

# KIC 010545066

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010545066-01	OBS	0337.01	19.782972	138.157338	371.2	5.630	30.6	32.1	1.10	5747	2.33	59.47
010545066-02	OBS	No	566.326980	186.006500	449.2	9.687	8.8	7.6	1.10	5747	2.47	0.68

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010545066-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
010545066-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—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.

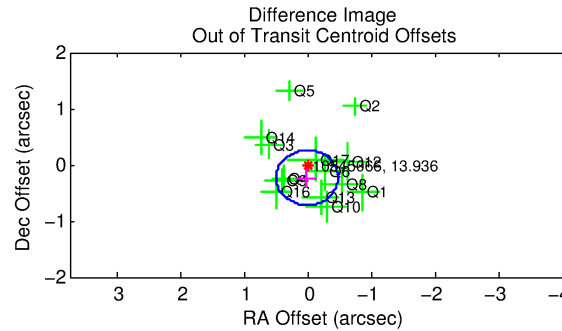
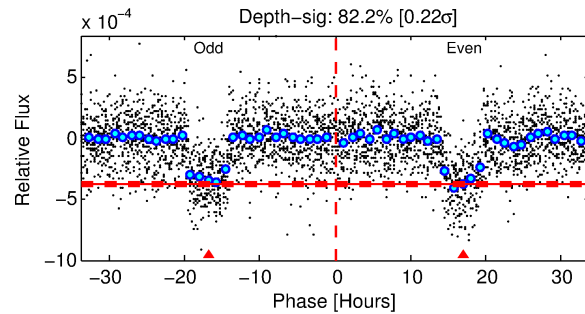
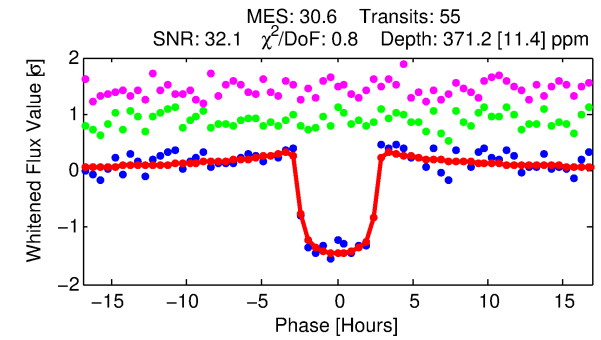
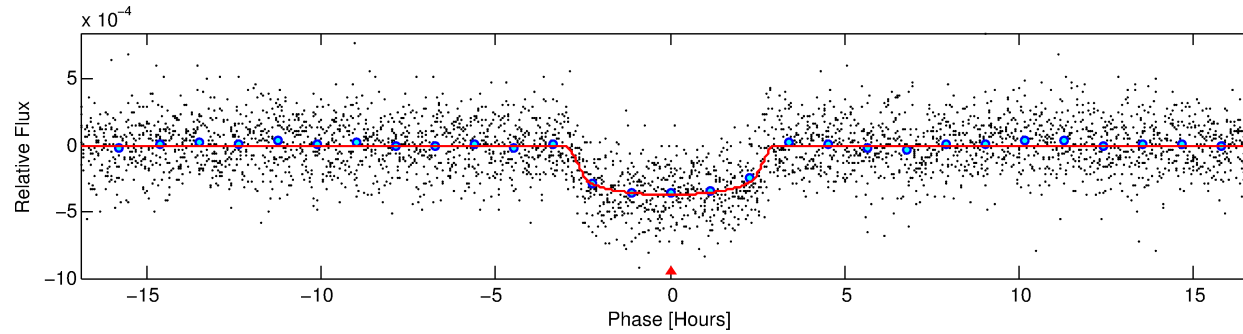
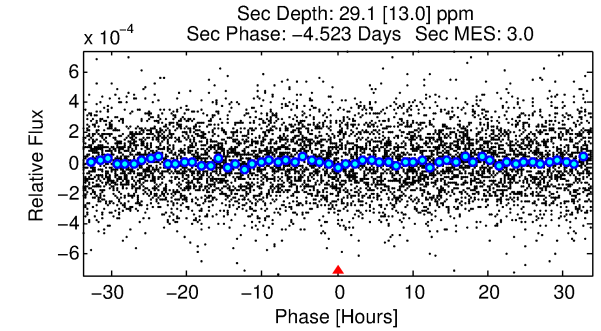
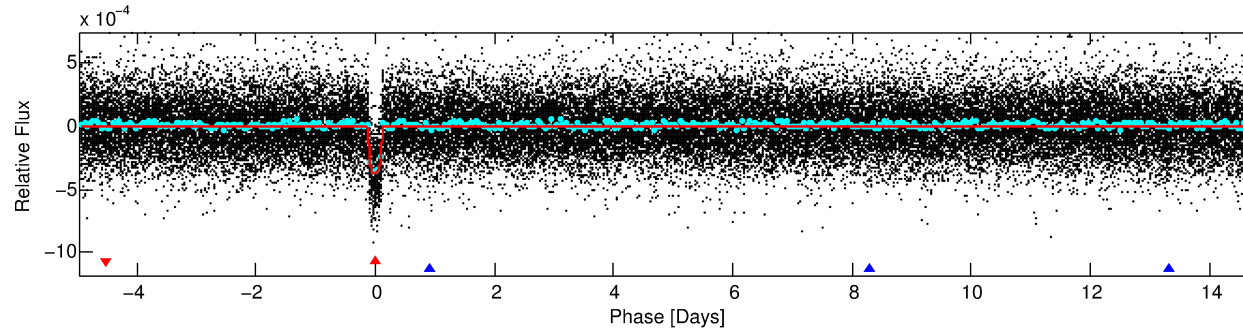
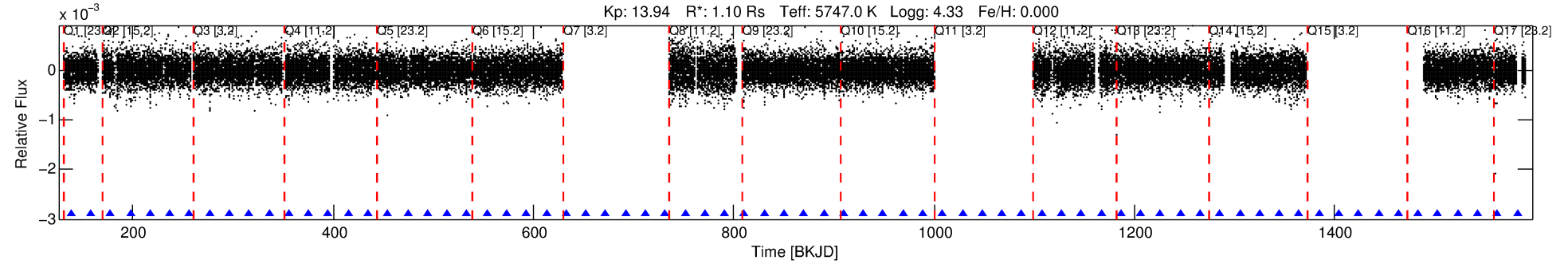
Ephemeris Match Information For 010545066-01

No Significant Match Found

# DV One-Page Summary

KIC: 10545066 Candidate: 1 of 2 Period: 19.783 d

KOI: K00337.01 Corr: 0.985



## DV Fit Results:

Period = 19.78297 [0.00007] d  
Epoch = 138.1573 [0.0027] BKJD  
Rp/R\* = 0.0194 [0.0034]  
a/R\* = 17.59 [13.62]  
b = 0.78 [0.39]  
Seff = 59.47 [13.33]  
Teq = 708 [40] K  
Rp = 2.33 [0.54] Re  
a = 0.1409 [0.0191] AU  
Ag = 58.49 [35.37] [1.63σ]  
Teffp = 3028 [434] K [5.33σ]

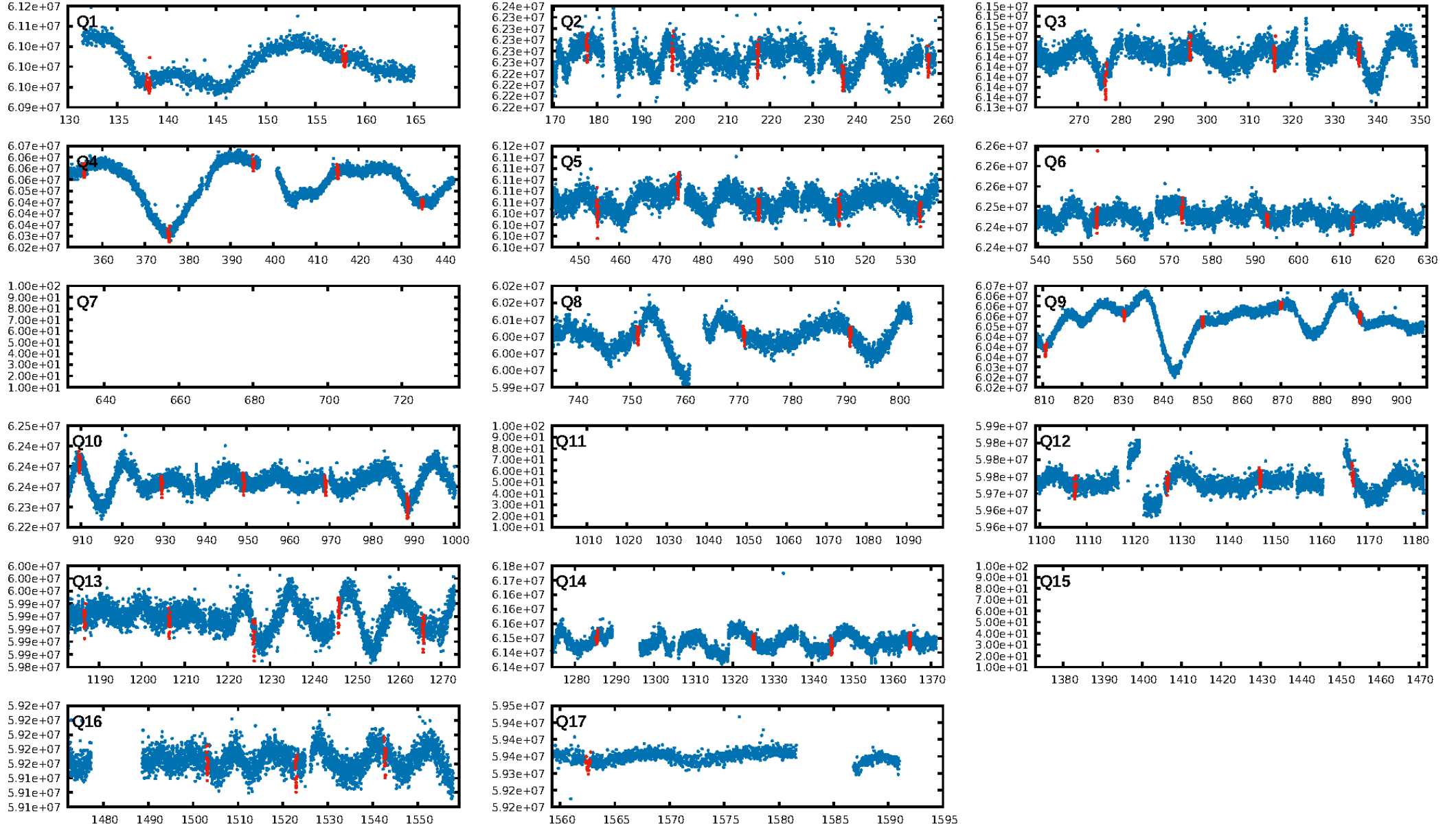
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [1170.77σ]  
ModelChiSquare2-sig: 81.5%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 3.85e-170  
RollingBand-fgt: 1.00 [52/52]  
GhostDiagnostic-chr: 4.473  
Centroid-sig: 34.5%  
Centroid-so: 0.564 arcsec [1.80σ]  
OotOffset-rm: 0.235 arcsec [1.45σ]  
OotOffset-st: 4/1/4/5 [14]  
KicOffset-rm: 0.181 arcsec [1.06σ]  
KicOffset-st: 4/1/4/5 [14]  
DiffImageQuality-fgm: 1.00 [14/14]  
DiffImageOverlap-fno: 1.00 [14/14]

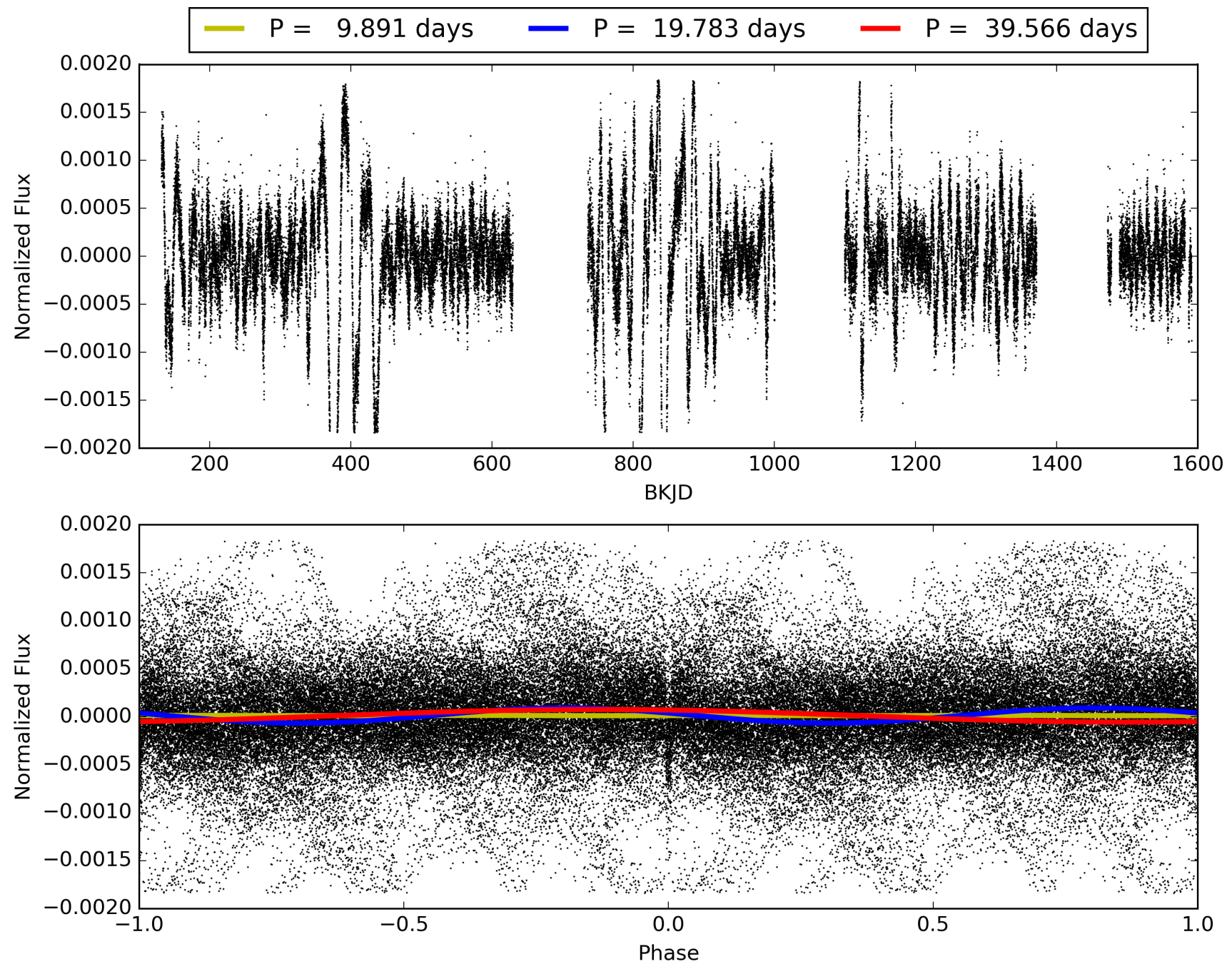
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 00:22:32 Z

