

# KIC 008167922

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008167922-01	OBS	No	395.796987	331.011884	713.1	12.607	10.1	8.8	9.21	7022	46.25	78.41
008167922-02	OBS	No	0.683931	131.626858	2.5	6.233	8.5	1.3	9.21	7022	1.48	0.00

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008167922-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_ALT—MOD_POS_ALT— INCONSISTENT_TRANS—CENT_FEW_DIFFS
008167922-02	OBS	FP	0.00	1	0	0	0	LPP_DV

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

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

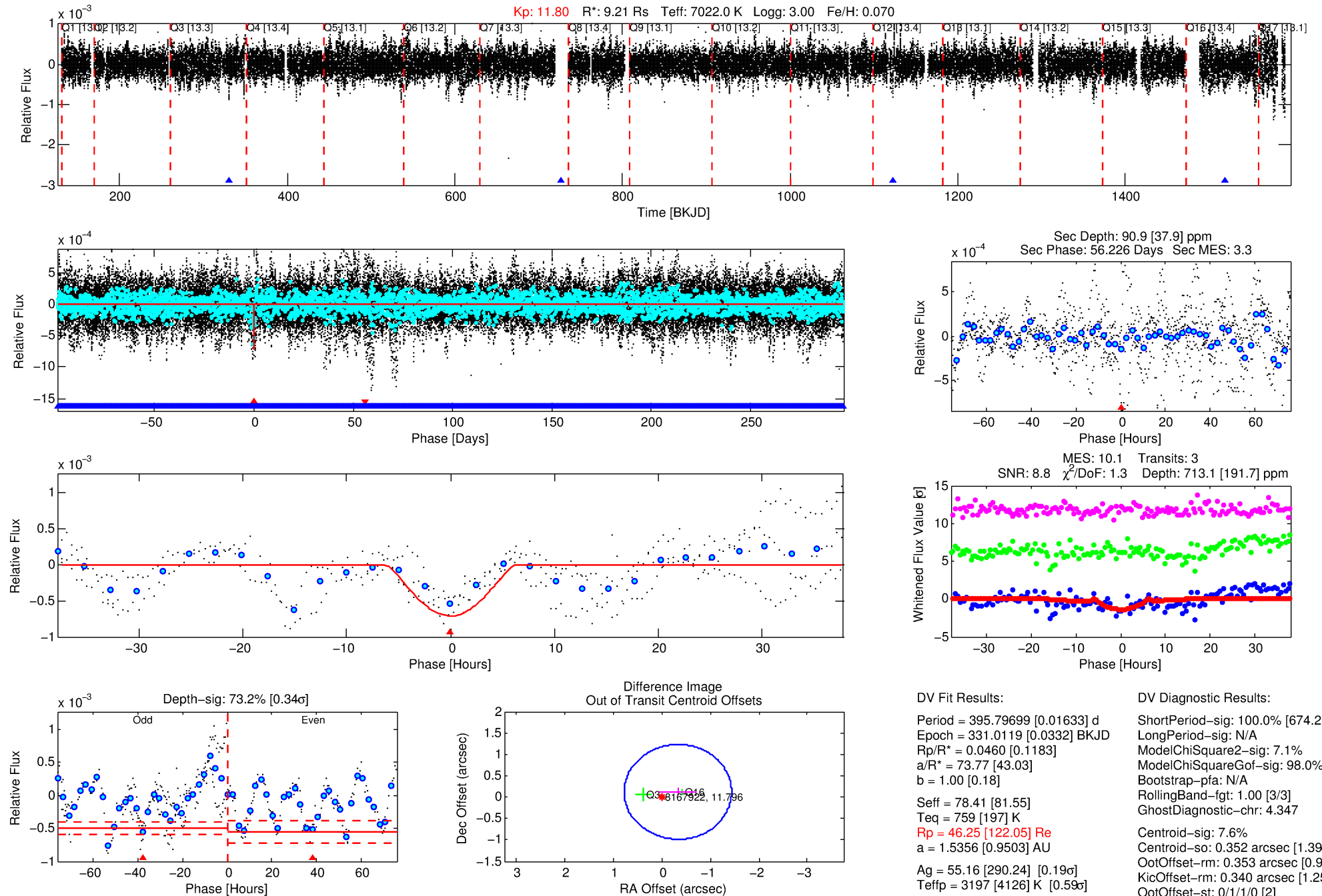
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008167922-01

No Significant Match Found

# DV One-Page Summary

KIC: 8167922 Candidate: 1 of 2 Period: 395.797 d



## DV Fit Results:

Period = 395.79699 [0.01633] d  
 Epoch = 331.0119 [0.0332] BKJD  
 Rp/R\* = 0.0460 [0.1183]  
 a/R\* = 73.77 [43.03]  
 b = 1.00 [0.18]  
 Seff = 78.41 [81.55]  
 Teq = 759 [197] K  
 Rp = 46.25 [122.05] Re  
 a = 1.5356 [0.9503] AU  
 Ag = 55.16 [290.24] [0.19 $\sigma$ ]  
 Tefp = 3197 [4126] K [0.59 $\sigma$ ]

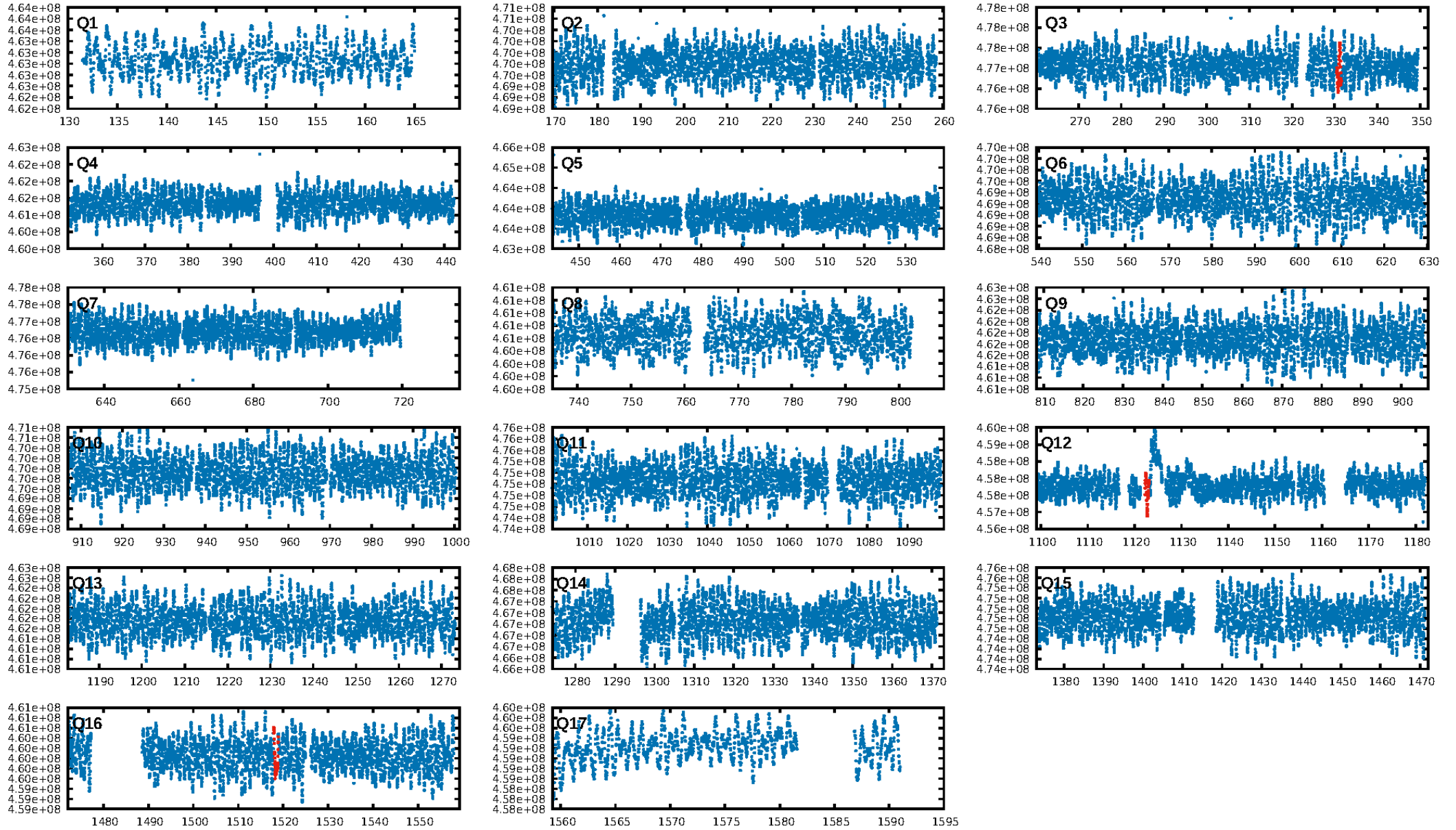
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [674.27 $\sigma$ ]  
 LongPeriod-sig: N/A  
 ModelChiSquare2-sig: 7.1%  
 ModelChiSquareGof-sig: 98.0%  
 Bootstrap-pfa: N/A  
 RollingBand-fgt: 1.00 [3/3]  
 GhostDiagnostic-chr: 4.347  
 Centroid-sig: 7.6%  
 Centroid-so: 0.352 arcsec [1.39 $\sigma$ ]  
 OotOffset-rm: 0.353 arcsec [0.95 $\sigma$ ]  
 KicOffset-rm: 0.340 arcsec [1.25 $\sigma$ ]  
 OotOffset-st: 0/1/1/0 [2]  
 KicOffset-st: 0/1/1/0 [2]  
 DiffImageQuality-fgm: 0.50 [1/2]  
 DiffImageOverlap-fno: 0.00 [0/2]

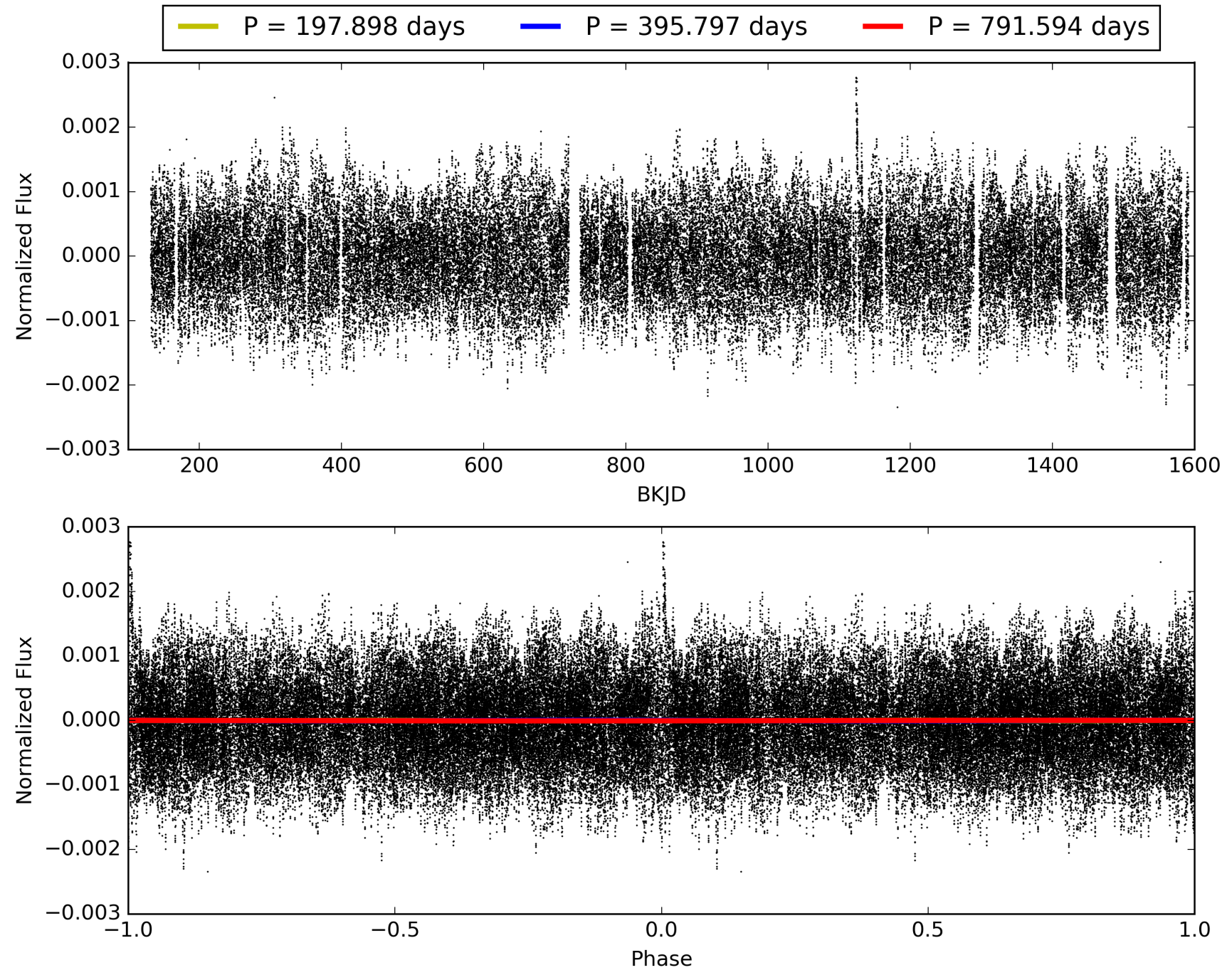
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 19:55:36 Z

