

# KIC 011253827

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
011253827-01	OBS	2672.02	42.992434	162.505340	1106.0	4.891	78.2	83.4	0.94	5593	3.52	14.36
011253827-02	OBS	2672.01	88.510817	182.678538	2680.8	7.872	61.4	105.4	0.94	5593	5.66	5.48

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
011253827-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
011253827-02	OBS	PC	0.82	0	0	0	0	NO_COMMENT

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

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

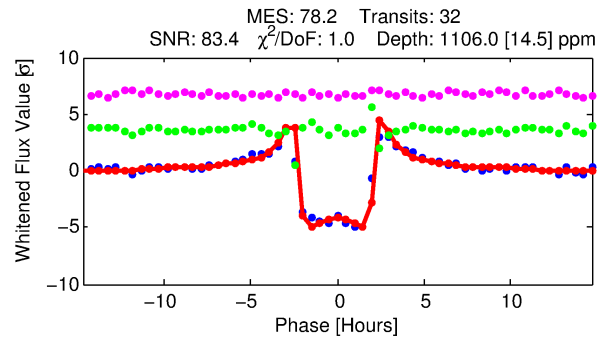
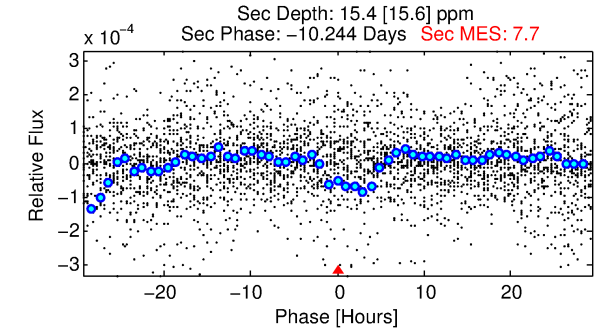
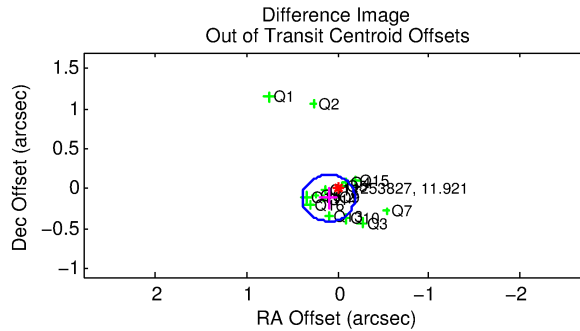
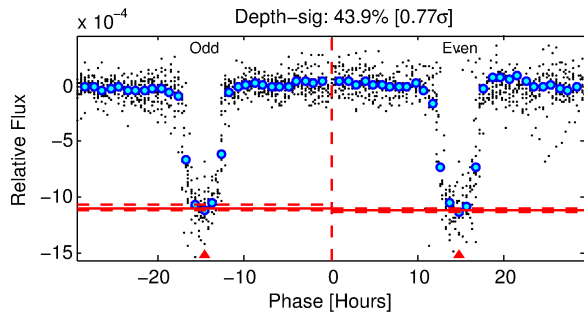
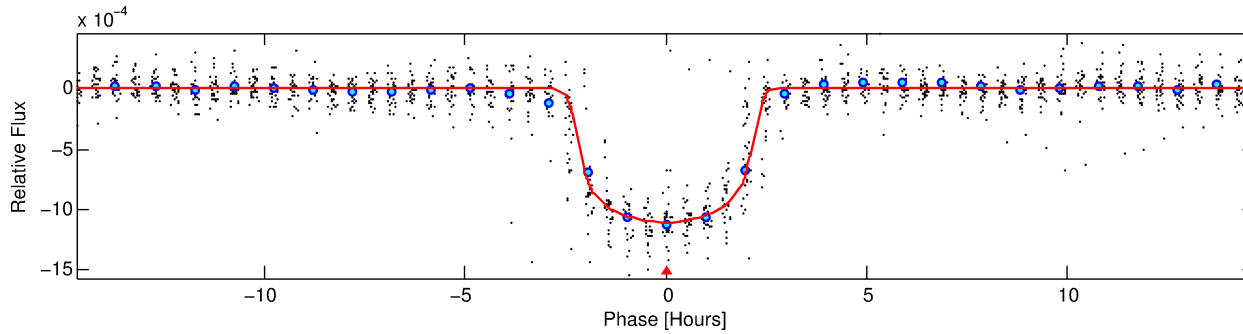
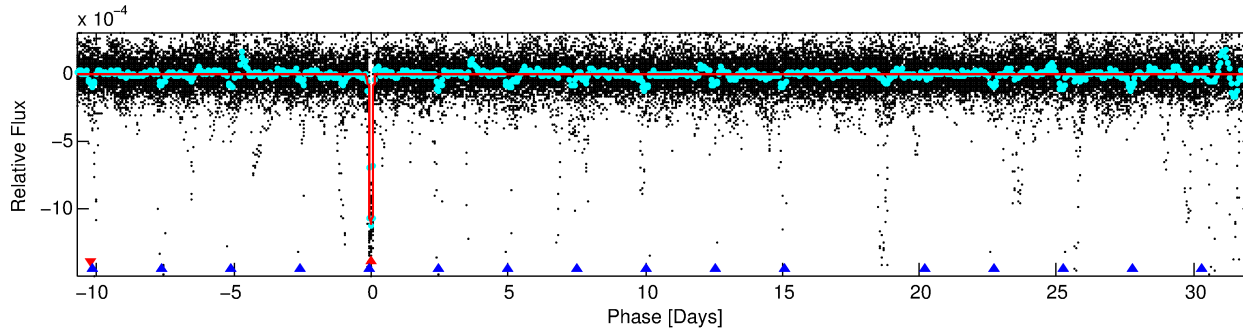
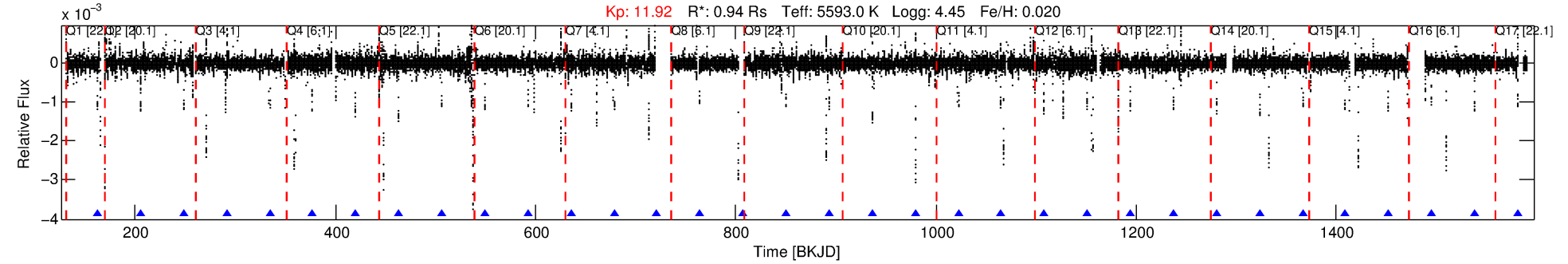
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 011253827-01

No Significant Match Found

# DV One-Page Summary

KIC: 11253827 Candidate: 1 of 2 Period: 42.992 d  
KOI: K02672.02 Name: Kepler-396b Corr: 0.968



## DV Fit Results:

Period = 42.99243 [0.00004] d  
Epoch = 162.5053 [0.0008] BKJD  
Rp/R\* = 0.0342 [0.0006]  
a/R\* = 42.86 [2.50]  
b = 0.81 [0.02]  
Seff = 14.36 [2.81]  
Teq = 496 [24] K  
Rp = 3.52 [0.46] Re  
a = 0.2335 [0.0272] AU  
Ag = 37.25 [38.40] [0.94σ]  
Teffp = 1896 [483] K [2.90σ]

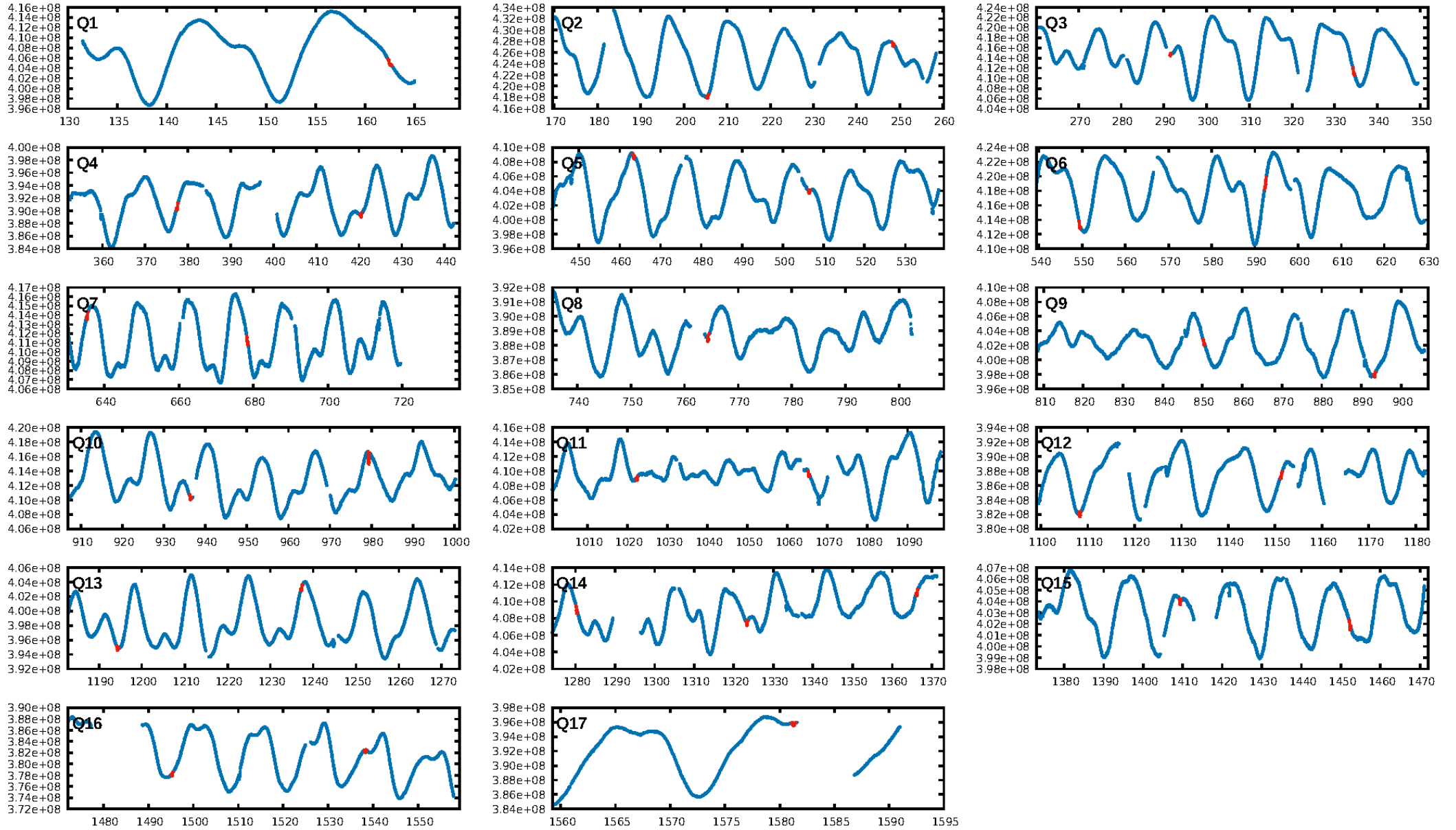
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [117.88σ]  
ModelChiSquare2-sig: 10.8%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [30/30]  
GhostDiagnostic-chr: 2.242  
Centroid-sig: 47.4%  
Centroid-so: 0.139 arcsec [2.28σ]  
OotOffset-rm: 0.154 arcsec [1.59σ]  
KicOffset-rm: 0.274 arcsec [2.60σ]  
OotOffset-st: 4/4/3/4 [15]  
KicOffset-st: 4/4/3/4 [15]  
DiffImageQuality-fgm: 1.00 [15/15]  
DiffImageOverlap-fno: 1.00 [15/15]

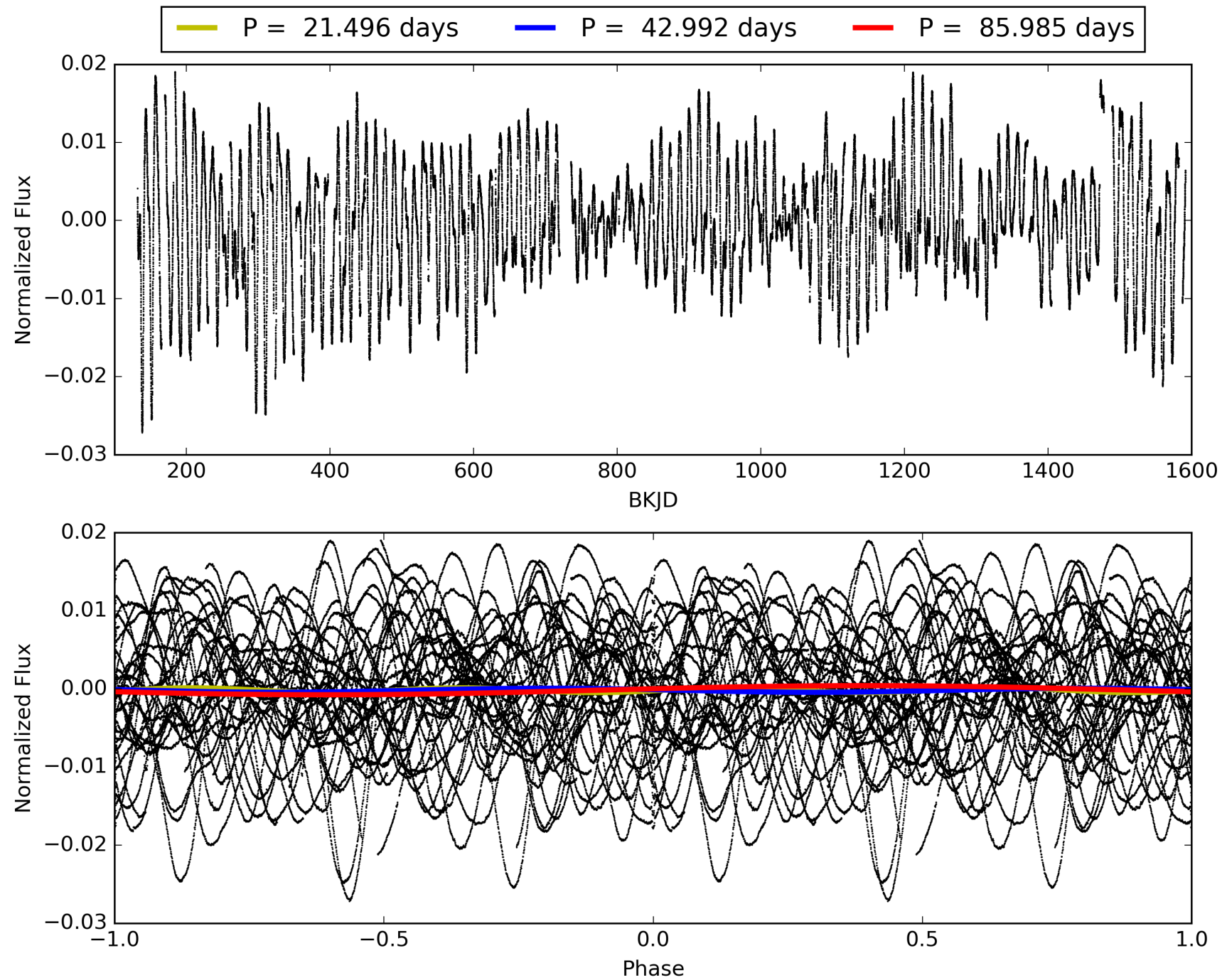
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 03:15:49 Z

