

# KIC 004758595

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004758595-01	OBS	No	423.350997	220.535177	432.2	4.872	13.1	7.6	0.40	3572	0.88	0.03
004758595-02	OBS	No	280.545583	360.075977	821.0	6.573	11.3	9.2	0.40	3572	1.83	0.06
004758595-03	OBS	No	286.518829	345.313155	286.2	12.658	9.5	5.2	0.40	3572	0.69	0.06
004758595-04	OBS	No	577.499818	244.825946	487.0	8.254	10.1	7.0	0.40	3572	0.95	0.02

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004758595-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
004758595-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
004758595-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_ZUMA—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS
004758595-04	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—INCONSISTENT_TRANS—CENT_KIC_POS

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

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

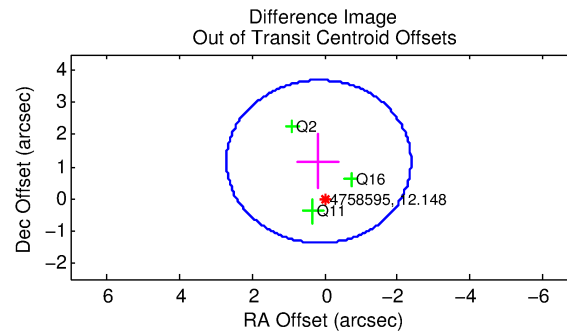
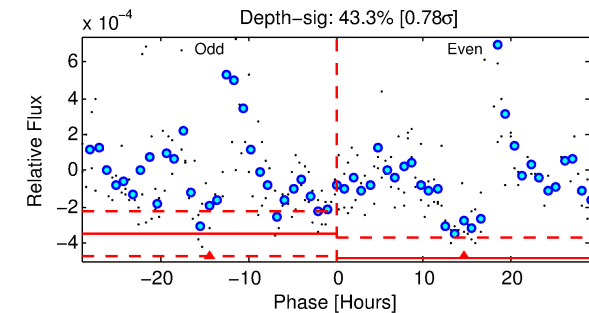
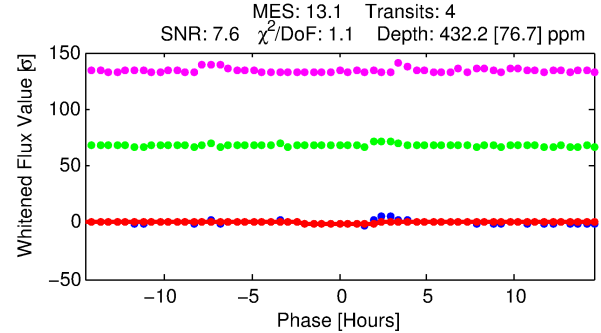
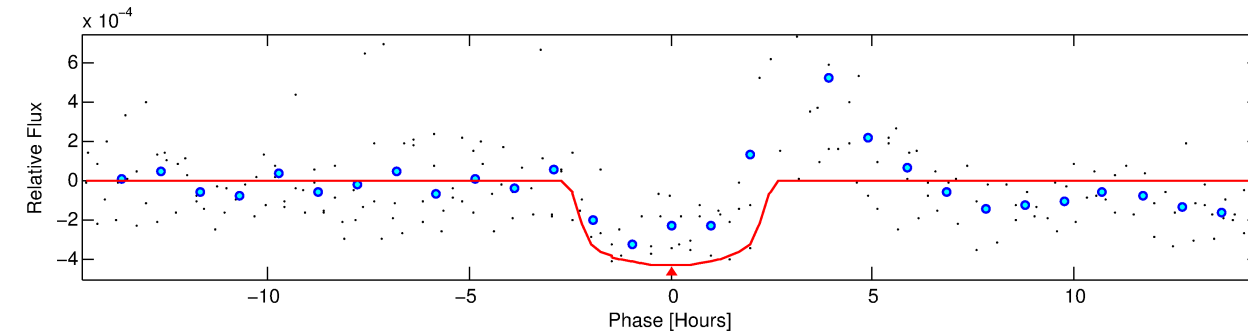
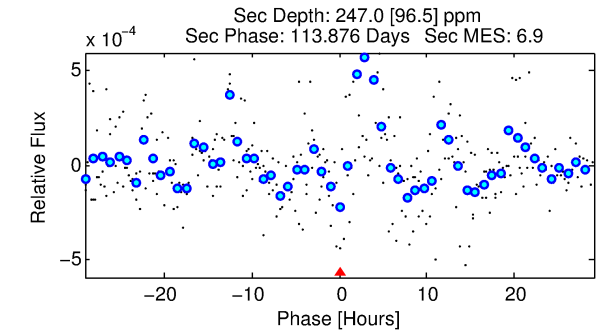
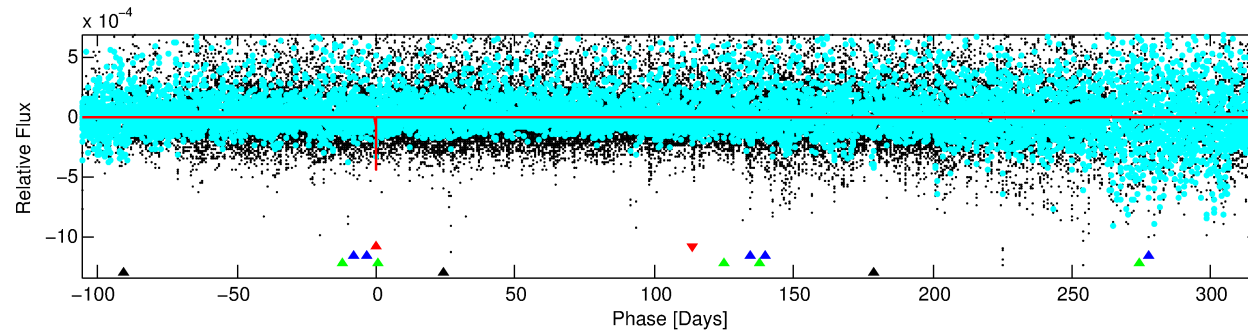
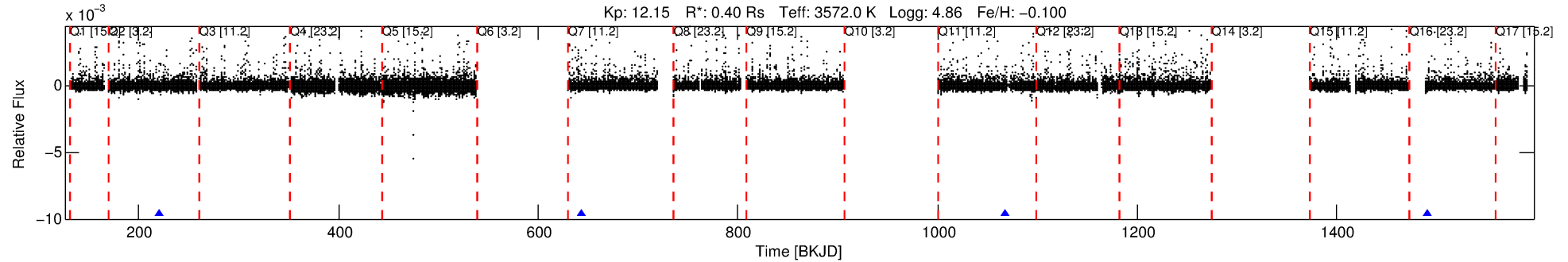
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004758595-01

No Significant Match Found

# DV One-Page Summary

KIC: 4758595 Candidate: 1 of 4 Period: 423.351 d



## DV Fit Results:

Period = 423.35100 [0.00795] d  
Epoch = 220.5352 [0.0117] BKJD  
Rp/R\* = 0.0202 [0.0858]  
a/R\* = 498.07 [9248.76]  
b = 0.69 [14.11]  
Seff = 0.03 [0.01]  
Teq = 109 [4] K  
Rp = 0.88 [3.72] Re  
a = 0.8229 [0.0746] AU  
Ag = 119631.74 [1014712.00] [0.12 $\sigma$ ]  
Teffp = 3147 [6673] K [0.46 $\sigma$ ]

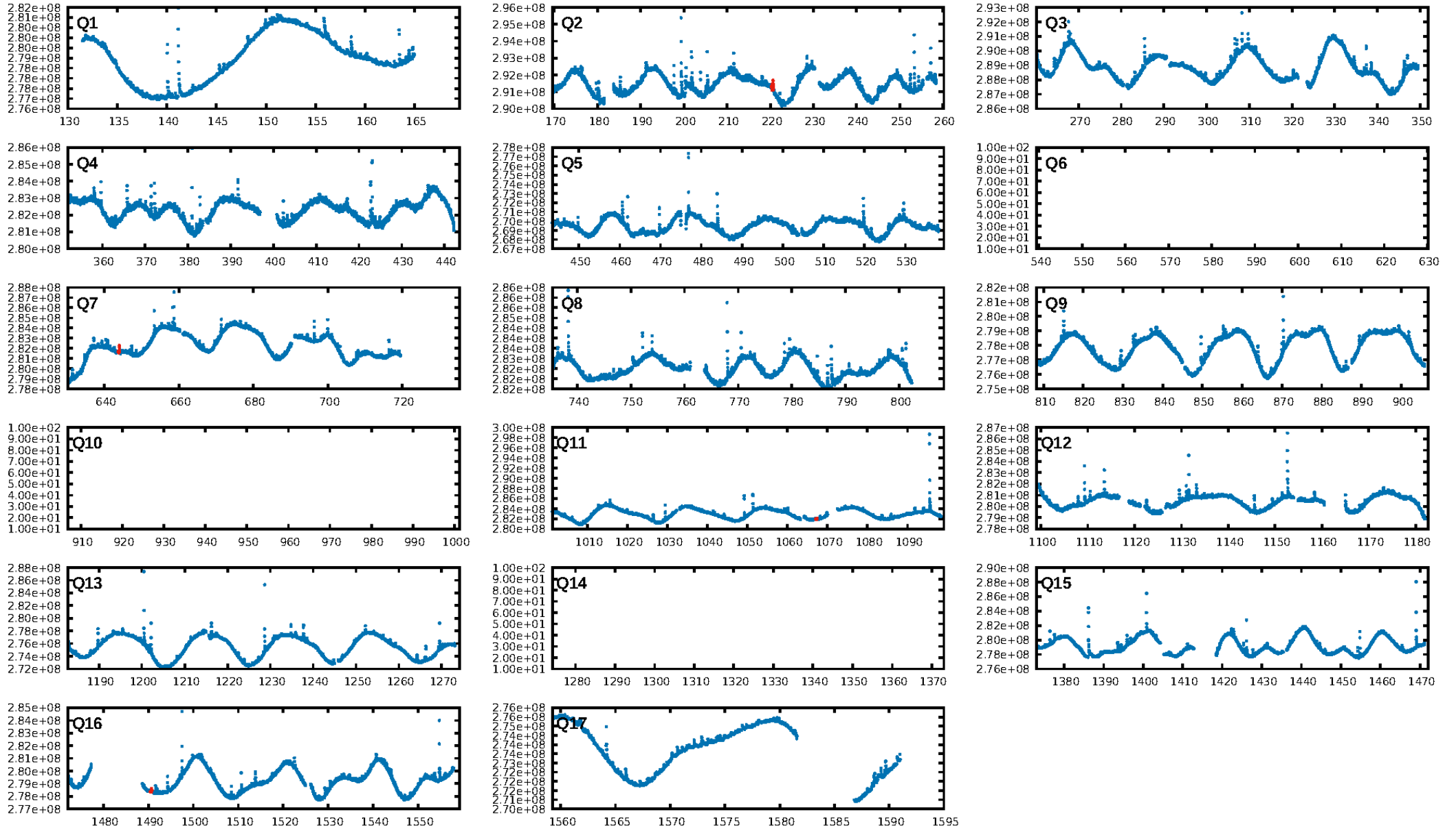
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [242.13 $\sigma$ ]  
LongPeriod-sig: 100.0% [385.98 $\sigma$ ]  
ModelChiSquare2-sig: 12.9%  
ModelChiSquareGof-sig: 95.2%  
**Bootstrap-pfa: 4.85e-11**  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -13.37  
Centroid-sig: 3.1%  
**Centroid-so: 2.252 arcsec [3.74 $\sigma$ ]**  
OotOffset-rm: 1.169 arcsec [1.38 $\sigma$ ]  
**KicOffset-rm: 2.688 arcsec [3.62 $\sigma$ ]**  
OotOffset-st: 1/1/1/0 [3]  
KicOffset-st: 1/1/1/0 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 1.00 [3/3]

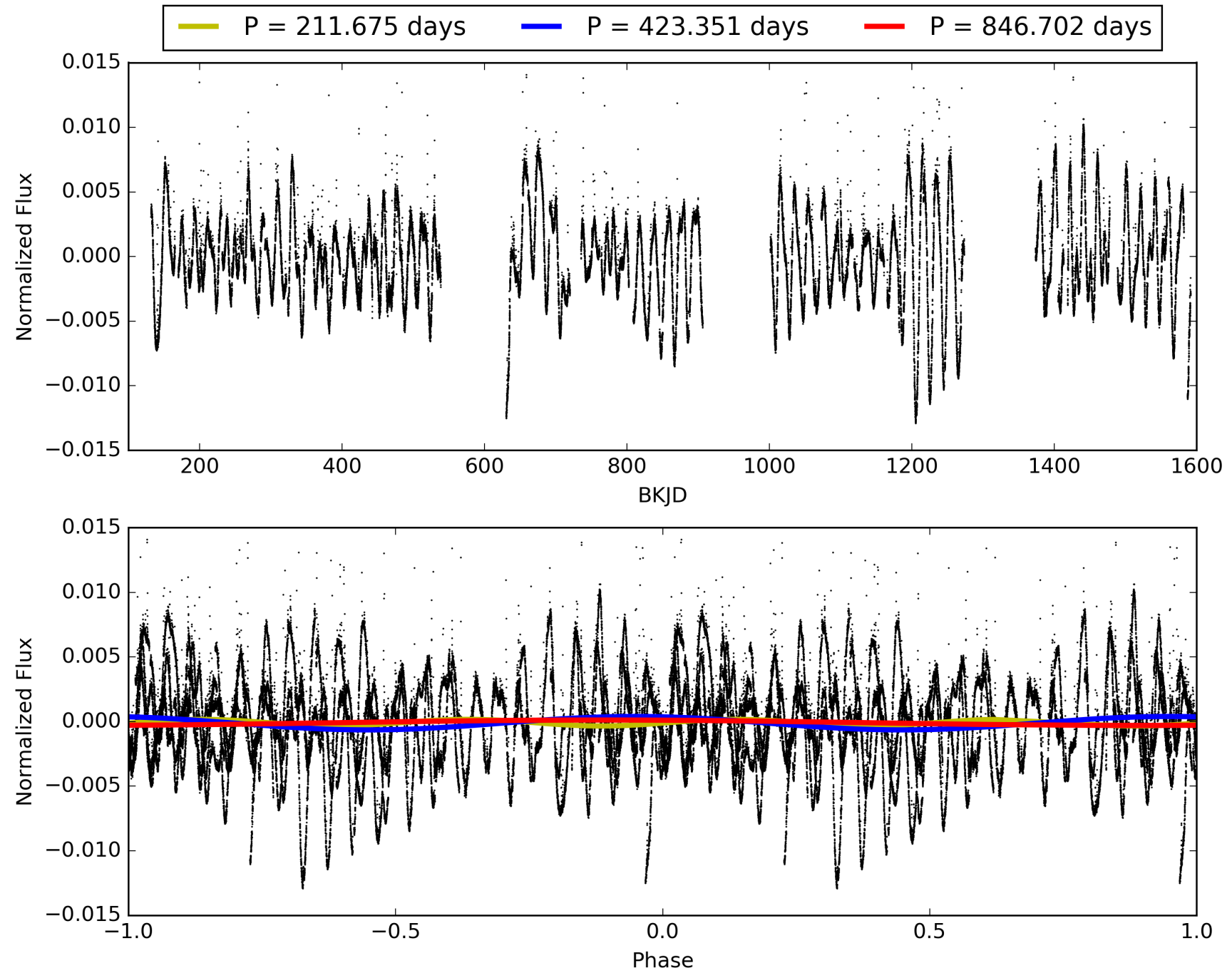
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 16:41:19 Z

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

# TCE 004758595-01, PDC Light Curves

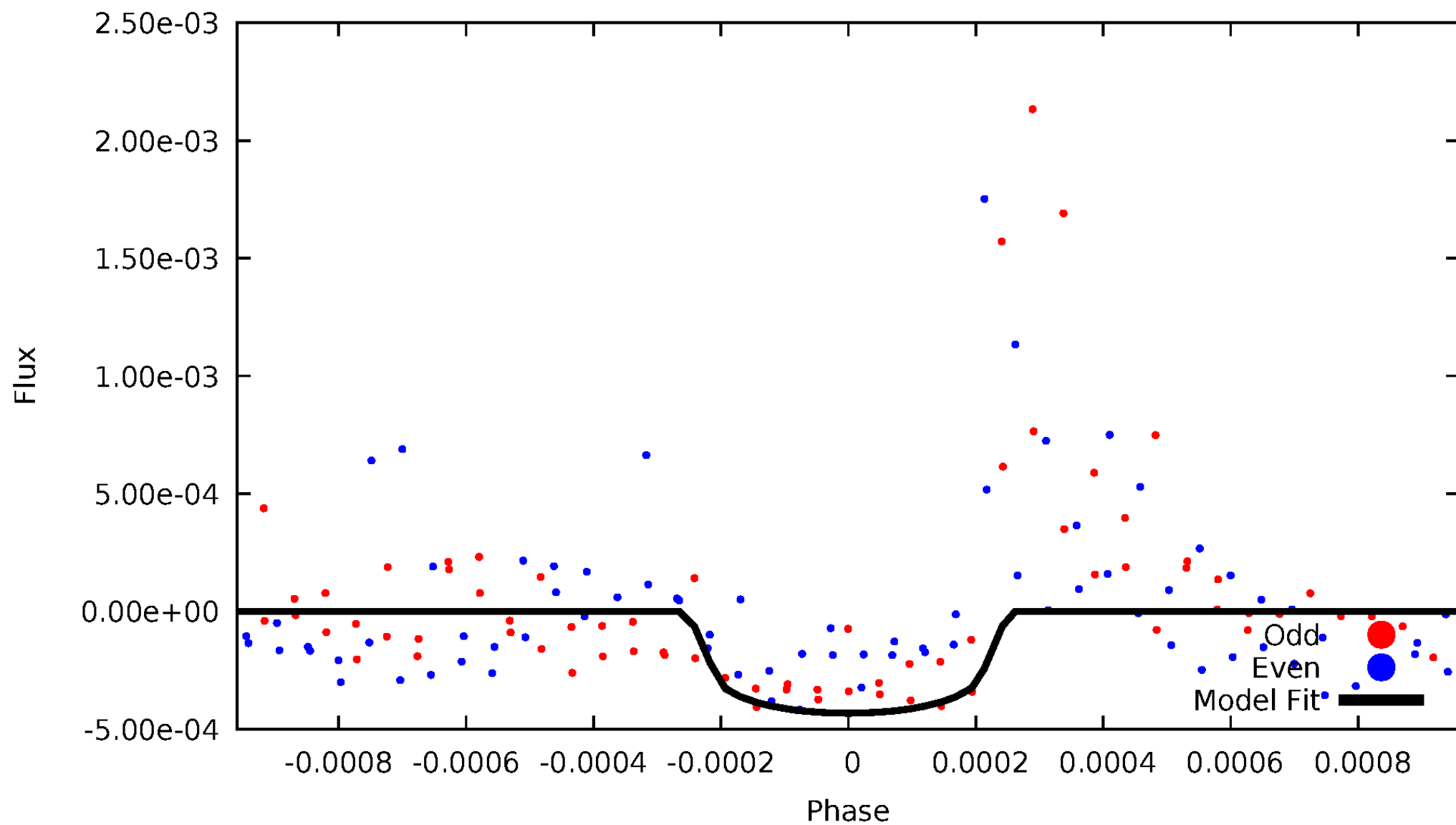


TCE 004758595-01



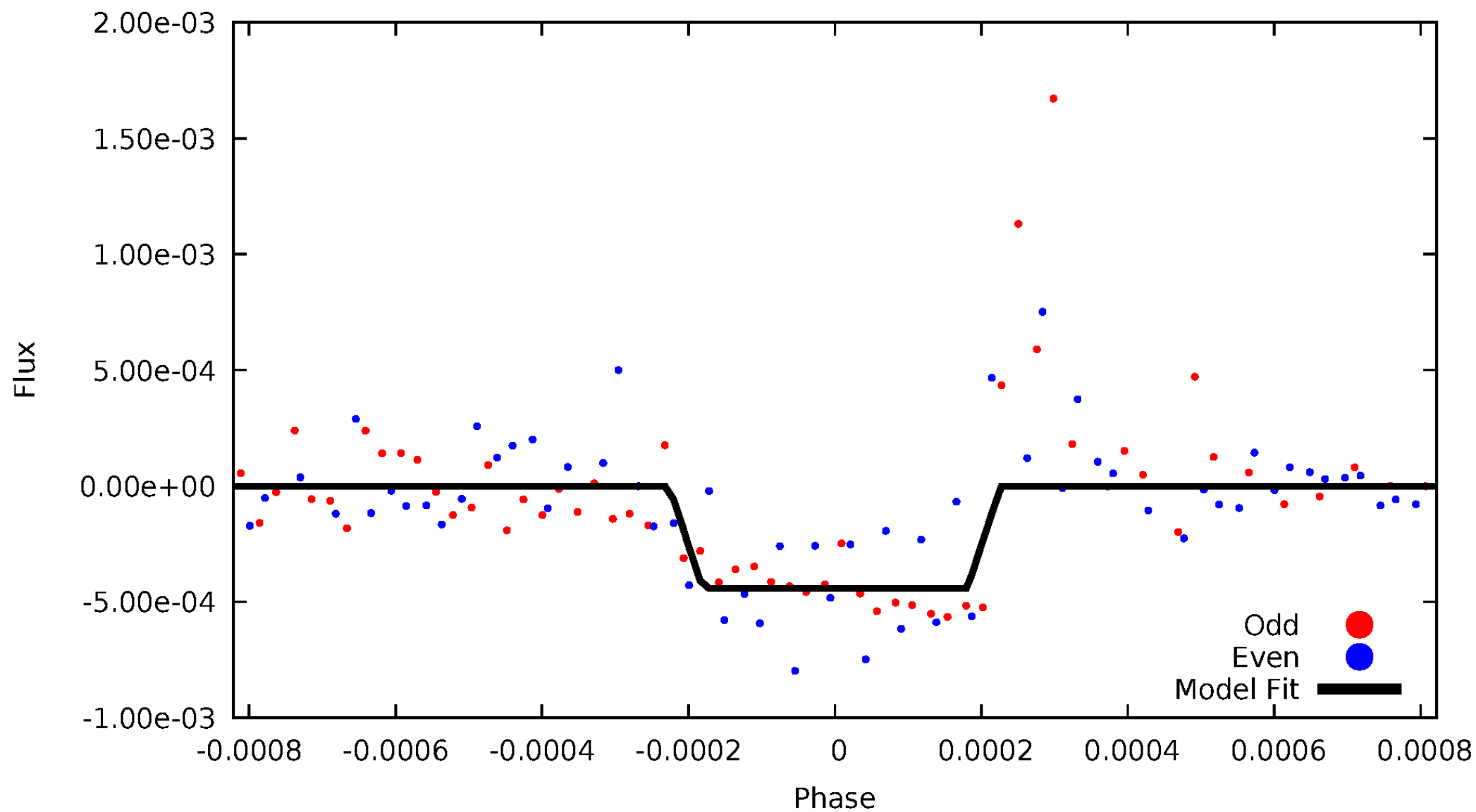
# DV Odd/Even

TCE 004758595-01



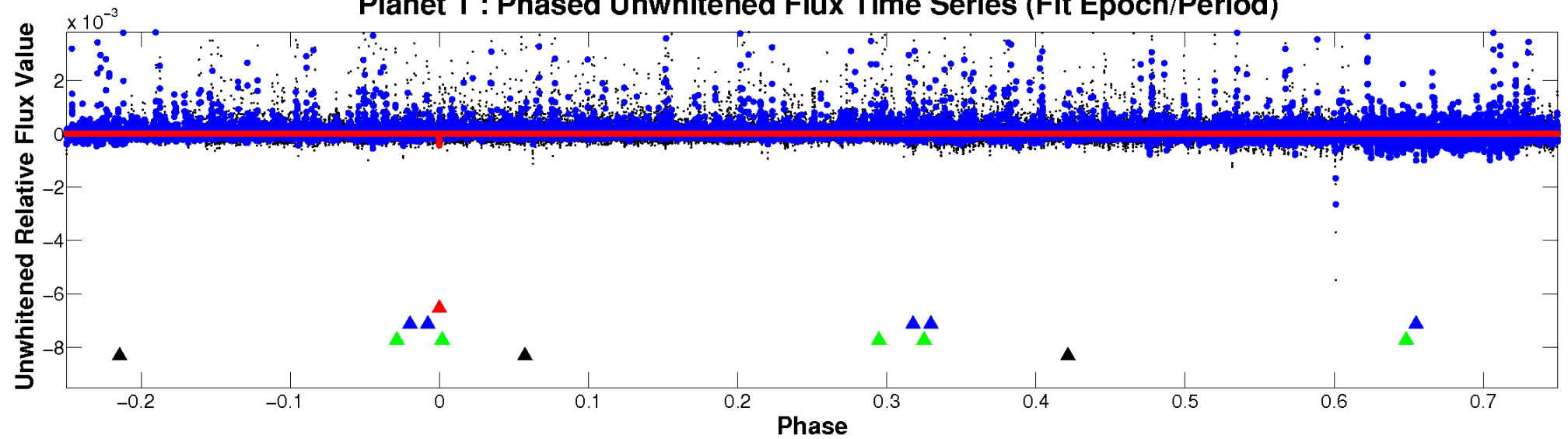
# ALT Odd/Even

TCE 004758595-01

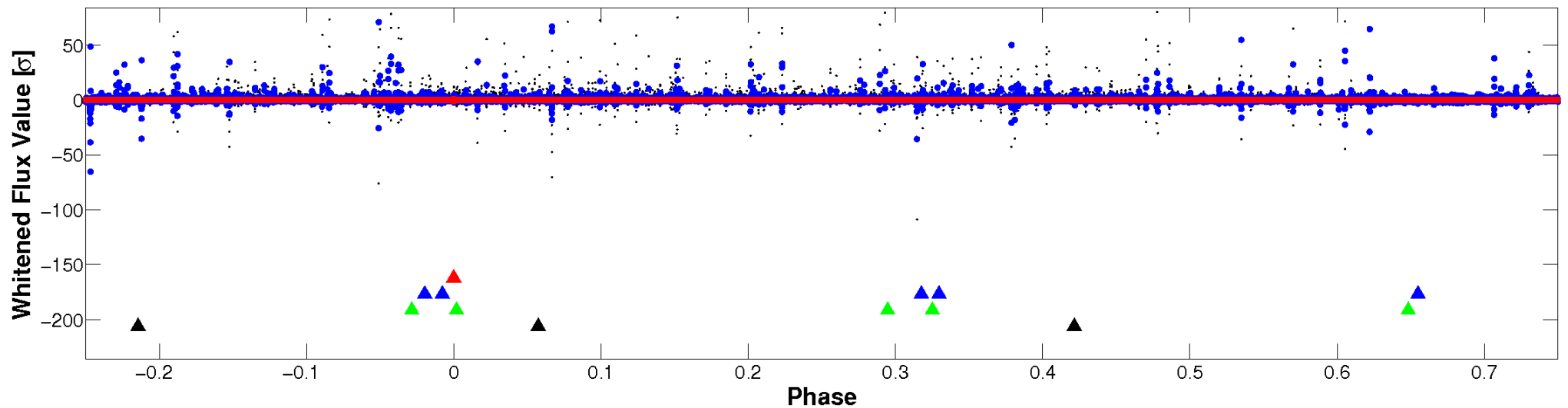


# Non-Whitened Vs. Whitened Light Curve

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

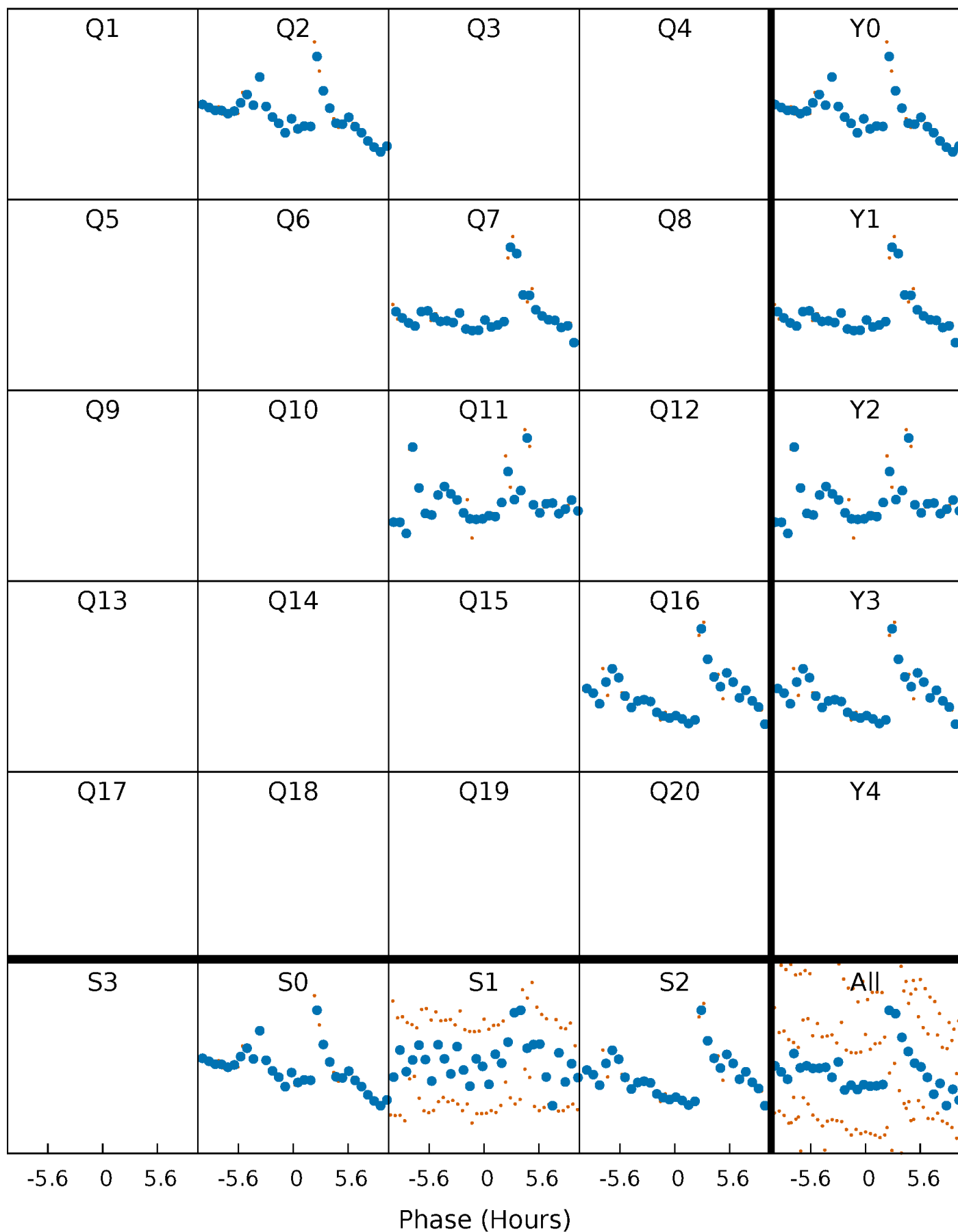


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

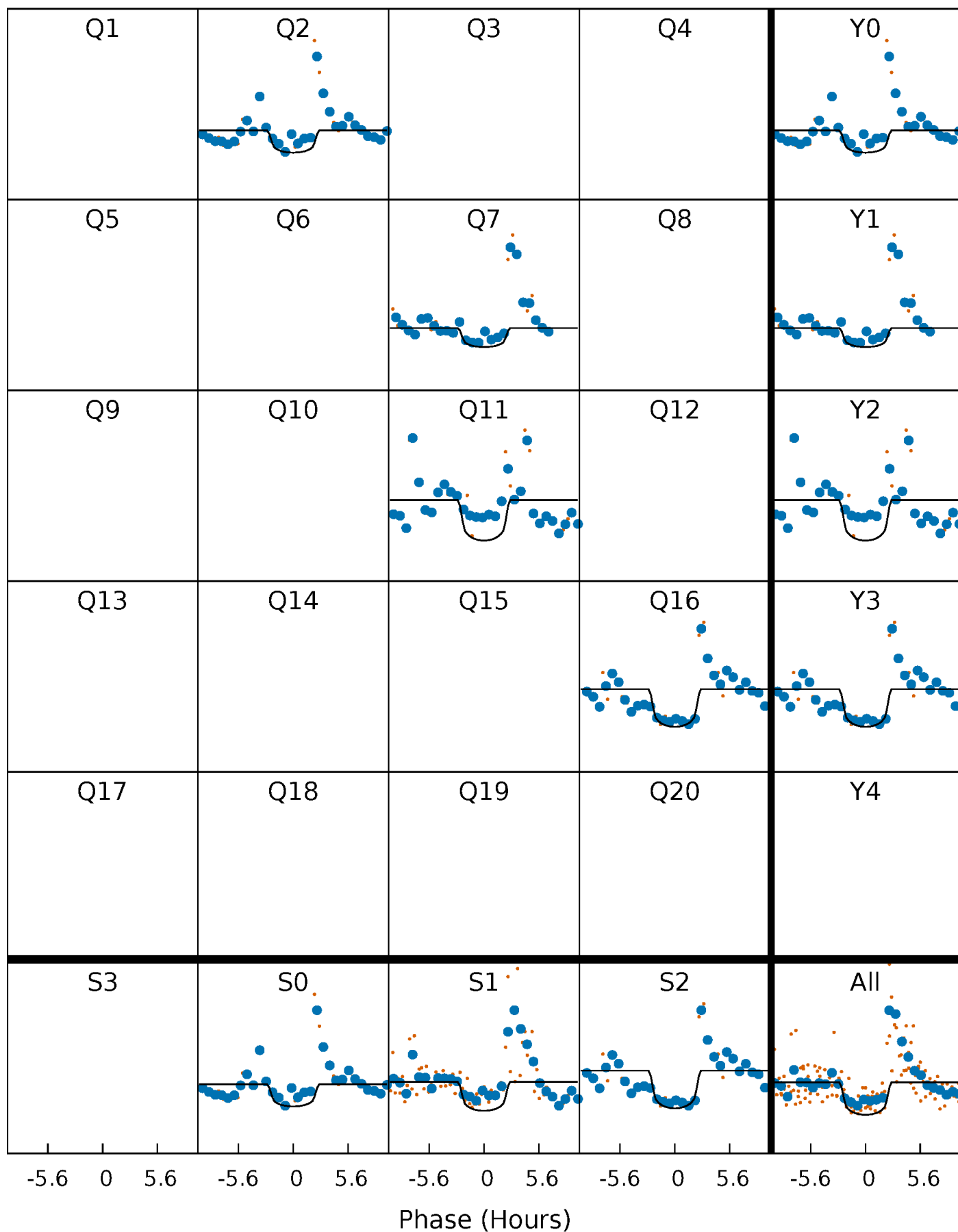
TCE 004758595-01 P=423.350997 Days  $T_0=220.535177$  (BKJD)





