

# KIC 003228825

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003228825-01	OBS	4055.01	0.730969	132.210373	24.1	2.522	16.1	14.8	1.59	6454	0.91	12785.86
003228825-02	OBS	No	465.681435	574.153585	1008.5	26.201	10.3	7.3	1.59	6454	6.04	2.33

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003228825-01	OBS	FP	0.00	0	1	1	1	MOD_SEC_DV—MOD_SEC_ALT—CENT_CROWDED—HALO_GHOST—EPHEM_MATCH
003228825-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—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.

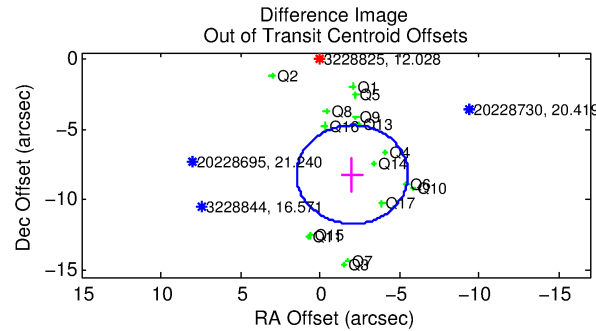
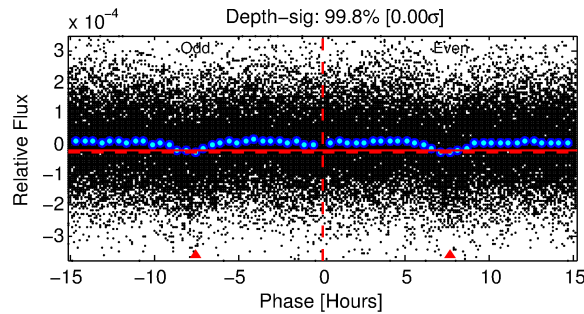
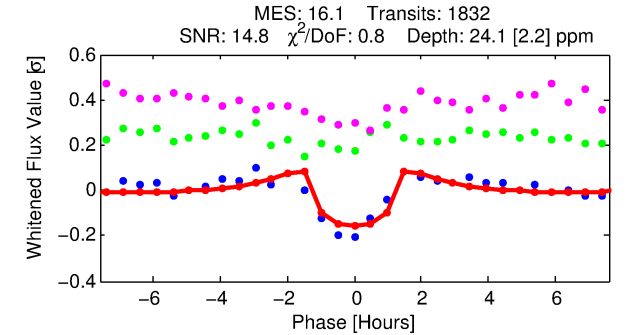
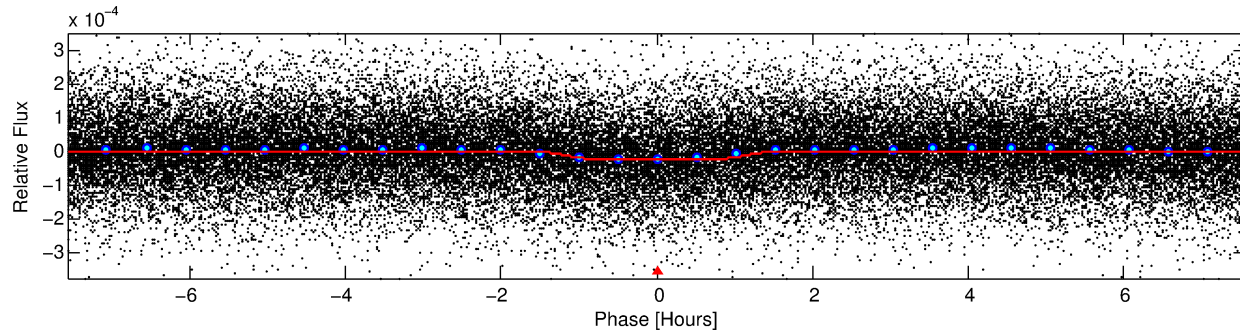
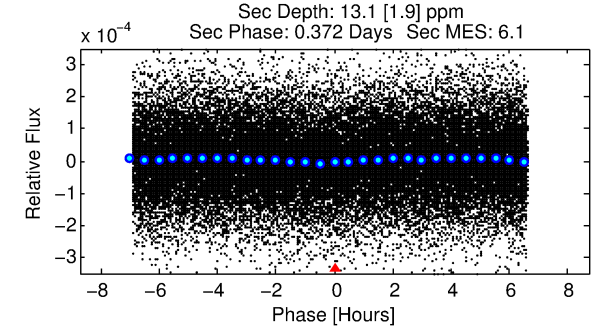
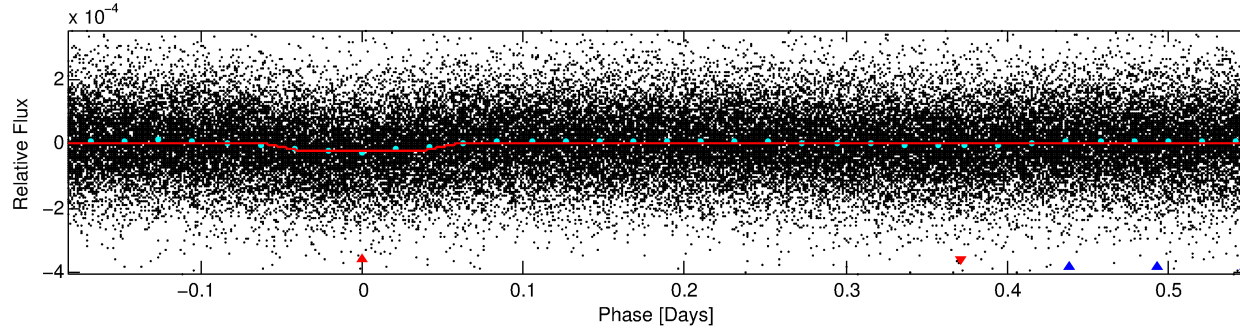
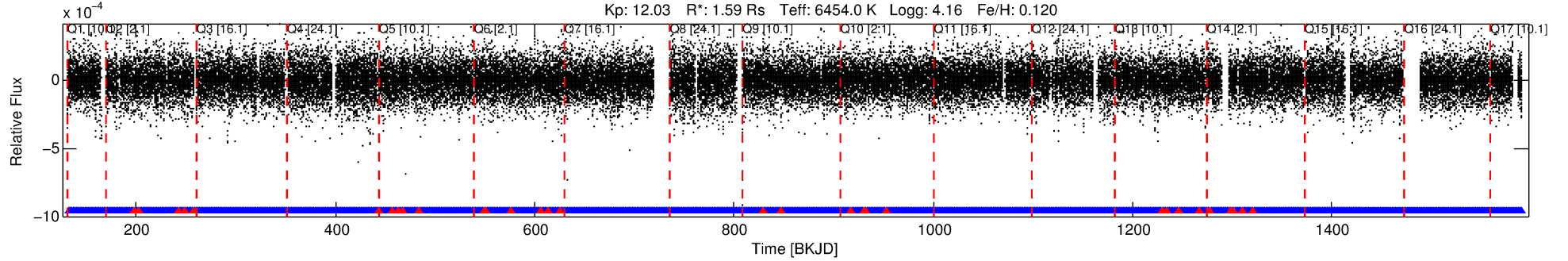
## Ephemeris Match Information For 003228825-01

TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $''$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
003228825-01	3228825	V404-Lyr-pri	3228863	1:1	66.0	-17	3	11.82	12.03	21724.00	Direct-PRF	0	3.68	1.50

**Notes:**  $P_1:P_2$  is the period ratio. Dist is the distance in arcseconds.  $\Delta$ Row and  $\Delta$ Col are the number of pixels apart in row and column.  $m_2$  and  $m_1$  are the magnitudes of the parent and child.  $D_2/D_1$  is the parent's transit depth divided by the child's.  $\sigma_P$  and  $\sigma_T$  are the significance of the match in period and epoch. For a match to be considered significant  $\sigma_P < 5.0$  and  $\sigma_T < 5.0$ . Matches which have  $\sigma_P$  and  $\sigma_T$  very close to this cutoff should receive extra scrutiny, especially if the period ratio is very large.

# DV One-Page Summary

KIC: 3228825 Candidate: 1 of 2 Period: 0.731 d  
KOI: K04055.01 Corr: 0.905



## DV Fit Results:

Period = 0.73097 [0.00001] d  
Epoch = 132.2104 [0.0014] BKJD  
Rp/R\* = 0.0053 [0.0010]  
a/R\* = 1.37 [0.67]  
b = 0.90 [0.23]  
Seff = 12785.86 [3031.23]  
Teff = 2711 [161] K  
Rp = 0.91 [0.25] Re  
a = 0.0175 [0.0028] AU  
Ag = 2.65 [1.25] [1.33σ]  
Teffp = 5350 [551] K [4.60σ]

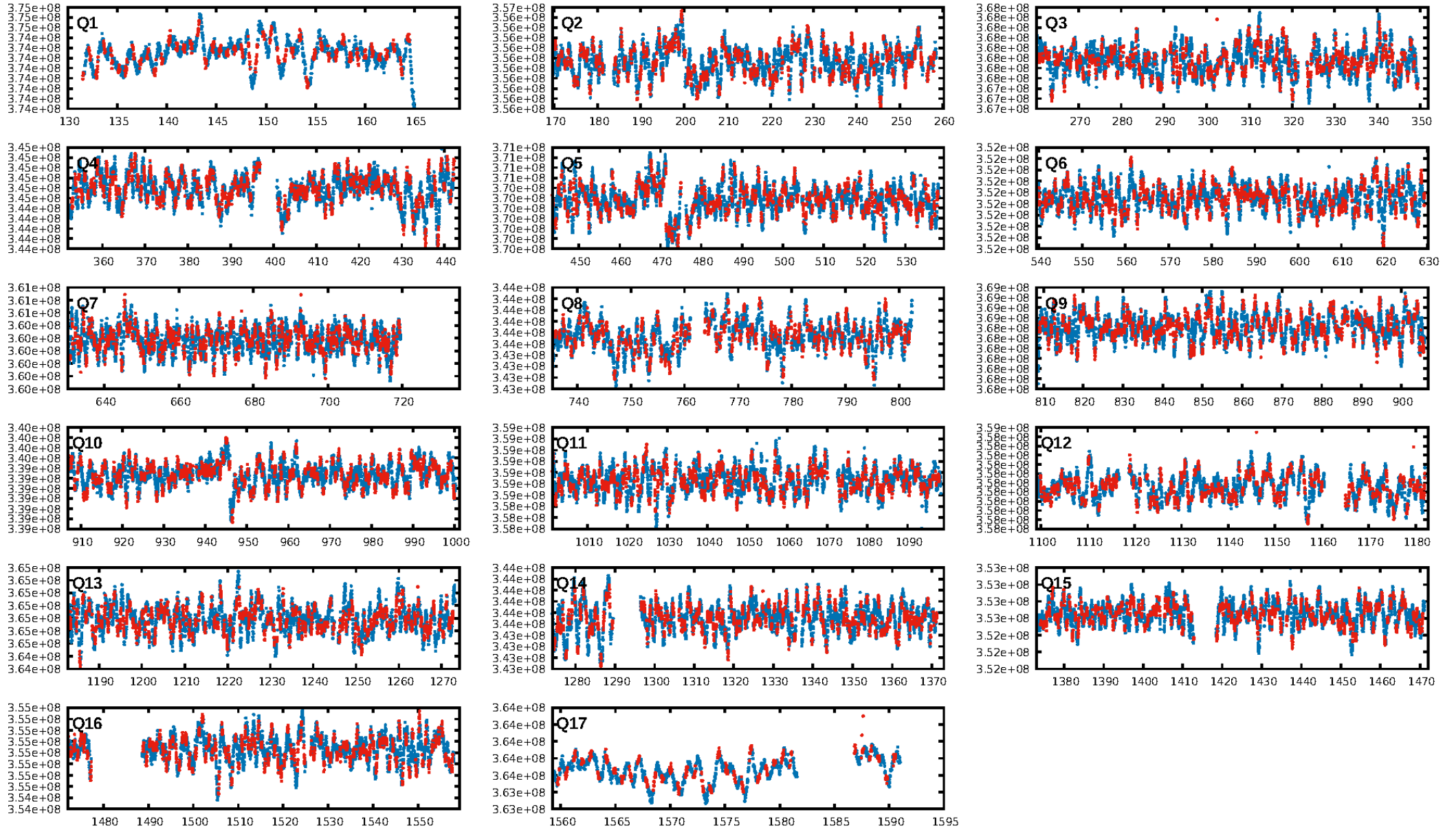
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [423.94σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.20e-60  
RollingBand-fgt: 0.98 [1716/1750]  
GhostDiagnostic-chr: -0.05107  
Centroid-sig: 0.0%  
Centroid-so: 1.883 arcsec [3.65σ]  
OotOffset-rm: 8.457 arcsec [7.23σ]  
KicOffset-rm: 8.456 arcsec [7.23σ]  
OotOffset-st: 4/4/3/5 [16]  
KicOffset-st: 4/4/3/5 [16]  
DiffImageQuality-fgm: 0.06 [1/16]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 23:00:46 Z

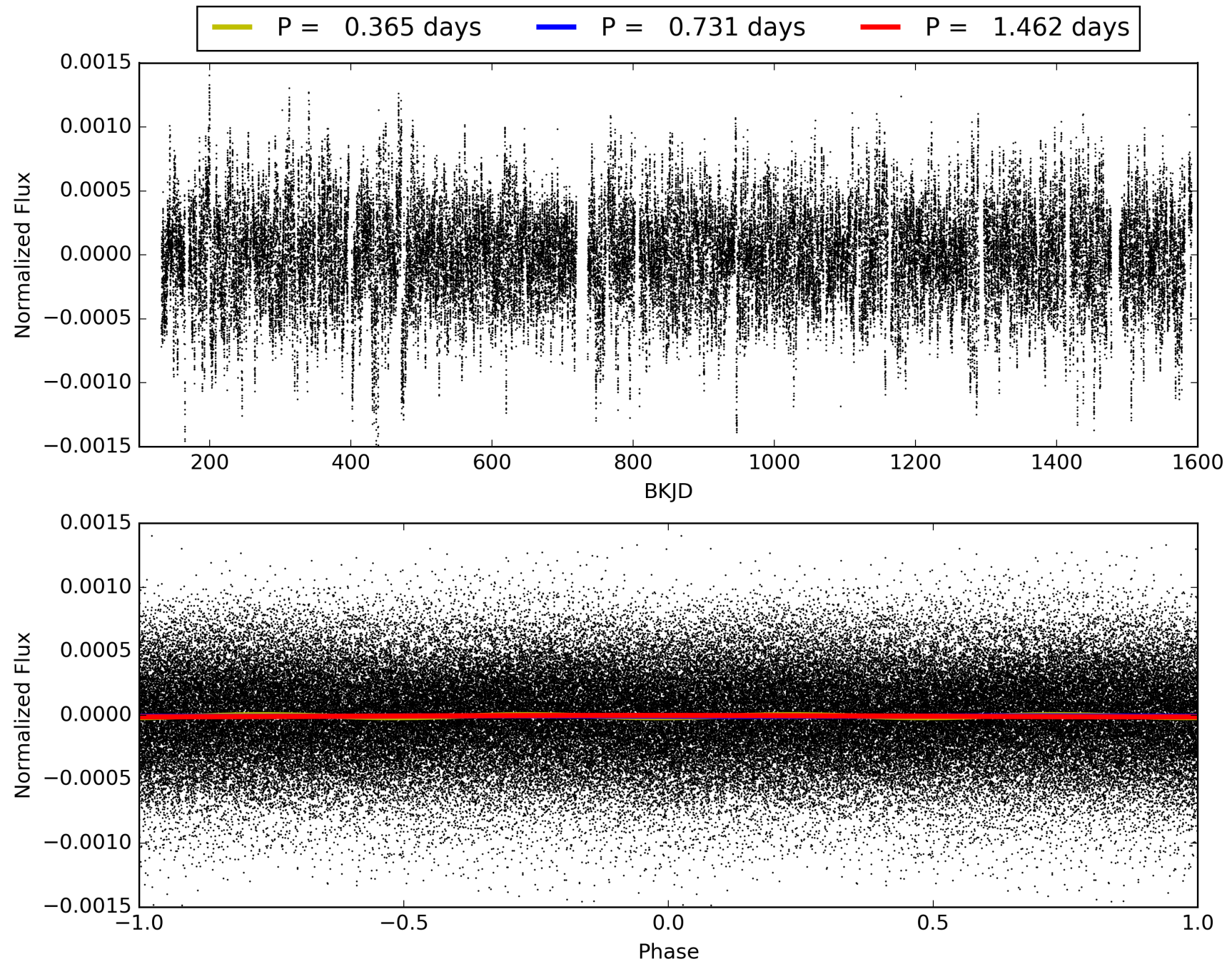
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 003228825-01, PDC Light Curves