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

# TCE 011253827-01, PDC Light Curves

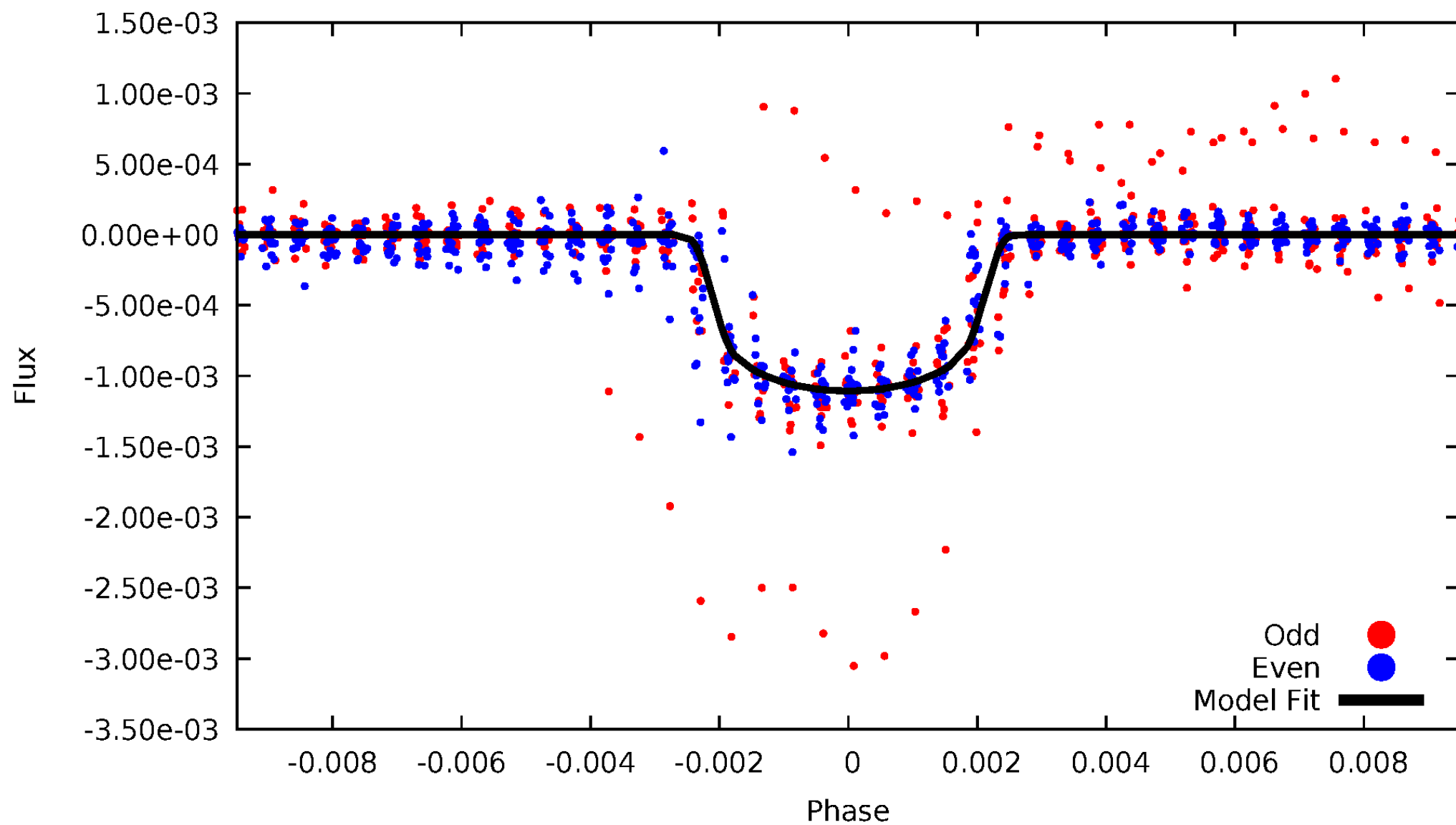


# TCE 011253827-01



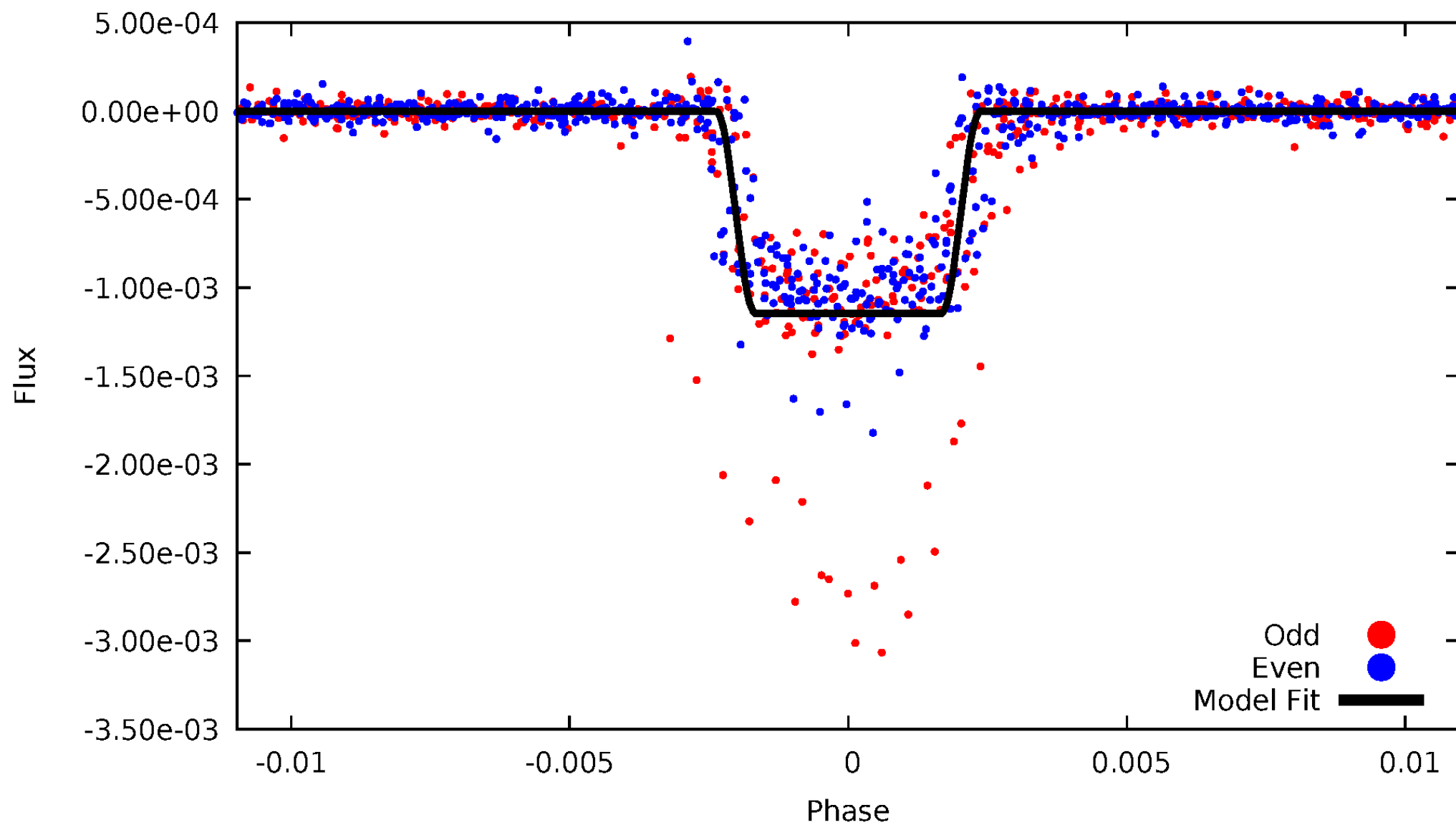
# DV Odd/Even

TCE 011253827-01



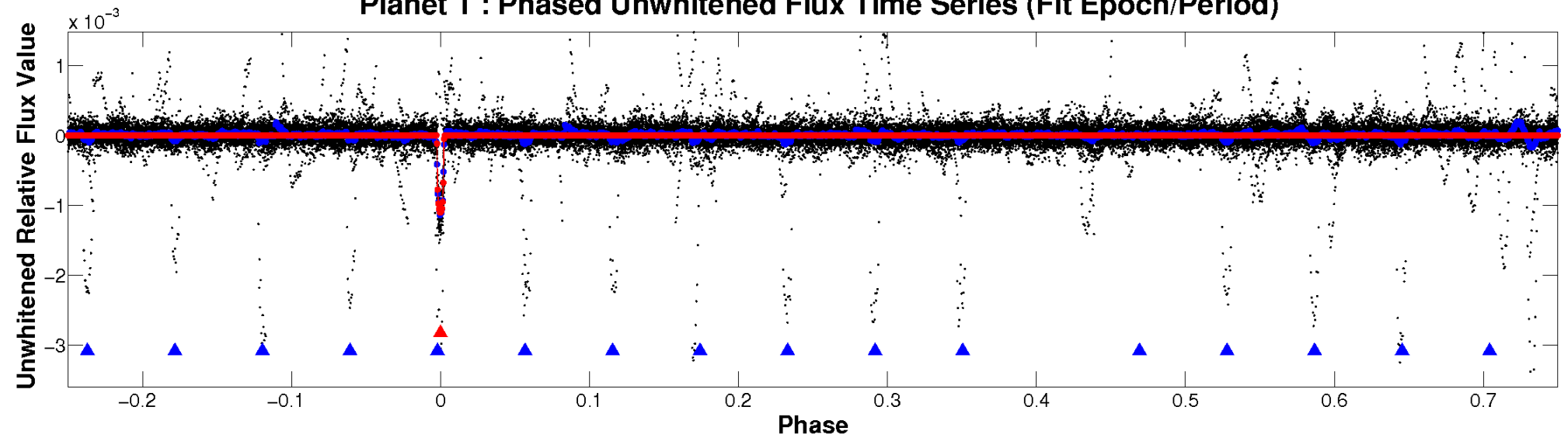
# ALT Odd/Even

TCE 011253827-01

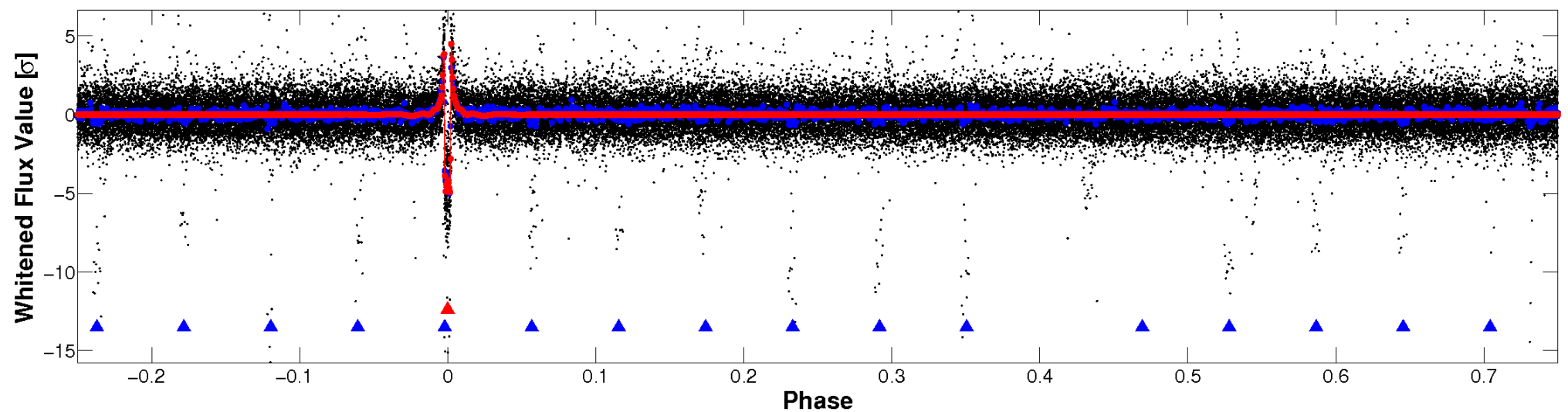


# Non-Whitened Vs. Whitened Light Curve

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

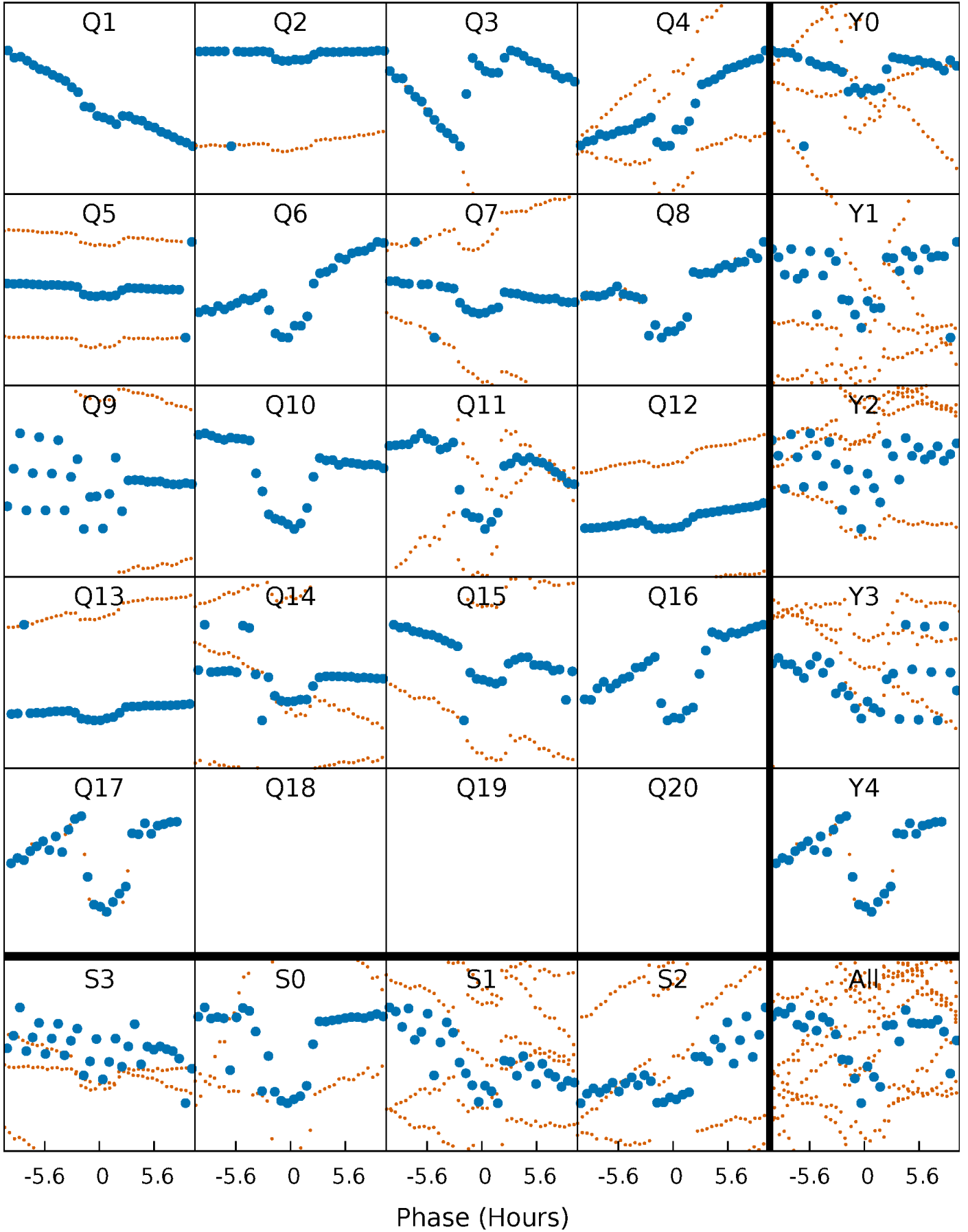


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

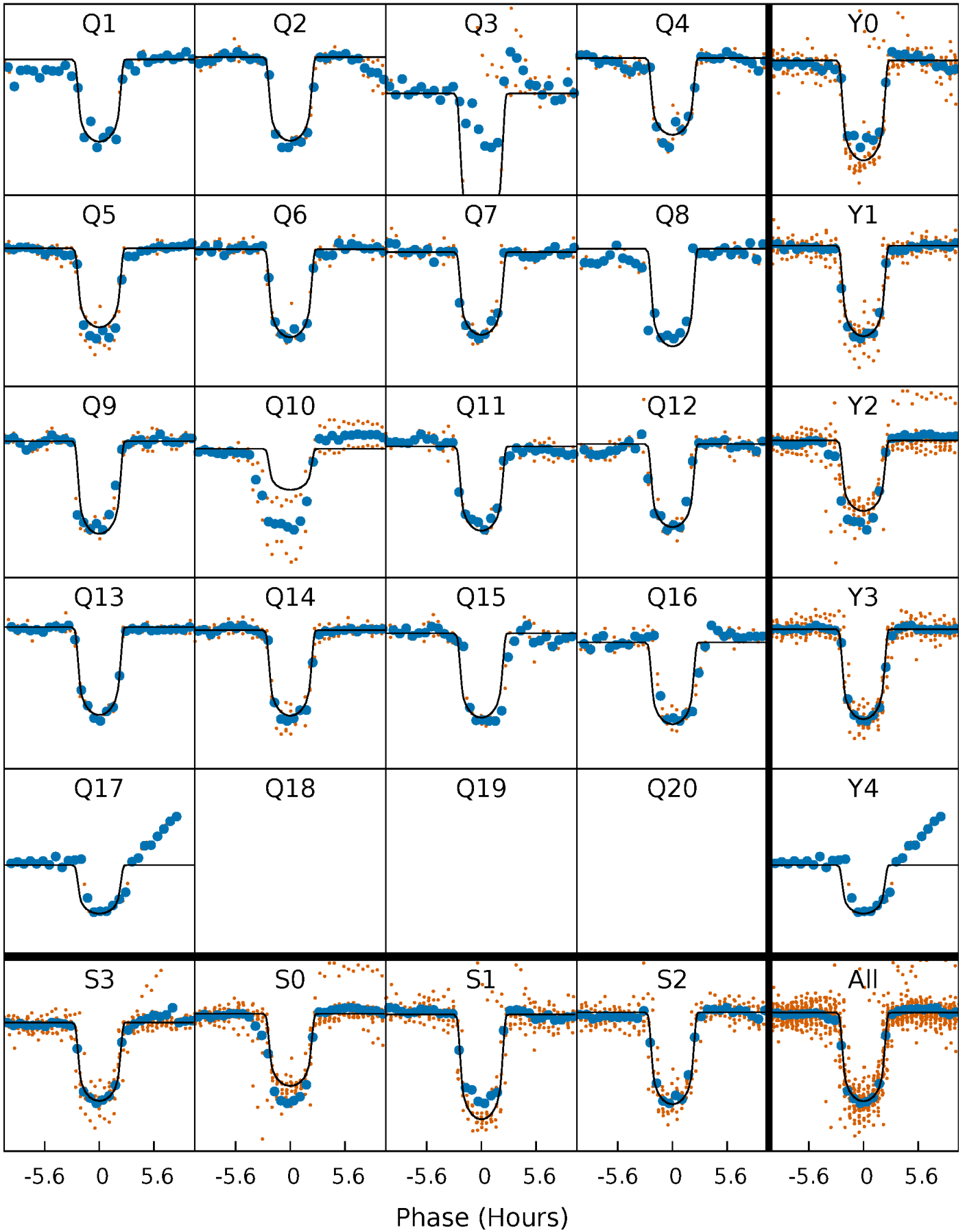
TCE 011253827-01   P= 42.992434 Days    $T_0=162.505340$  (BKJD)





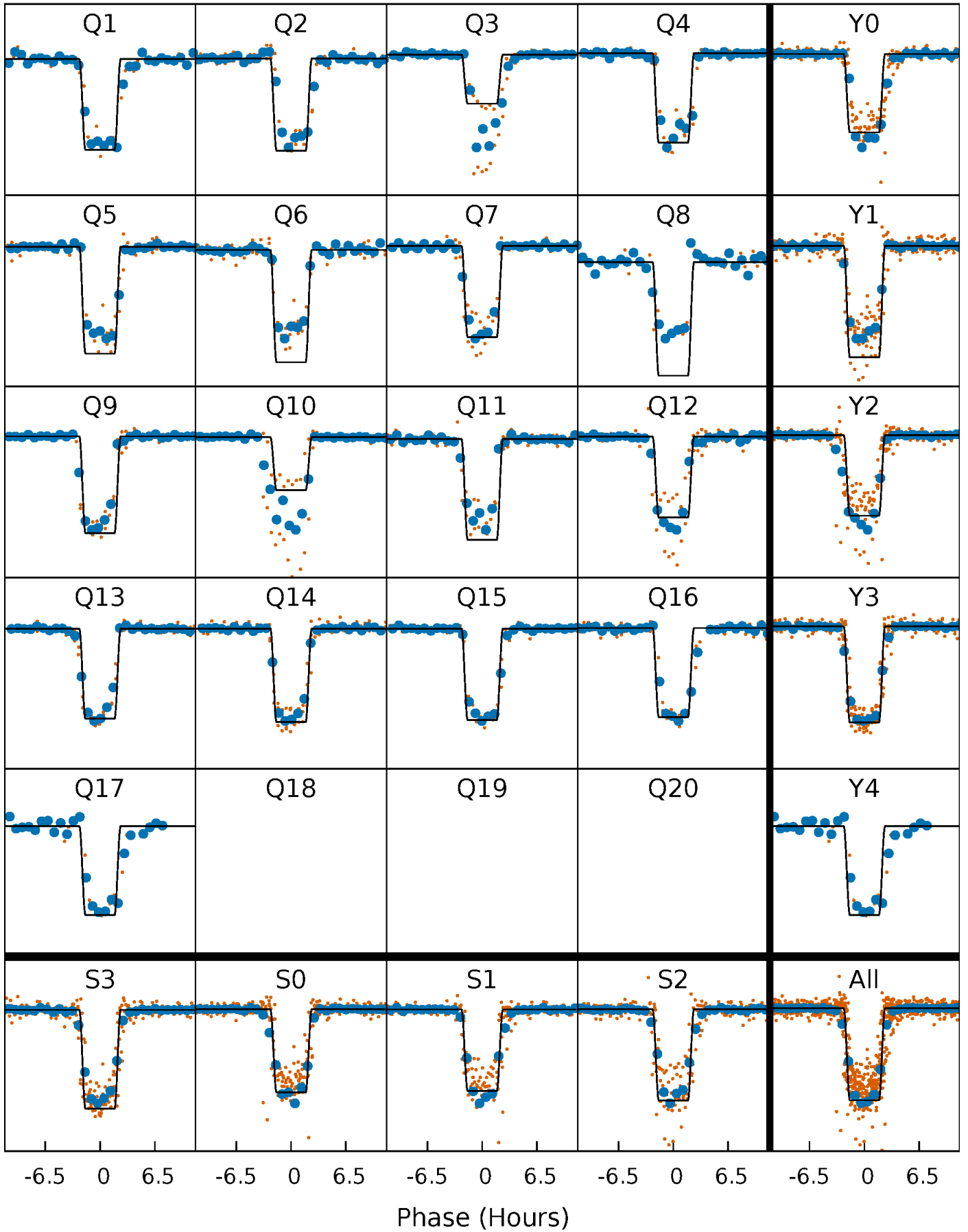
# DV Quarter-Phased Transit Curves

TCE 011253827-01 P= 42.992434 Days  $T_0=162.505340$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

