

# KIC 010165244

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010165244-01	OBS	No	454.210465	424.480337	2422.7	3.029	13.9	7.9	0.67	4090	3.28	0.11
010165244-02	OBS	No	586.924204	325.642112	2251.7	3.113	14.1	7.1	0.67	4090	3.60	0.08
010165244-03	OBS	No	168.226244	230.373498	2194.9	6.555	12.2	6.4	0.67	4090	3.98	0.42
010165244-04	OBS	No	269.994191	210.878507	2702.4	5.035	15.3	9.1	0.67	4090	3.89	0.22
010165244-05	OBS	No	519.388410	465.965620	2051.4	8.009	11.9	5.6	0.67	4090	6.22	0.09

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010165244-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010165244-02	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—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010165244-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
010165244-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE_ZUMA—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS
010165244-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

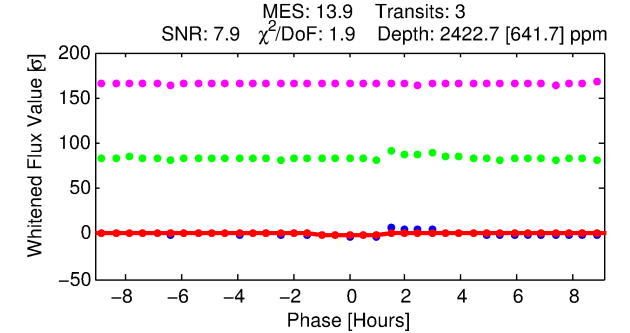
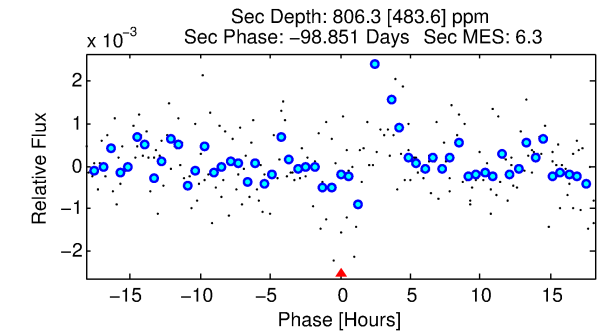
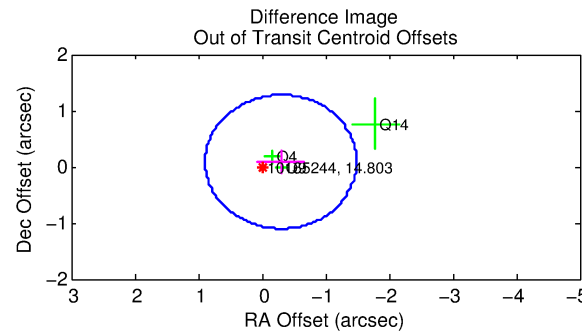
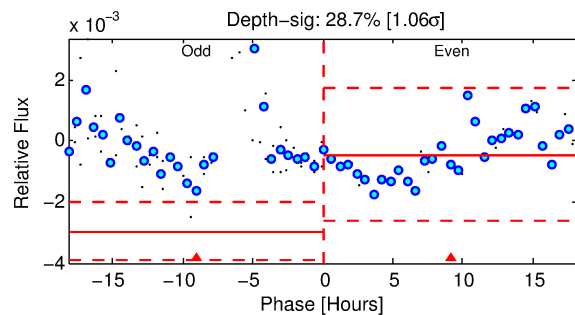
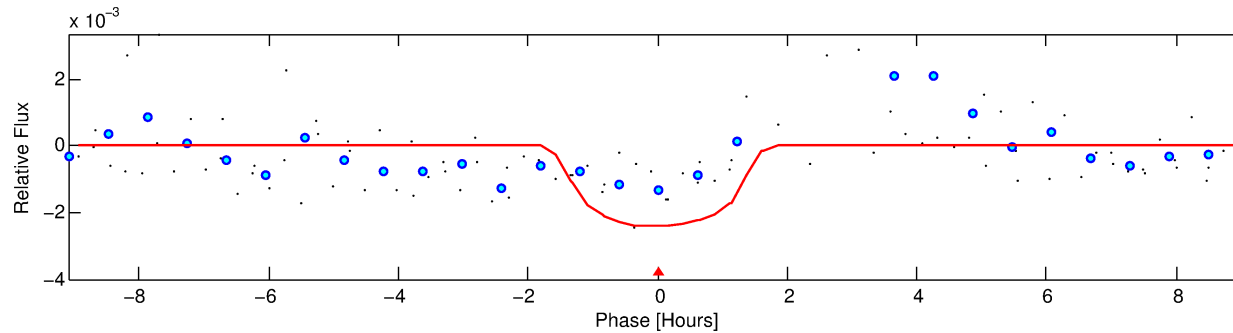
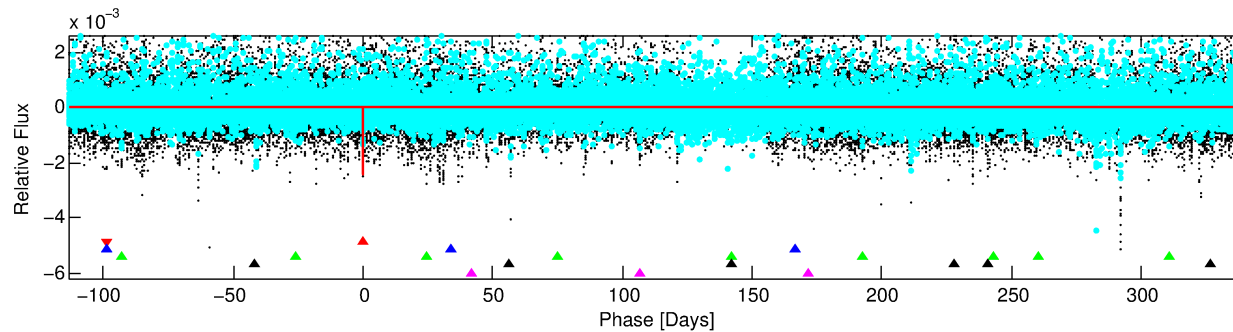
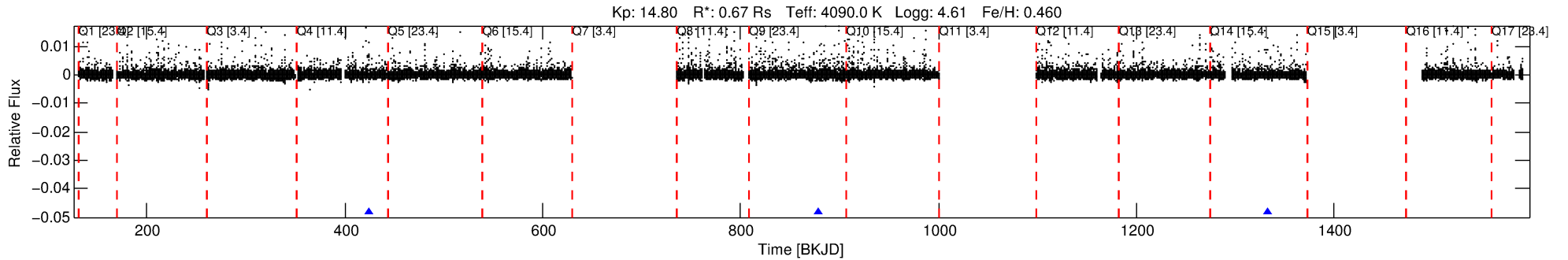
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 010165244-01