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

# TCE 010545066-01, PDC Light Curves

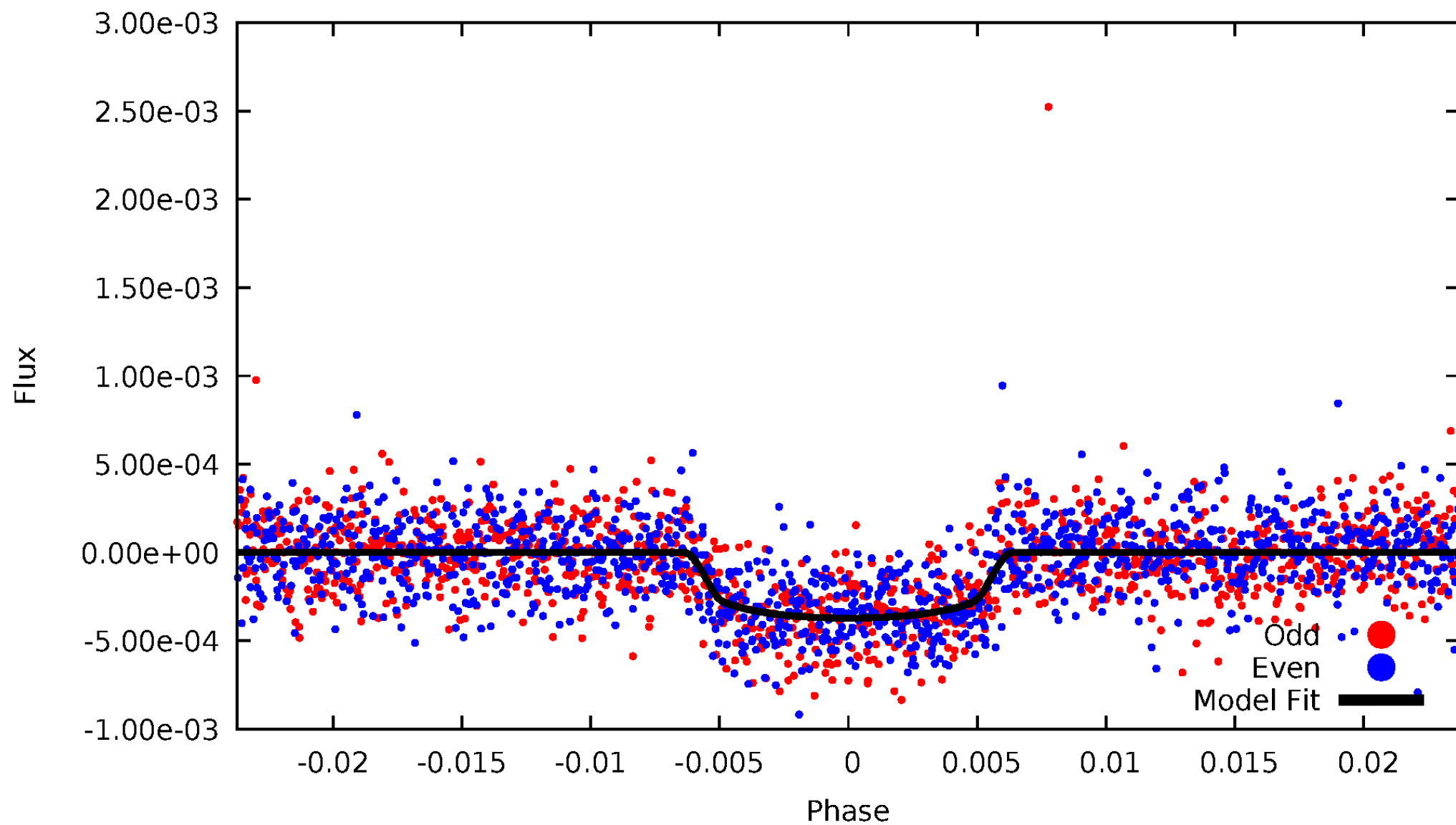


# TCE 010545066-01



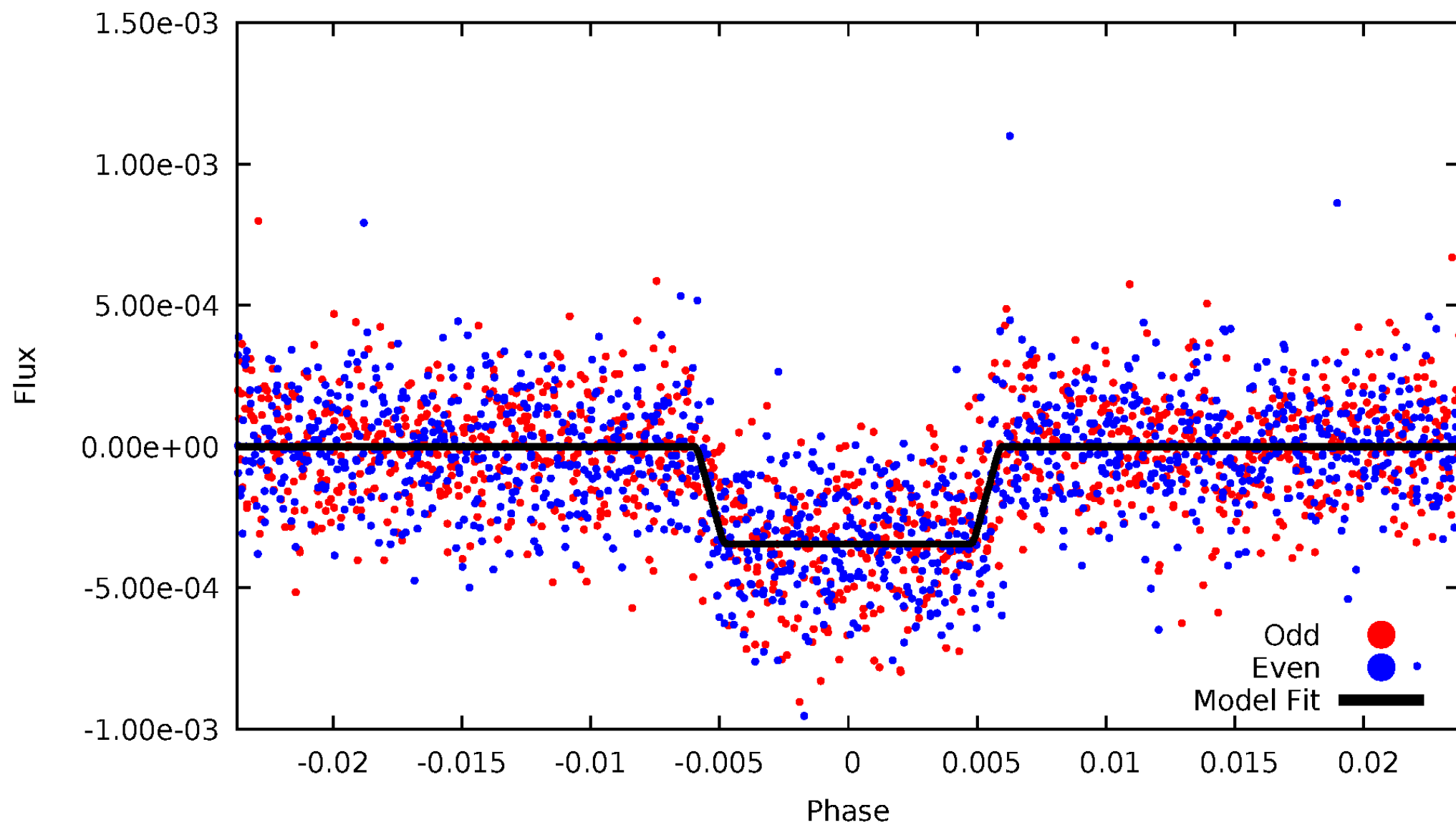
# DV Odd/Even

TCE 010545066-01



# ALT Odd/Even

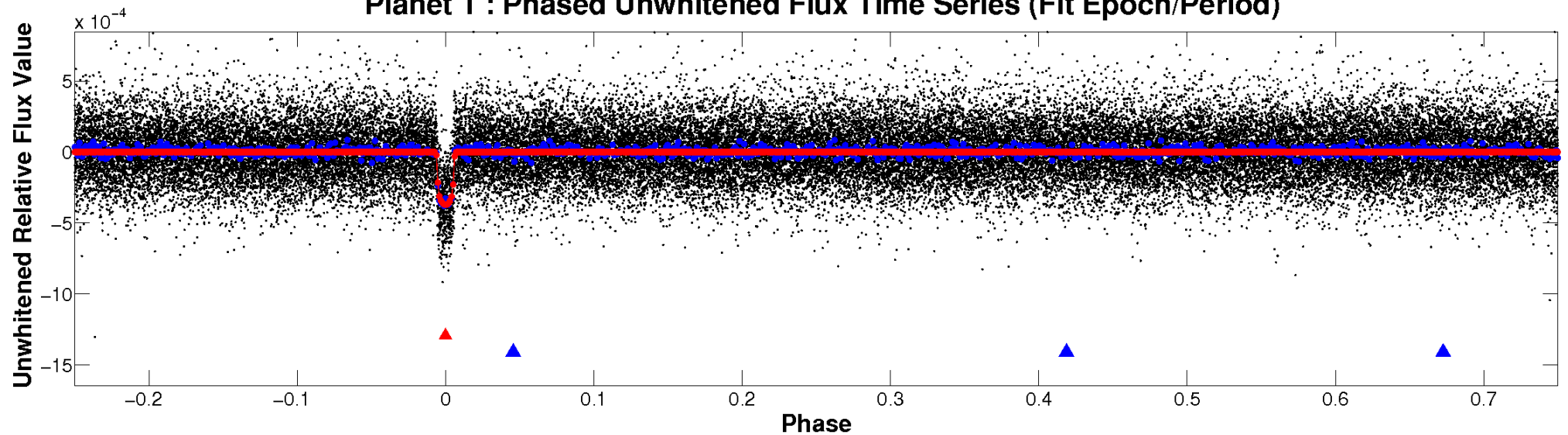
TCE 010545066-01



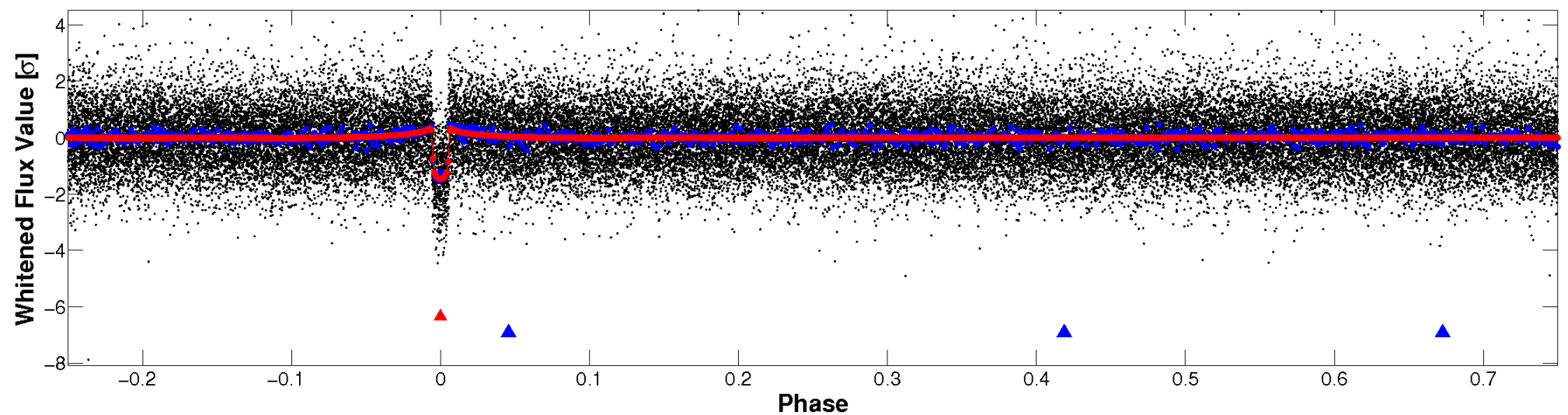


# Non-Whitened Vs. Whitened Light Curve

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

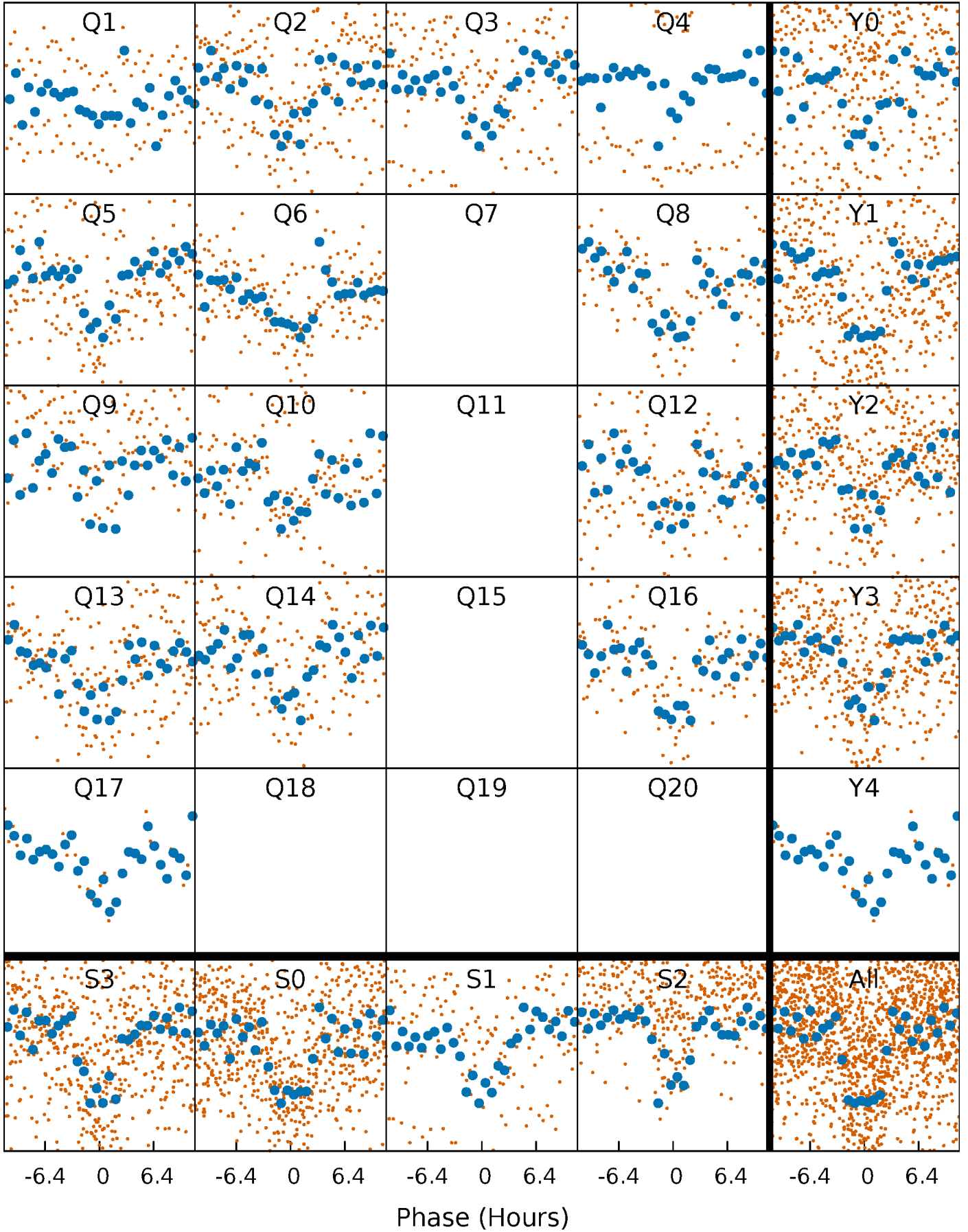


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

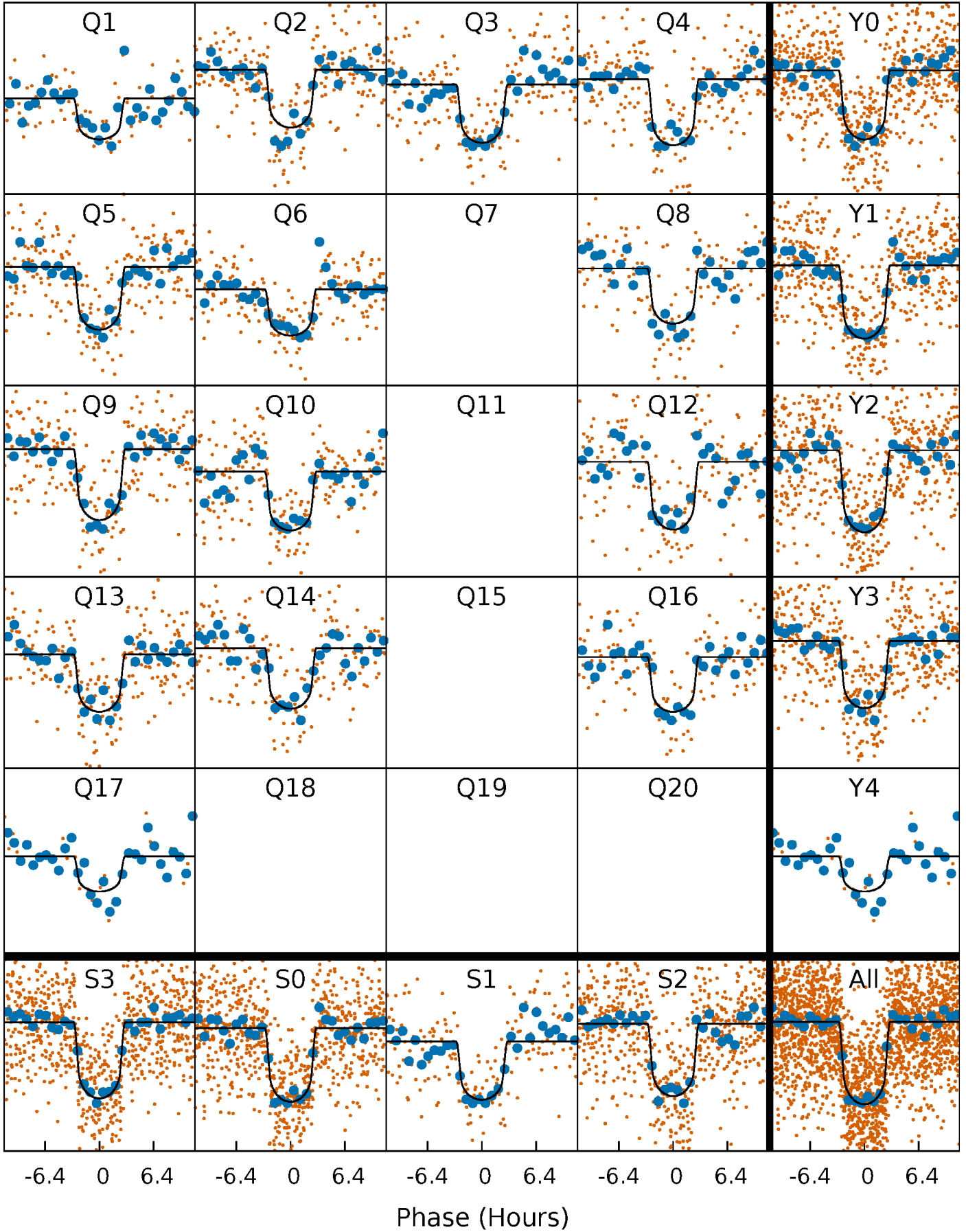
TCE 010545066-01 P= 19.782972 Days  $T_0=138.157338$  (BKJD)





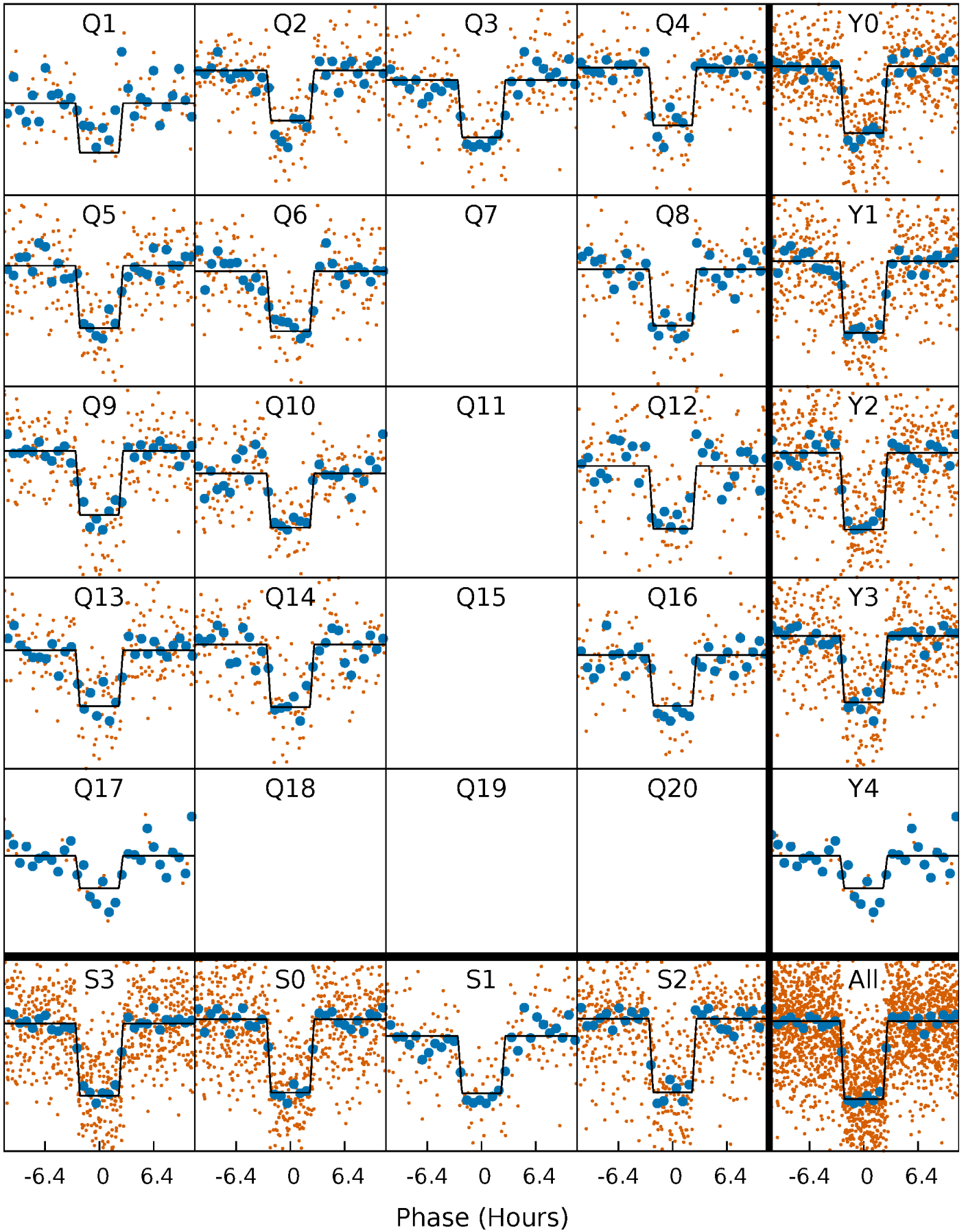
# DV Quarter-Phased Transit Curves

TCE 010545066-01 P= 19.782972 Days  $T_0=138.157338$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

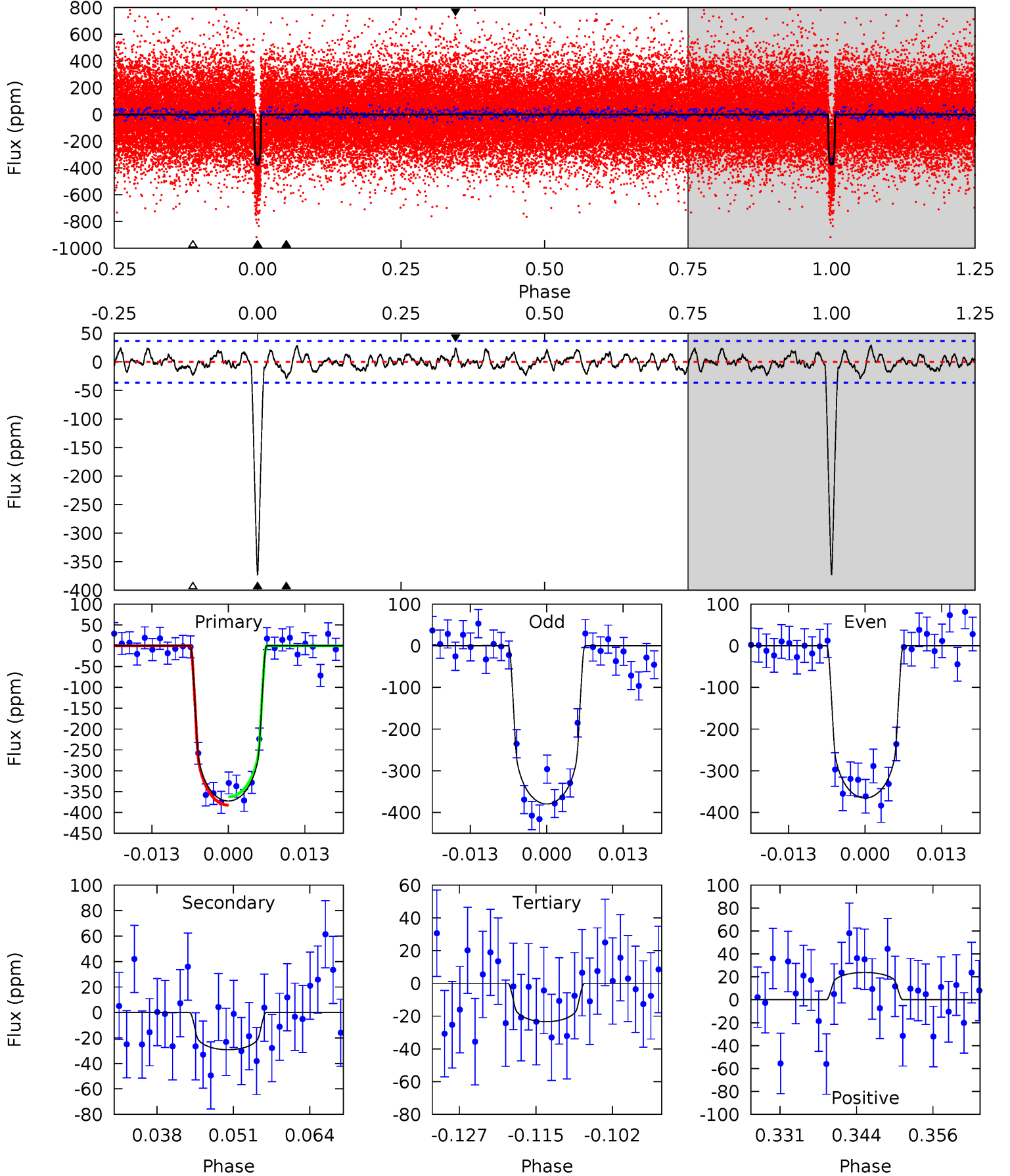
TCE 010545066-01 P= 19.783093 Days  $T_0=138.151628$  (BKJD)



