

# KIC 009180282

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009180282-01	OBS	5636.01	2.791298	131.937795	135.8	2.893	23.1	23.4	1.67	6407	2.28	2329.36
009180282-02	OBS	No	2.791315	133.341399	47.6	3.542	7.8	8.2	1.67	6407	1.35	2329.34

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009180282-01	OBS	FP	0.00	0	1	1	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—CENT_RESOLVED_OFFSET—HALO_GHOST
009180282-02	OBS	FP	0.00	1	1	1	0	IS_SEC_TCE—CENT_RESOLVED_OFFSET

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

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

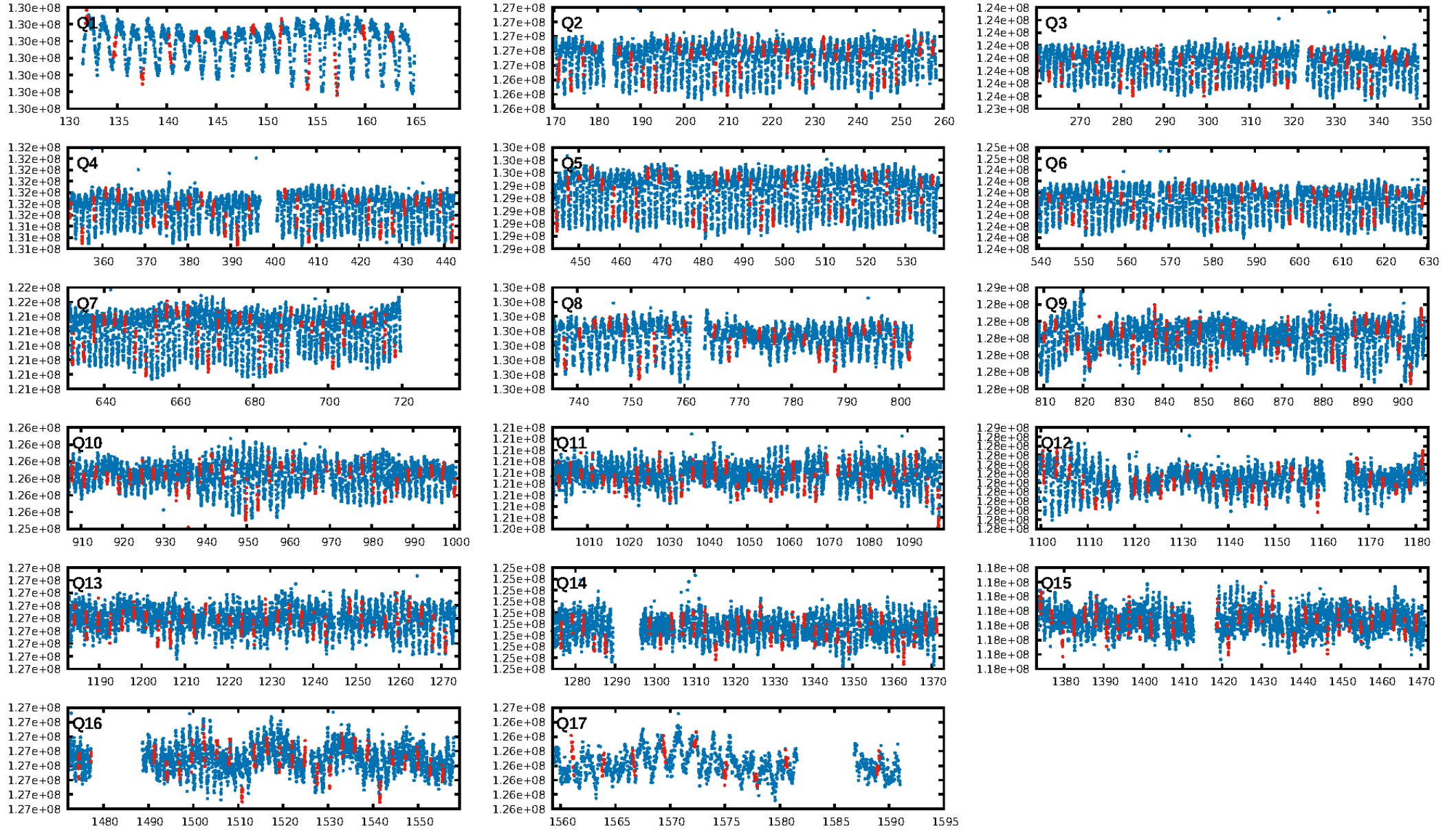
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009180282-01

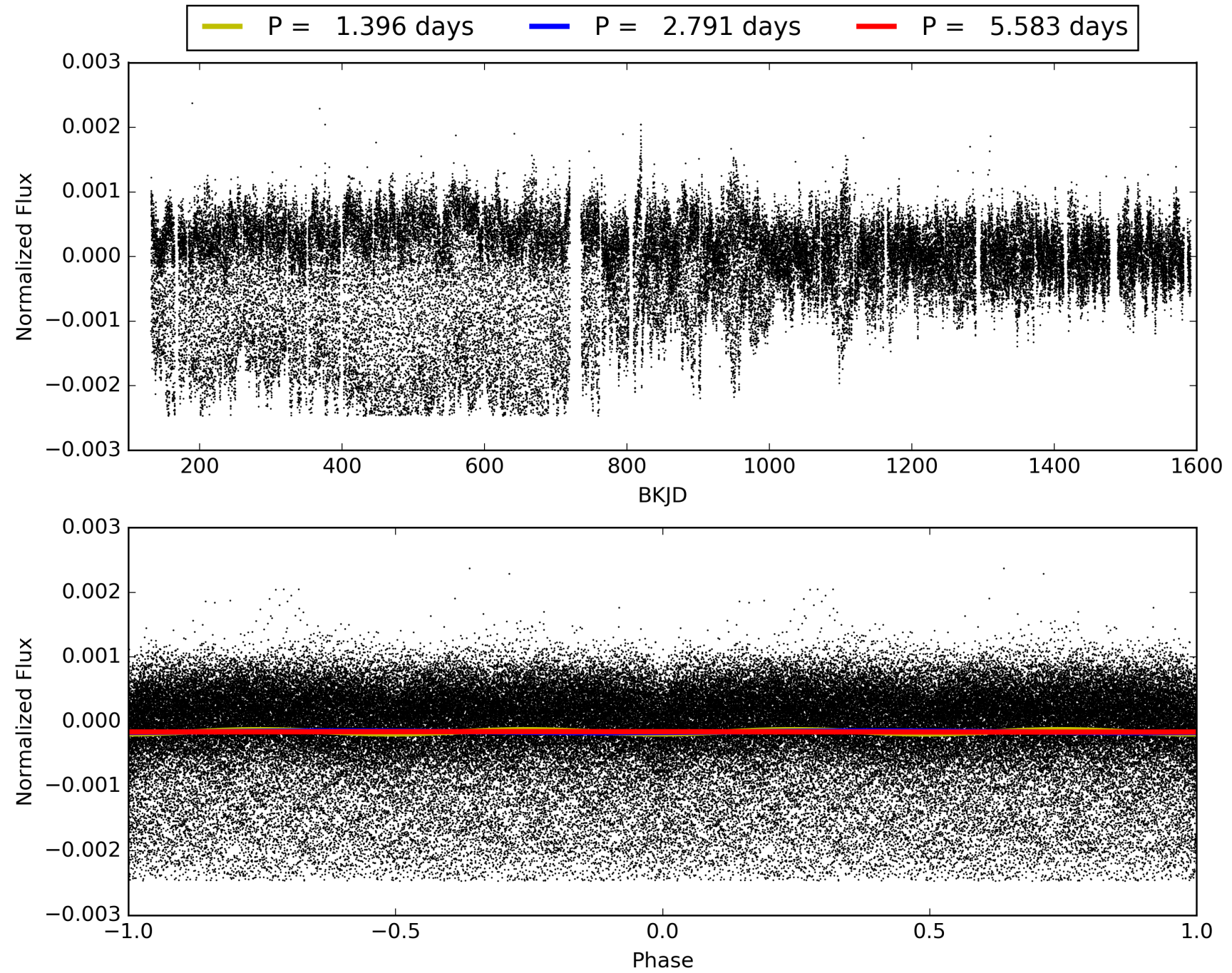
No Significant Match Found

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

# TCE 009180282-01, PDC Light Curves



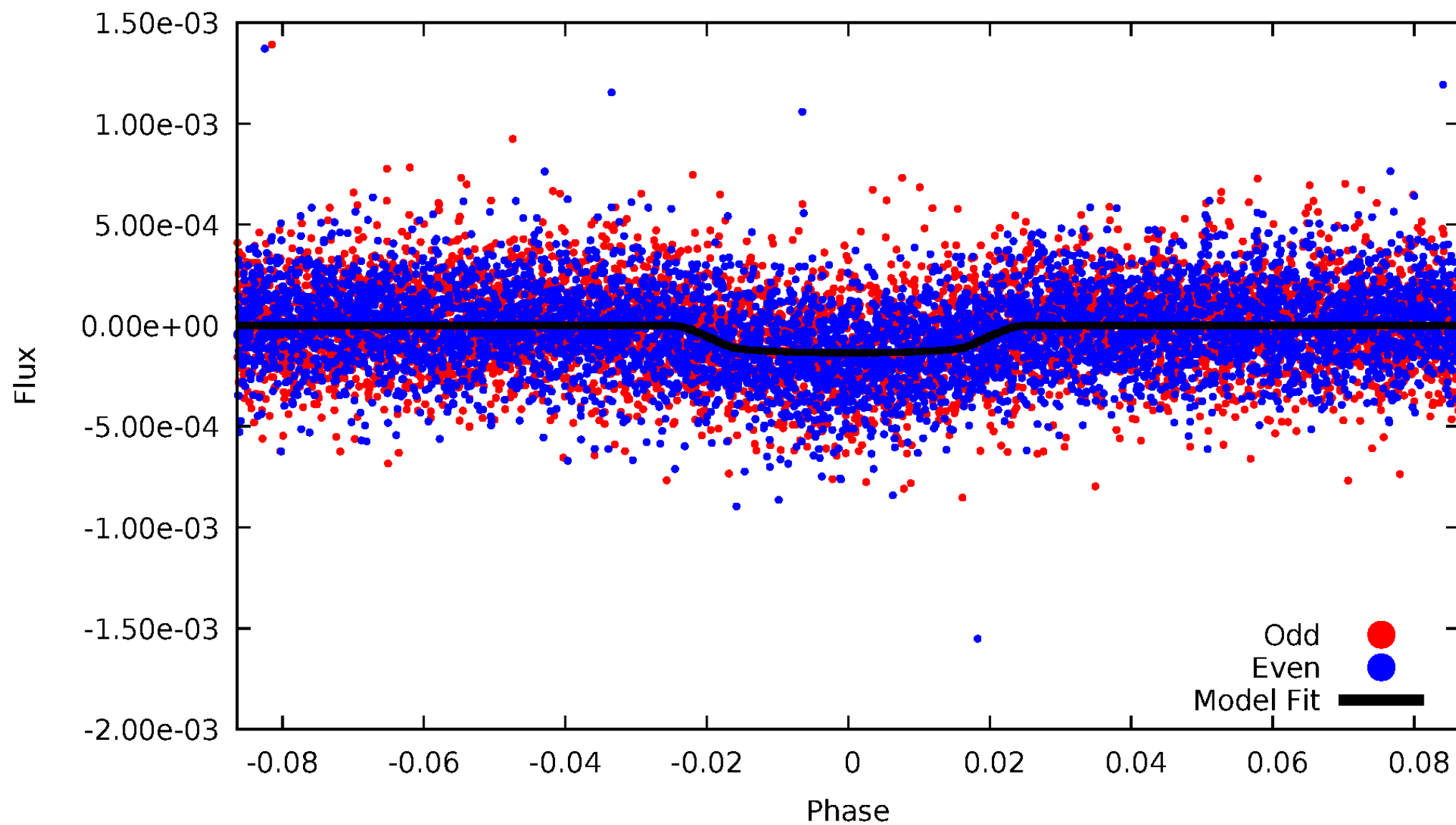
TCE 009180282-01





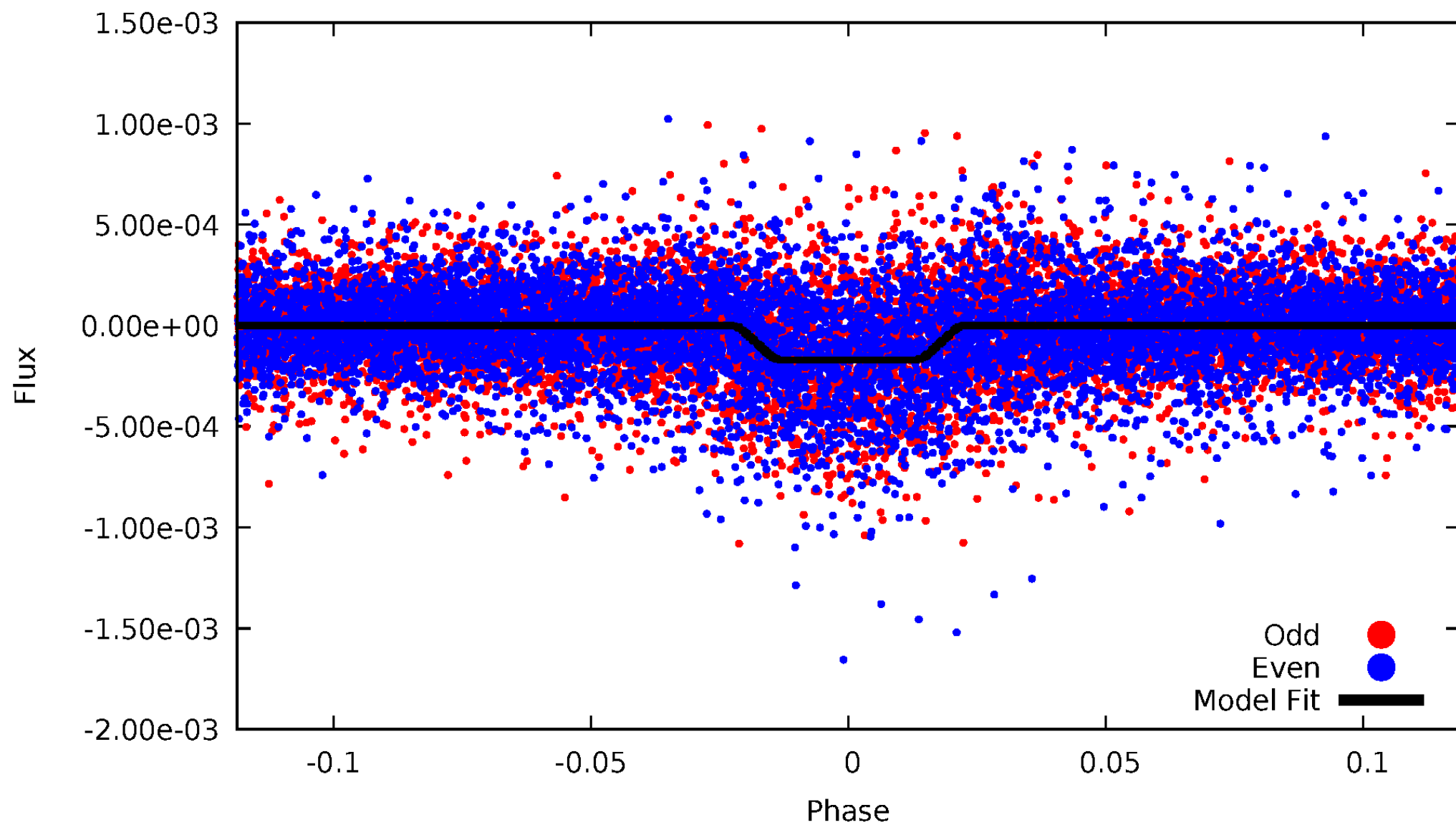
DV Odd/Even

TCE 009180282-01

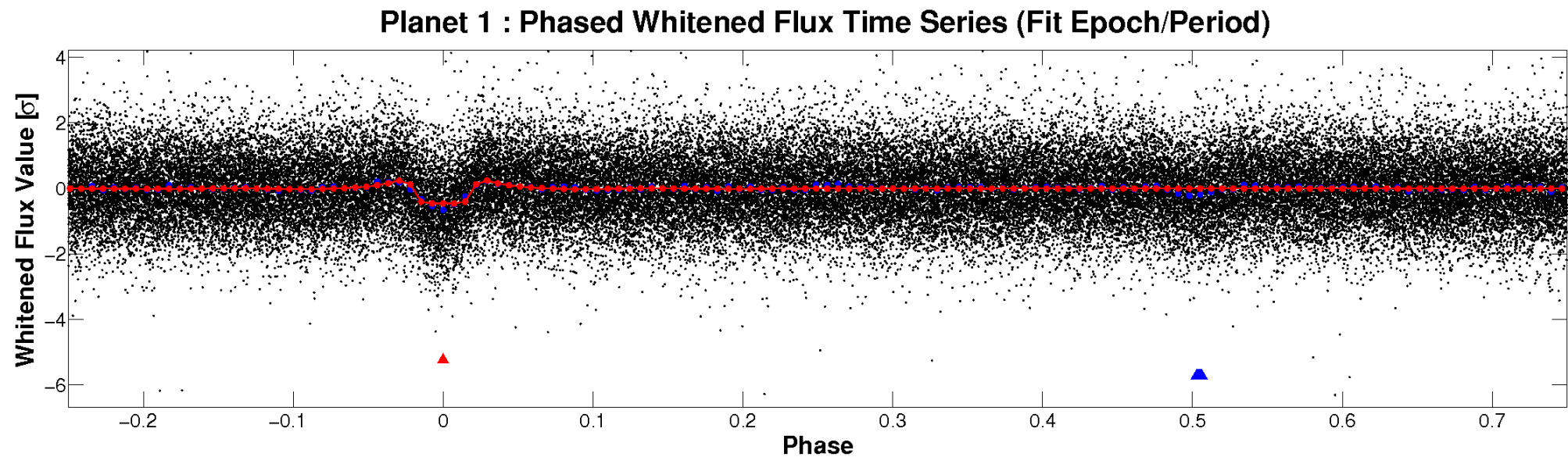
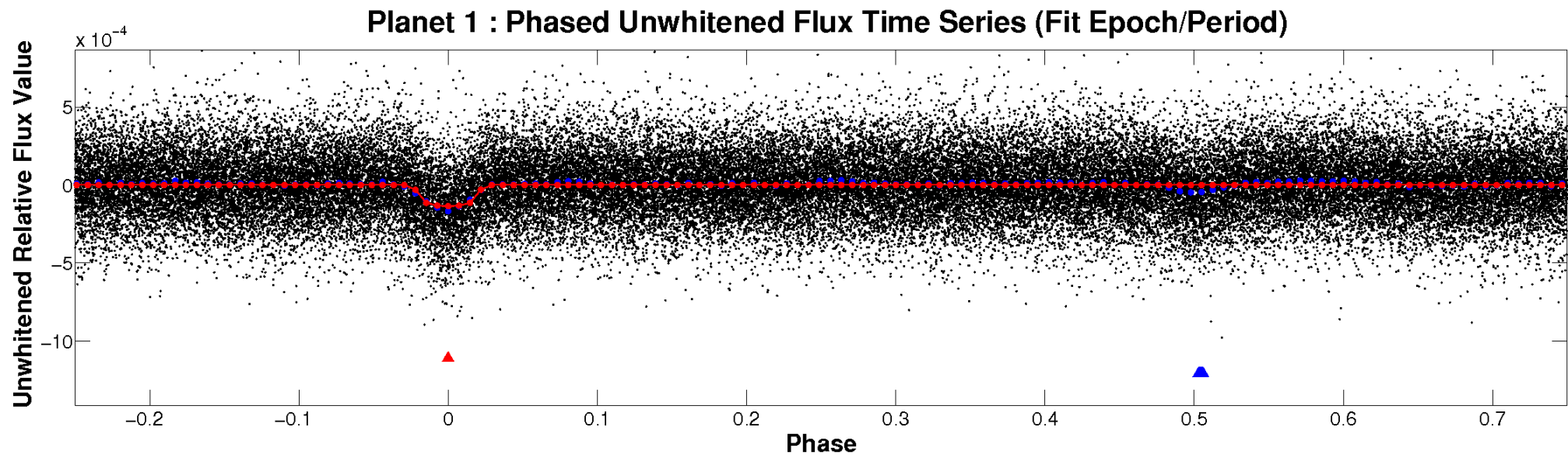