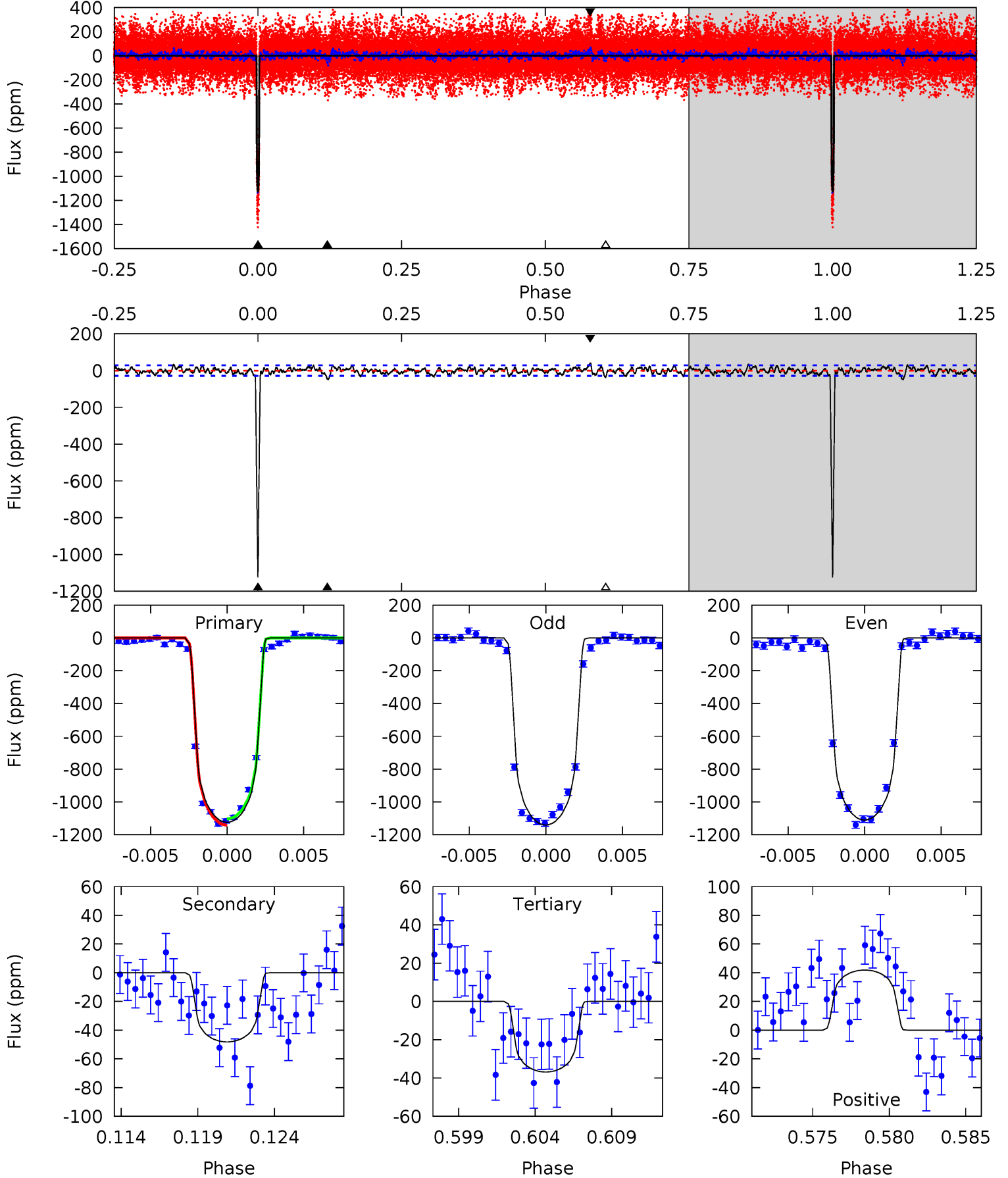
TCE 011253827-01 P= 42.993291 Days  $T_0=162.487371$  (BKJD)



# DV Model-Shift Uniqueness Test

011253827-01, P = 42.992434 Days, E = 119.512906 Days

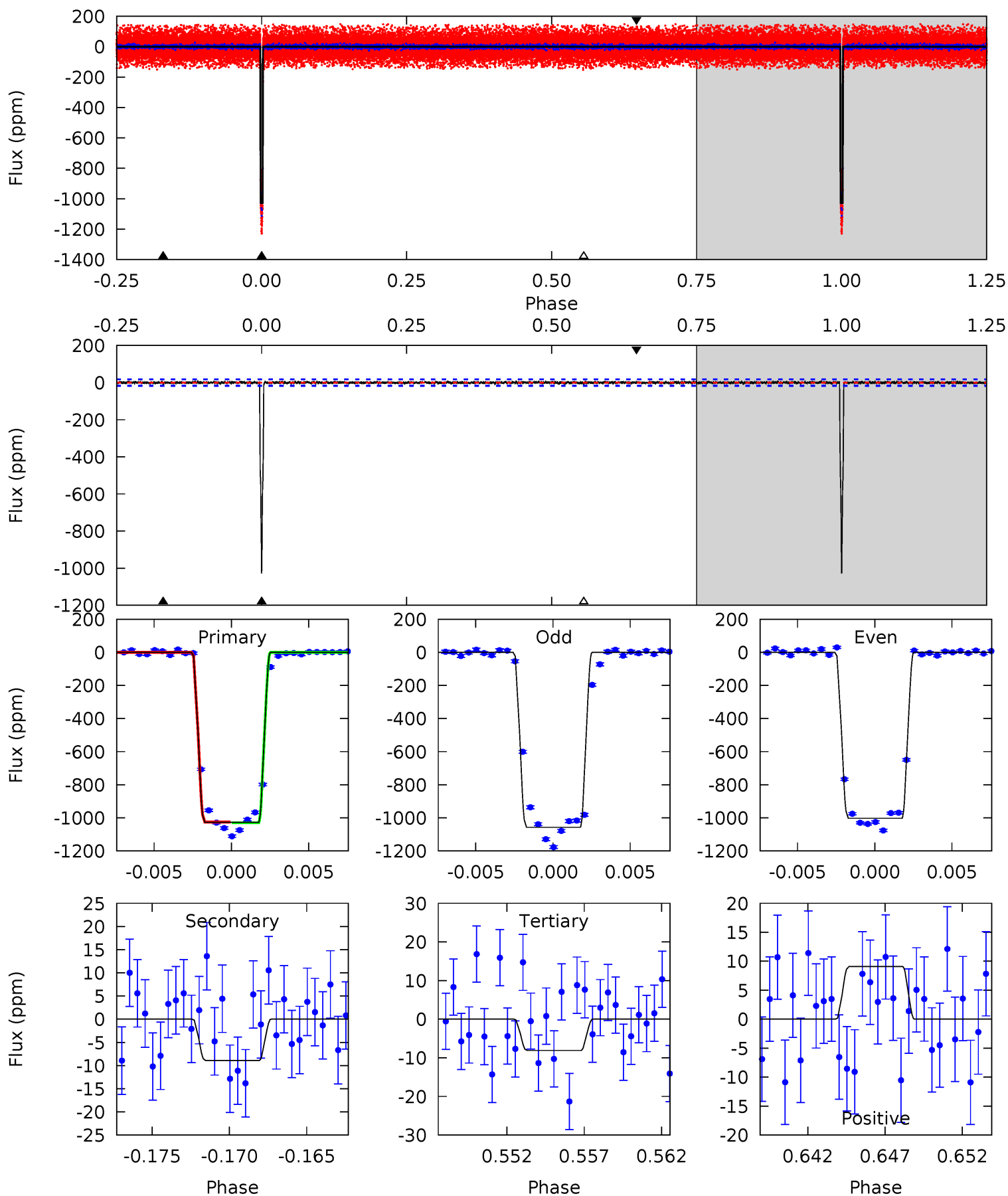
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
201.1	8.62	6.60	7.49	5.16	2.81	2.20	194.5	193.6	2.03	1.13	2.70	1.04	0.04	3.44



# Alt Model-Shift Uniqueness Test

011253827-01, P = 42.993291 Days, E = 119.494080 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
307.1	2.66	2.42	2.71	5.17	2.83	0.64	304.7	304.4	0.24	-0.05	8.16	1.07	0.01	0



### Stellar Parameters For KIC 011253827

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5593^{+111}_{-111}$	$4.450^{+0.068}_{-0.102}$	$0.020^{+0.150}_{-0.150}$	$0.945^{+0.122}_{-0.075}$	$0.918^{+0.063}_{-0.051}$	$1.533^{+0.438}_{-0.483}$
	+2%/-2%	+2%/-2%	+750%/-750%	+13%/-8%	+7%/-6%	+29%/-31%
Source	SPE59	SPE59	SPE59	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 011253827-01 / KOI 2672.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-48 \pm 6$	$3.55^{+0.25}_{-0.20}$	$696^{+26}_{-20}$	$3132^{+70}_{-74}$	$114^{+20}_{-20}$
Alt.	$-9 \pm 3$	$3.51^{+0.29}_{-0.19}$	$697^{+27}_{-24}$	$2495^{+110}_{-135}$	$21^{+9}_{-8}$

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

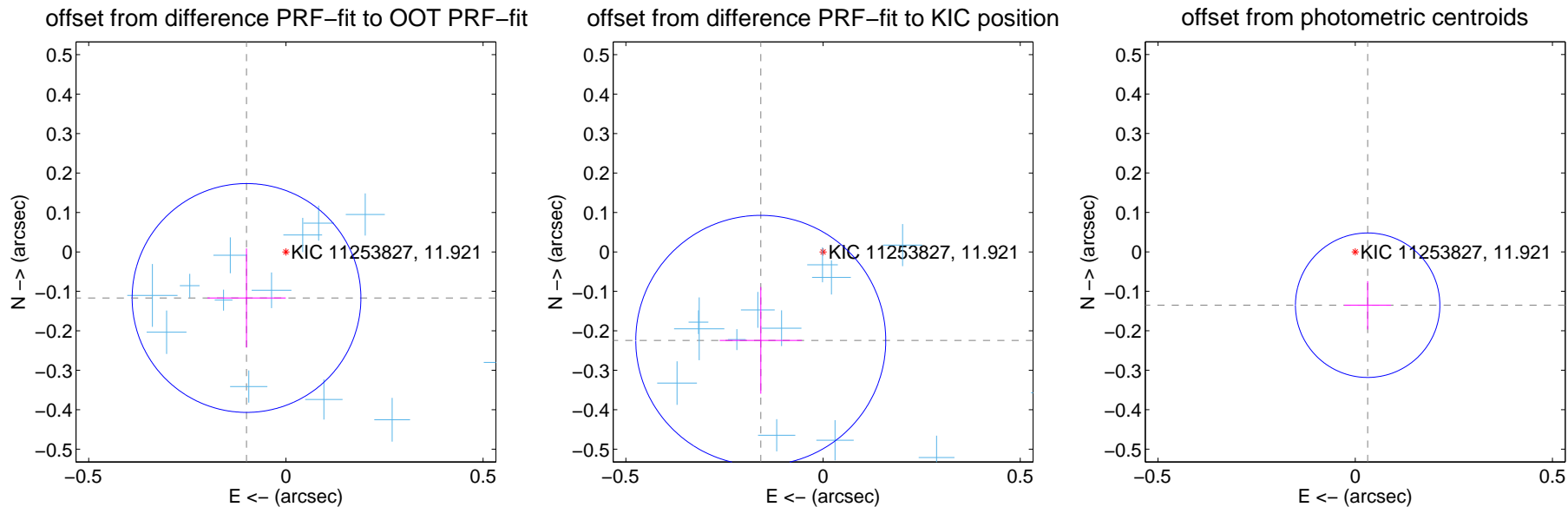
## DV Centroid Data

Supplemental centroid analysis for 011253827-01. **Kepler magnitude: 11.92.** Transit SNR 83.41

There are 15 quarters with good PRF difference image offsets

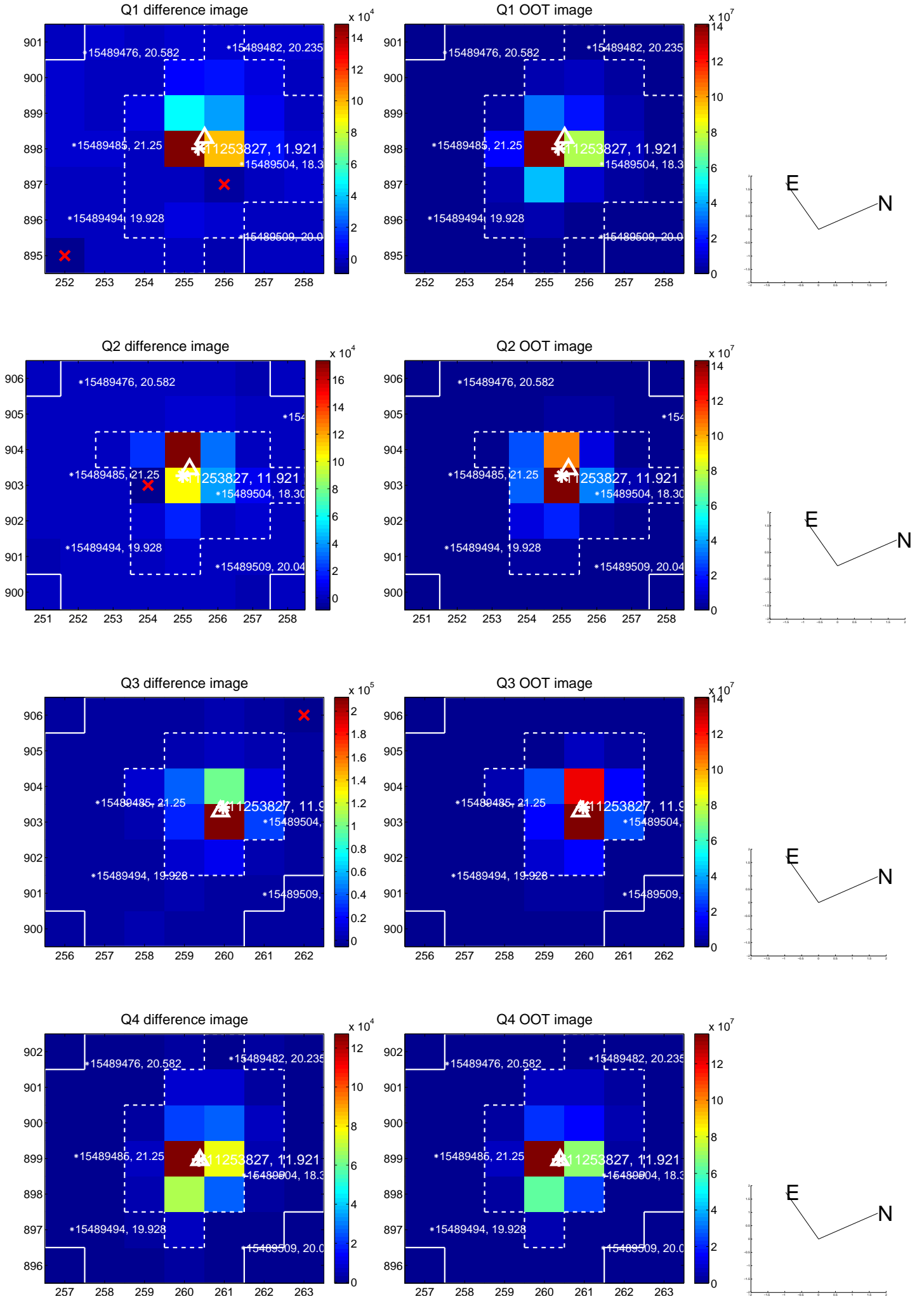
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.154 \pm 0.097$	1.59	$0.100 \pm 0.099$	$-0.117 \pm 0.125$
PRF-fit source offset from KIC position	$0.274 \pm 0.106$	2.60	$0.158 \pm 0.104$	$-0.224 \pm 0.135$
photometric centroid source offset	$0.14 \pm 0.06$	2.28	$-0.03 \pm 0.06$	$-0.14 \pm 0.06$

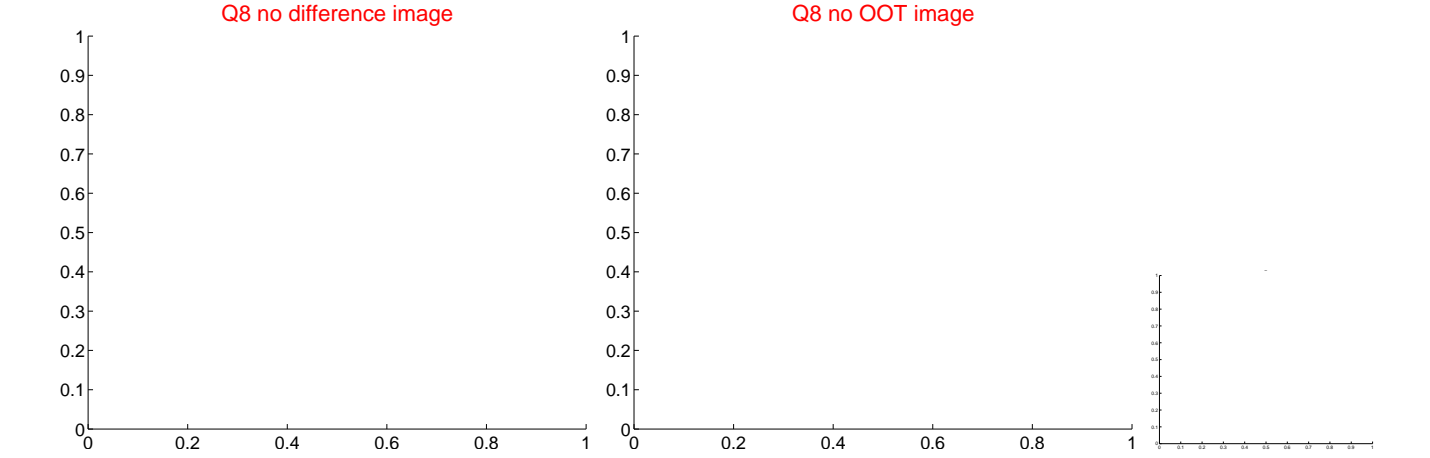
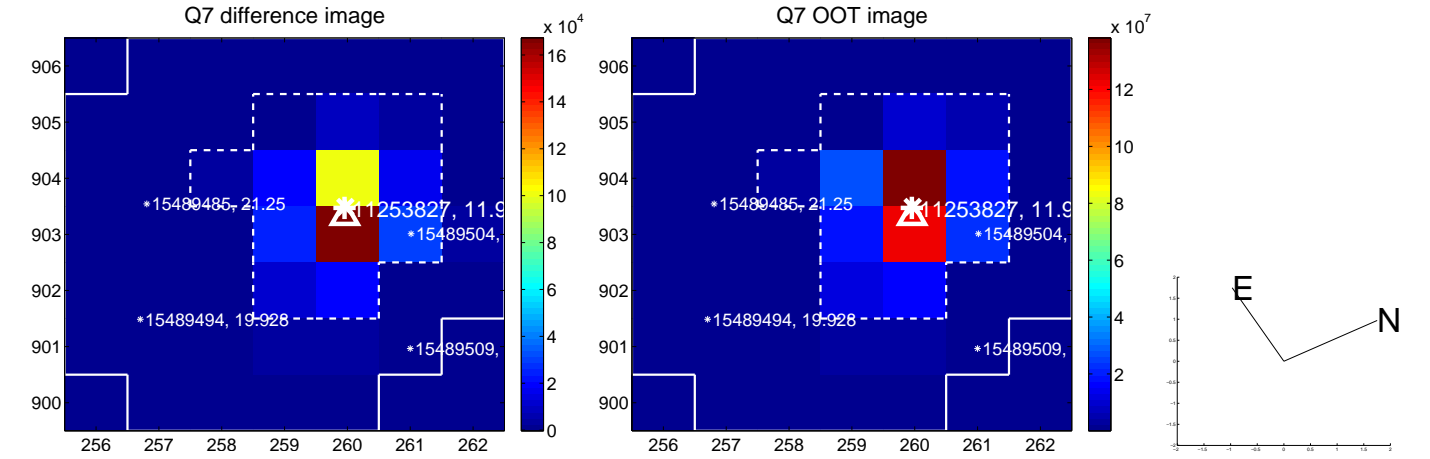
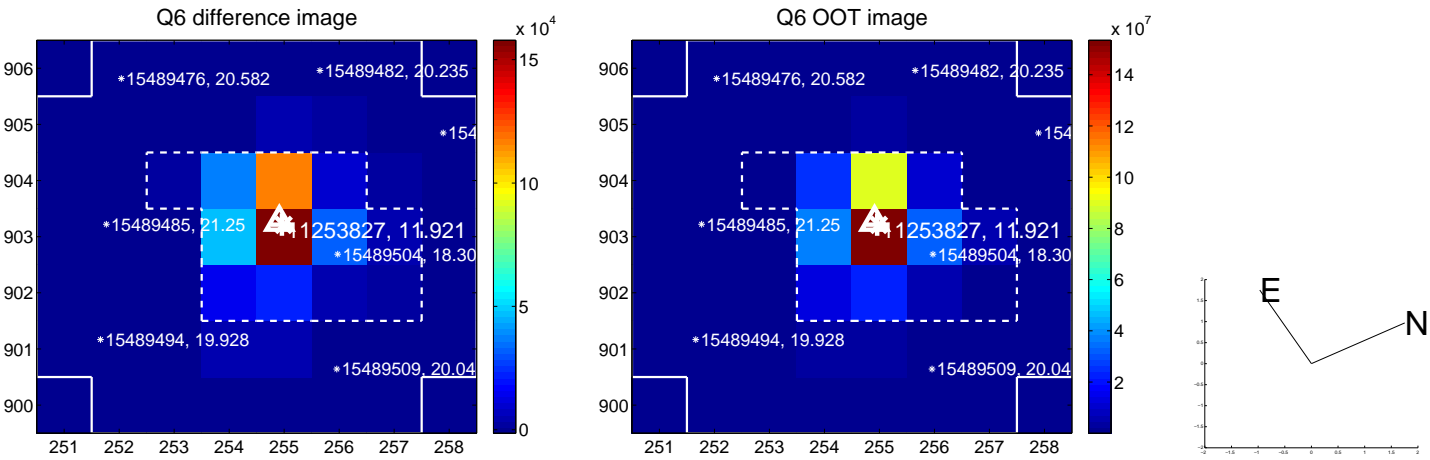
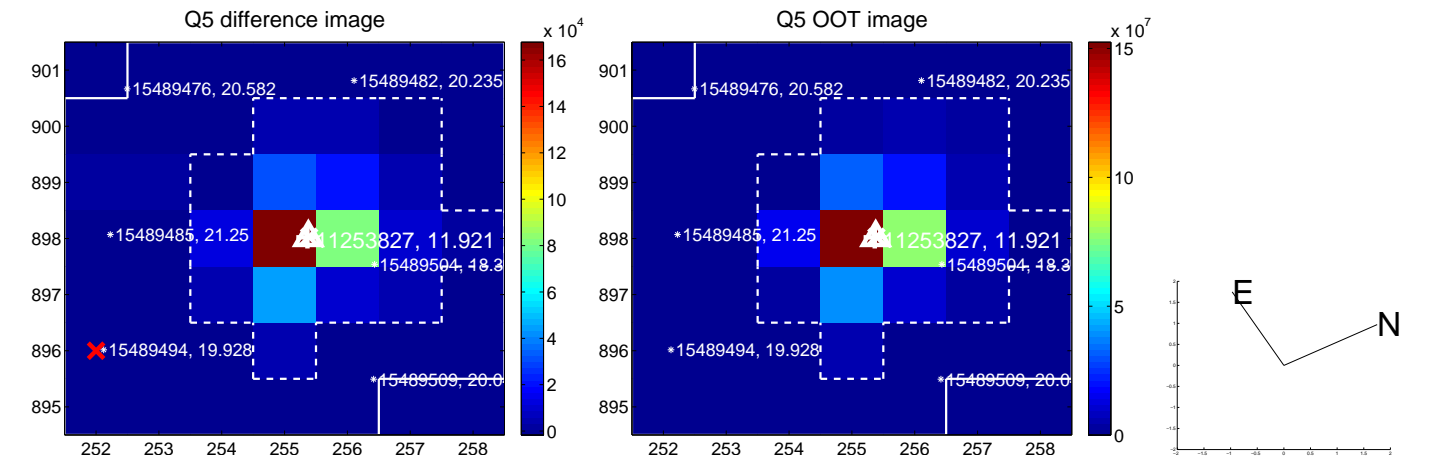


