

# KIC 010920813

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010920813-01	OBS	7386.01	53.741378	184.814534	286028.0	38.864	5202.7	3513.3	0.74	5288	39.27	5.94
010920813-02	OBS	No	53.740759	155.552819	116485.6	47.141	1179.0	3360.3	0.74	5288	25.37	5.94

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010920813-01	OBS	FP	0.00	1	0	0	0	LPP_DV
010920813-02	OBS	FP	0.00	1	0	0	0	SAME_NTL_PERIOD

**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.

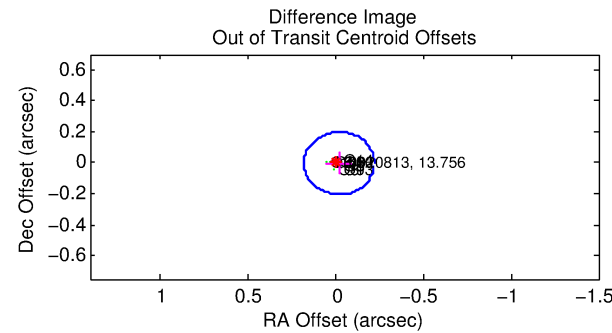
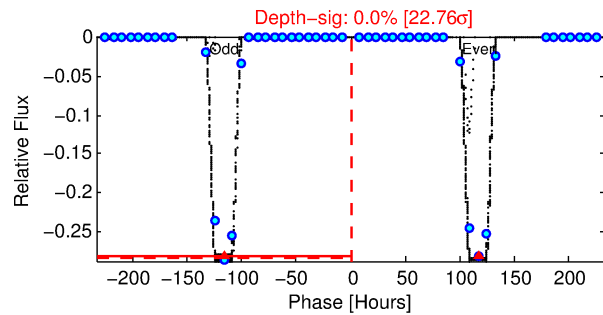
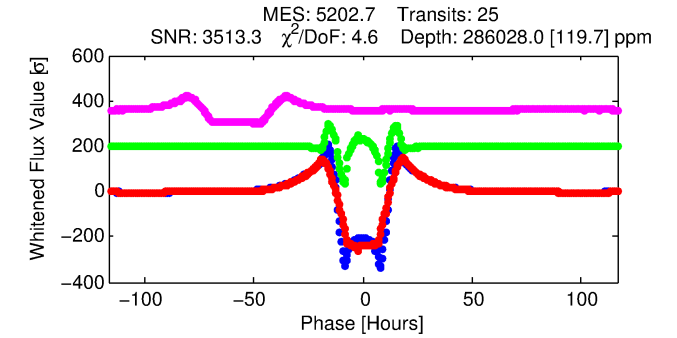
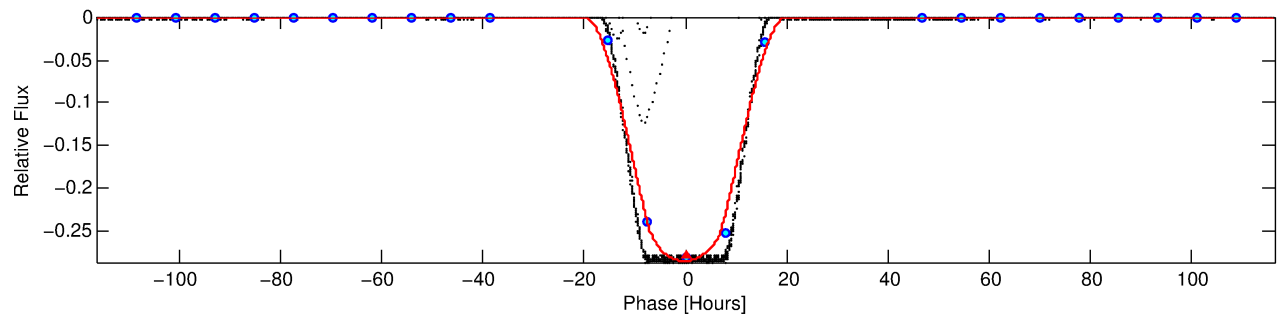
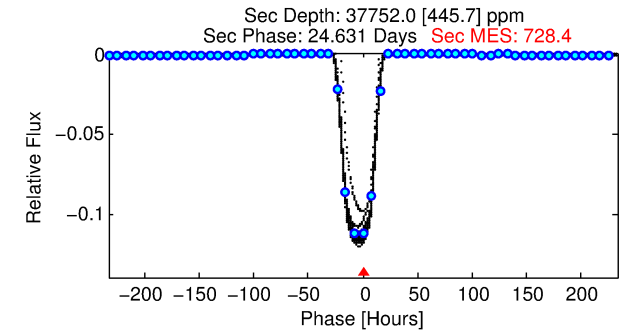
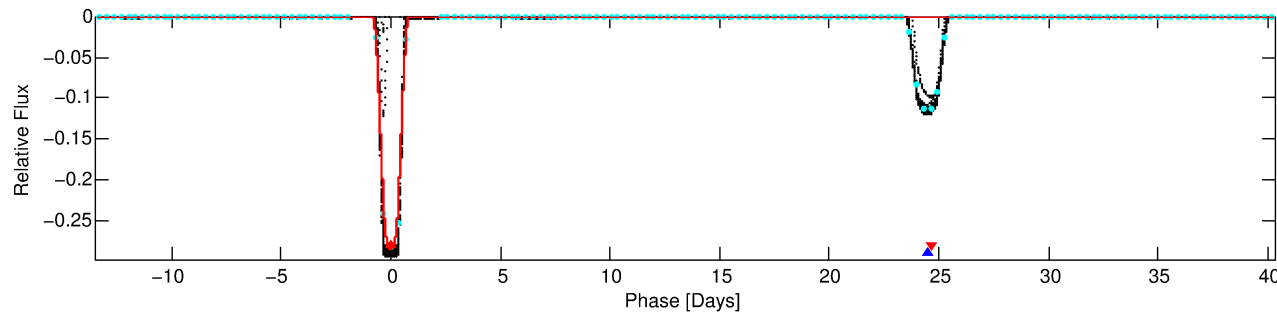
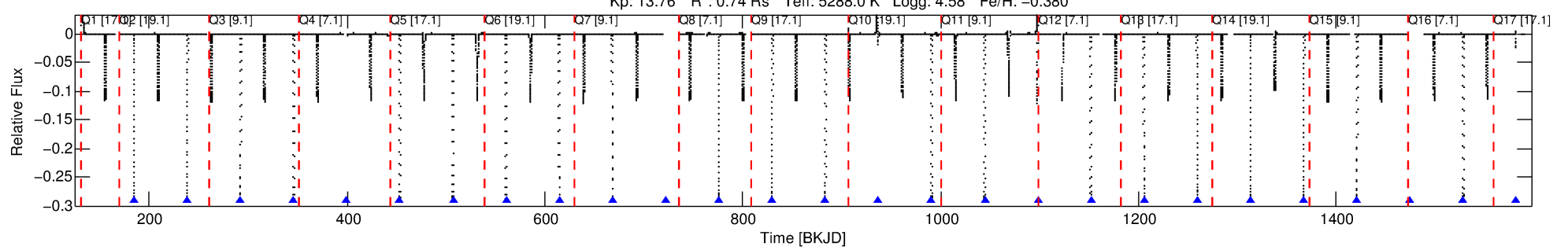
## Ephemeris Match Information For 010920813-01

No Significant Match Found

# DV One-Page Summary

KIC: 10920813 Candidate: 1 of 2 Period: 53.741 d  
KOI: K07386.01 Corr: 0.997

Kp: 13.76 R\*: 0.74 Rs Teff: 5288.0 K Logg: 4.58 Fe/H: -0.380



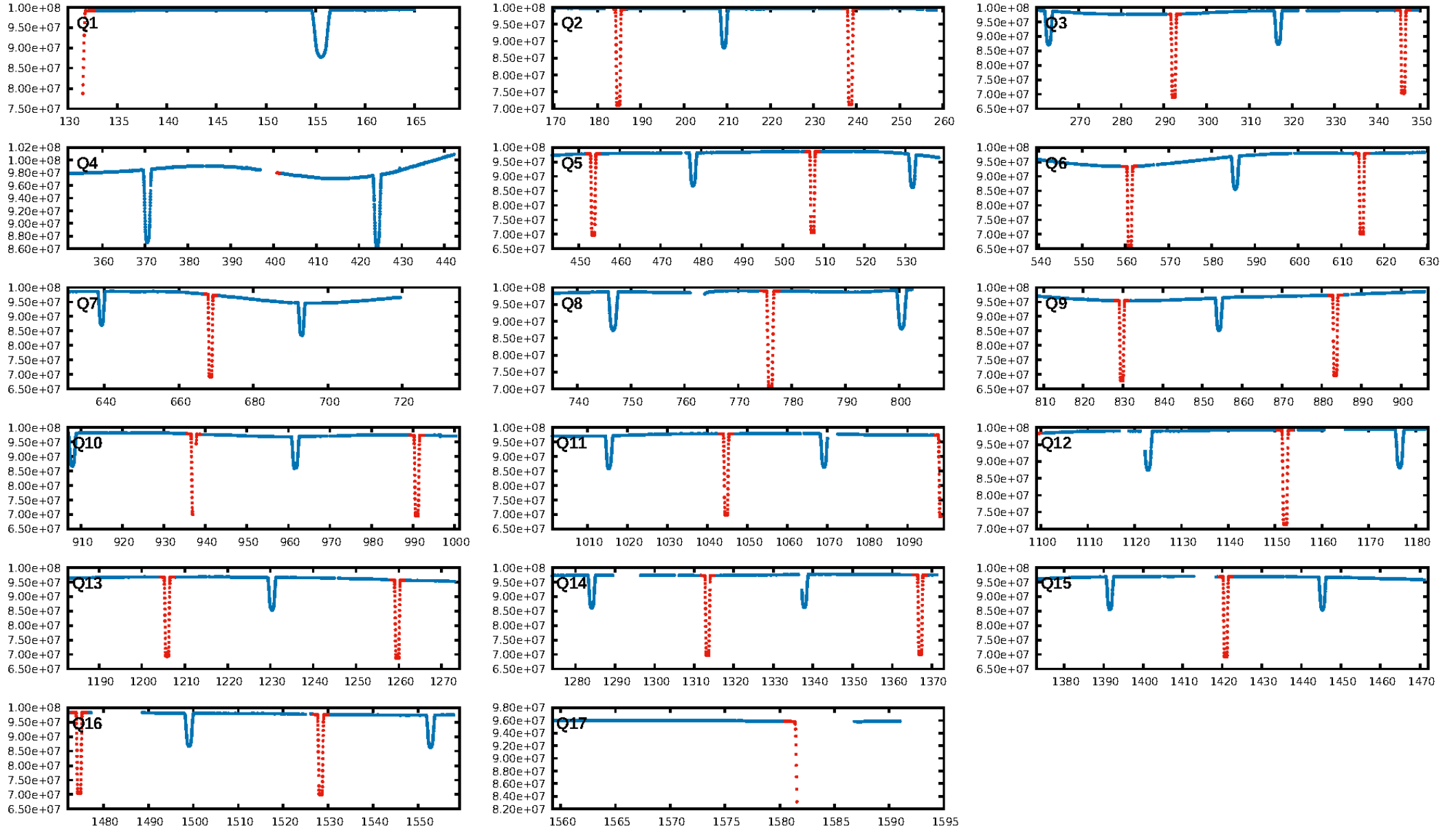
## DV Fit Results:

Period = 53.74138 [0.00001] d  
Epoch = 184.8145 [0.0002] BKJD  
Rp/R\* = 0.4883 [0.0001]  
a/R\* = 15.75 [0.01]  
b = 0.00 [0.10]  
Seff = 5.94 [1.28]  
Teq = 398 [21] K  
Rp = 39.27 [5.59] Re  
a = 0.2531 [0.0283] AU  
Ag = 862.45 [131.17] [6.57σ]  
Teffp = 3336 [128] K [22.67σ]

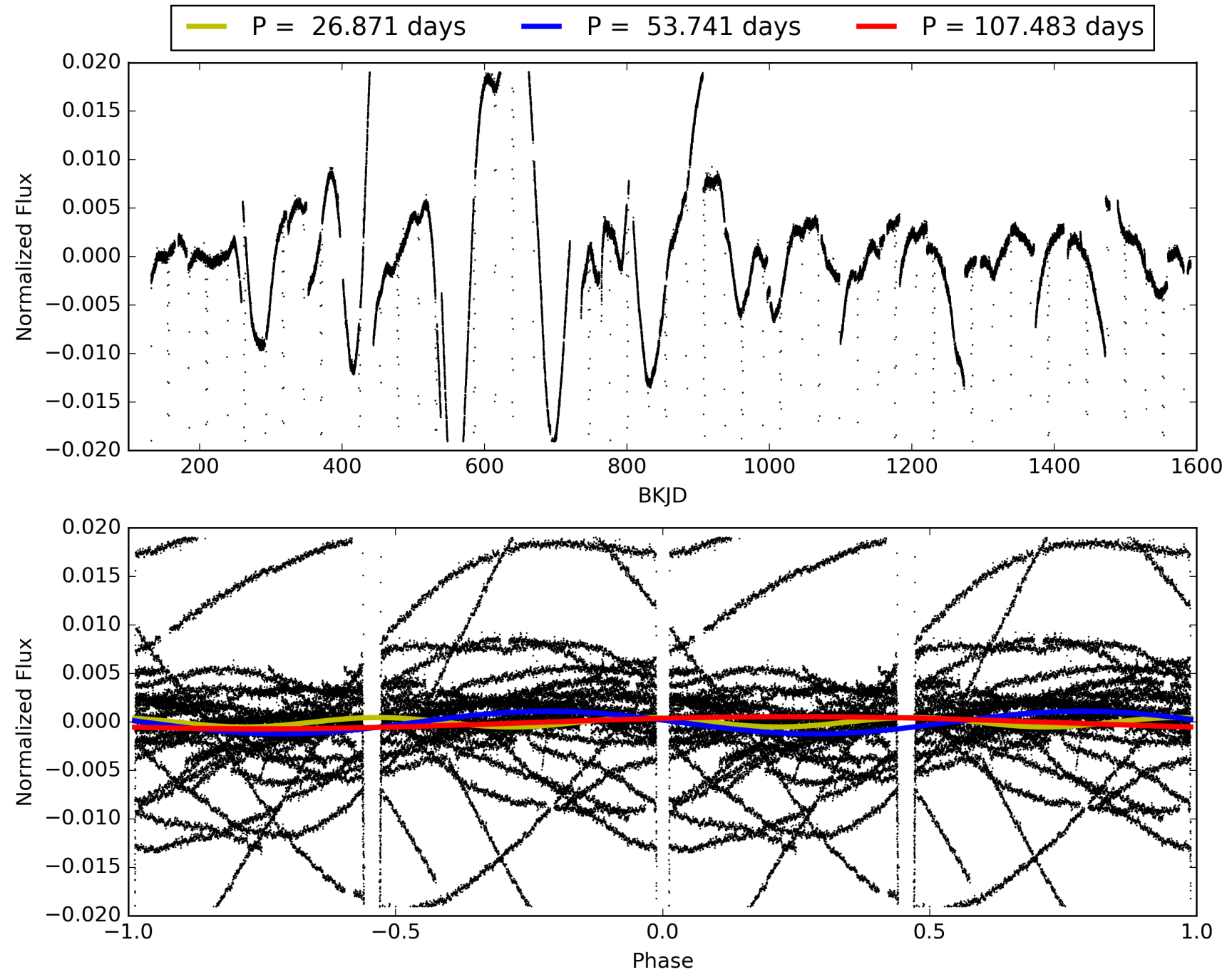
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [23/23]  
GhostDiagnostic-chr: 3.313  
Centroid-sig: N/A  
Centroid-so: 0.064 arcsec [103.09σ]  
OotOffset-rm: 0.020 arcsec [0.30σ]  
KicOffset-rm: 0.121 arcsec [1.78σ]  
OotOffset-st: 4/3/1/3 [11]  
KicOffset-st: 4/3/1/3 [11]  
DiffImageQuality-fgm: 1.00 [11/11]  
DiffImageOverlap-fno: 1.00 [11/11]