# DV Model-Shift Uniqueness Test

010545066-01,  $P = 19.782972$  Days,  $E = 118.374366$  Days

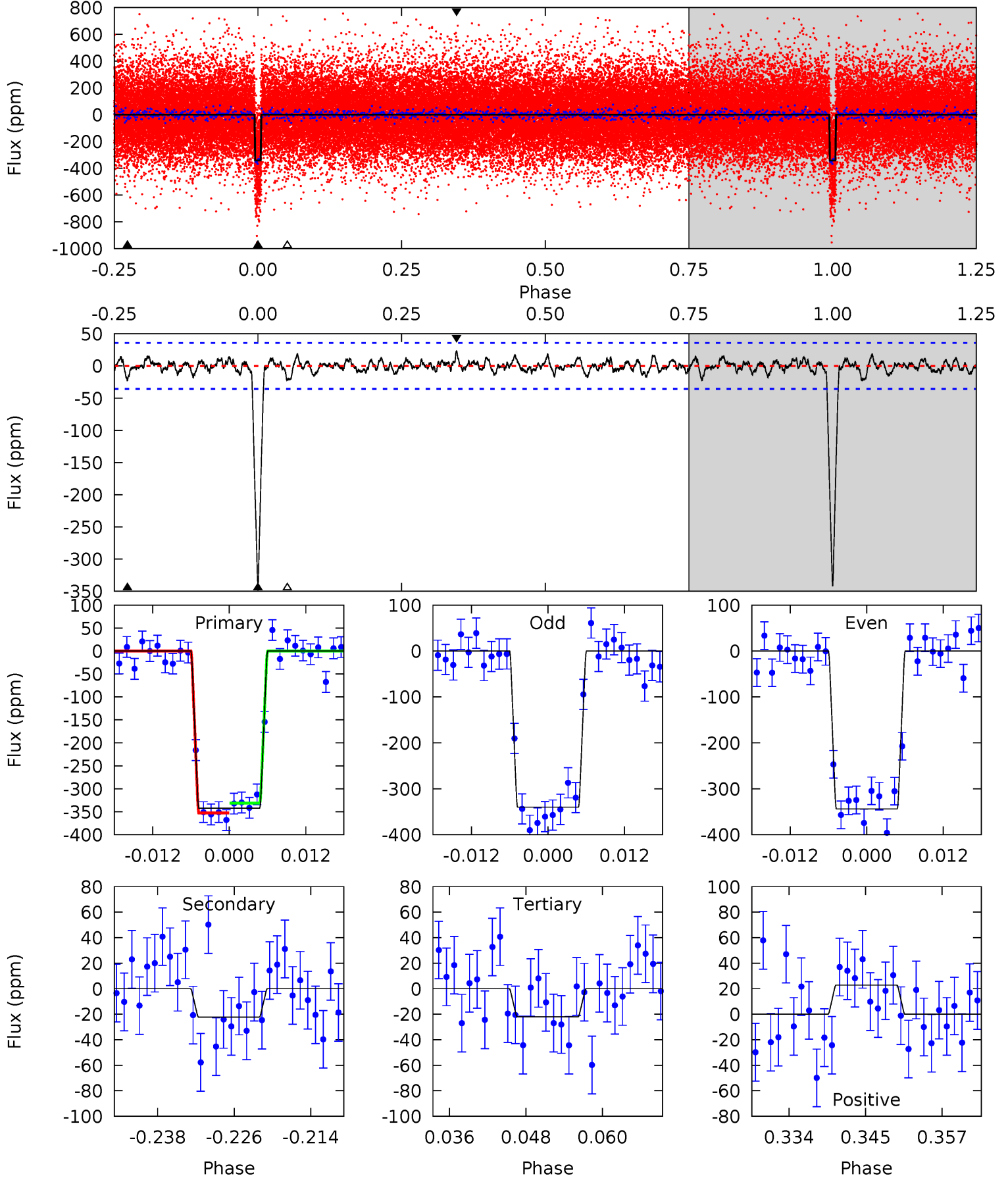
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
50.9	3.99	3.19	3.25	4.98	2.49	1.30	47.7	47.6	0.80	0.74	0.97	1.01	0.07	1.37



# Alt Model-Shift Uniqueness Test

010545066-01,  $P = 19.783093$  Days,  $E = 118.368535$  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
47.8	3.11	3.09	3.19	4.99	2.51	0.98	44.7	44.6	0.02	-0.09	0.26	0.99	0.06	1.50



### Stellar Parameters For KIC 010545066

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5747^{+115}_{-104}$	$4.335^{+0.120}_{-0.108}$	$0.000^{+0.150}_{-0.150}$	$1.099^{+0.164}_{-0.148}$	$0.953^{+0.079}_{-0.057}$	$1.010^{+0.583}_{-0.314}$
	+2%/-2%	+3%/-2%	+inf%/-inf%	+15%/-13%	+8%/-6%	+58%/-31%
Source	SPE57	SPE57	SPE57	DSEP		

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

### Secondary Eclipse Parameters for KIC 010545066-01 / KOI 0337.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-29 \pm 7$	$2.34^{+0.46}_{-0.44}$	$989^{+45}_{-44}$	$3497^{+270}_{-229}$	$59^{+33}_{-21}$
Alt.	$-22 \pm 7$	$2.23^{+0.50}_{-0.43}$	$991^{+43}_{-44}$	$3405^{+303}_{-256}$	$49^{+34}_{-21}$

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

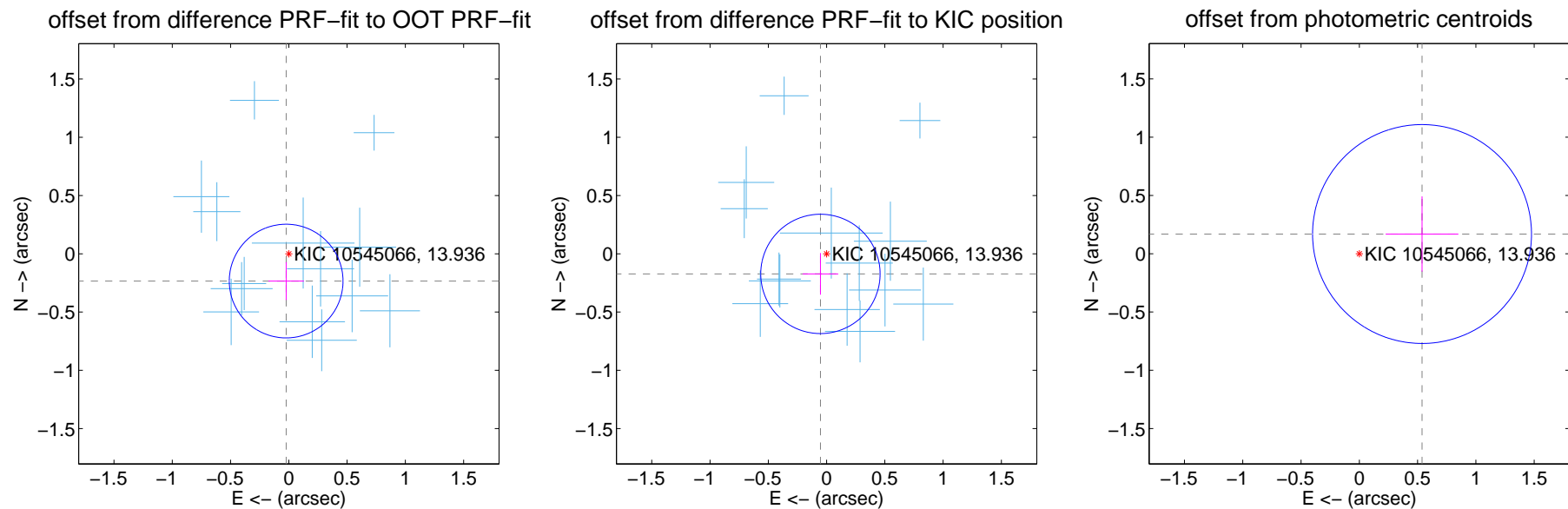
## DV Centroid Data

Supplemental centroid analysis for 010545066-01. Kepler magnitude: 13.94. Transit SNR 32.11

There are 14 quarters with good PRF difference image offsets

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

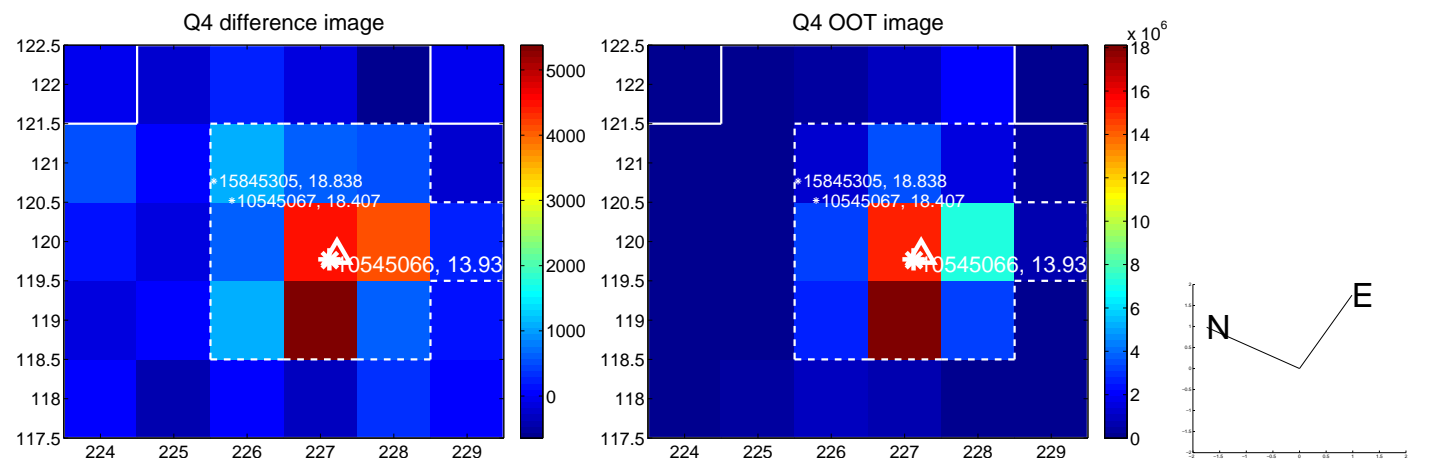
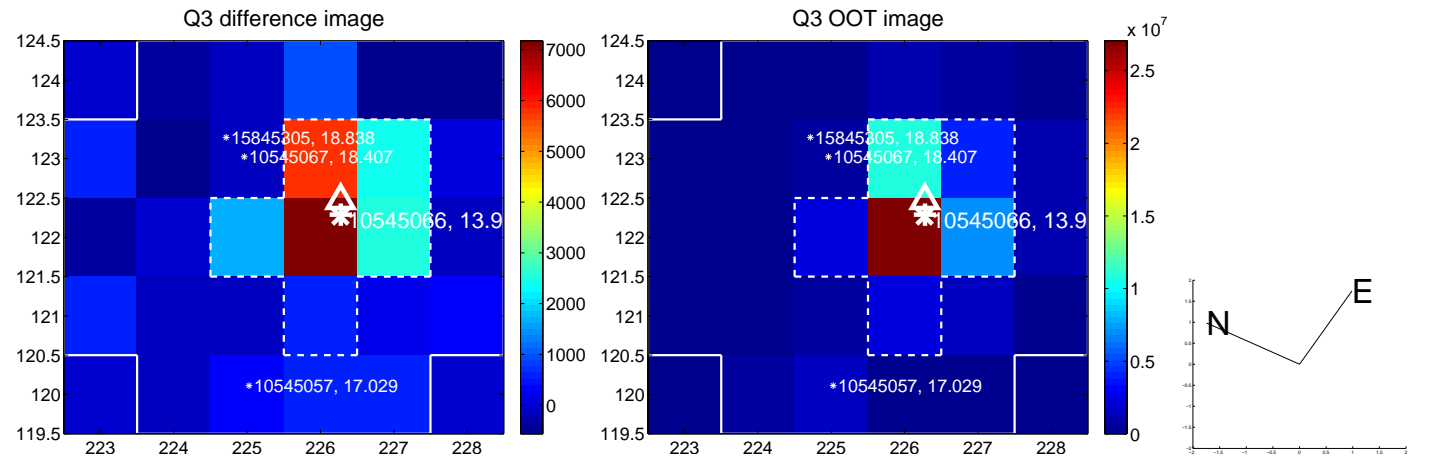
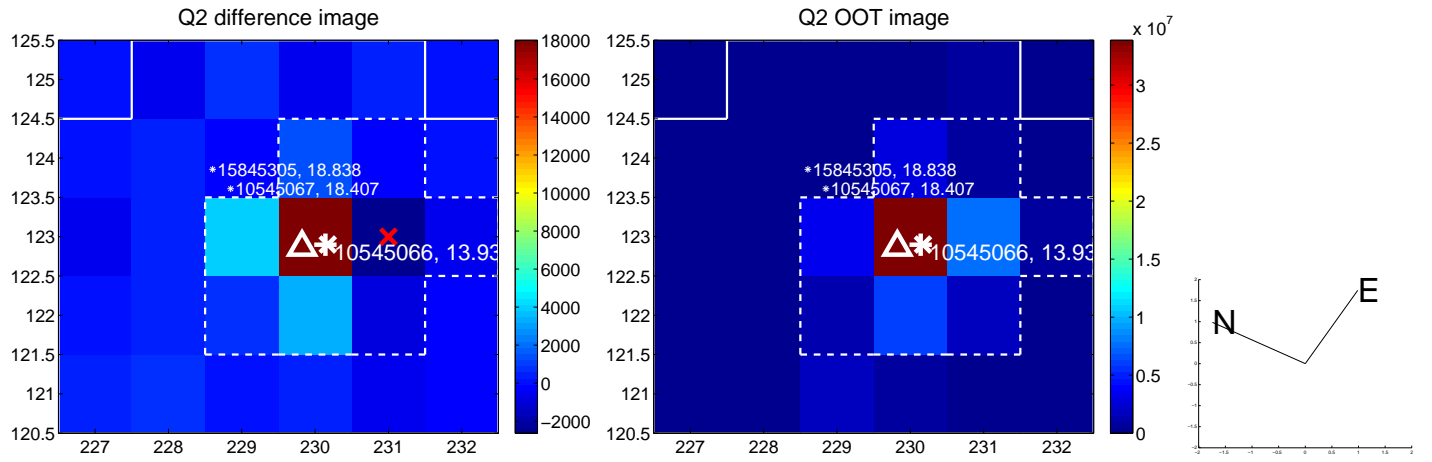
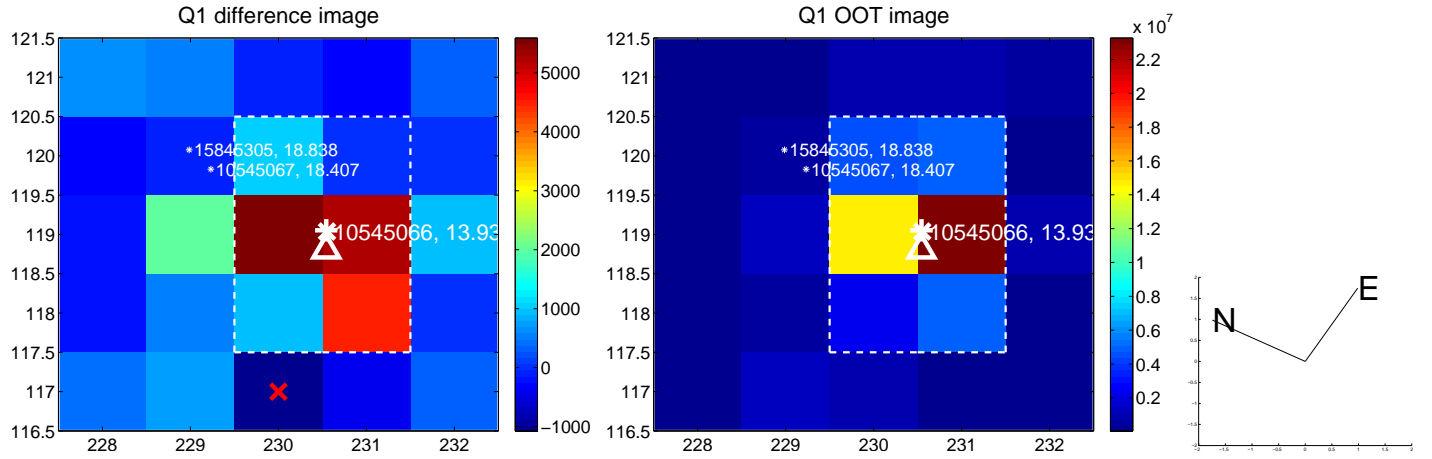
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.235 \pm 0.163$	1.45	$0.023 \pm 0.153$	$-0.234 \pm 0.163$
PRF-fit source offset from KIC position	$0.181 \pm 0.171$	1.06	$0.053 \pm 0.153$	$-0.173 \pm 0.179$
photometric centroid source offset	$0.56 \pm 0.31$	1.80	$-0.54 \pm 0.31$	$0.17 \pm 0.32$