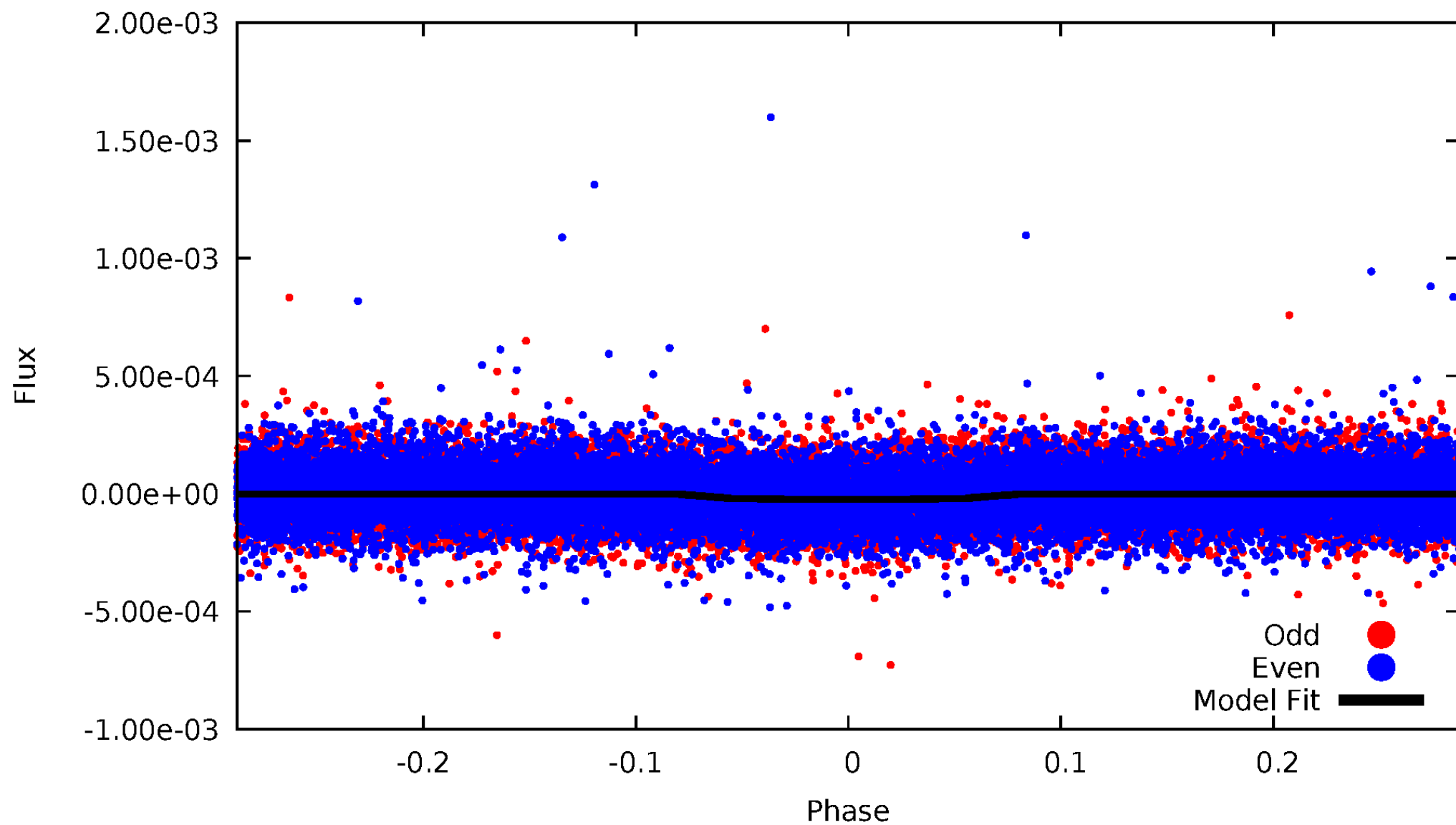


TCE 003228825-01



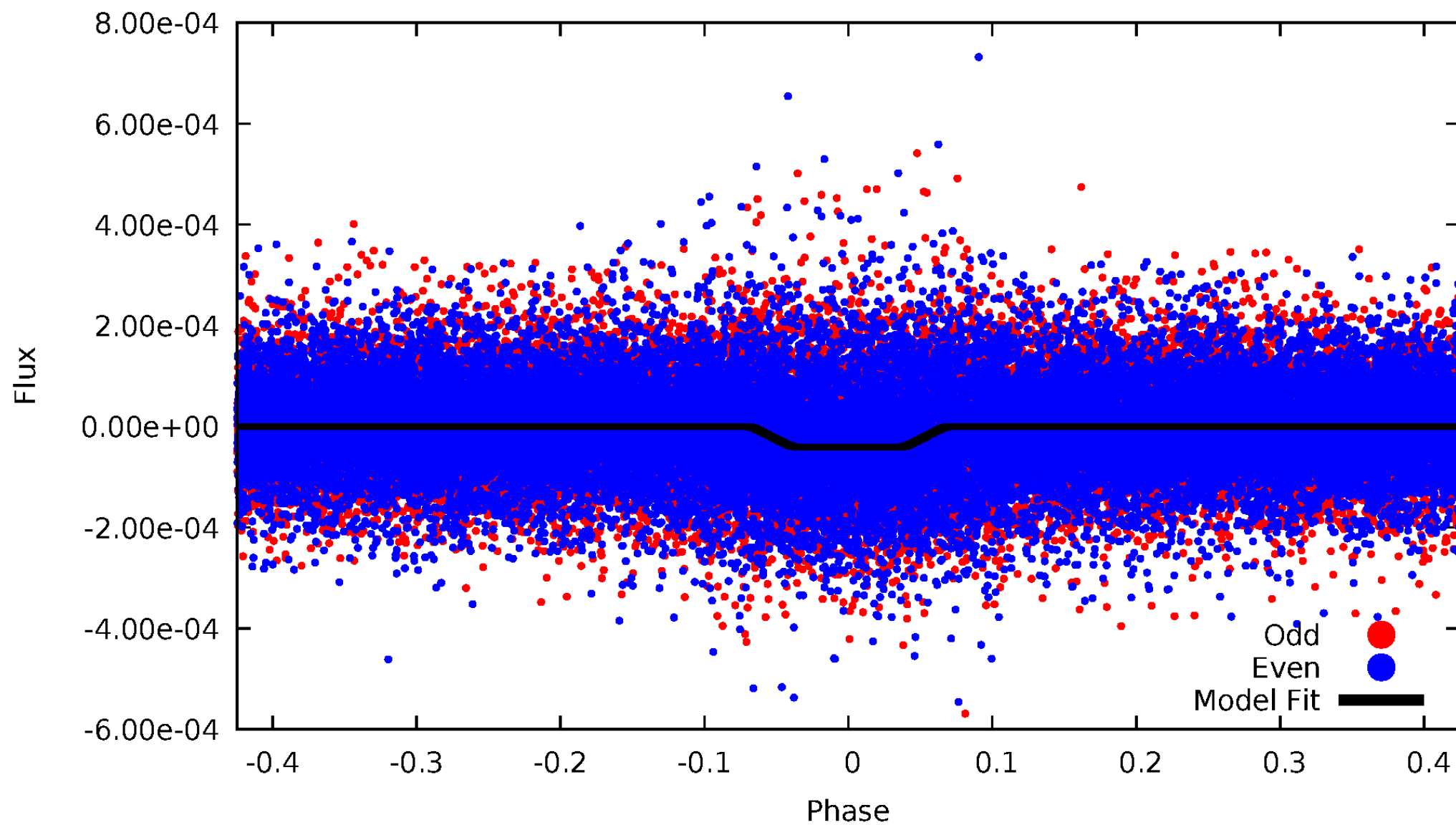
# DV Odd/Even

TCE 003228825-01

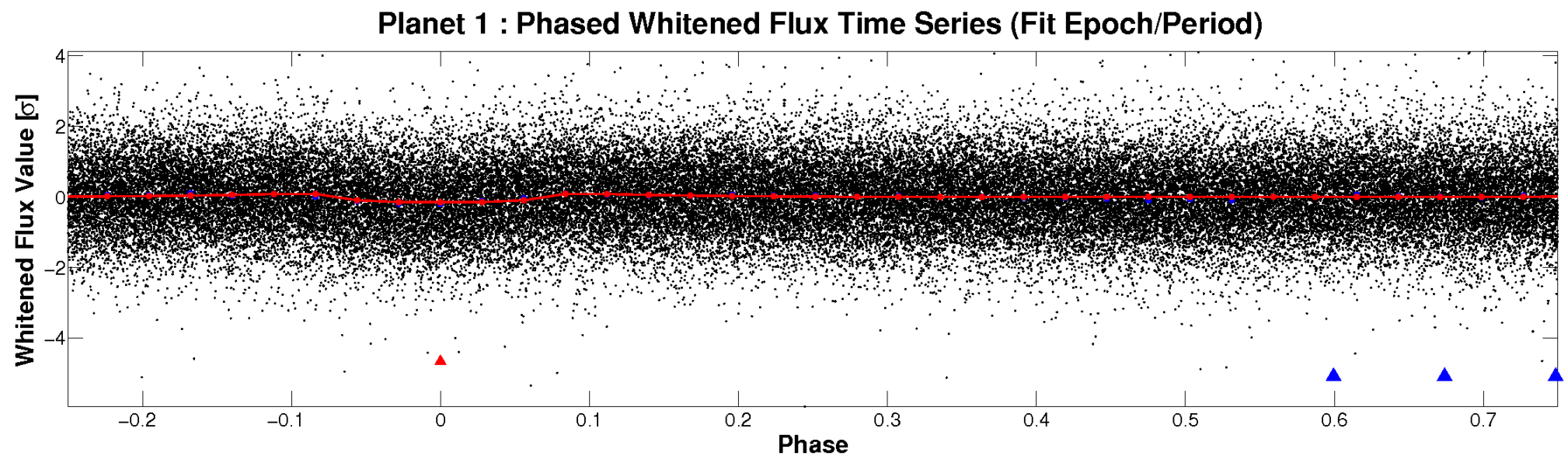
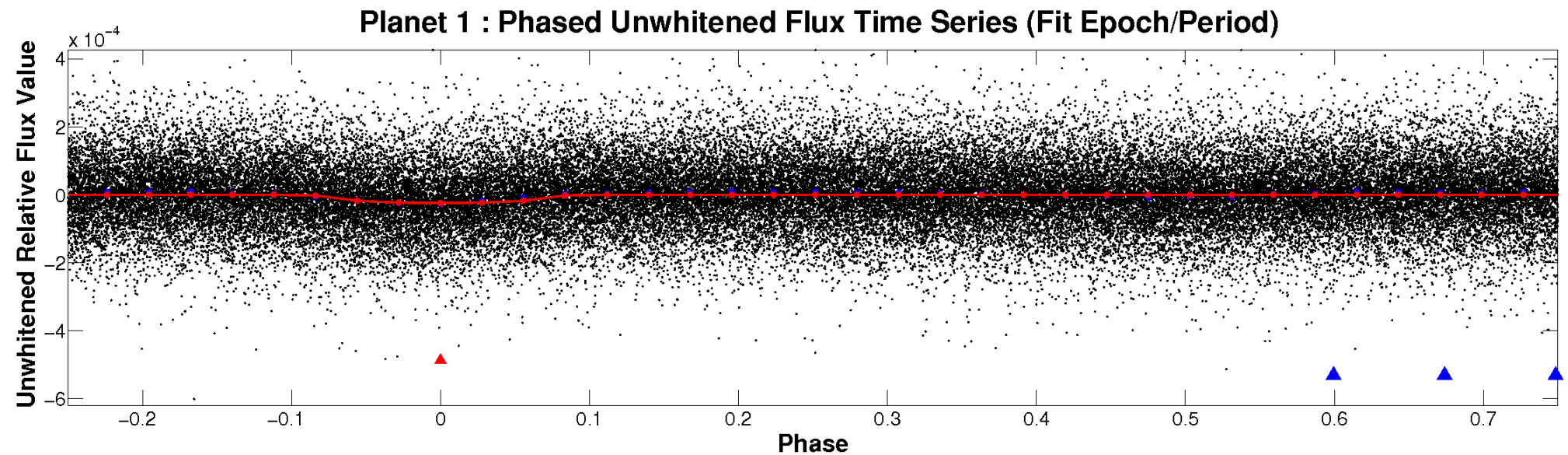


# ALT Odd/Even

TCE 003228825-01



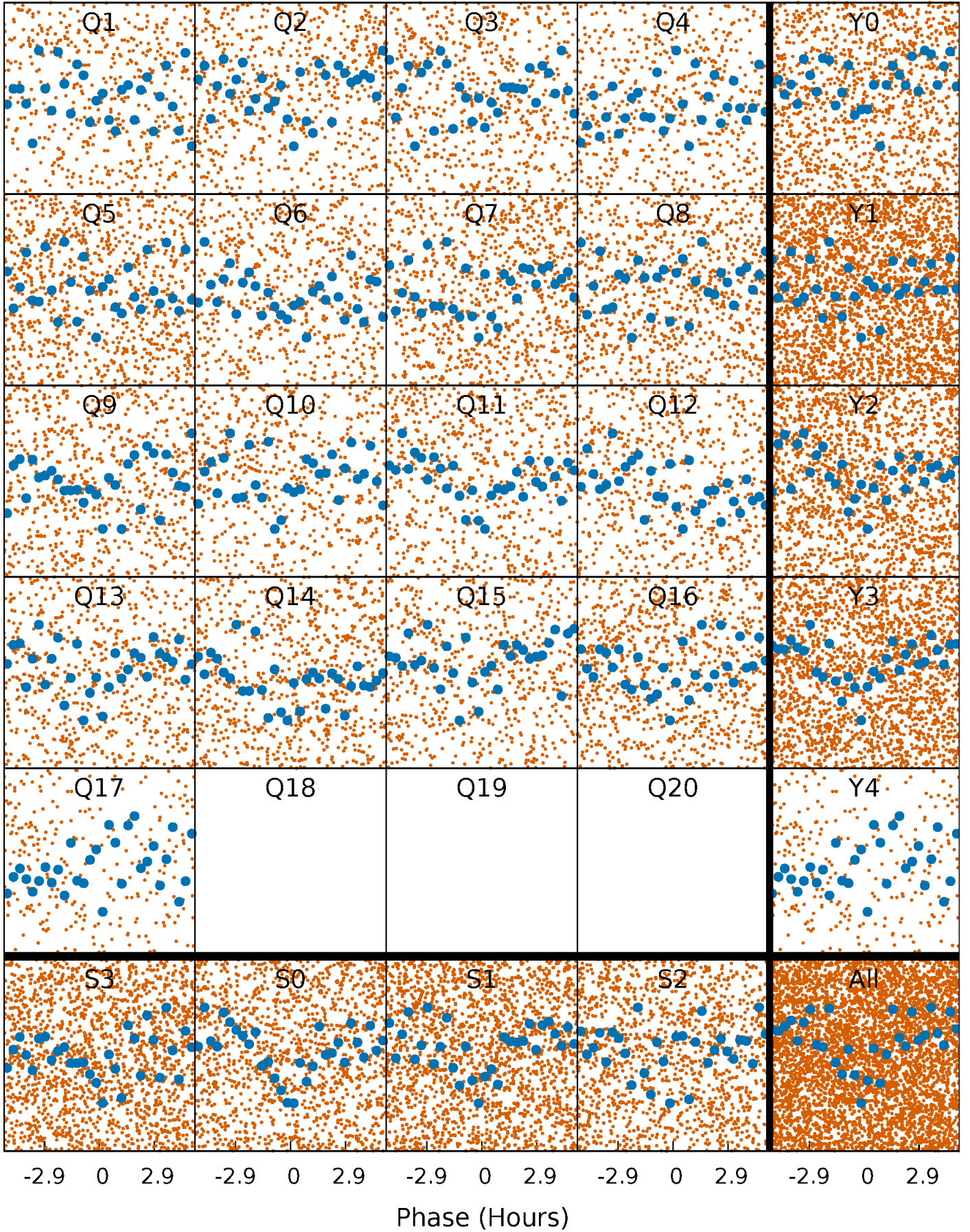
# Non-Whitened Vs. Whitened Light Curve





# PDC Quarter-Phased Transit Curves

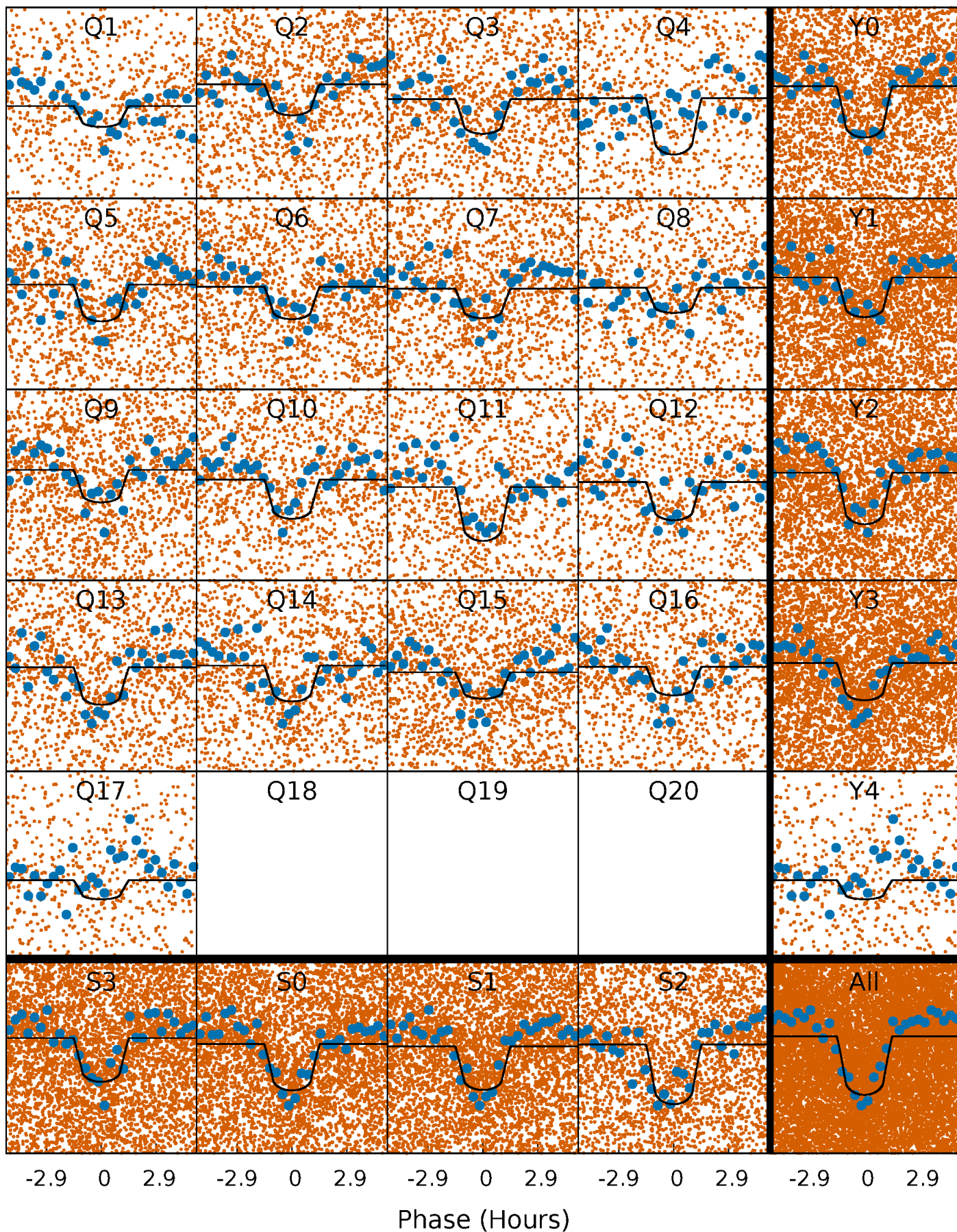
TCE 003228825-01 P= 0.730969 Days  $T_0=132.210373$  (BKJD)