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

# TCE 008167922-01, PDC Light Curves

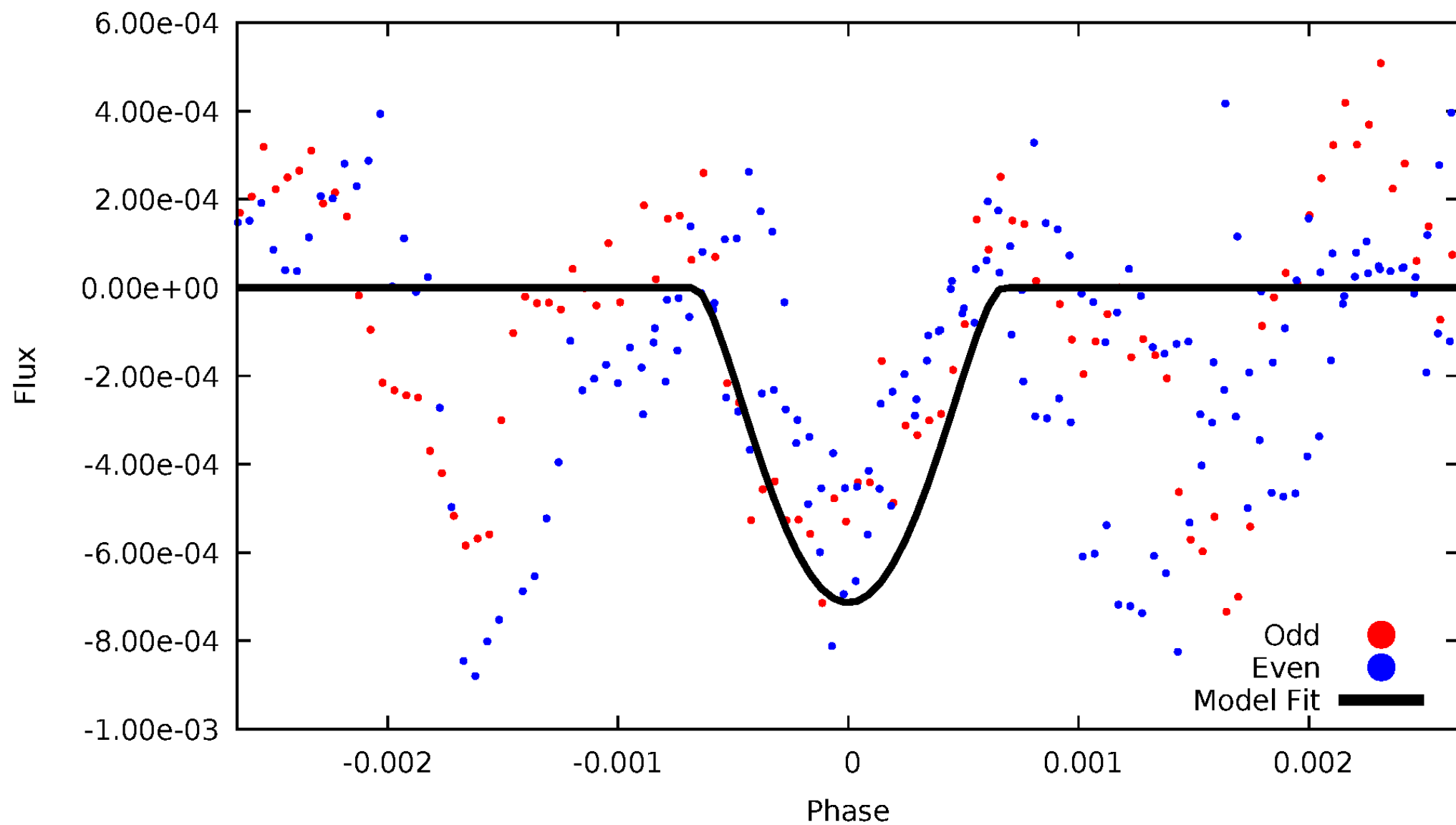


# TCE 008167922-01



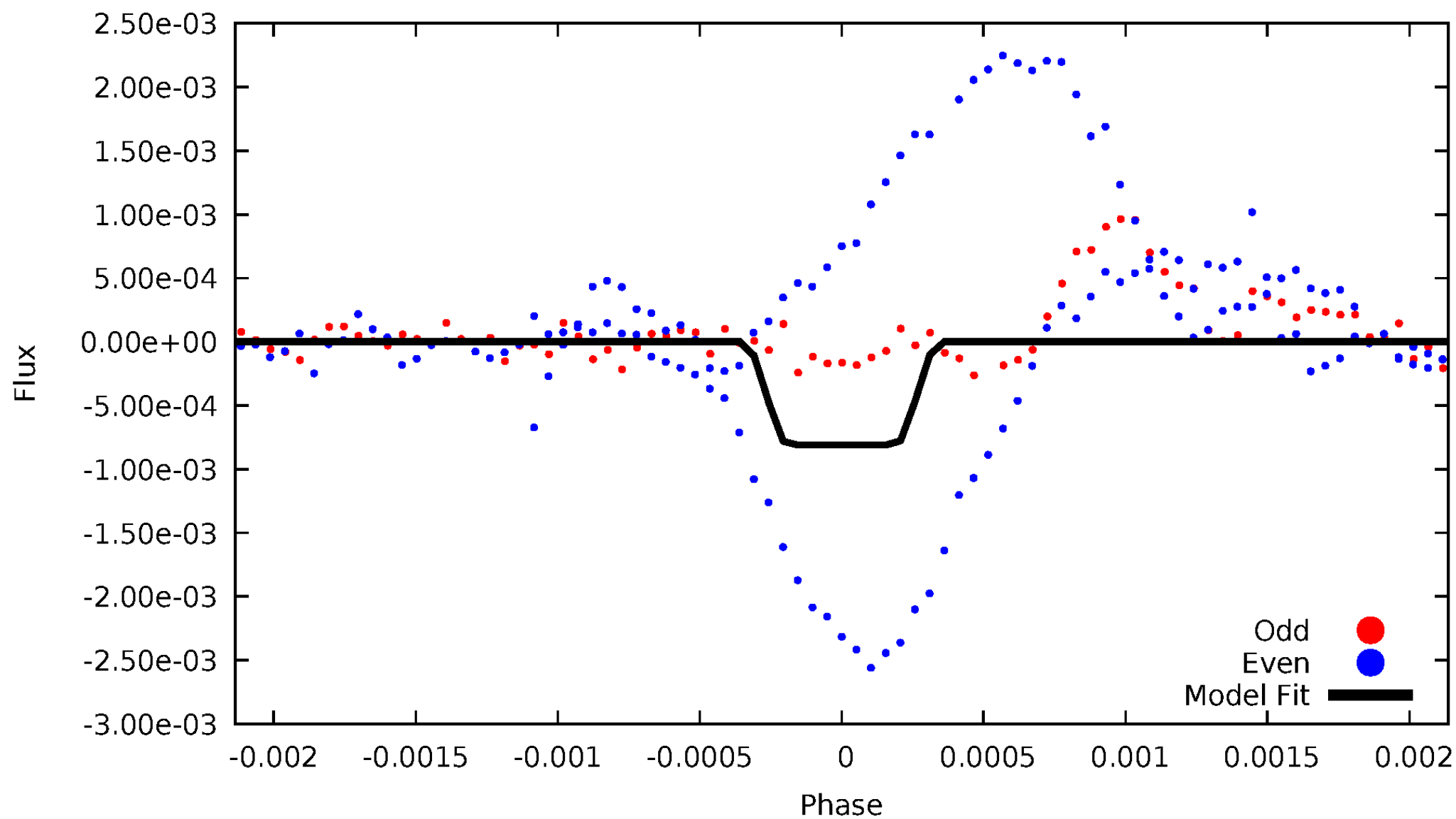
# DV Odd/Even

TCE 008167922-01



# ALT Odd/Even

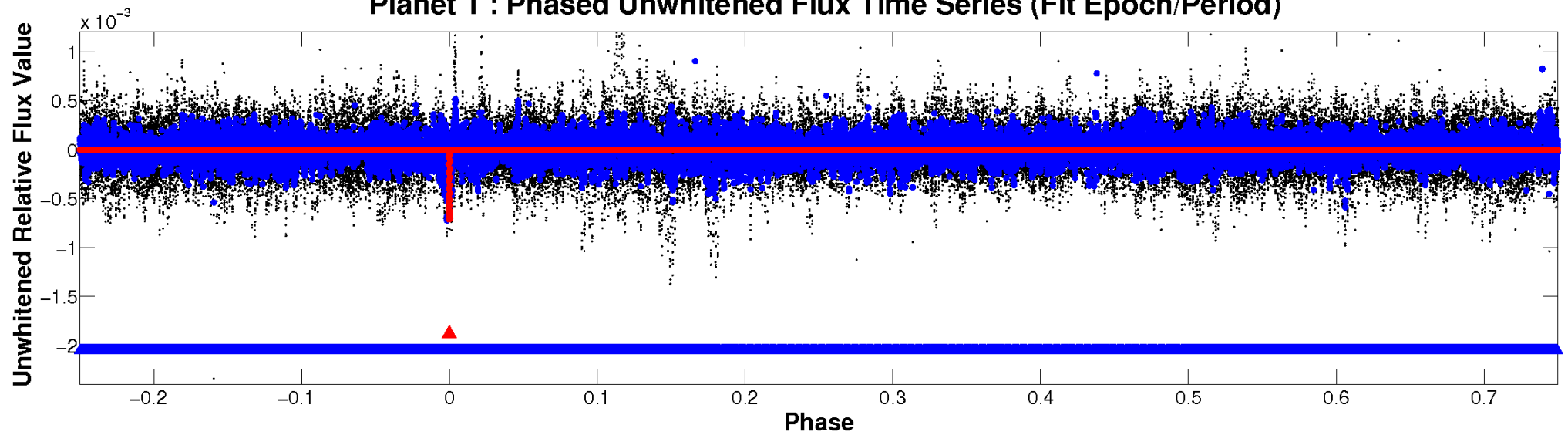
TCE 008167922-01



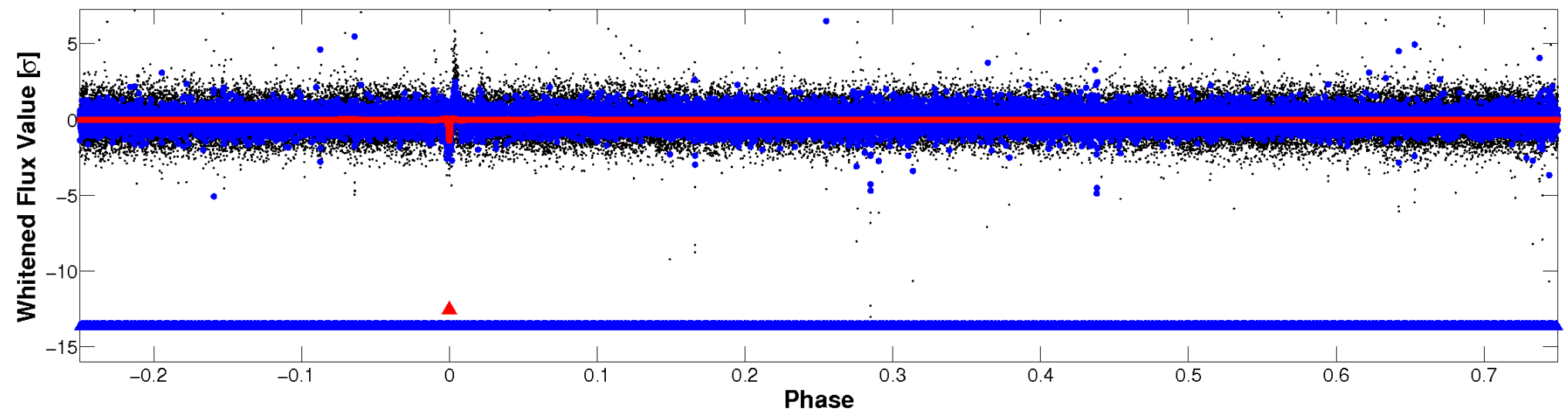


# Non-Whitened Vs. Whitened Light Curve

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

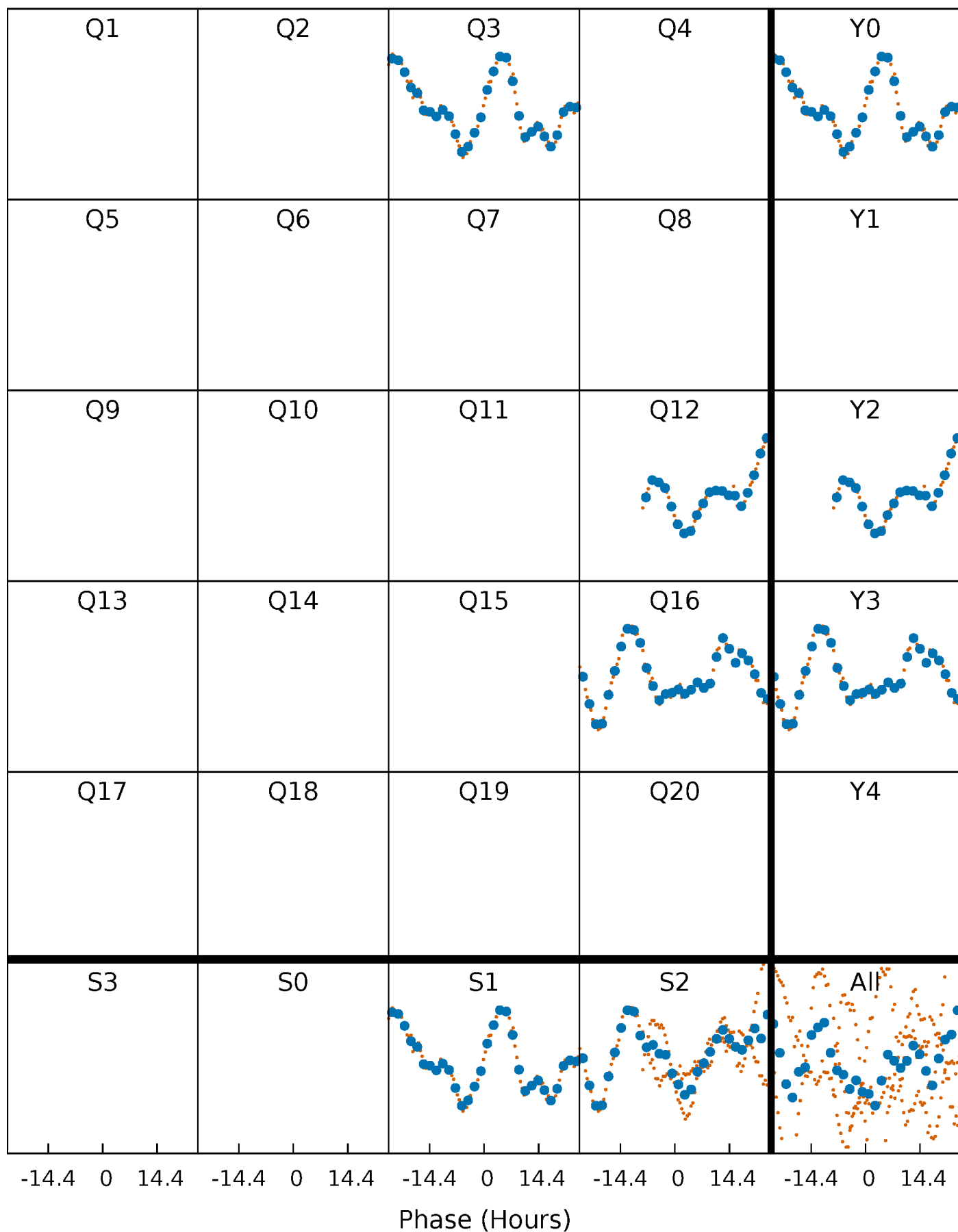


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

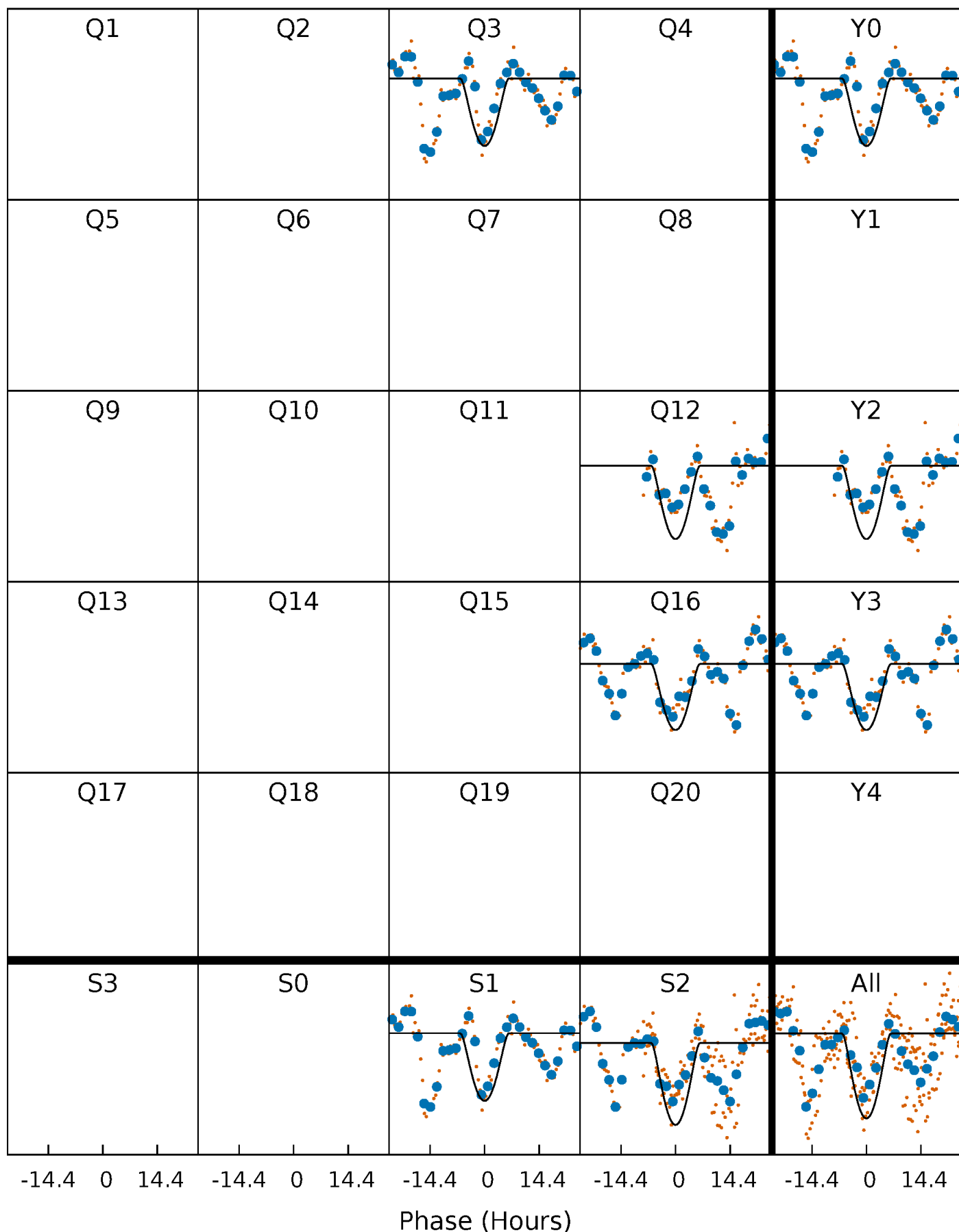
TCE 008167922-01 P=395.796987 Days  $T_0=331.011884$  (BKJD)