# ALT Odd/Even

TCE 009180282-01

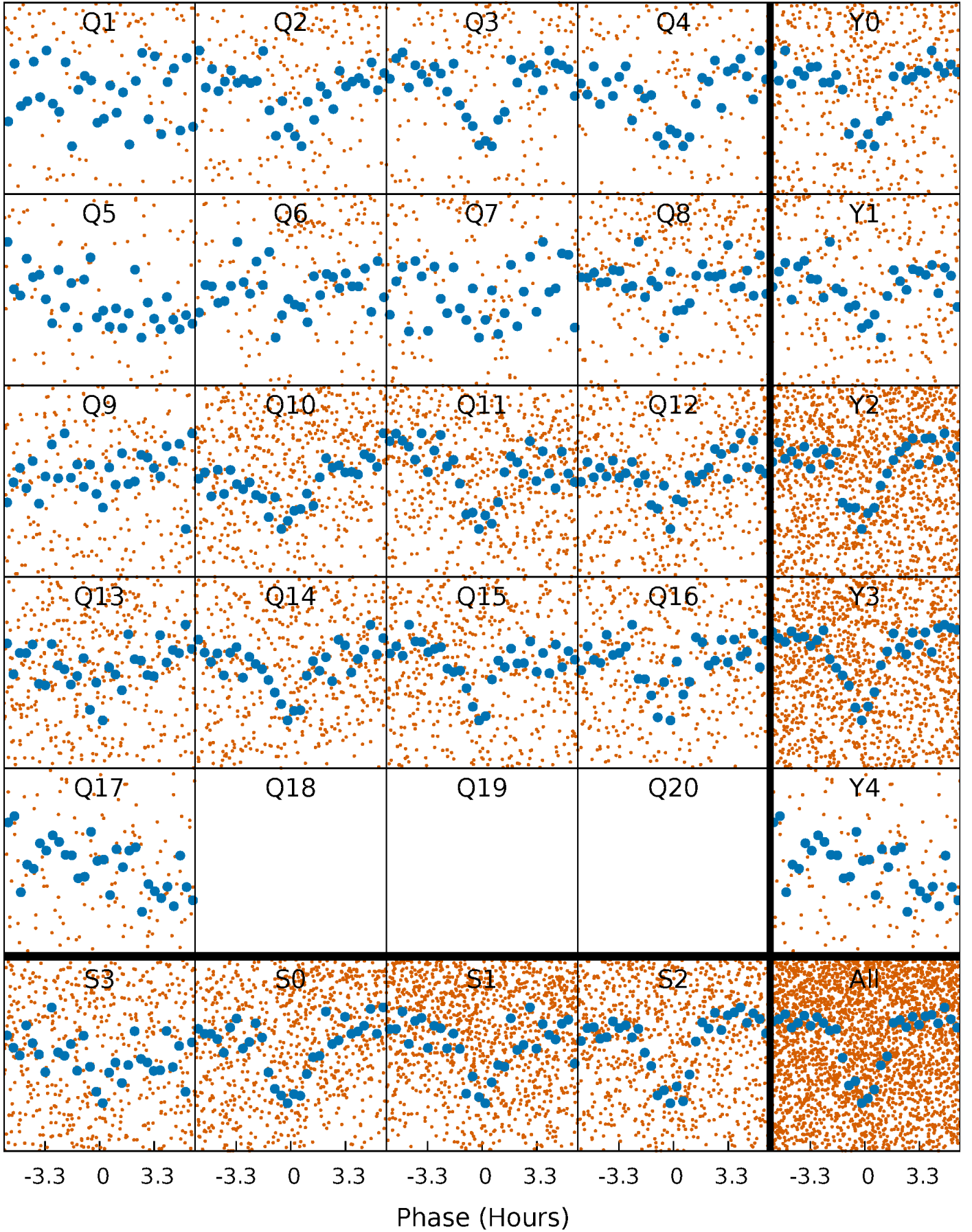


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

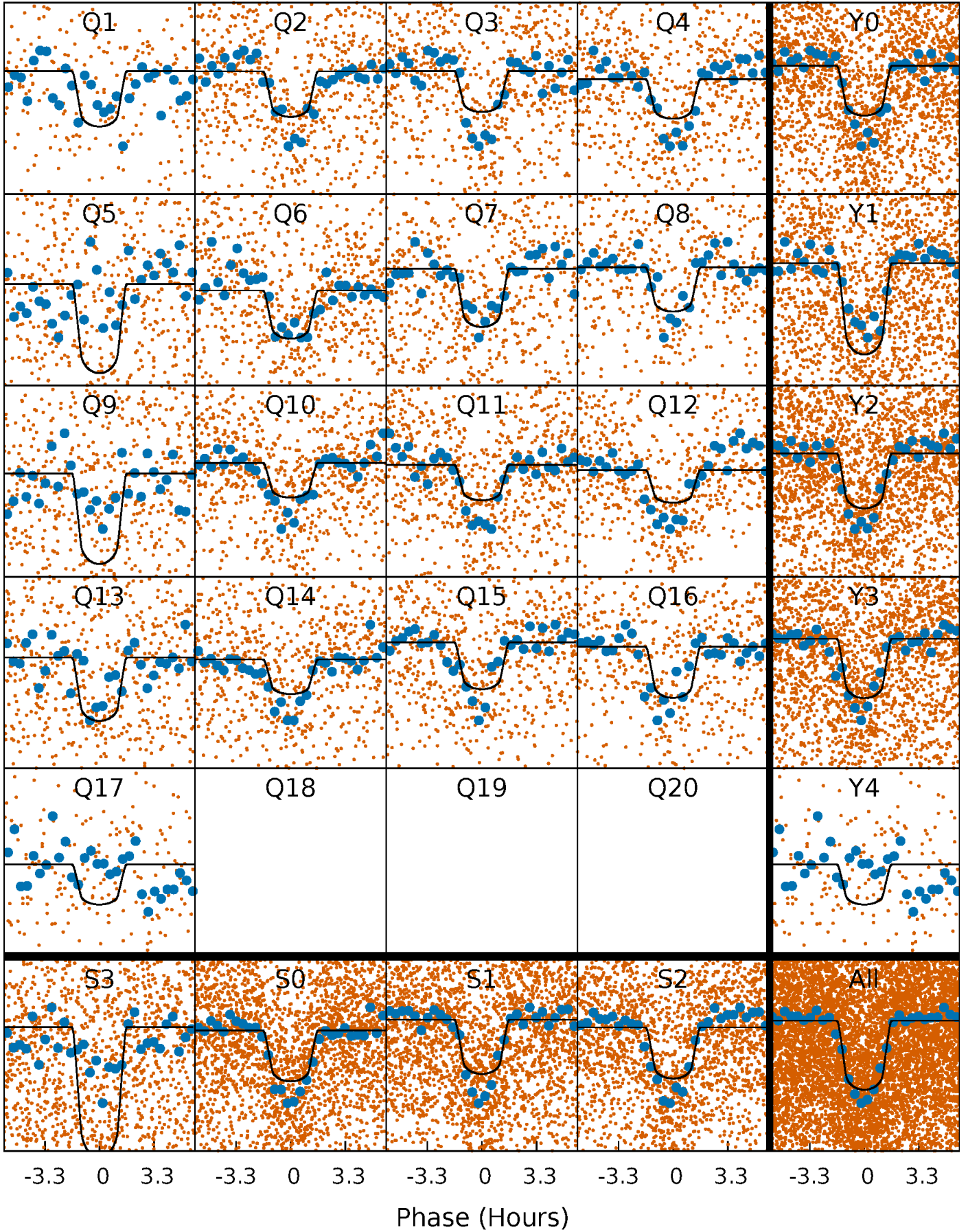
TCE 009180282-01 P= 2.791298 Days  $T_0=131.937795$  (BKJD)





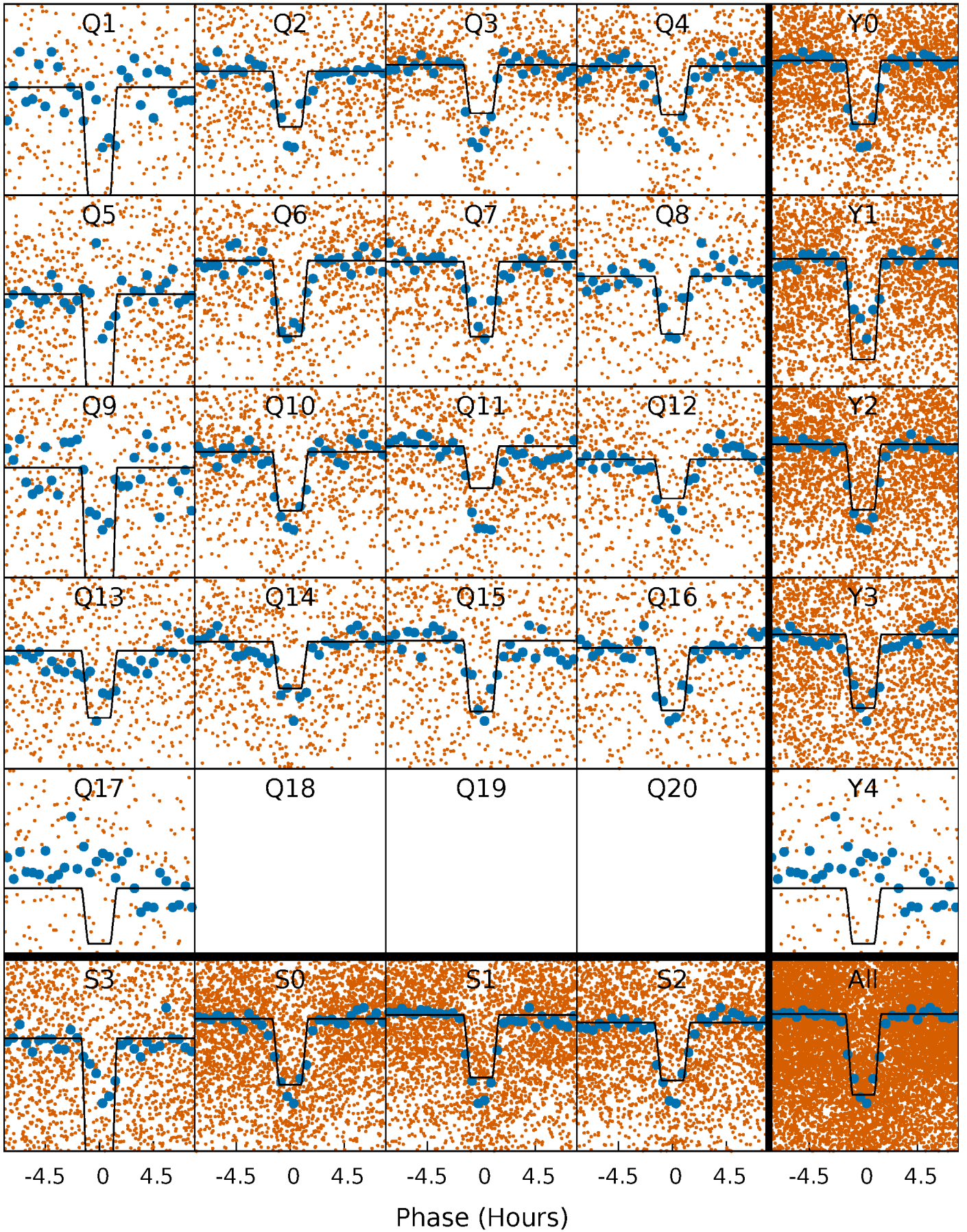
# DV Quarter-Phased Transit Curves

TCE 009180282-01   P= 2.791298 Days    $T_0=131.937795$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

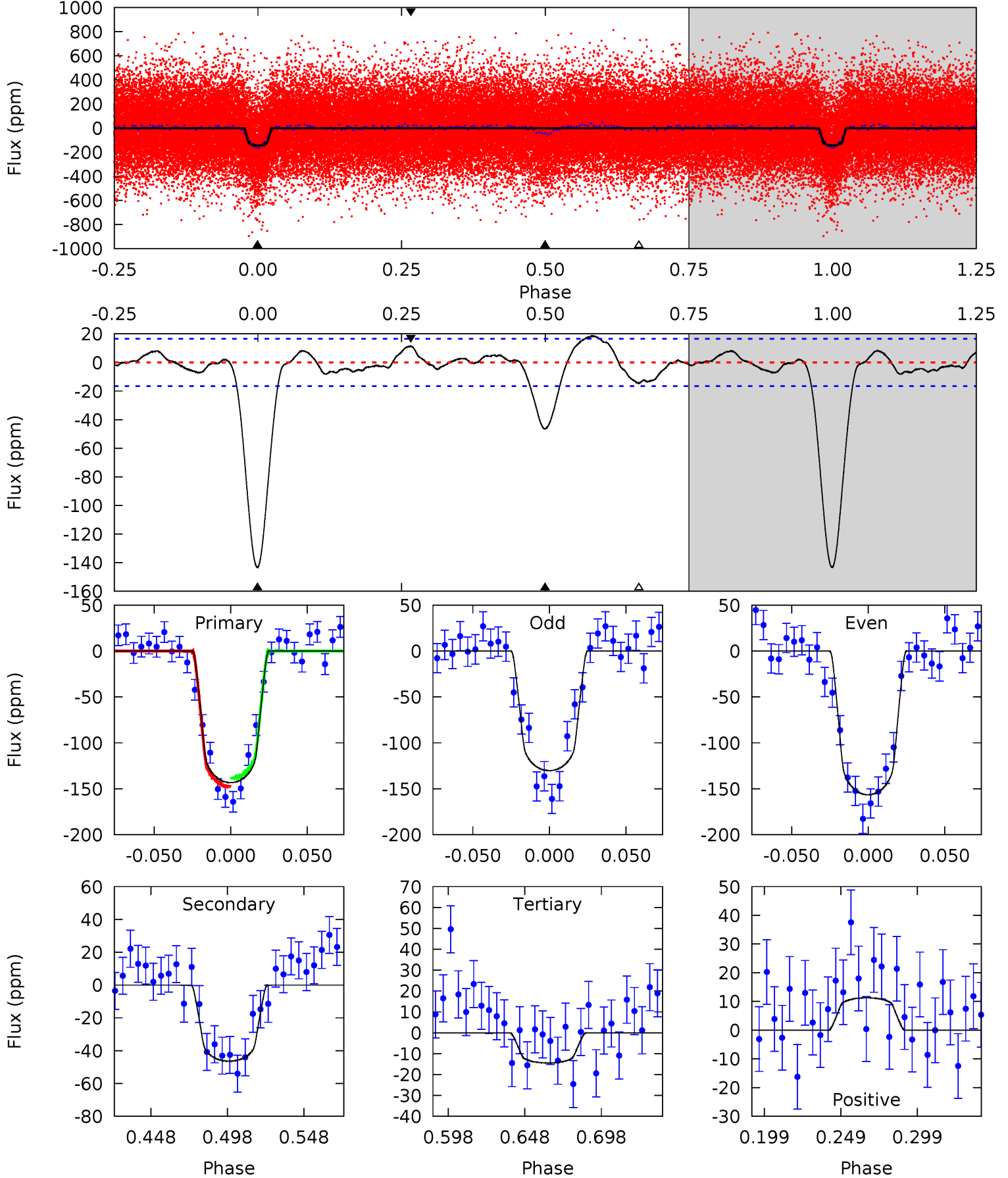
TCE 009180282-01 P= 2.791232 Days  $T_0=131.949485$  (BKJD)



# DV Model-Shift Uniqueness Test

009180282-01, P = 2.791298 Days, E = 129.146497 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
40.9	13.2	4.12	3.22	4.71	1.96	1.96	36.8	37.7	9.12	10.0	3.76	1.04	0.11	1.28

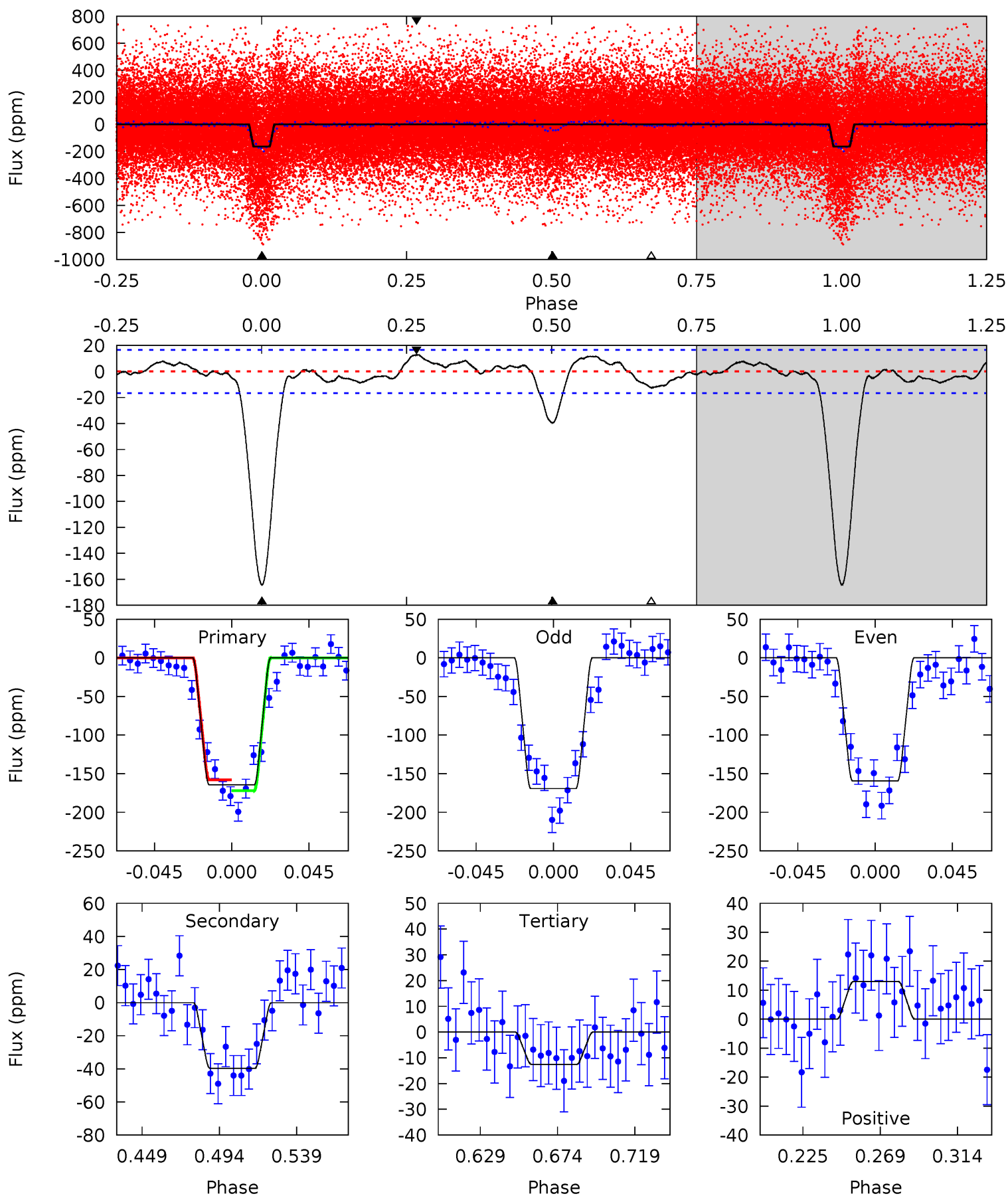




# Alt Model-Shift Uniqueness Test

009180282-01, P = 2.791232 Days, E = 129.158253 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
46.7	11.3	3.57	3.68	4.73	2.01	1.71	43.1	43.0	7.69	7.57	1.41	1.12	0.07	2.01





### Stellar Parameters For KIC 009180282

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6407^{+173}_{-192}$	$4.111^{+0.220}_{-0.180}$	$0.000^{+0.250}_{-0.300}$	$1.668^{+0.508}_{-0.457}$	$1.311^{+0.197}_{-0.241}$	$0.398^{+0.516}_{-0.196}$
	+3%/-3%	+5%/-4%	+inf%/-inf%	+30%/-27%	+15%/-18%	+130%/-49%
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 009180282-01 / KOI 5636.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-46 \pm 4$	$2.28^{+0.54}_{-0.45}$	$2478^{+201}_{-199}$	$4791^{+345}_{-285}$	$8.891^{+4.468}_{-3.072}$
Alt.	$-40 \pm 4$	$2.35^{+0.51}_{-0.46}$	$2464^{+200}_{-188}$	$4573^{+291}_{-257}$	$7.149^{+3.705}_{-2.374}$

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

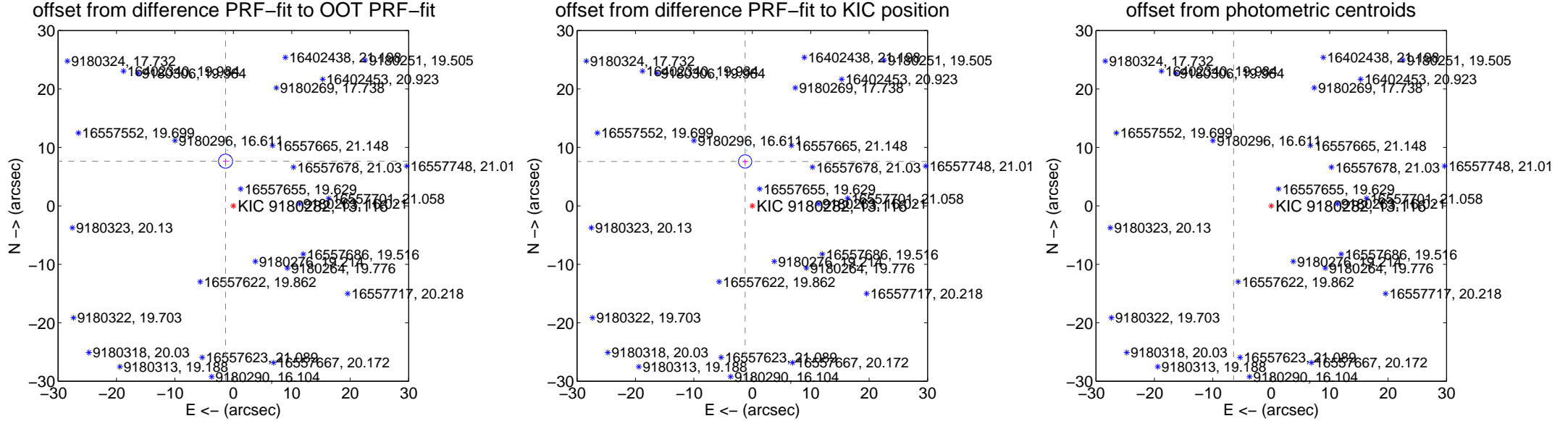
## DV Centroid Data

Supplemental centroid analysis for 009180282-01. Kepler magnitude: 13.12. Transit SNR 23.38