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

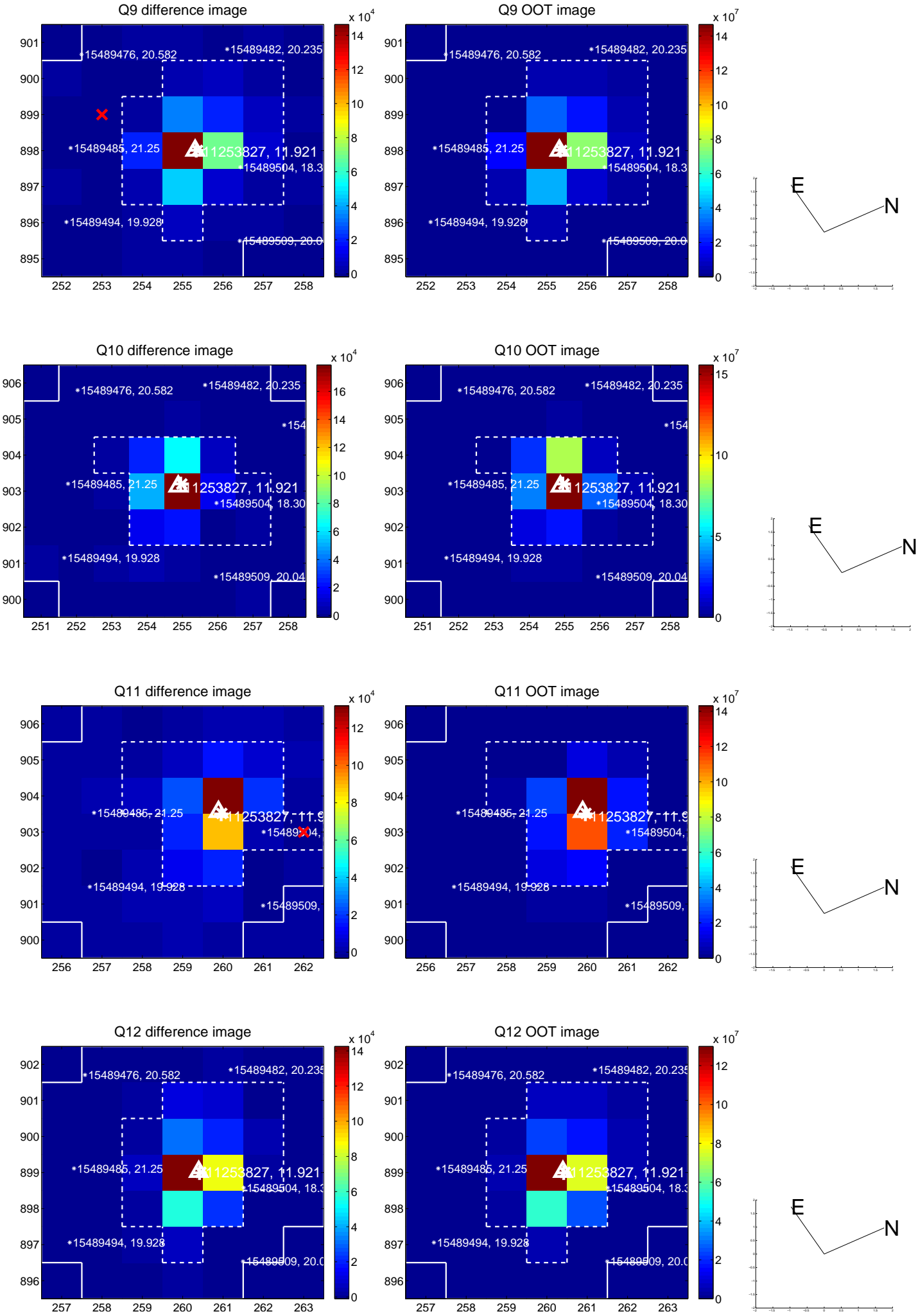


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

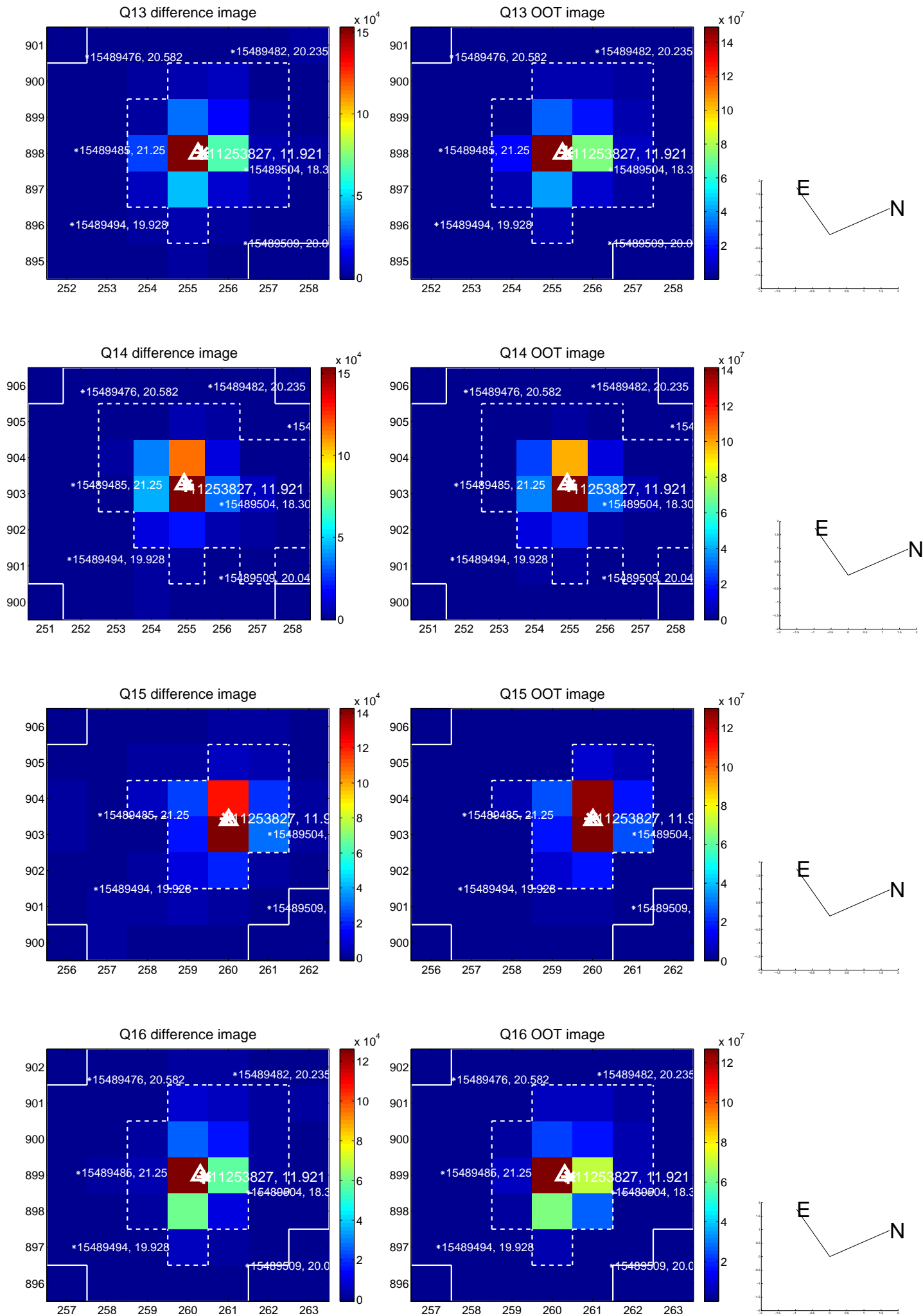




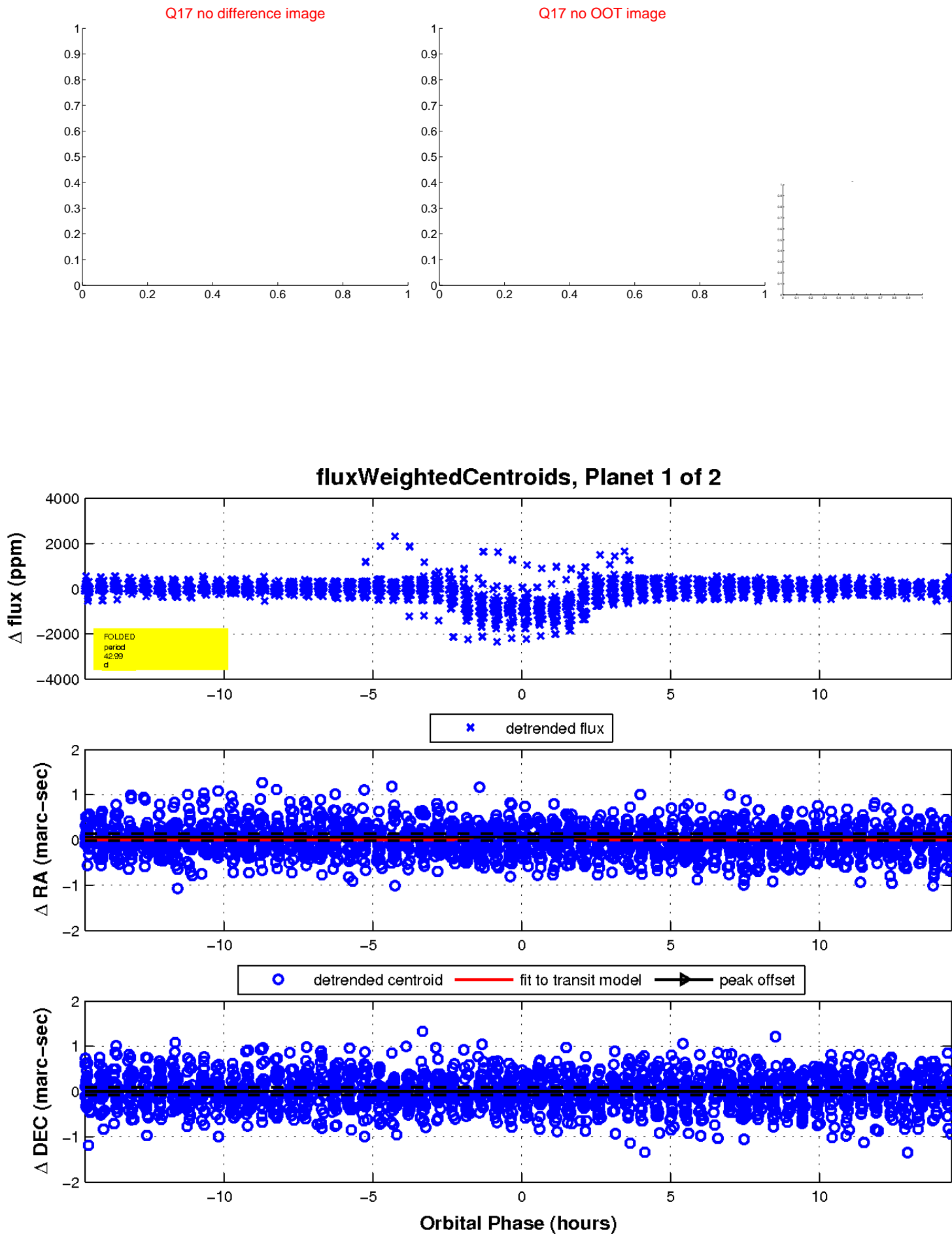
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

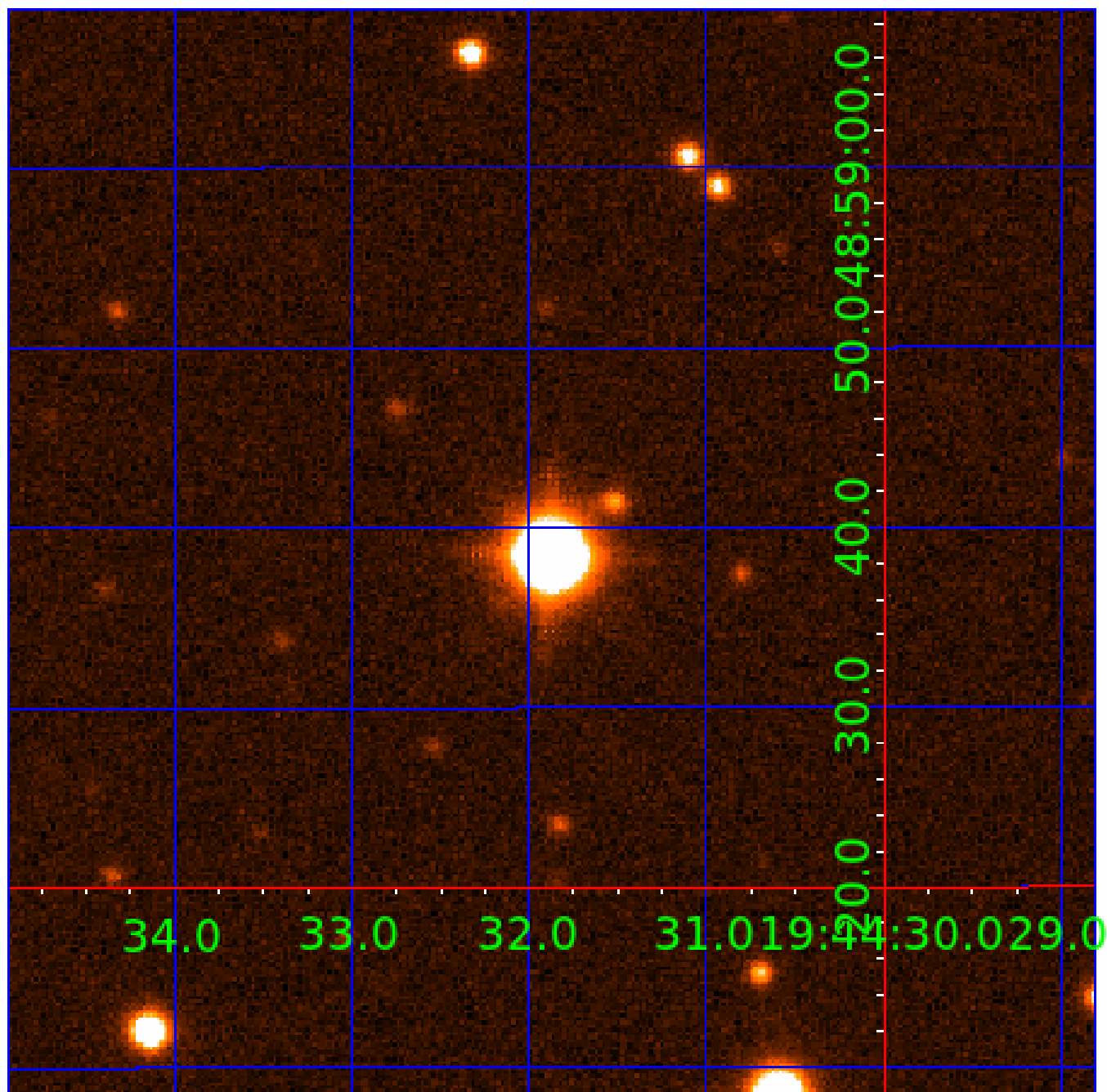


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 011253827

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
011253827-01	OBS	2672.02	42.992434	162.505340	1106.0	4.891	78.2	83.4	0.94	5593	3.52	14.36
011253827-02	OBS	2672.01	88.510817	182.678538	2680.8	7.872	61.4	105.4	0.94	5593	5.66	5.48

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
011253827-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
011253827-02	OBS	PC	0.82	0	0	0	0	NO_COMMENT

