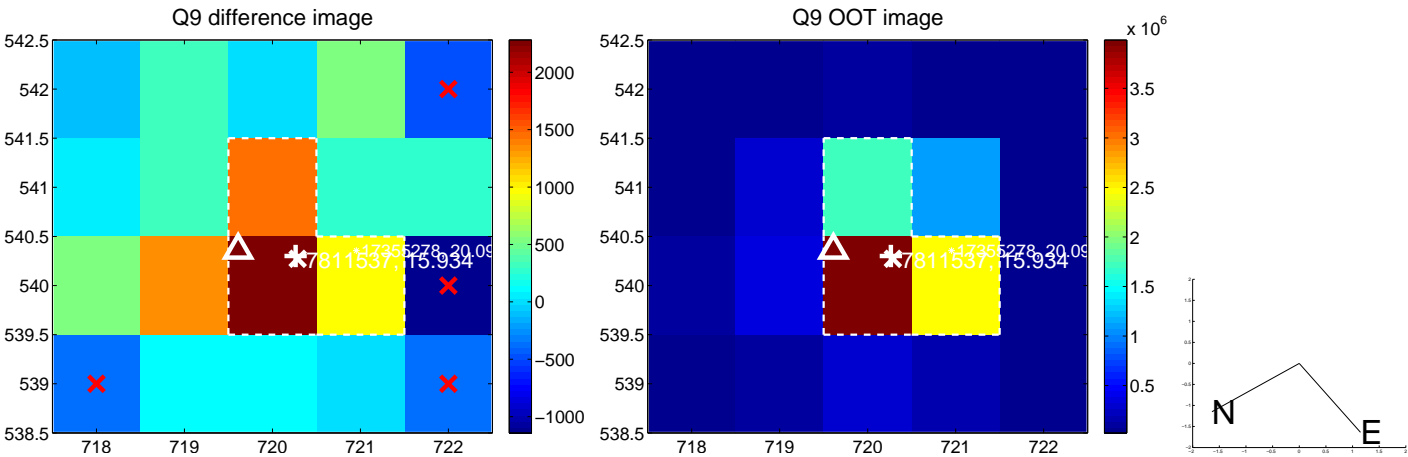




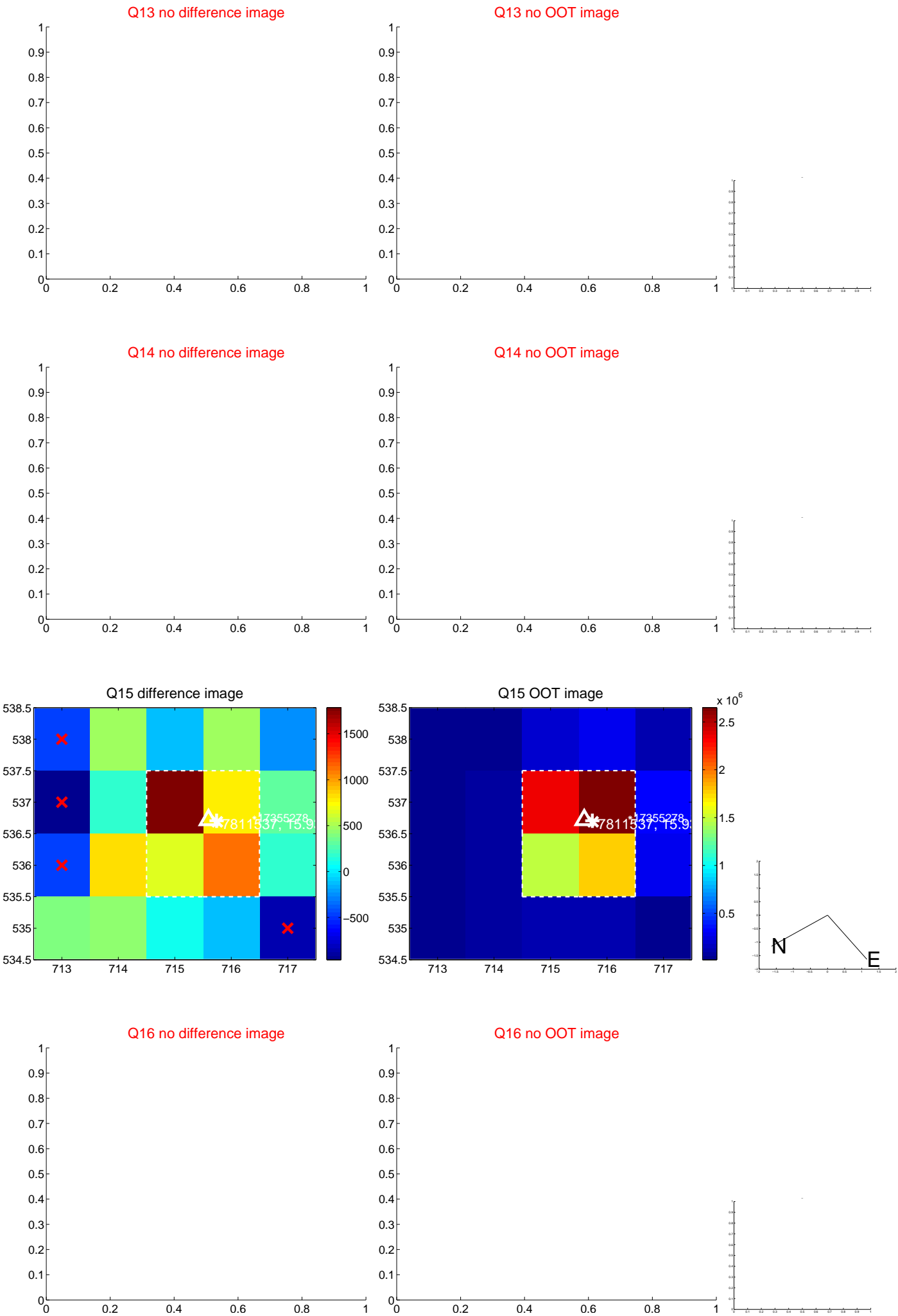
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



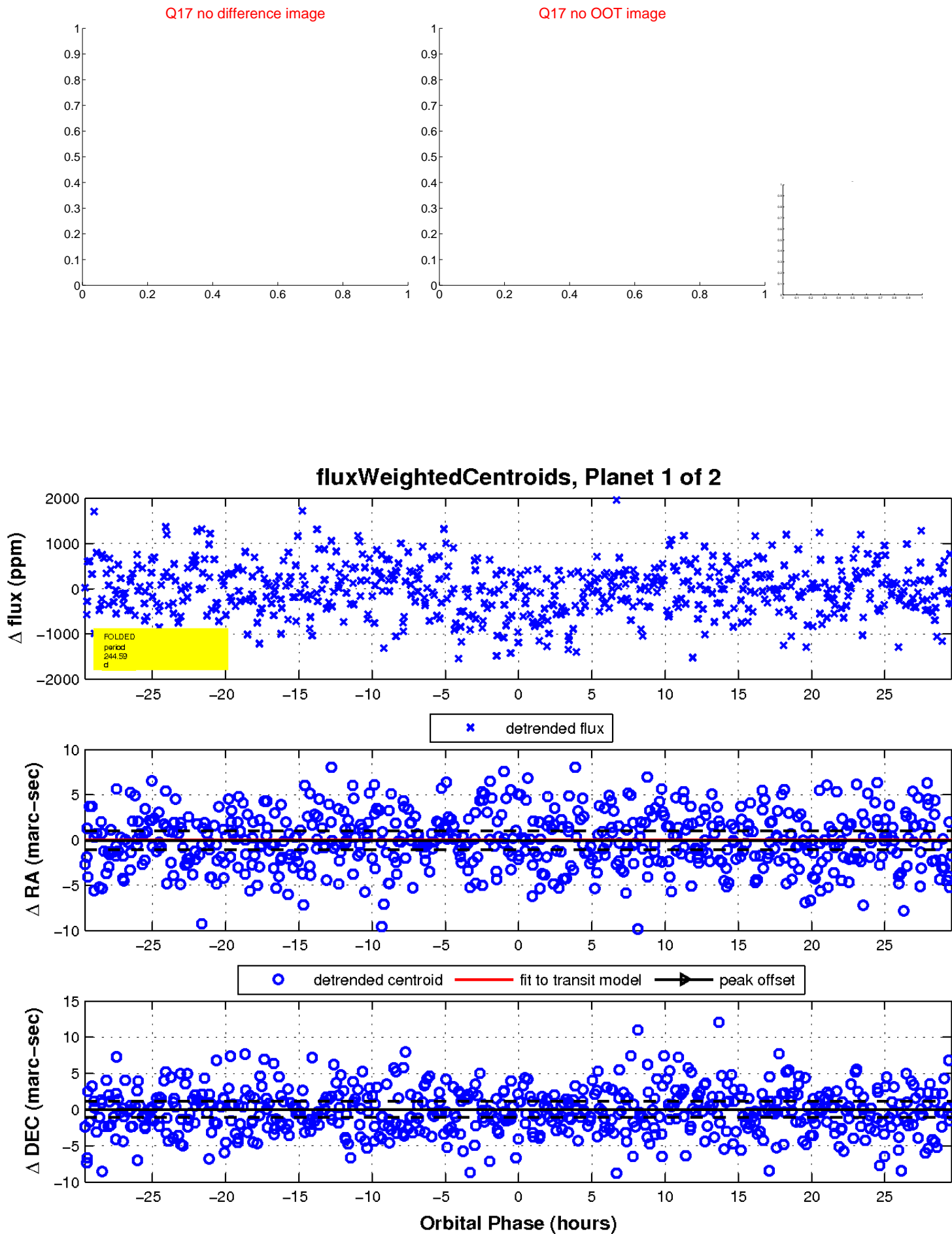
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