# TCE 010920813-01, PDC Light Curves

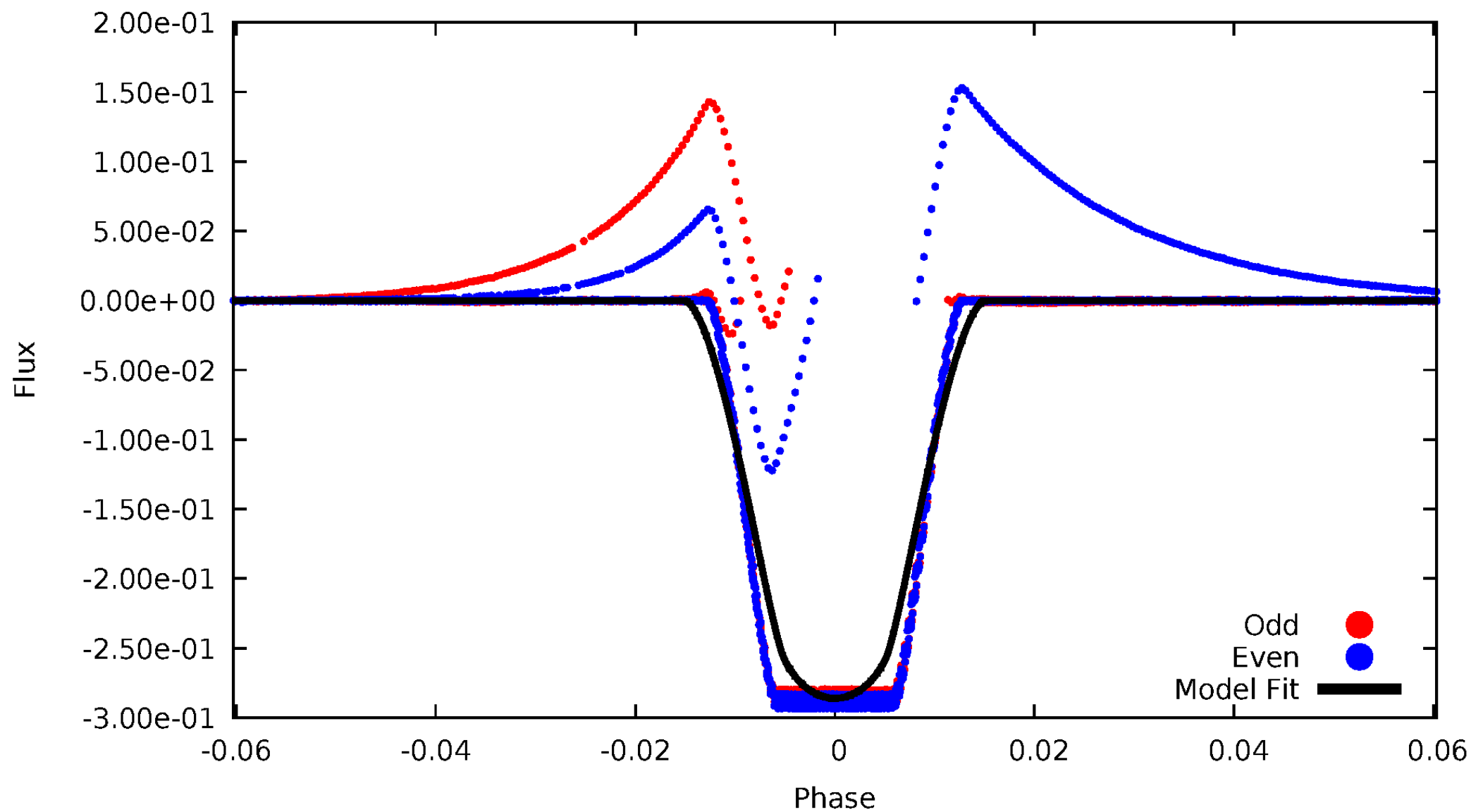


TCE 010920813-01



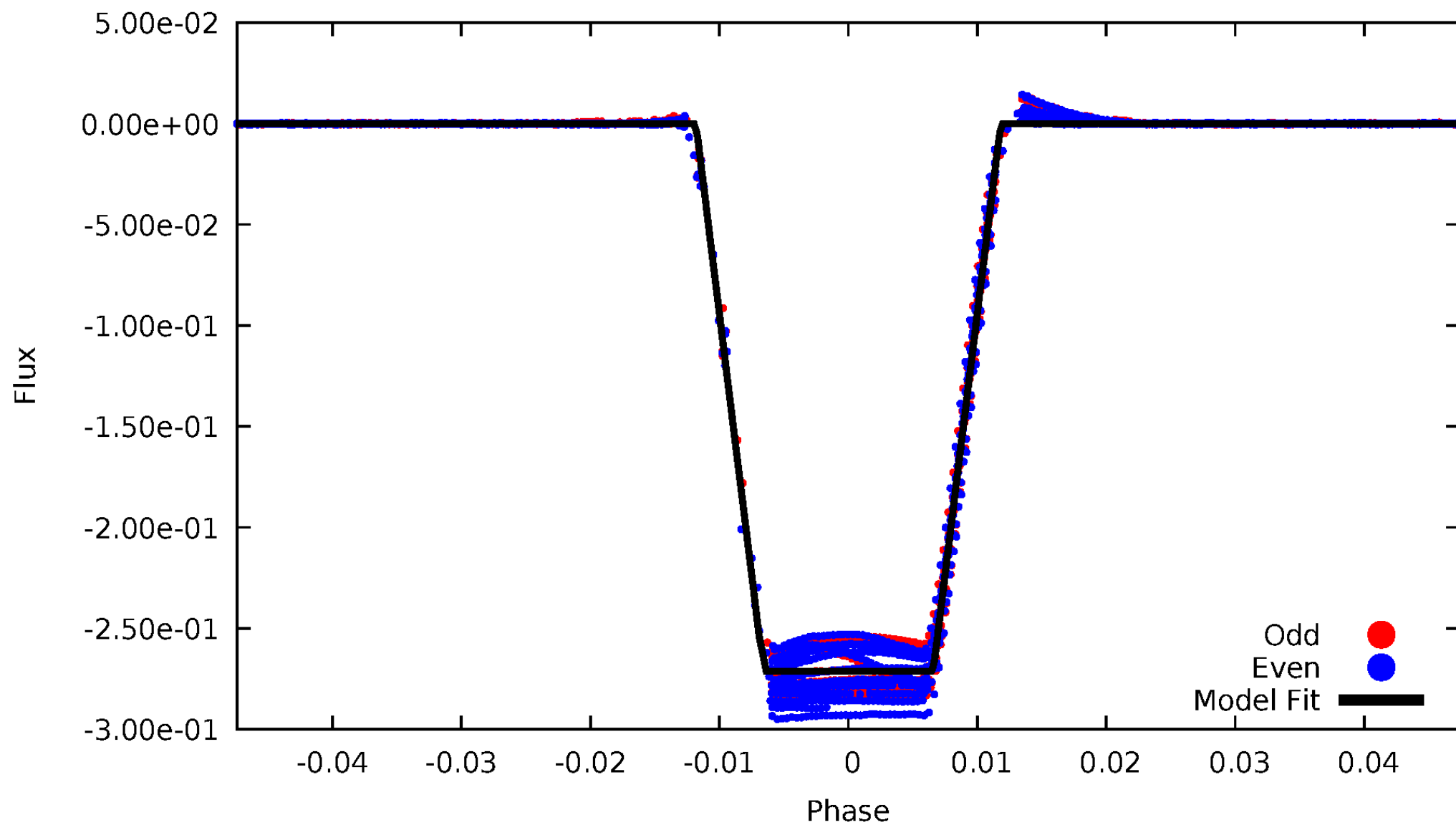
# DV Odd/Even

TCE 010920813-01



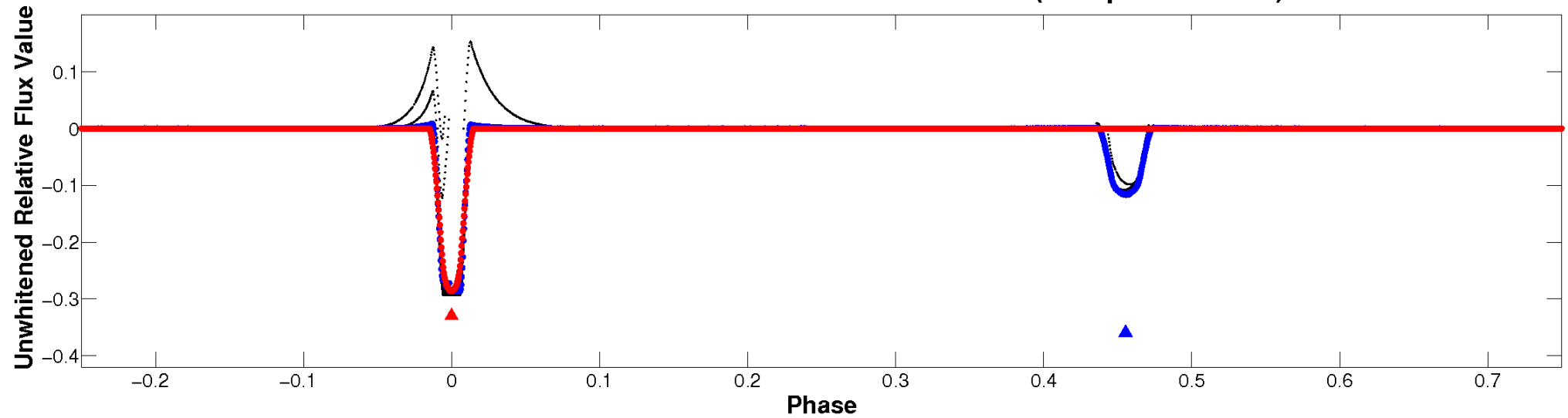
# ALT Odd/Even

TCE 010920813-01

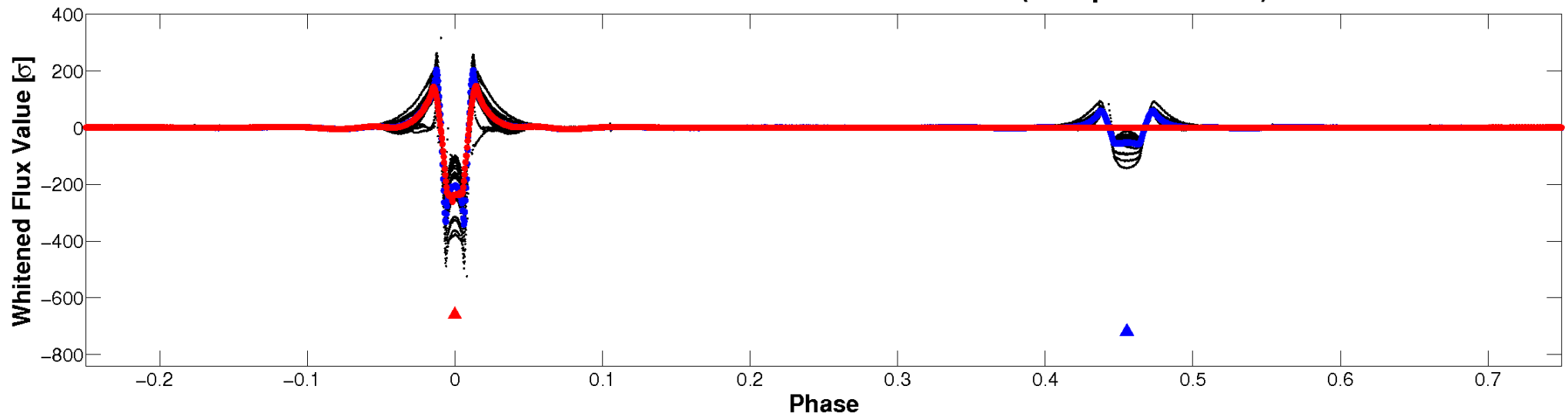


# Non-Whitened Vs. Whitened Light Curve

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

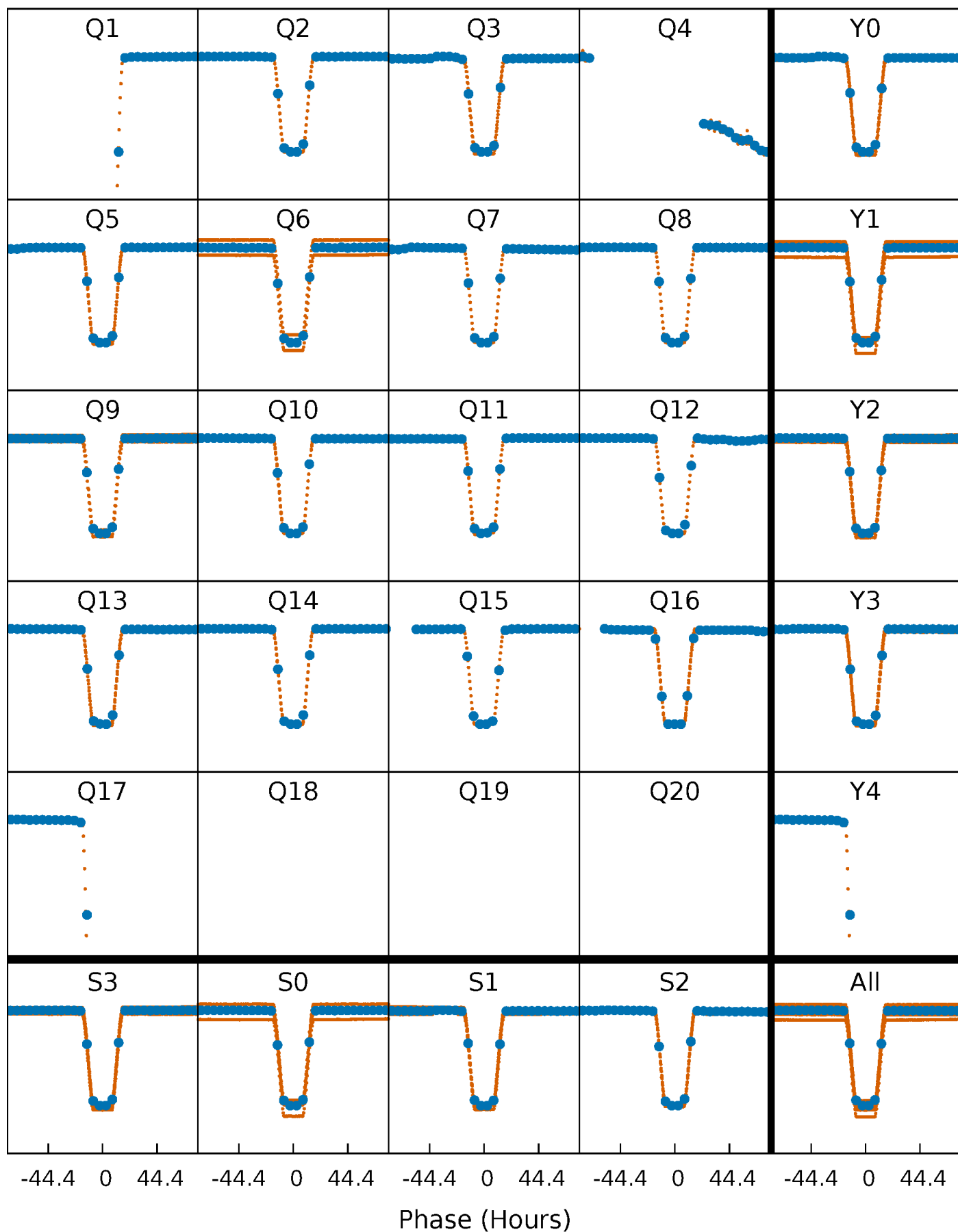


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

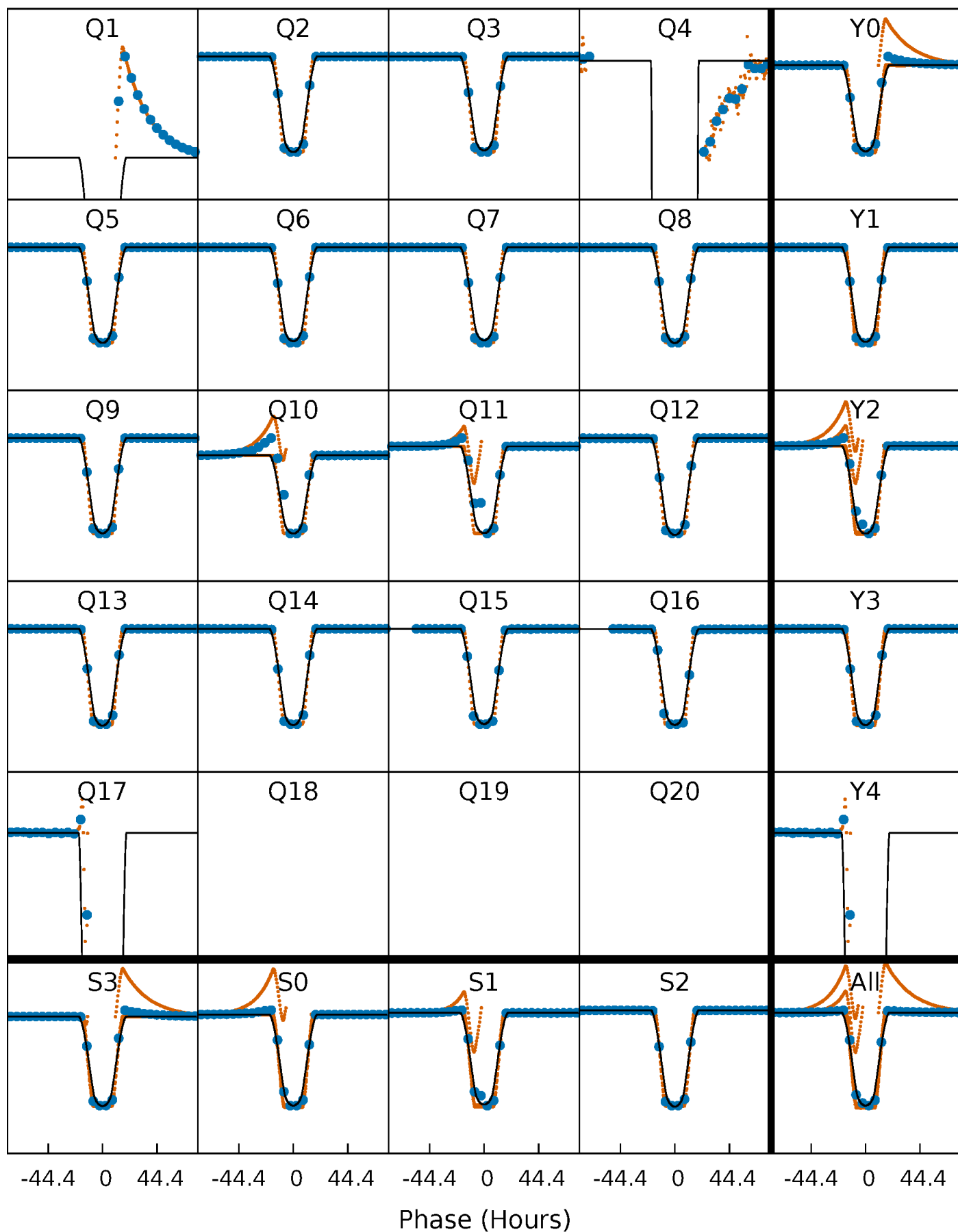
TCE 010920813-01 P= 53.741378 Days  $T_0=184.814534$  (BKJD)





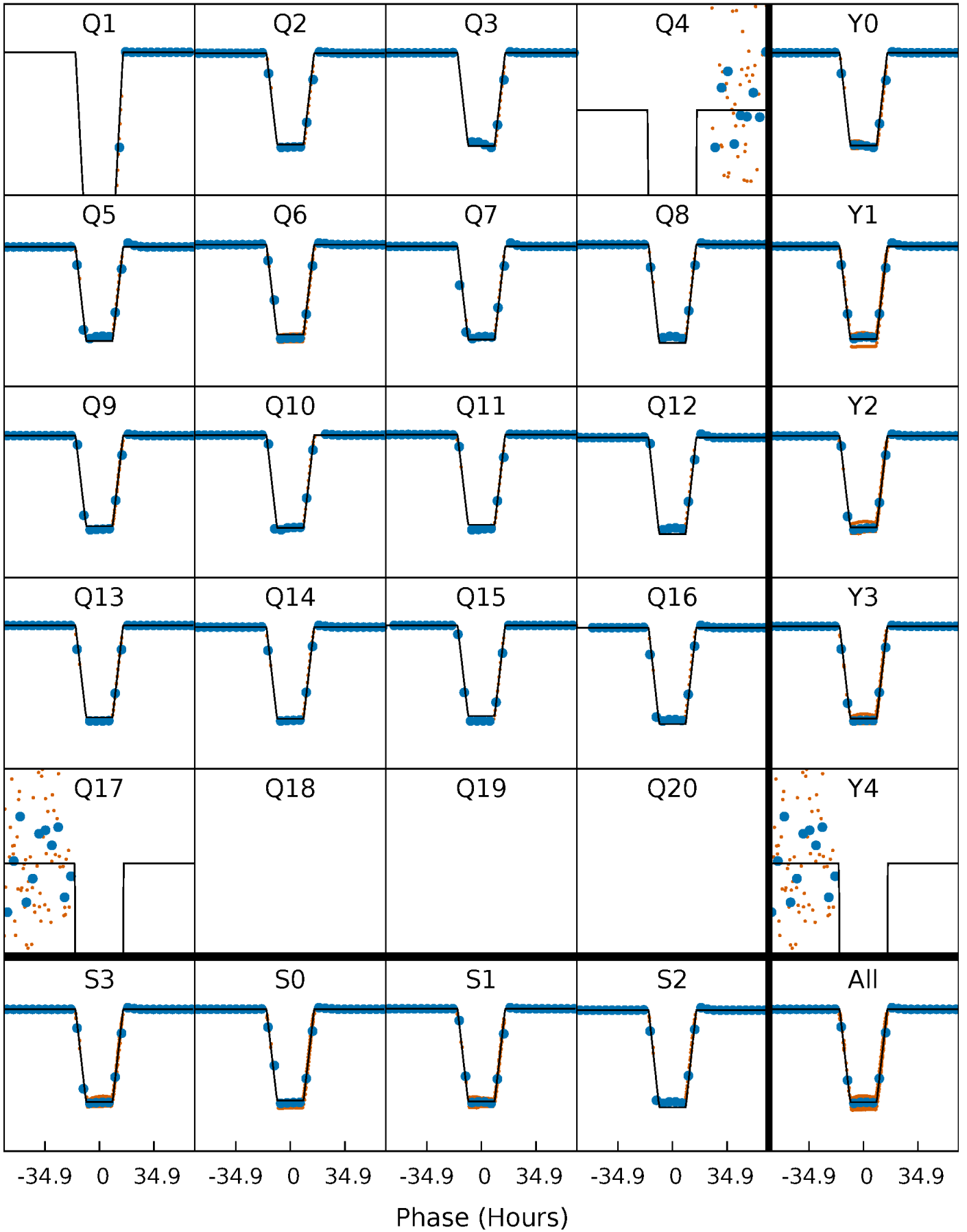
# DV Quarter-Phased Transit Curves

TCE 010920813-01 P= 53.741378 Days  $T_0=184.814534$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

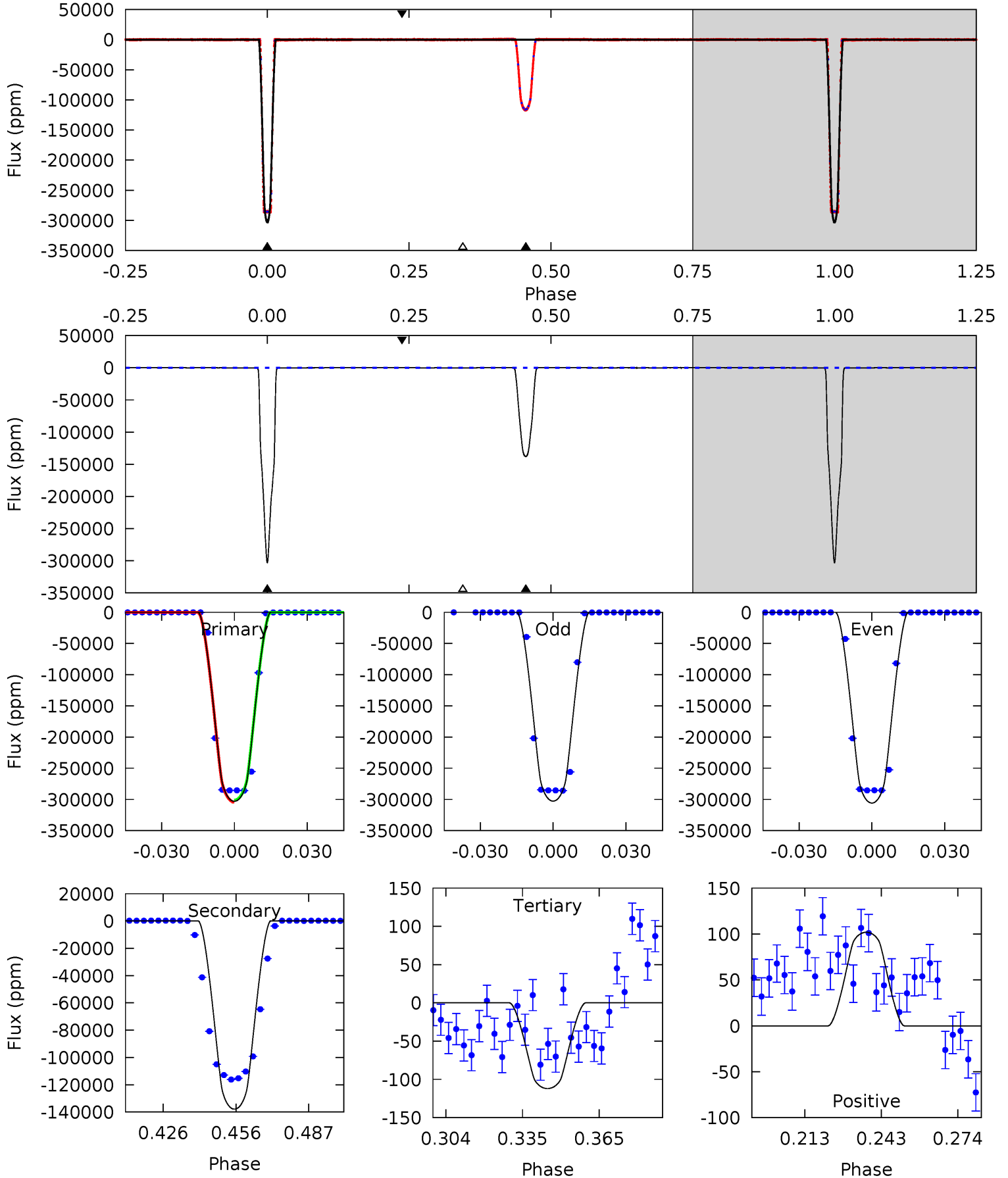
TCE 010920813-01 P= 53.742001 Days  $T_0=184.803568$  (BKJD)