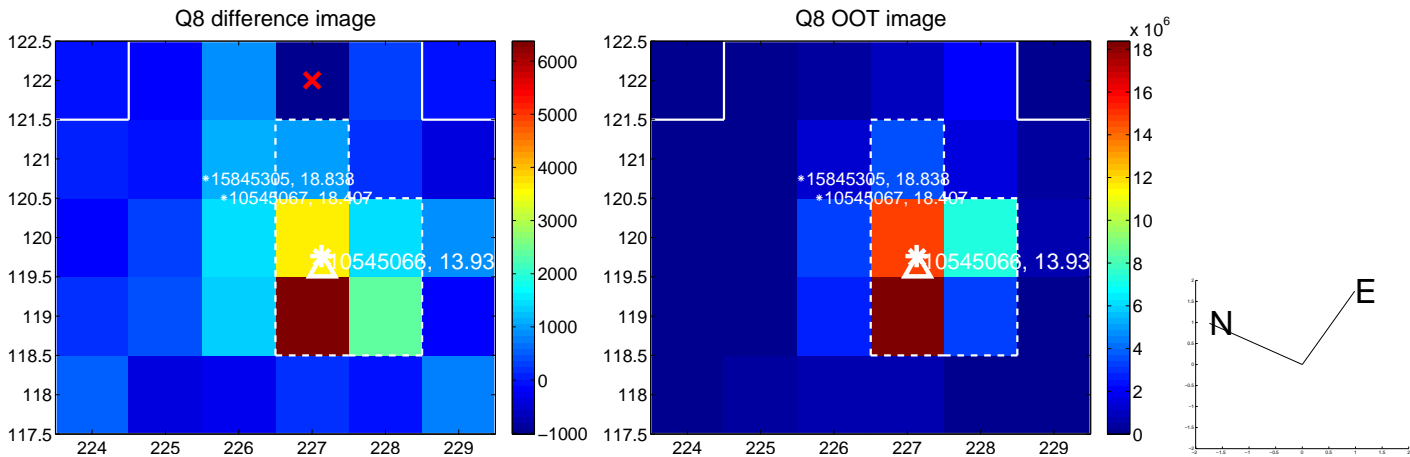
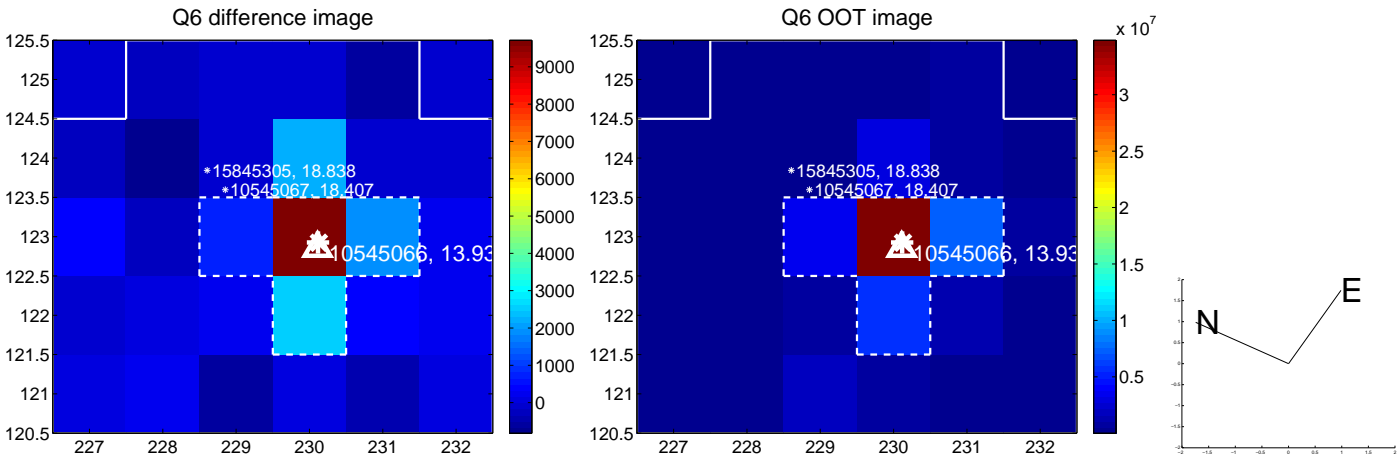
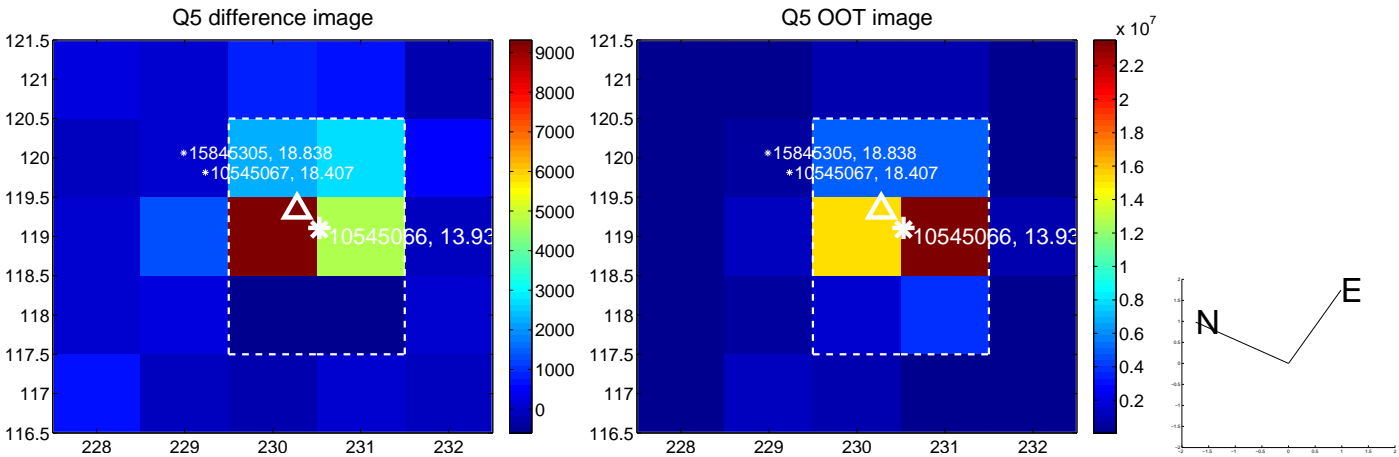
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



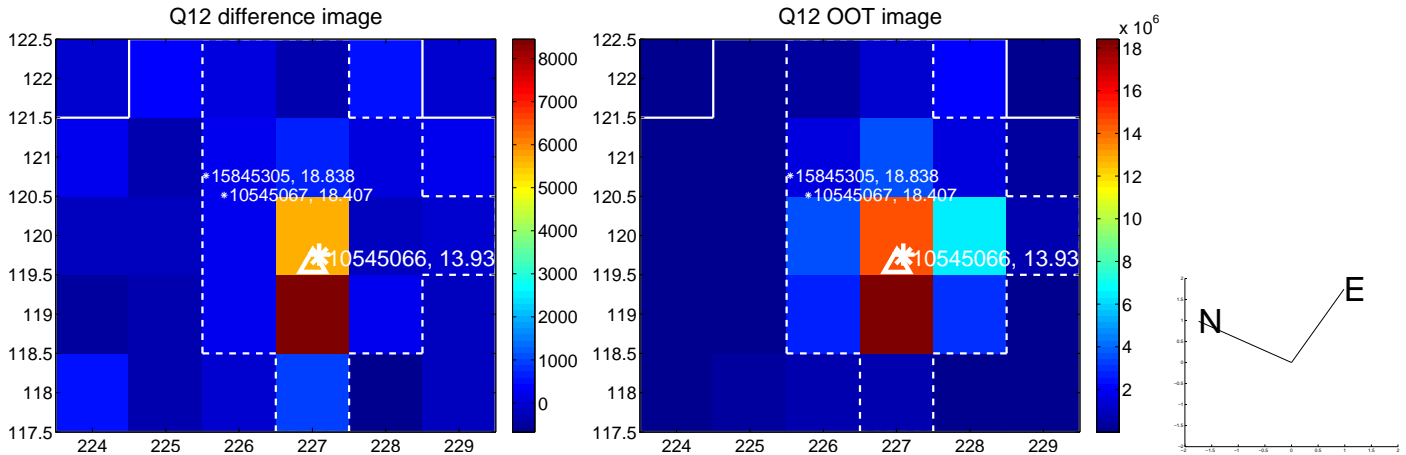
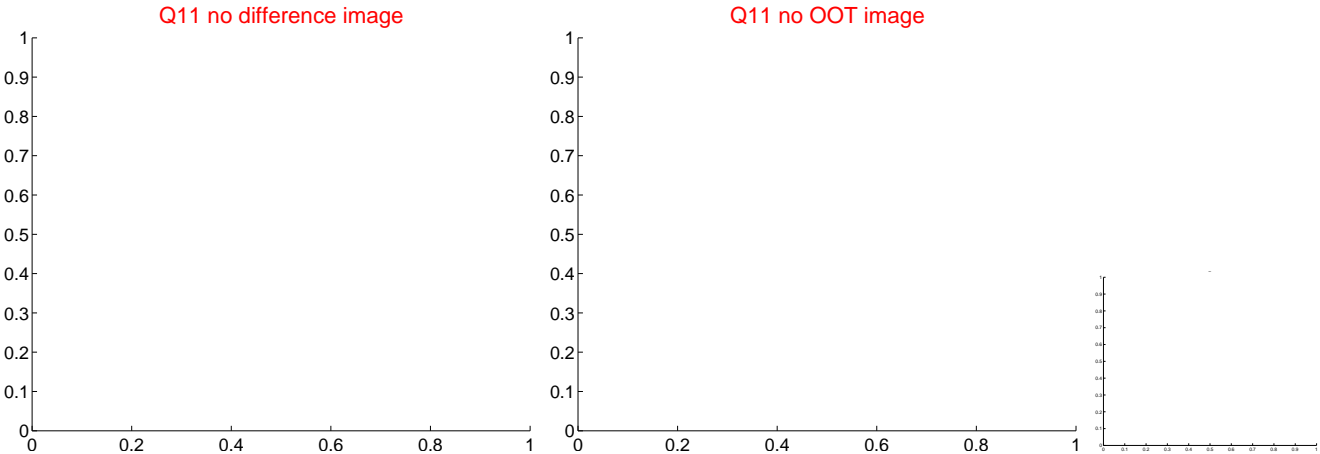
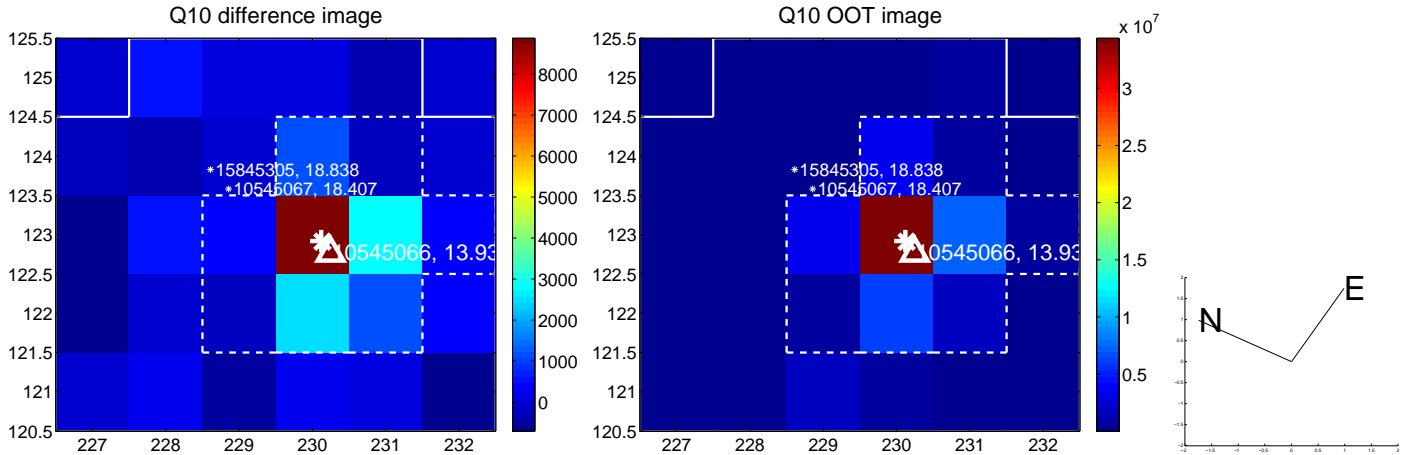
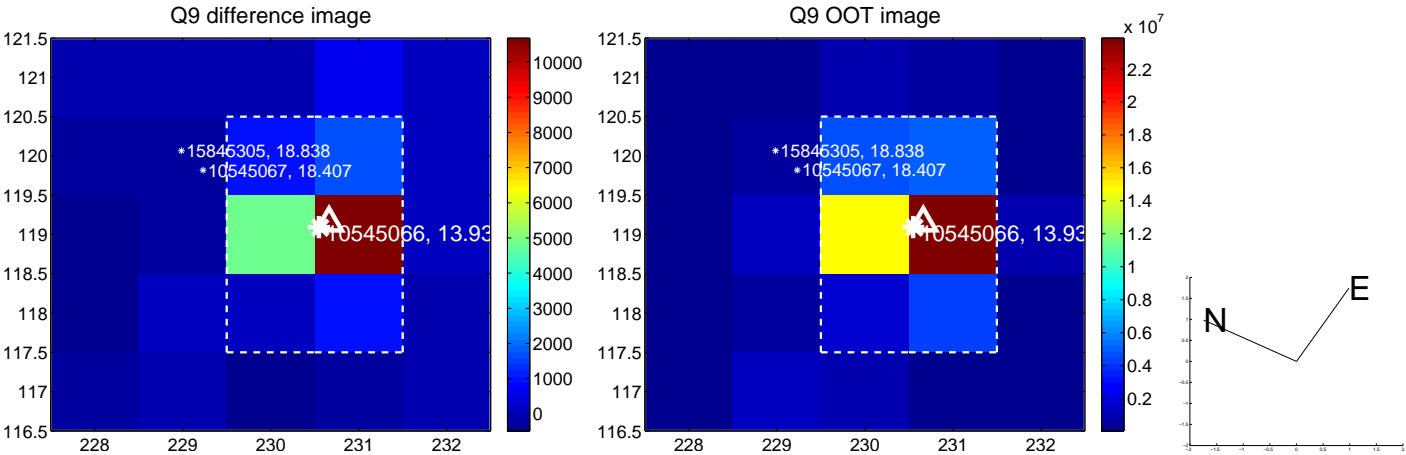
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



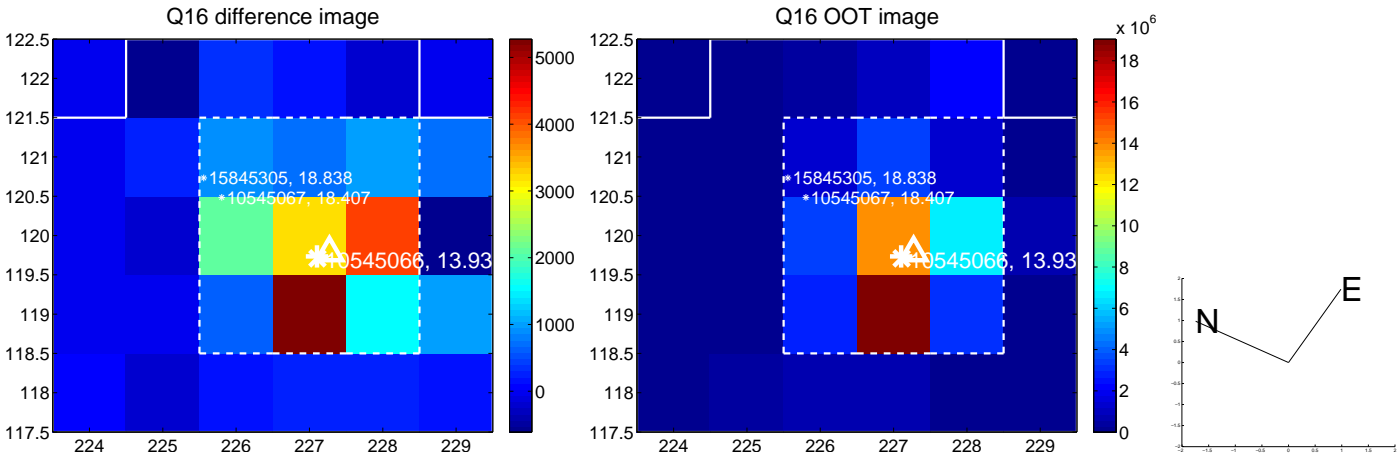
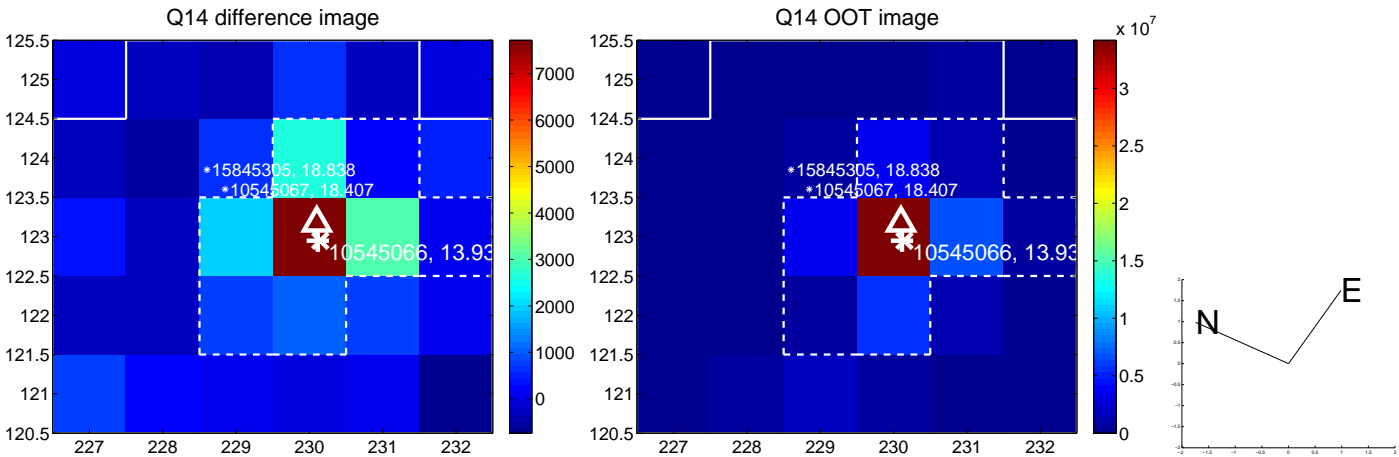
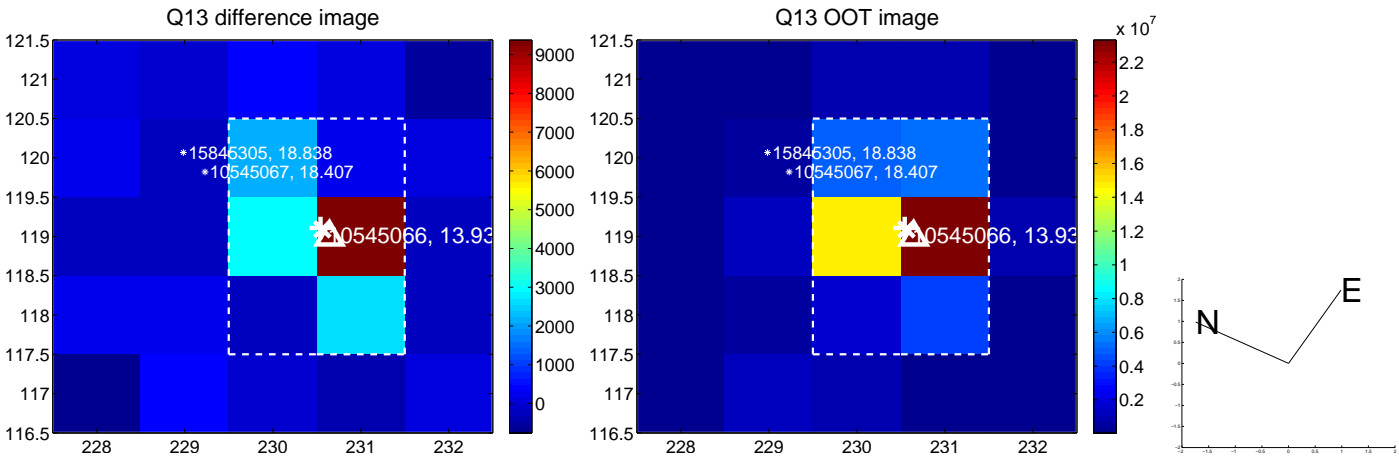
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



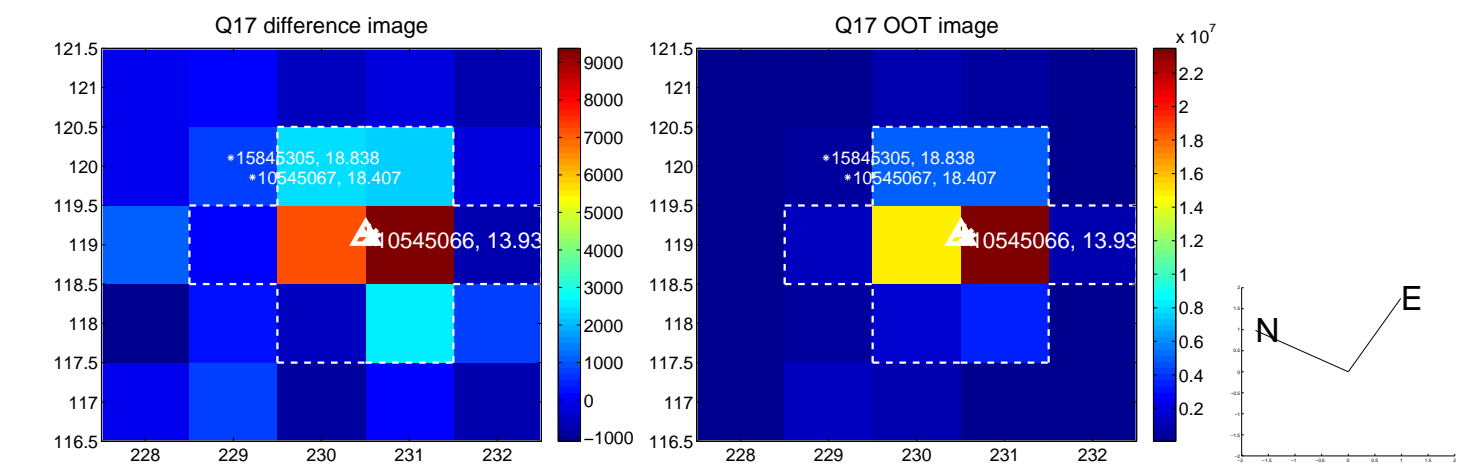
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



