

# KIC 004678188

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004678188-01	OBS	No	374.559875	258.449783	609.1	7.540	11.4	5.3	1.27	6002	3.26	1.87
004678188-02	OBS	No	569.277981	226.364432	949.1	5.441	7.8	8.2	1.27	6002	4.20	1.07

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004678188-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_ZUMA_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV— INCONSISTENT_TRANS—CENT_FEW_DIFFS
004678188-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT— 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.

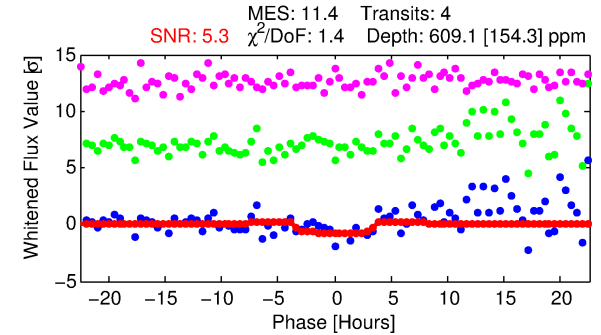
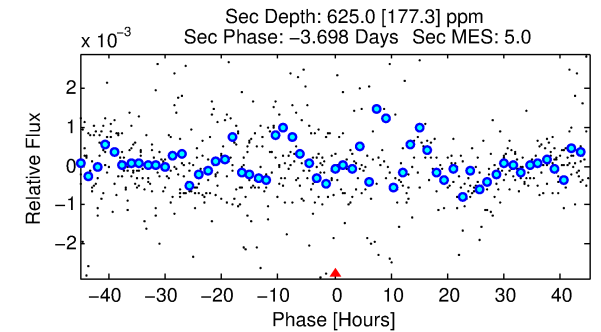
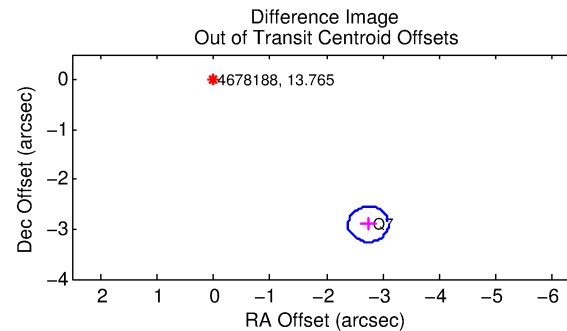
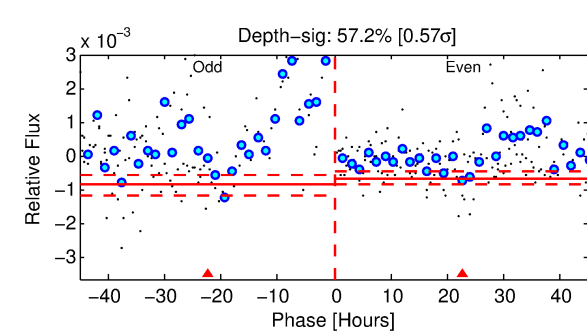
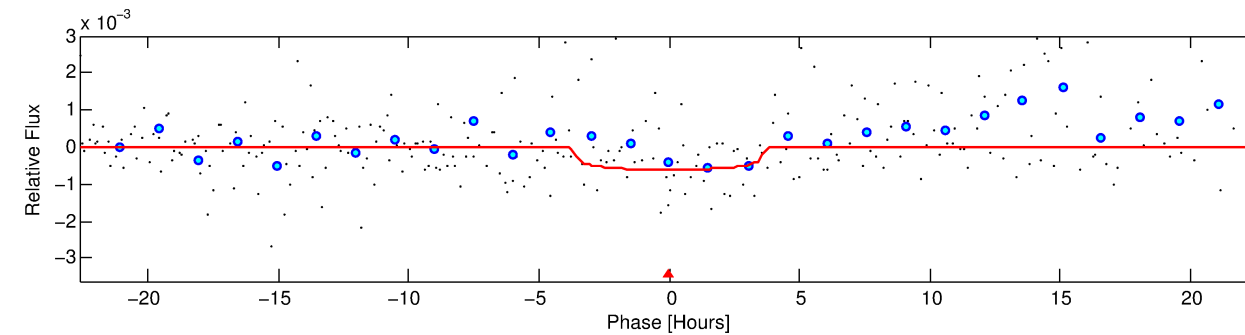
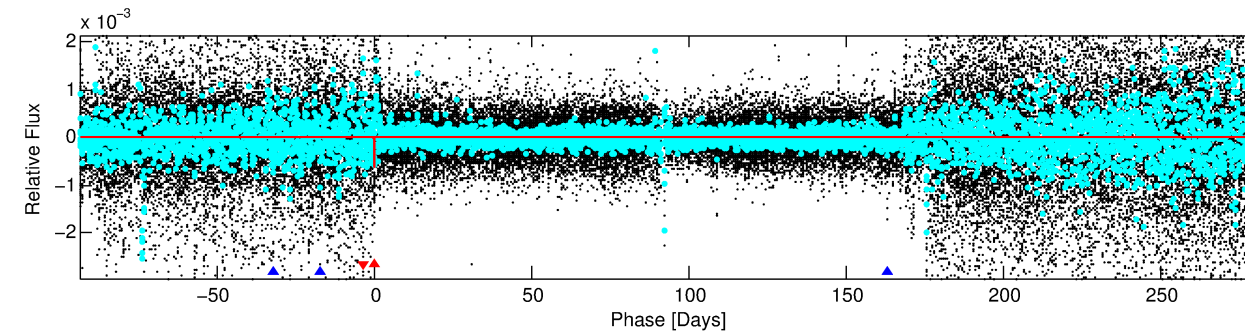
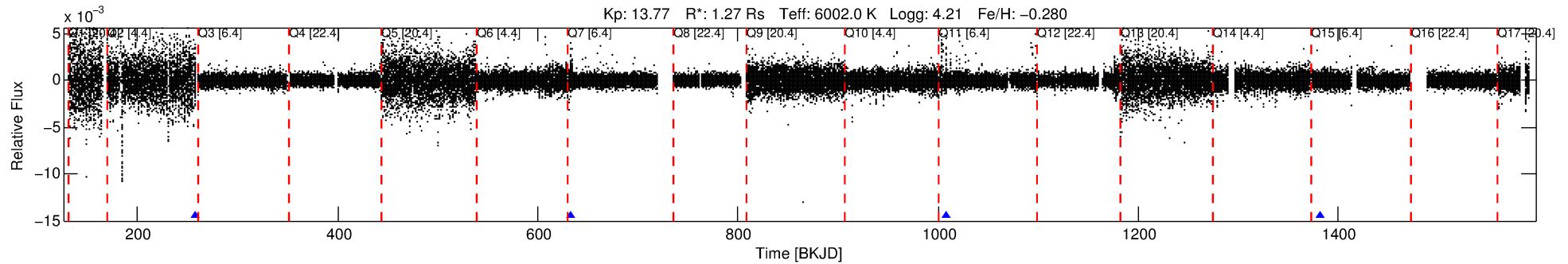
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004678188-01

No Significant Match Found

# DV One-Page Summary

KIC: 4678188 Candidate: 1 of 2 Period: 374.560 d



## DV Fit Results:

Period = 374.55987 [0.01512] d  
Epoch = 258.4498 [0.0347] BKJD  
Rp/R\* = 0.0236 [0.0439]  
a/R\* = 314.39 [2842.54]  
b = 0.60 [9.69]  
Seff = 1.87 [0.83]  
Teq = 298 [33] K  
Rp = 3.26 [6.12] Re  
a = 0.9992 [0.2637] AU  
Ag = 32213.07 [120718.54] [0.27 $\sigma$ ]  
Teffp = 6173 [5749] K [1.02 $\sigma$ ]

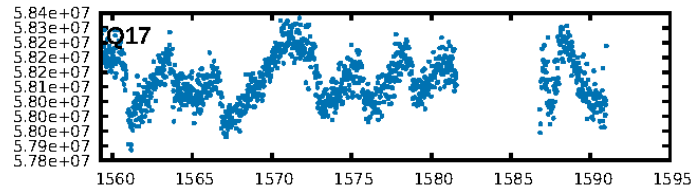
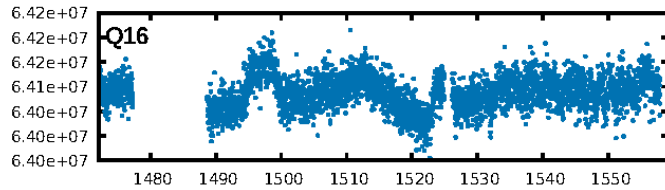
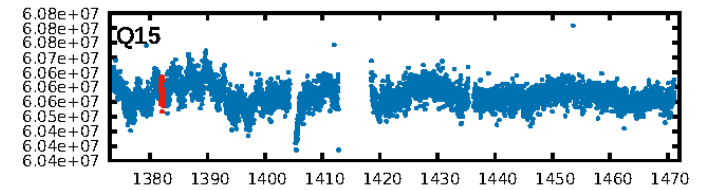
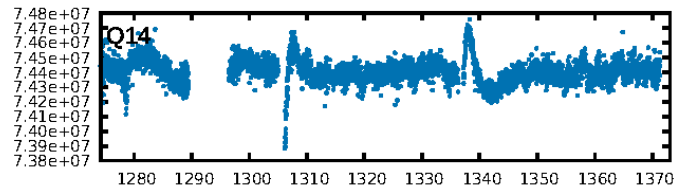
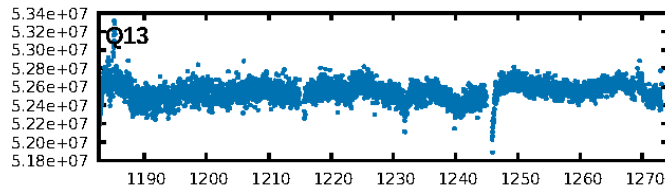
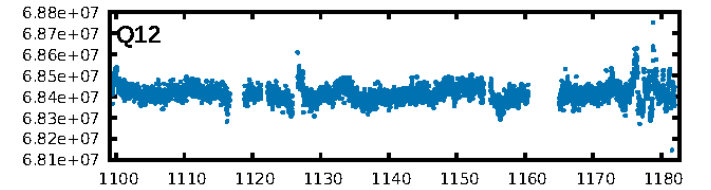
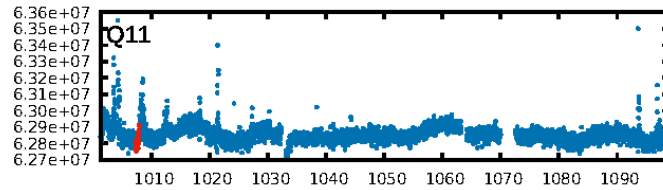
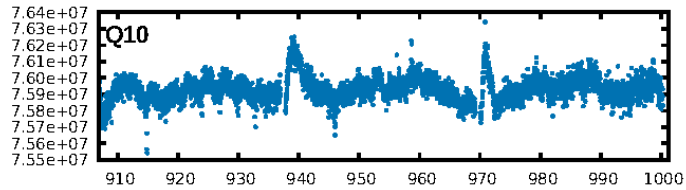
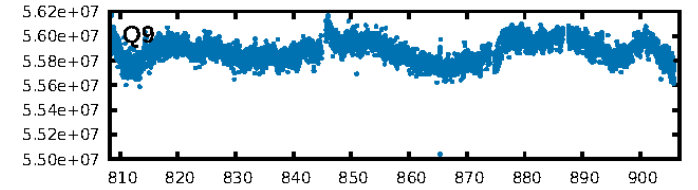
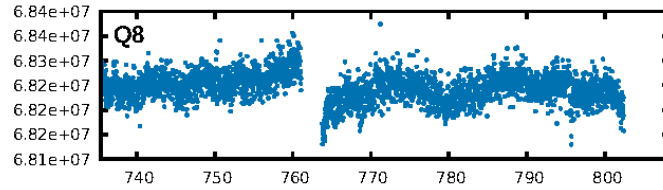
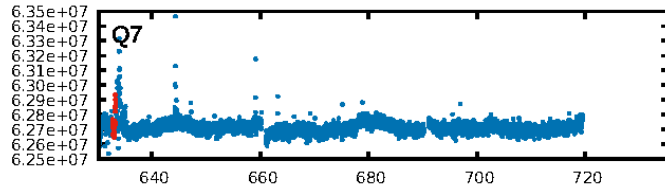
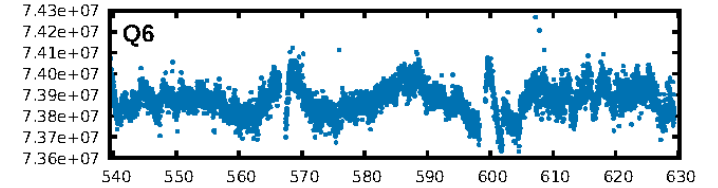
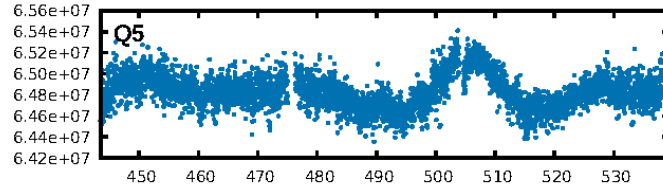
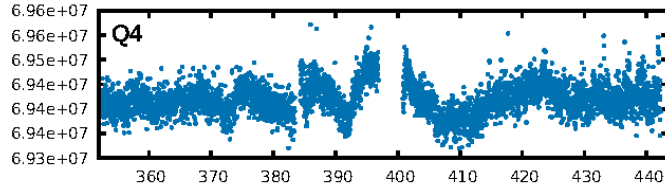
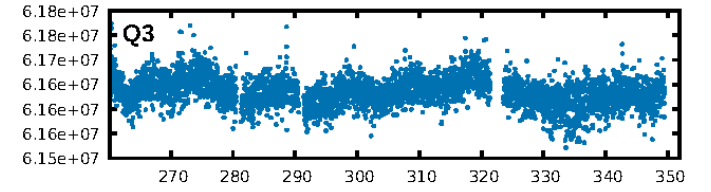
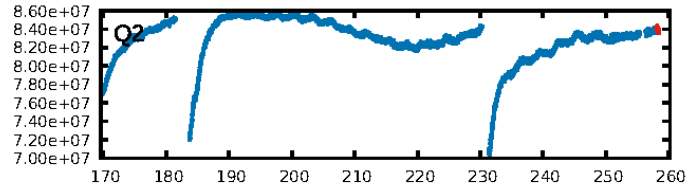
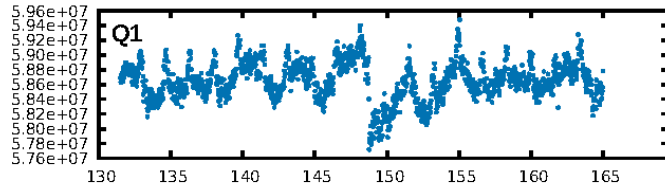
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [502.57 $\sigma$ ]  
ModelChiSquare2-sig: 11.8%  
ModelChiSquareGof-sig: 92.4%  
Bootstrap-pfa: 1.54e-10  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -3.473  
Centroid-sig: 37.1%  
Centroid-so: 3.229 arcsec [12.47 $\sigma$ ]  
OotOffset-rm: 3.993 arcsec [33.72 $\sigma$ ]  
KicOffset-rm: 0.403 arcsec [3.42 $\sigma$ ]  
OotOffset-st: 0/1/0/0 [1]  
KicOffset-st: 0/1/0/0 [1]  
DiffImageQuality-fgm: 1.00 [1/1]  
DiffImageOverlap-fno: 1.00 [3/3]

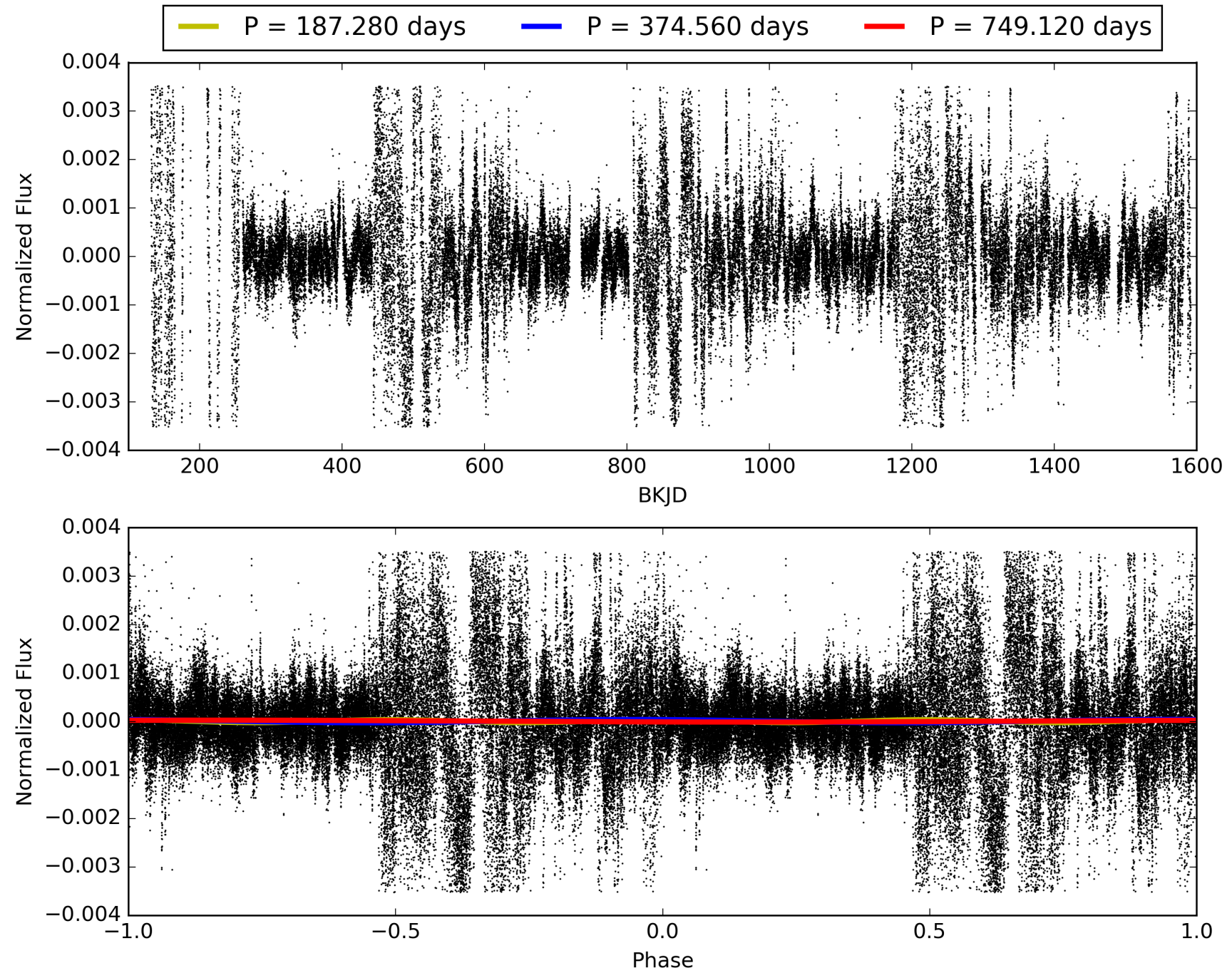
Software Revision: svn-ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 14:32:55 Z