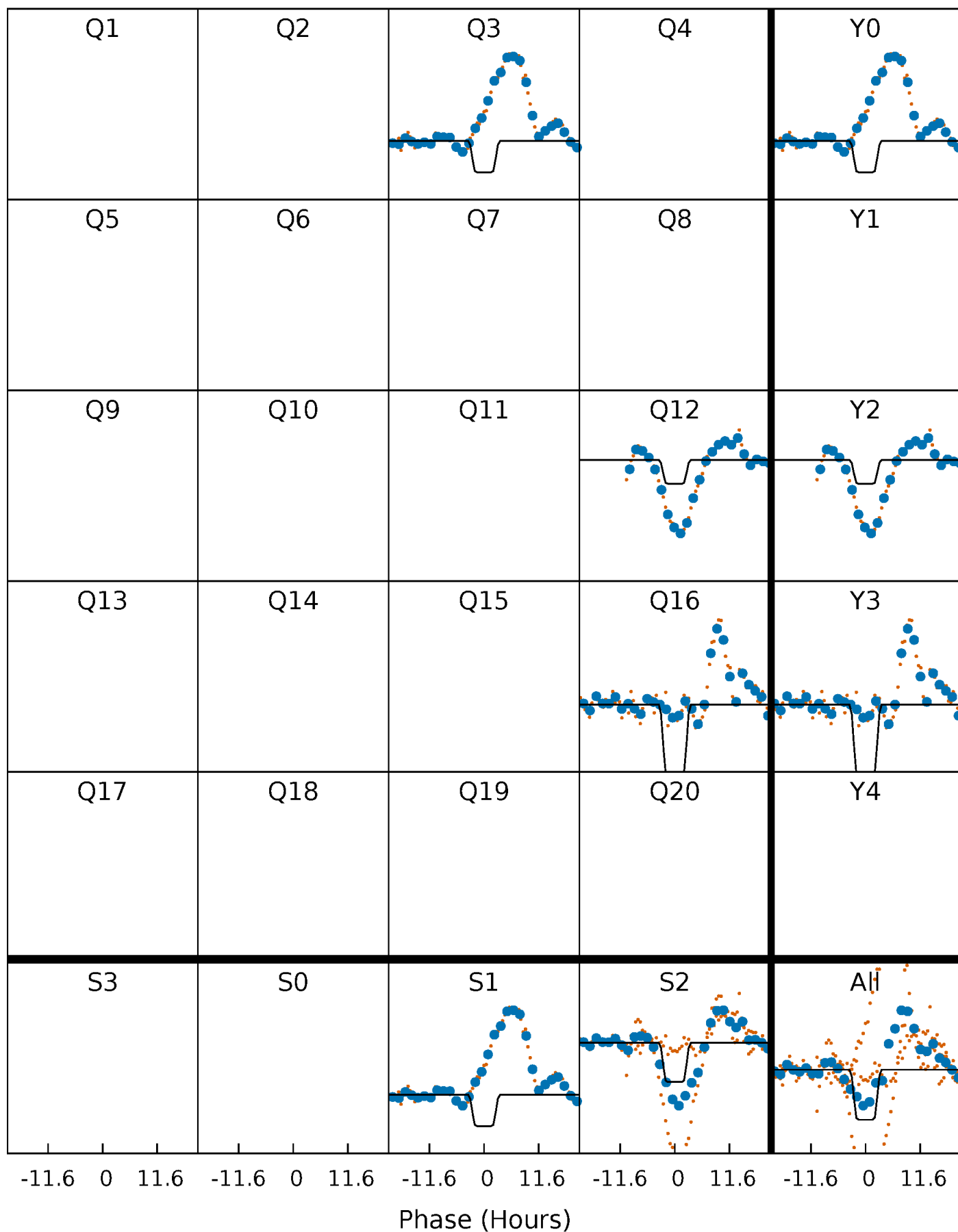
# DV Quarter-Phased Transit Curves

TCE 008167922-01 P=395.796987 Days  $T_0=331.011884$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

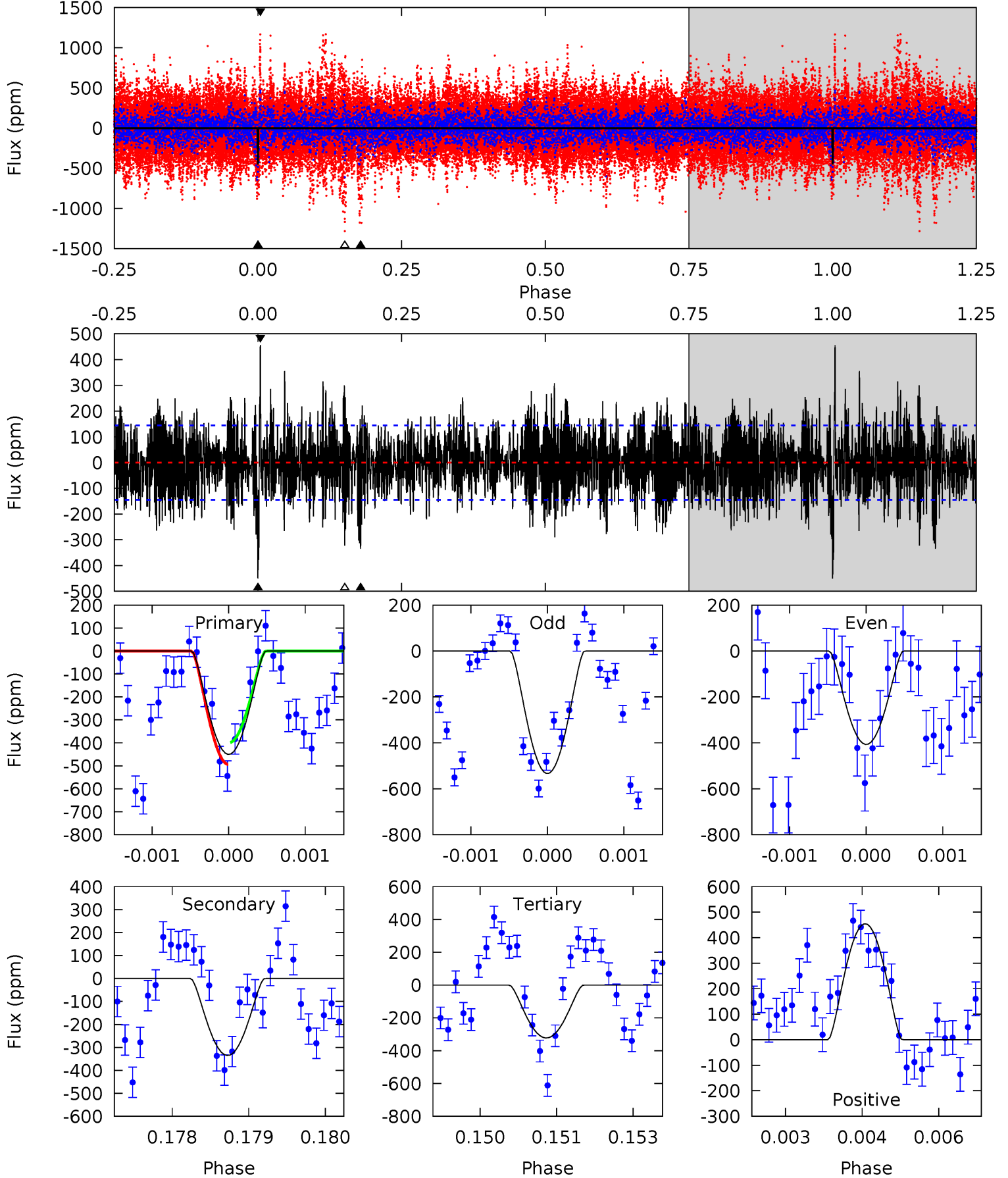
TCE 008167922-01 P=395.859358 Days  $T_0=330.963236$  (BKJD)



# DV Model-Shift Uniqueness Test

008167922-01, P = 395.796987 Days, E = 331.011884 Days

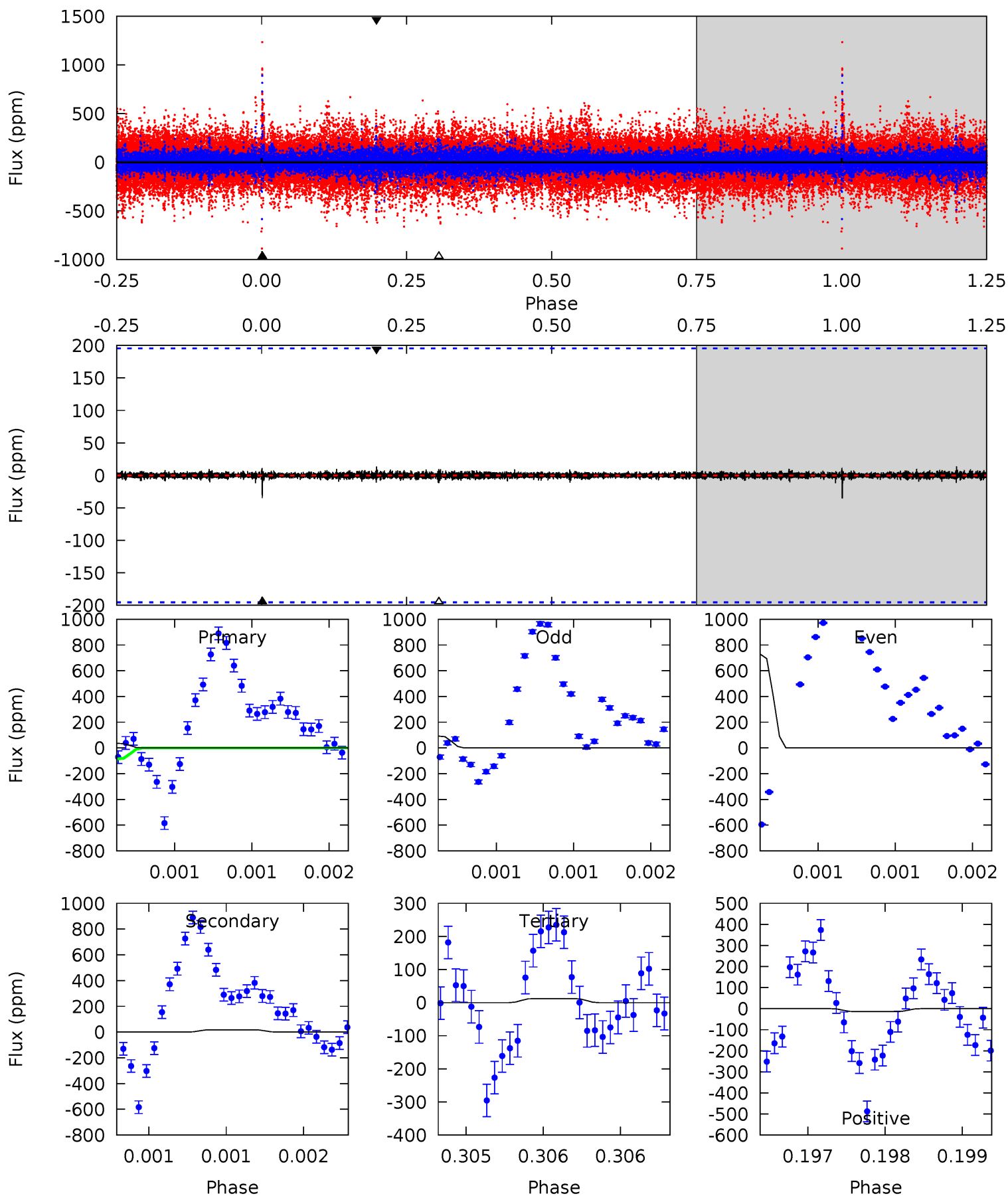
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
16.8	12.5	12.0	16.9	5.39	3.20	3.58	4.76	-0.16	0.47	-4.45	2.20	1.01	0.50	1.79



# Alt Model-Shift Uniqueness Test

008167922-01, P = 395.859358 Days, E = 330.963236 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
1.00	0.50	0.34	0.39	5.54	3.42	0.07	0.66	0.61	0.16	0.11	12.6	5.53	0.28	0



### Stellar Parameters For KIC 008167922

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7022^{+157}_{-244}$	$2.998^{+0.620}_{-0.073}$	$0.070^{+0.200}_{-0.300}$	$9.213^{+1.025}_{-5.467}$	$3.080^{+0.211}_{-1.198}$	$0.006^{+0.060}_{-0.001}$
	+2%/-3%	+21%/-2%	+286%/-429%	+11%/-59%	+7%/-39%	+1085%/-24%
Source	PHO1	FLK73	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 008167922-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-335 \pm 27$	$83.03^{+91.81}_{-57.40}$	$1018^{+69}_{-159}$	$3469^{+1775}_{-633}$	$63^{+586}_{-48}$
Alt.	$-18 \pm 35$	$77.98^{+87.30}_{-53.45}$	$1016^{+75}_{-154}$	$2176^{+942}_{-4505}$	$2.038^{+30.738}_{-4.569}$

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

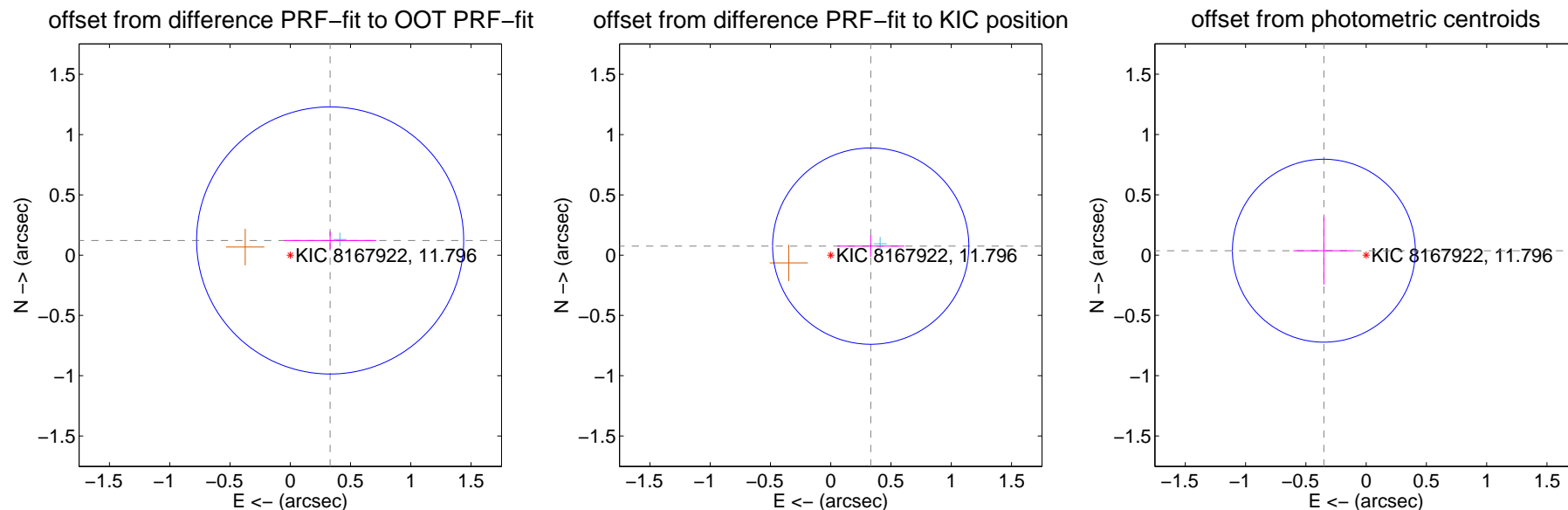
## DV Centroid Data

Supplemental centroid analysis for 008167922-01. **Kepler magnitude: 11.80.** Transit SNR 8.76

**There are 1 quarters with good PRF difference image offsets**

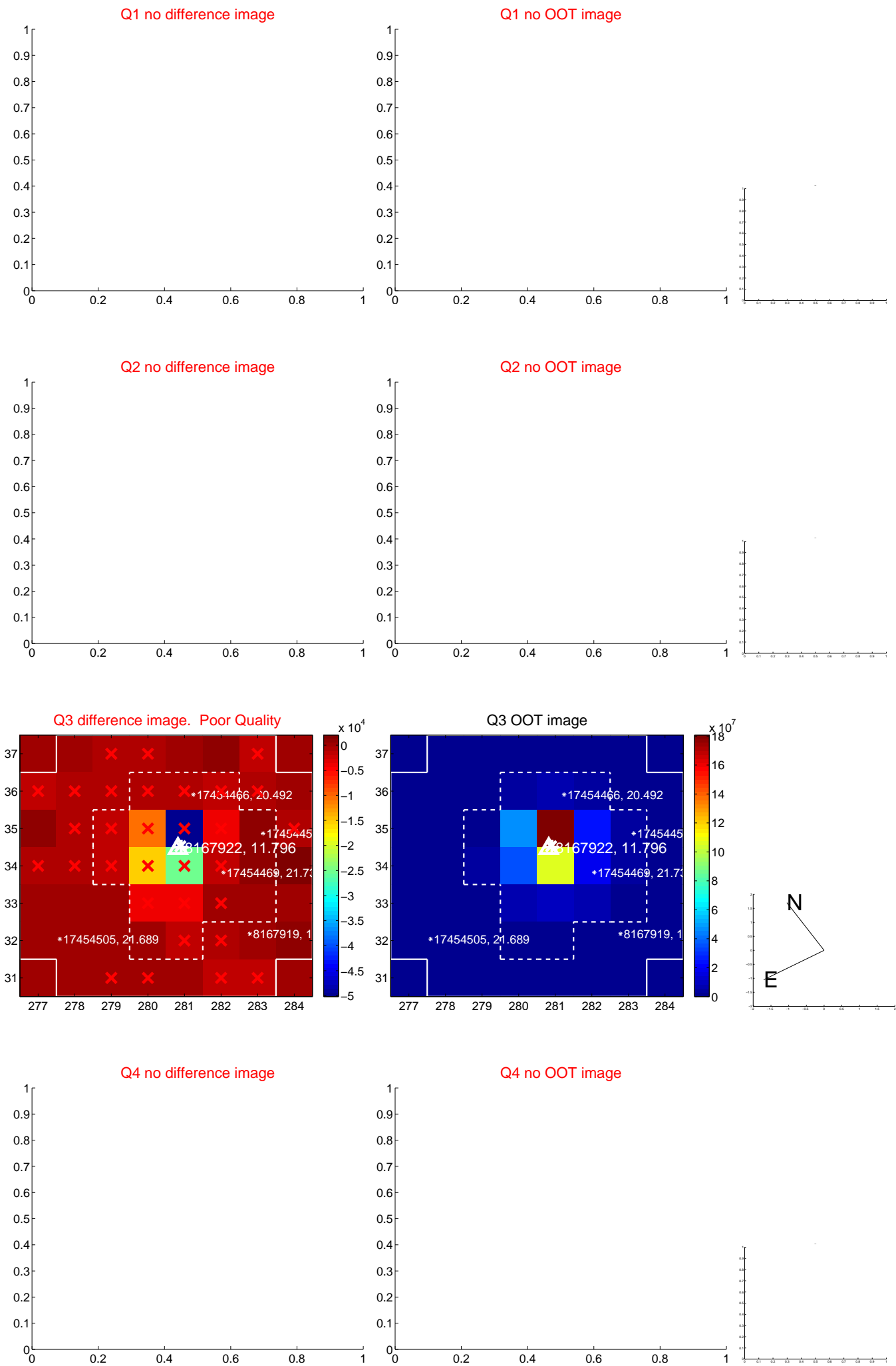
The direct PRF centroid is offset from the target star catalog position by about 0.04 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.353 \pm 0.369$	0.95	$-0.331 \pm 0.382$	$0.122 \pm 0.073$
PRF-fit source offset from KIC position	$0.340 \pm 0.271$	1.25	$-0.332 \pm 0.277$	$0.075 \pm 0.090$
photometric centroid source offset	$0.35 \pm 0.25$	1.39	$0.35 \pm 0.25$	$0.04 \pm 0.28$