# DV Quarter-Phased Transit Curves

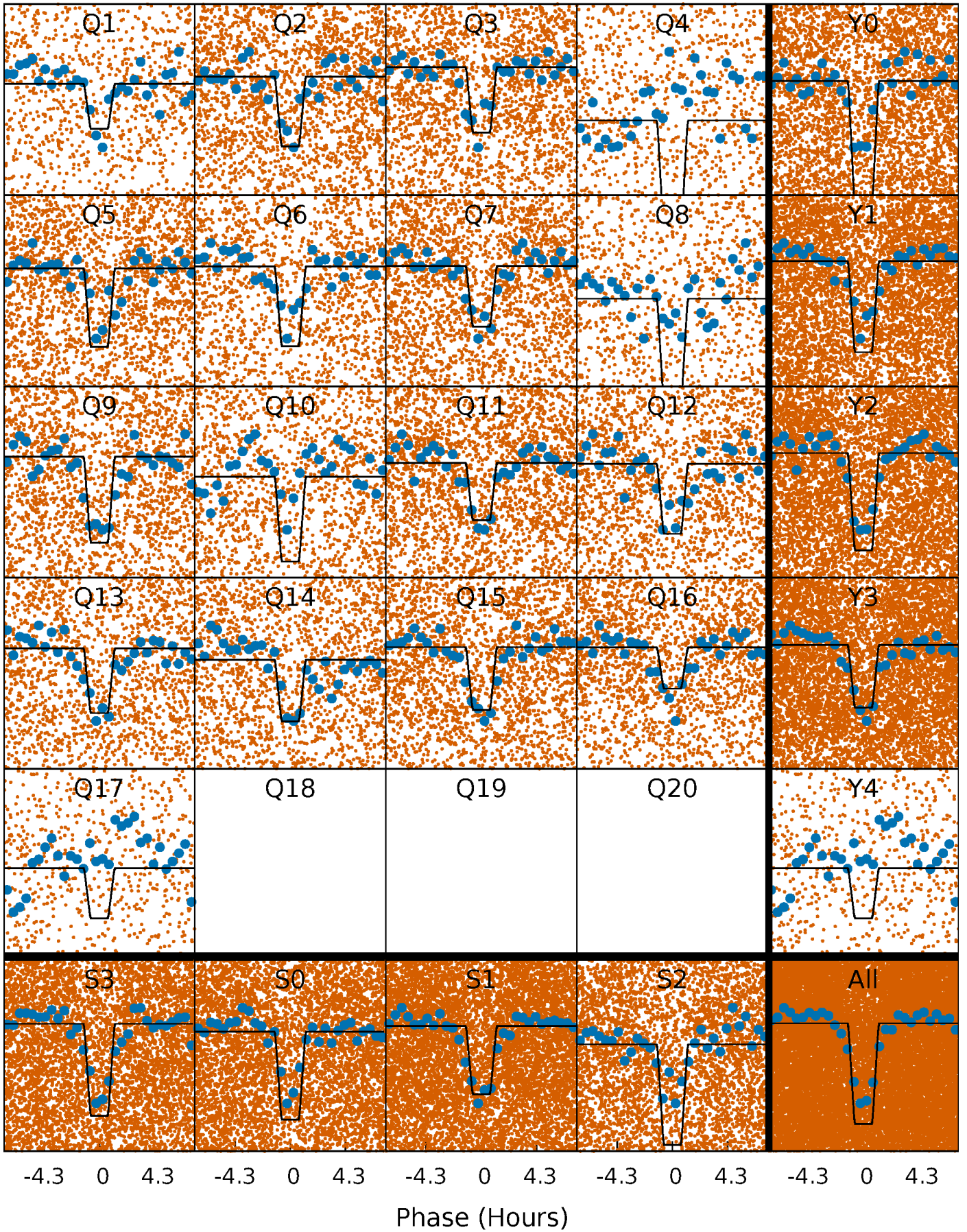
TCE 003228825-01 P= 0.730969 Days  $T_0=132.210373$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

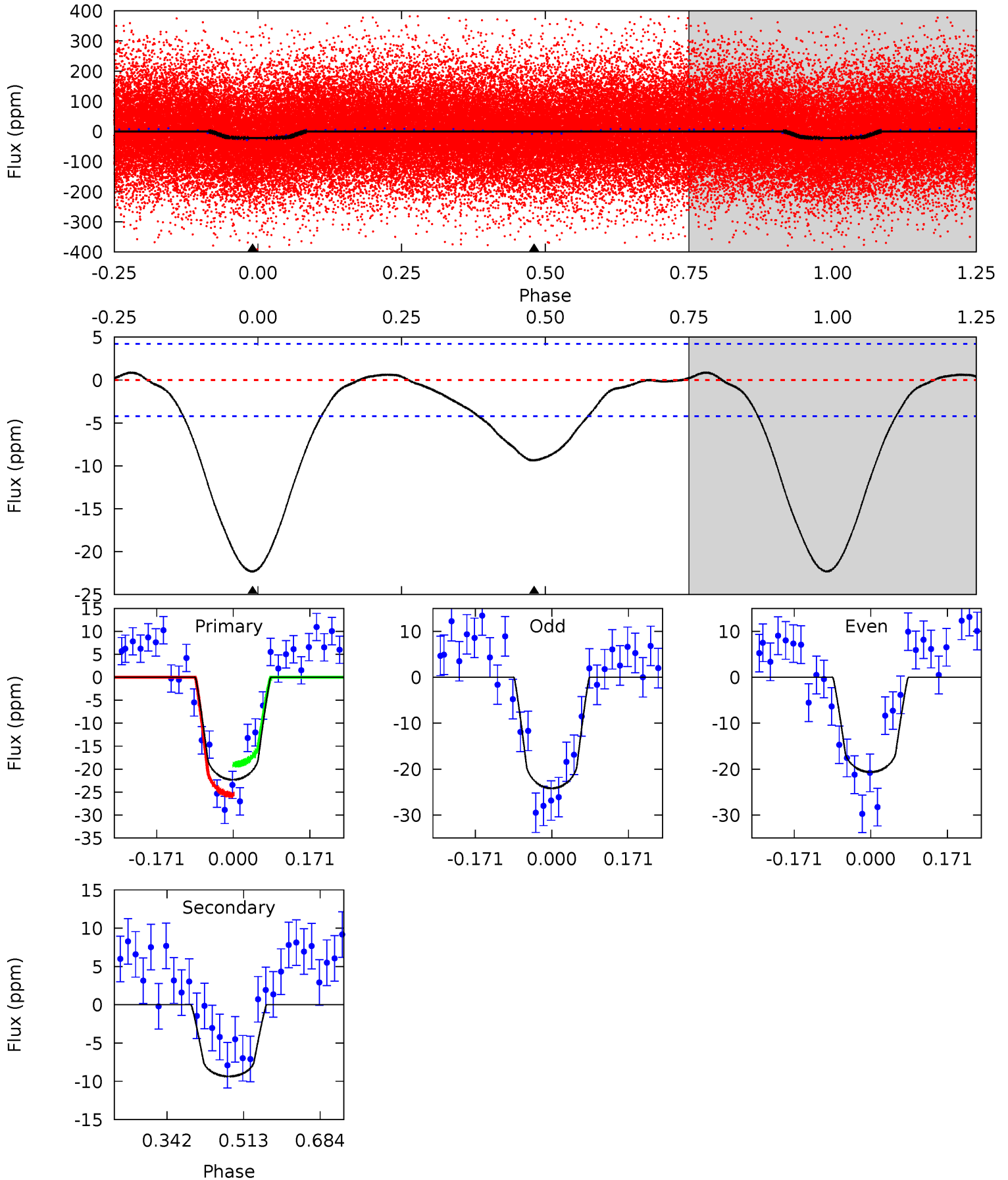
TCE 003228825-01 P= 0.730945 Days  $T_0=132.226770$  (BKJD)



# DV Model-Shift Uniqueness Test

003228825-01, P = 0.730969 Days, E = 131.479404 Days

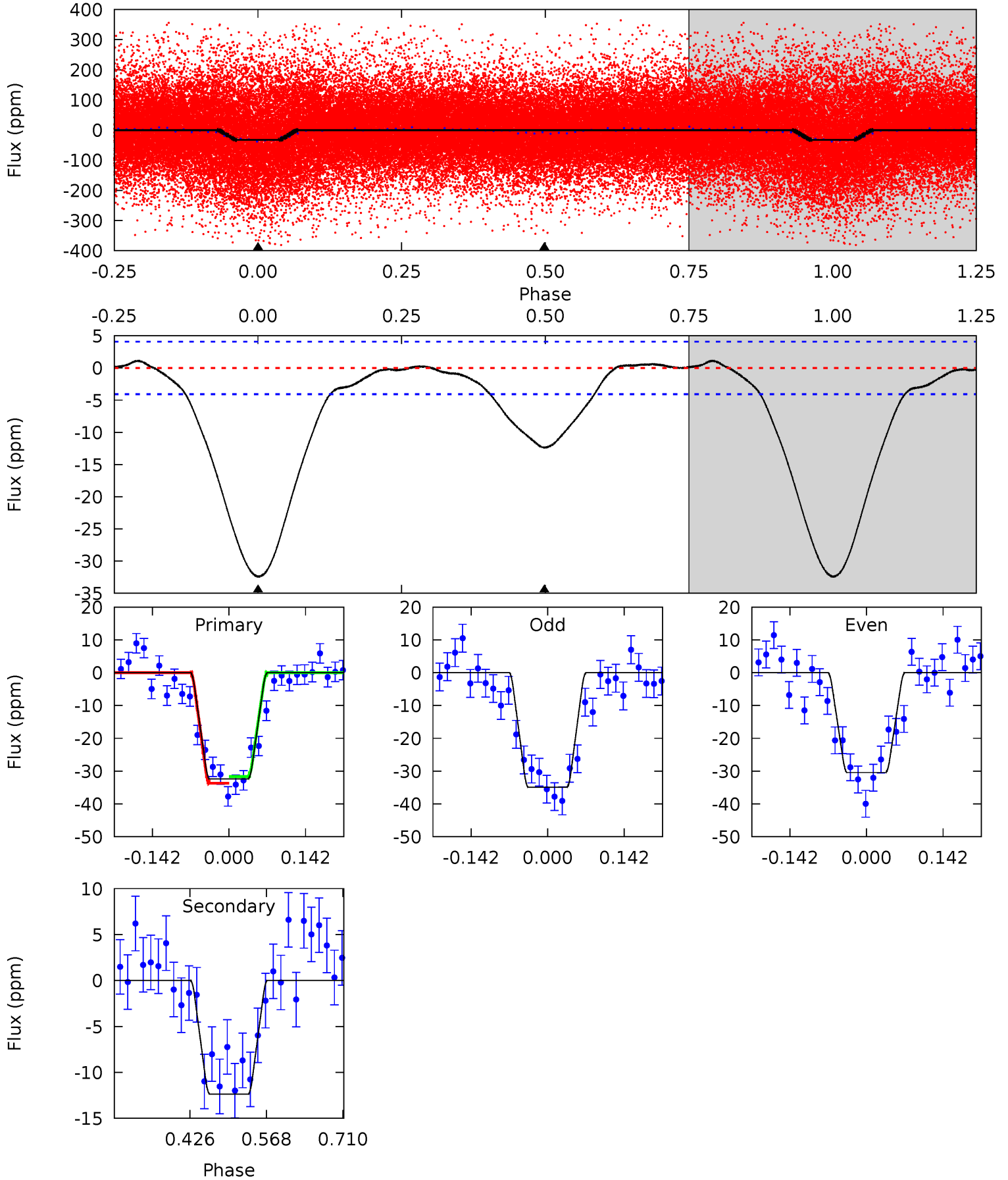
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
23.6	9.89	0	0	4.45	1.37	0.50	23.6	23.6	9.89	9.89	1.87	1.11	0.04	3.51



# Alt Model-Shift Uniqueness Test

003228825-01, P = 0.730945 Days, E = 131.495825 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
35.6	13.6	0	0	4.49	1.47	1.08	35.6	35.6	13.6	13.6	2.49	0.89	0.03	1.11





### Stellar Parameters For KIC 003228825

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6454^{+77}_{-83}$	$4.163^{+0.125}_{-0.125}$	$0.120^{+0.150}_{-0.200}$	$1.587^{+0.308}_{-0.252}$	$1.336^{+0.110}_{-0.121}$	$0.471^{+0.271}_{-0.171}$
	+1%/-1%	+3%/-3%	+125%/-167%	+19%/-16%	+8%/-9%	+58%/-36%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 003228825-01 / KOI 4055.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-9 \pm 1$	$0.91^{+0.19}_{-0.19}$	$3783^{+179}_{-164}$	$4811^{+518}_{-425}$	$1.894^{+1.052}_{-0.637}$
Alt.	$-12 \pm 1$	$1.10^{+0.21}_{-0.23}$	$3791^{+203}_{-182}$	$4706^{+483}_{-342}$	$1.717^{+0.948}_{-0.531}$

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

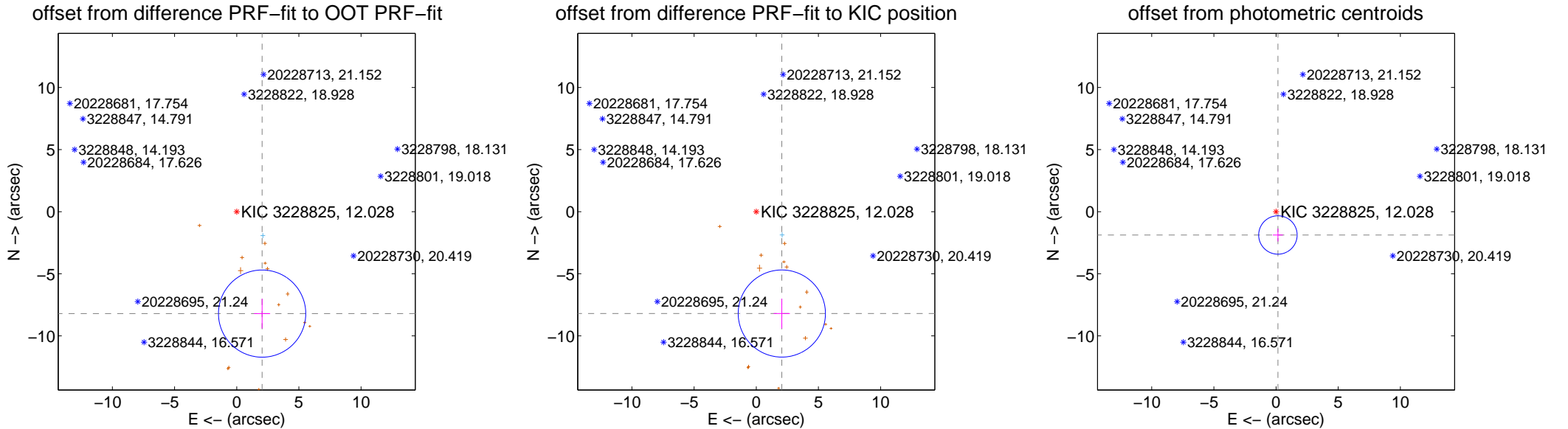
## DV Centroid Data

Supplemental centroid analysis for 003228825-01. Kepler magnitude: 12.03. Transit SNR 14.82