There are 12 quarters with good PRF difference image offsets

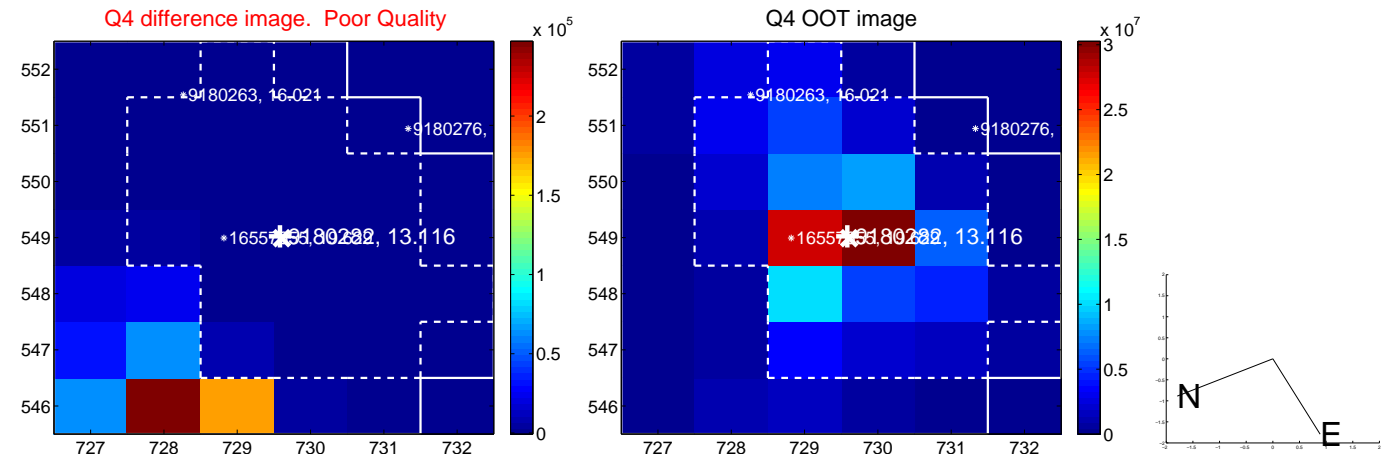
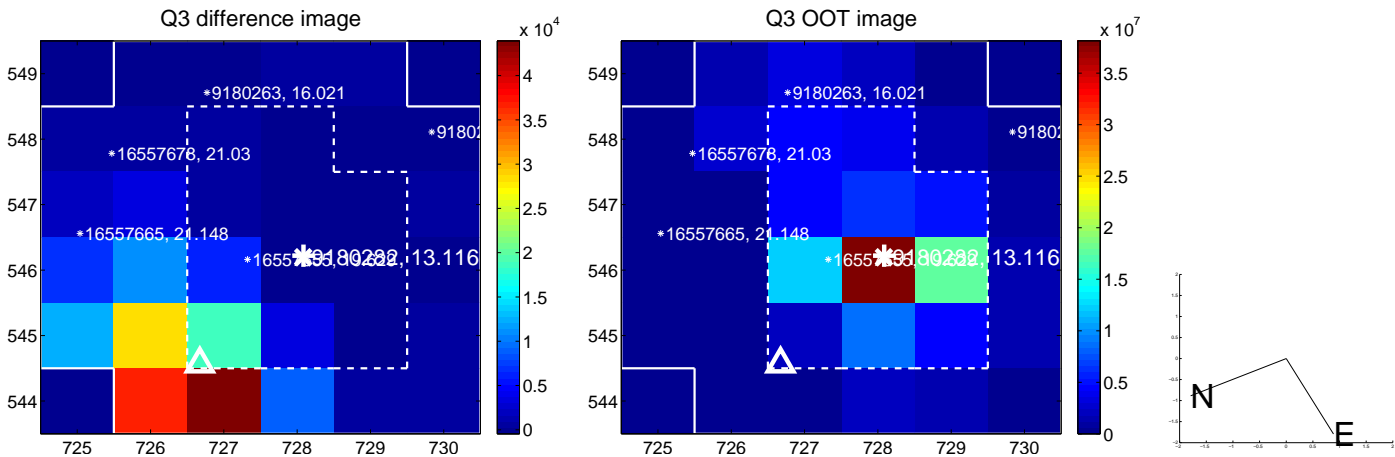
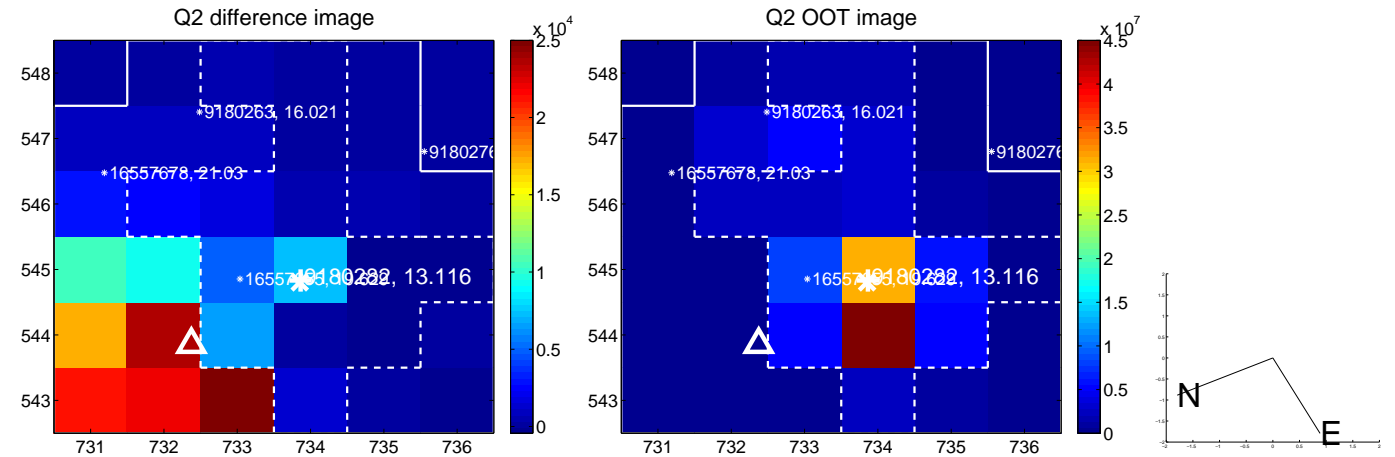
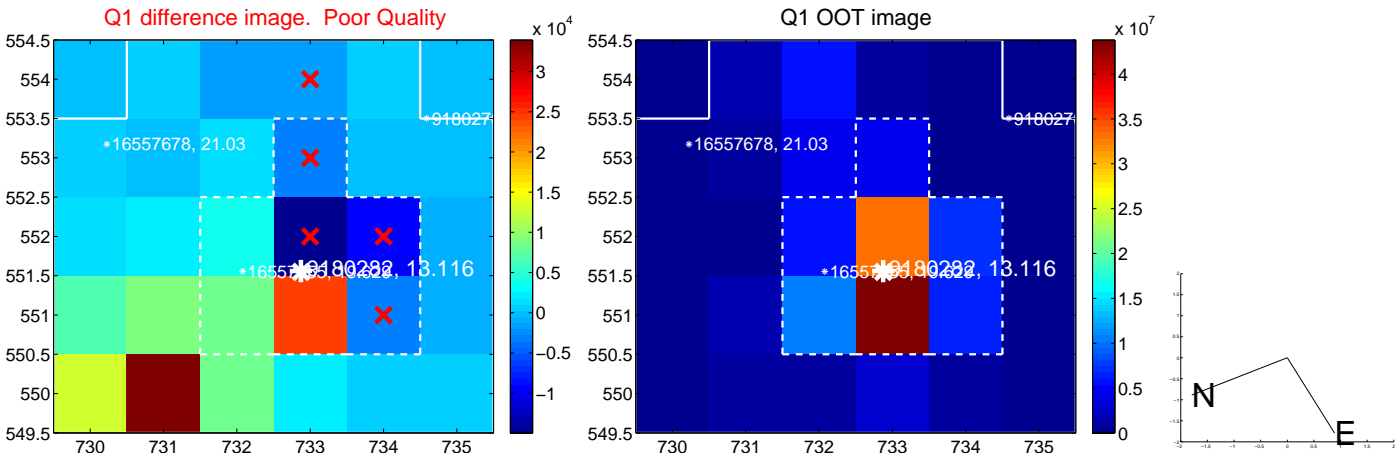
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	7.762 $\pm$ 0.401	19.36	1.333 $\pm$ 0.419	7.647 $\pm$ 0.429
PRF-fit source offset from KIC position	7.692 $\pm$ 0.378	20.34	1.226 $\pm$ 0.418	7.594 $\pm$ 0.394
photometric centroid source offset	53.19 $\pm$ 0.36	149.68	6.44 $\pm$ 0.46	52.80 $\pm$ 0.35

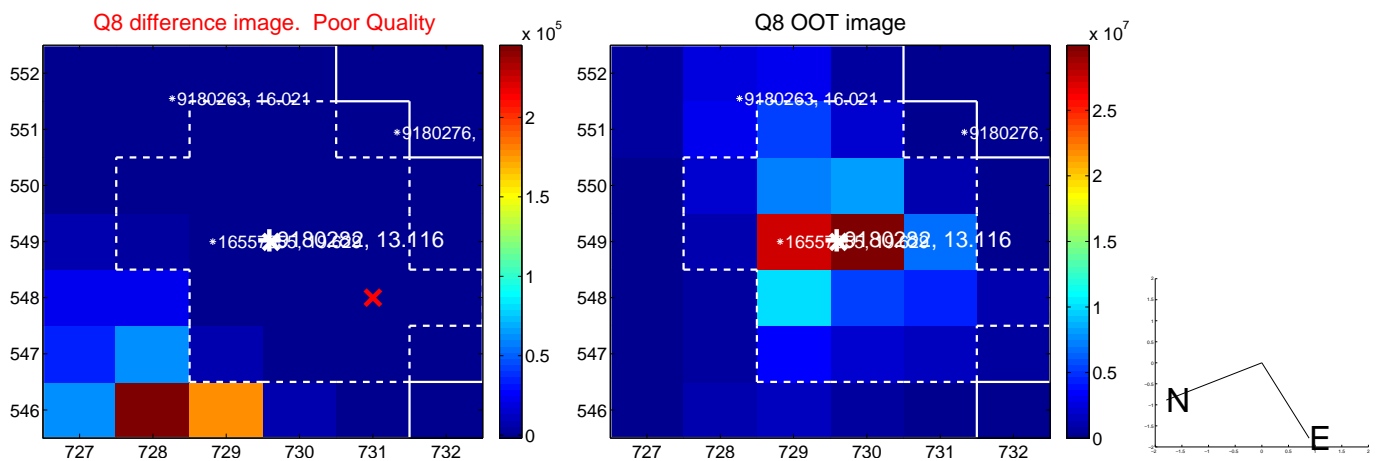
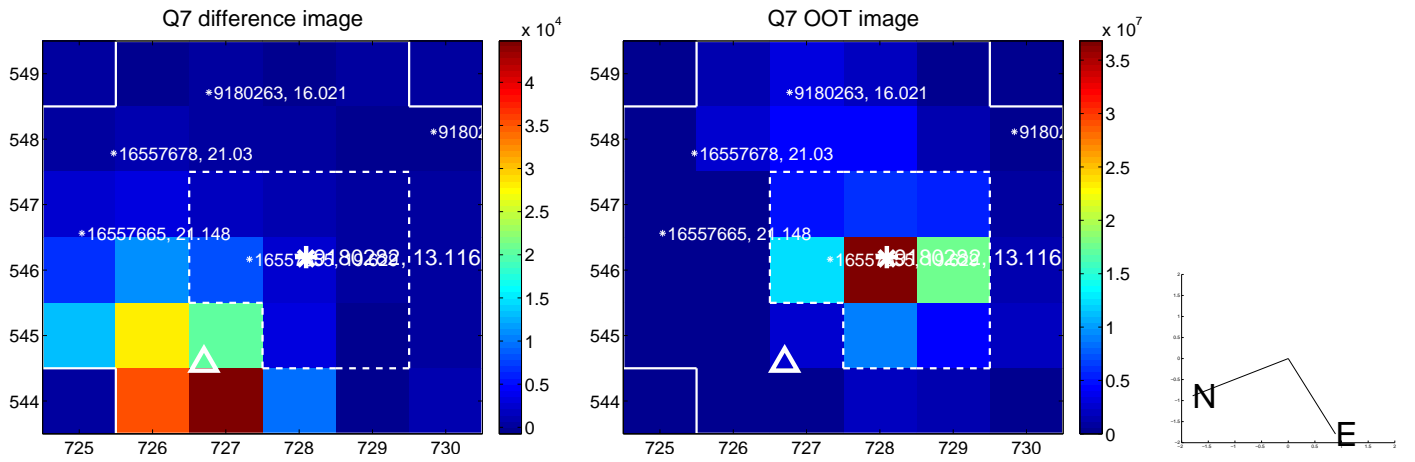
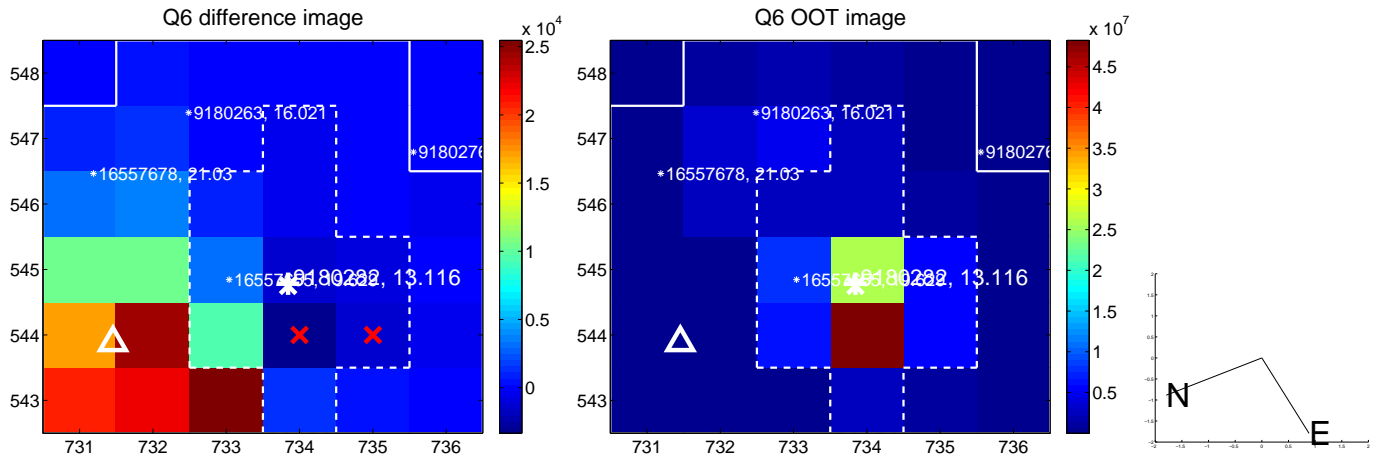
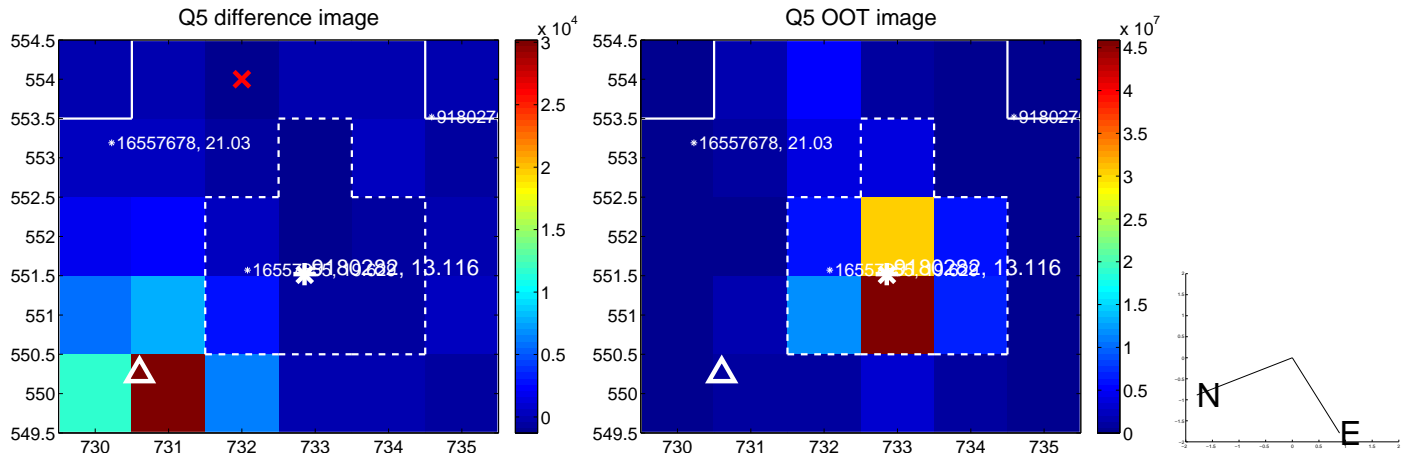