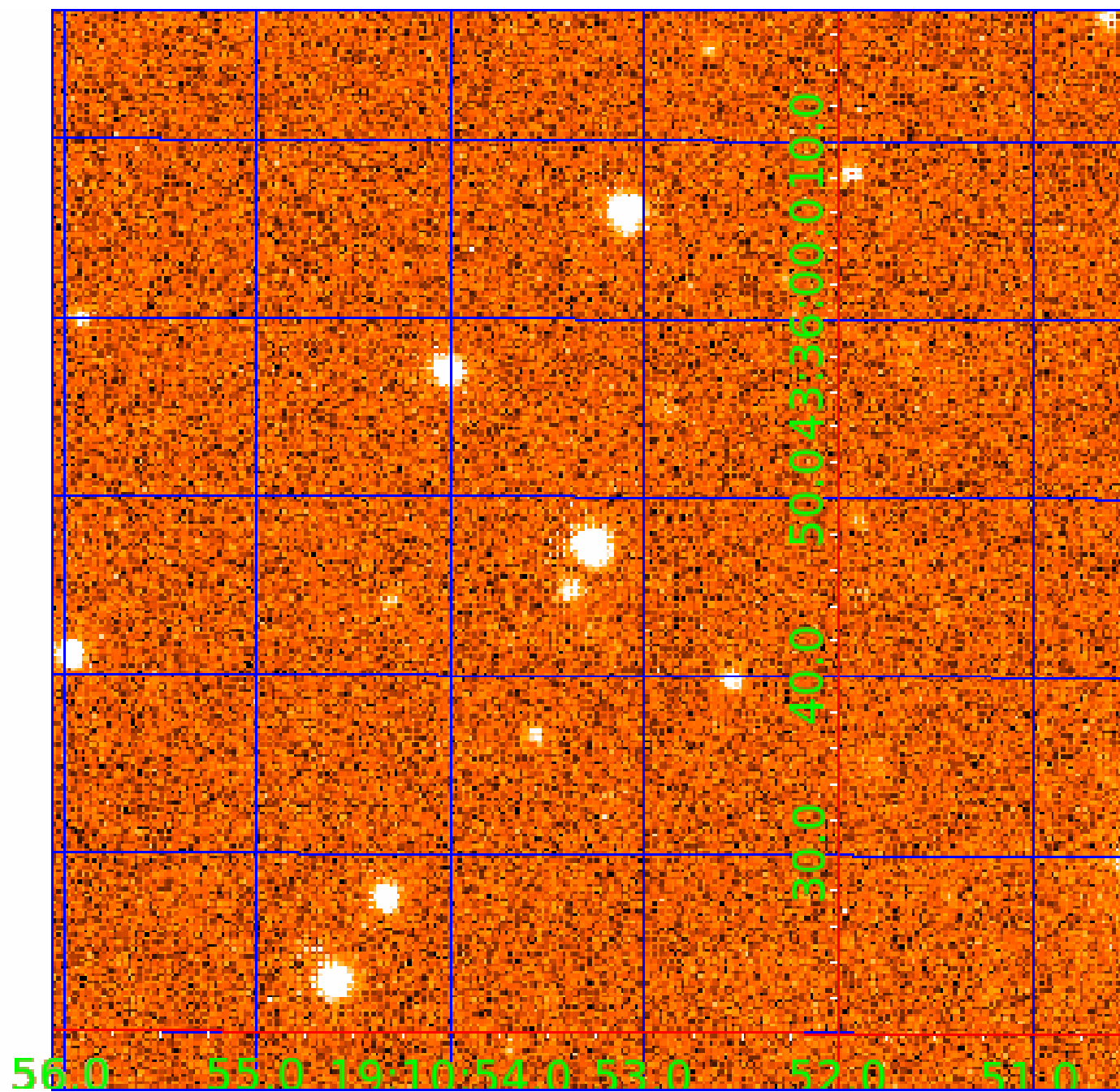


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



# UKIRT Image

Declination



# KIC 007811537

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007811537-01	OBS	8145.02	244.587873	159.349398	465.8	9.897	7.8	7.3	1.12	6321	2.78	2.73
007811537-02	OBS	8145.01	16.933957	146.004604	262.8	4.542	7.2	7.6	1.12	6321	3.42	95.89

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007811537-01	OBS	FP	0.31	1	0	0	0	INDIV_TRANS_MARSHALL—CENT_FEW_DIFFS
007811537-02	OBS	FP	0.20	1	0	0	0	MOD_NONUNIQ_ALT—CENT_FEW_DIFFS

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

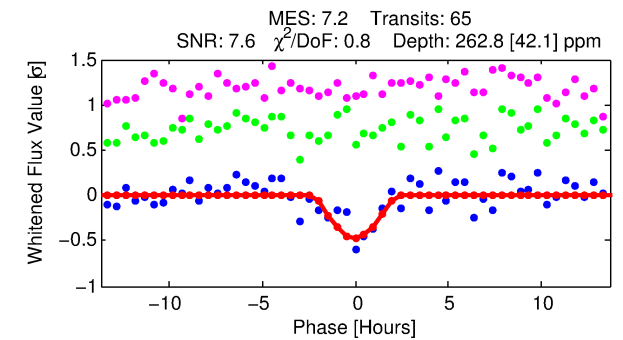
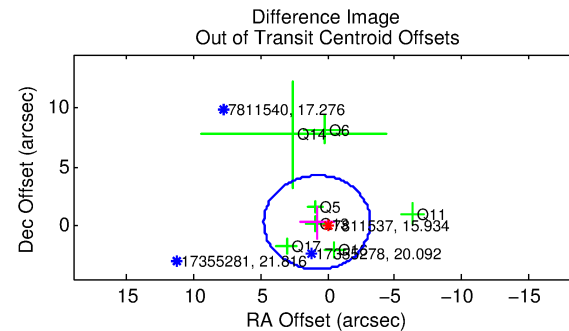
N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

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 007811537-02

No Significant Match Found

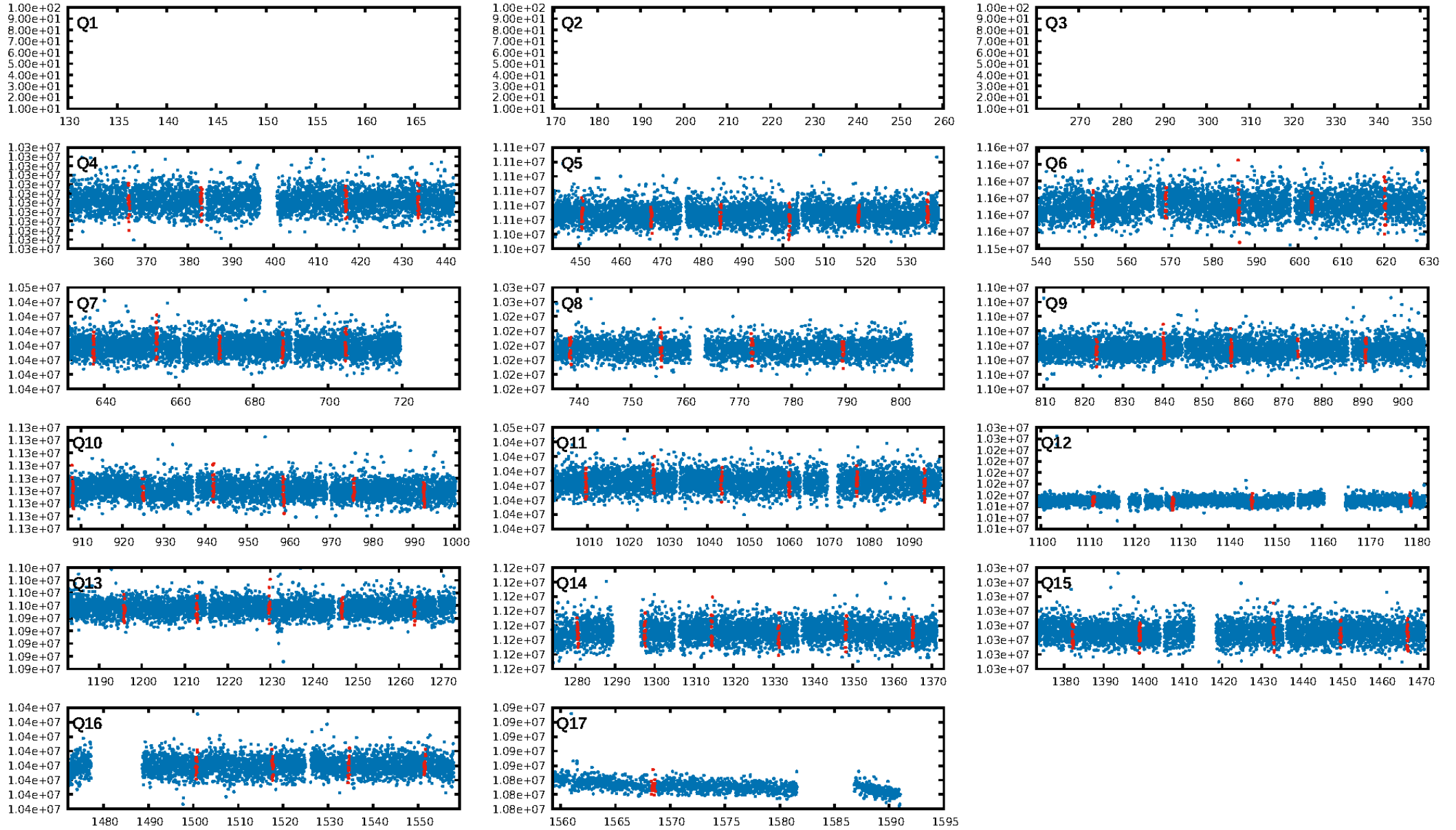
## KIC: 7811537    Candidate: 2 of 2    Period: 16.934 d



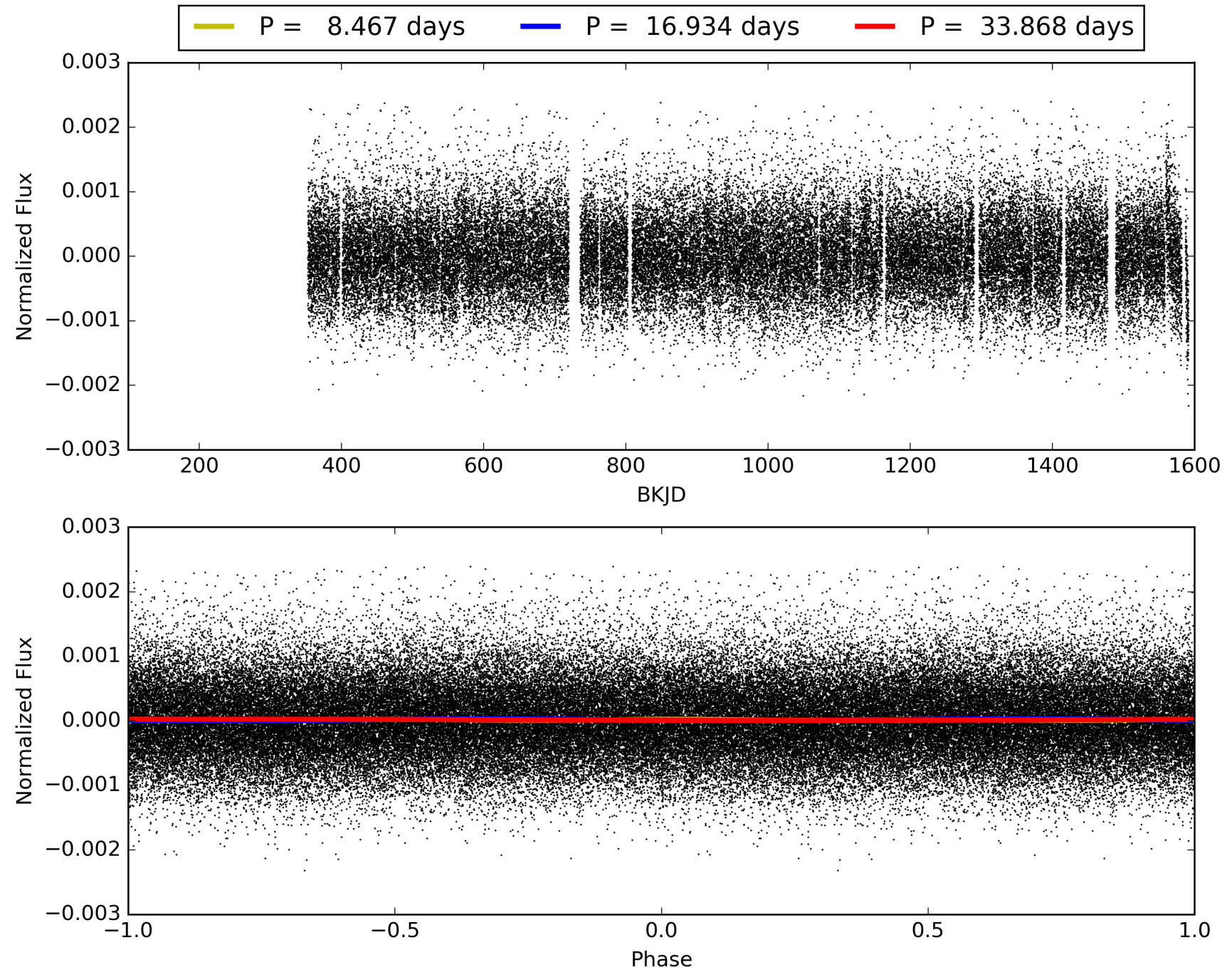
ShortPeriod-sig: N/A  
 LongPeriod-sig: 100.0% [501.73σ]  
 ModelChiSquare2-sig: 100.0%  
 ModelChiSquareGof-sig: 100.0%  
 Bootstrap-pfa: 3.31e-13  
 RollingBand-fgt: 1.00 [64/64]  
 GhostDiagnostic-chr: 382.2  
  