There are 1 quarters with good PRF difference image offsets

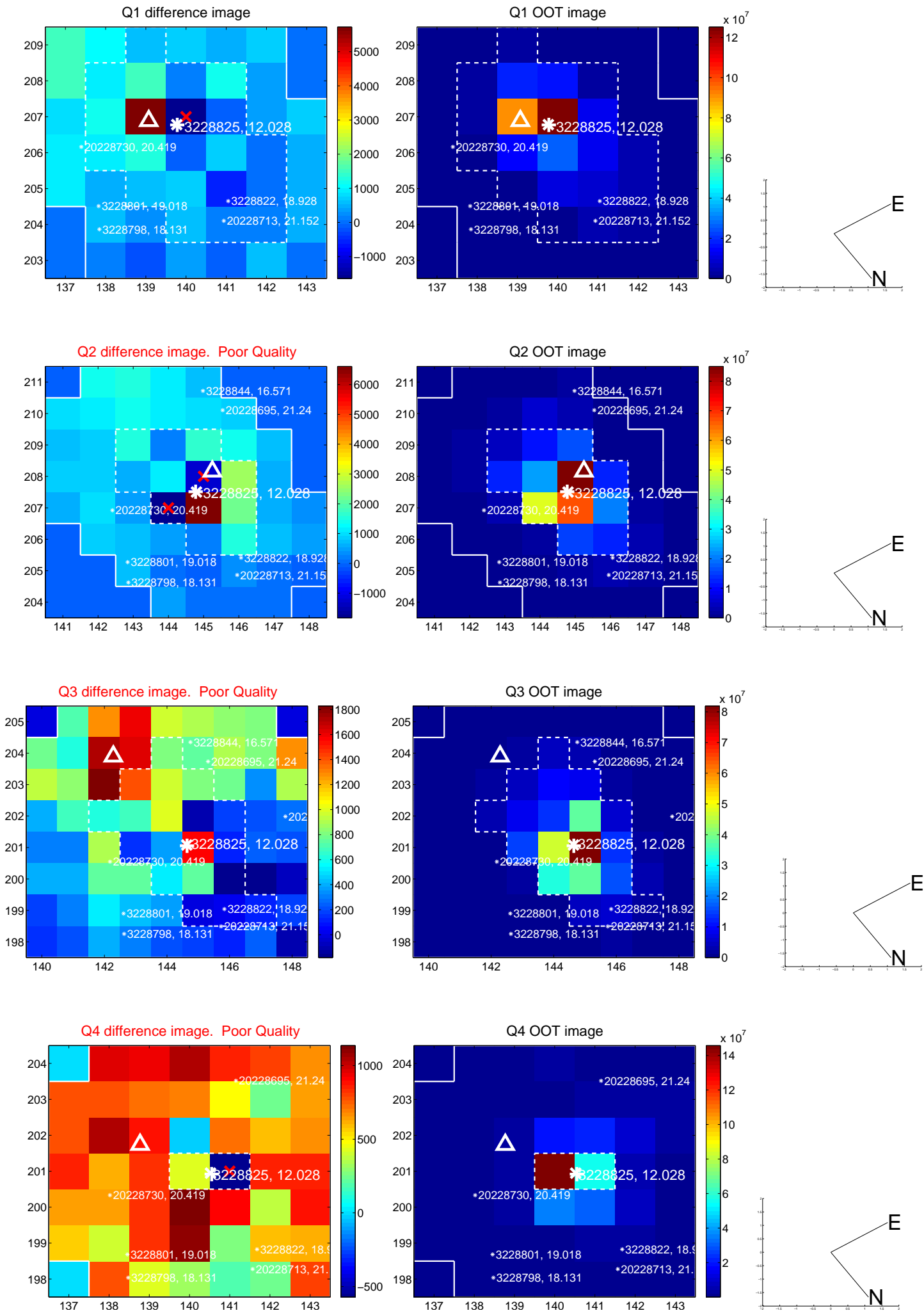
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$8.457 \pm 1.170$	7.23	$-2.042 \pm 0.647$	$-8.207 \pm 1.195$
PRF-fit source offset from KIC position	$8.456 \pm 1.169$	7.23	$-2.058 \pm 0.653$	$-8.202 \pm 1.194$
photometric centroid source offset	$1.88 \pm 0.52$	3.65	$-0.15 \pm 0.40$	$-1.88 \pm 0.52$

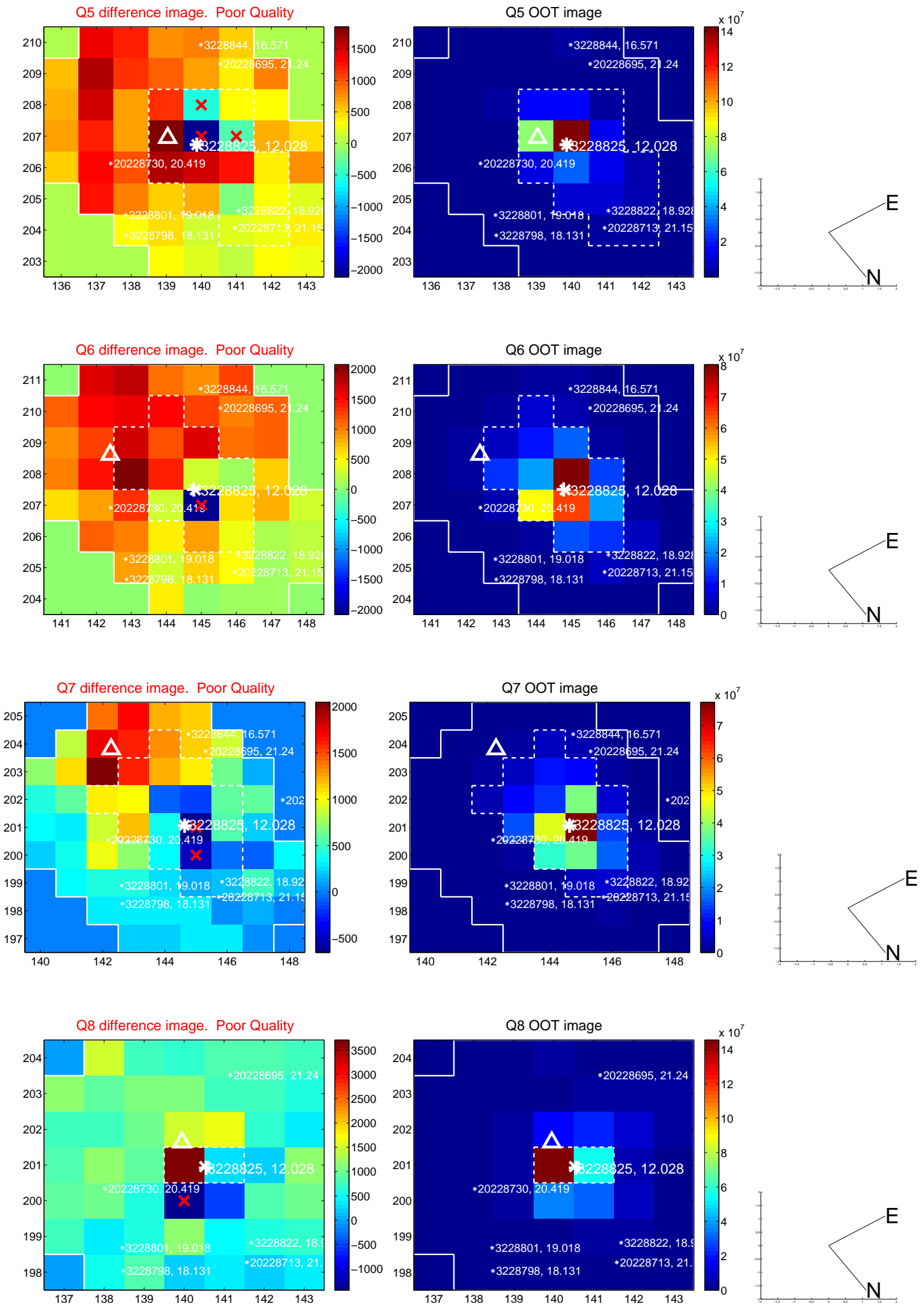


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

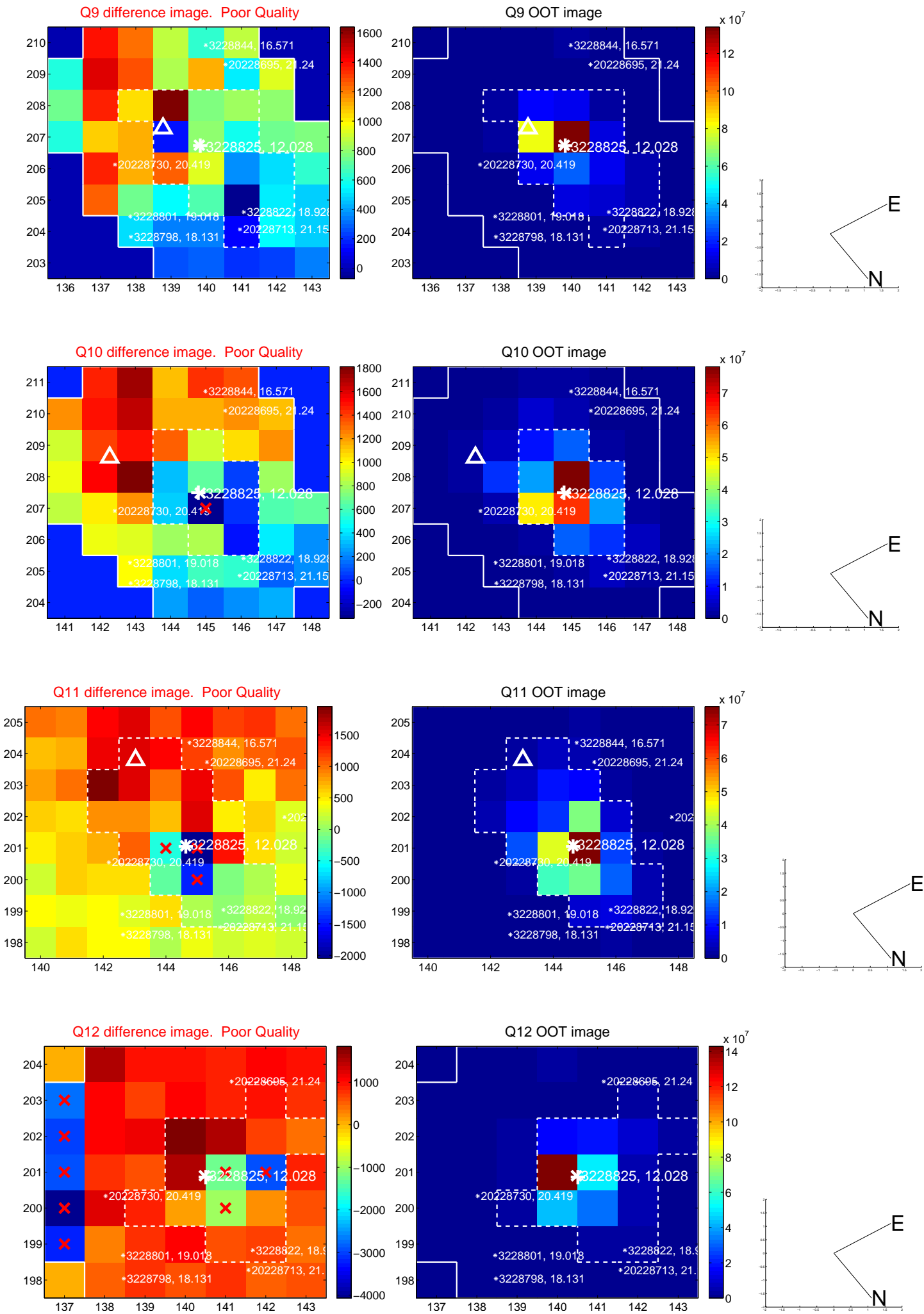


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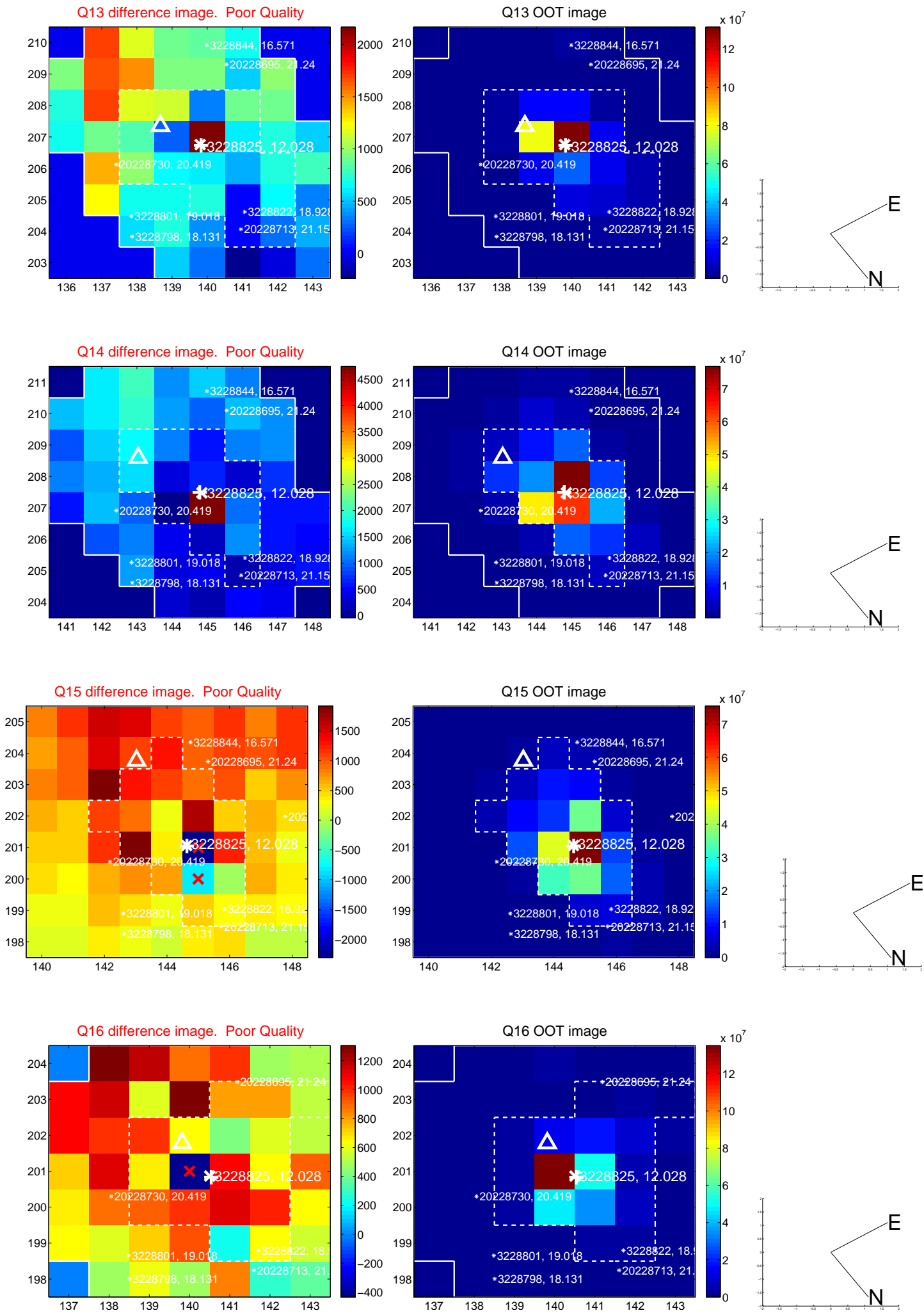




