

# KIC 006225816

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006225816-01	OBS	No	631.848628	198.922519	1864.9	4.466	17.7	7.4	0.71	4519	3.01	0.11
006225816-02	OBS	No	321.231991	193.541424	528.7	4.530	13.9	2.9	0.71	4519	1.55	0.28
006225816-03	OBS	No	390.115059	355.180112	645.9	7.803	23.5	2.9	0.71	4519	1.73	0.22
006225816-04	OBS	No	661.066533	224.228272	106.3	9.000	16.4	-1.0	0.71	4519	0.69	0.11

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006225816-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_SATURATED
006225816-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
006225816-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
006225816-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

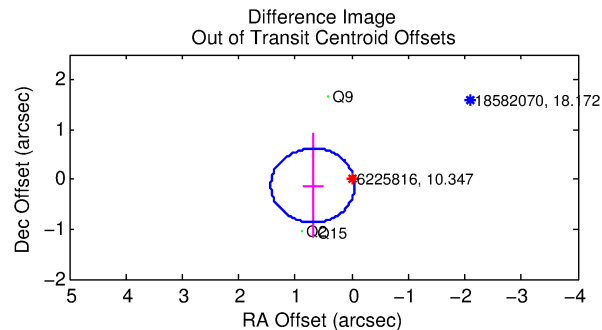
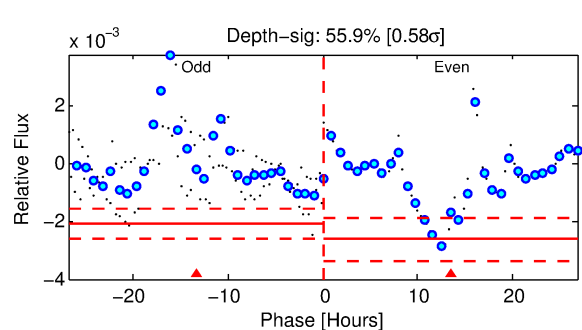
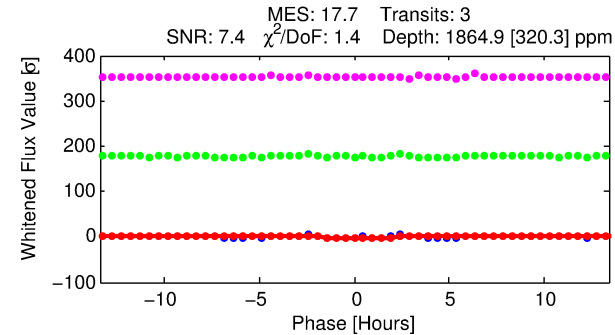
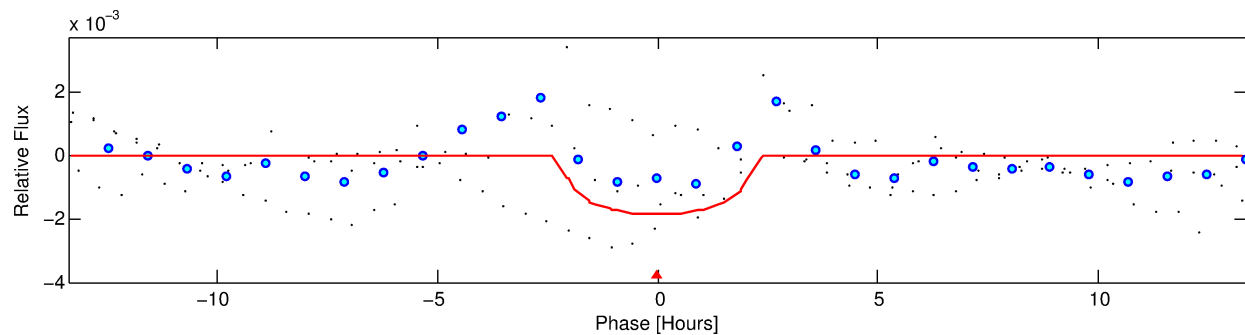
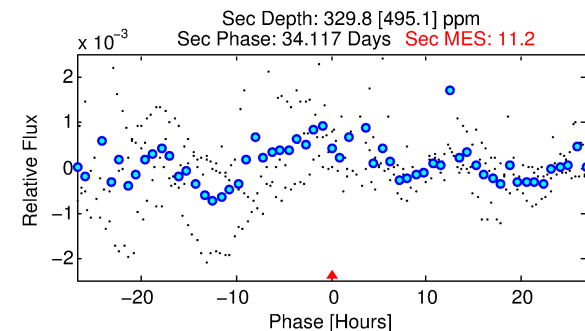
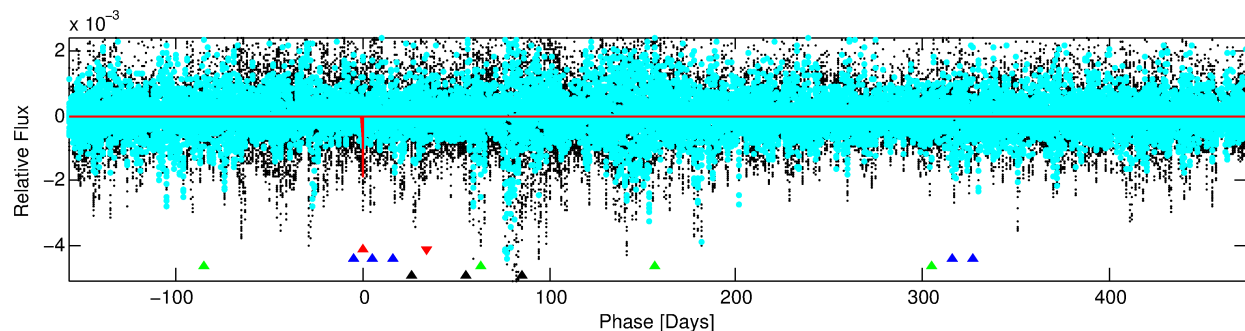
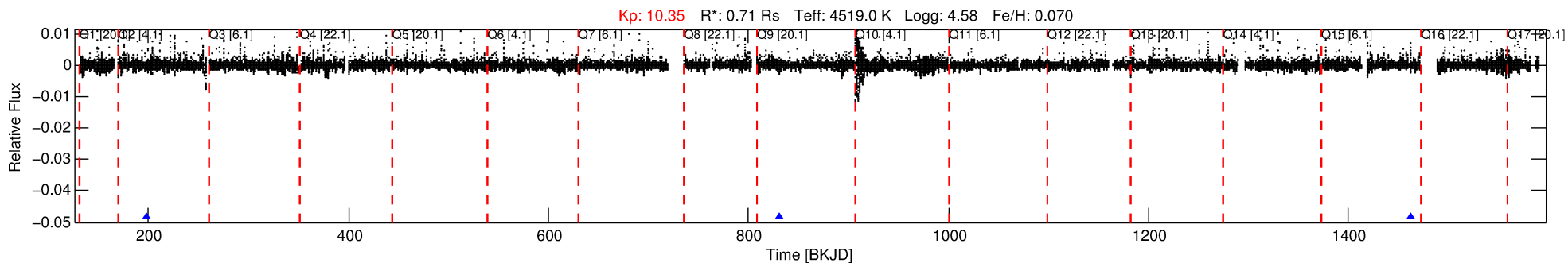
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006225816-01

No Significant Match Found

# DV One-Page Summary

KIC: 6225816 Candidate: 1 of 4 Period: 631.849 d



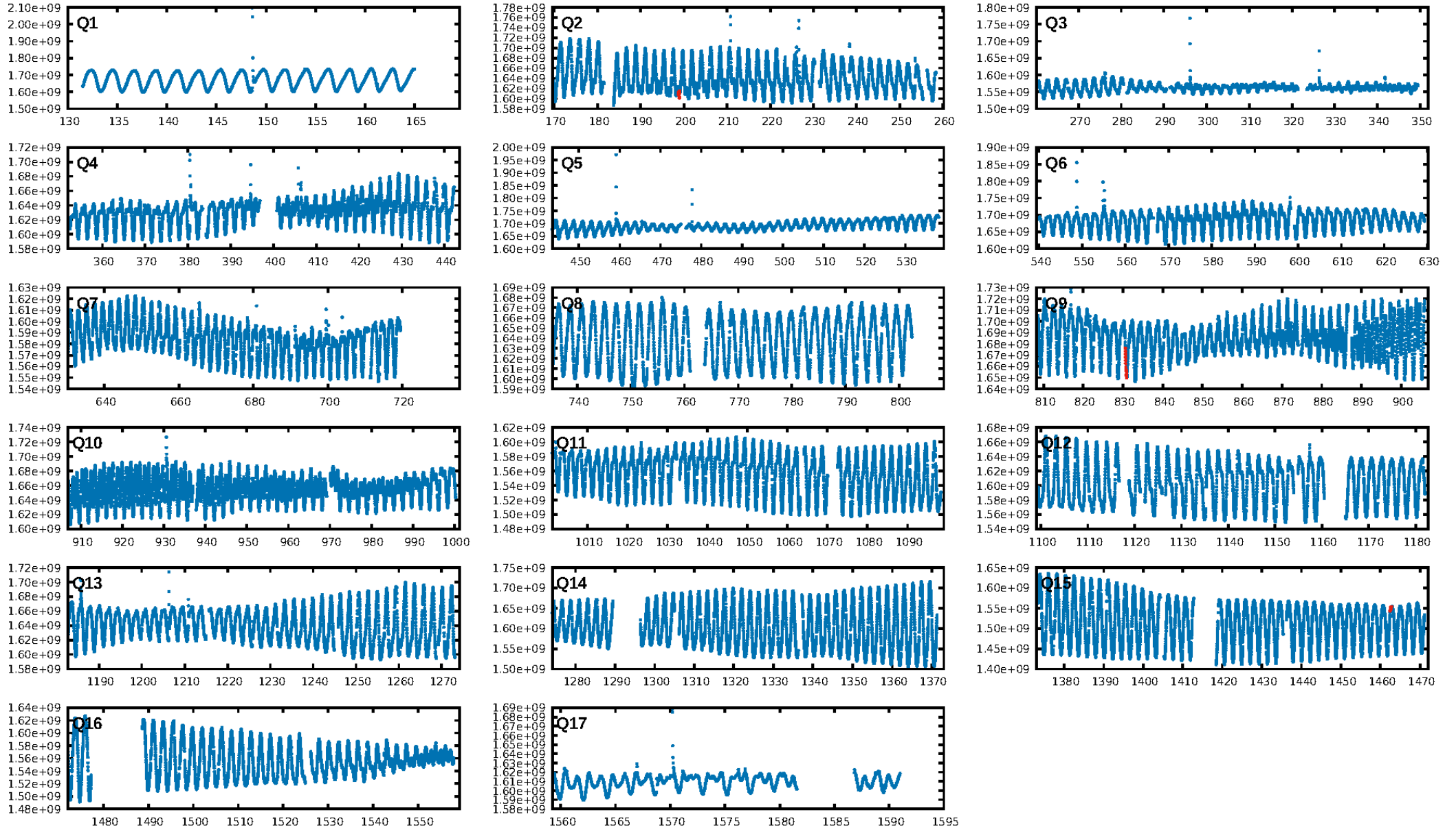
## DV Fit Results:

Period = 631.84863 [0.00437] d  
Epoch = 198.9225 [0.0065] BKJD  
Rp/R\* = 0.0391 [0.0352]  
a/R\* = 1023.01 [2652.70]  
b = 0.43 [5.05]  
Seff = 0.11 [0.02]  
Teq = 148 [6] K  
Rp = 3.01 [2.73] Re  
a = 1.2793 [0.0892] AU  
Ag = 32782.07 [77015.22] [0.43 $\sigma$ ]  
Teffp = 3081 [1811] K [1.62 $\sigma$ ]

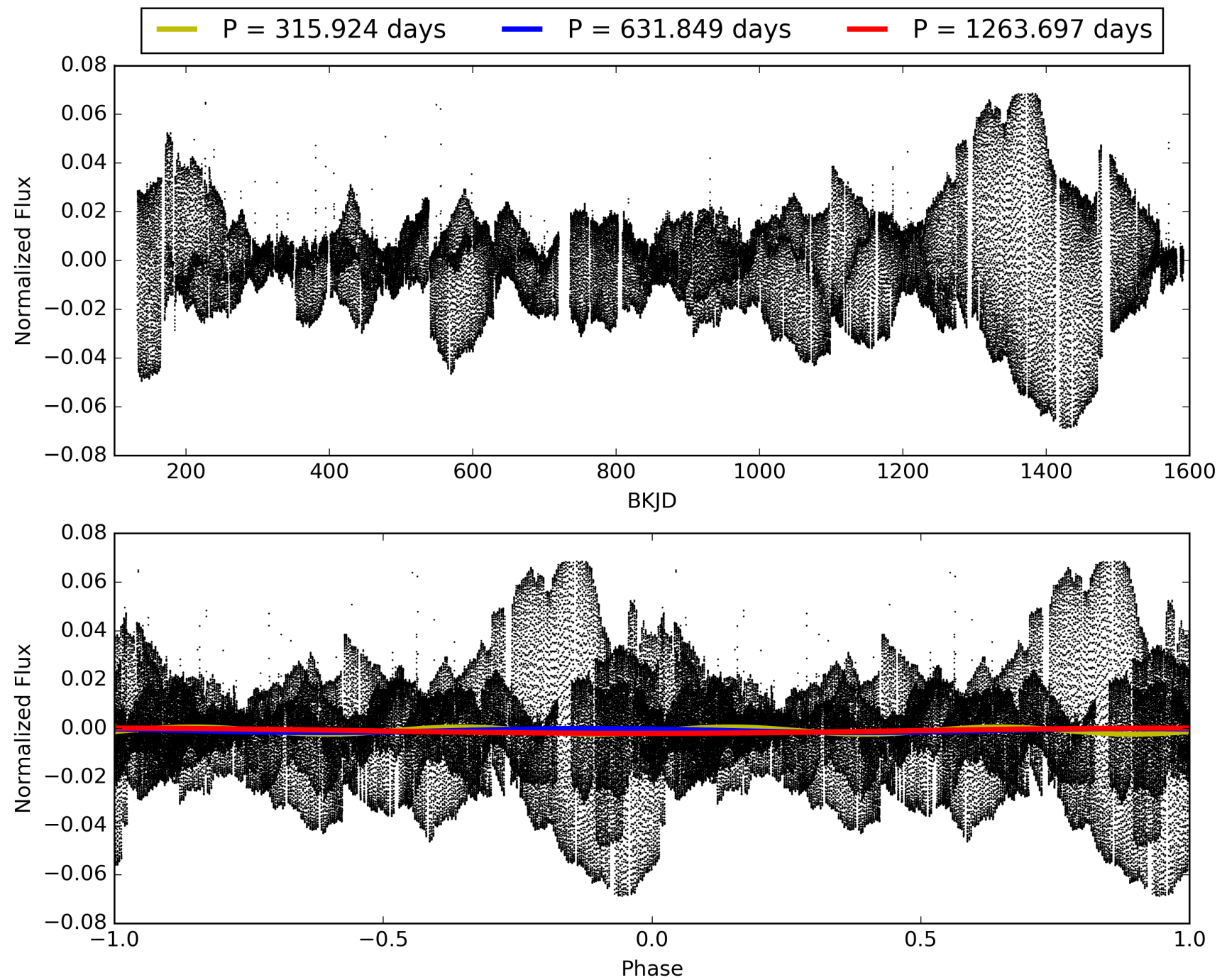
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [645.29 $\sigma$ ]  
LongPeriod-sig: 100.0% [69.79 $\sigma$ ]  
ModelChiSquare2-sig: 5.5%  
ModelChiSquareGof-sig: 67.7%  
Bootstrap-pfa: 1.68e-09  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 1.543  
Centroid-sig: 0.2%  
Centroid-so: 0.541 arcsec [1.12 $\sigma$ ]  
OotOffset-rm: 0.702 arcsec [2.84 $\sigma$ ]  
KicOffset-rm: 2.078 arcsec [1.96 $\sigma$ ]  
OotOffset-st: 1/1/0/1 [3]  
KicOffset-st: 1/1/0/1 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 1.00 [3/3]

# TCE 006225816-01, PDC Light Curves



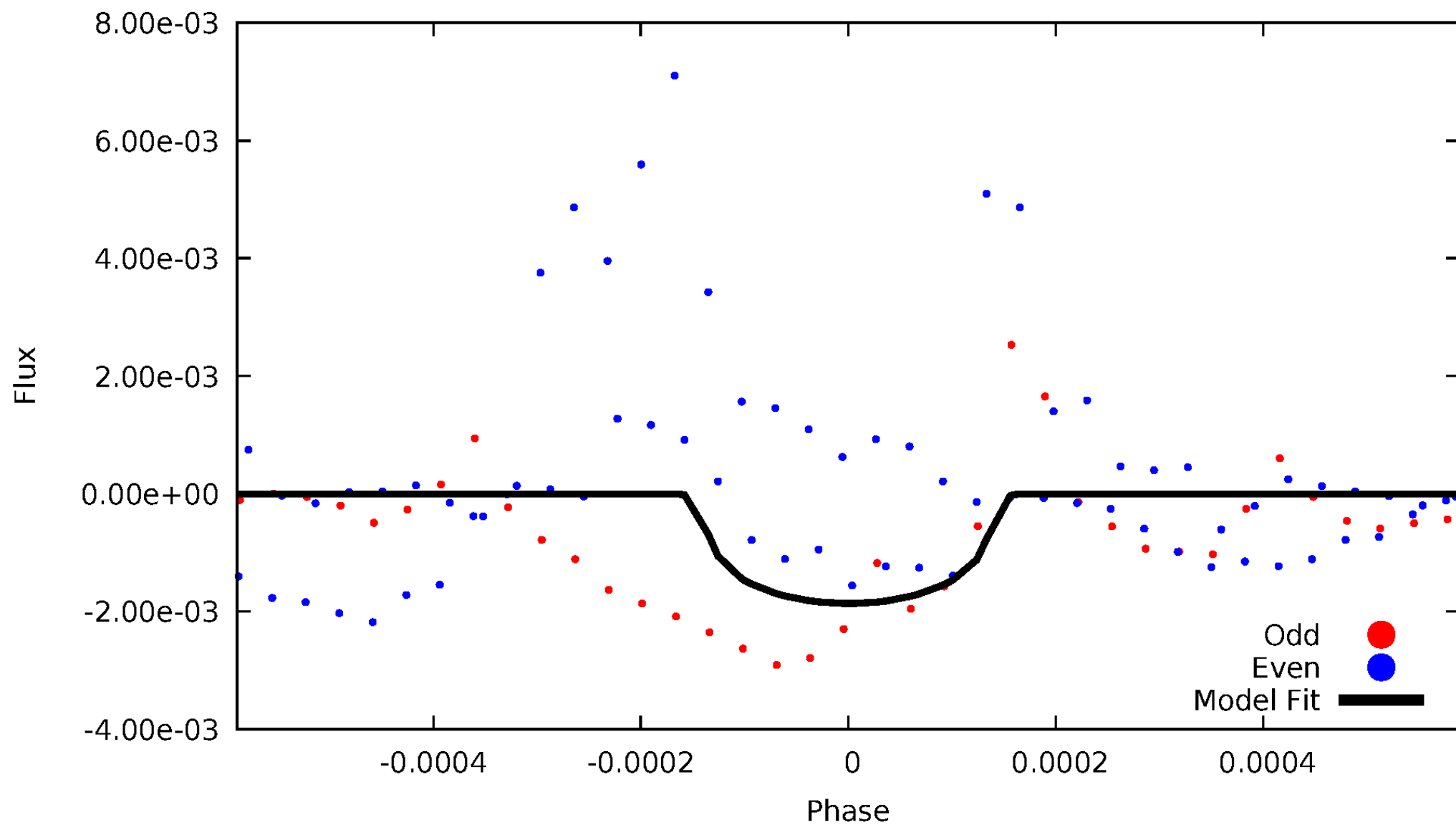
TCE 006225816-01





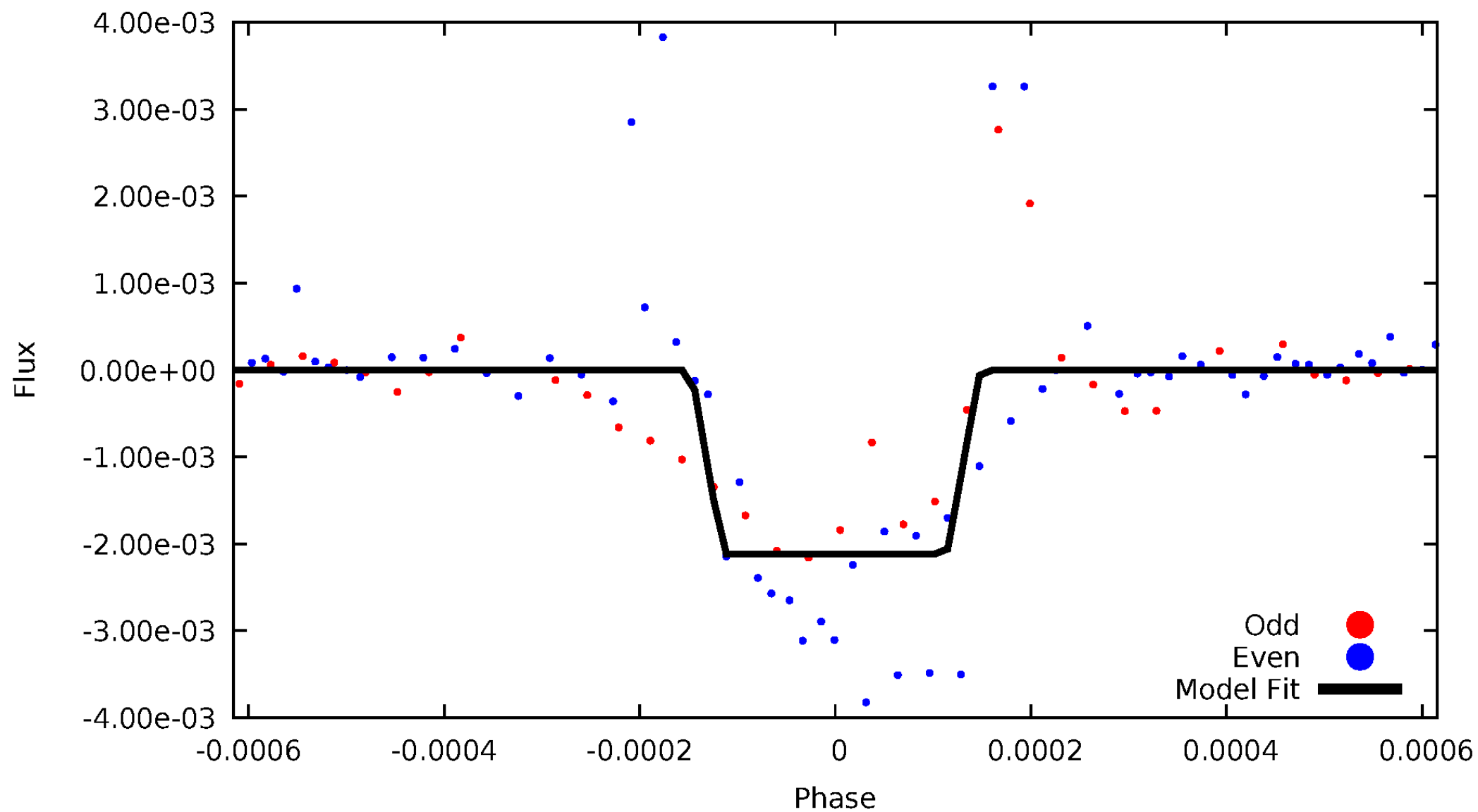
# DV Odd/Even

TCE 006225816-01



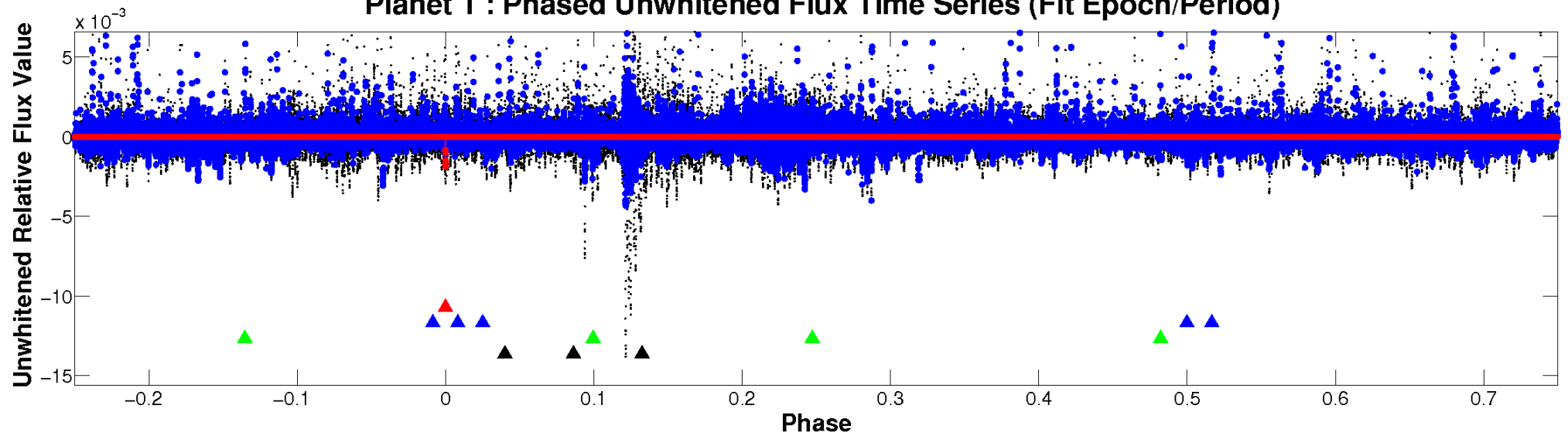
# ALT Odd/Even

TCE 006225816-01

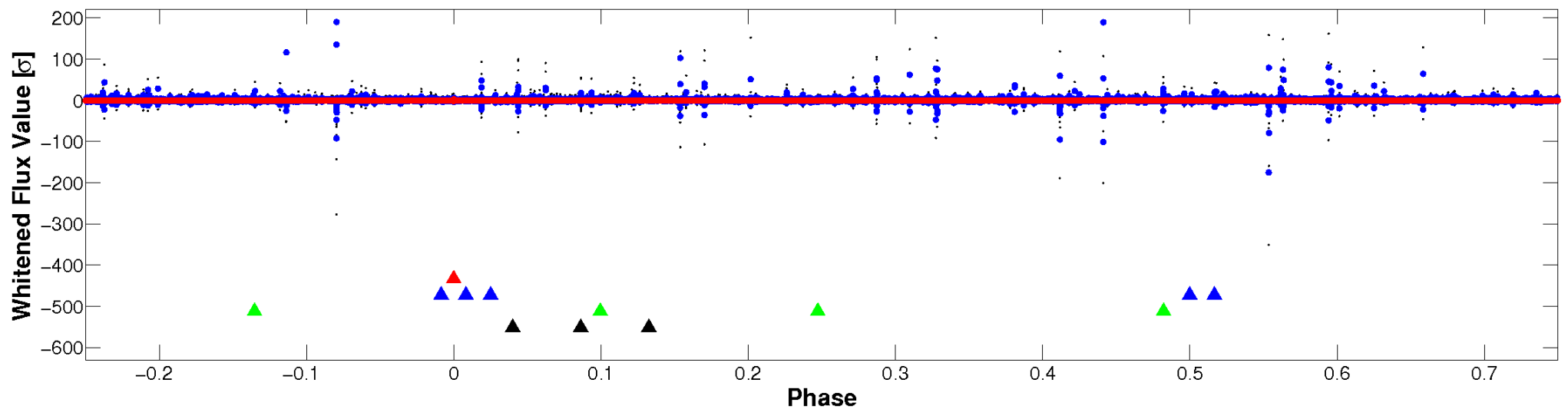


# Non-Whitened Vs. Whitened Light Curve

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

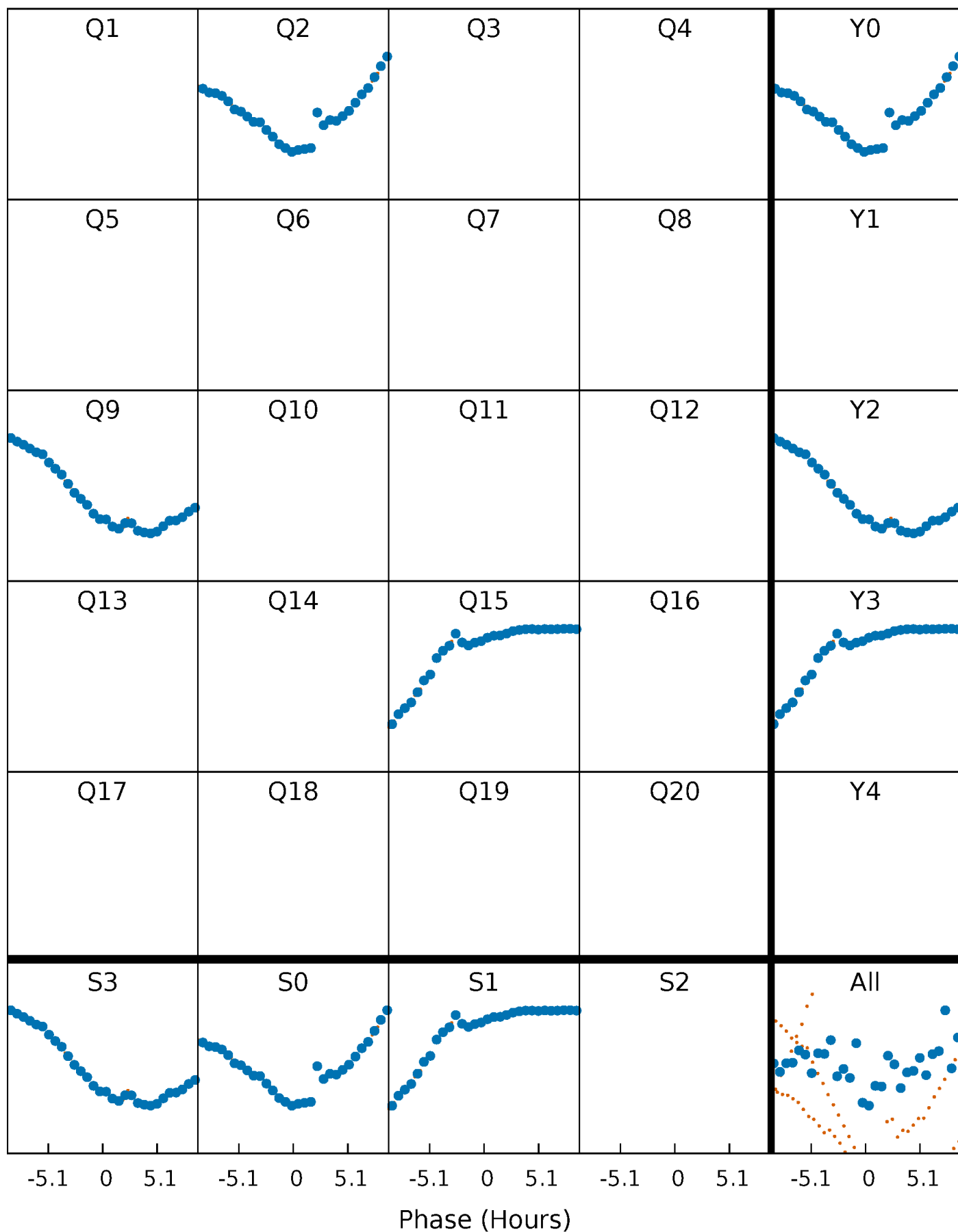


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



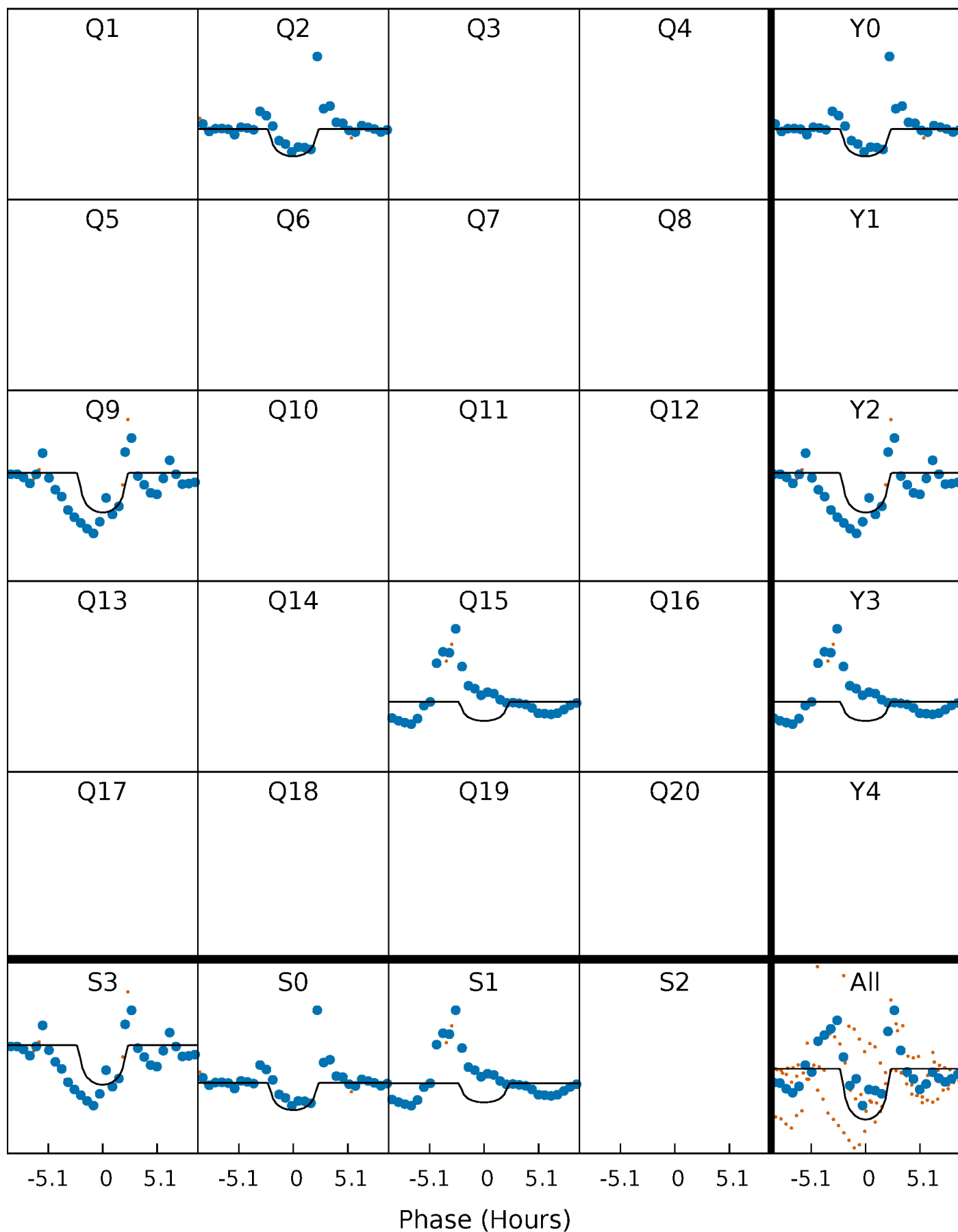
# PDC Quarter-Phased Transit Curves

TCE 006225816-01 P=631.848629 Days  $T_0=198.922519$  (BKJD)