No Significant Match Found

# DV One-Page Summary

KIC: 10165244 Candidate: 1 of 5 Period: 454.210 d



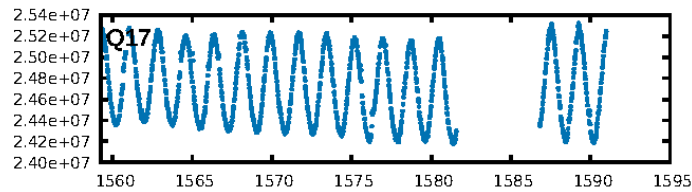
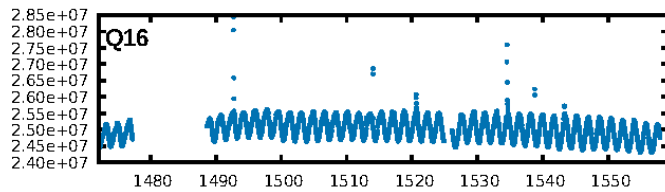
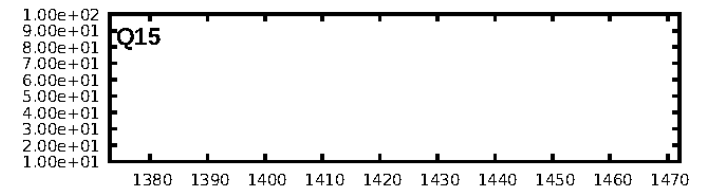
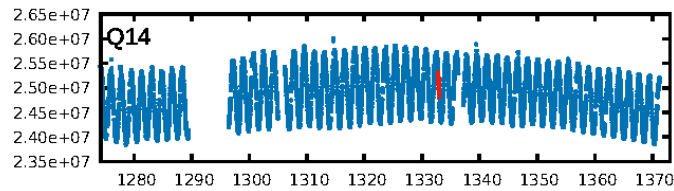
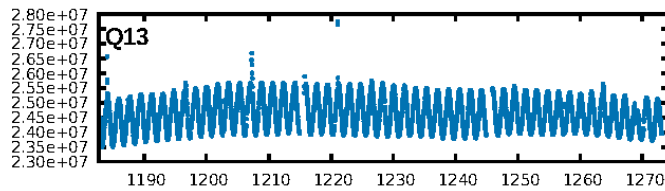
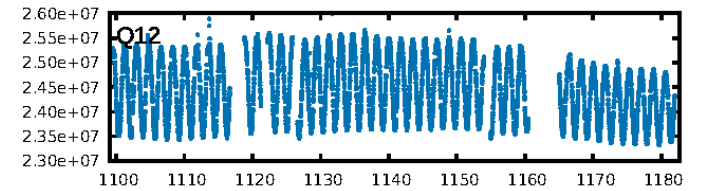
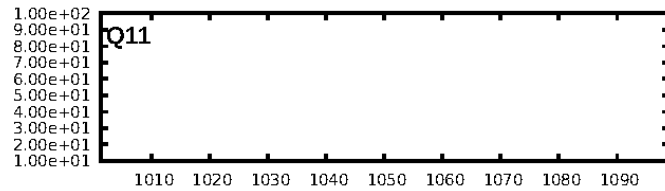