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

# TCE 004678188-01, PDC Light Curves

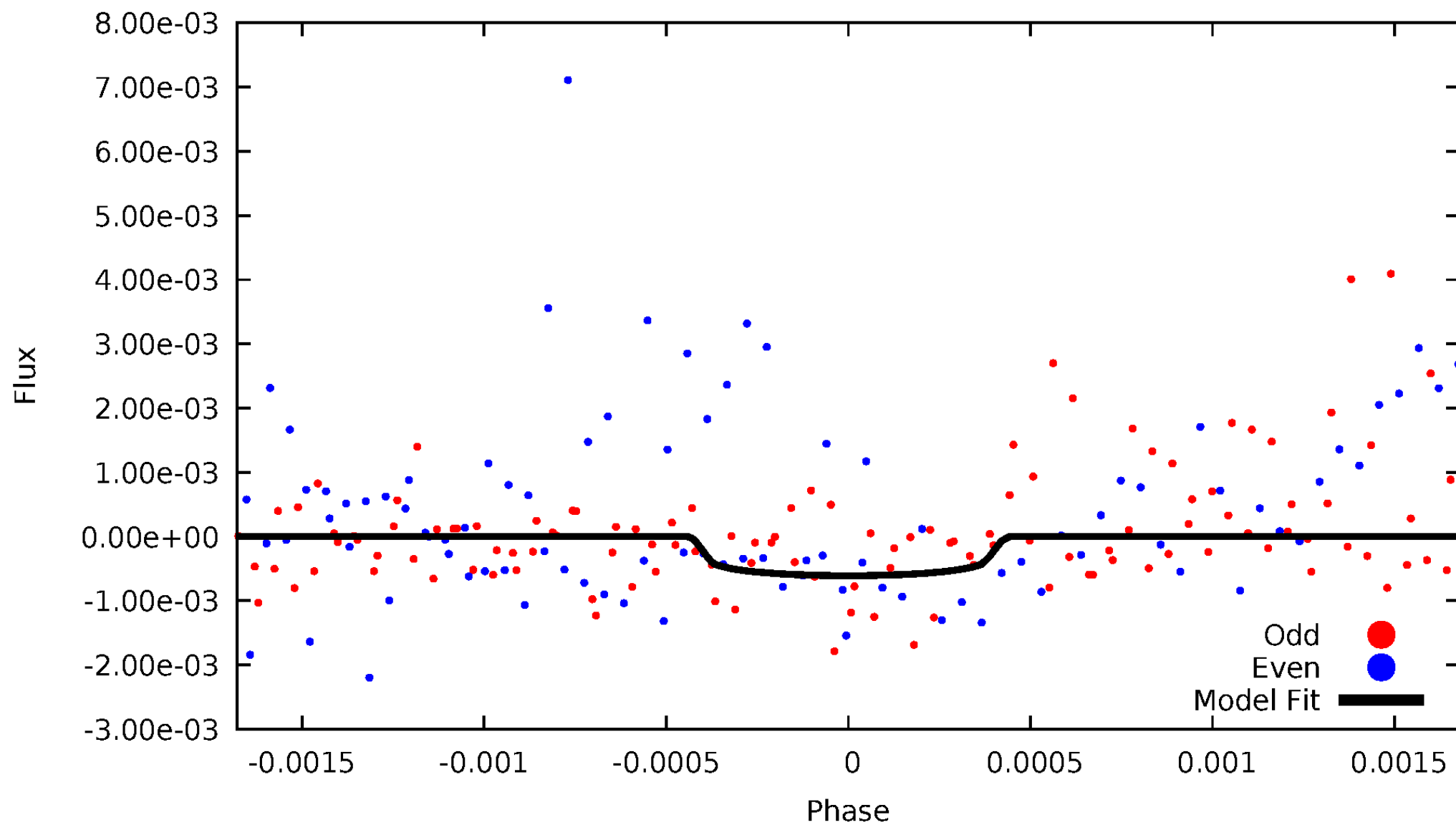


TCE 004678188-01



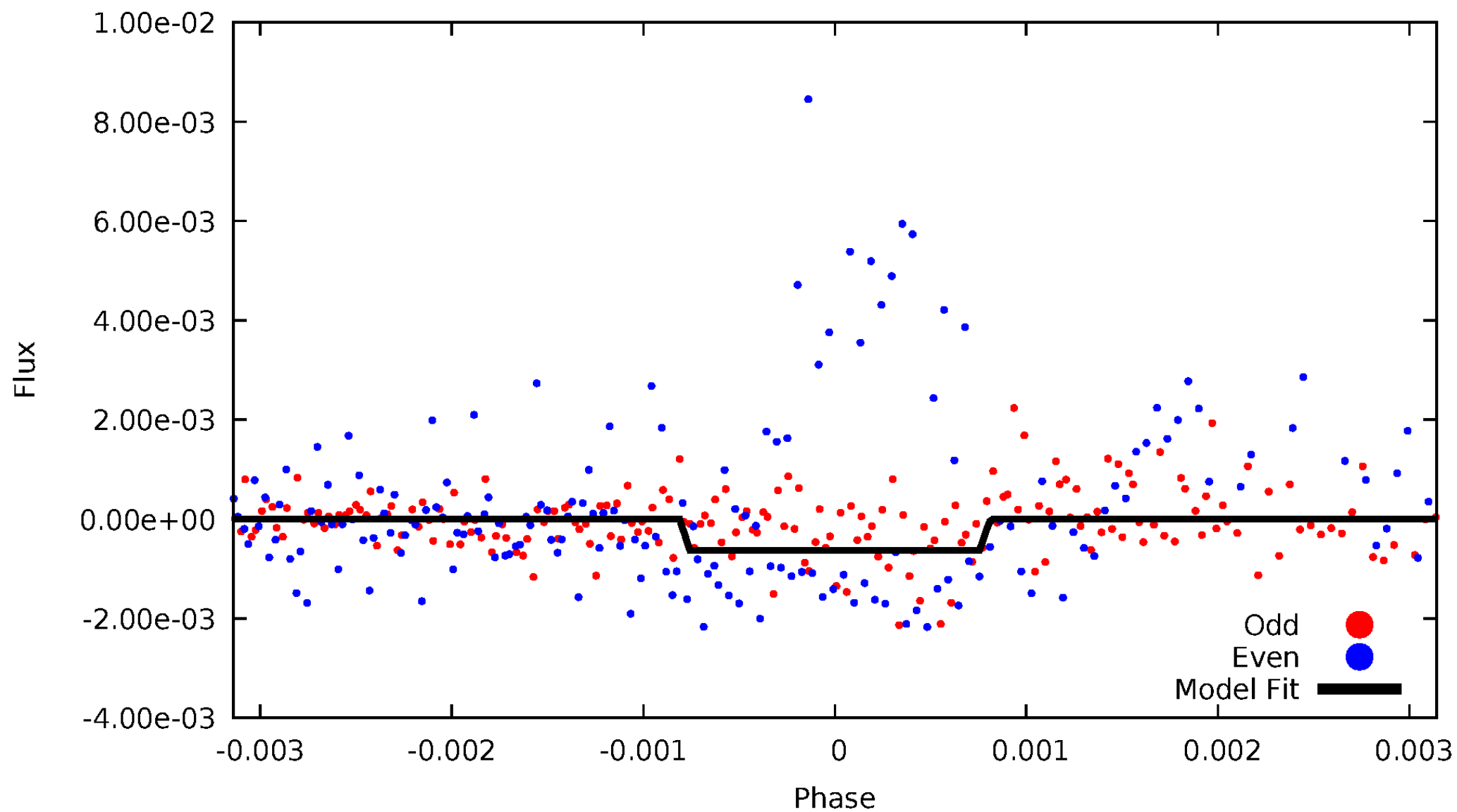
# DV Odd/Even

TCE 004678188-01

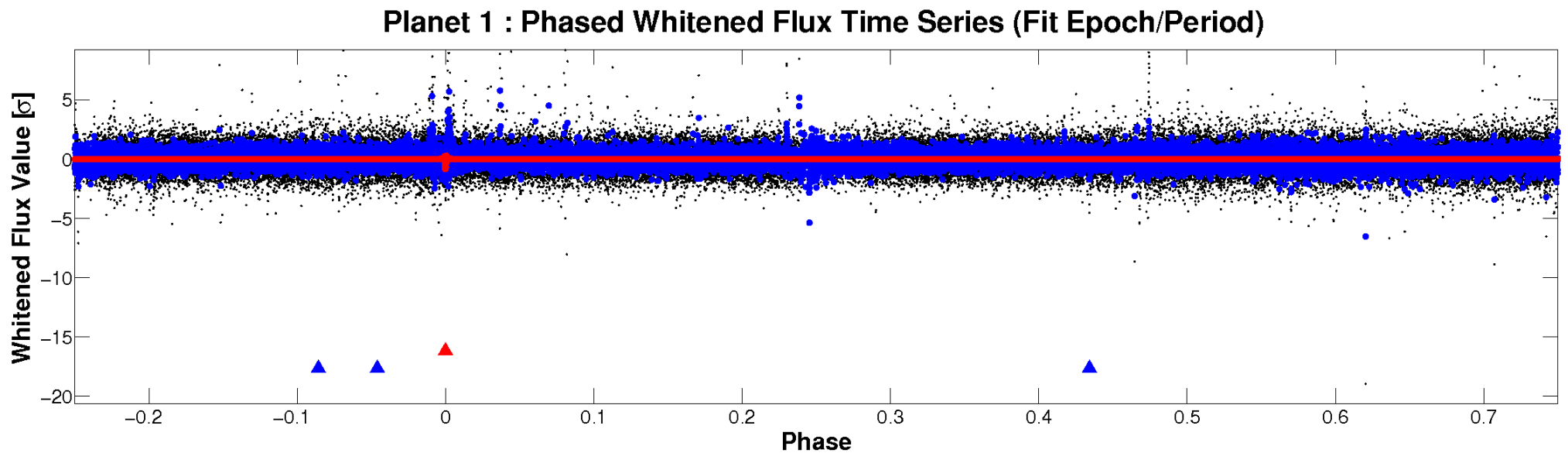
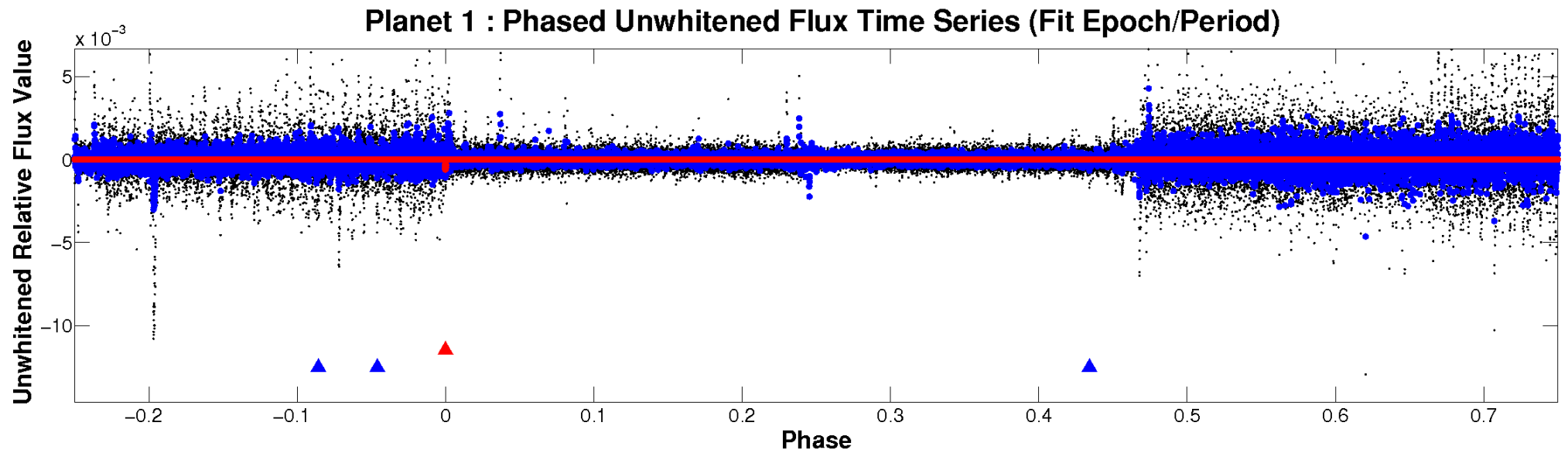


# ALT Odd/Even

TCE 004678188-01



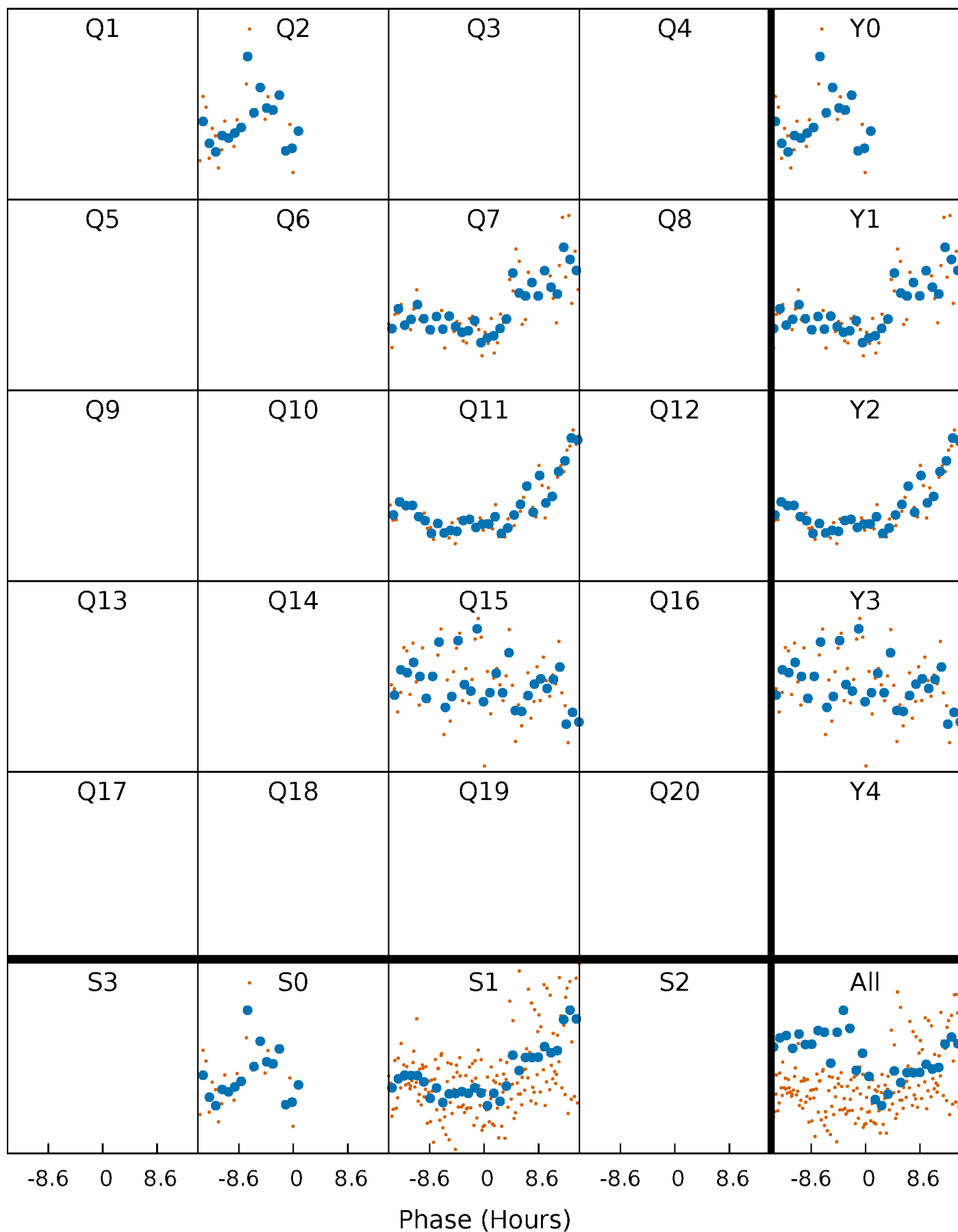
# Non-Whitened Vs. Whitened Light Curve





# PDC Quarter-Phased Transit Curves

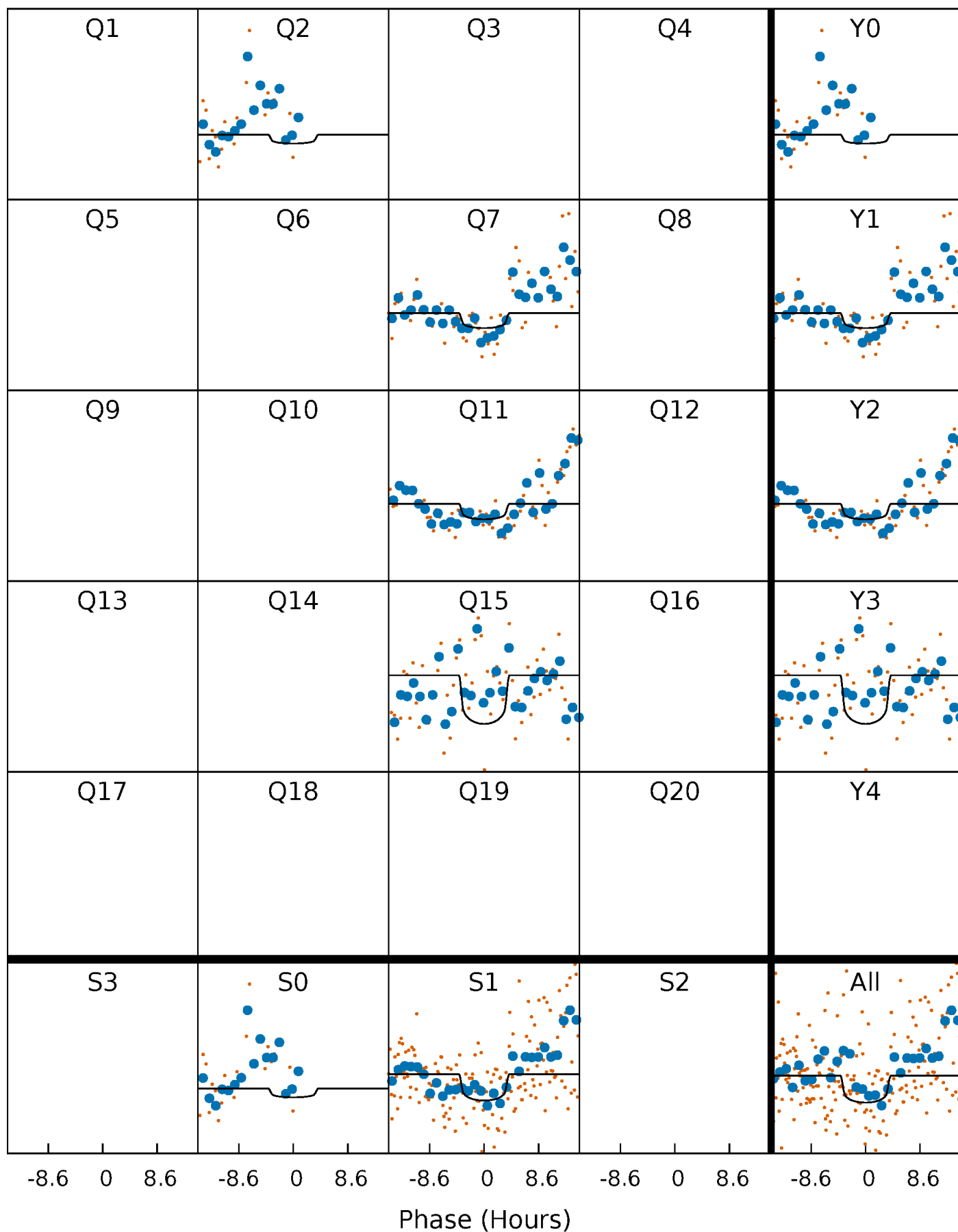
TCE 004678188-01 P=374.559875 Days  $T_0=258.449783$  (BKJD)





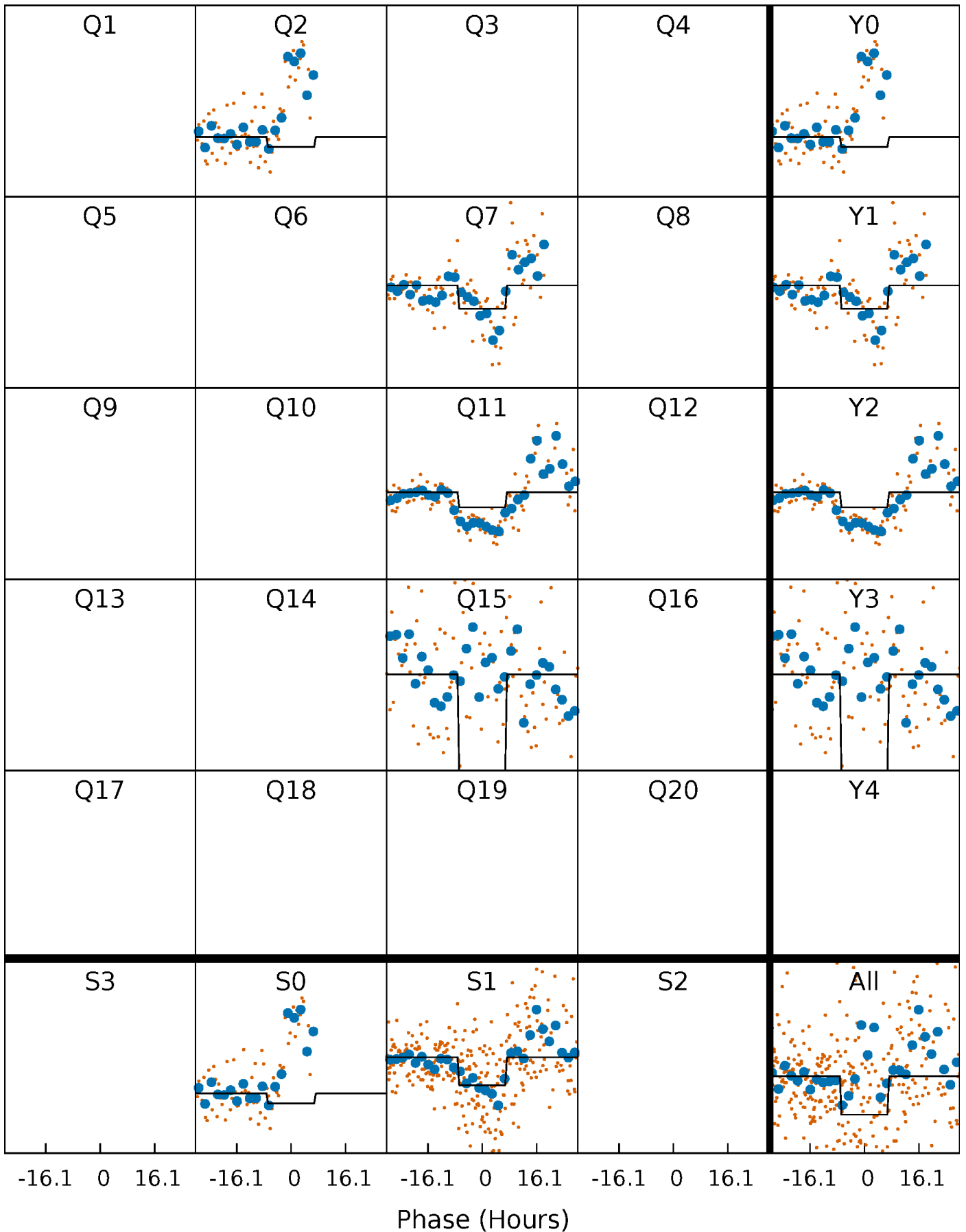
# DV Quarter-Phased Transit Curves

TCE 004678188-01 P=374.559875 Days  $T_0=258.449783$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