# DV Quarter-Phased Transit Curves

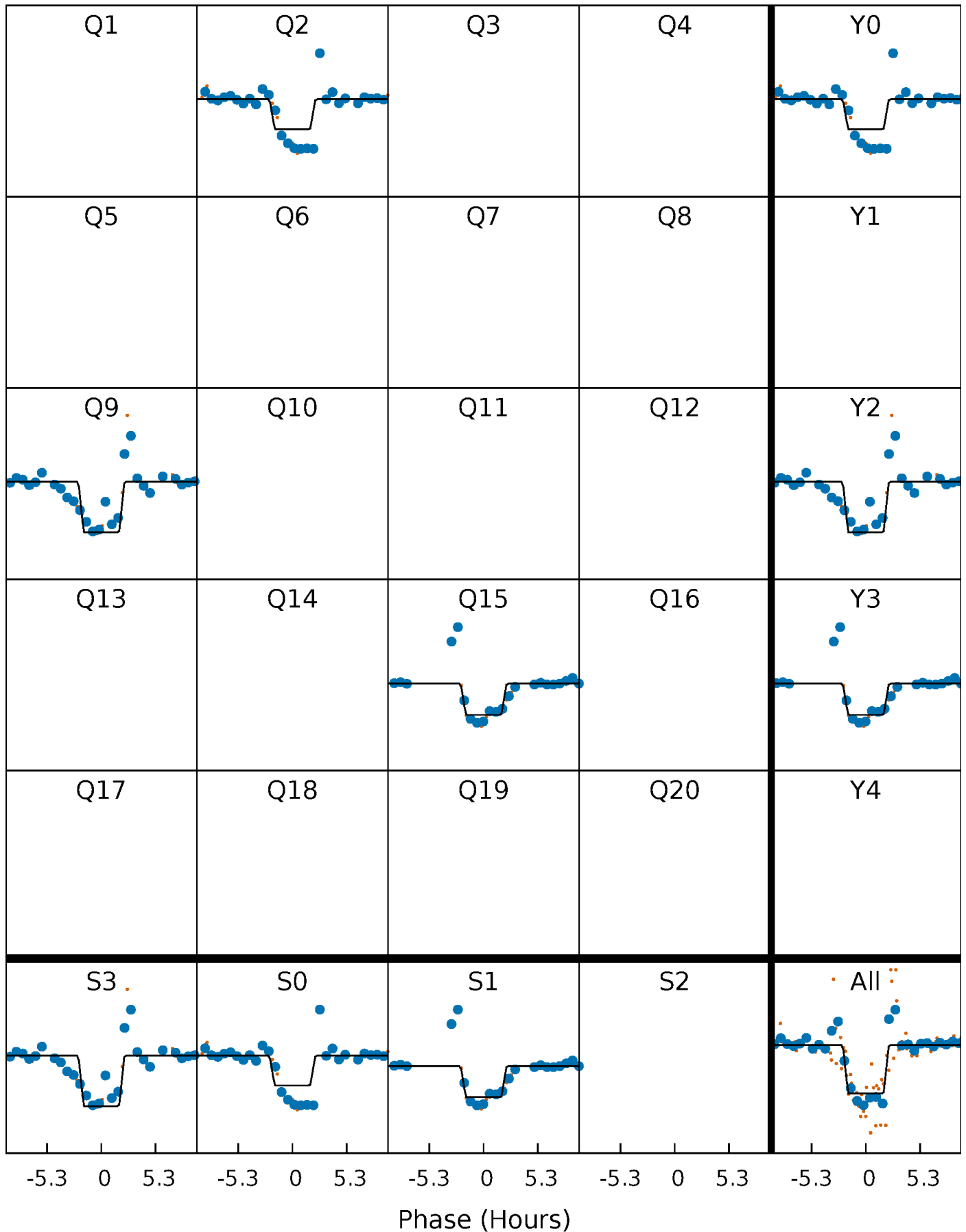
TCE 006225816-01 P=631.848629 Days  $T_0=198.922519$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

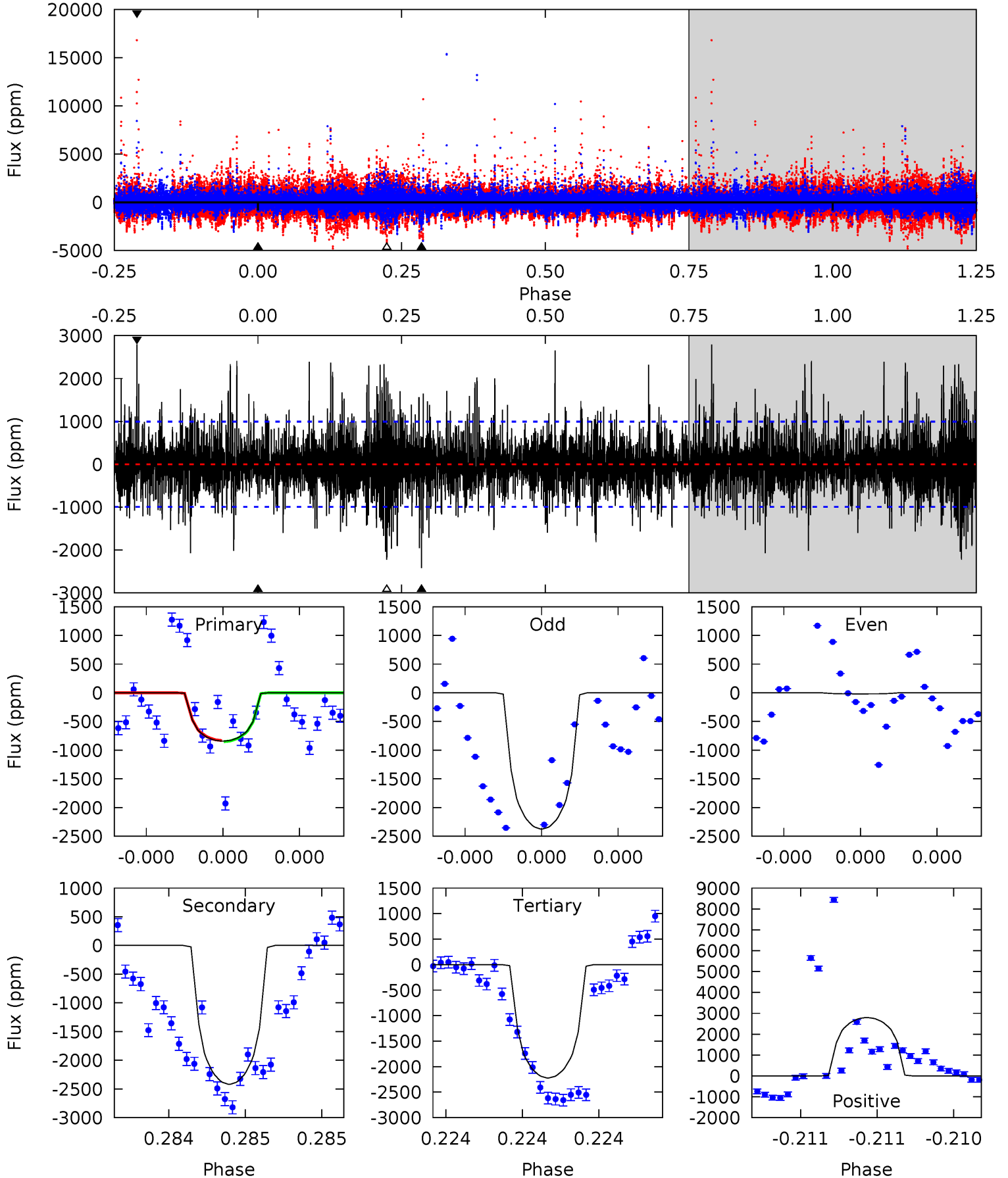
TCE 006225816-01 P=631.860165 Days  $T_0=198.904944$  (BKJD)



# DV Model-Shift Uniqueness Test

006225816-01, P = 631.848629 Days, E = 198.922519 Days

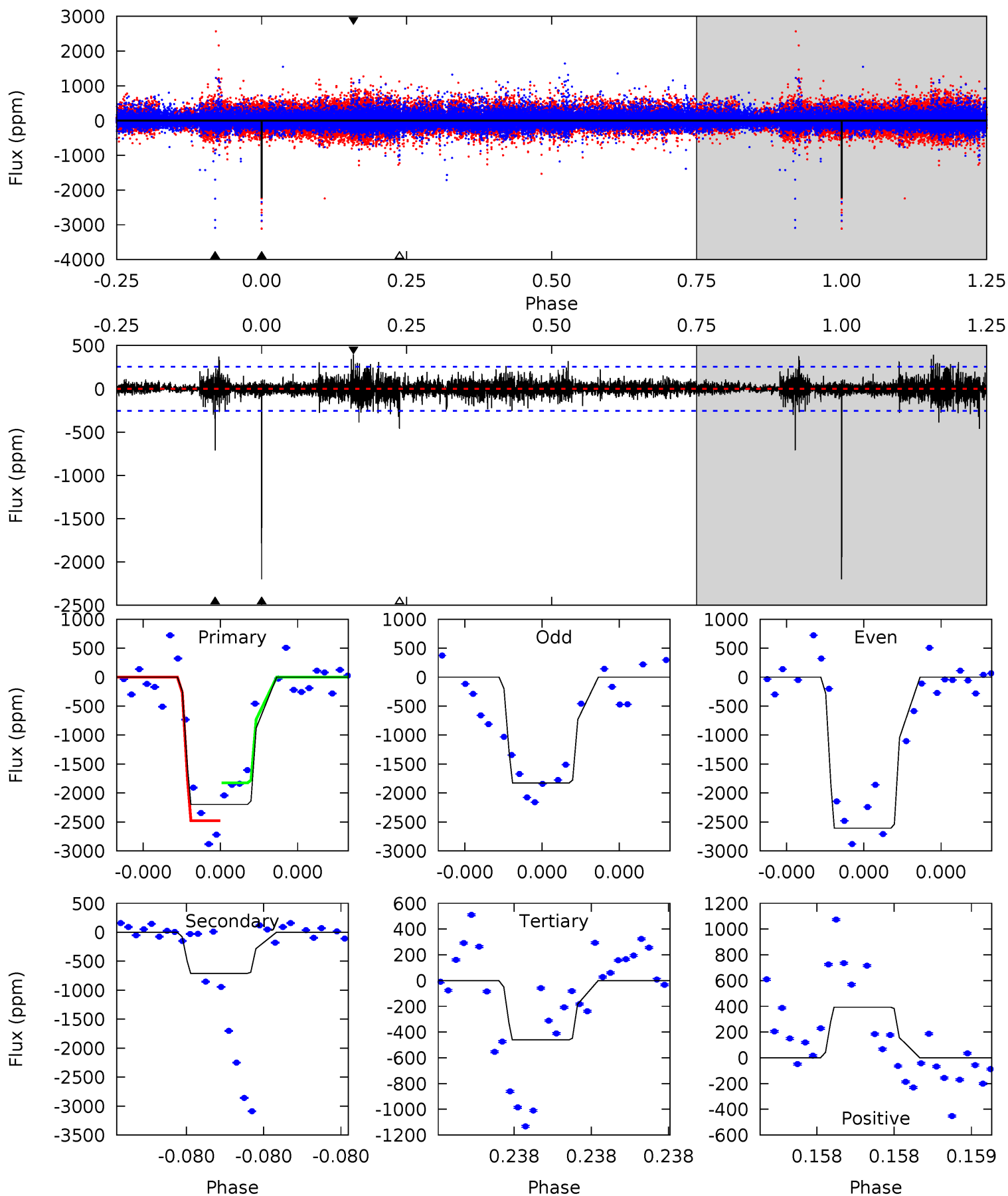
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.79	13.8	12.6	15.9	5.65	3.60	2.85	-7.84	-11.1	1.12	-2.14	4.77	0.83	0.54	0.06



# Alt Model-Shift Uniqueness Test

006225816-01, P = 631.860165 Days, E = 198.904944 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
48.7	15.7	10.2	8.72	5.67	3.62	1.26	38.5	40.0	5.50	7.01	7.73	1.04	0.15	6.90



### Stellar Parameters For KIC 006225816

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4519^{+161}_{-161}$	$4.585^{+0.053}_{-0.025}$	$0.070^{+0.250}_{-0.300}$	$0.706^{+0.038}_{-0.060}$	$0.700^{+0.060}_{-0.054}$	$2.797^{+0.657}_{-0.260}$
	+4%/-4%	+1%/-1%	+357%/-429%	+5%/-8%	+9%/-8%	+23%/-9%
Source	PHO54	PHO54	PHO54	DSEP		

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

### Secondary Eclipse Parameters for KIC 006225816-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-2418 \pm 176$	$3.36^{+2.53}_{-1.91}$	$205^{+8}_{-8}$	$4712^{+2353}_{-892}$	$198901^{+813887}_{-135977}$
Alt.	$-709 \pm 45$	$3.78^{+2.62}_{-2.25}$	$206^{+9}_{-8}$	$3648^{+1416}_{-570}$	$46620^{+229764}_{-30766}$

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

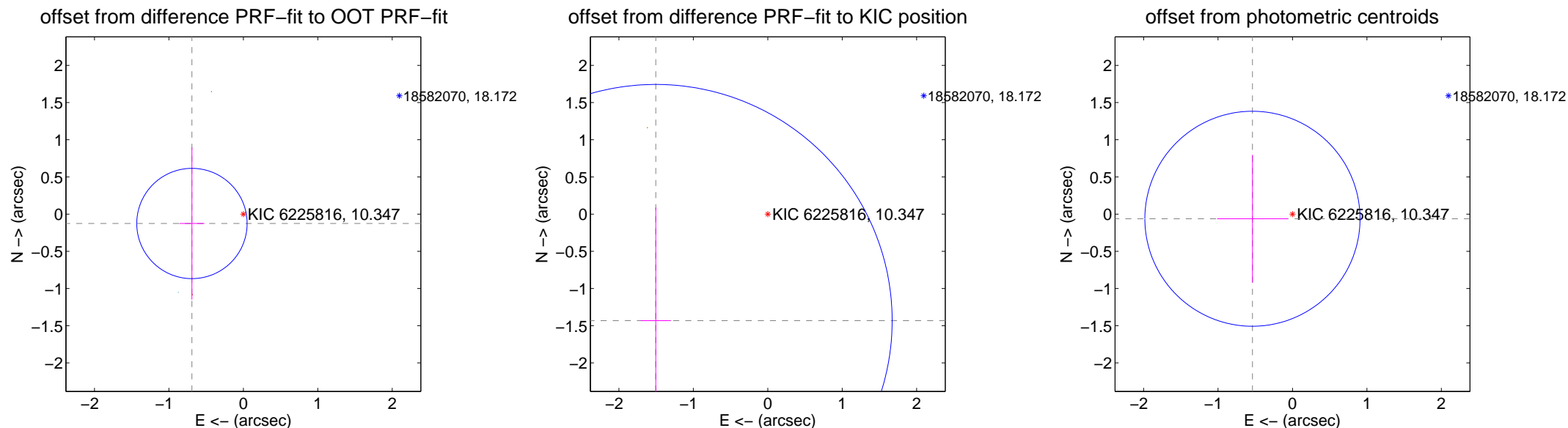
## DV Centroid Data

Supplemental centroid analysis for 006225816-01. **Kepler magnitude: 10.35.** Transit SNR 7.39

There are 1 quarters with good PRF difference image offsets

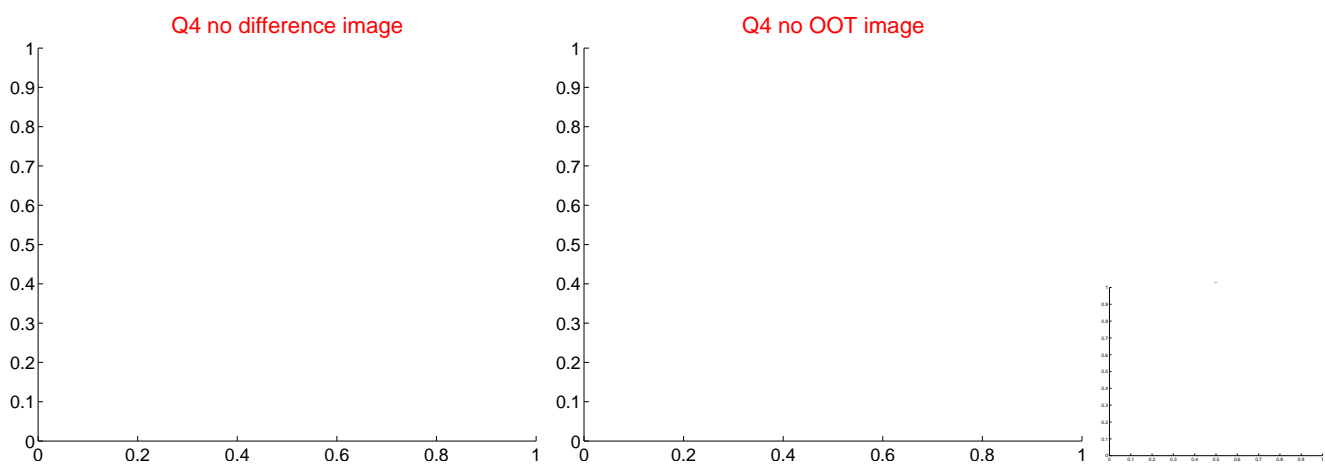
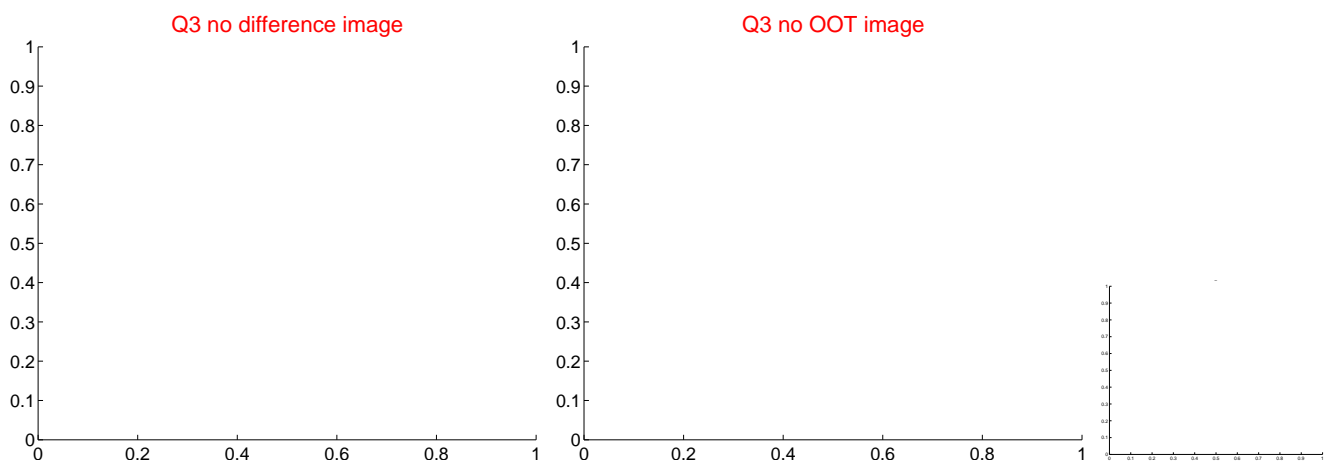
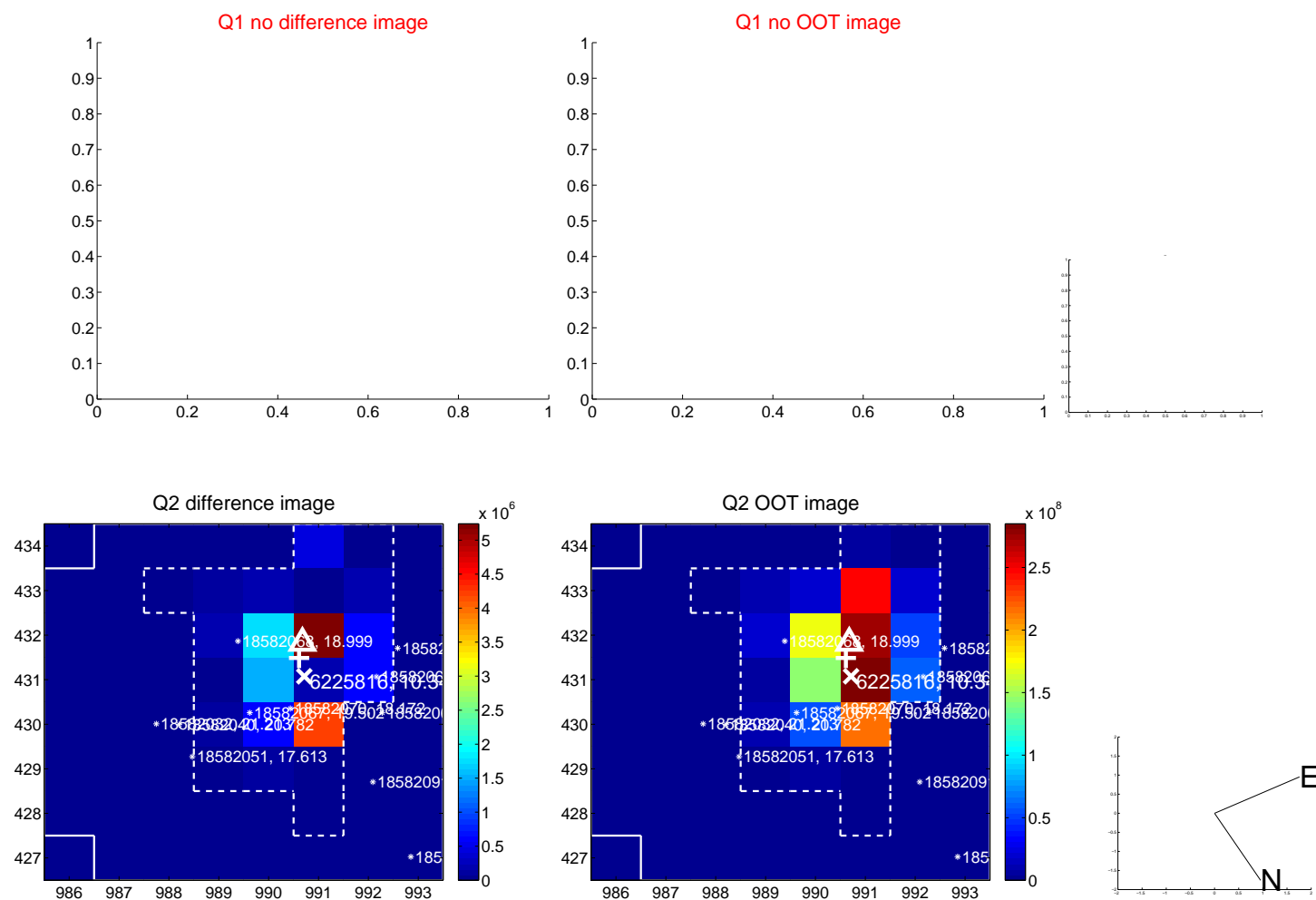
The OOT PRF centroid is offset from the target star catalog position by about 2.44 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.702 \pm 0.247$	2.84	$0.691 \pm 0.168$	$-0.126 \pm 1.024$
PRF-fit source offset from KIC position	$2.078 \pm 1.059$	1.96	$1.505 \pm 0.203$	$-1.433 \pm 1.521$
photometric centroid source offset	$0.54 \pm 0.48$	1.12	$0.54 \pm 0.47$	$-0.06 \pm 0.86$





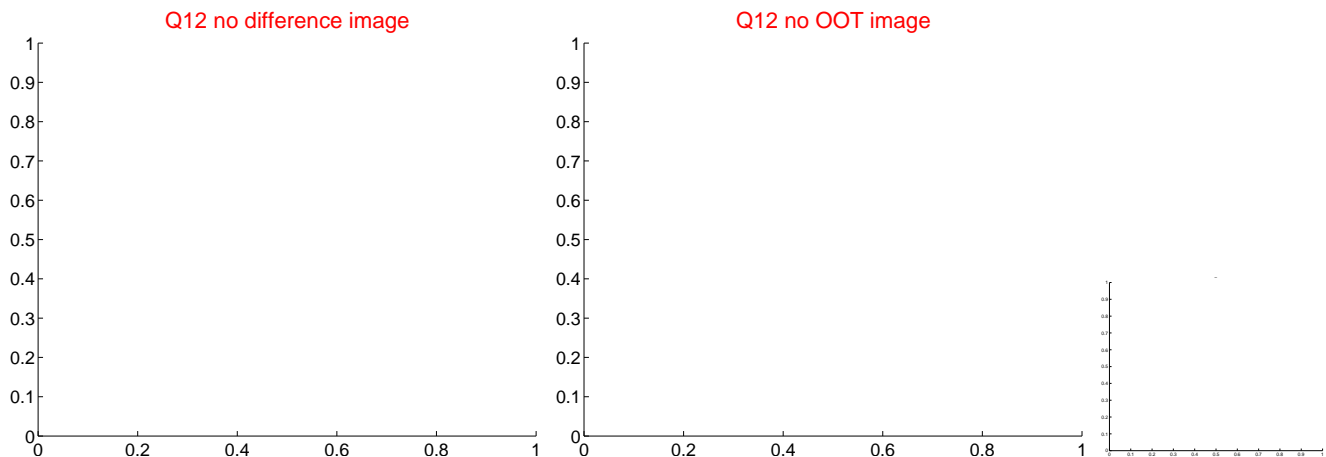
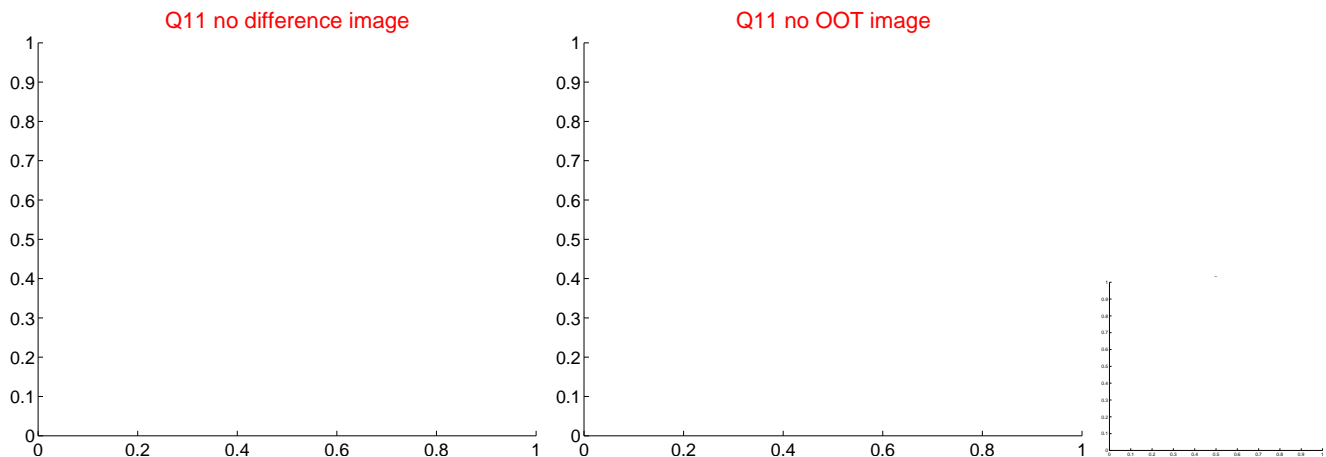
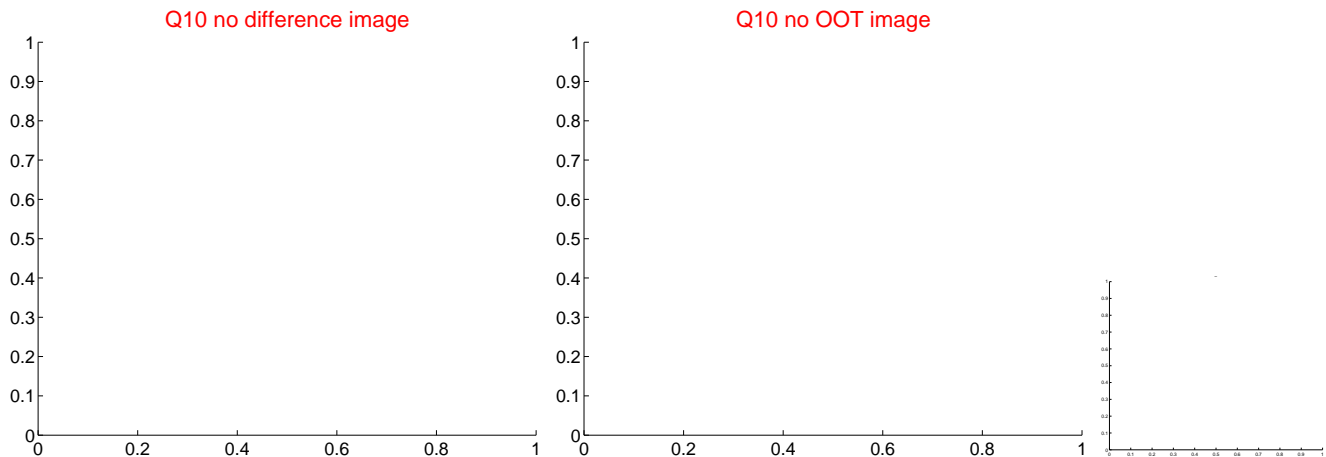
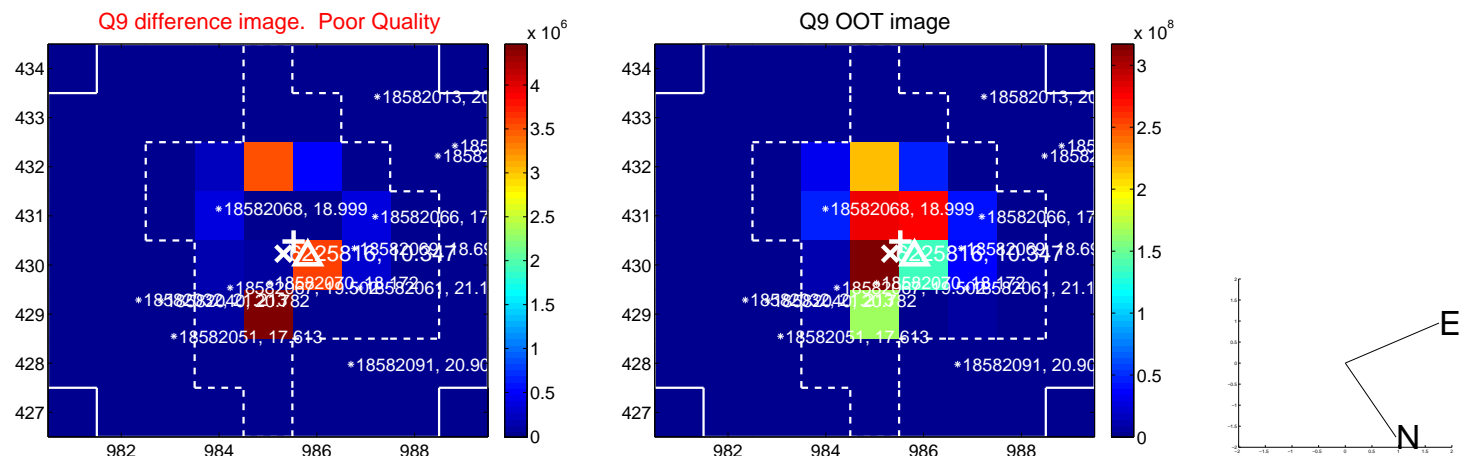
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



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.