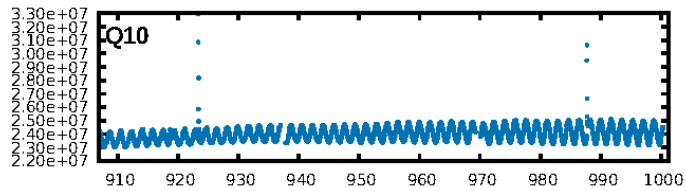
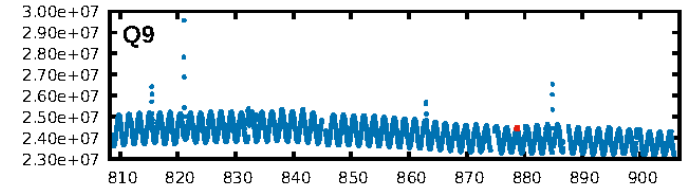
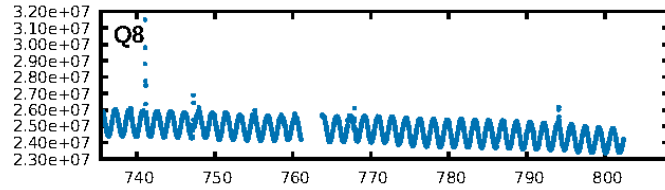
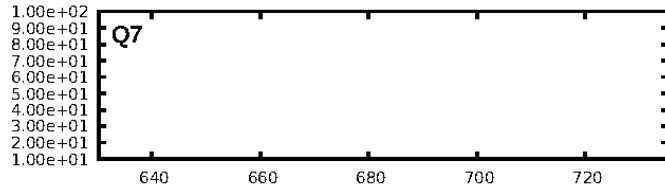
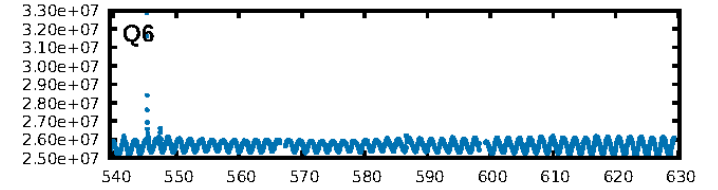
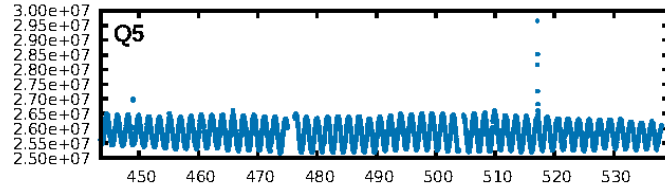
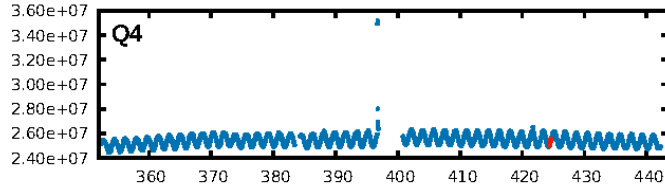
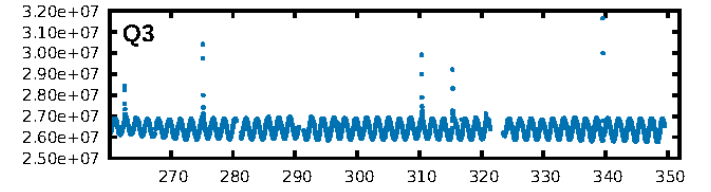
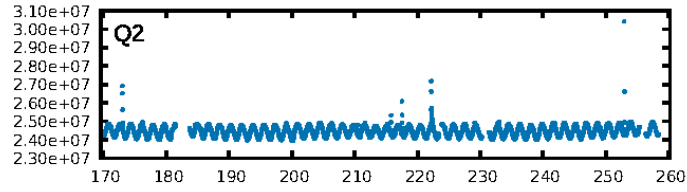
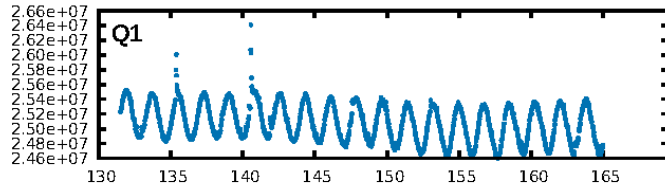
## DV Fit Results:

Period = 454.21047 [0.00721] d  
Epoch = 424.4803 [0.0090] BKJD  
Rp/R\* = 0.0446 [0.1046]  
a/R\* = 1082.64 [6878.02]  
b = 0.44 [11.88]  
Seff = 0.11 [0.02]  
Teq = 147 [7] K  
Rp = 3.28 [7.70] Re  
a = 1.0115 [0.0854] AU  
Ag = 42254.07 [200076.37] [0.21σ]  
Teffp = 3265 [3866] K [0.81σ]

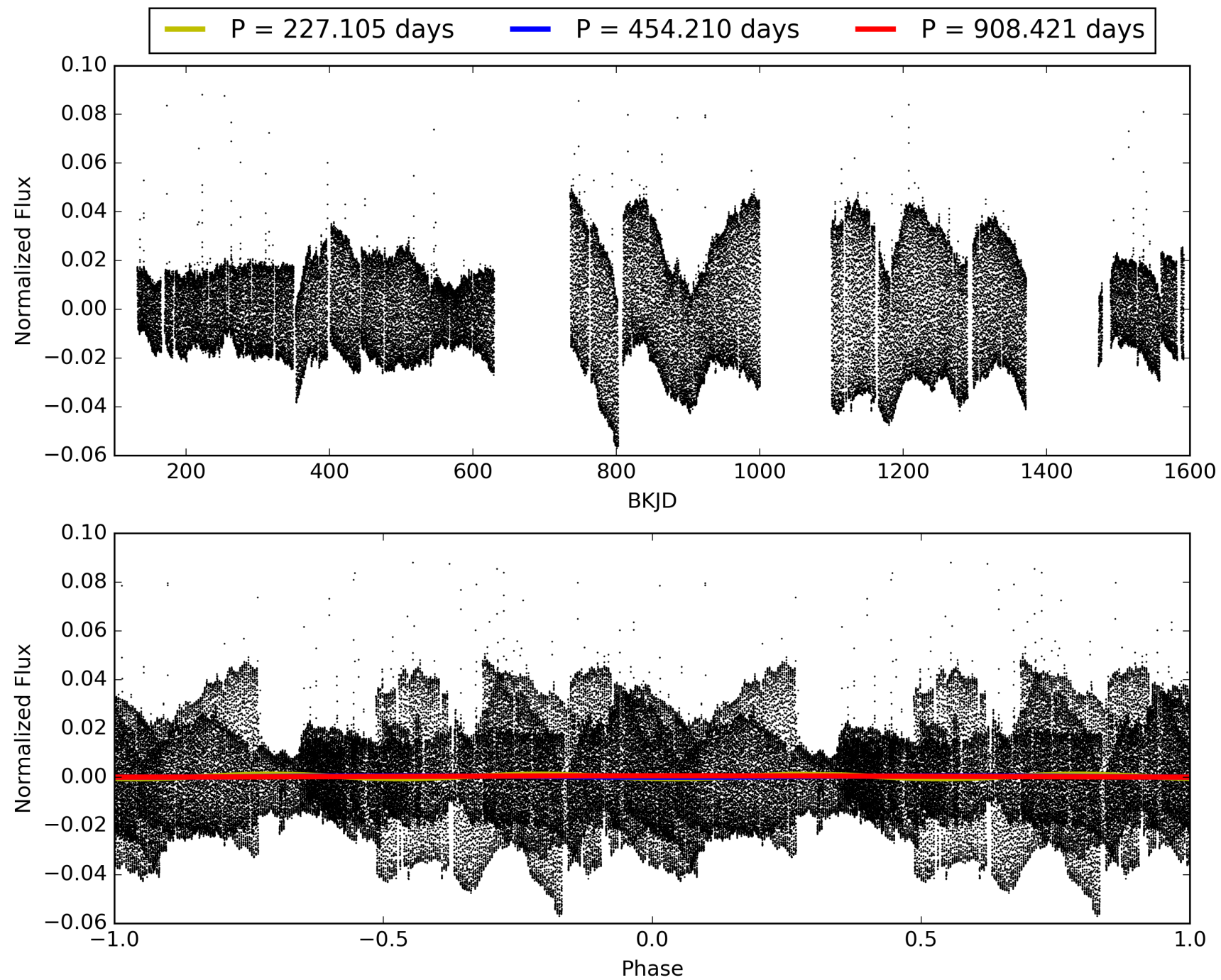
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [752.45σ]  
LongPeriod-sig: 100.0% [182.69σ]  
ModelChiSquare2-sig: 0.1%  
ModelChiSquareGof-sig: 13.4%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 0.7669  
Centroid-sig: 89.7%  
Centroid-so: 0.235 arcsec [0.32σ]  
OotOffset-rm: 0.309 arcsec [0.78σ]  
KicOffset-rm: 0.159 arcsec [0.27σ]  
OotOffset-st: 1/0/1/1 [3]  
KicOffset-st: 1/0/1/1 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