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

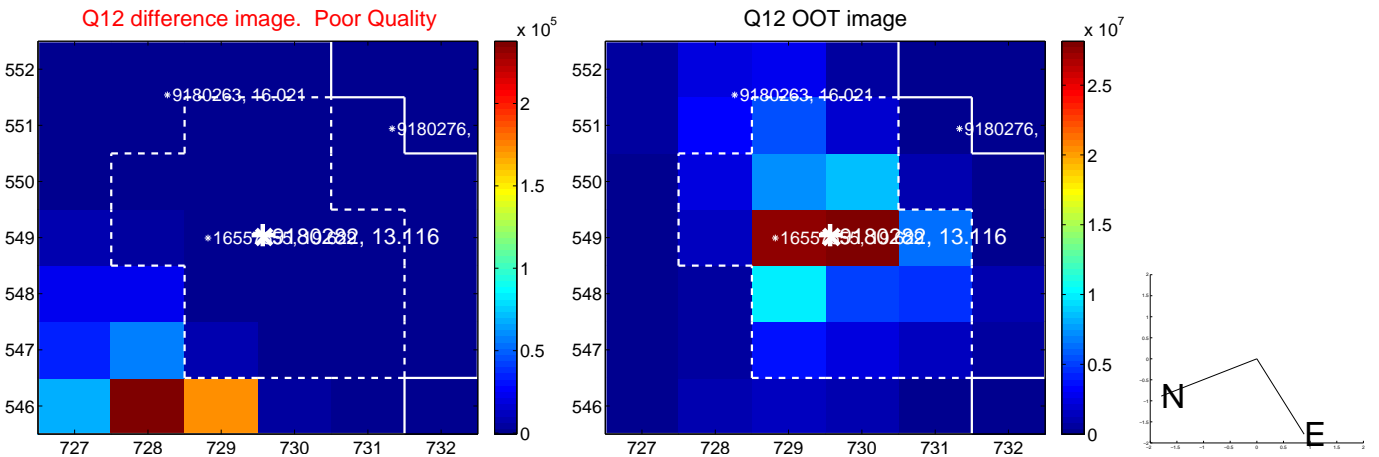
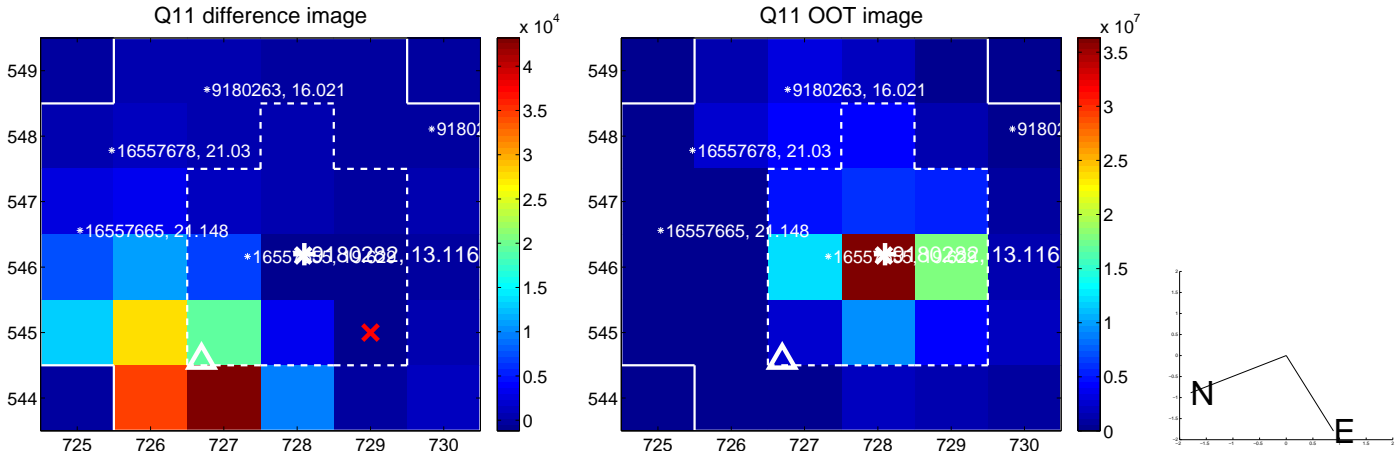
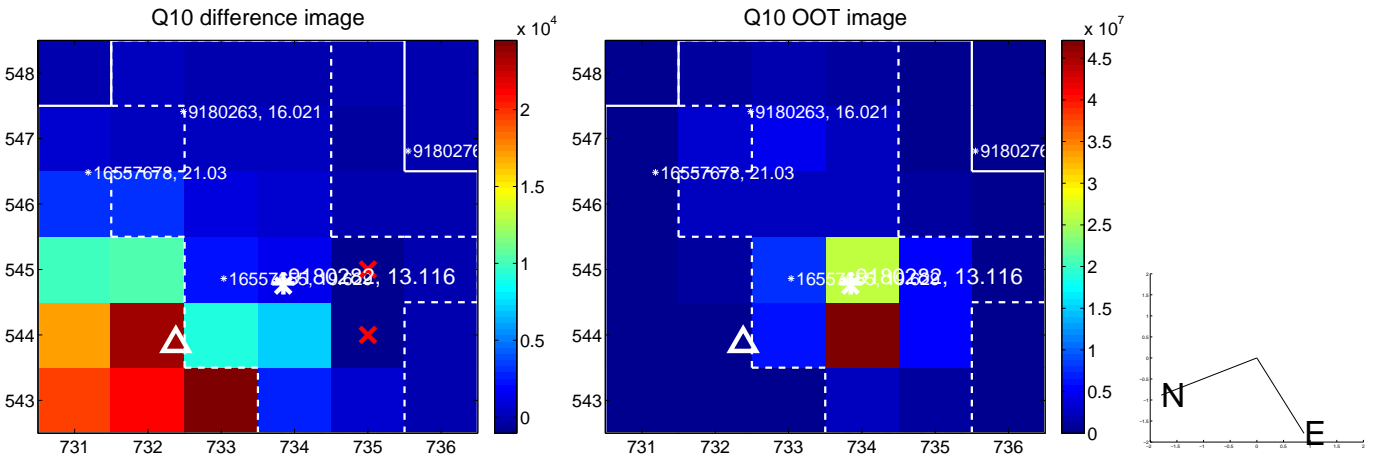
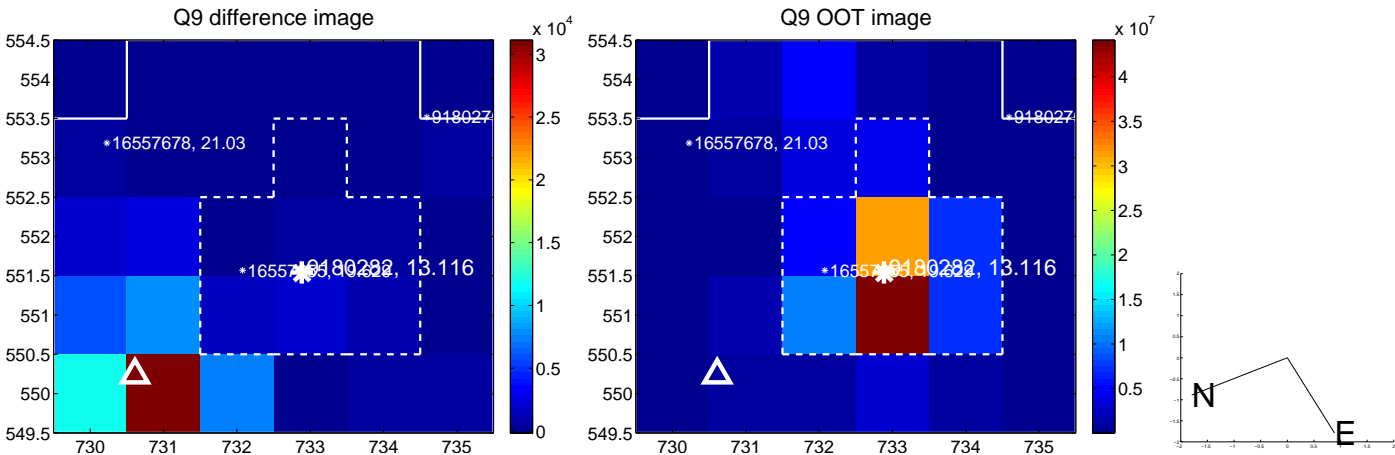


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



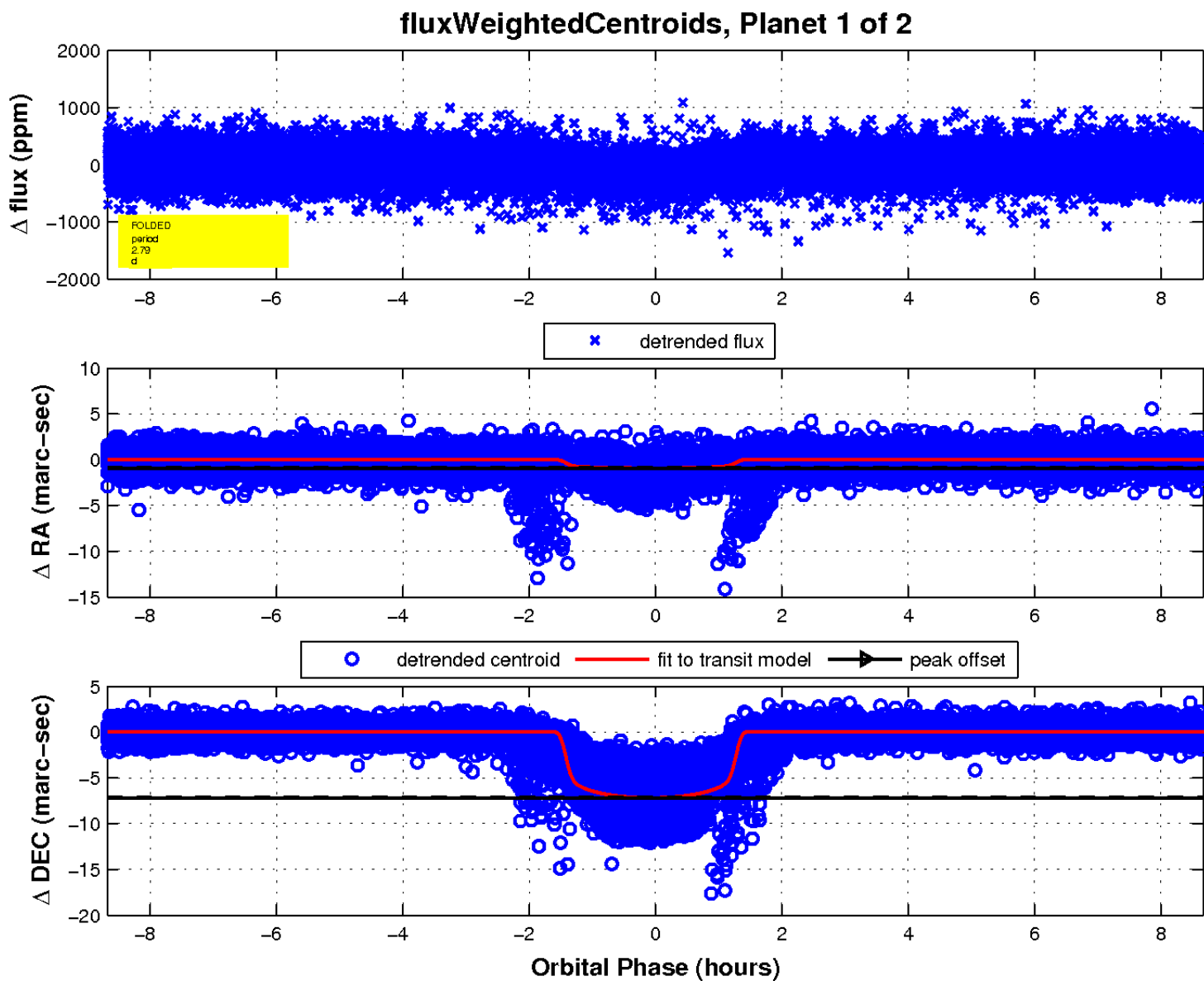
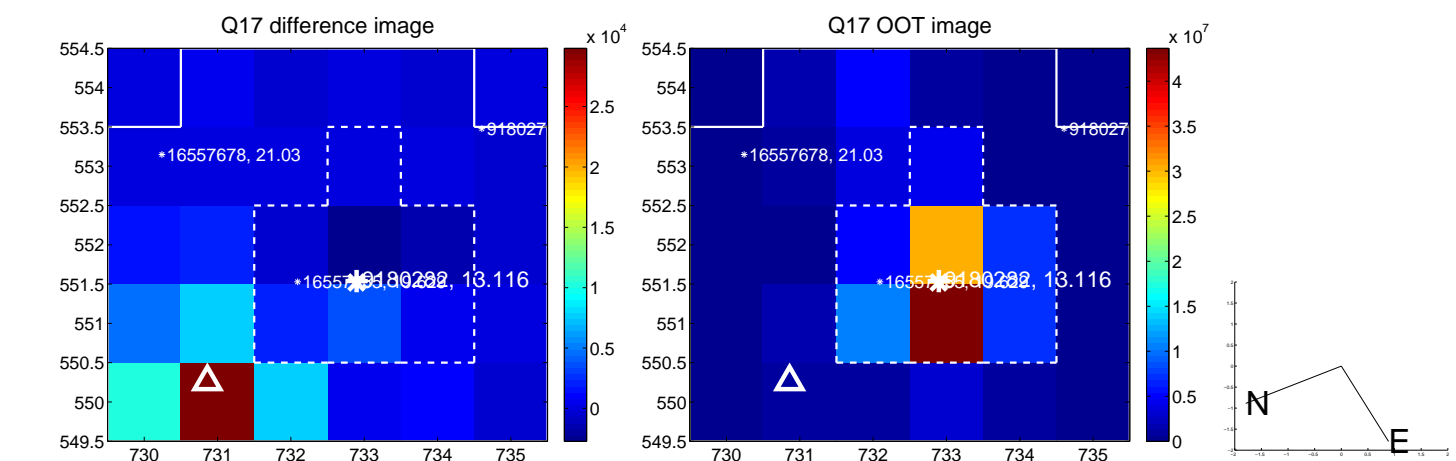


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



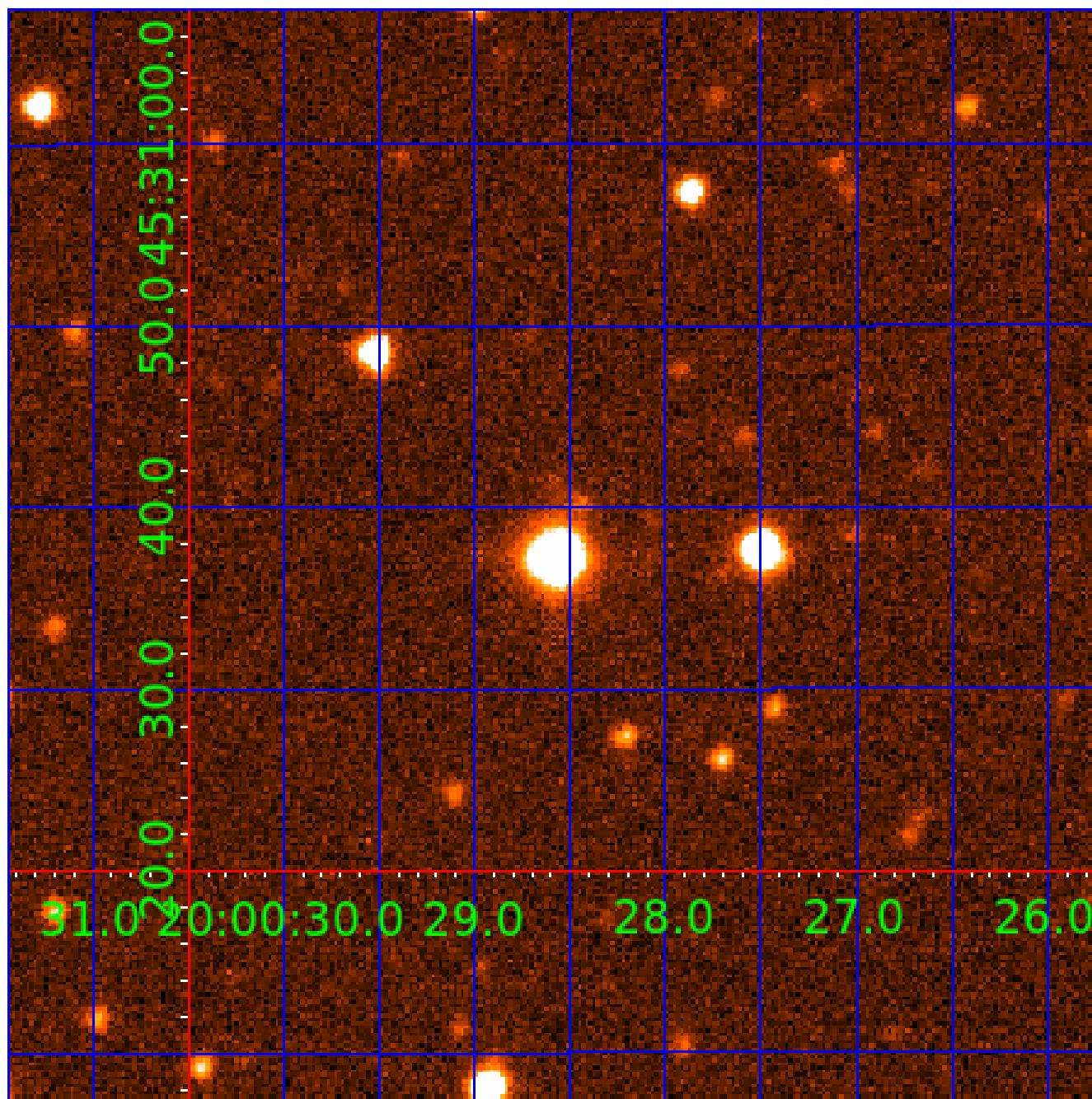


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\Delta$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 009180282

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009180282-01	OBS	5636.01	2.791298	131.937795	135.8	2.893	23.1	23.4	1.67	6407	2.28	2329.36
009180282-02	OBS	No	2.791315	133.341399	47.6	3.542	7.8	8.2	1.67	6407	1.35	2329.34

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009180282-01	OBS	FP	0.00	0	1	1	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—CENT_RESOLVED_OFFSET—HALO_GHOST
009180282-02	OBS	FP	0.00	1	1	1	0	IS_SEC_TCE—CENT_RESOLVED_OFFSET

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

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

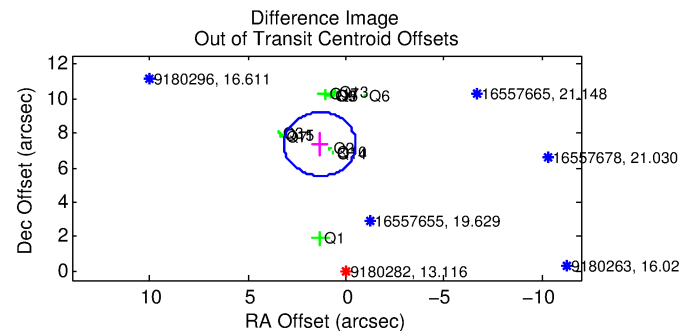
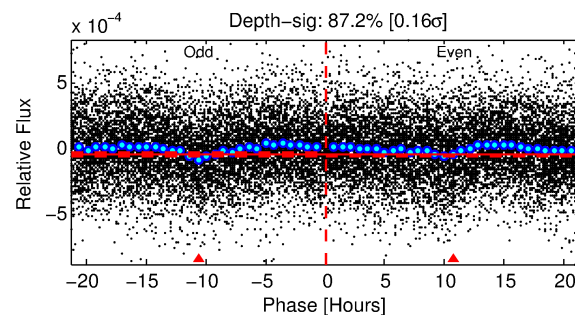
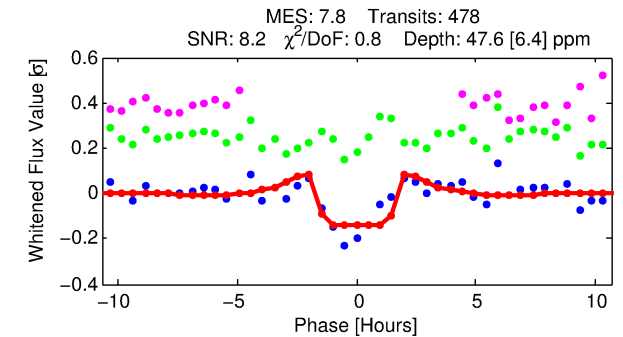
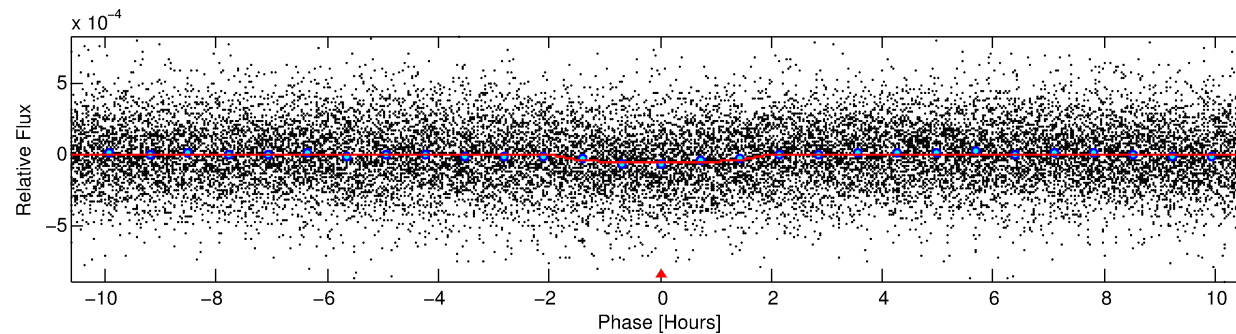
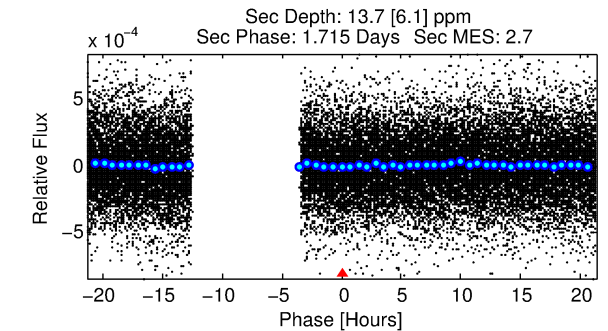
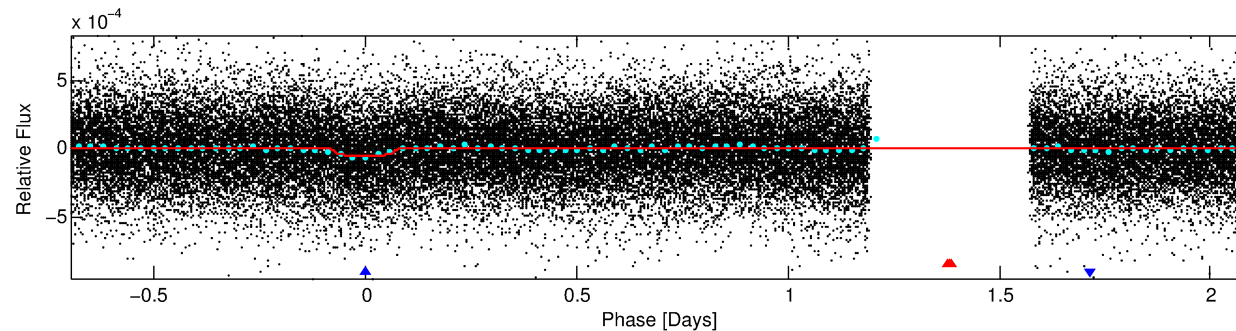
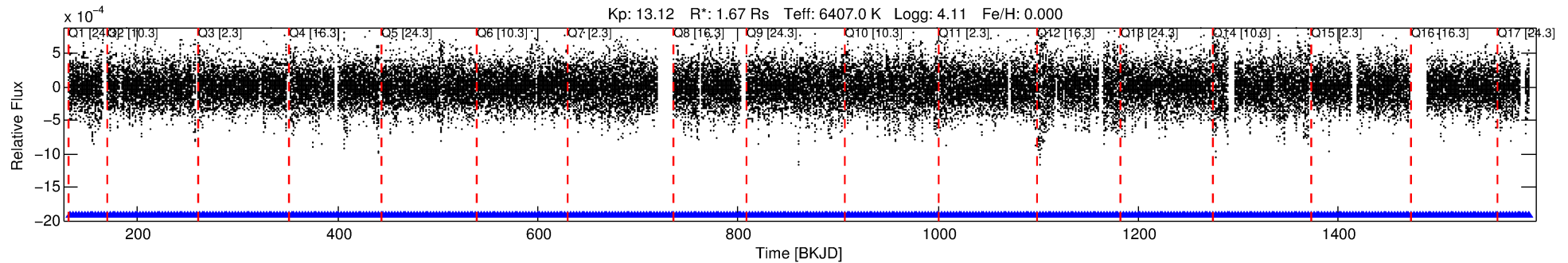
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009180282-02