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

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





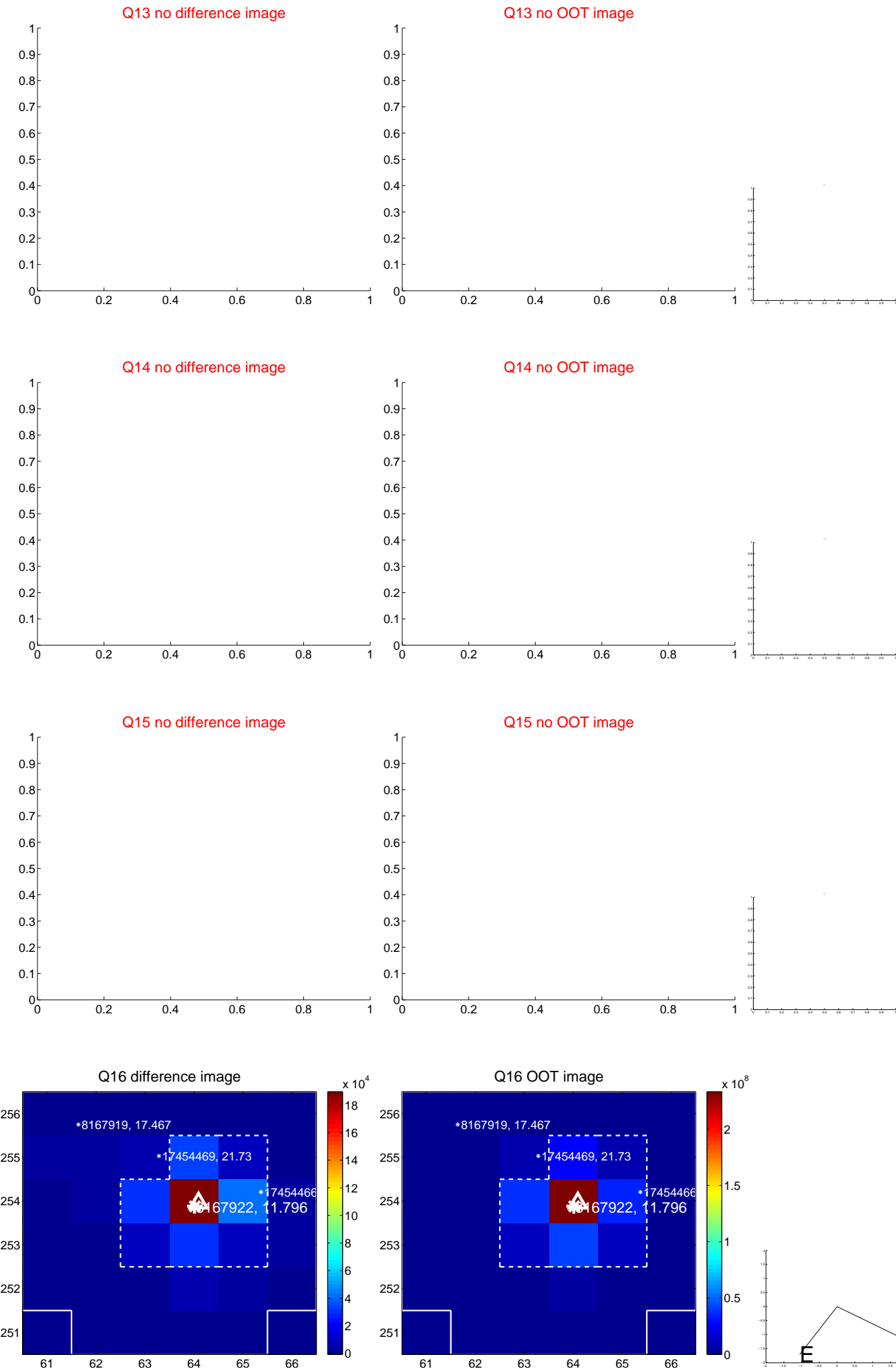
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



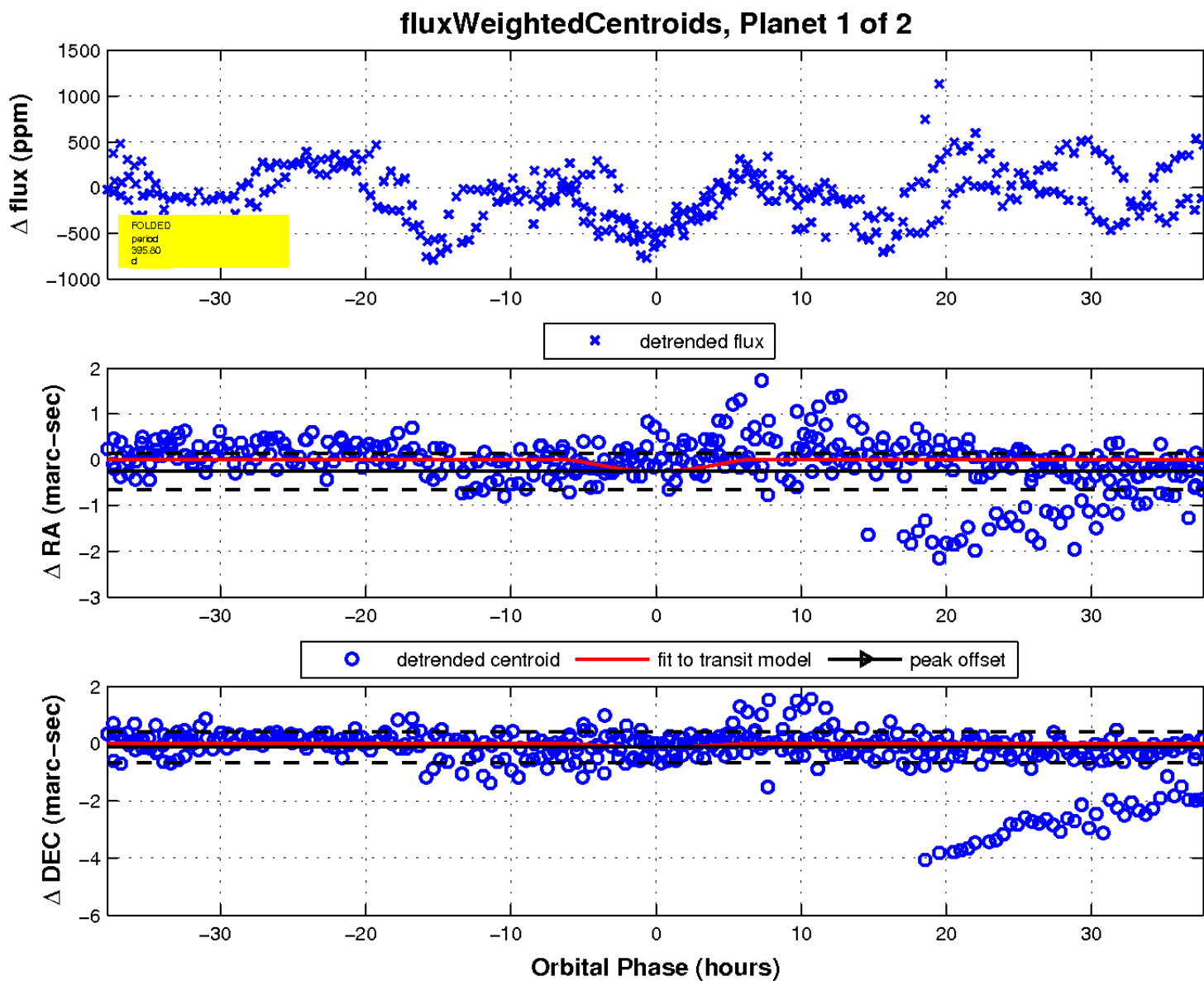
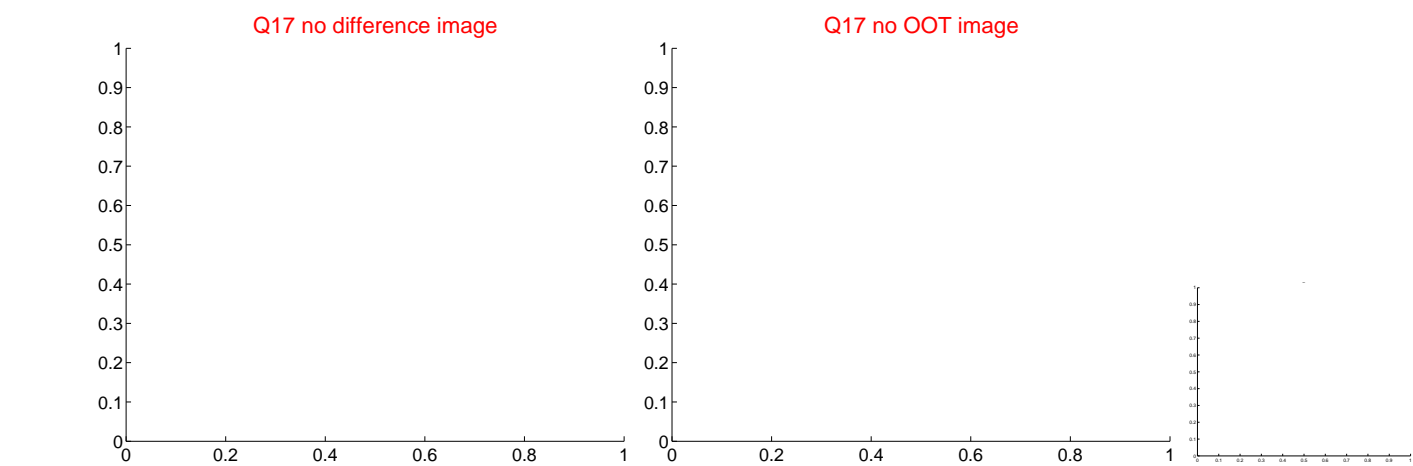
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

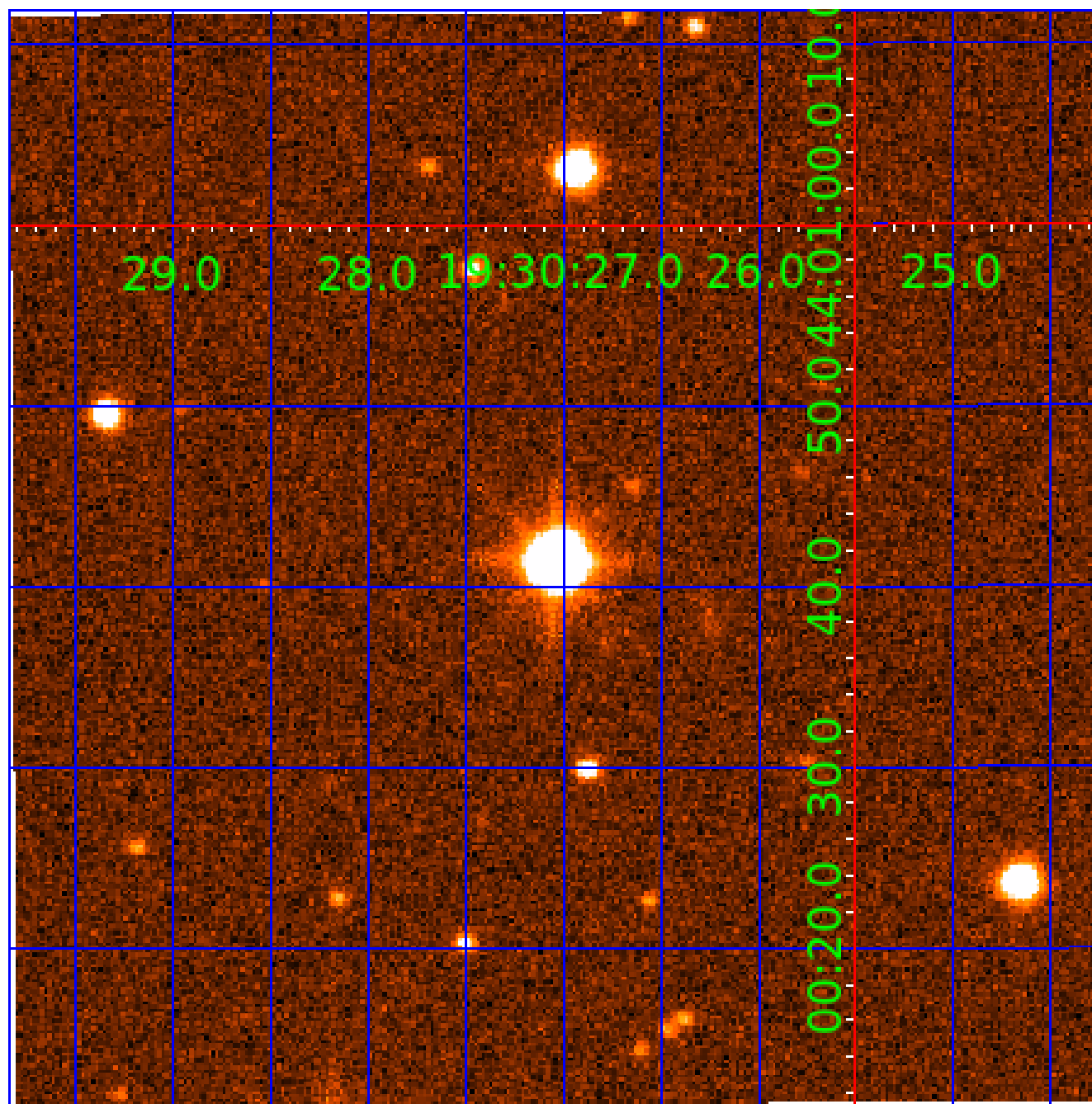


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 008167922

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008167922-01	OBS	No	395.796987	331.011884	713.1	12.607	10.1	8.8	9.21	7022	46.25	78.41
008167922-02	OBS	No	0.683931	131.626858	2.5	6.233	8.5	1.3	9.21	7022	1.48	0.00

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008167922-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_ALT—MOD_POS_ALT— INCONSISTENT_TRANS—CENT_FEW_DIFFS
008167922-02	OBS	FP	0.00	1	0	0	0	LPP_DV