# DV Model-Shift Uniqueness Test

010920813-01, P = 53.741378 Days, E = 131.073156 Days

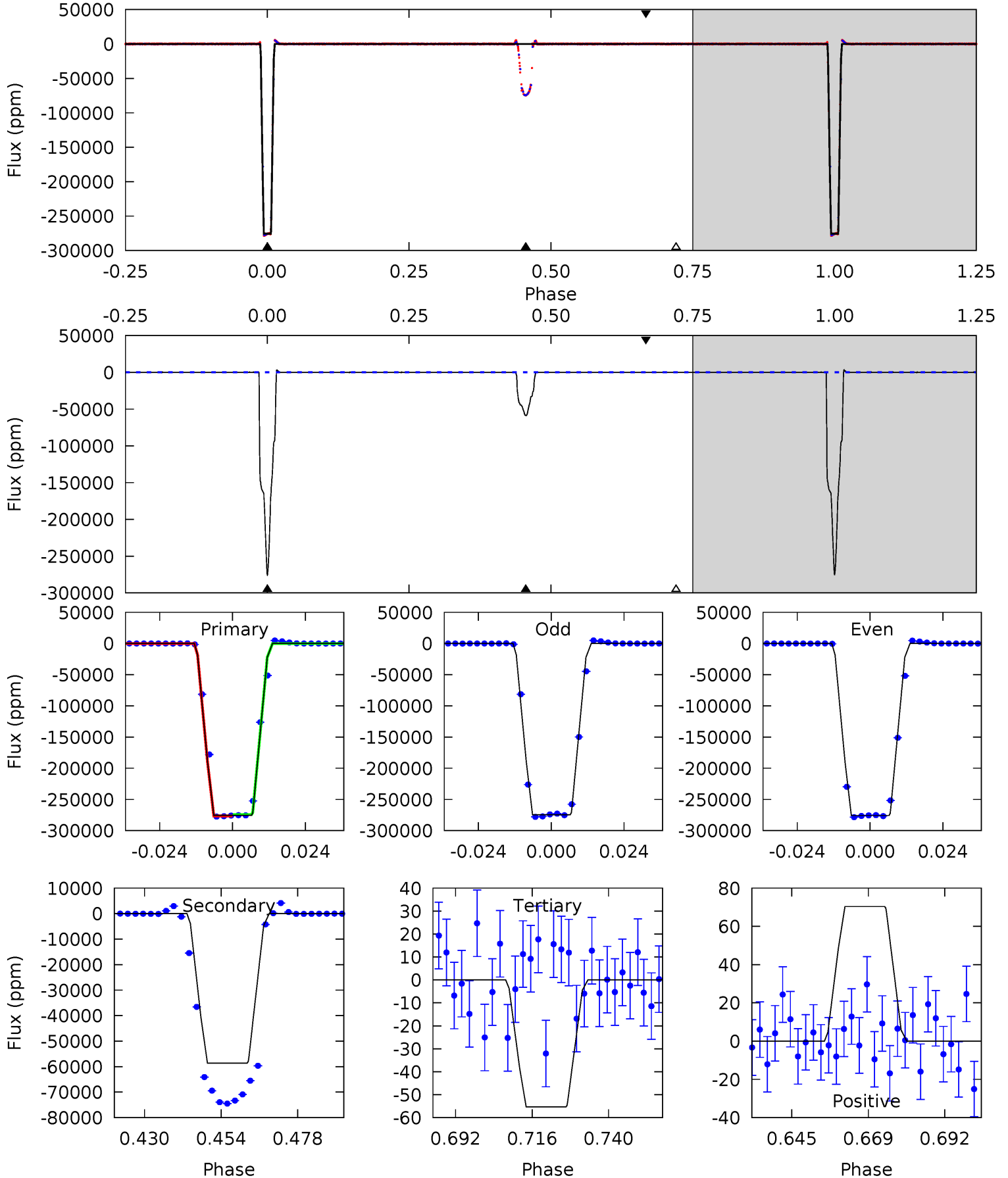
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
28863	13133	10.7	9.71	4.81	2.16	7.85	28852	28853	13123	13124	143.6	0.83	0.00	0



# Alt Model-Shift Uniqueness Test

010920813-01, P = 53.742001 Days, E = 131.061567 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
17724	3774	3.56	4.53	4.86	2.26	1.33	17721	17720	3771	3770	42.8	1.00	0.01	0



### Stellar Parameters For KIC 010920813

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5288^{+202}_{-184}$	$4.577^{+0.056}_{-0.077}$	$-0.380^{+0.300}_{-0.300}$	$0.737^{+0.105}_{-0.070}$	$0.748^{+0.092}_{-0.061}$	$2.629^{+0.698}_{-0.656}$
	+4%/-3%	+1%/-2%	+79%/-79%	+14%/-9%	+12%/-8%	+27%/-25%
Source	PHO54	PHO54	PHO54	DSEP		

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

### Secondary Eclipse Parameters for KIC 010920813-01 / KOI 7386.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-137891 \pm 10$	$39.39^{+2.99}_{-2.05}$	$560^{+26}_{-26}$	$4850^{+181}_{-147}$	$3610^{+356}_{-391}$
Alt.	$-58654 \pm 16$	$42.16^{+3.28}_{-2.39}$	$560^{+26}_{-24}$	$3970^{+111}_{-119}$	$1241^{+119}_{-135}$

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

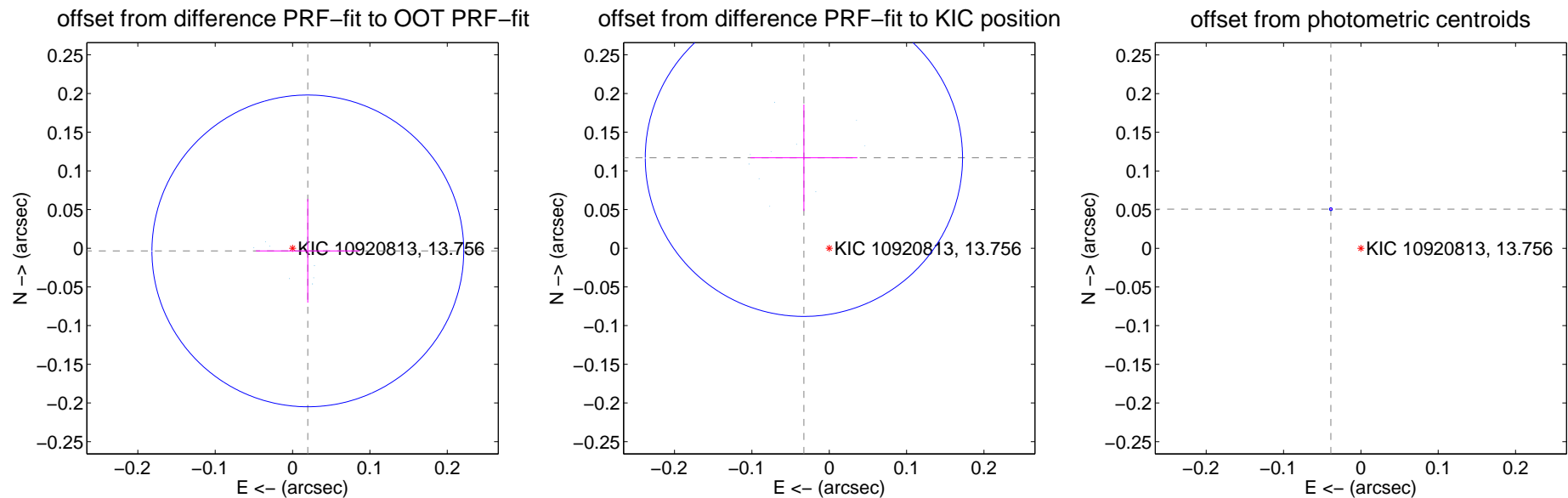
## DV Centroid Data

Supplemental centroid analysis for 010920813-01. Kepler magnitude: 13.76. Transit SNR 3513.29

There are 11 quarters with good PRF difference image offsets

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

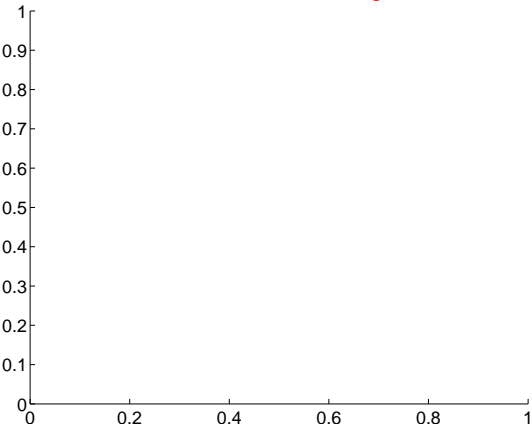
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.020 \pm 0.067$	0.30	$-0.020 \pm 0.067$	$-0.003 \pm 0.067$
PRF-fit source offset from KIC position	$0.121 \pm 0.068$	1.78	$0.033 \pm 0.069$	$0.117 \pm 0.069$
photometric centroid source offset	$0.06 \pm 0.00$	103.09	$0.04 \pm 0.00$	$0.05 \pm 0.00$