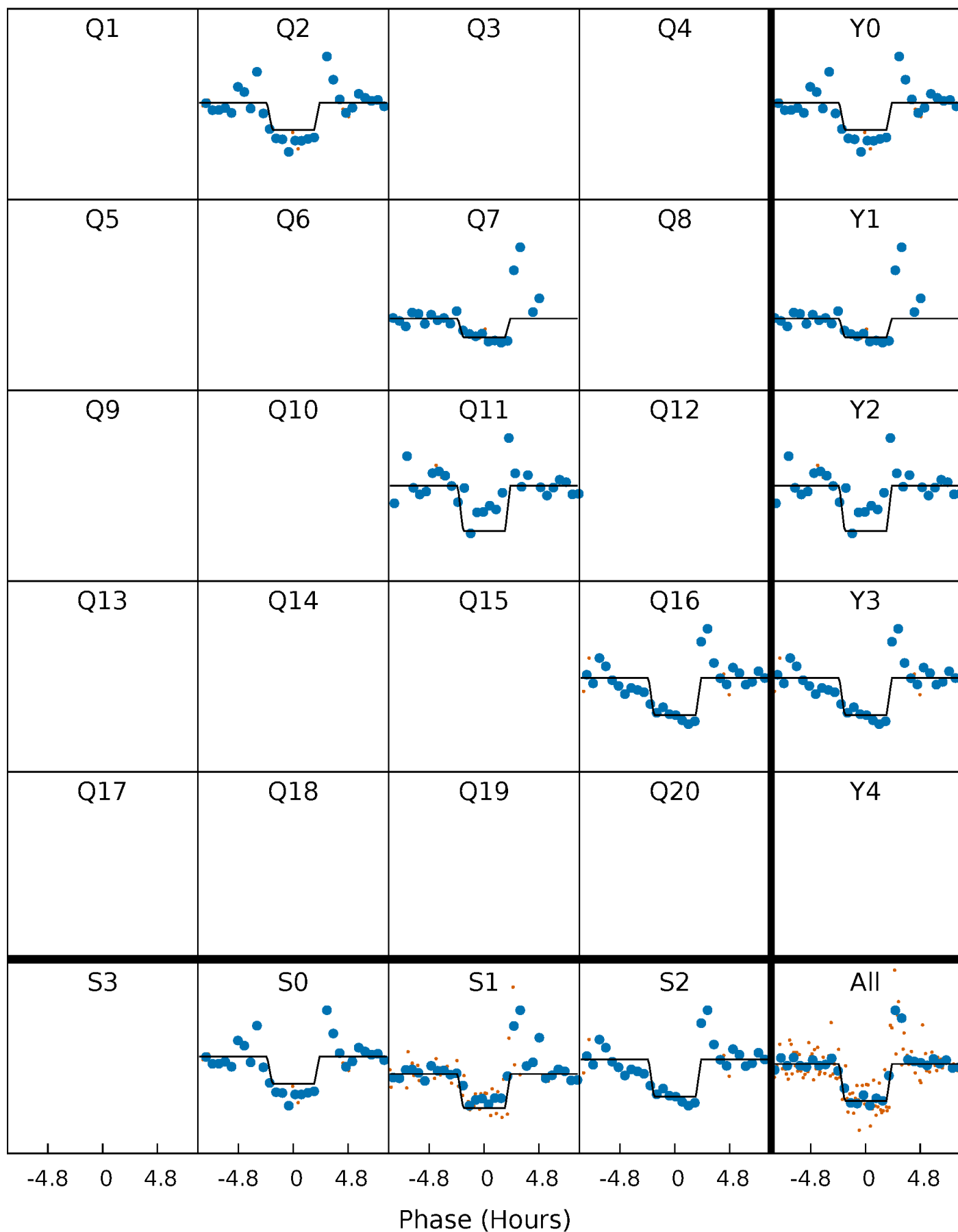
# DV Quarter-Phased Transit Curves

TCE 004758595-01 P=423.350997 Days  $T_0=220.535177$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

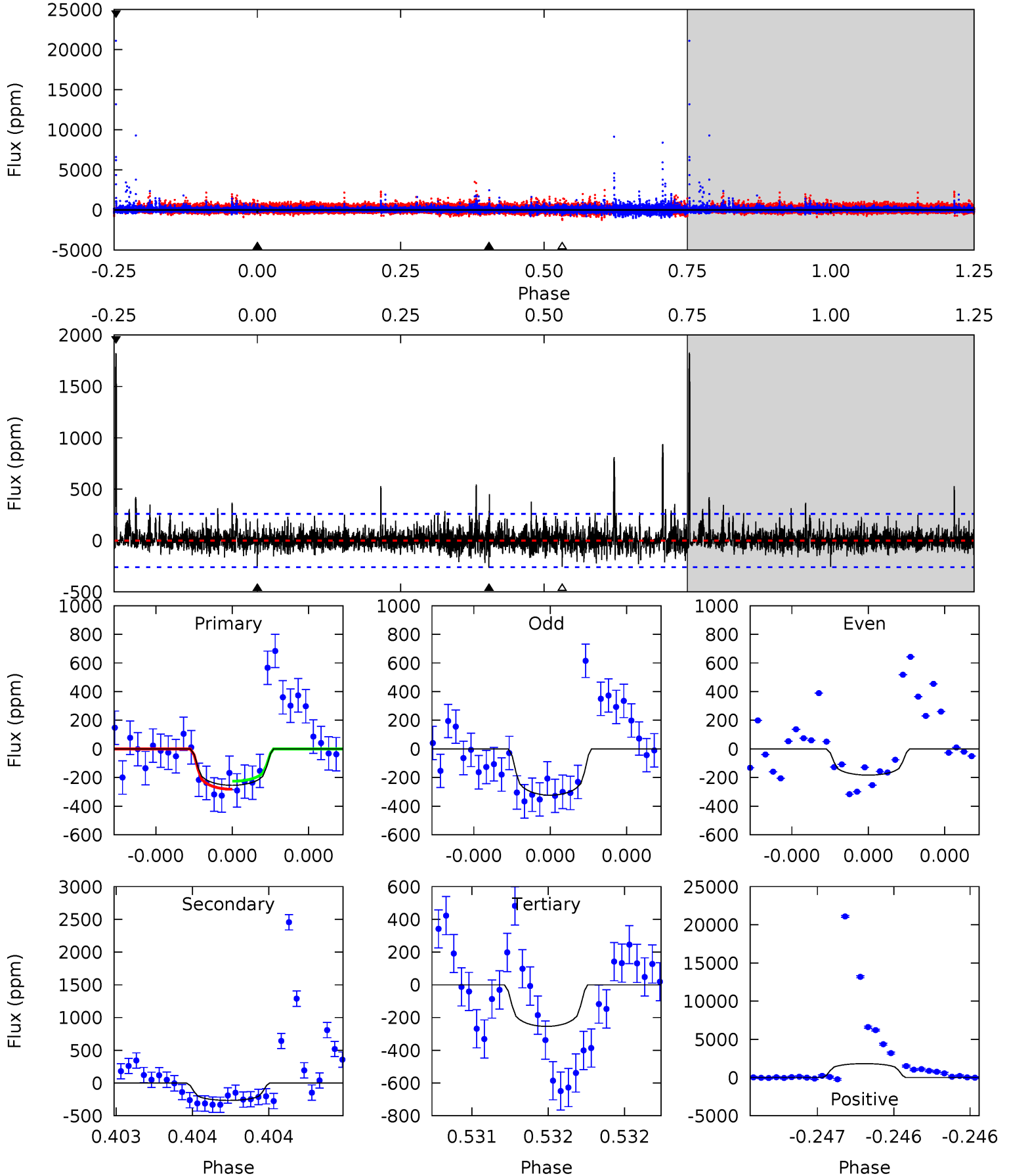
TCE 004758595-01 P=423.356118 Days  $T_0=220.526079$  (BKJD)



# DV Model-Shift Uniqueness Test

004758595-01, P = 423.350997 Days, E = 220.535177 Days

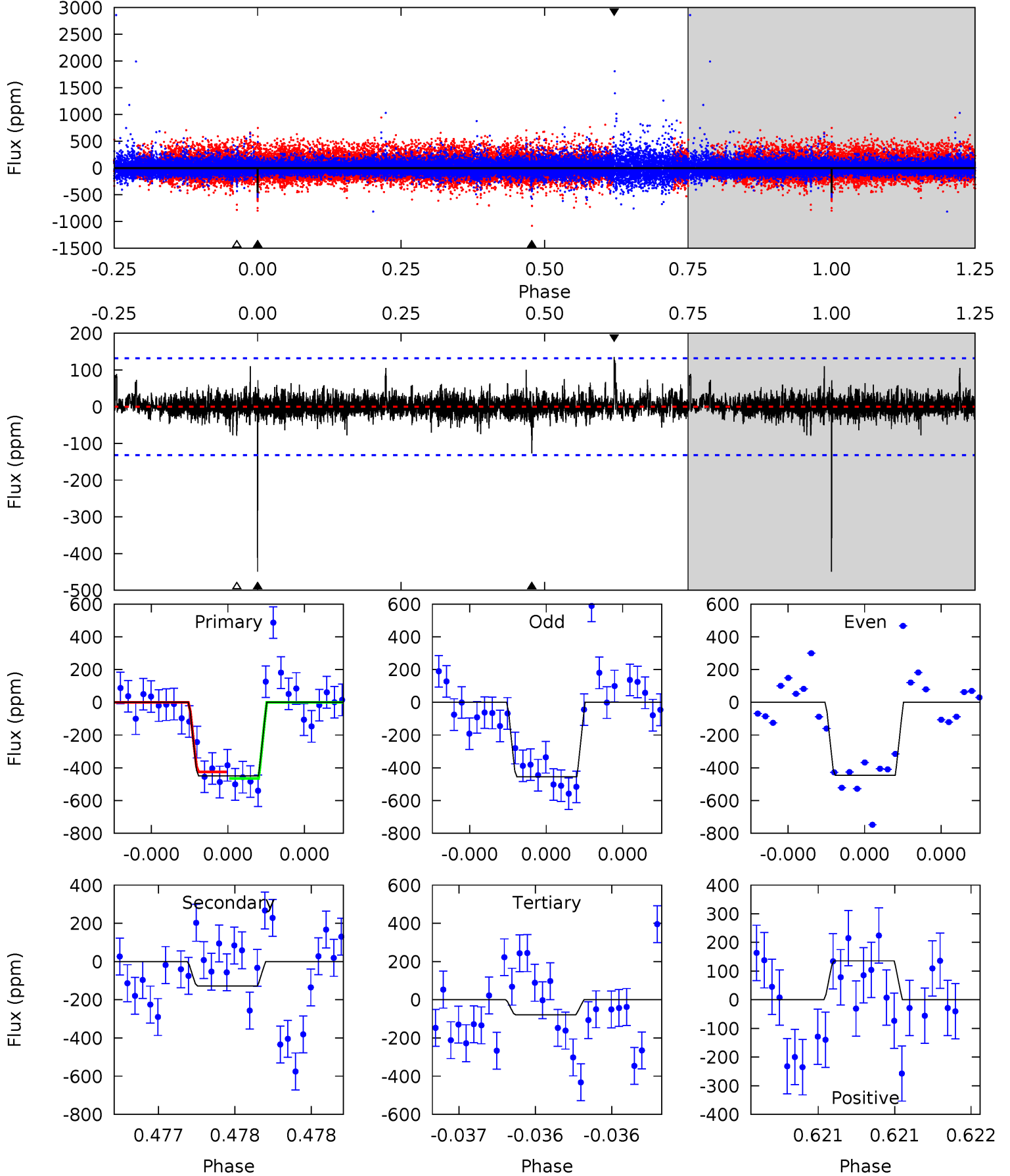
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.47	5.71	5.47	39.3	5.58	3.49	1.93	0.00	-33.8	0.24	-33.5	1.03	1.18	0.87	0.58



# Alt Model-Shift Uniqueness Test

004758595-01, P = 423.356118 Days, E = 220.526079 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
19.0	5.40	3.35	5.75	5.59	3.51	0.77	15.7	13.3	2.05	-0.35	0.18	0.96	0.23	0.83



### Stellar Parameters For KIC 004758595

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3572^{+71}_{-86}$	$4.858^{+0.054}_{-0.045}$	$-0.100^{+0.100}_{-0.100}$	$0.397^{+0.043}_{-0.048}$	$0.417^{+0.046}_{-0.062}$	$9.405^{+2.705}_{-1.757}$
	+2%/-2%	+1%/-1%	+100%/-100%	+11%/-12%	+11%/-15%	+29%/-19%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 004758595-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-266 \pm 46$	$2.95^{+2.70}_{-2.01}$	$153^{+4}_{-5}$	$2409^{+866}_{-340}$	$11368^{+99869}_{-8384}$
Alt.	$-127 \pm 24$	$2.81^{+2.86}_{-1.90}$	$152^{+4}_{-5}$	$2237^{+659}_{-318}$	$5965^{+43541}_{-4544}$

$T_{\text{max}}$  = 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

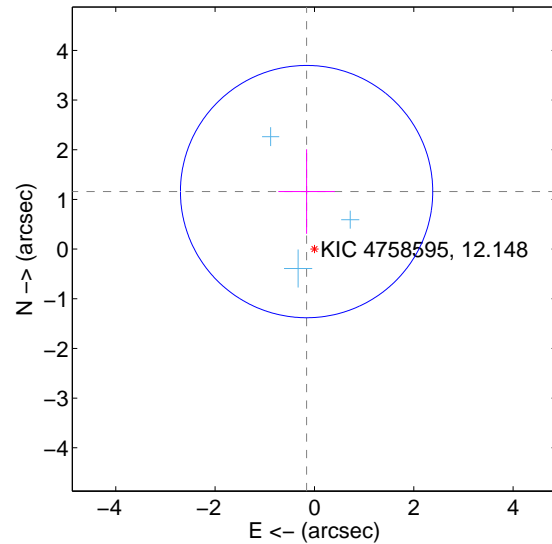
Supplemental centroid analysis for 004758595-01. Kepler magnitude: 12.15. Transit SNR 7.61

There are 3 quarters with good PRF difference image offsets

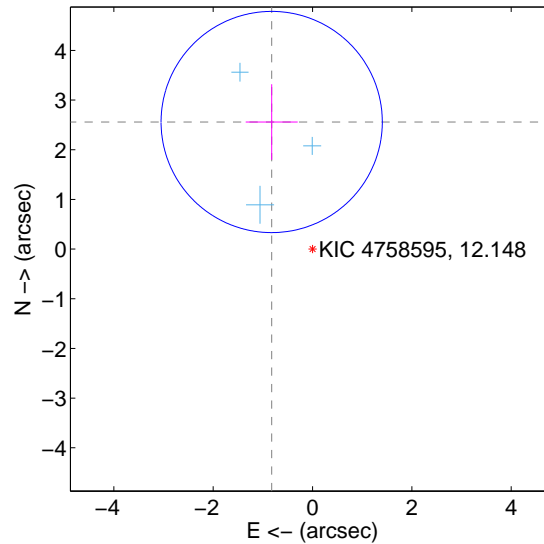
The direct PRF centroid is offset from the target star catalog position by about 1.65 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.169 \pm 0.847$	1.38	$0.158 \pm 0.569$	$1.158 \pm 0.851$
PRF-fit source offset from KIC position	$2.688 \pm 0.742$	3.62	$0.822 \pm 0.524$	$2.559 \pm 0.761$
photometric centroid source offset	$2.25 \pm 0.60$	3.74	$1.43 \pm 0.51$	$1.74 \pm 0.66$

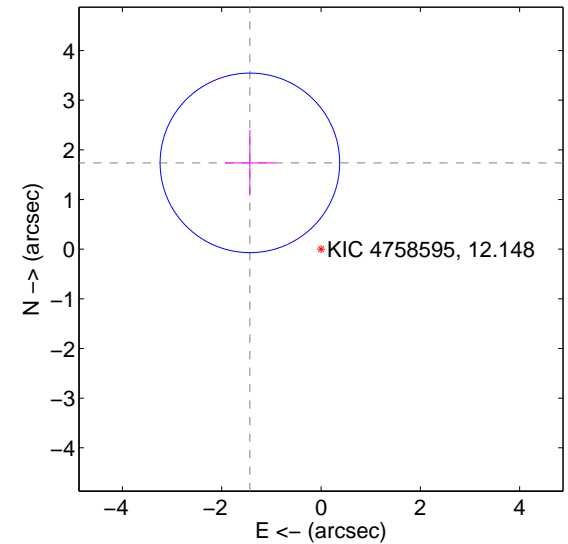
offset from difference PRF-fit to OOT PRF-fit



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.

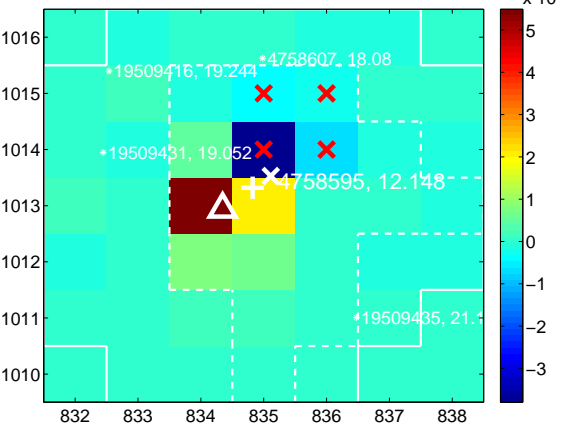
Q1 no difference image



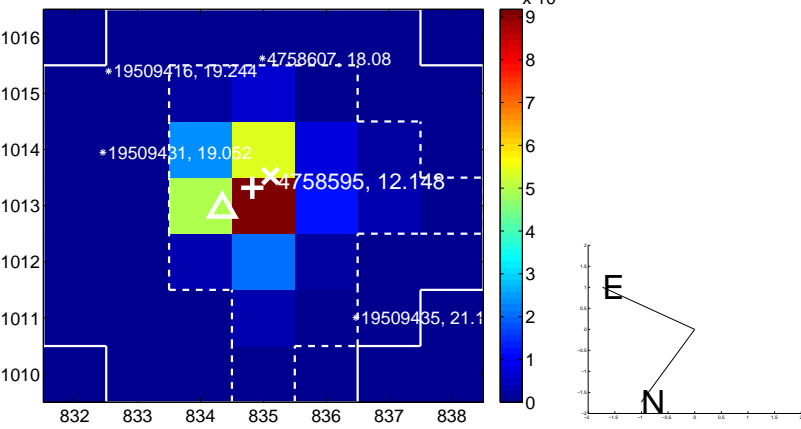
Q1 no OOT image



Q2 difference image



Q2 OOT image



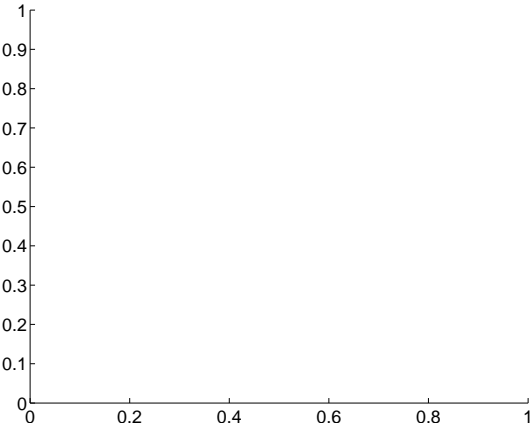
Q3 no difference image



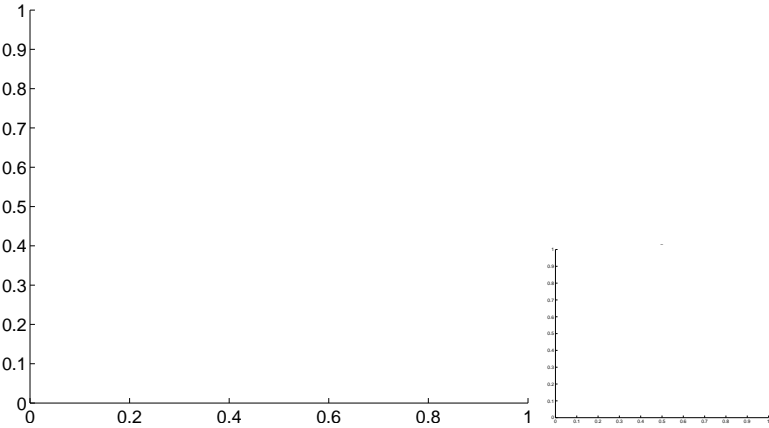
Q3 no OOT image



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.

Q9 no difference image



Q9 no OOT image



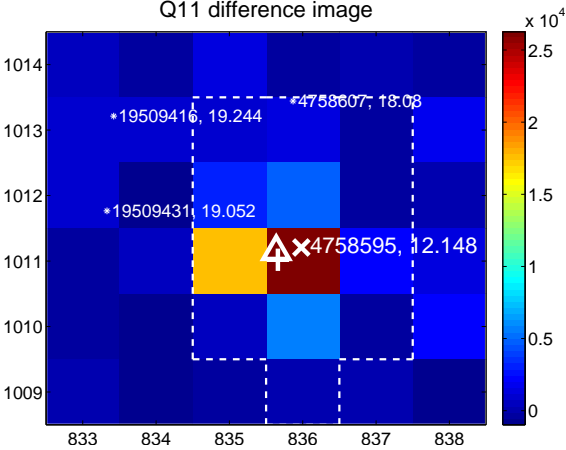
Q10 no difference image



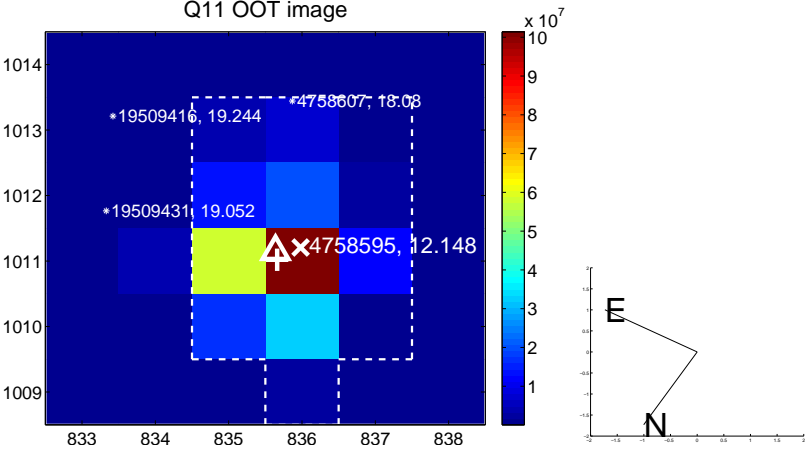
Q10 no OOT image



Q11 difference image



Q11 OOT image



Q12 no difference image



Q12 no OOT image



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

Q13 no difference image



Q13 no OOT image



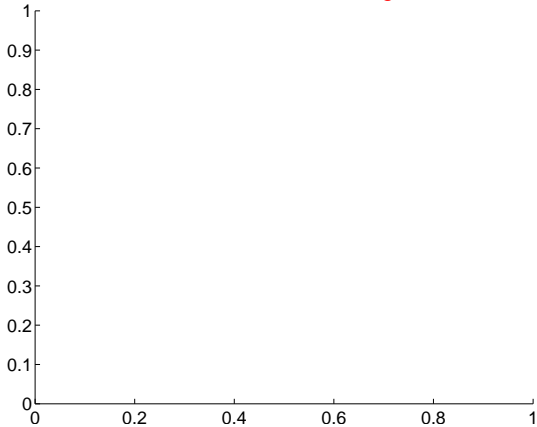
Q14 no difference image



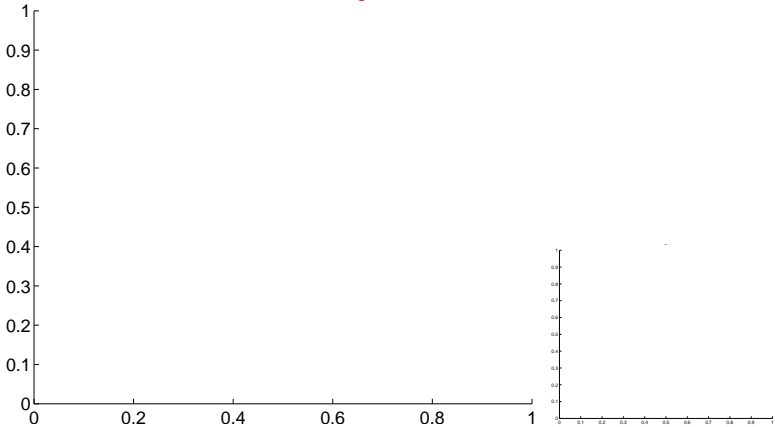
Q14 no OOT image



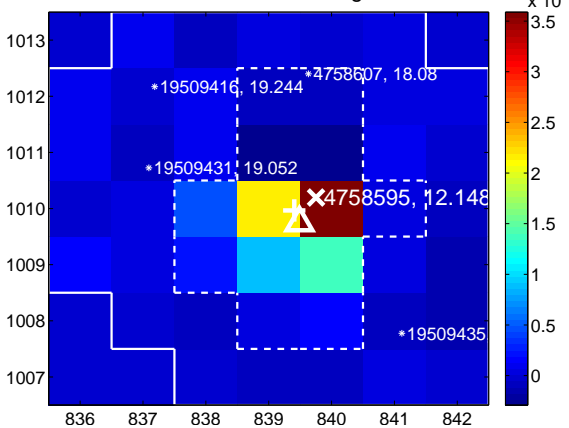
Q15 no difference image



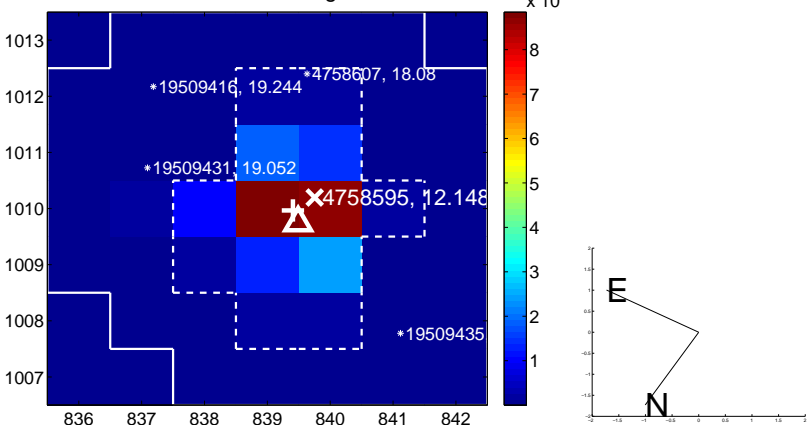
Q15 no OOT image



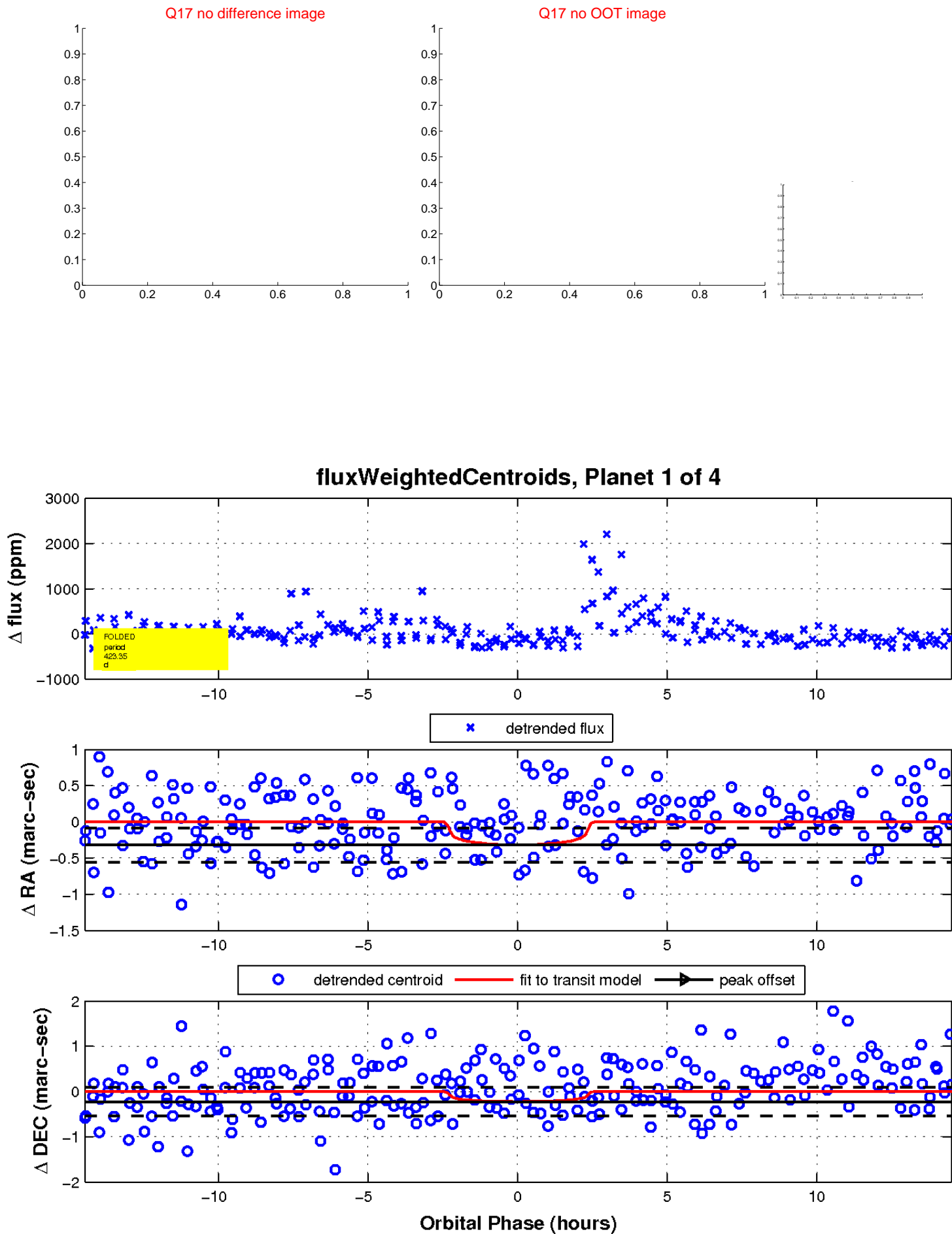
Q16 difference image



Q16 OOT image

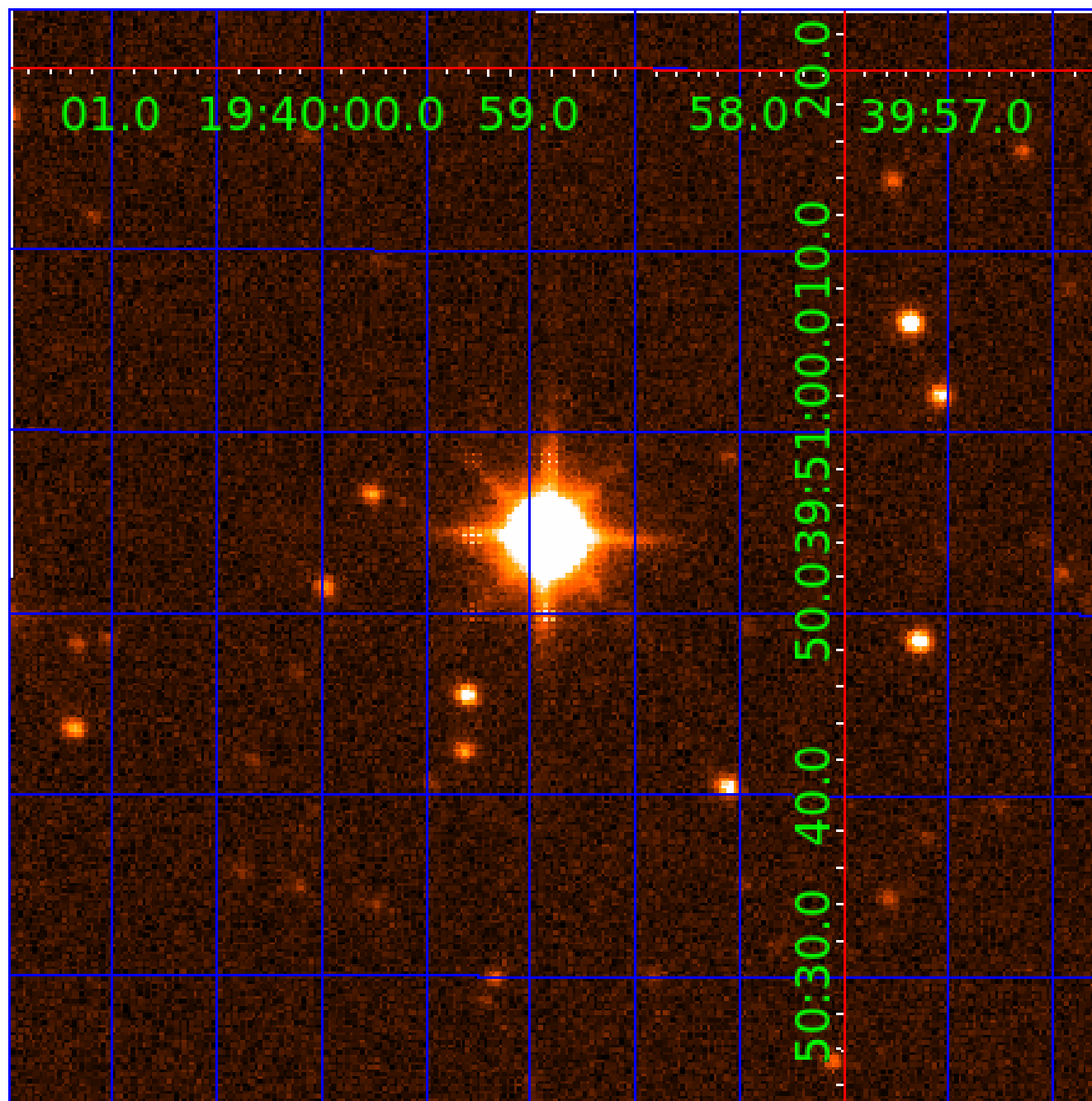


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 004758595

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004758595-01	OBS	No	423.350997	220.535177	432.2	4.872	13.1	7.6	0.40	3572	0.88	0.03
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004758595-03	OBS	No	286.518829	345.313155	286.2	12.658	9.5	5.2	0.40	3572	0.69	0.06
004758595-04	OBS	No	577.499818	244.825946	487.0	8.254	10.1	7.0	0.40	3572	0.95	0.02

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004758595-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
004758595-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
004758595-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_ZUMA—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS
004758595-04	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—INCONSISTENT_TRANS—CENT_KIC_POS