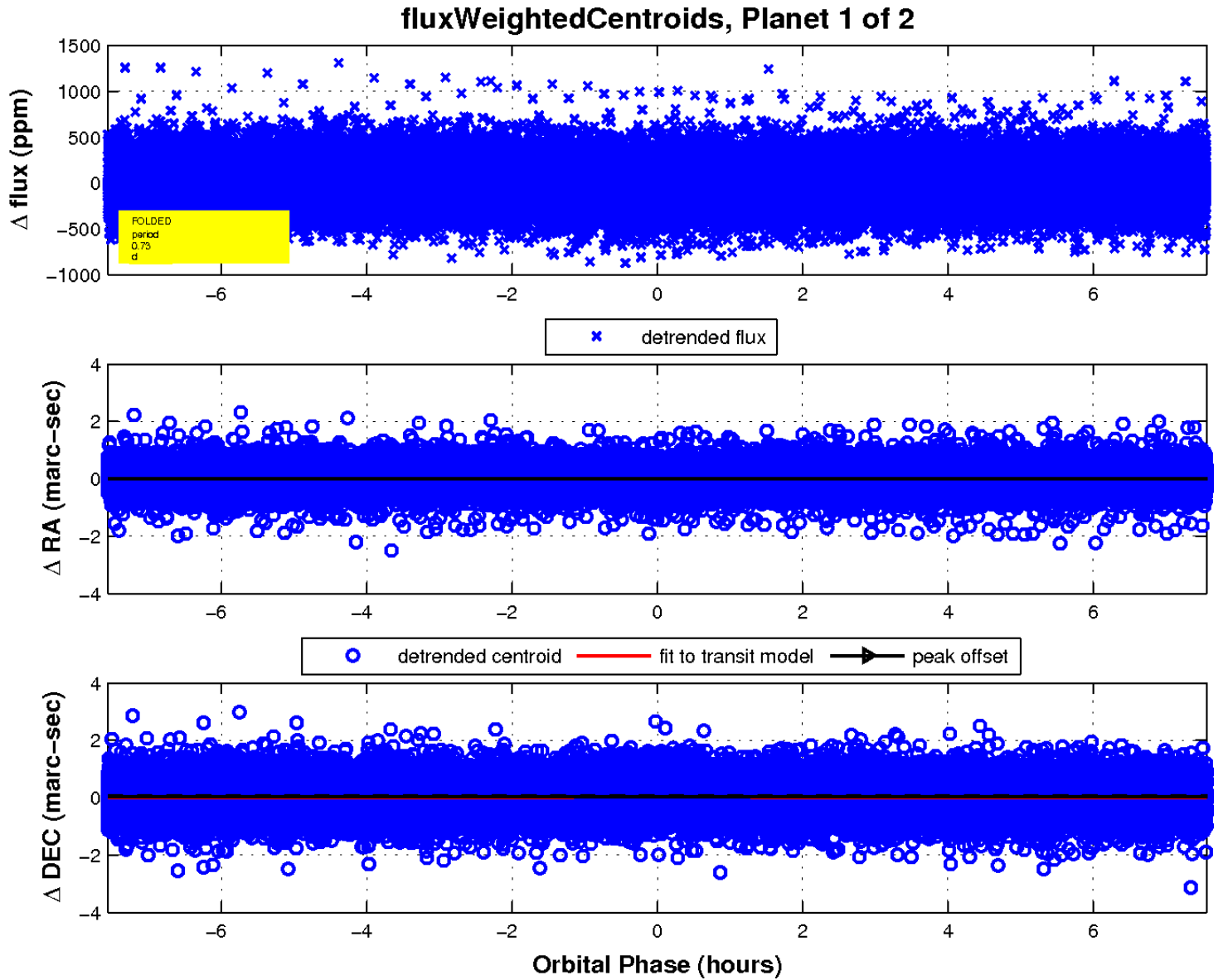
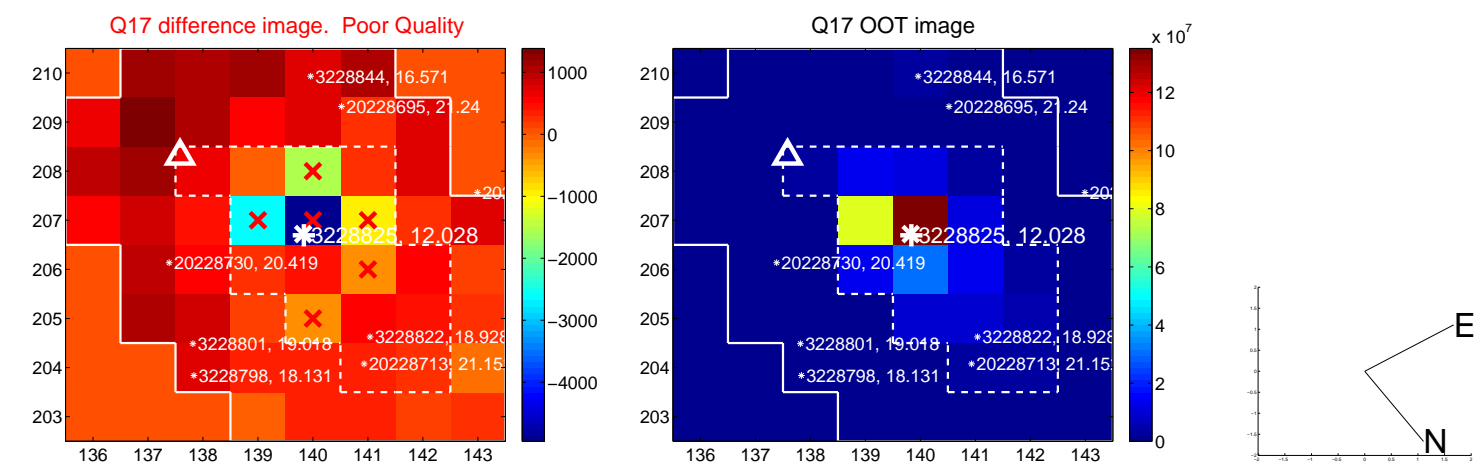
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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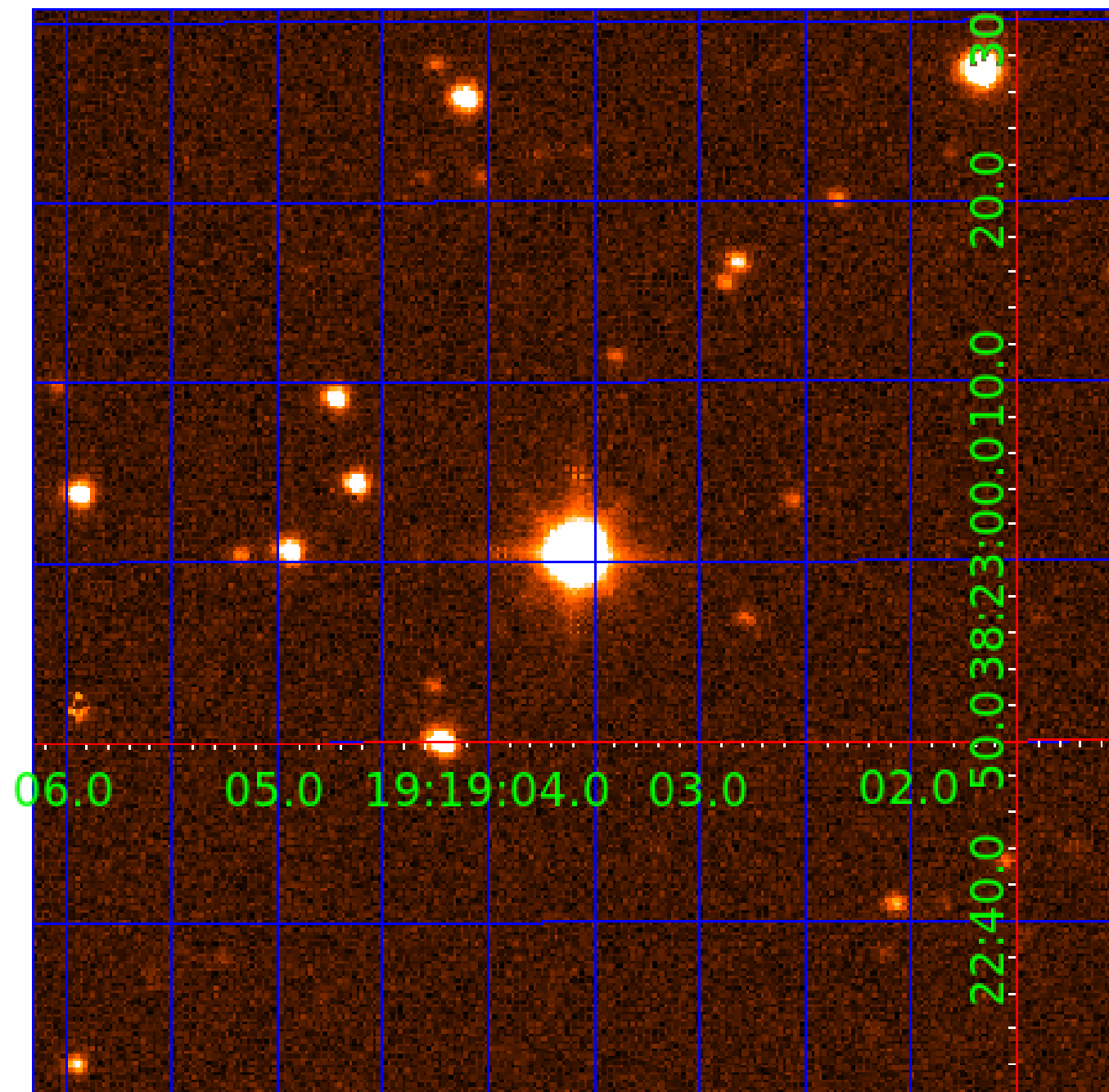


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UKIRT Image

Declination





# KIC 003228825

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003228825-01	OBS	4055.01	0.730969	132.210373	24.1	2.522	16.1	14.8	1.59	6454	0.91	12785.86
003228825-02	OBS	No	465.681435	574.153585	1008.5	26.201	10.3	7.3	1.59	6454	6.04	2.33

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003228825-01	OBS	FP	0.00	0	1	1	1	MOD_SEC_DV—MOD_SEC_ALT—CENT_CROWDED—HALO_GHOST—EPHEM_MATCH
003228825-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—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.

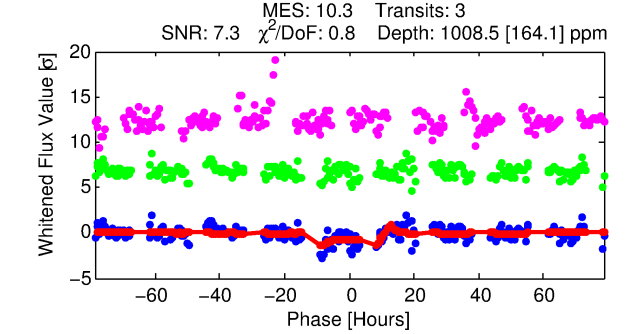
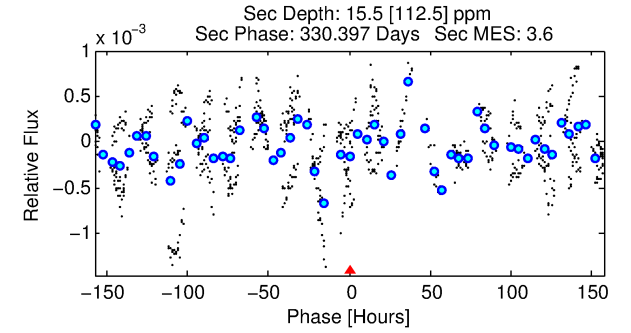
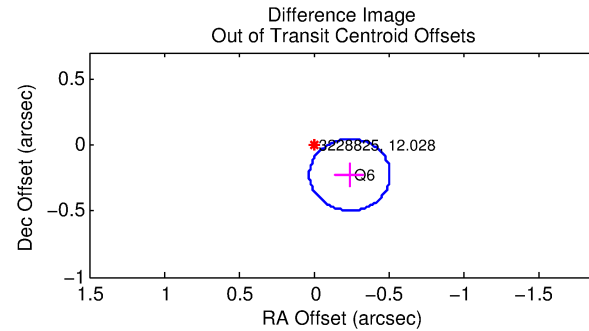
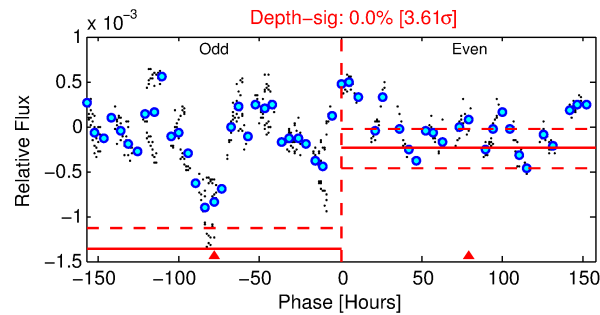
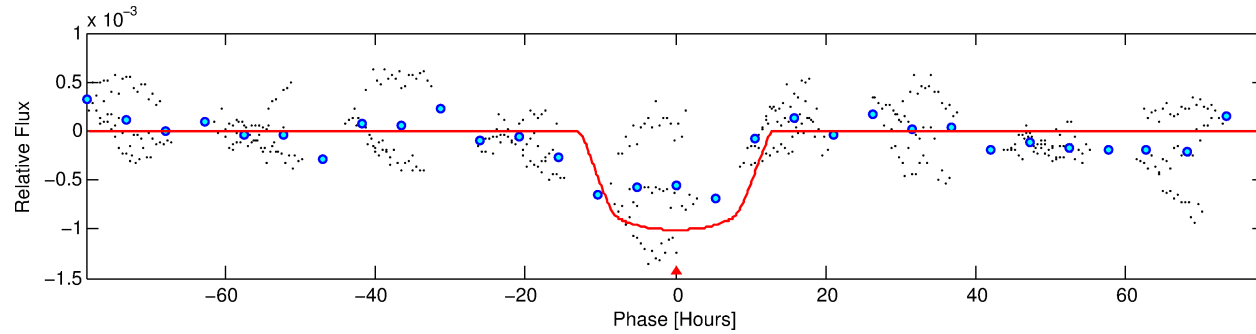
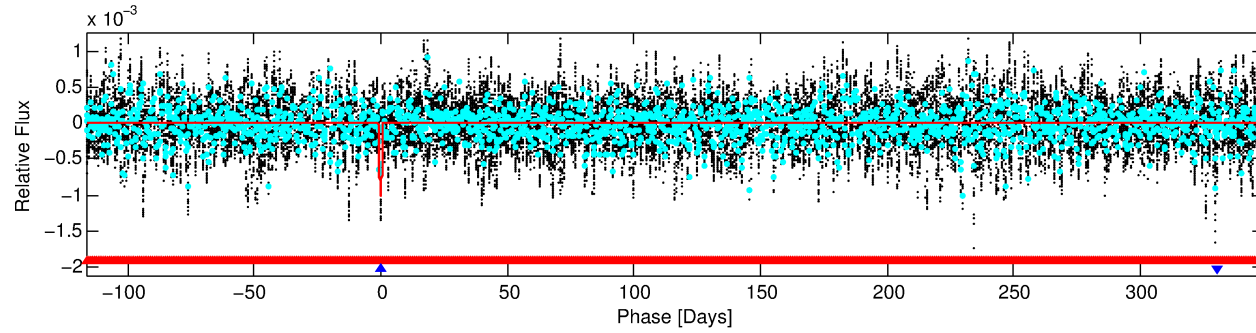
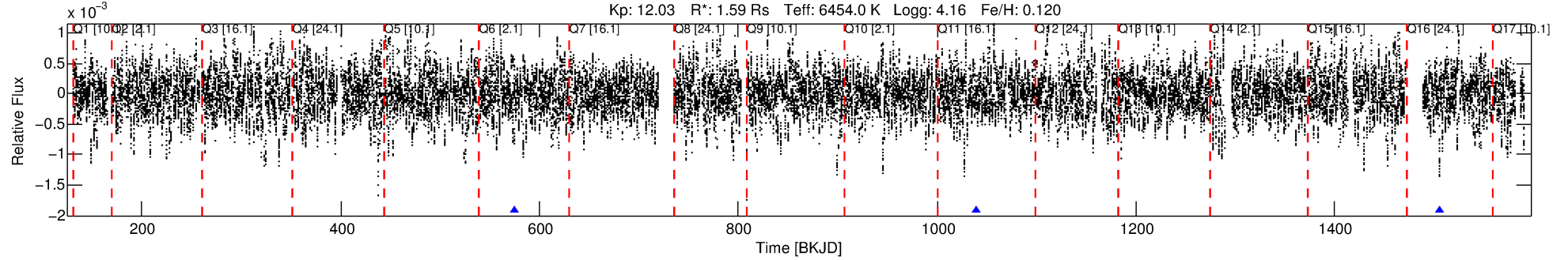
## Ephemeris Match Information For 003228825-02

No Significant Match Found

# DV One-Page Summary

KIC: 3228825 Candidate: 2 of 2 Period: 465.681 d  
KOI: K04055 Corr: No Ephemeris Match

Kp: 12.03 R\*: 1.59 Rs Teff: 6454.0 K Logg: 4.16 Fe/H: 0.120



## DV Fit Results:

Period = 465.68144 [0.01709] d  
Epoch = 574.1536 [0.0406] BKJD  
Rp/R\* = 0.0349 [0.0030]  
a/R\* = 63.67 [6.89]  
b = 0.92 [0.02]  
Seff = 2.33 [0.55]  
Teff = 315 [19] K  
Rp = 6.04 [1.28] Re  
a = 1.2956 [0.2087] AU  
Ag = 392.52 [2852.48] [0.14σ]  
Teffp = 2169 [3938] K [0.47σ]