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

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

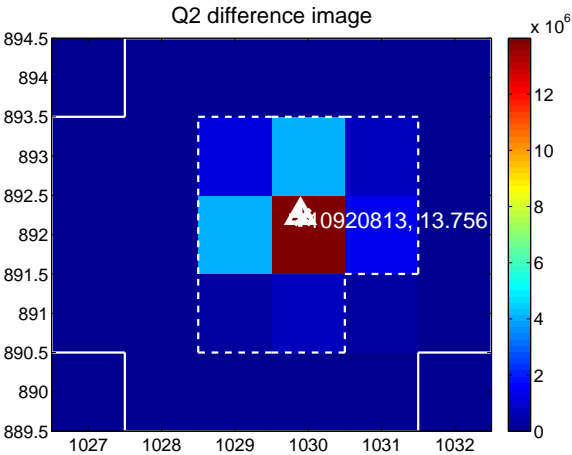
Q1 no difference image



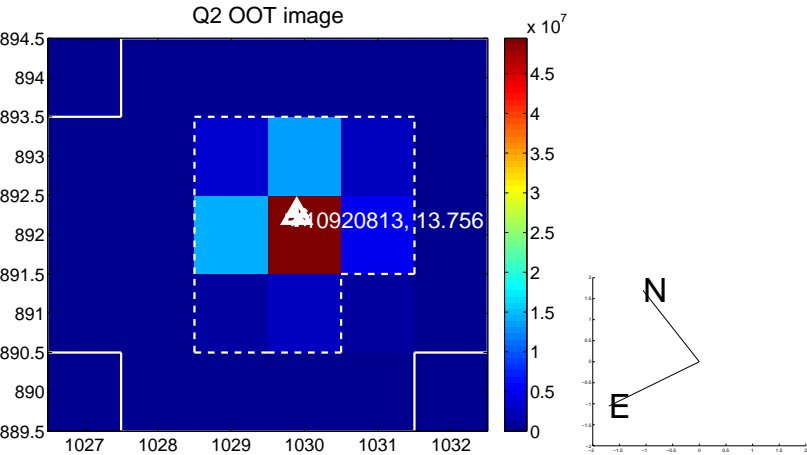
Q1 no OOT image



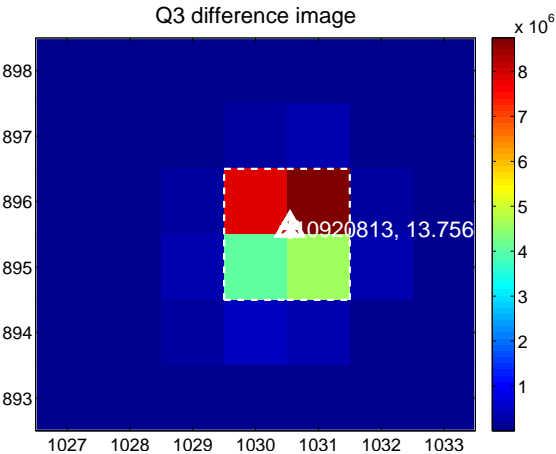
Q2 difference image



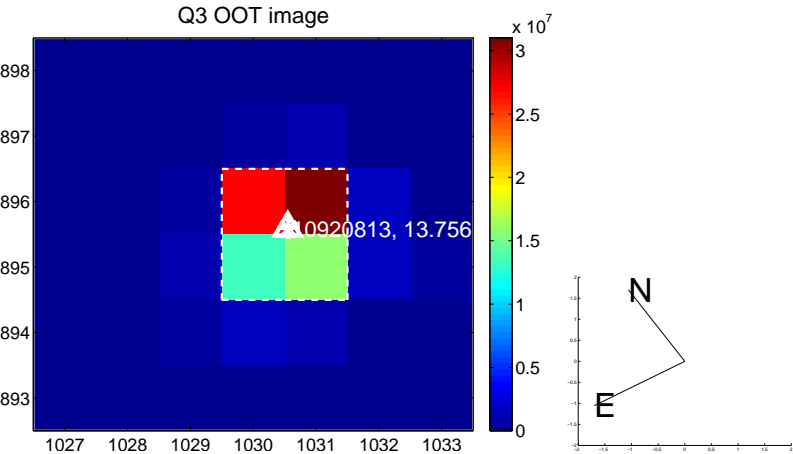
Q2 OOT image



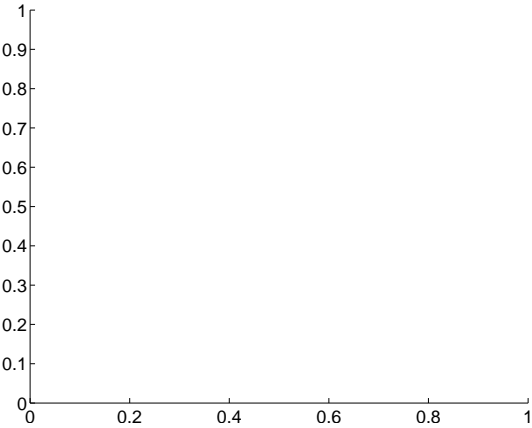
Q3 difference image



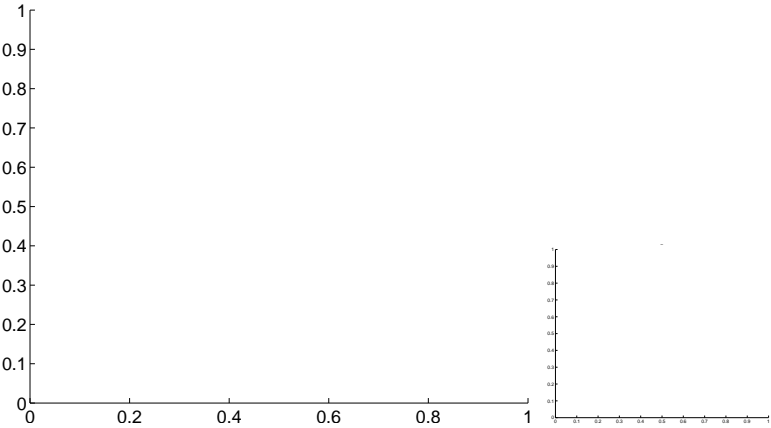
Q3 OOT image



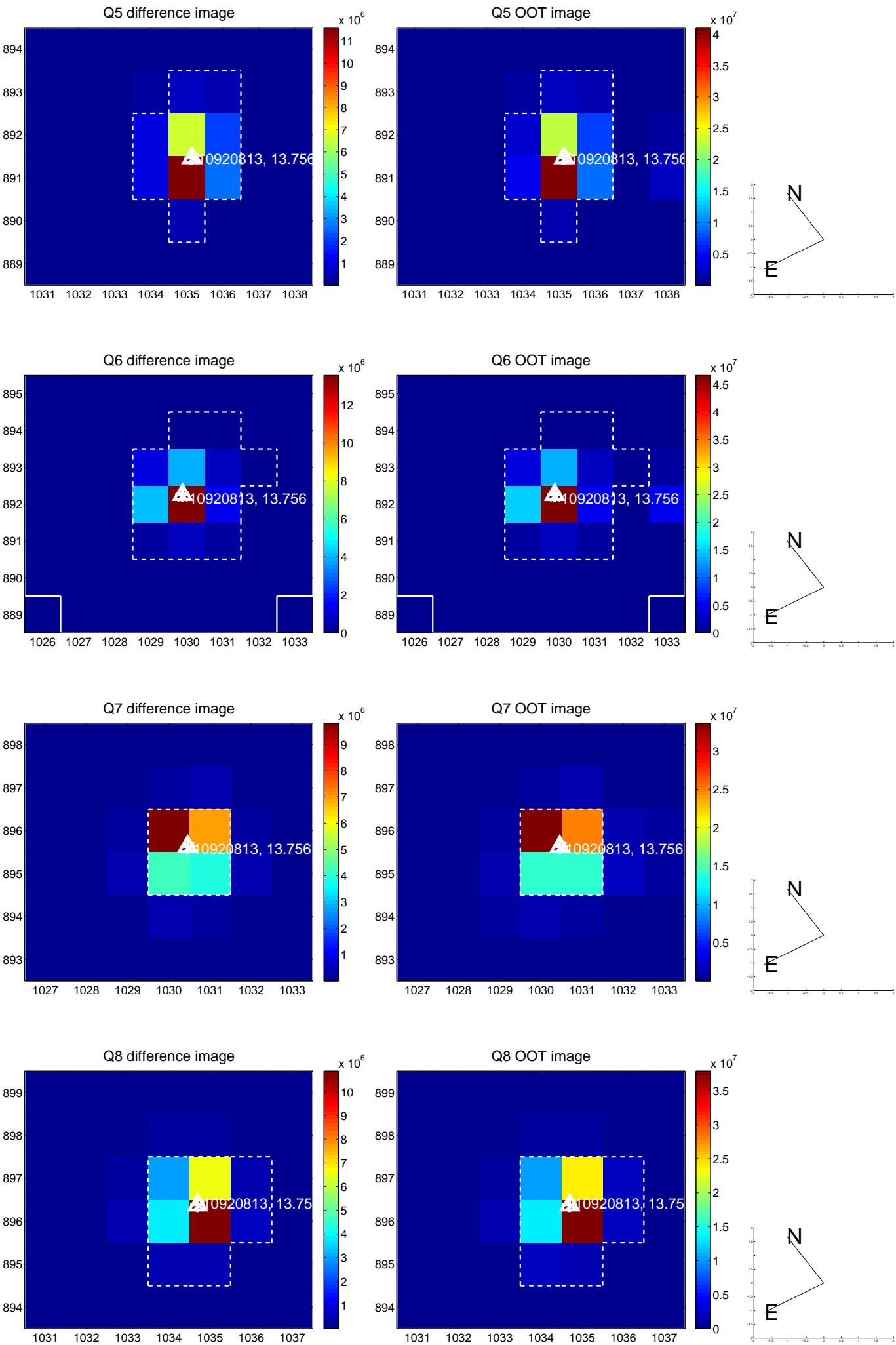
Q4 no difference image



Q4 no OOT image

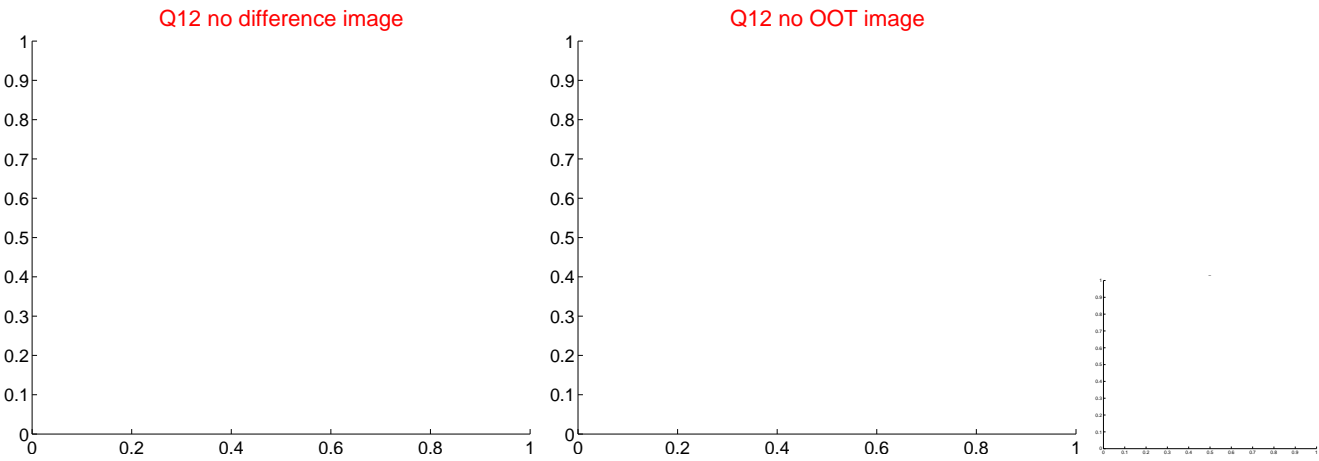
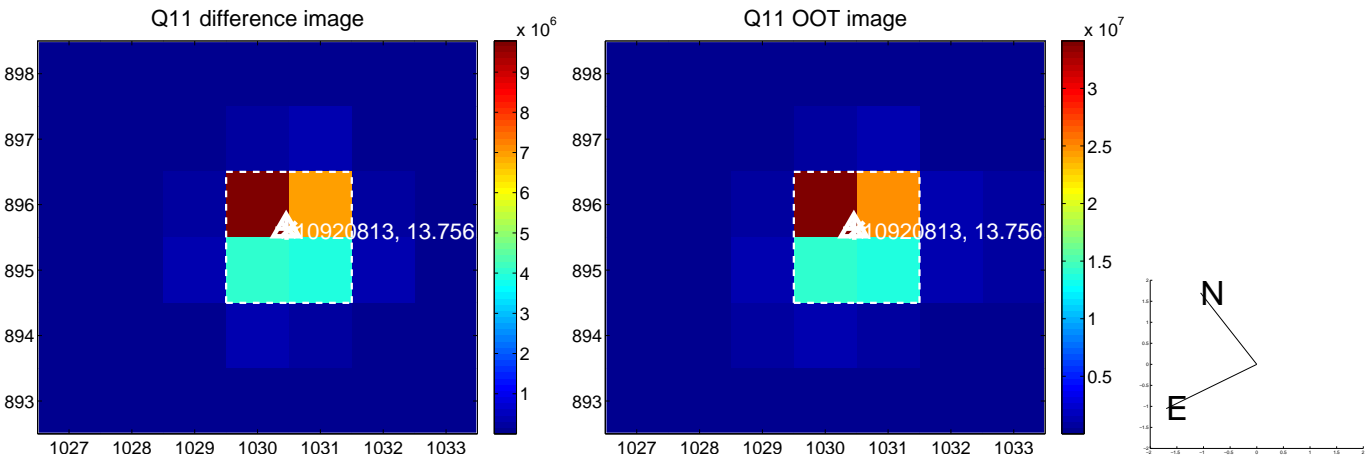
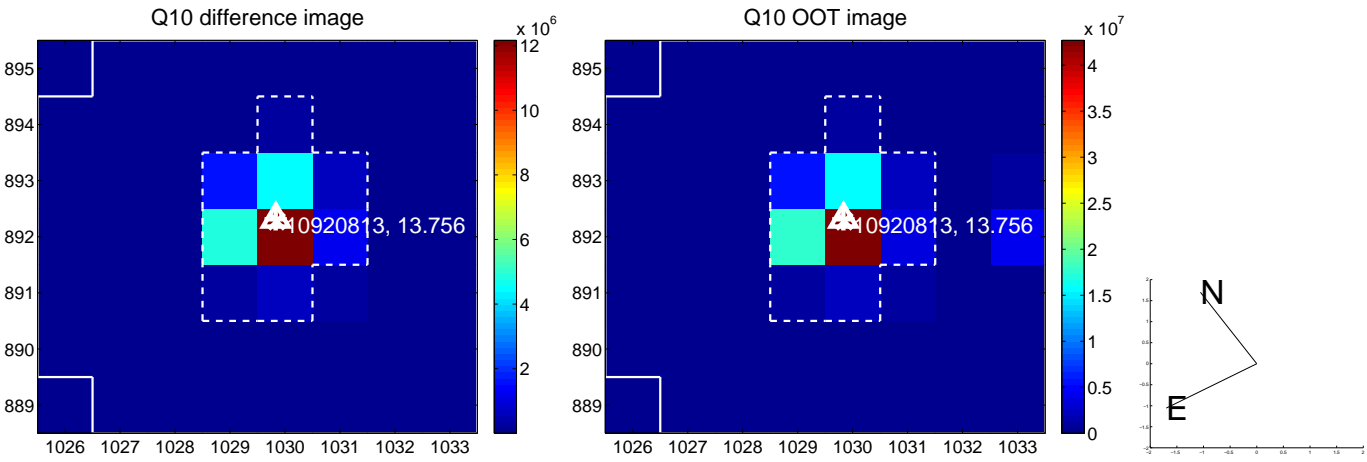
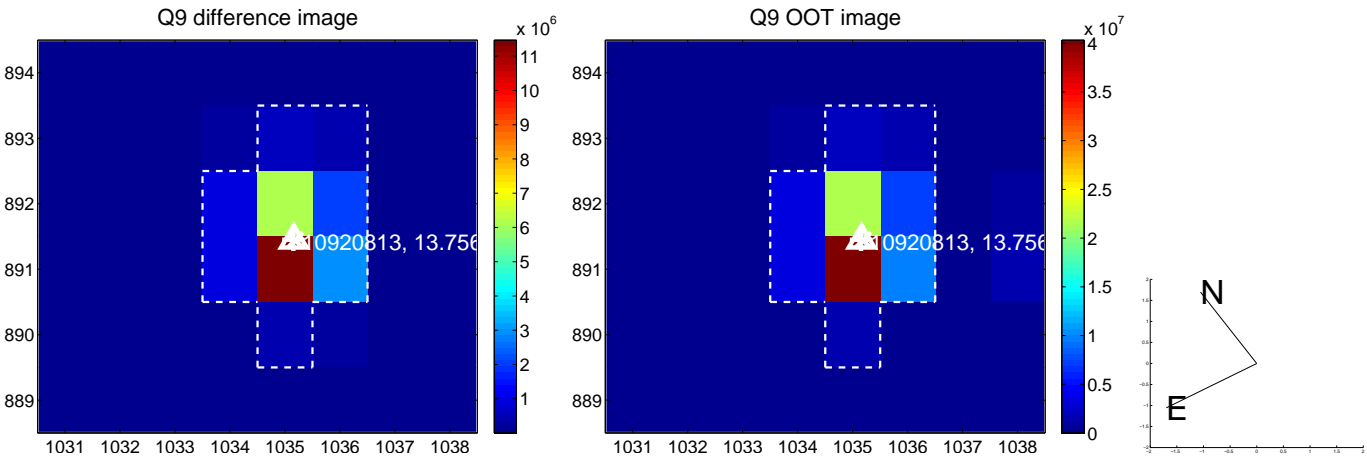


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

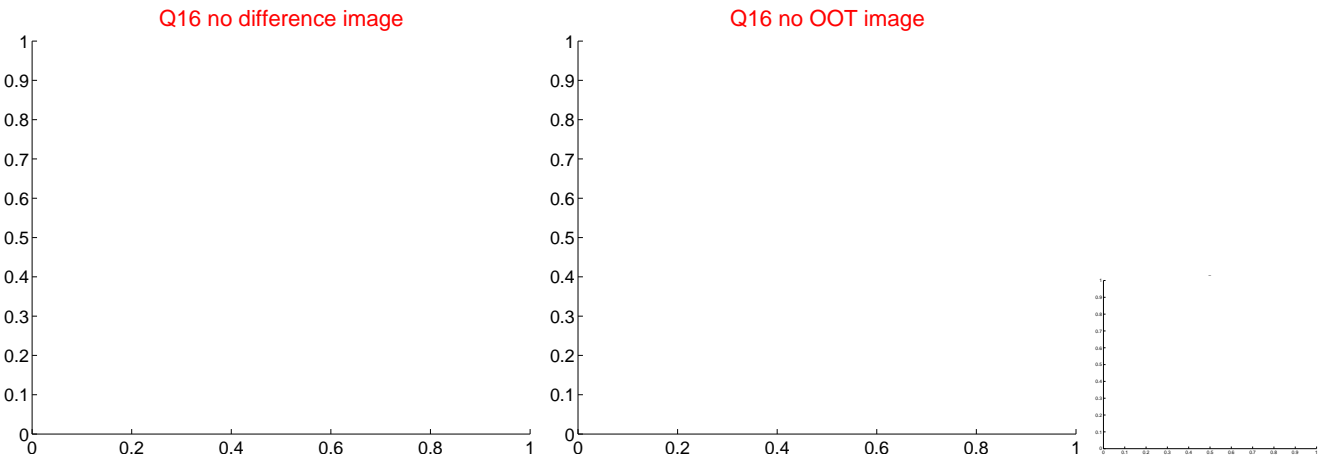
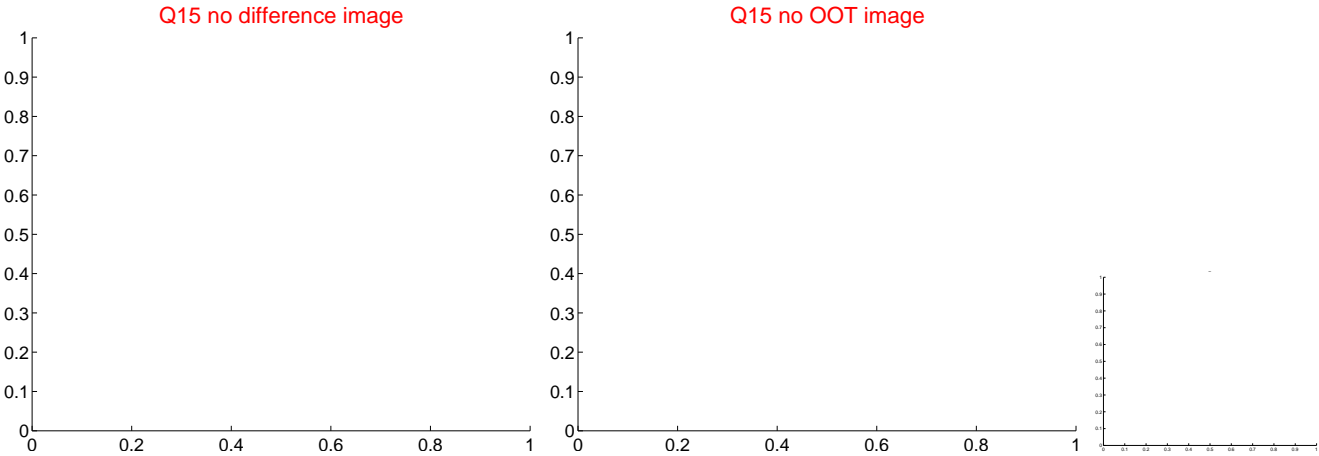
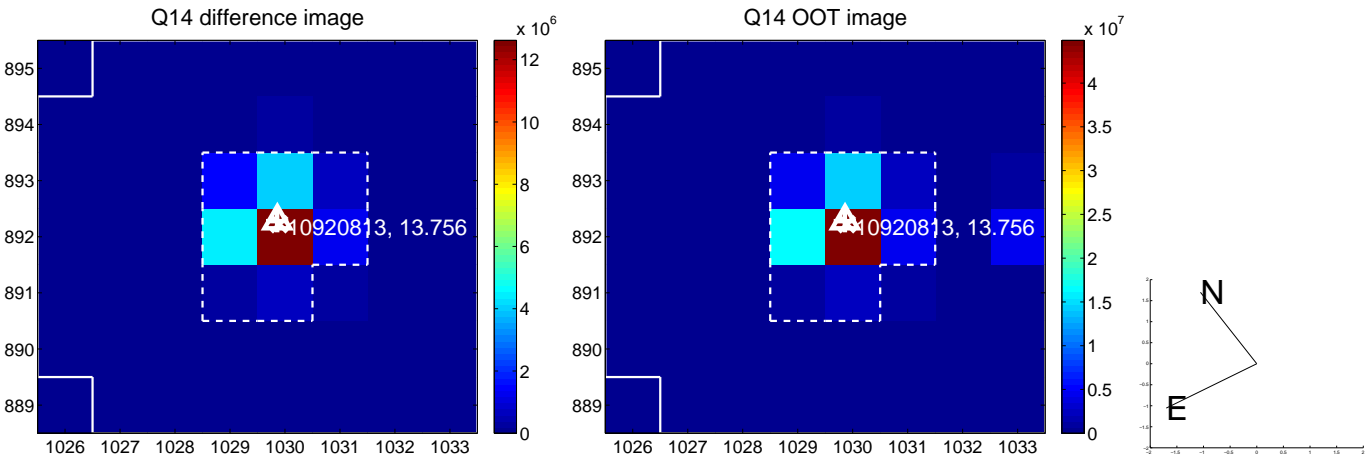
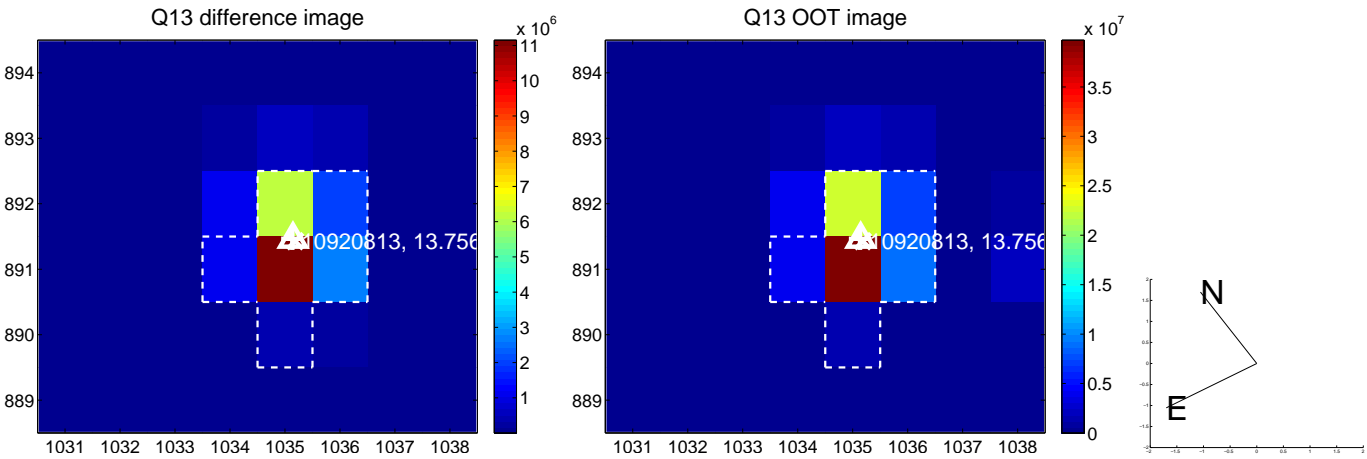




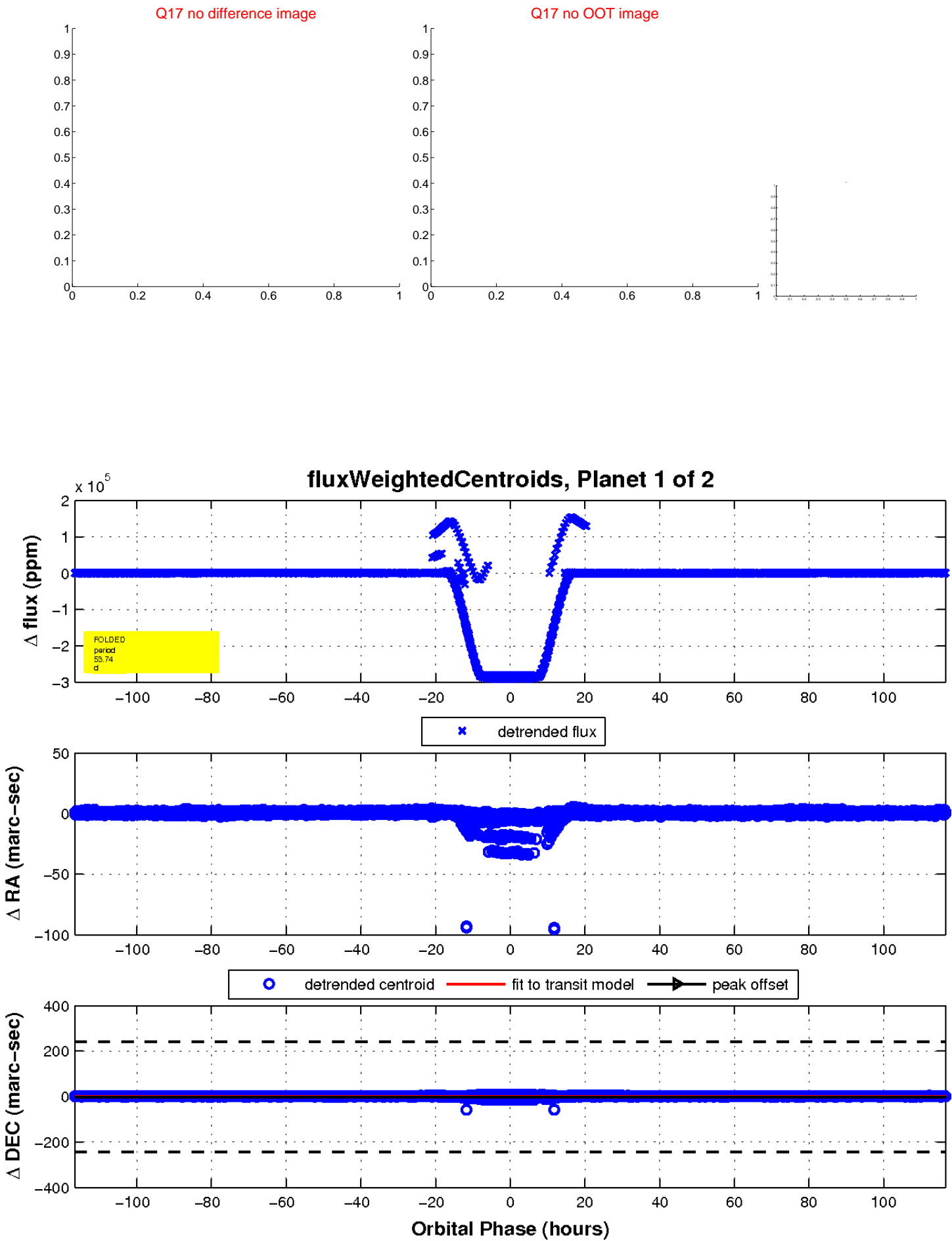
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

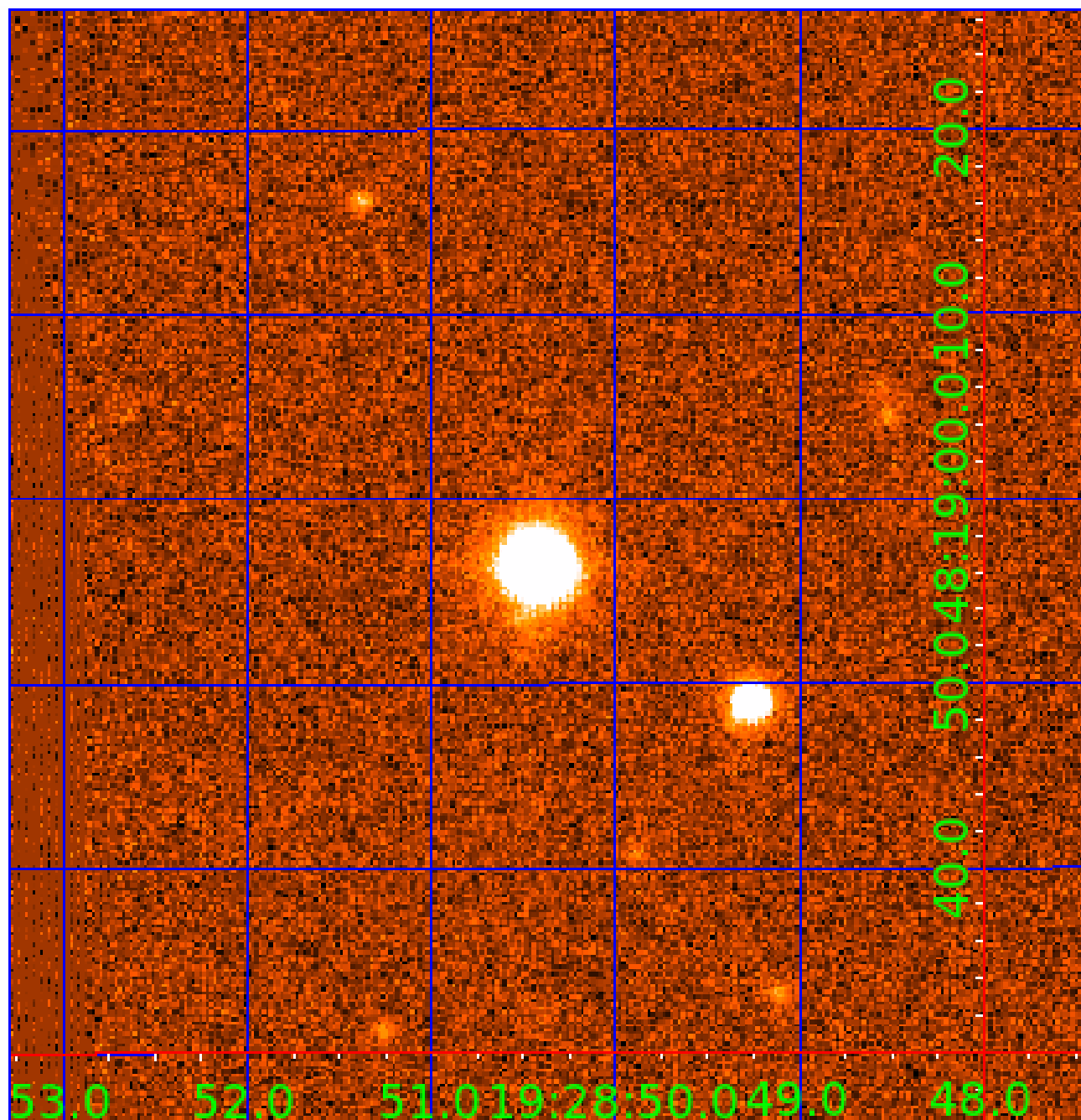


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 010920813

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010920813-01	OBS	7386.01	53.741378	184.814534	286028.0	38.864	5202.7	3513.3	0.74	5288	39.27	5.94
010920813-02	OBS	No	53.740759	155.552819	116485.6	47.141	1179.0	3360.3	0.74	5288	25.37	5.94