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

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

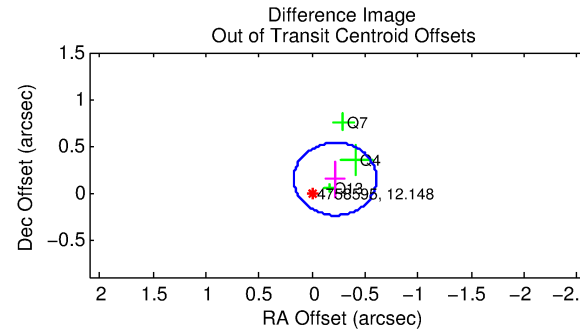
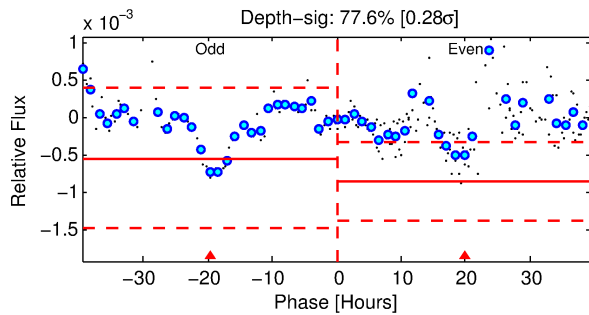
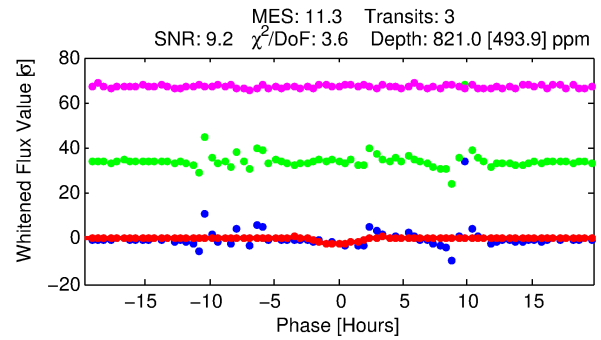
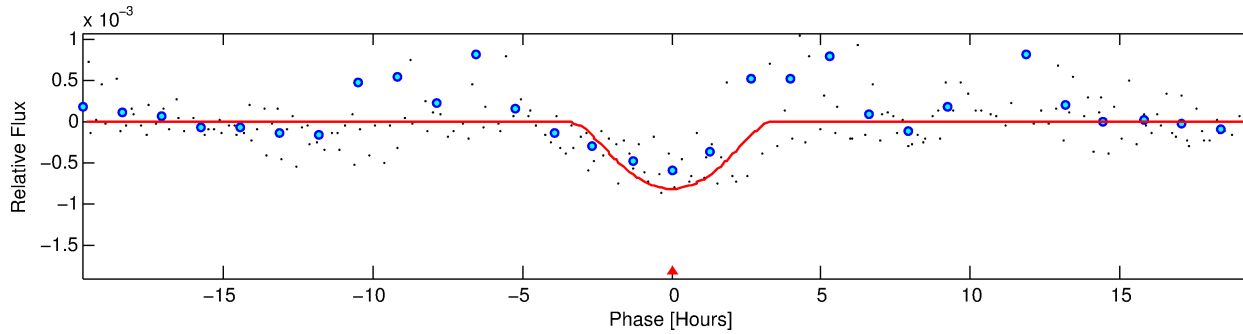
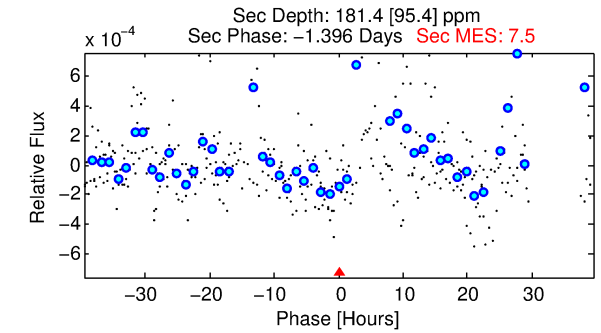
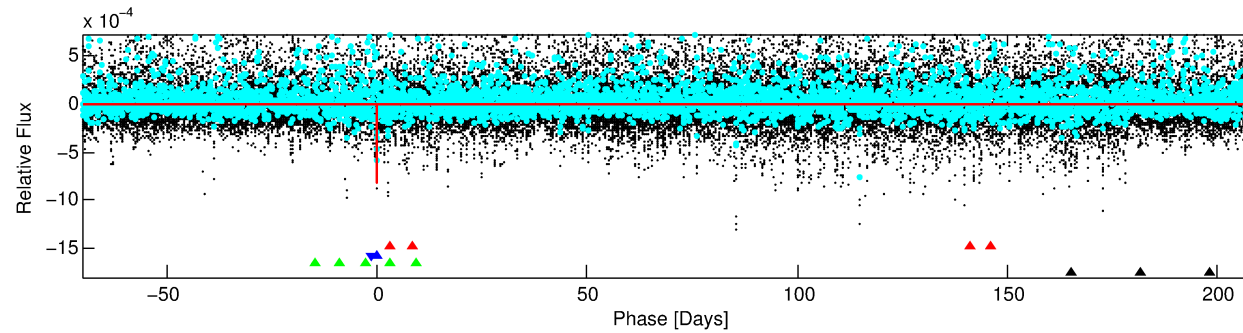
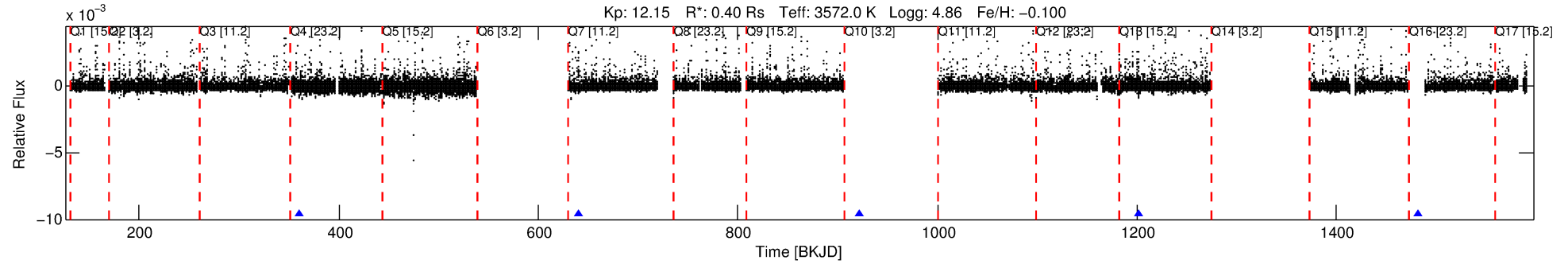
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004758595-02

No Significant Match Found

# DV One-Page Summary

KIC: 4758595 Candidate: 2 of 4 Period: 280.546 d



## DV Fit Results:

Period = 280.54558 [0.02483] d  
Epoch = 360.0760 [0.0440] BKJD  
Rp/R\* = 0.0423 [0.1574]  
a/R\* = 113.07 [144.23]  
b = 0.98 [0.29]  
Seff = 0.06 [0.01]  
Teq = 126 [5] K  
Rp = 1.83 [6.82] Re  
a = 0.6255 [0.0567] AU  
Ag = 11636.87 [86868.87] [0.13 $\sigma$ ]  
Teffp = 2016 [3762] K [0.50 $\sigma$ ]

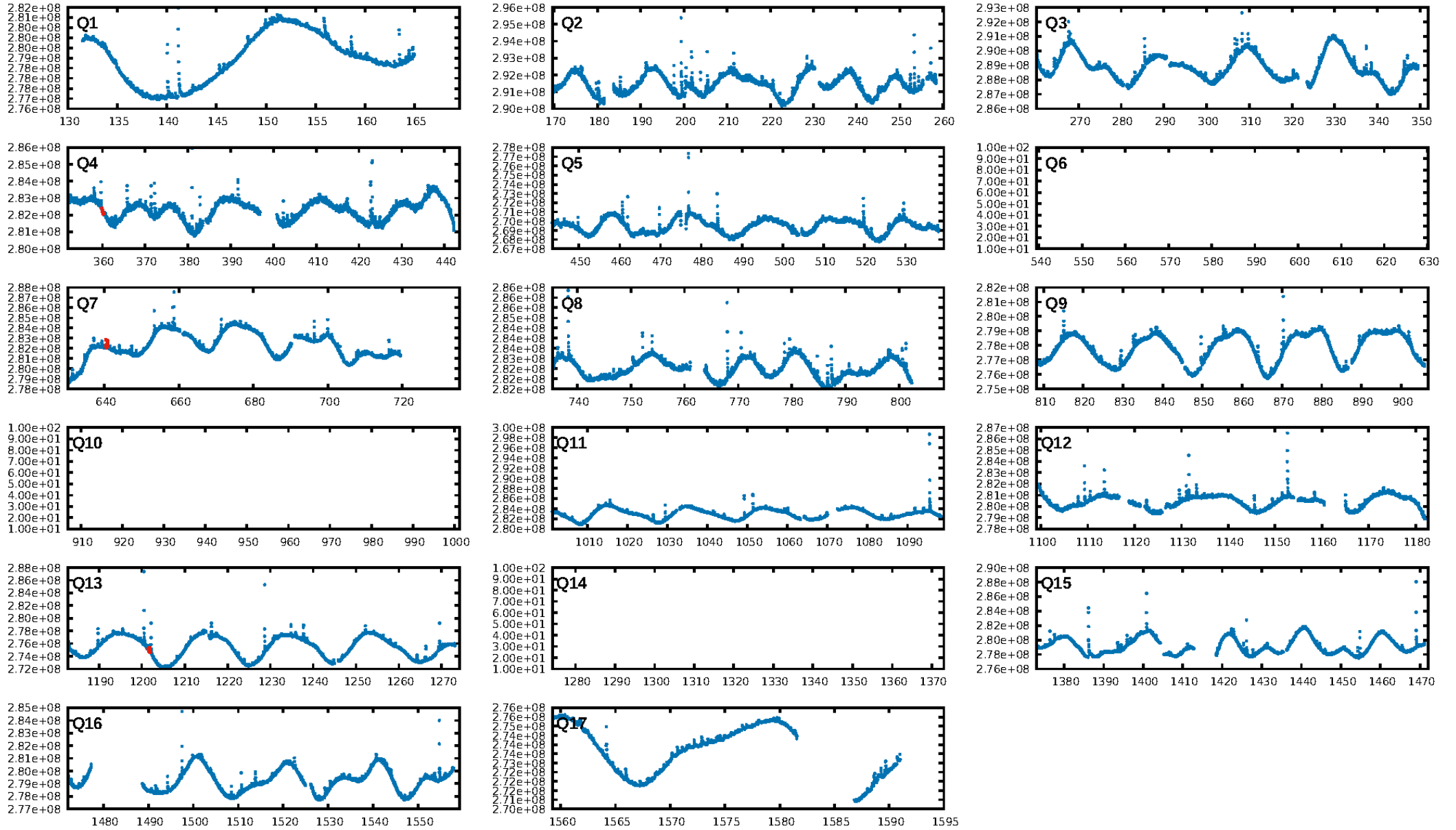
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [10.05 $\sigma$ ]  
ModelChiSquare2-sig: 0.3%  
ModelChiSquareGof-sig: 0.9%  
**Bootstrap-pfa: 4.75e-09**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -0.9505  
Centroid-sig: 87.2%  
**Centroid-so: 1.469 arcsec [3.78 $\sigma$ ]**  
OotOffset-rm: 0.263 arcsec [2.03 $\sigma$ ]  
OotOffset-st: 0/1/1/1 [3]  
KicOffset-rm: **1.685 arcsec [12.44 $\sigma$ ]**  
KicOffset-st: 0/1/1/1 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 1.00 [3/3]

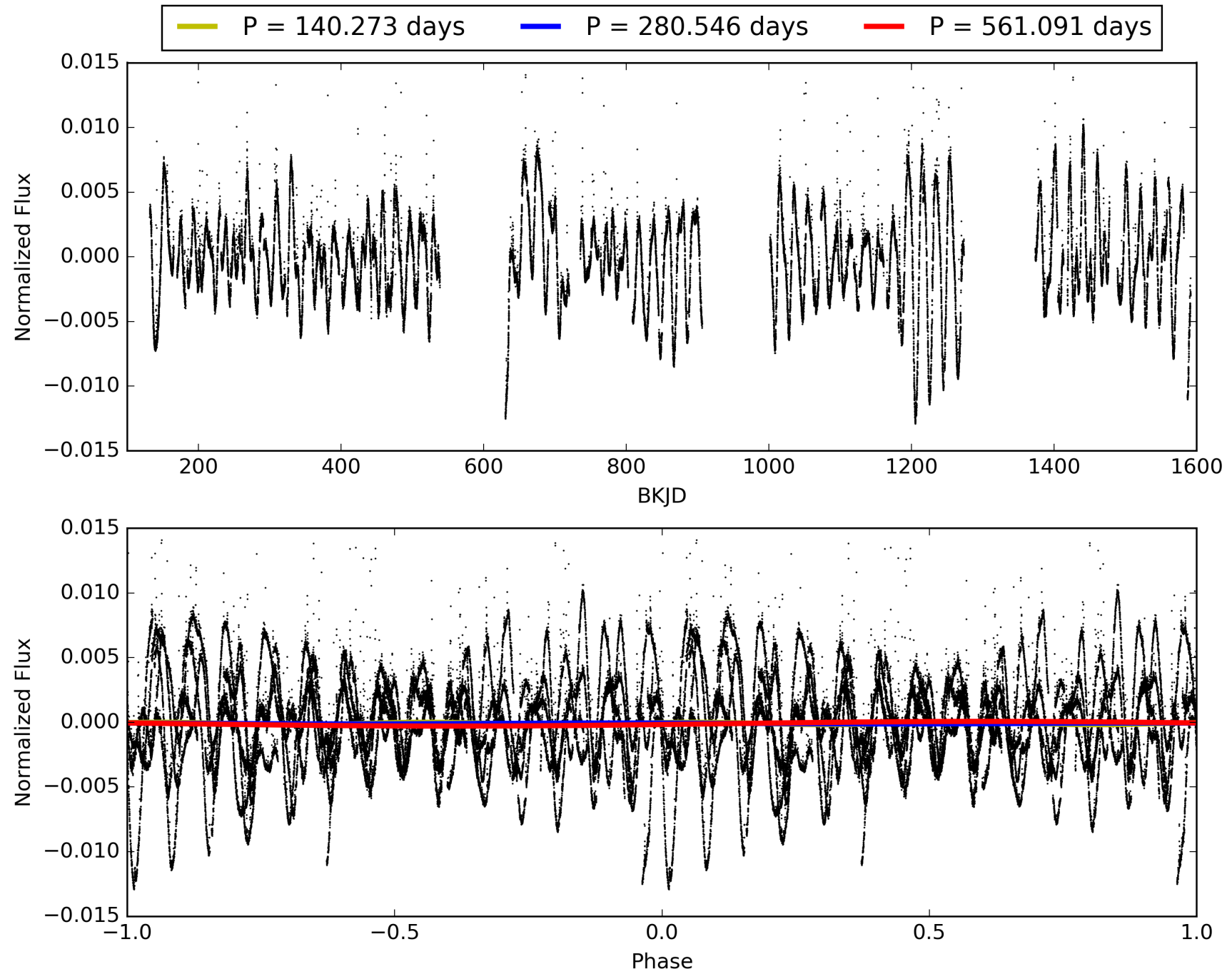
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 16:41:27 Z

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

# TCE 004758595-02, PDC Light Curves



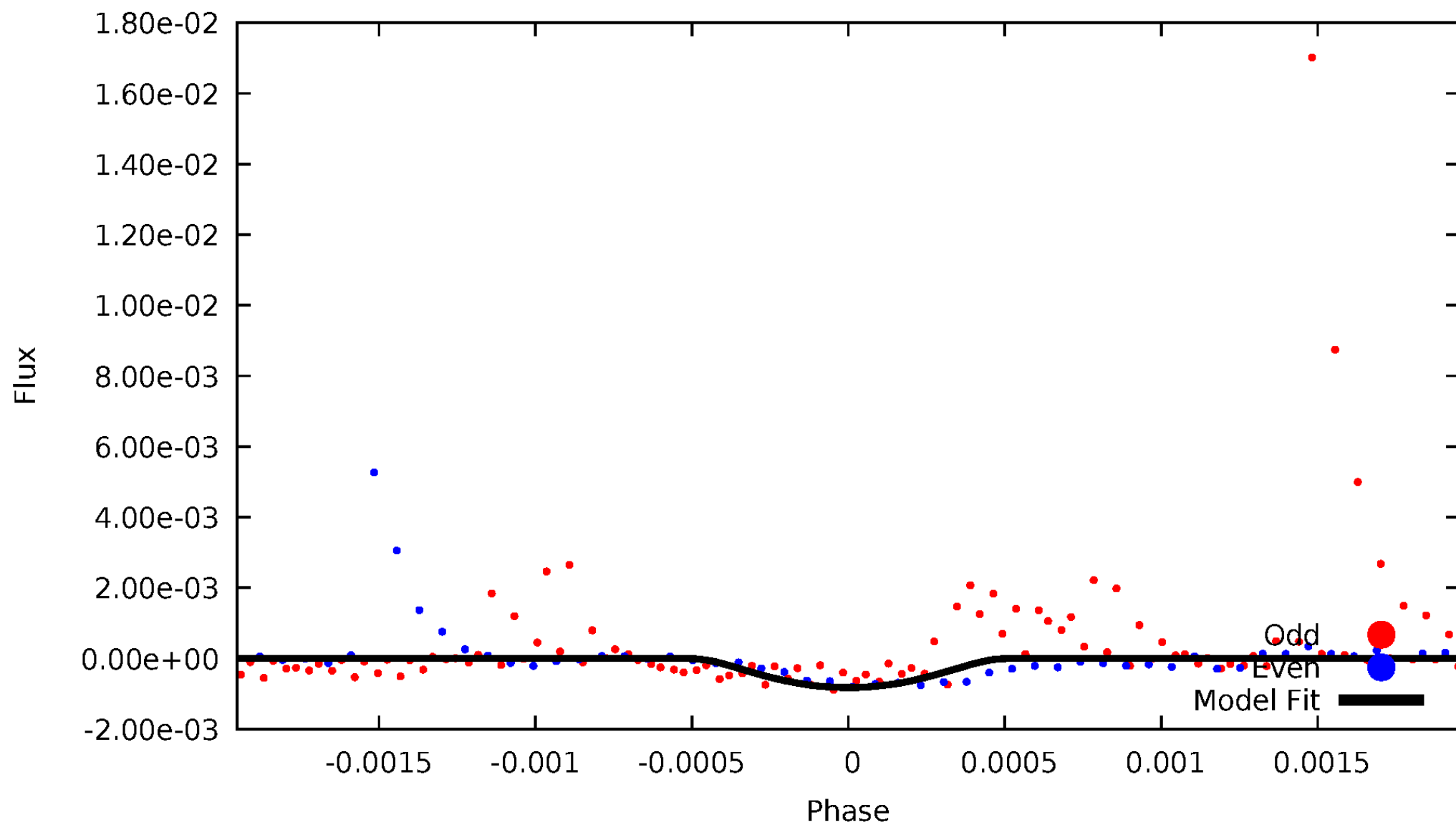
TCE 004758595-02





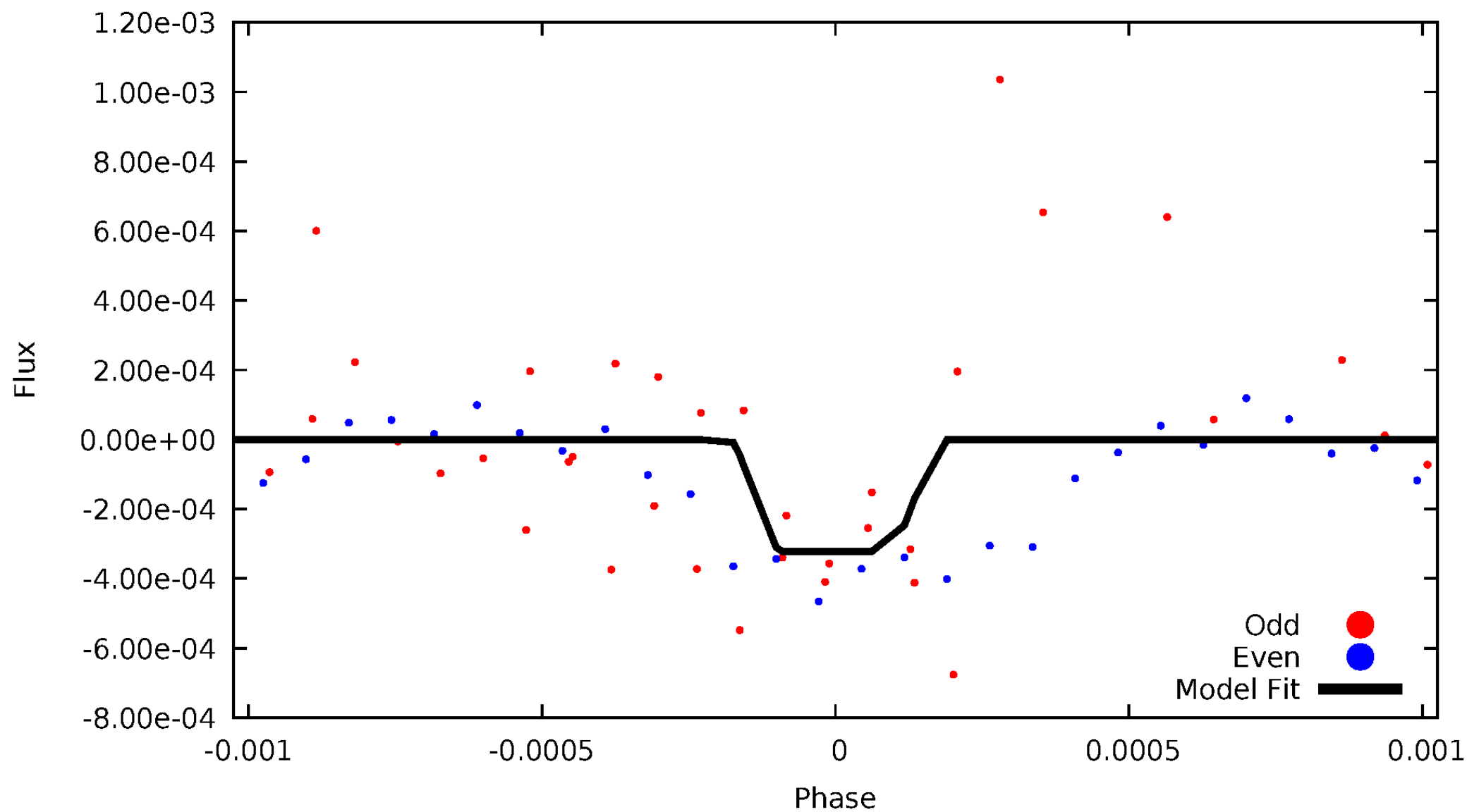
# DV Odd/Even

TCE 004758595-02



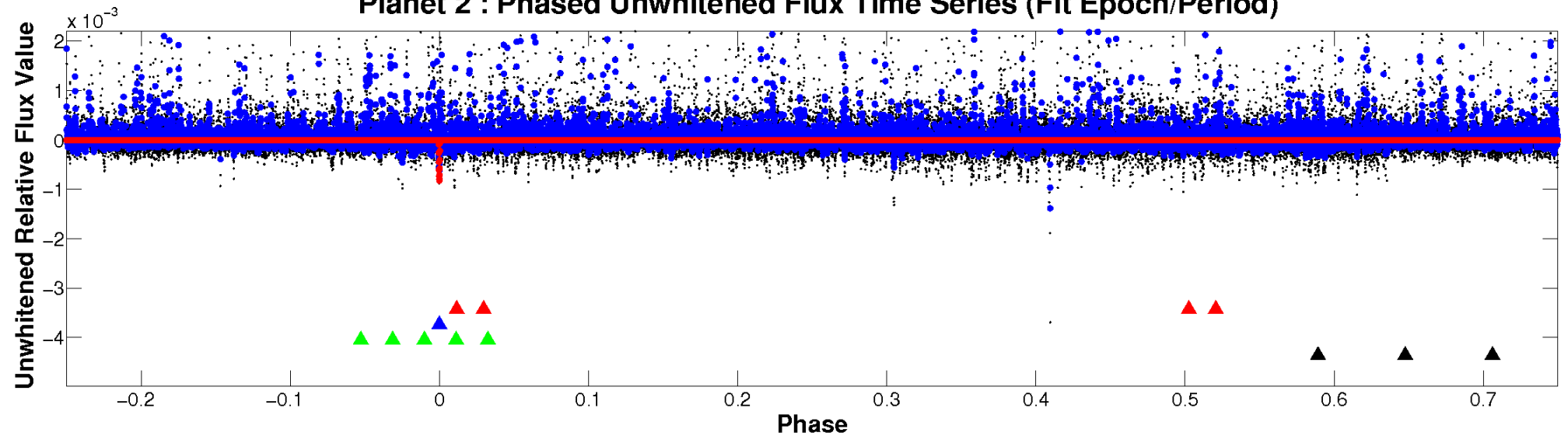
# ALT Odd/Even

TCE 004758595-02

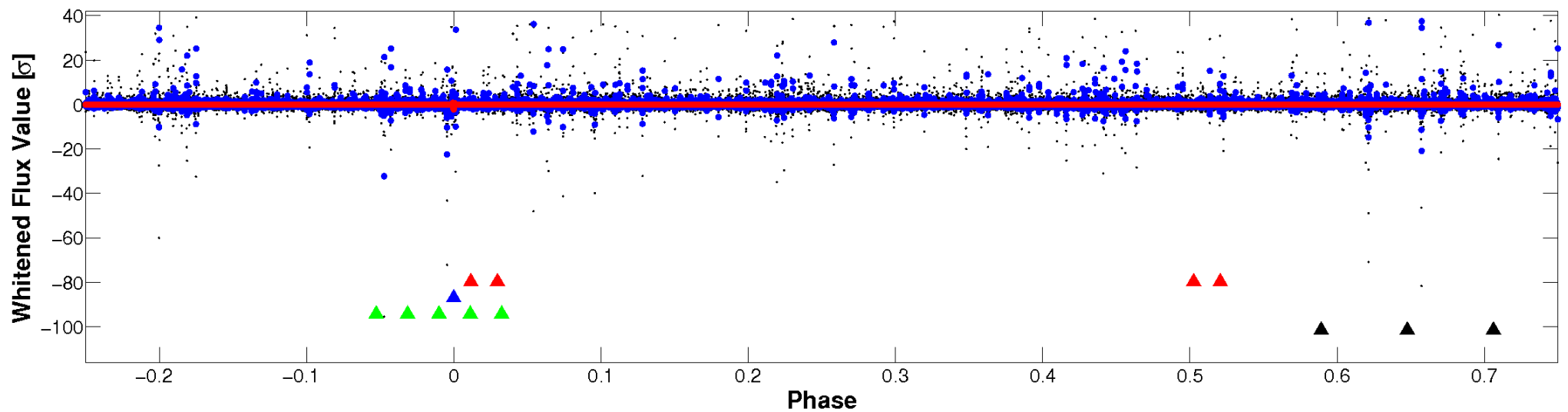


# Non-Whitened Vs. Whitened Light Curve

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

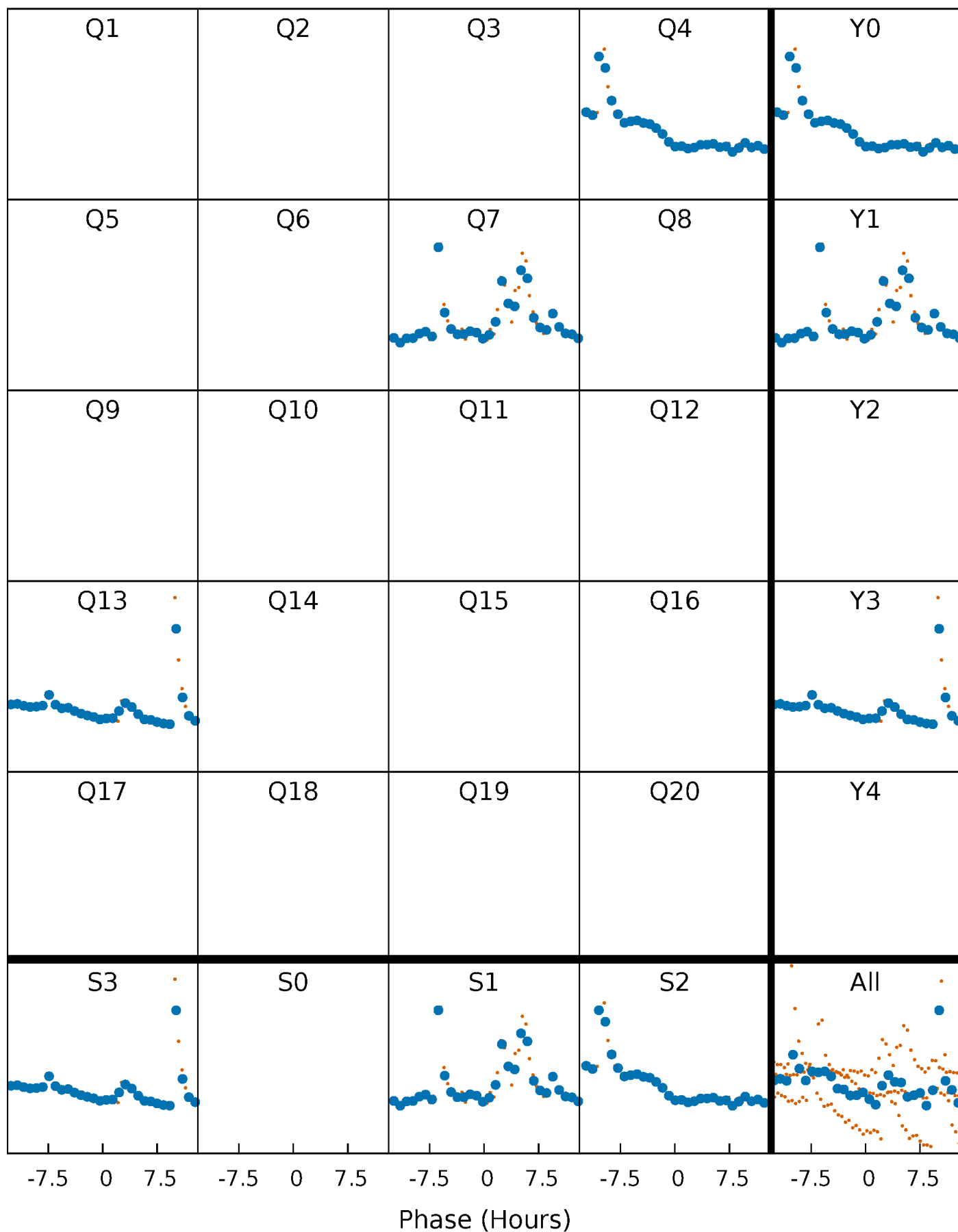


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



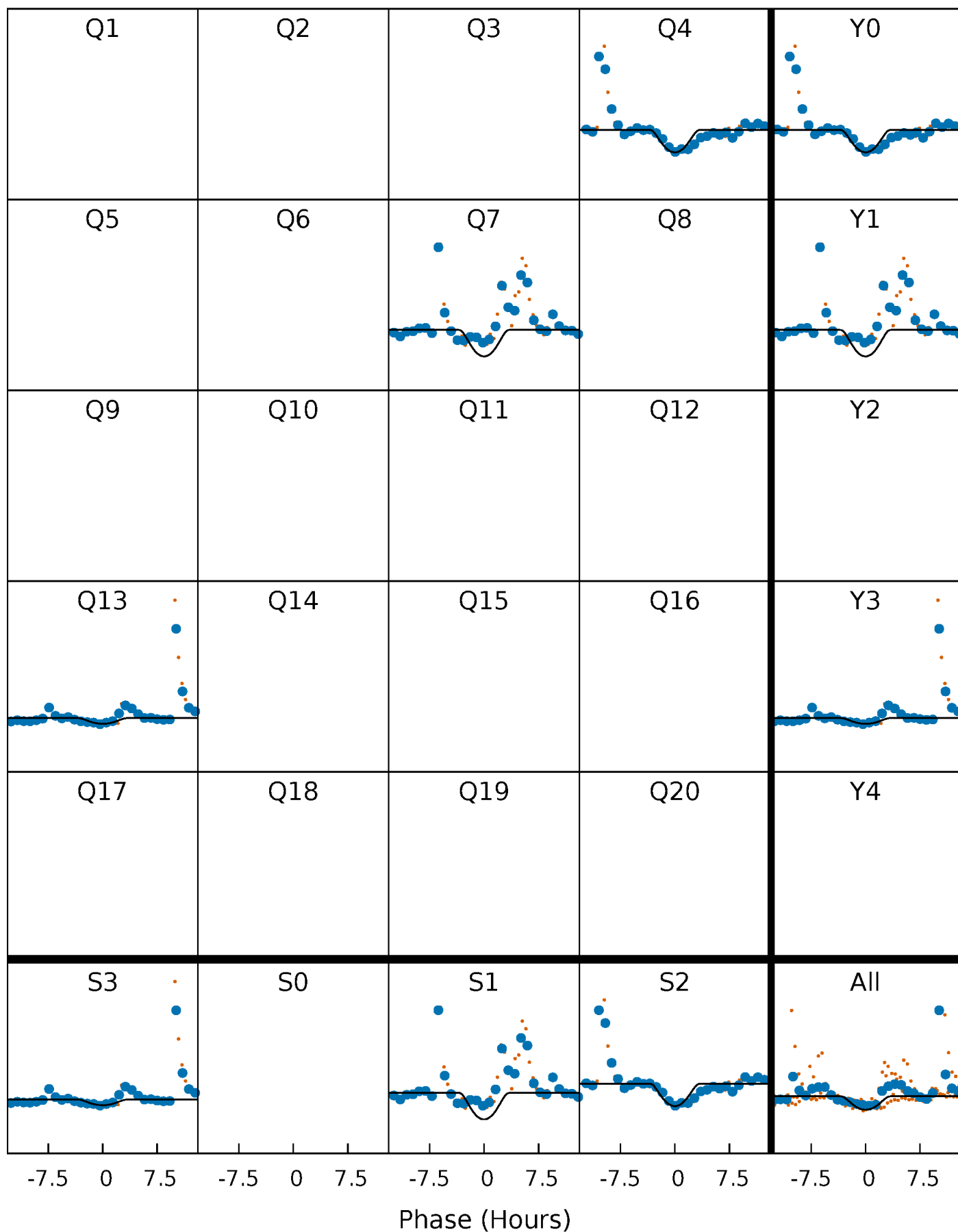
# PDC Quarter-Phased Transit Curves

TCE 004758595-02     $P=280.545583$  Days     $T_0=360.075978$  (BKJD)



# DV Quarter-Phased Transit Curves

TCE 004758595-02     $P=280.545583$  Days     $T_0=360.075978$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