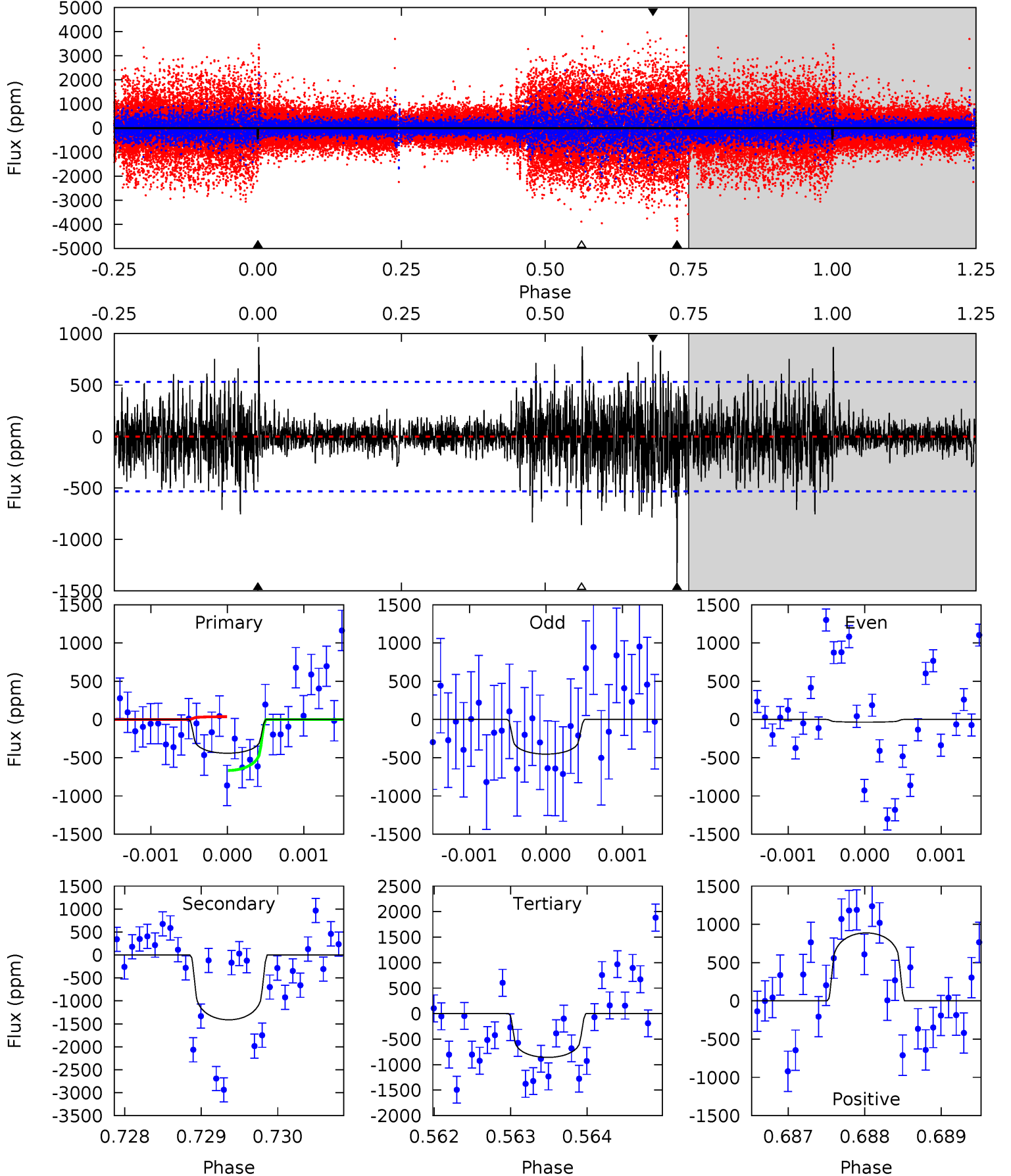
TCE 004678188-01 P=374.656134 Days  $T_0=258.213952$  (BKJD)



# DV Model-Shift Uniqueness Test

004678188-01, P = 374.559875 Days, E = 258.449783 Days

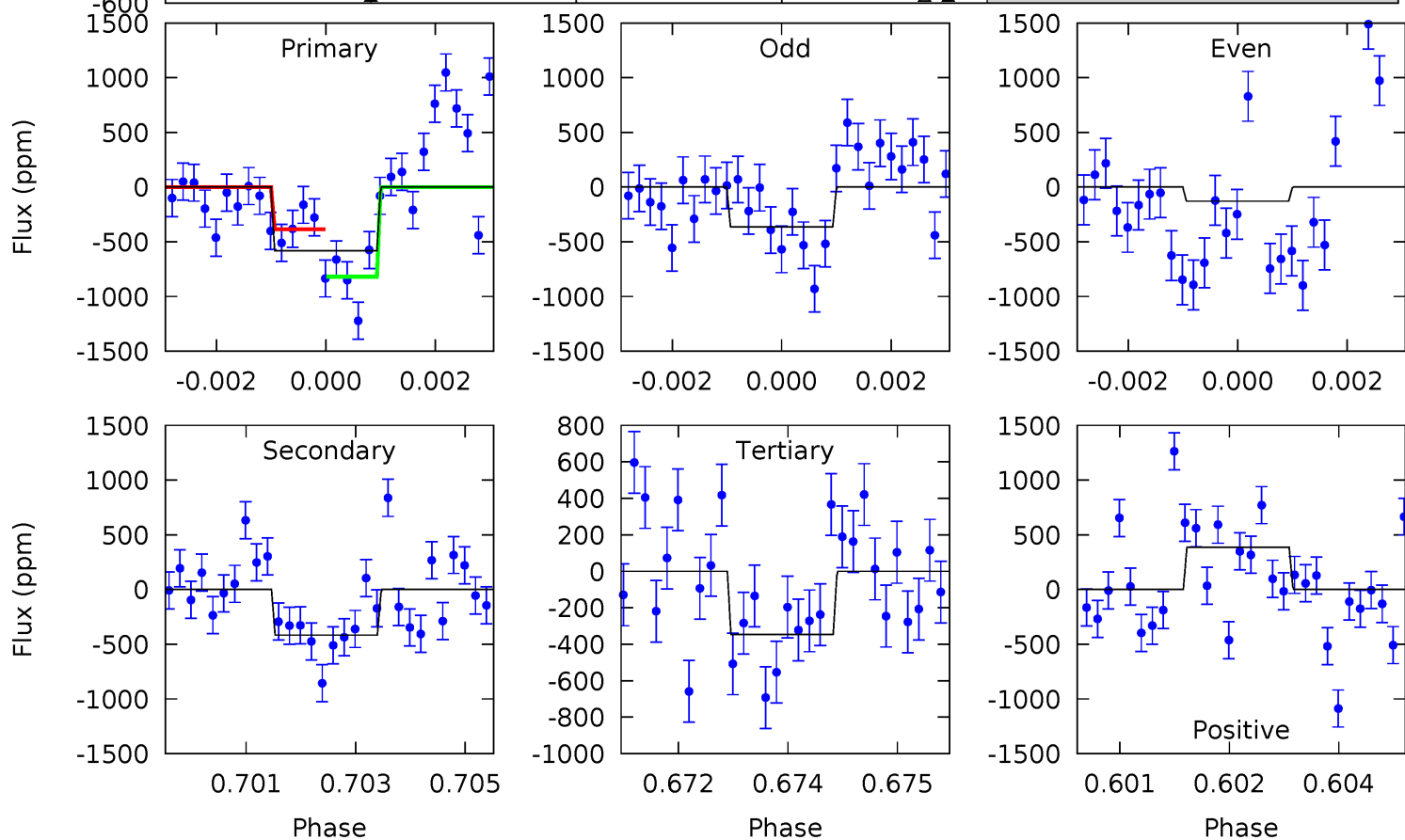
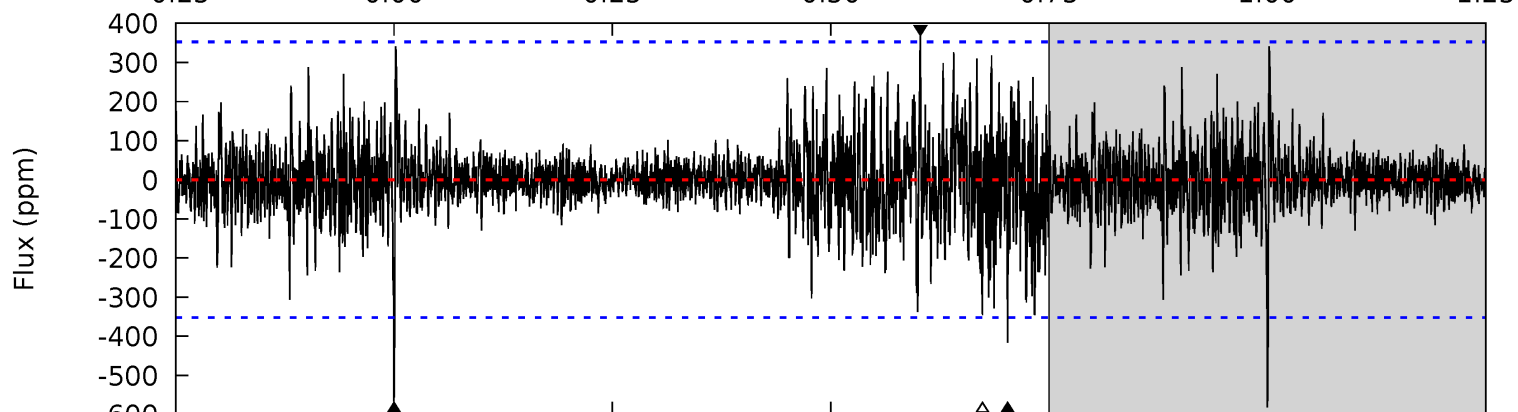
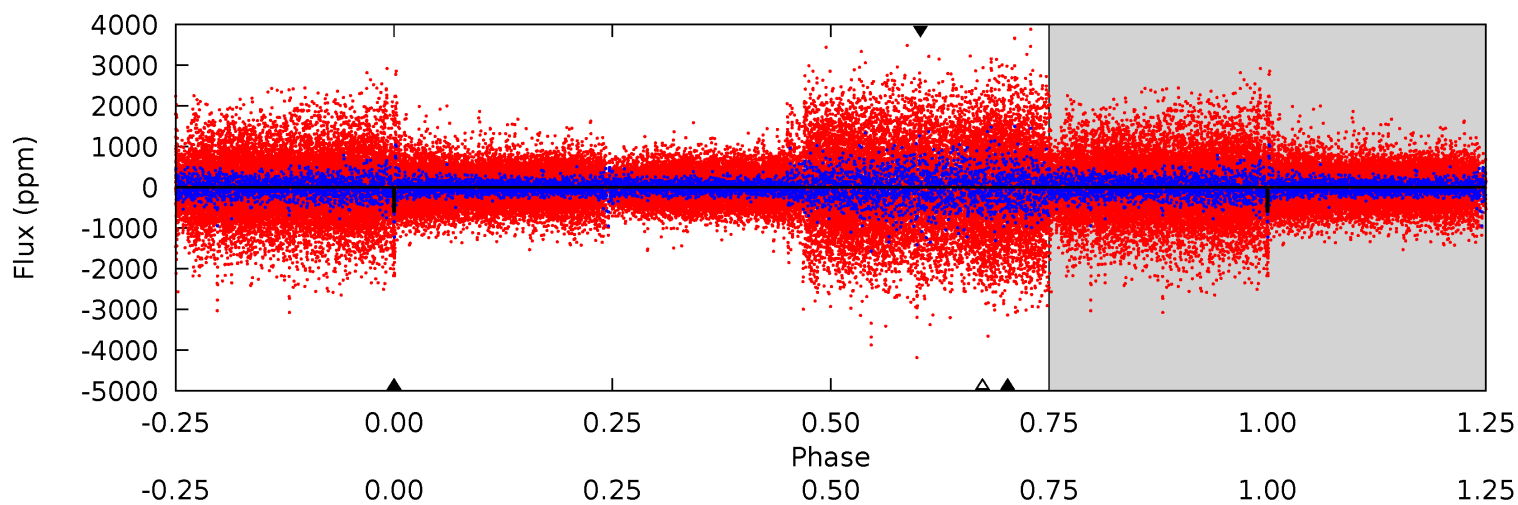
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.54	14.5	8.83	9.14	5.47	3.32	1.95	-4.29	-4.60	5.70	5.39	1.92	0.13	0.39	3.03



# Alt Model-Shift Uniqueness Test

004678188-01, P = 374.656134 Days, E = 258.213952 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
8.86	6.35	5.28	5.90	5.36	3.15	1.16	3.58	2.96	1.08	0.45	1.75	-0.46	0.40	3.08



### Stellar Parameters For KIC 004678188

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6002^{+181}_{-181}$	$4.210^{+0.252}_{-0.168}$	$-0.280^{+0.300}_{-0.300}$	$1.266^{+0.341}_{-0.341}$	$0.948^{+0.143}_{-0.104}$	$0.658^{+0.890}_{-0.307}$
	+3%/-3%	+6%/-4%	+107%/-107%	+27%/-27%	+15%/-11%	+135%/-47%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 004678188-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1412 \pm 97$	$5.53^{+4.97}_{-3.81}$	$414^{+33}_{-33}$	$5793^{+6146}_{-1387}$	$25380^{+243155}_{-18412}$
Alt.	$-417 \pm 66$	$5.75^{+5.07}_{-3.73}$	$414^{+32}_{-33}$	$4430^{+2674}_{-902}$	$7003^{+51047}_{-5101}$

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

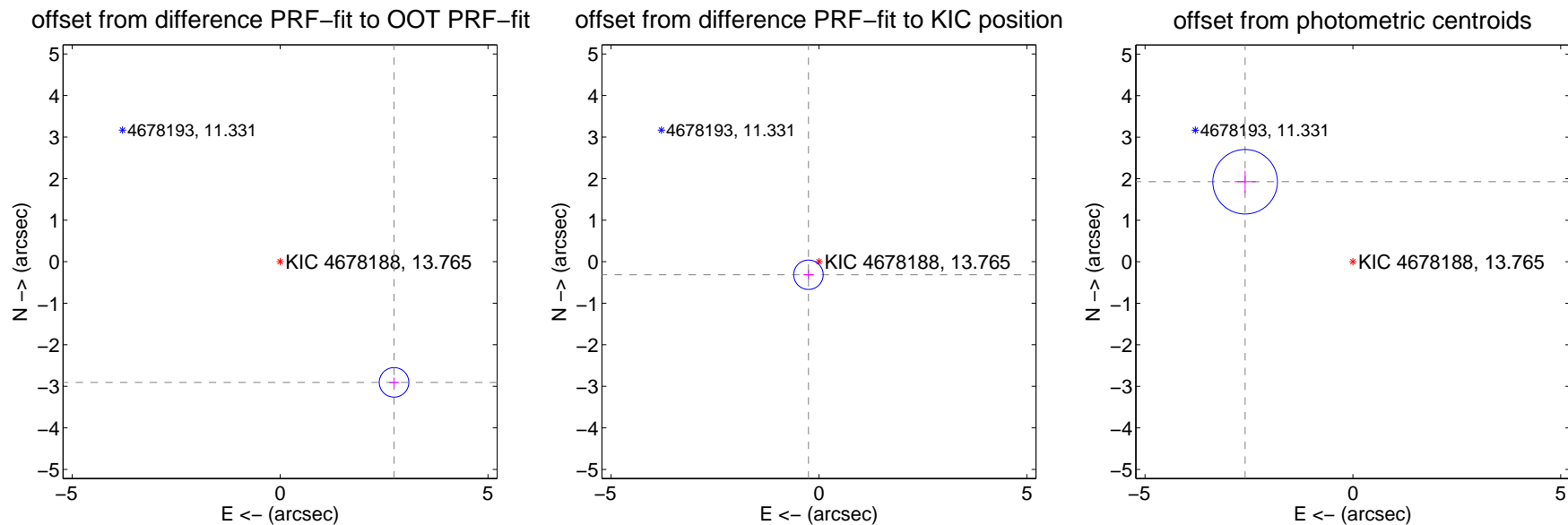
## DV Centroid Data

Supplemental centroid analysis for 004678188-01. Kepler magnitude: 13.77. Transit SNR 5.29

There are 1 quarters with good PRF difference image offsets

The OOT PRF centroid is offset from the target star catalog position by about 3.96 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$3.993 \pm 0.118$	33.72	$-2.740 \pm 0.121$	$-2.904 \pm 0.116$
PRF-fit source offset from KIC position	$0.403 \pm 0.118$	3.42	$0.253 \pm 0.121$	$-0.314 \pm 0.116$
photometric centroid source offset	$3.23 \pm 0.26$	12.47	$2.59 \pm 0.25$	$1.93 \pm 0.27$