Q13 no difference image



Q13 no OOT image



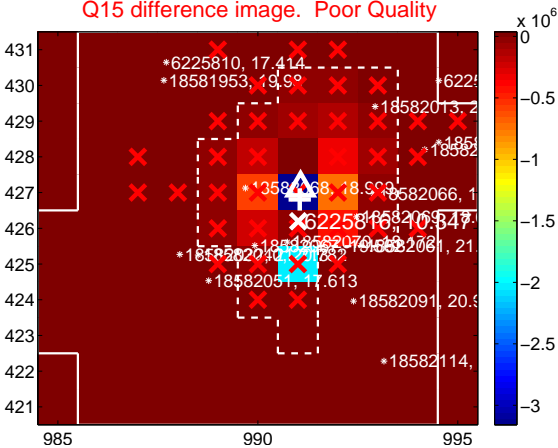
Q14 no difference image



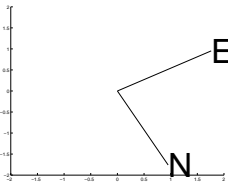
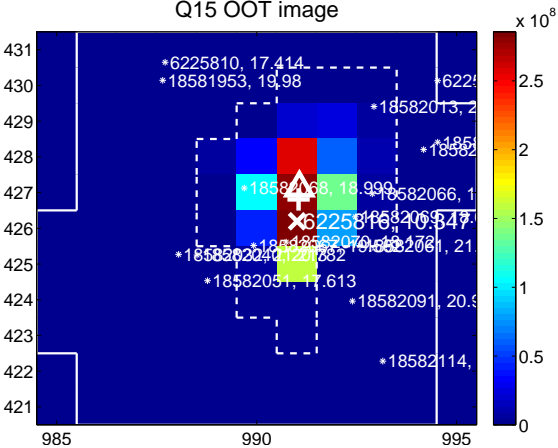
Q14 no OOT image



Q15 difference image. Poor Quality



Q15 OOT image



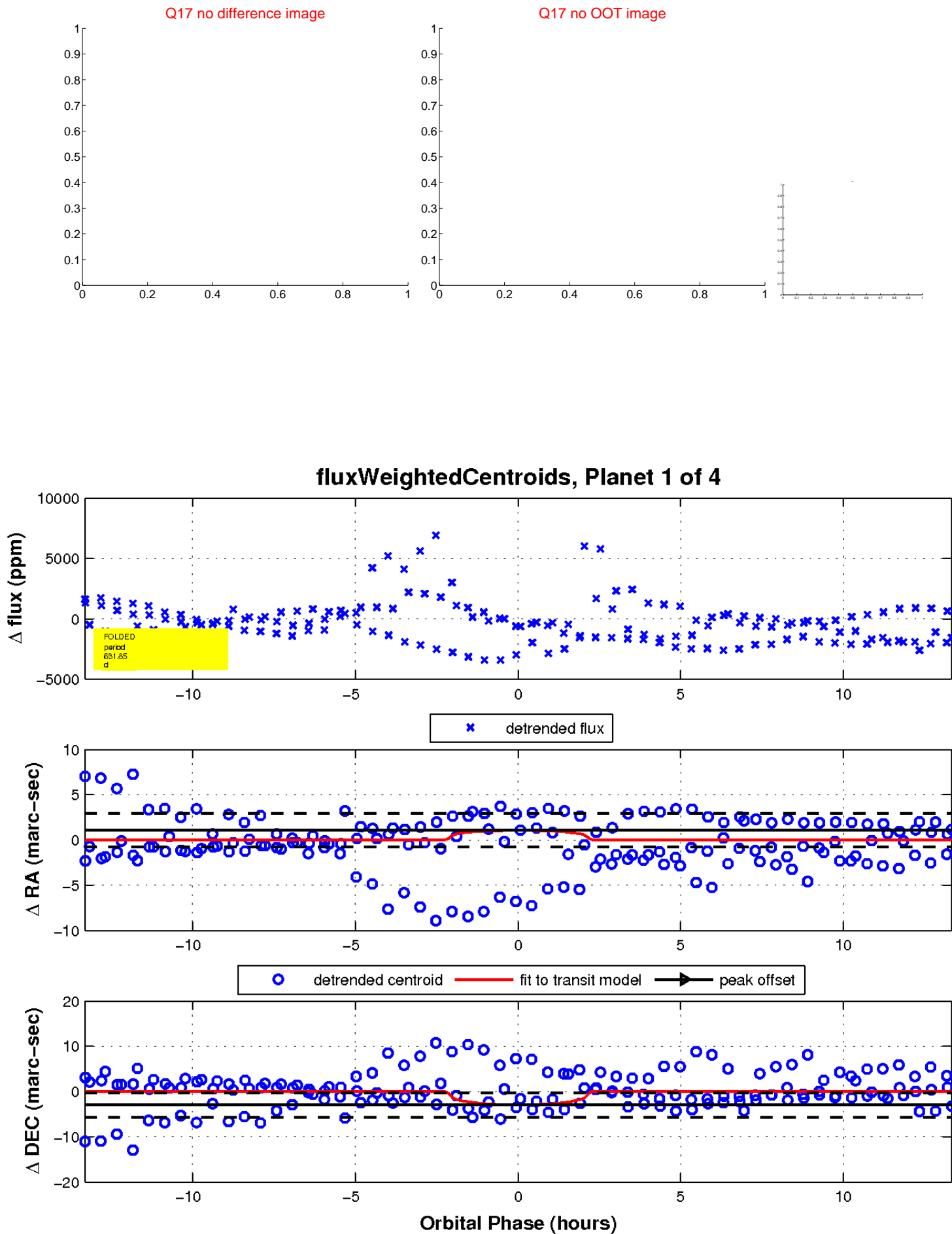
Q16 no difference image



Q16 no OOT image



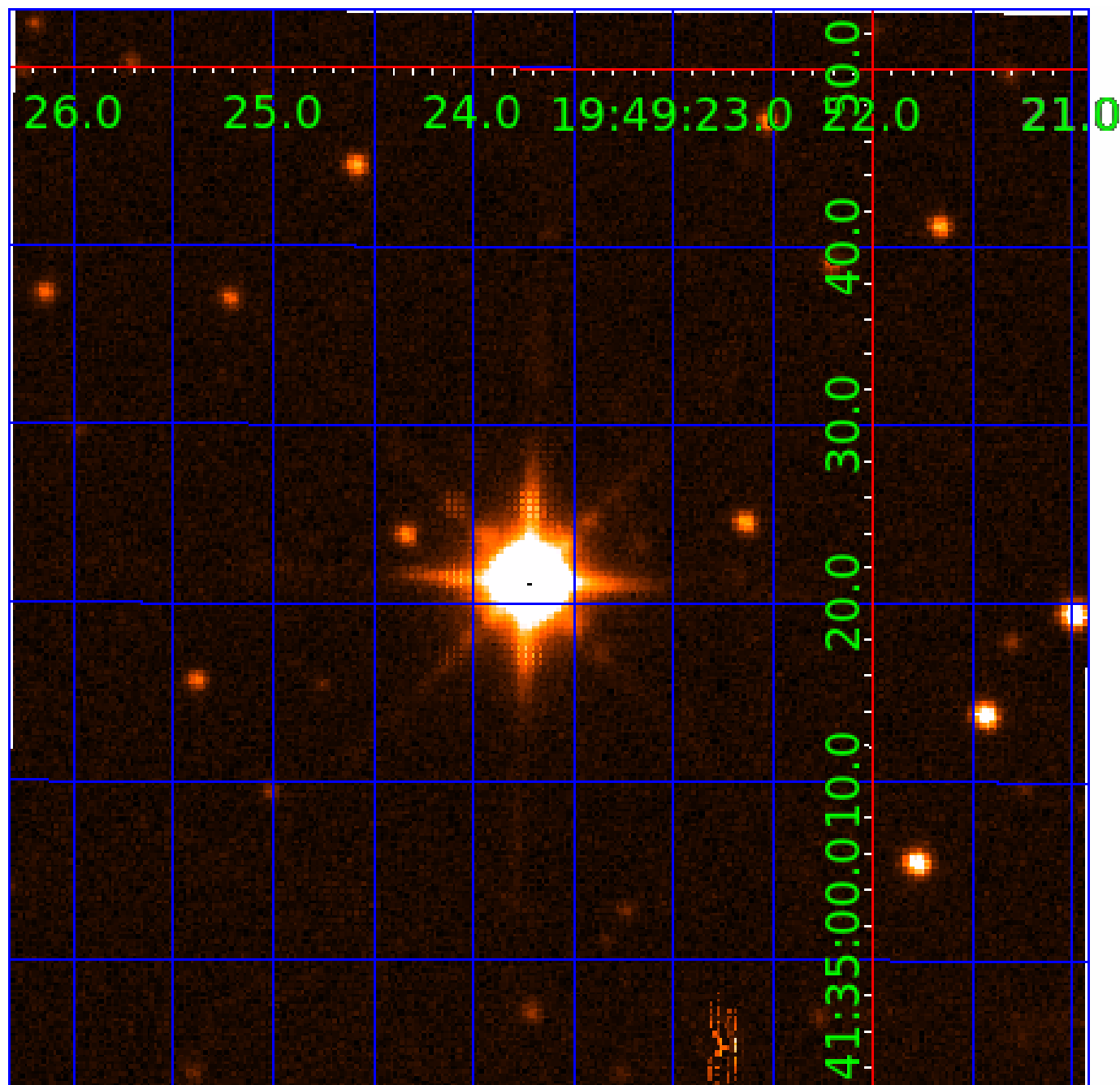
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



# KIC 006225816

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006225816-01	OBS	No	631.848628	198.922519	1864.9	4.466	17.7	7.4	0.71	4519	3.01	0.11
006225816-02	OBS	No	321.231991	193.541424	528.7	4.530	13.9	2.9	0.71	4519	1.55	0.28
006225816-03	OBS	No	390.115059	355.180112	645.9	7.803	23.5	2.9	0.71	4519	1.73	0.22
006225816-04	OBS	No	661.066533	224.228272	106.3	9.000	16.4	-1.0	0.71	4519	0.69	0.11

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006225816-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_SATURATED
006225816-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
006225816-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
006225816-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

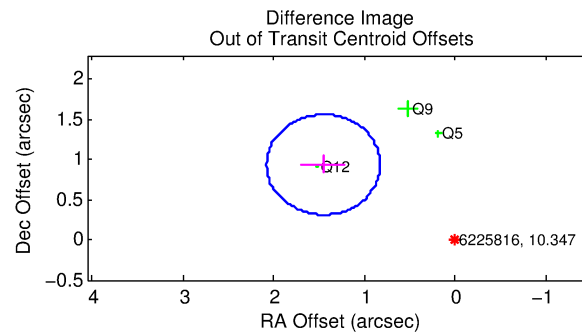
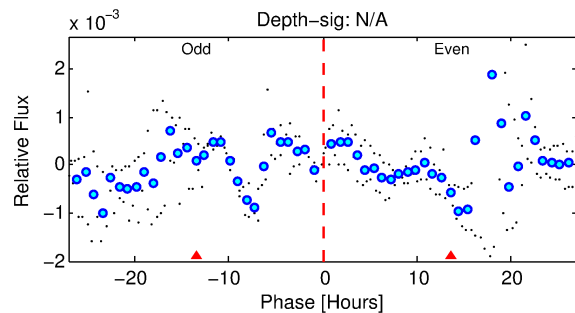
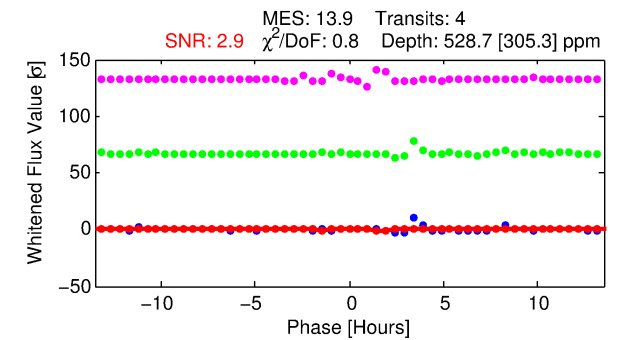
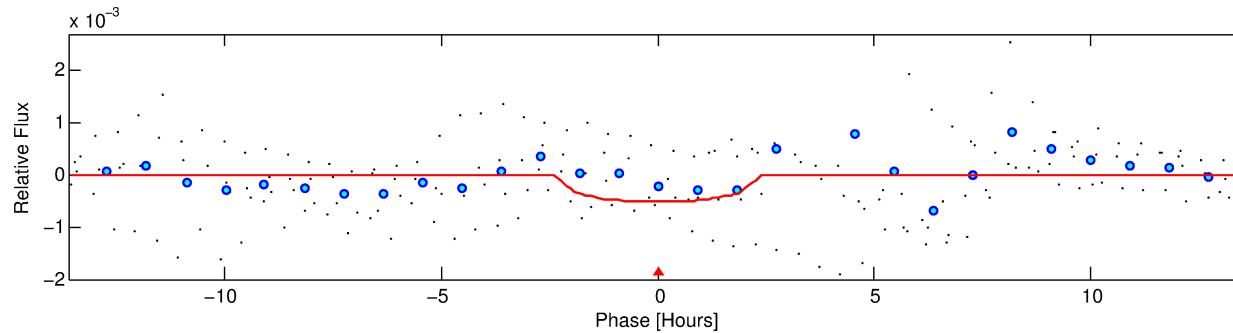
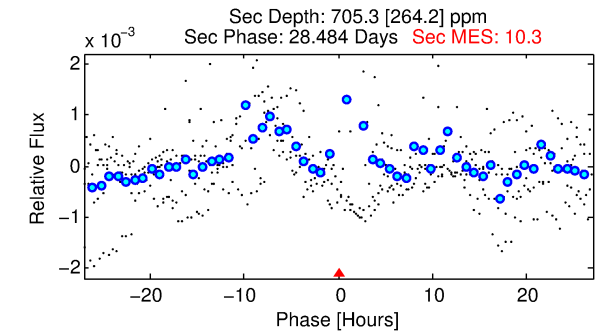
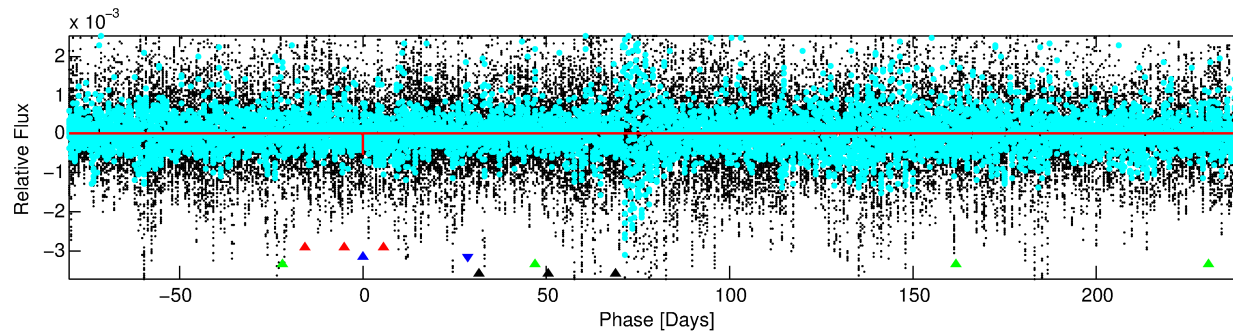
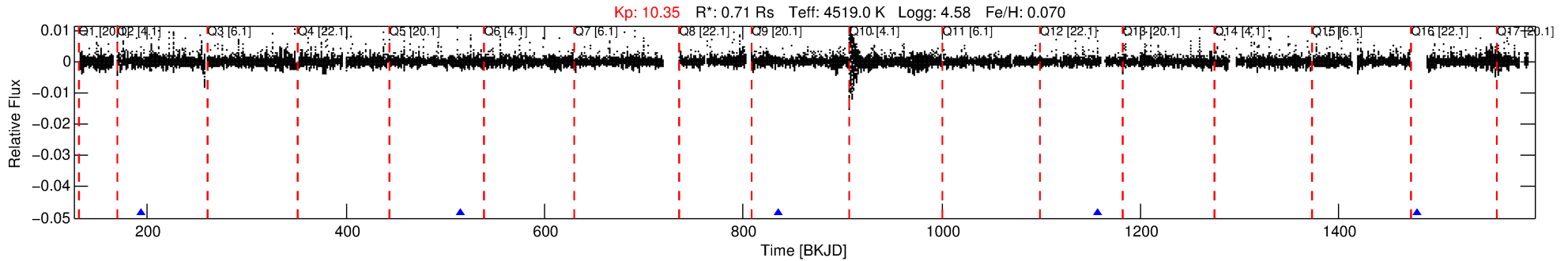
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006225816-02

No Significant Match Found

# DV One-Page Summary

KIC: 6225816 Candidate: 2 of 4 Period: 321.232 d



## DV Fit Results:

Period = 321.23199 [0.00802] d  
Epoch = 193.5414 [0.0161] BKJD  
Rp/R\* = 0.0202 [0.0382]  
a/R\* = 546.98 [3163.86]  
b = 0.15 [39.55]  
Seff = 0.28 [0.05]  
Teq = 186 [8] K  
Rp = 1.55 [2.95] Re  
a = 0.8149 [0.0568] AU  
Ag = 106826.71 [407462.21] [0.26σ]  
Teffp = 5187 [4948] K [1.01σ]

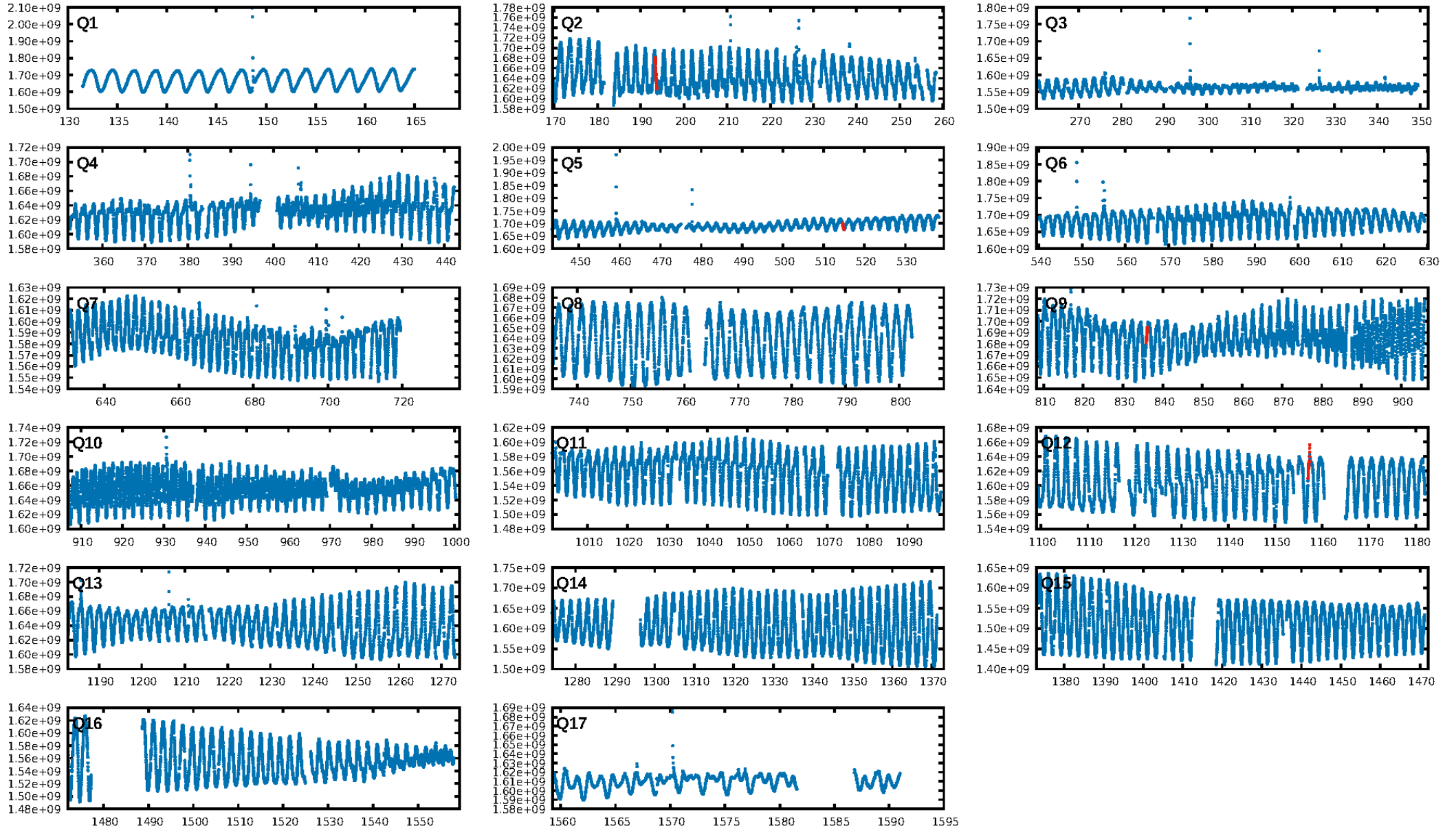
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [183.23σ]  
ModelChiSquare2-sig: 7.5%  
ModelChiSquareGof-sig: 99.7%  
Bootstrap-pfa: 5.99e-08  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 2.039  
Centroid-sig: 30.4%  
Centroid-so: 1.217 arcsec [0.88σ]  
OotOffset-rm: 1.727 arcsec [8.29σ]  
KicOffset-rm: 3.483 arcsec [6.52σ]  
OotOffset-st: 0/0/1/2 [3]  
KicOffset-st: 0/0/1/2 [3]  
DiffImageQuality-fgm: 0.00 [0/3]  
DiffImageOverlap-fno: 1.00 [4/4]

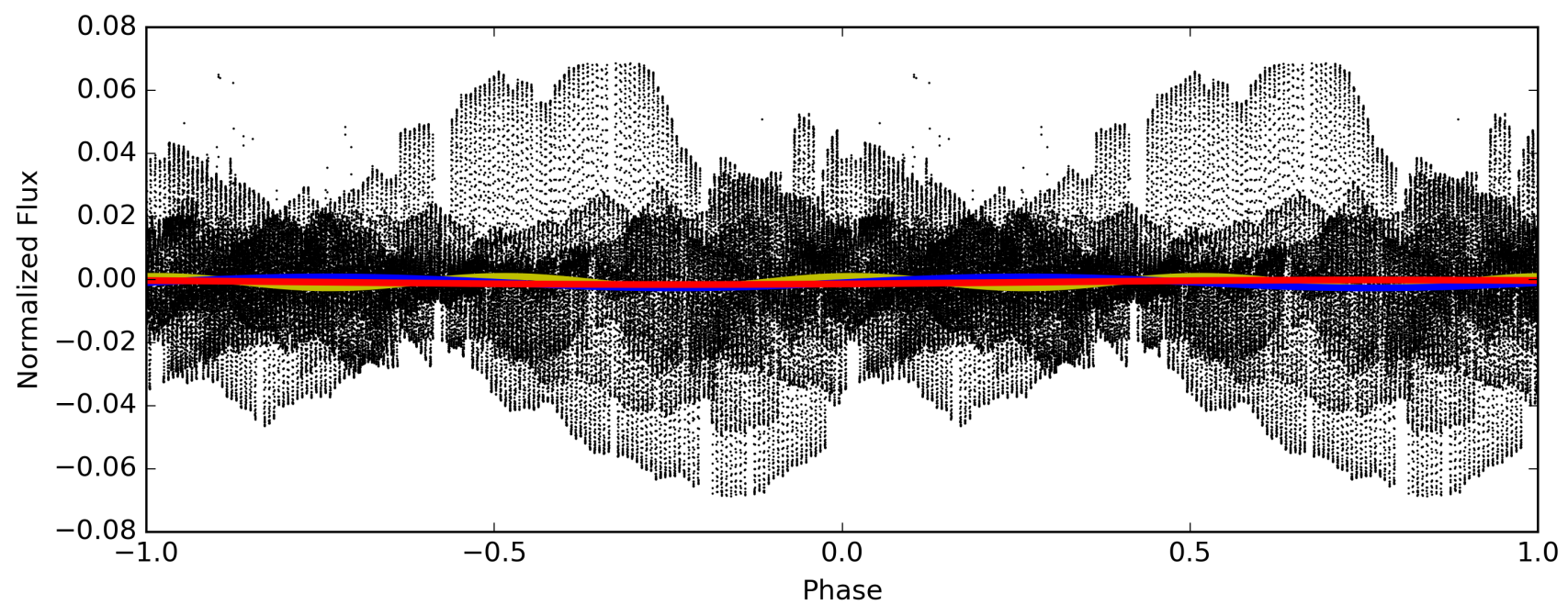
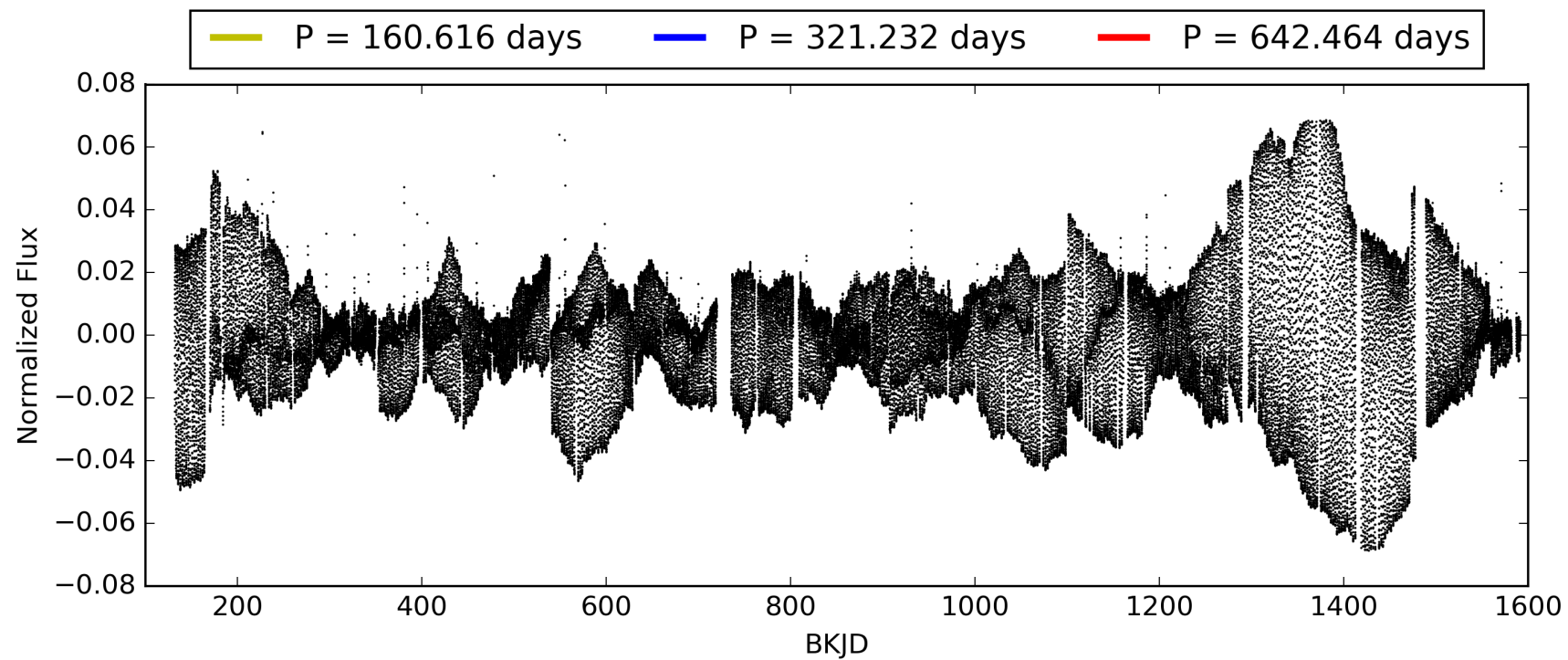
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 03-Feb-2016 08:23:20 Z