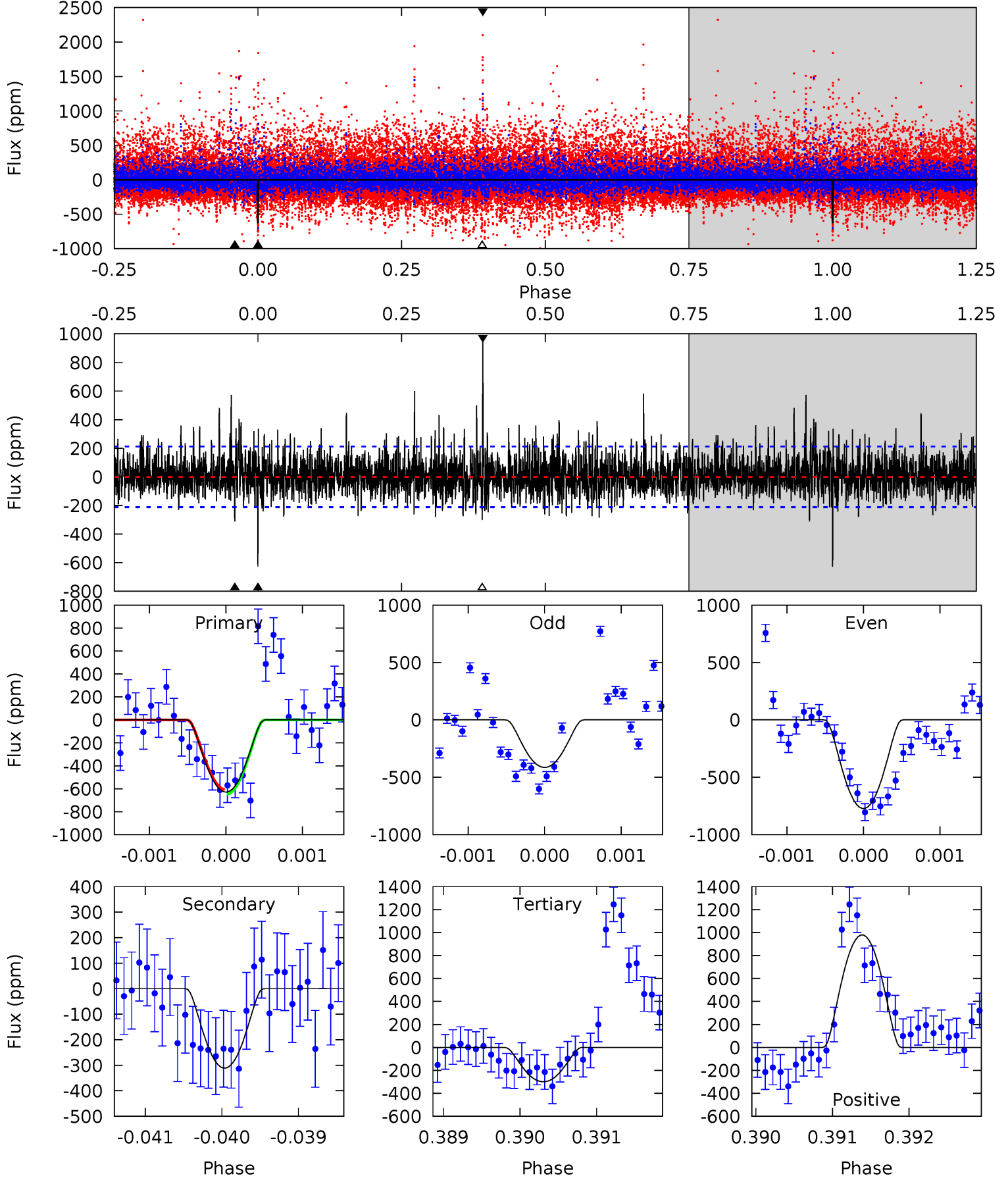
TCE 004758595-02     $P=280.552532$  Days     $T_0=360.087678$  (BKJD)



# DV Model-Shift Uniqueness Test

004758595-02, P = 280.545583 Days, E = 79.530395 Days

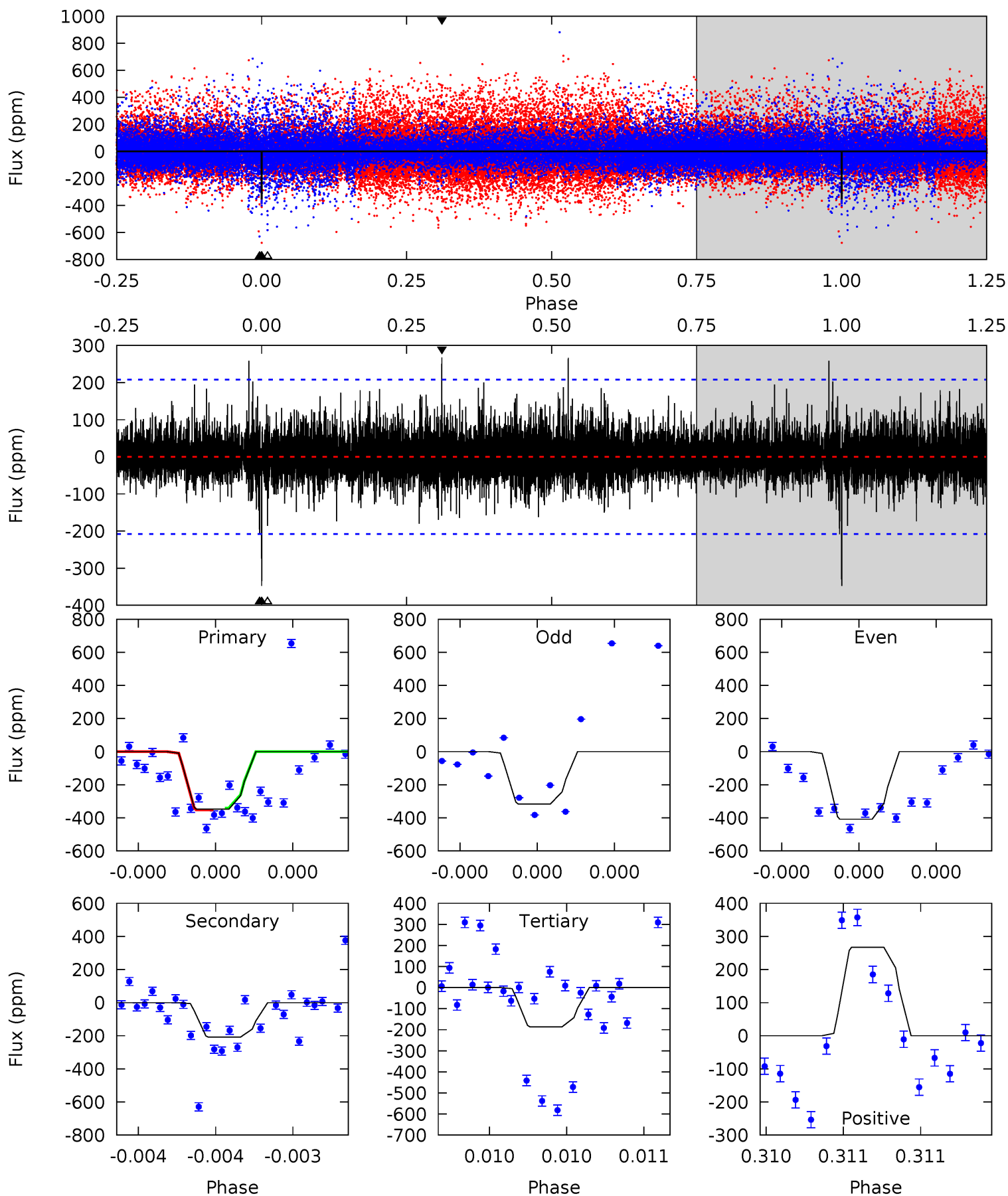
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
16.2	8.00	7.70	25.2	5.45	3.29	2.69	8.46	-9.02	0.30	-17.2	3.64	0.77	0.61	0.53



# Alt Model-Shift Uniqueness Test

004758595-02, P = 280.552532 Days, E = 79.535146 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
9.41	5.63	5.03	7.23	5.63	3.56	1.21	4.38	2.18	0.60	-1.60	1.19	0.94	0.43	0.16





### Stellar Parameters For KIC 004758595

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3572^{+71}_{-86}$	$4.858^{+0.054}_{-0.045}$	$-0.100^{+0.100}_{-0.100}$	$0.397^{+0.043}_{-0.048}$	$0.417^{+0.046}_{-0.062}$	$9.405^{+2.705}_{-1.757}$
	+2%/-2%	+1%/-1%	+100%/-100%	+11%/-12%	+11%/-15%	+29%/-19%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 004758595-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-311 \pm 39$	$5.27^{+5.79}_{-3.61}$	$175^{+5}_{-6}$	$2143^{+687}_{-302}$	$2435^{+21004}_{-1872}$
Alt.	$-208 \pm 37$	$4.82^{+5.11}_{-3.27}$	$175^{+5}_{-6}$	$2098^{+637}_{-281}$	$1973^{+16938}_{-1515}$

$T_{\text{max}}$  = 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

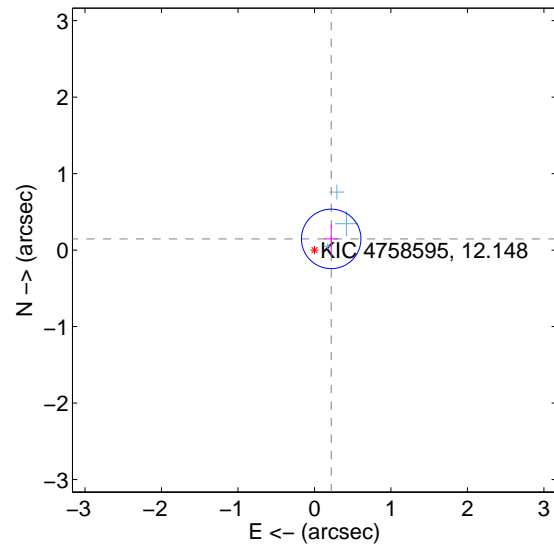
Supplemental centroid analysis for 004758595-02. Kepler magnitude: 12.15. Transit SNR 9.21

There are 3 quarters with good PRF difference image offsets

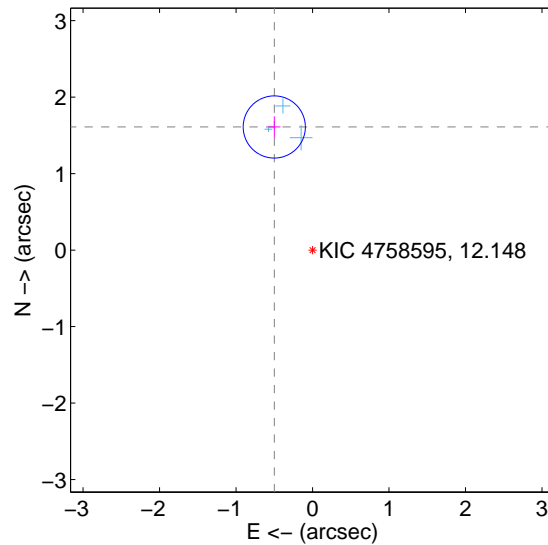
The direct PRF centroid is offset from the target star catalog position by about 1.70 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.263 \pm 0.130$	2.03	$-0.219 \pm 0.091$	$0.146 \pm 0.189$
PRF-fit source offset from KIC position	$1.685 \pm 0.135$	12.44	$0.500 \pm 0.081$	$1.609 \pm 0.140$
photometric centroid source offset	$1.47 \pm 0.39$	3.78	$0.80 \pm 0.35$	$1.23 \pm 0.40$

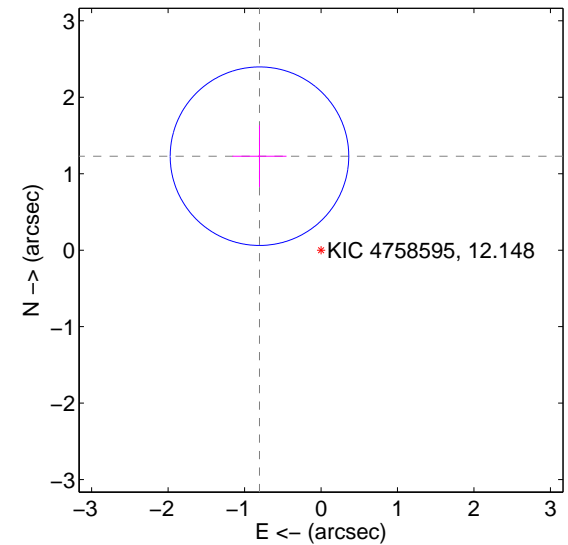
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

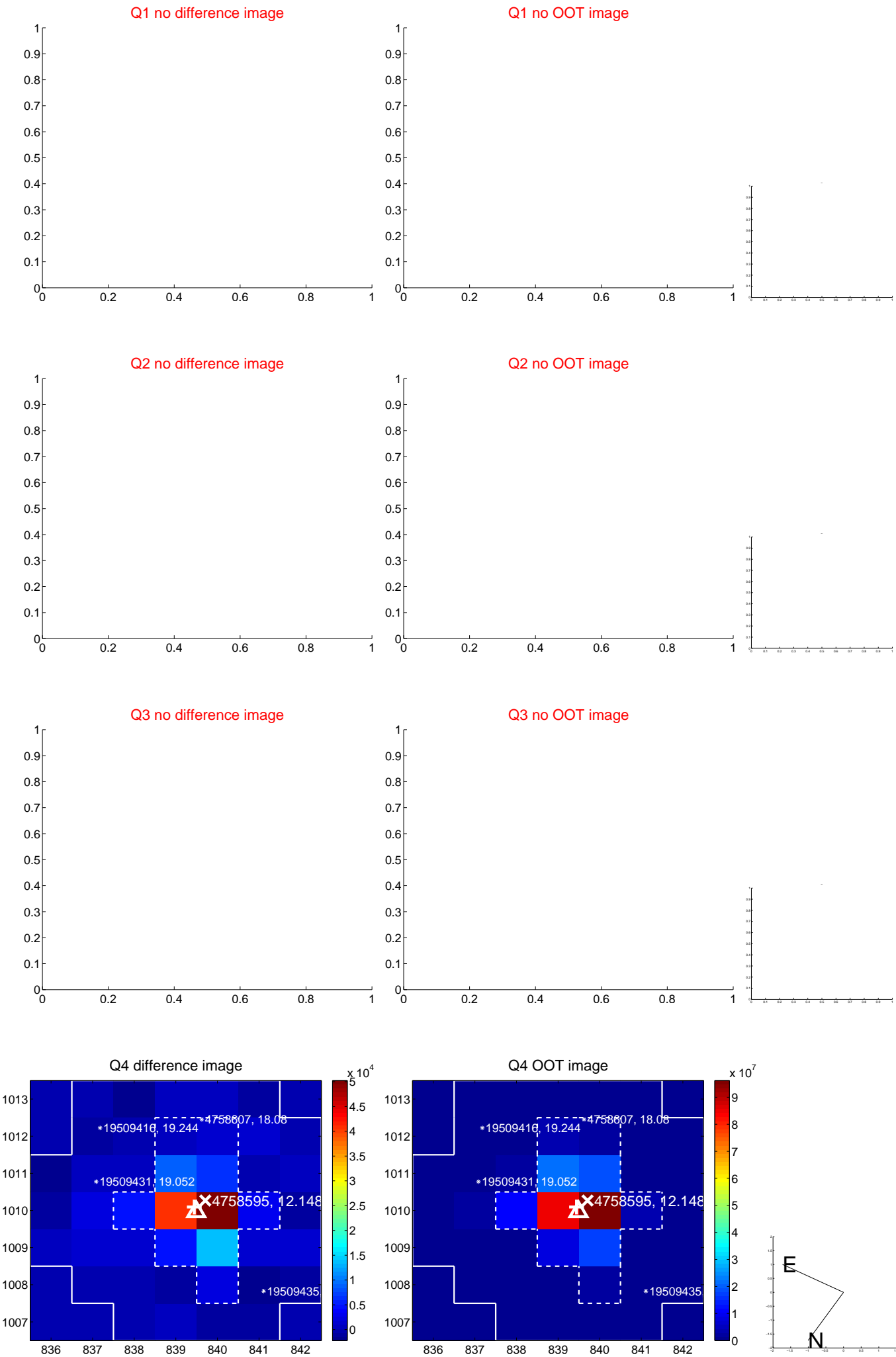


offset from photometric centroids

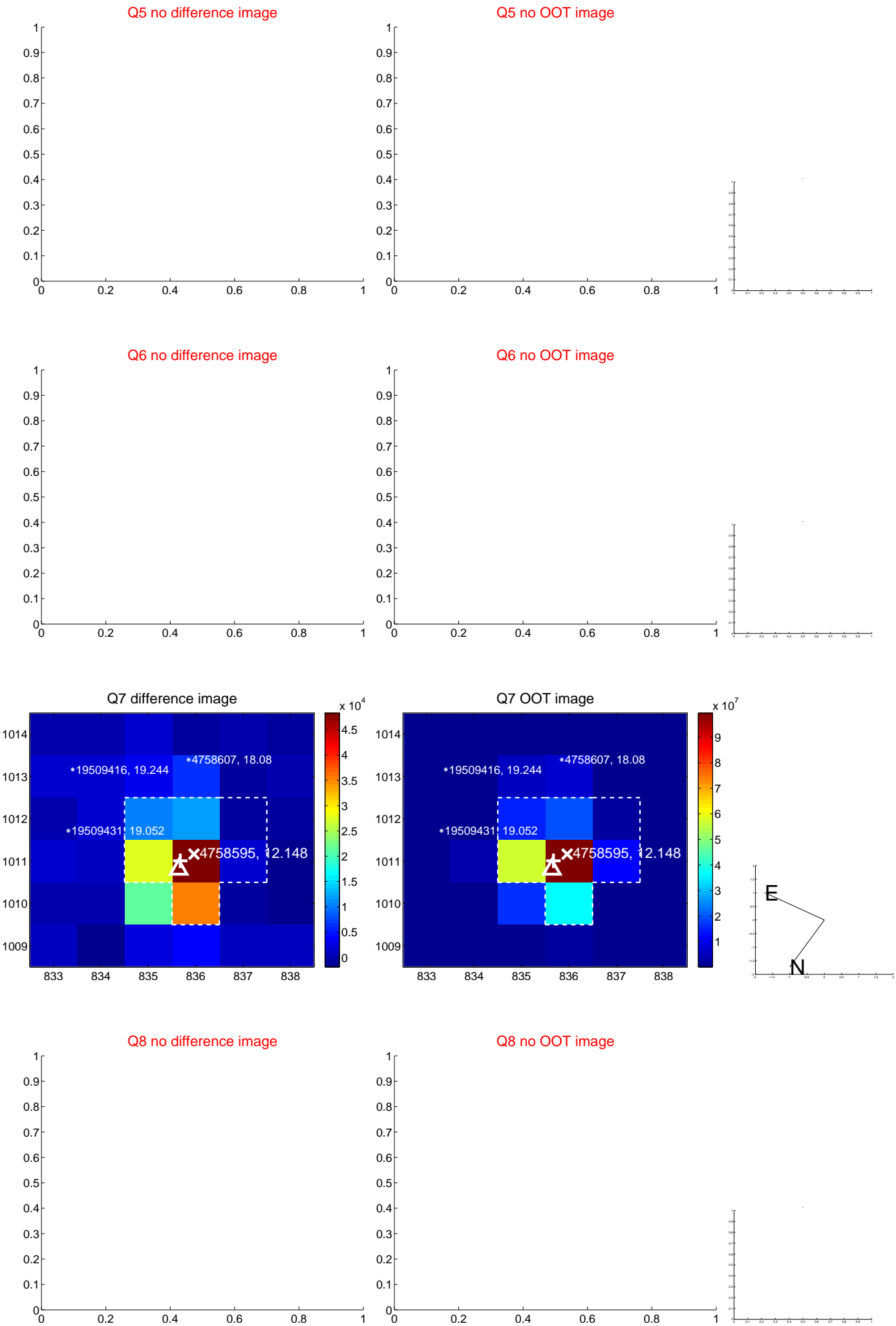


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



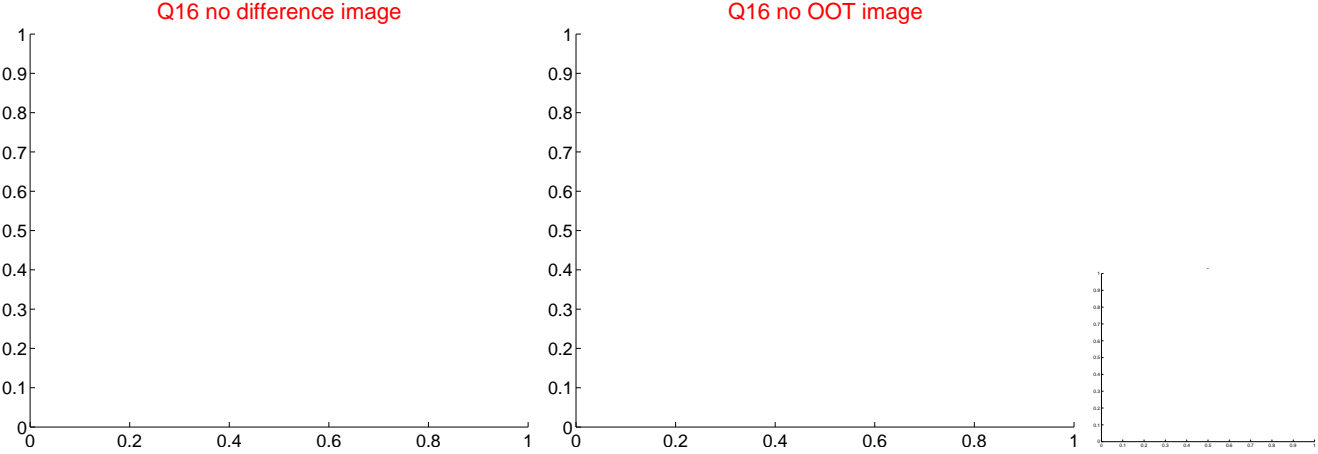
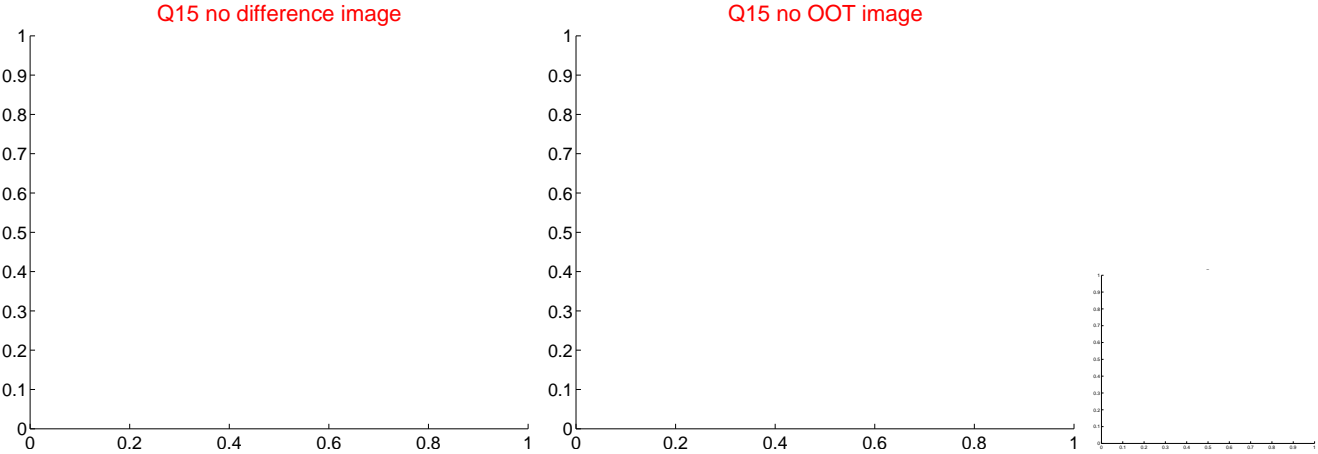
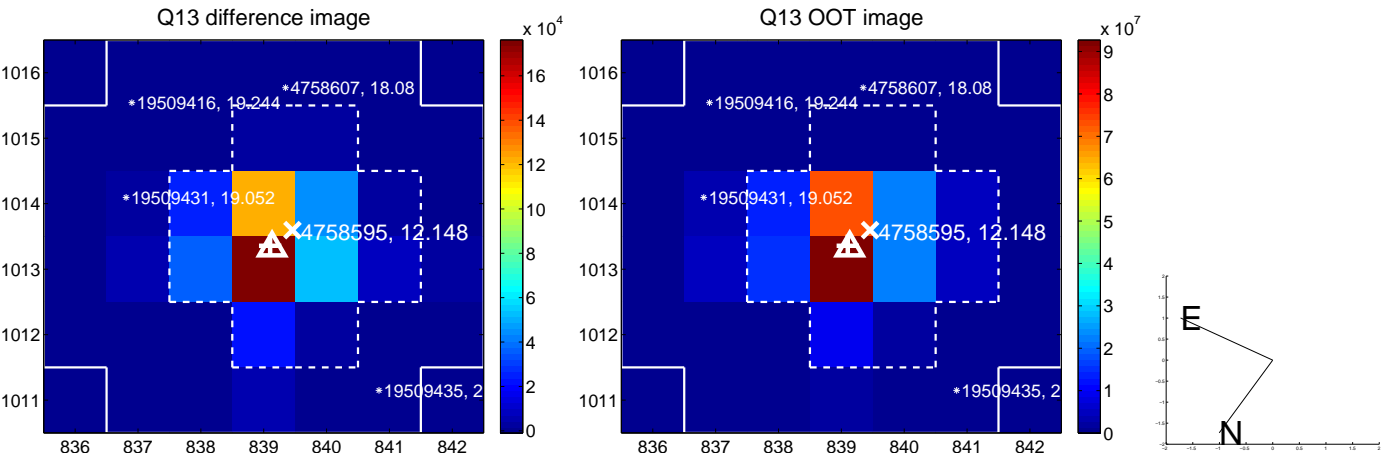
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



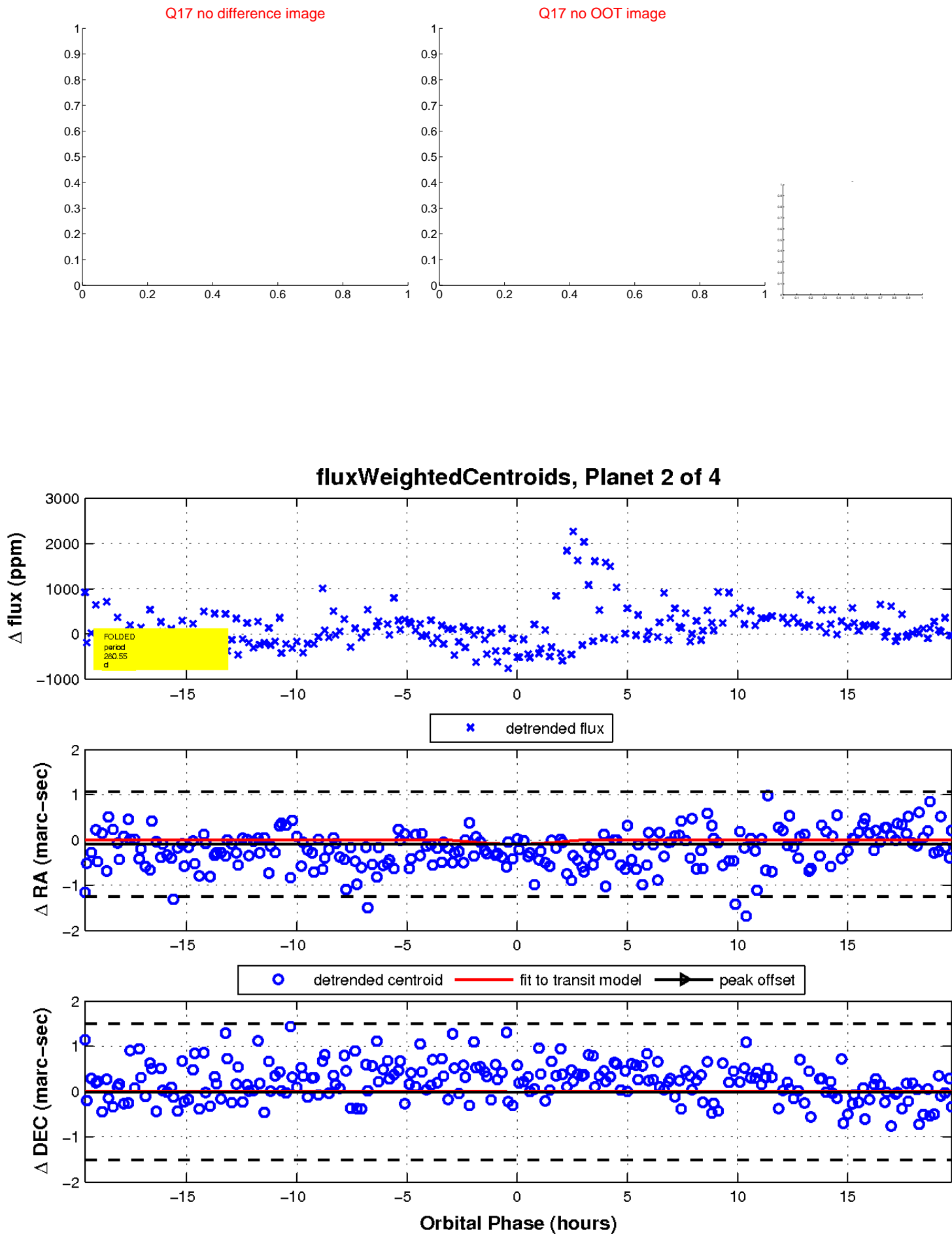
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

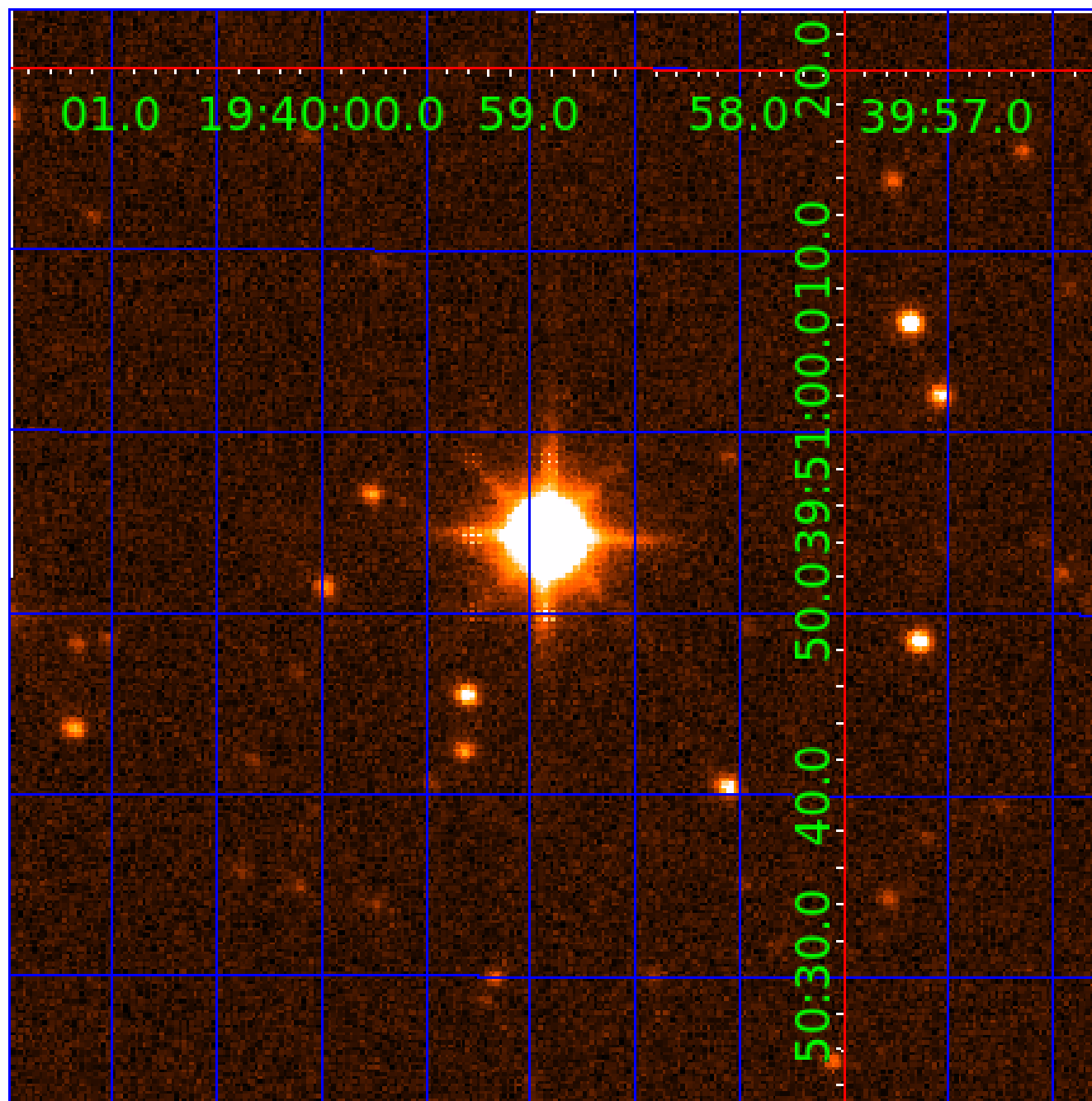


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 004758595

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004758595-01	OBS	No	423.350997	220.535177	432.2	4.872	13.1	7.6	0.40	3572	0.88	0.03
004758595-02	OBS	No	280.545583	360.075977	821.0	6.573	11.3	9.2	0.40	3572	1.83	0.06
004758595-03	OBS	No	286.518829	345.313155	286.2	12.658	9.5	5.2	0.40	3572	0.69	0.06
004758595-04	OBS	No	577.499818	244.825946	487.0	8.254	10.1	7.0	0.40	3572	0.95	0.02

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004758595-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
004758595-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
004758595-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_ZUMA—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS
004758595-04	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—INCONSISTENT_TRANS—CENT_KIC_POS