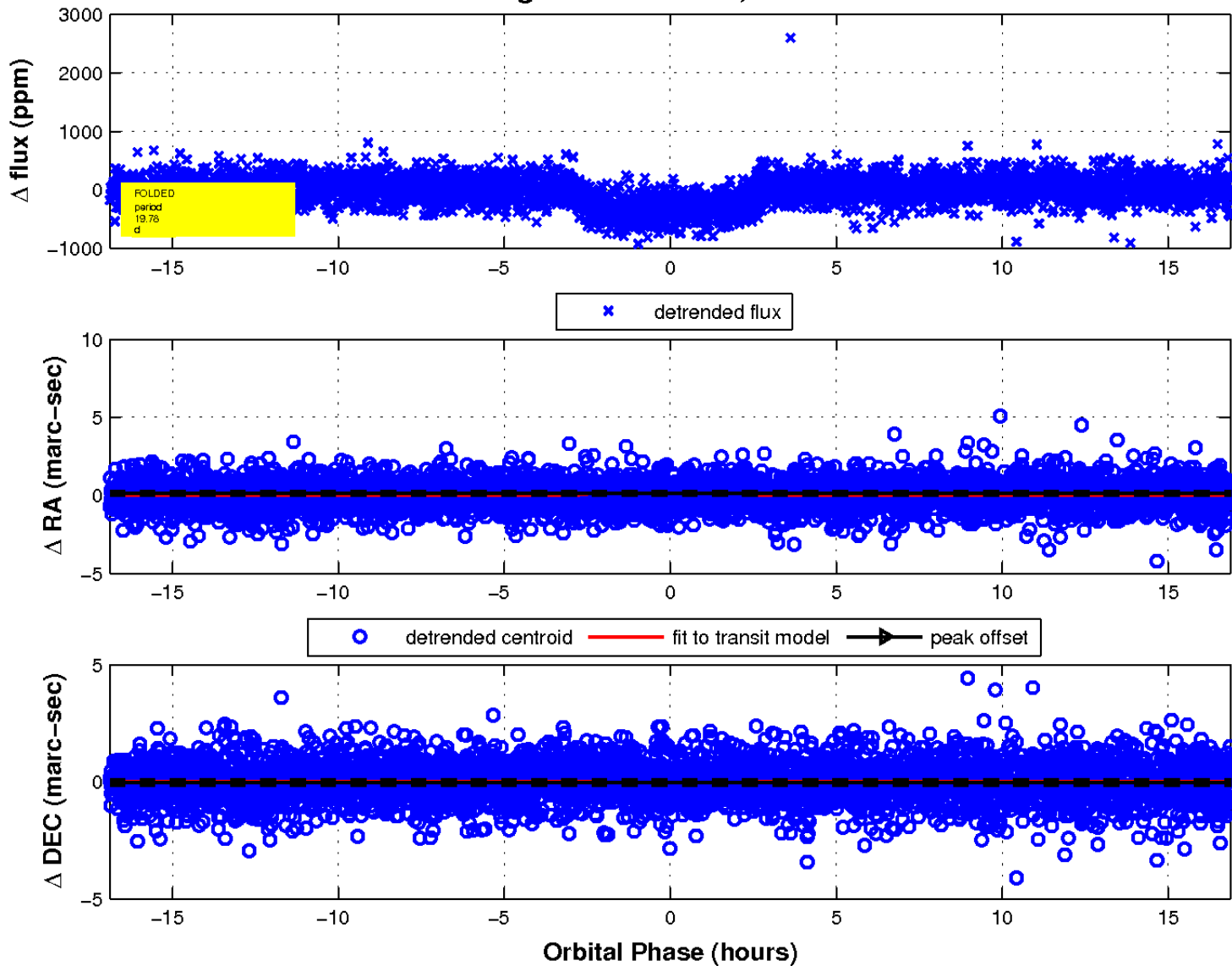
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

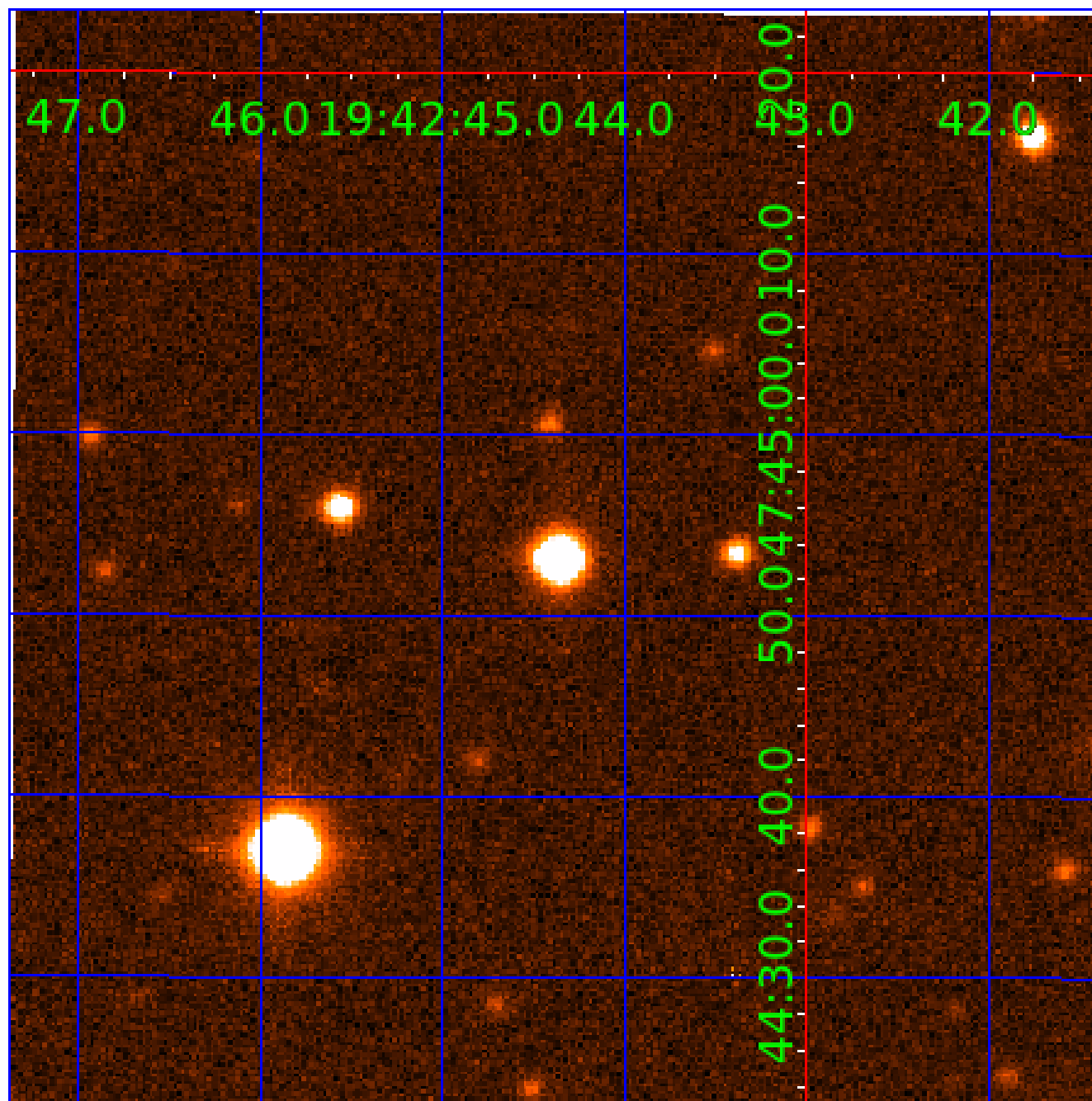


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination





# KIC 010545066

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010545066-01	OBS	0337.01	19.782972	138.157338	371.2	5.630	30.6	32.1	1.10	5747	2.33	59.47
010545066-02	OBS	No	566.326980	186.006500	449.2	9.687	8.8	7.6	1.10	5747	2.47	0.68

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010545066-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
010545066-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—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 010545066-02

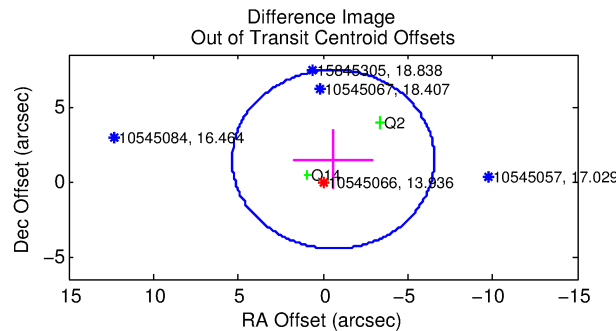
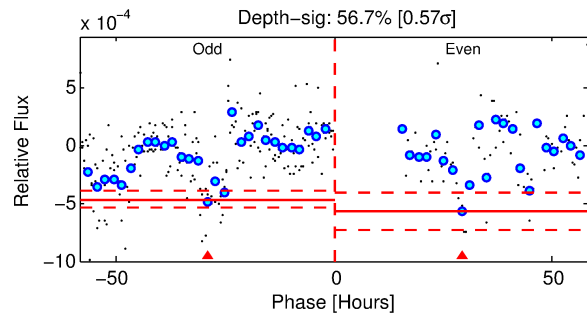
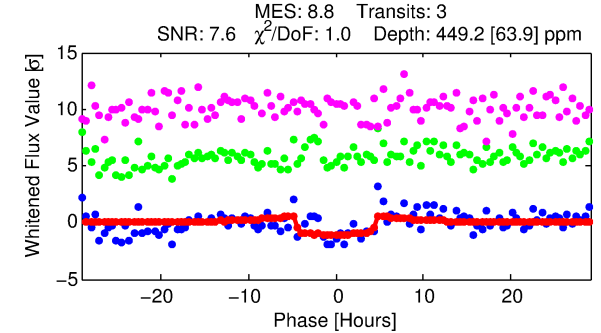
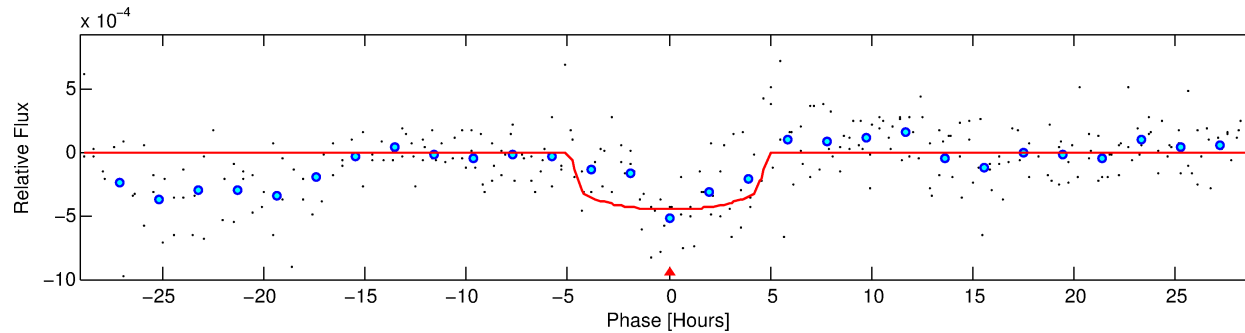
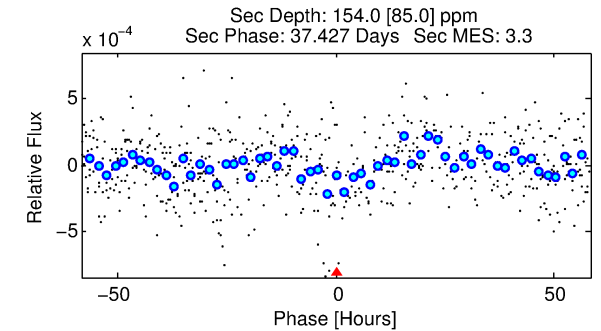
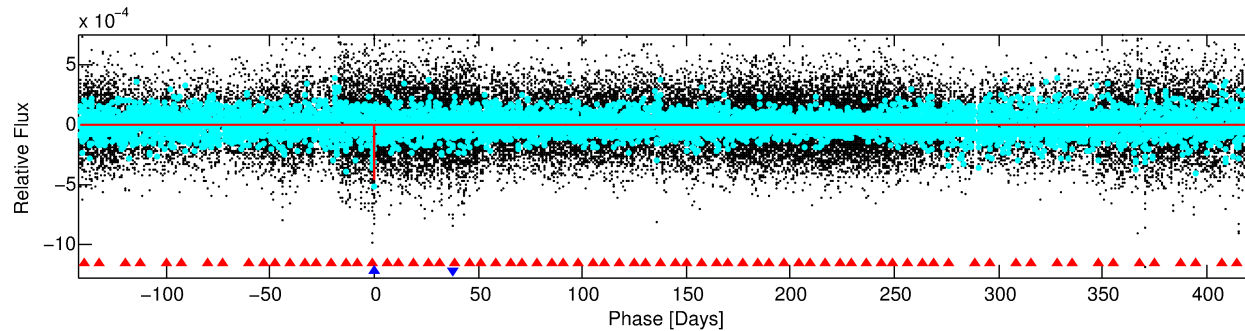
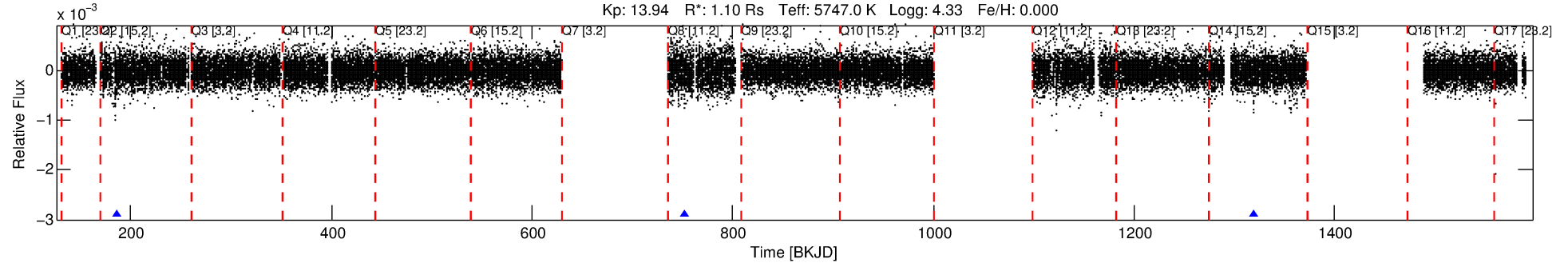
No Significant Match Found

# DV One-Page Summary

KIC: 10545066 Candidate: 2 of 2 Period: 566.327 d

KOI: K00337 Corr: No Ephemeris Match

Kp: 13.94 R\*: 1.10 Rs Teff: 5747.0 K Logg: 4.33 Fe/H: 0.000



## DV Fit Results:

Period = 566.32698 [0.00807] d  
Epoch = 186.0065 [0.0115] BKJD  
Rp/R\* = 0.0206 [0.0106]  
a/R\* = 341.77 [749.24]  
b = 0.68 [1.78]  
Seff = 0.68 [0.15]  
Teq = 231 [13] K  
Rp = 2.47 [1.32] Re  
a = 1.3185 [0.1788] AU  
Ag = 24185.83 [28659.69] [0.84σ]  
Teffp = 4463 [1304] K [3.24σ]

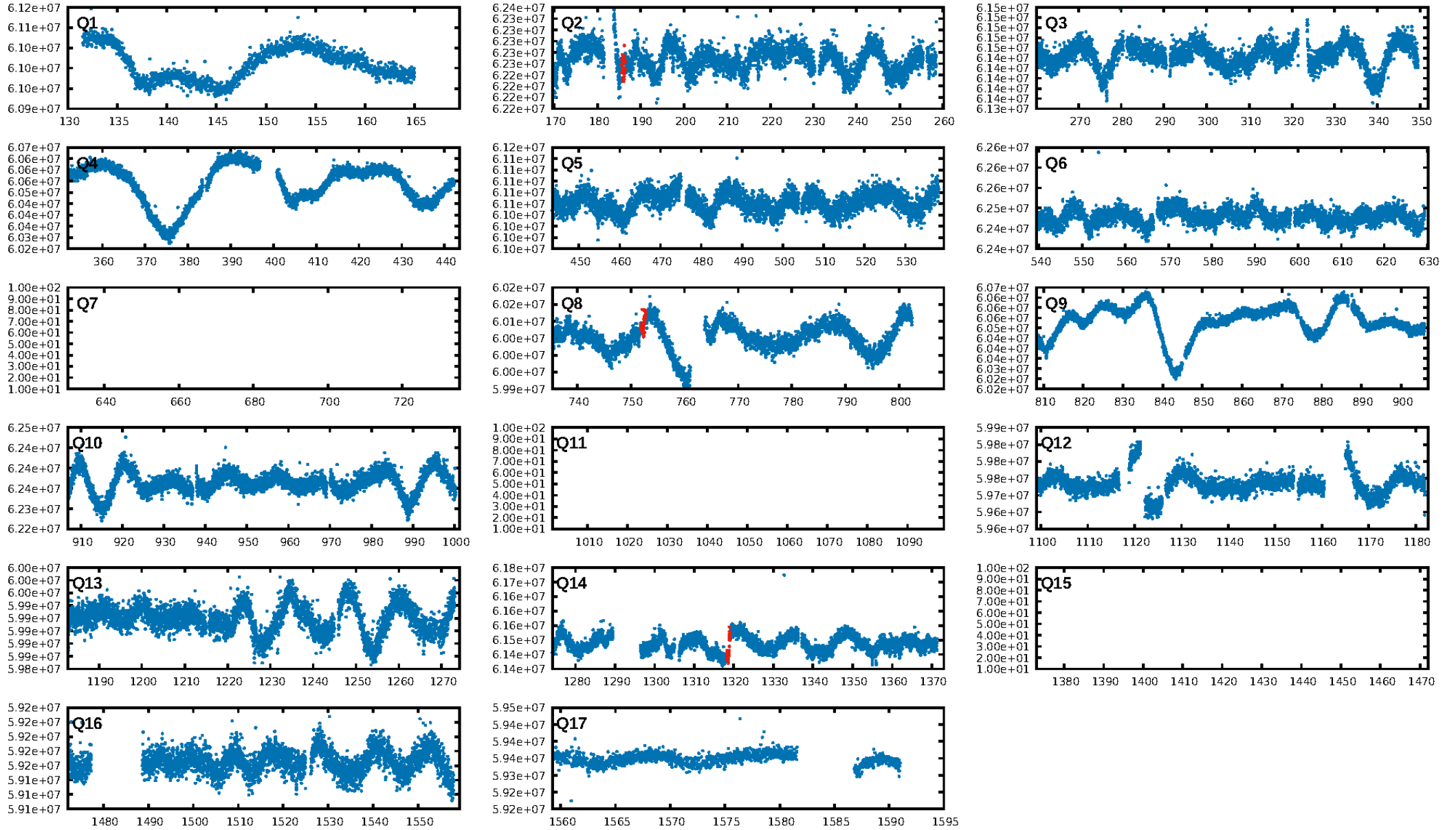
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [1170.77σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 21.3%  
ModelChiSquareGof-sig: 92.2%  
**Bootstrap-pfa: 2.61e-10**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 5.313  
Centroid-sig: 29.7%  
Centroid-so: 0.655 arcsec [0.69σ]  
OotOffset-rm: 1.605 arcsec [0.81σ]  
OotOffset-st: 2/0/0/0 [2]  
KicOffset-rm: 1.736 arcsec [0.87σ]  
KicOffset-st: 2/0/0/0 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 1.00 [3/3]