 Centroid-sig: 9.2%  
 Centroid-so: 2.830 arcsec [1.42σ]  
 OotOffset-rm: 0.829 arcsec [0.63σ]  
 KicOffset-rm: 0.730 arcsec [0.62σ]  
 OotOffset-st: 2/1/1/3 [7]  
 KicOffset-st: 2/1/1/3 [7]  
 DiffImageQuality-fgm: 0.29 [2/7]  
 DiffImageOverlap-fno: 1.00 [14/14]



# TCE 007811537-02, PDC Light Curves

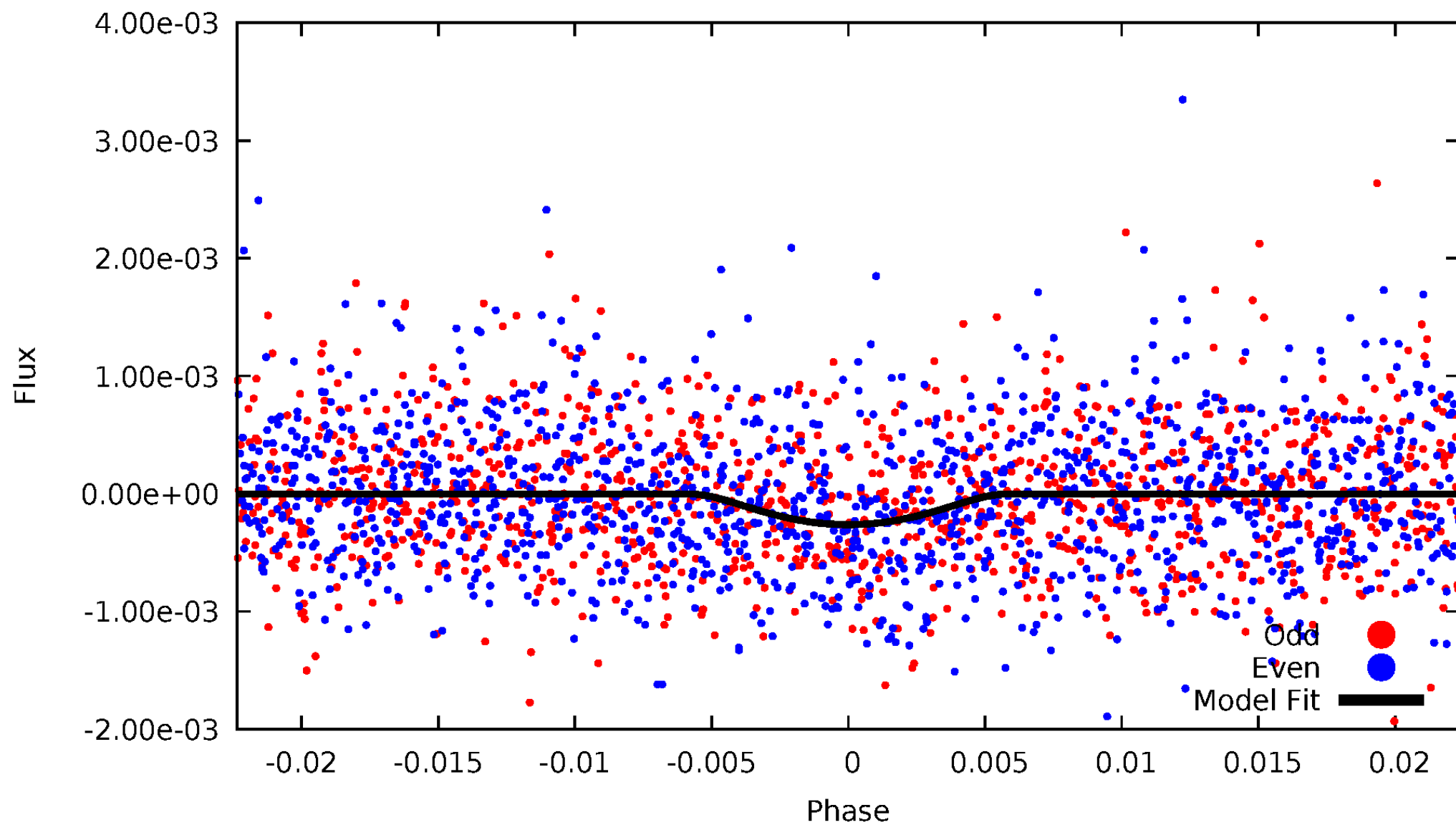


# TCE 007811537-02



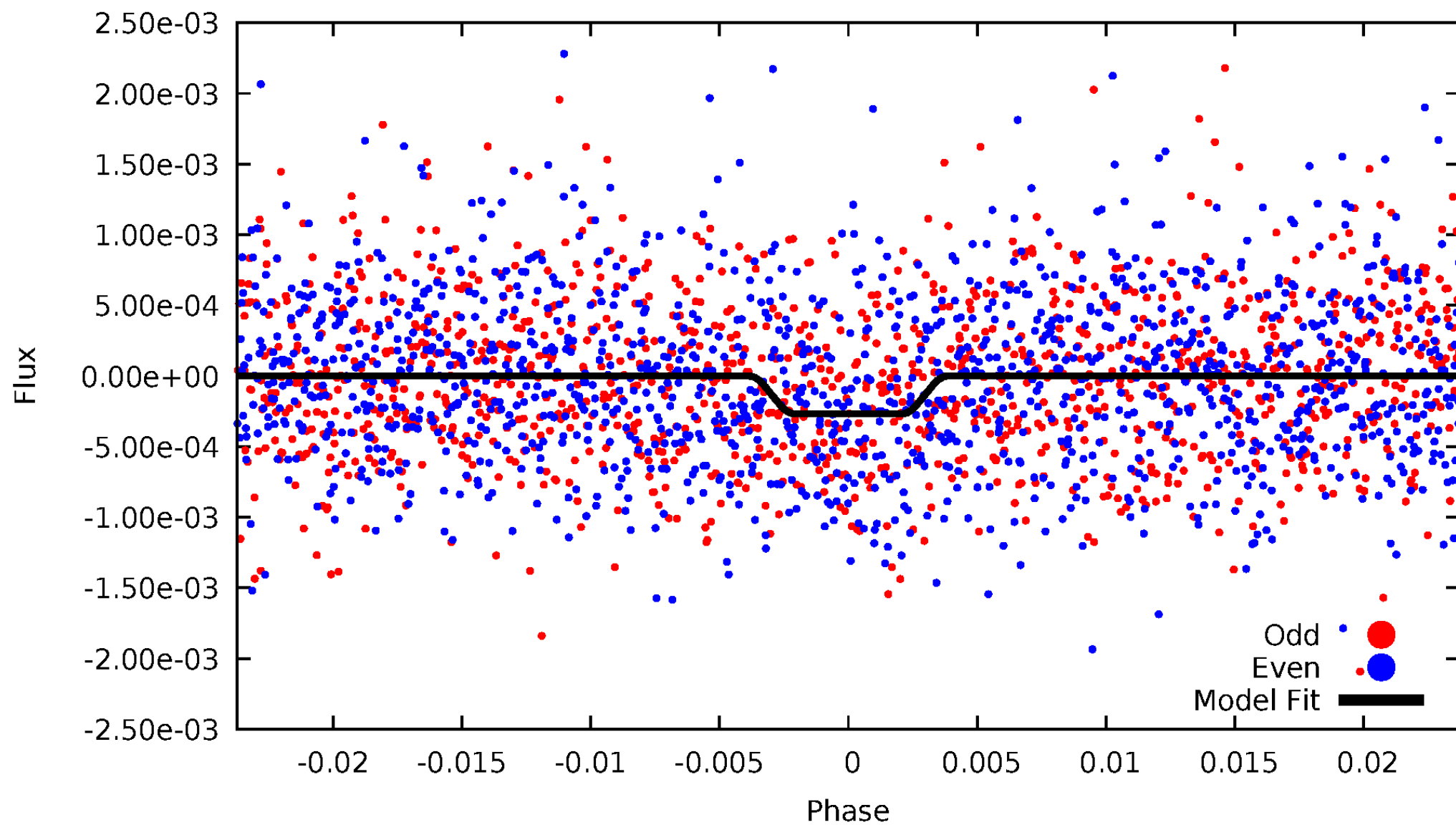
# DV Odd/Even

TCE 007811537-02



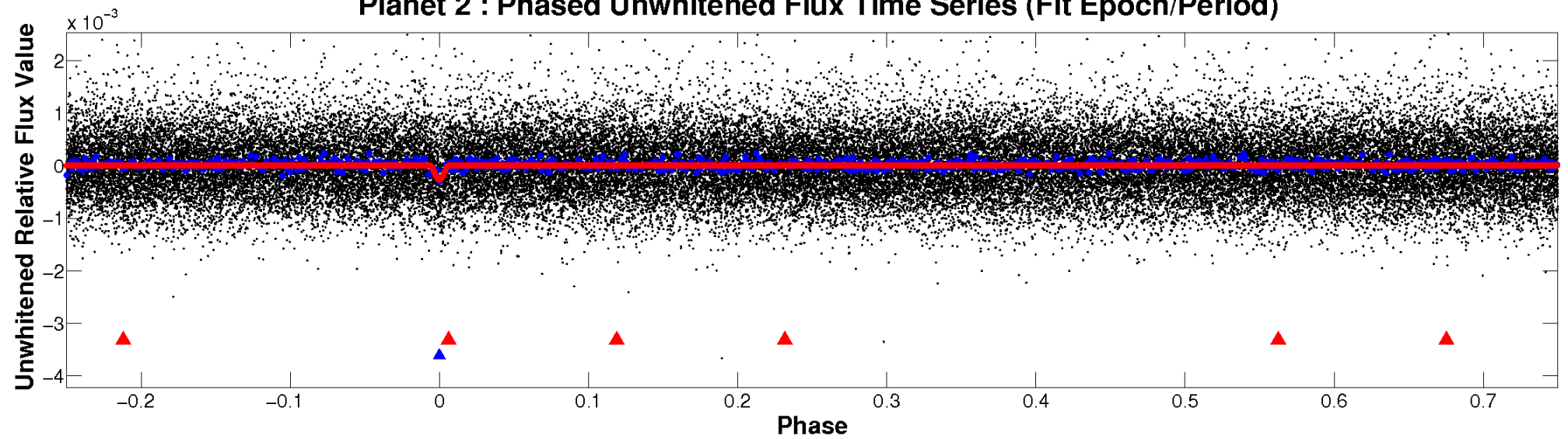
# ALT Odd/Even

TCE 007811537-02

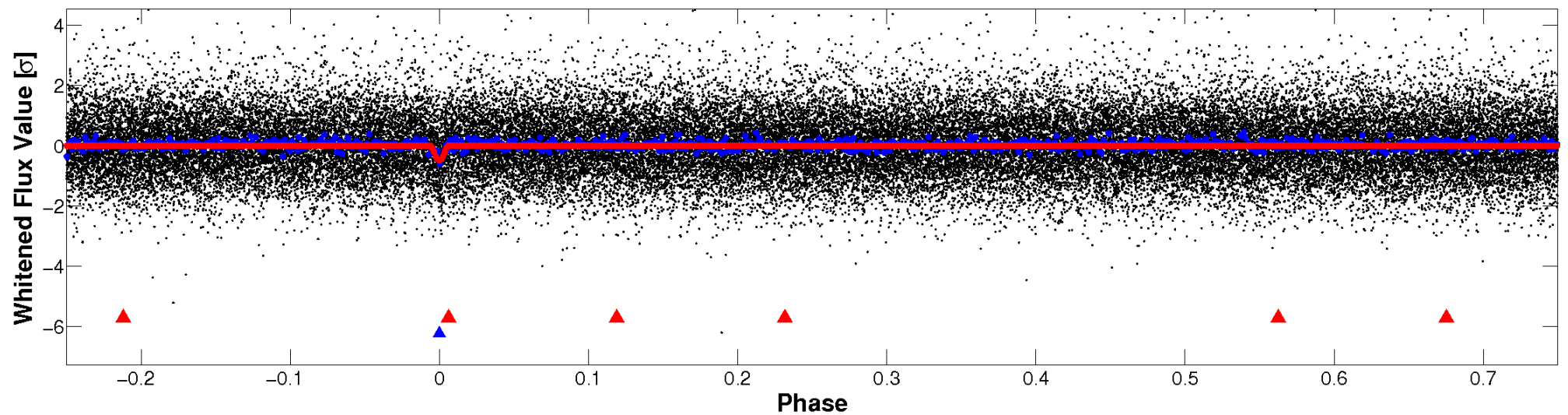