**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.

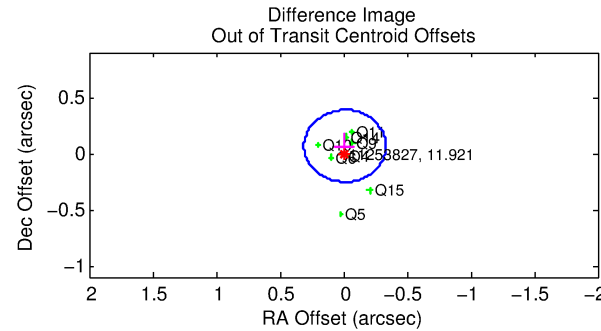
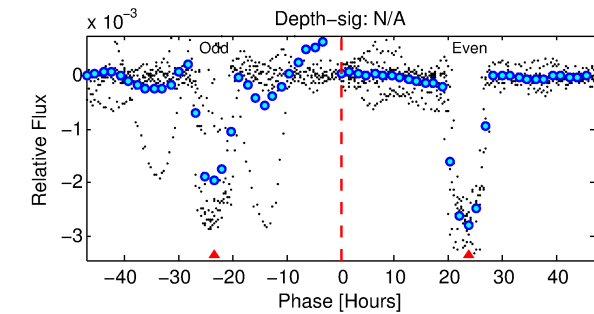
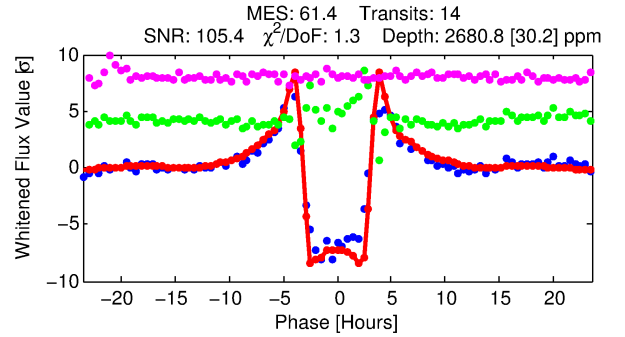
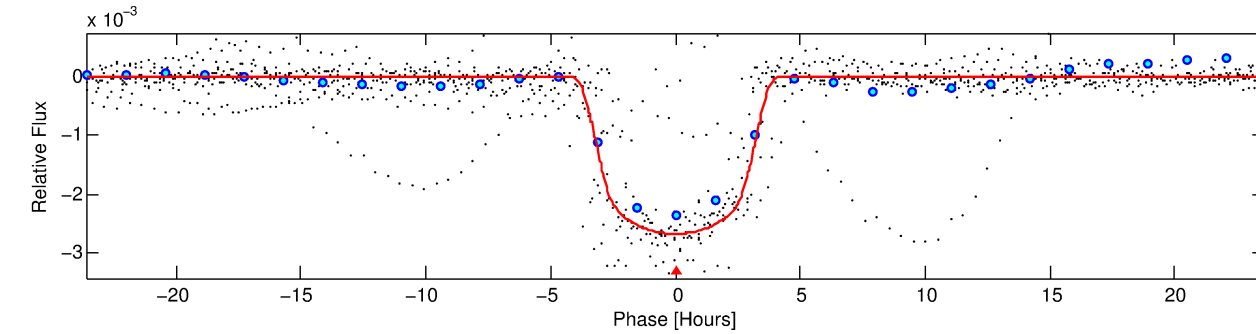
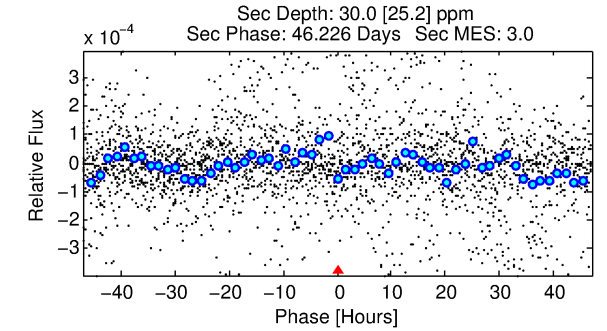
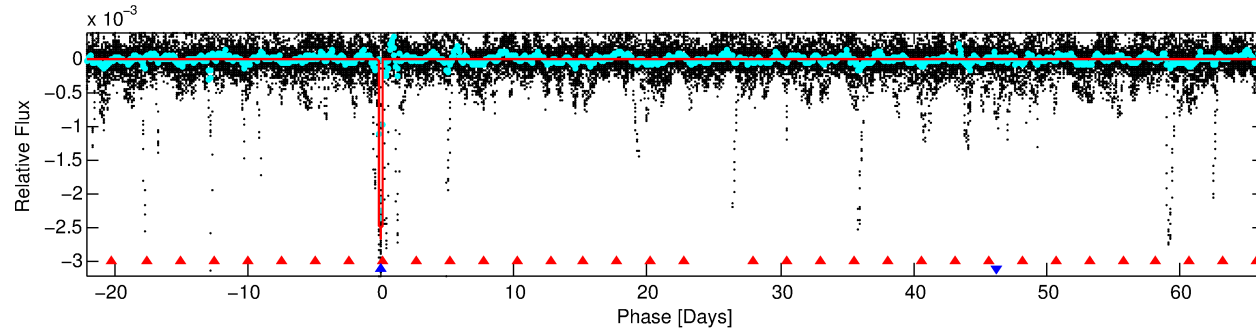
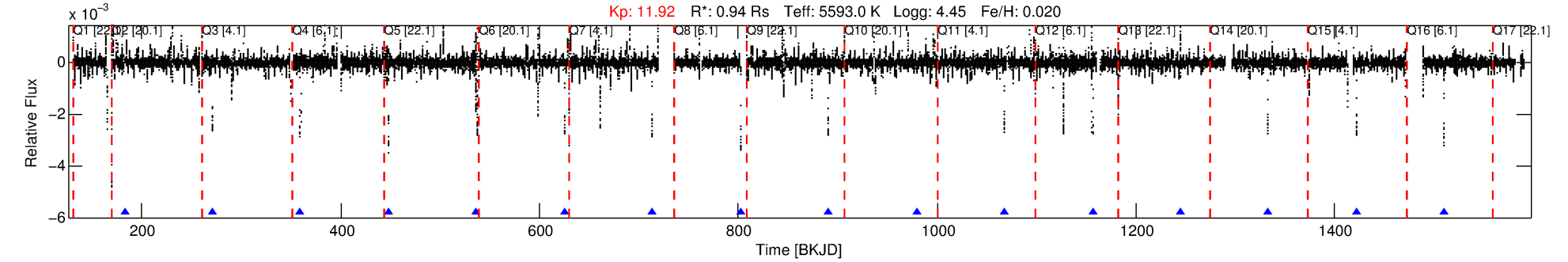
## Ephemeris Match Information For 011253827-02

No Significant Match Found

# DV One-Page Summary

KIC: 11253827 Candidate: 2 of 2 Period: 88.511 d  
KOI: K02672.01 Name: Kepler-396c Corr: 0.970

Kp: 11.92 R\*: 0.94 Rs Teff: 5593.0 K Logg: 4.45 Fe/H: 0.020



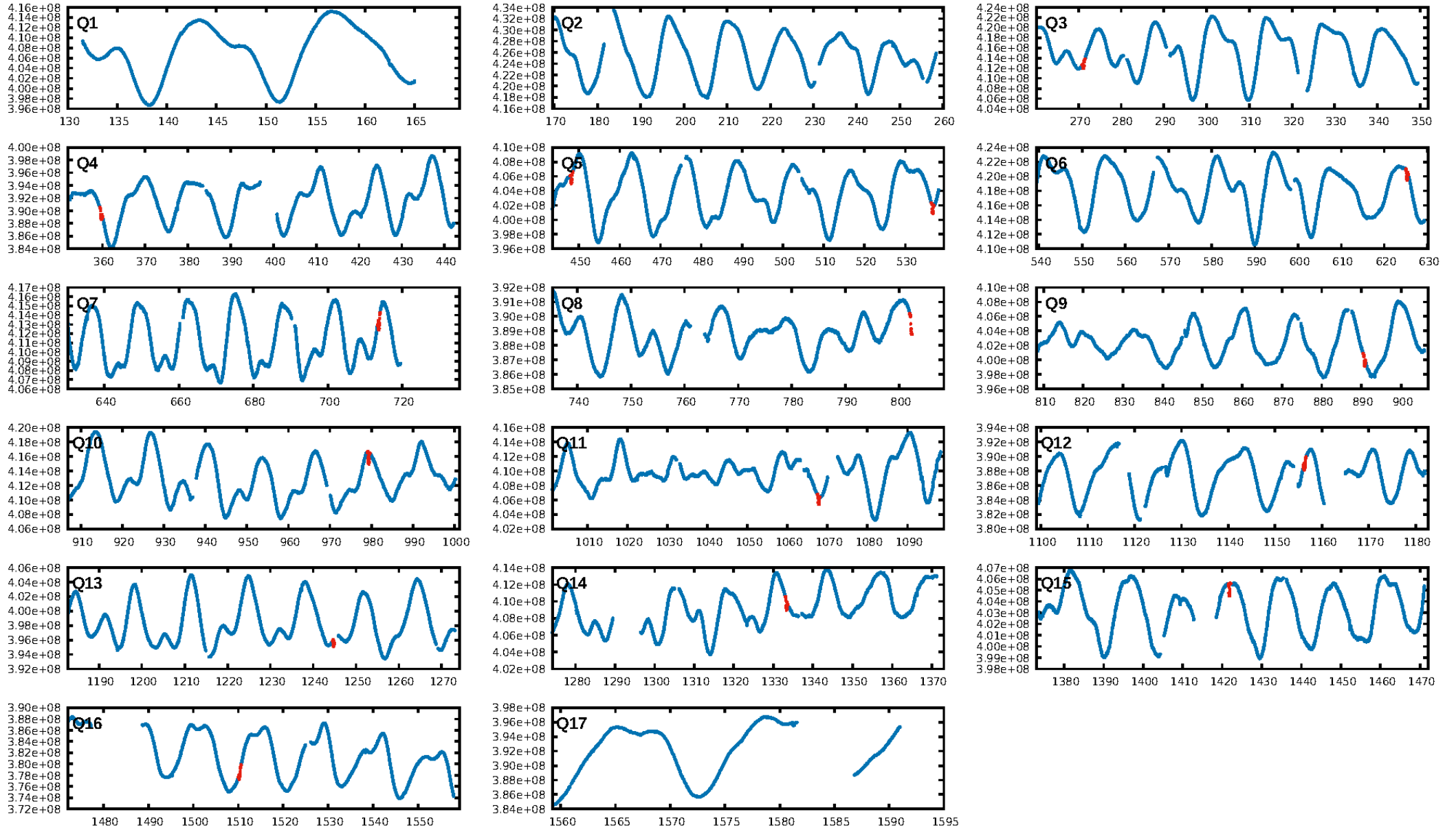
## DV Fit Results:

Period = 88.51082 [0.00010] d  
Epoch = 182.6785 [0.0010] BKJD  
Rp/R\* = 0.0548 [0.0004]  
a/R\* = 52.55 [0.85]  
b = 0.86 [0.00]  
Seff = 5.48 [1.07]  
Teq = 390 [19] K  
Rp = 5.65 [0.73] Re  
a = 0.3778 [0.0440] AU  
Ag = 73.70 [63.38] [1.15σ]  
Teff = 1768 [373] K [3.68σ]

## DV Diagnostic Results:

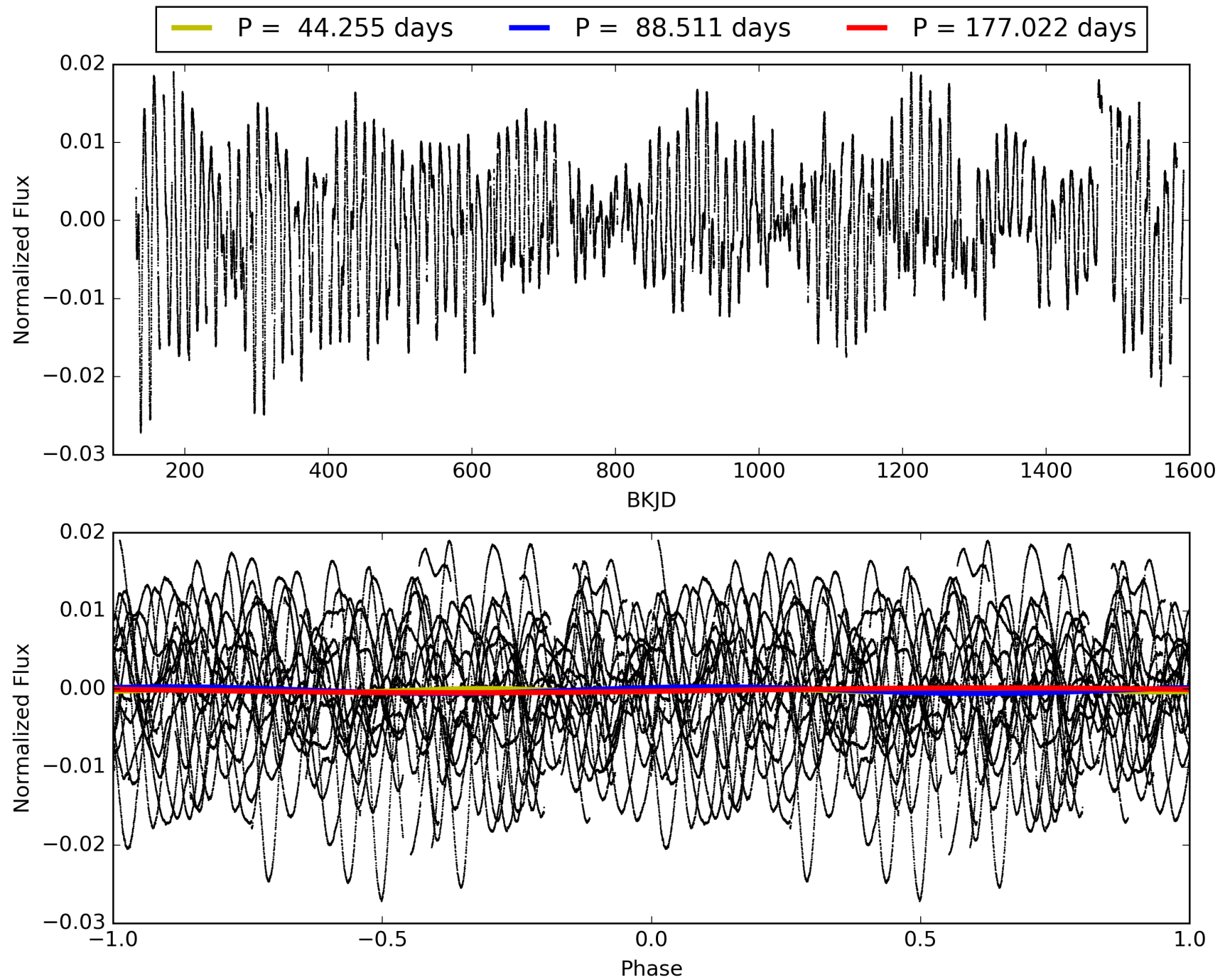
ShortPeriod-sig: 100.0% [117.88σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.0%  
Bootstrap-pfa: 2.70e-274  
RollingBand-fgt: 1.00 [14/14]  
GhostDiagnostic-chr: 1.147  
Centroid-sig: 52.3%  
Centroid-so: 0.143 arcsec [4.30σ]  
OotOffset-rm: 0.067 arcsec [0.63σ]  
KicOffset-rm: 0.053 arcsec [0.54σ]  
OotOffset-st: 3/2/1/2 [8]  
KicOffset-st: 3/2/1/2 [8]  
DiffImageQuality-fgm: 1.00 [8/8]  
DiffImageOverlap-fno: 0.88 [7/8]