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

# TCE 006225816-02, PDC Light Curves



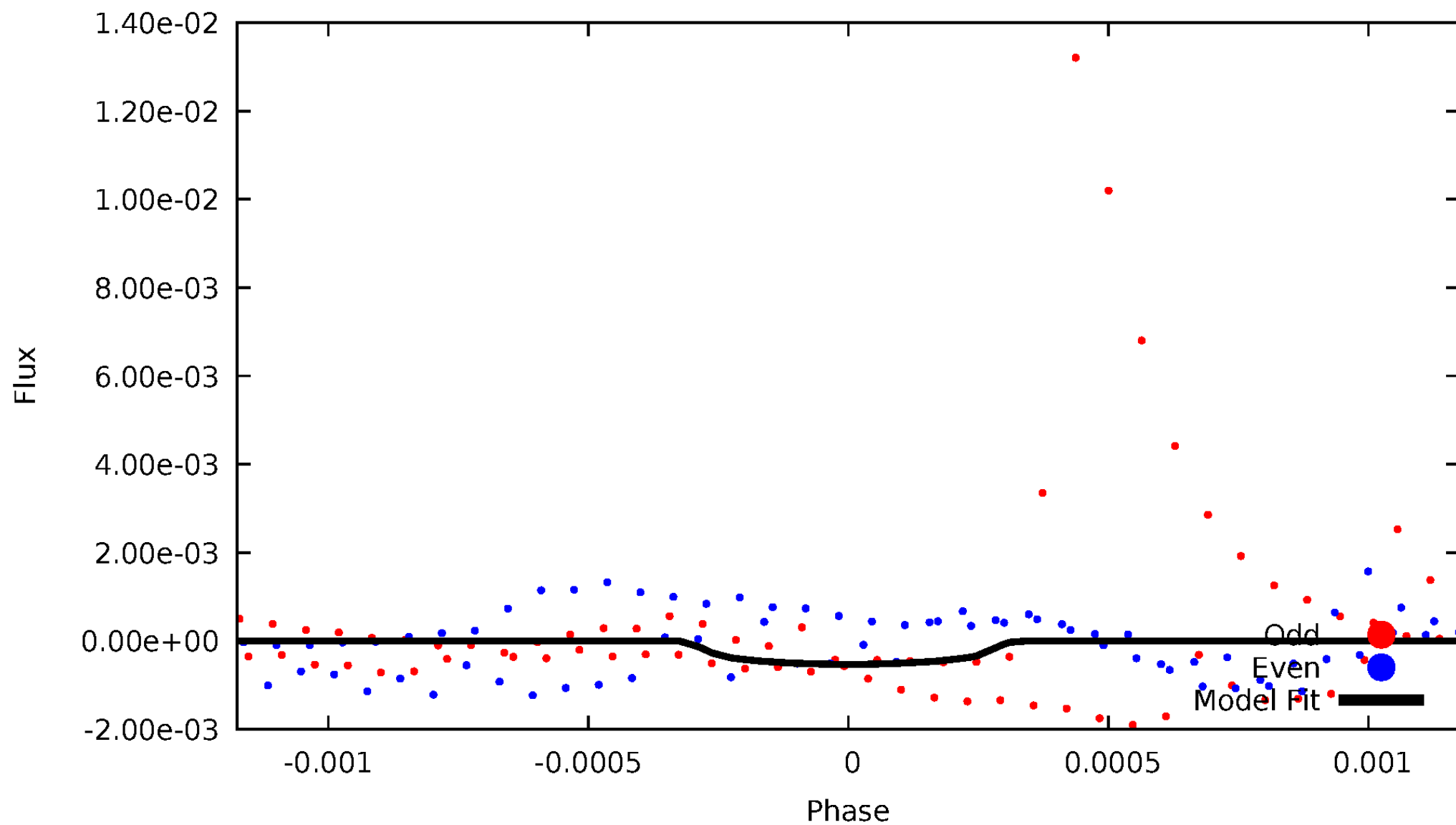
TCE 006225816-02





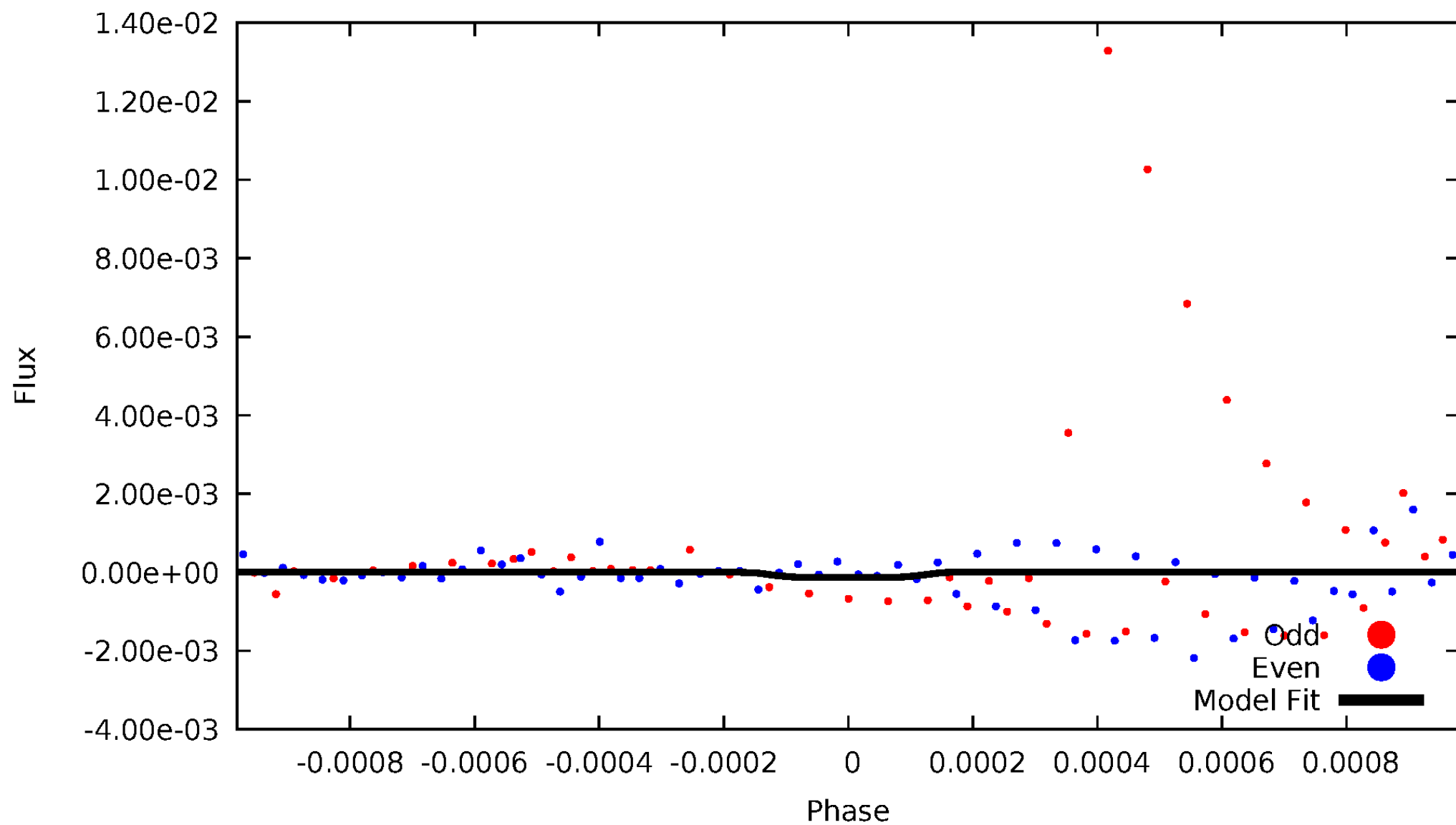
# DV Odd/Even

TCE 006225816-02



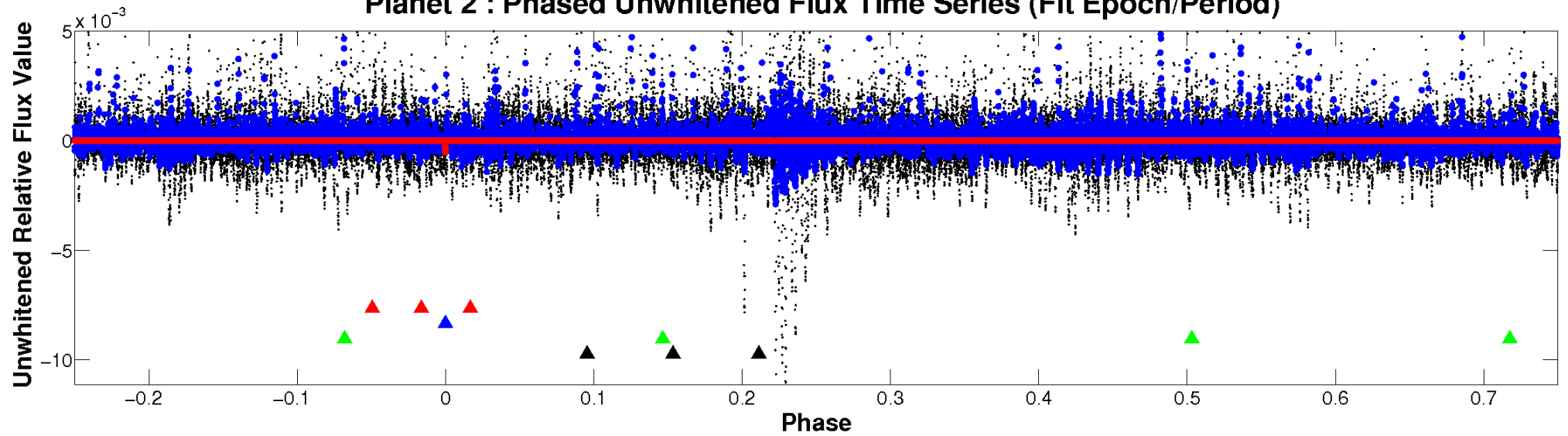
# ALT Odd/Even

TCE 006225816-02

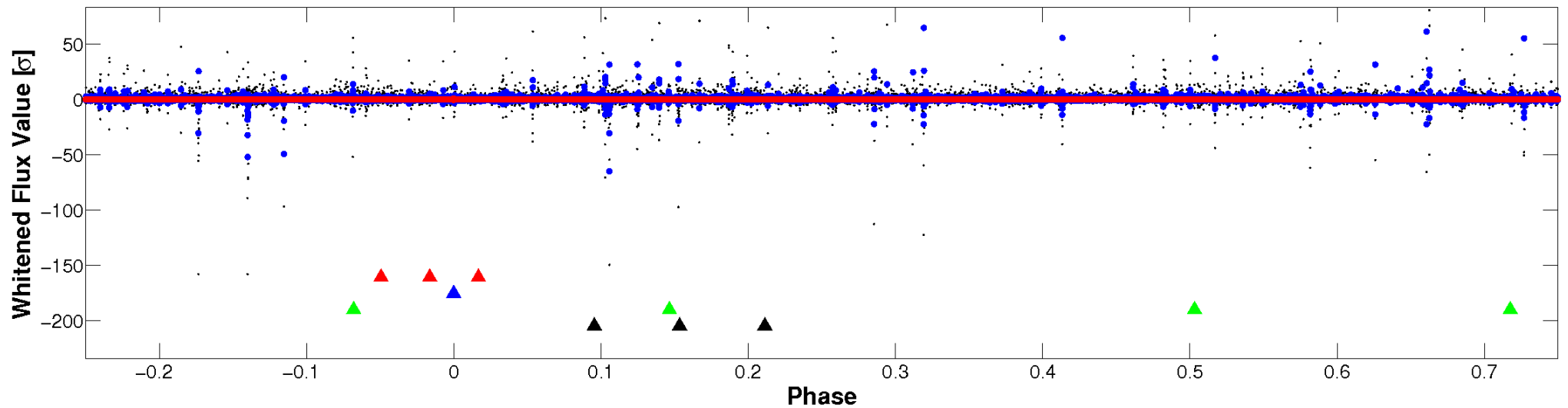


# Non-Whitened Vs. Whitened Light Curve

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

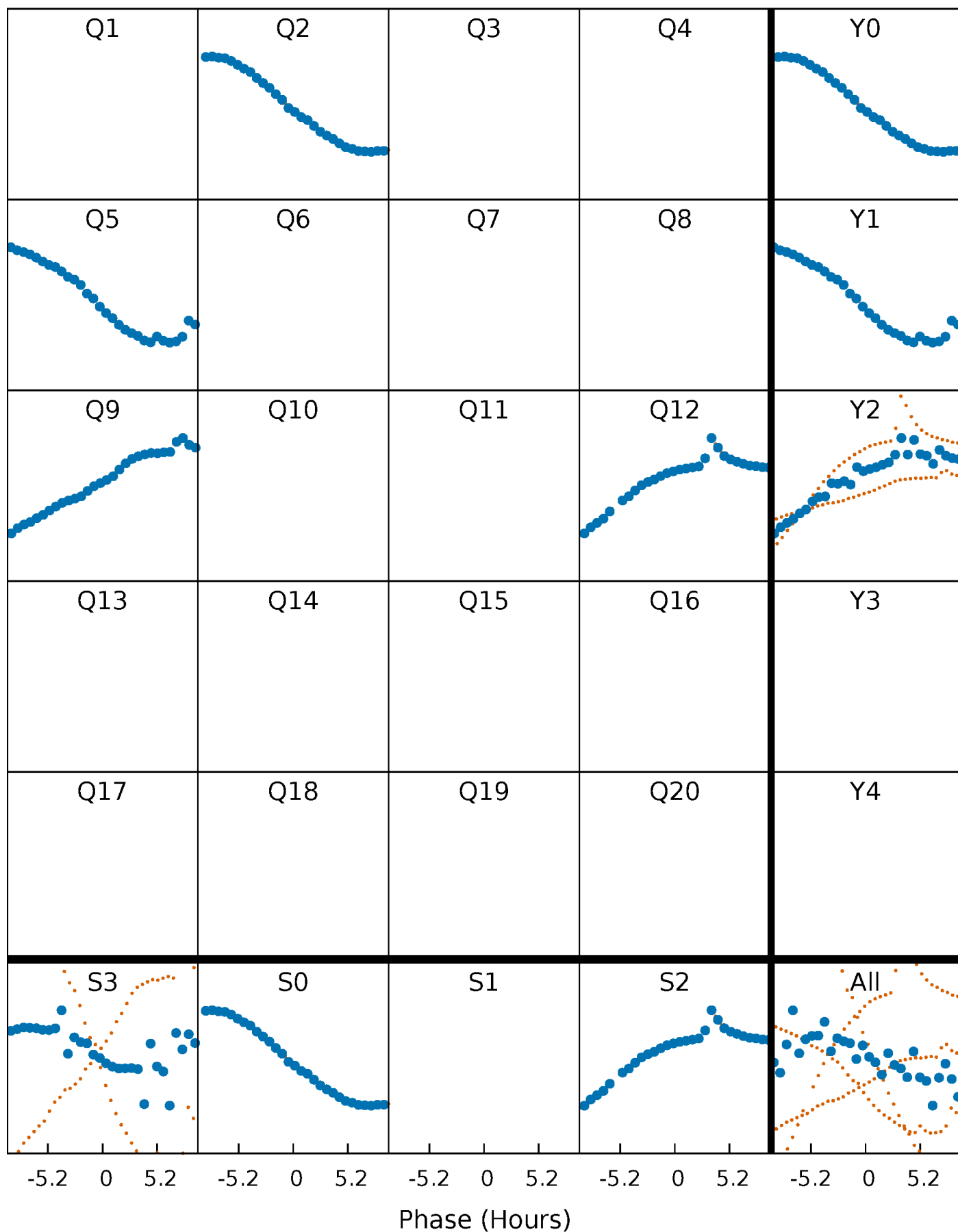


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



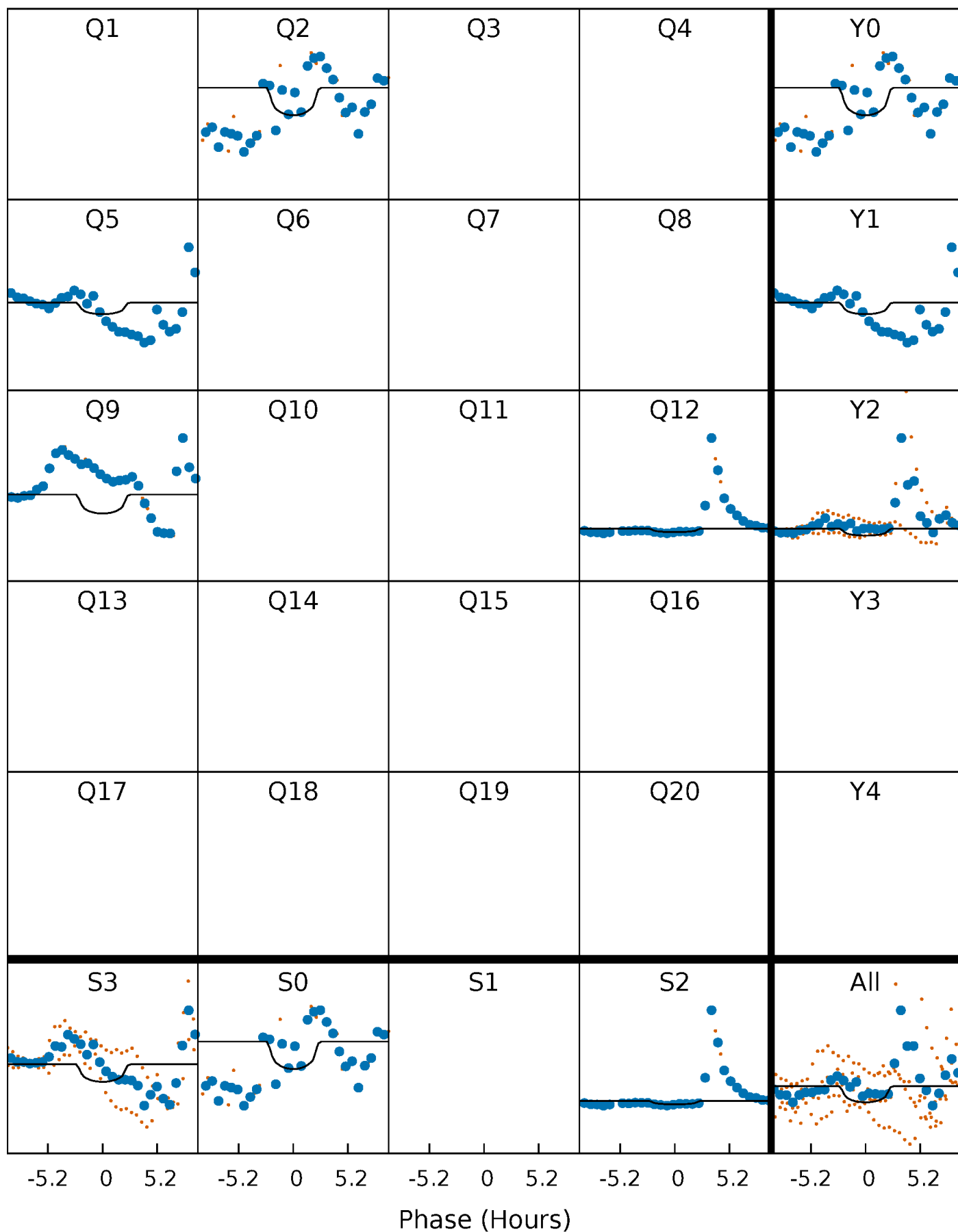
# PDC Quarter-Phased Transit Curves

TCE 006225816-02 P=321.231991 Days  $T_0=193.541424$  (BKJD)



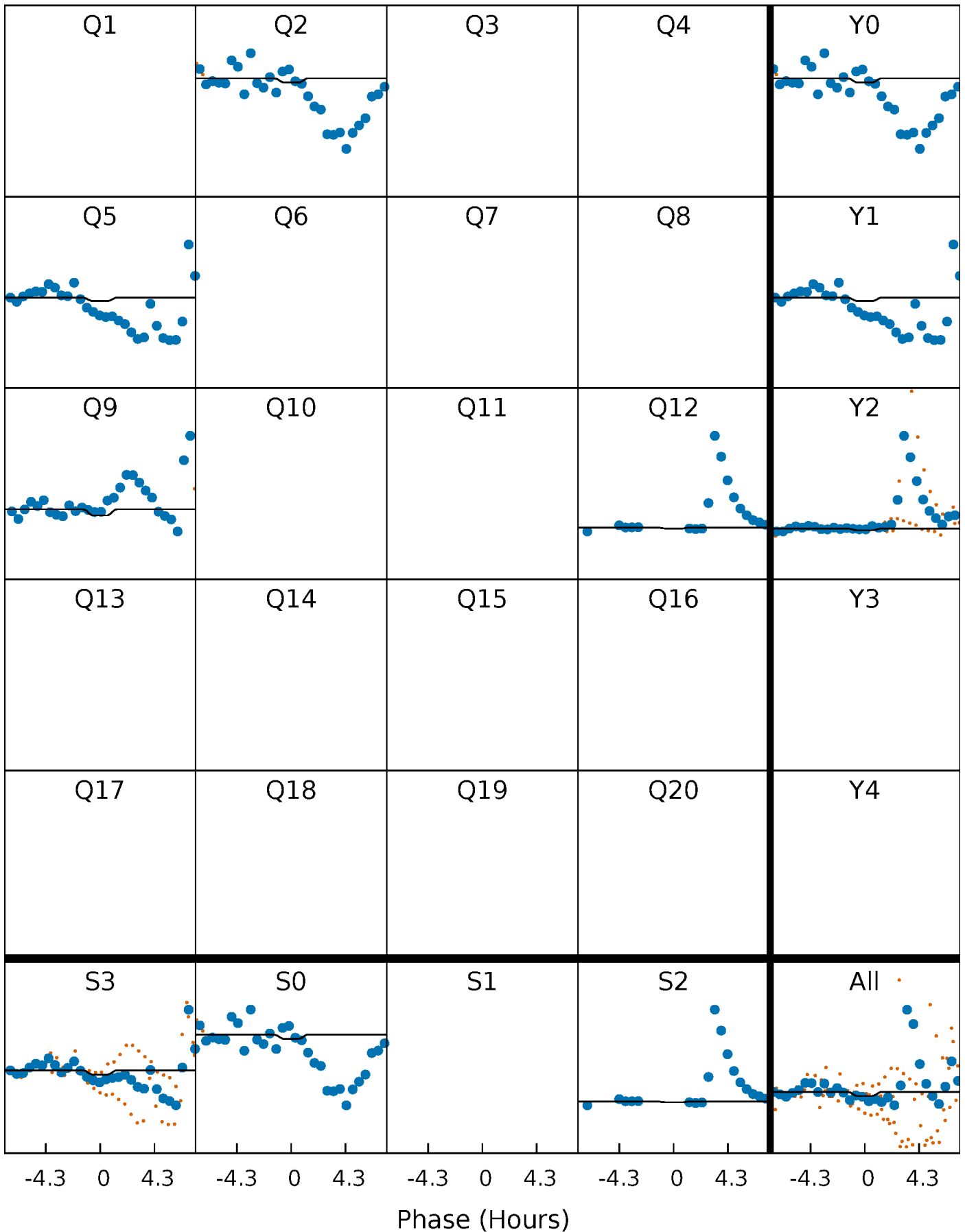
# DV Quarter-Phased Transit Curves

TCE 006225816-02     $P=321.231991$  Days     $T_0=193.541424$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

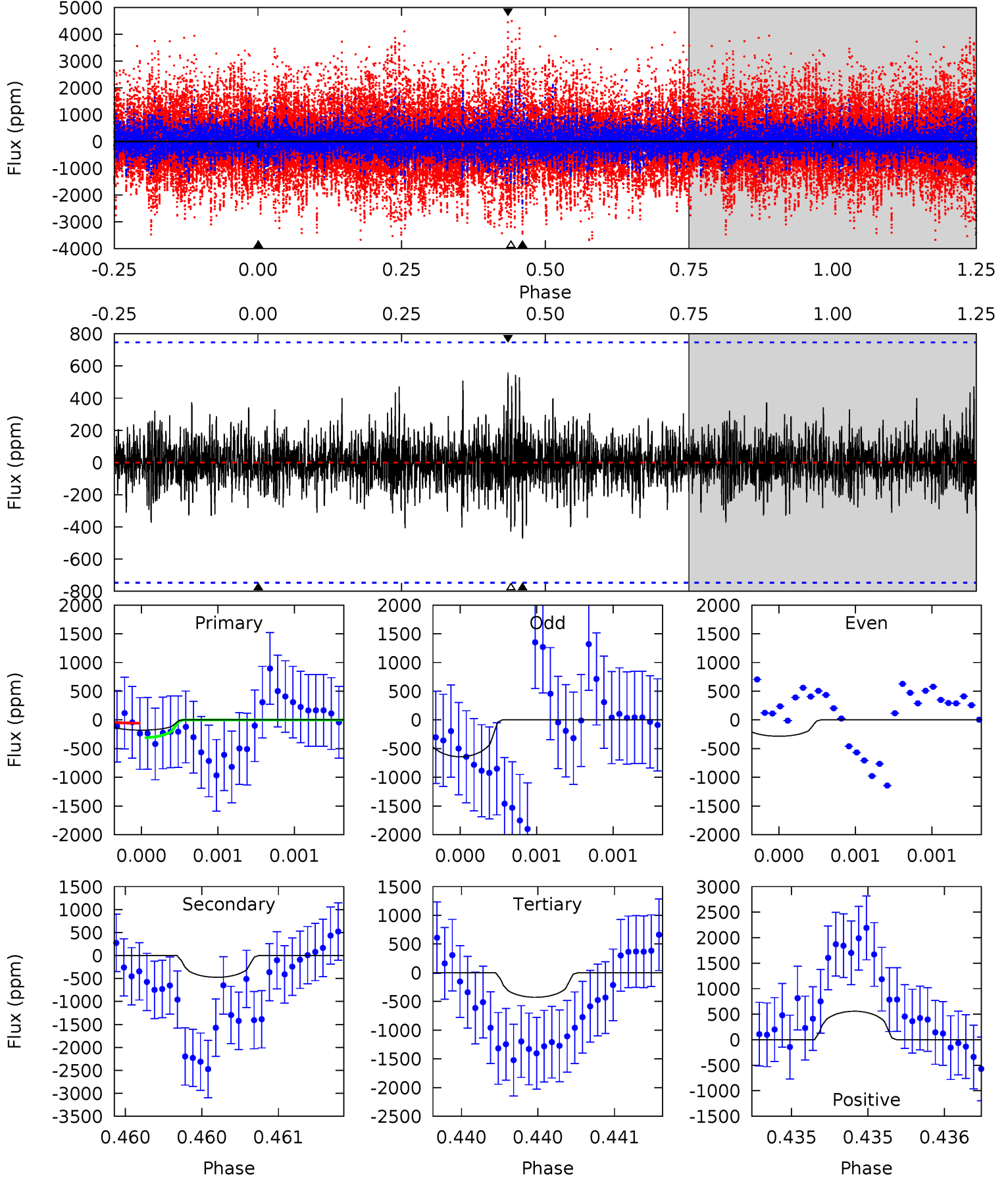
TCE 006225816-02 P=321.208752 Days  $T_0=193.617642$  (BKJD)



# DV Model-Shift Uniqueness Test

006225816-02, P = 321.231991 Days, E = 193.541424 Days

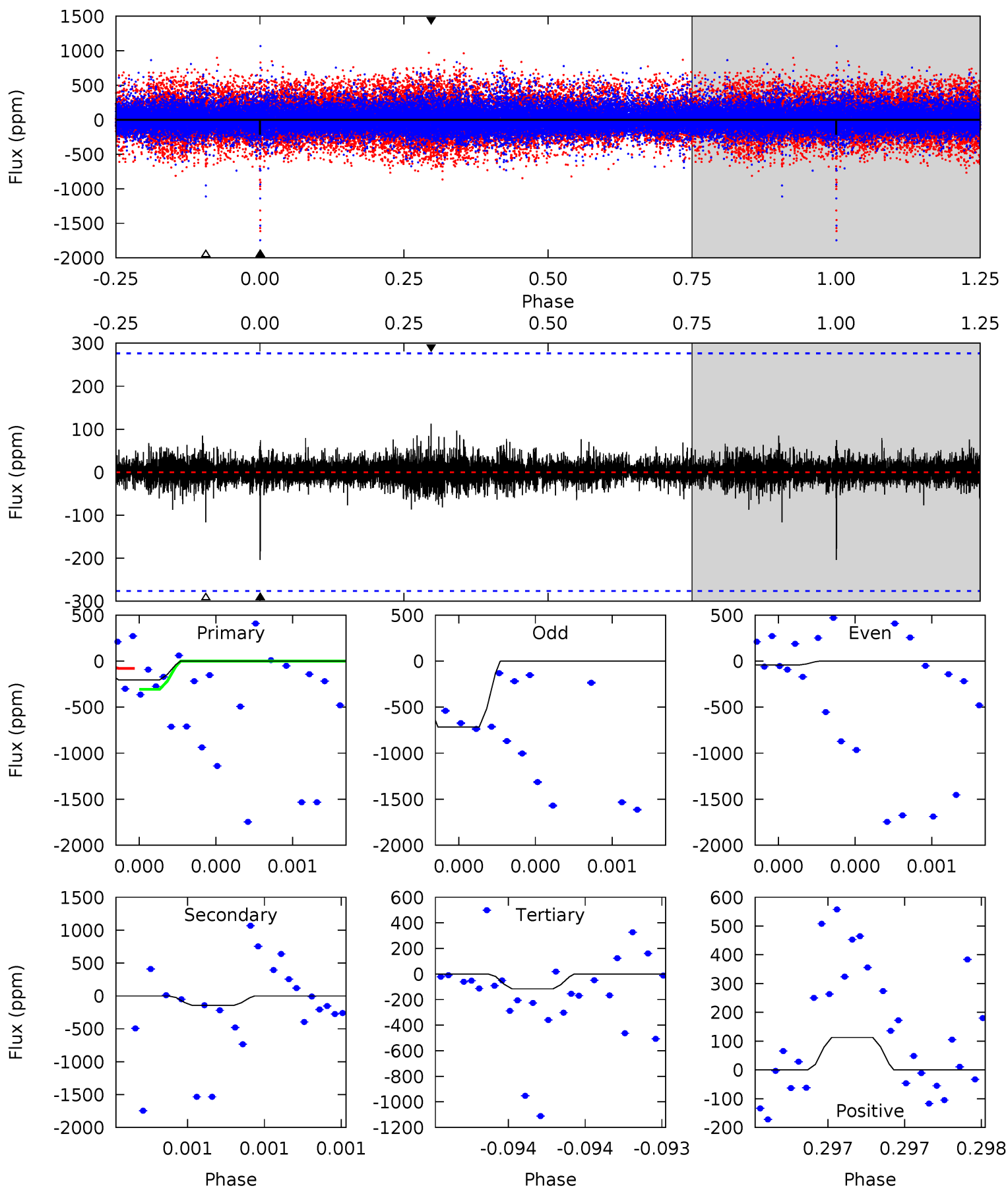
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1.33	3.51	3.17	4.14	5.53	3.42	0.85	-1.84	-2.81	0.34	-0.63	1.24	0.49	0.54	0.95



# Alt Model-Shift Uniqueness Test

006225816-02, P = 321.208752 Days, E = 193.617642 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
4.18	2.99	2.38	2.31	5.66	3.62	0.39	1.80	1.86	0.61	0.68	6.25	-6.54	0.36	2.32





### Stellar Parameters For KIC 006225816

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4519^{+161}_{-161}$	$4.585^{+0.053}_{-0.025}$	$0.070^{+0.250}_{-0.300}$	$0.706^{+0.038}_{-0.060}$	$0.700^{+0.060}_{-0.054}$	$2.797^{+0.657}_{-0.260}$
	+4%/-4%	+1%/-1%	+357%/-429%	+5%/-8%	+9%/-8%	+23%/-9%
Source	PHO54	PHO54	PHO54	DSEP		

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

### Secondary Eclipse Parameters for KIC 006225816-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-474 \pm 135$	$2.59^{+2.46}_{-1.72}$	$258^{+10}_{-10}$	$3864^{+2165}_{-787}$	$25970^{+197215}_{-19549}$
Alt.	$-146 \pm 49$	$2.27^{+2.31}_{-1.58}$	$257^{+10}_{-9}$	$3277^{+1894}_{-599}$	$9551^{+104273}_{-7223}$

$T_{max}$  = 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

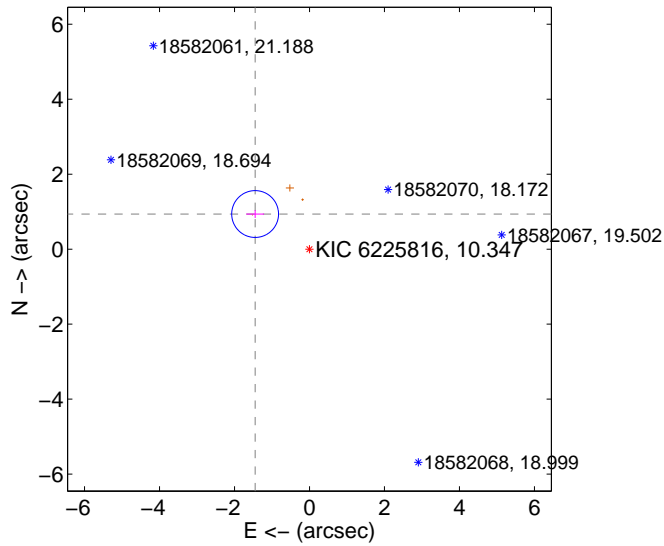
Supplemental centroid analysis for 006225816-02. **Kepler magnitude: 10.35.** Transit SNR 2.89

There are 0 quarters with good PRF difference image offsets

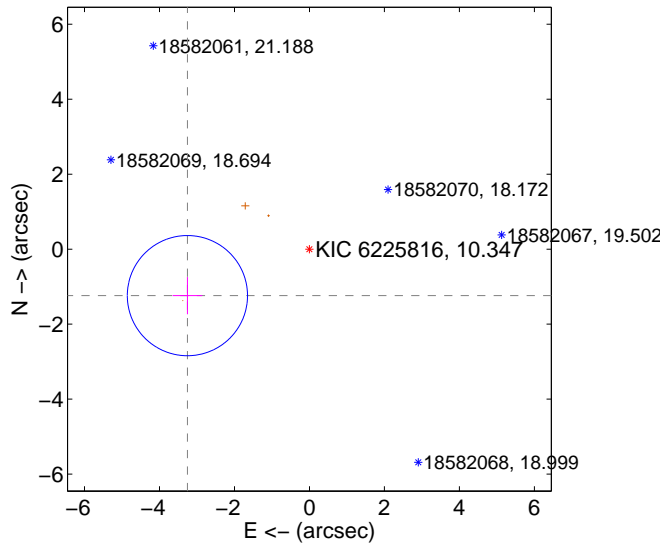
The OOT PRF centroid is offset from the target star catalog position by about 2.94 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>1.727 \pm 0.208</math></b>	<b>8.29</b>	$1.450 \pm 0.238$	$0.937 \pm 0.106$
PRF-fit source offset from KIC position	<b><math>3.483 \pm 0.534</math></b>	<b>6.52</b>	$3.255 \pm 0.396$	$-1.239 \pm 0.497$
photometric centroid source offset	$1.22 \pm 1.39$	0.88	$0.25 \pm 0.95$	$-1.19 \pm 1.40$

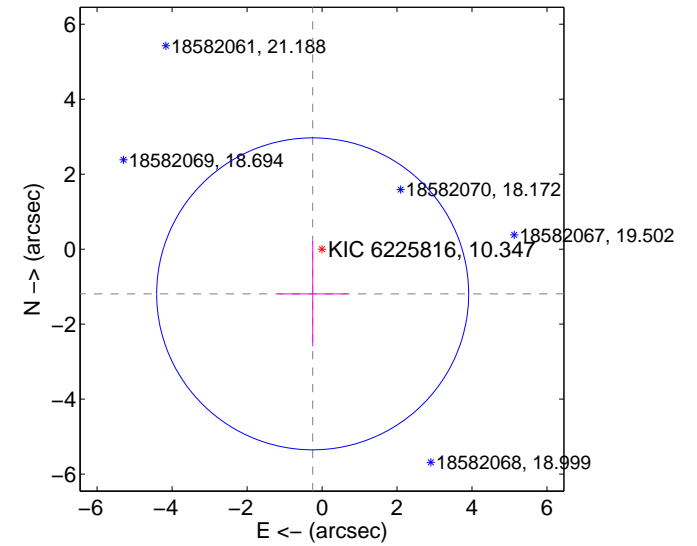
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids



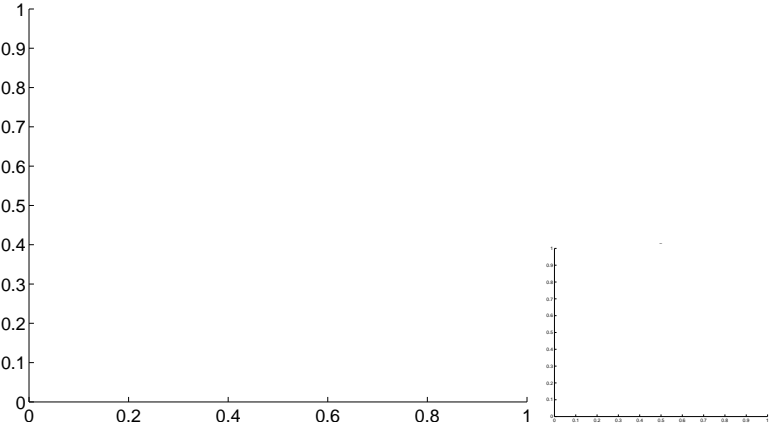
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