# Non-Whitened Vs. Whitened Light Curve

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



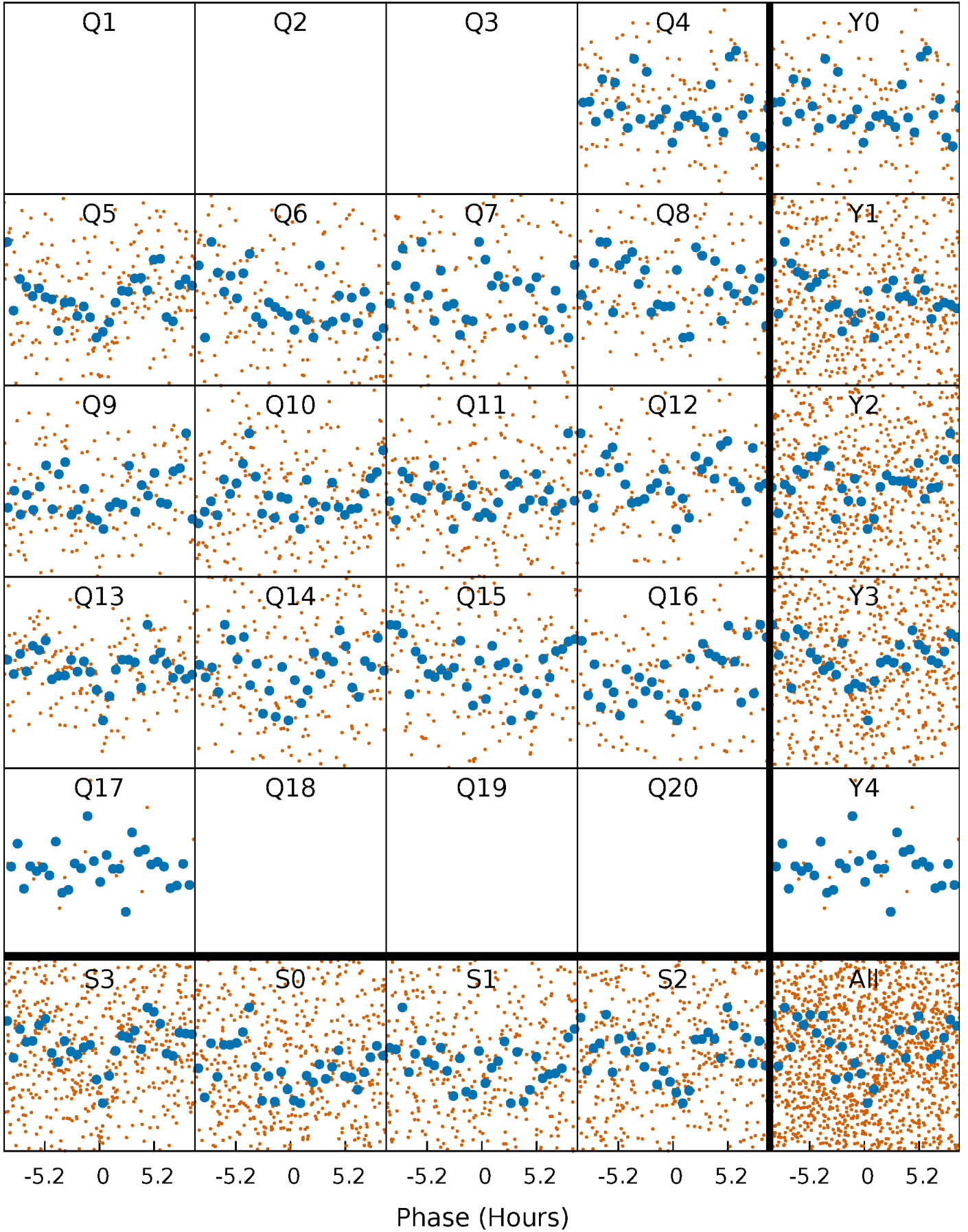
## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)





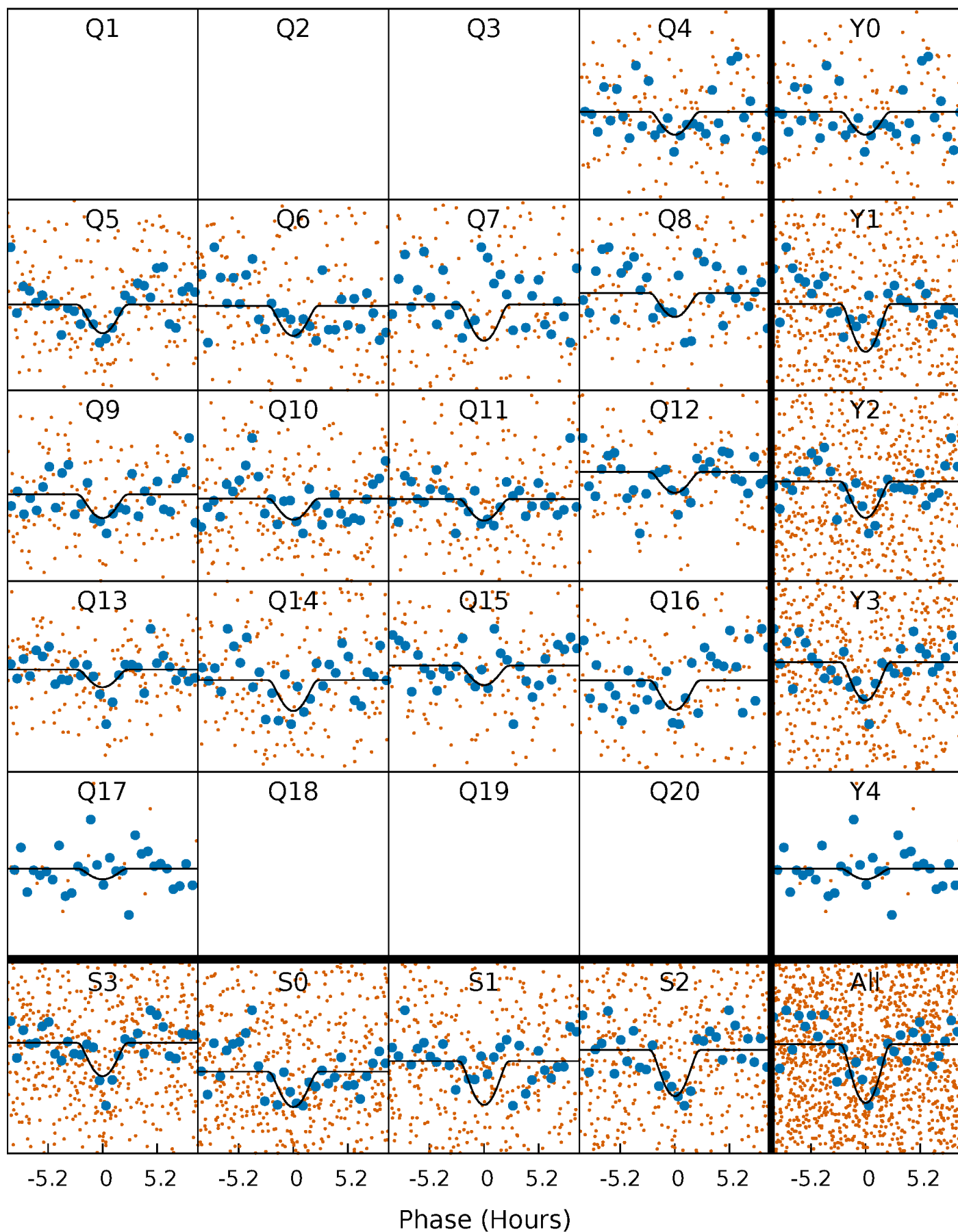
# PDC Quarter-Phased Transit Curves

TCE 007811537-02 P= 16.933957 Days  $T_0=146.004604$  (BKJD)



# DV Quarter-Phased Transit Curves

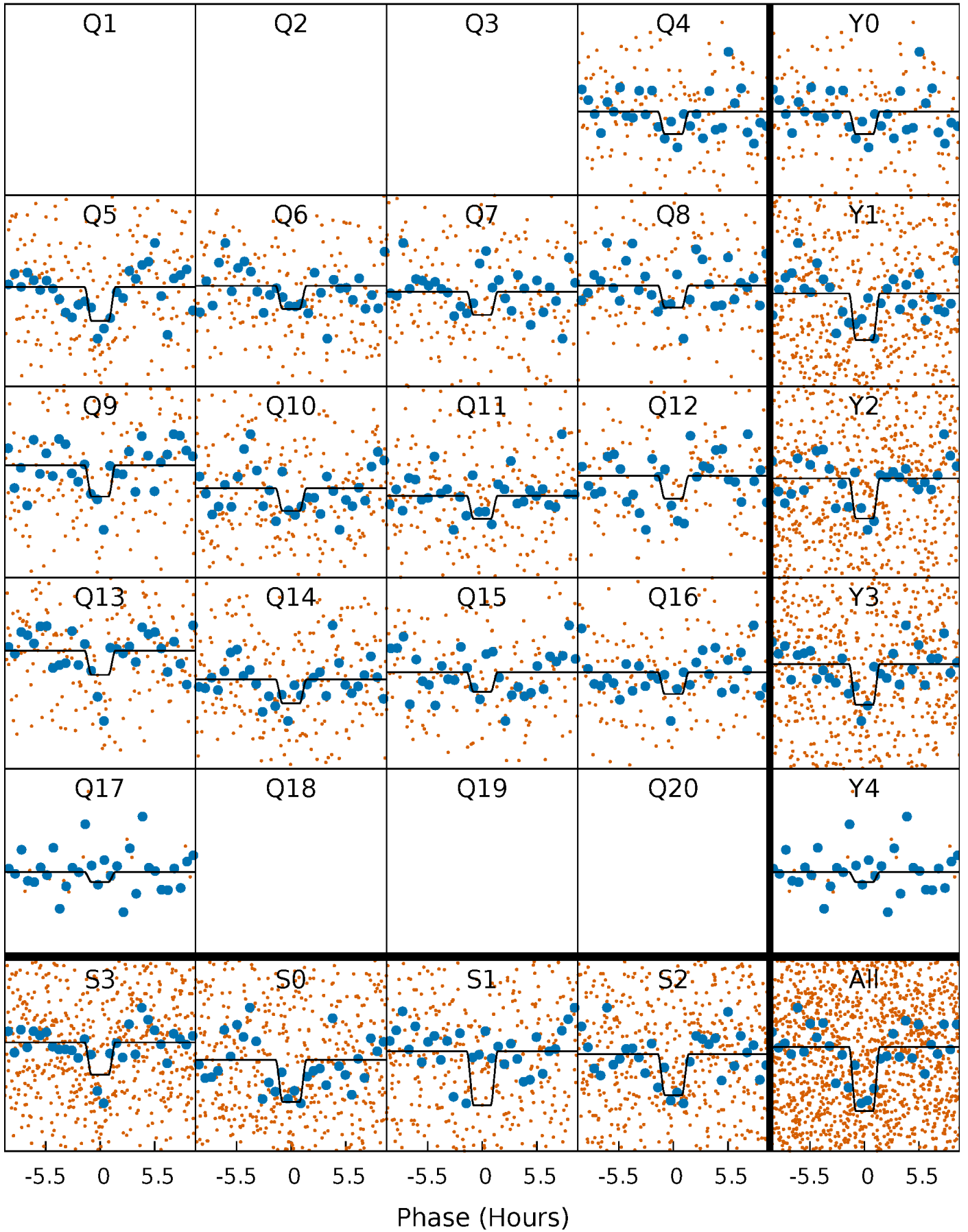
TCE 007811537-02 P= 16.933957 Days  $T_0=146.004604$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