# TCE 011253827-02, PDC Light Curves





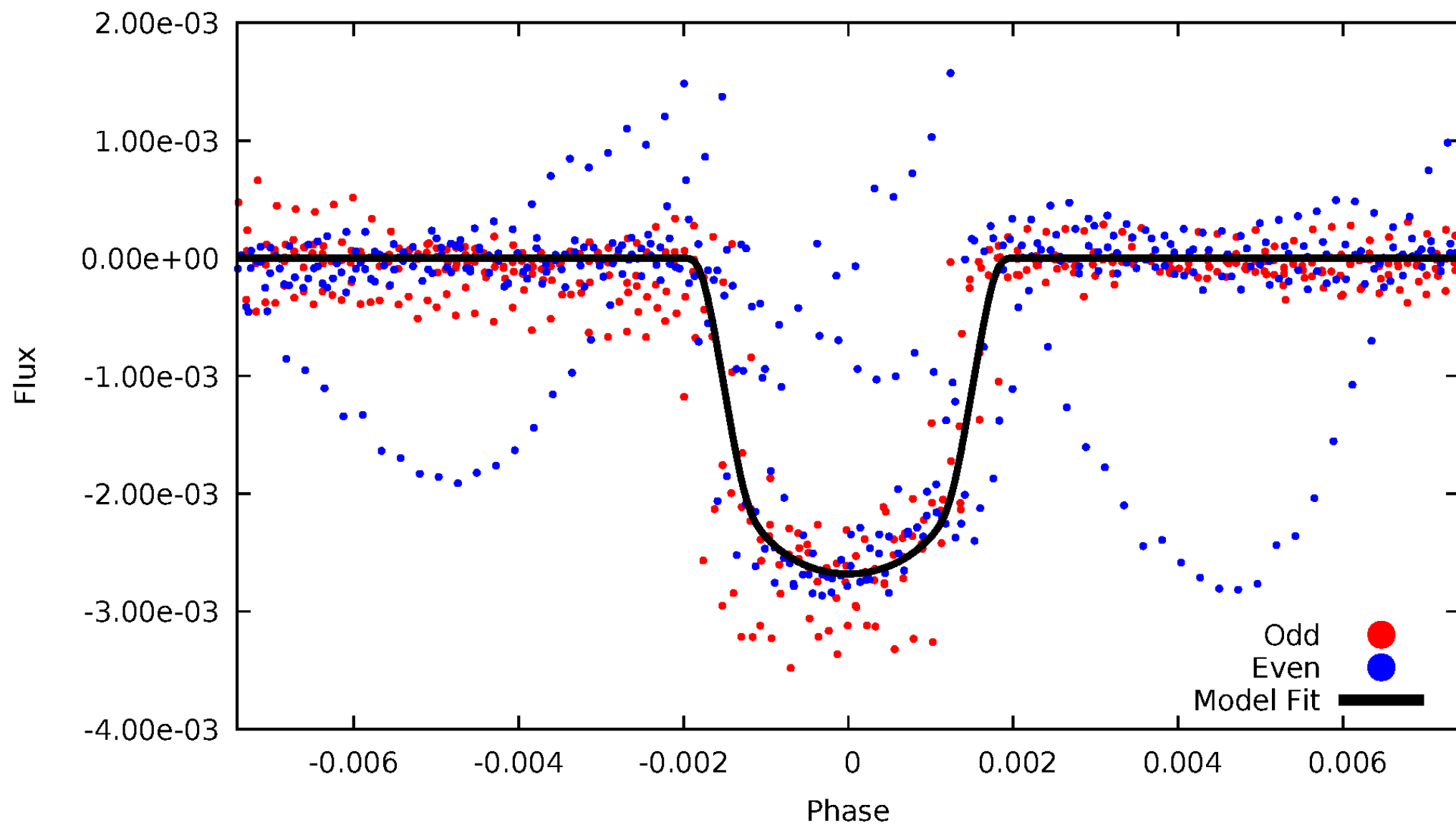
# TCE 011253827-02





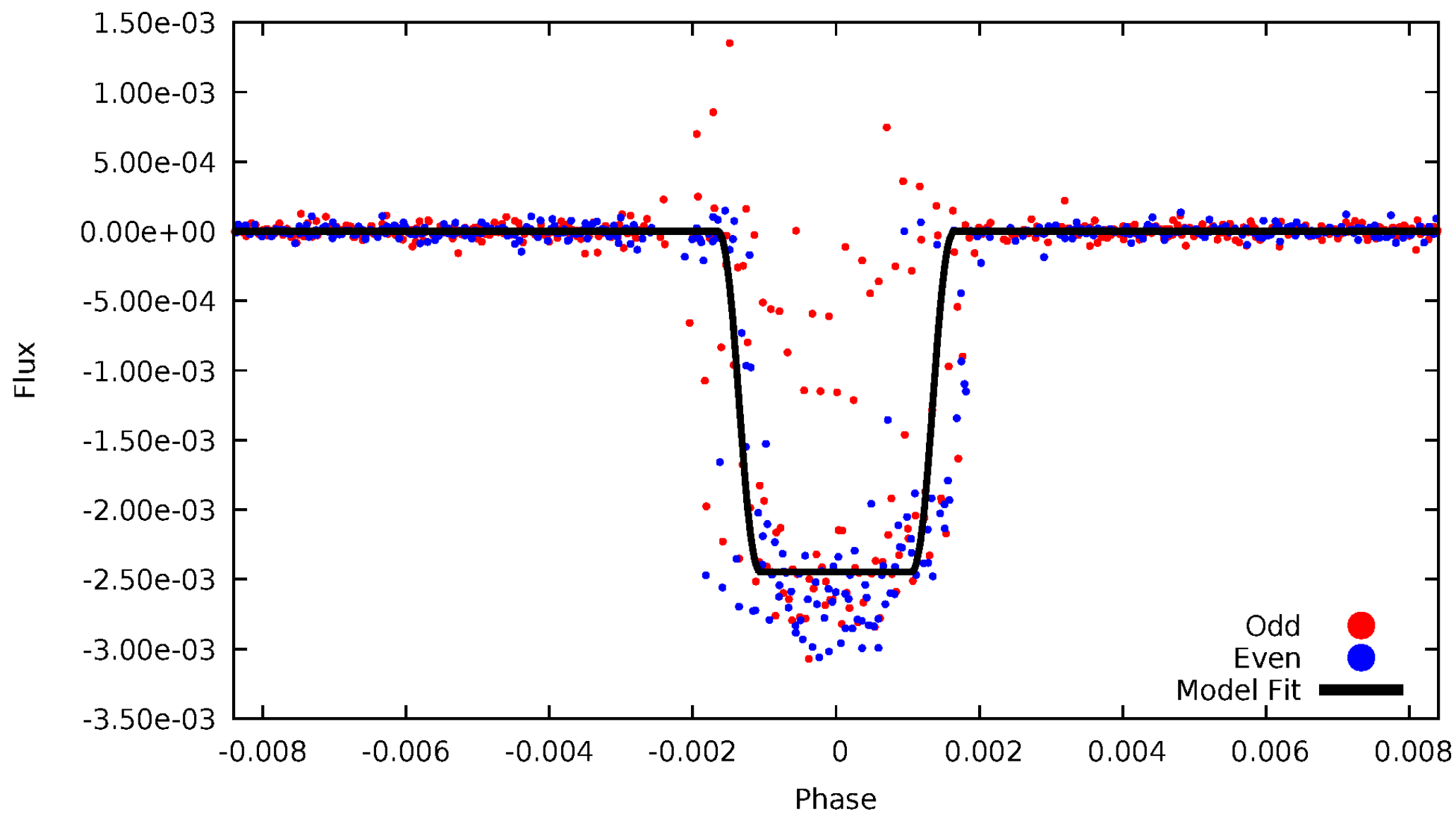
# DV Odd/Even

TCE 011253827-02



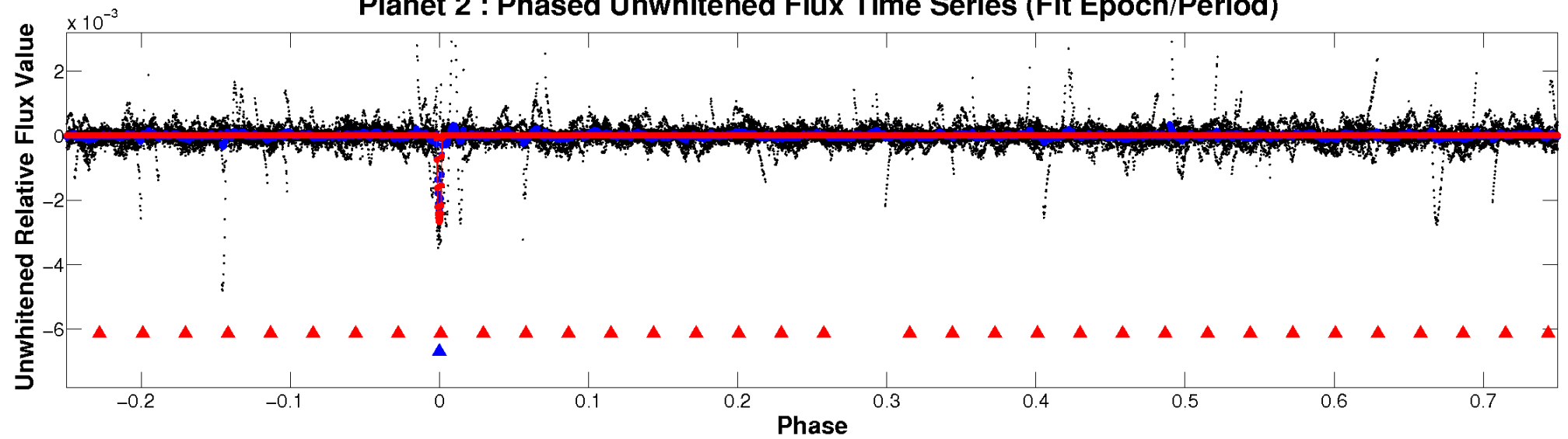
# ALT Odd/Even

TCE 011253827-02

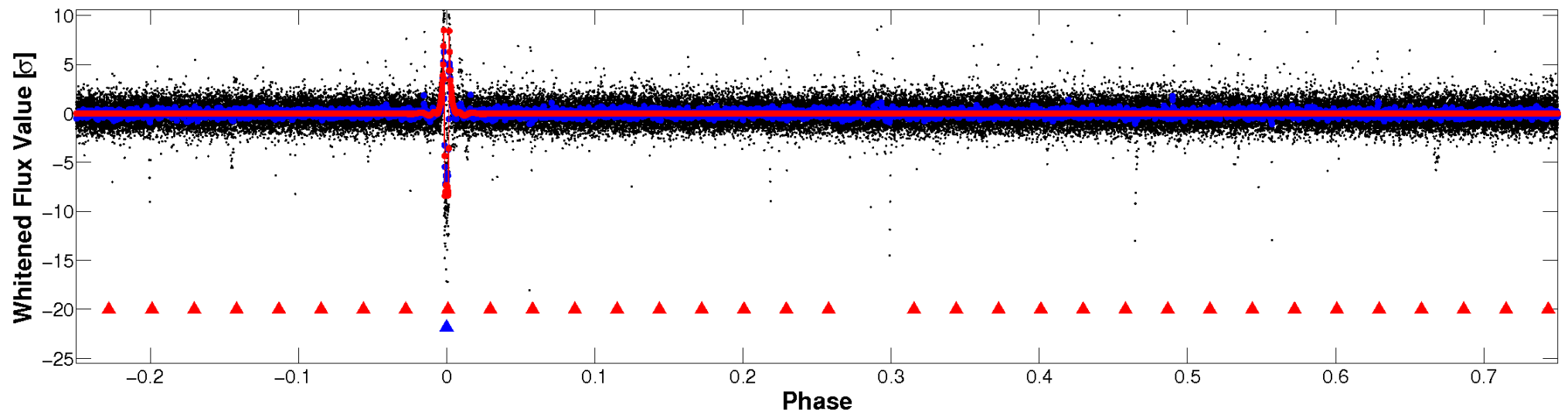


# Non-Whitened Vs. Whitened Light Curve

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

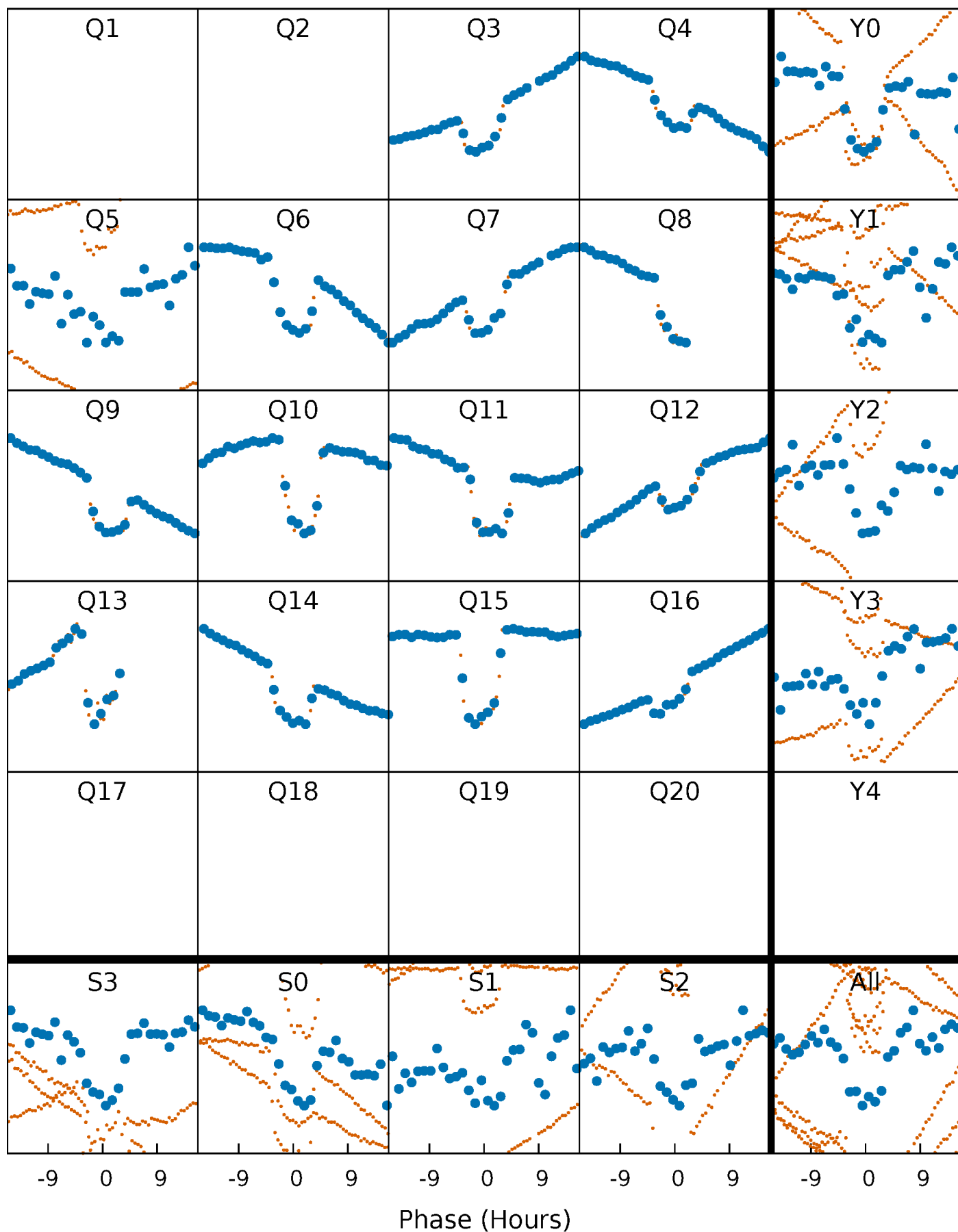


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



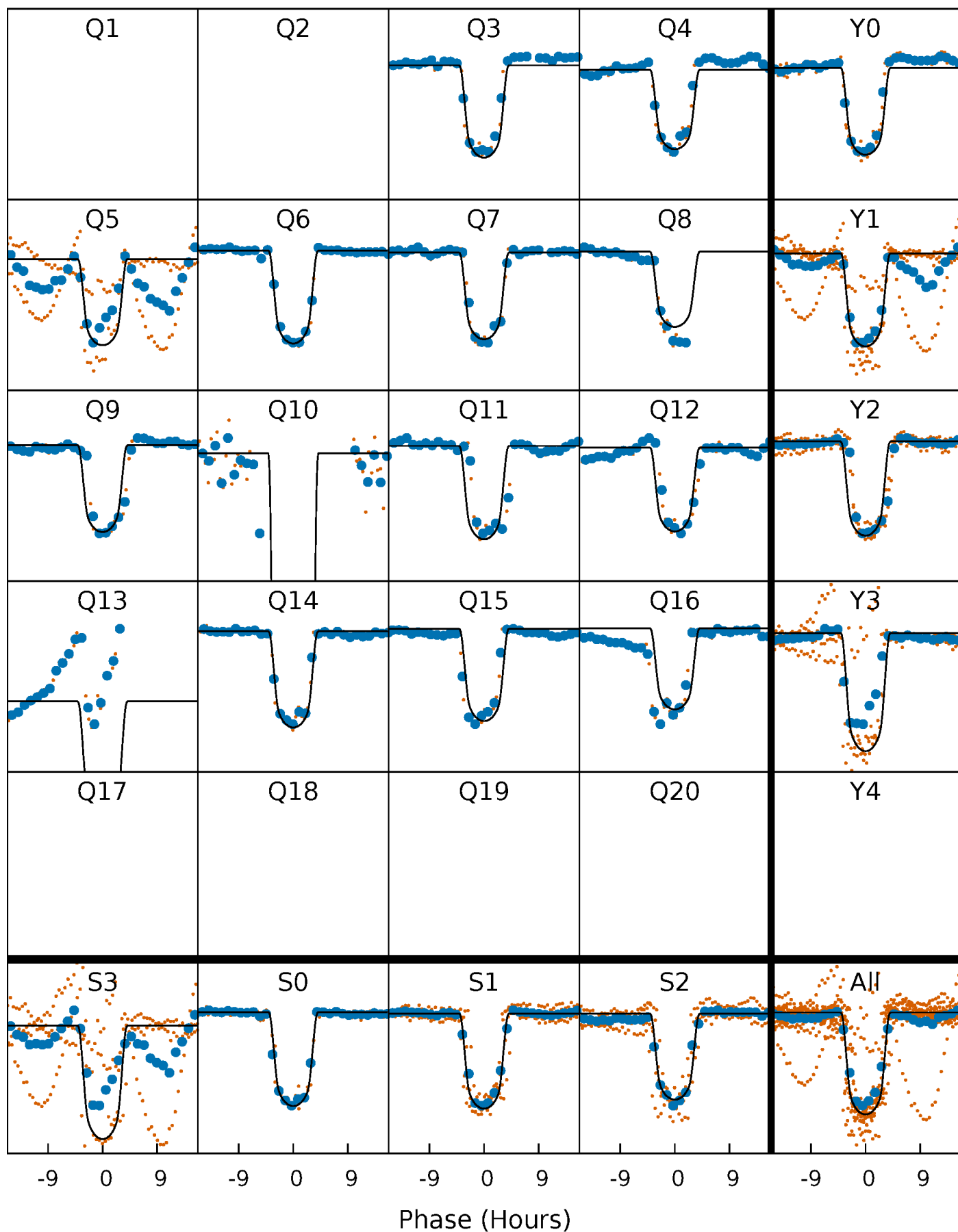
# PDC Quarter-Phased Transit Curves

TCE 011253827-02   P= 88.510817 Days    $T_0=182.678538$  (BKJD)



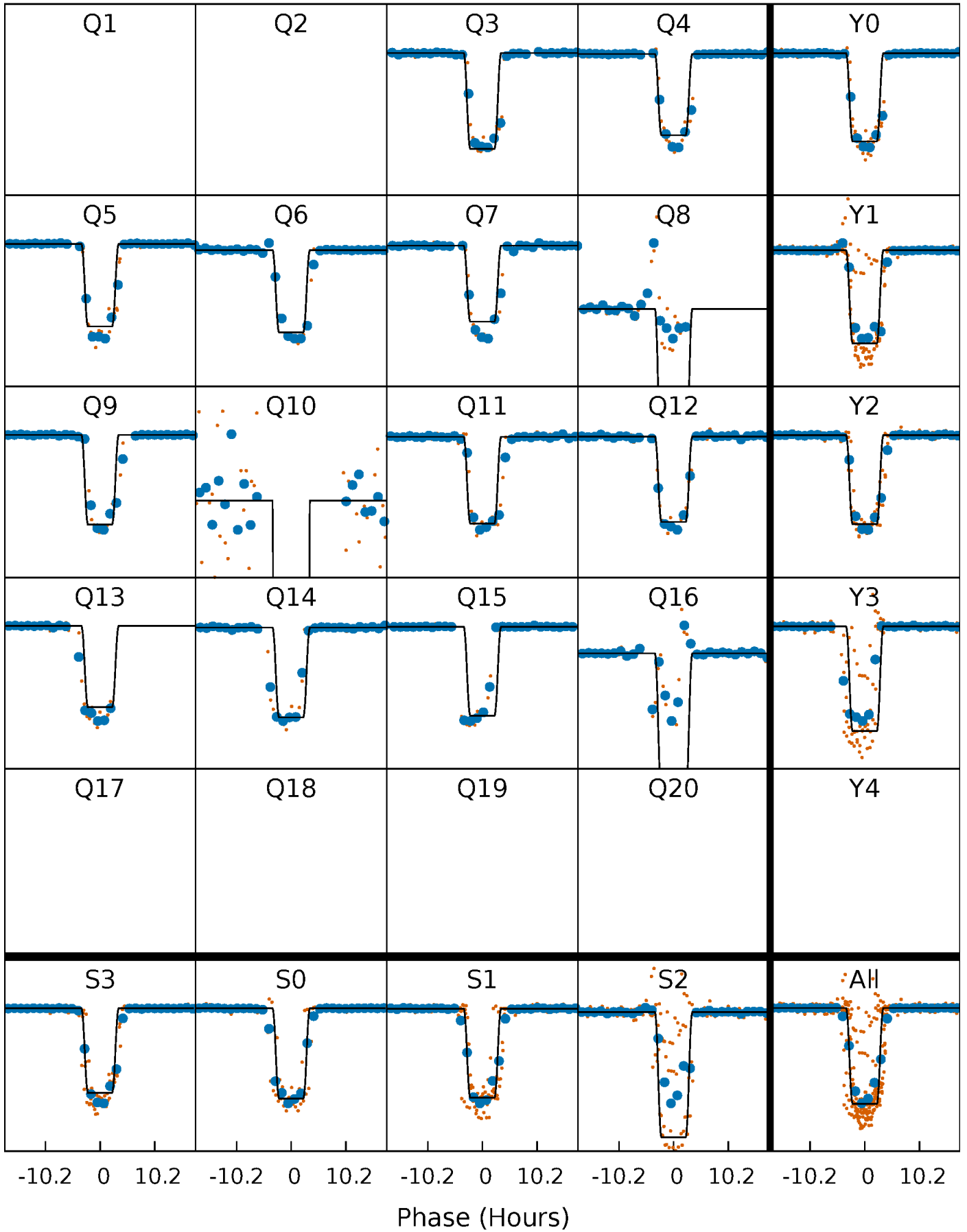
# DV Quarter-Phased Transit Curves

TCE 011253827-02 P= 88.510817 Days  $T_0=182.678538$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