# TCE 010165244-01, PDC Light Curves



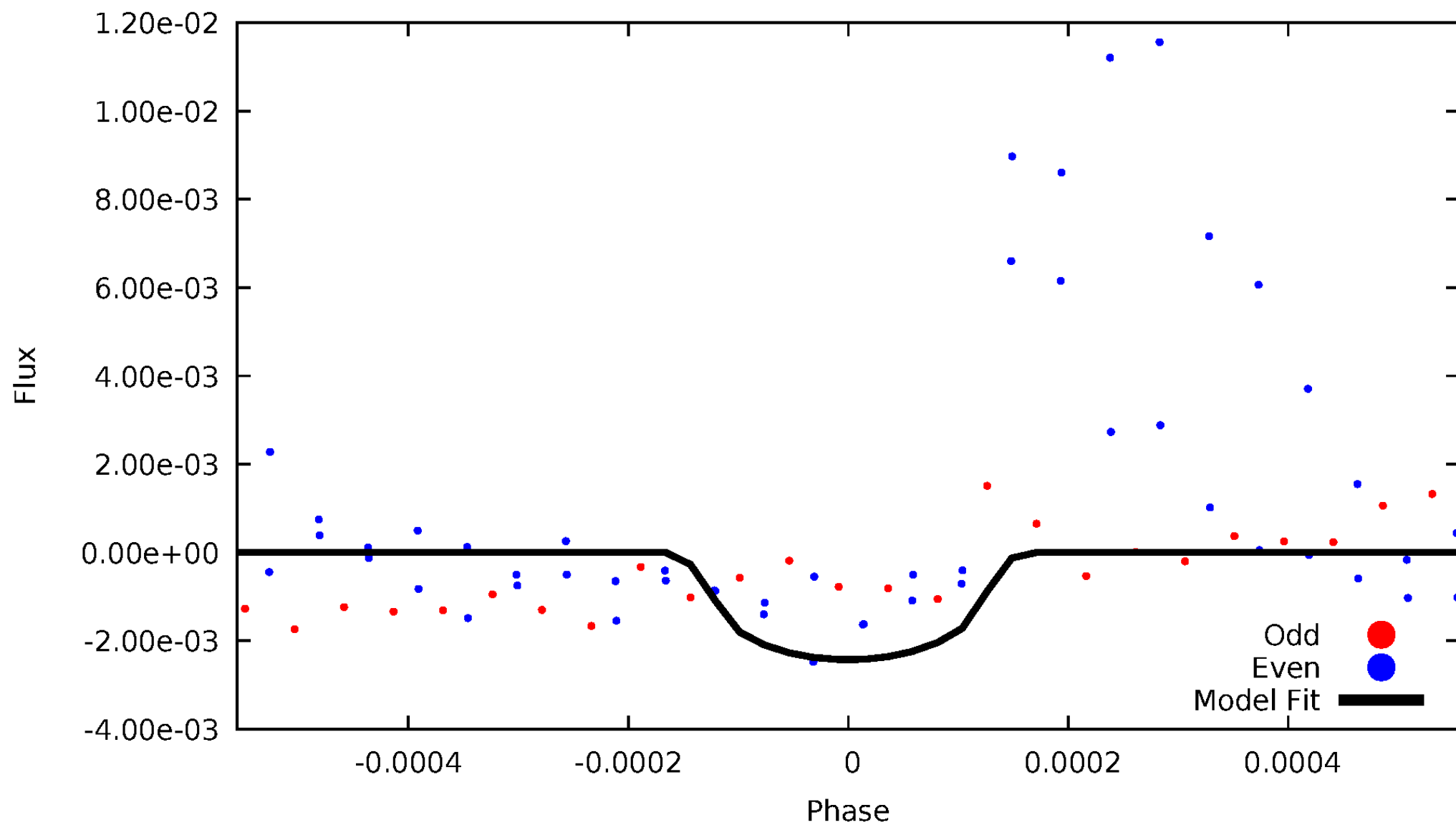