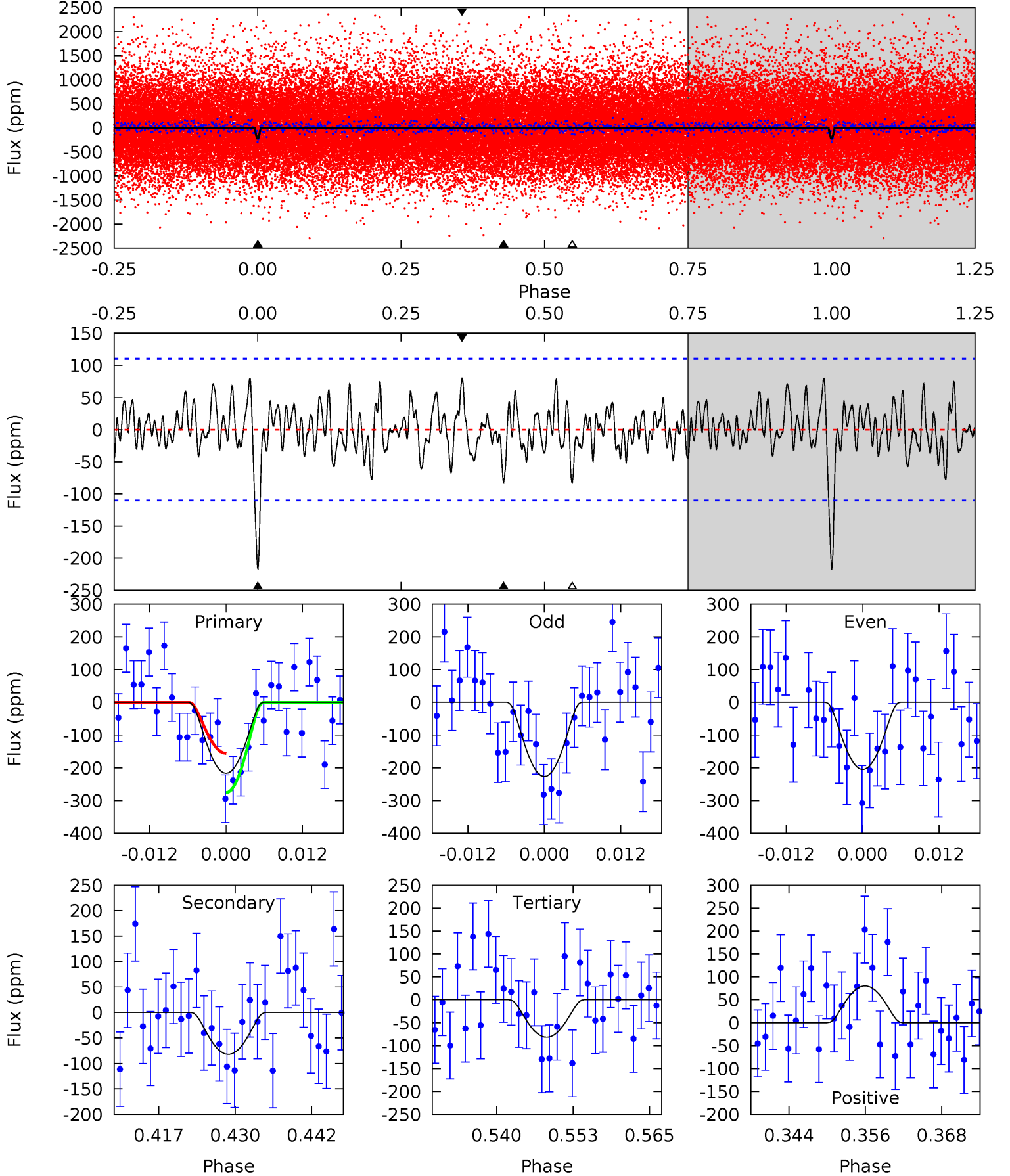
TCE 007811537-02 P= 16.934206 Days  $T_0=145.998007$  (BKJD)



# DV Model-Shift Uniqueness Test

007811537-02, P = 16.933957 Days, E = 146.004604 Days

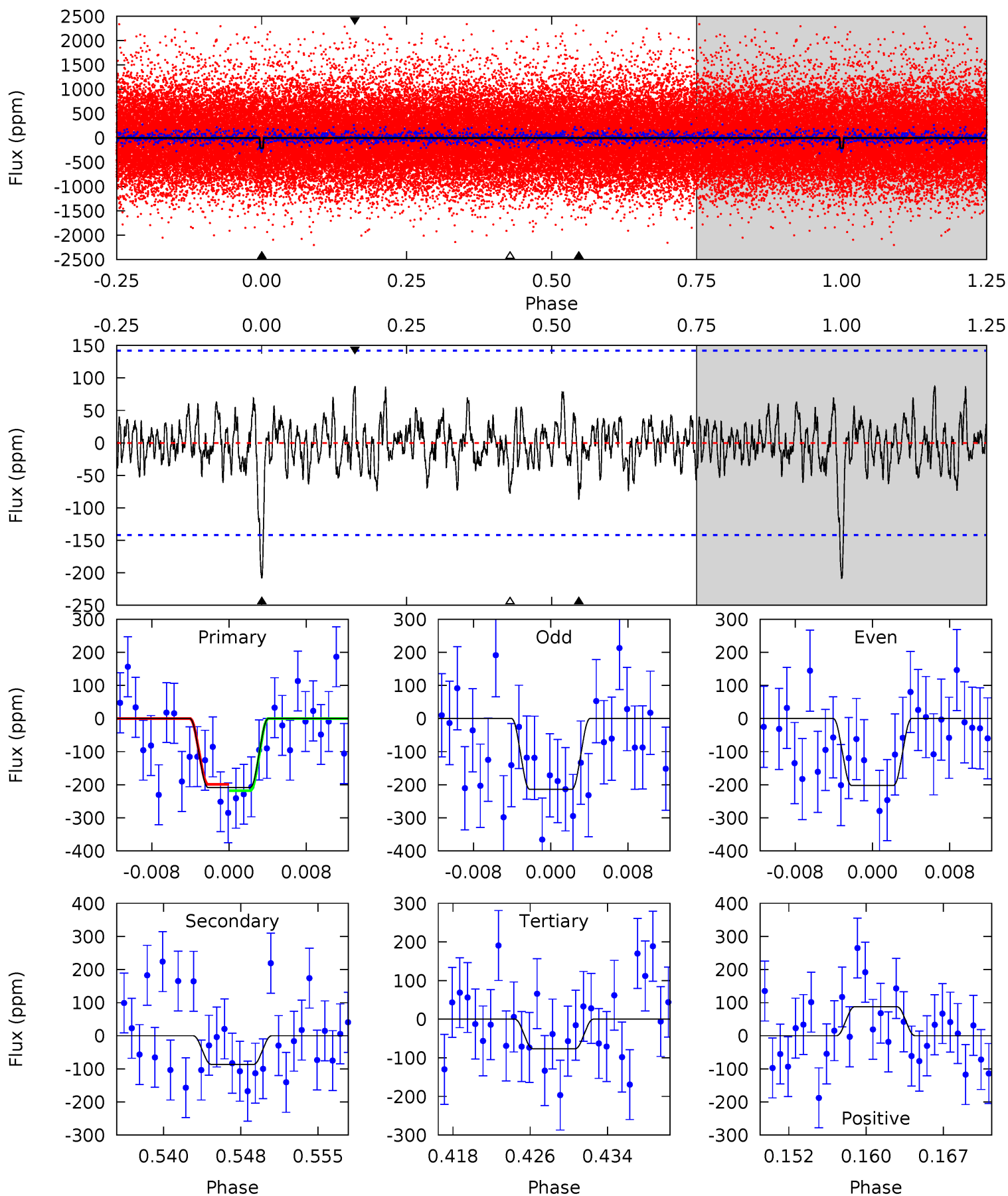
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.80	3.71	3.70	3.63	4.99	2.50	1.31	6.10	6.18	0.01	0.09	0.49	0.95	0.27	2.73



# Alt Model-Shift Uniqueness Test

007811537-02, P = 16.934206 Days, E = 145.998007 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
7.45	3.10	2.74	3.13	5.08	2.67	1.00	4.71	4.32	0.36	-0.03	0.21	0.86	0.30	0.34



### Stellar Parameters For KIC 007811537

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6321^{+196}_{-239}$	$4.417^{+0.052}_{-0.208}$	$0.070^{+0.250}_{-0.300}$	$1.125^{+0.370}_{-0.123}$	$1.207^{+0.152}_{-0.169}$	$1.195^{+0.351}_{-0.648}$
	+3%/-4%	+1%/-5%	+357%/-429%	+33%/-11%	+13%/-14%	+29%/-54%
Source	KIC0	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 007811537-02 / KOI 8145.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-82 \pm 22$	$12.93^{+12.82}_{-8.67}$	$1138^{+83}_{-55}$	$2653^{+1032}_{-455}$	$4.815^{+39.603}_{-3.597}$
Alt.	$-87 \pm 28$	$11.79^{+12.36}_{-8.29}$	$1141^{+83}_{-61}$	$2756^{+1192}_{-499}$	$6.177^{+66.075}_{-4.701}$

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

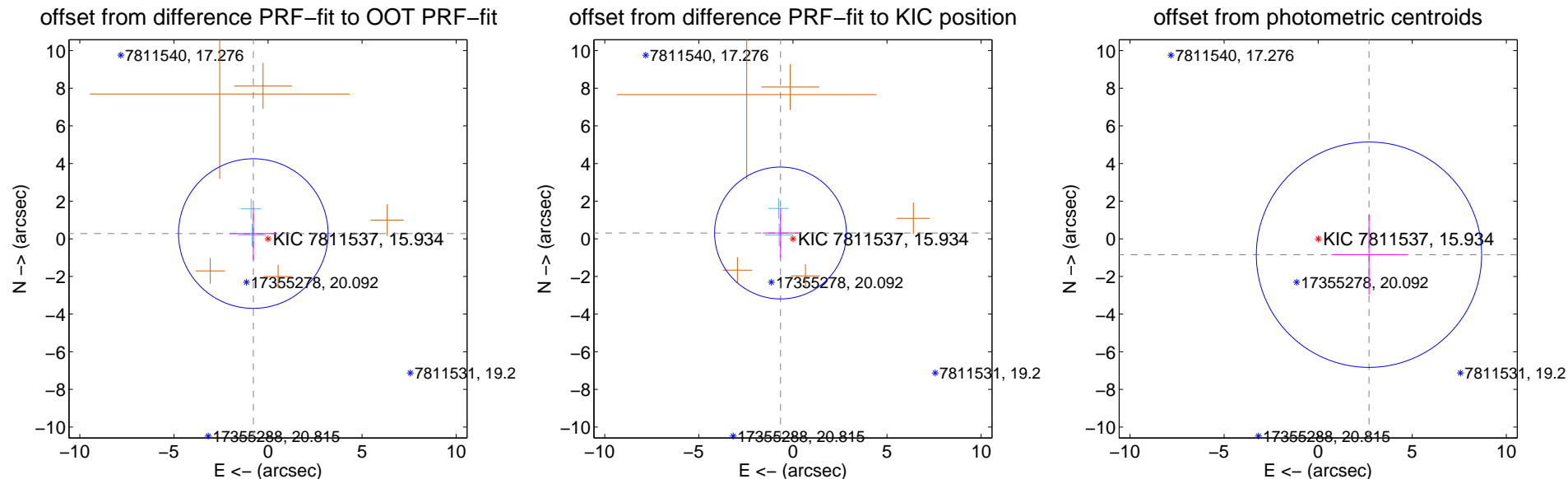
## DV Centroid Data

Supplemental centroid analysis for 007811537-02. Kepler magnitude: 15.93. Transit SNR 7.56