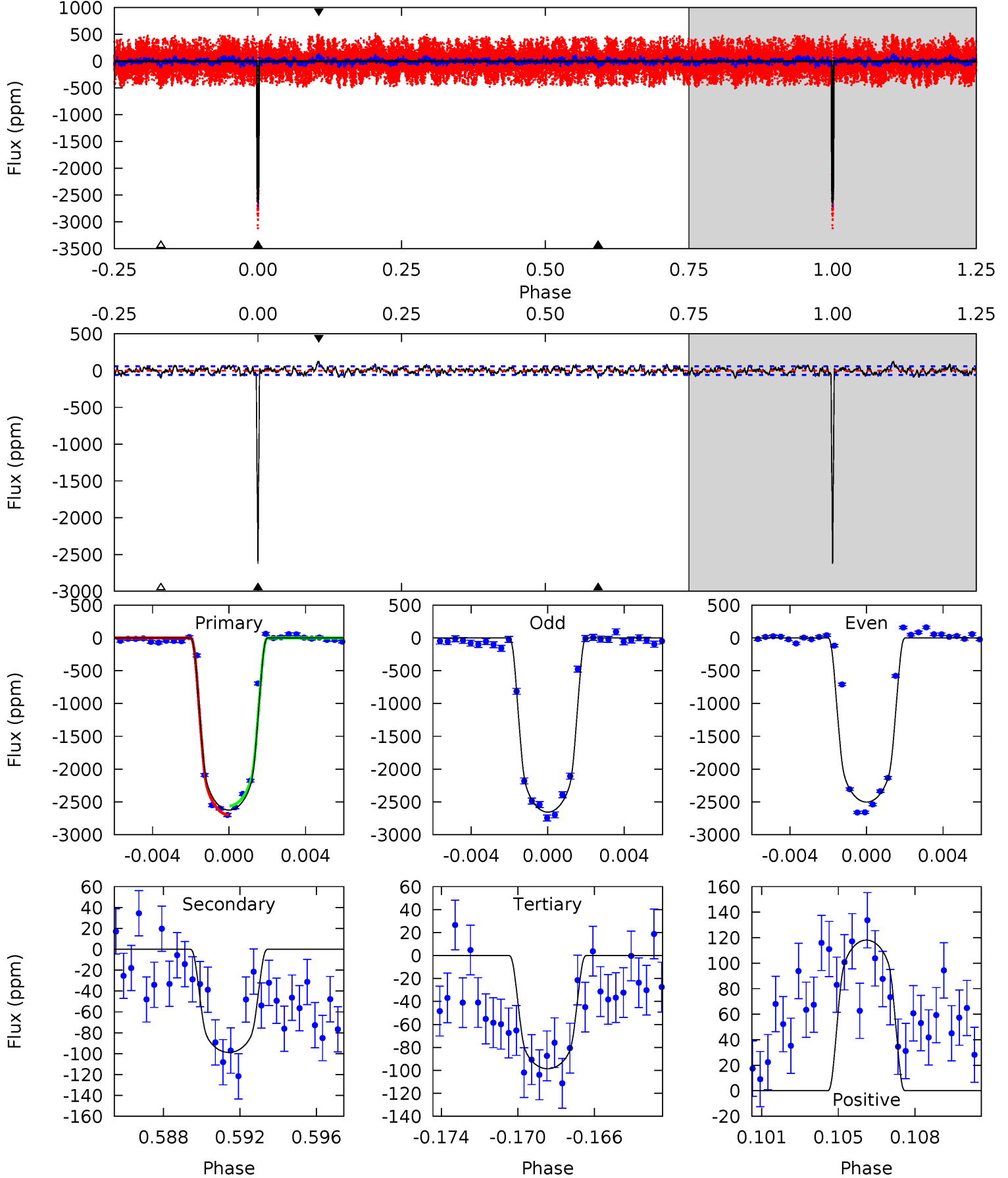
TCE 011253827-02 P= 88.517091 Days  $T_0=182.631588$  (BKJD)



# DV Model-Shift Uniqueness Test

011253827-02, P = 88.510817 Days, E = 94.167721 Days

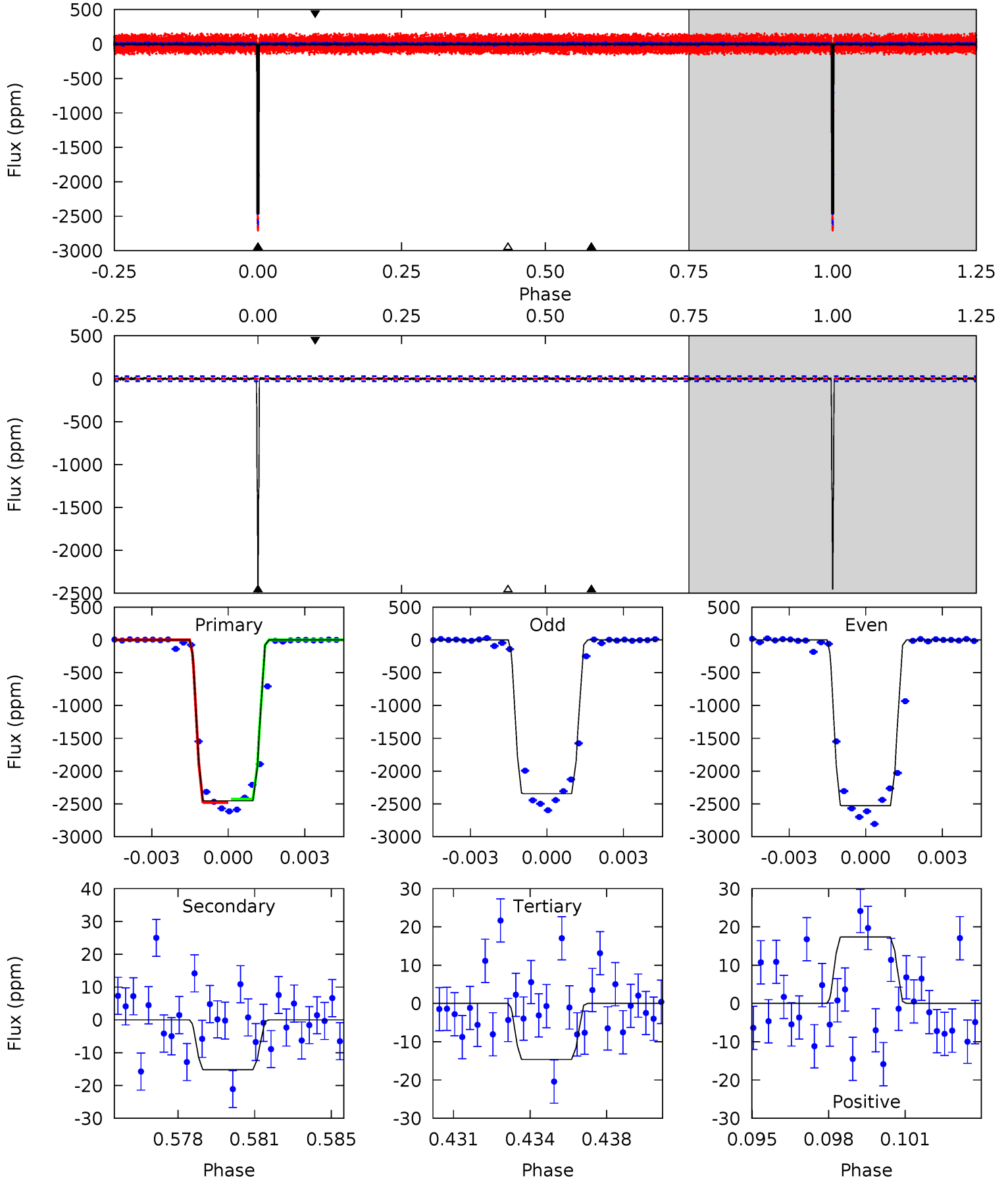
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
228.6	8.61	8.59	10.3	5.21	2.89	2.71	220.0	218.3	0.02	-1.68	6.62	0.90	0.04	6.09



# Alt Model-Shift Uniqueness Test

011253827-02, P = 88.517091 Days, E = 94.114497 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
451.1	2.79	2.69	3.20	5.24	2.94	0.70	448.4	447.9	0.11	-0.40	15.6	0.88	0.01	5.19





### Stellar Parameters For KIC 011253827

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5593^{+111}_{-111}$	$4.450^{+0.068}_{-0.102}$	$0.020^{+0.150}_{-0.150}$	$0.945^{+0.122}_{-0.075}$	$0.918^{+0.063}_{-0.051}$	$1.533^{+0.438}_{-0.483}$
	+2%/-2%	+2%/-2%	+750%/-750%	+13%/-8%	+7%/-6%	+29%/-31%
Source	SPE59	SPE59	SPE59	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 011253827-02 / KOI 2672.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-99 \pm 11$	$5.68^{+0.45}_{-0.30}$	$547^{+21}_{-18}$	$3033^{+64}_{-68}$	$239^{+44}_{-41}$
Alt.	$-15 \pm 5$	$5.12^{+0.40}_{-0.26}$	$547^{+22}_{-17}$	$2435^{+103}_{-130}$	$45^{+17}_{-18}$

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

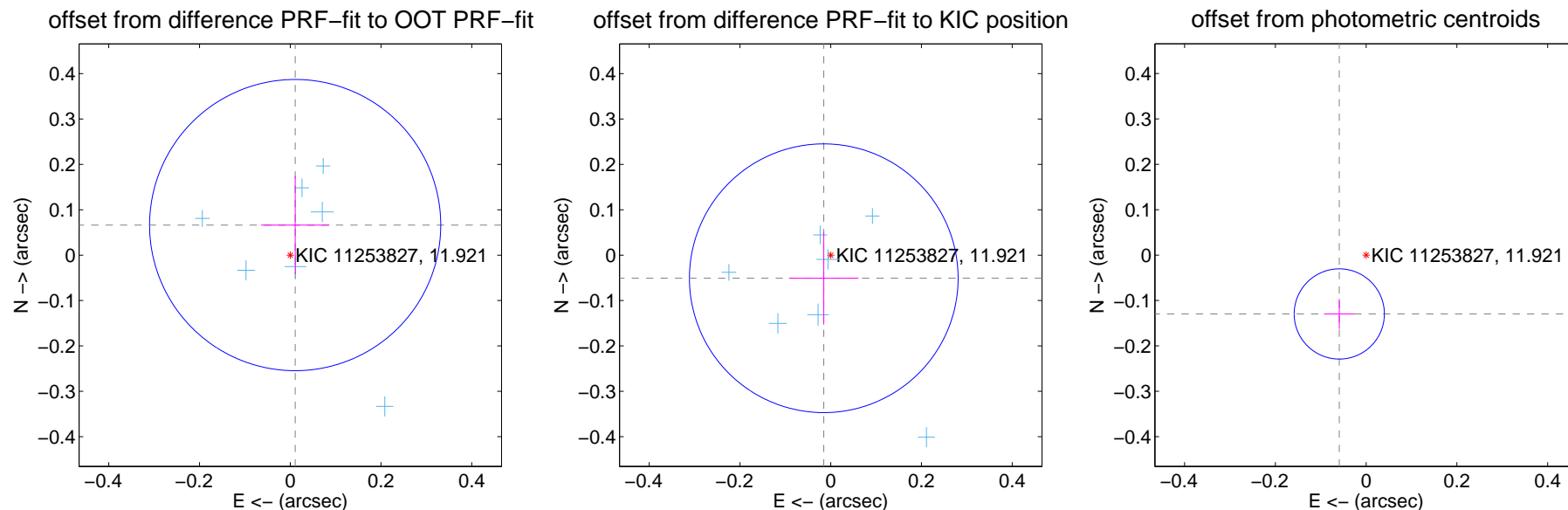
## DV Centroid Data

Supplemental centroid analysis for 011253827-02. **Kepler magnitude: 11.92.** Transit SNR 105.39

There are 8 quarters with good PRF difference image offsets

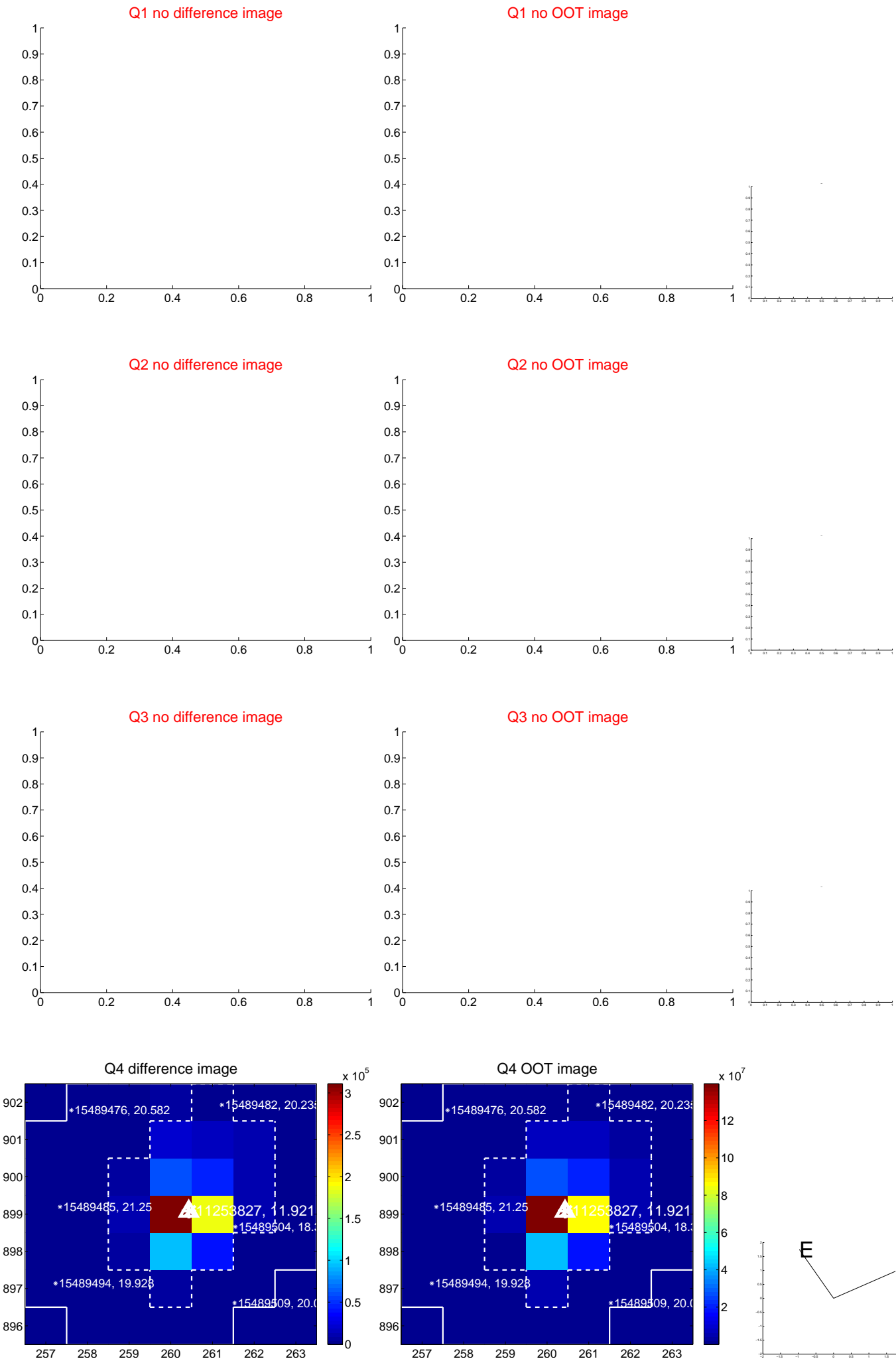
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.067 \pm 0.107$	0.63	$-0.011 \pm 0.075$	$0.066 \pm 0.108$
PRF-fit source offset from KIC position	$0.053 \pm 0.099$	0.54	$0.015 \pm 0.077$	$-0.051 \pm 0.102$
photometric centroid source offset	<b><math>0.14 \pm 0.03</math></b>	<b>4.30</b>	$0.06 \pm 0.03$	$-0.13 \pm 0.03$

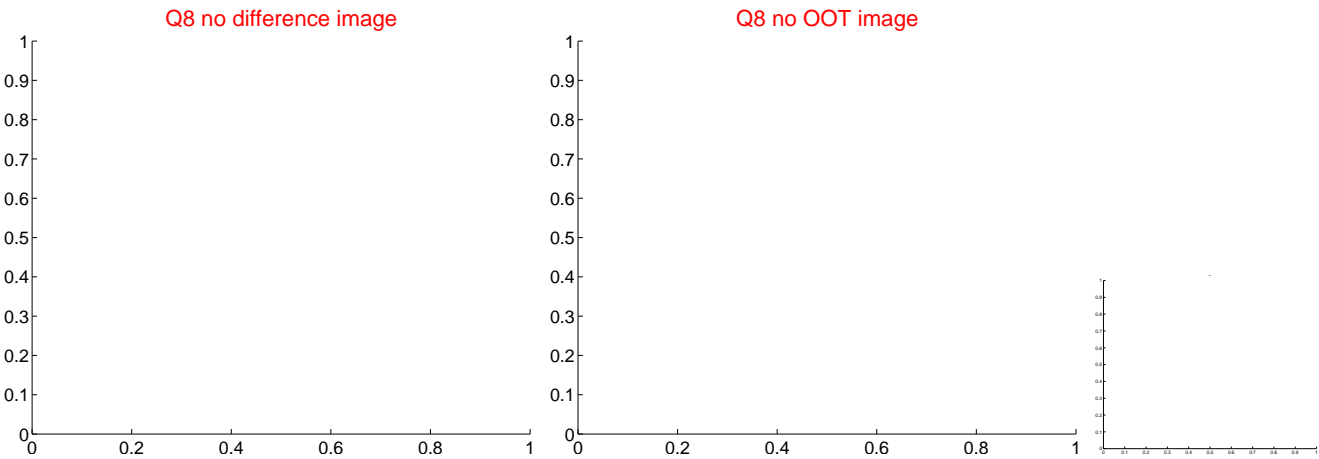
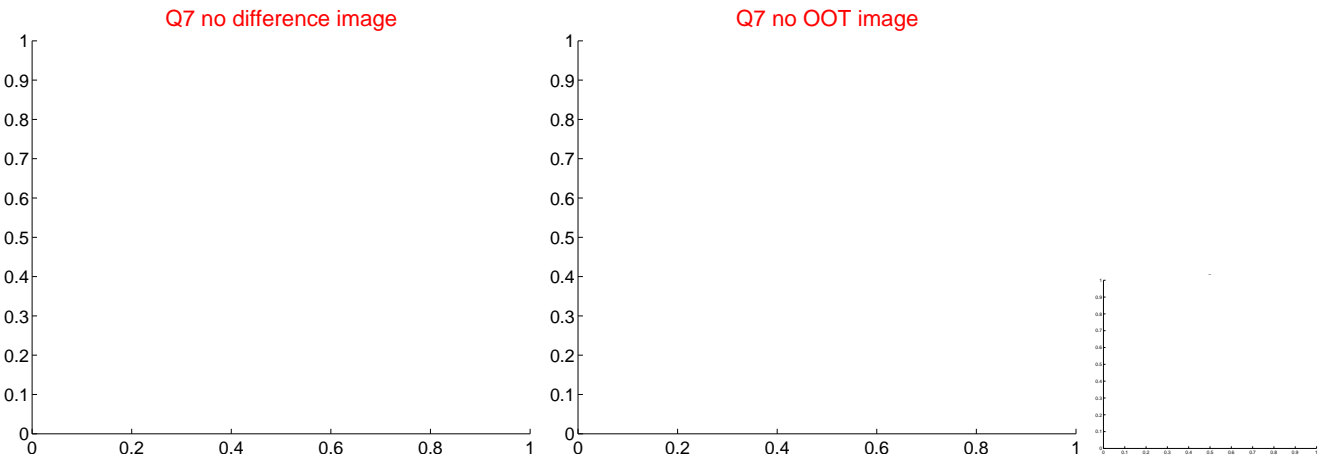
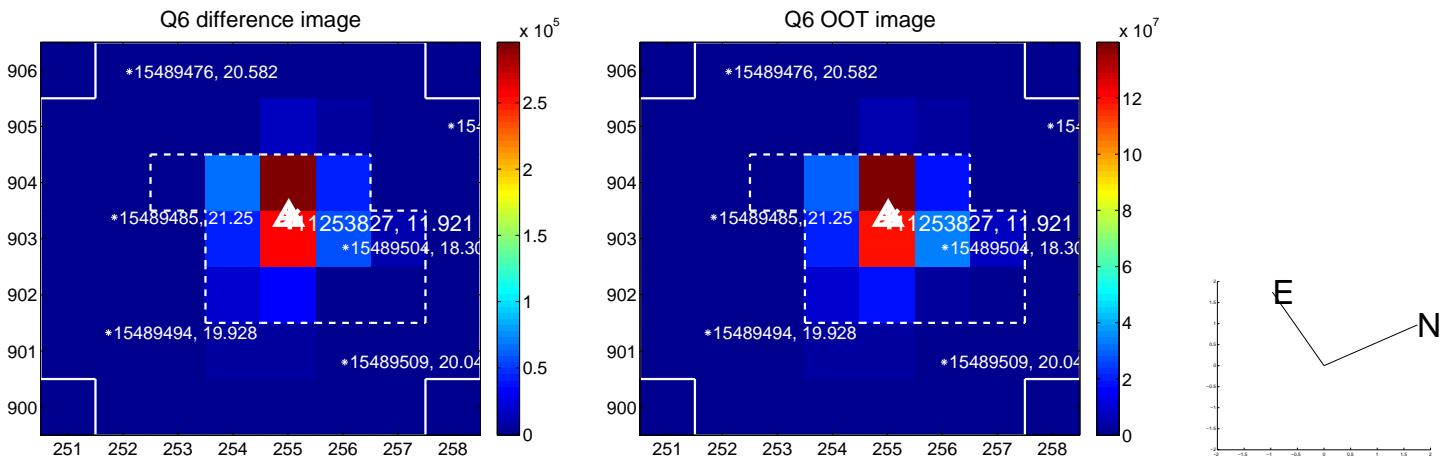
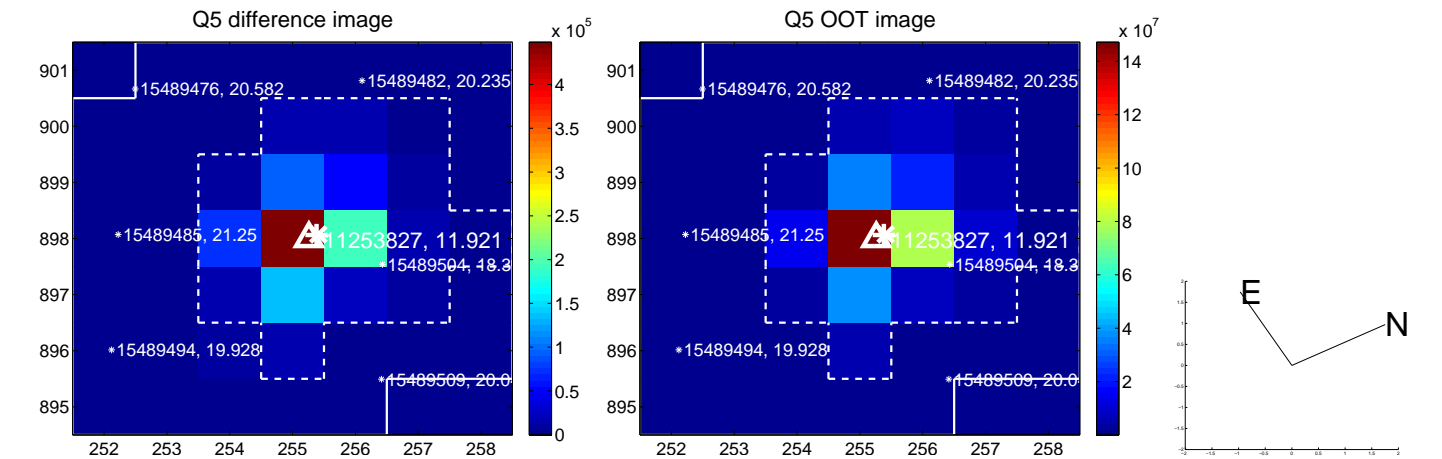