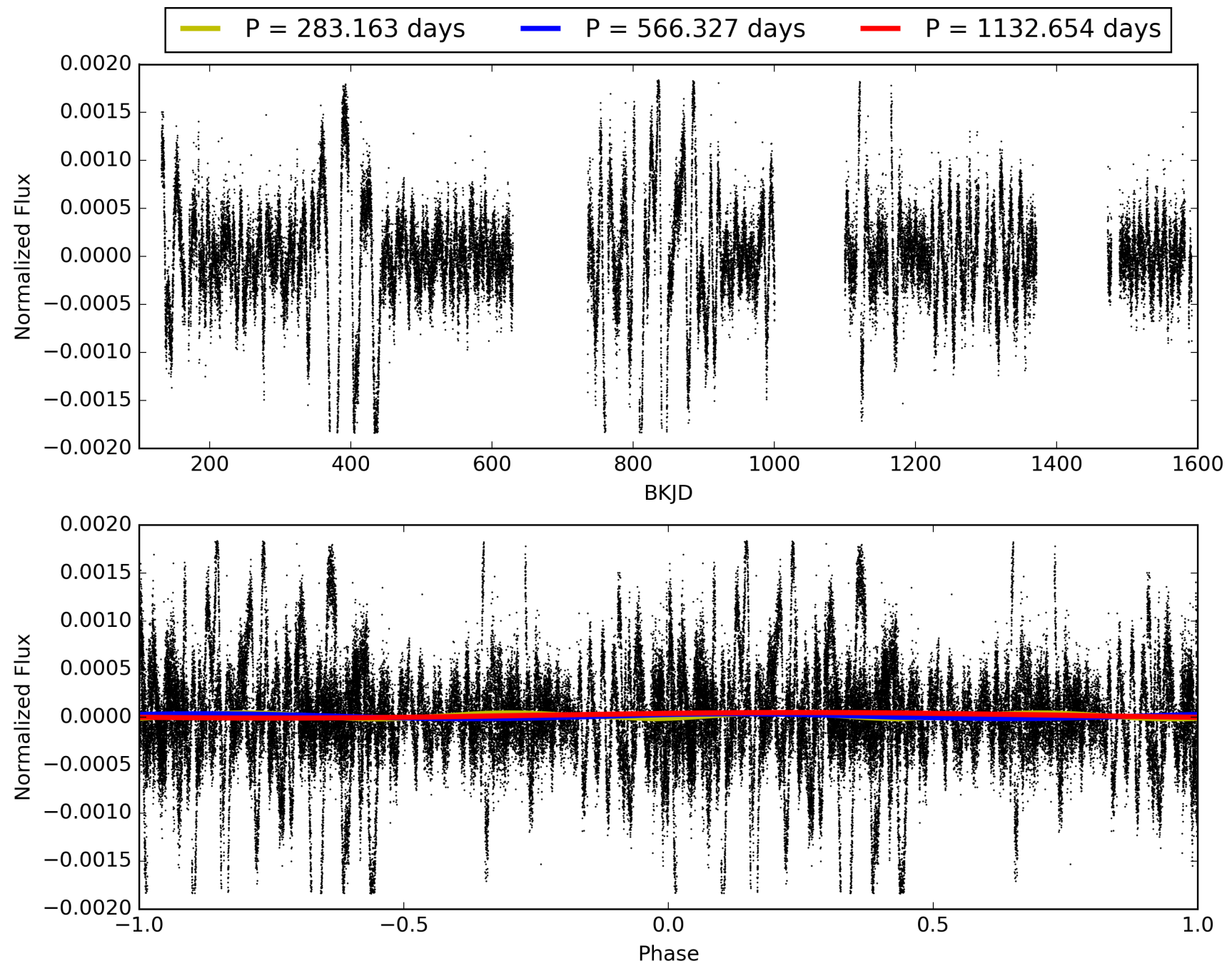
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 00:22:42 Z

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

# TCE 010545066-02, PDC Light Curves

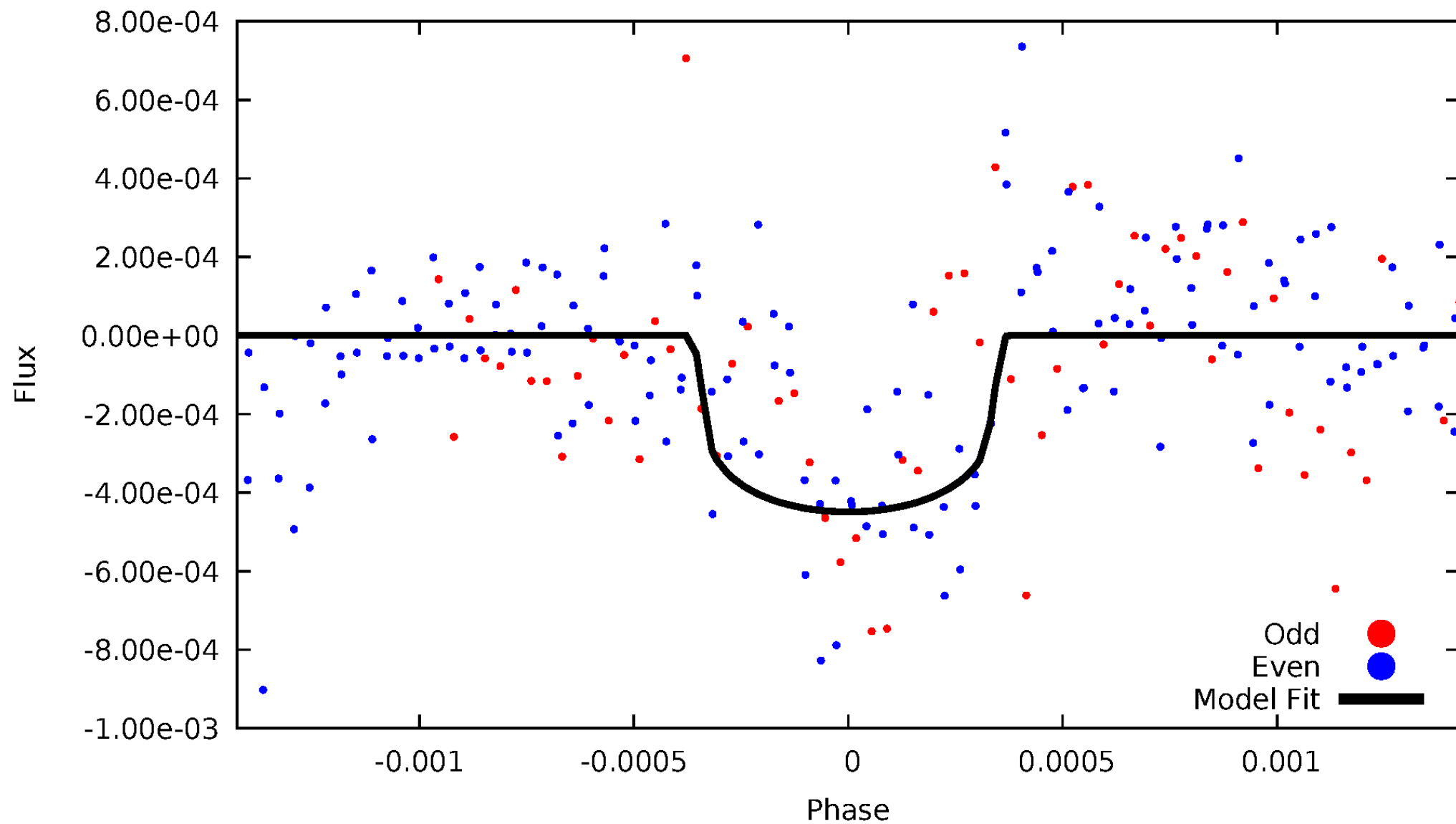


# TCE 010545066-02



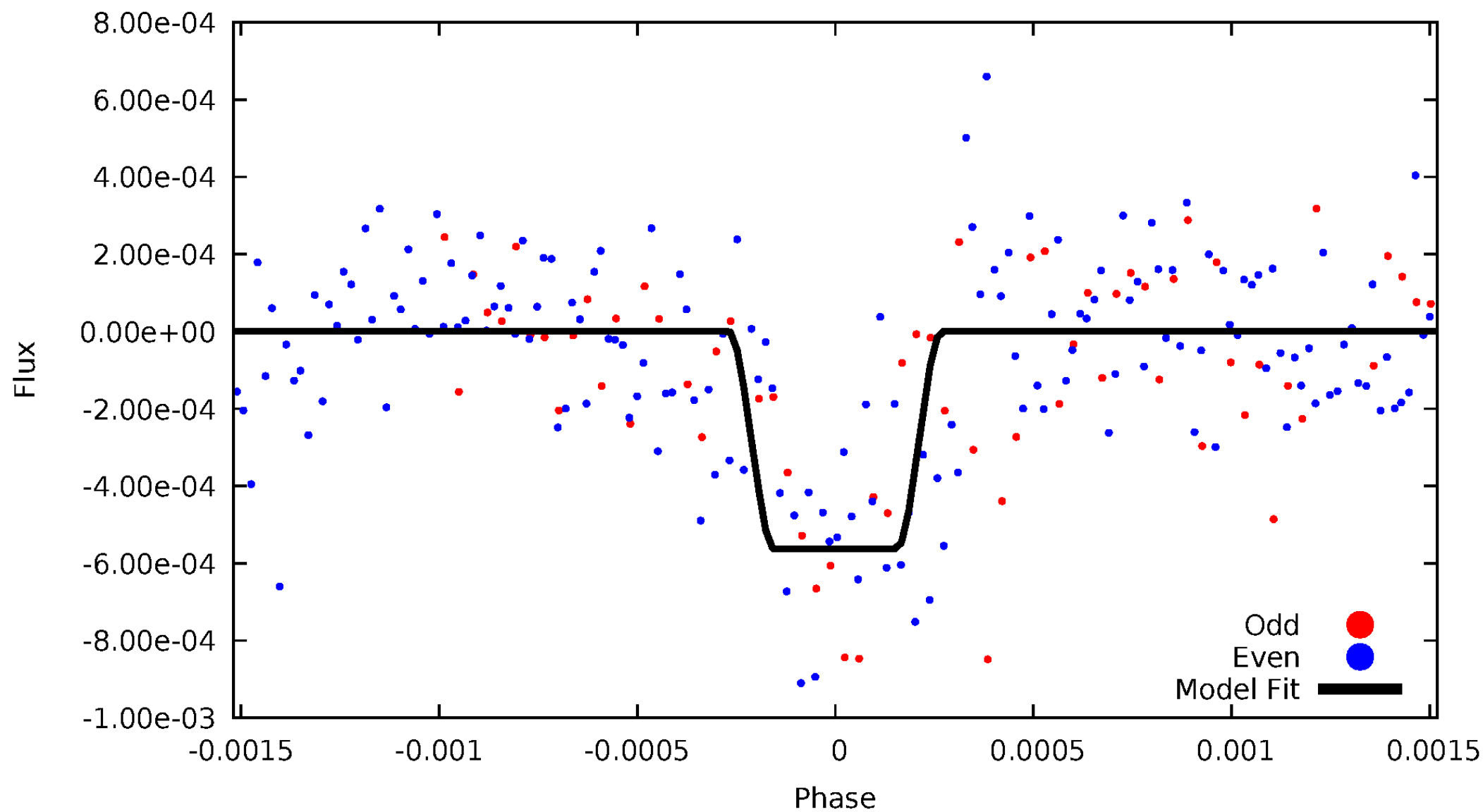
# DV Odd/Even

TCE 010545066-02



# ALT Odd/Even

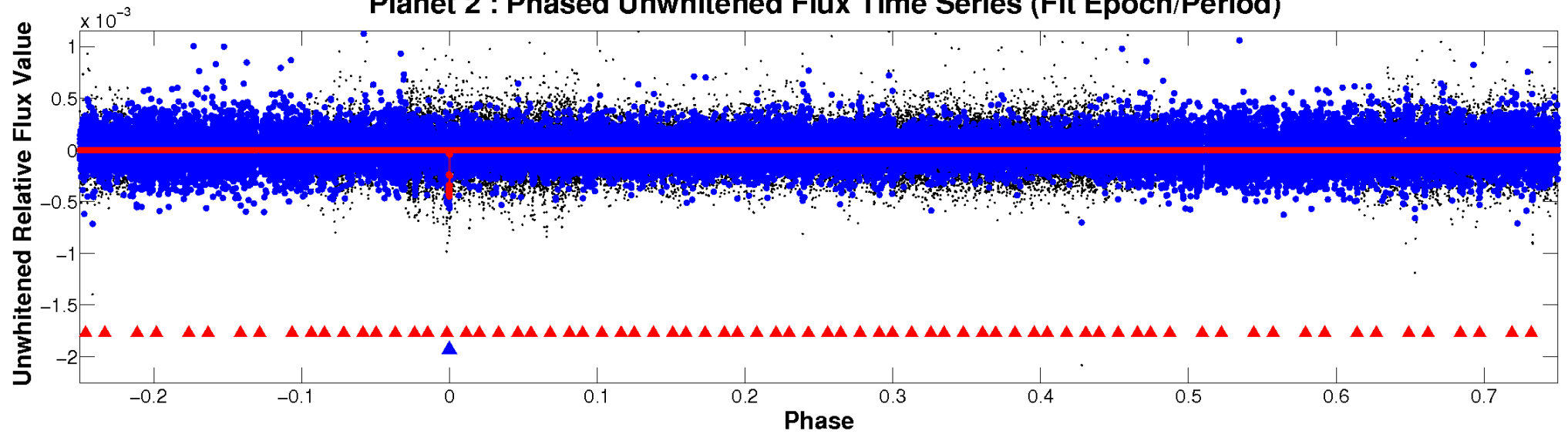
TCE 010545066-02



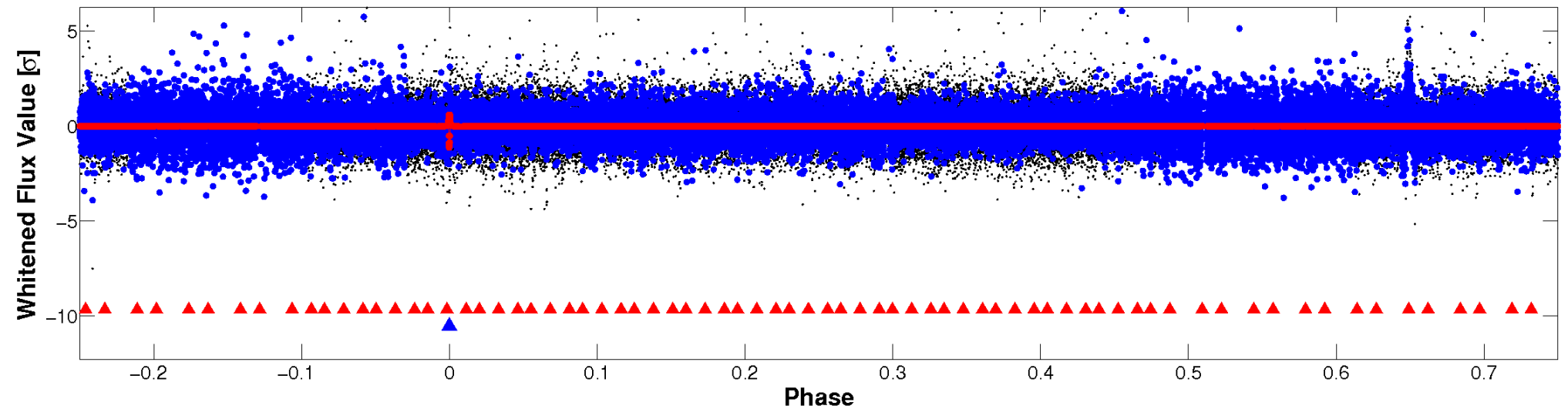


# Non-Whitened Vs. Whitened Light Curve

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

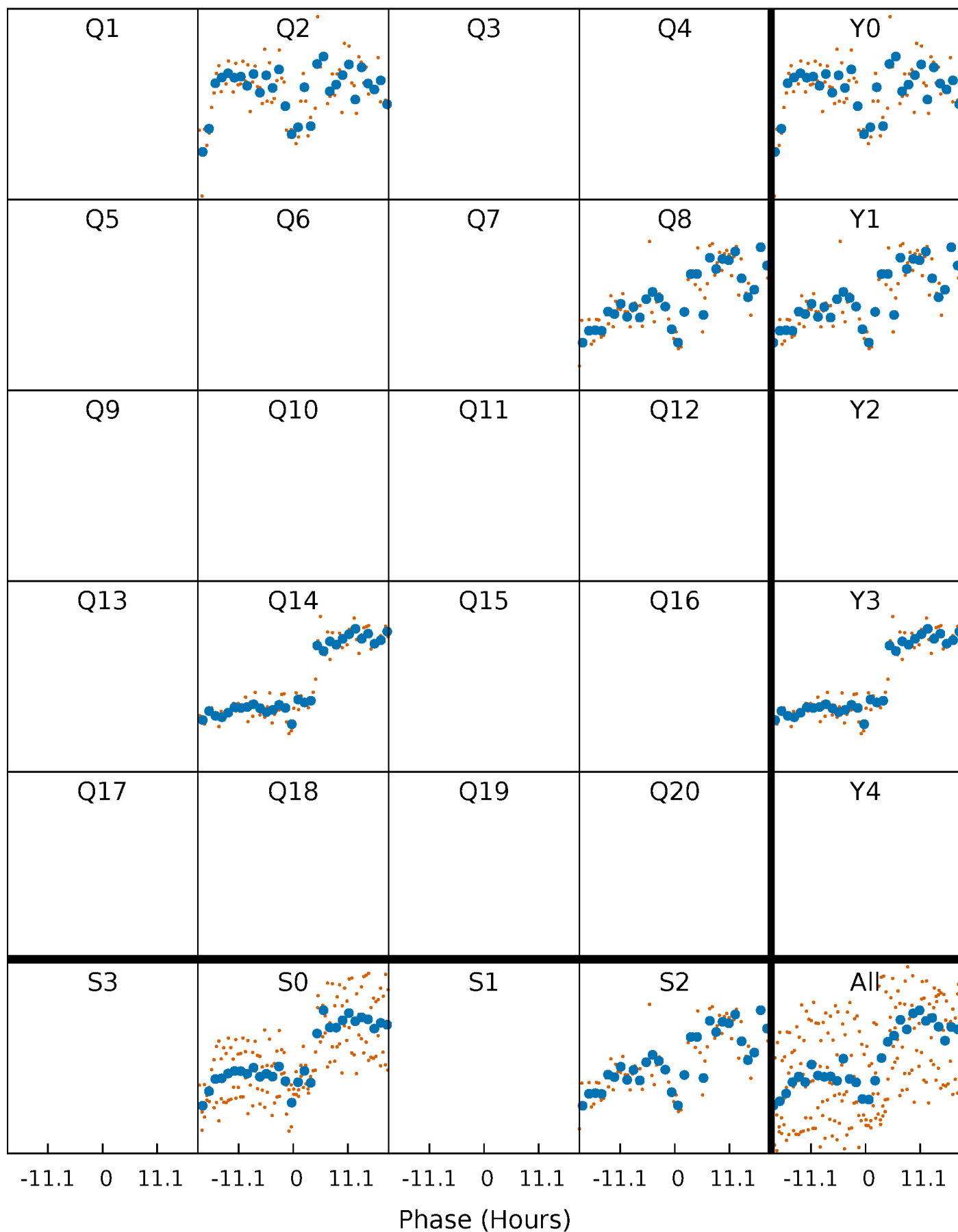


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



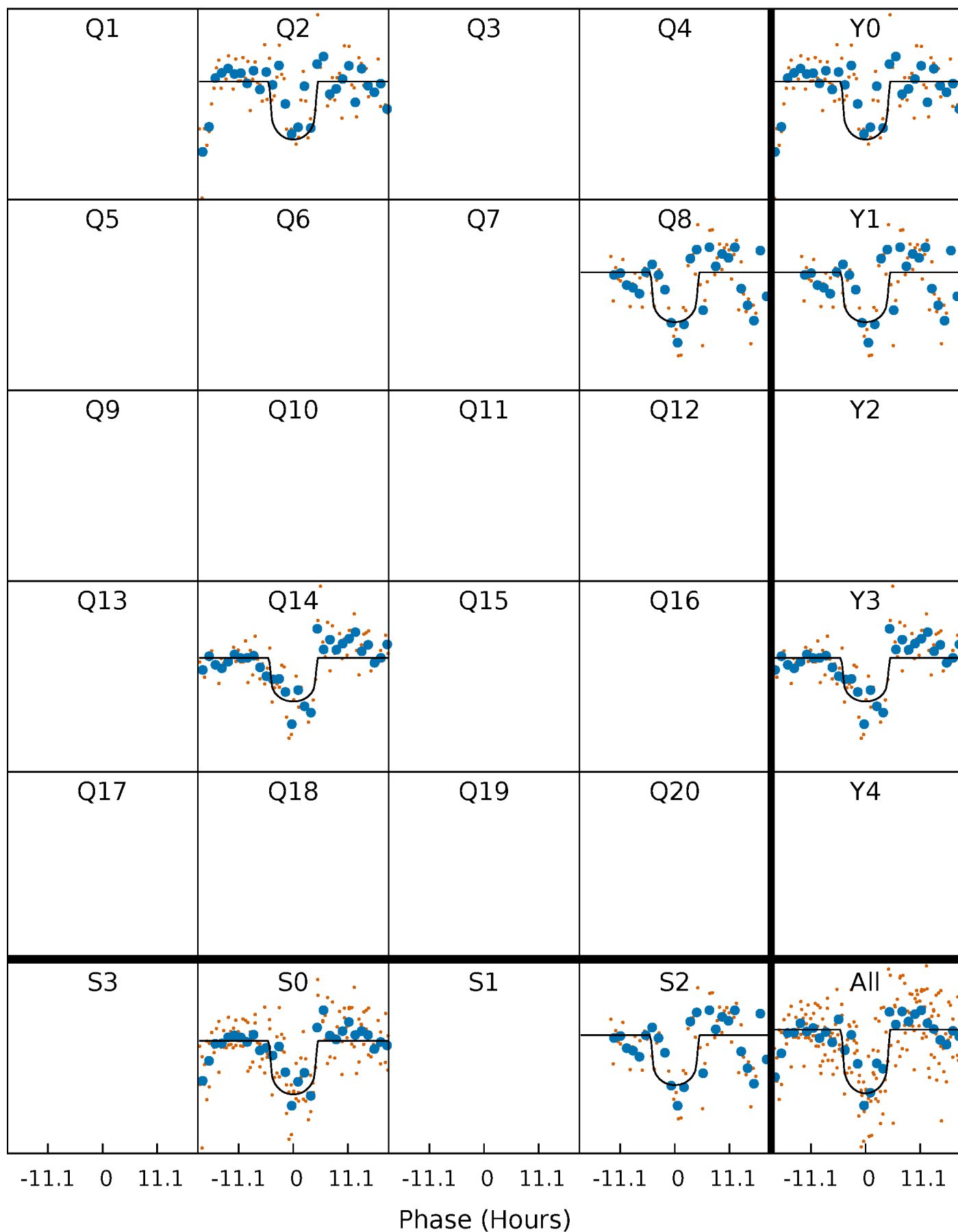
# PDC Quarter-Phased Transit Curves

TCE 010545066-02     $P=566.326980$  Days     $T_0=186.006500$  (BKJD)