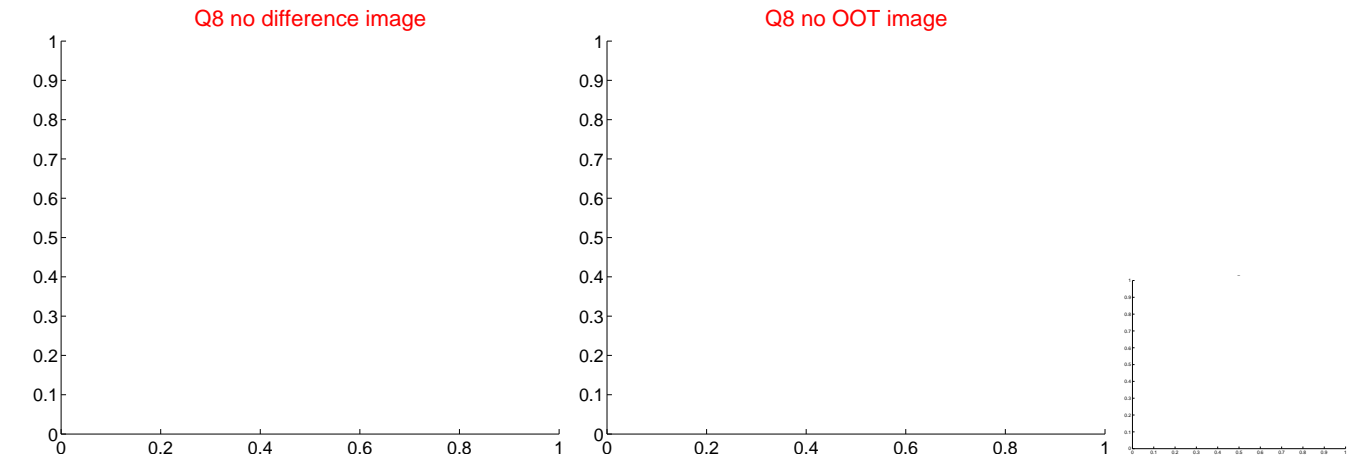
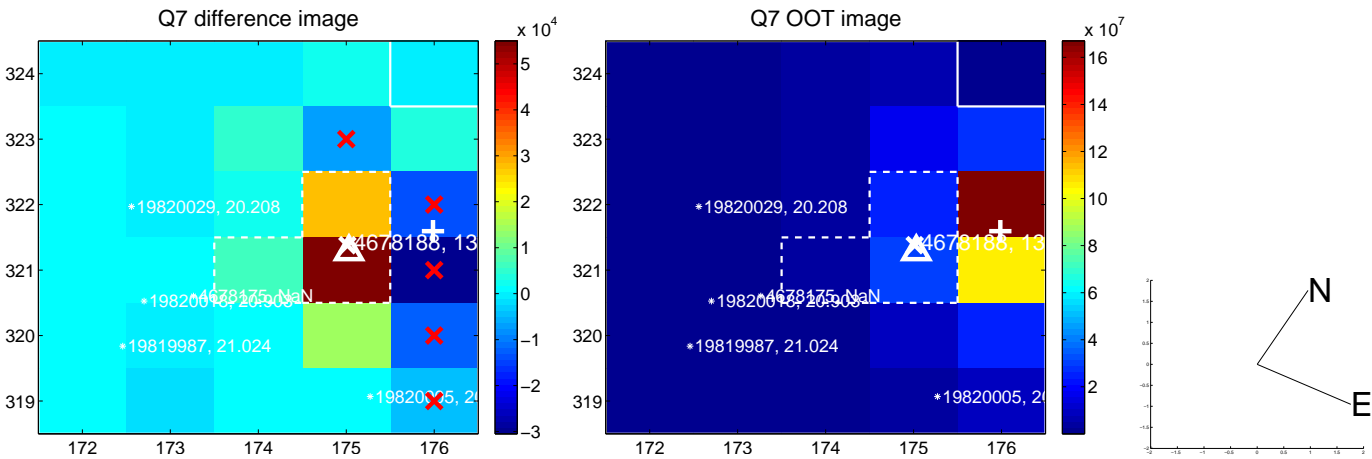
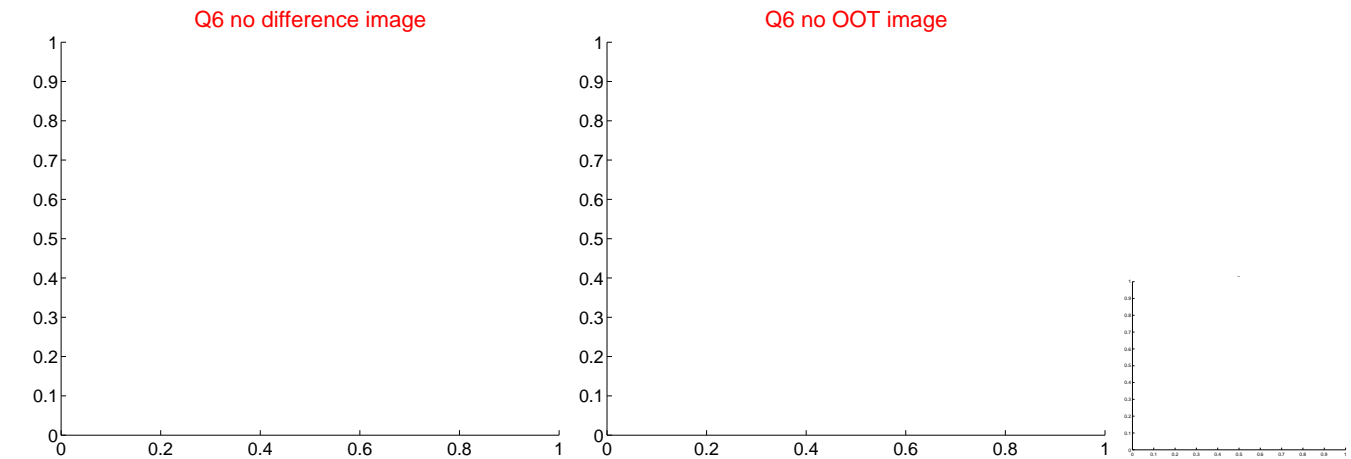
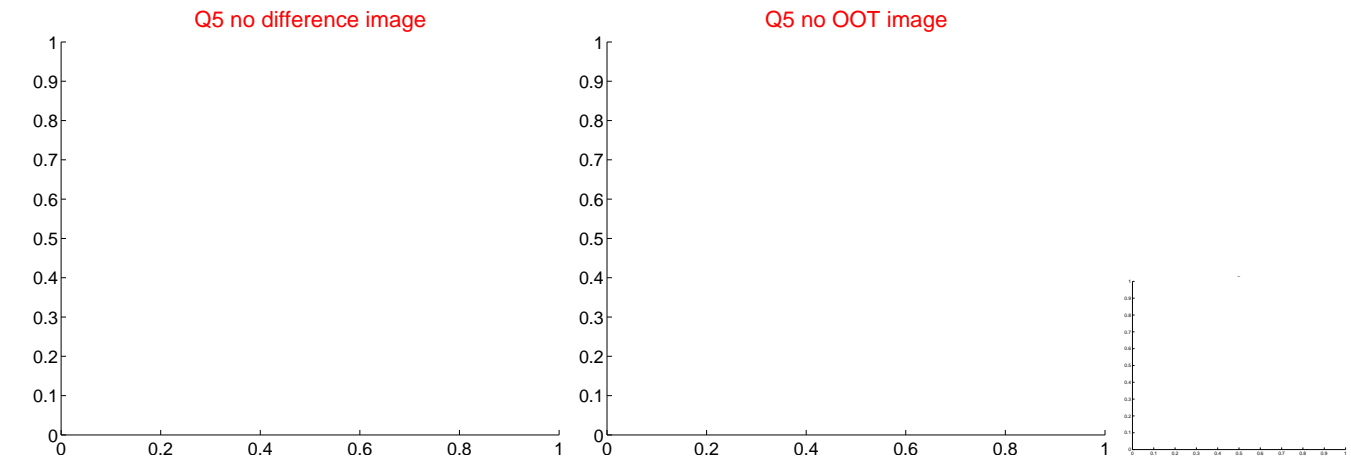
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

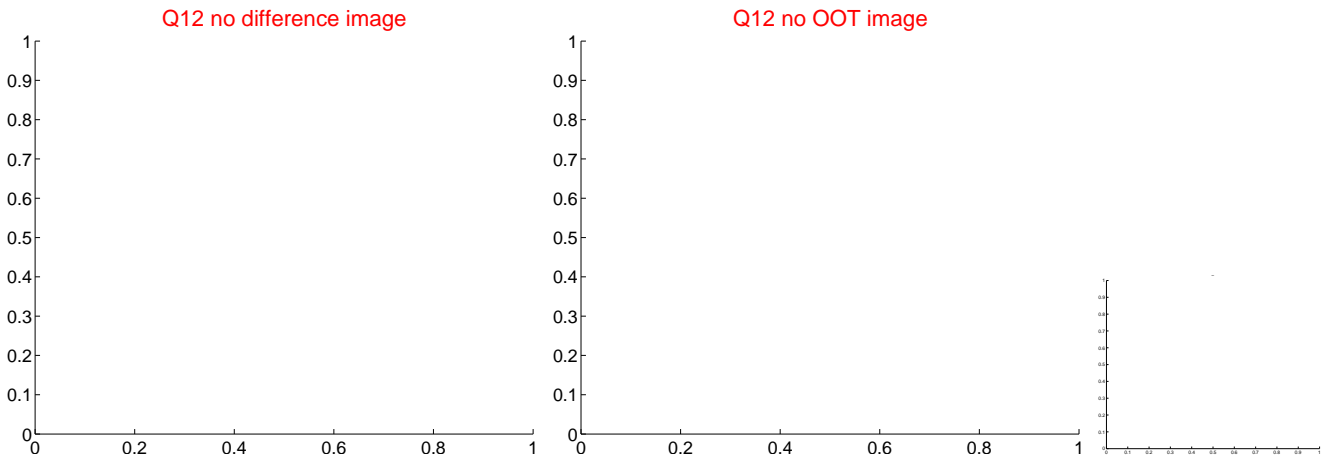
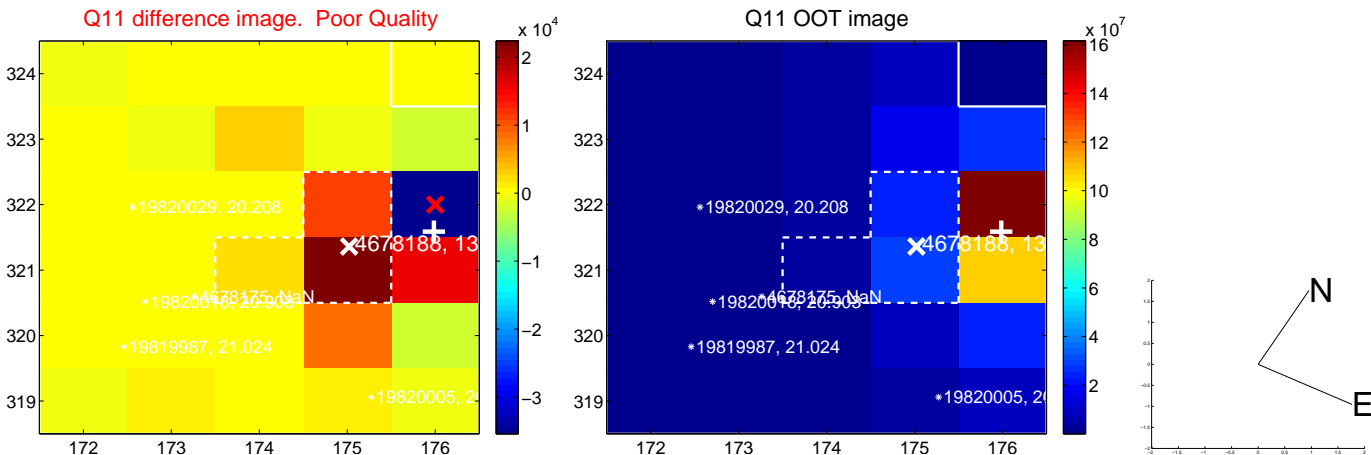
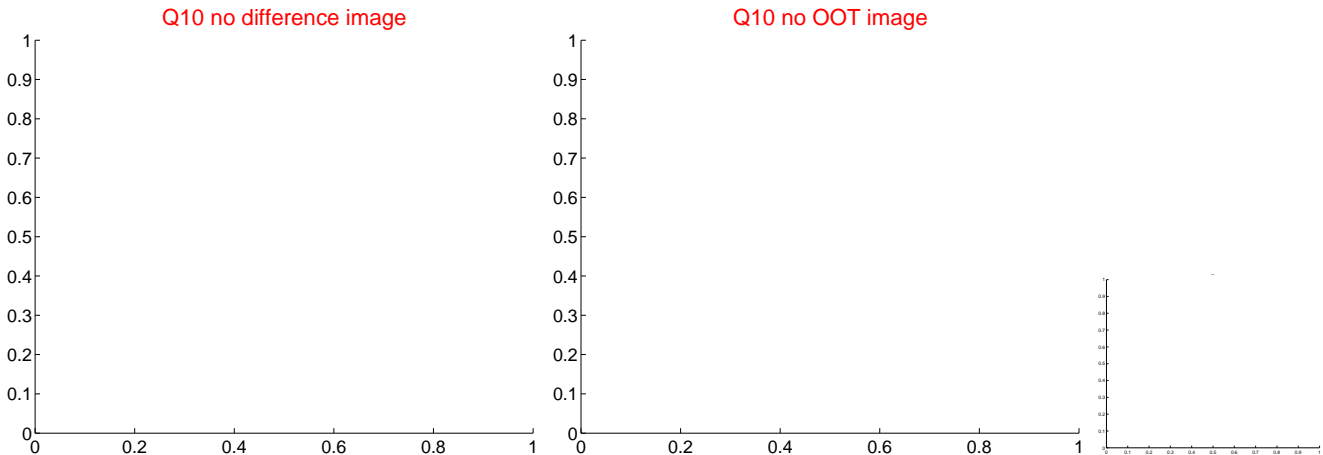
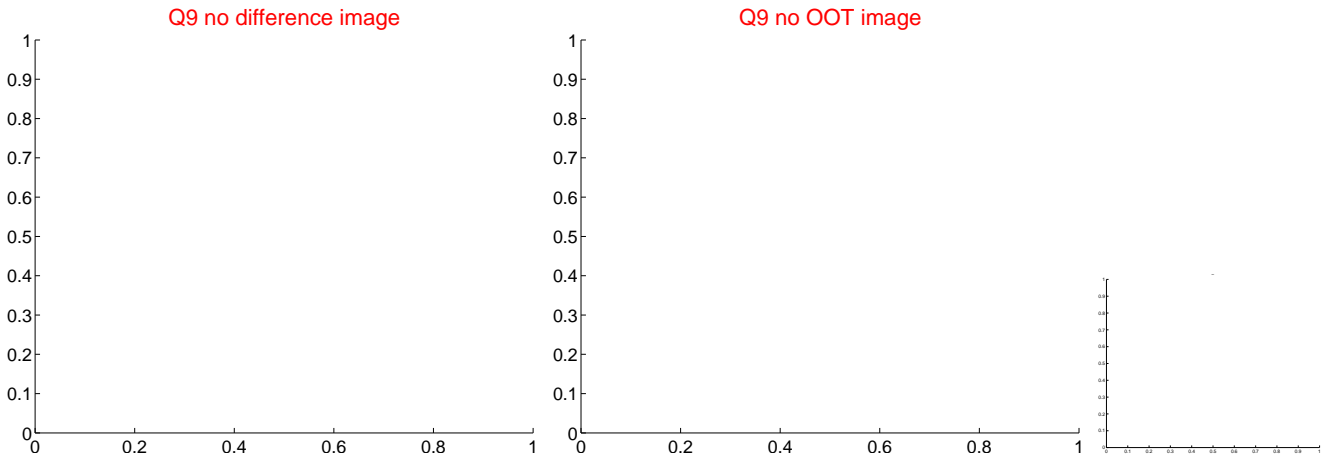




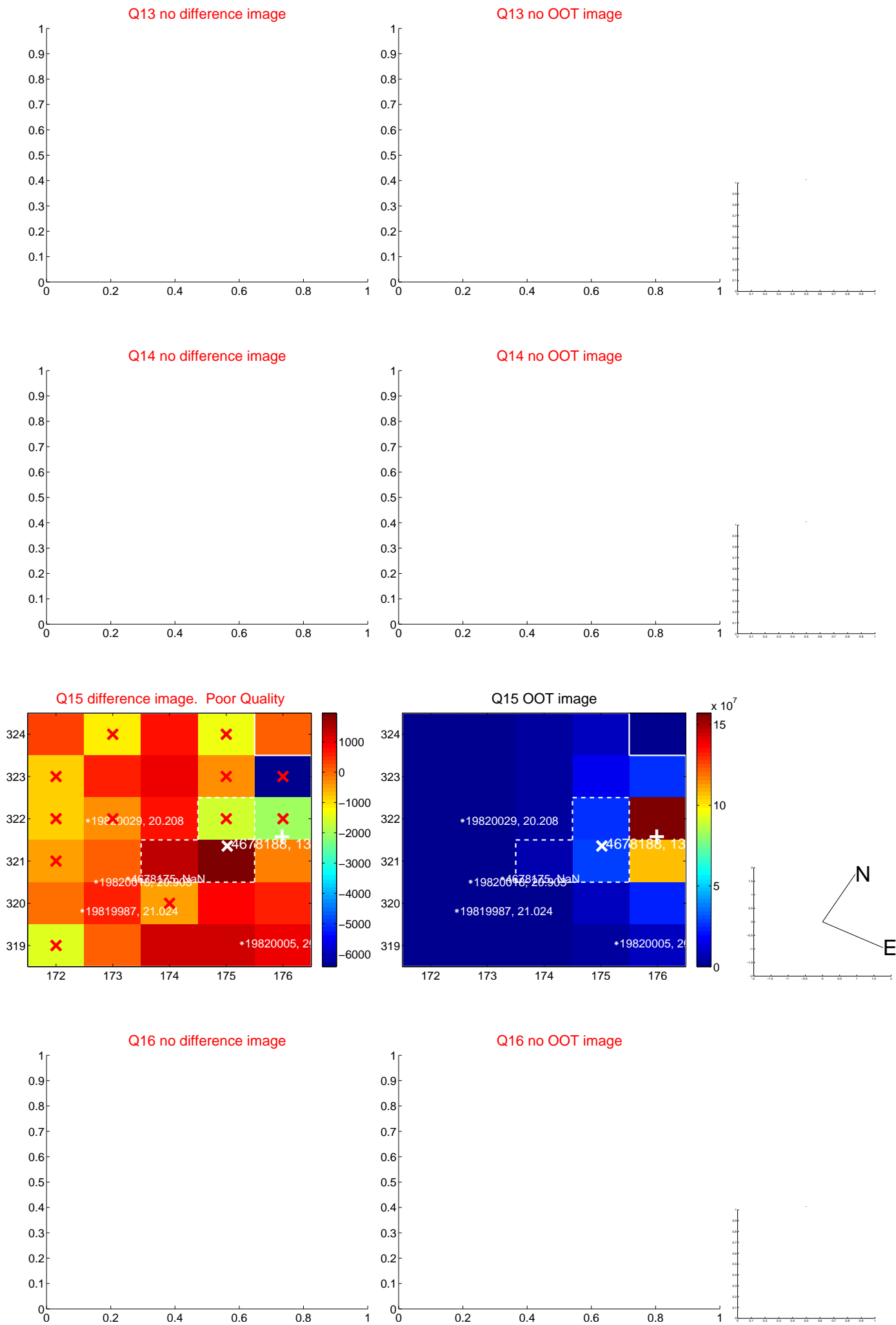
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



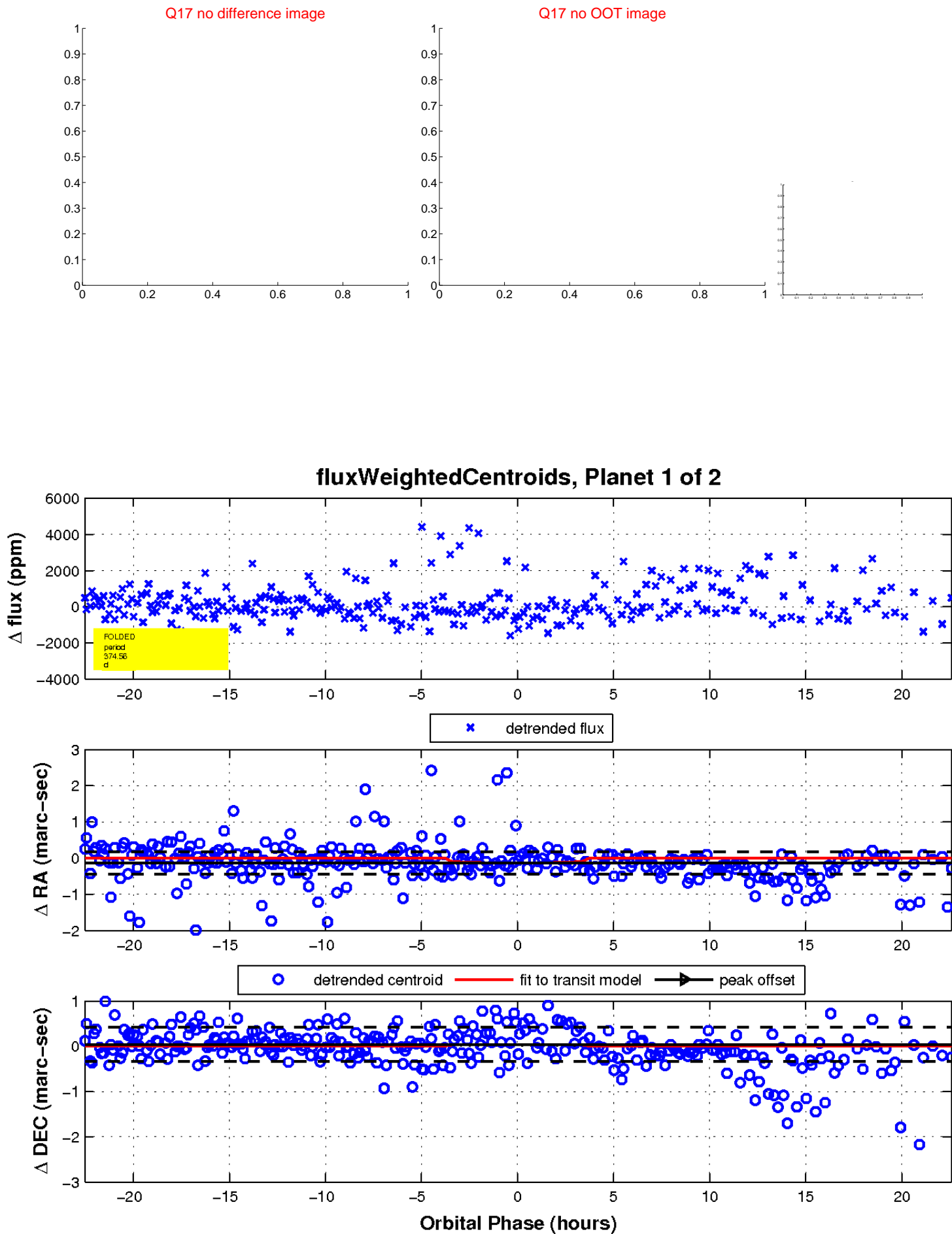
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



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

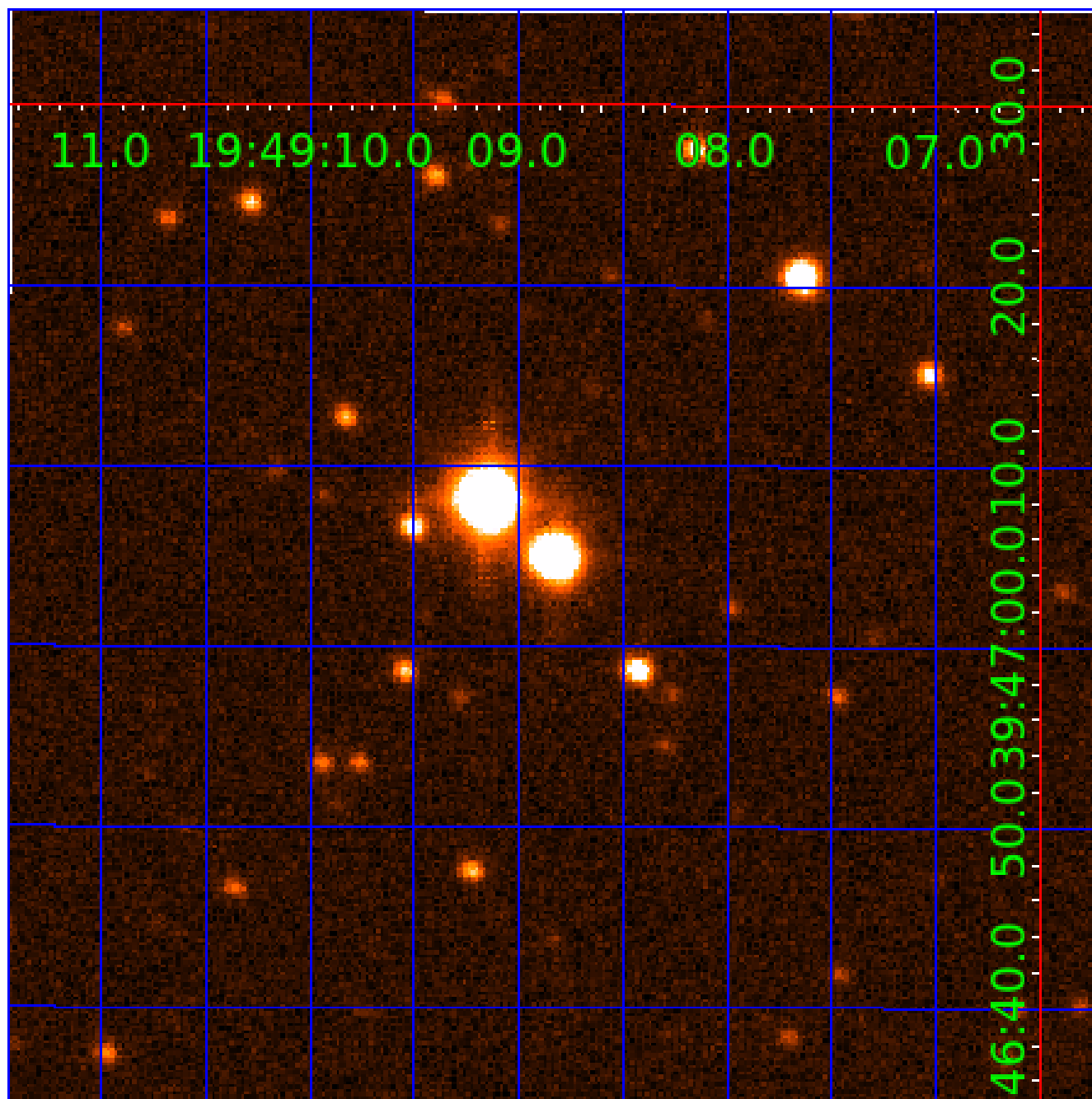


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 004678188

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004678188-01	OBS	No	374.559875	258.449783	609.1	7.540	11.4	5.3	1.27	6002	3.26	1.87
004678188-02	OBS	No	569.277981	226.364432	949.1	5.441	7.8	8.2	1.27	6002	4.20	1.07

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004678188-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_ZUMA_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV— INCONSISTENT_TRANS—CENT_FEW_DIFFS
004678188-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT— 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.