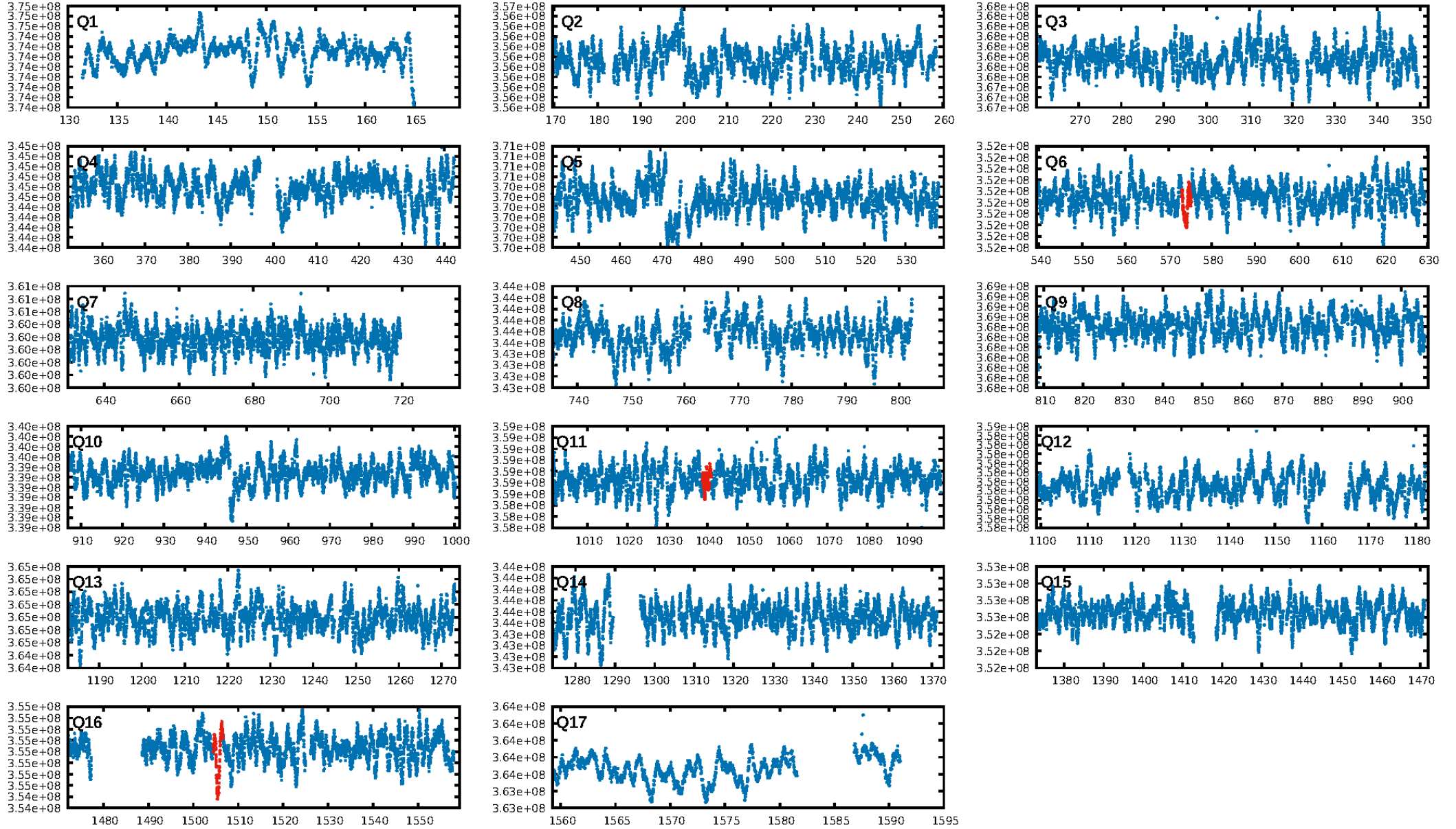
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [423.94σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 1.7%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 9.24e-13  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 21.96  
Centroid-sig: 4.9%  
Centroid-so: 0.290 arcsec [1.80σ]  
OotOffset-rm: 0.331 arcsec [3.68σ]  
KicOffset-rm: 0.559 arcsec [6.24σ]  
OotOffset-st: 1/0/0/0 [1]  
KicOffset-st: 1/0/0/0 [1]  
DiffImageQuality-fgm: 1.00 [1/1]  
DiffImageOverlap-fno: 0.00 [0/1]

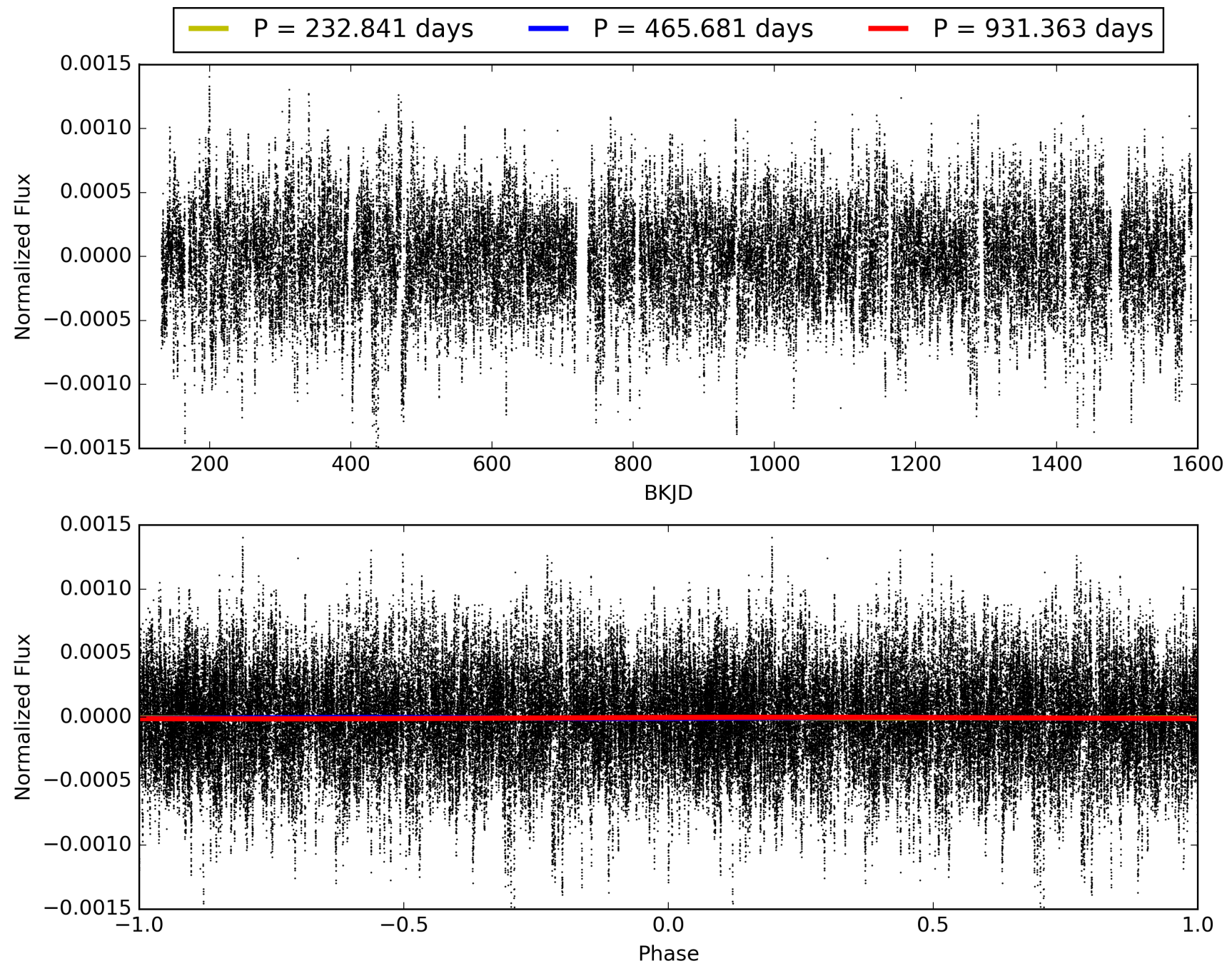
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 23:00:57 Z