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

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

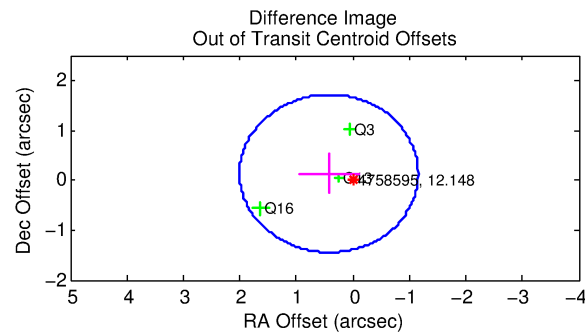
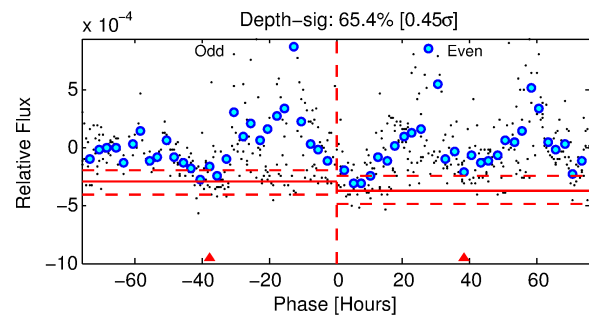
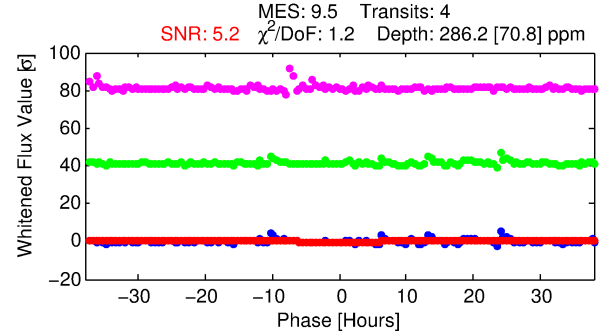
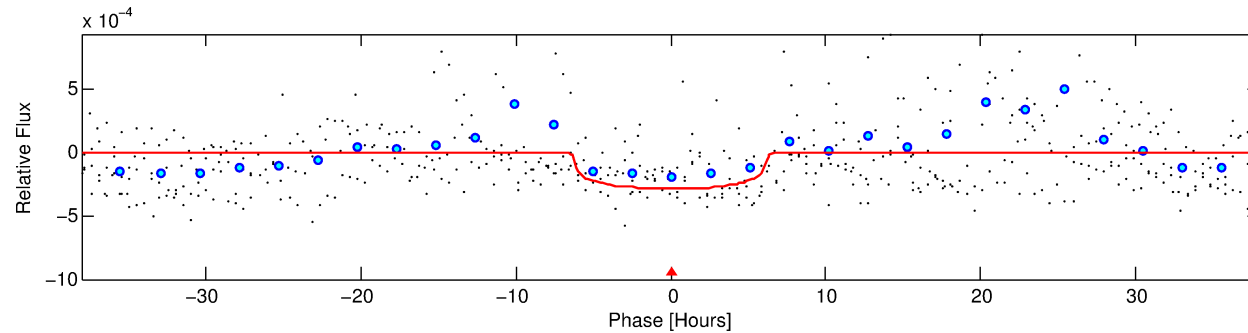
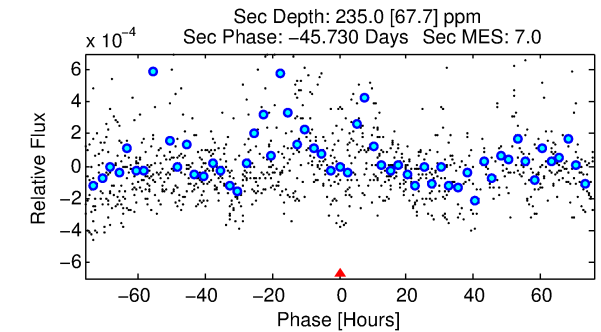
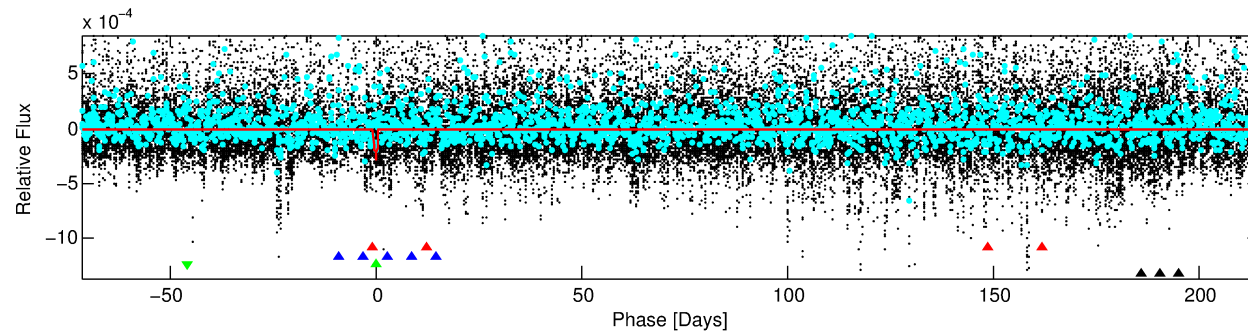
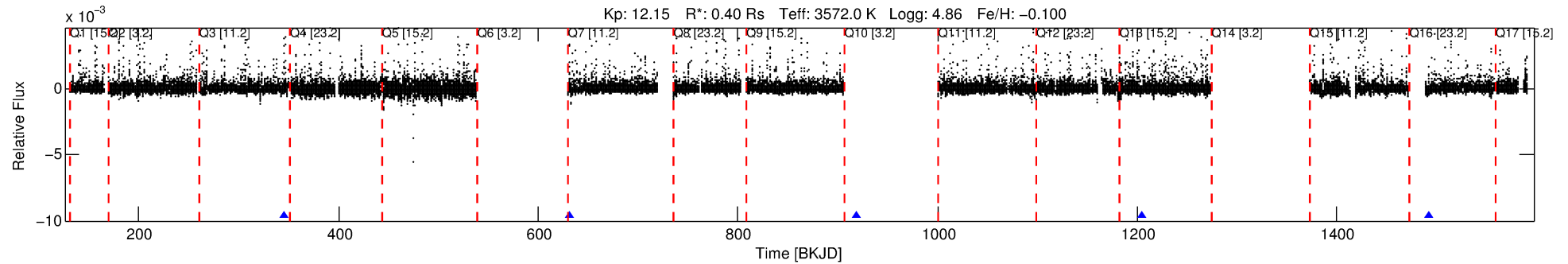
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004758595-03

No Significant Match Found

# DV One-Page Summary

KIC: 4758595 Candidate: 3 of 4 Period: 286.519 d



## DV Fit Results:

Period = 286.51883 [0.00556] d  
Epoch = 345.3132 [0.0152] BKJD  
Rp/R\* = 0.0160 [0.0101]  
a/R\* = 144.83 [378.84]  
b = 0.58 [3.05]  
Seff = 0.06 [0.01]  
Teq = 125 [5] K  
Rp = 0.69 [0.45] Re  
a = 0.6343 [0.0575] AU  
Ag = 108141.62 [140359.12] [0.77]  
Teffp = 3495 [1133] K [2.98 $\sigma$ ]

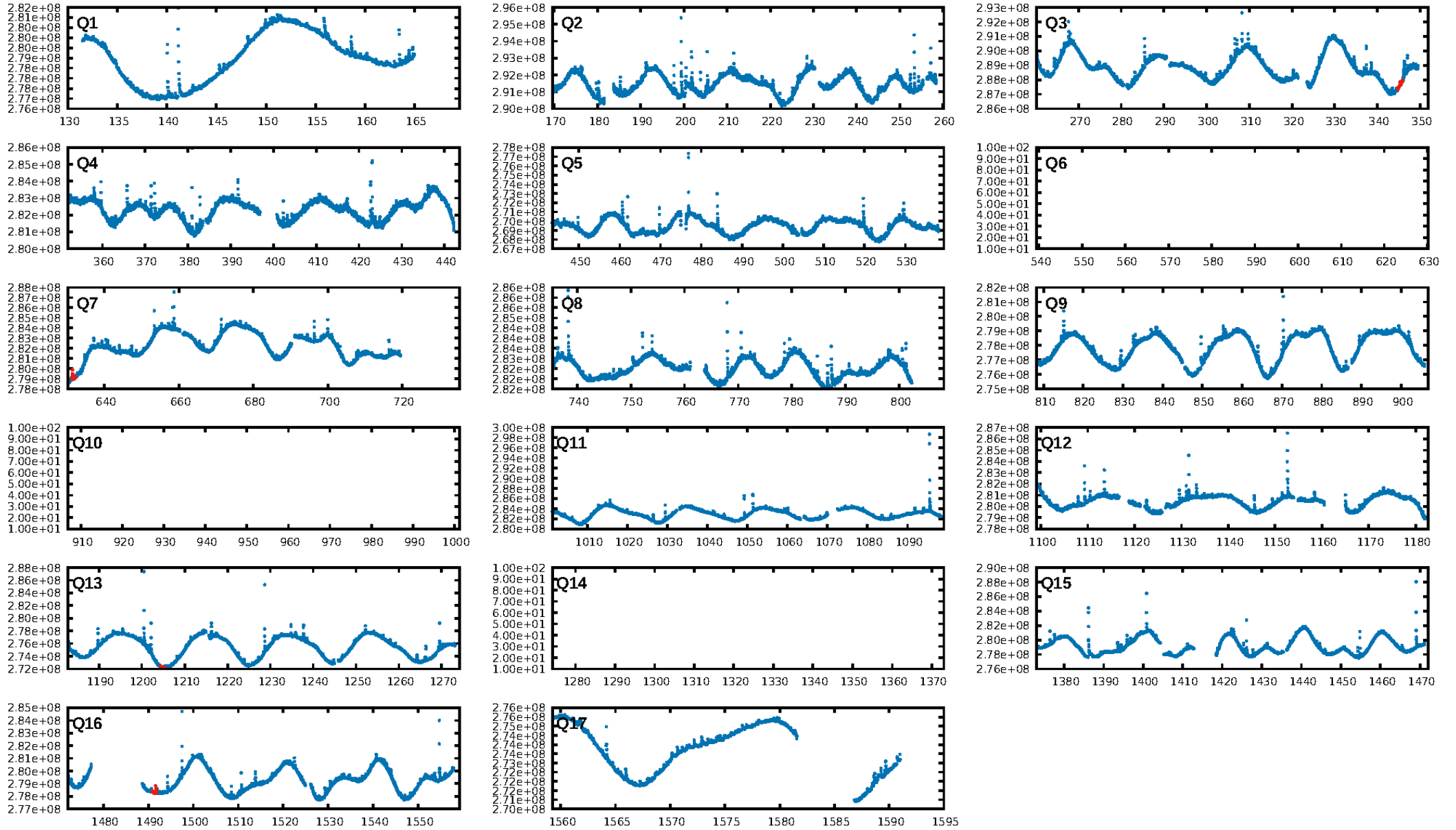
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [10.05 $\sigma$ ]  
LongPeriod-sig: 100.0% [242.13 $\sigma$ ]  
ModelChiSquare2-sig: 59.9%  
ModelChiSquareGof-sig: 99.9%  
Bootstrap-pfa: 1.67e-07  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -3.049  
Centroid-sig: 2.1%  
Centroid-so: 2.298 arcsec [3.06 $\sigma$ ]  
OotOffset-rm: 0.443 arcsec [0.84 $\sigma$ ]  
KicOffset-rm: 1.950 arcsec [5.20 $\sigma$ ]  
OotOffset-st: 0/1/1/1 [3]  
KicOffset-st: 0/1/1/1 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 0.67 [2/3]

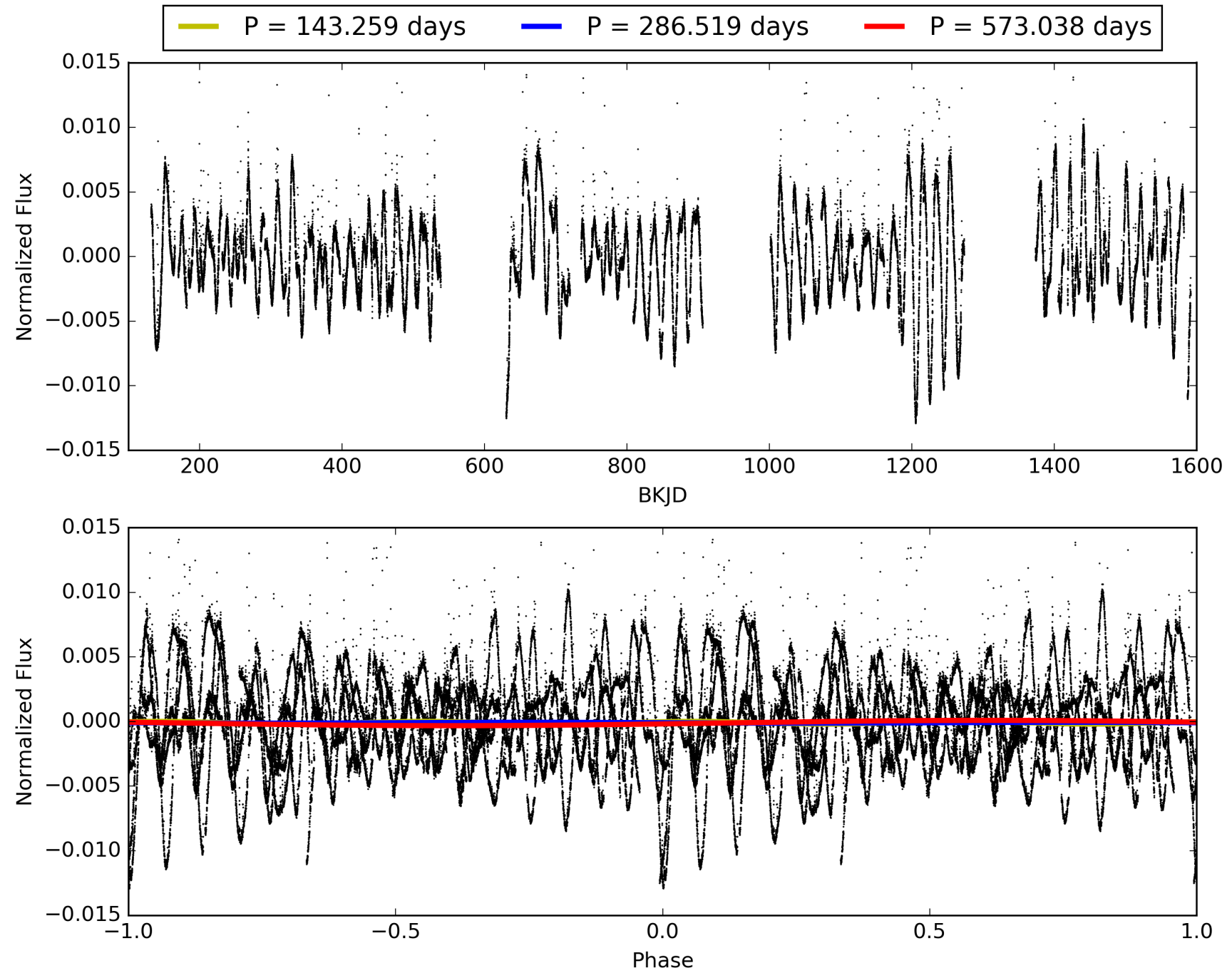
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 16:41:34 Z

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

# TCE 004758595-03, PDC Light Curves

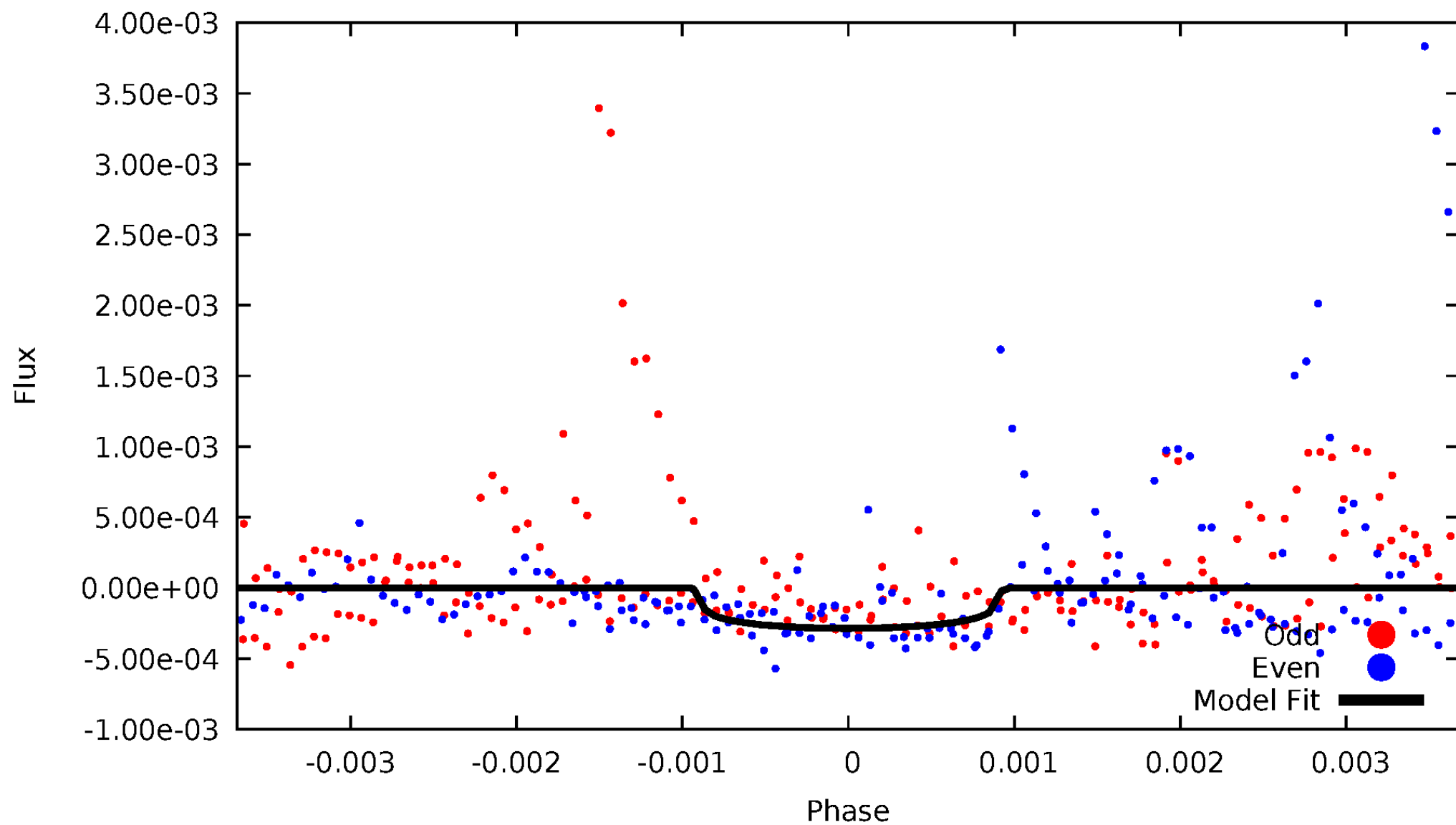


TCE 004758595-03



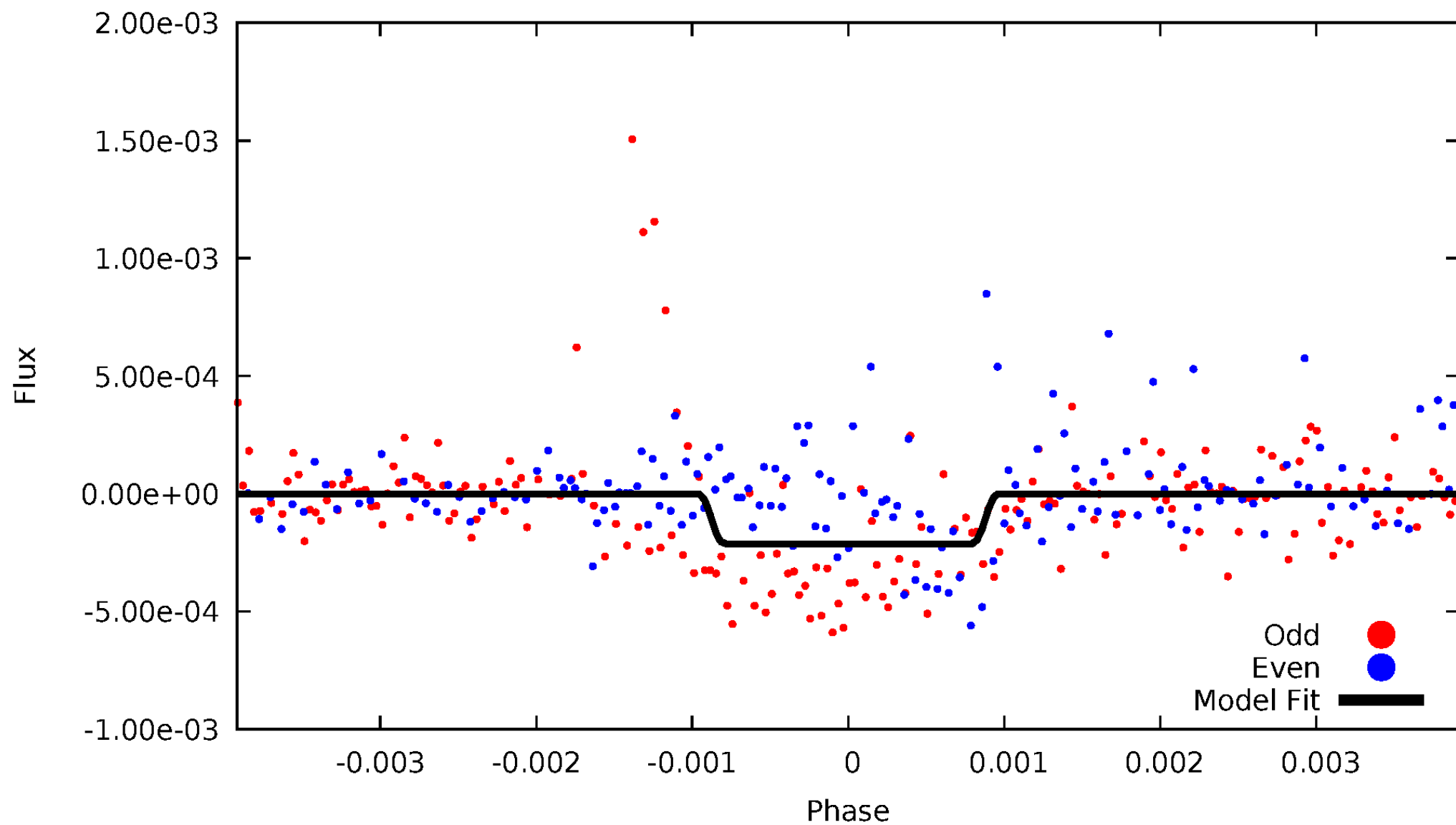
# DV Odd/Even

TCE 004758595-03



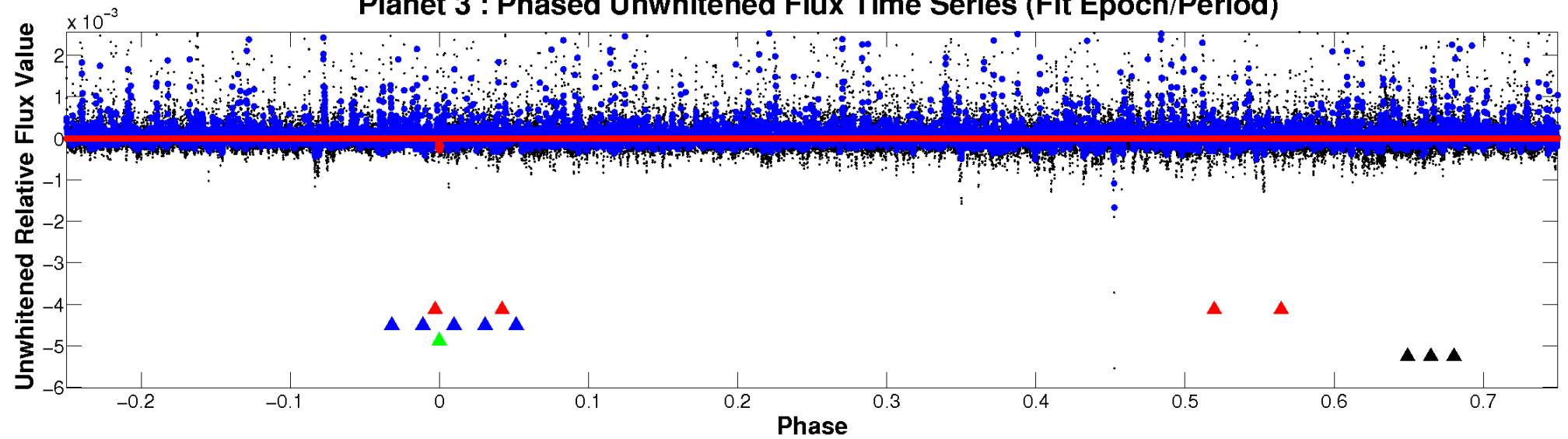
# ALT Odd/Even

TCE 004758595-03

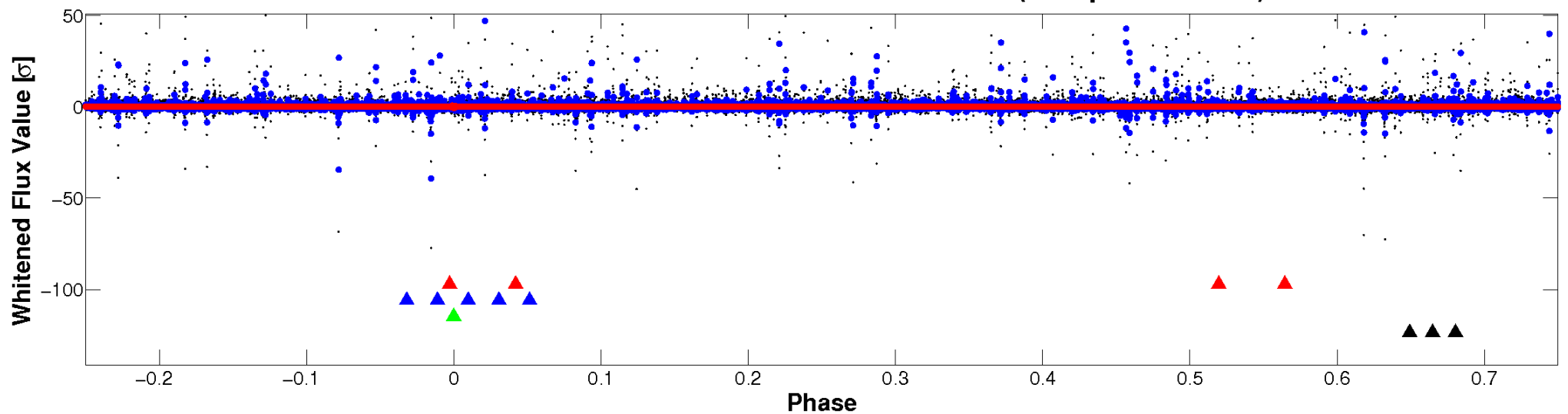


# Non-Whitened Vs. Whitened Light Curve

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

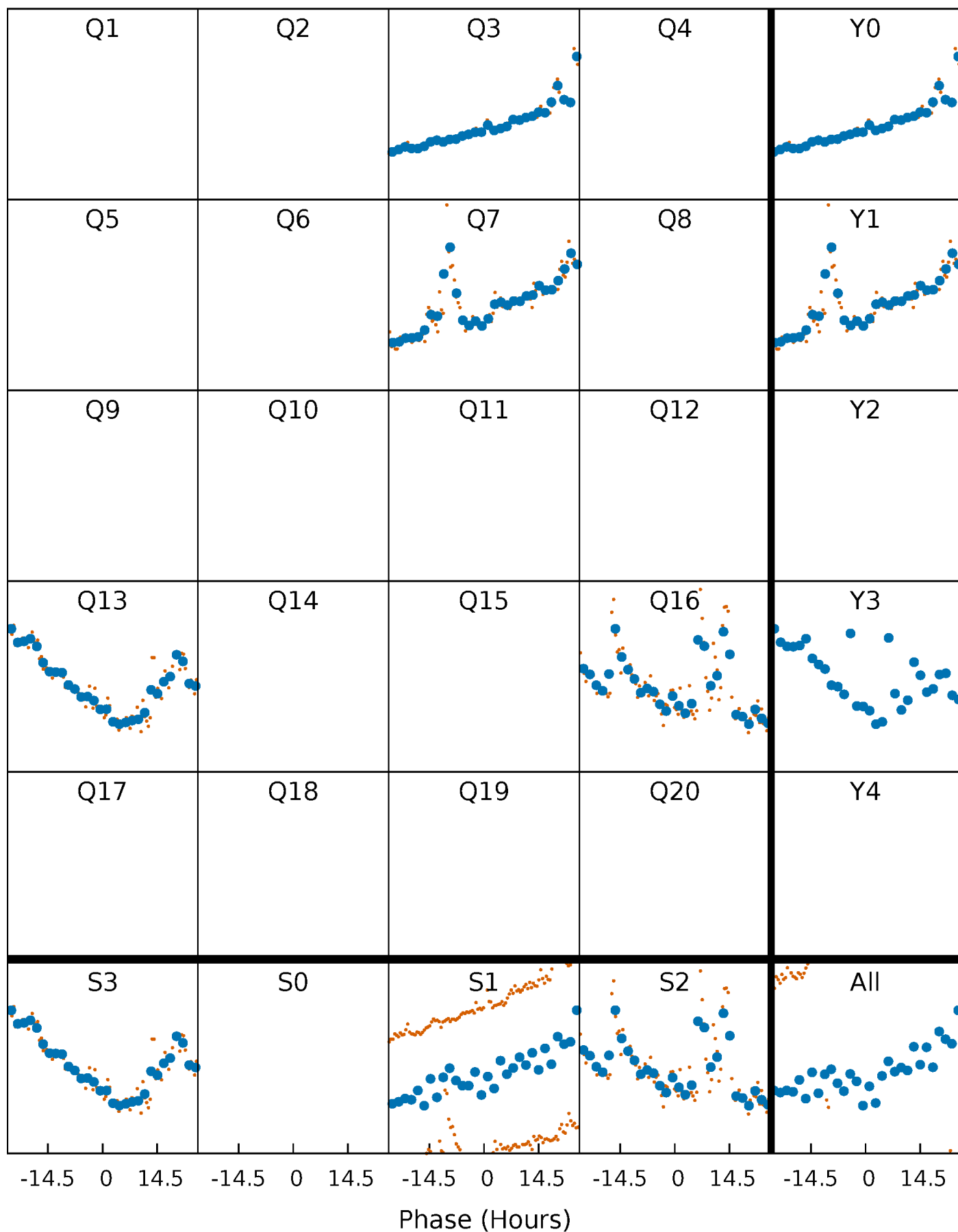


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

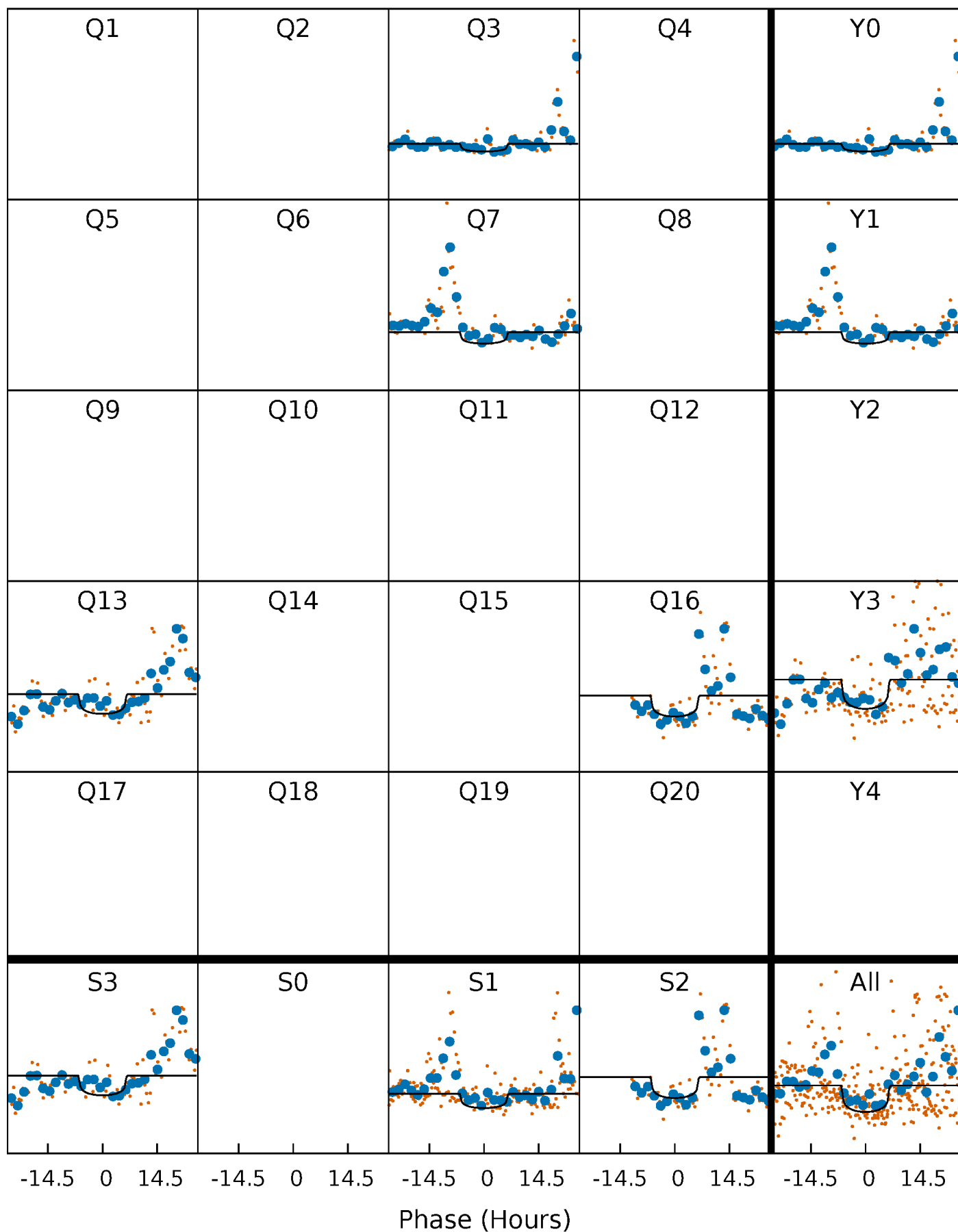
TCE 004758595-03     $P=286.518829$  Days     $T_0=345.313155$  (BKJD)