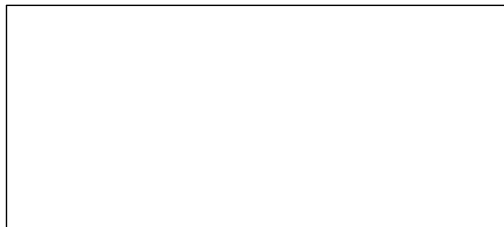
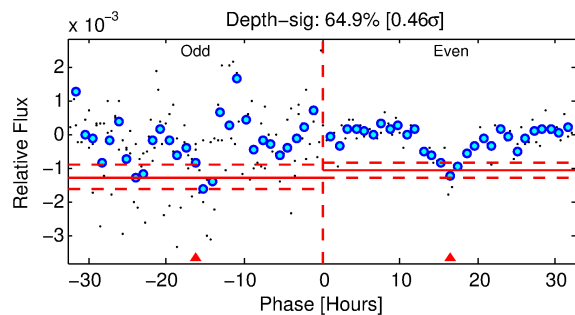
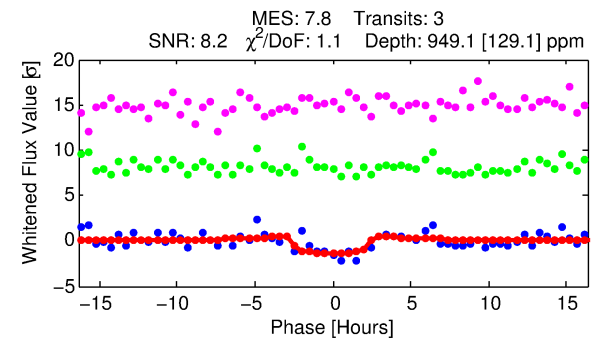
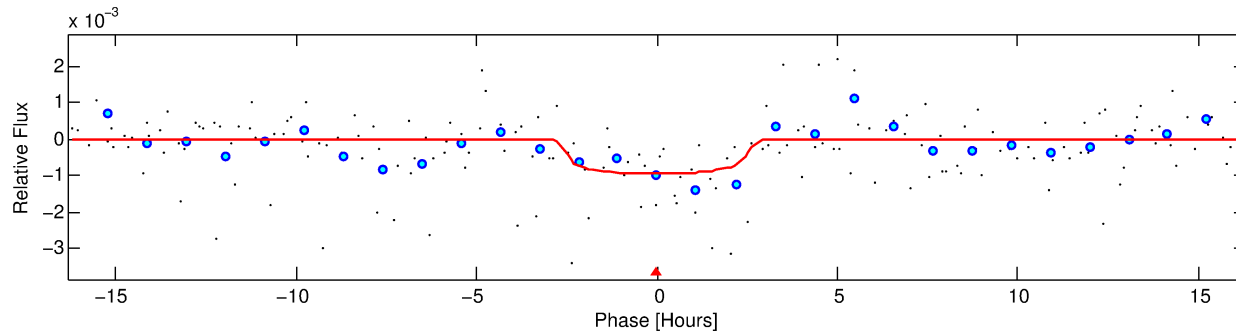
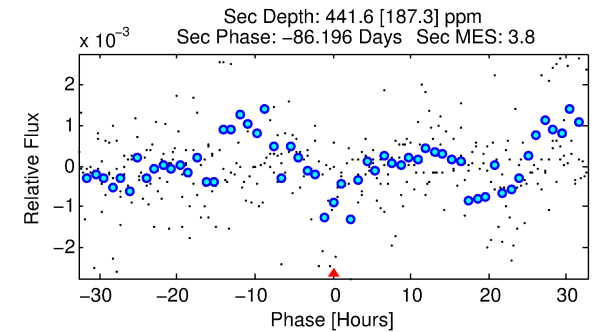
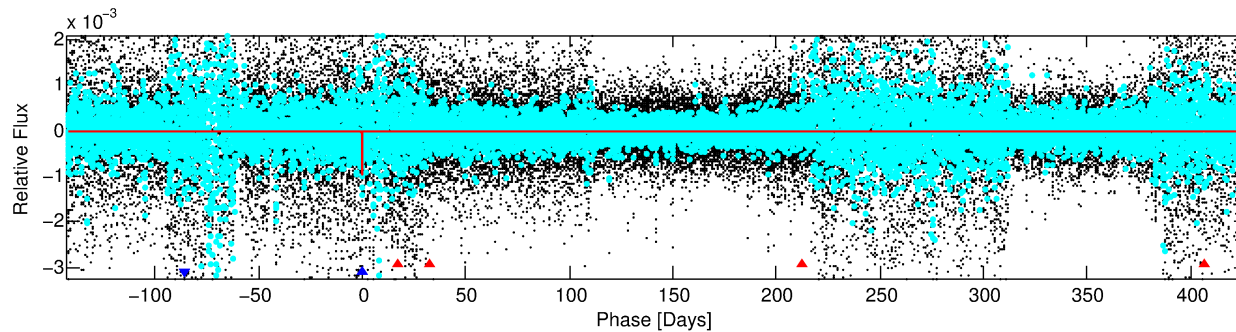
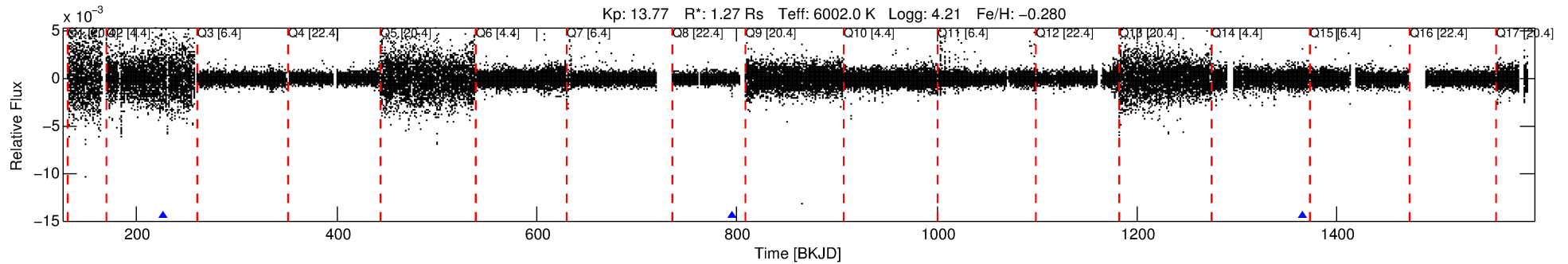
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004678188-02

No Significant Match Found

# DV One-Page Summary

KIC: 4678188 Candidate: 2 of 2 Period: 569.278 d



## DV Fit Results:

Period = 569.27798 [0.01464] d  
Epoch = 226.3644 [0.0206] BKJD  
Rp/R\* = 0.0304 [0.0275]  
a/R\* = 586.88 [2602.55]  
b = 0.72 [2.97]  
Seff = 1.07 [0.47]  
Teq = 259 [29] K  
Rp = 4.20 [3.96] Re  
a = 1.3209 [0.3486] AU  
Ag = 24065.58 [45872.29] [0.52 $\sigma$ ]  
Teffp = 4992 [2323] K [2.04 $\sigma$ ]

## DV Diagnostic Results:

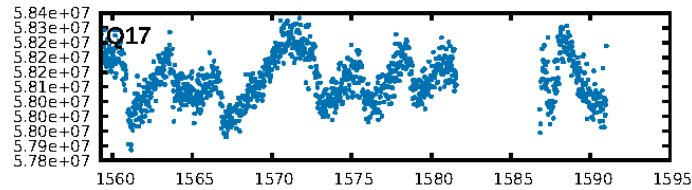
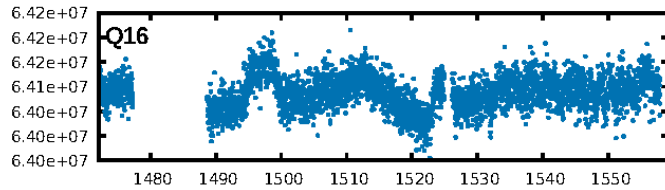
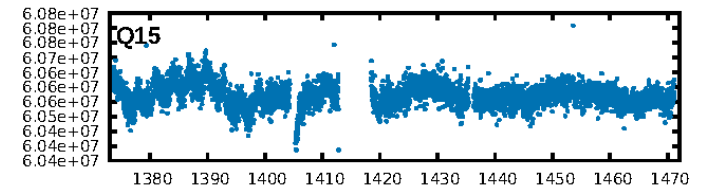
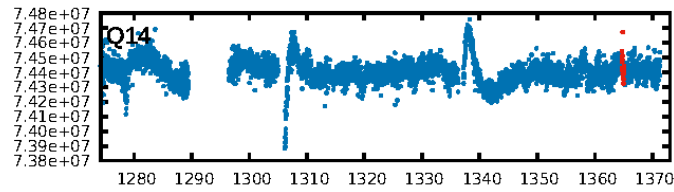
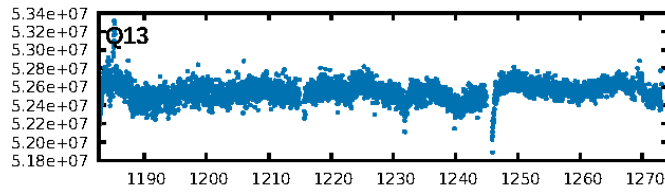
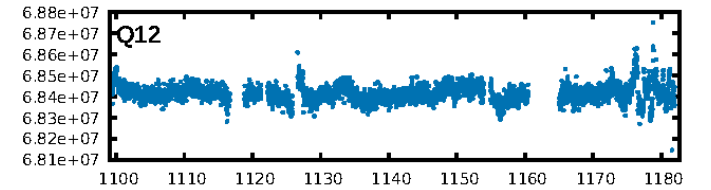
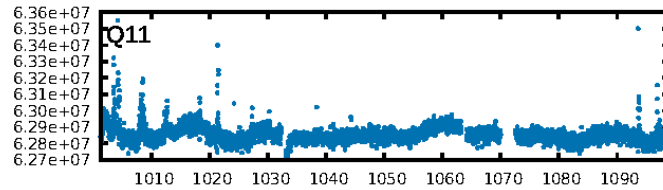
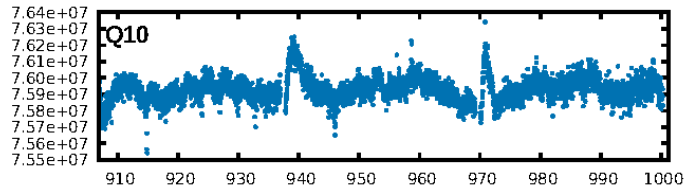
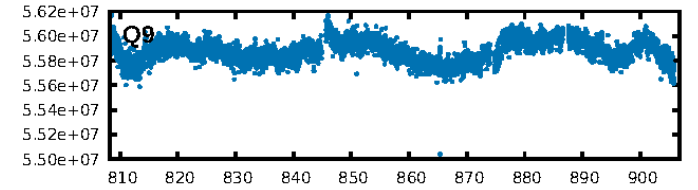
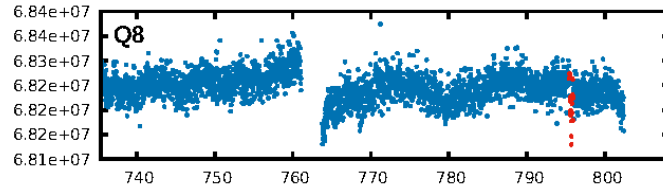
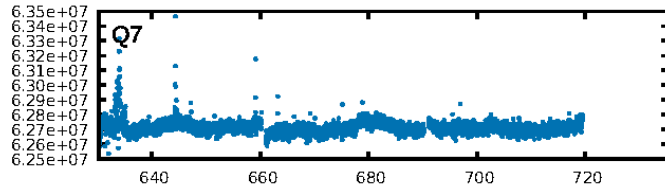
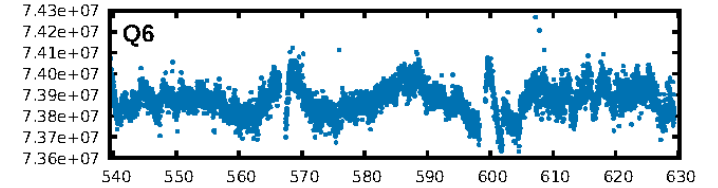
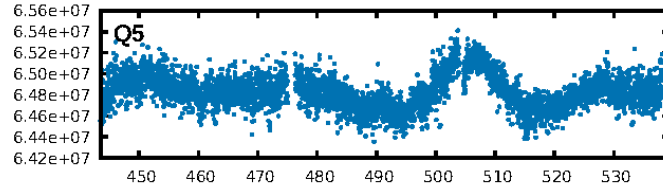
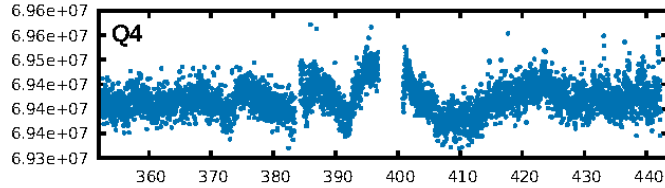
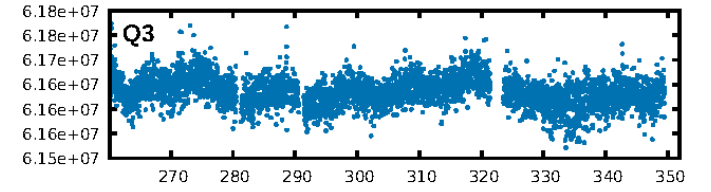
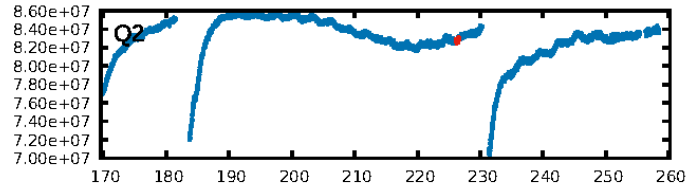
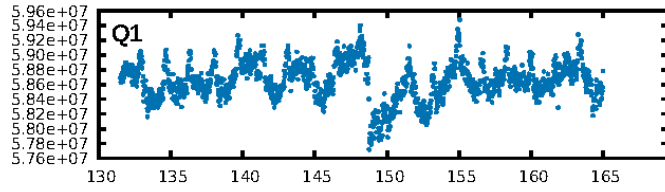
ShortPeriod-sig: 100.0% [502.57 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 34.5%  
ModelChiSquareGof-sig: 92.3%  
**Bootstrap-pfa: 3.74e-07**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 2.661  
Centroid-sig: 0.4%  
**Centroid-so: 2.717 arcsec [12.22 $\sigma$ ]**  
OotOffset-rm: N/A  
KicOffset-rm: N/A  
OotOffset-st: 0/0/0 [0]  
KicOffset-st: 0/0/0 [0]  
DiffImageQuality-fgm: N/A  
DiffImageOverlap-fno: 1.00 [3/3]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 14:33:22 Z

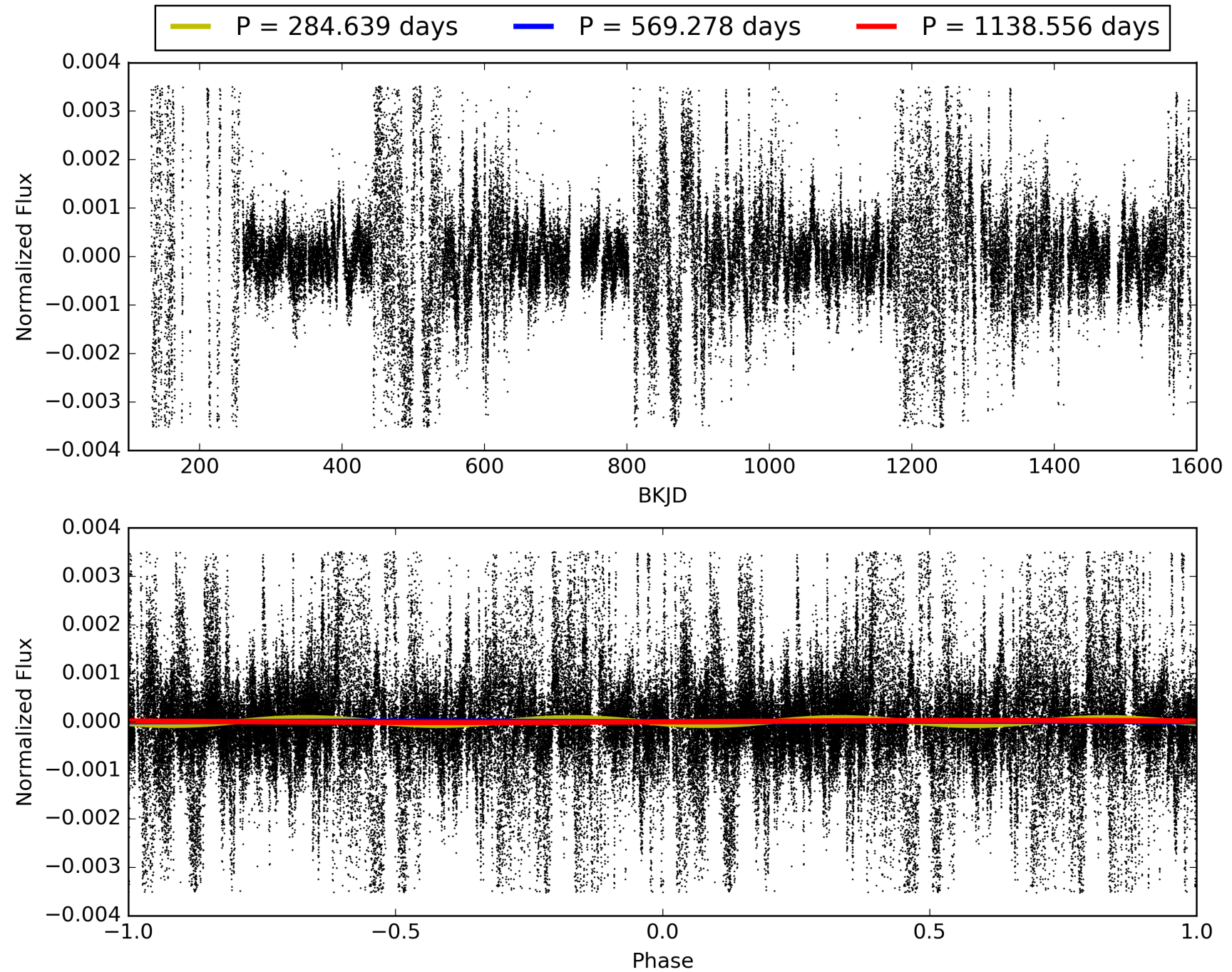
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 004678188-02, PDC Light Curves