No Significant Match Found

# DV One-Page Summary

KIC: 9180282 Candidate: 2 of 2 Period: 2.791 d  
KOI: K05636 Corr: No Ephemeris Match



## DV Fit Results:

Period = 2.79132 [0.00002] d  
Epoch = 133.3414 [0.0033] BKJD  
Rp/R\* = 0.0074 [0.0022]  
a/R\* = 2.88 [4.05]  
b = 0.90 [0.34]  
Seff = 2329.34 [959.40]  
Teq = 1771 [182] K  
Rp = 1.35 [0.57] Re  
a = 0.0425 [0.0112] AU  
Ag = 7.45 [6.22] [1.04σ]  
Teff = 4526 [843] K [3.19σ]

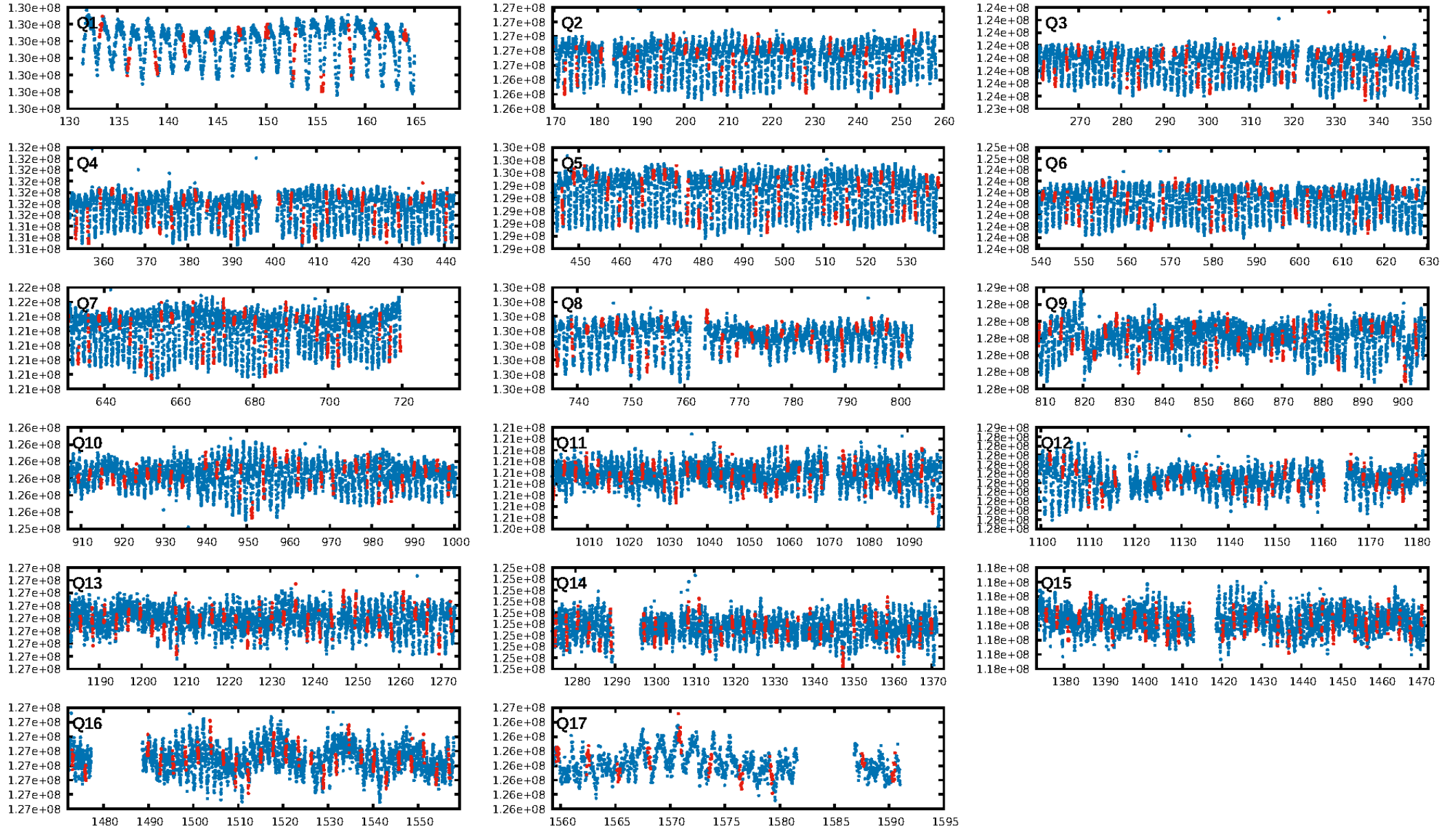
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 5.48e-14  
RollingBand-fgt: 1.00 [456/456]  
GhostDiagnostic-chr: -0.2998  
Centroid-sig: 0.0%  
Centroid-so: 56.396 arcsec [60.76σ]  
OotOffset-rm: 7.491 arcsec [12.18σ]  
KicOffset-rm: 7.401 arcsec [12.11σ]  
OotOffset-st: 4/4/0/5 [13]  
KicOffset-st: 4/4/0/5 [13]  
DiffImageQuality-fgm: 0.85 [11/13]  
DiffImageOverlap-fno: 1.00 [17/17]

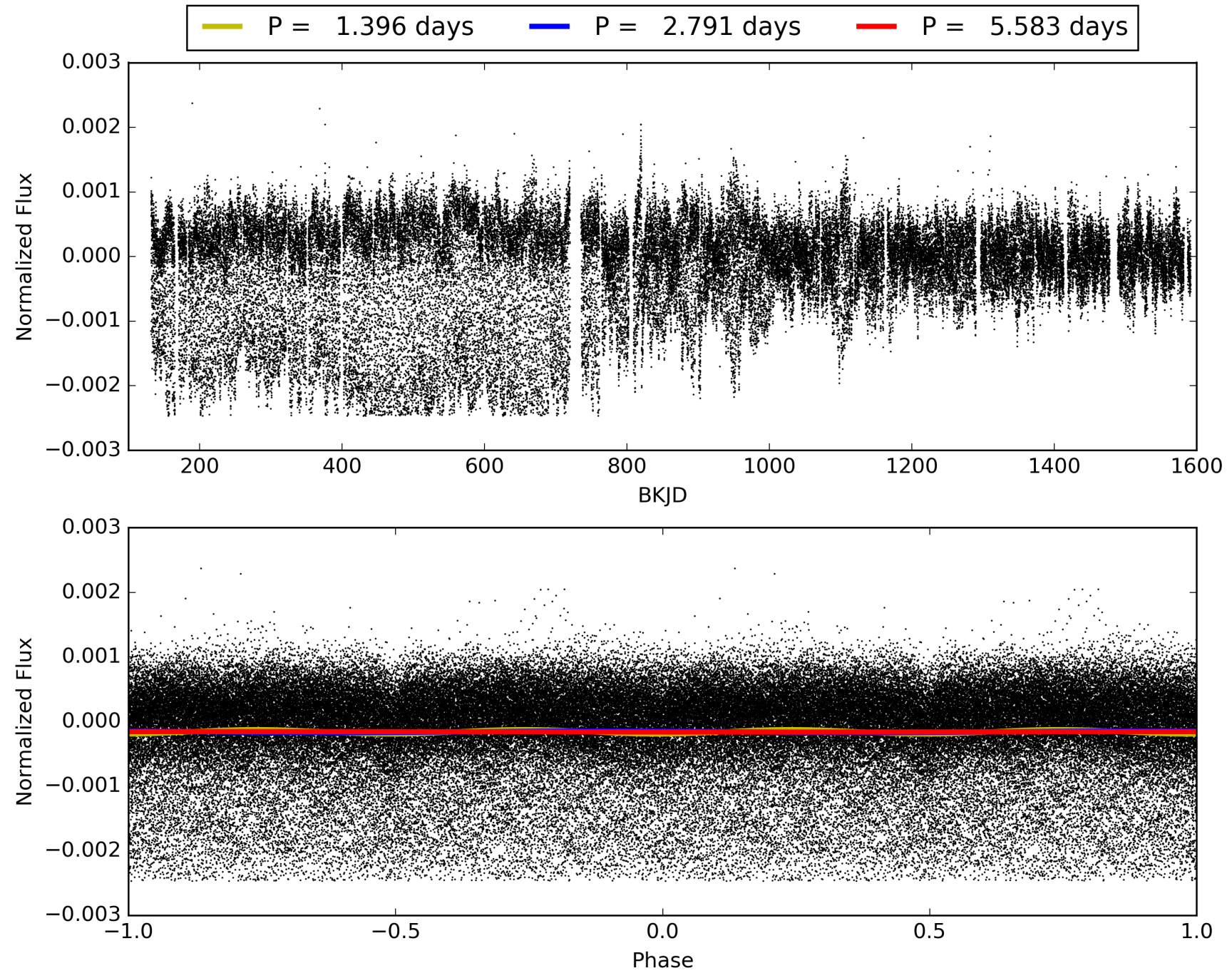
Software Revision: svn-ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 14:13:10 Z