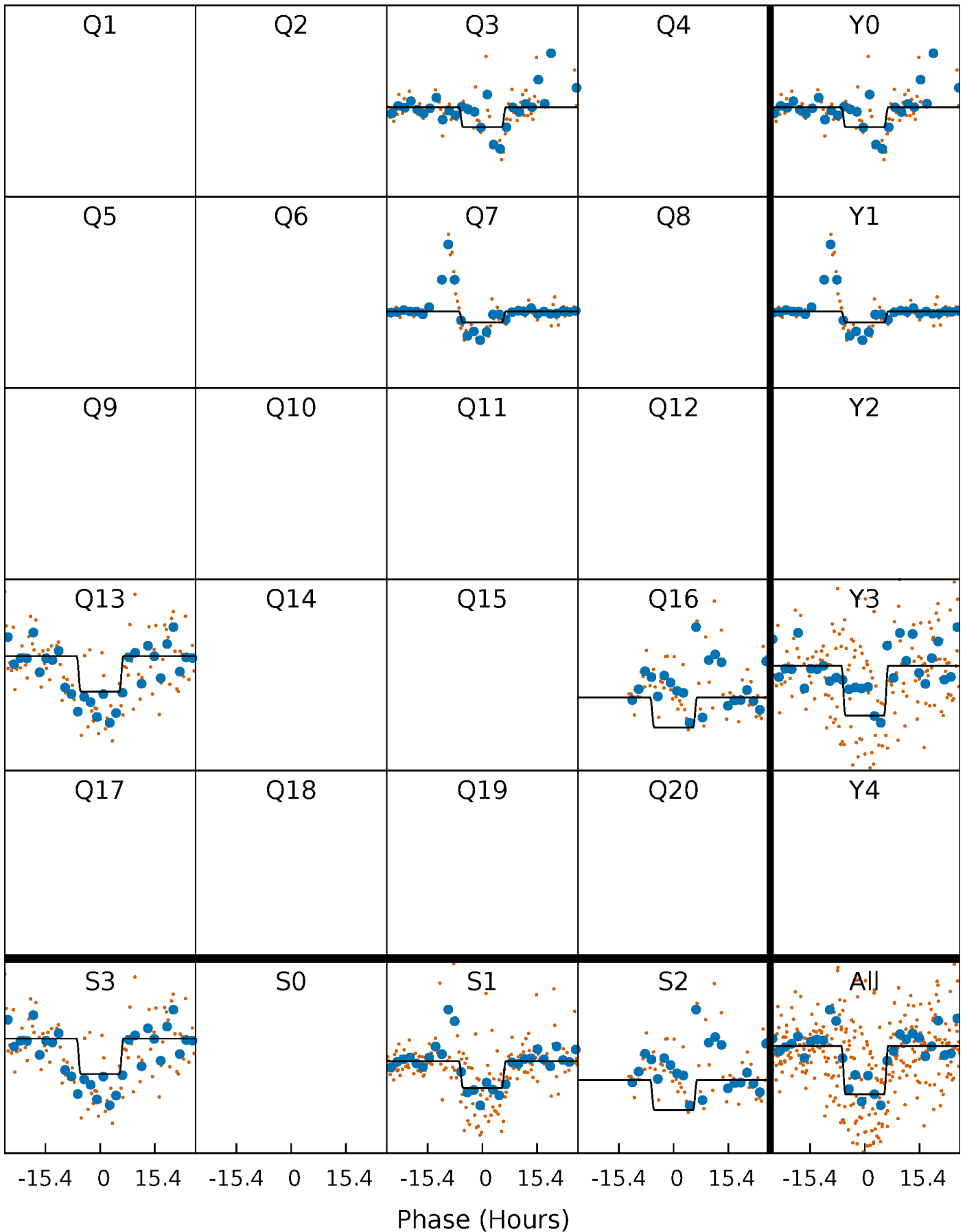
# DV Quarter-Phased Transit Curves

TCE 004758595-03     $P=286.518829$  Days     $T_0=345.313155$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

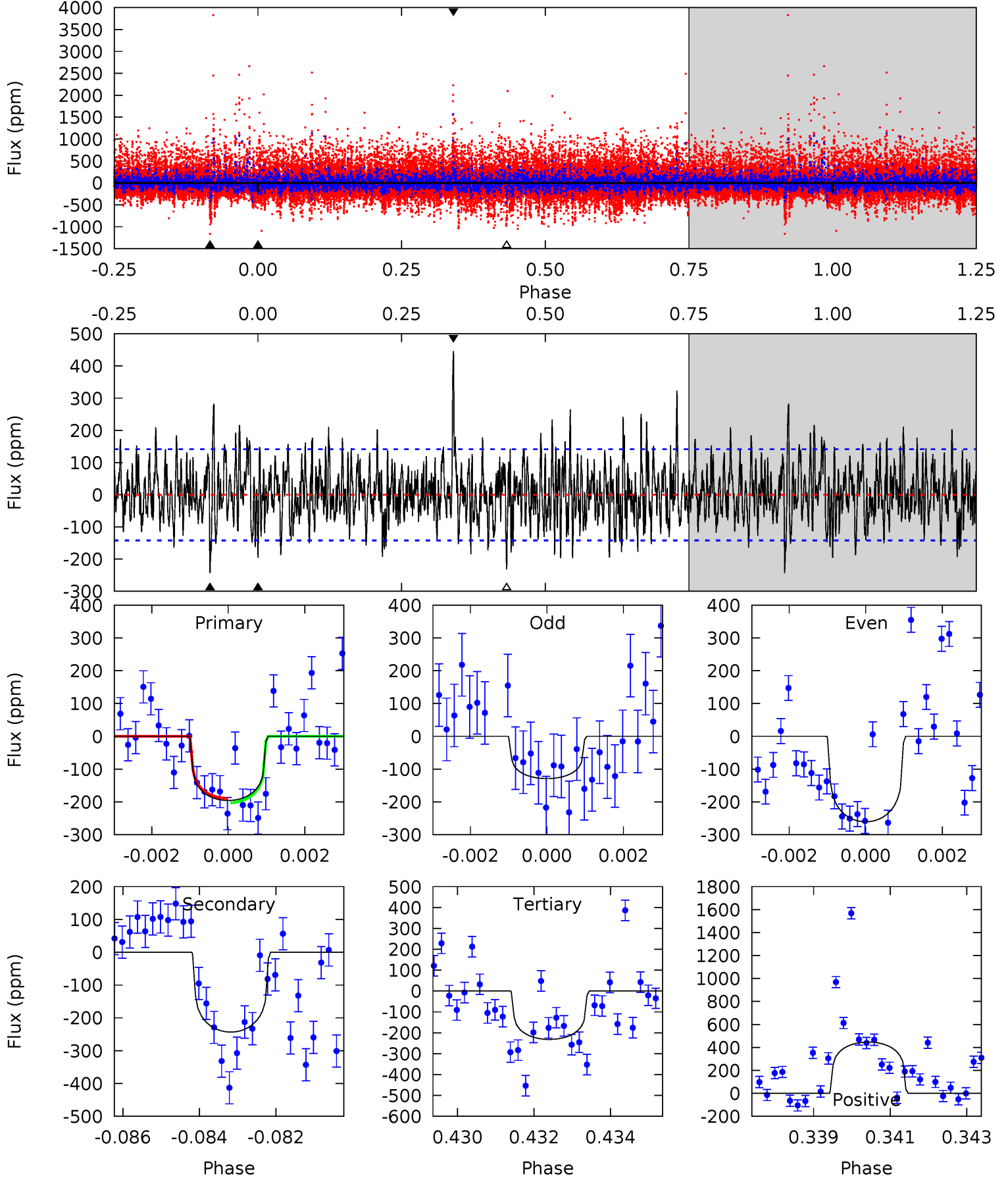
TCE 004758595-03   P=286.533001 Days    $T_0=345.306340$  (BKJD)



# DV Model-Shift Uniqueness Test

004758595-03, P = 286.518829 Days, E = 58.794326 Days

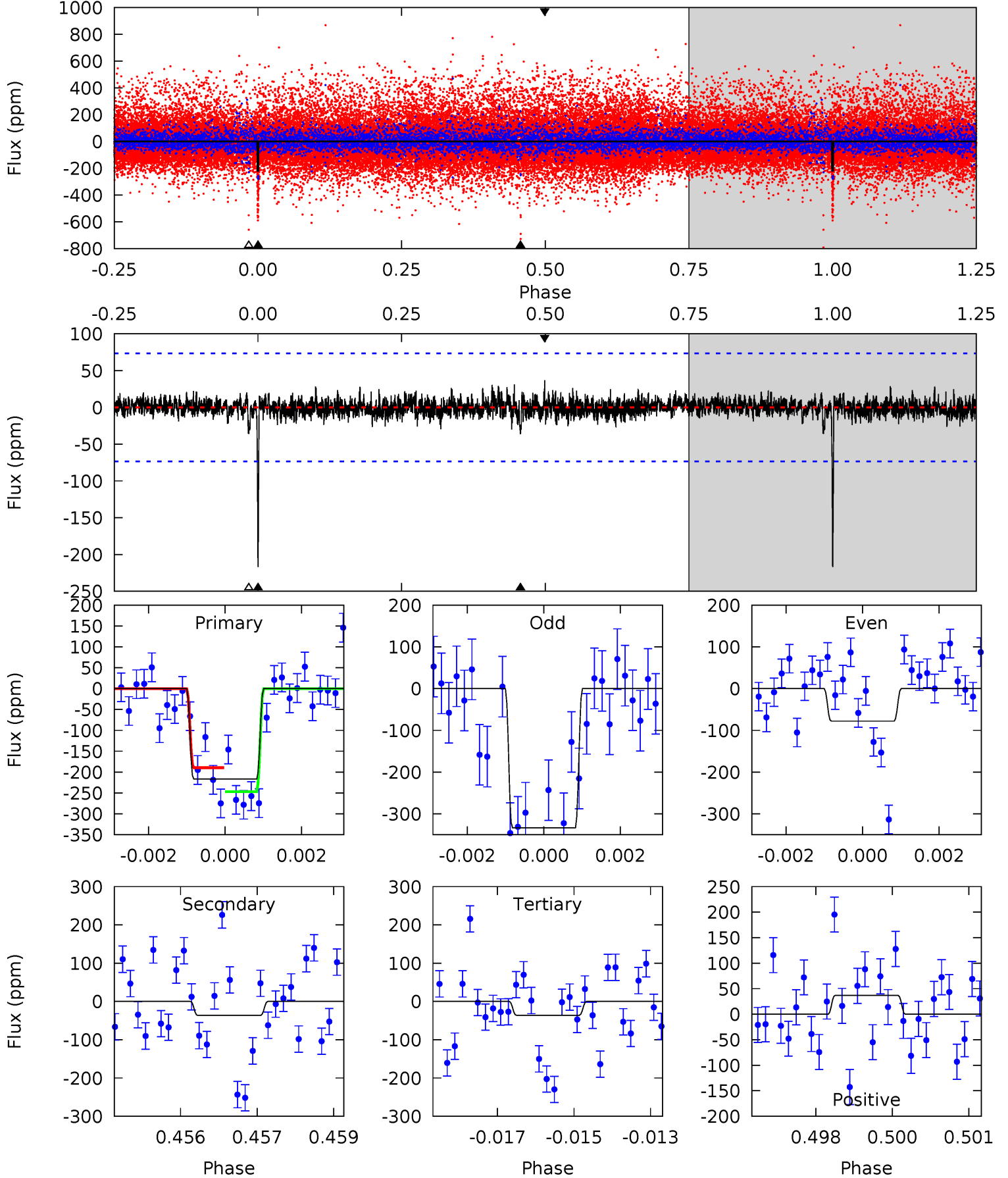
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.37	9.16	8.74	16.8	5.34	3.11	2.89	-1.36	-9.45	0.43	-7.66	1.71	1.08	0.65	0.26



# Alt Model-Shift Uniqueness Test

004758595-03, P = 286.533001 Days, E = 58.773339 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
15.8	2.64	2.62	2.68	5.33	3.10	0.58	13.1	13.1	0.02	-0.04	8.88	0.79	0.15	2.09



### Stellar Parameters For KIC 004758595

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$3572^{+71}_{-86}$	$4.858^{+0.054}_{-0.045}$	$-0.100^{+0.100}_{-0.100}$	$0.397^{+0.043}_{-0.048}$	$0.417^{+0.046}_{-0.062}$	$9.405^{+2.705}_{-1.757}$
	+2%/-2%	+1%/-1%	+100%/-100%	+11%/-12%	+11%/-15%	+29%/-19%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 004758595-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-243 \pm 27$	$0.73^{+0.44}_{-0.37}$	$174^{+5}_{-5}$	$3465^{+983}_{-448}$	$97955^{+337250}_{-58163}$
Alt.	$-36 \pm 14$	$0.67^{+0.44}_{-0.36}$	$174^{+5}_{-6}$	$2701^{+665}_{-341}$	$17088^{+60752}_{-11245}$

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

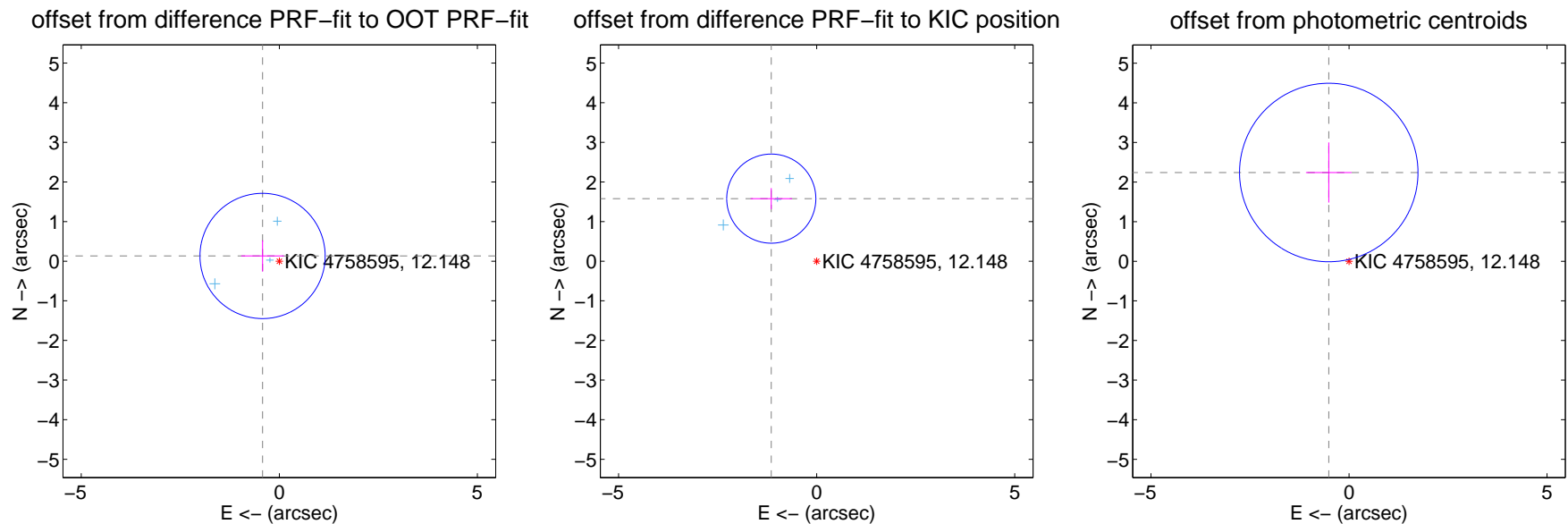
## DV Centroid Data

Supplemental centroid analysis for 004758595-03. Kepler magnitude: 12.15. Transit SNR 5.16

There are 3 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 1.65 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.443 \pm 0.527$	0.84	$0.423 \pm 0.538$	$0.132 \pm 0.395$
PRF-fit source offset from KIC position	$1.950 \pm 0.375$	5.20	$1.145 \pm 0.524$	$1.579 \pm 0.264$
photometric centroid source offset	$2.30 \pm 0.75$	3.06	$0.51 \pm 0.58$	$2.24 \pm 0.76$



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



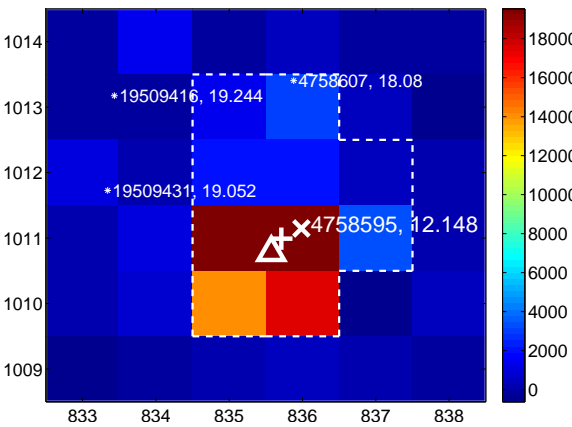
Q2 no difference image



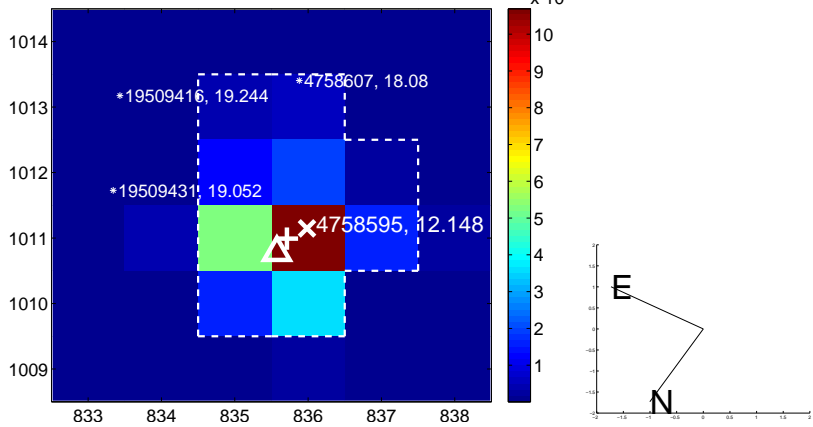
Q2 no OOT image



Q3 difference image



Q3 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.

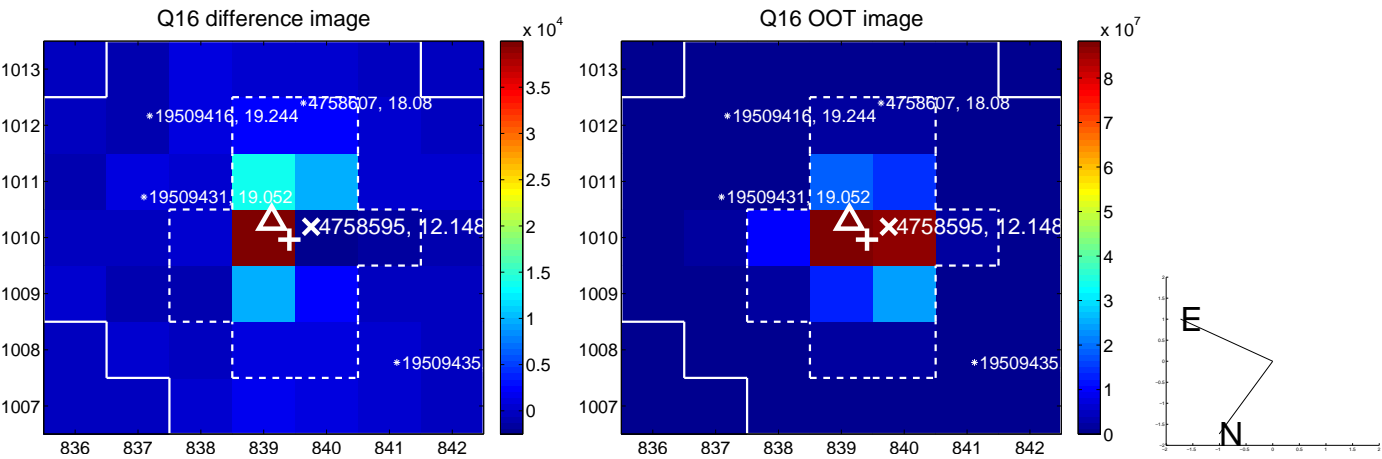
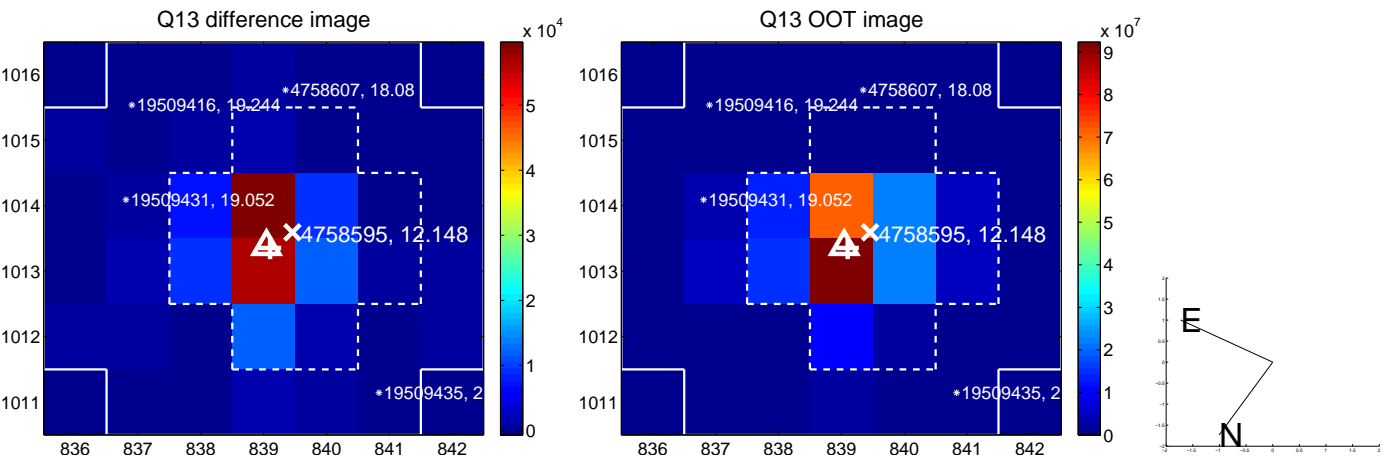




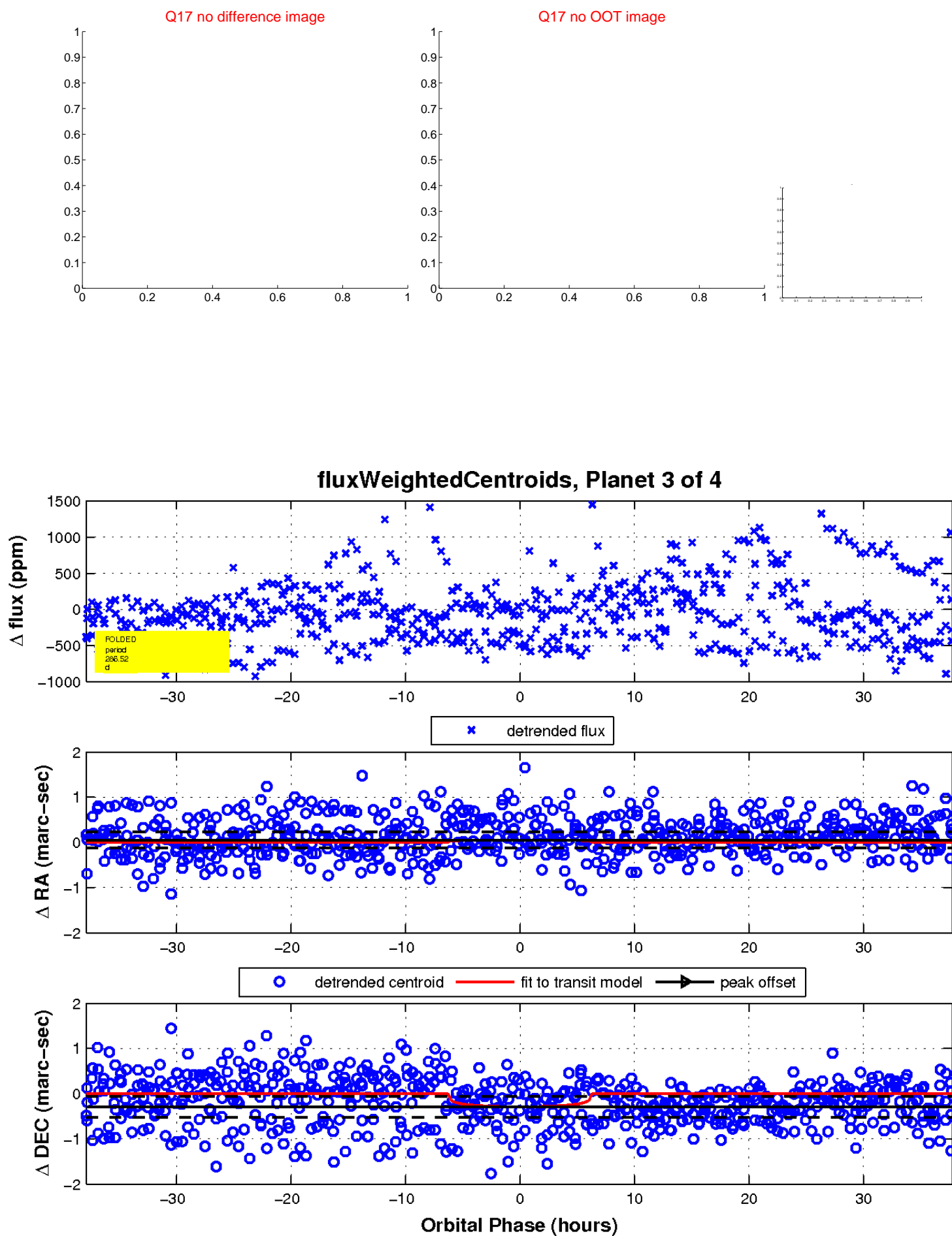
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

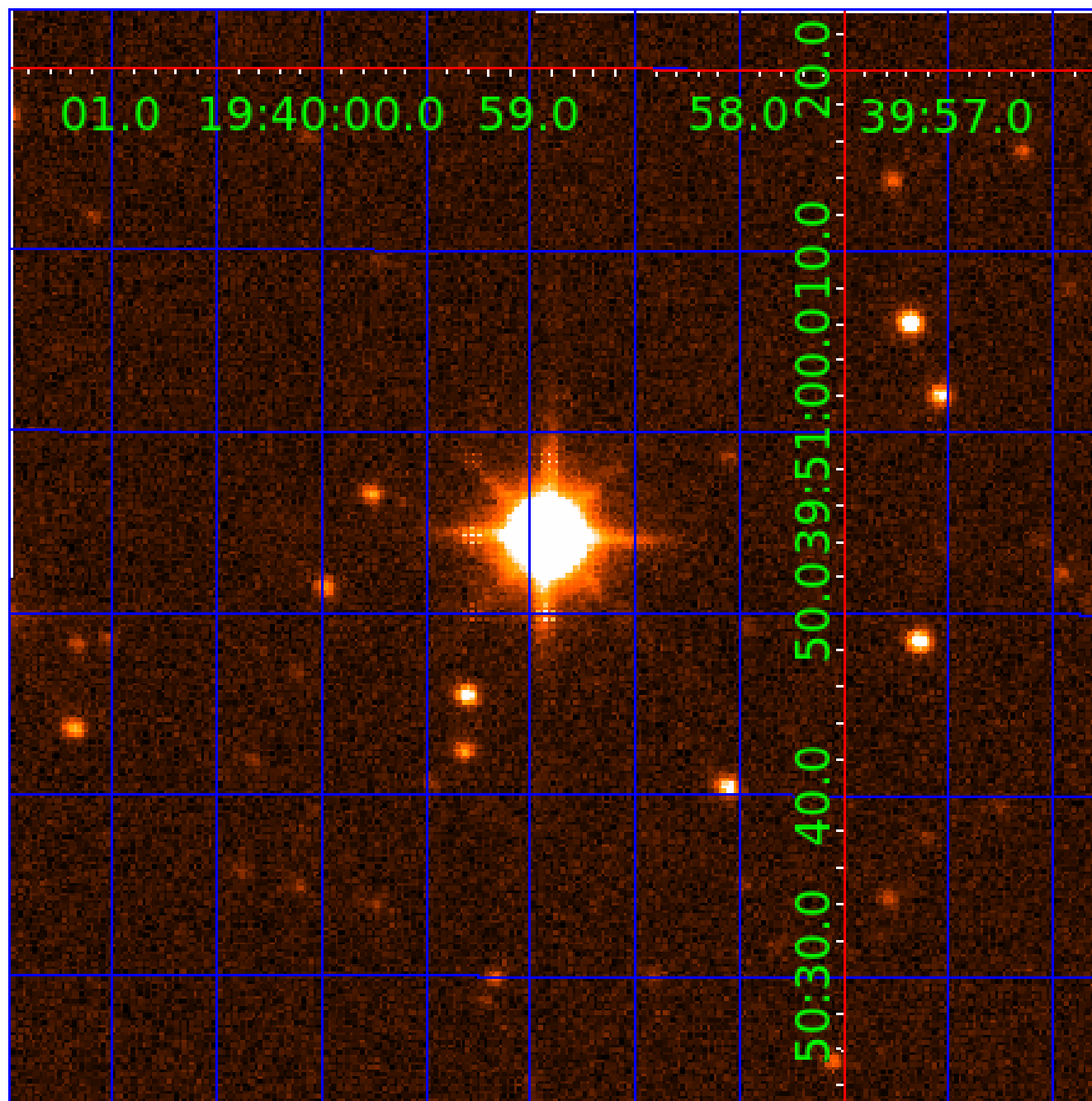


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 004758595

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004758595-01	OBS	No	423.350997	220.535177	432.2	4.872	13.1	7.6	0.40	3572	0.88	0.03
004758595-02	OBS	No	280.545583	360.075977	821.0	6.573	11.3	9.2	0.40	3572	1.83	0.06
004758595-03	OBS	No	286.518829	345.313155	286.2	12.658	9.5	5.2	0.40	3572	0.69	0.06
004758595-04	OBS	No	577.499818	244.825946	487.0	8.254	10.1	7.0	0.40	3572	0.95	0.02

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004758595-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
004758595-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
004758595-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_ZUMA—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS
004758595-04	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—INCONSISTENT_TRANS—CENT_KIC_POS

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

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

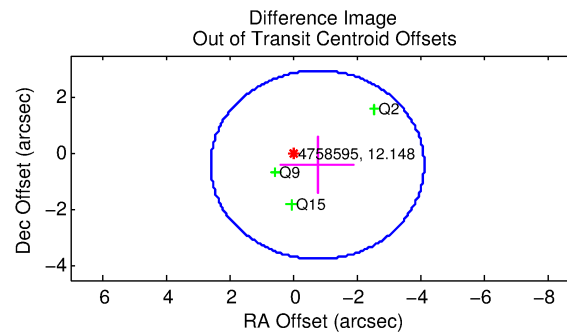
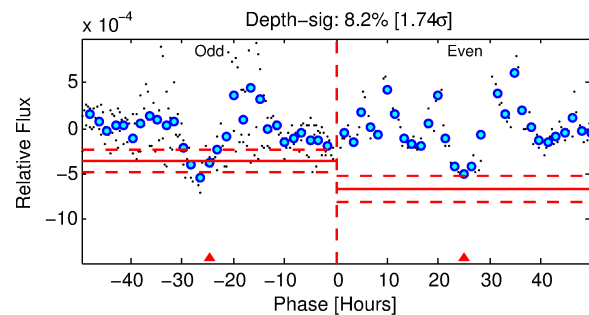
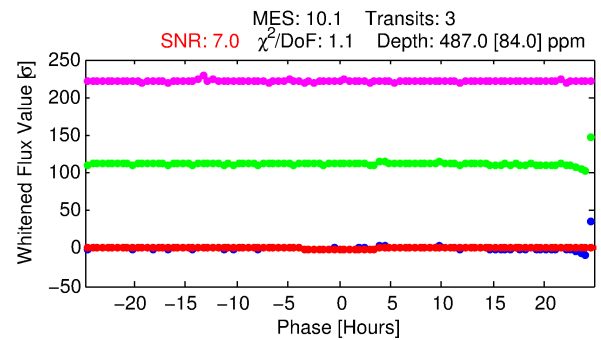
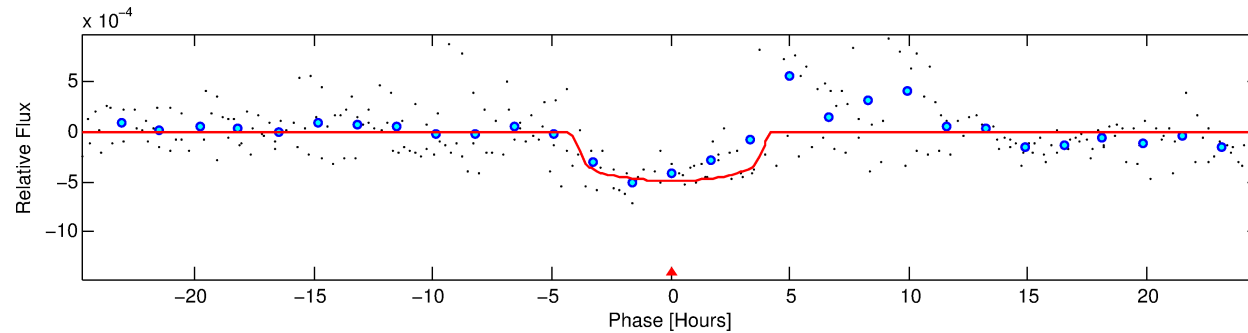
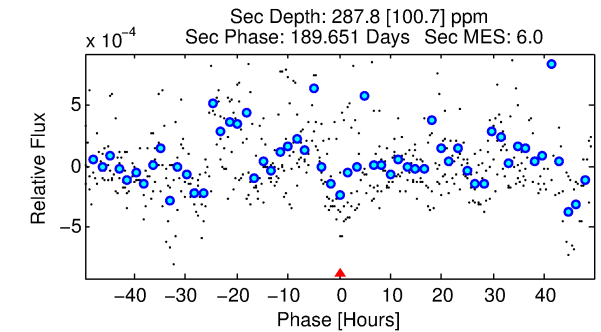
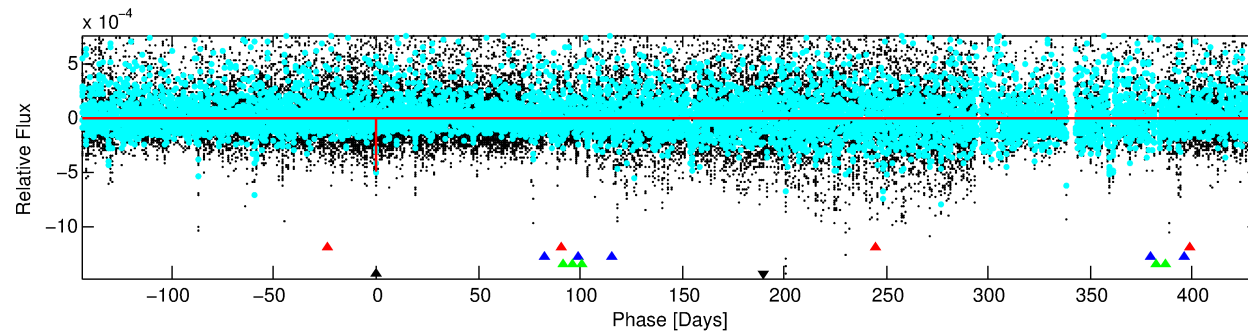
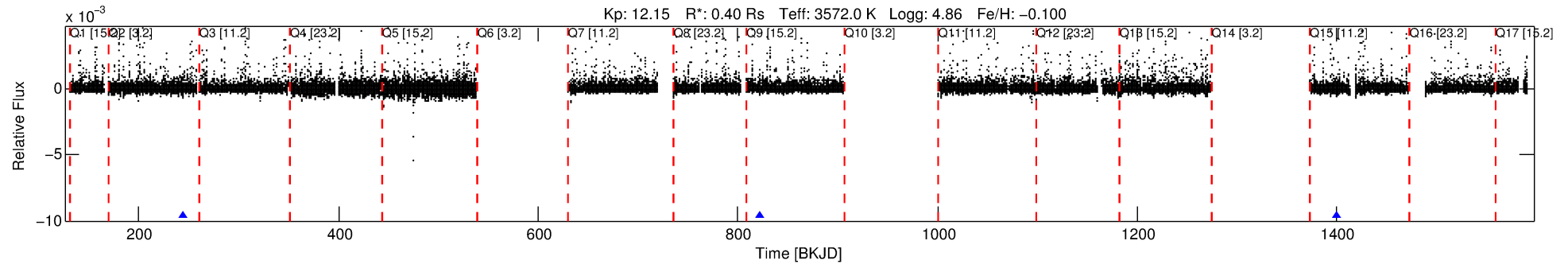
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004758595-04