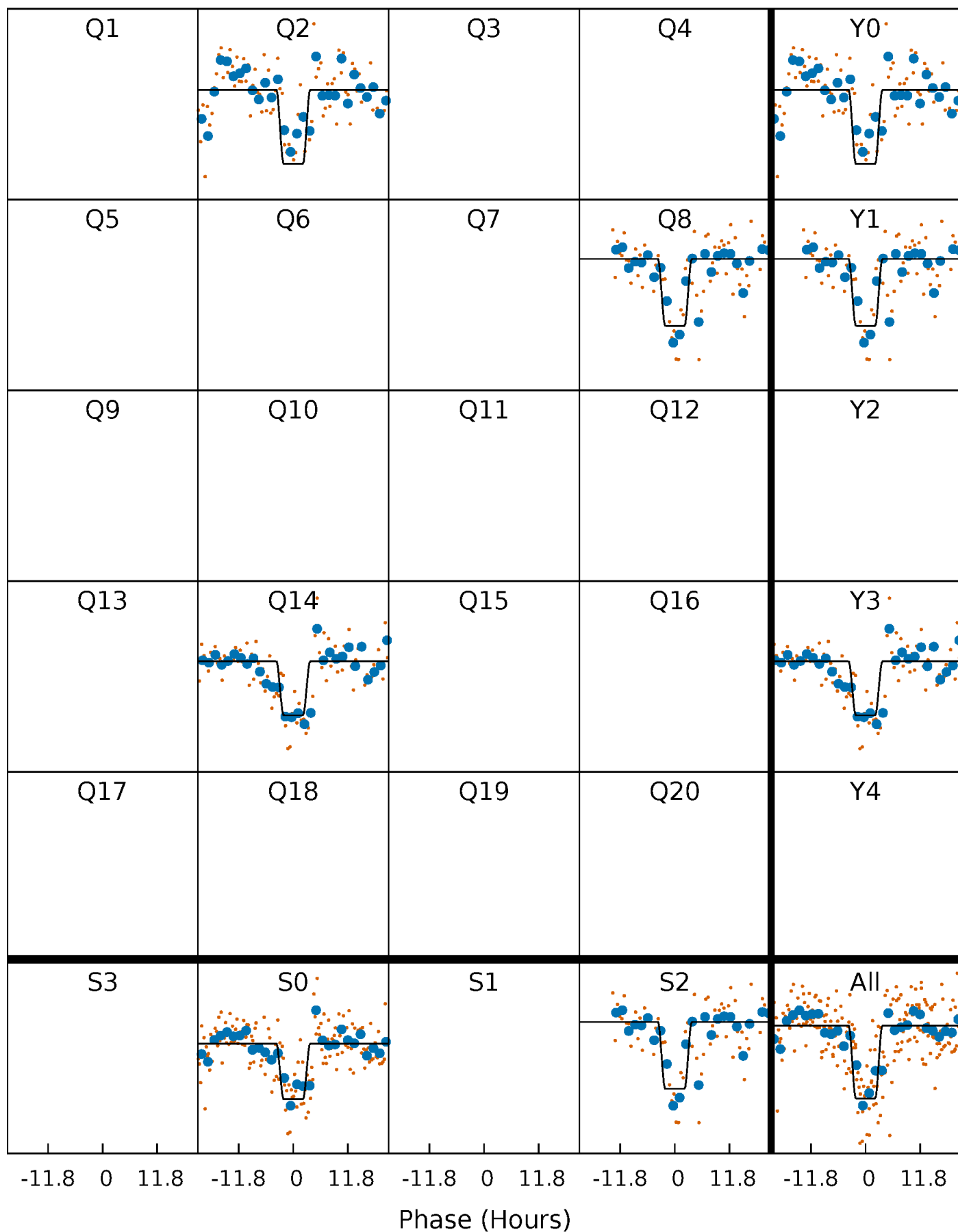
# DV Quarter-Phased Transit Curves

TCE 010545066-02 P=566.326980 Days  $T_0=186.006500$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

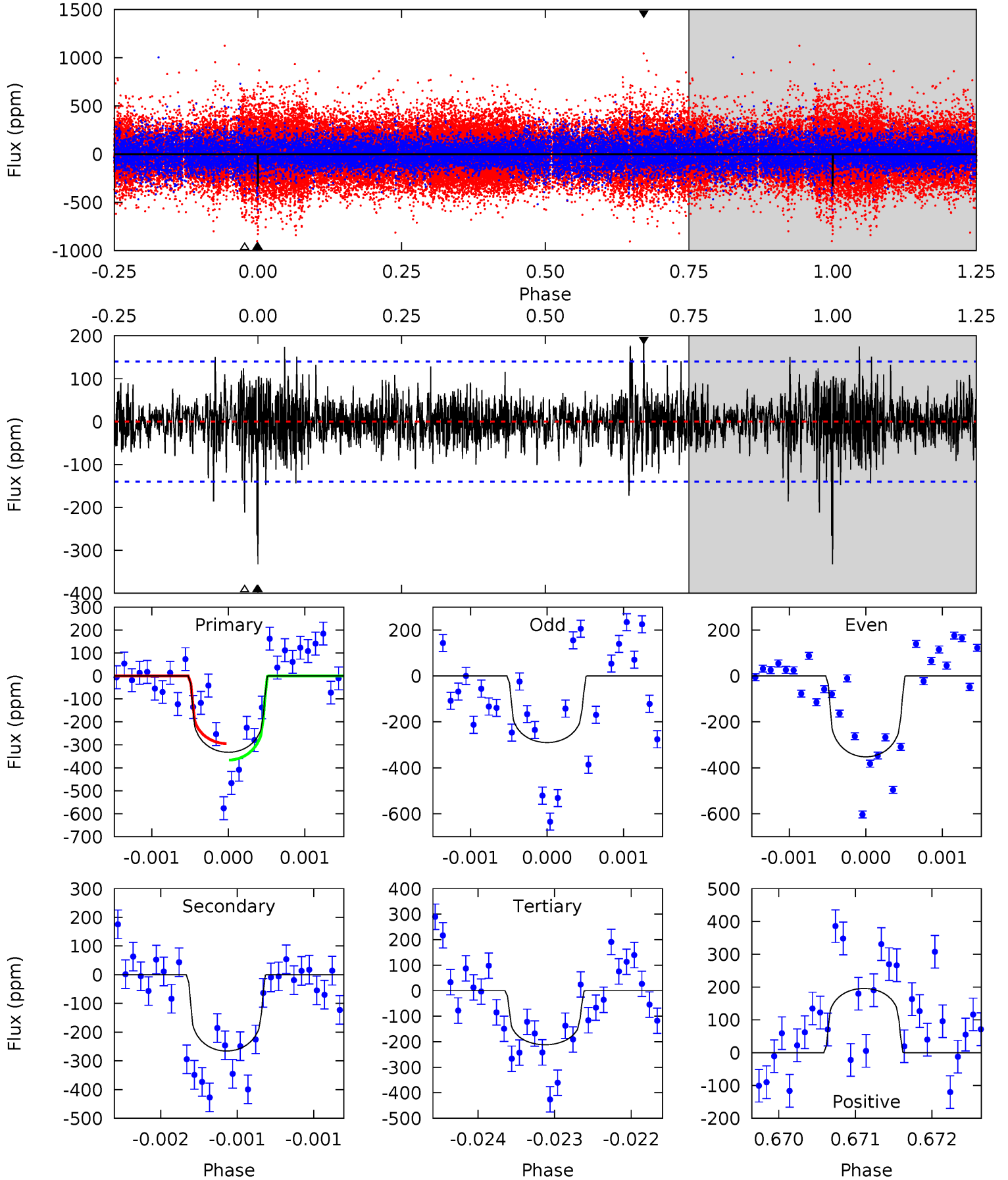
TCE 010545066-02     $P=566.322927$  Days     $T_0=186.027637$  (BKJD)



# DV Model-Shift Uniqueness Test

010545066-02, P = 566.326980 Days, E = 186.006500 Days

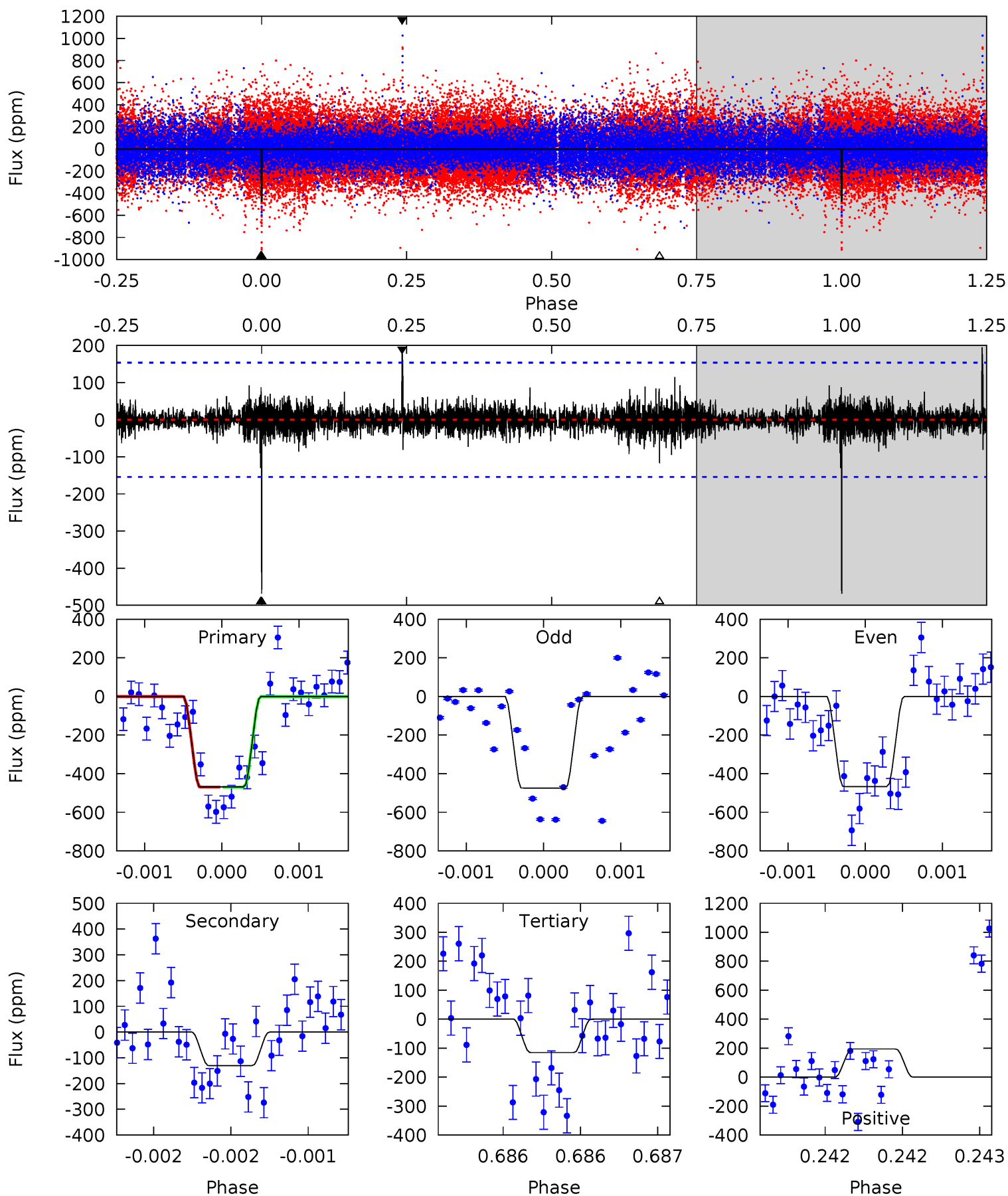
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.1	10.4	8.32	7.69	5.51	3.38	1.62	4.74	5.37	2.12	2.75	1.15	1.14	0.37	1.39



# Alt Model-Shift Uniqueness Test

010545066-02, P = 566.322927 Days, E = 186.027637 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
16.9	4.70	4.16	7.02	5.56	3.46	0.81	12.8	9.91	0.54	-2.33	0.13	0.99	0.29	0.00



### Stellar Parameters For KIC 010545066

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5747^{+115}_{-104}$	$4.335^{+0.120}_{-0.108}$	$0.000^{+0.150}_{-0.150}$	$1.099^{+0.164}_{-0.148}$	$0.953^{+0.079}_{-0.057}$	$1.010^{+0.583}_{-0.314}$
	+2%/-2%	+3%/-2%	+inf%/-inf%	+15%/-13%	+8%/-6%	+58%/-31%
Source	SPE57	SPE57	SPE57	DSEP		

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

### Secondary Eclipse Parameters for KIC 010545066-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-266 \pm 25$	$2.50^{+1.36}_{-1.22}$	$323^{+14}_{-14}$	$5126^{+1813}_{-786}$	$40407^{+103912}_{-23295}$
Alt.	$-130 \pm 28$	$2.87^{+1.32}_{-1.24}$	$324^{+15}_{-14}$	$4210^{+1083}_{-531}$	$15268^{+33273}_{-8429}$

$T_{max}$  = 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

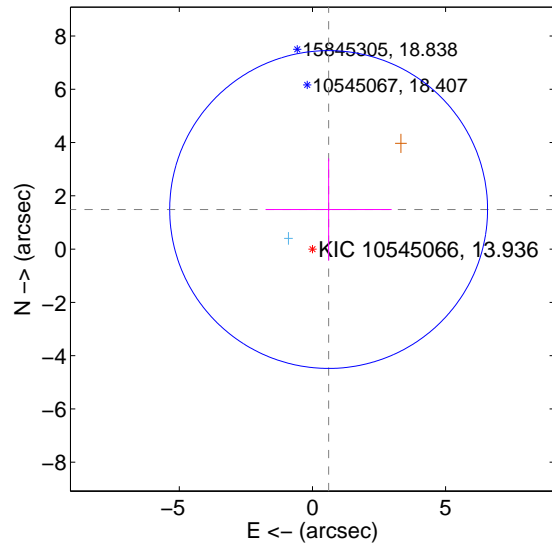
Supplemental centroid analysis for 010545066-02. Kepler magnitude: 13.94. Transit SNR 7.64

There are 1 quarters with good PRF difference image offsets

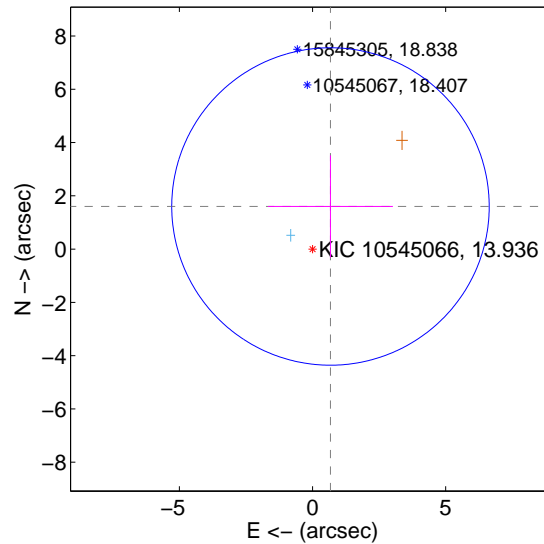
The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.605 \pm 1.989$	0.81	$-0.608 \pm 2.366$	$1.486 \pm 1.918$
PRF-fit source offset from KIC position	$1.736 \pm 1.986$	0.87	$-0.674 \pm 2.342$	$1.600 \pm 1.916$
photometric centroid source offset	$0.66 \pm 0.95$	0.69	$0.05 \pm 0.92$	$-0.65 \pm 0.95$

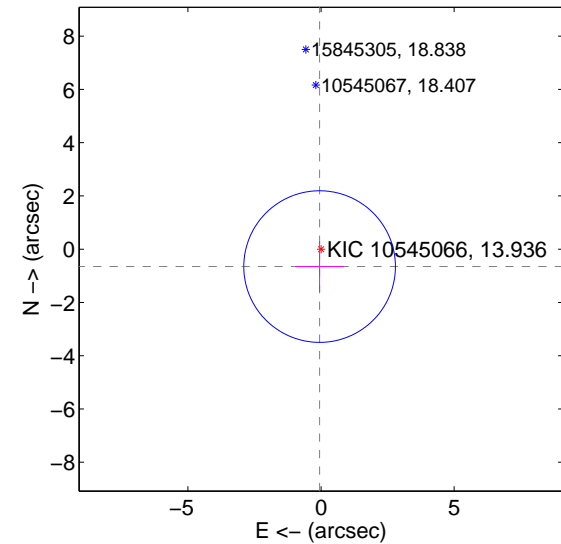
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