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

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

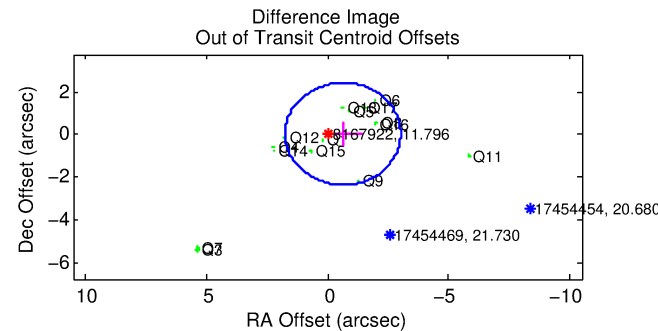
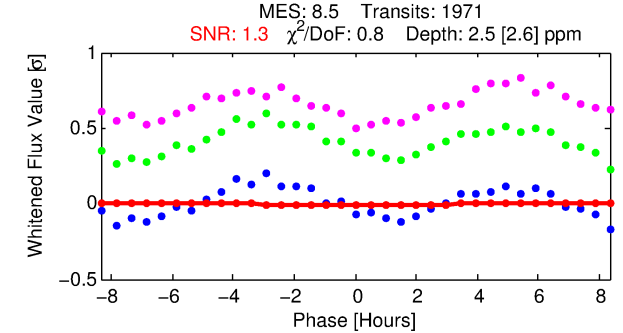
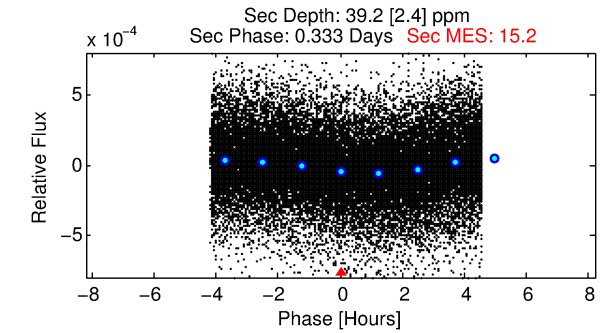
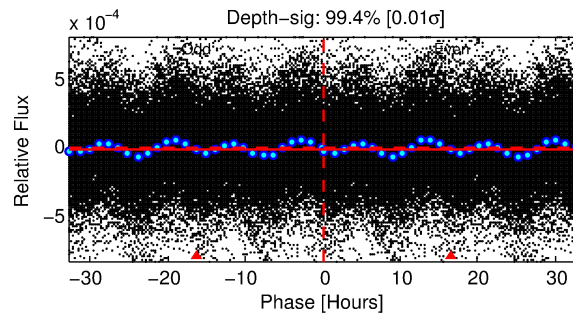
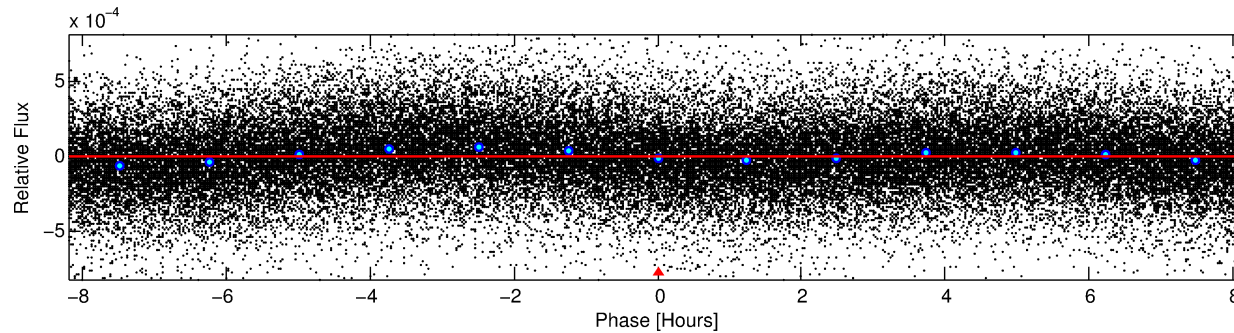
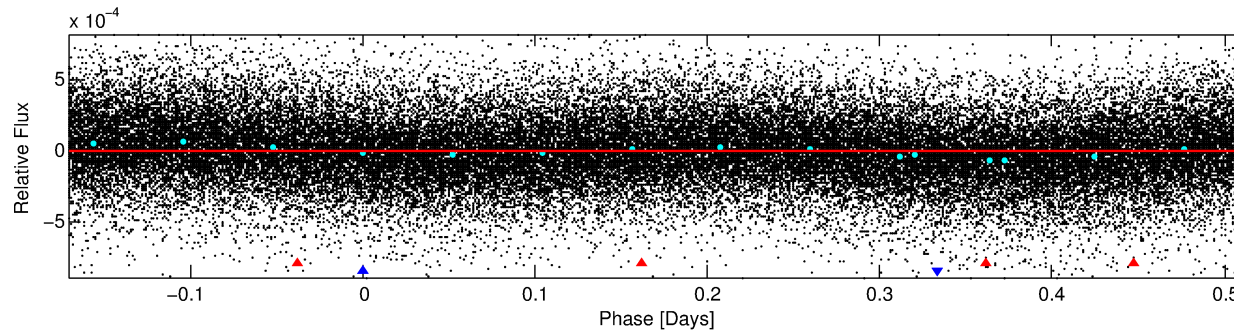
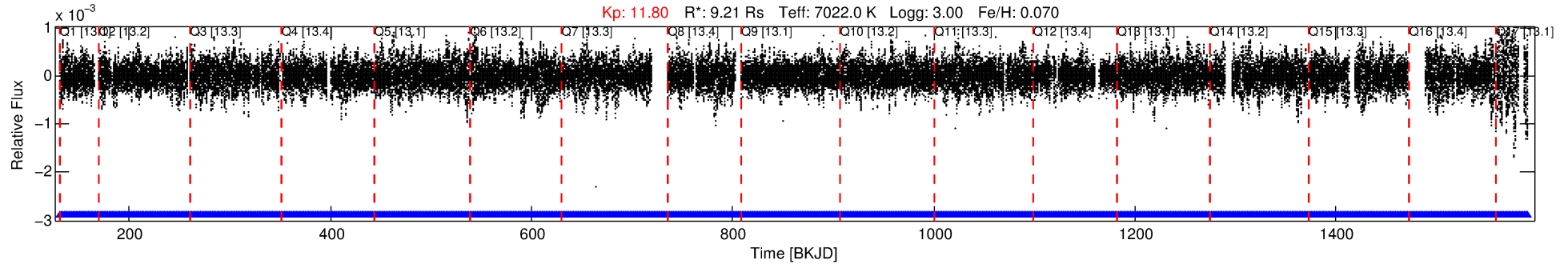
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008167922-02

No Significant Match Found

# DV One-Page Summary

KIC: 8167922 Candidate: 2 of 2 Period: 0.684 d



## DV Fit Results:

Period = 0.68393 [0.00010] d  
Epoch = 131.6269 [0.0172] BKJD  
Rp/R\* = 0.0015 [0.0039]  
a/R\* = 1.07 [2.03]  
b = 0.30 [45.48]  
Seff = N/A  
Teq = N/A  
Rp = 1.47 [3.97] Re  
a = N/A  
Ag = N/A  
Teffp = N/A

## DV Diagnostic Results:

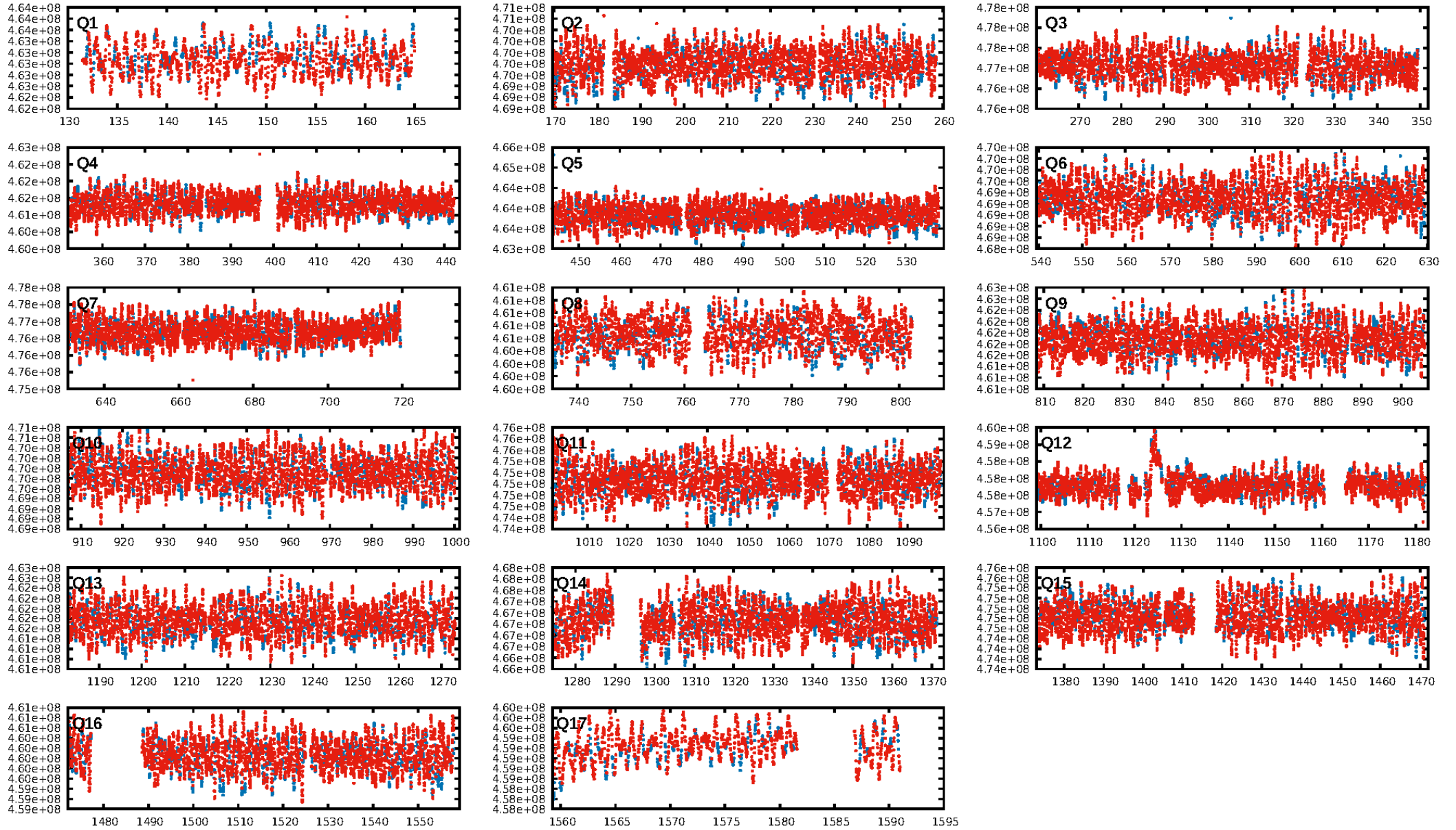
ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [674.27 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [1882/1882]  
GhostDiagnostic-chr: N/A  
Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 0.635 arcsec [0.80 $\sigma$ ]  
KicOffset-rm: 0.636 arcsec [0.85 $\sigma$ ]  
OotOffset-st: 2/4/4/5 [15]  
KicOffset-st: 2/4/4/5 [15]  
DiffImageQuality-fgm: 0.40 [6/15]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 19:55:47 Z

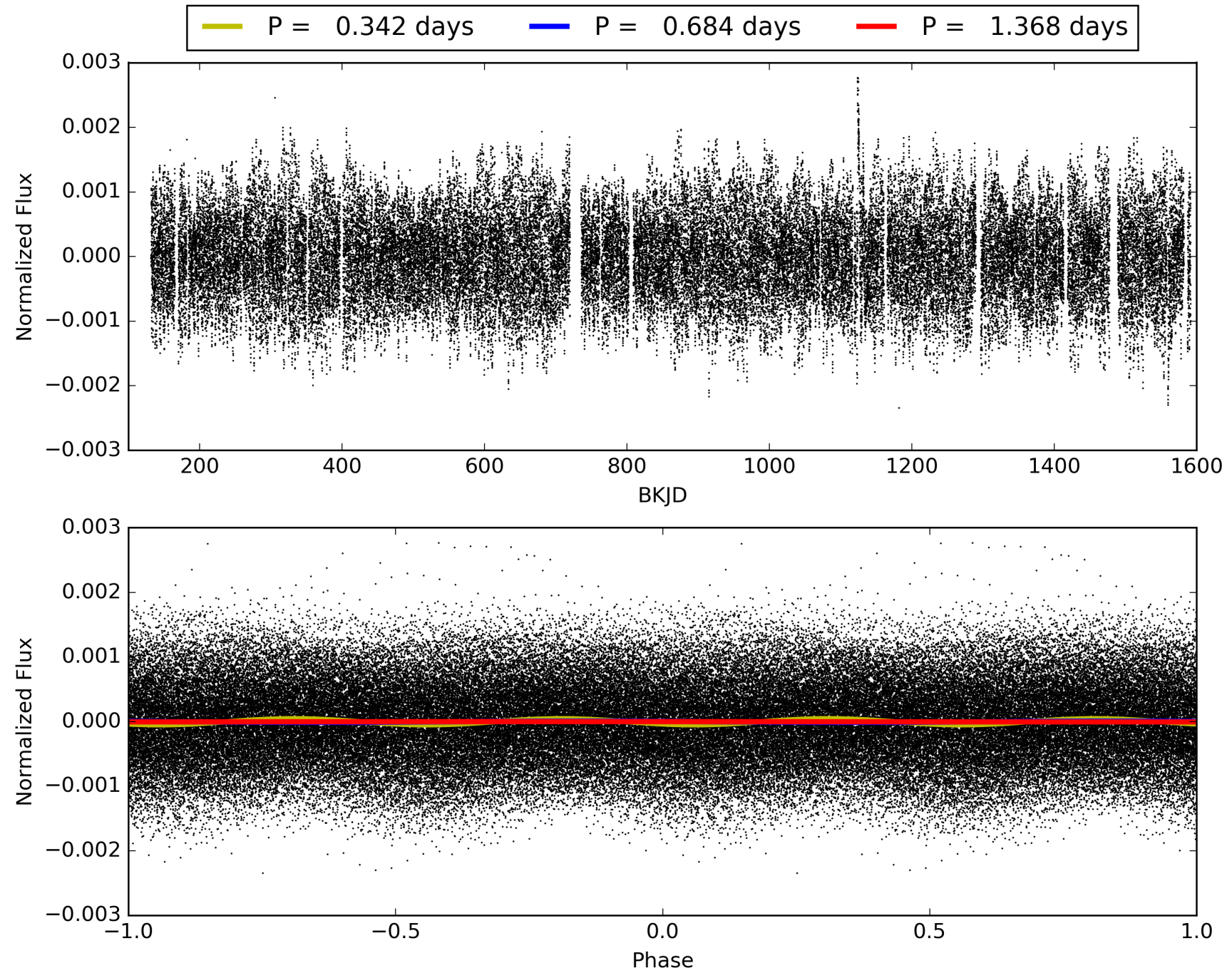
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 008167922-02, PDC Light Curves