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

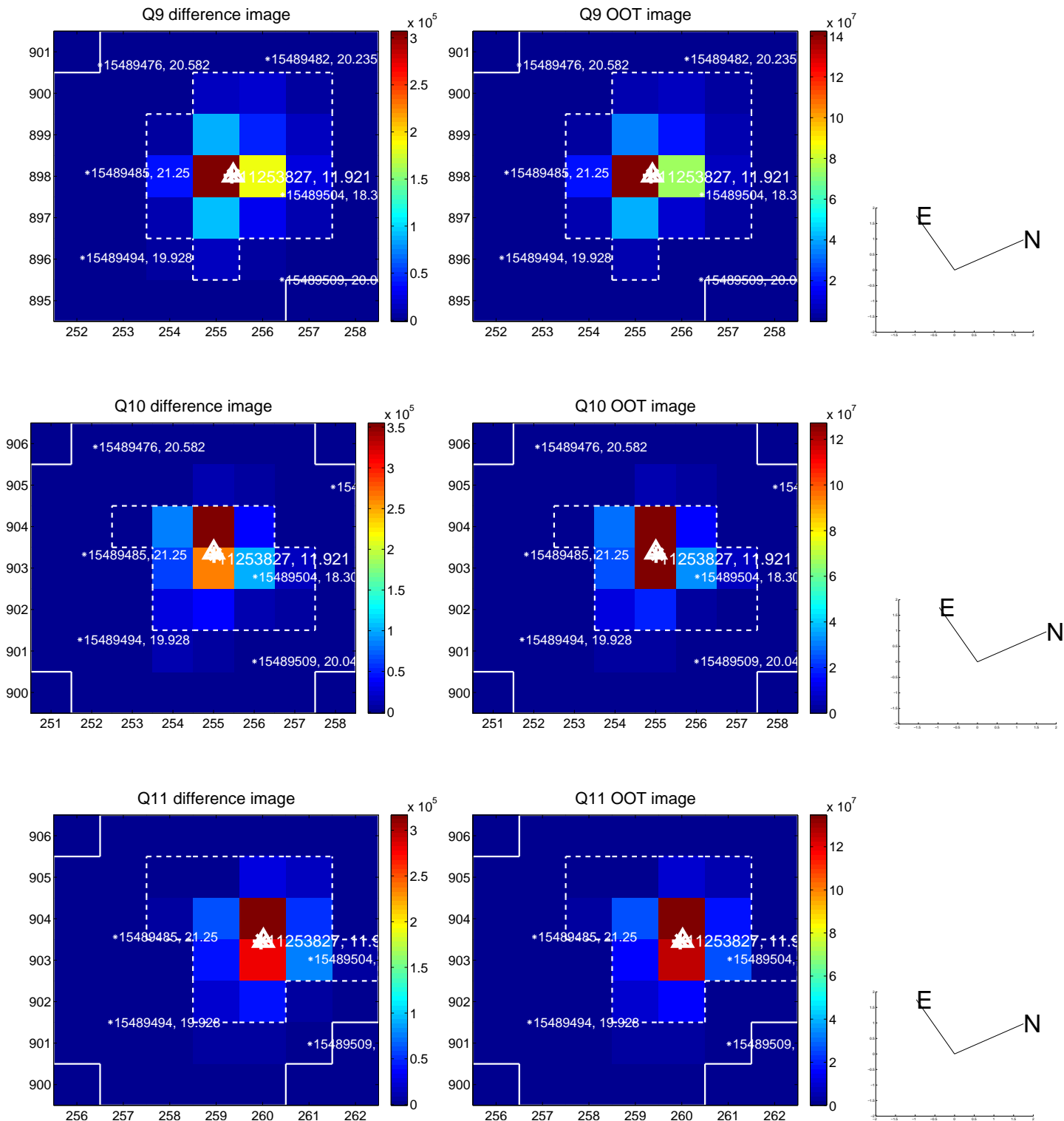
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

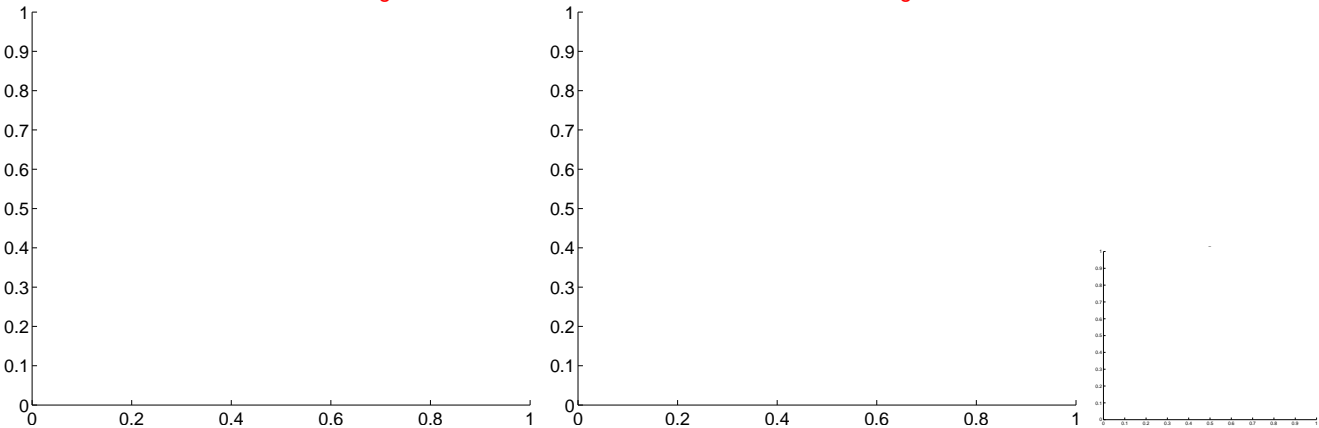


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



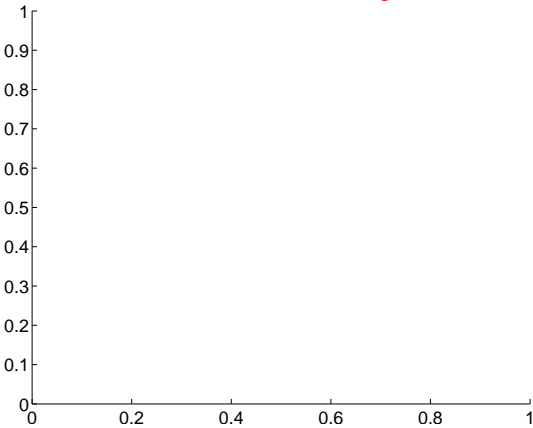
Q12 no difference image

Q12 no OOT image

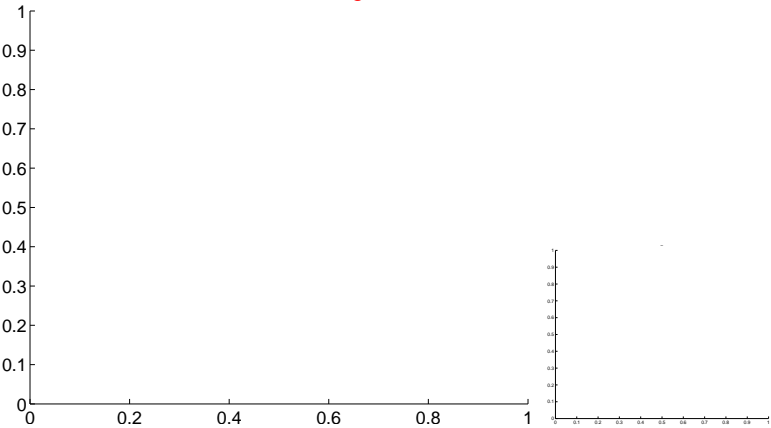


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

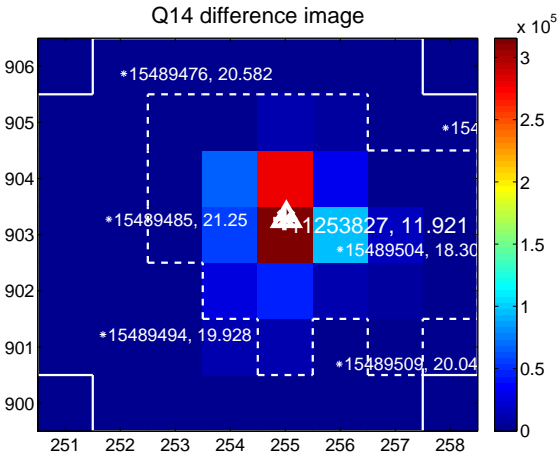
Q13 no difference image



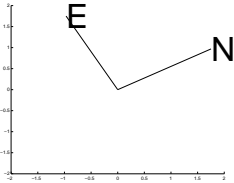
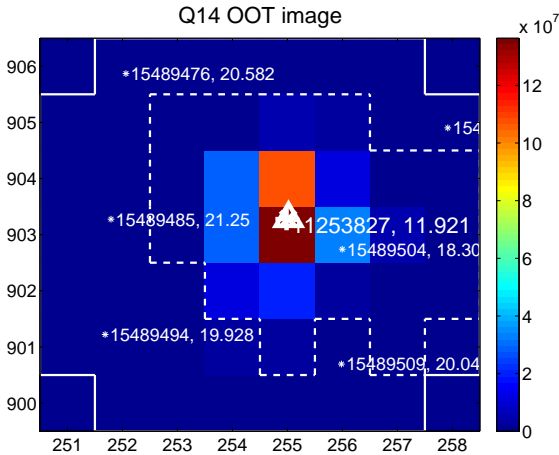
Q13 no OOT image



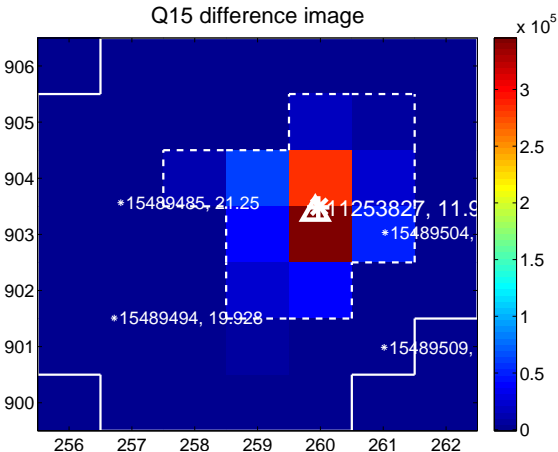
Q14 difference image



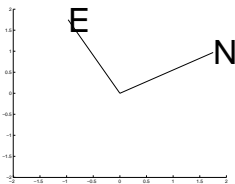
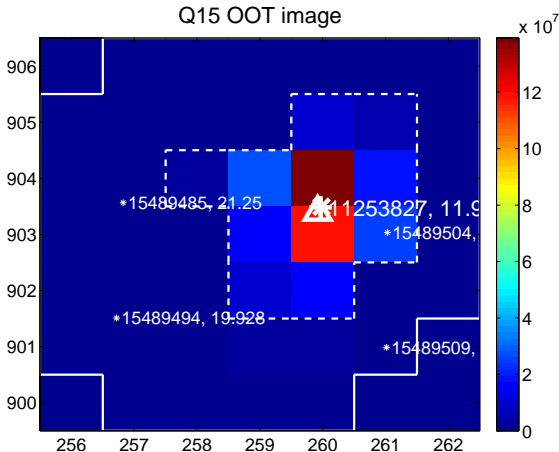
Q14 OOT image



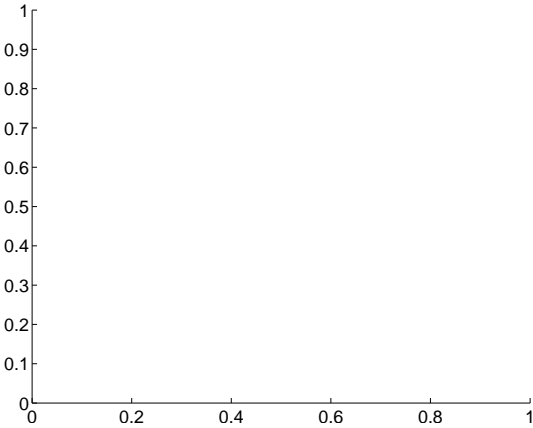
Q15 difference image



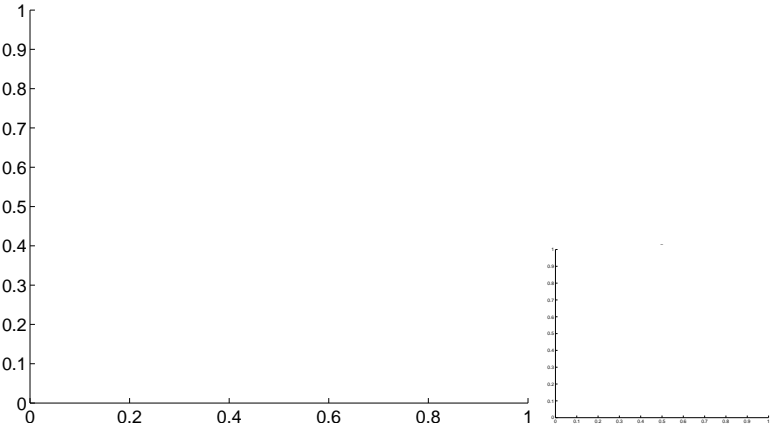
Q15 OOT image



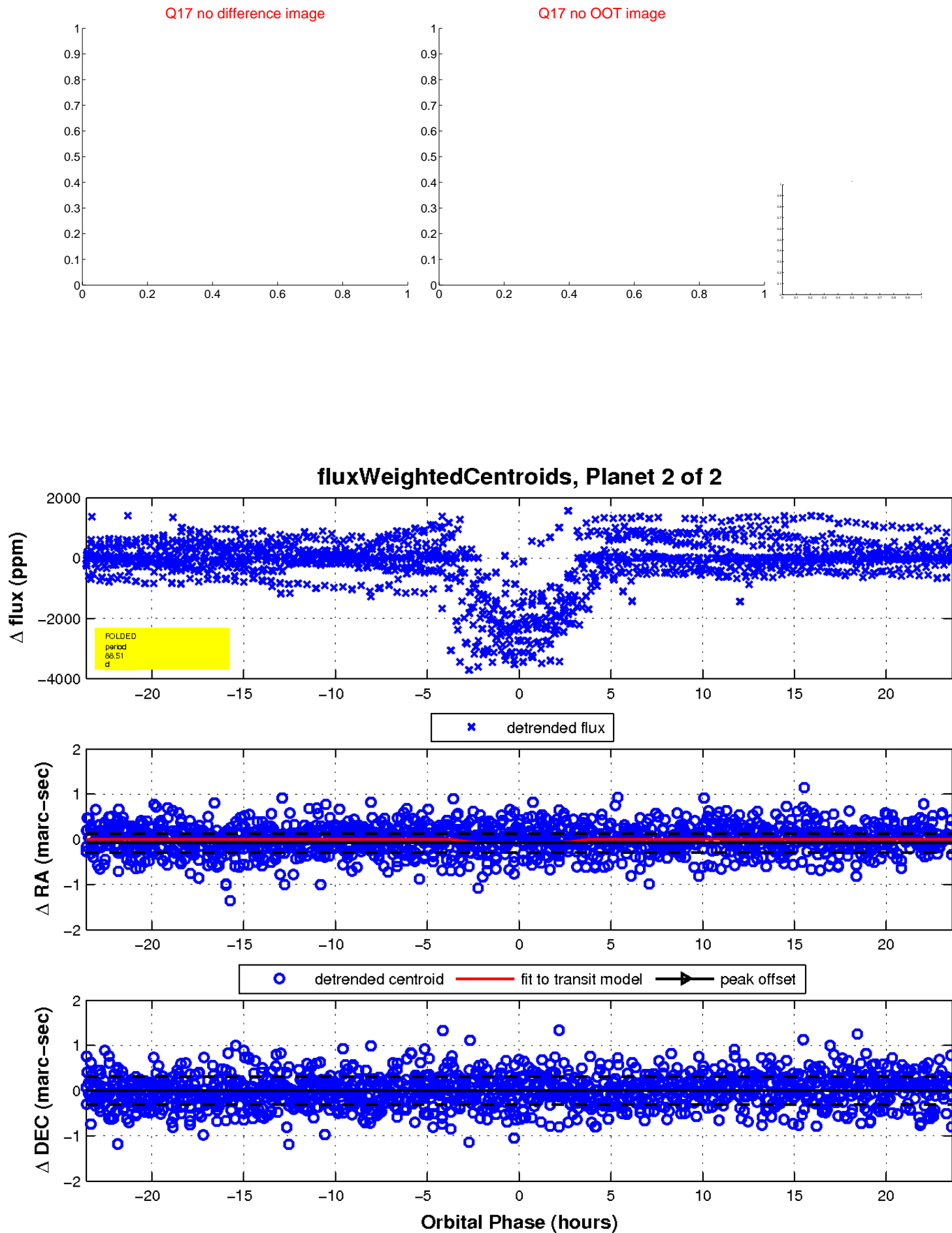
Q16 no difference image



Q16 no OOT image



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



UKIRT Image

Declination