There are 2 quarters with good PRF difference image offsets

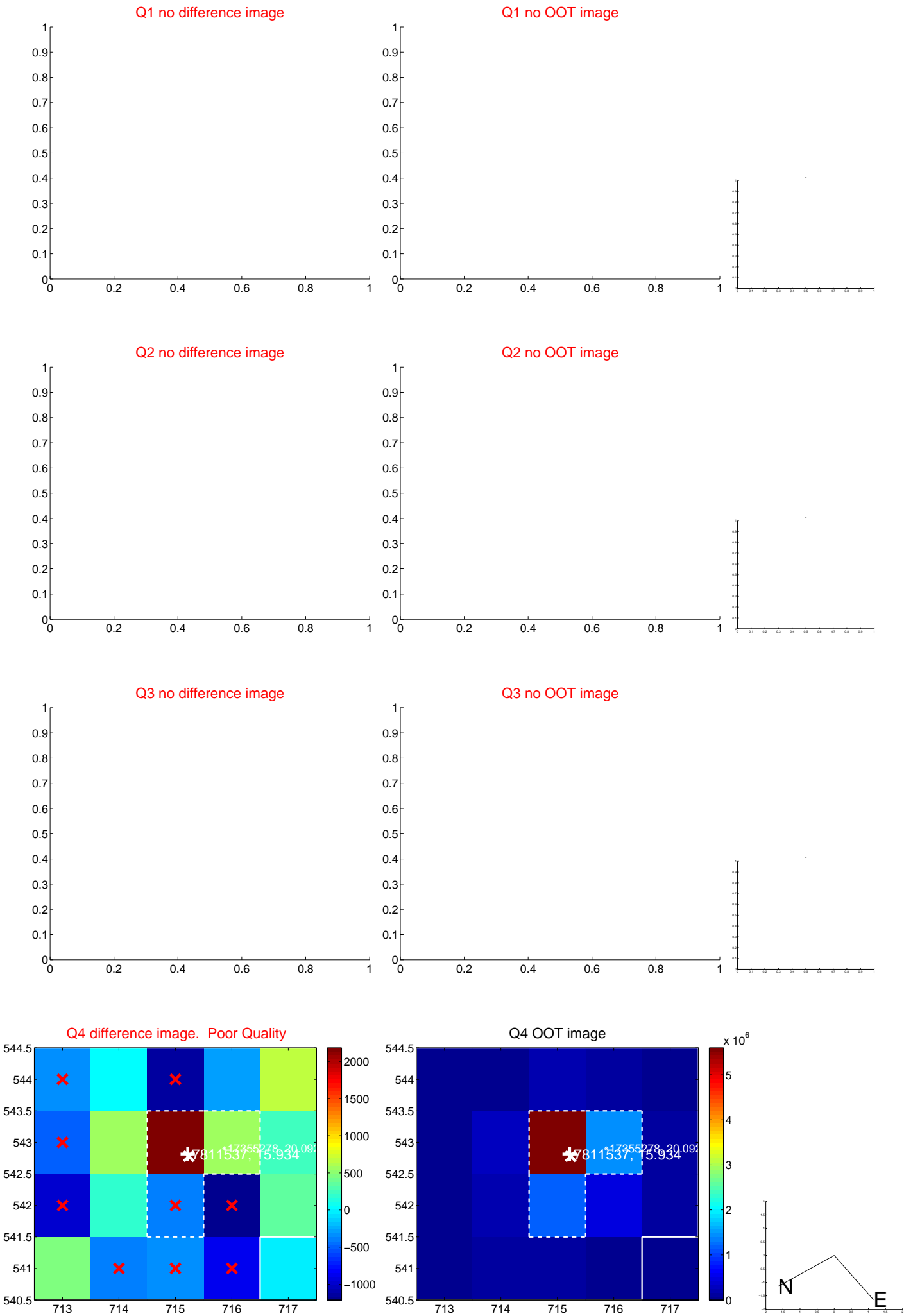
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.829 \pm 1.325$	0.63	$0.781 \pm 1.263$	$0.279 \pm 1.392$
PRF-fit source offset from KIC position	$0.730 \pm 1.168$	0.62	$0.661 \pm 0.944$	$0.309 \pm 1.319$
photometric centroid source offset	$2.83 \pm 2.00$	1.42	$-2.70 \pm 1.98$	$-0.84 \pm 2.12$

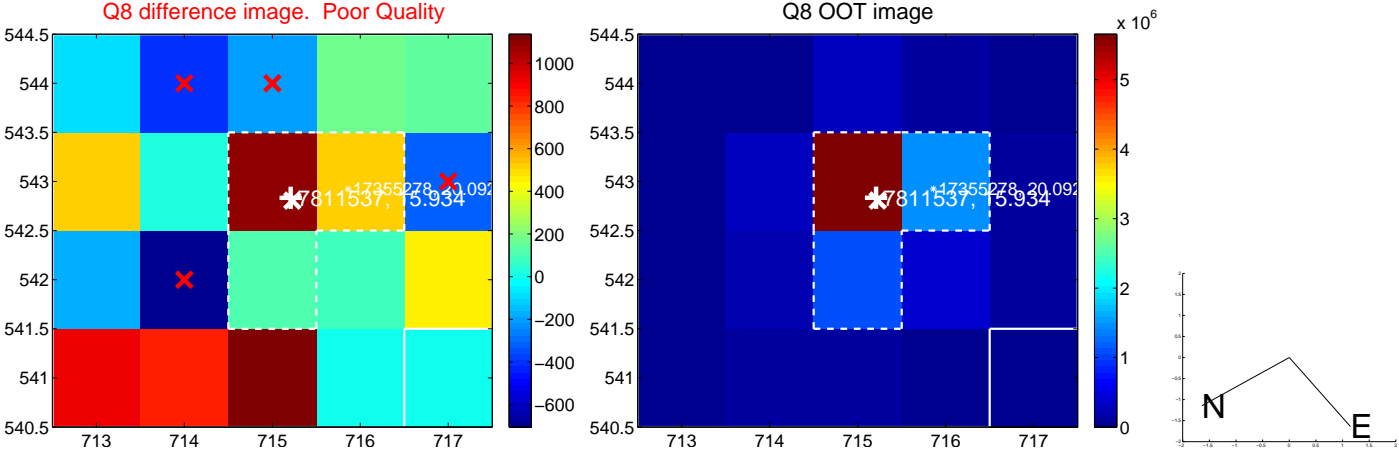
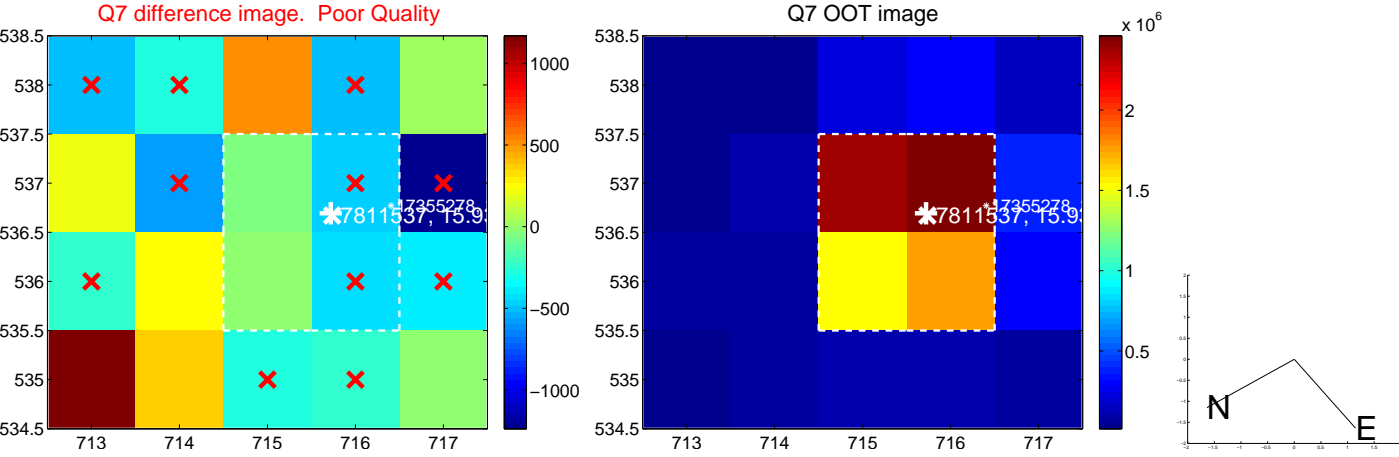
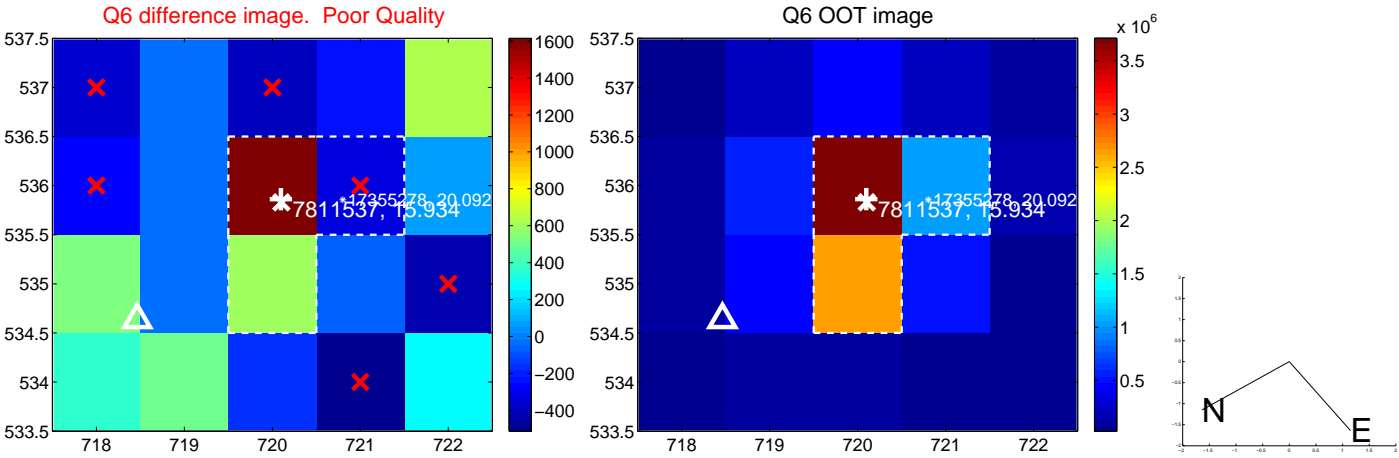
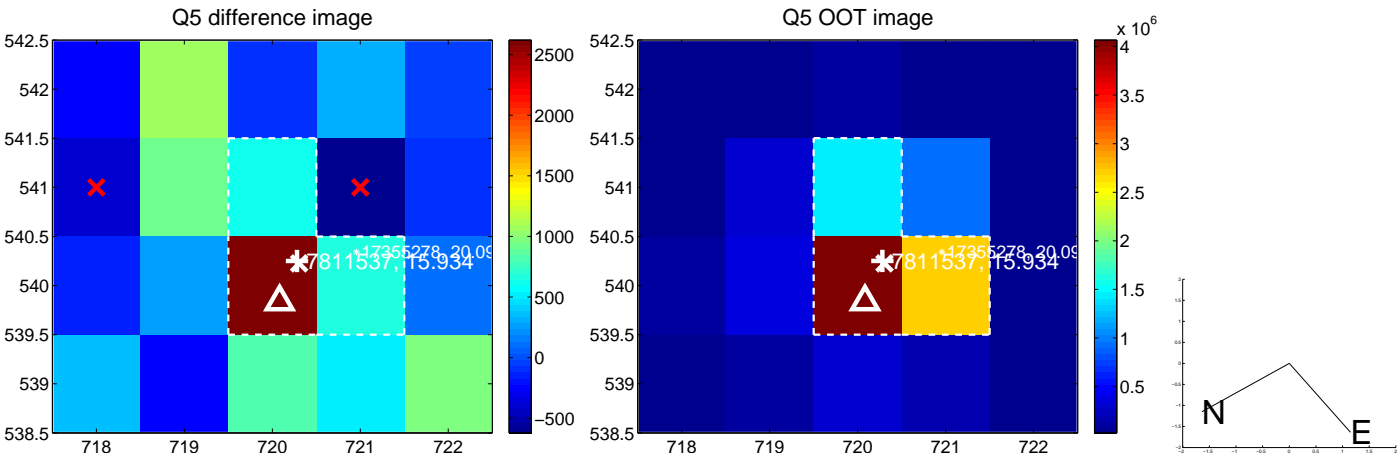