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010920813-01	OBS	FP	0.00	1	0	0	0	LPP_DV
010920813-02	OBS	FP	0.00	1	0	0	0	SAME_NTL_PERIOD

**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.

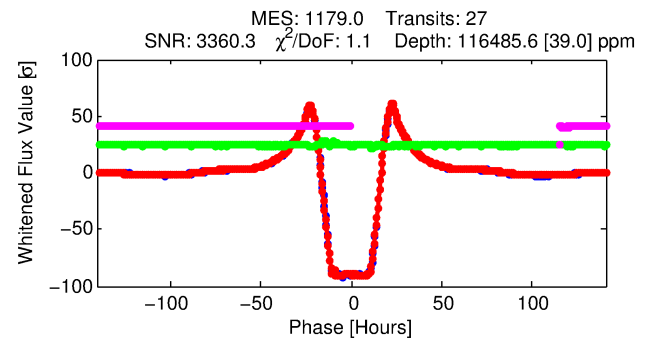
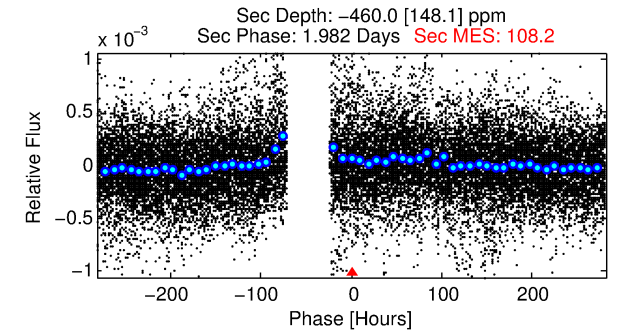
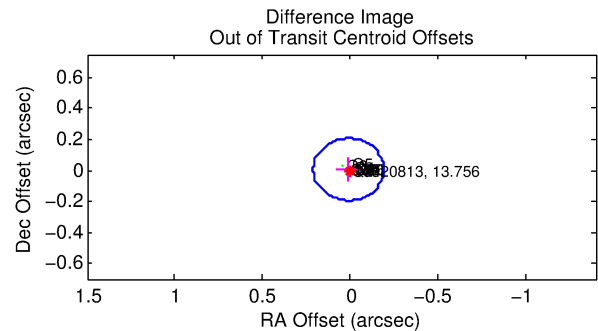
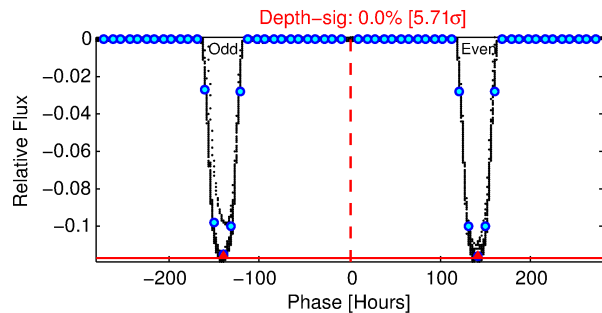
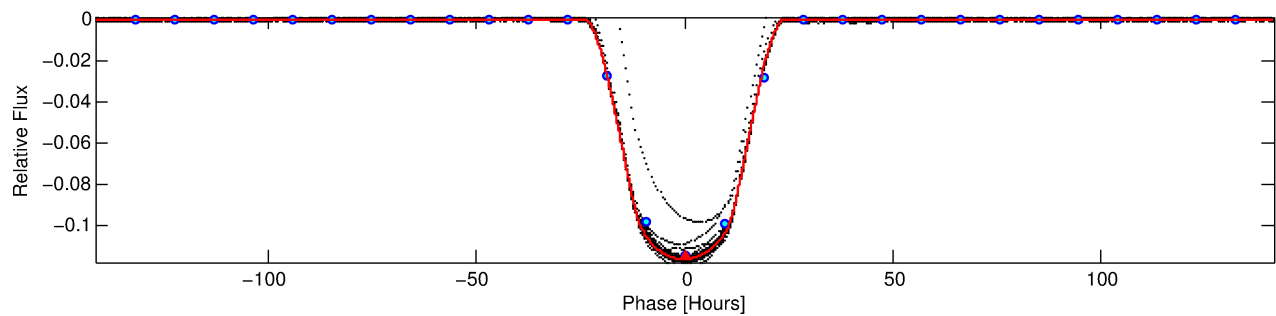
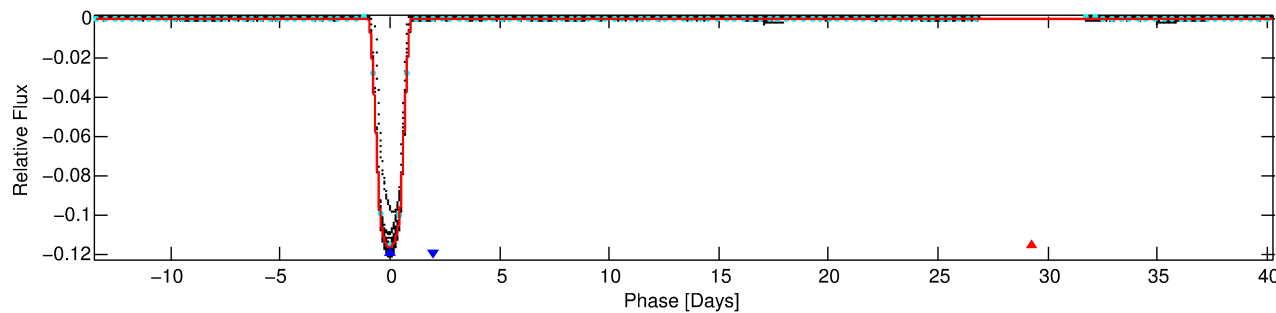
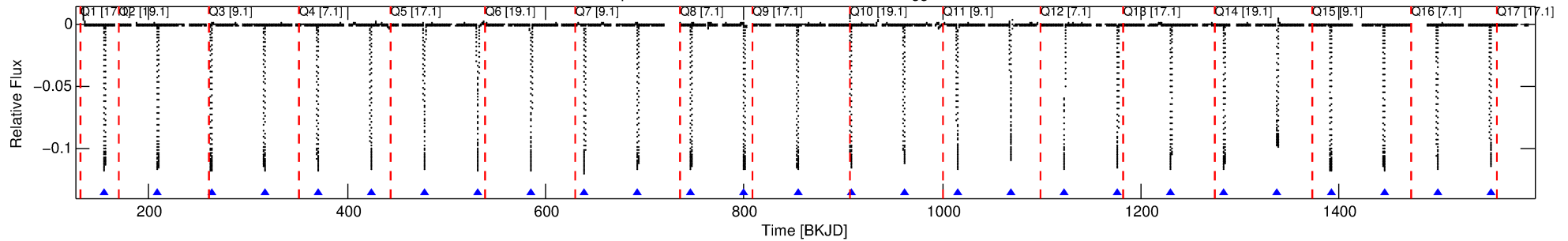
## Ephemeris Match Information For 010920813-02

No Significant Match Found

# DV One-Page Summary

KIC: 10920813 Candidate: 2 of 2 Period: 53.741 d  
KOI: K07386 Corr: No Ephemeris Match

Kp: 13.76 R\*: 0.74 Rs Teff: 5288.0 K Logg: 4.58 Fe/H: -0.380



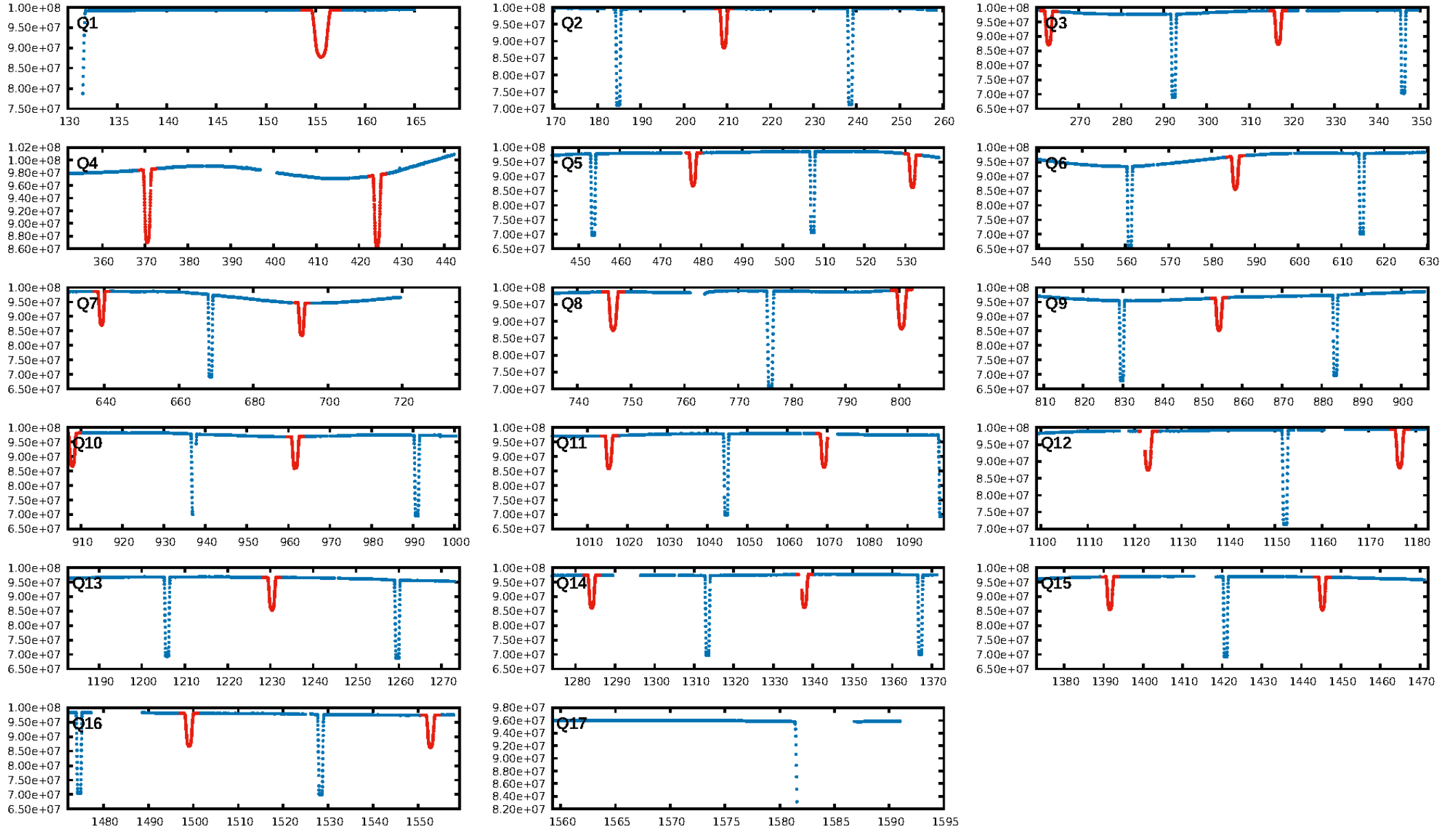
## DV Fit Results:

Period = 53.74076 [0.00001] d  
Epoch = 155.5528 [0.0002] BKJD  
Rp/R\* = 0.3155 [0.0001]  
a/R\* = 10.99 [0.00]  
b = 0.38 [0.00]  
Seff = 5.94 [1.28]  
Teq = 398 [21] K  
Rp = 25.37 [3.61] Re  
a = 0.2531 [0.0283] AU  
Ag = N/A  
Teffp = N/A

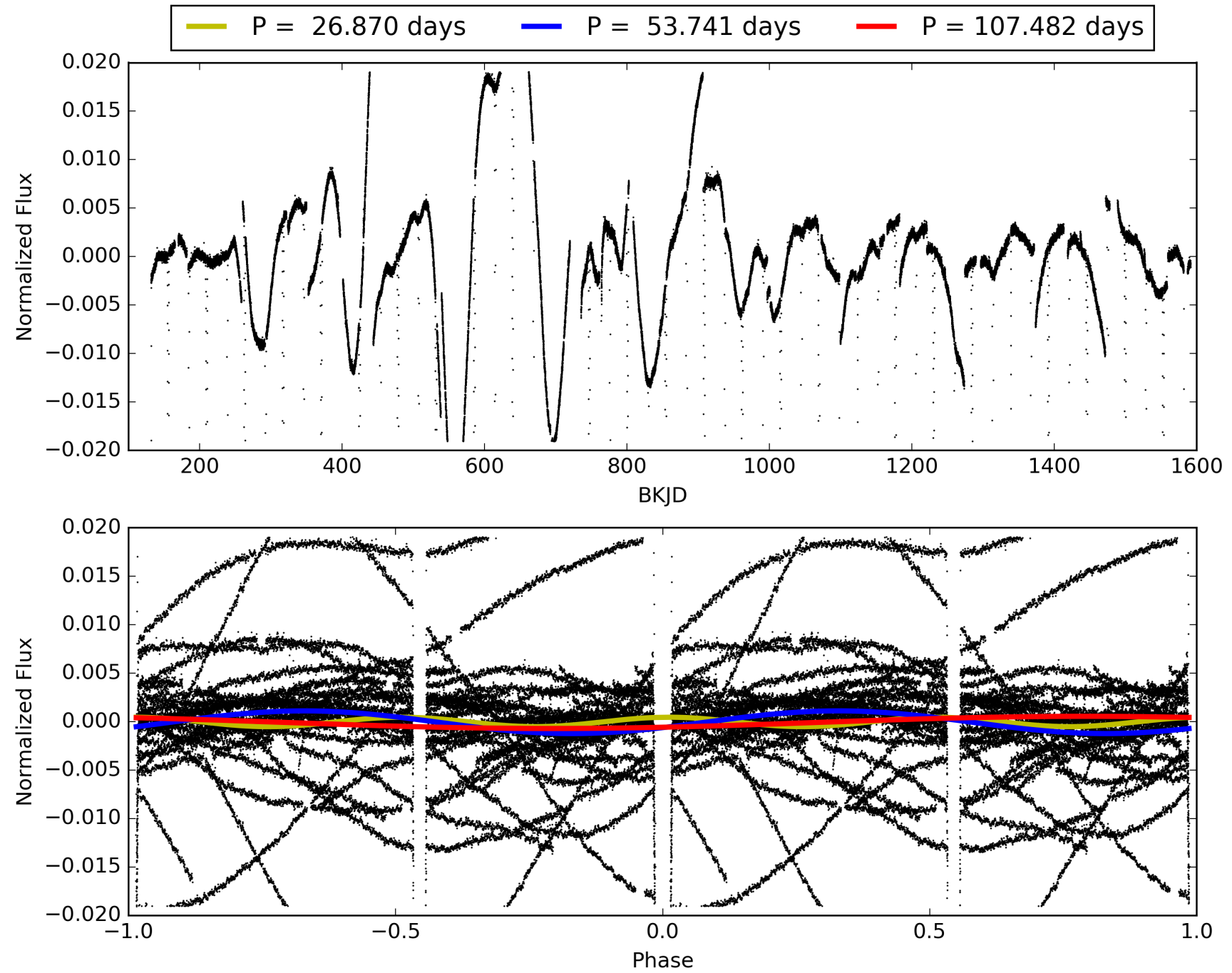
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [26/26]  
GhostDiagnostic-chr: 9.696  
Centroid-sig: N/A  
Centroid-so: 0.087 arcsec [65.65σ]  
OotOffset-rm: 0.013 arcsec [0.19σ]  
KicOffset-rm: 0.129 arcsec [1.90σ]  
OotOffset-st: 3/4/3/3 [13]  
KicOffset-st: 3/4/3/3 [13]  
DiffImageQuality-fgm: 1.00 [13/13]  
DiffImageOverlap-fno: 1.00 [13/13]