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

# TCE 003228825-02, PDC Light Curves



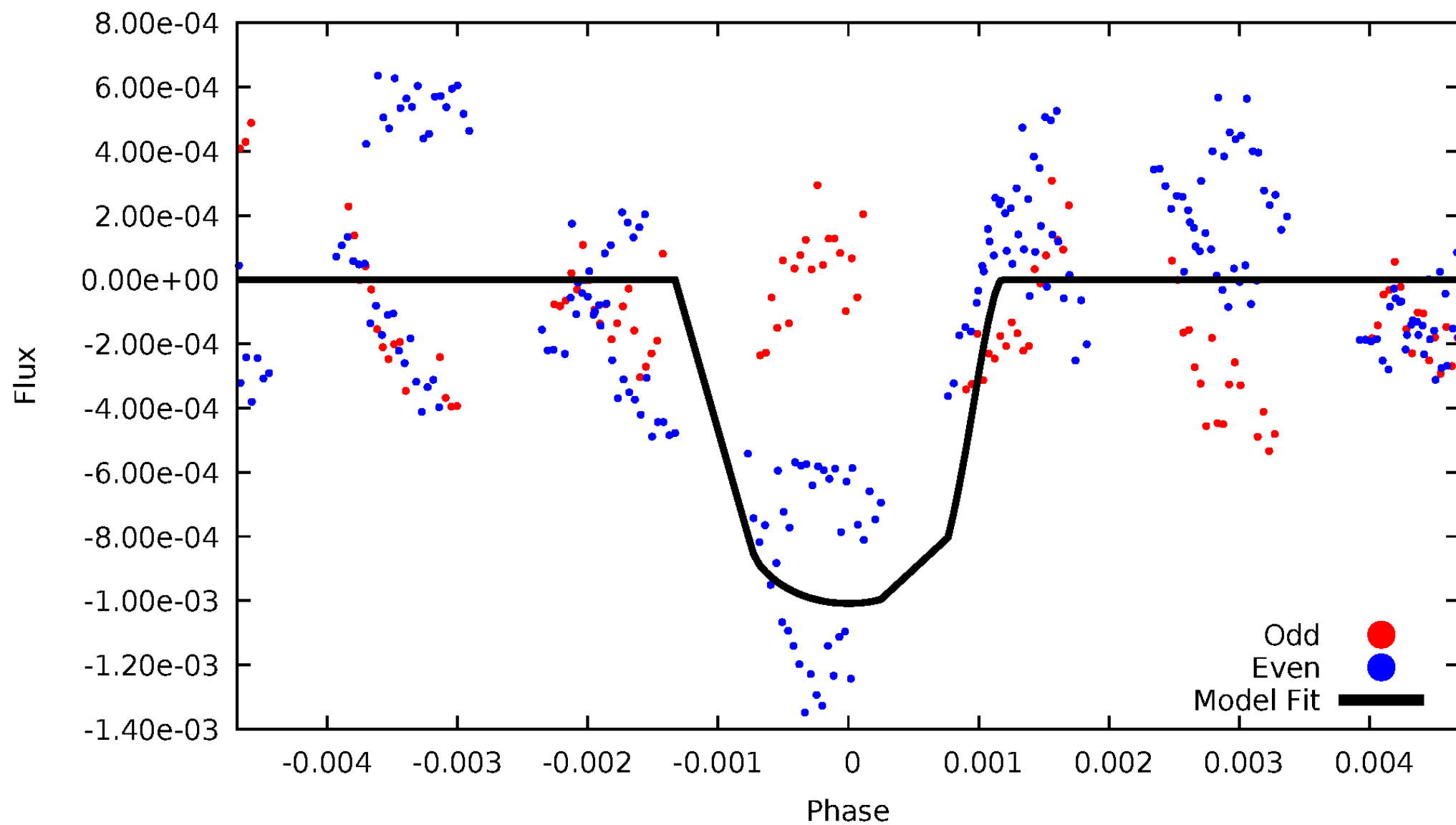
TCE 003228825-02





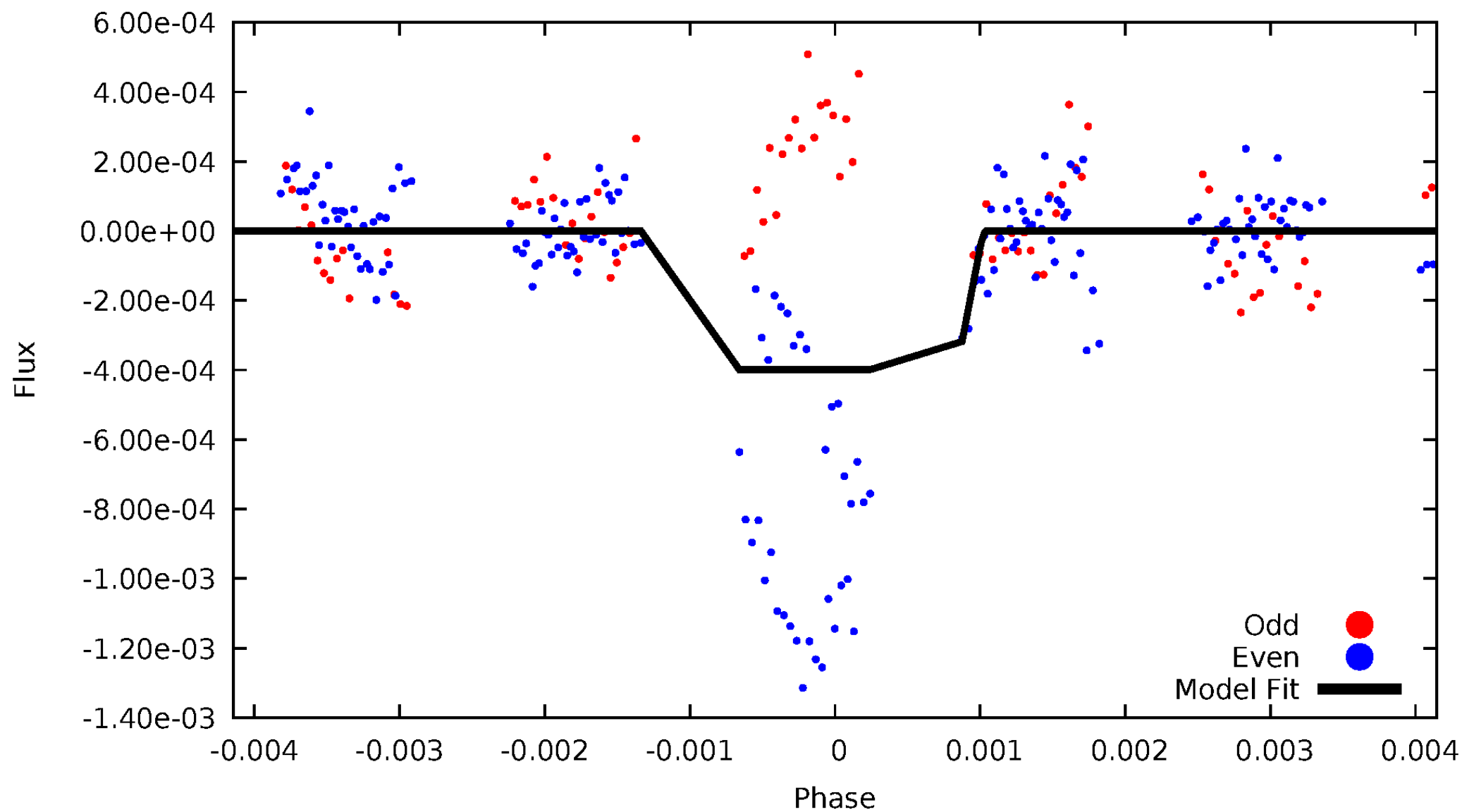
# DV Odd/Even

TCE 003228825-02



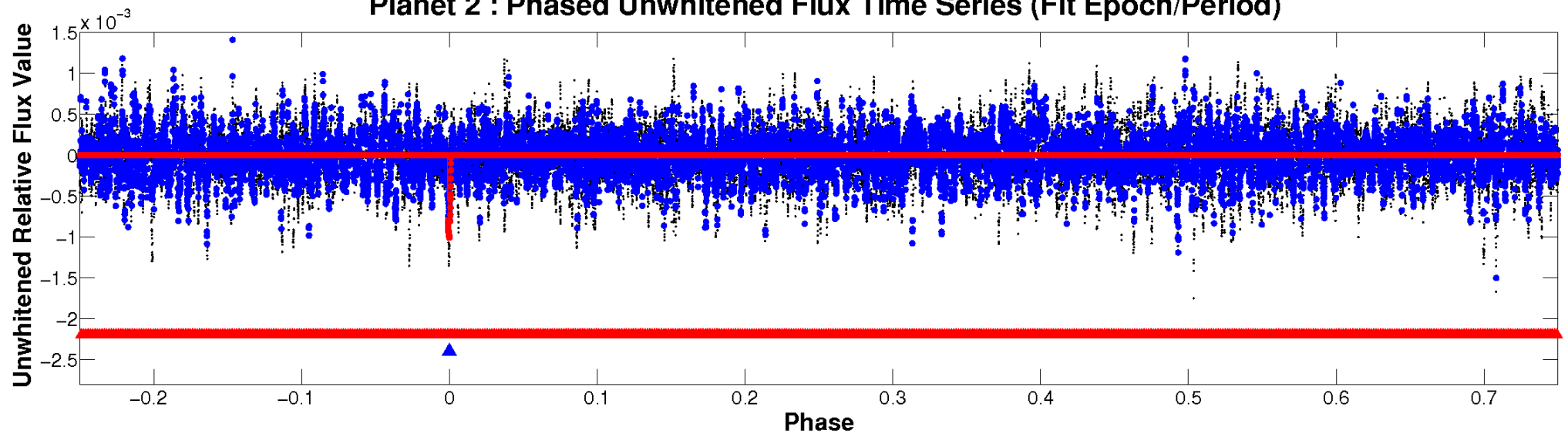
# ALT Odd/Even

TCE 003228825-02

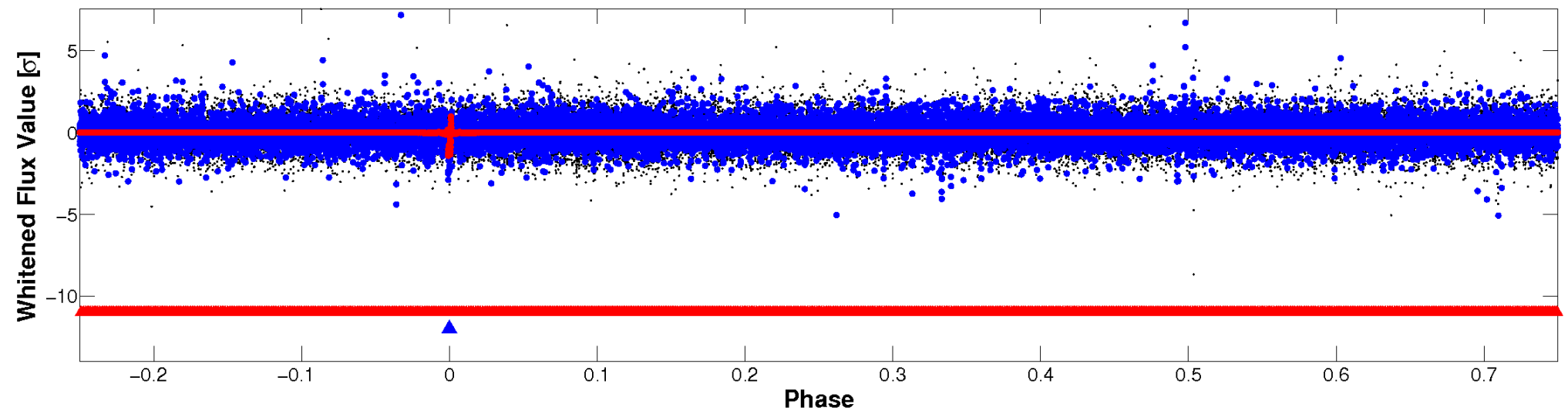


# Non-Whitened Vs. Whitened Light Curve

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

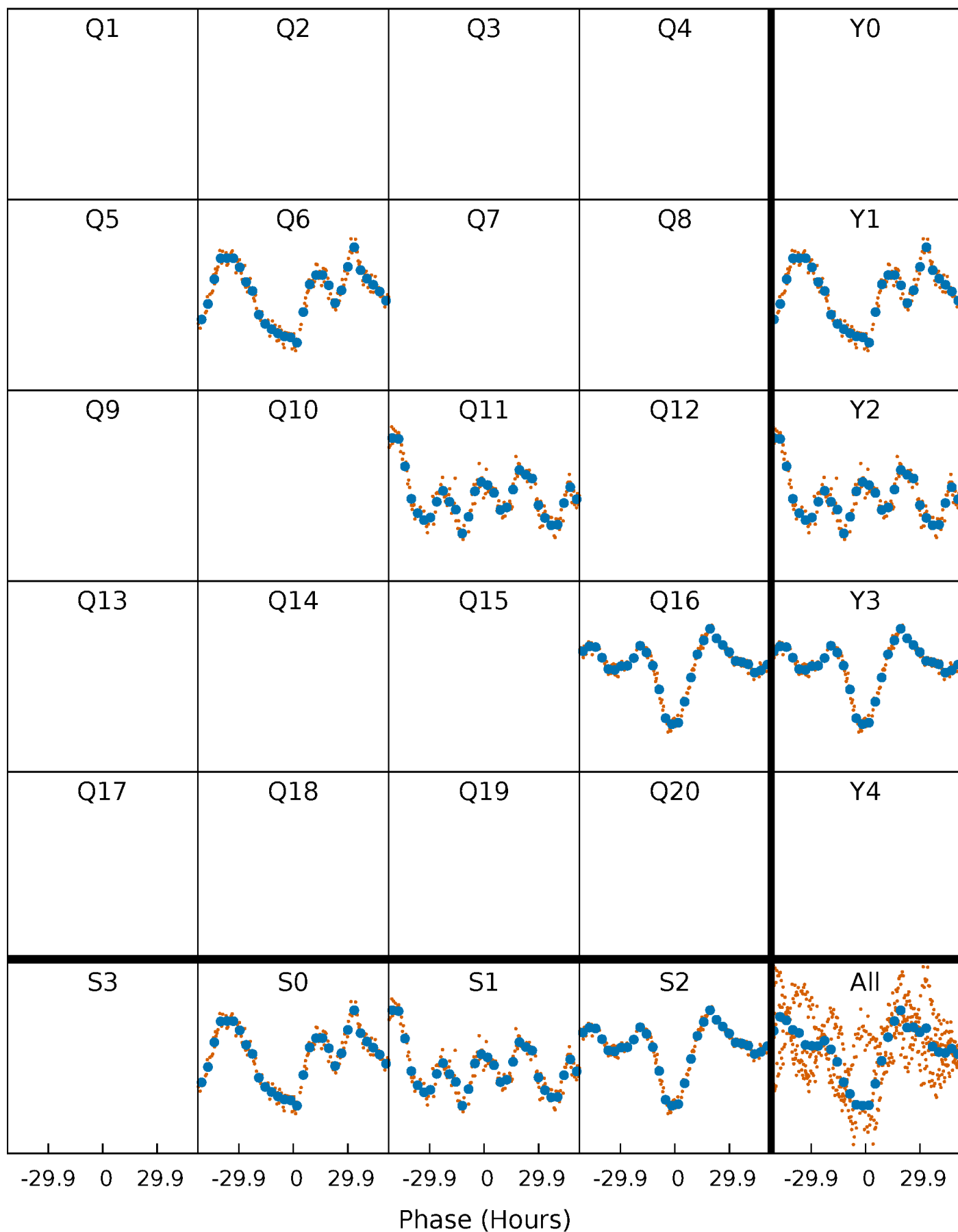


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

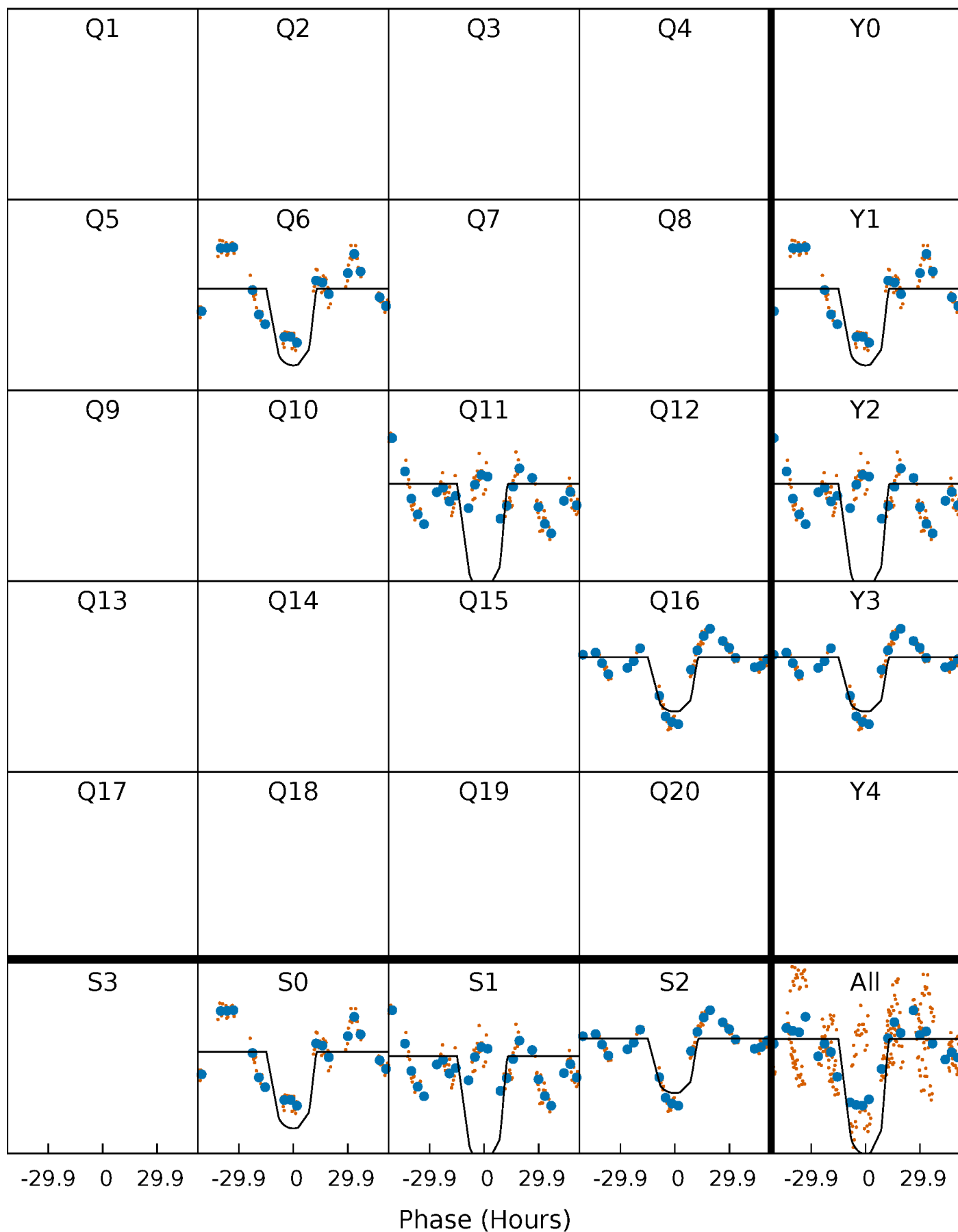
TCE 003228825-02 P=465.681436 Days  $T_0=574.153585$  (BKJD)





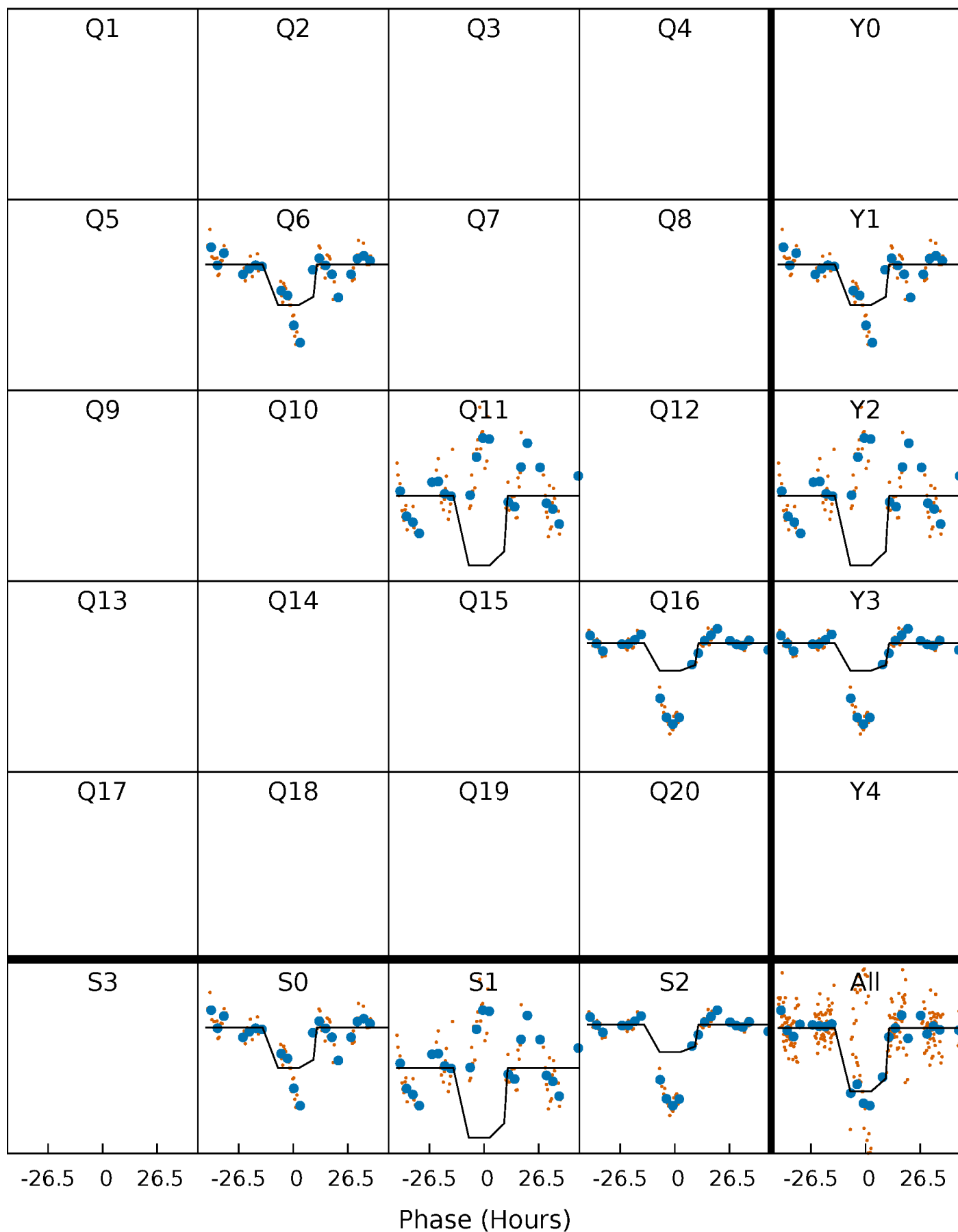
# DV Quarter-Phased Transit Curves

TCE 003228825-02 P=465.681436 Days  $T_0=574.153585$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

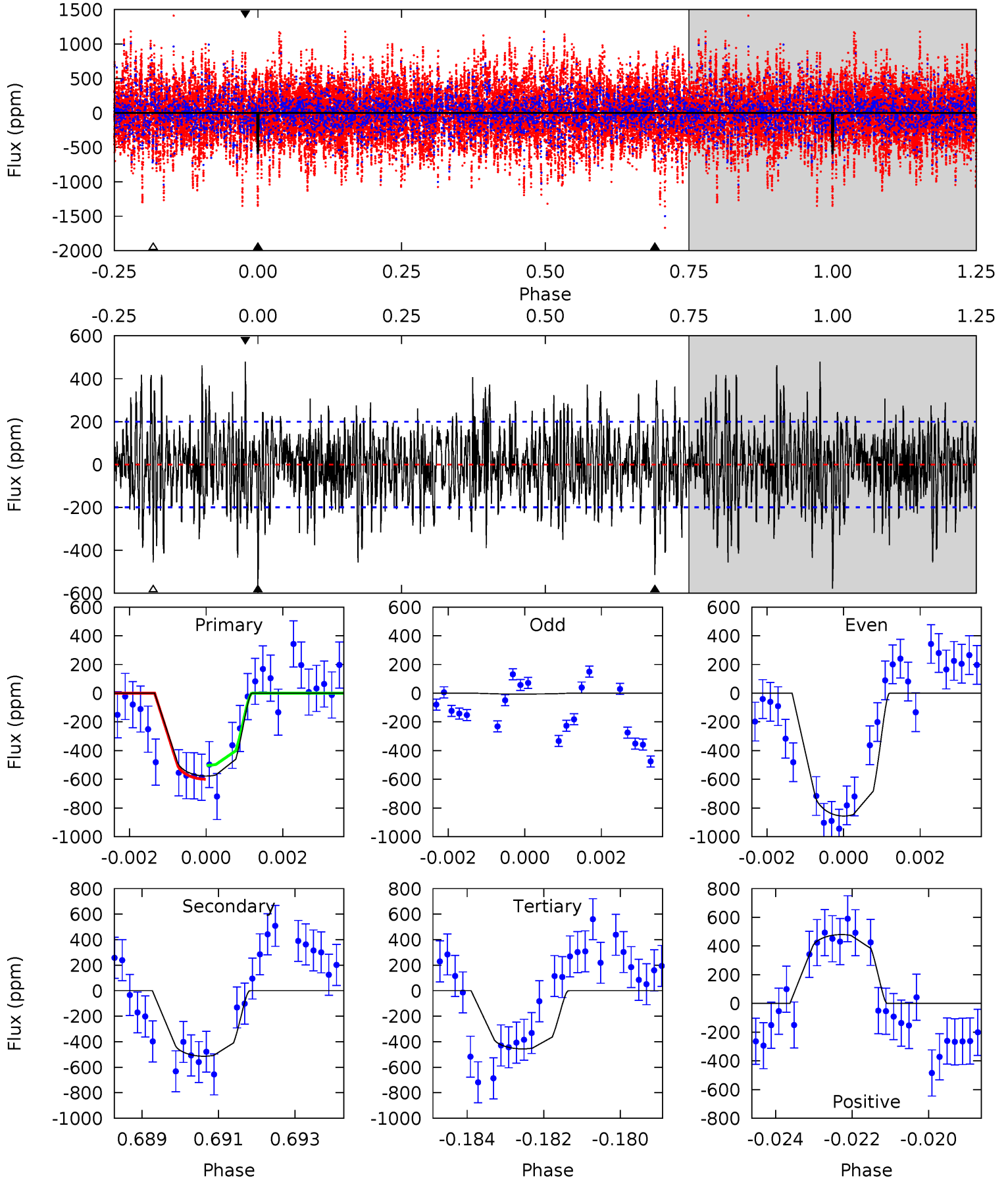
TCE 003228825-02 P=465.653588 Days  $T_0=574.157402$  (BKJD)