No Significant Match Found

# DV One-Page Summary

KIC: 4758595 Candidate: 4 of 4 Period: 577.500 d



## DV Fit Results:

Period = 577.49982 [0.00670] d  
Epoch = 244.8259 [0.0090] BKJD  
Rp/R\* = 0.0220 [0.0062]  
a/R\* = 366.17 [404.78]  
b = 0.76 [0.62]  
Seff = 0.02 [0.00]  
Teq = 99 [4] K  
Rp = 0.95 [0.29] Re  
a = 1.0122 [0.0917] AU  
Ag = 178774.15 [120762.98] [1.48 $\sigma$ ]  
Teffp = 3138 [527] K [5.76 $\sigma$ ]

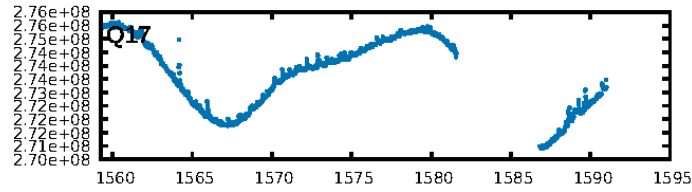
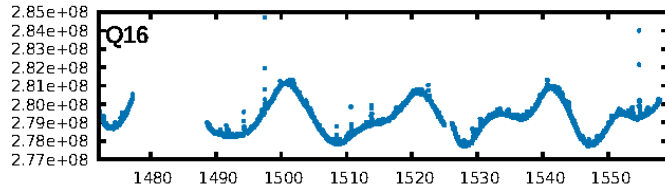
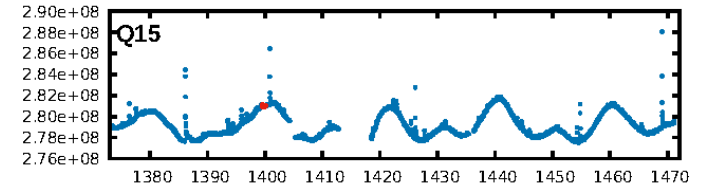
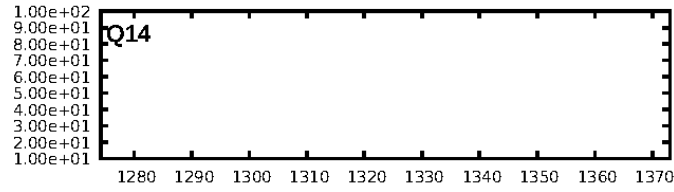
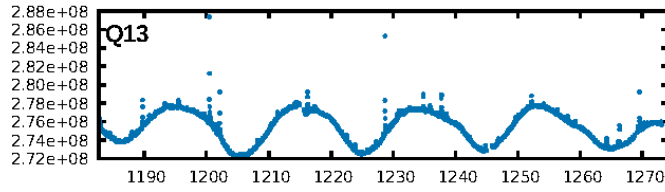
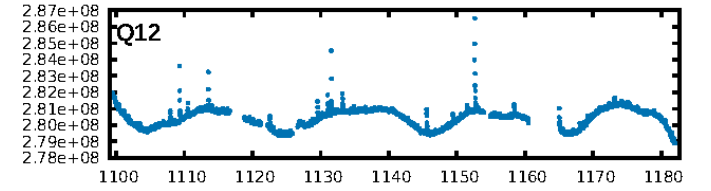
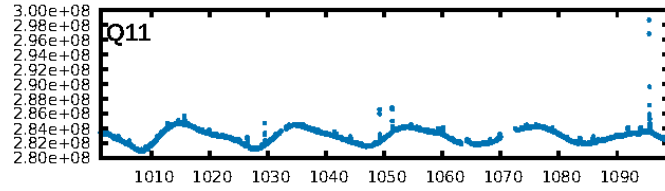
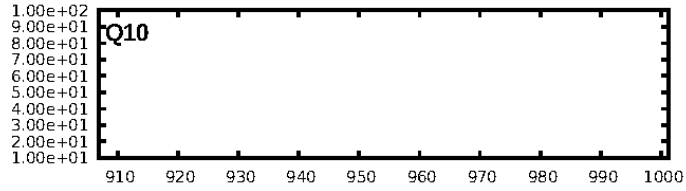
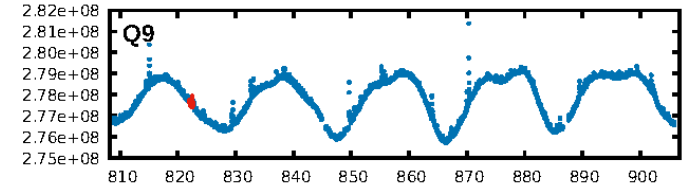
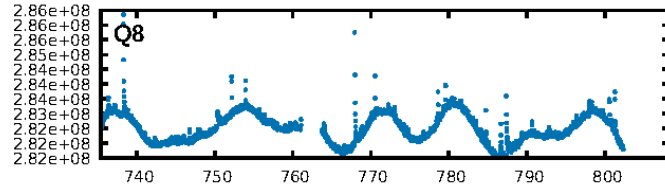
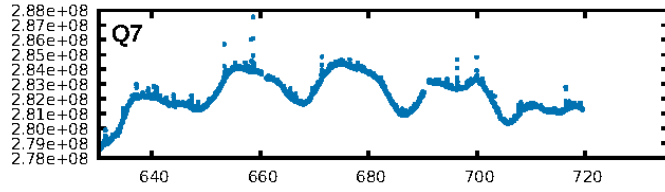
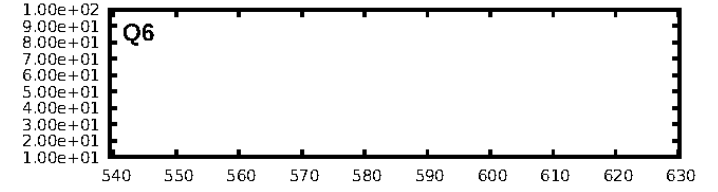
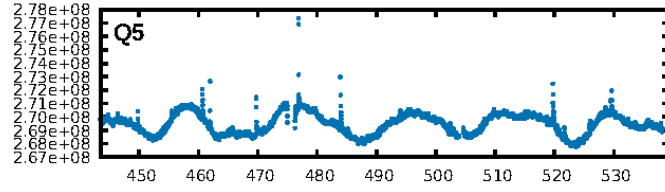
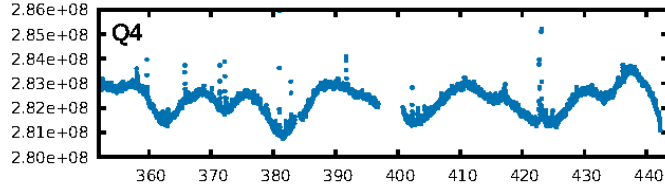
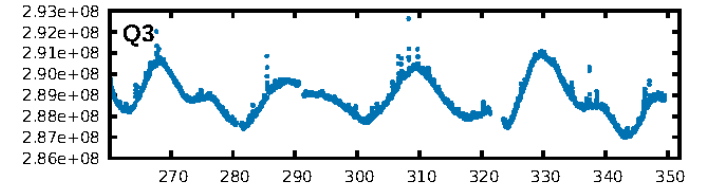
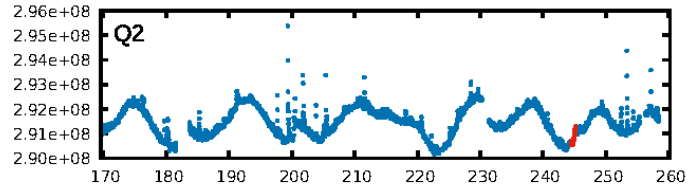
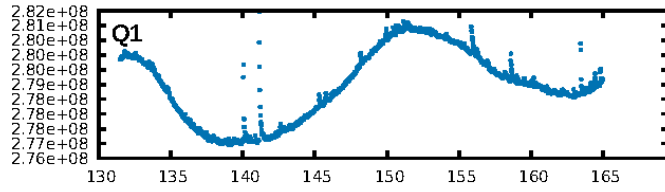
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [385.98 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 22.4%  
ModelChiSquareGof-sig: 99.5%  
**Bootstrap-pfa: 8.08e-08**  
RollingBand-fgt: 1.00 [3/3]  
**GhostDiagnostic-chr: 0.5755**  
Centroid-sig: 78.4%  
Centroid-so: 1.559 arcsec [2.84 $\sigma$ ]  
OotOffset-rm: 0.872 arcsec [0.78 $\sigma$ ]  
OotOffset-st: 1/1/0/1 [3]  
KicOffset-rm: 0.931 arcsec [0.79 $\sigma$ ]  
KicOffset-st: 1/1/0/1 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 1.00 [3/3]

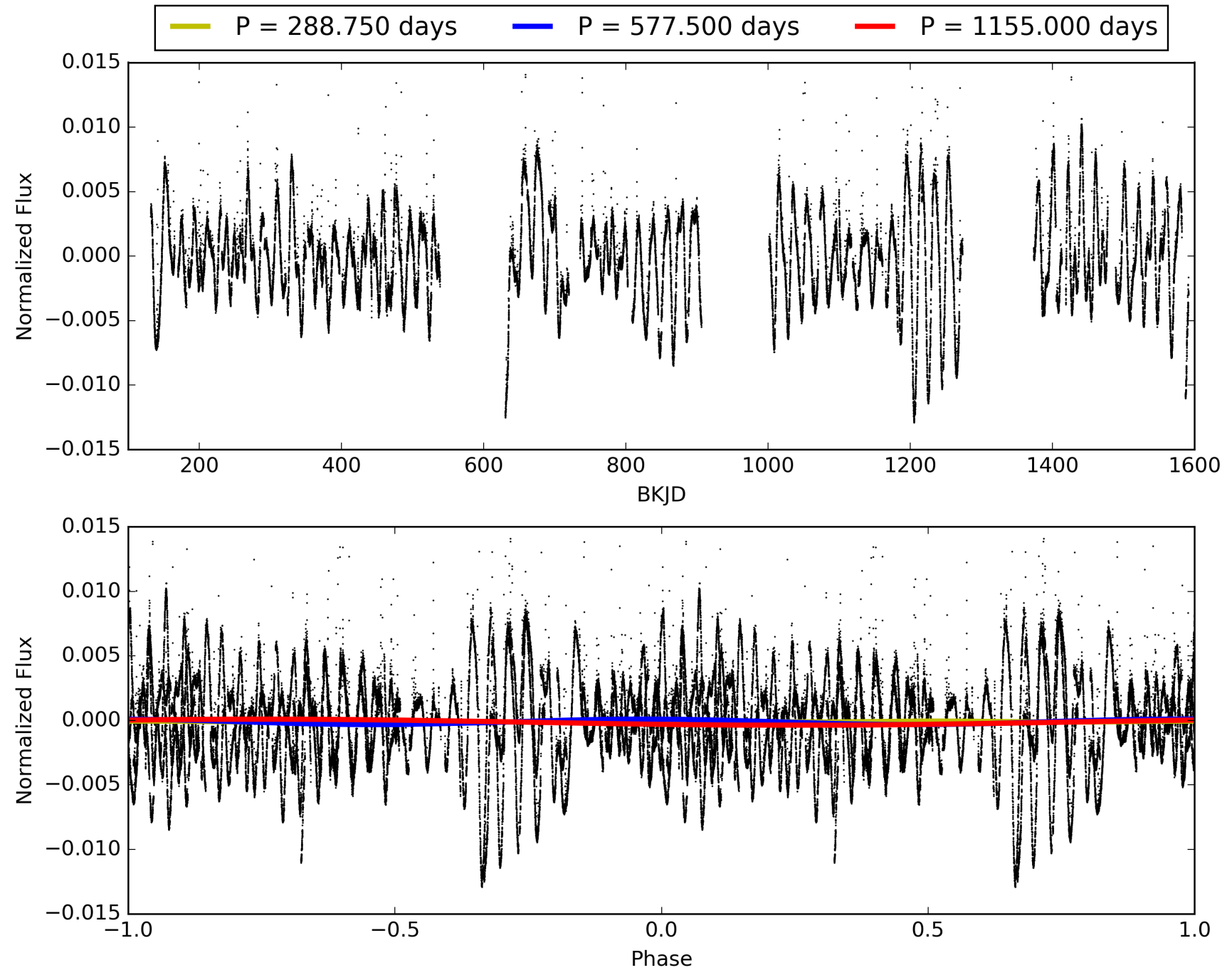
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 16:41:44 Z

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

# TCE 004758595-04, PDC Light Curves



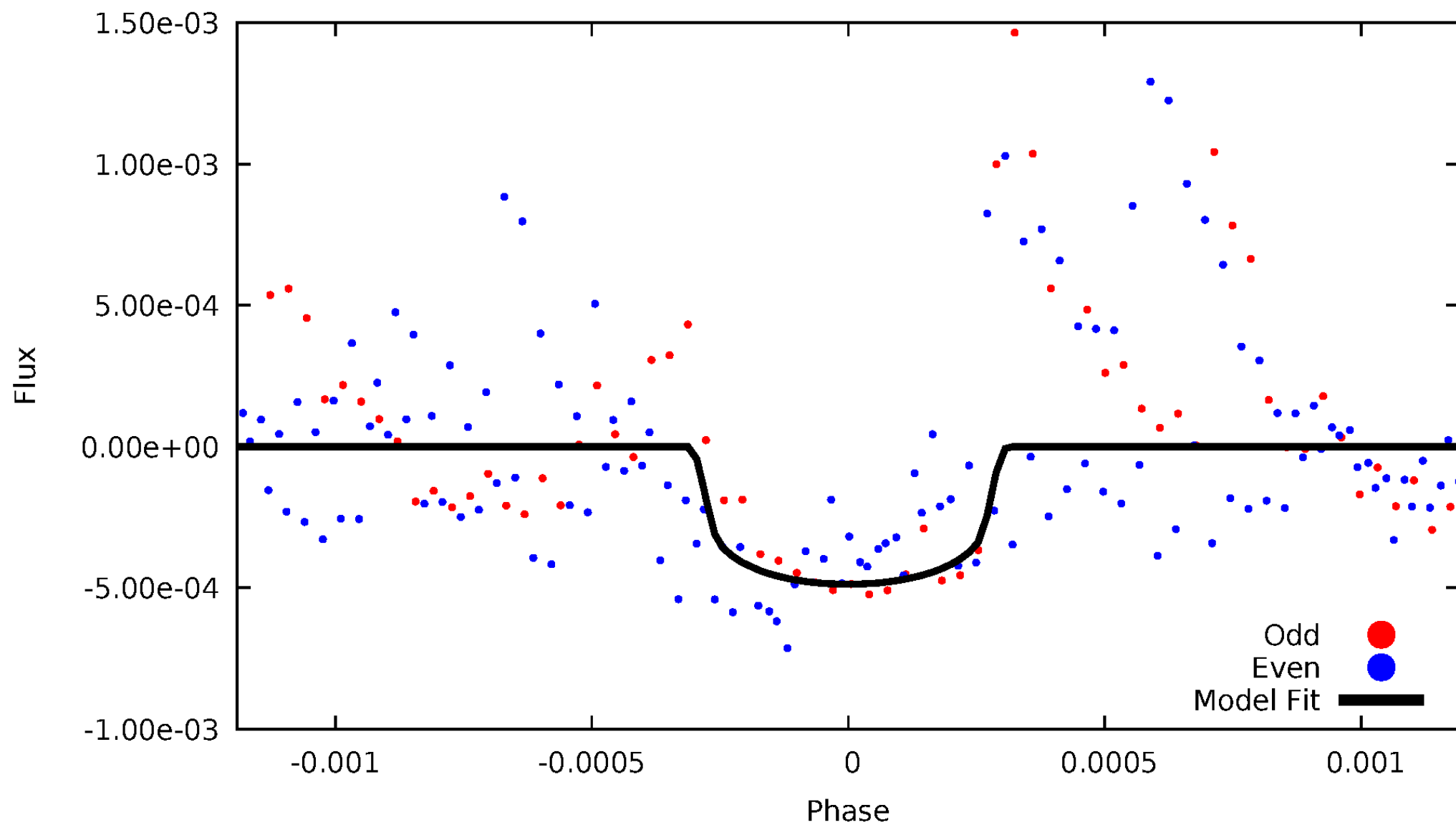
# TCE 004758595-04





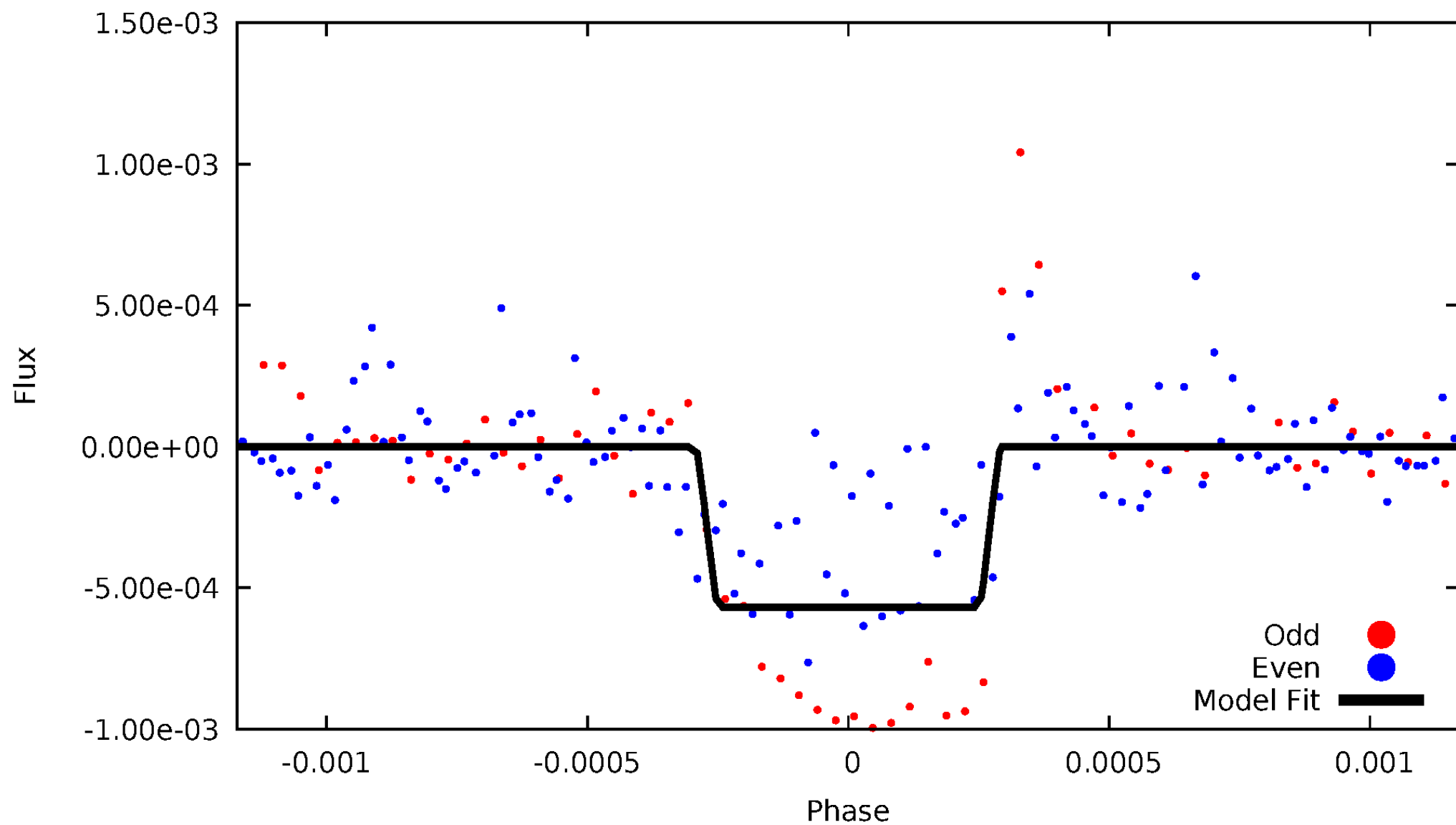
# DV Odd/Even

TCE 004758595-04



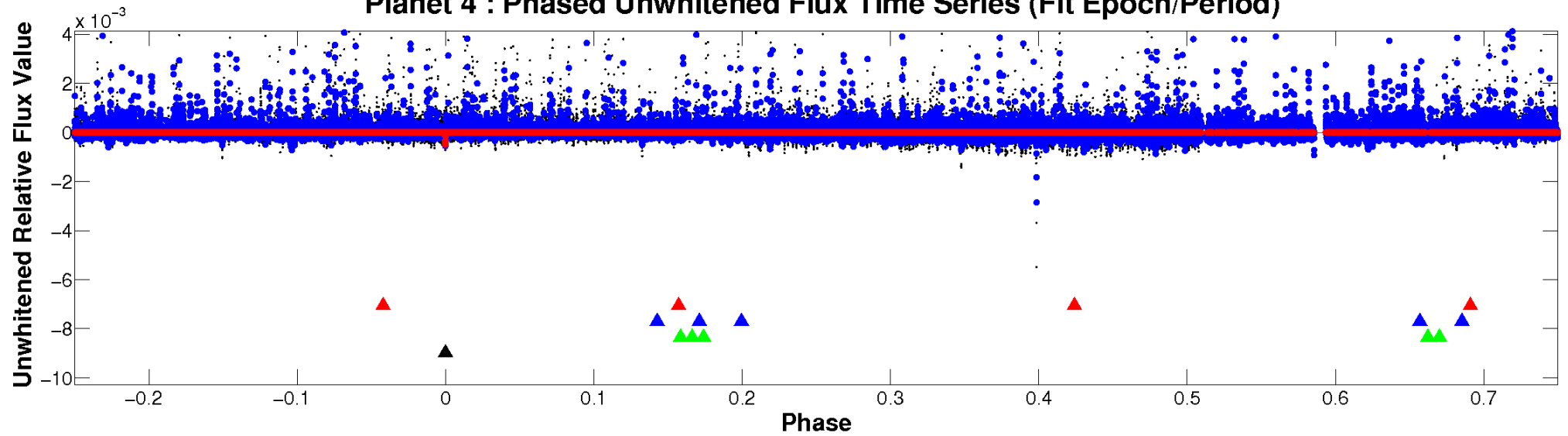
# ALT Odd/Even

TCE 004758595-04

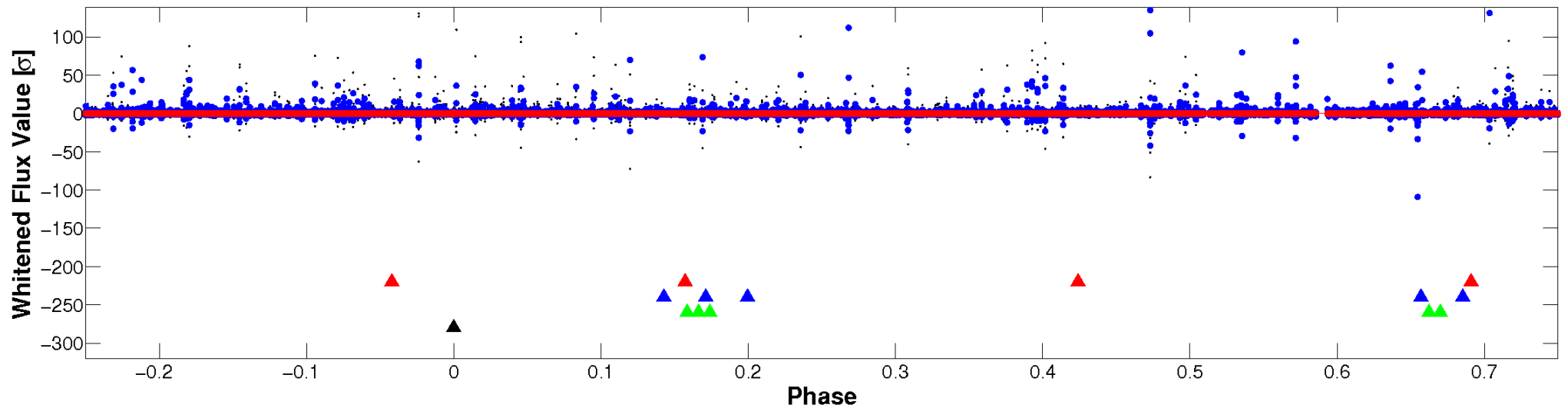


# Non-Whitened Vs. Whitened Light Curve

## Planet 4 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

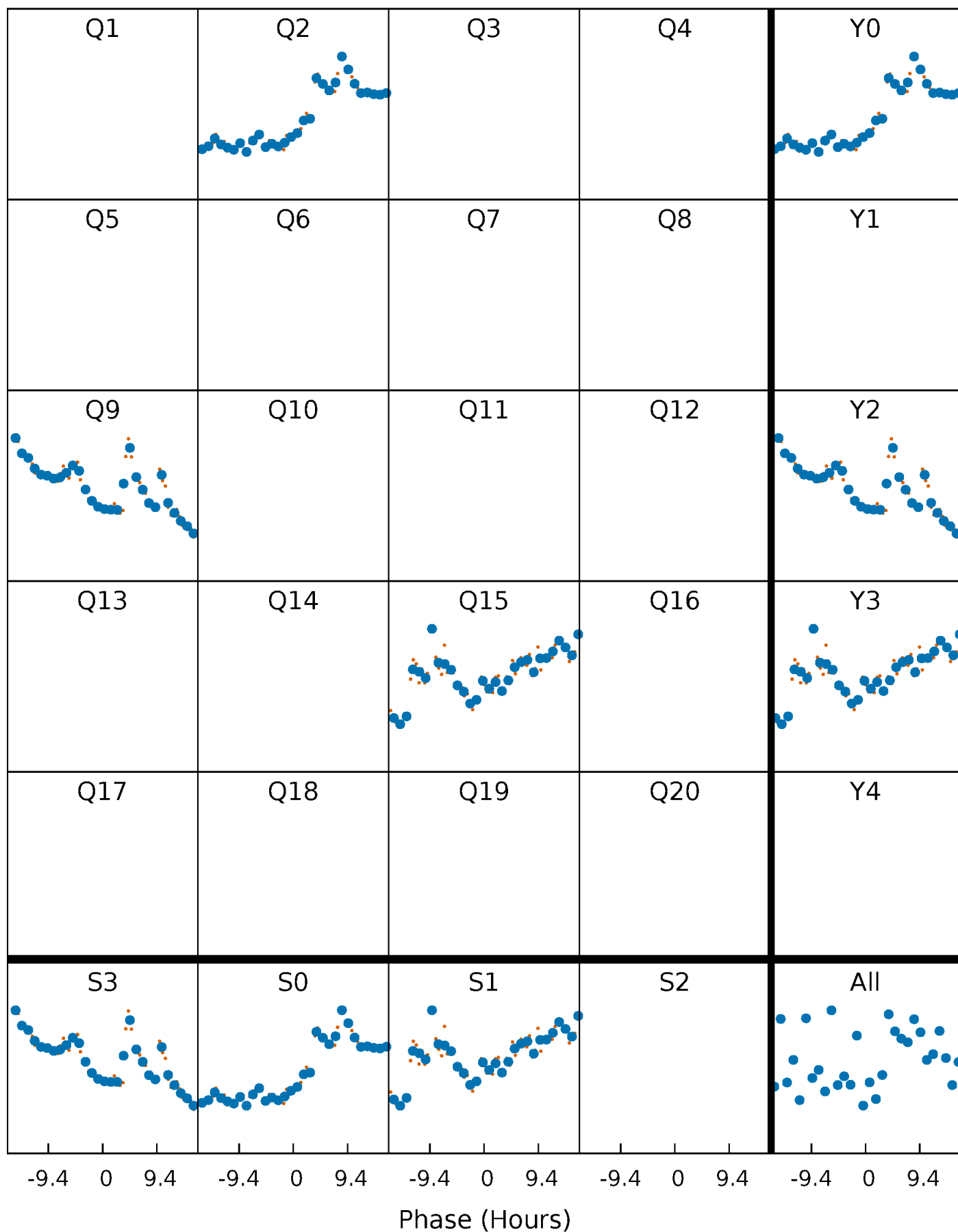


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



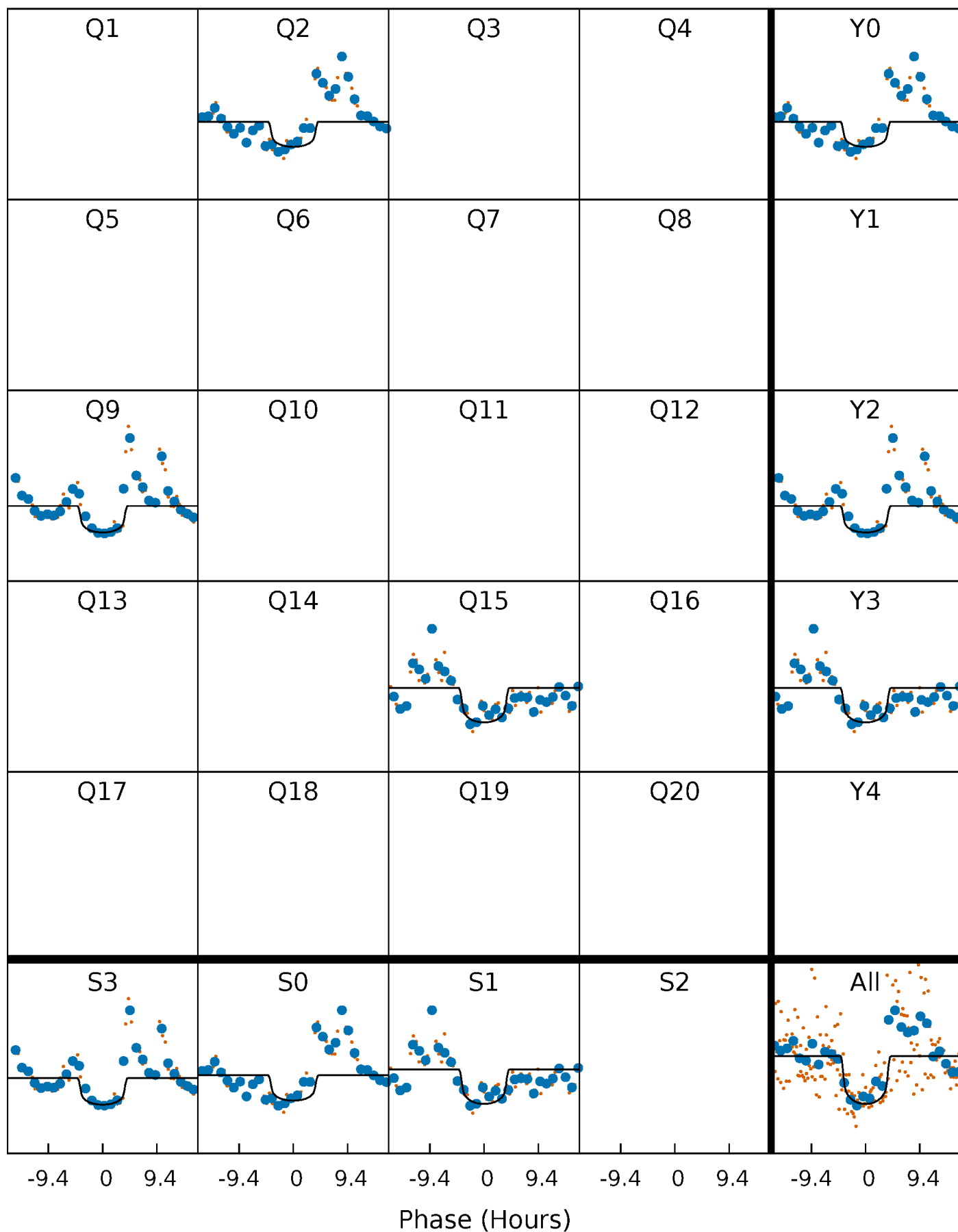
# PDC Quarter-Phased Transit Curves

TCE 004758595-04     $P=577.499818$  Days     $T_0=244.825946$  (BKJD)



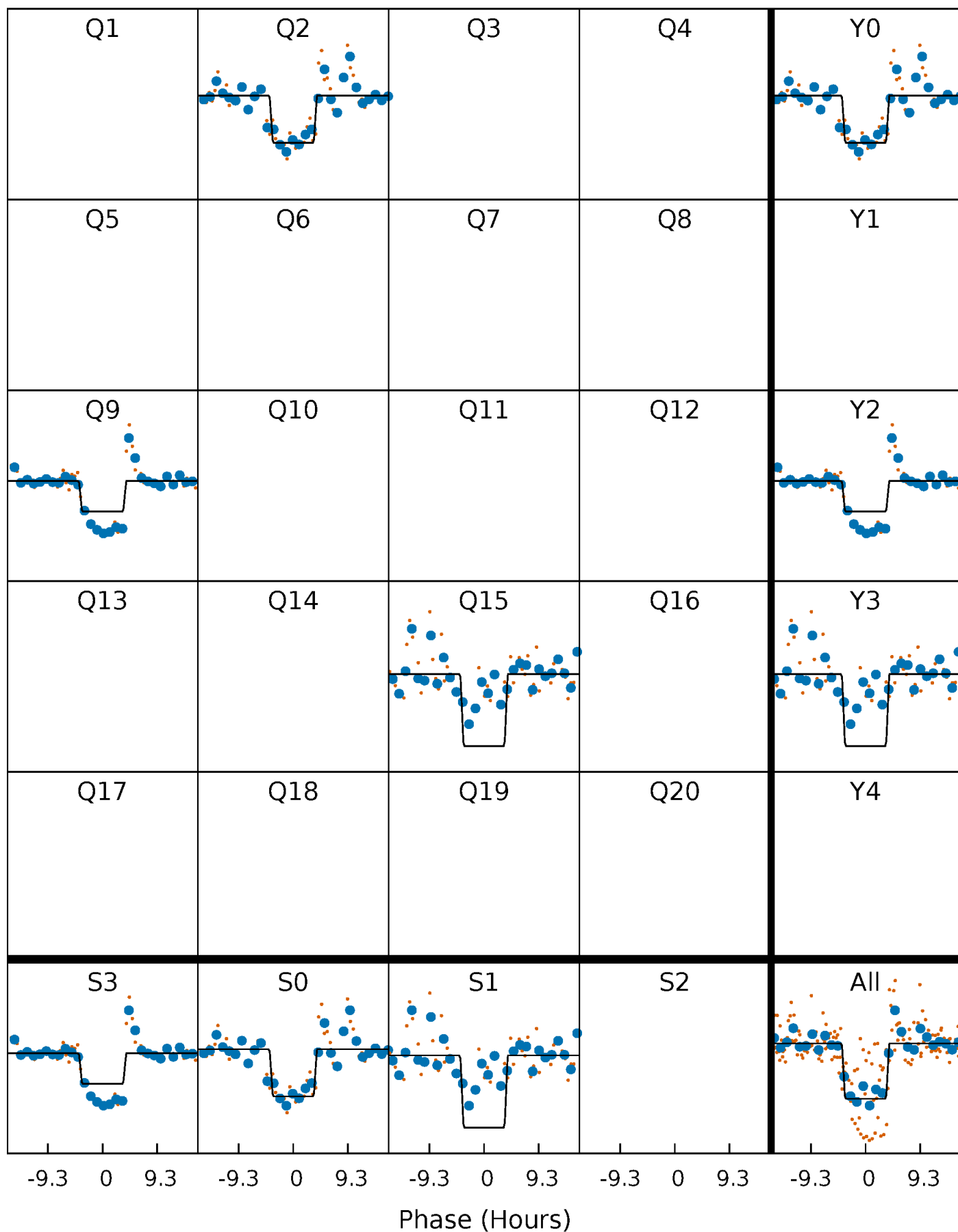
# DV Quarter-Phased Transit Curves

TCE 004758595-04     $P=577.499818$  Days     $T_0=244.825946$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