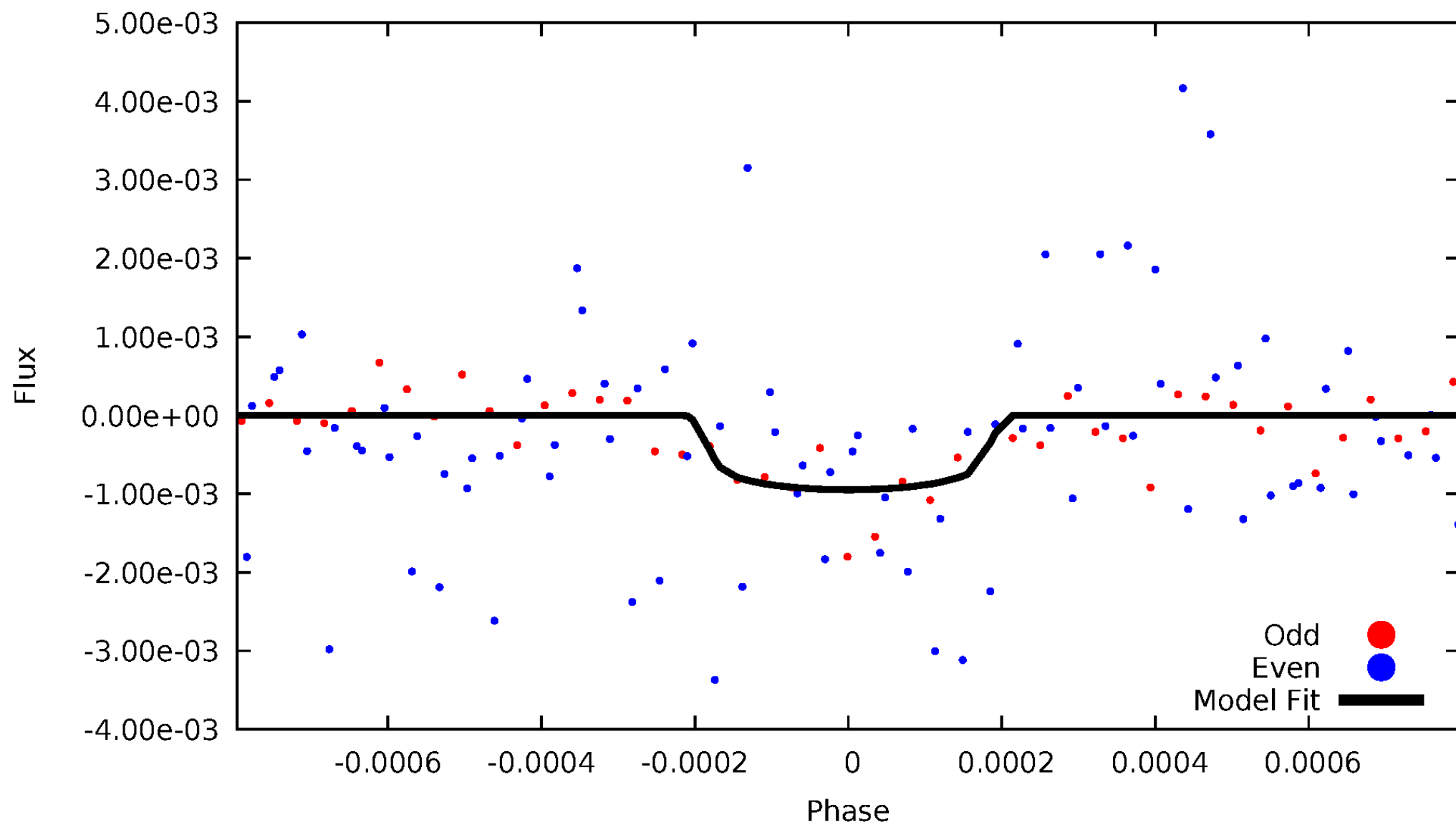


TCE 004678188-02



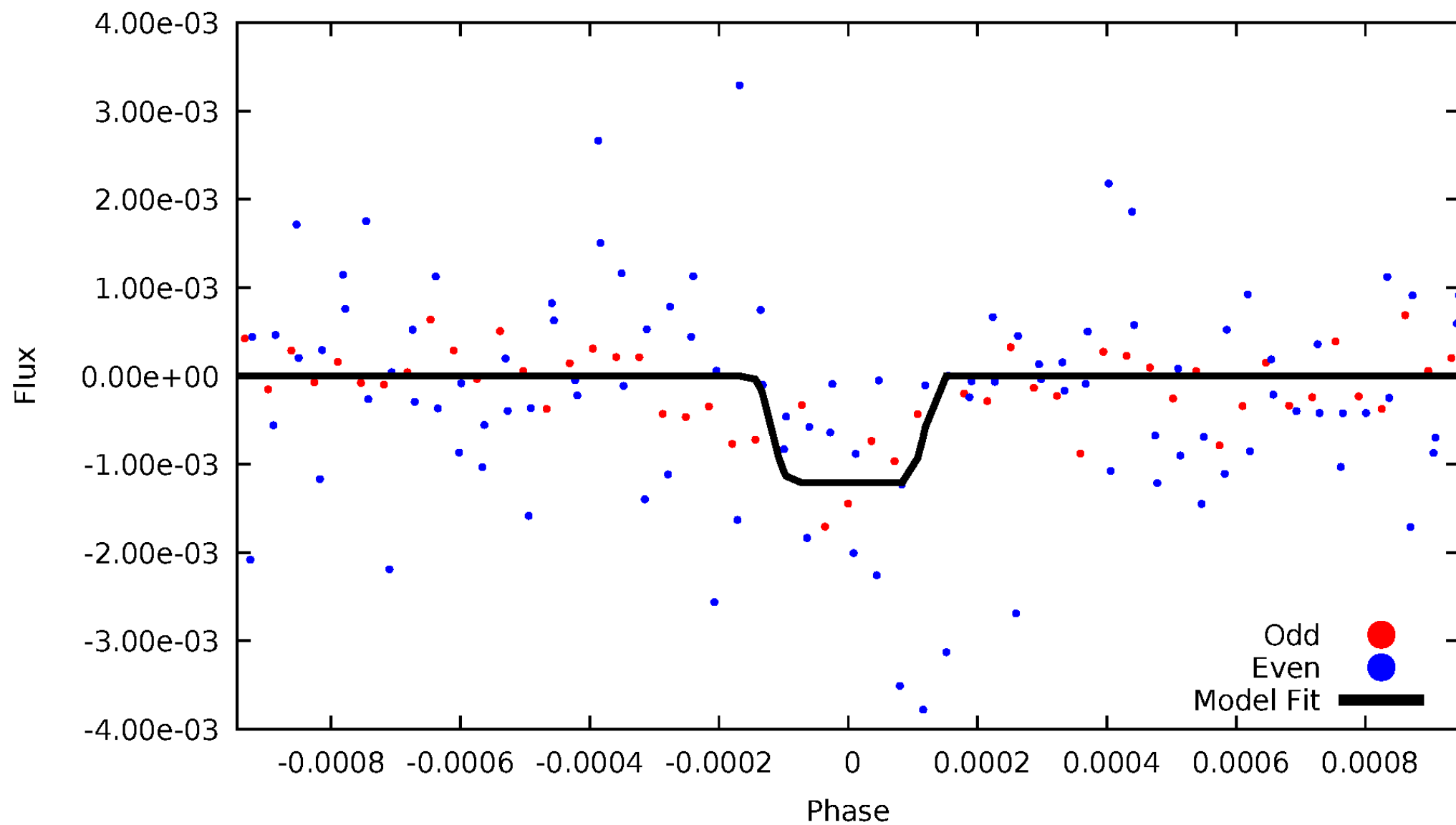
# DV Odd/Even

TCE 004678188-02



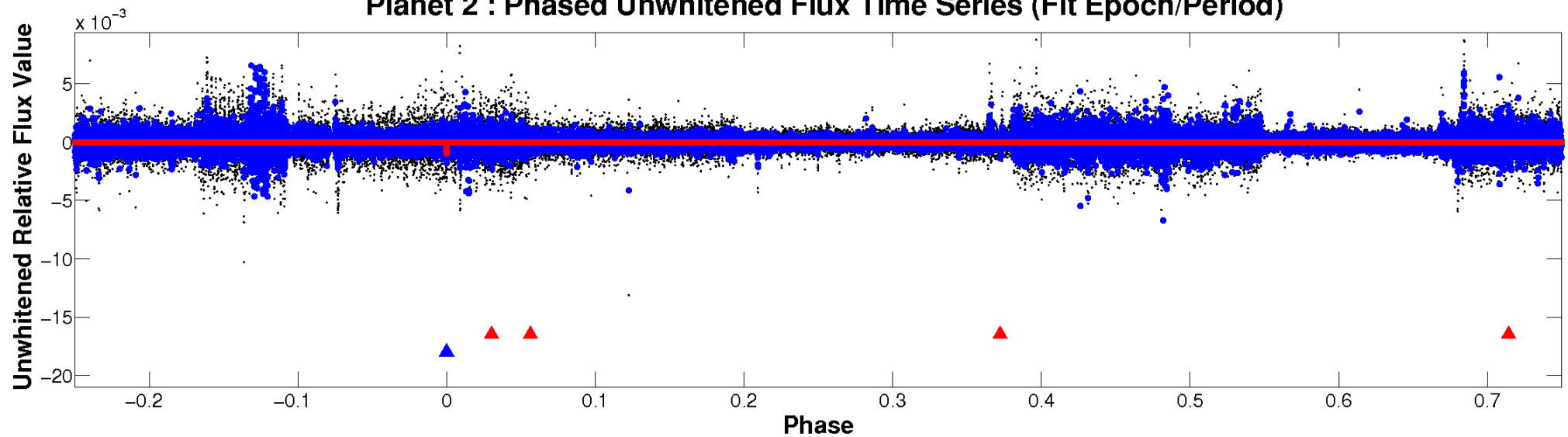
# ALT Odd/Even

TCE 004678188-02

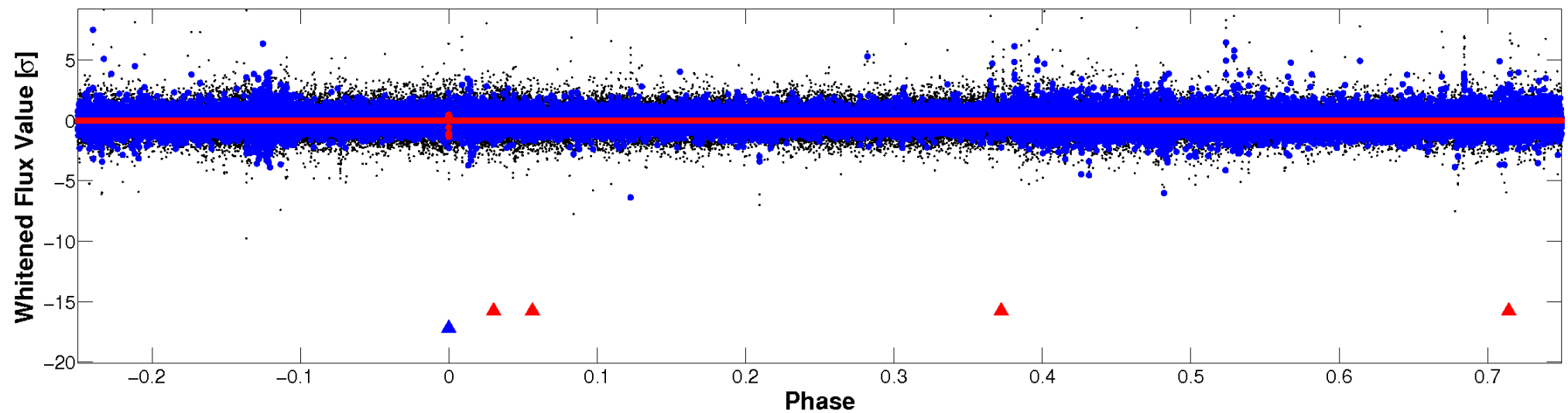


# Non-Whitened Vs. Whitened Light Curve

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

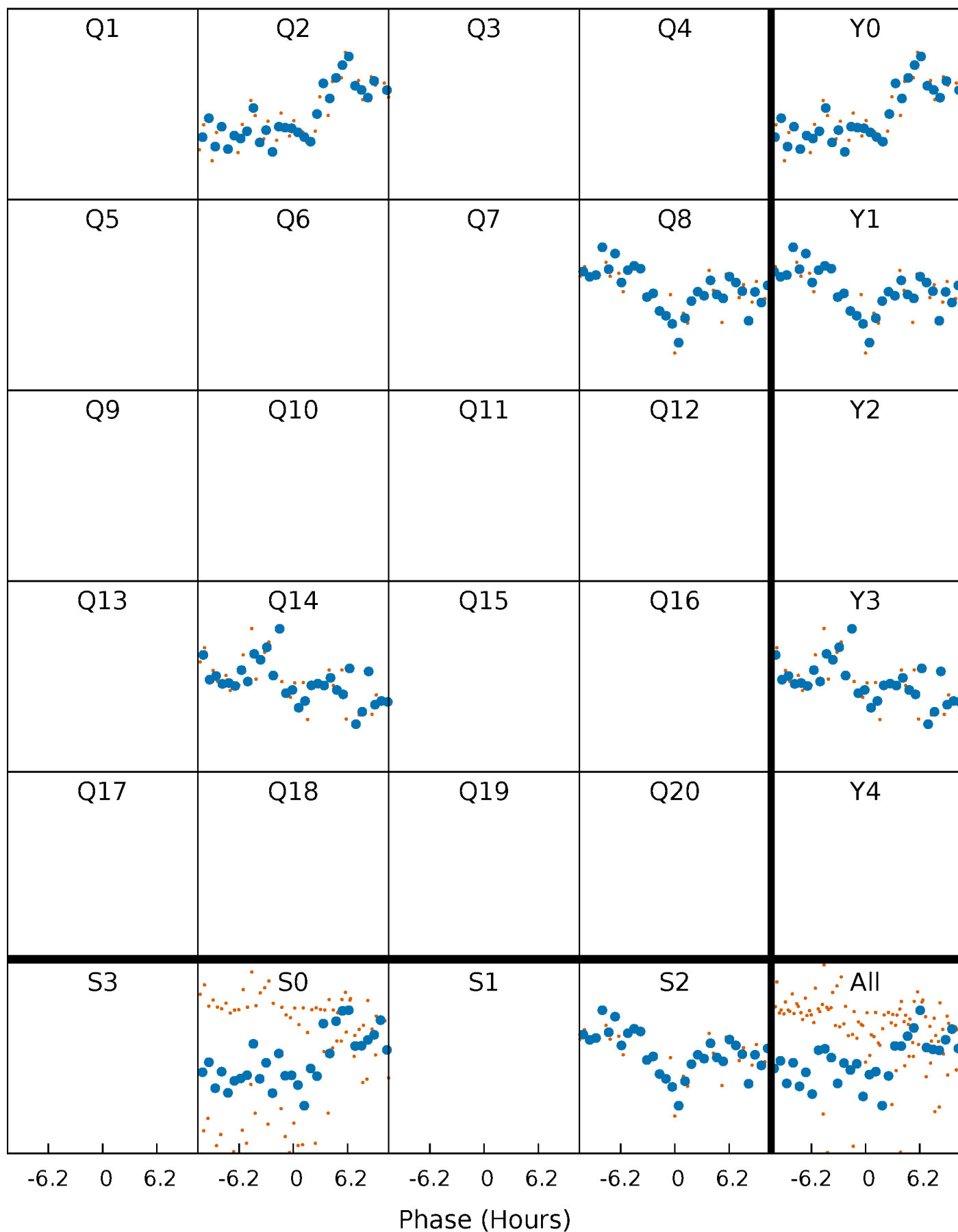


**Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



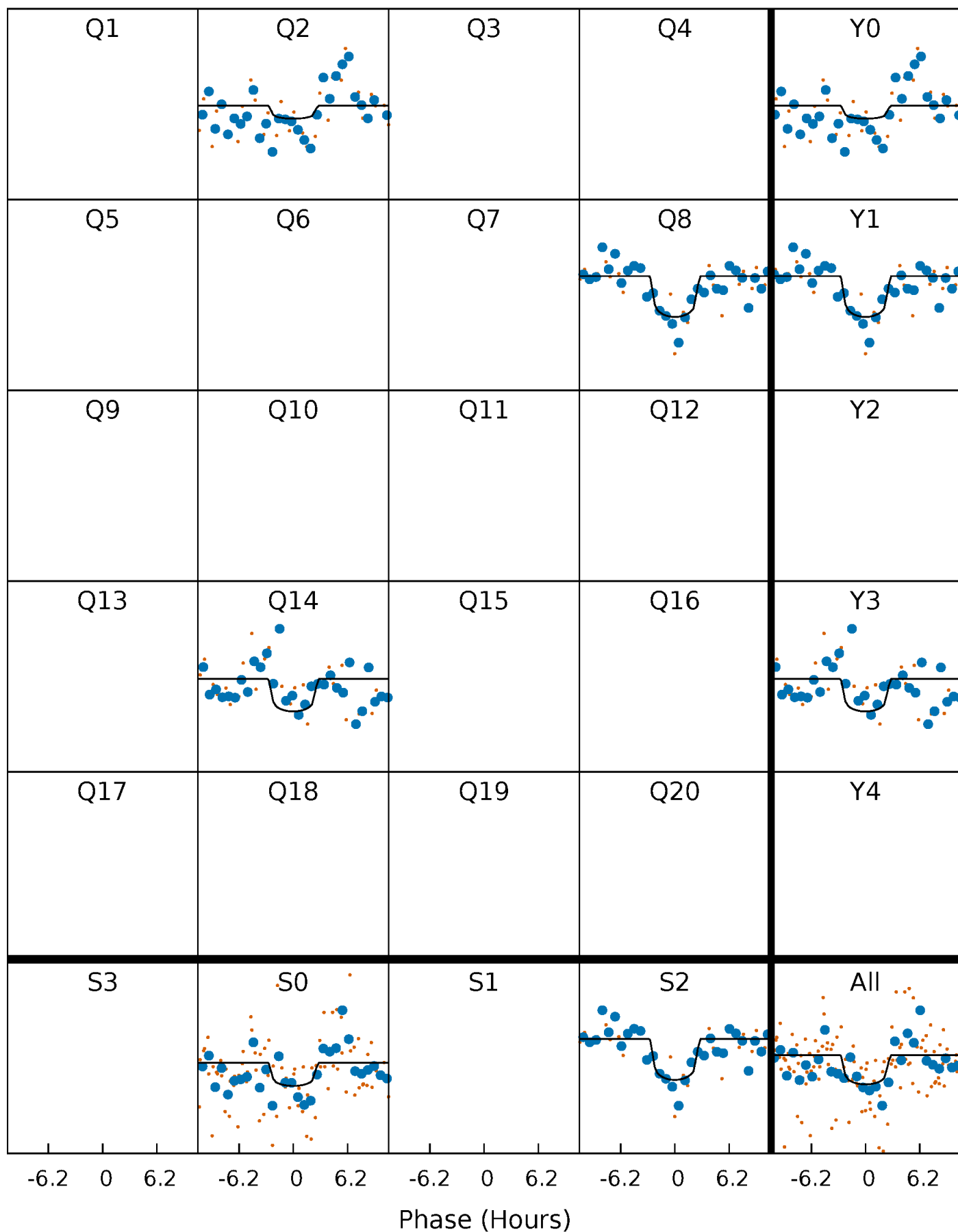
# PDC Quarter-Phased Transit Curves

TCE 004678188-02     $P=569.277981$  Days     $T_0=226.364432$  (BKJD)