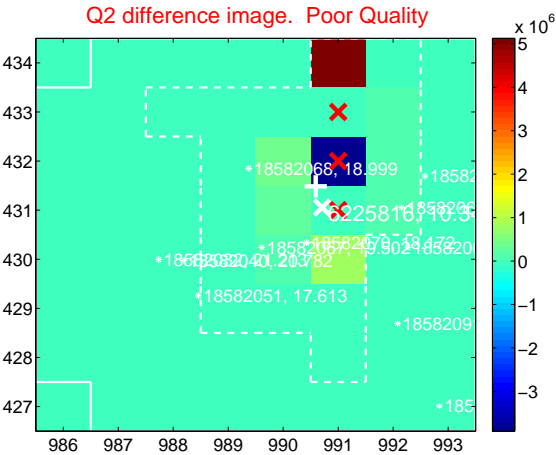
Q1 no difference image



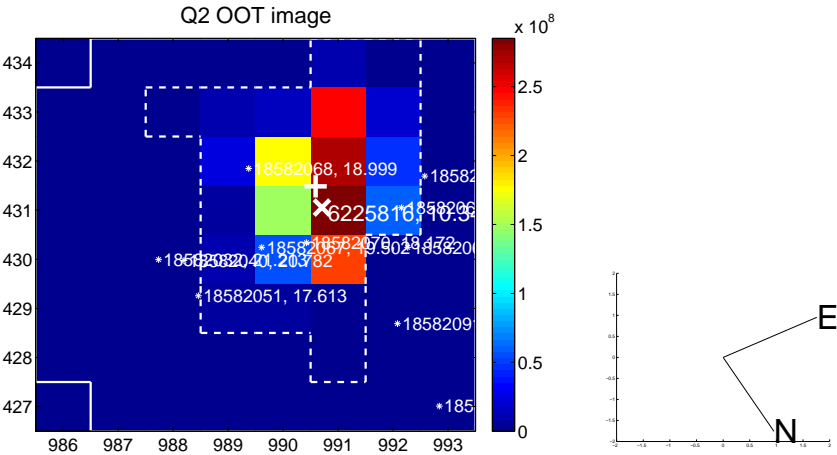
Q1 no OOT image



Q2 difference image. Poor Quality



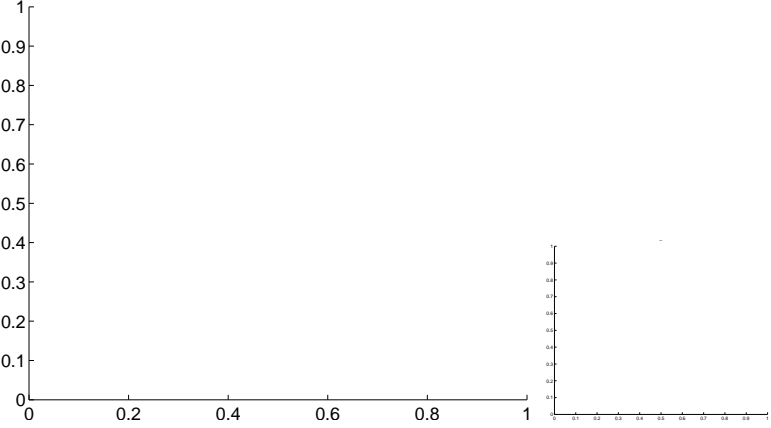
Q2 OOT image



Q3 no difference image



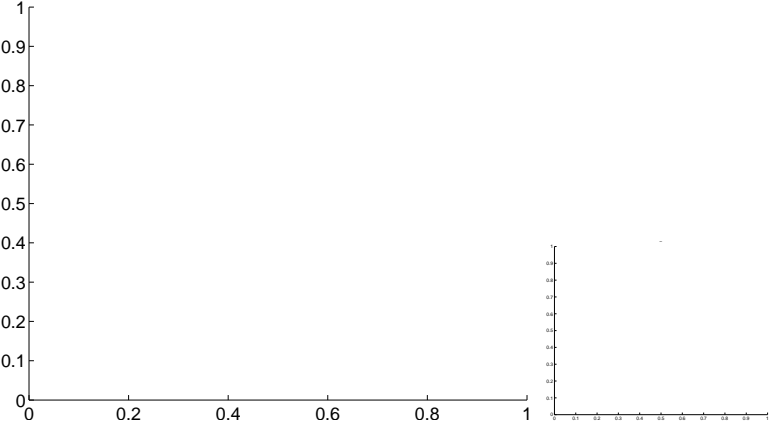
Q3 no OOT image



Q4 no difference image

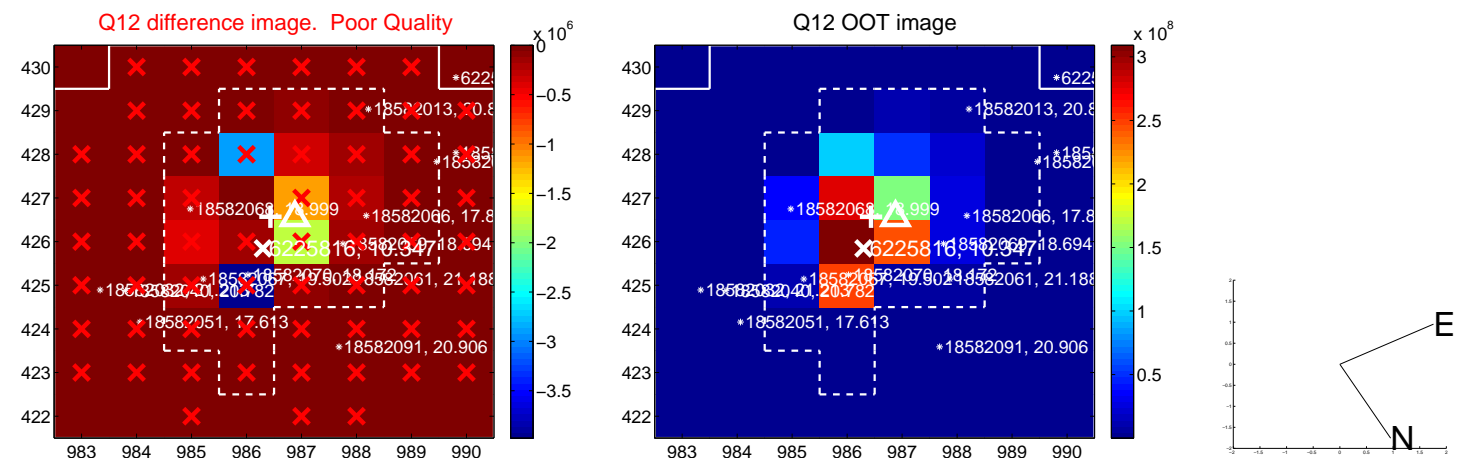
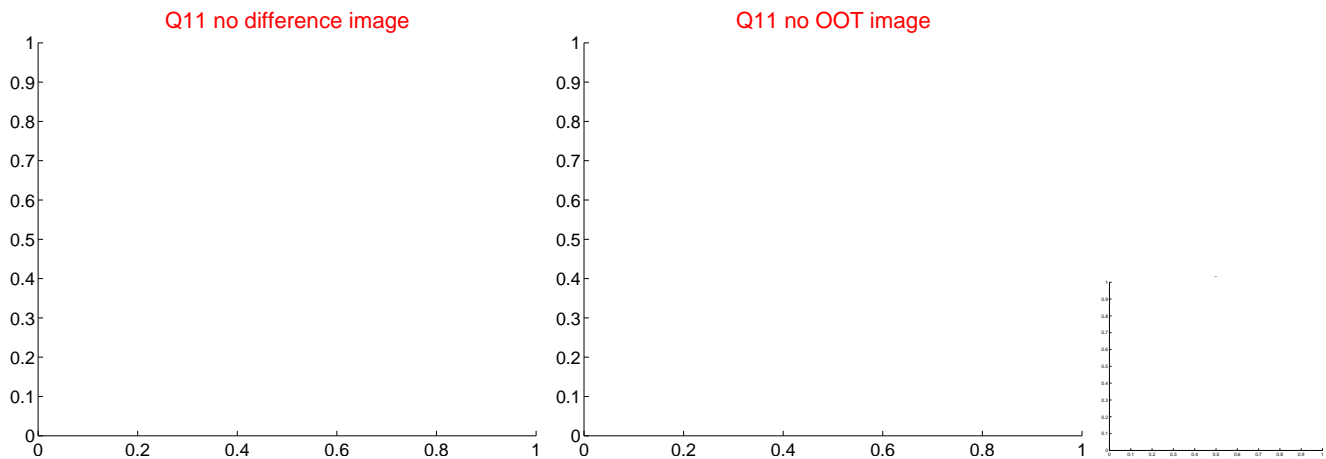
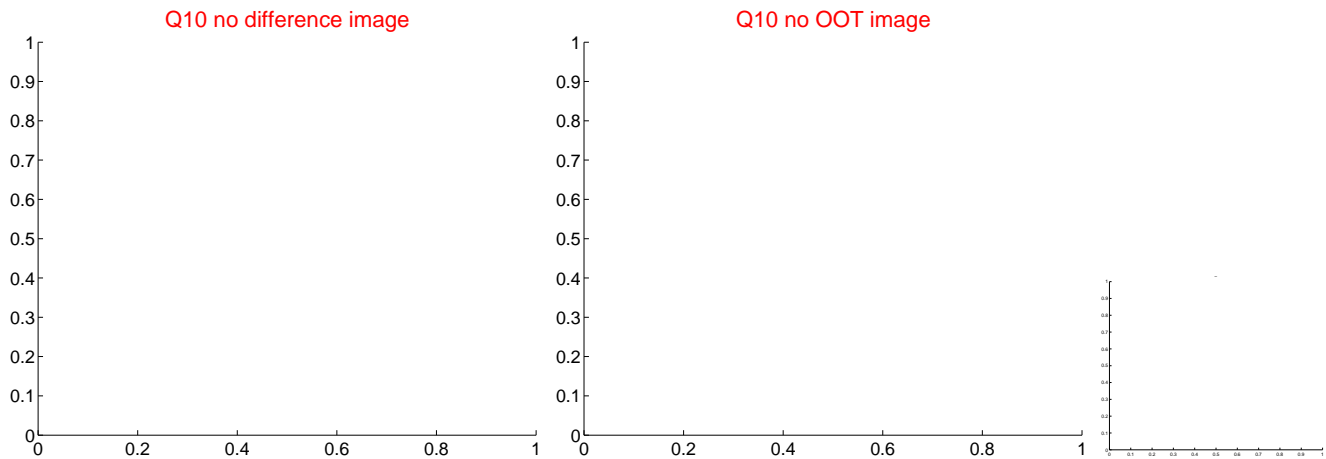
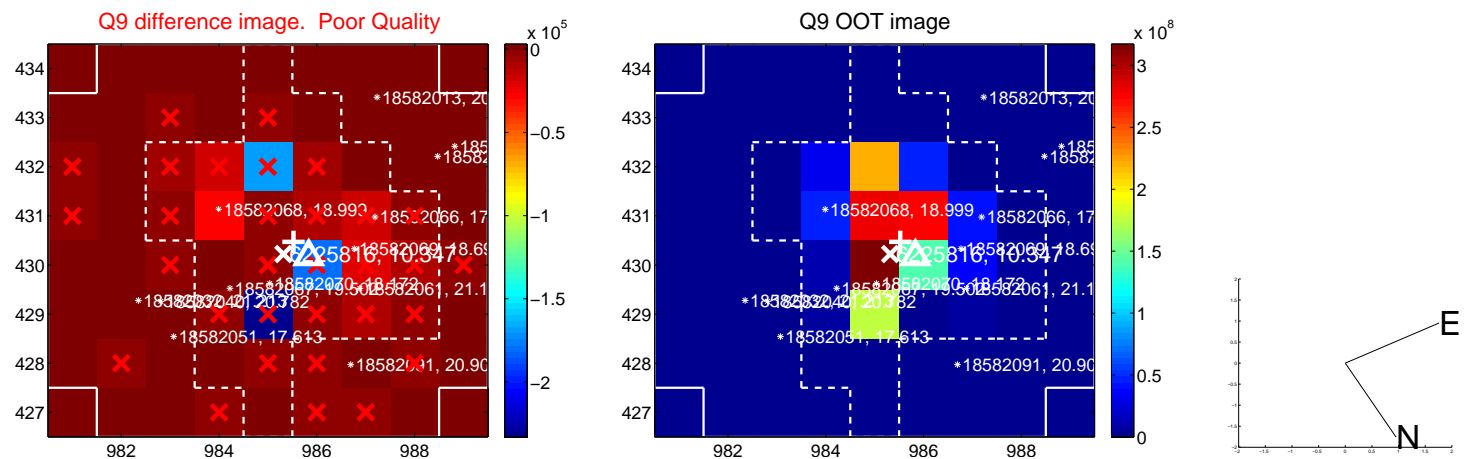


Q4 no OOT image





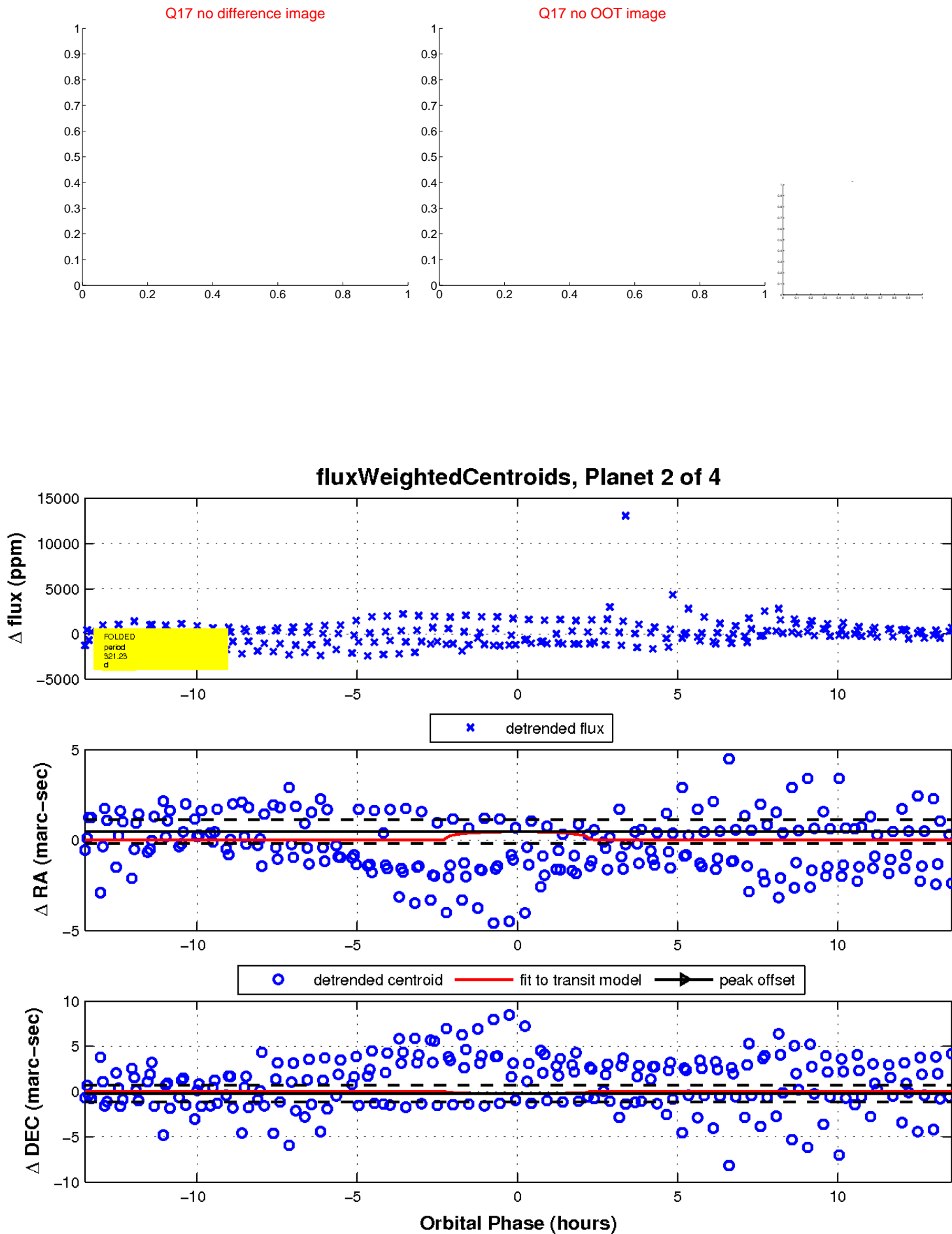
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

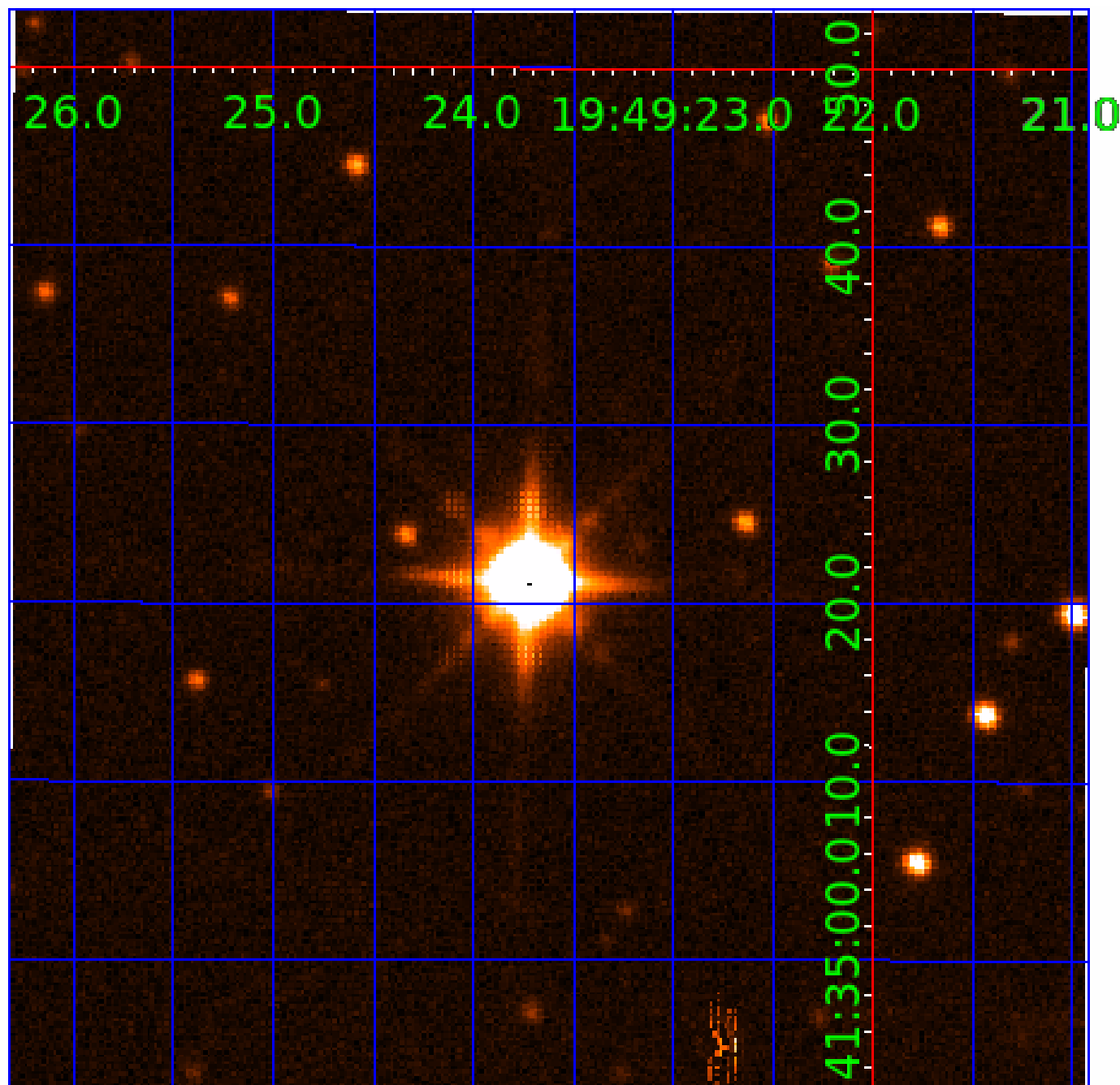


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 006225816

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006225816-01	OBS	No	631.848628	198.922519	1864.9	4.466	17.7	7.4	0.71	4519	3.01	0.11
006225816-02	OBS	No	321.231991	193.541424	528.7	4.530	13.9	2.9	0.71	4519	1.55	0.28
006225816-03	OBS	No	390.115059	355.180112	645.9	7.803	23.5	2.9	0.71	4519	1.73	0.22
006225816-04	OBS	No	661.066533	224.228272	106.3	9.000	16.4	-1.0	0.71	4519	0.69	0.11

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006225816-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_SATURATED
006225816-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
006225816-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
006225816-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

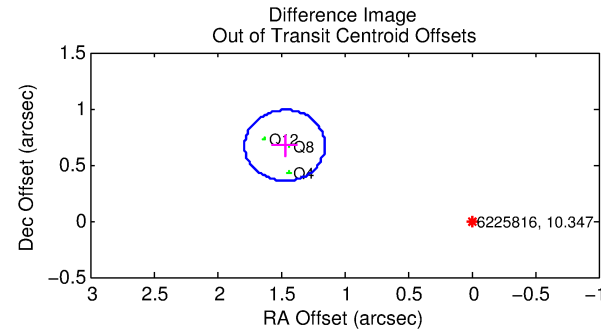
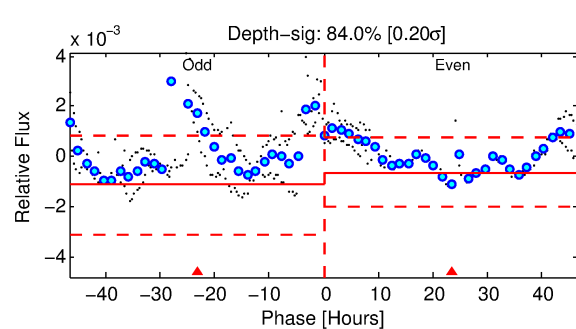
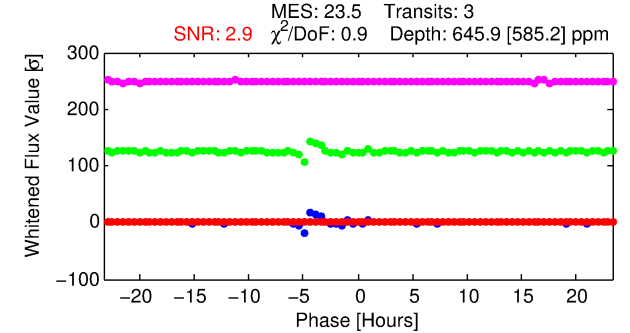
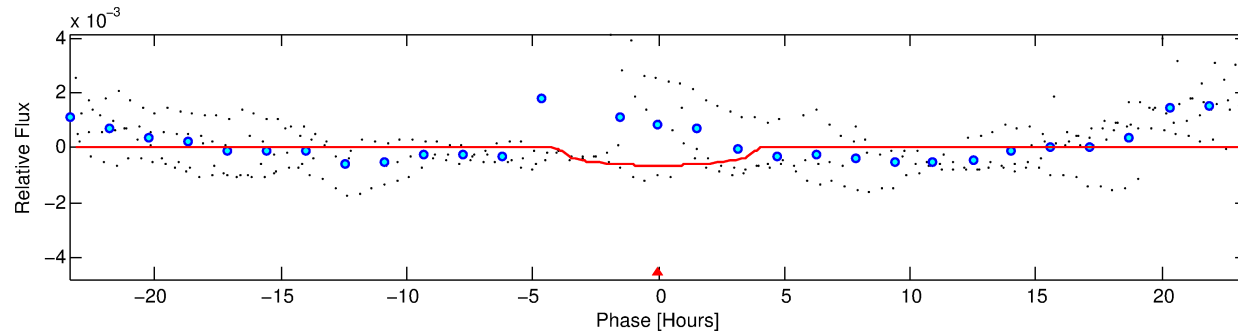
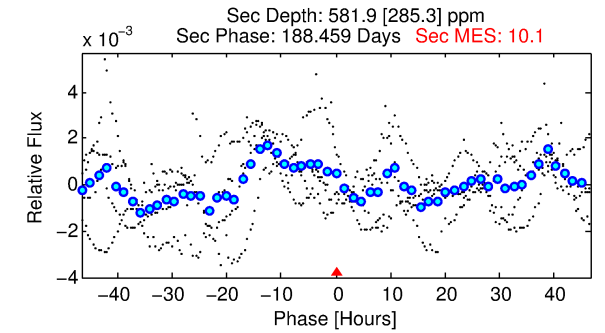
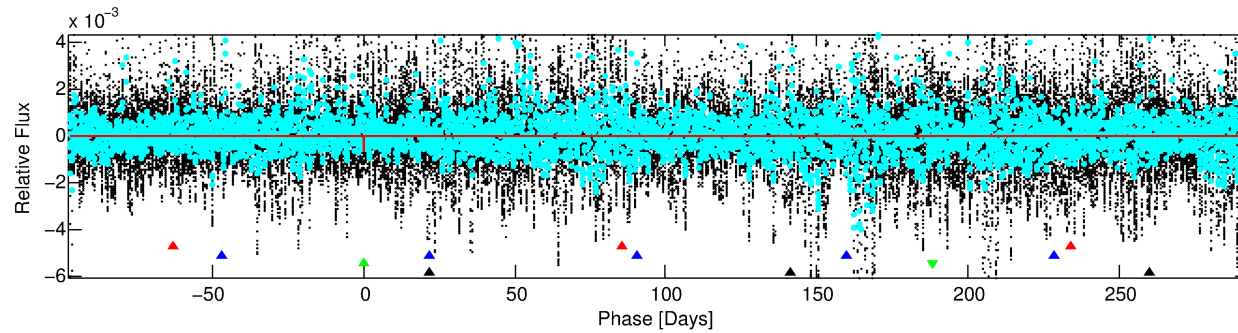
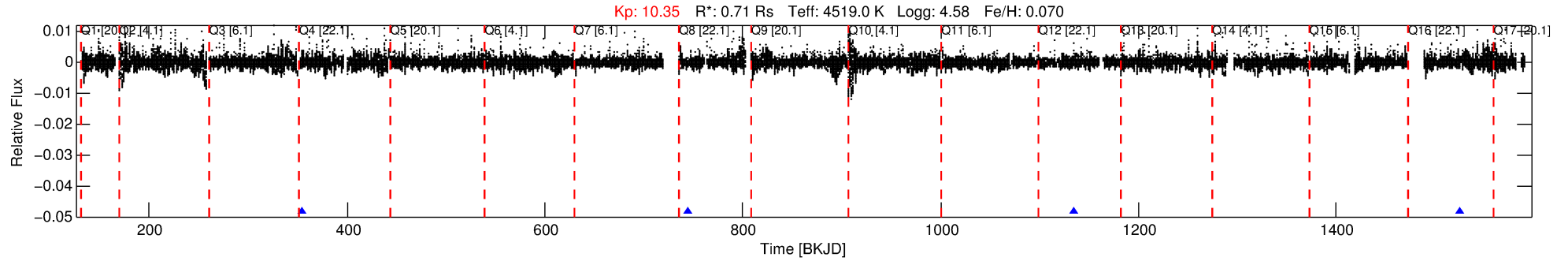
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 006225816-03

No Significant Match Found

# DV One-Page Summary

KIC: 6225816 Candidate: 3 of 4 Period: 390.115 d



## DV Fit Results:

Period = 390.11506 [0.01460] d  
Epoch = 355.1801 [0.0186] BKJD  
Rp/R\* = 0.0225 [0.0346]  
a/R\* = 377.25 [1937.31]  
b = 0.26 [18.29]  
Seff = 0.22 [0.04]  
Teq = 174 [8] K  
Rp = 1.73 [2.67] Re  
a = 0.9276 [0.0647] AU  
Ag = 91947.09 [286944.51] [0.32σ]  
Teffp = 4683 [3655] K [1.23σ]

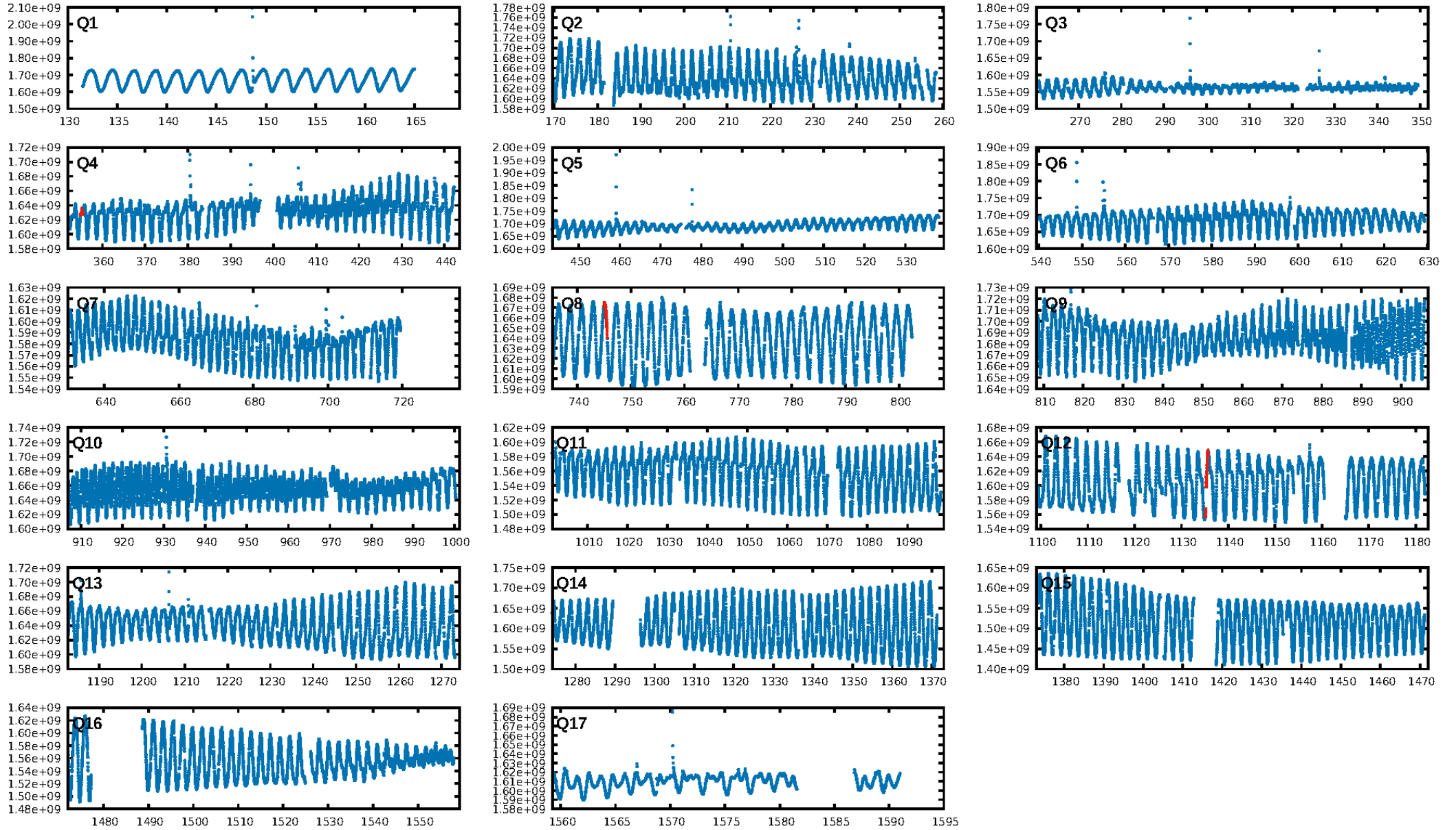
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [183.23σ]  
LongPeriod-sig: 100.0% [645.29σ]  
ModelChiSquare2-sig: 98.4%  
ModelChiSquareGoF-sig: 100.0%  
Bootstrap-pfa: 1.42e-14  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 1.951  
Centroid-sig: 51.1%  
Centroid-so: 1.794 arcsec [2.39σ]  
OotOffset-rm: 1.615 arcsec [15.34σ]  
KicOffset-rm: 3.306 arcsec [27.06σ]  
OotOffset-st: 0/0/3/0 [3]  
KicOffset-st: 0/0/3/0 [3]  
DiffImageQuality-fgm: 0.00 [0/3]  
DiffImageOverlap-fno: 1.00 [3/3]

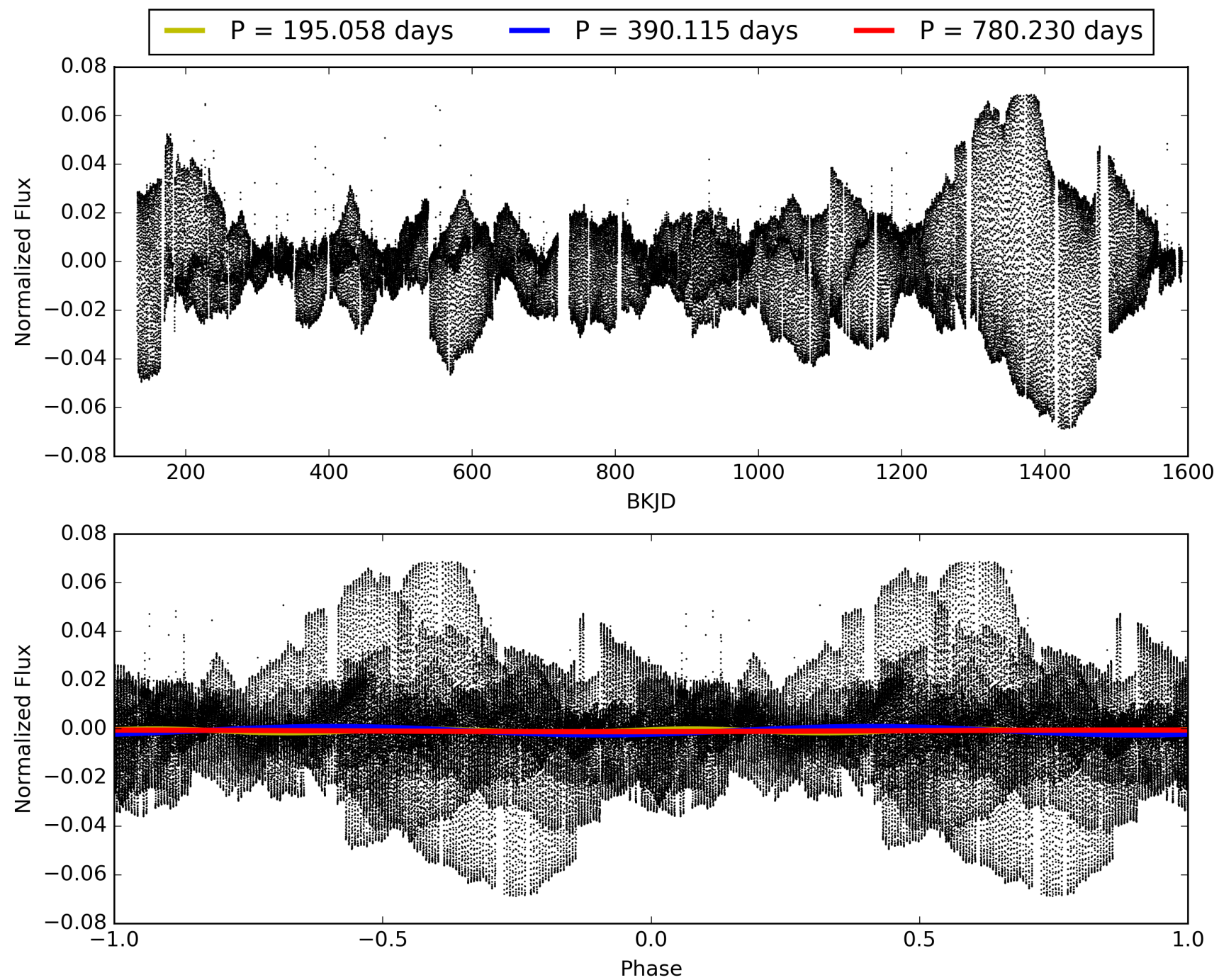
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 03-Feb-2016 08:23:30 Z