# TCE 010920813-02, PDC Light Curves



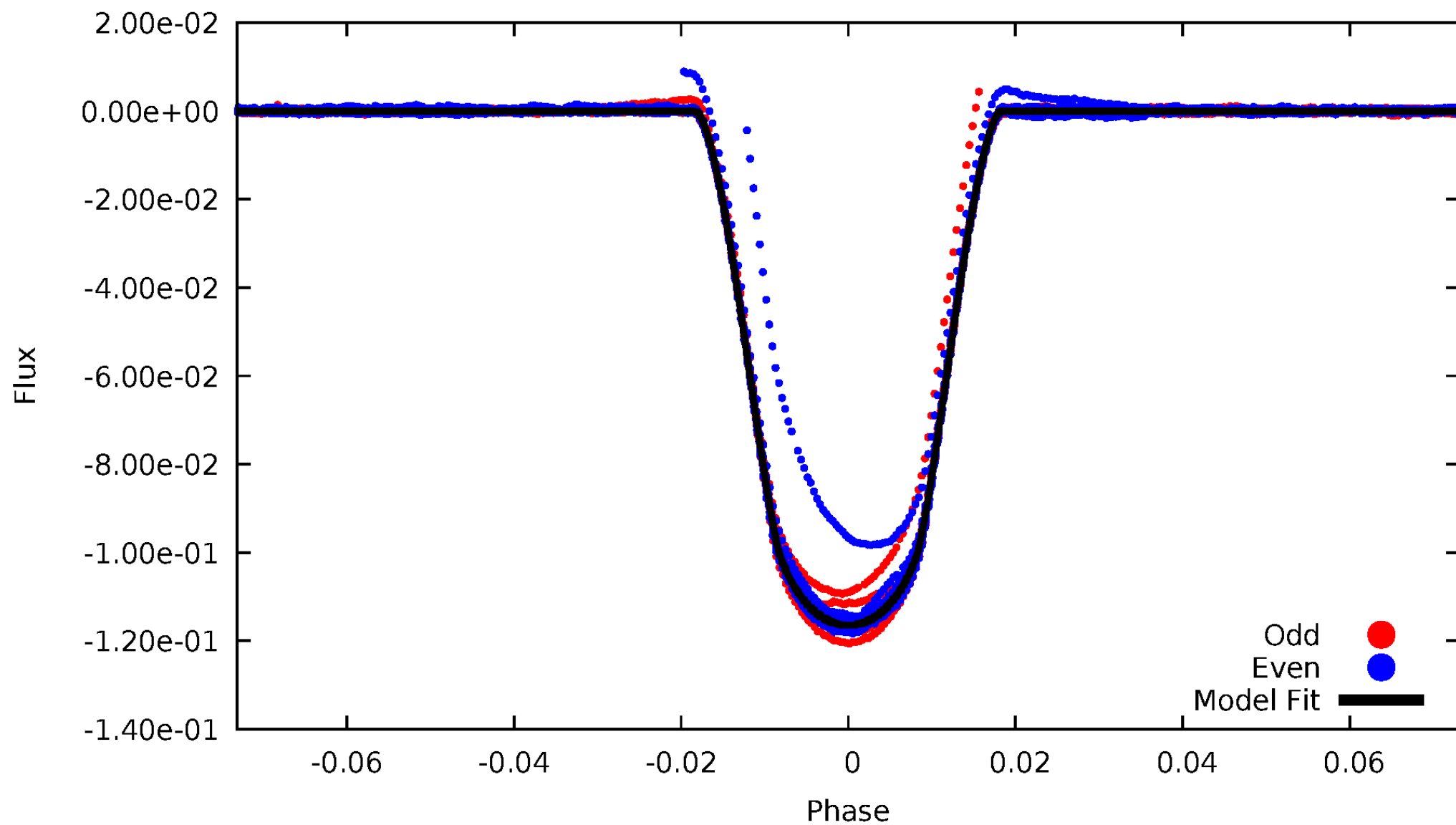
# TCE 010920813-02





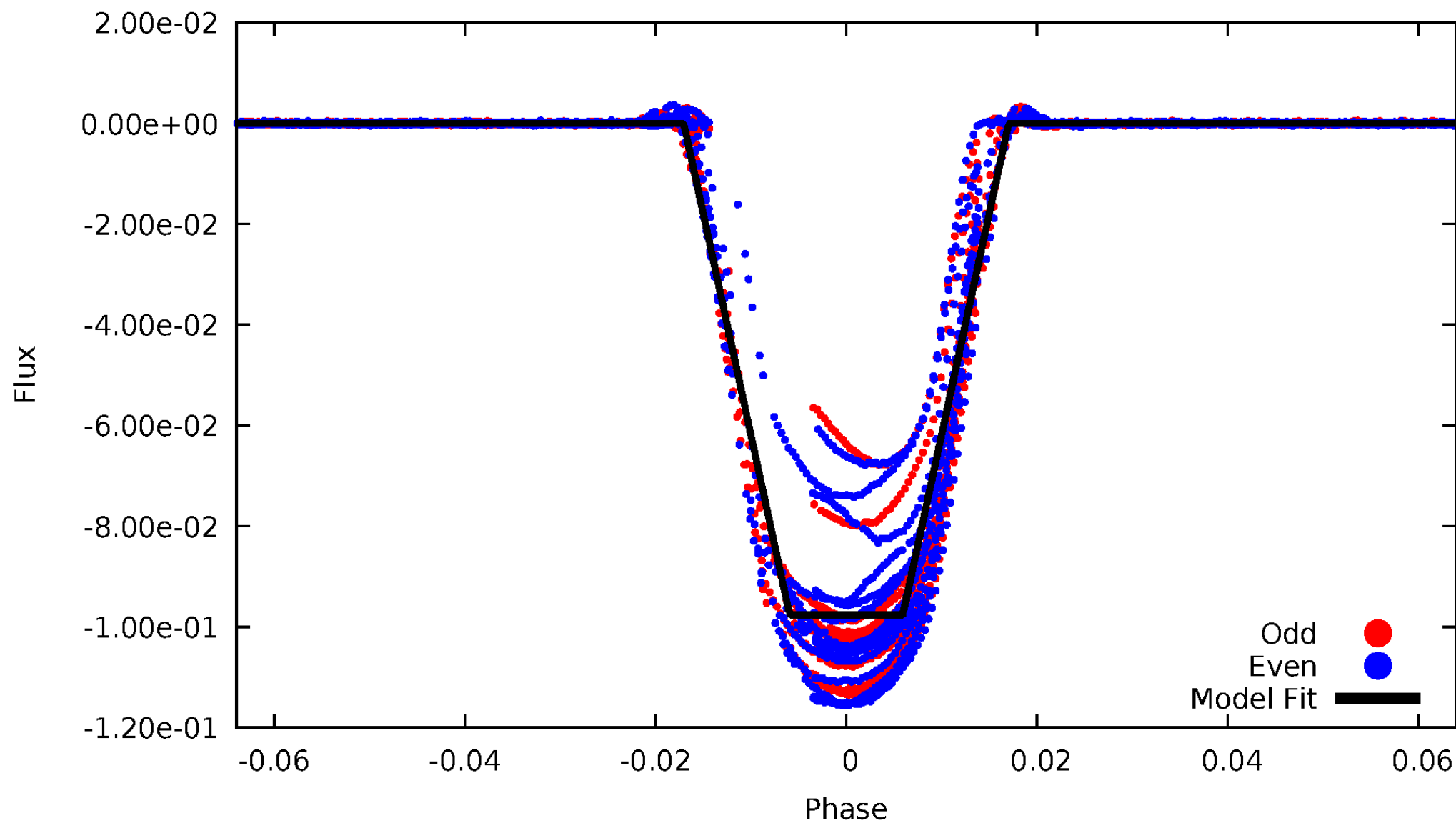
# DV Odd/Even

TCE 010920813-02



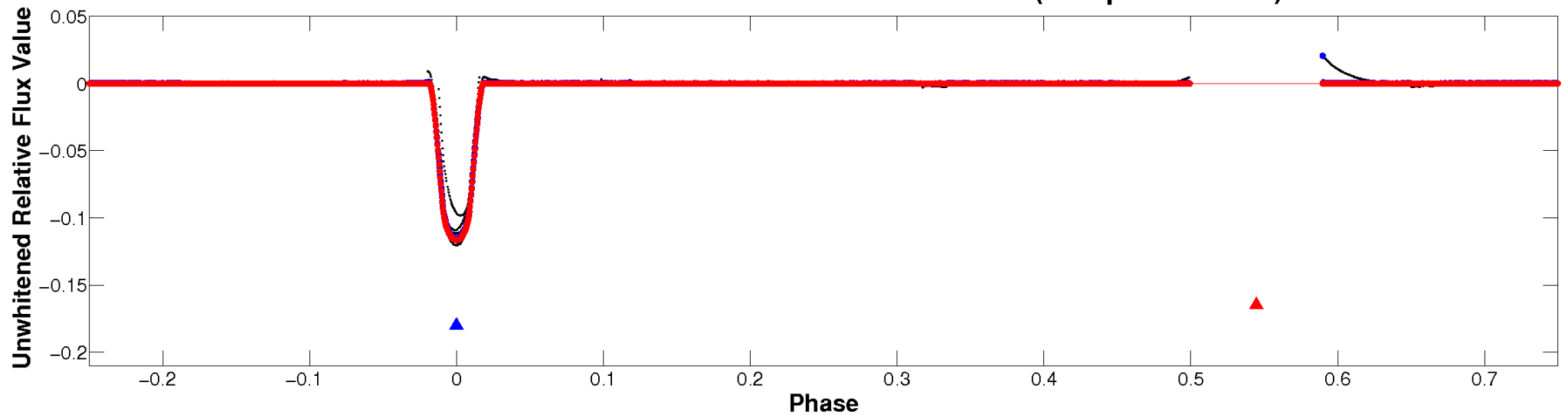
# ALT Odd/Even

TCE 010920813-02

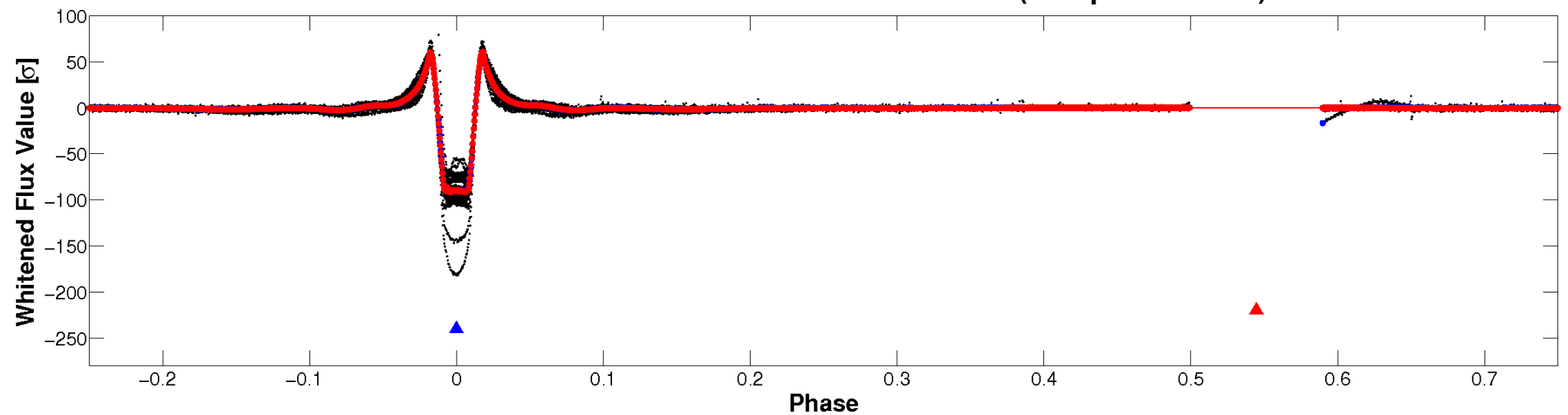


# Non-Whitened Vs. Whitened Light Curve

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

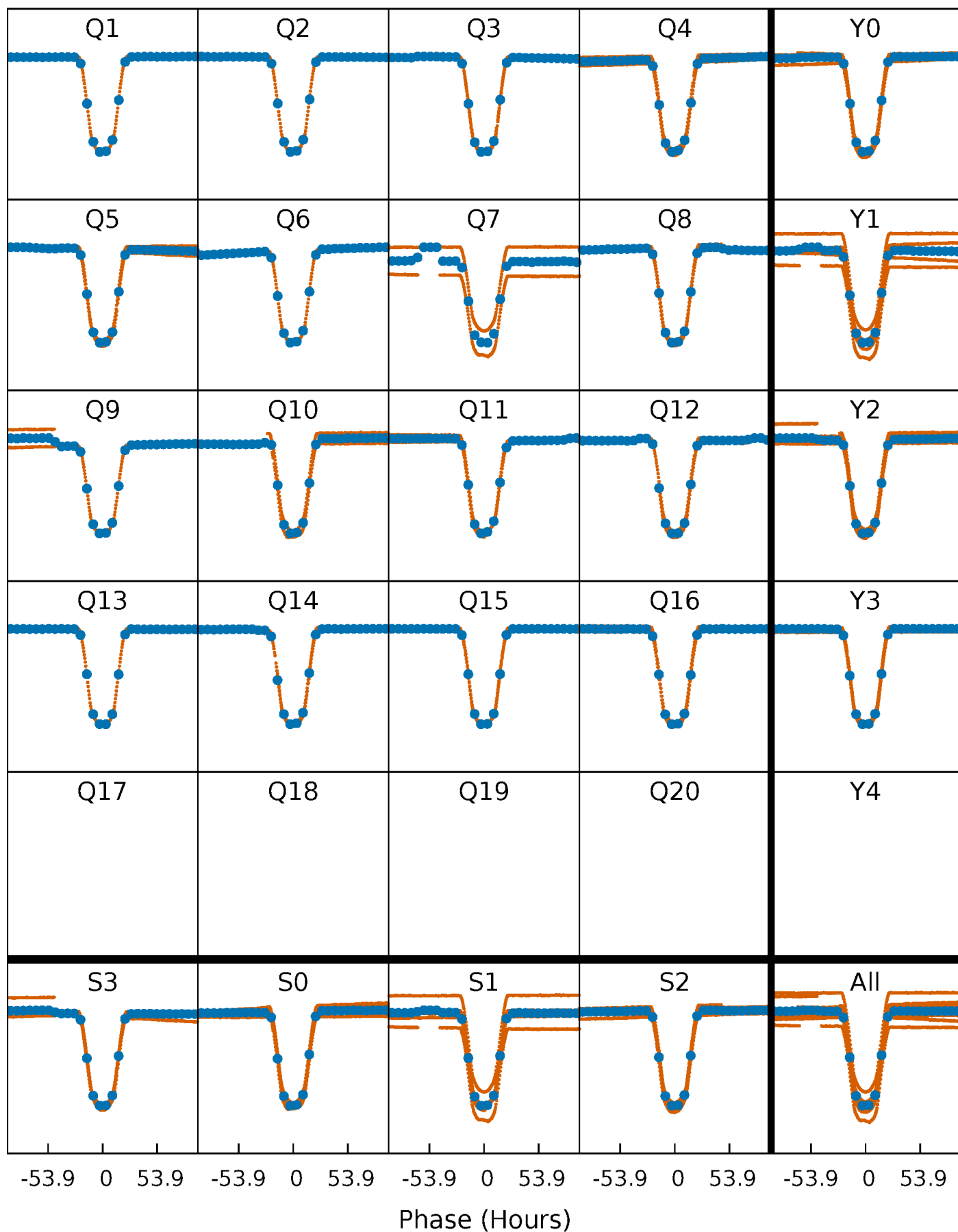


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



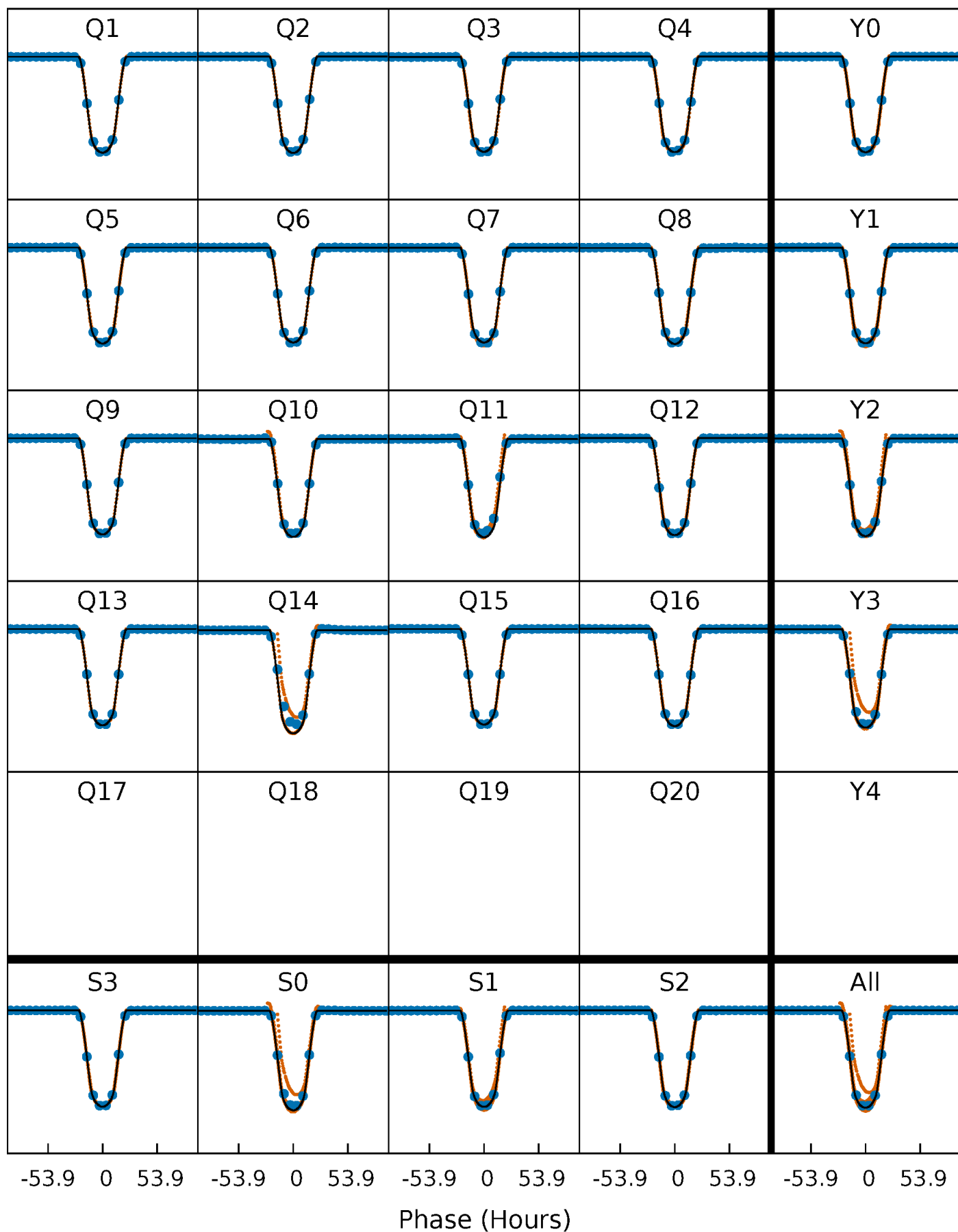
# PDC Quarter-Phased Transit Curves

TCE 010920813-02 P= 53.740759 Days  $T_0=155.552819$  (BKJD)



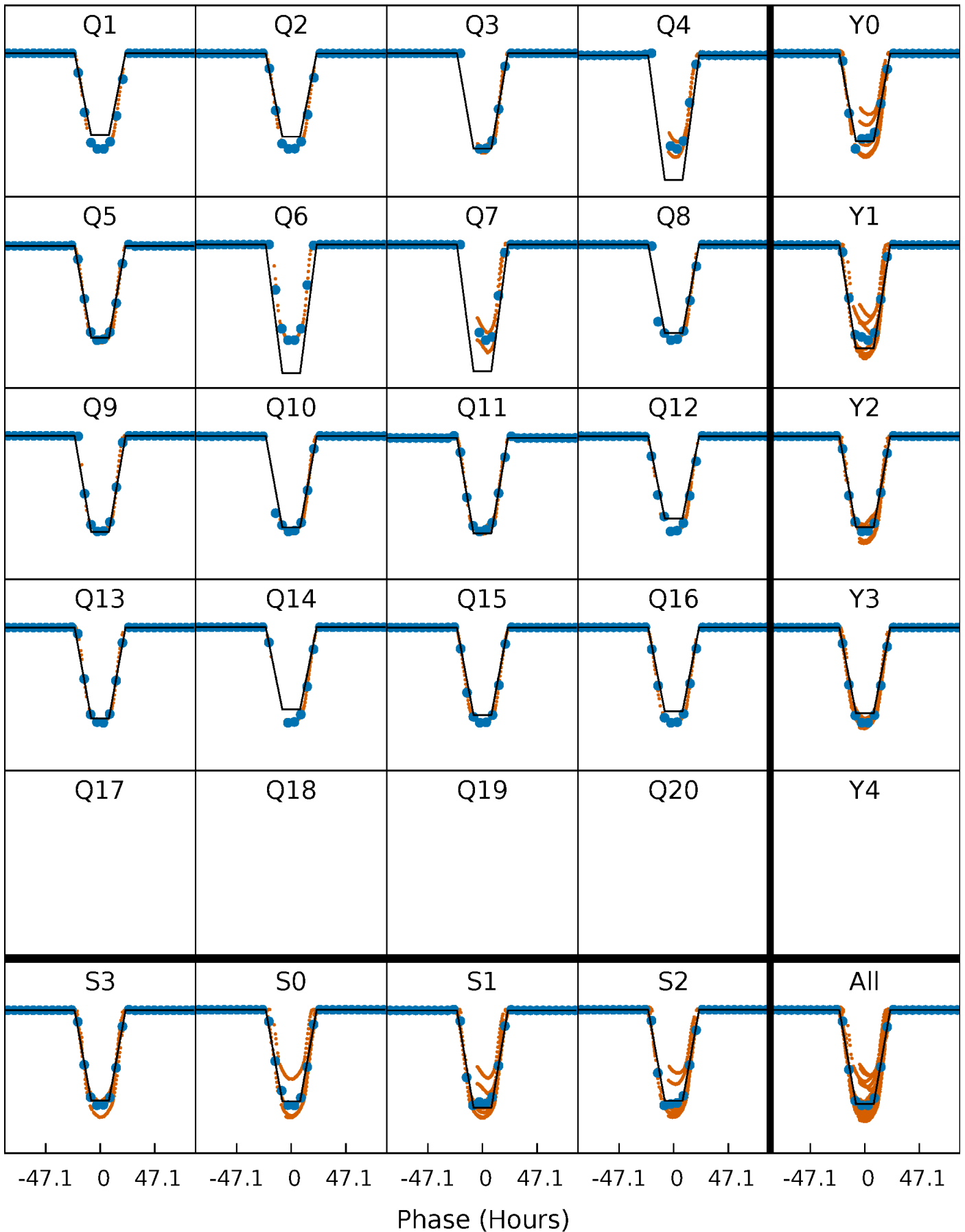
# DV Quarter-Phased Transit Curves

TCE 010920813-02 P= 53.740759 Days  $T_0=155.552819$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

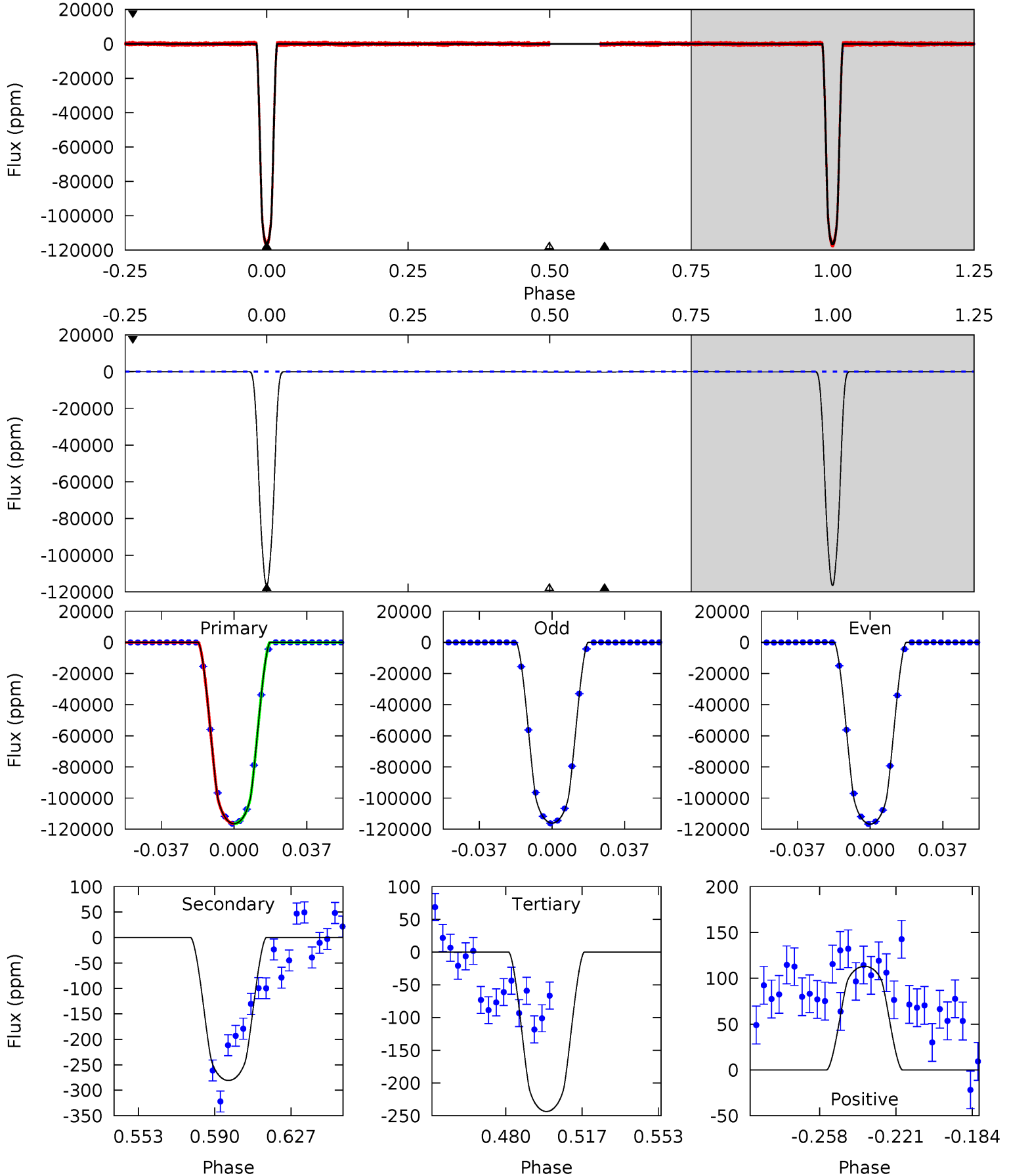
TCE 010920813-02 P= 53.742001 Days  $T_0=155.528677$  (BKJD)