# DV Quarter-Phased Transit Curves

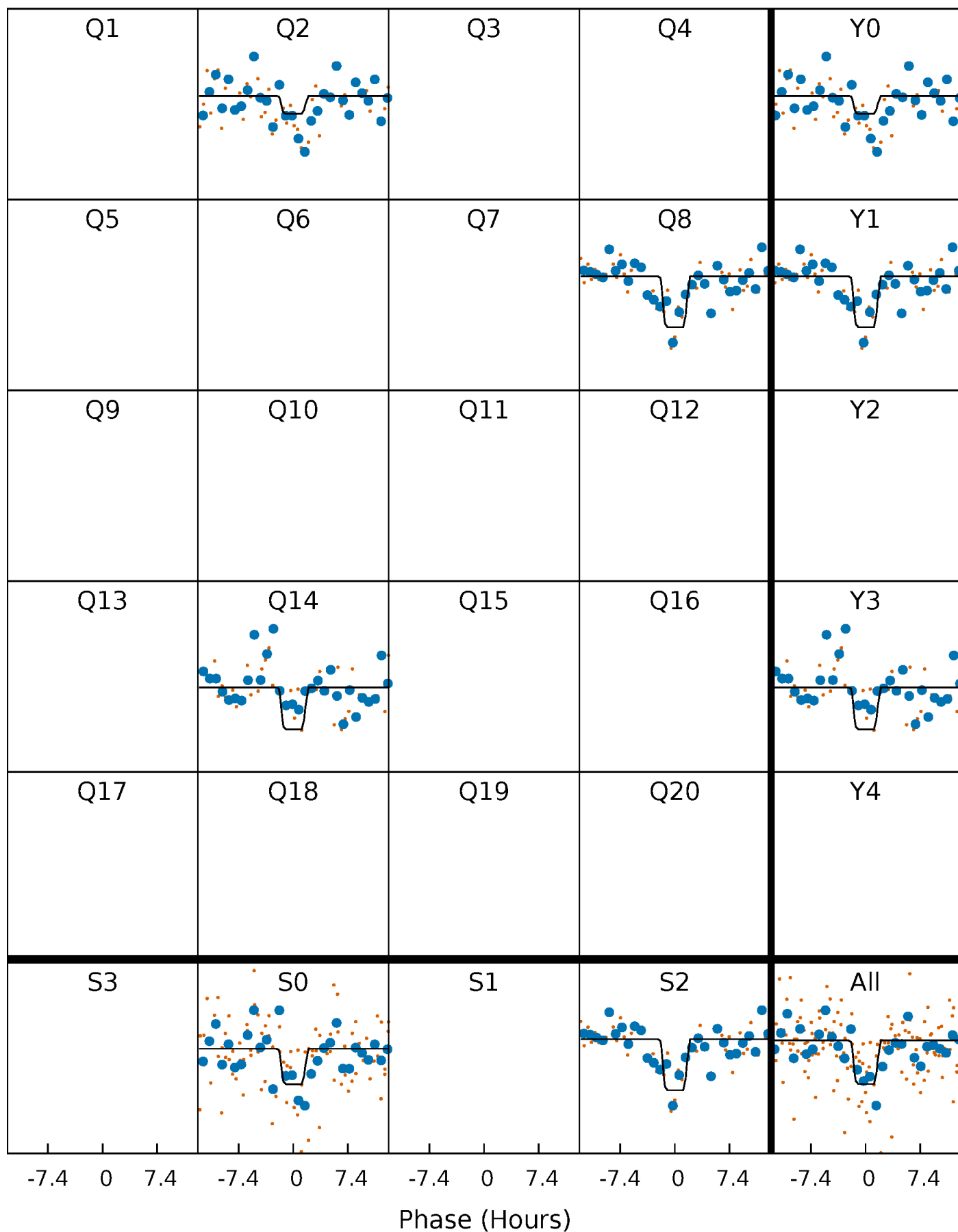
TCE 004678188-02 P=569.277981 Days  $T_0=226.364432$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

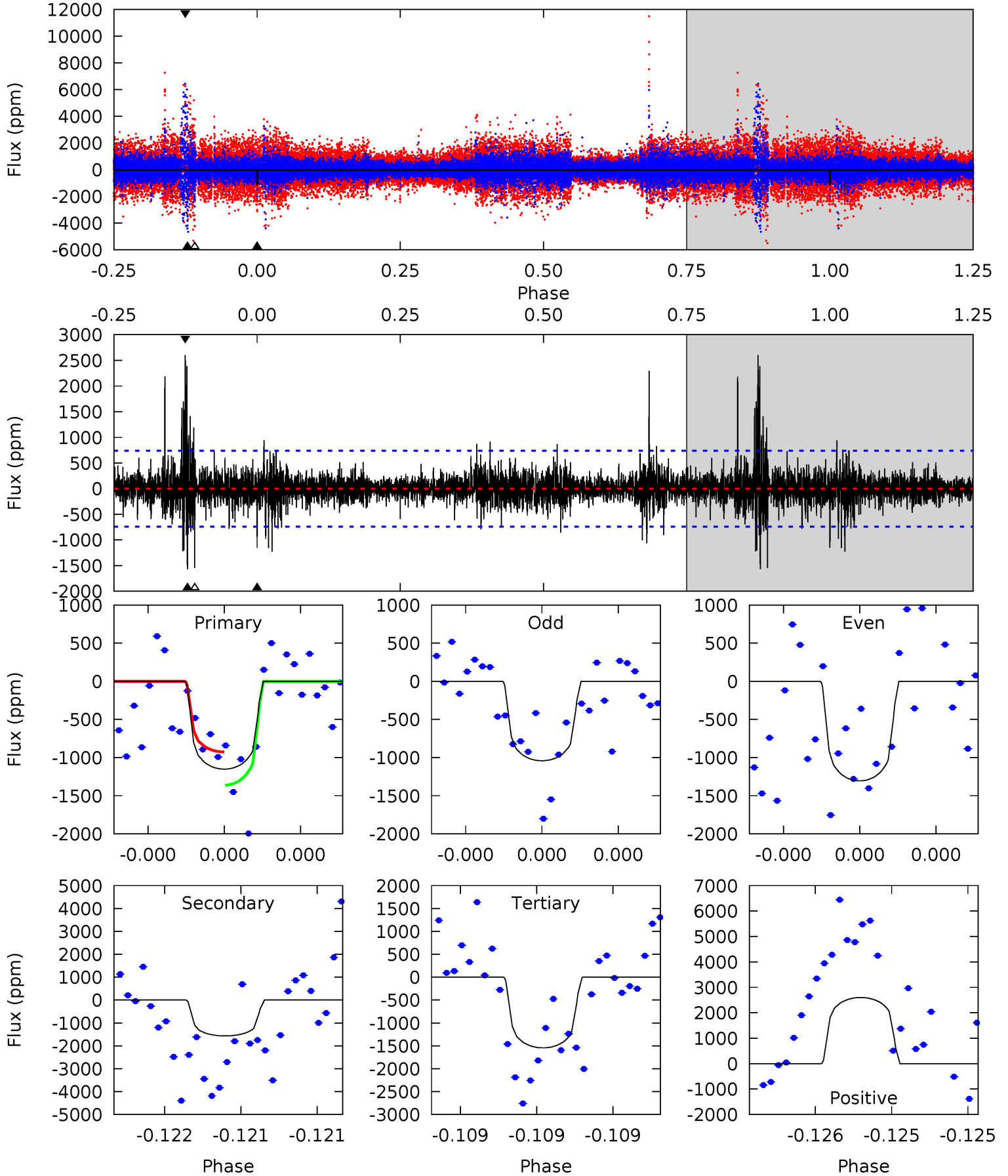
TCE 004678188-02 P=569.278982 Days  $T_0=226.383399$  (BKJD)



# DV Model-Shift Uniqueness Test

004678188-02, P = 569.277981 Days, E = 226.364432 Days

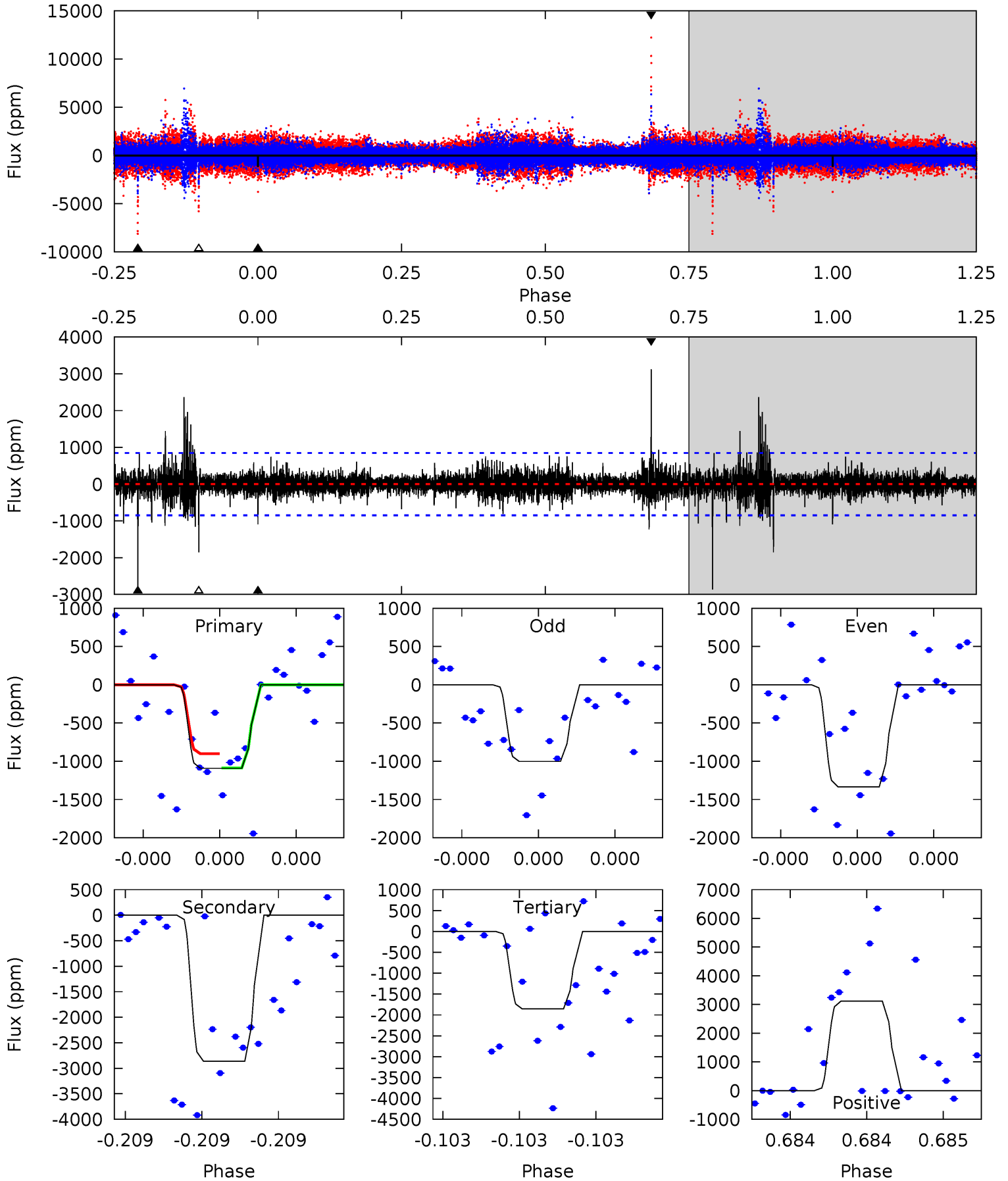
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.73	11.9	11.7	19.7	5.60	3.53	1.67	-2.98	-11.0	0.17	-7.85	0.97	1.03	0.62	1.62



# Alt Model-Shift Uniqueness Test

004678188-02, P = 569.278982 Days, E = 226.383399 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
7.29	19.1	12.4	20.8	5.67	3.63	1.37	-5.09	-13.5	6.72	-1.72	1.08	1.22	0.52	0.61



### Stellar Parameters For KIC 004678188

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6002^{+181}_{-181}$	$4.210^{+0.252}_{-0.168}$	$-0.280^{+0.300}_{-0.300}$	$1.266^{+0.341}_{-0.341}$	$0.948^{+0.143}_{-0.104}$	$0.658^{+0.890}_{-0.307}$
	+3%/-3%	+6%/-4%	+107%/-107%	+27%/-27%	+15%/-11%	+135%/-47%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 004678188-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-1567 \pm 132$	$4.88^{+3.57}_{-3.04}$	$361^{+28}_{-30}$	$6308^{+5622}_{-1374}$	$65750^{+372870}_{-44404}$
Alt.	$-2861 \pm 150$	$5.22^{+3.57}_{-2.88}$	$361^{+27}_{-29}$	$7181^{+5174}_{-1684}$	$99035^{+412724}_{-63303}$

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

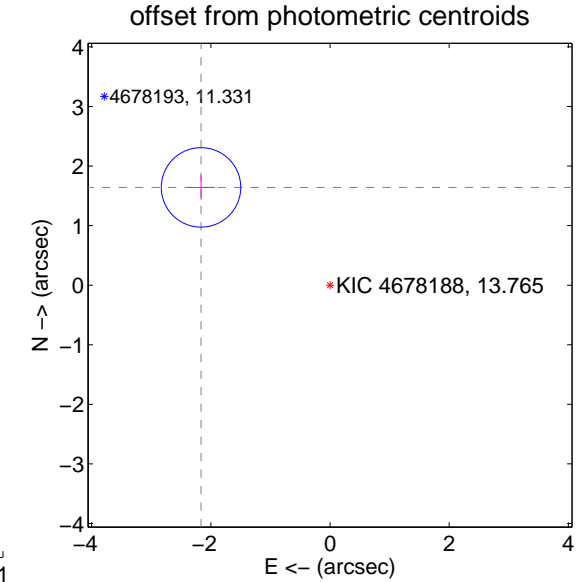
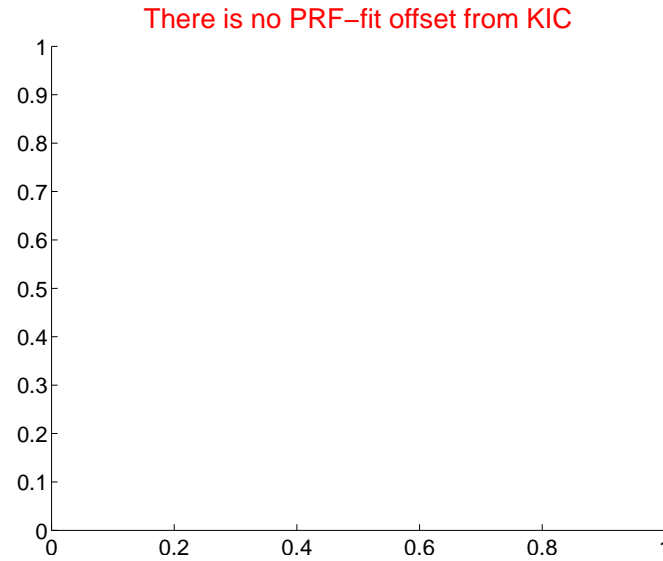
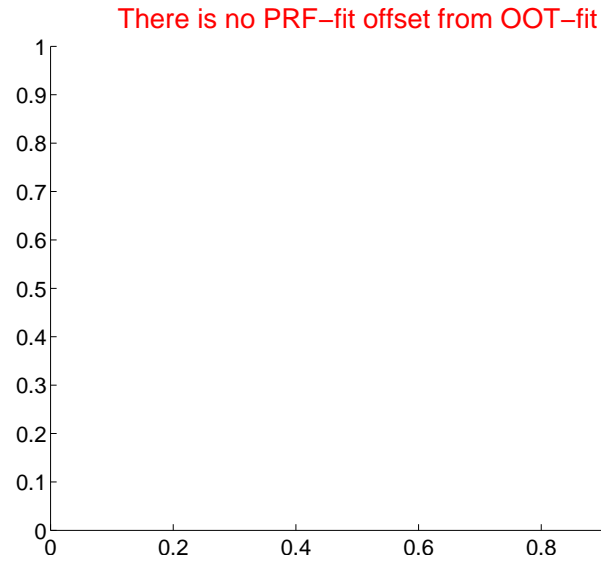
## DV Centroid Data

Supplemental centroid analysis for 004678188-02. Kepler magnitude: 13.77. Transit SNR 8.18

There are 0 quarters with good PRF difference image offsets

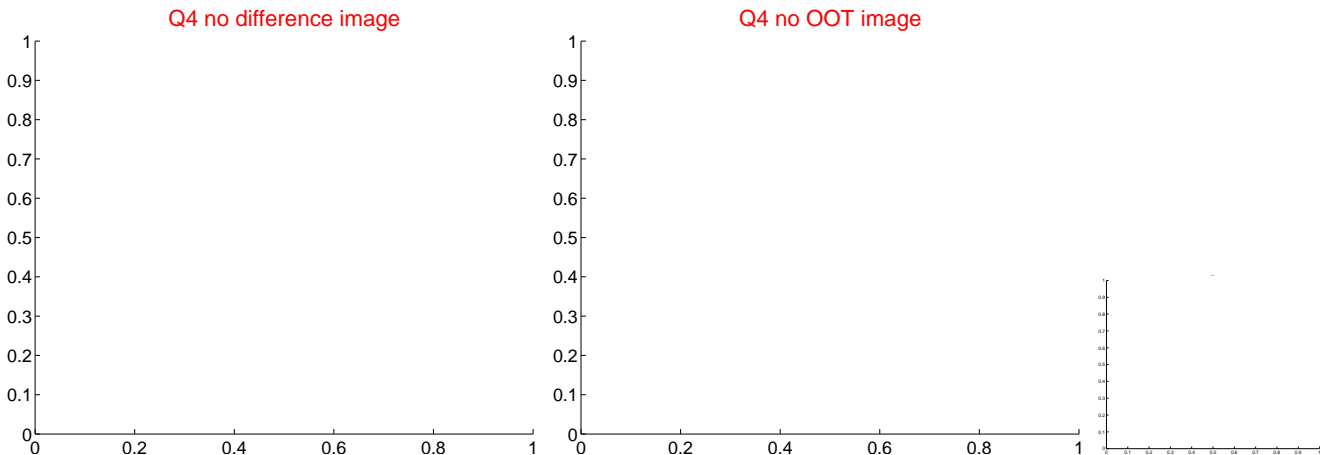
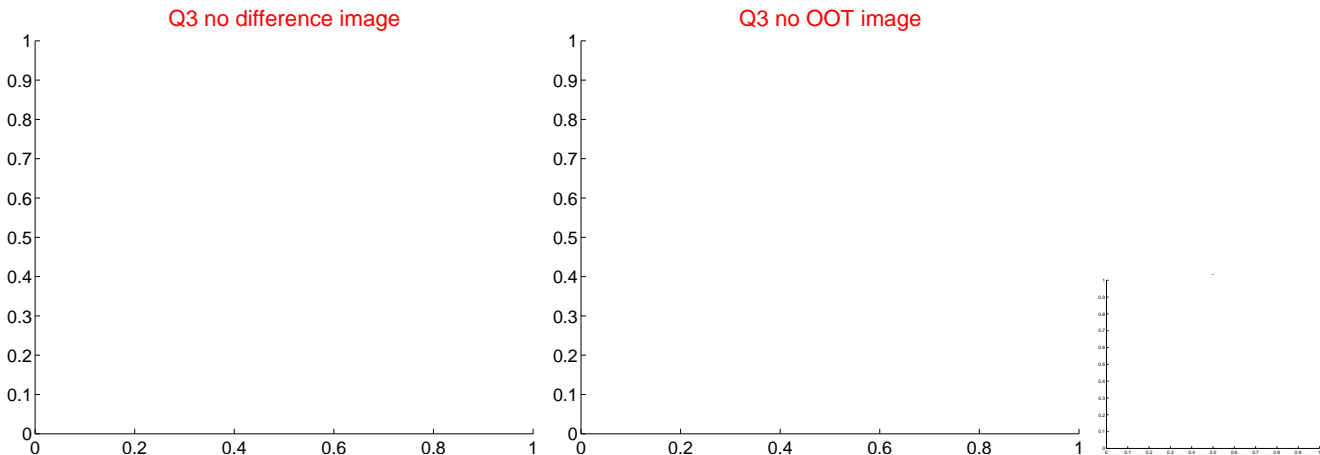
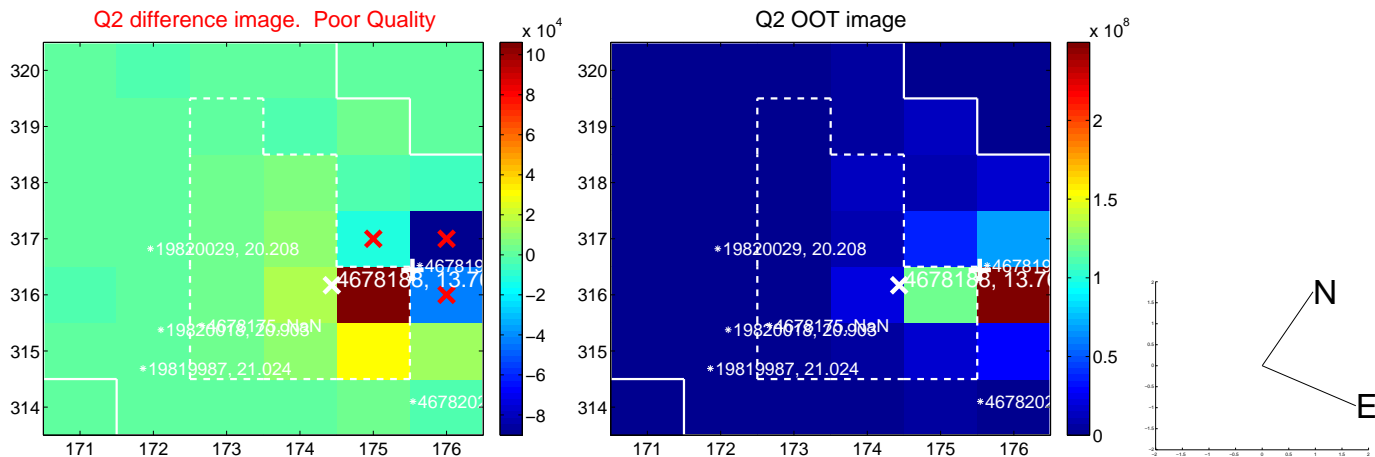
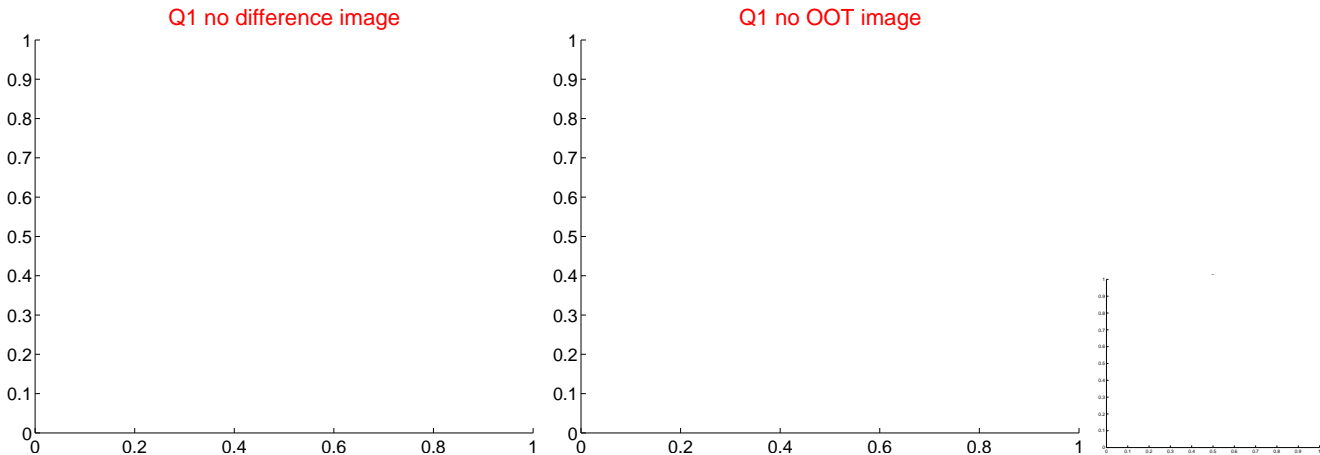
The direct PRF centroid is offset from the target star catalog position by about NaN arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	—	—	—	—
PRF-fit source offset from KIC position	—	—	—	—
photometric centroid source offset	$2.72 \pm 0.22$	12.22	$2.17 \pm 0.23$	$1.64 \pm 0.21$