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

# TCE 009180282-02, PDC Light Curves



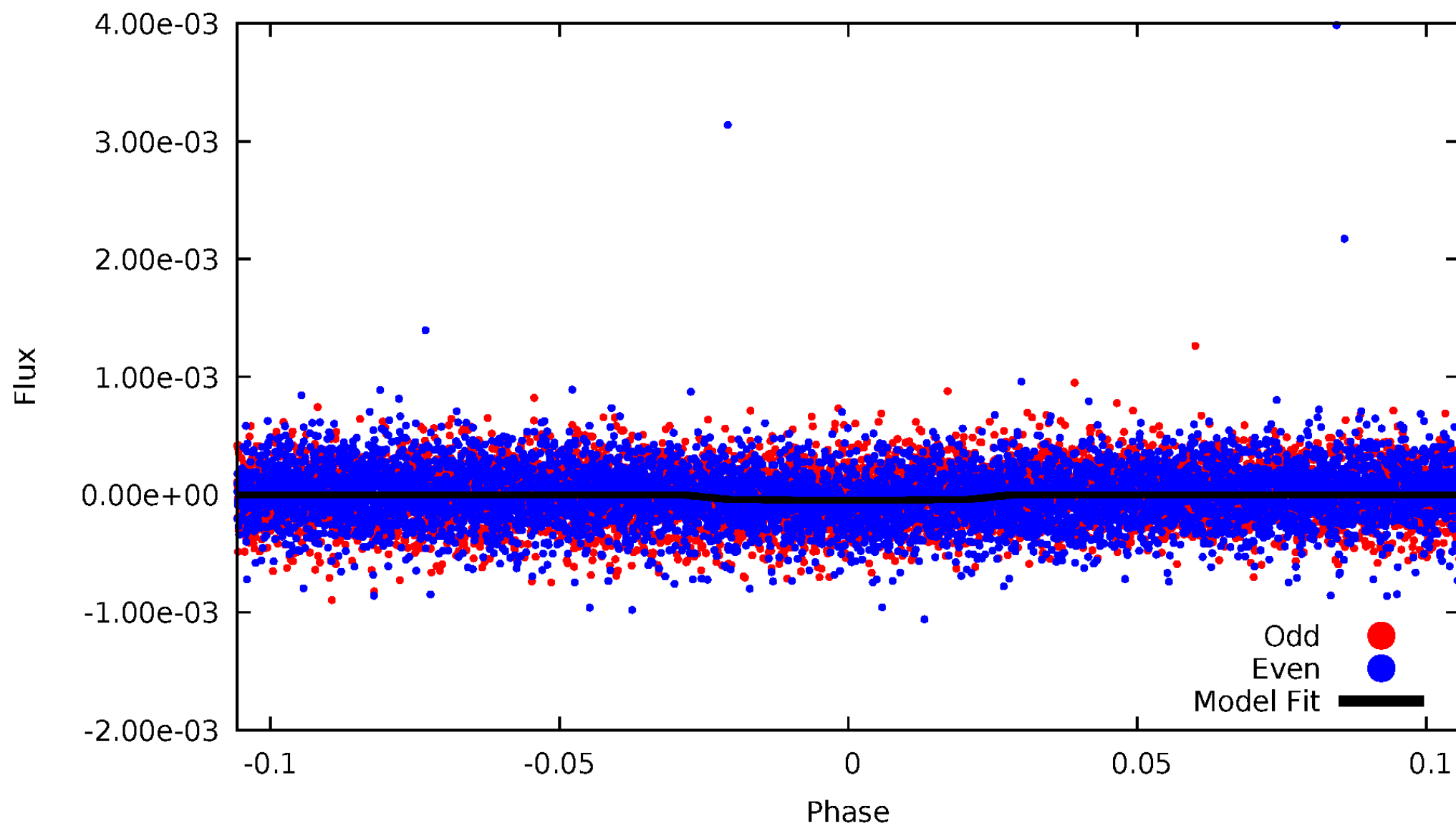
TCE 009180282-02





# DV Odd/Even

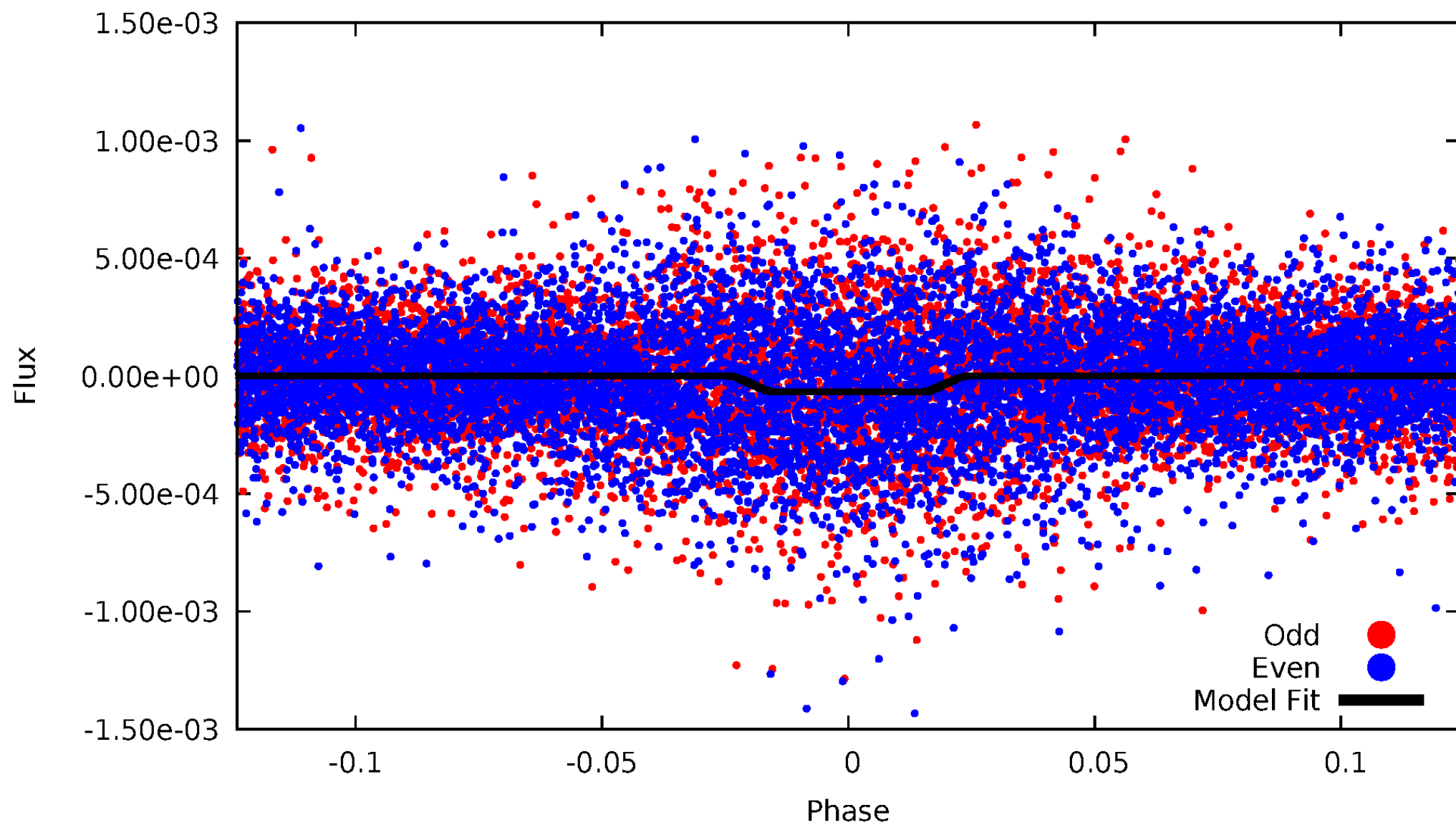
TCE 009180282-02





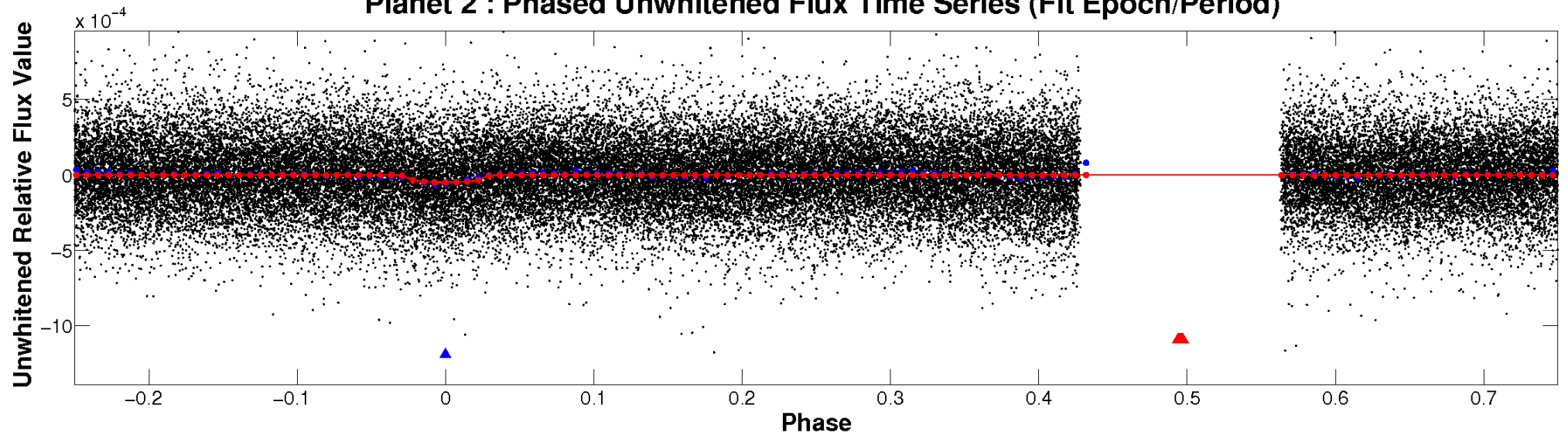
# ALT Odd/Even

TCE 009180282-02

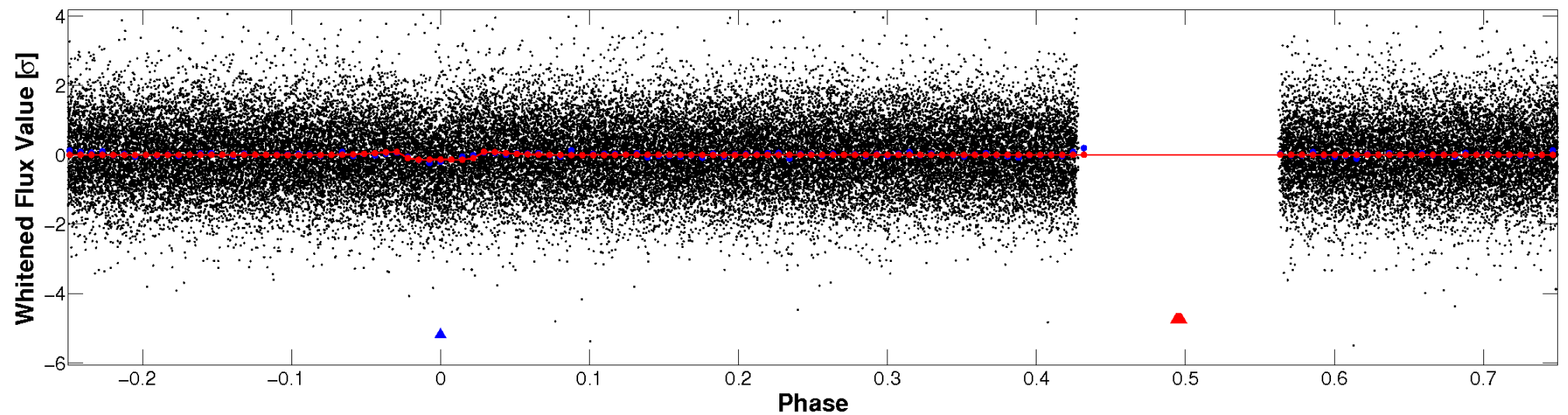


# Non-Whitened Vs. Whitened Light Curve

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

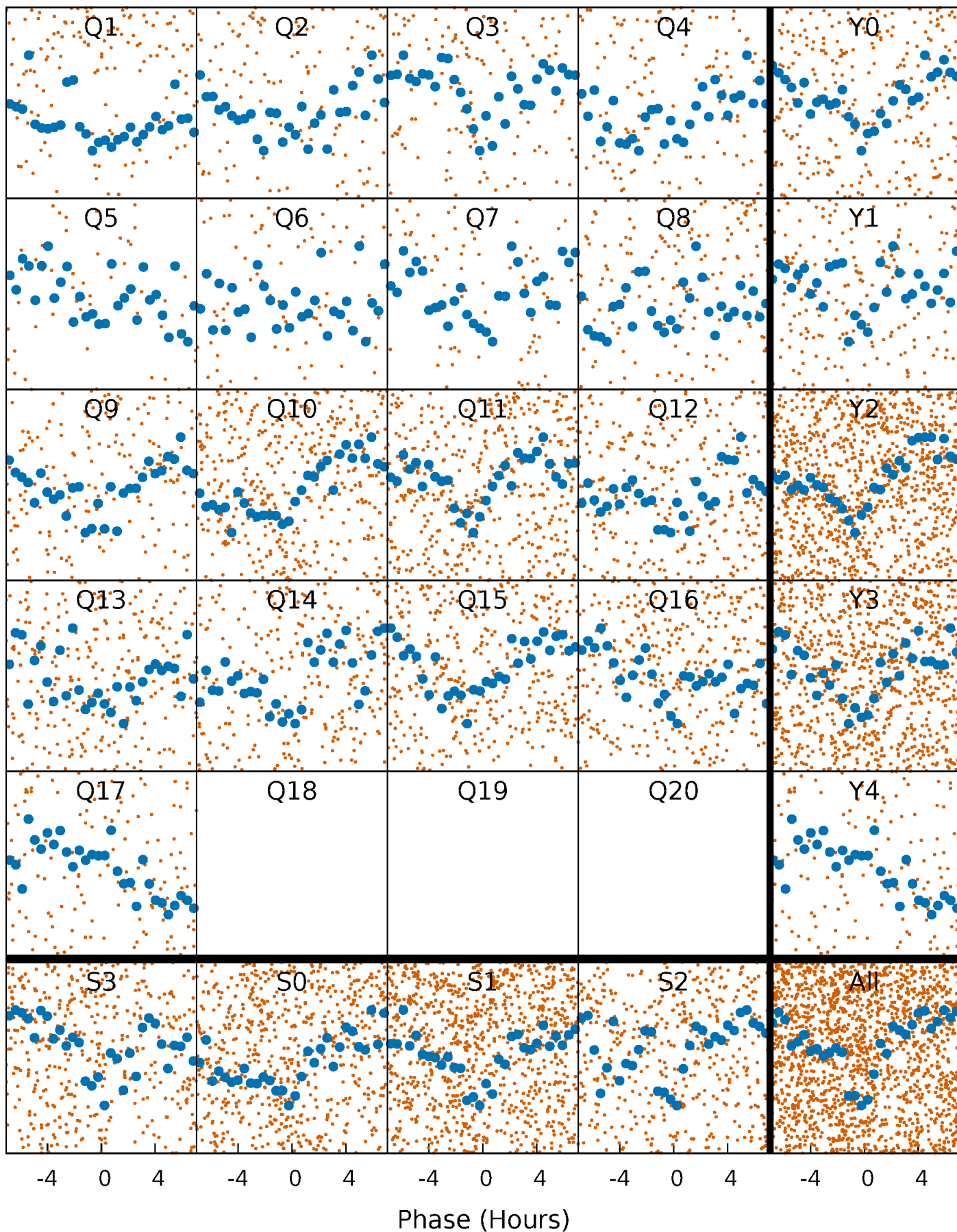


**Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



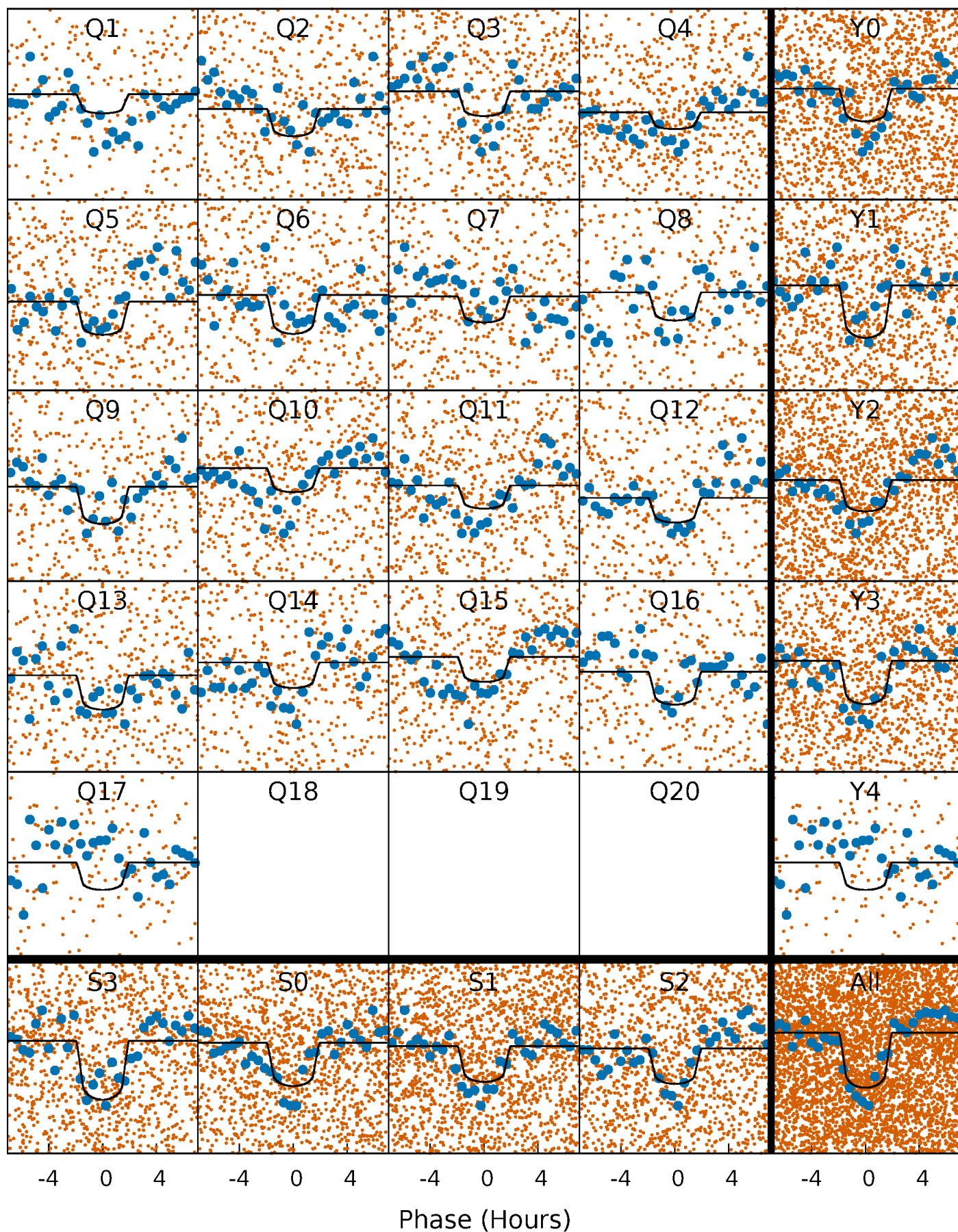
# PDC Quarter-Phased Transit Curves

TCE 009180282-02   P= 2.791315 Days    $T_0=133.341399$  (BKJD)



# DV Quarter-Phased Transit Curves

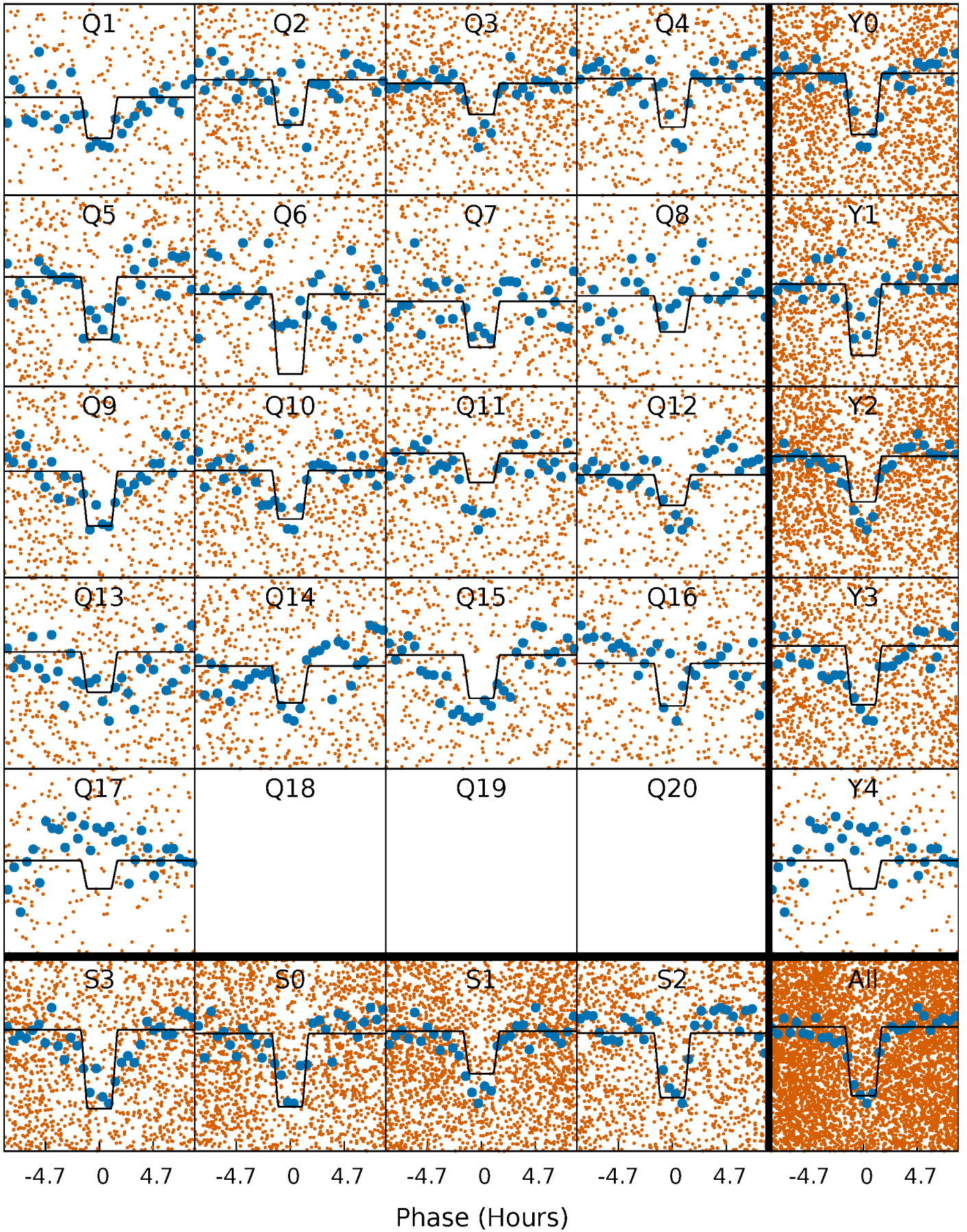
TCE 009180282-02 P= 2.791315 Days  $T_0=133.341399$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 009180282-02 P= 2.791261 Days  $T_0=133.340677$  (BKJD)

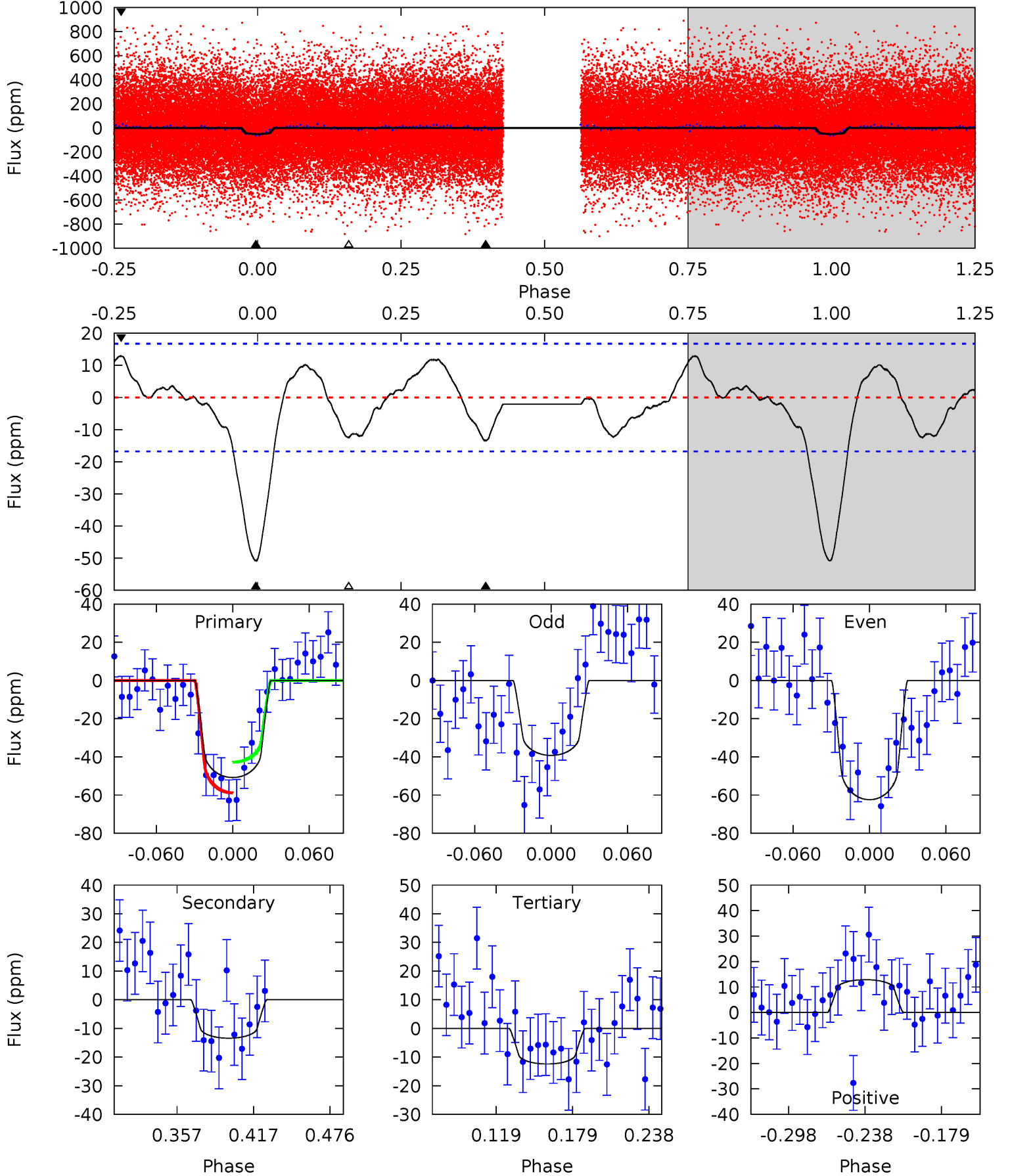




# DV Model-Shift Uniqueness Test

009180282-02, P = 2.791315 Days, E = 130.550084 Days

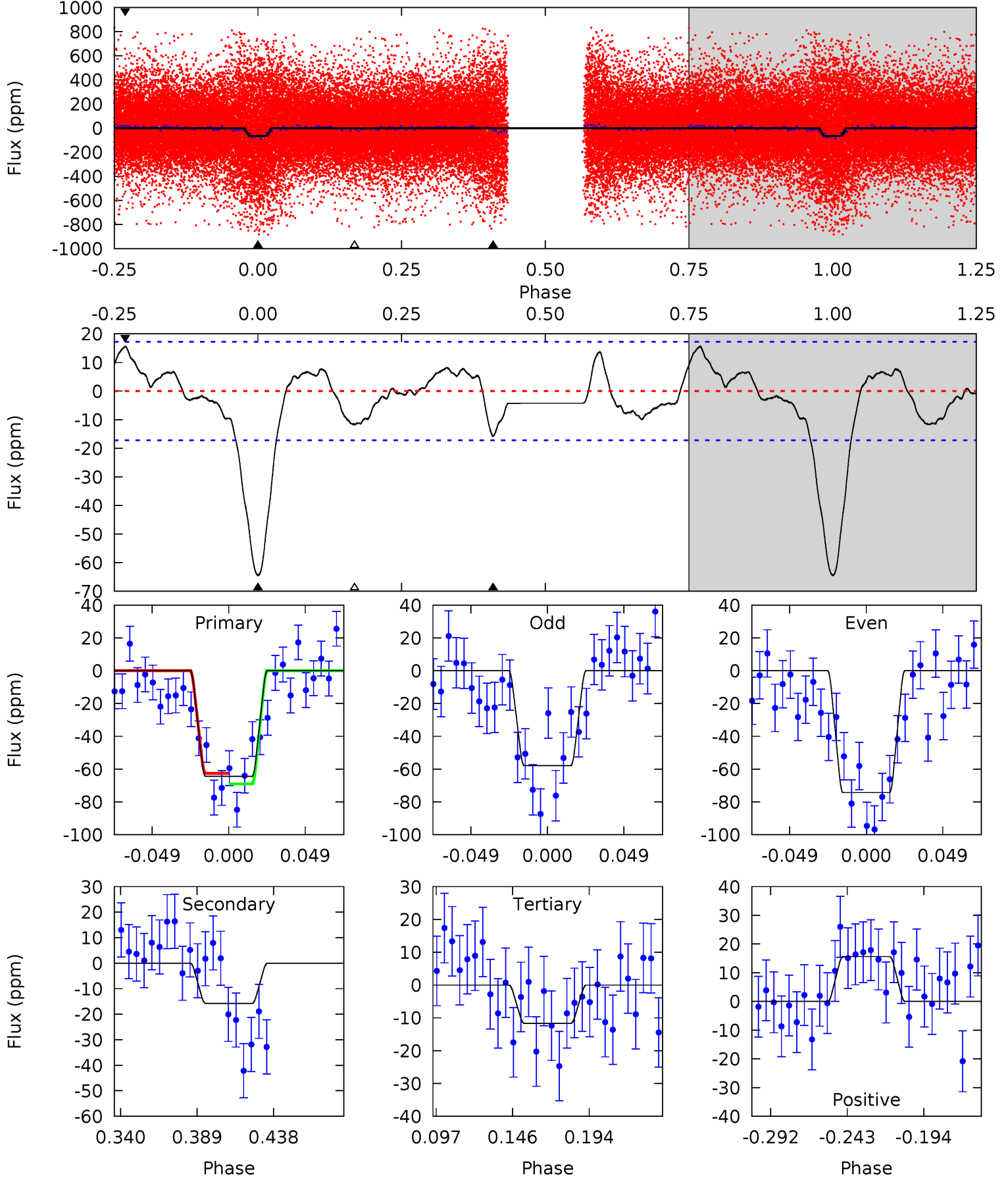
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.2	3.74	3.46	3.59	4.67	1.88	1.93	10.7	10.6	0.28	0.15	3.23	0.98	0.20	2.23



# Alt Model-Shift Uniqueness Test

009180282-02, P = 2.791261 Days, E = 130.549416 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
17.6	4.31	3.20	4.28	4.71	1.97	1.80	14.4	13.4	1.11	0.03	2.22	0.84	0.20	0.91



### Stellar Parameters For KIC 009180282

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6407^{+173}_{-192}$	$4.111^{+0.220}_{-0.180}$	$0.000^{+0.250}_{-0.300}$	$1.668^{+0.508}_{-0.457}$	$1.311^{+0.197}_{-0.241}$	$0.398^{+0.516}_{-0.196}$
	+3%/-3%	+5%/-4%	+inf%/-inf%	+30%/-27%	+15%/-18%	+130%/-49%
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 009180282-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-13 \pm 4$	$1.31^{+0.49}_{-0.41}$	$2456^{+232}_{-188}$	$4576^{+819}_{-501}$	$7.339^{+9.212}_{-3.606}$
Alt.	$-16 \pm 4$	$1.50^{+0.46}_{-0.43}$	$2471^{+195}_{-208}$	$4518^{+652}_{-451}$	$6.797^{+6.861}_{-3.082}$