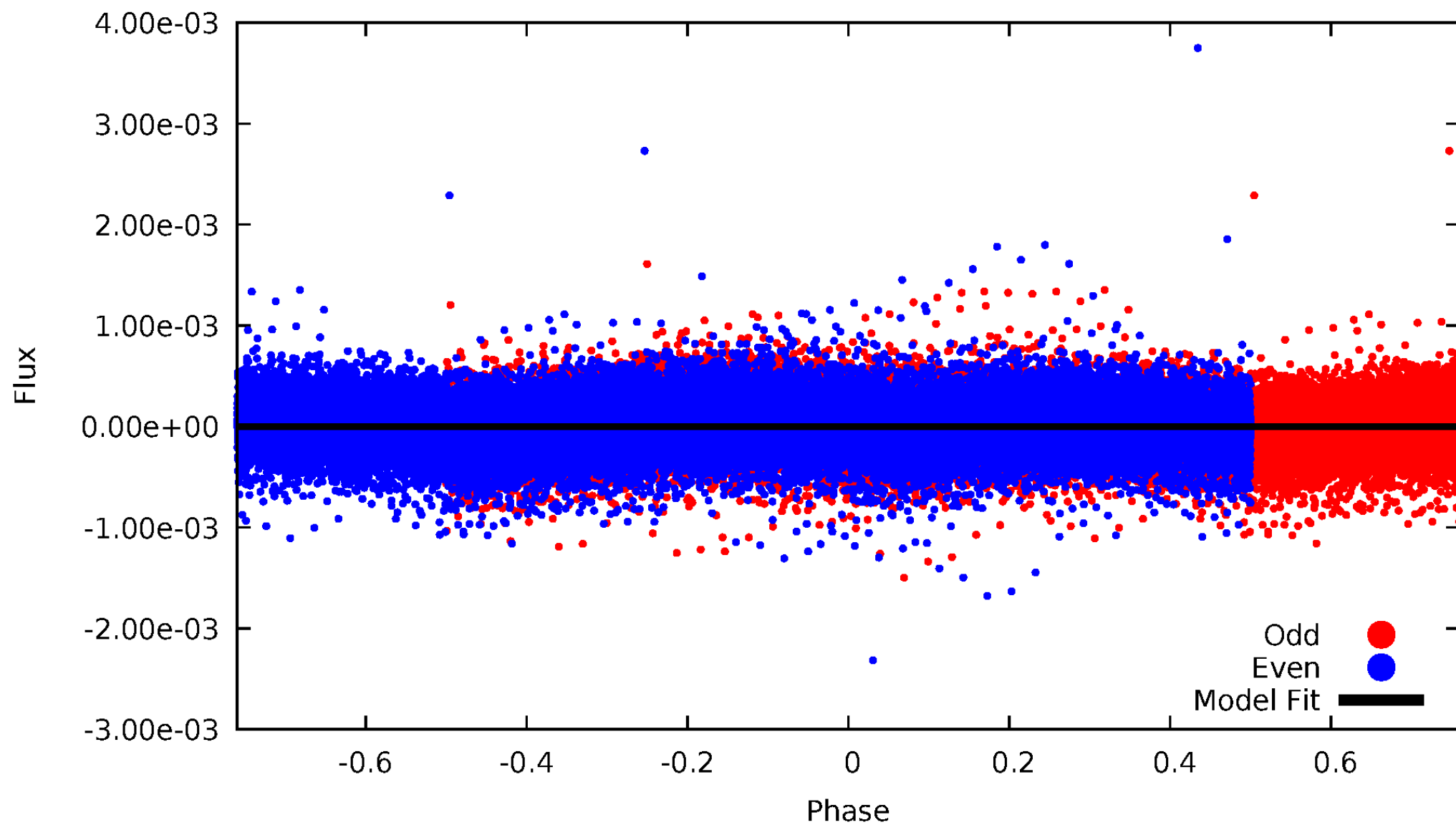


# TCE 008167922-02



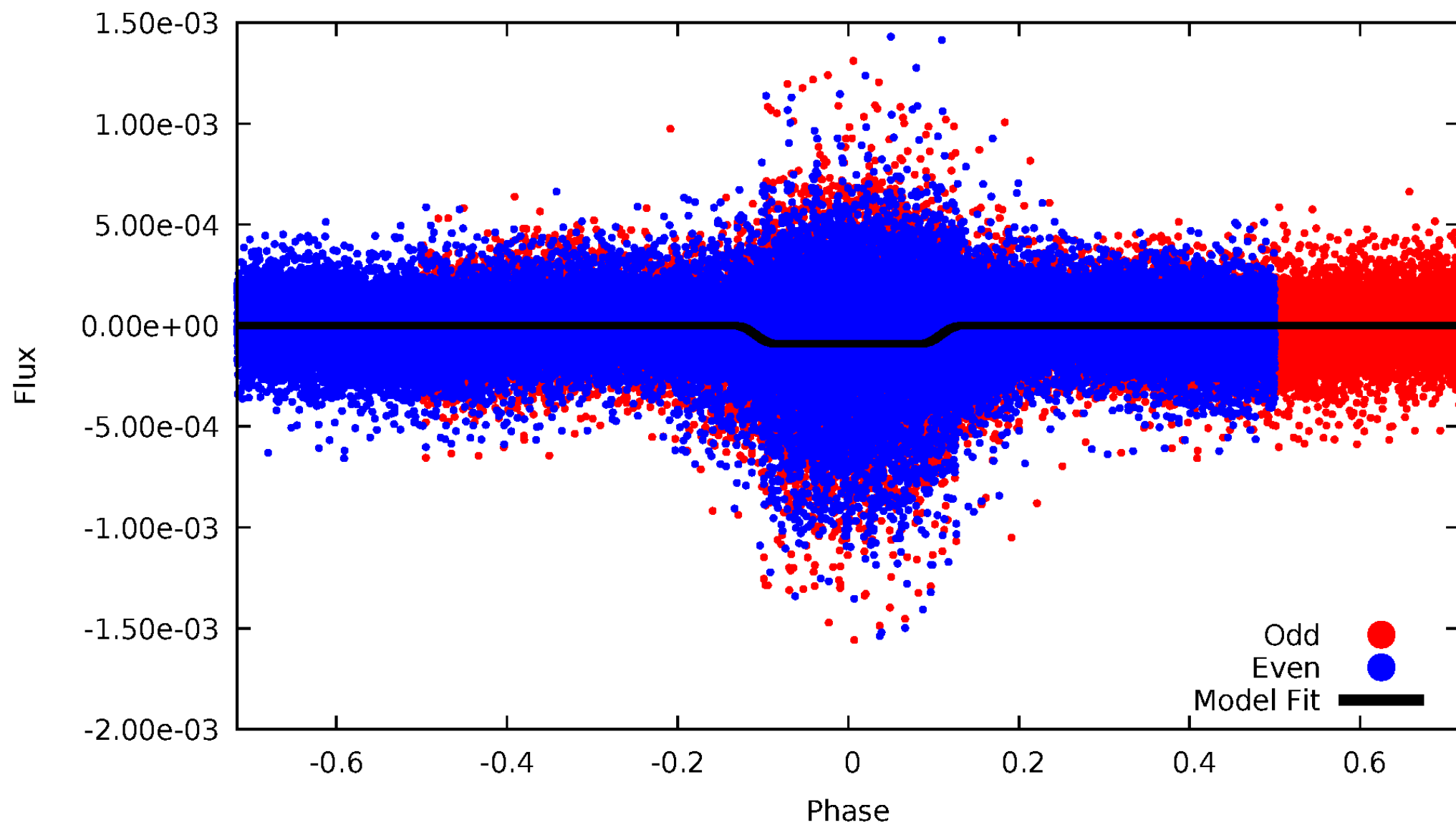
DV Odd/Even

TCE 008167922-02



# ALT Odd/Even

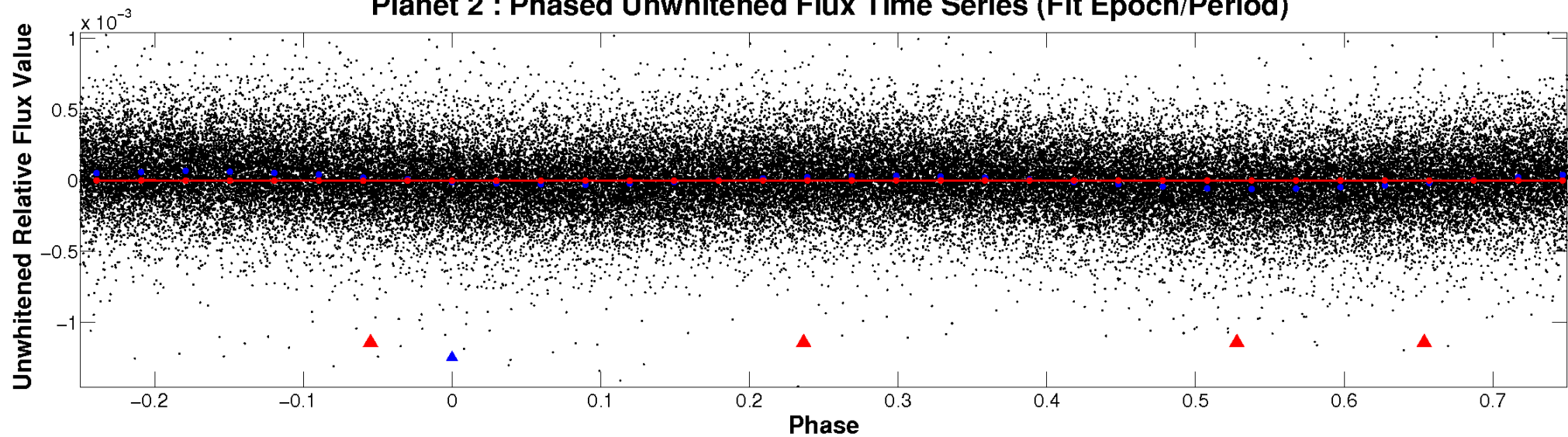
TCE 008167922-02



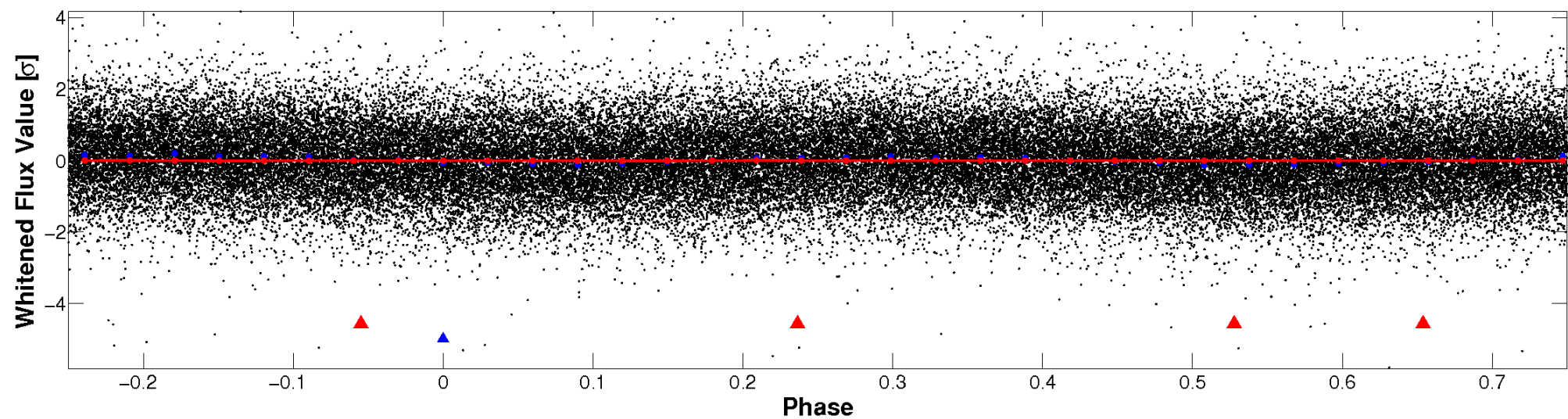


# Non-Whitened Vs. Whitened Light Curve

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

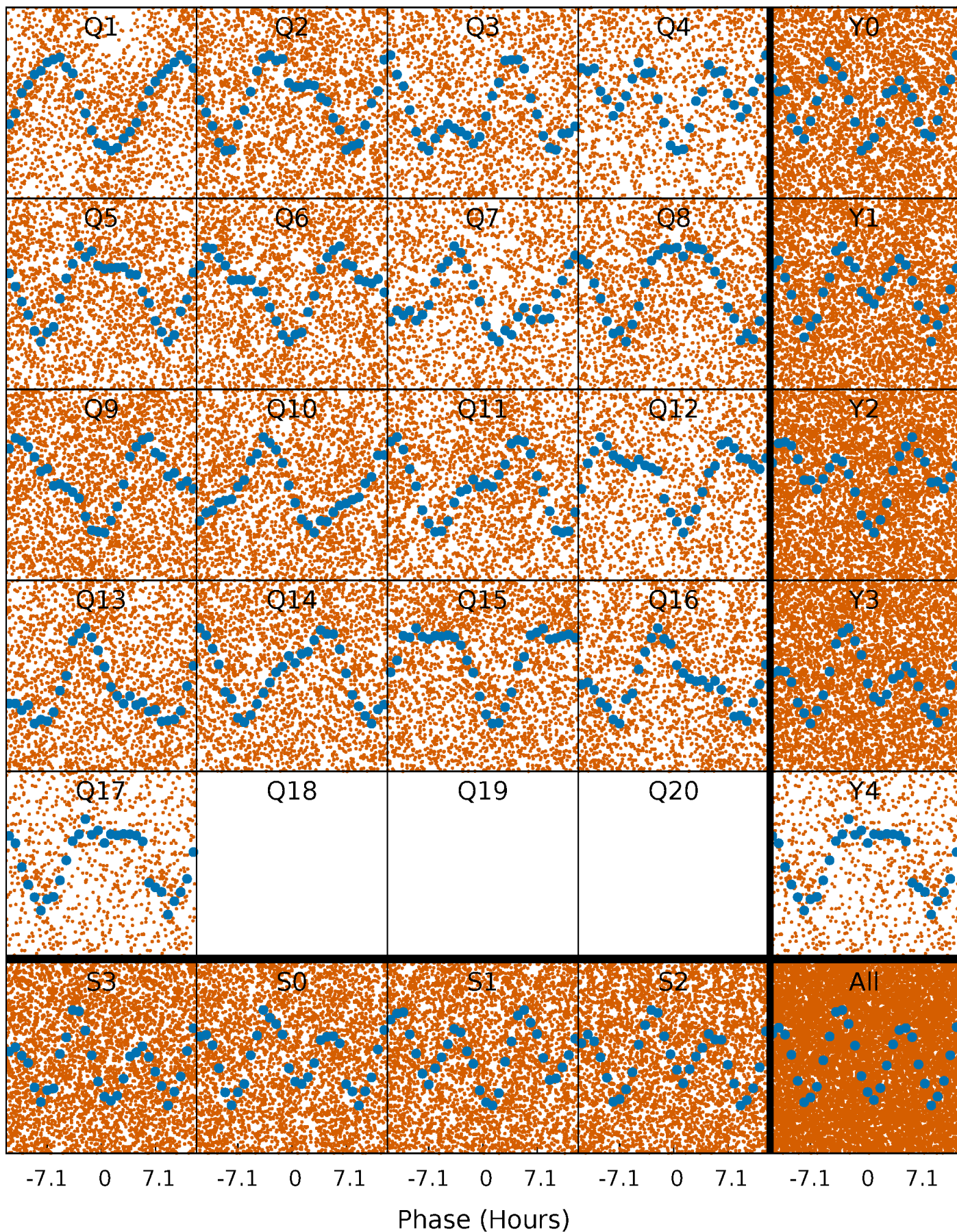


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

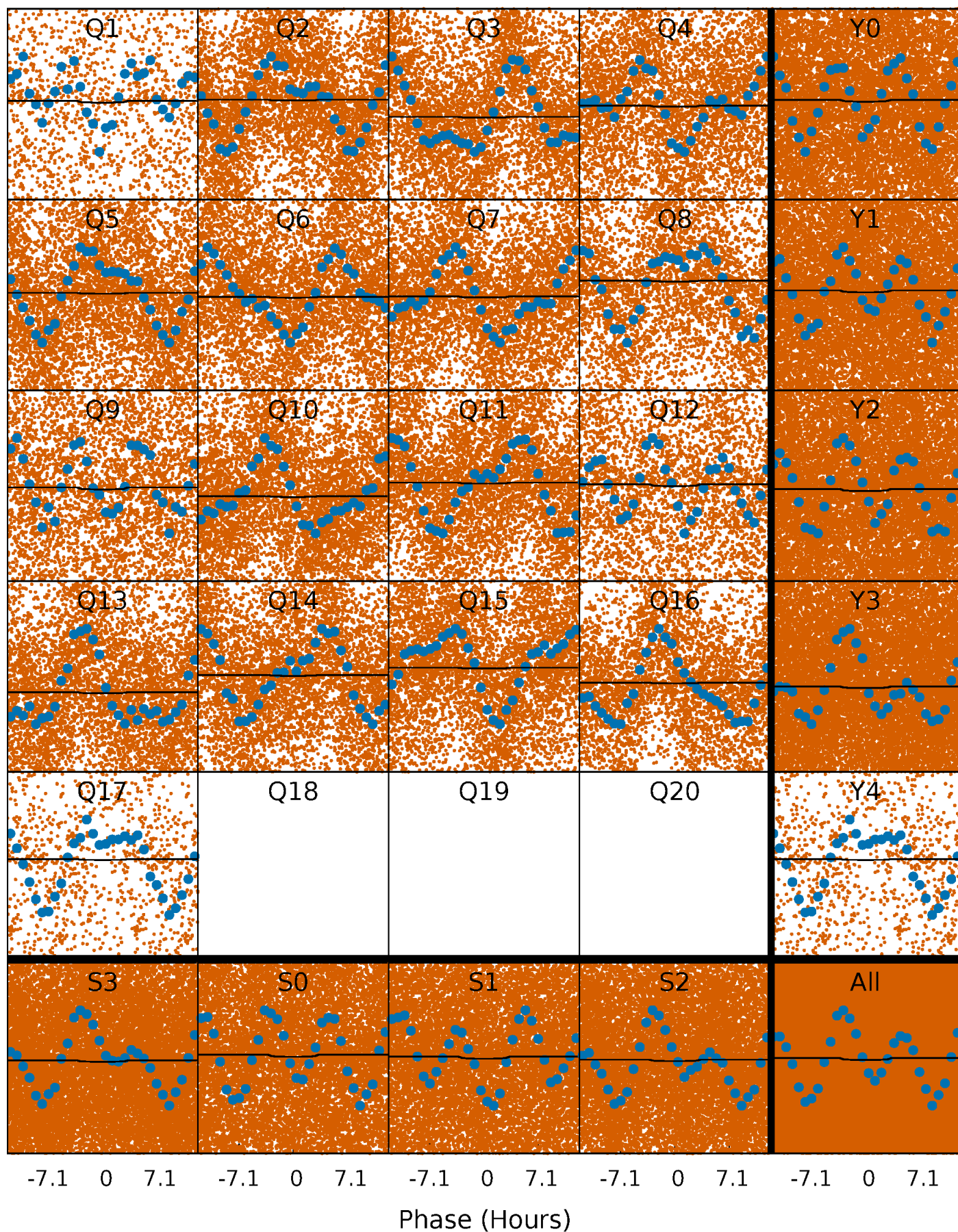
TCE 008167922-02   P= 0.683931 Days    $T_0=131.626858$  (BKJD)