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

# TCE 006225816-03, PDC Light Curves

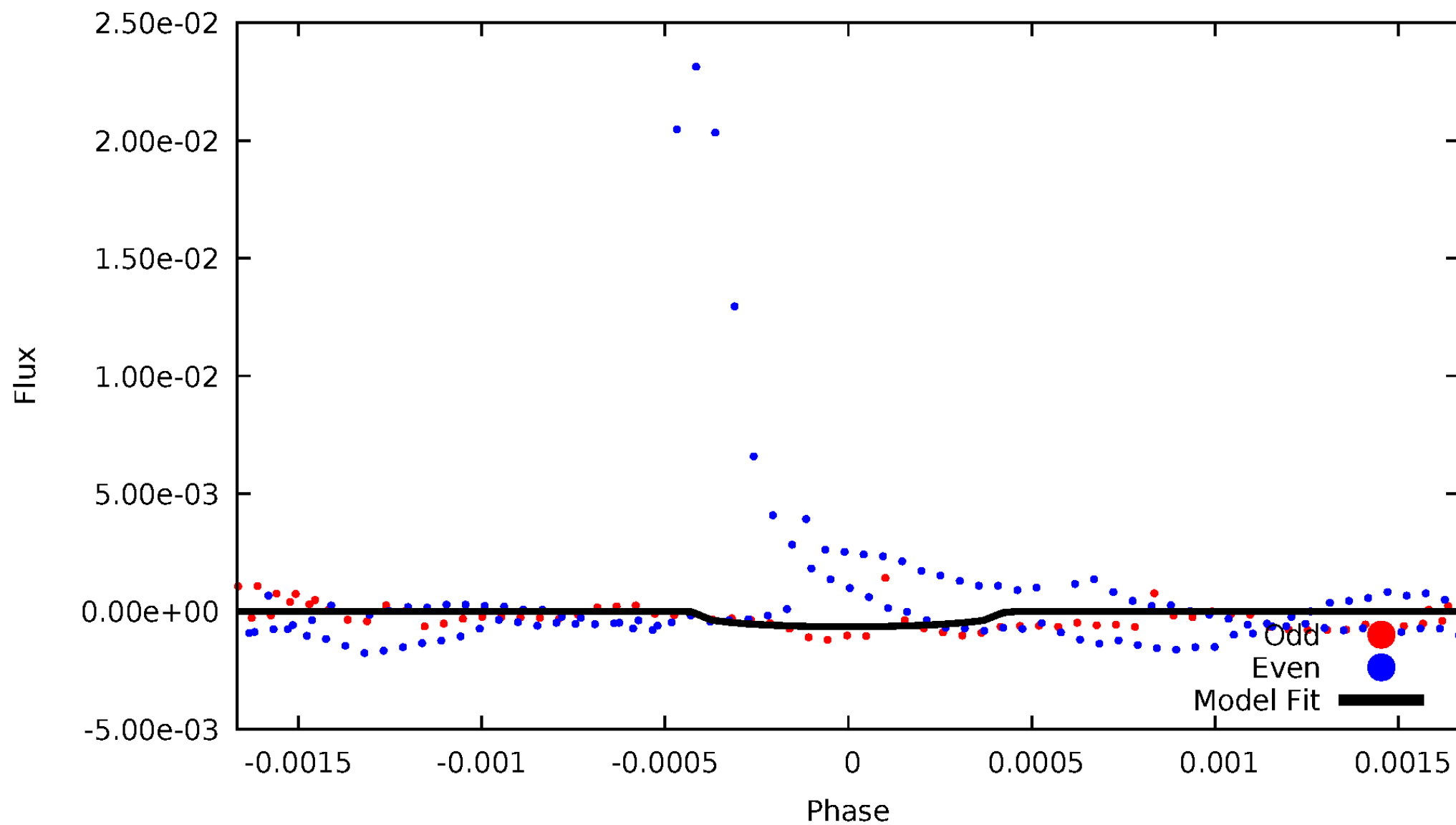


TCE 006225816-03



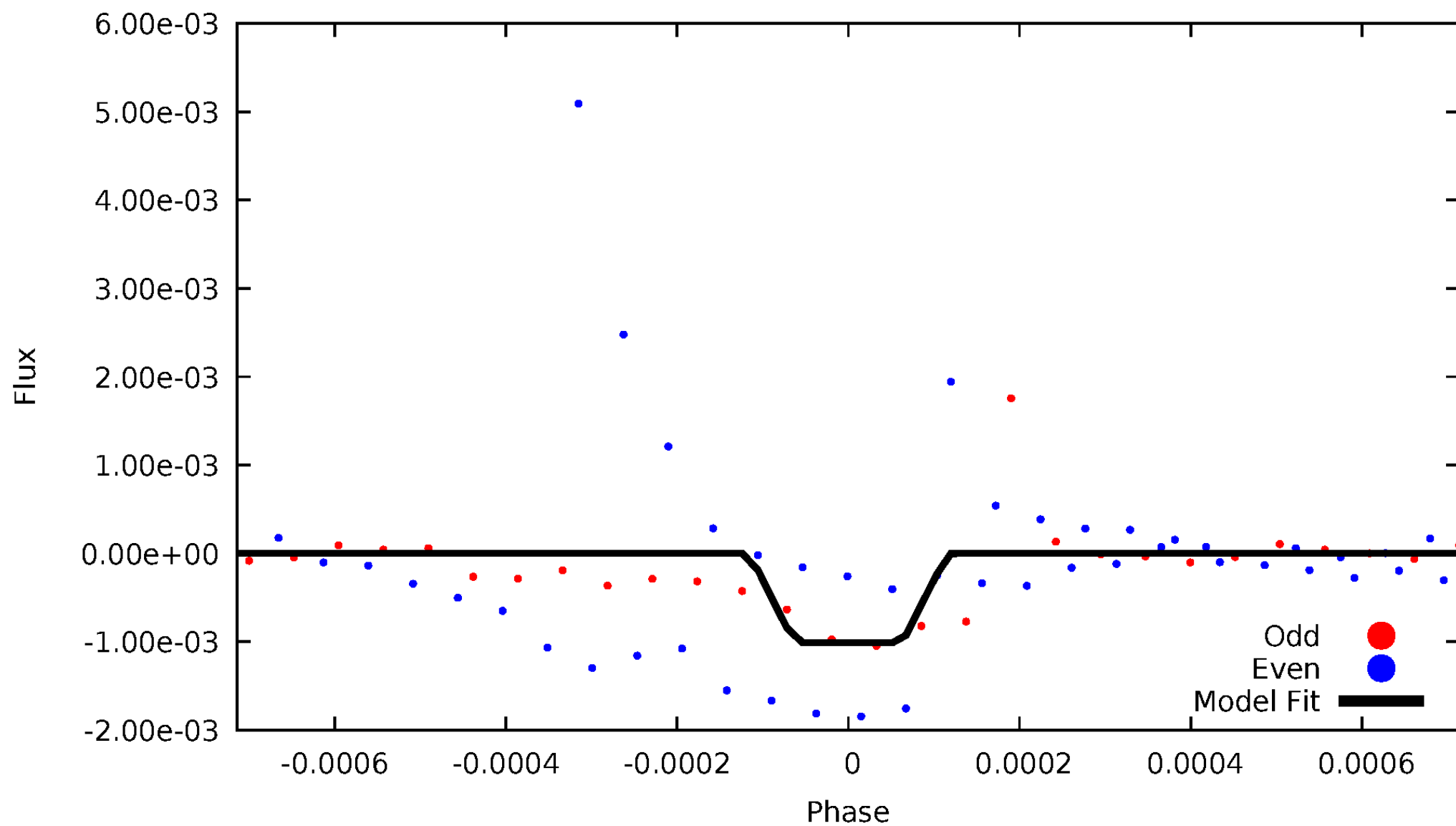
# DV Odd/Even

TCE 006225816-03



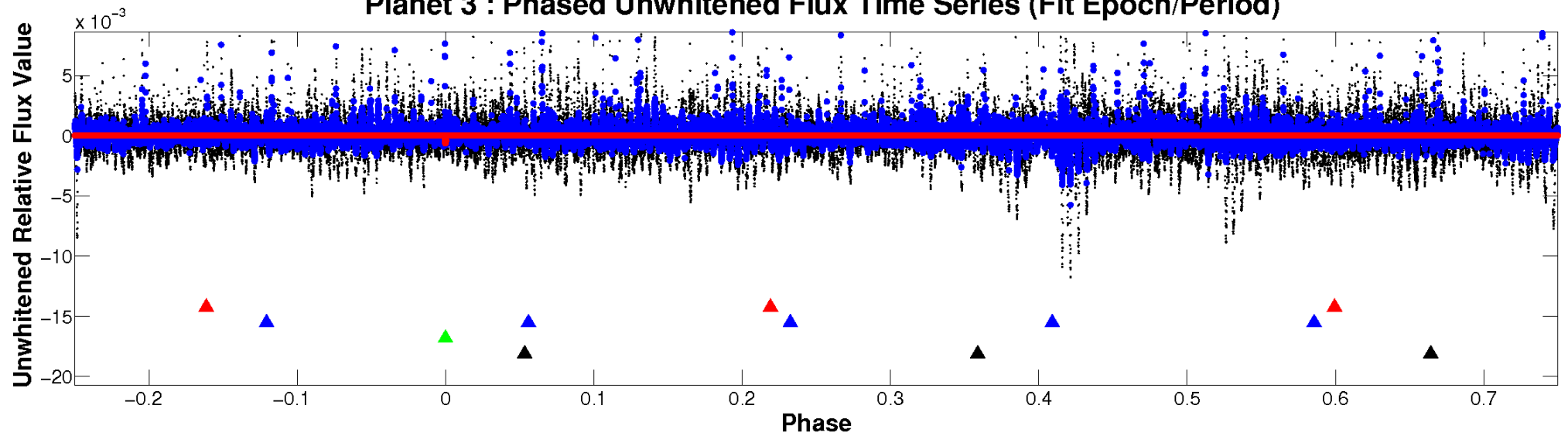
# ALT Odd/Even

TCE 006225816-03

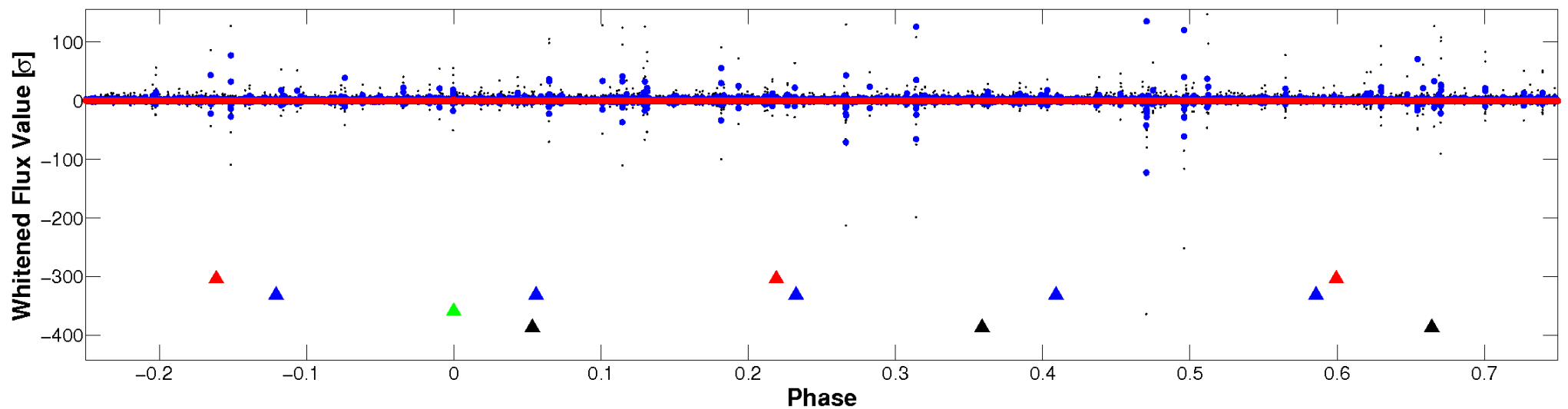


# Non-Whitened Vs. Whitened Light Curve

**Planet 3 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)**

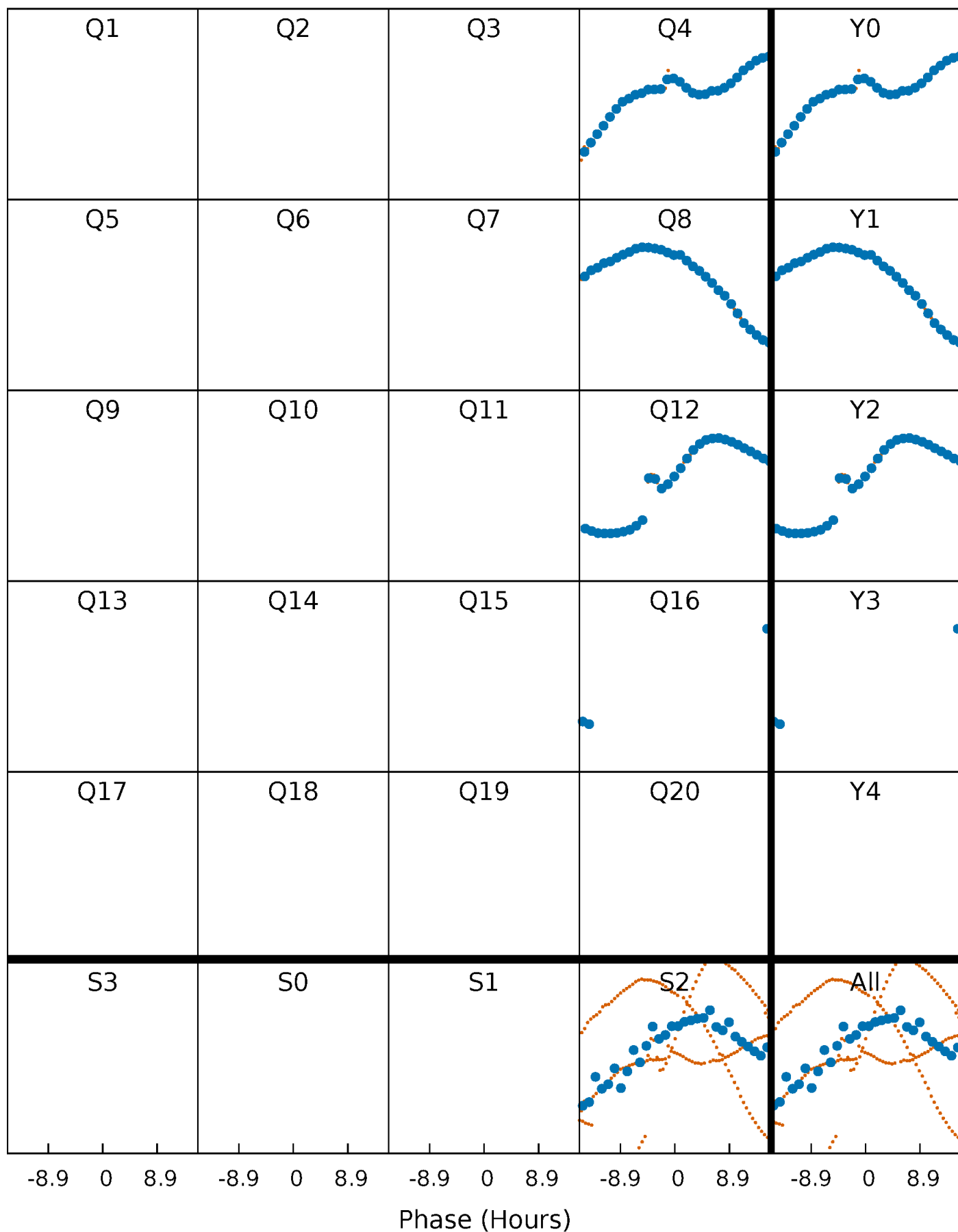


**Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

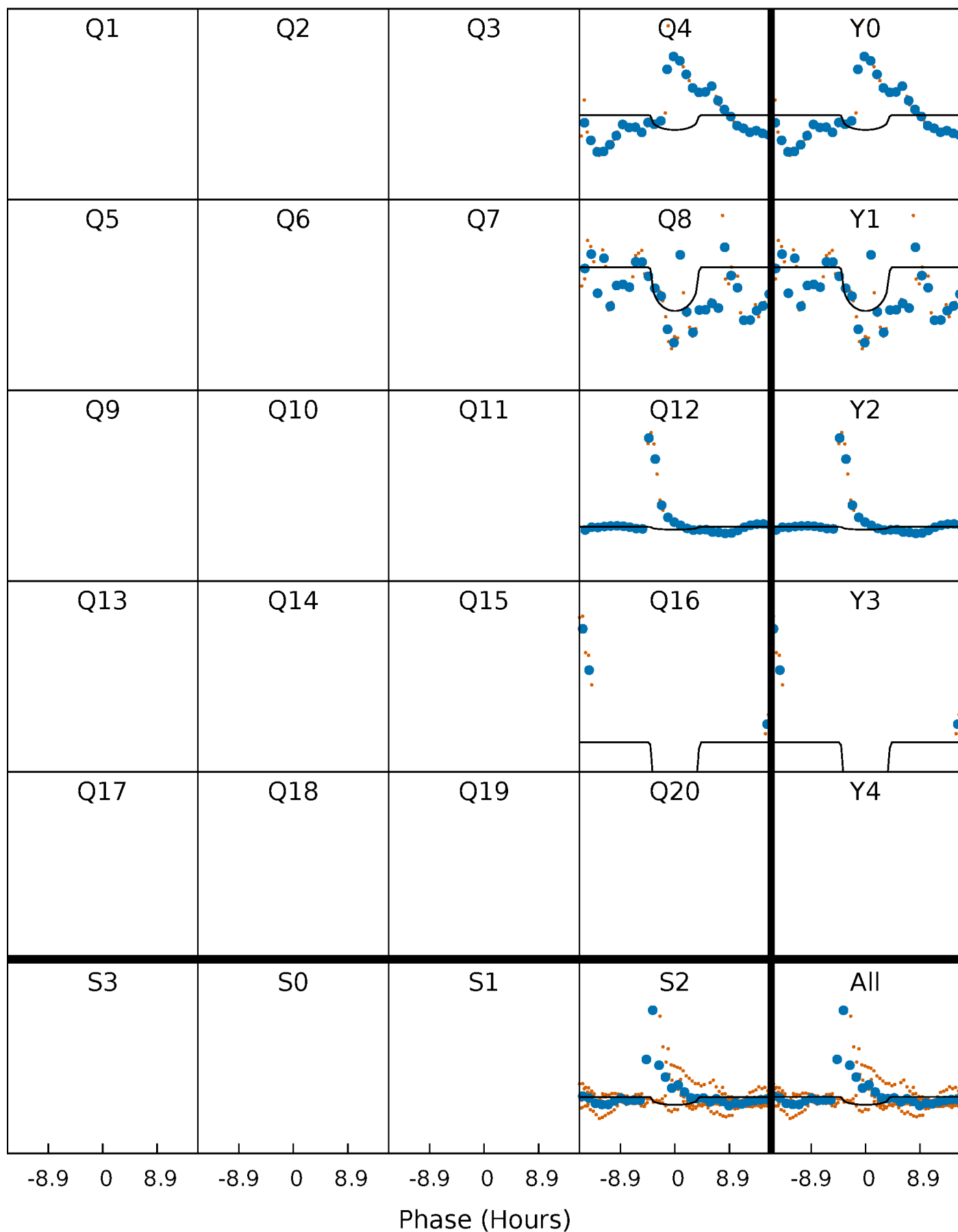
TCE 006225816-03 P=390.115059 Days  $T_0=355.180112$  (BKJD)





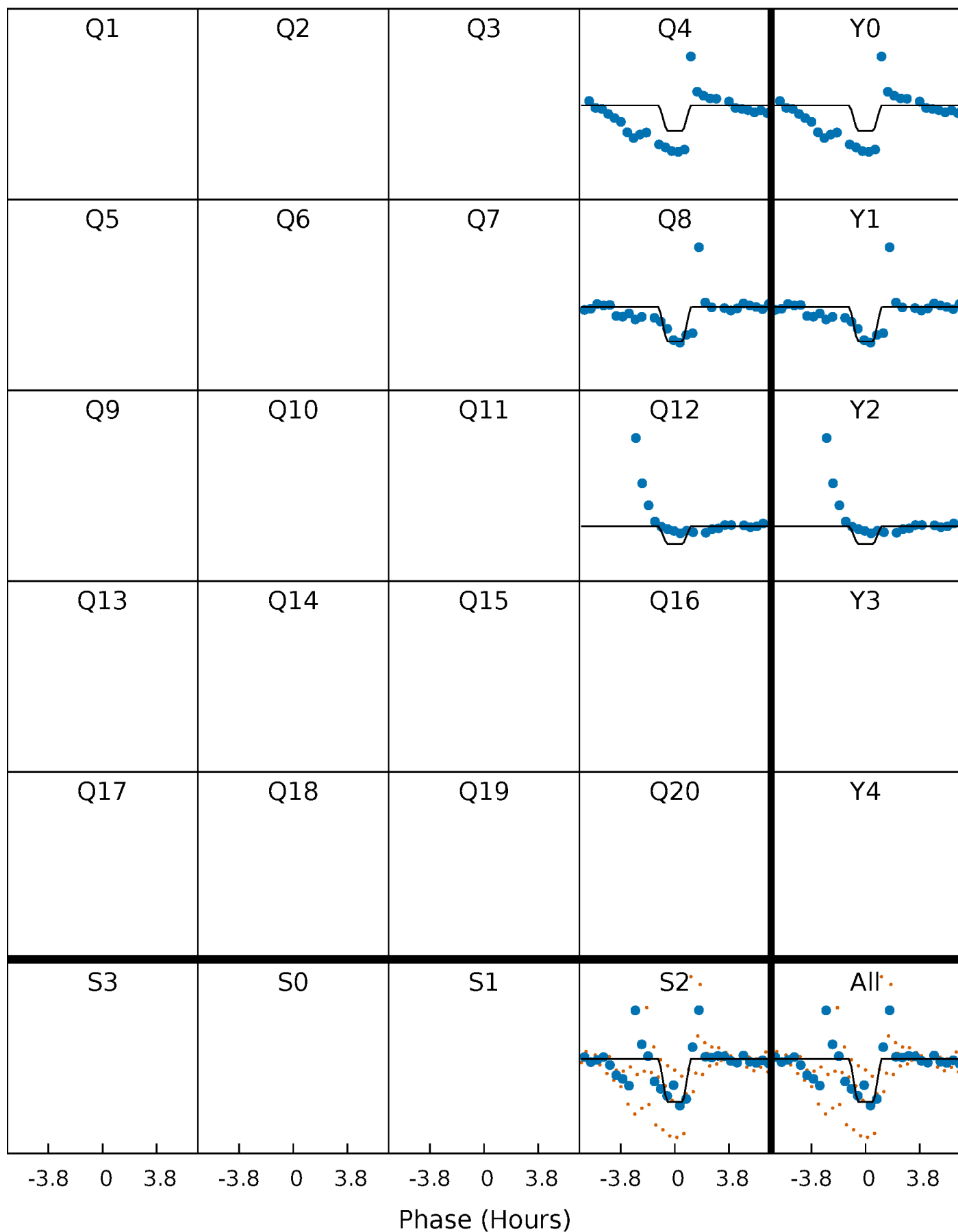
# DV Quarter-Phased Transit Curves

TCE 006225816-03     $P=390.115059$  Days     $T_0=355.180112$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

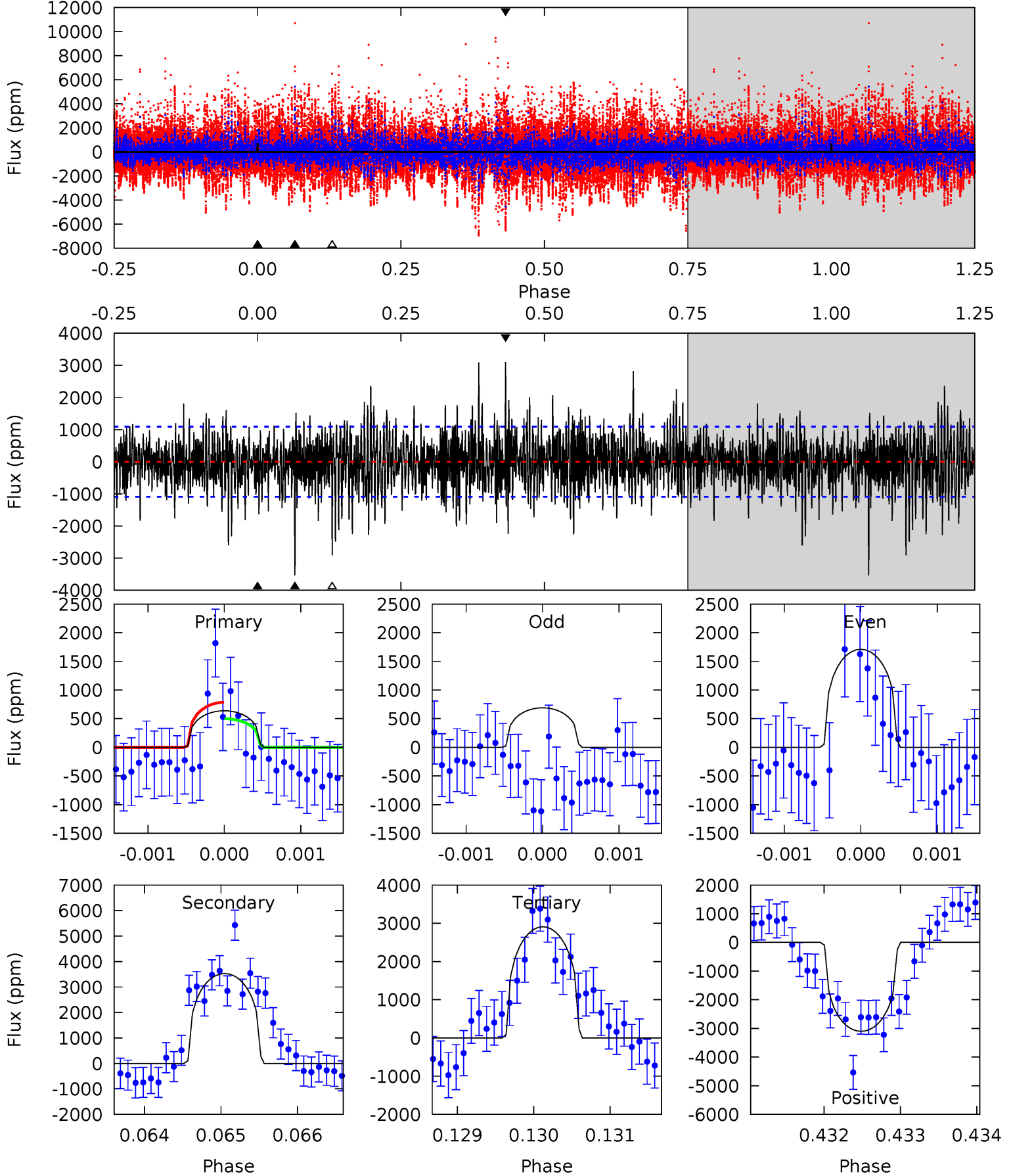
TCE 006225816-03     $P=390.172017$  Days     $T_0=355.088445$  (BKJD)



# DV Model-Shift Uniqueness Test

006225816-03, P = 390.115059 Days, E = 355.180112 Days

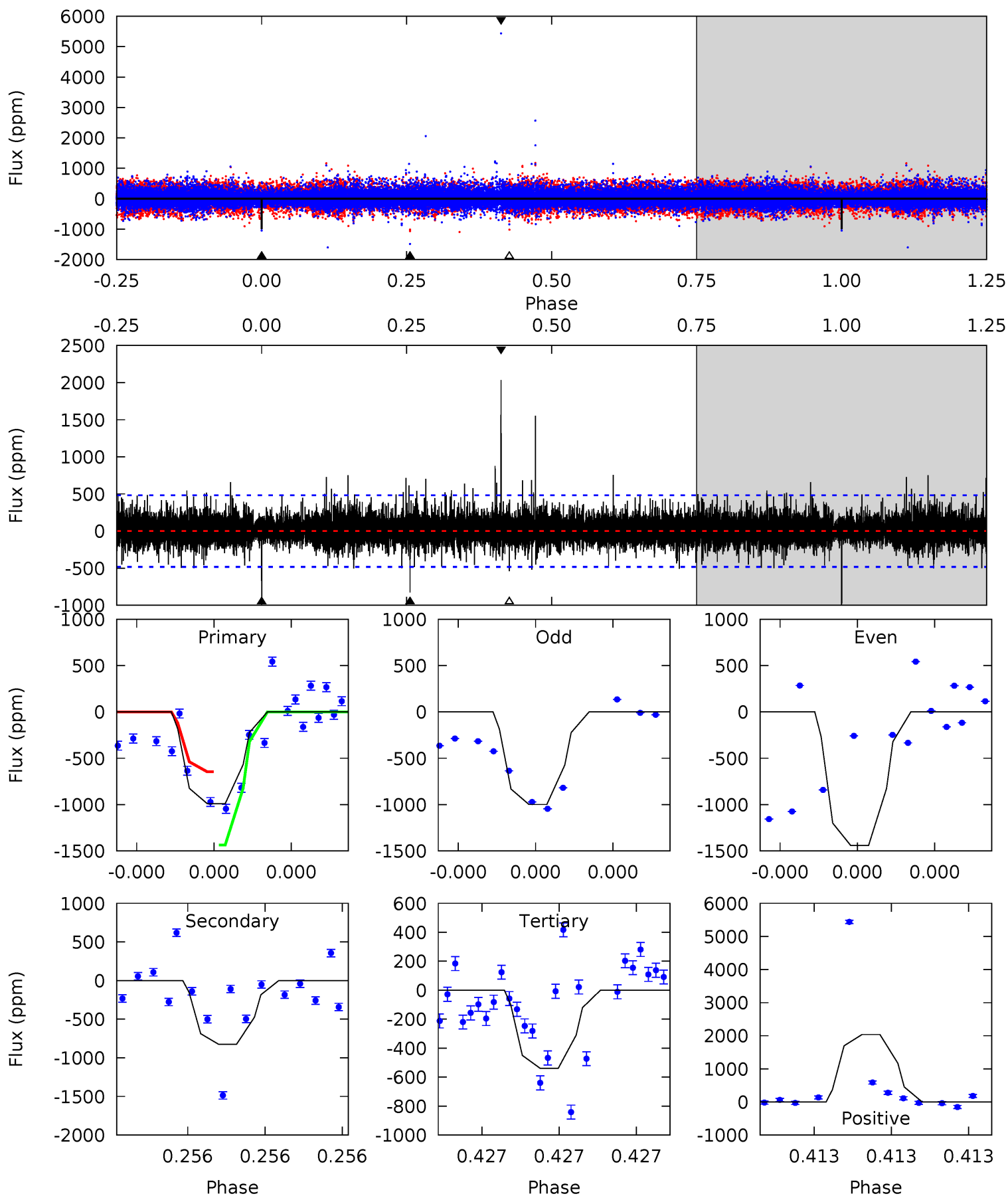
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
3.19	17.6	14.5	15.5	5.47	3.32	3.39	-11.4	-12.3	3.09	2.13	2.25	0.88	0.47	0.72



# Alt Model-Shift Uniqueness Test

006225816-03, P = 390.172017 Days, E = 355.088445 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
11.7	9.78	6.40	24.1	5.71	3.69	1.41	5.34	-12.4	3.38	-14.4	2.96	1.09	0.67	5.55



### Stellar Parameters For KIC 006225816

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4519^{+161}_{-161}$	$4.585^{+0.053}_{-0.025}$	$0.070^{+0.250}_{-0.300}$	$0.706^{+0.038}_{-0.060}$	$0.700^{+0.060}_{-0.054}$	$2.797^{+0.657}_{-0.260}$
	+4%/-4%	+1%/-1%	+357%/-429%	+5%/-8%	+9%/-8%	+23%/-9%
Source	PHO54	PHO54	PHO54	DSEP		

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

### Secondary Eclipse Parameters for KIC 006225816-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-3527 \pm 200$	$2.71^{+2.02}_{-1.80}$	$242^{+9}_{-10}$	$5644^{+5433}_{-1193}$	$228270^{+1852073}_{-152316}$
Alt.	$-825 \pm 84$	$3.09^{+2.43}_{-1.96}$	$242^{+9}_{-9}$	$3978^{+2138}_{-664}$	$41592^{+275426}_{-28315}$

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

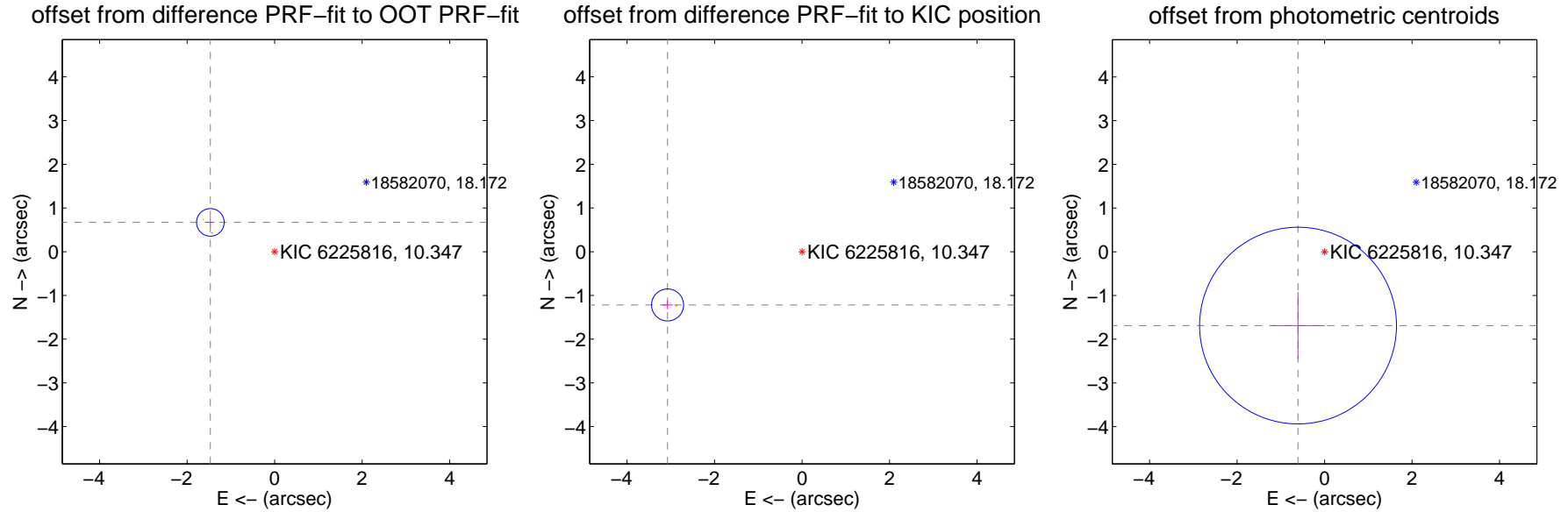
## DV Centroid Data

Supplemental centroid analysis for 006225816-03. **Kepler magnitude: 10.35.** Transit SNR 2.94

There are 0 quarters with good PRF difference image offsets

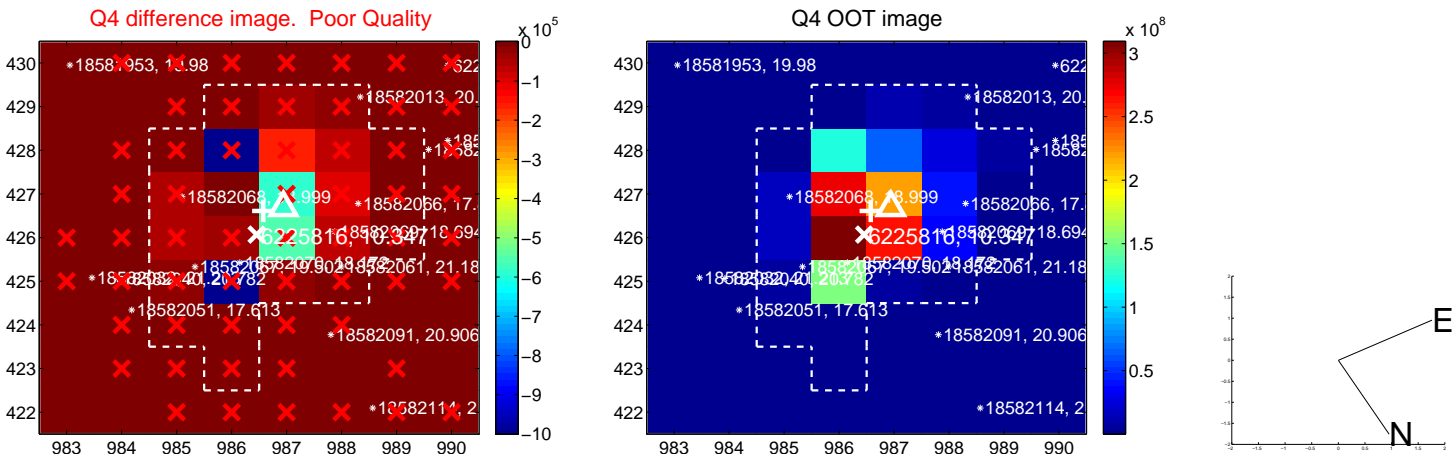
The OOT PRF centroid is offset from the target star catalog position by about 2.74 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>1.615 \pm 0.105</math></b>	<b>15.34</b>	$1.469 \pm 0.092$	$0.671 \pm 0.092$
PRF-fit source offset from KIC position	<b><math>3.306 \pm 0.122</math></b>	<b>27.06</b>	$3.073 \pm 0.126$	$-1.218 \pm 0.096$
photometric centroid source offset	$1.79 \pm 0.75$	2.39	$0.61 \pm 0.61$	$-1.69 \pm 0.77$



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.