# DV Model-Shift Uniqueness Test

010920813-02, P = 53.740759 Days, E = 101.812060 Days

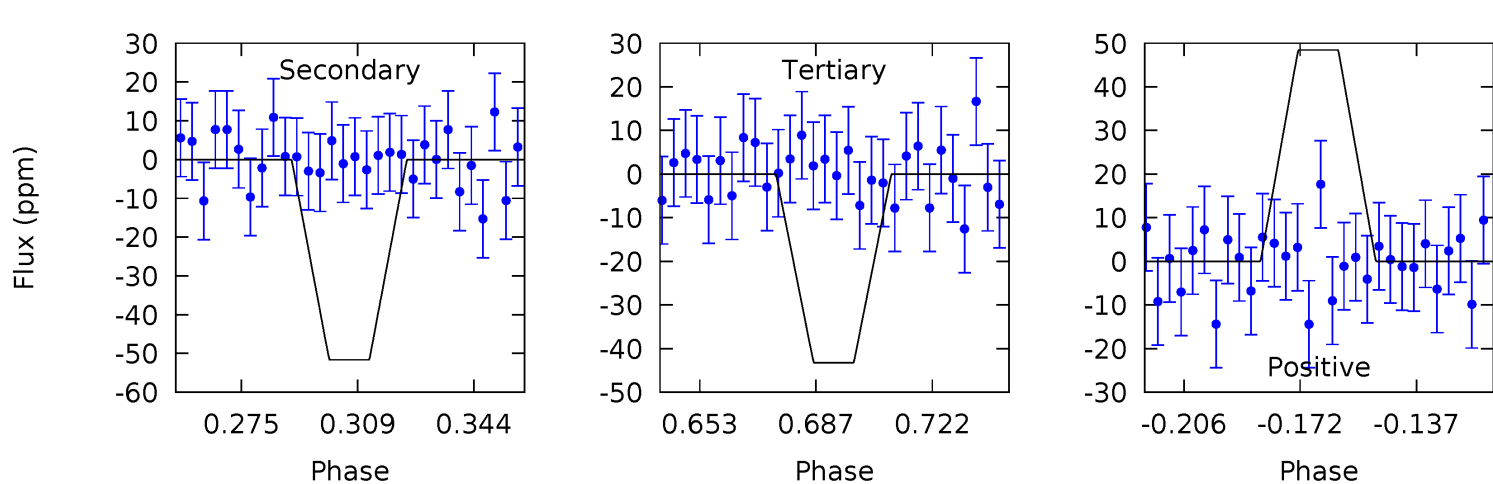
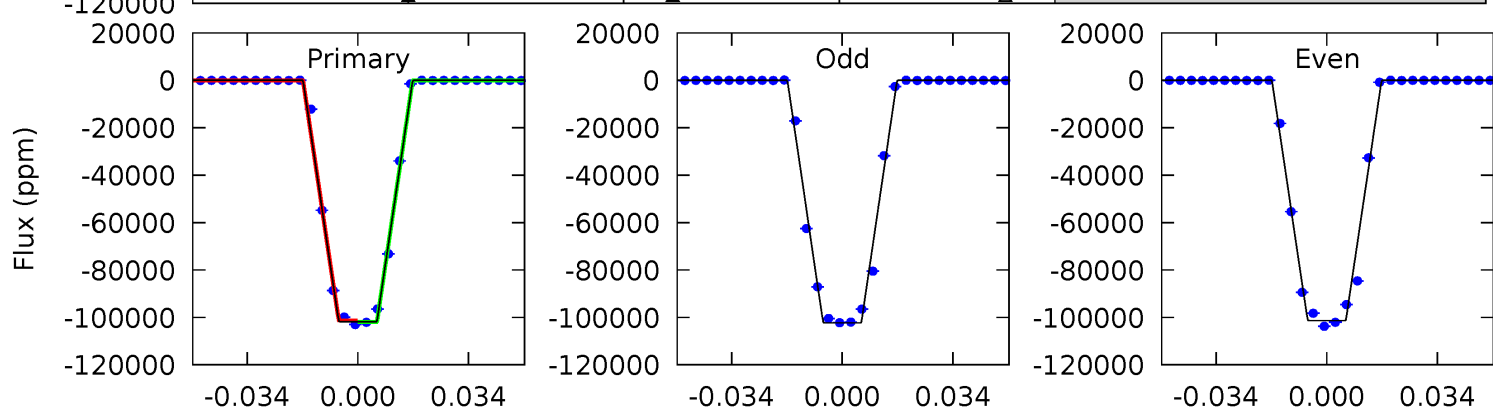
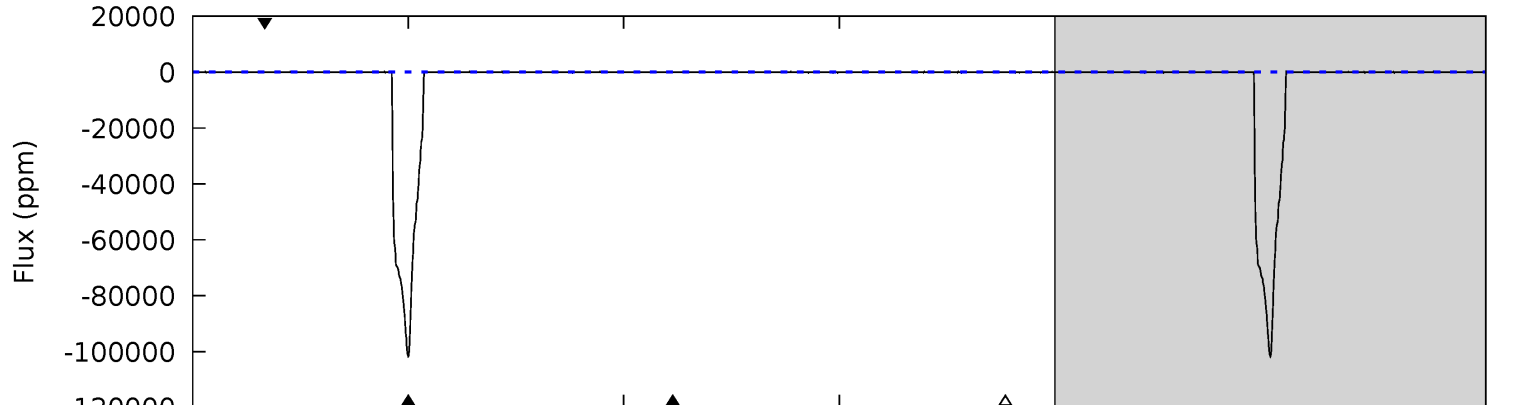
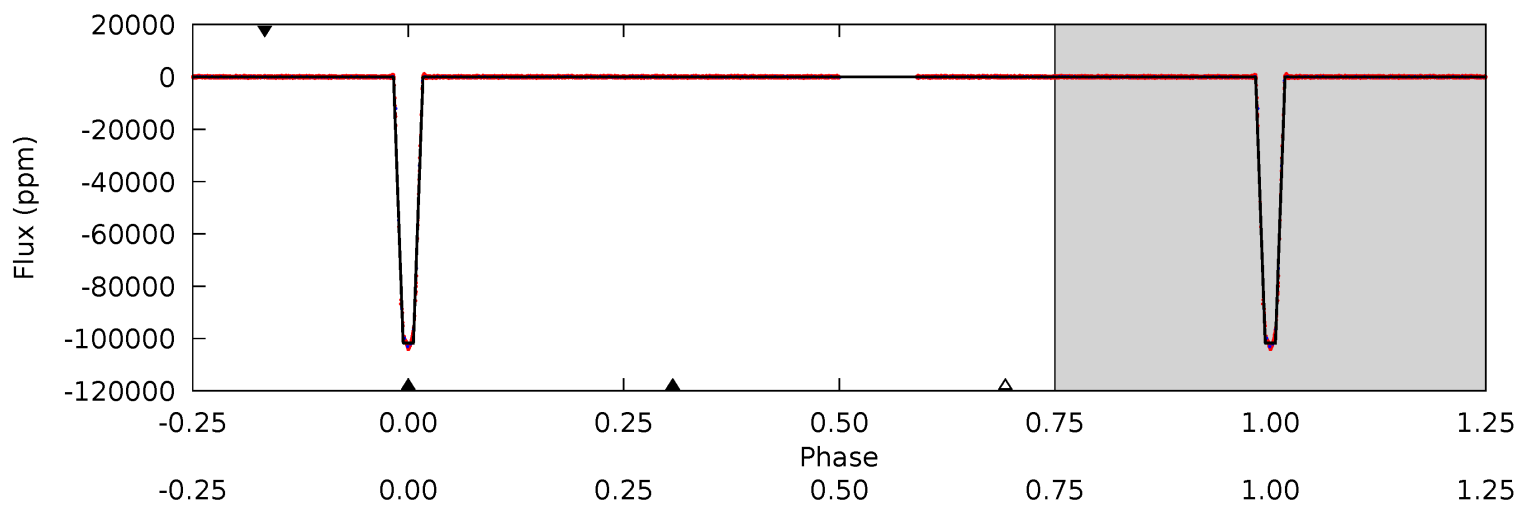
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
17453	42.1	36.5	16.9	4.77	2.09	9.29	17417	17436	5.57	25.1	45.2	0.99	0.00	0



# Alt Model-Shift Uniqueness Test

010920813-02, P = 53.742001 Days, E = 101.786676 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
7893	4.01	3.36	3.76	4.78	2.12	1.17	7890	7890	0.65	0.25	45.2	0.97	0.00	0





### Stellar Parameters For KIC 010920813

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5288^{+202}_{-184}$	$4.577^{+0.056}_{-0.077}$	$-0.380^{+0.300}_{-0.300}$	$0.737^{+0.105}_{-0.070}$	$0.748^{+0.092}_{-0.061}$	$2.629^{+0.698}_{-0.656}$
	+4%/-3%	+1%/-2%	+79%/-79%	+14%/-9%	+12%/-8%	+27%/-25%
Source	PHO54	PHO54	PHO54	DSEP		

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

### Secondary Eclipse Parameters for KIC 010920813-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-281 \pm 7$	$25.56^{+1.98}_{-1.50}$	$559^{+27}_{-25}$	$2166^{+41}_{-37}$	$15^{+2}_{-2}$
Alt.	$-52 \pm 13$	$25.14^{+1.95}_{-1.27}$	$558^{+26}_{-23}$	$1812^{+51}_{-60}$	$2.831^{+0.859}_{-0.747}$

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

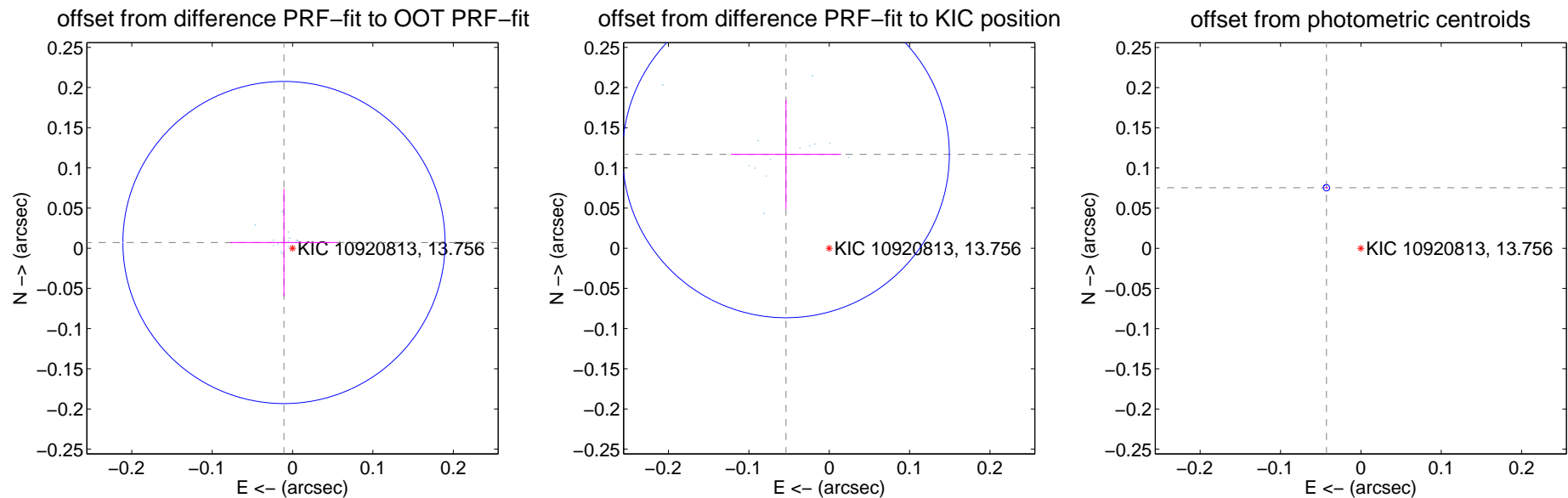
## DV Centroid Data

Supplemental centroid analysis for 010920813-02. Kepler magnitude: 13.76. Transit SNR 3360.33

There are 13 quarters with good PRF difference image offsets

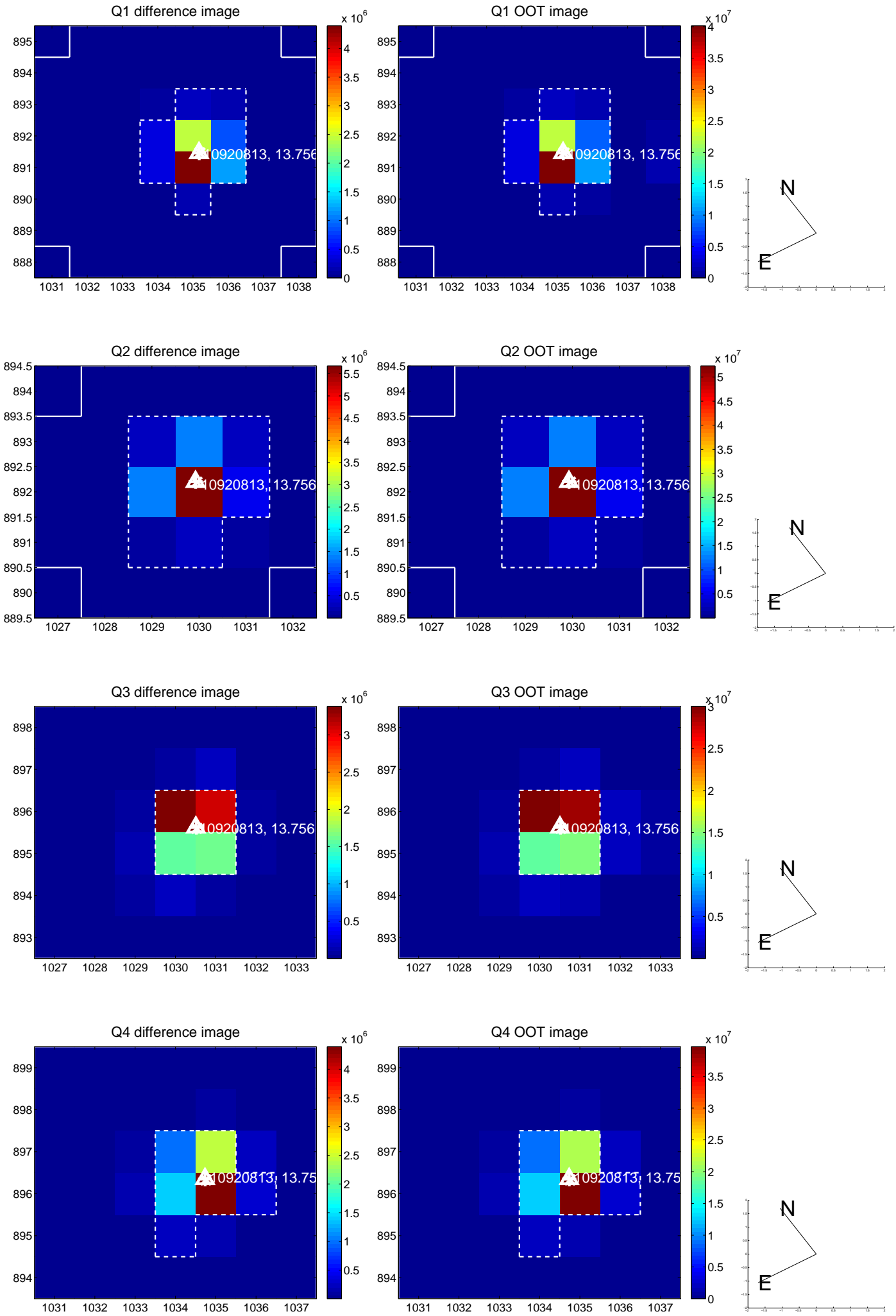
The direct PRF centroid is offset from the target star catalog position by about 0.21 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.013 \pm 0.067$	0.19	$0.011 \pm 0.067$	$0.007 \pm 0.067$
PRF-fit source offset from KIC position	$0.129 \pm 0.068$	1.90	$0.054 \pm 0.069$	$0.117 \pm 0.068$
photometric centroid source offset	$0.09 \pm 0.00$	<b>65.65</b>	$0.04 \pm 0.00$	$0.08 \pm 0.00$