# DV Quarter-Phased Transit Curves

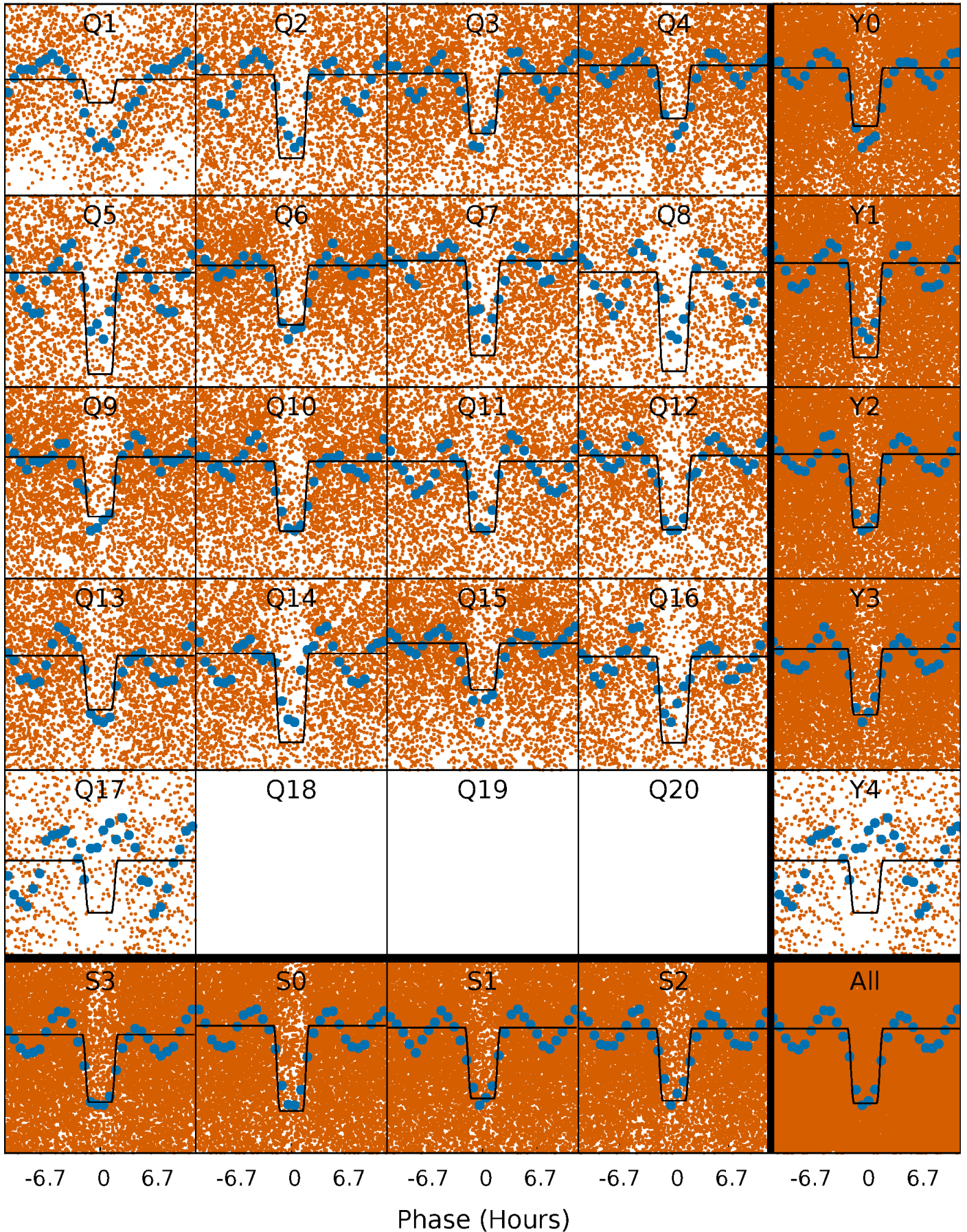
TCE 008167922-02   P= 0.683931 Days    $T_0=131.626858$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

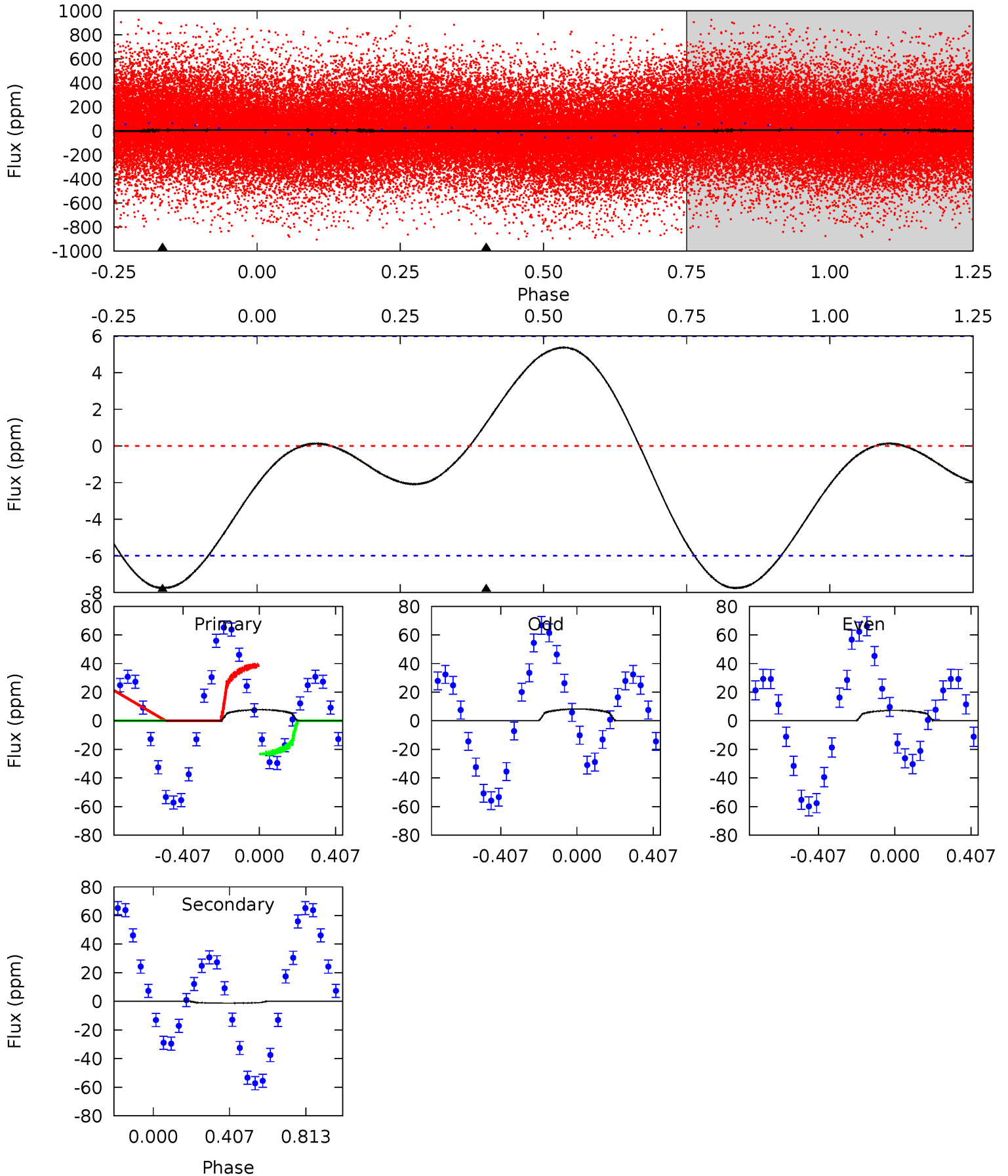
TCE 008167922-02   P= 0.683976 Days    $T_0=131.626276$  (BKJD)



# DV Model-Shift Uniqueness Test

008167922-02, P = 0.683931 Days, E = 130.942927 Days

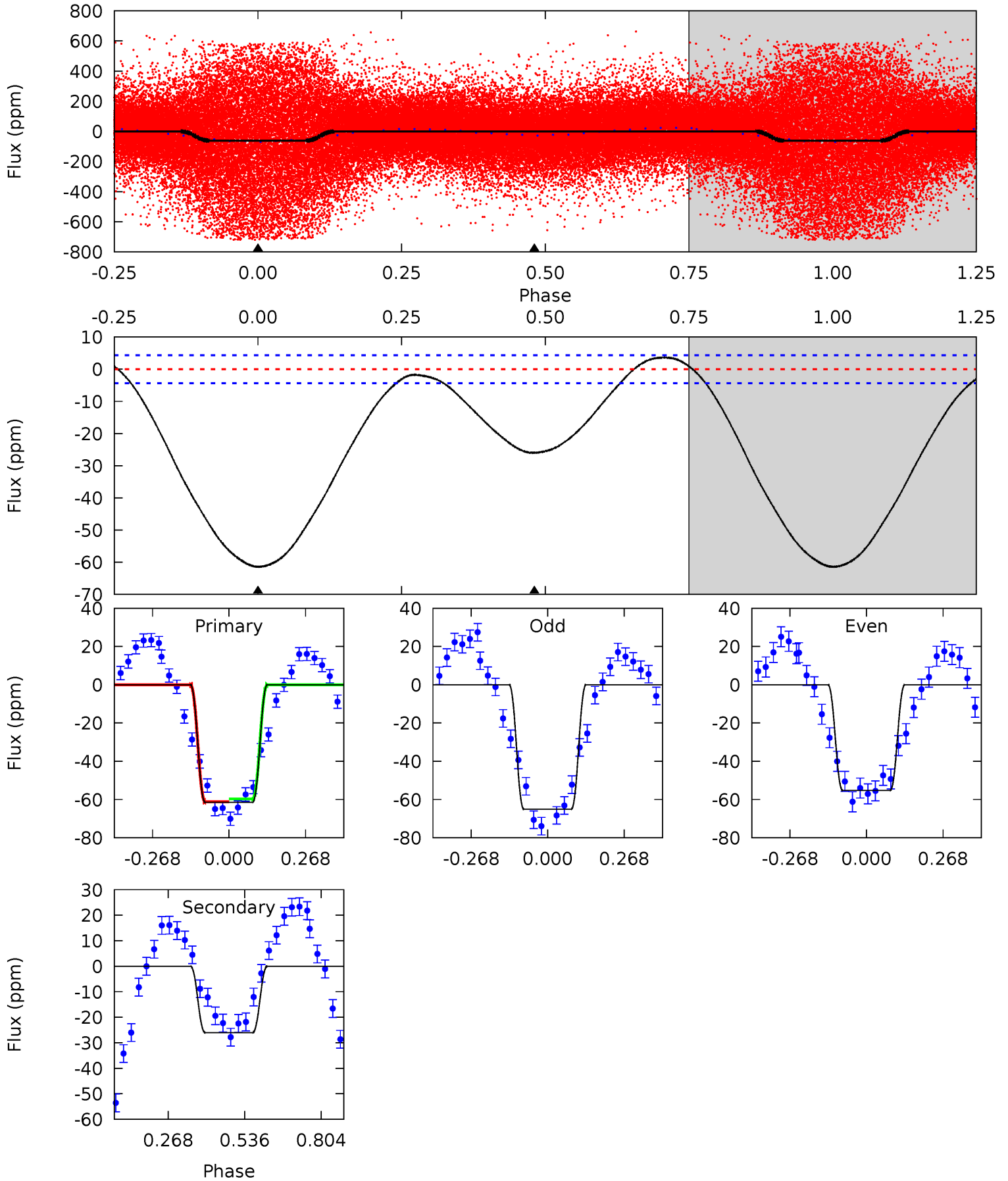
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.51	-0.89	0	0	4.26	0.83	0.14	5.51	5.51	-0.89	-0.89	0.35	0.75	0.41	5.42



# Alt Model-Shift Uniqueness Test

008167922-02, P = 0.683976 Days, E = 130.942300 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
61.8	26.1	0	0	4.35	1.11	3.34	61.8	61.8	26.1	26.1	4.90	1.30	0.06	0.75



### Stellar Parameters For KIC 008167922

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7022^{+157}_{-244}$	$2.998^{+0.620}_{-0.073}$	$0.070^{+0.200}_{-0.300}$	$9.213^{+1.025}_{-5.467}$	$3.080^{+0.211}_{-1.198}$	$0.006^{+0.060}_{-0.001}$
	+2%/-3%	+21%/-2%	+286%/-429%	+11%/-59%	+7%/-39%	+1085%/-24%
Source	PHO1	FLK73	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 008167922-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$1\pm1$	$2.69^{+3.04}_{-1.75}$	$8480^{+591}_{-1220}$	$-7236^{+1181}_{-1335}$	$-0.028^{+0.033}_{-0.317}$
Alt.	$-26\pm1$	$7.85^{+4.72}_{-3.56}$	$8545^{+529}_{-1287}$	$-5950^{+9947}_{-1006}$	$0.111^{+0.235}_{-0.067}$

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

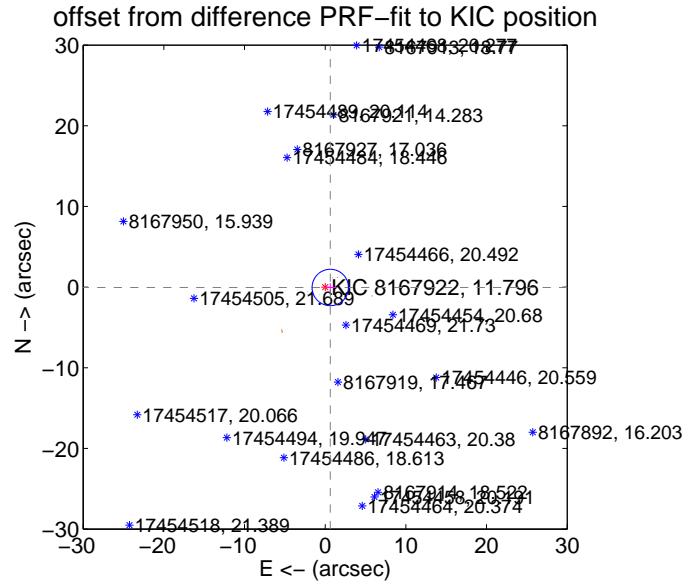
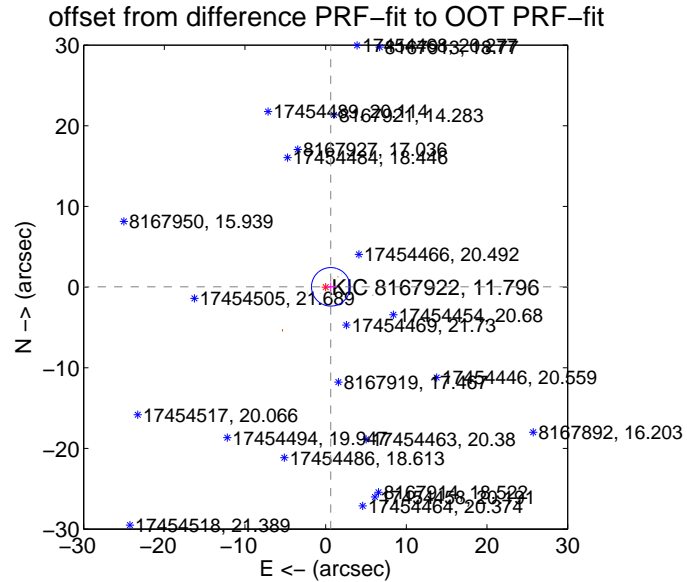
## DV Centroid Data

Supplemental centroid analysis for 008167922-02. **Kepler magnitude: 11.80.** Transit SNR 1.26

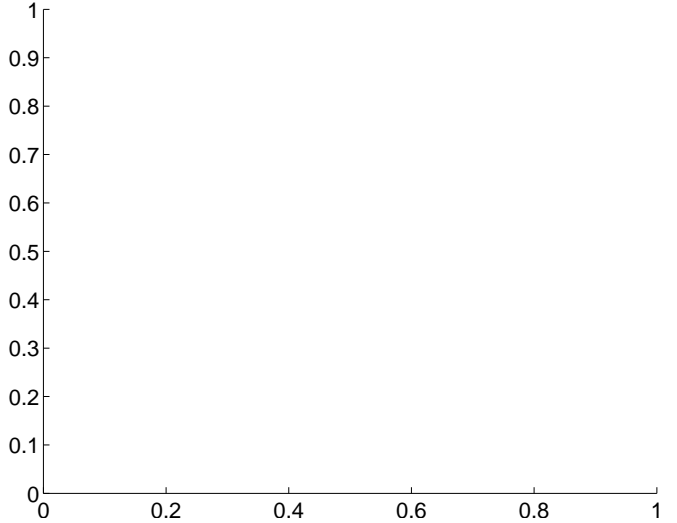
There are 6 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.635 \pm 0.796$	0.80	$-0.634 \pm 0.775$	$0.034 \pm 0.554$
PRF-fit source offset from KIC position	$0.636 \pm 0.752$	0.85	$-0.634 \pm 0.783$	$-0.047 \pm 0.540$
photometric centroid source offset	—	—	—	—