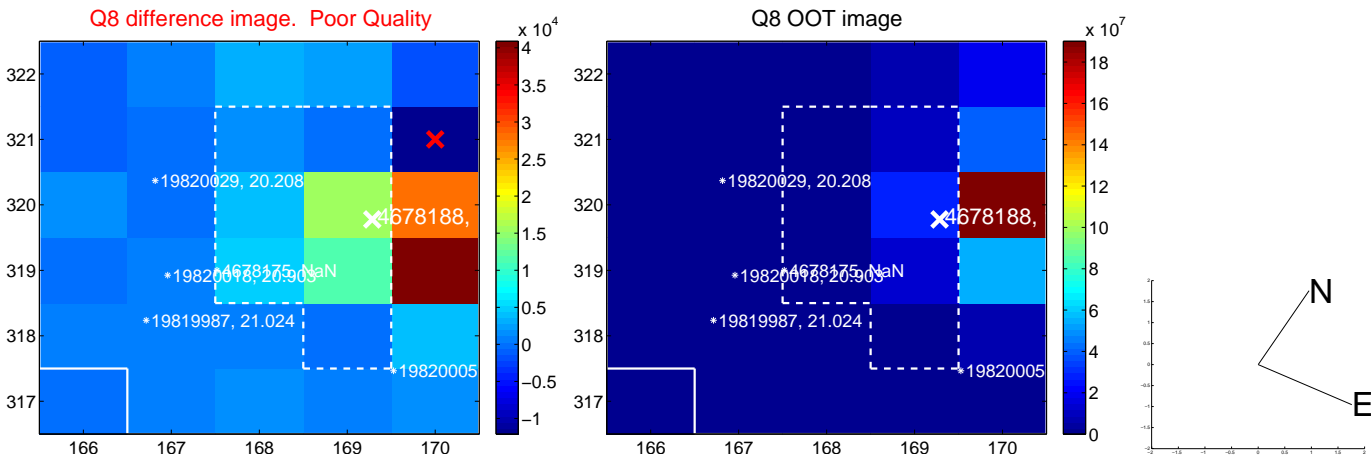
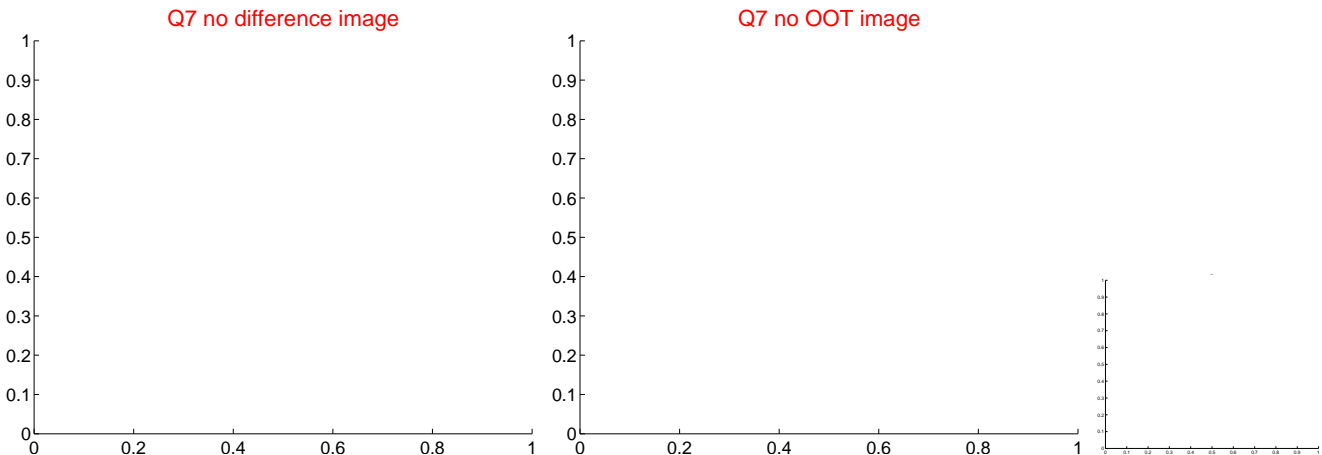
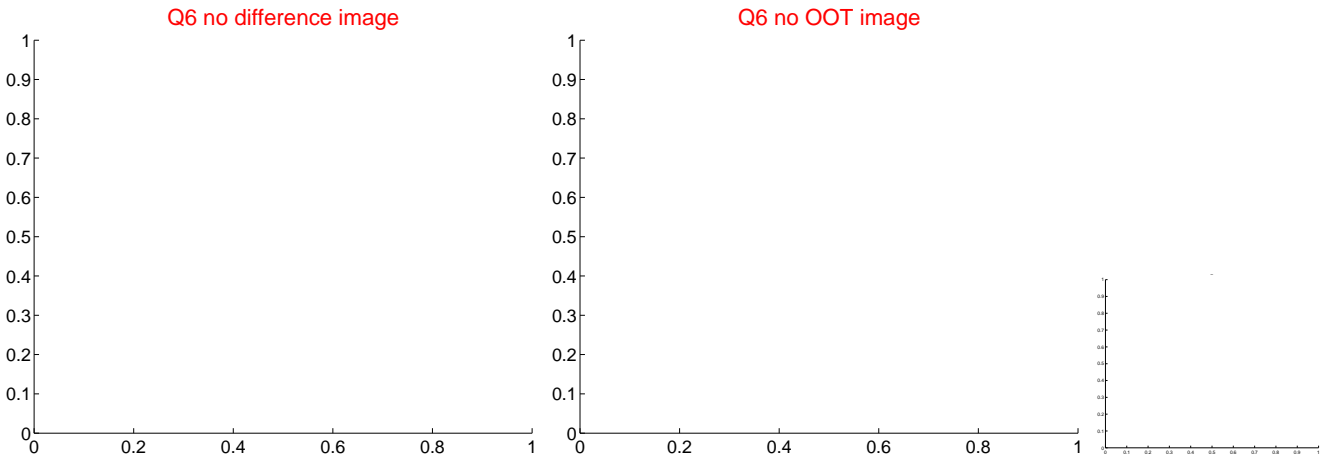
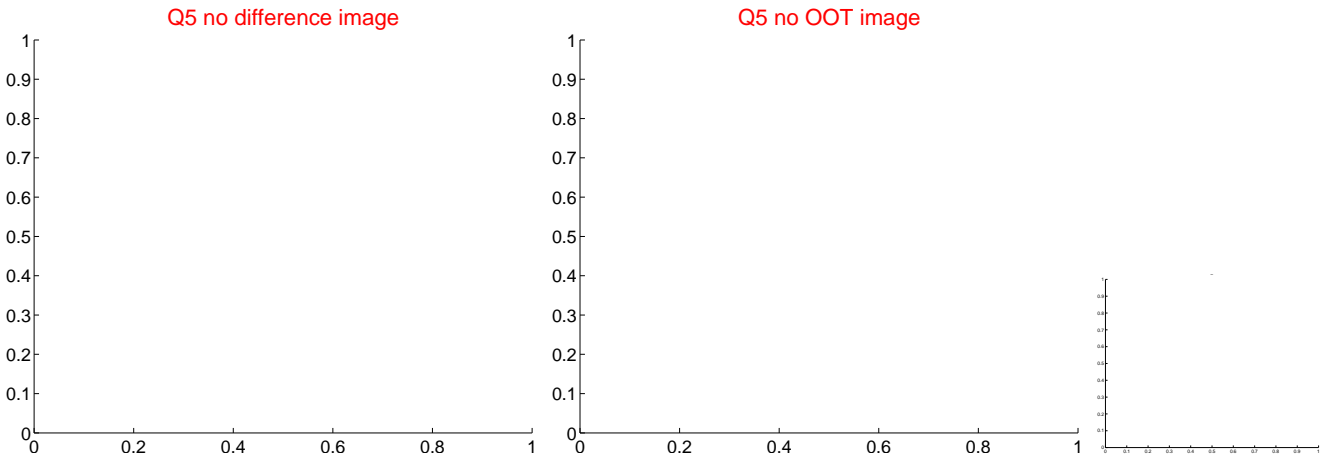


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

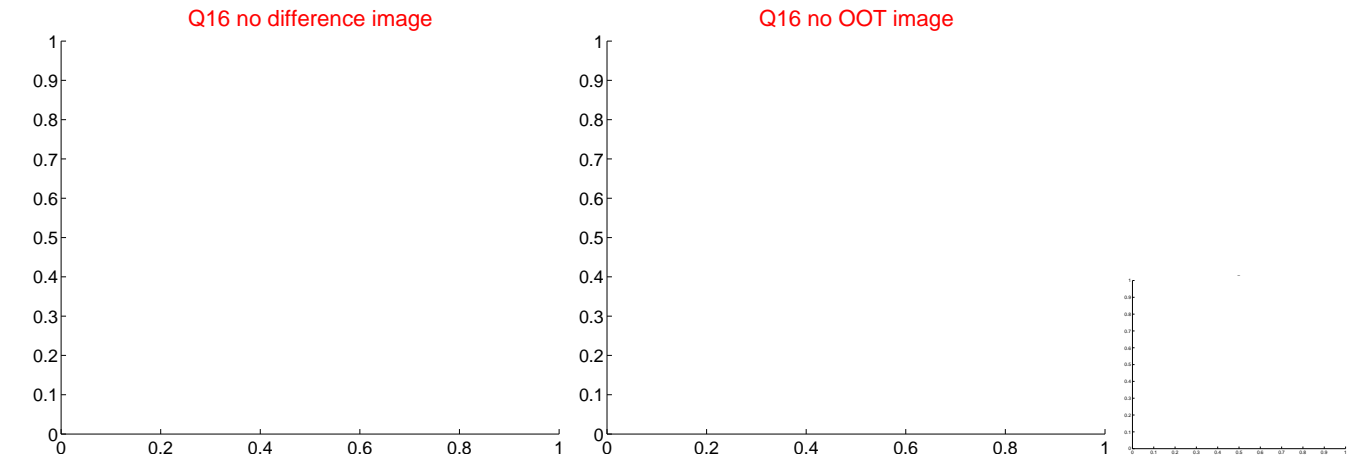
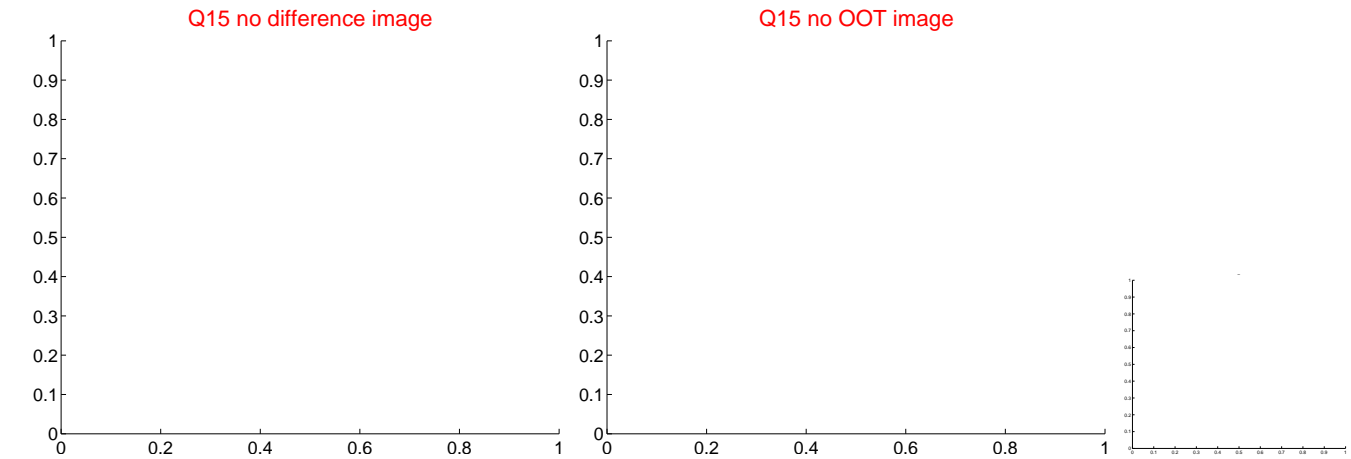
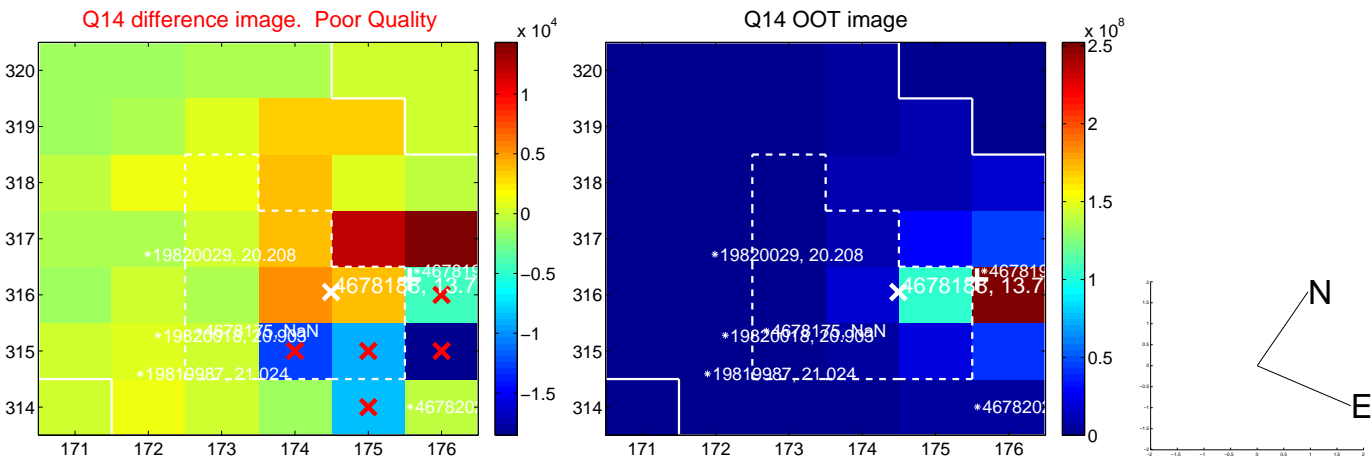
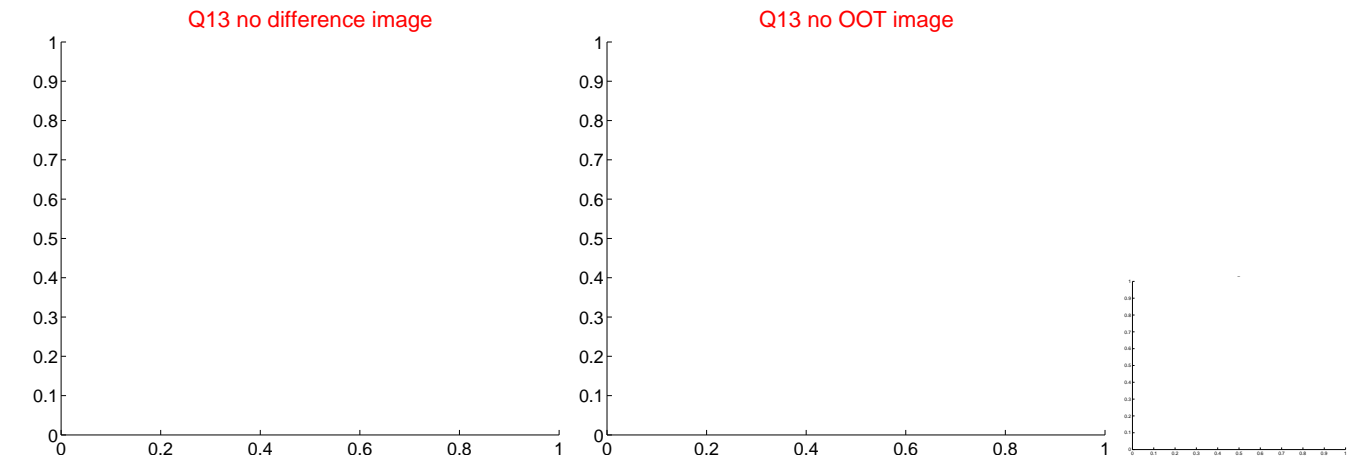




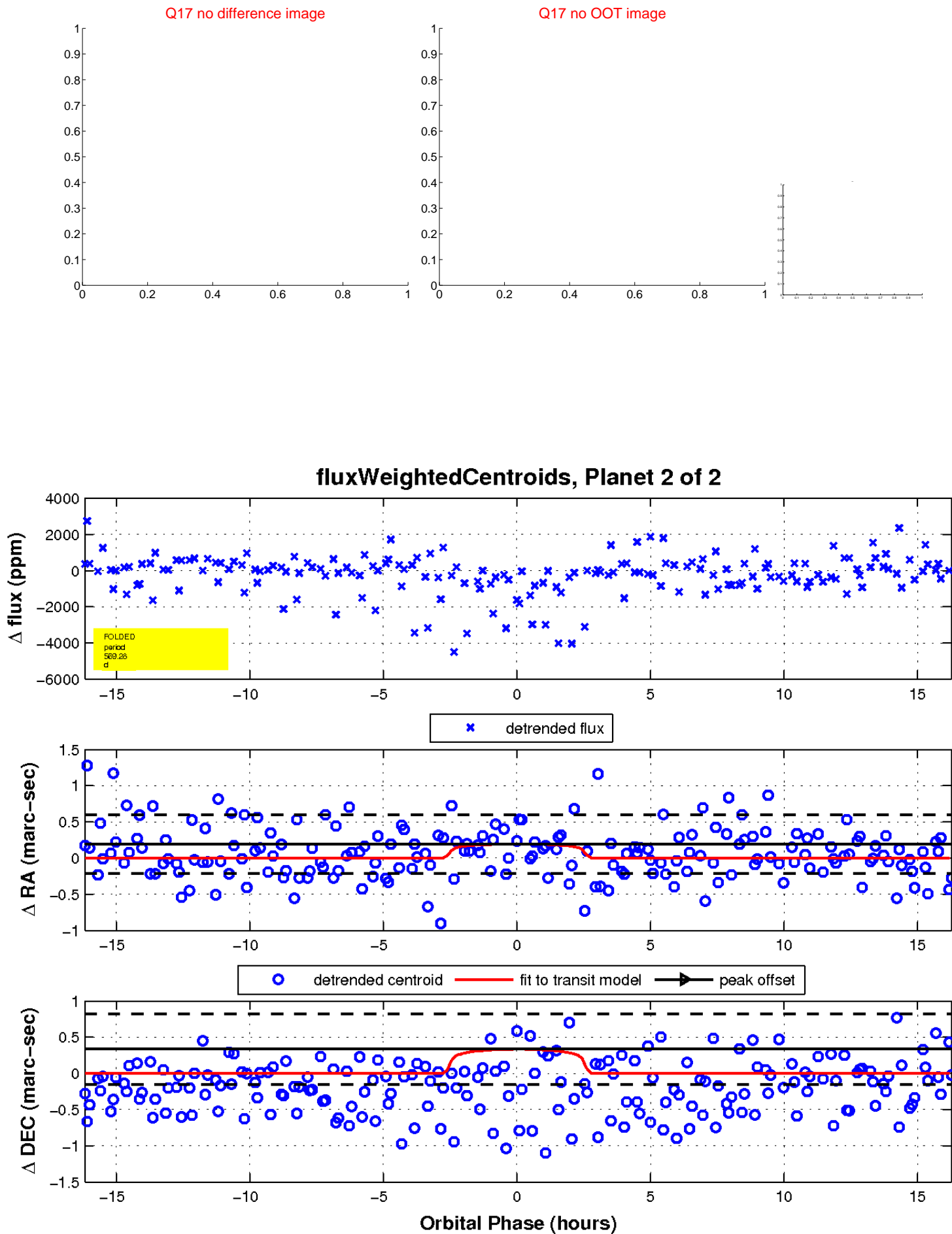
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