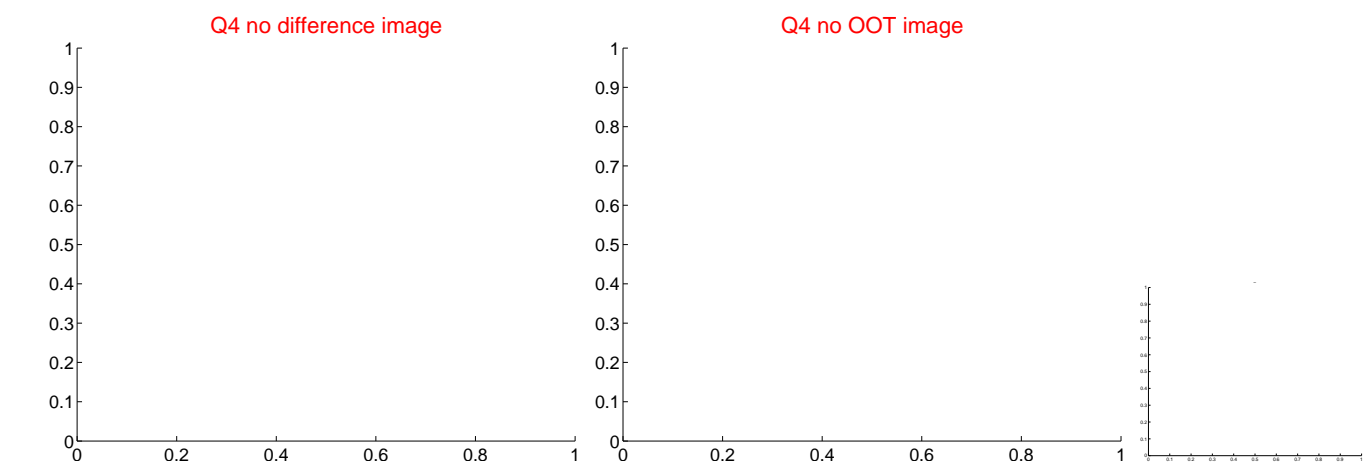
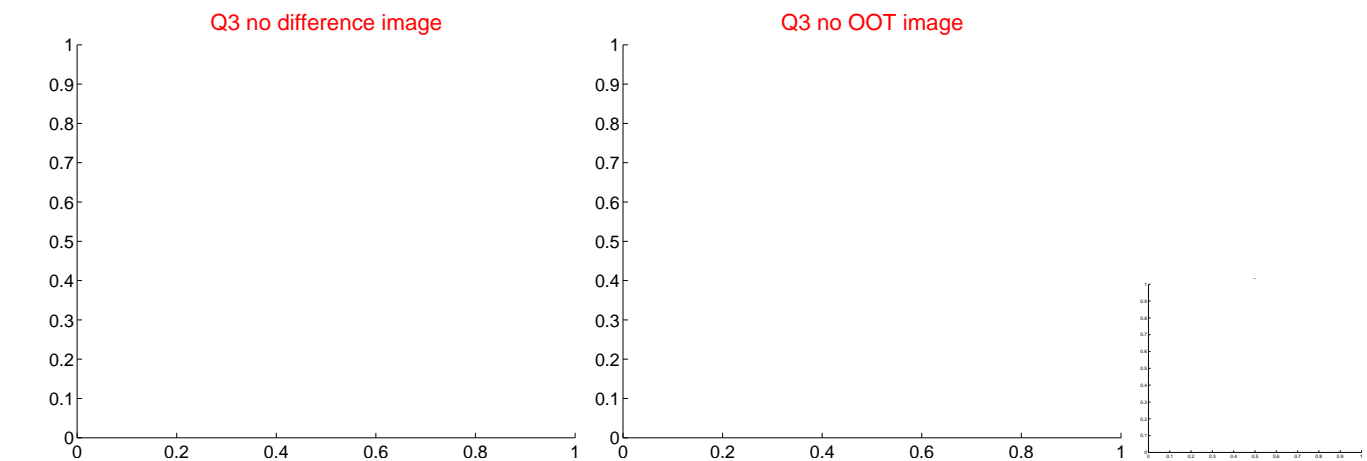
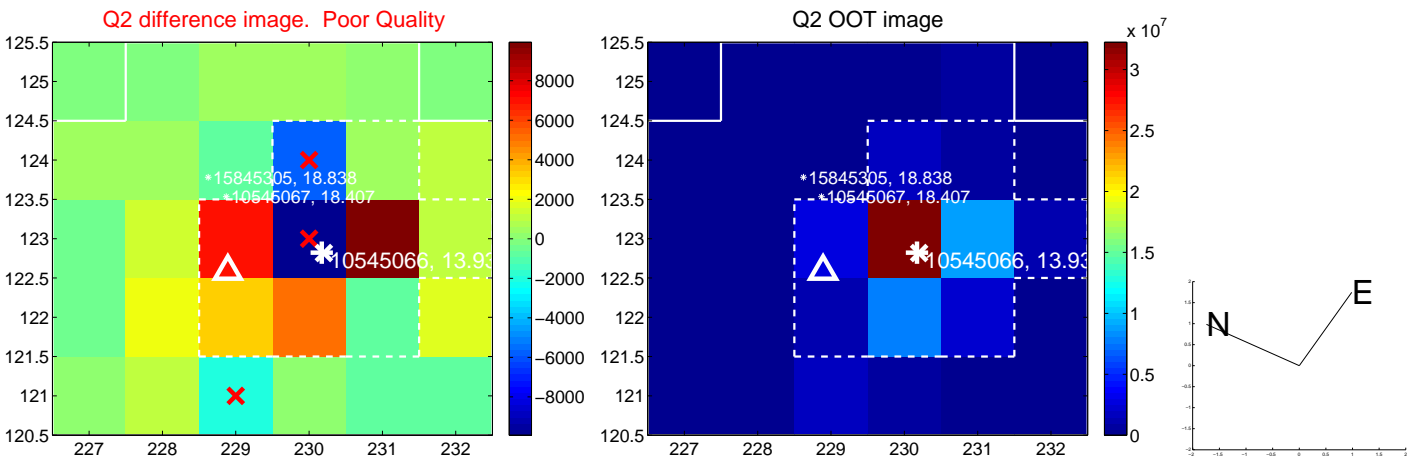
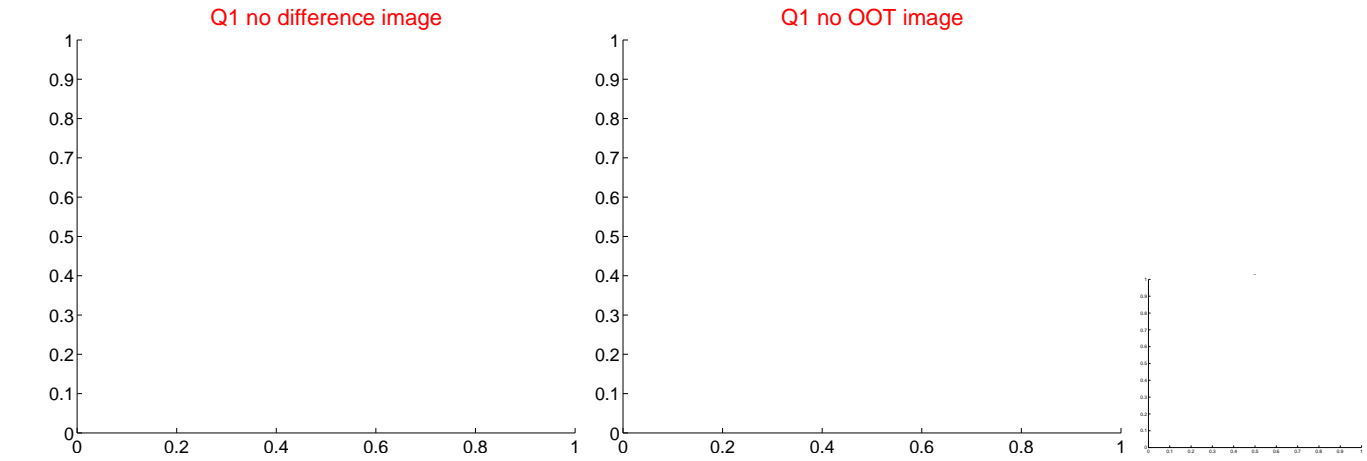


offset from photometric centroids

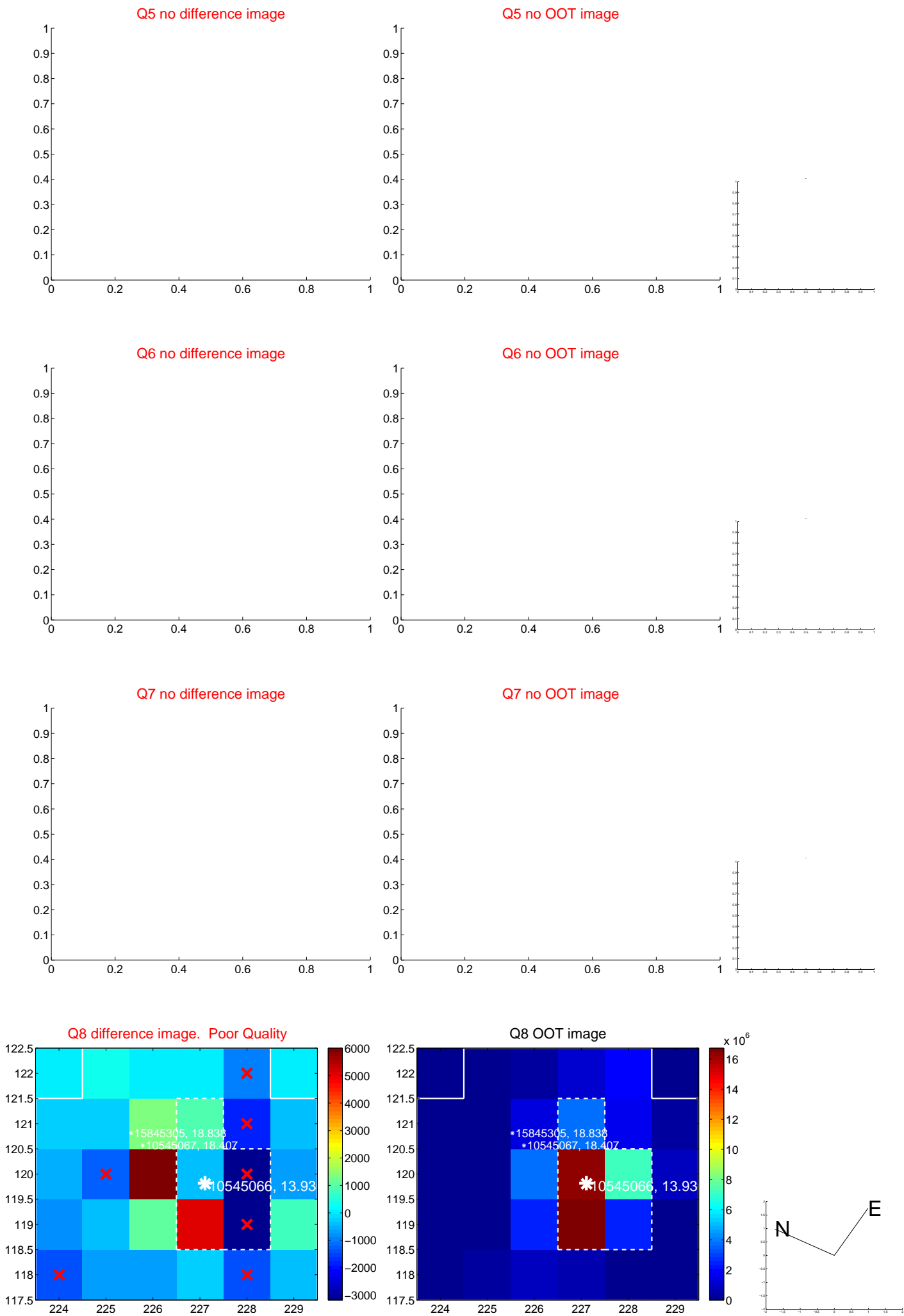


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



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

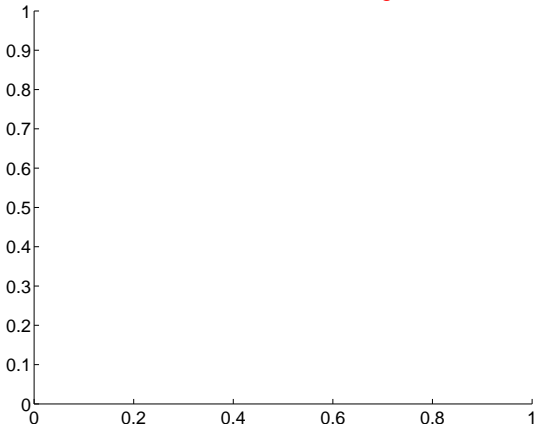


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

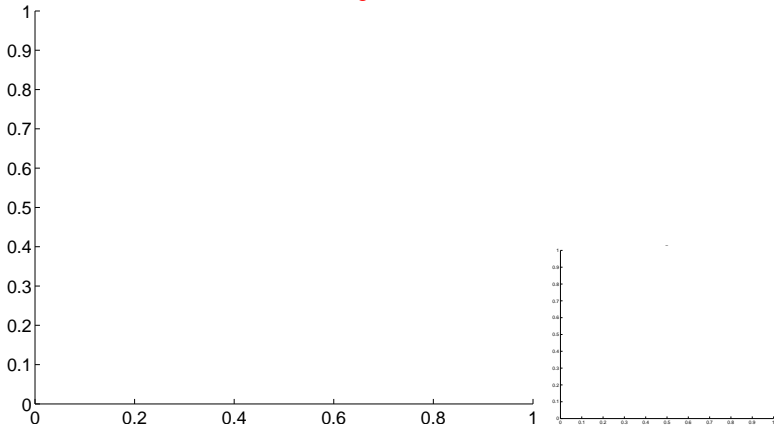


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

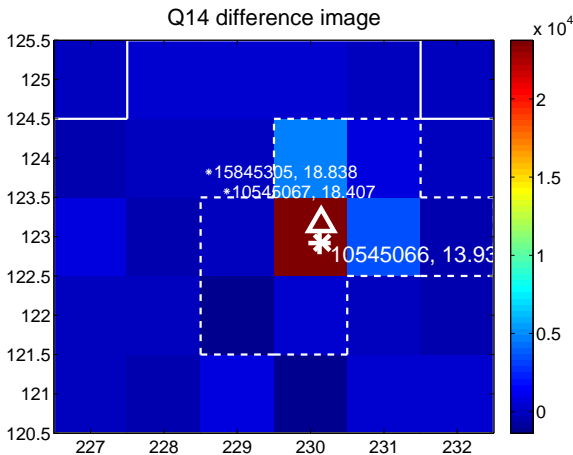
Q13 no difference image



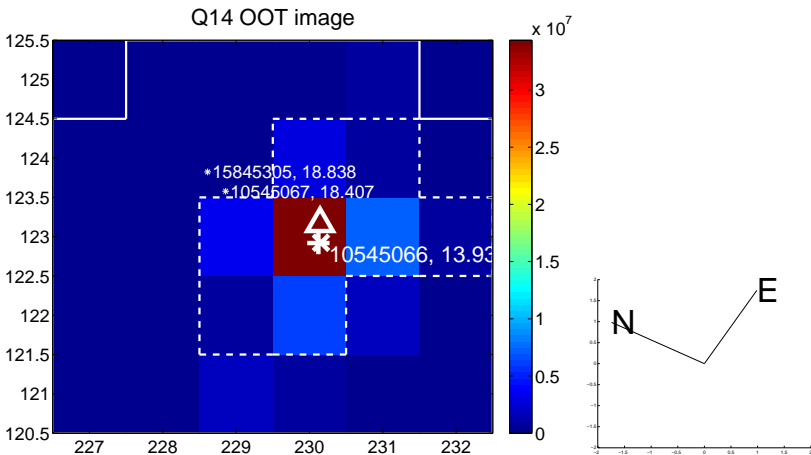
Q13 no OOT image



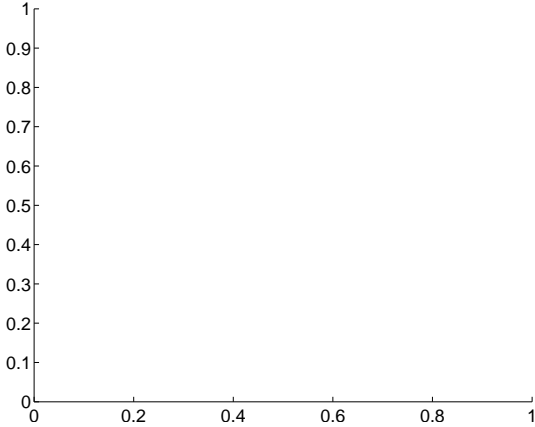
Q14 difference image



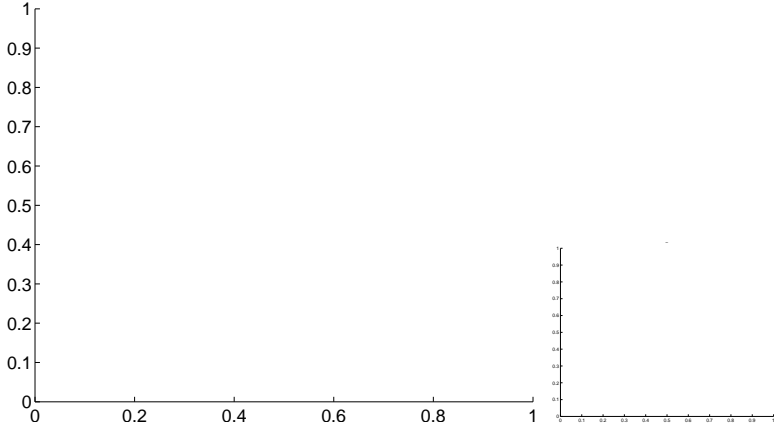
Q14 OOT image



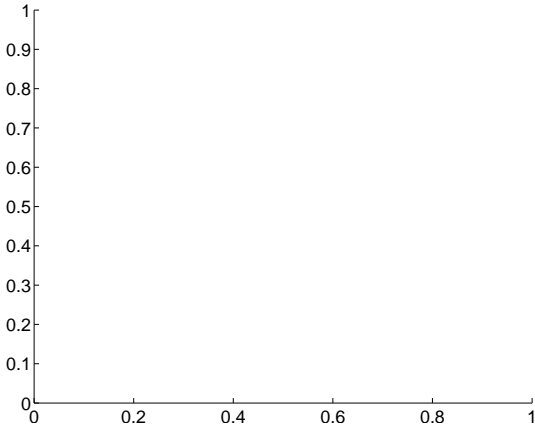
Q15 no difference image



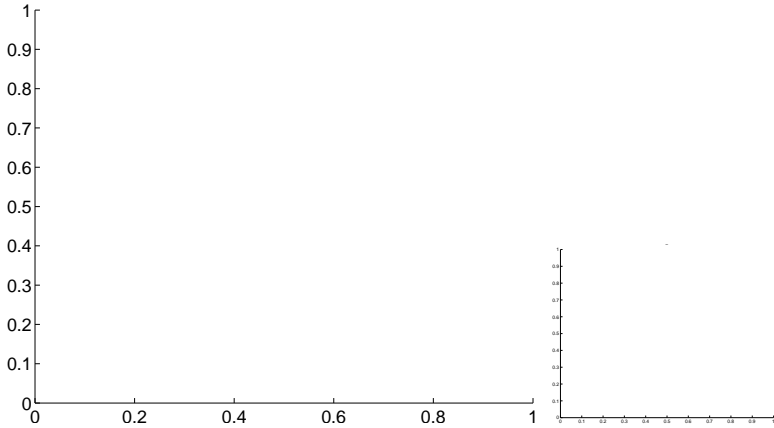
Q15 no OOT image



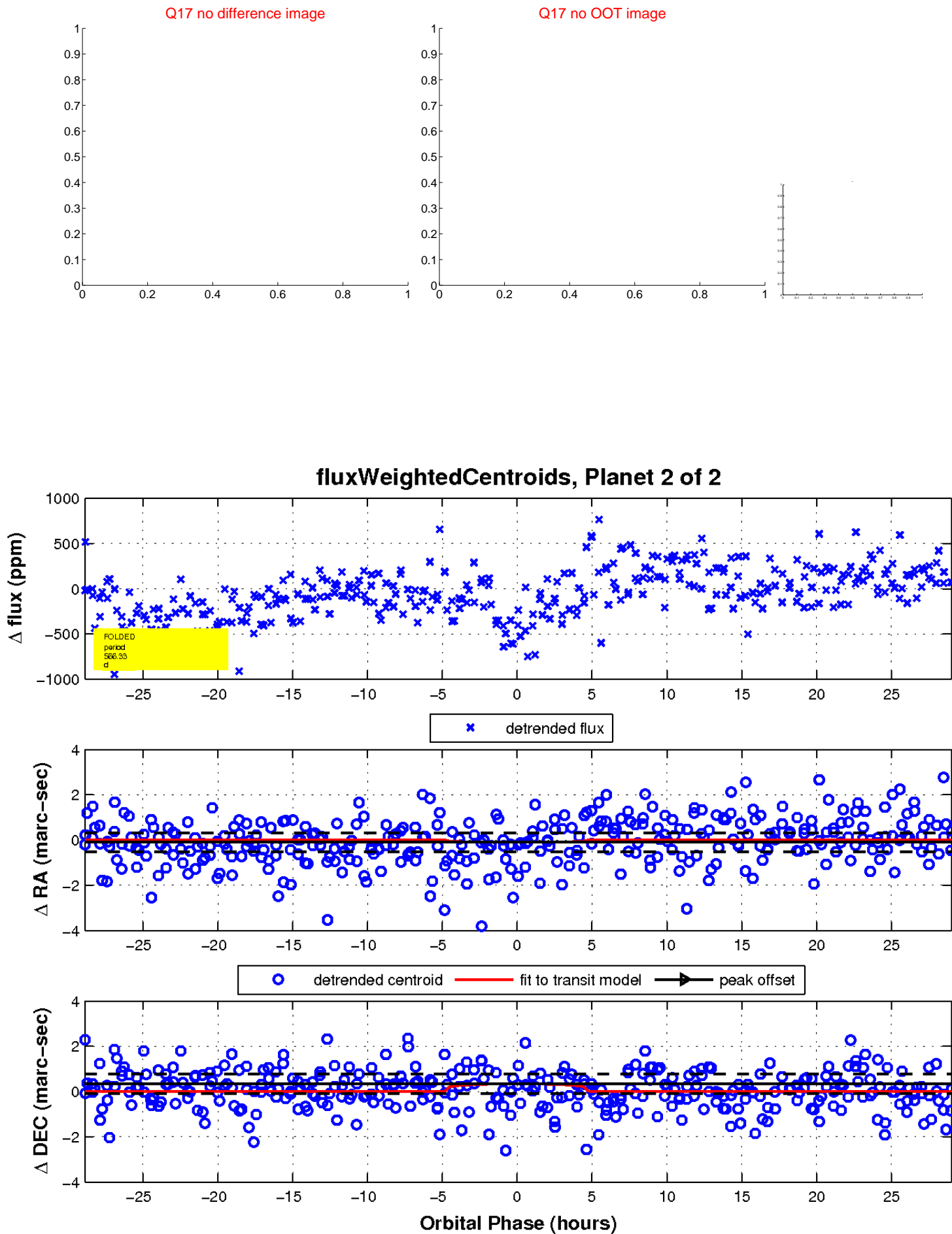
Q16 no difference image



Q16 no OOT image



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



UKIRT Image

Declination