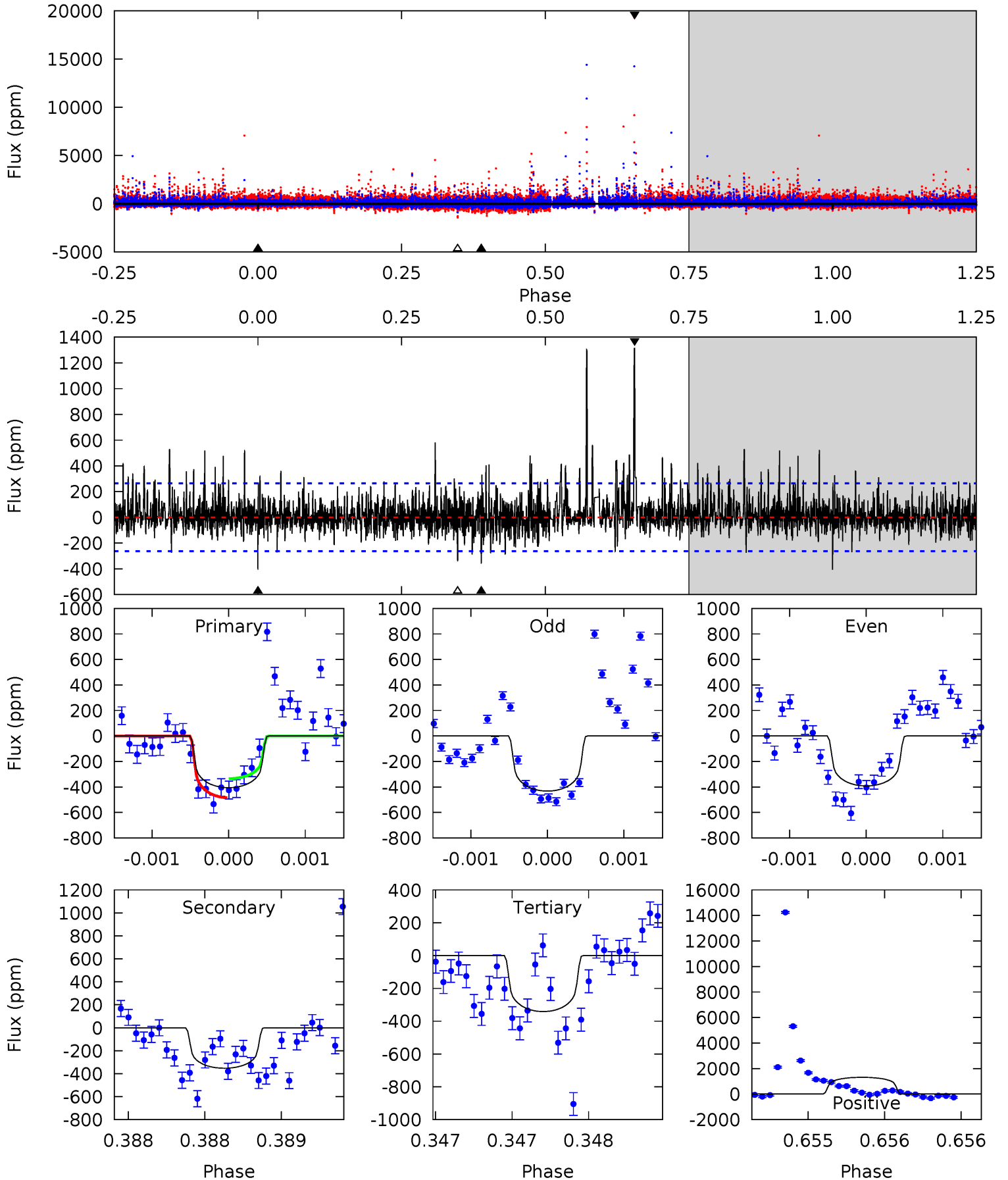
TCE 004758595-04 P=577.520517 Days  $T_0=244.801917$  (BKJD)



# DV Model-Shift Uniqueness Test

004758595-04, P = 577.499818 Days, E = 244.825946 Days

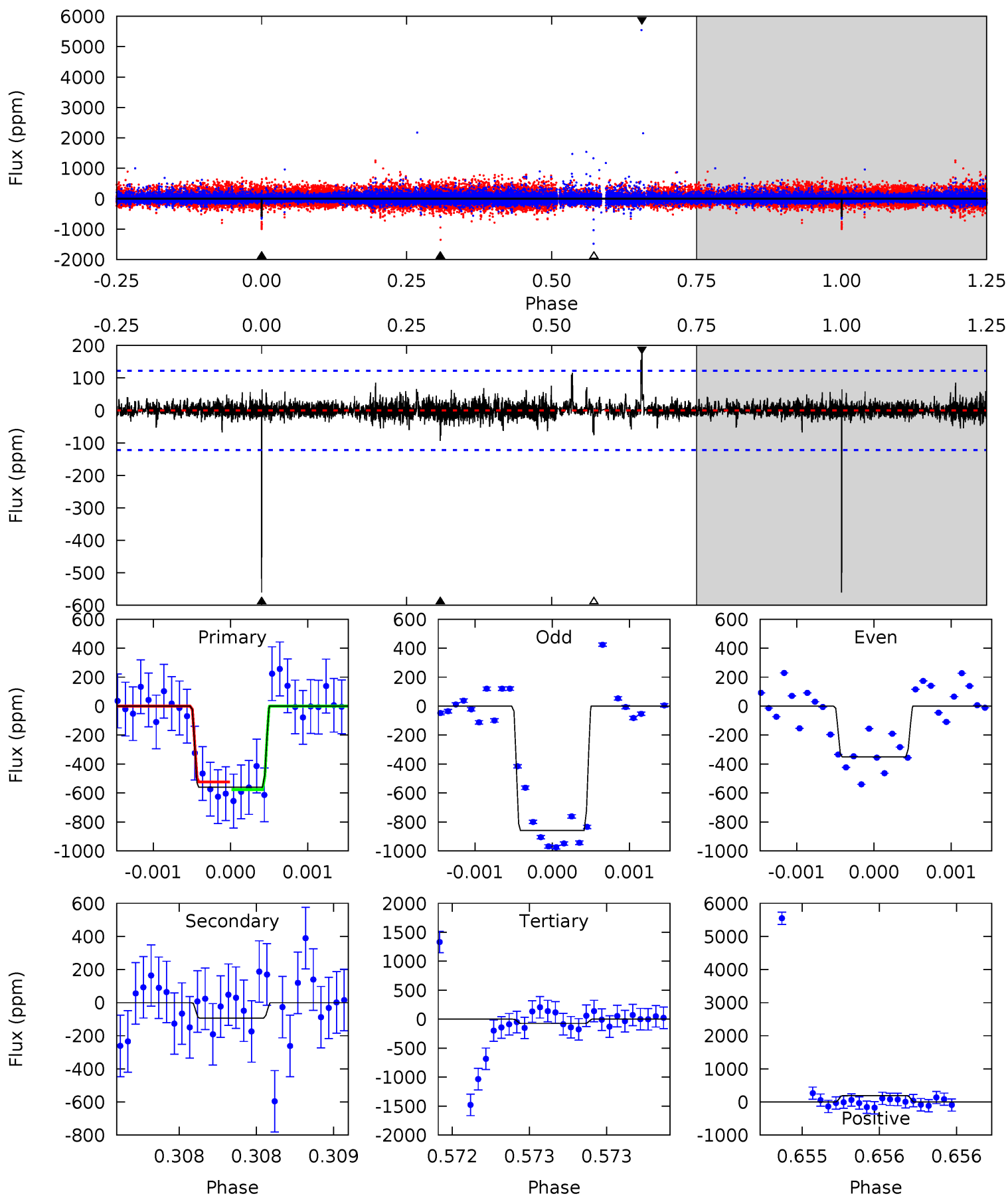
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.51	7.40	7.17	27.6	5.54	3.42	2.34	1.34	-19.1	0.24	-20.2	0.25	0.94	0.76	1.53



# Alt Model-Shift Uniqueness Test

004758595-04, P = 577.520517 Days, E = 244.801917 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
25.5	4.24	3.35	8.74	5.55	3.44	0.69	22.1	16.7	0.89	-4.49	11.6	0.98	0.26	1.20





### Stellar Parameters For KIC 004758595

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3572^{+71}_{-86}$	$4.858^{+0.054}_{-0.045}$	$-0.100^{+0.100}_{-0.100}$	$0.397^{+0.043}_{-0.048}$	$0.417^{+0.046}_{-0.062}$	$9.405^{+2.705}_{-1.757}$
	+2%/-2%	+1%/-1%	+100%/-100%	+11%/-12%	+11%/-15%	+29%/-19%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 004758595-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-353 \pm 48$	$0.94^{+0.28}_{-0.25}$	$138^{+4}_{-4}$	$3402^{+363}_{-267}$	$227182^{+178062}_{-96406}$
Alt.	$-93 \pm 22$	$1.03^{+0.30}_{-0.27}$	$138^{+4}_{-4}$	$2752^{+253}_{-200}$	$50390^{+46237}_{-21709}$

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

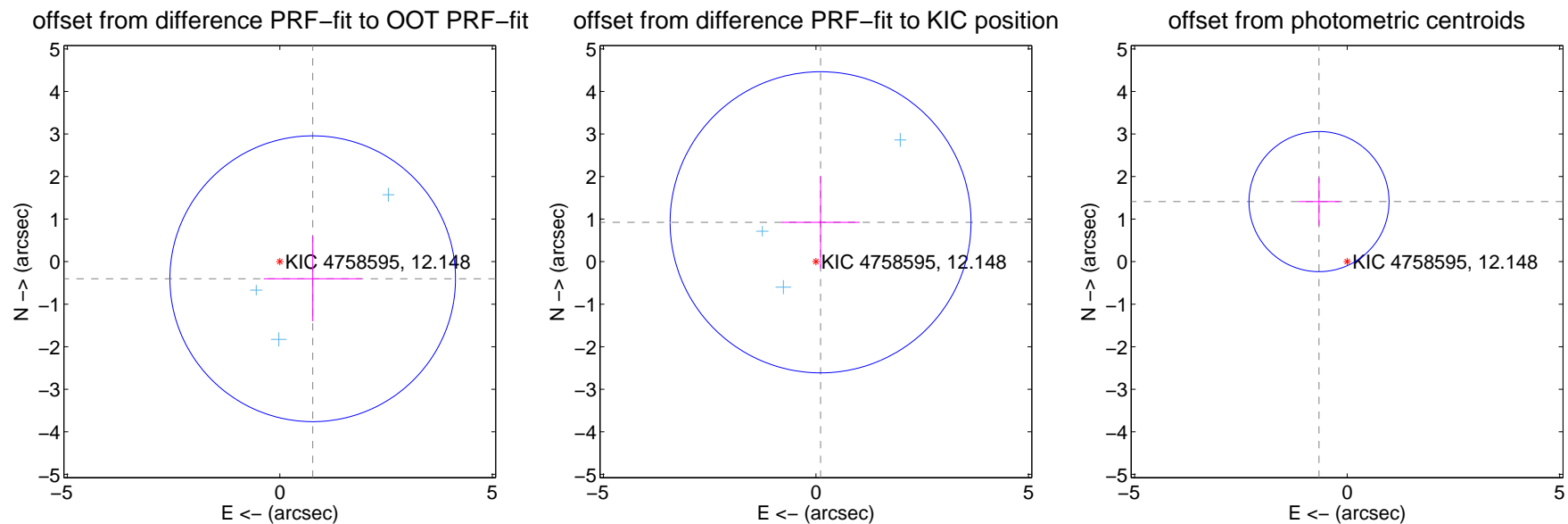
## DV Centroid Data

Supplemental centroid analysis for 004758595-04. Kepler magnitude: 12.15. Transit SNR 7.02

There are 3 quarters with good PRF difference image offsets

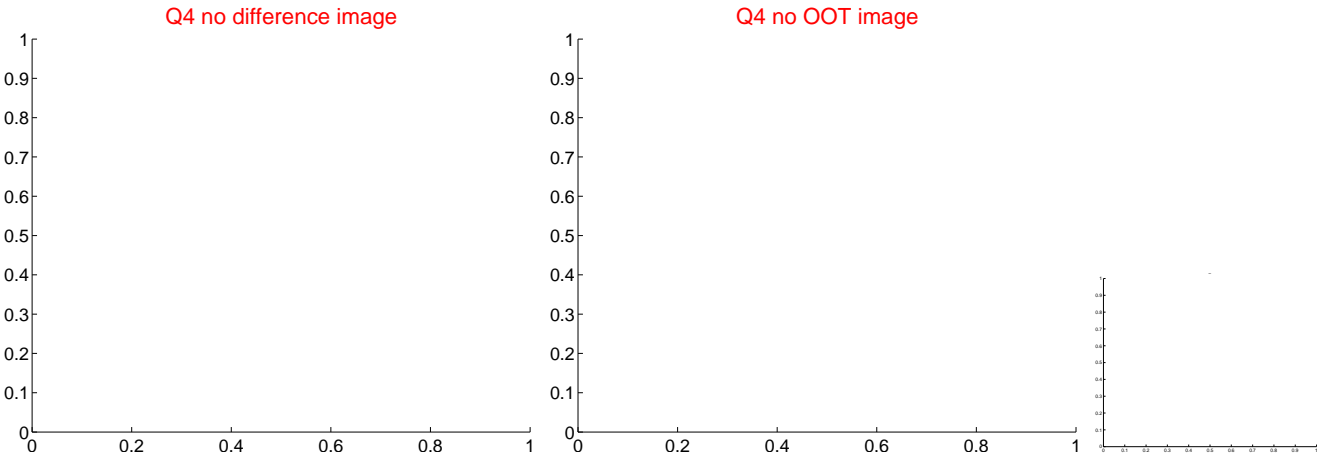
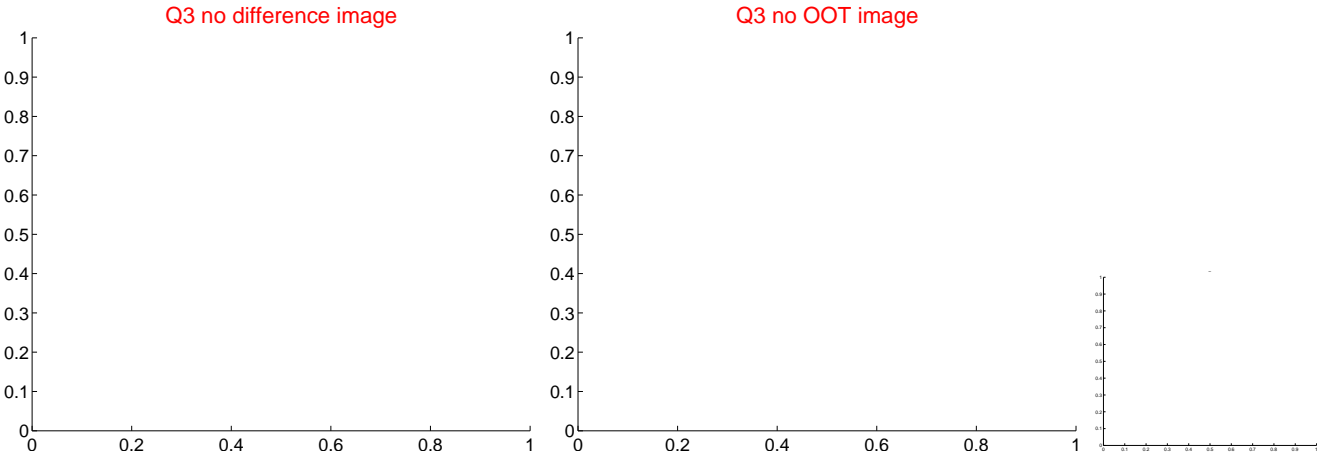
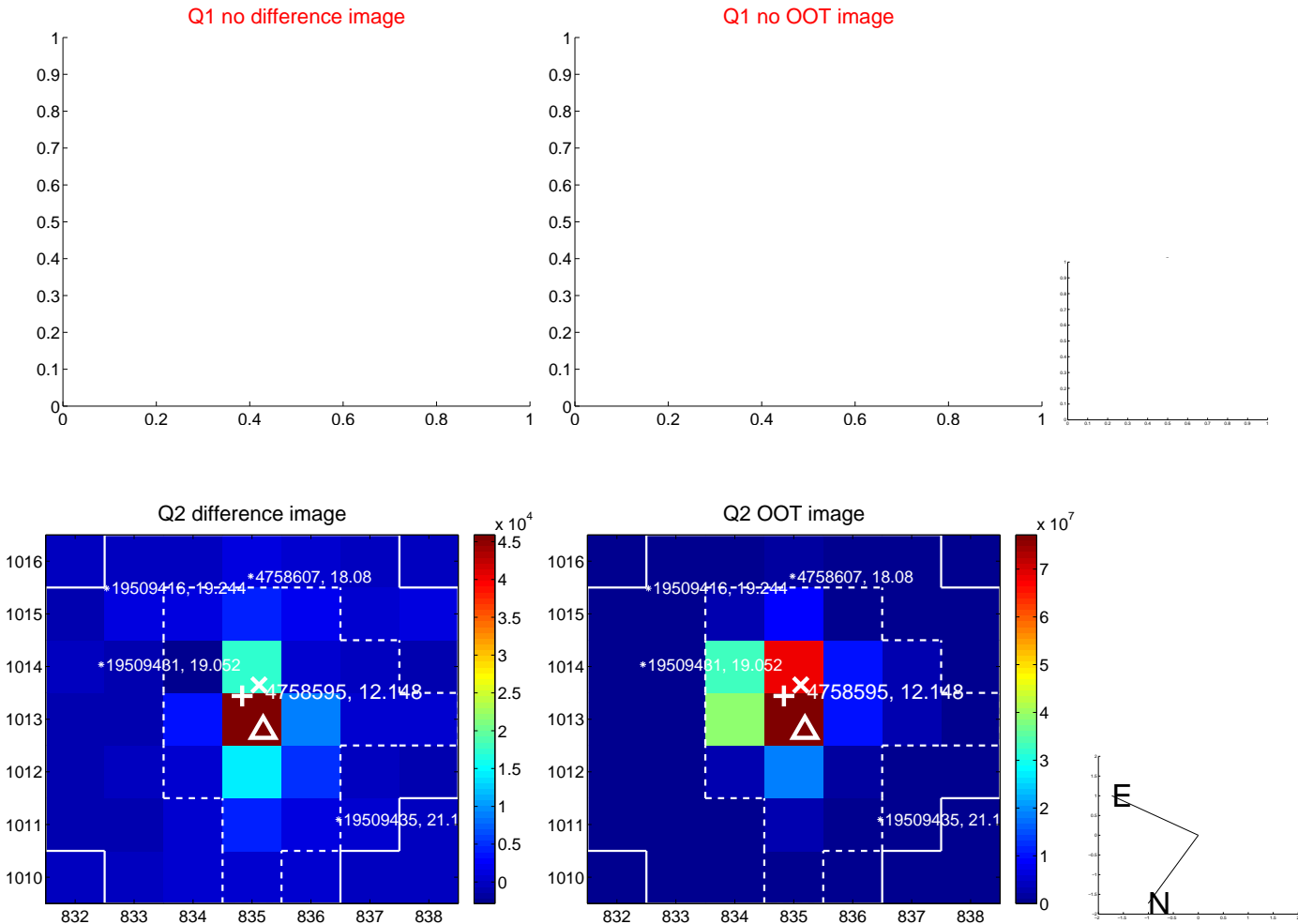
The direct PRF centroid is offset from the target star catalog position by about 1.44 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.872 \pm 1.120$	0.78	$-0.774 \pm 1.150$	$-0.402 \pm 1.001$
PRF-fit source offset from KIC position	$0.931 \pm 1.180$	0.79	$-0.109 \pm 0.921$	$0.925 \pm 1.084$
photometric centroid source offset	$1.56 \pm 0.55$	2.84	$0.66 \pm 0.49$	$1.41 \pm 0.56$



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.

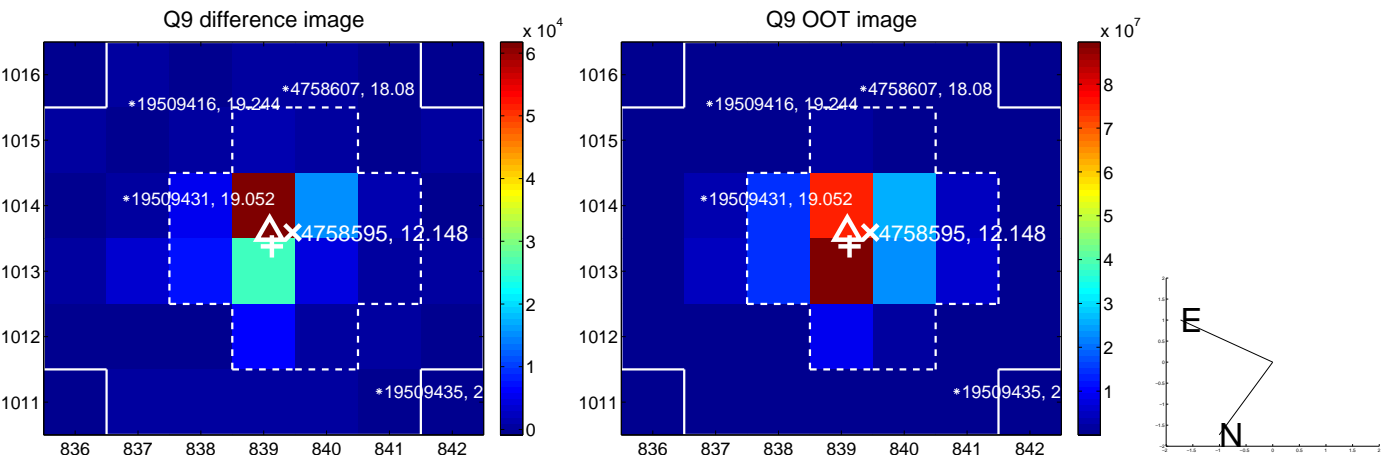
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



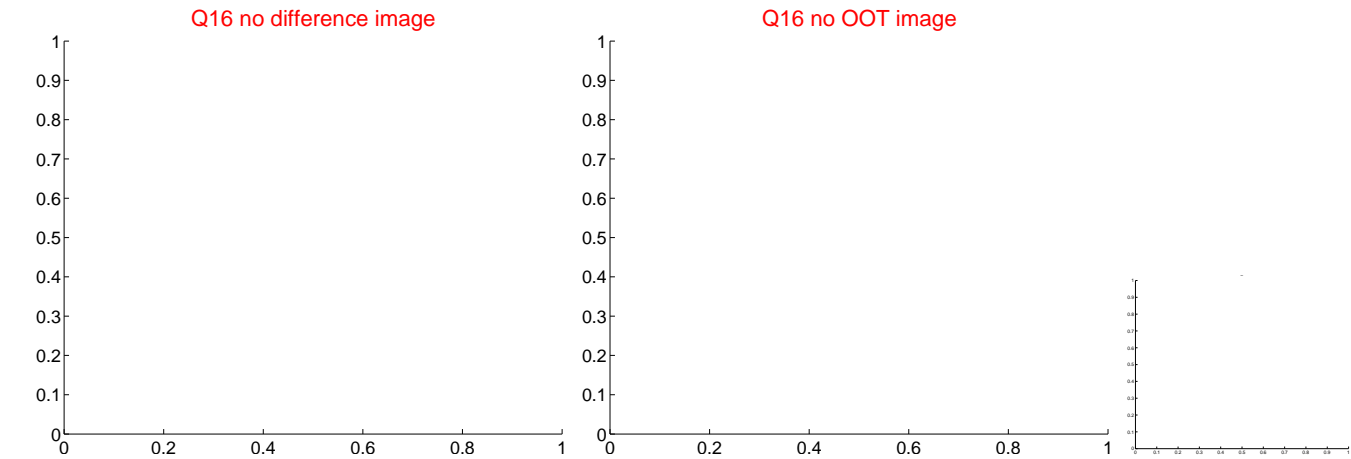
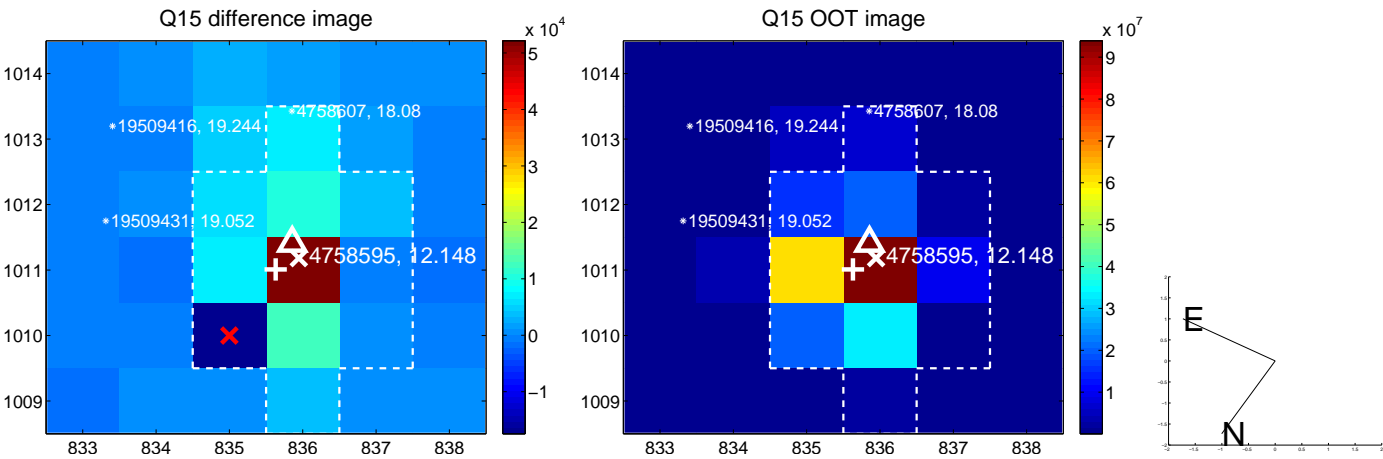
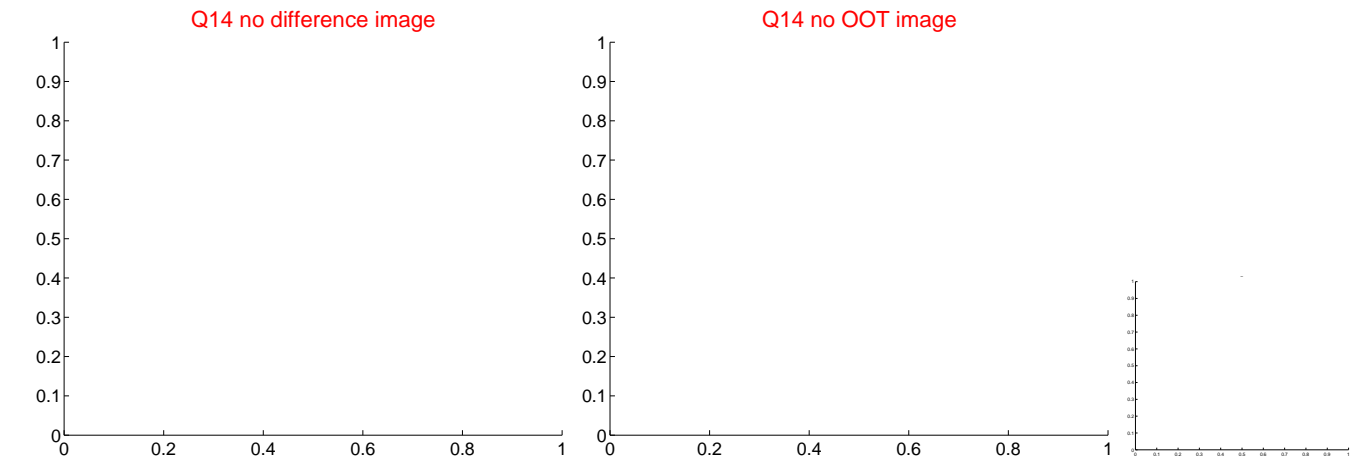
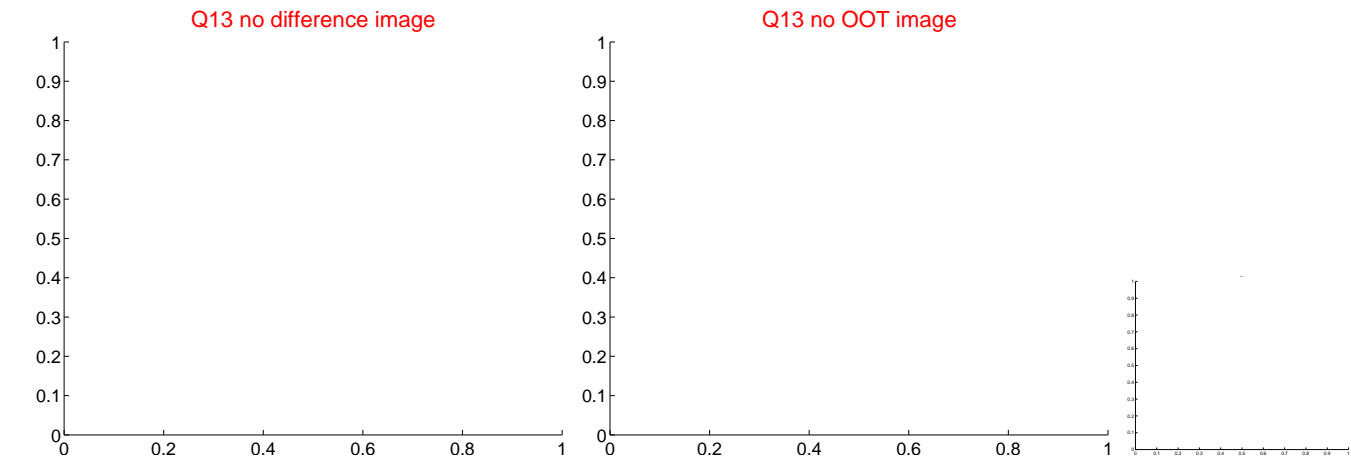
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



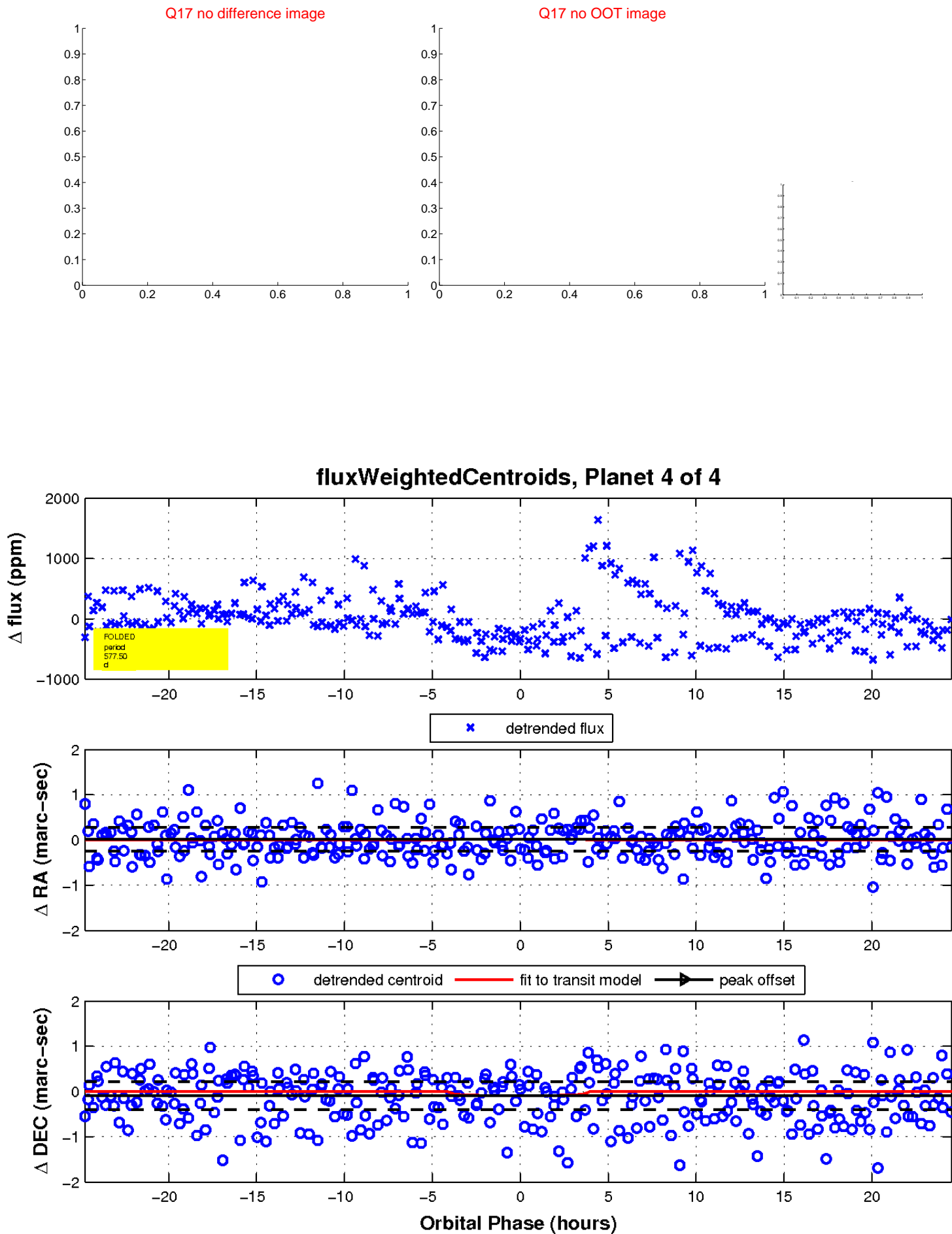
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