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

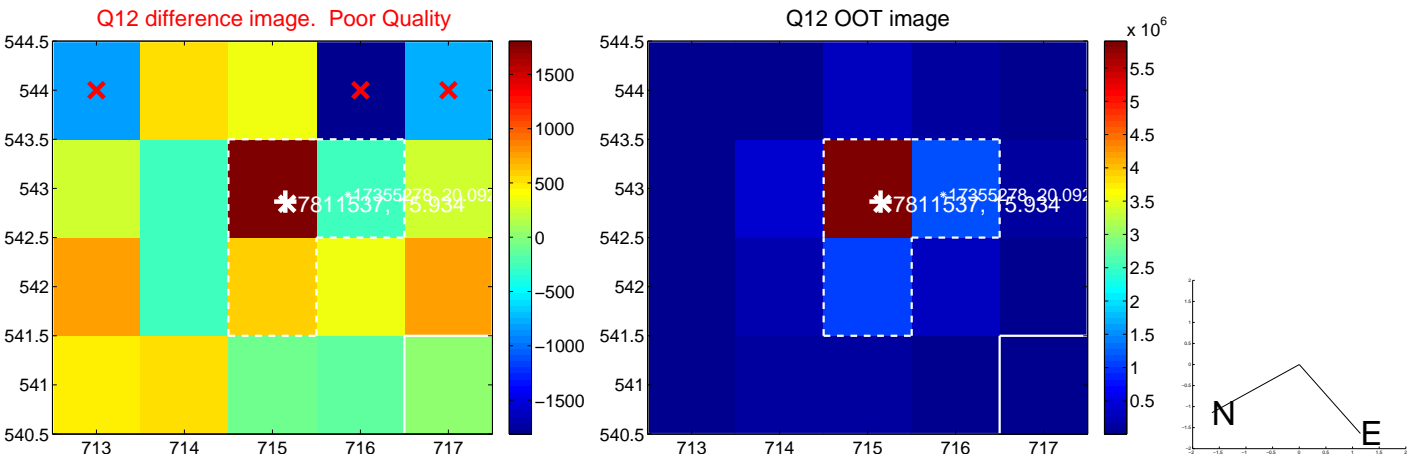
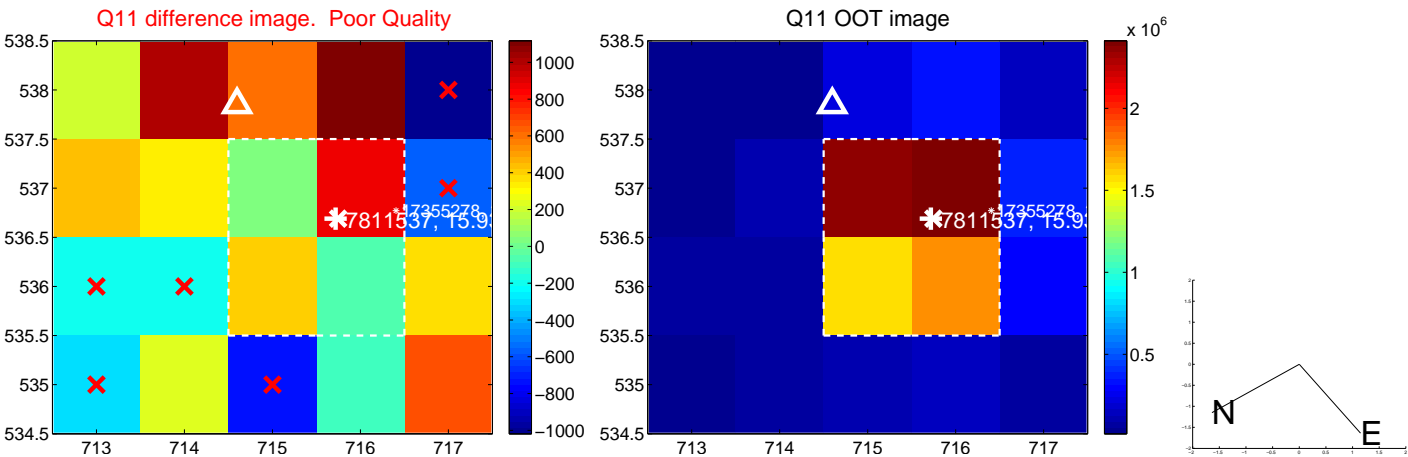
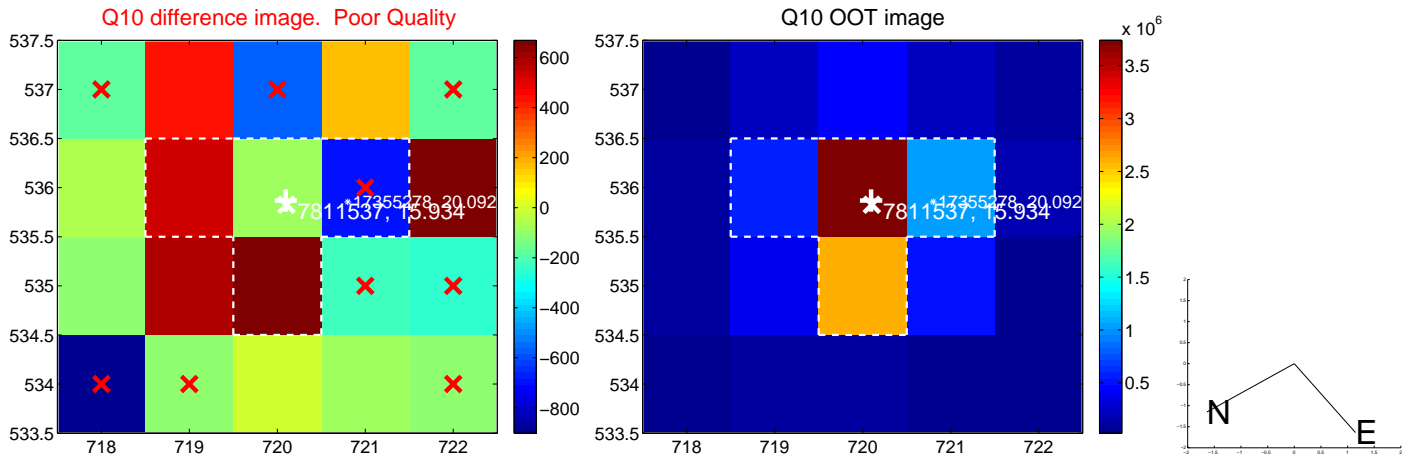
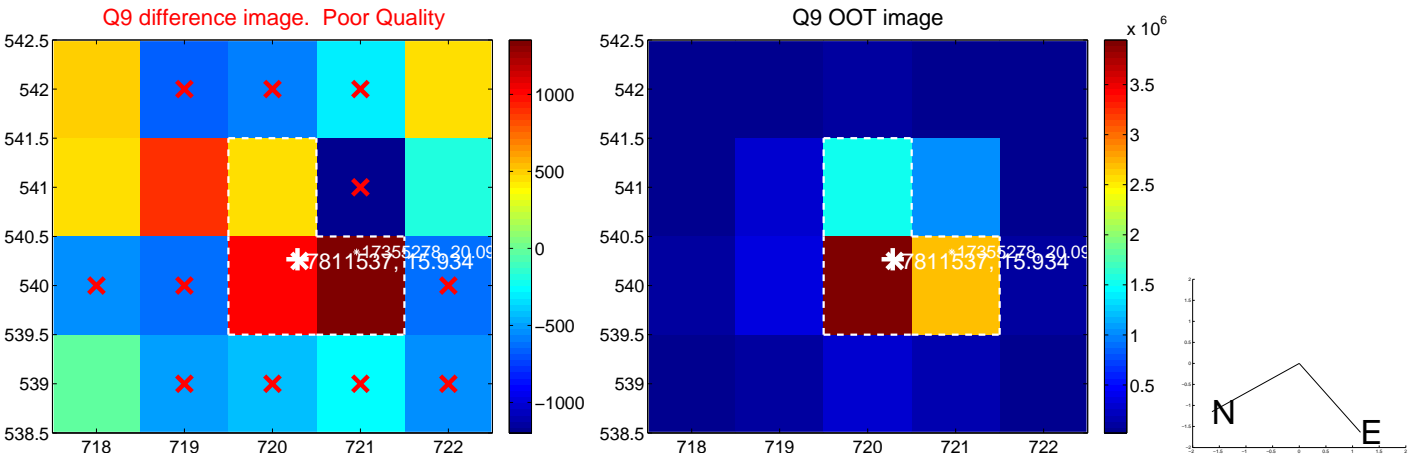