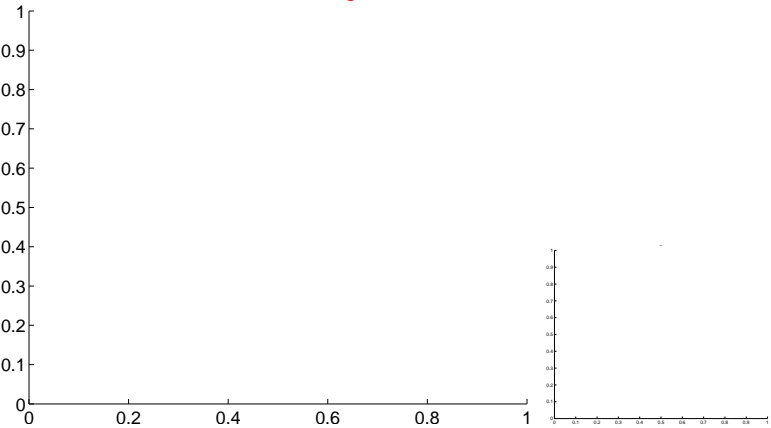


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

Q5 no difference image



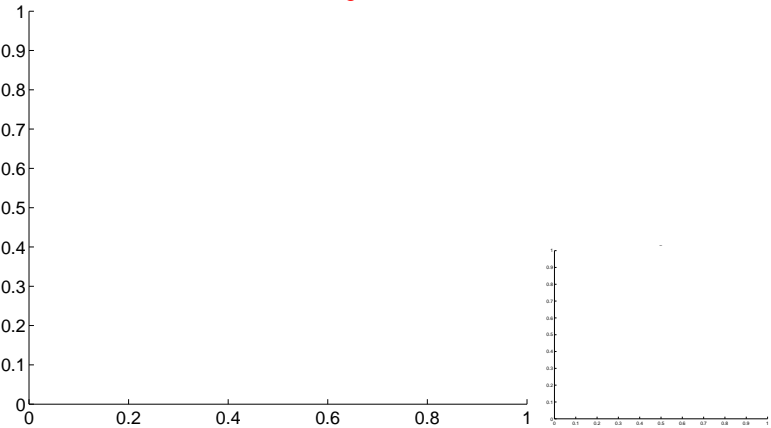
Q5 no OOT image



Q6 no difference image



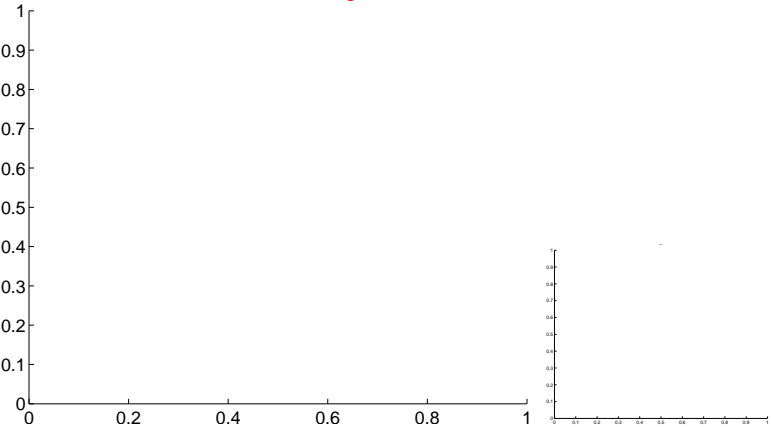
Q6 no OOT image



Q7 no difference image

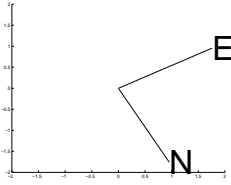
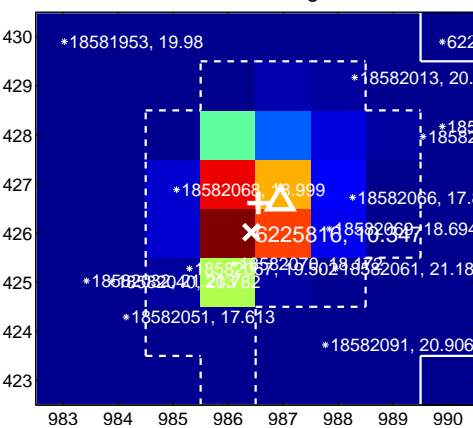
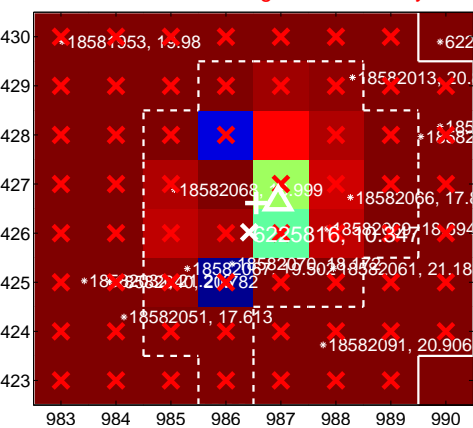


Q7 no OOT image



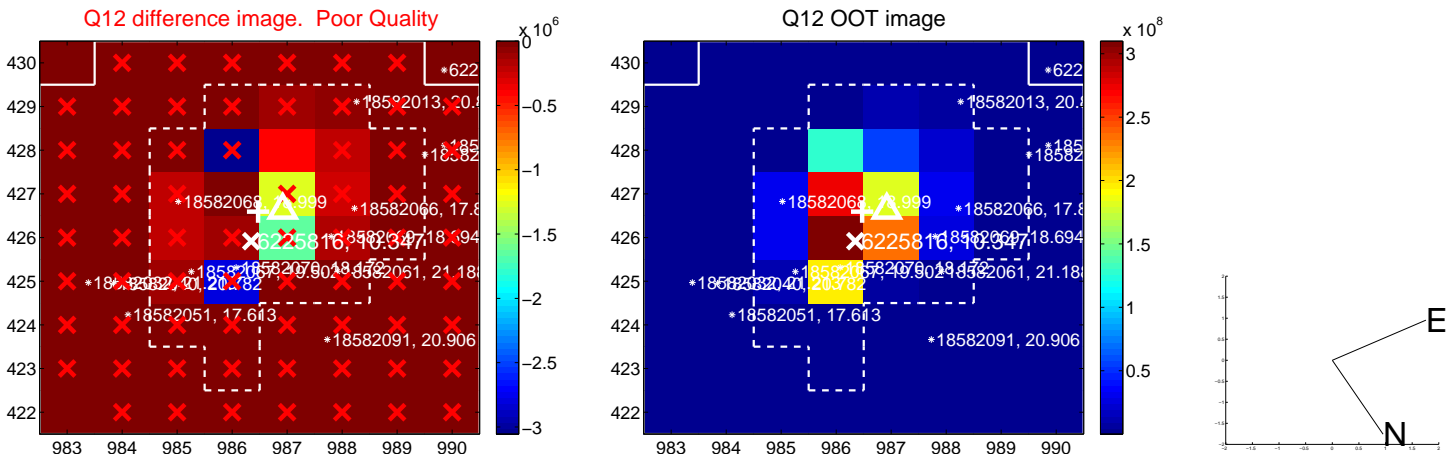
Q8 difference image. Poor Quality

Q8 OOT image





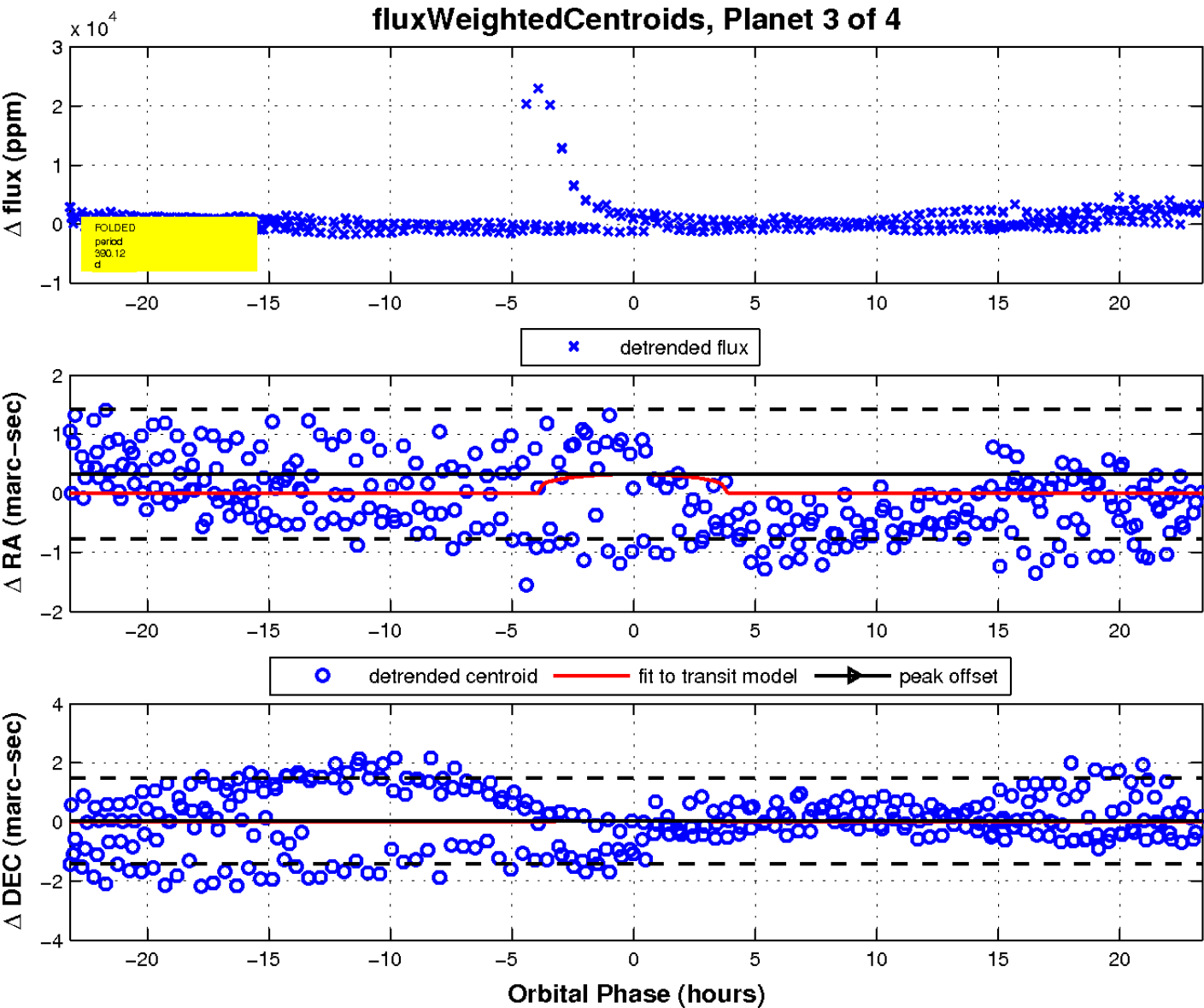
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



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

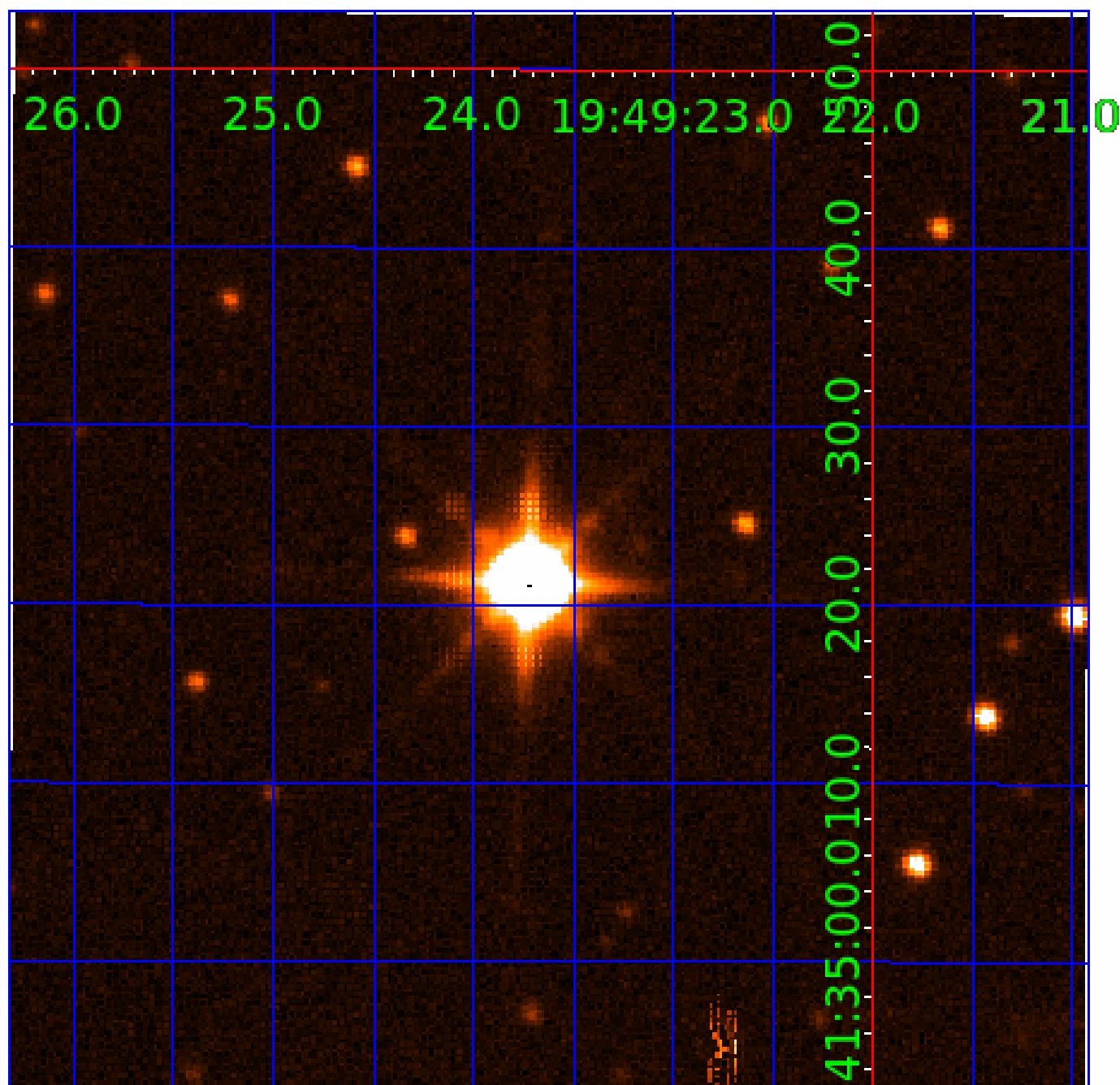


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 006225816

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006225816-01	OBS	No	631.848628	198.922519	1864.9	4.466	17.7	7.4	0.71	4519	3.01	0.11
006225816-02	OBS	No	321.231991	193.541424	528.7	4.530	13.9	2.9	0.71	4519	1.55	0.28
006225816-03	OBS	No	390.115059	355.180112	645.9	7.803	23.5	2.9	0.71	4519	1.73	0.22
006225816-04	OBS	No	661.066533	224.228272	106.3	9.000	16.4	-1.0	0.71	4519	0.69	0.11

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006225816-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_SATURATED
006225816-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
006225816-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
006225816-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED

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

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

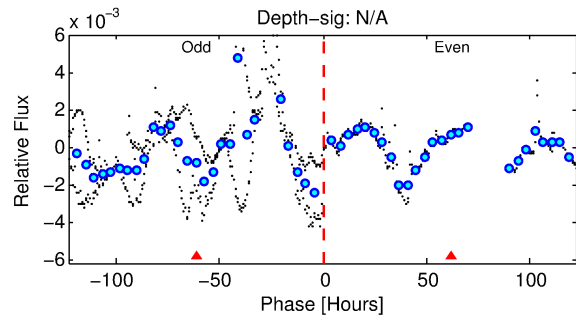
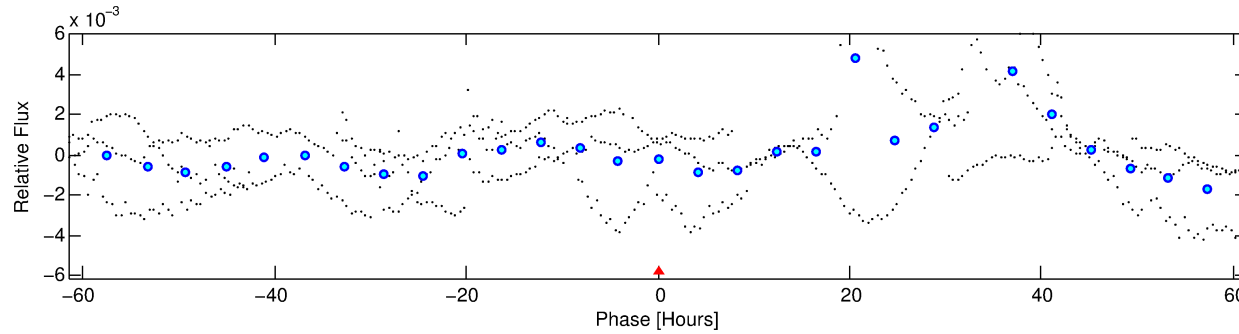
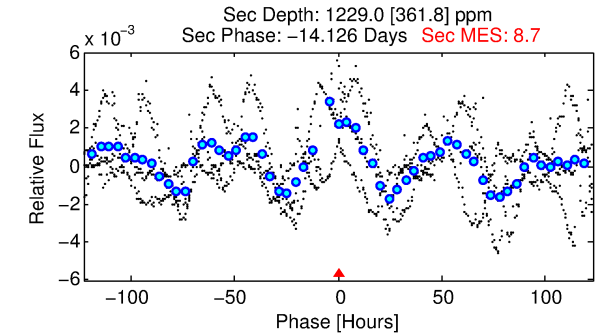
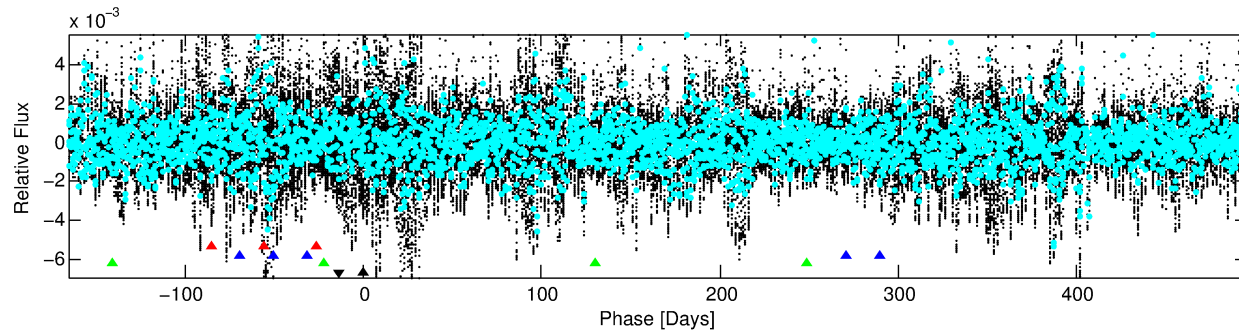
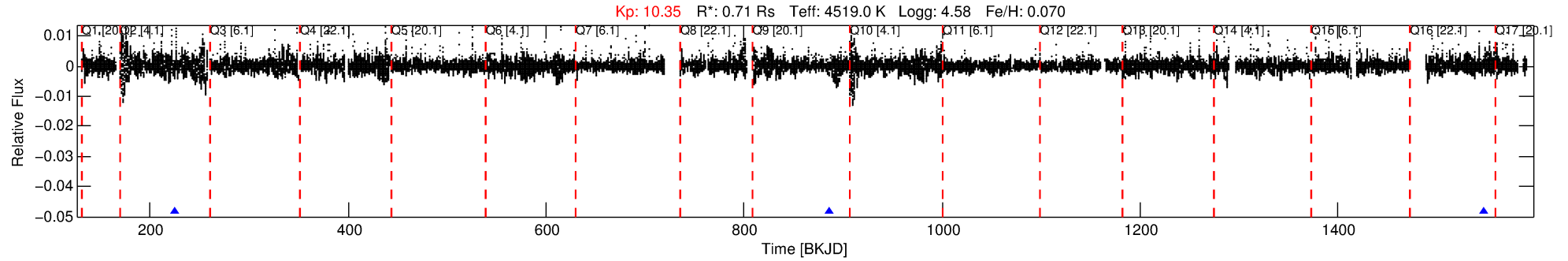
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 006225816-04

No Significant Match Found

# DV One-Page Summary

KIC: 6225816 Candidate: 4 of 4 Period: 661.067 d



## TPS TCE Results:

Period = 661.06653 d  
Epoch = 224.2283 BKJD

DV fit results are unavailable

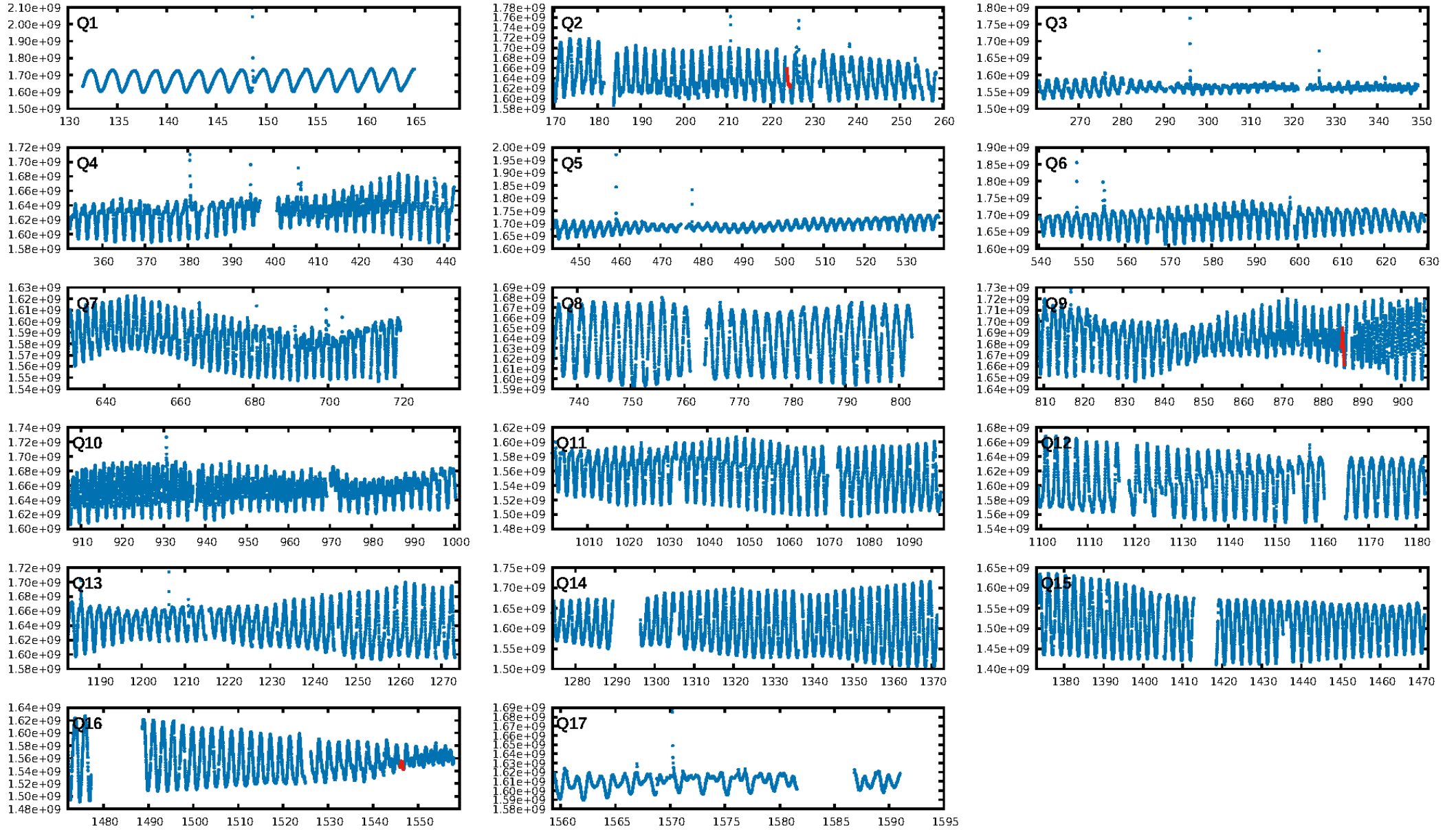
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [69.79σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 7.94e-09  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 5.539  
Centroid-sig: 47.7%  
Centroid-so: 6.840 arcsec [0.80σ]  
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 [1/1]

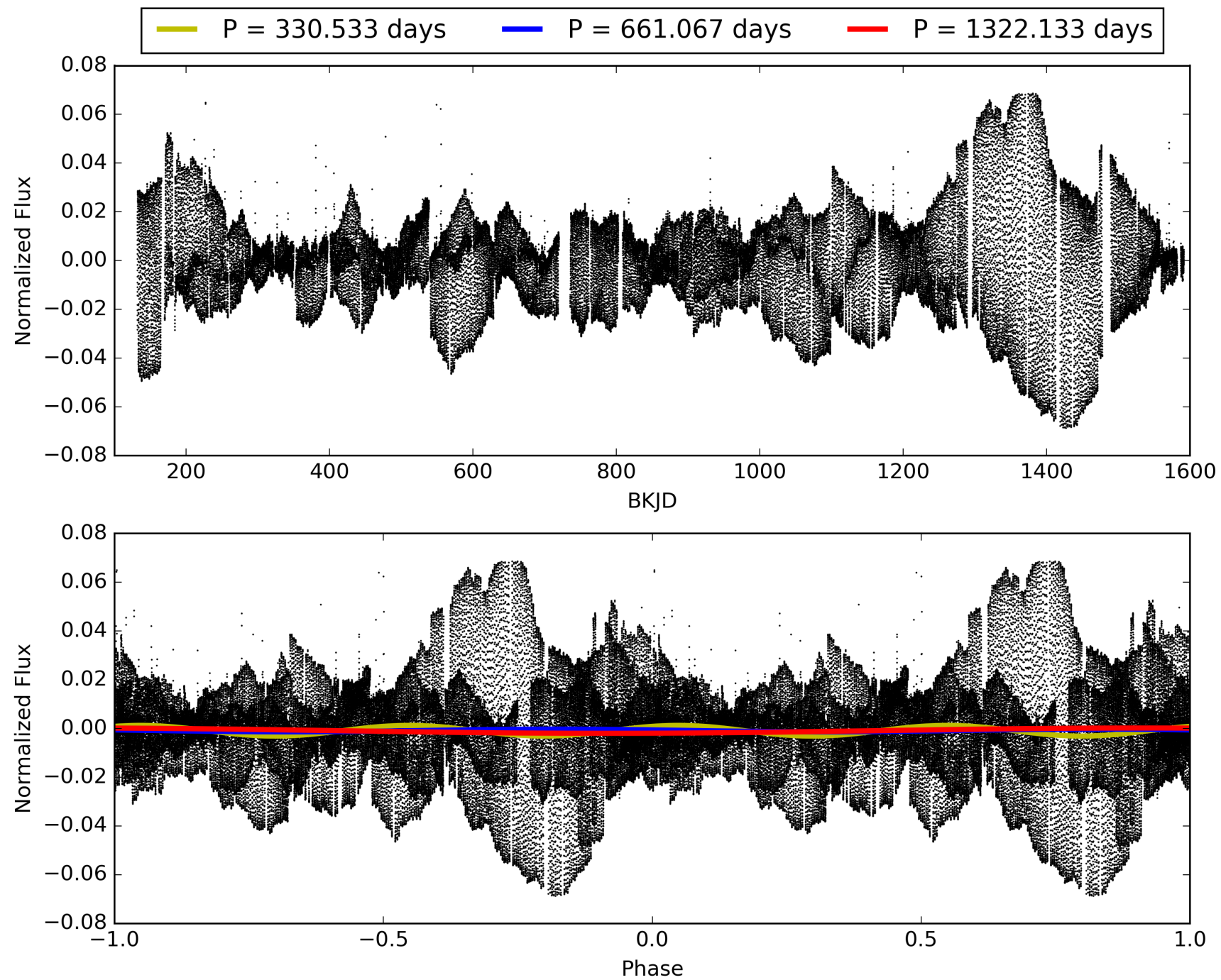
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 03-Feb-2016 08:23:38 Z