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

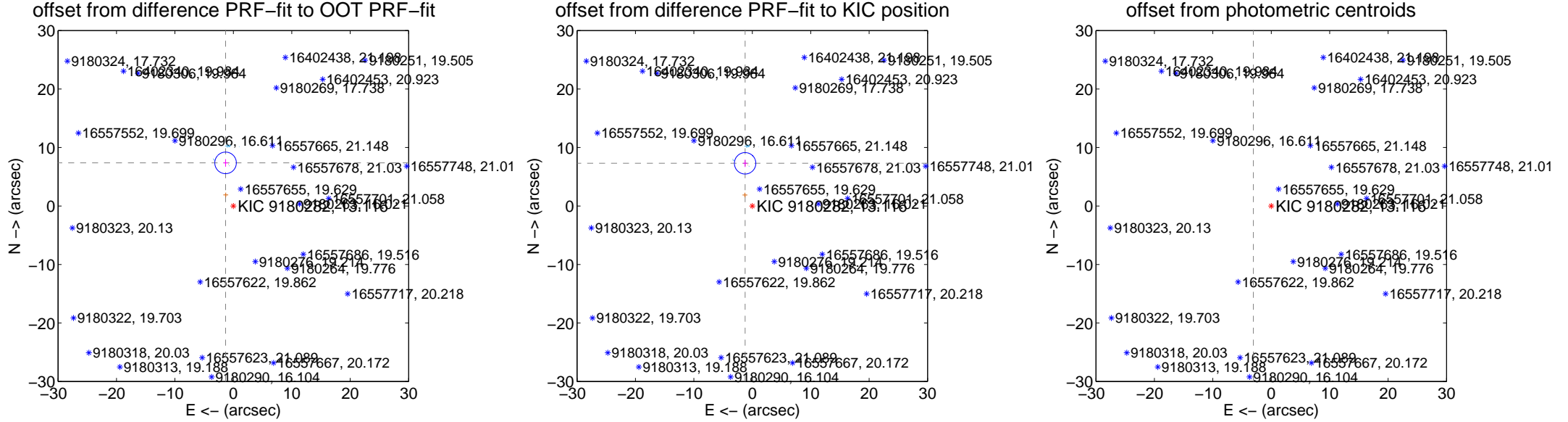
## DV Centroid Data

Supplemental centroid analysis for 009180282-02. Kepler magnitude: 13.12. Transit SNR 8.23

There are 11 quarters with good PRF difference image offsets

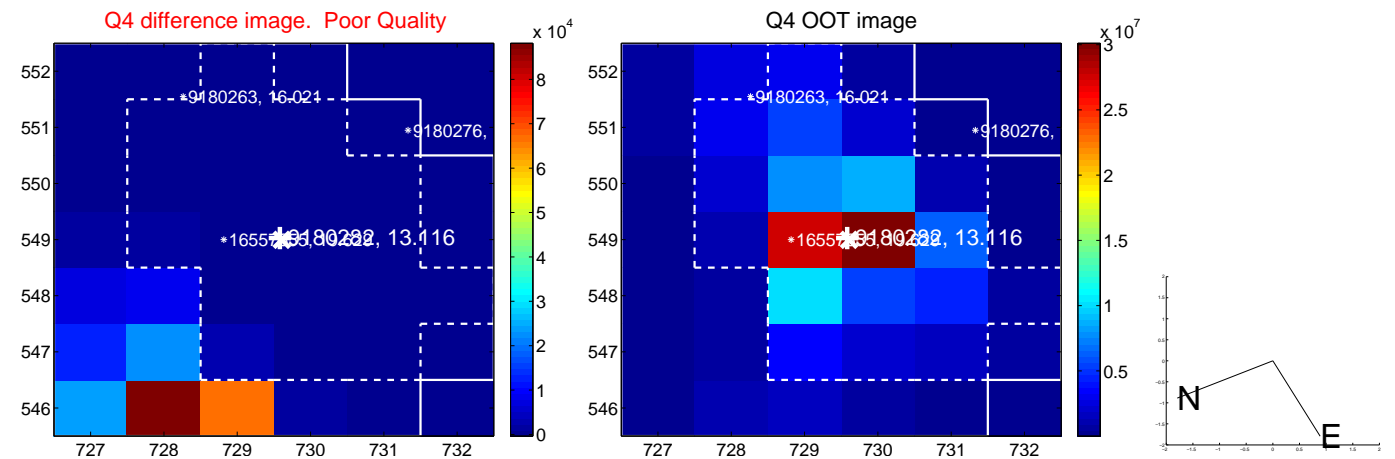
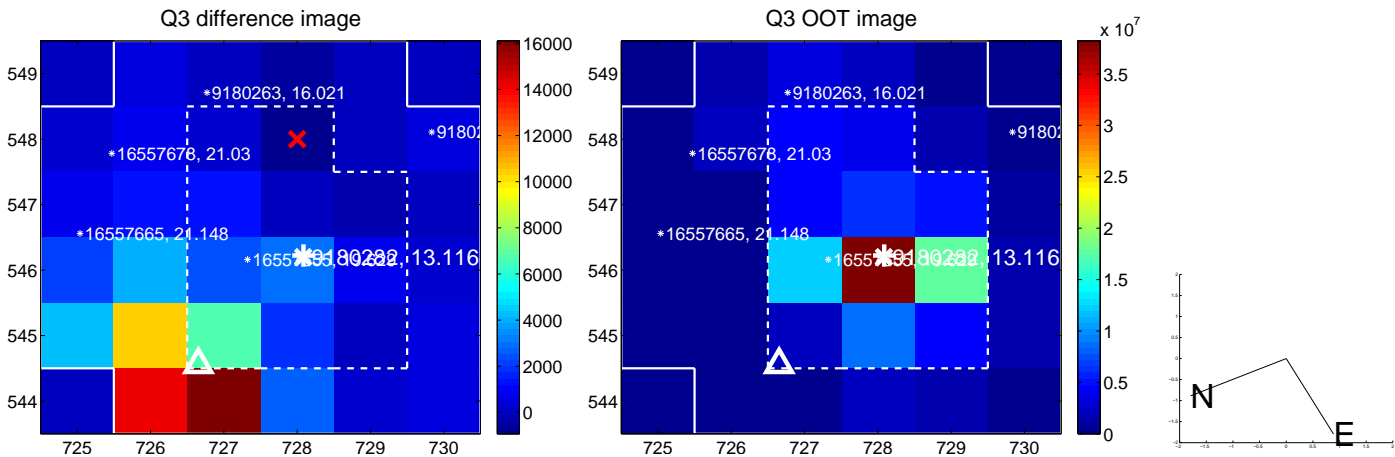
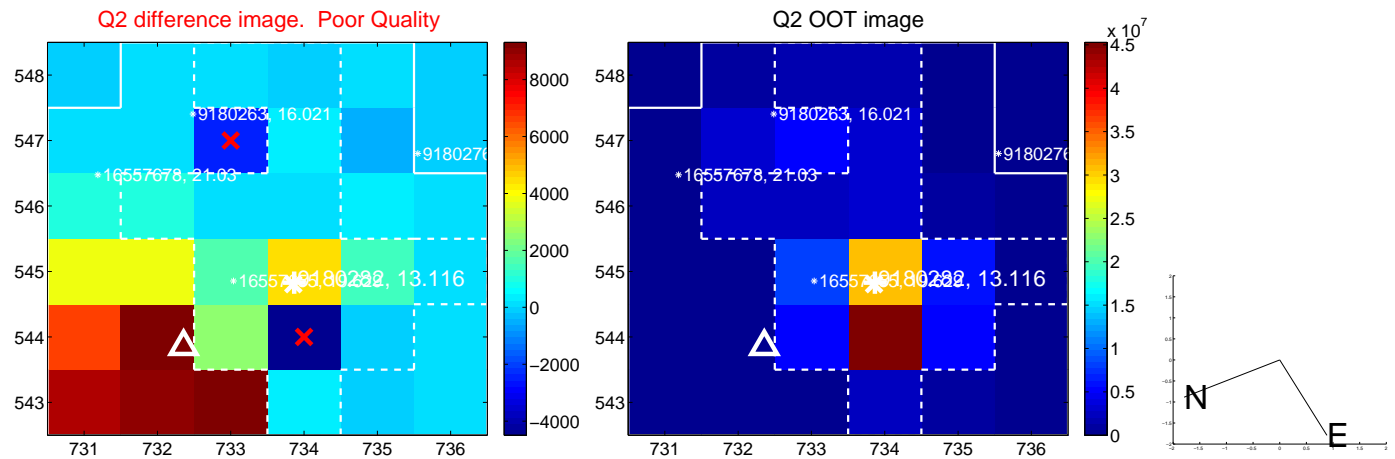
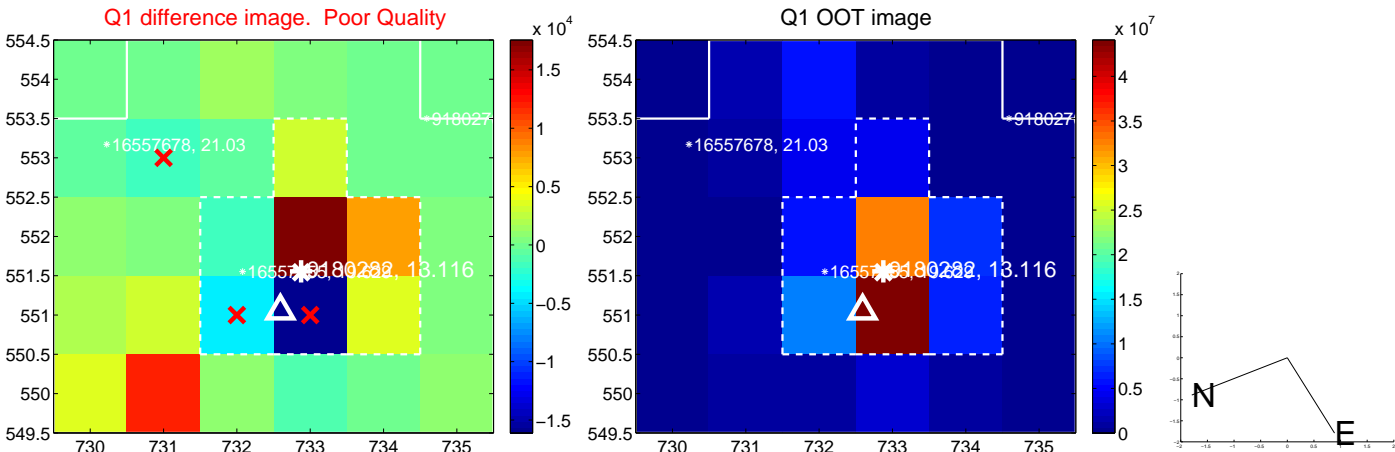
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b>7.491 <math>\pm</math> 0.615</b>	<b>12.18</b>	1.331 $\pm$ 0.398	7.372 $\pm$ 0.647
PRF-fit source offset from KIC position	<b>7.401 <math>\pm</math> 0.611</b>	<b>12.11</b>	1.230 $\pm$ 0.357	7.298 $\pm$ 0.628
photometric centroid source offset	<b>56.40 <math>\pm</math> 0.93</b>	<b>60.76</b>	3.06 $\pm$ 1.20	56.31 $\pm$ 0.93



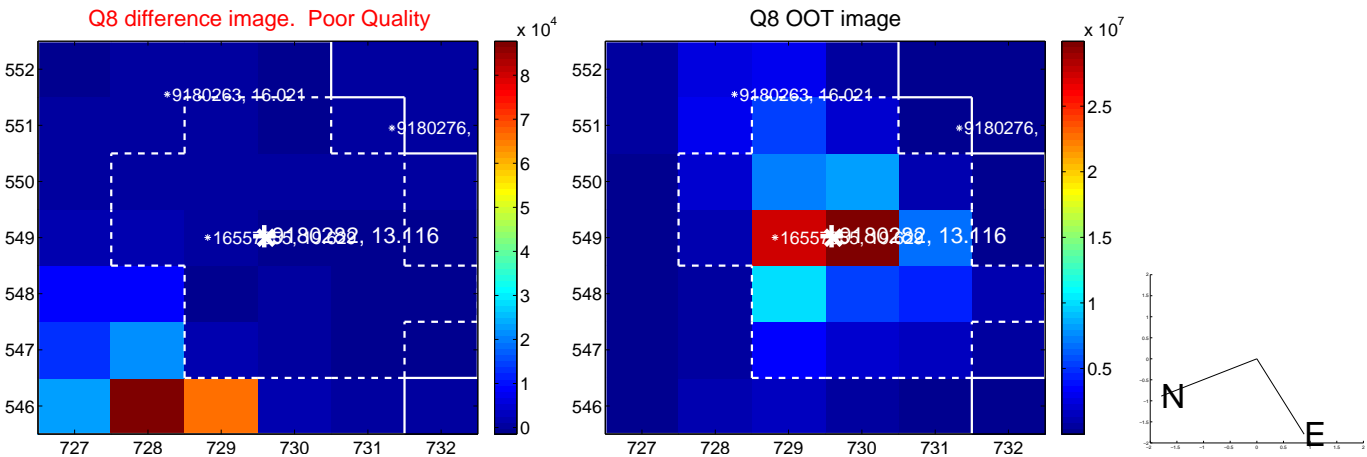
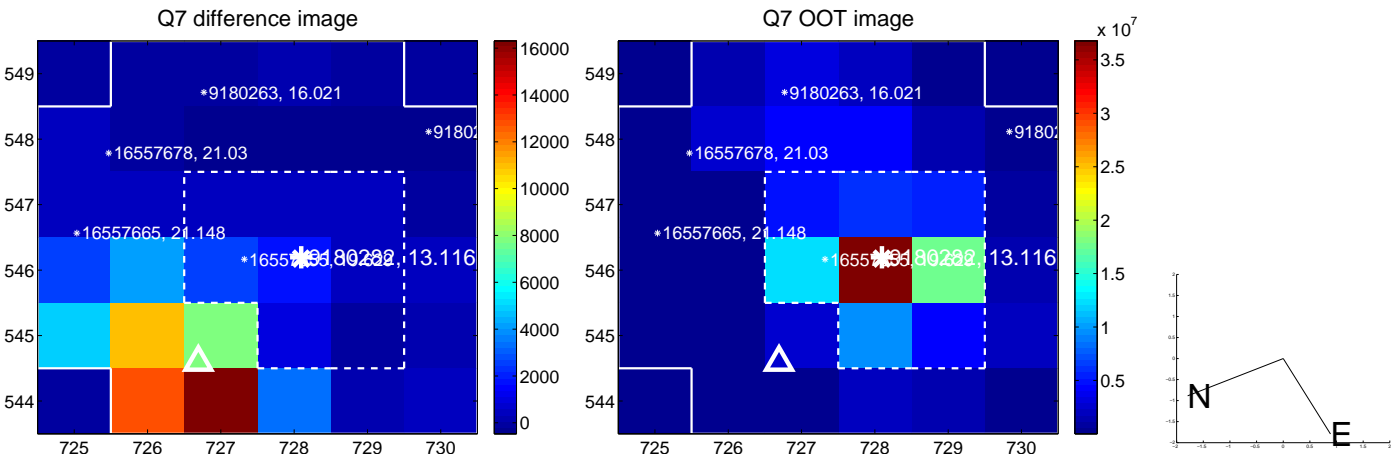
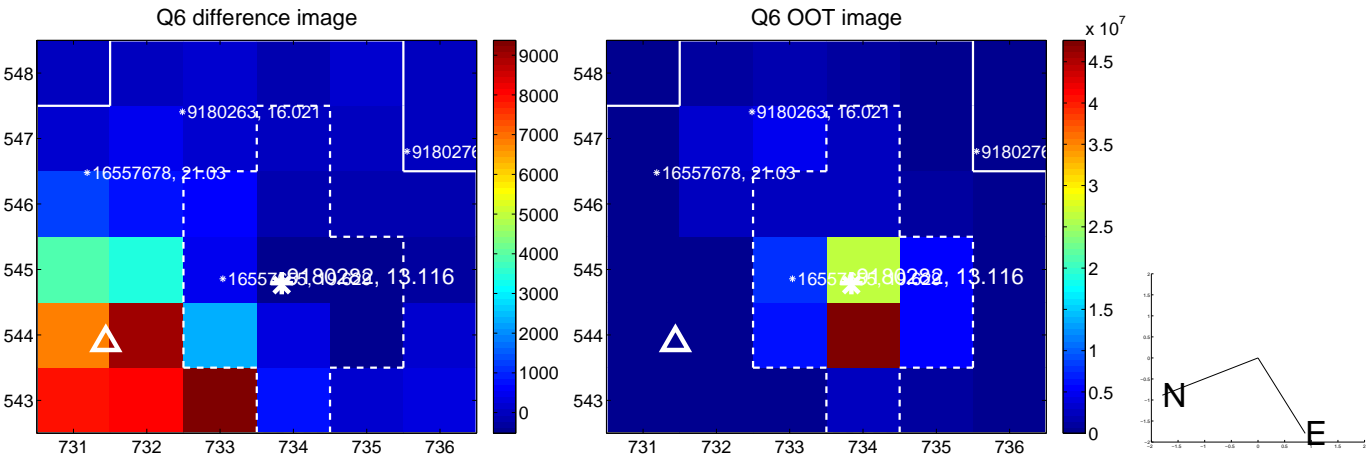
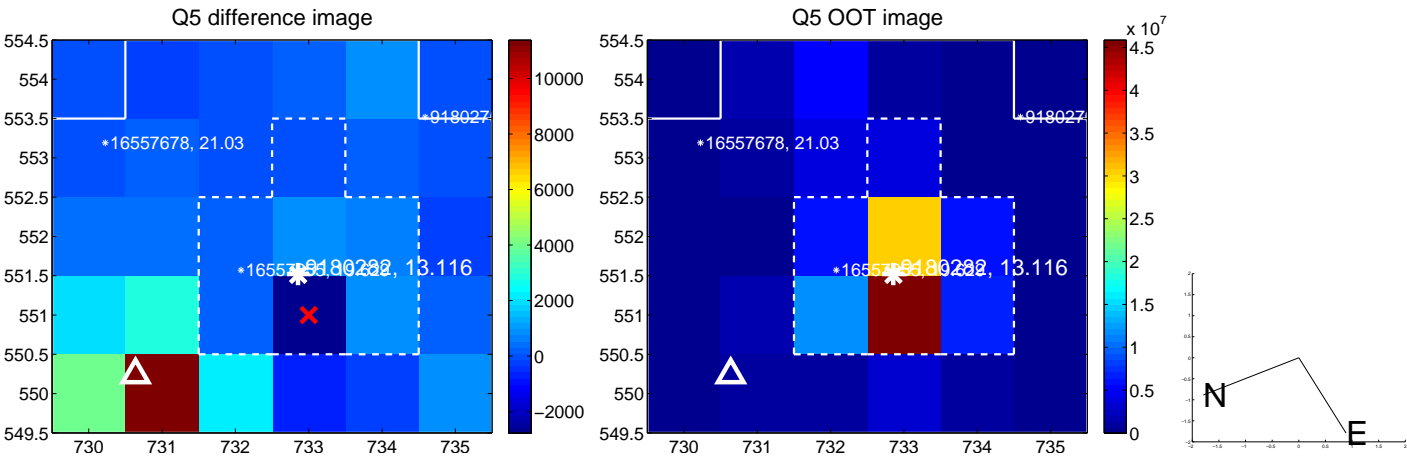
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