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

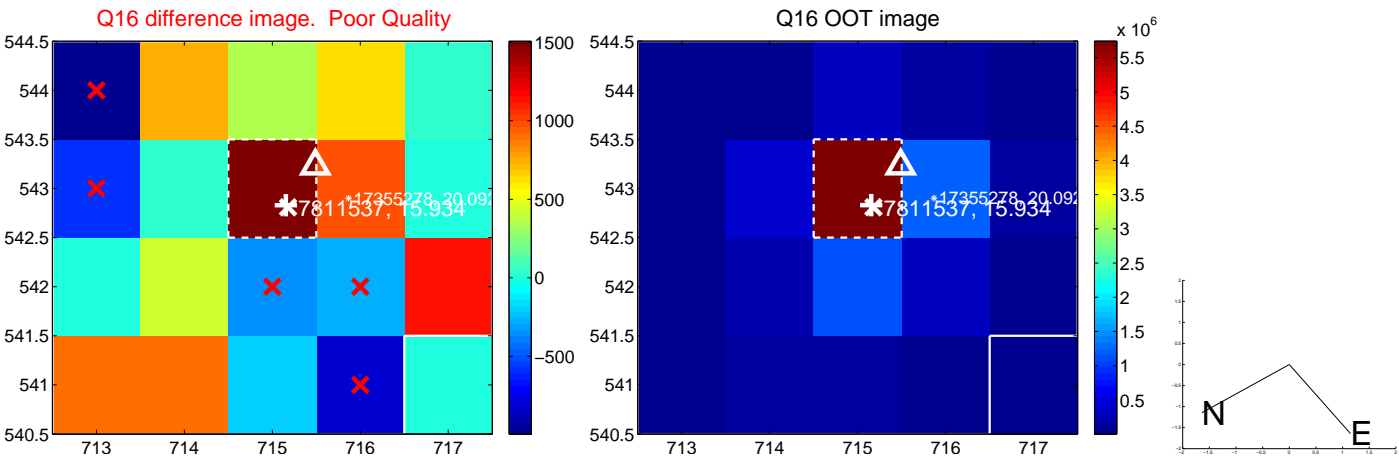
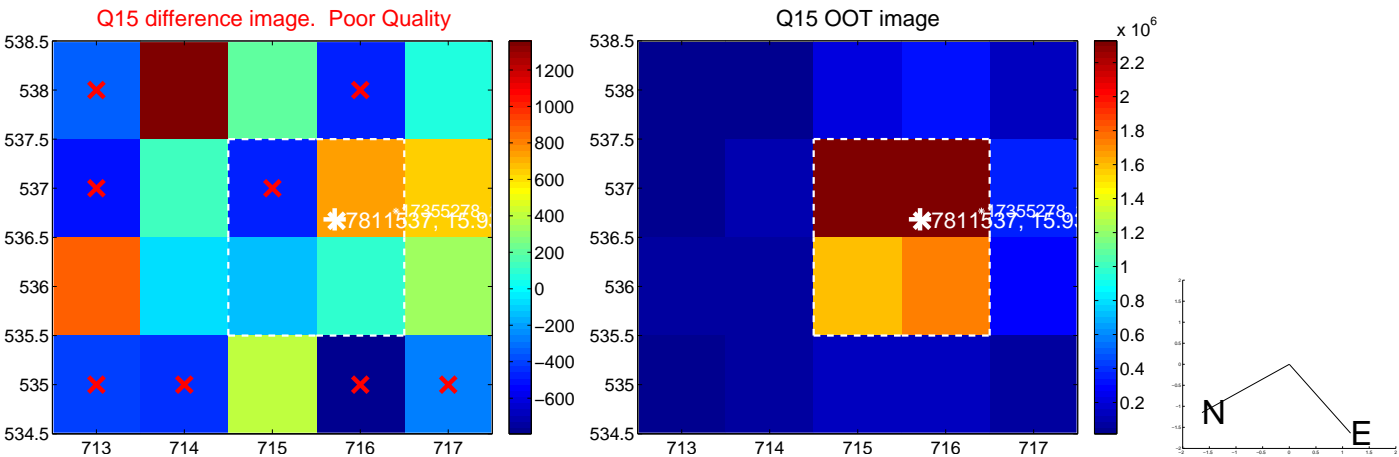
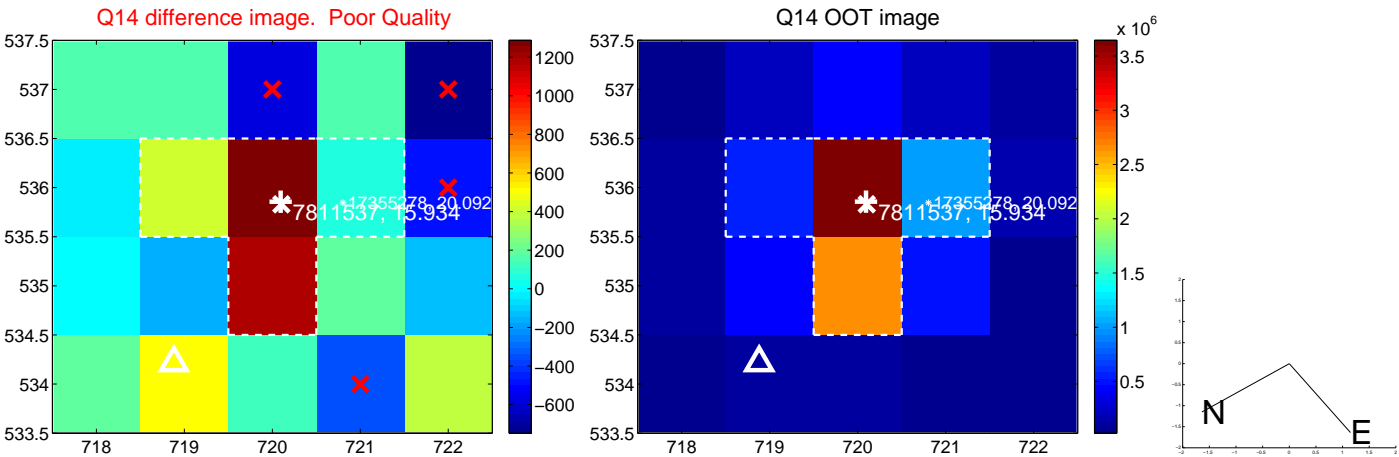
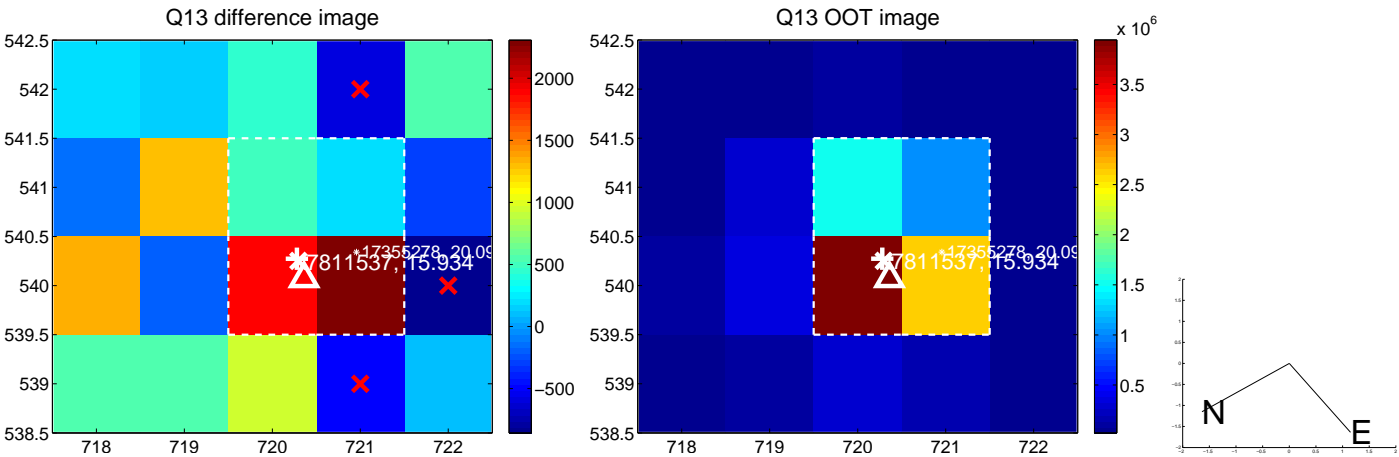




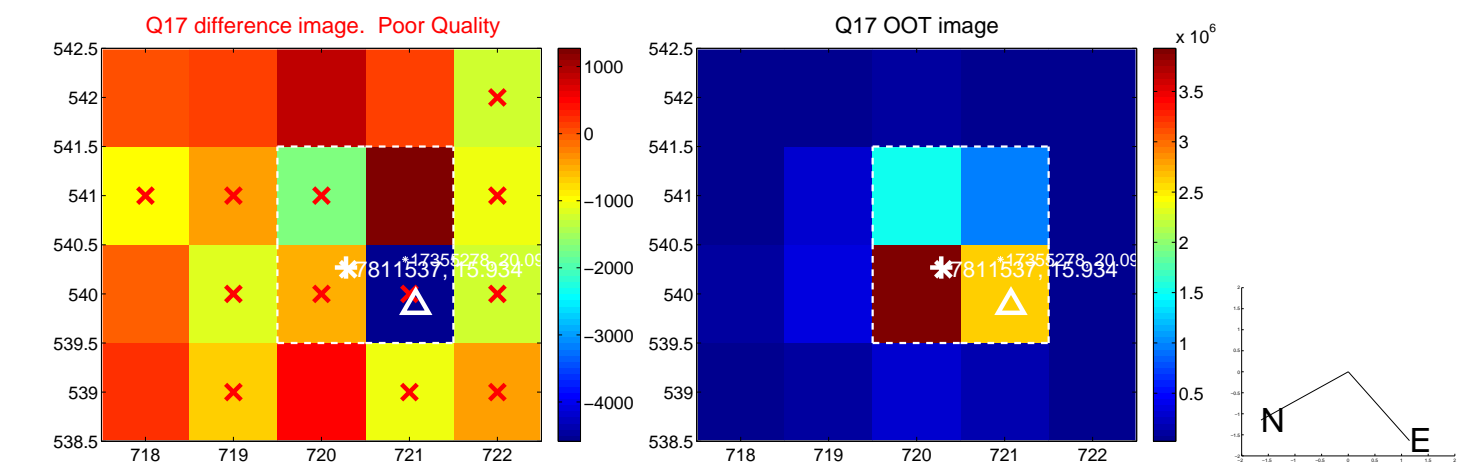
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



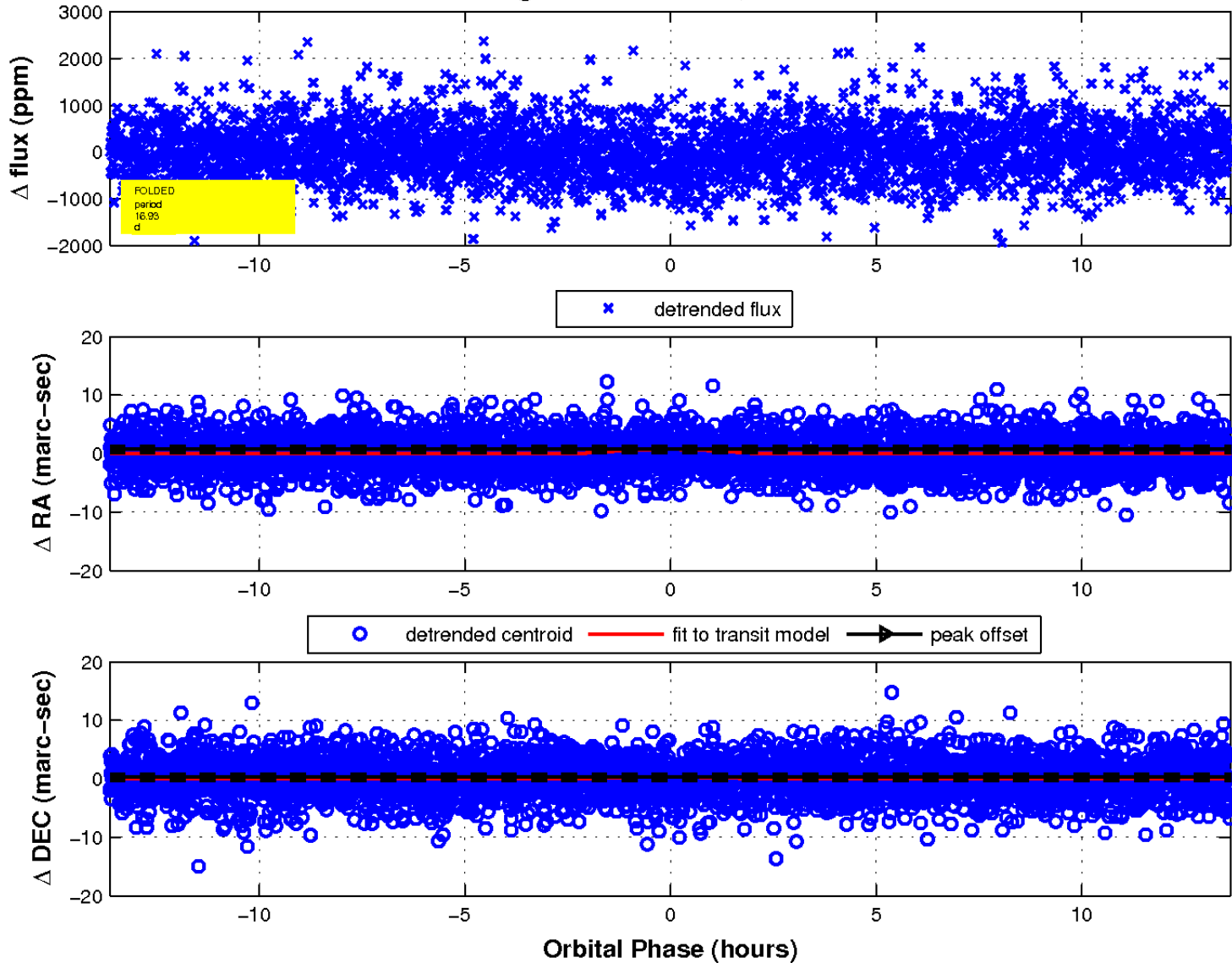
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