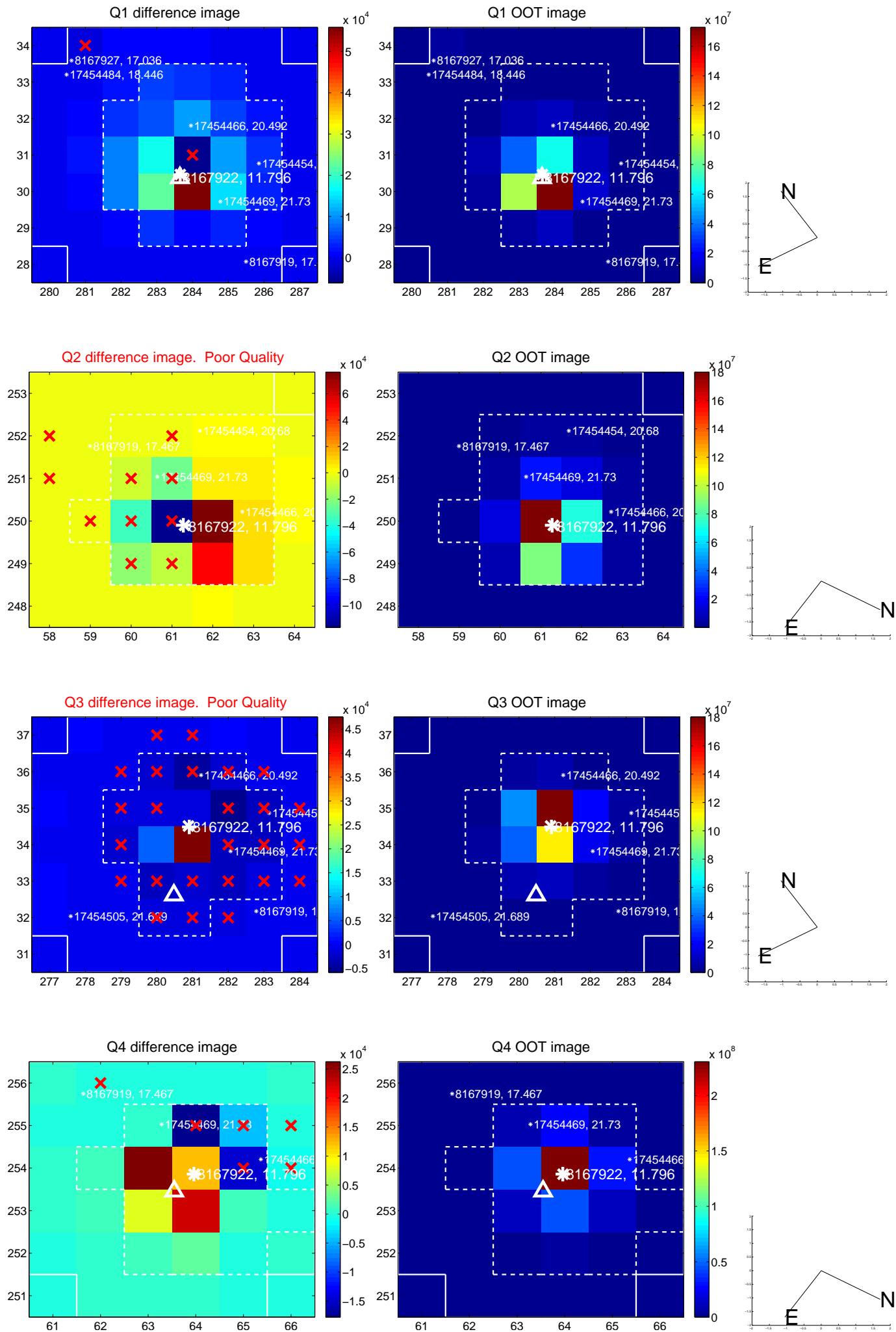
There are no photometric centroids



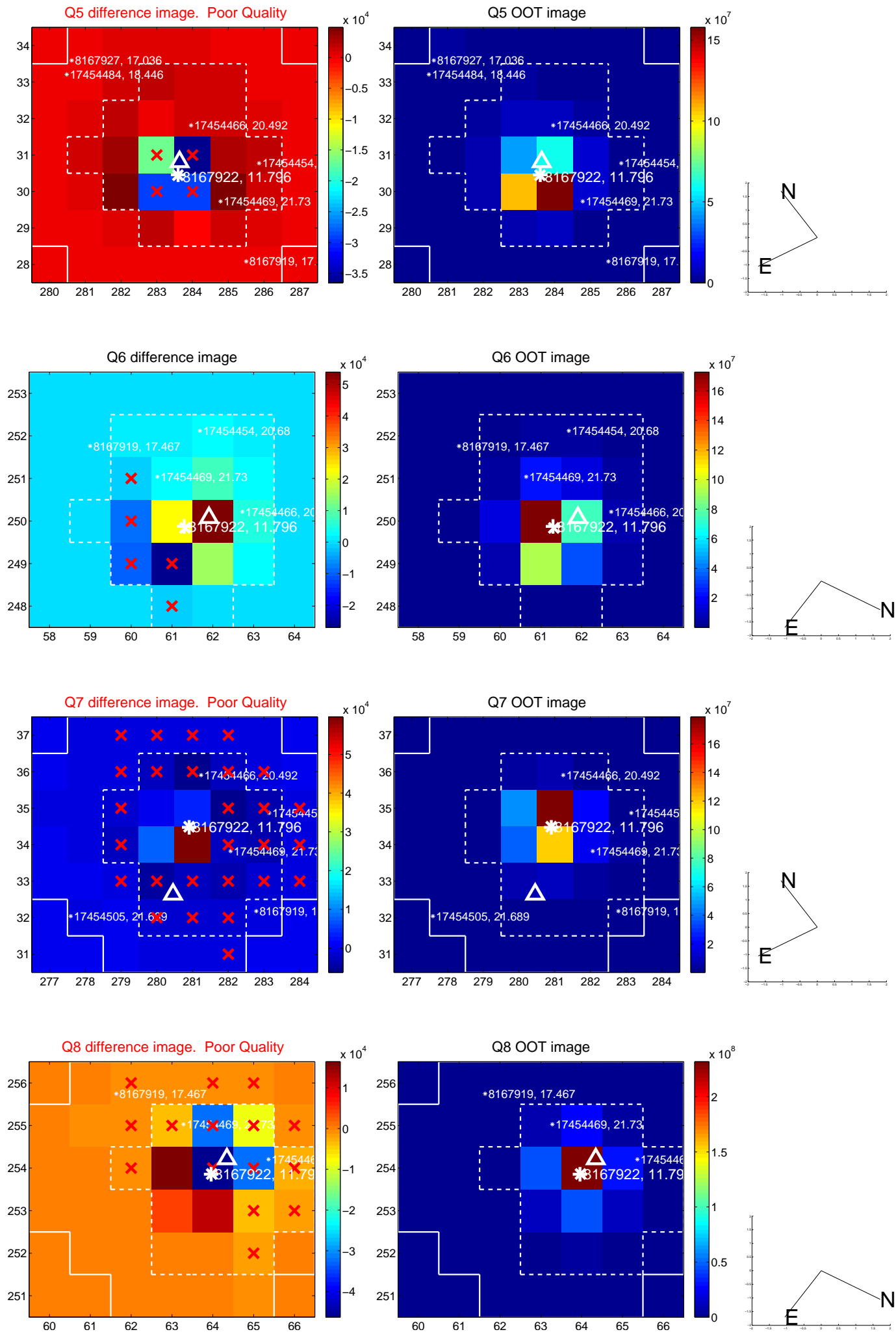
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

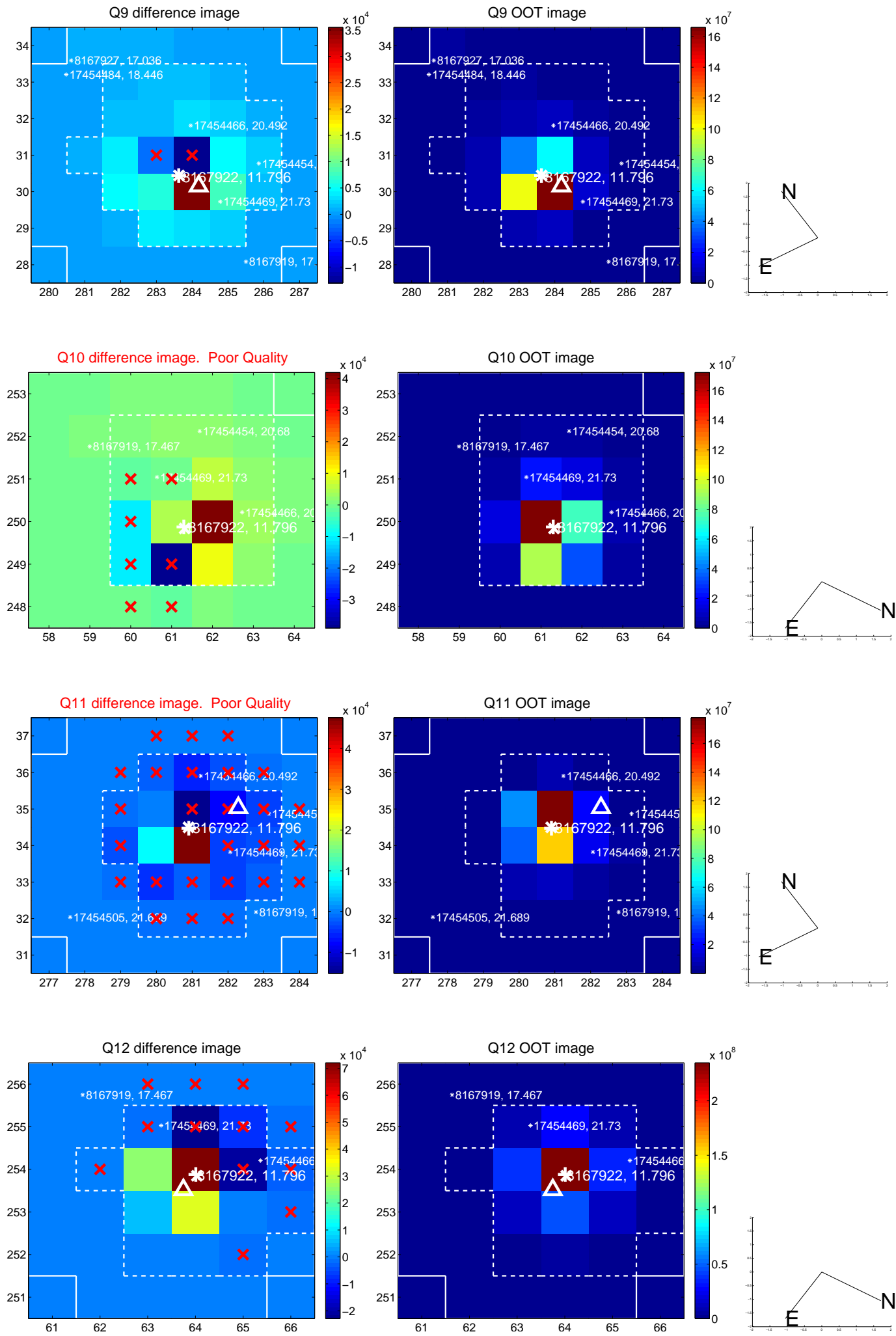


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

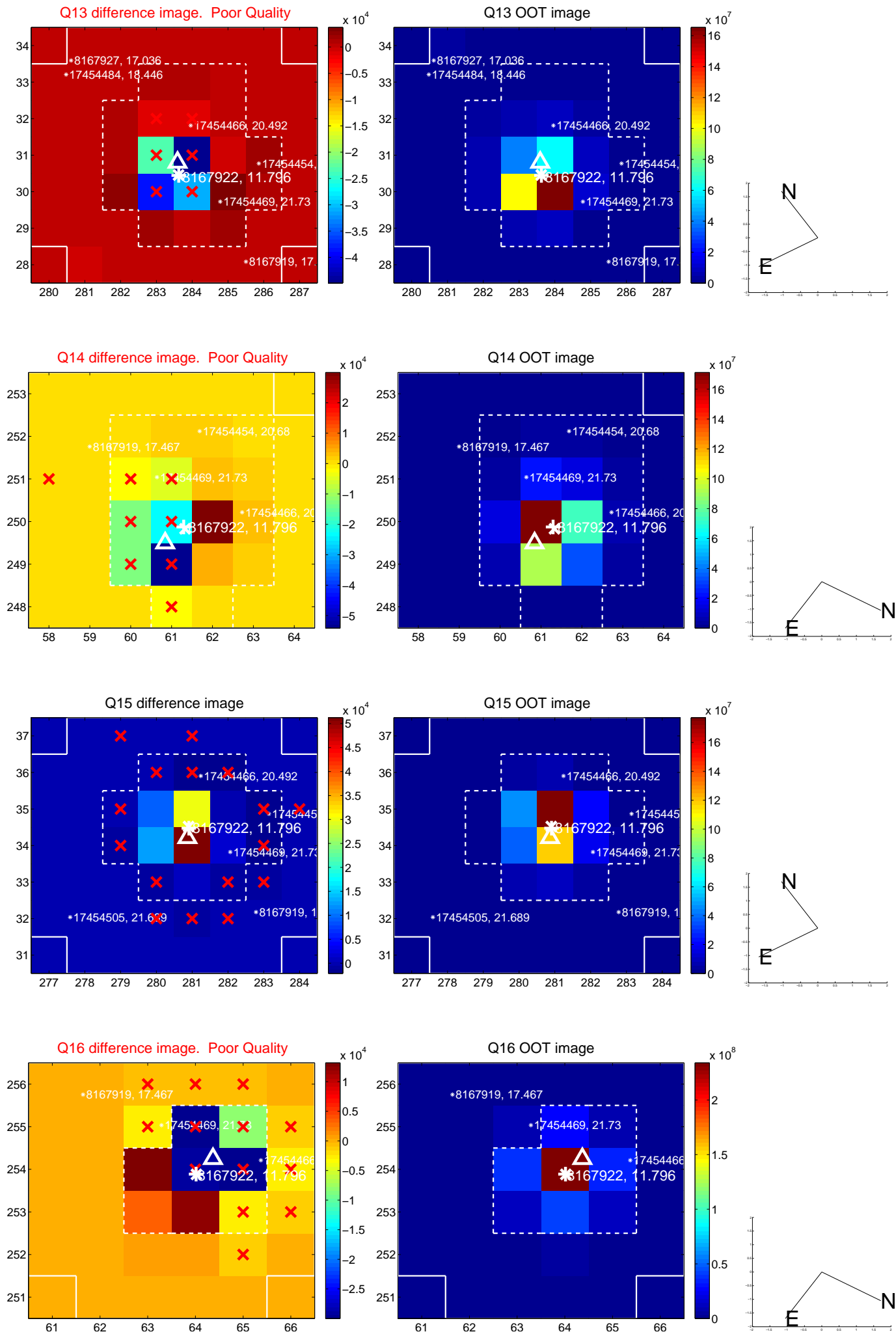




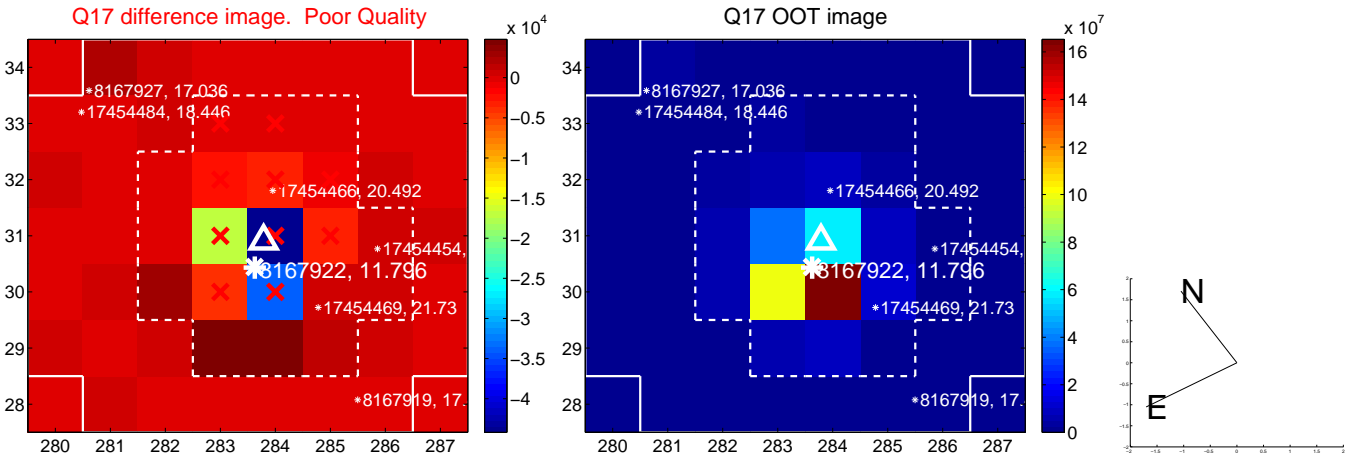
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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folded centroid time series figure for this object.

UKIRT Image

Declination