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

# TCE 006225816-04, PDC Light Curves



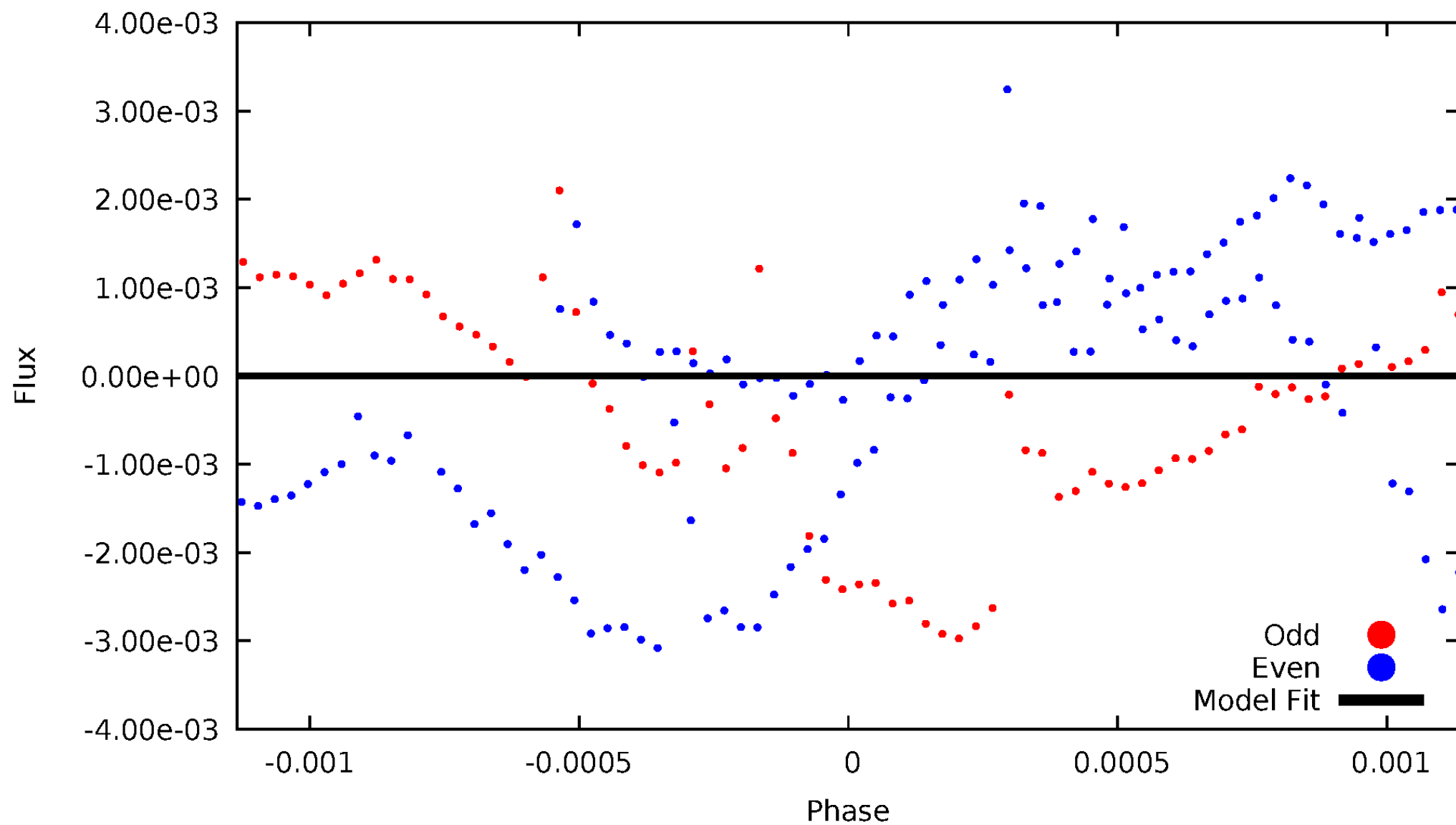
TCE 006225816-04





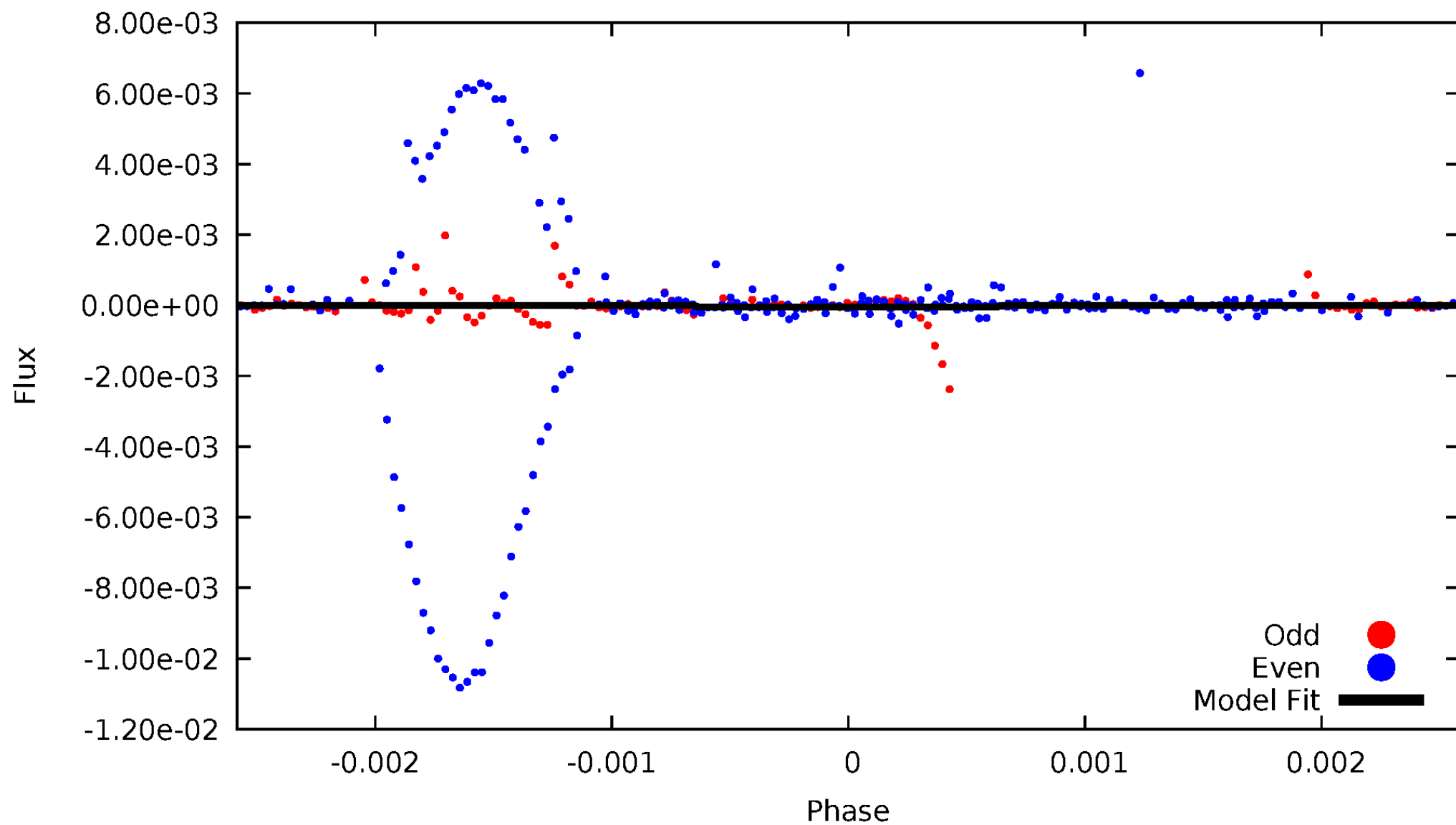
# DV Odd/Even

TCE 006225816-04



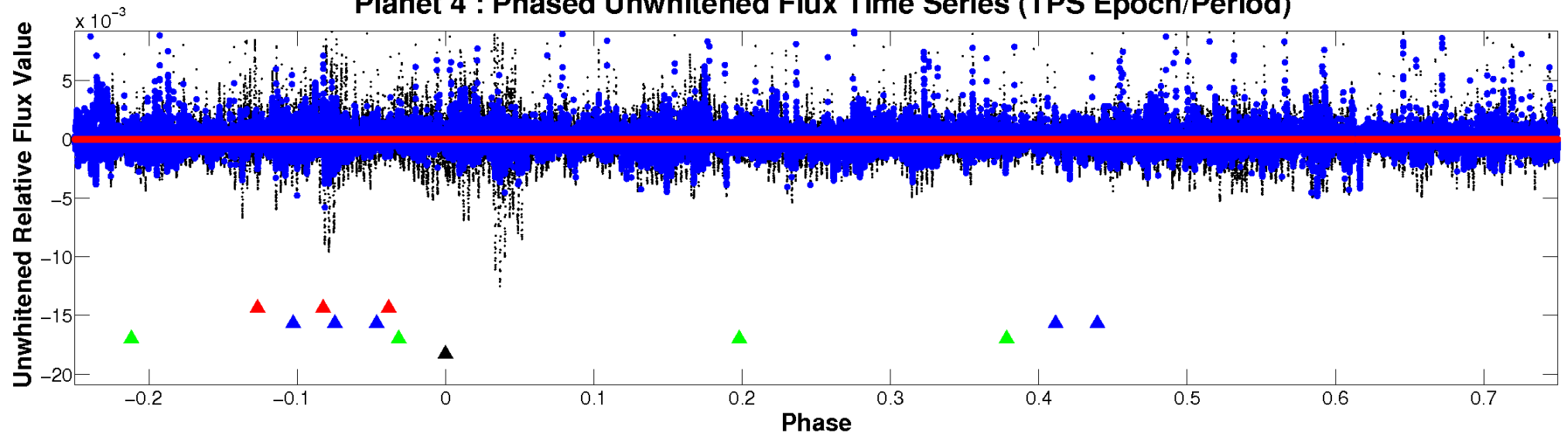
# ALT Odd/Even

TCE 006225816-04



# Non-Whitened Vs. Whitened Light Curve

**Planet 4 : Phased Unwhitened Flux Time Series (TPS Epoch/Period)**

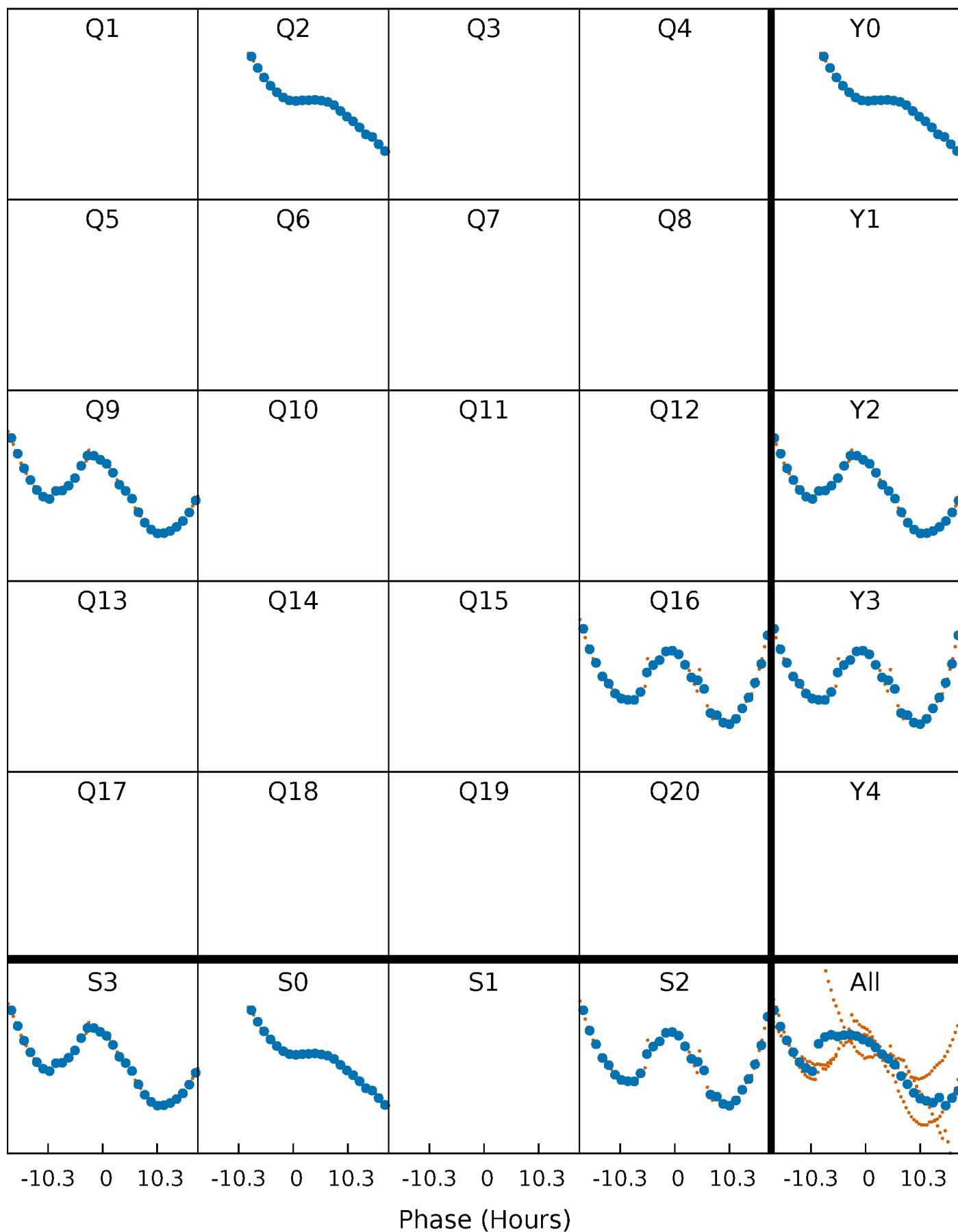


**Planet 4 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



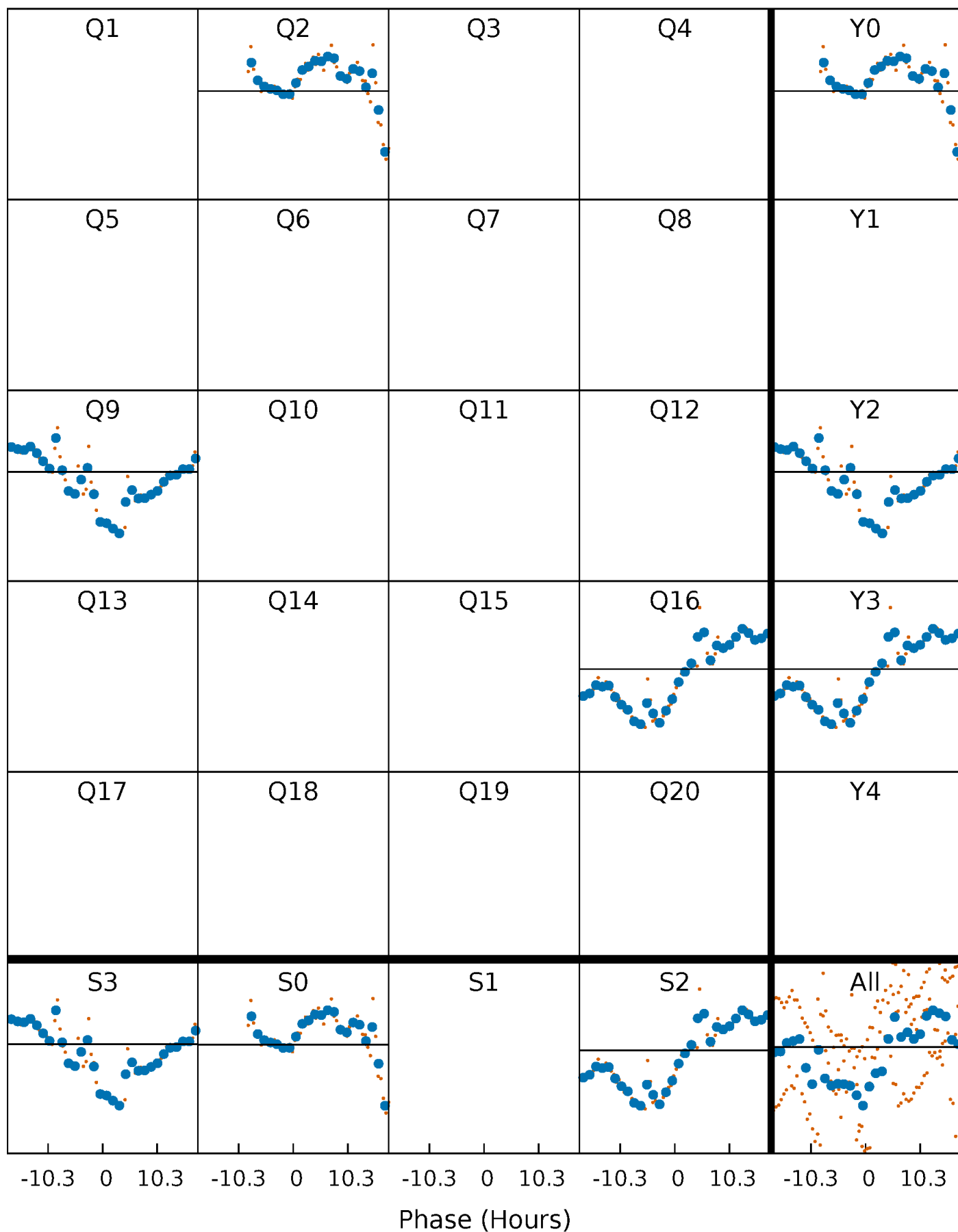
# PDC Quarter-Phased Transit Curves

TCE 006225816-04 P=661.066533 Days  $T_0=224.228272$  (BKJD)



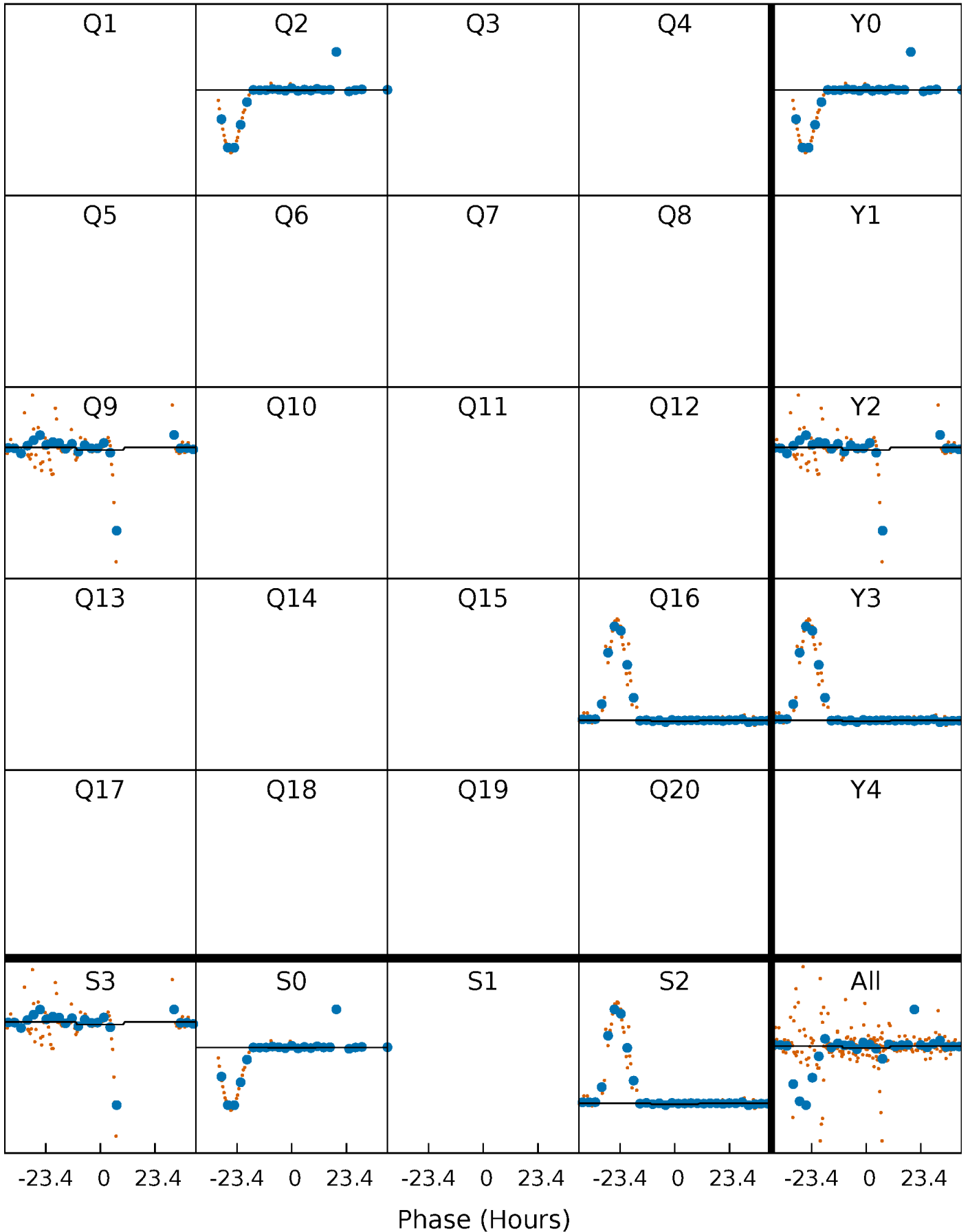
# DV Quarter-Phased Transit Curves

TCE 006225816-04     $P=661.066533$  Days     $T_0=224.228272$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

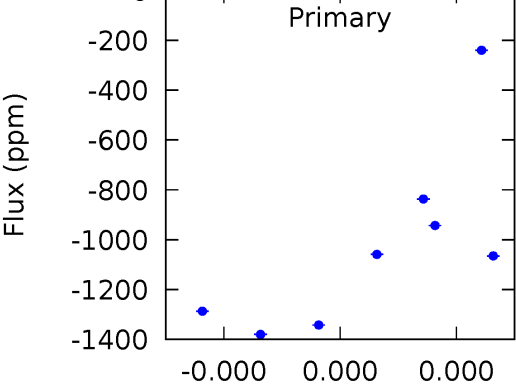
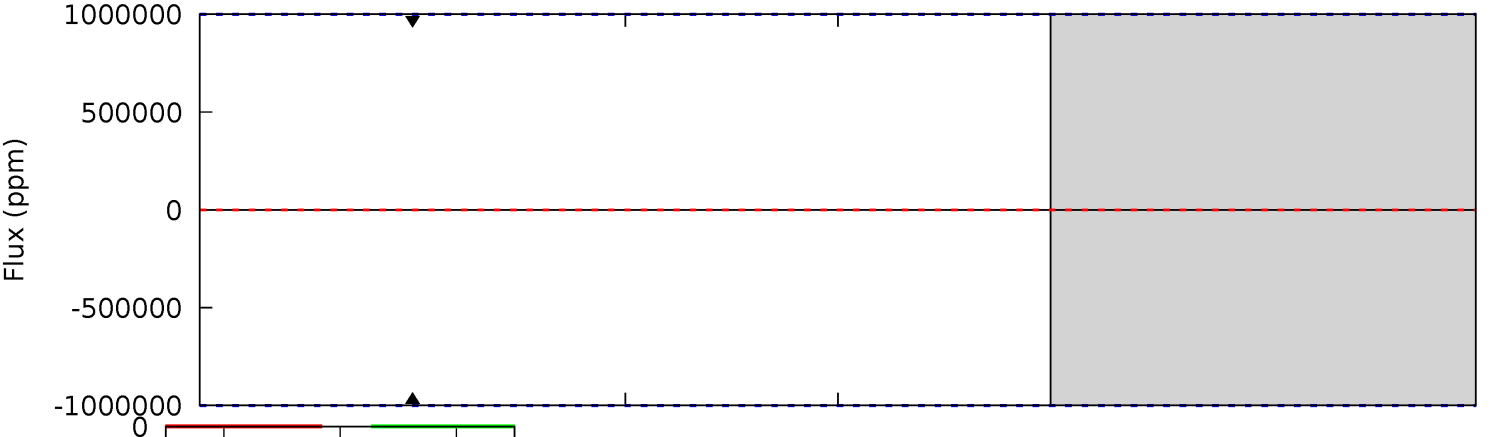
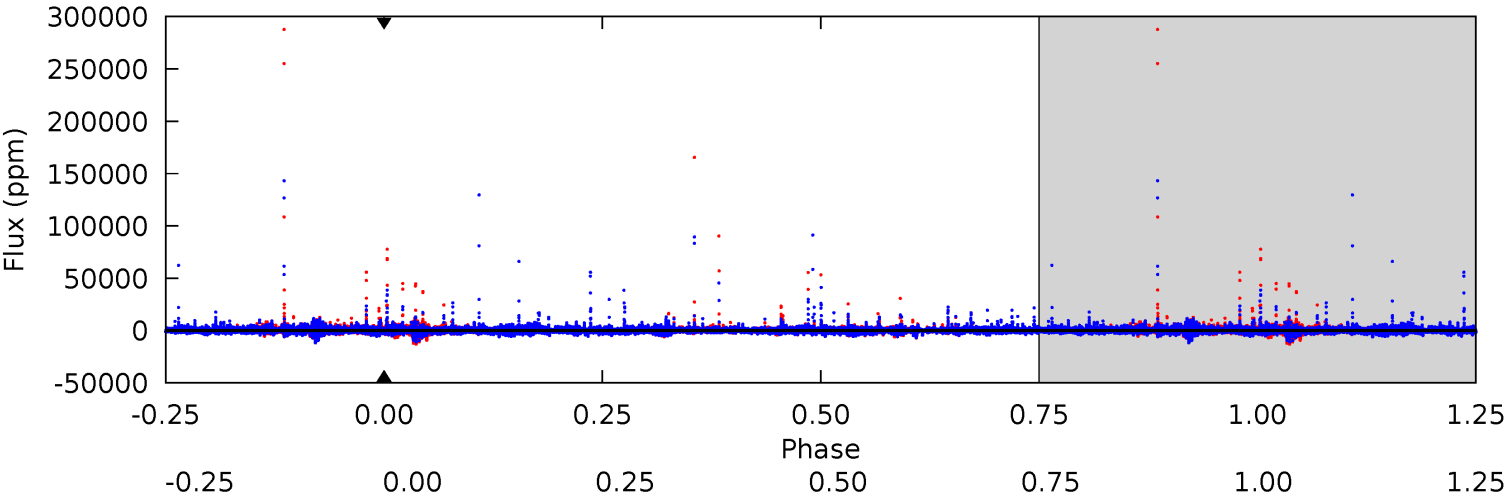
TCE 006225816-04 P=661.066533 Days  $T_0=225.245734$  (BKJD)



# DV Model-Shift Uniqueness Test

006225816-04, P = 661.066533 Days, E = 224.228272 Days

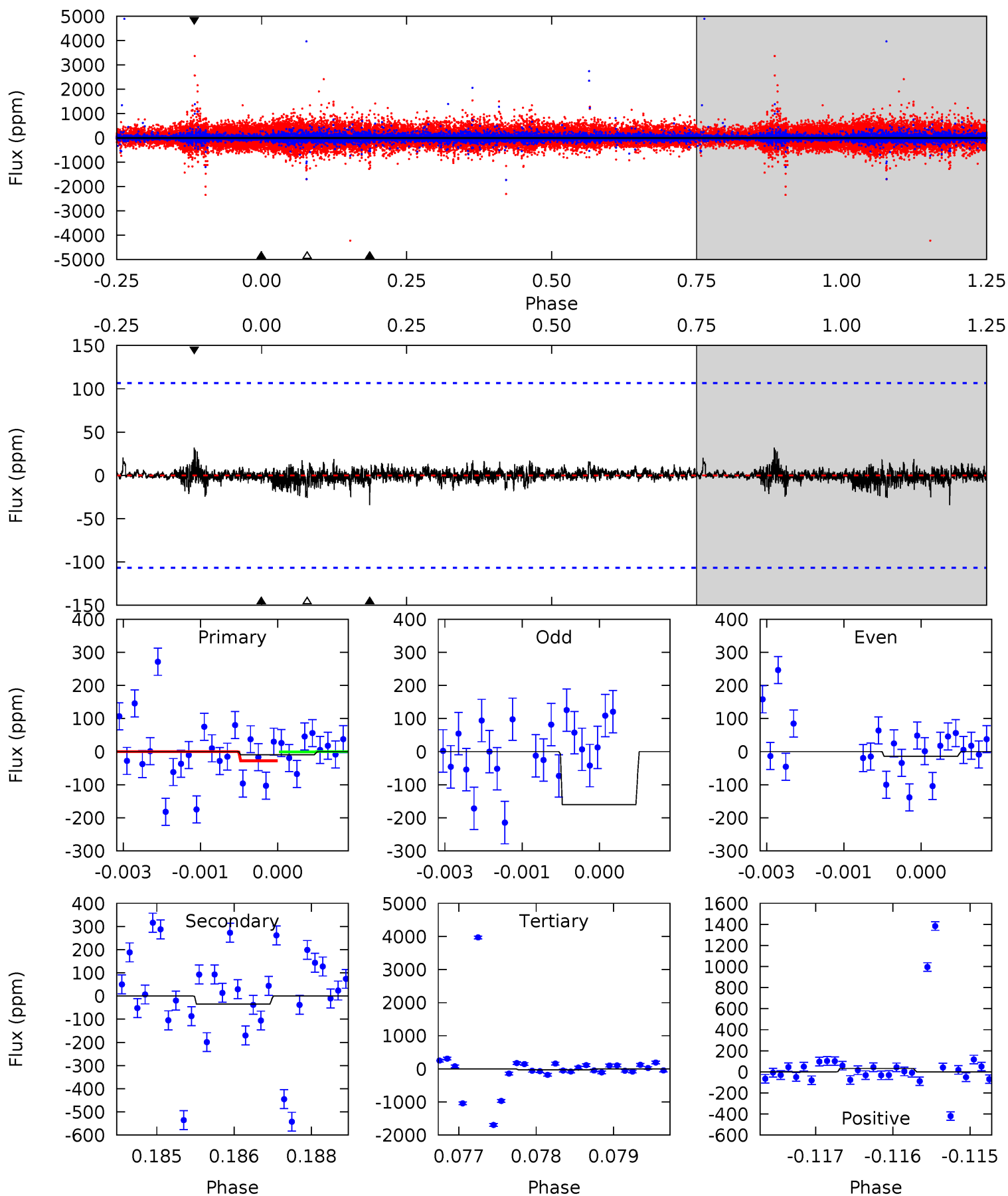
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

006225816-04, P = 661.066533 Days, E = 225.245734 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
0.49	1.74	1.30	1.63	5.40	3.22	0.25	-0.82	-1.14	0.43	0.11	3.11	7.73	0.48	0.68





### Stellar Parameters For KIC 006225816

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4519^{+161}_{-161}$	$4.585^{+0.053}_{-0.025}$	$0.070^{+0.250}_{-0.300}$	$0.706^{+0.038}_{-0.060}$	$0.700^{+0.060}_{-0.054}$	$2.797^{+0.657}_{-0.260}$
	+4%/-4%	+1%/-1%	+357%/-429%	+5%/-8%	+9%/-8%	+23%/-9%
Source	PHO54	PHO54	PHO54	DSEP		

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

### Secondary Eclipse Parameters for KIC 006225816-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$0 \pm 1000000$	$4.99^{+6.00}_{-3.33}$	$203^{+8}_{-8}$	$3871^{+8995}_{-16111}$	$76460^{+6385186}_{-5830012}$
Alt.	$-34 \pm 20$	$5.52^{+5.79}_{-3.90}$	$203^{+8}_{-7}$	$2144^{+832}_{-359}$	$910^{+12332}_{-757}$

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

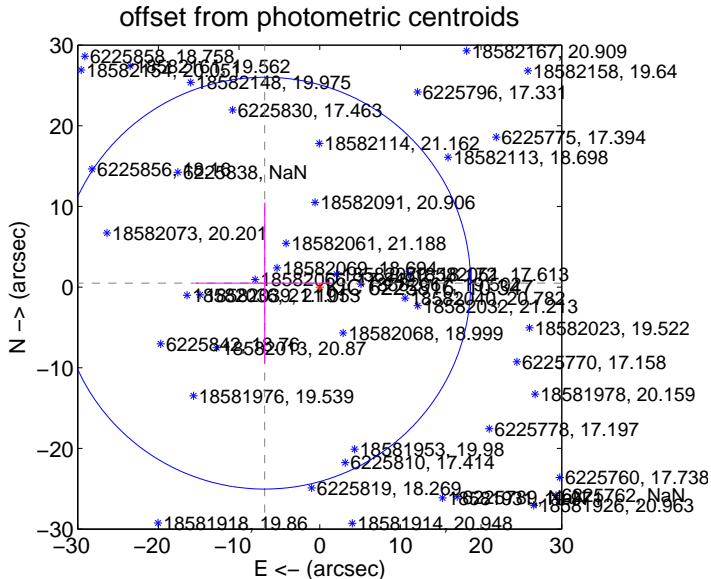
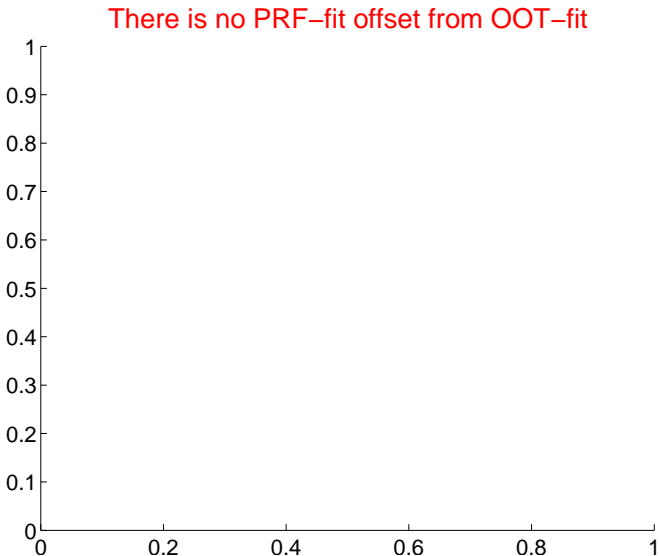
## DV Centroid Data

Supplemental centroid analysis for 006225816-04. **Kepler magnitude: 10.35.** Transit SNR -1.00

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	$6.84 \pm 8.51$	0.80	$6.82 \pm 8.50$	$0.49 \pm 9.98$



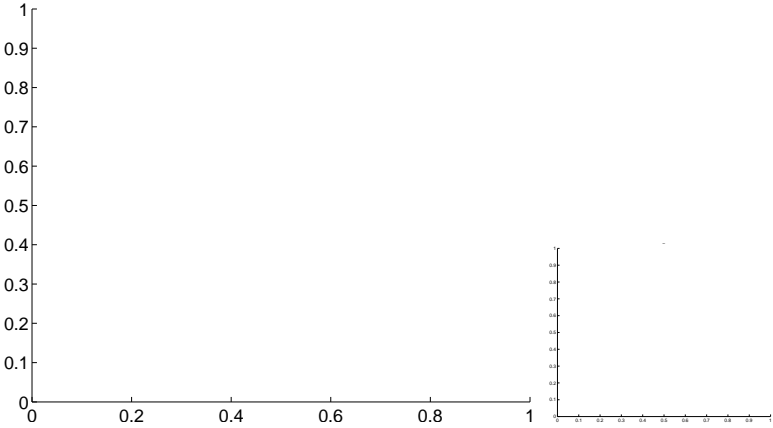
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

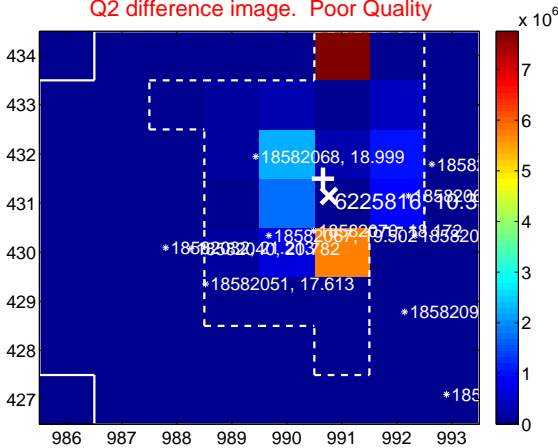
Q1 no difference image



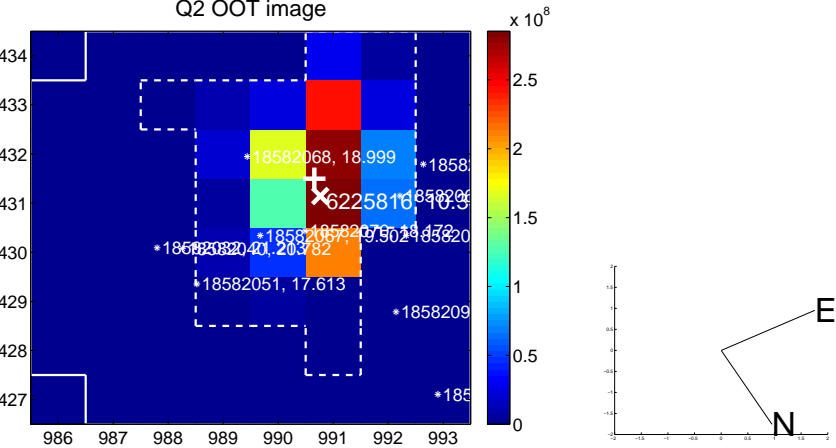
Q1 no OOT image



Q2 difference image. Poor Quality



Q2 OOT image



Q3 no difference image



Q3 no OOT image



Q4 no difference image



Q4 no OOT image



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



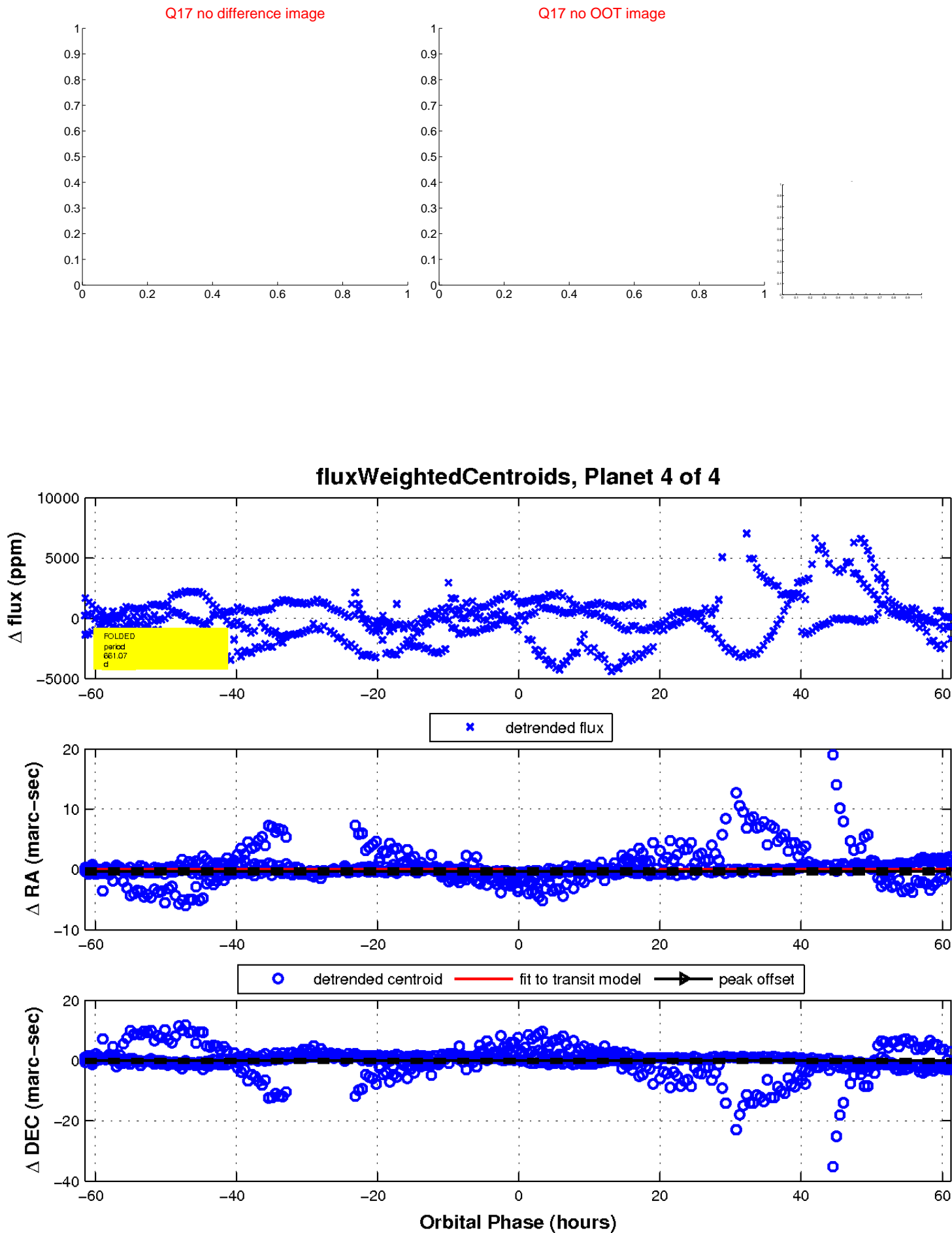
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