# DV Model-Shift Uniqueness Test

003228825-02, P = 465.681436 Days, E = 108.472149 Days

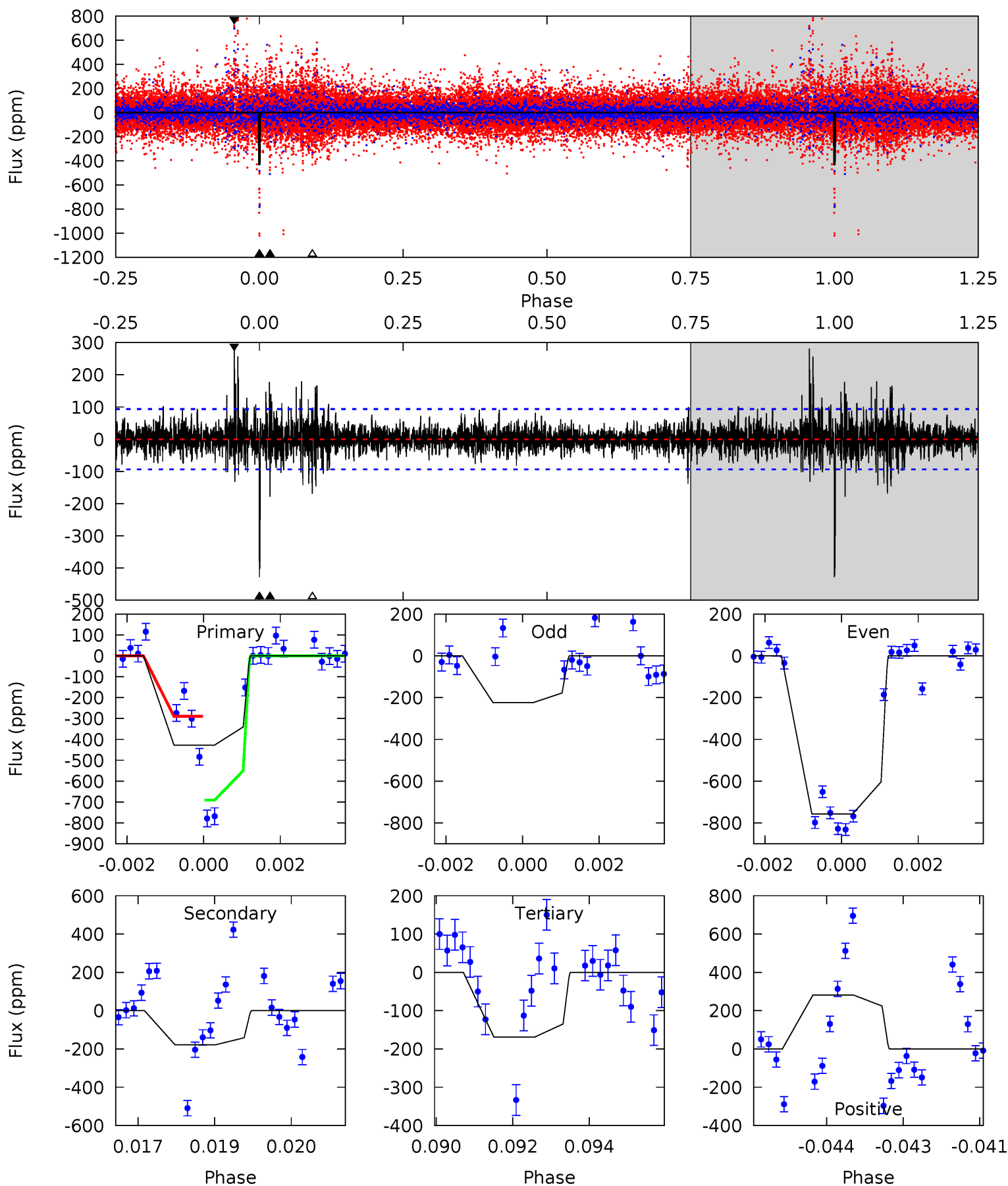
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
15.4	13.7	12.2	12.8	5.33	3.09	3.65	3.25	2.61	1.54	0.91	10.8	0.86	0.45	1.27



# Alt Model-Shift Uniqueness Test

003228825-02, P = 465.653588 Days, E = 108.503814 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
24.5	10.2	9.67	16.1	5.36	3.14	1.78	14.8	8.35	0.51	-5.93	18.7	0.92	0.40	0





### Stellar Parameters For KIC 003228825

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6454^{+77}_{-83}$	$4.163^{+0.125}_{-0.125}$	$0.120^{+0.150}_{-0.200}$	$1.587^{+0.308}_{-0.252}$	$1.336^{+0.110}_{-0.121}$	$0.471^{+0.271}_{-0.171}$
	+1%/-1%	+3%/-3%	+125%/-167%	+19%/-16%	+8%/-9%	+58%/-36%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 003228825-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-514 \pm 37$	$6.01^{+0.88}_{-0.71}$	$439^{+23}_{-19}$	$5245^{+260}_{-218}$	$12967^{+3999}_{-2900}$
Alt.	$-178 \pm 17$	$3.45^{+0.72}_{-0.65}$	$440^{+21}_{-19}$	$5327^{+439}_{-346}$	$13689^{+7571}_{-4108}$

$T_{\text{max}}$  = 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

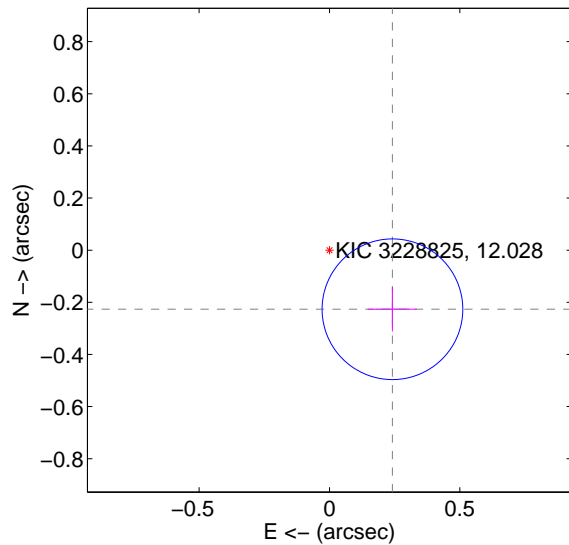
Supplemental centroid analysis for 003228825-02. Kepler magnitude: 12.03. Transit SNR 7.25

There are 1 quarters with good PRF difference image offsets

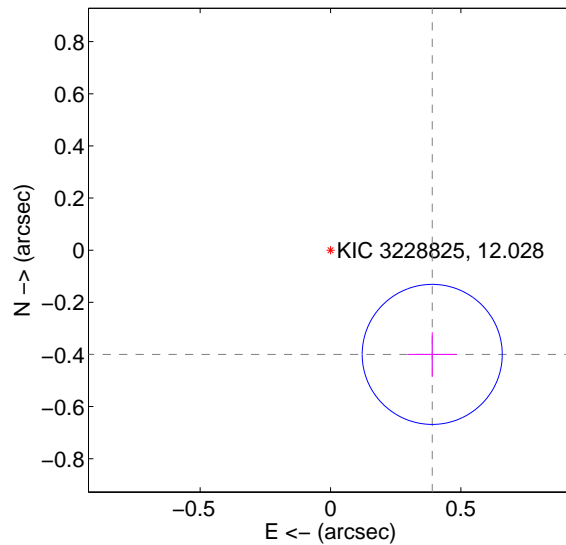
The direct PRF centroid is offset from the target star catalog position by about 0.23 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.331 \pm 0.090$	3.68	$-0.242 \pm 0.094$	$-0.227 \pm 0.085$
PRF-fit source offset from KIC position	$0.559 \pm 0.090$	6.24	$-0.390 \pm 0.094$	$-0.400 \pm 0.085$
photometric centroid source offset	$0.29 \pm 0.16$	1.80	$0.29 \pm 0.16$	$-0.01 \pm 0.24$

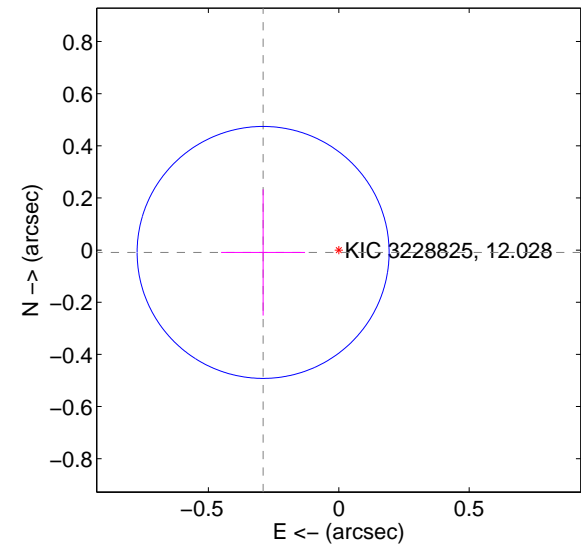
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids

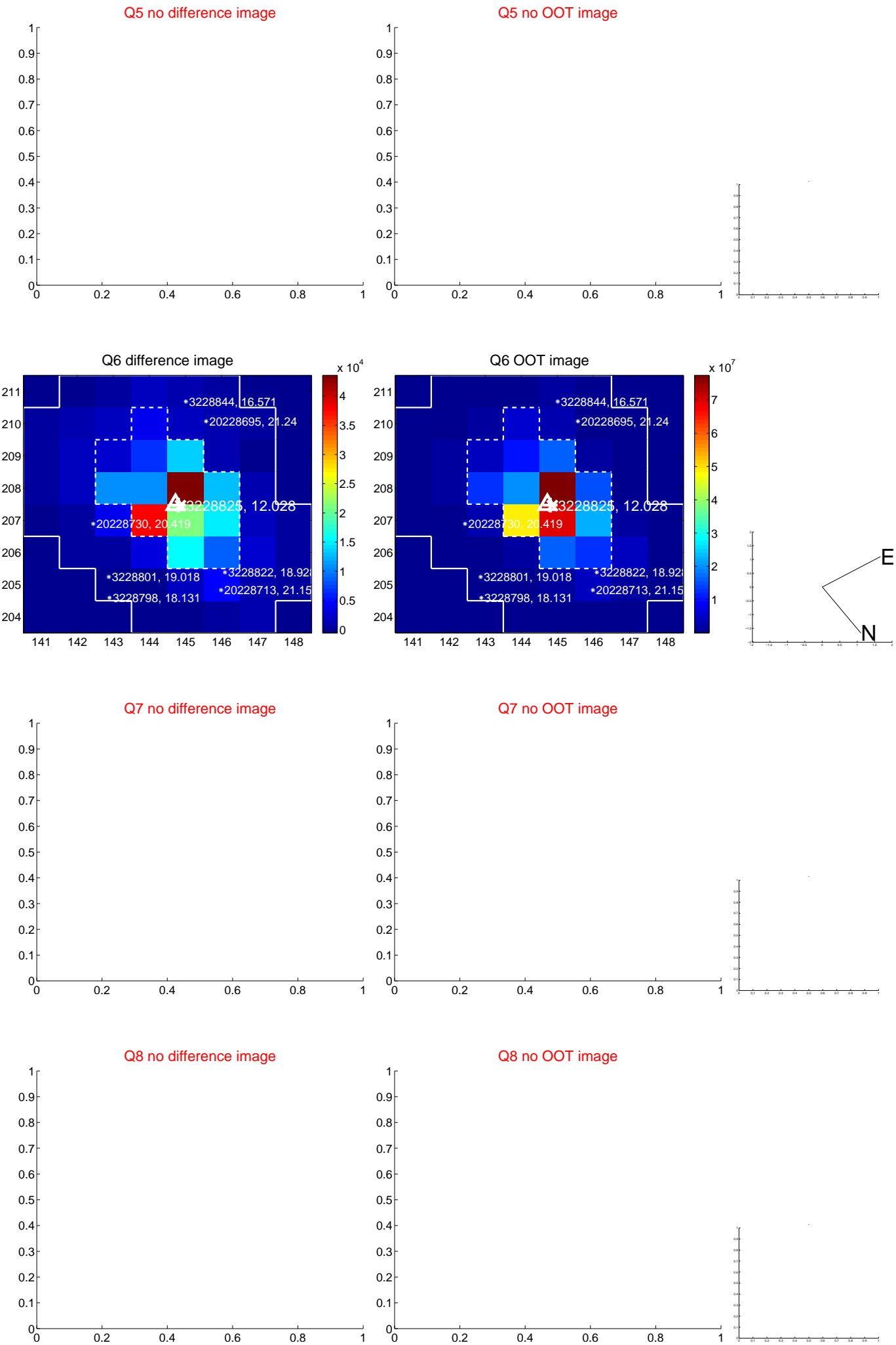


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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





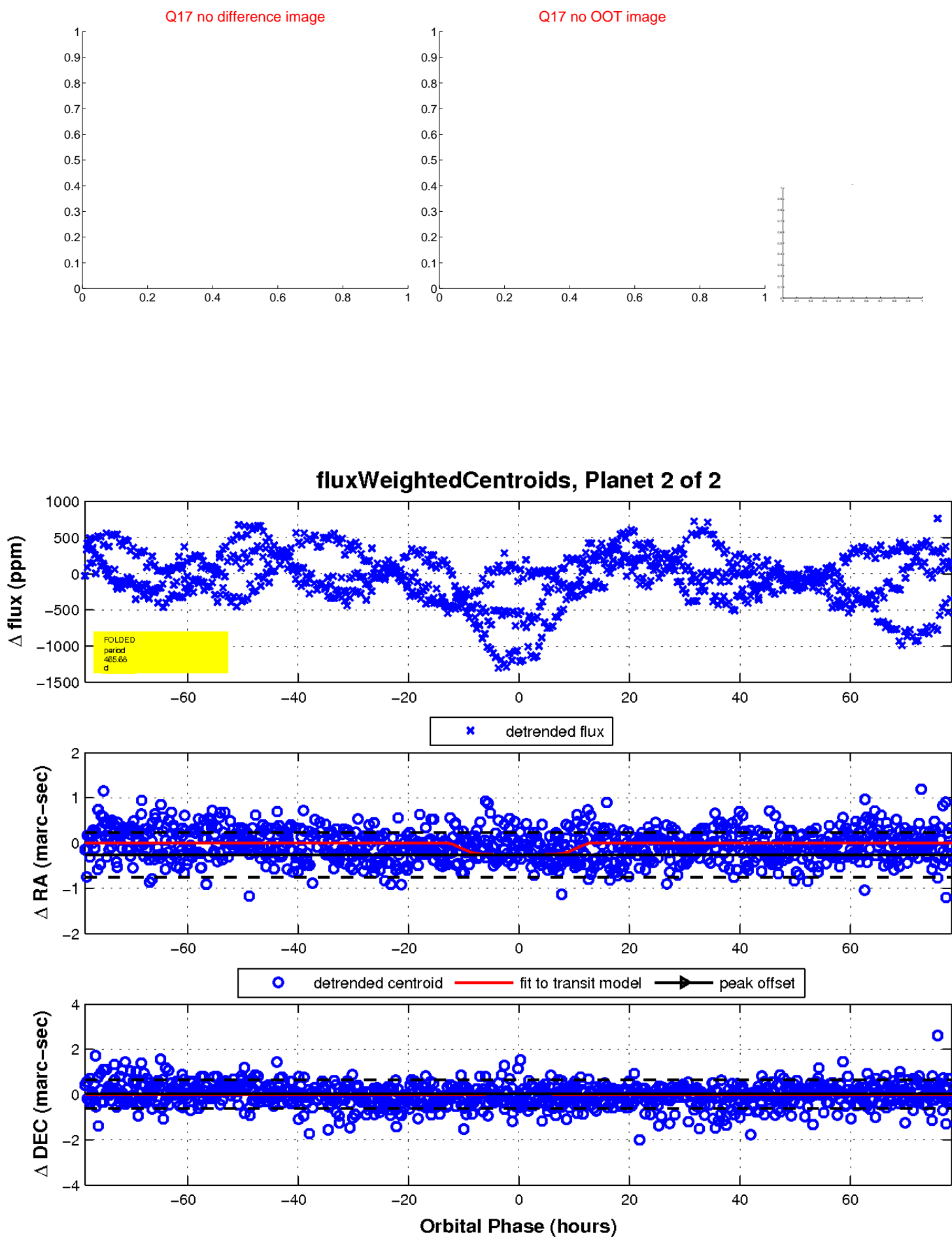
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