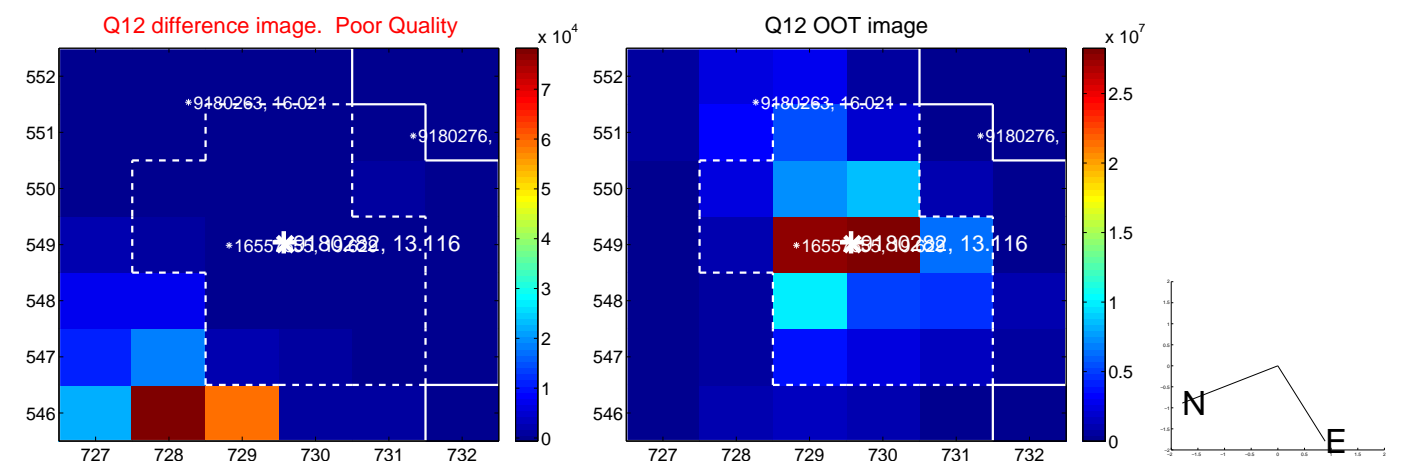
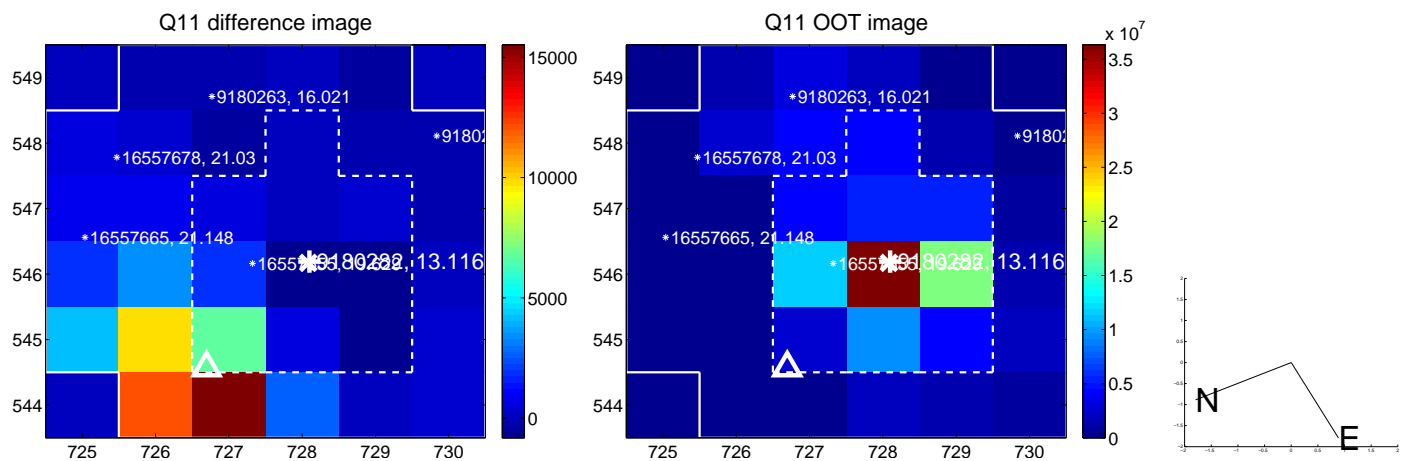
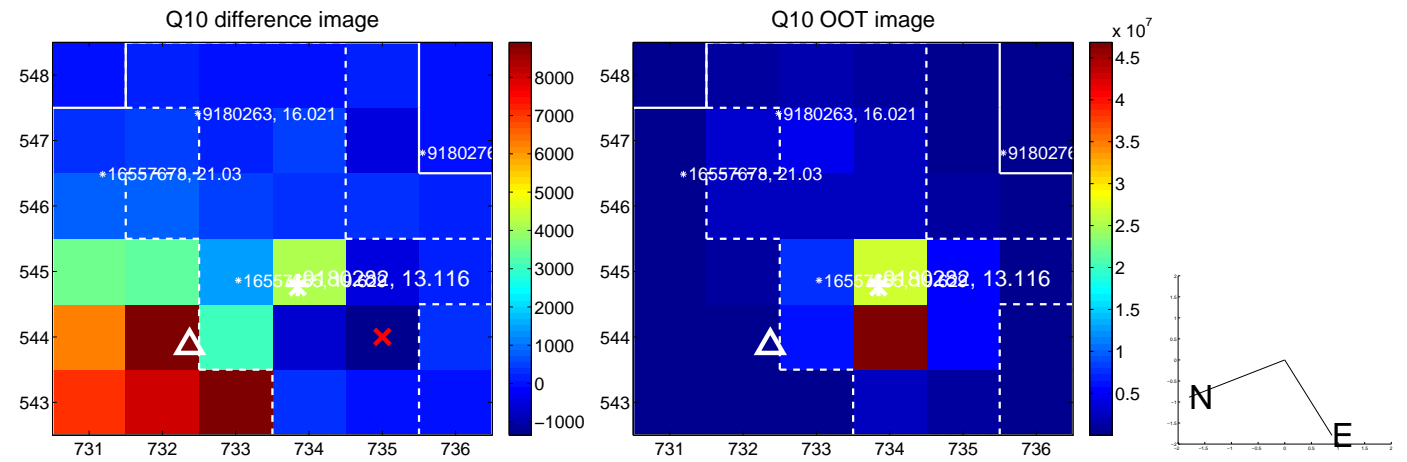
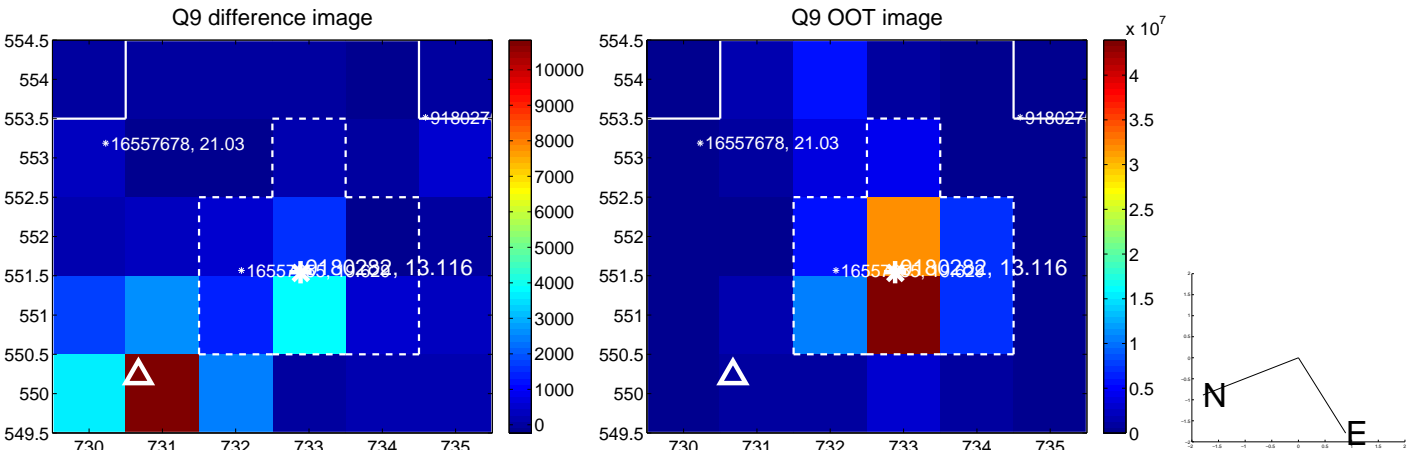




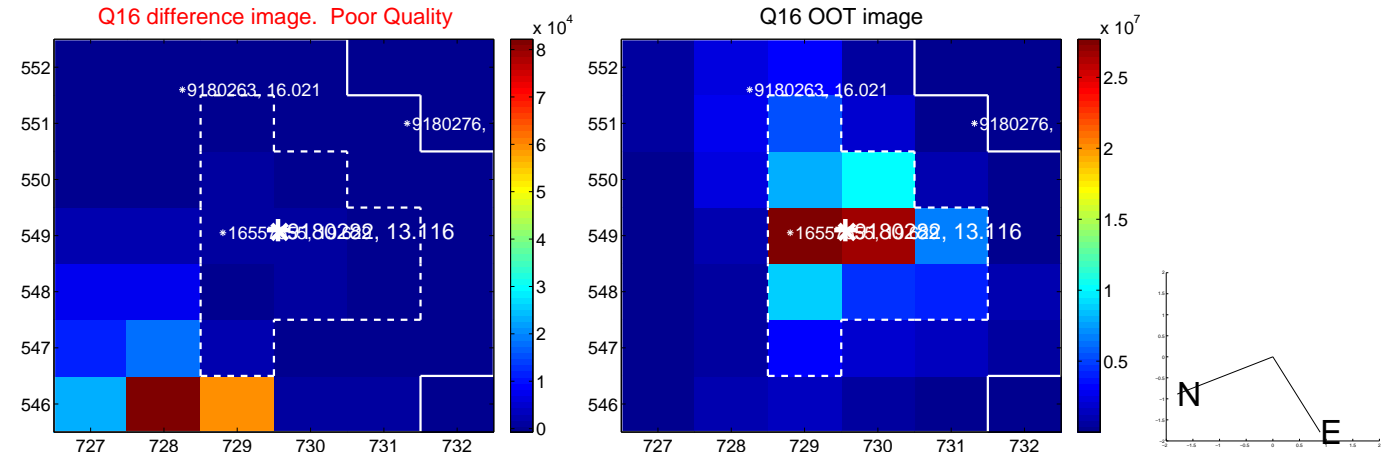
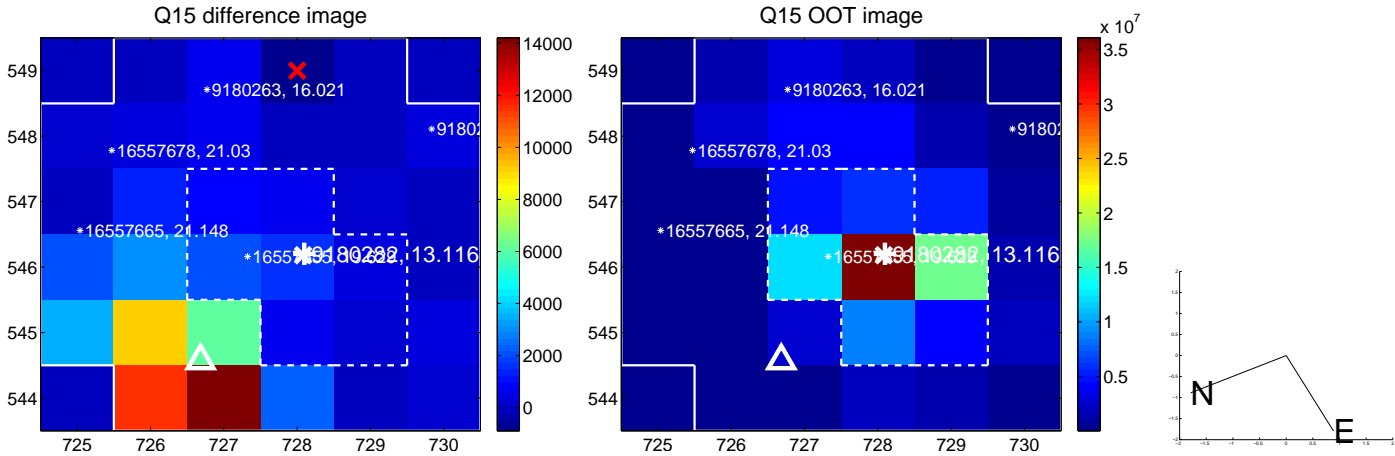
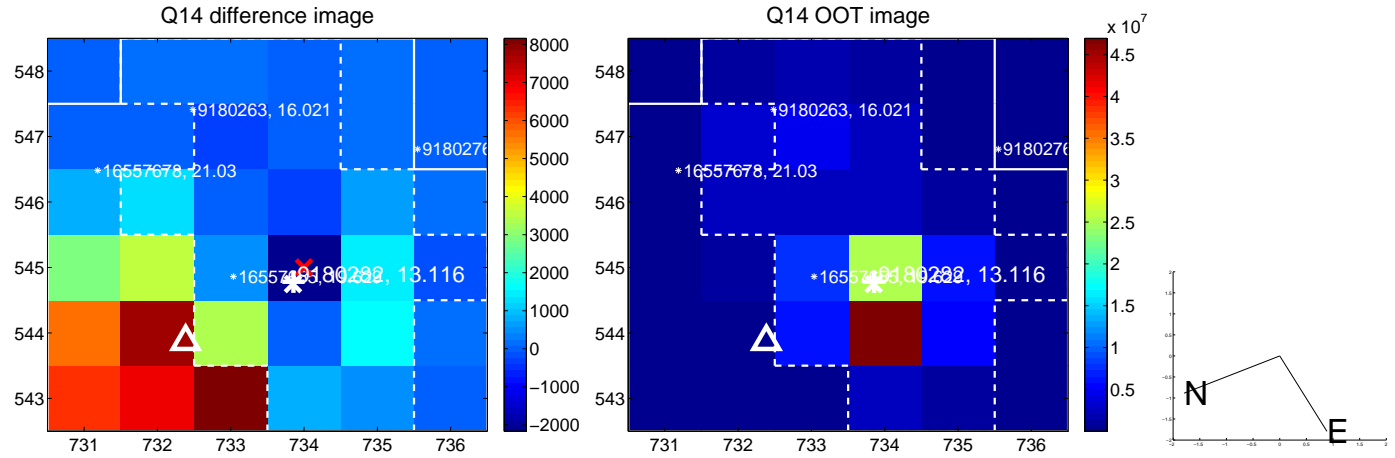
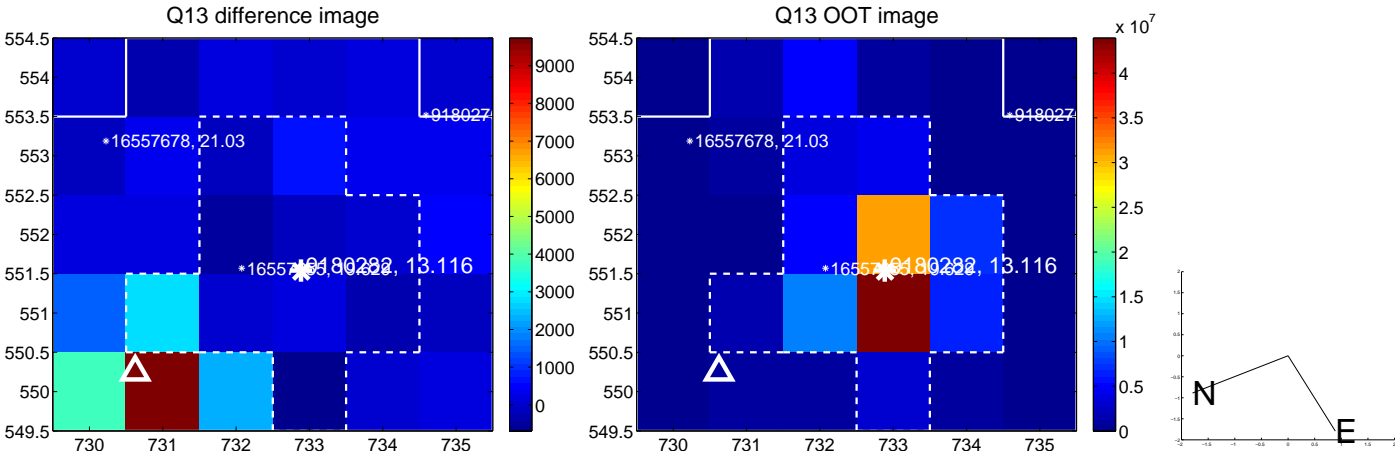
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



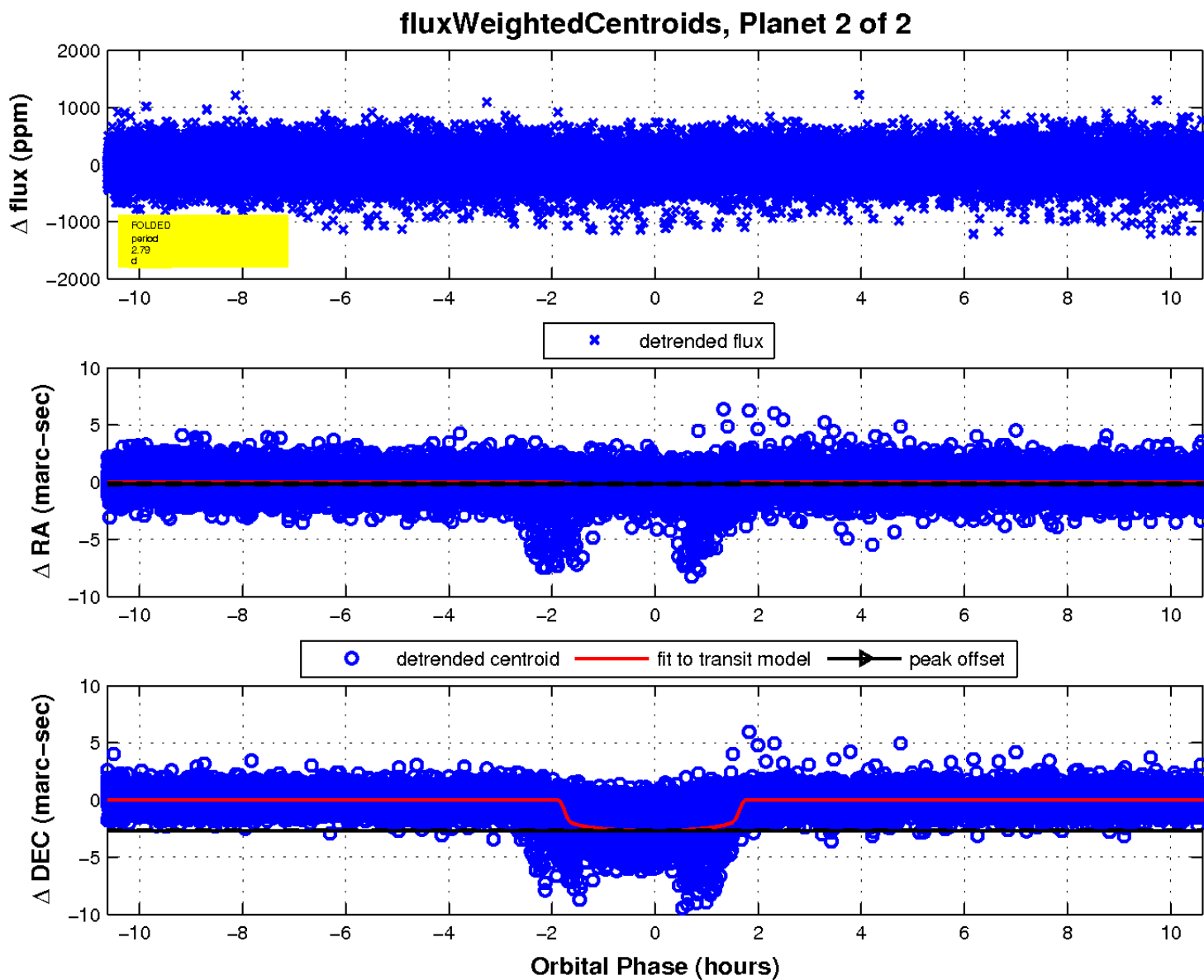
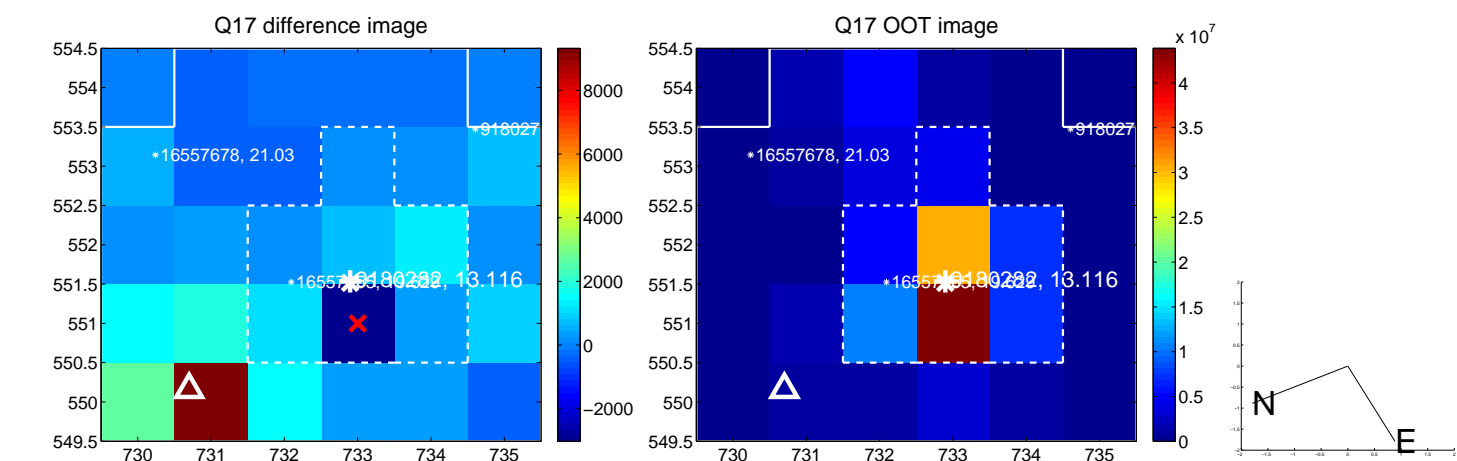
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