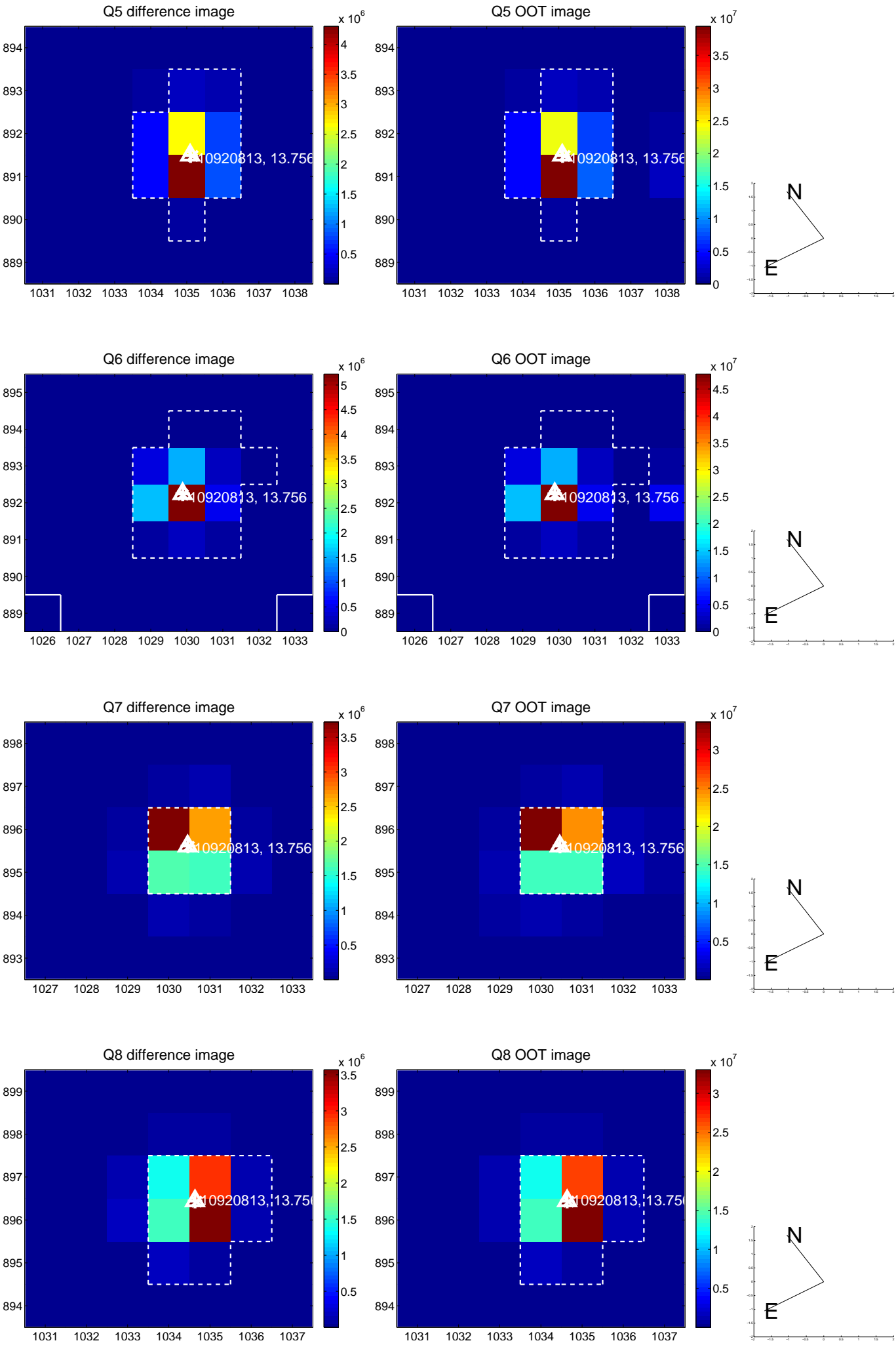


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

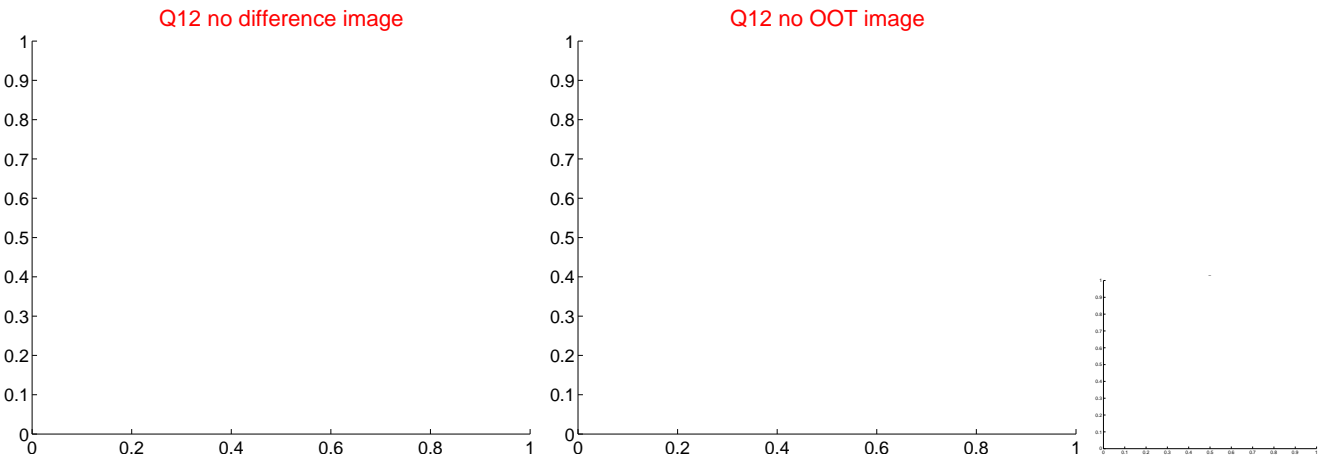
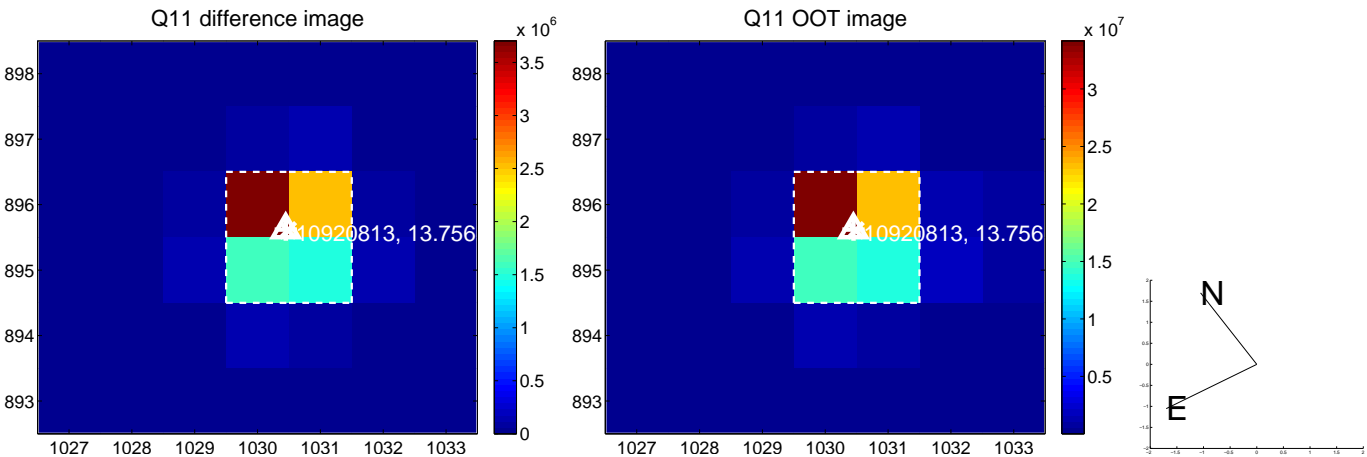
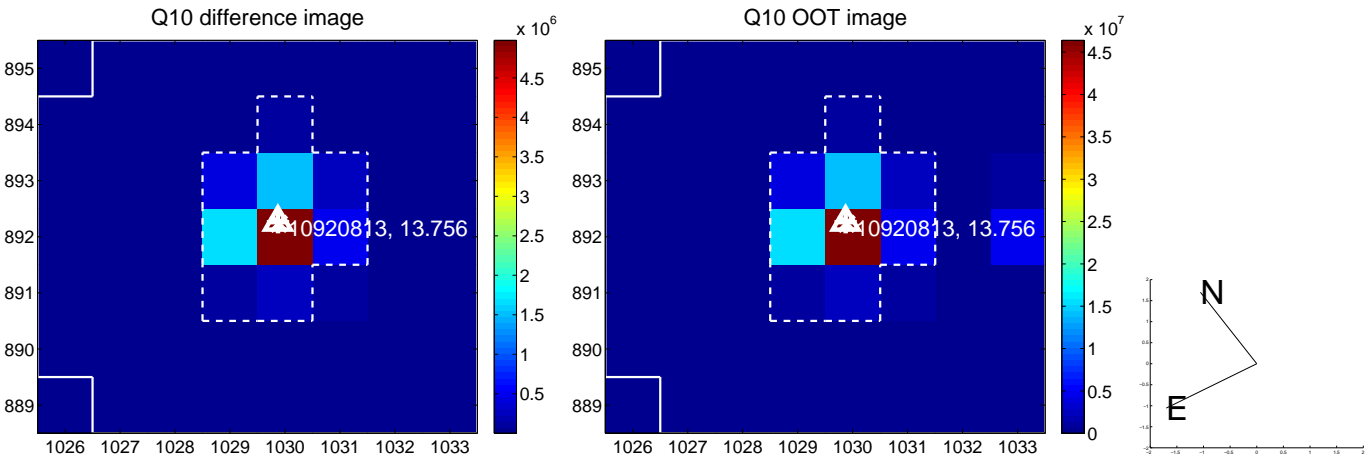
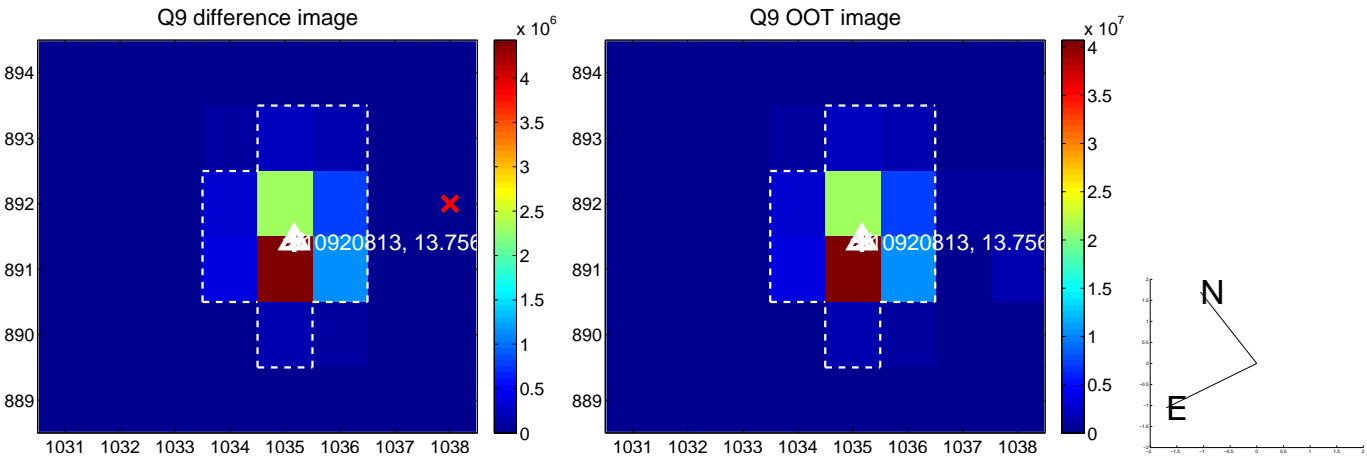
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



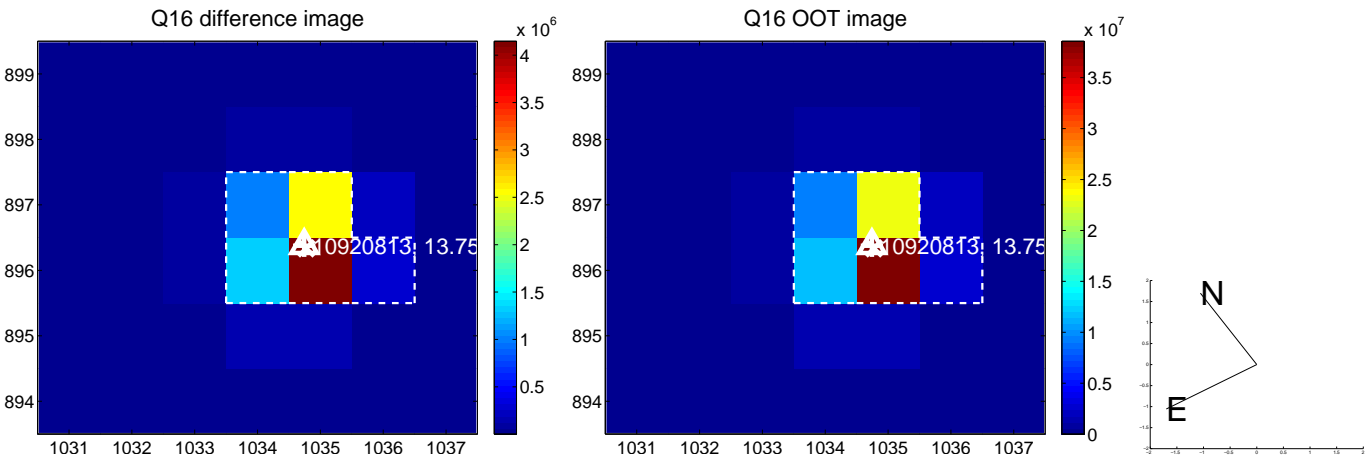
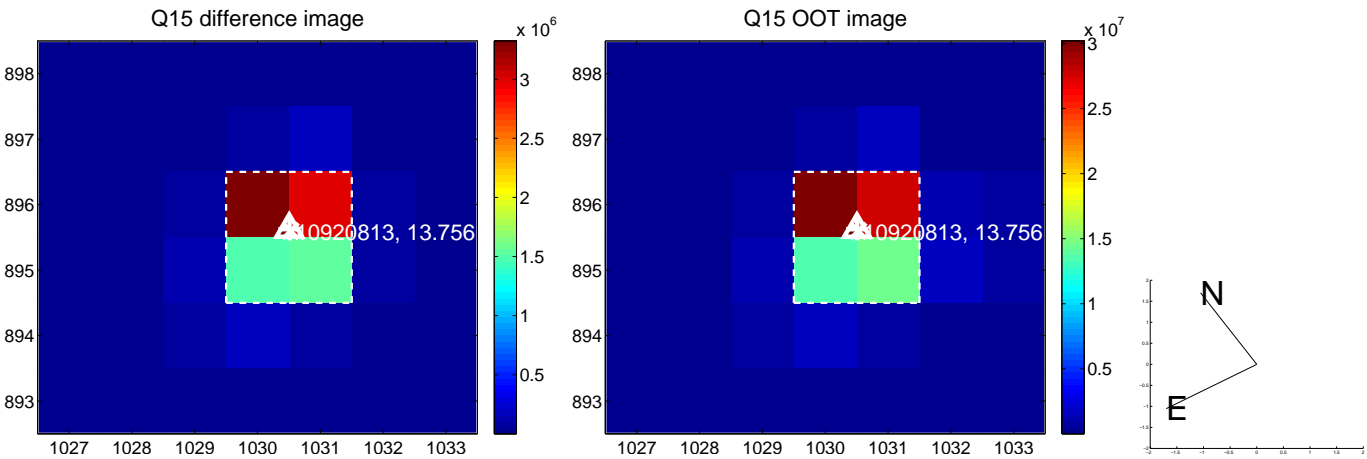
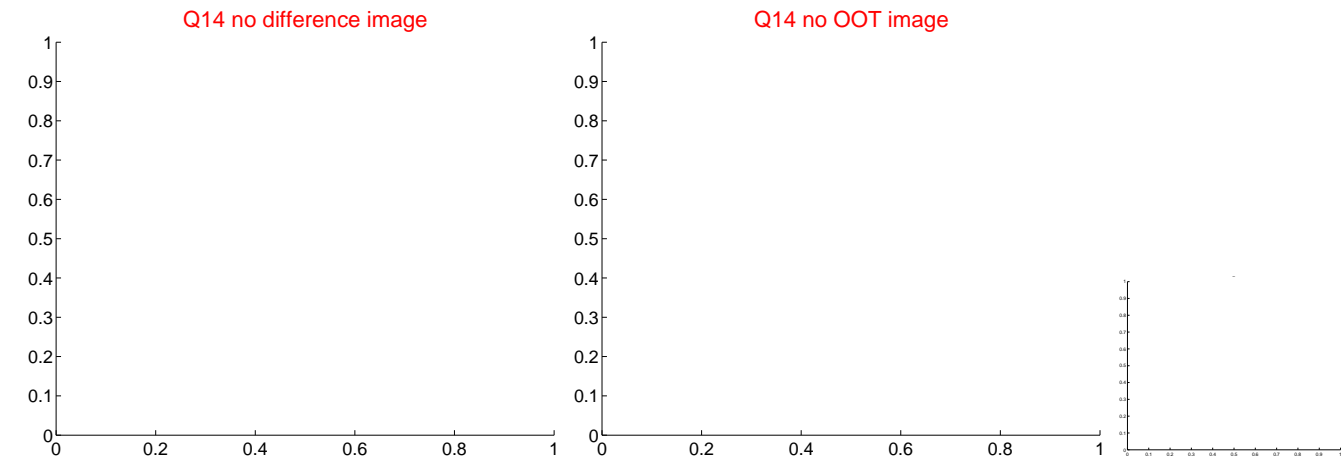
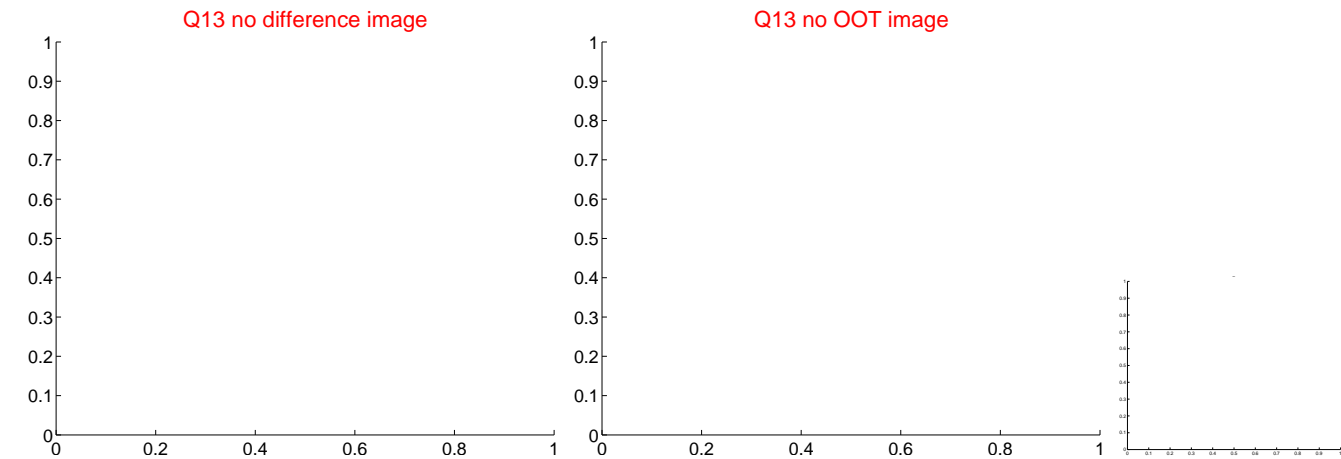
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



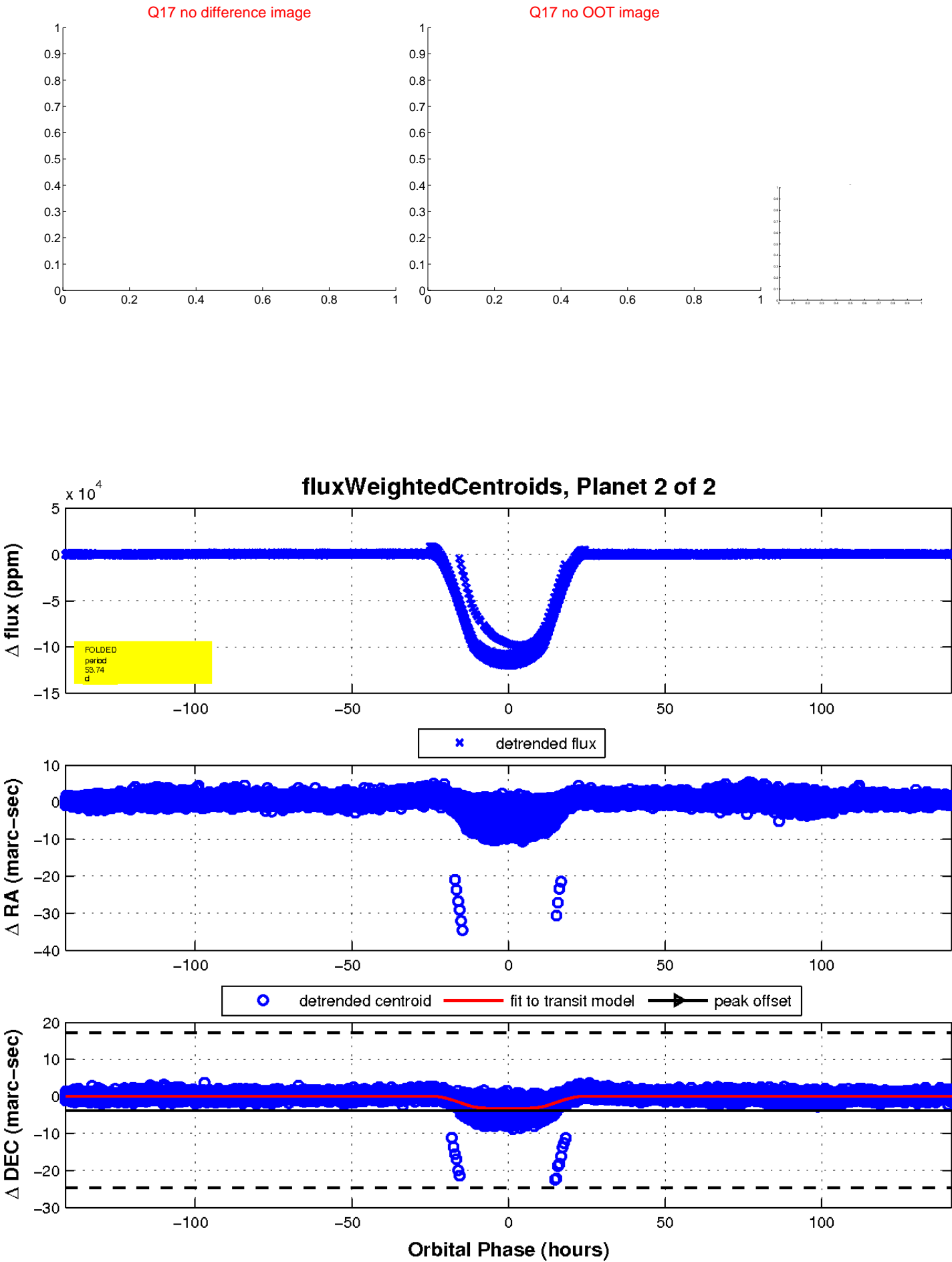
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