# TCE 010165244-01





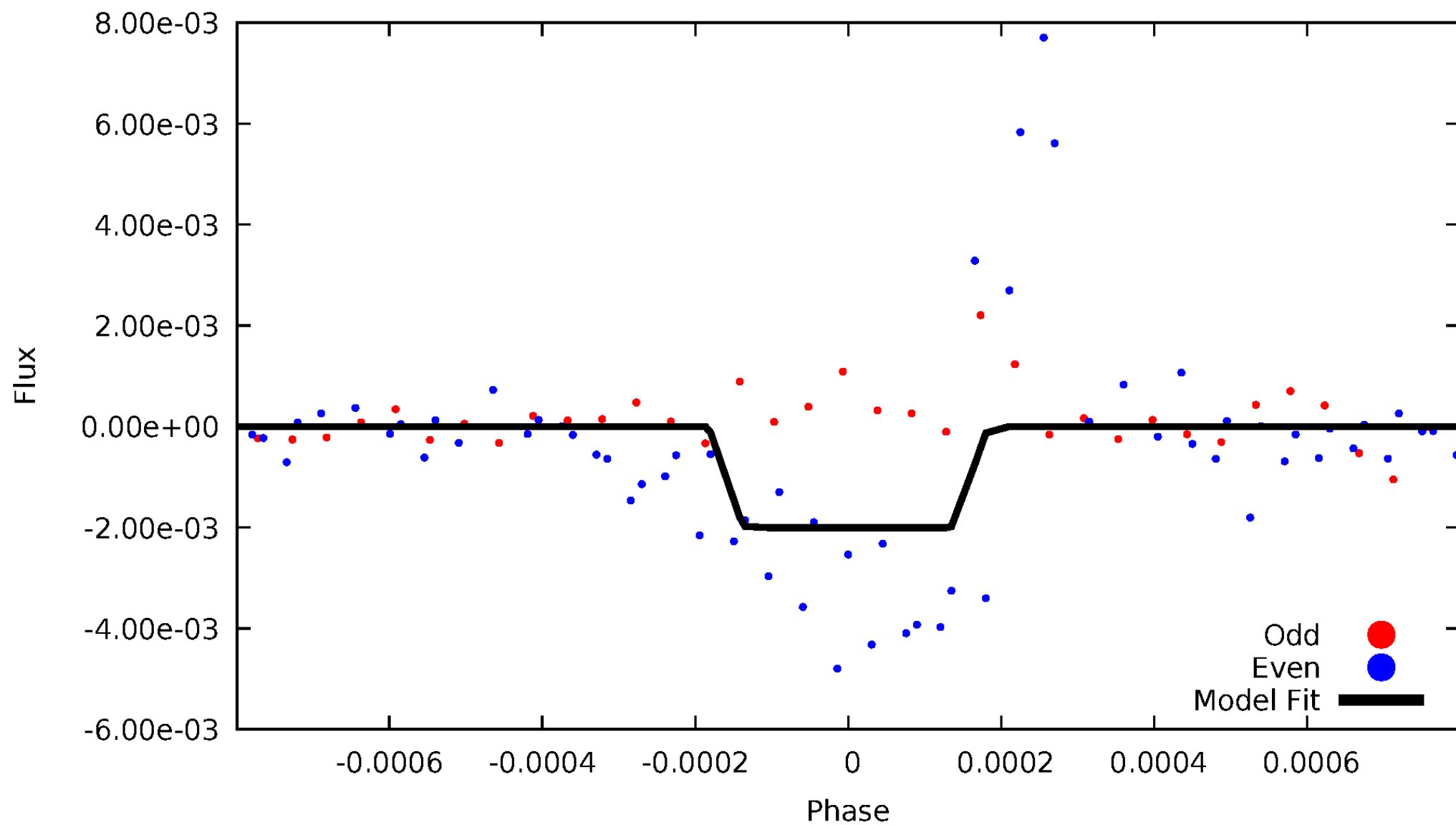
# DV Odd/Even

TCE 010165244-01



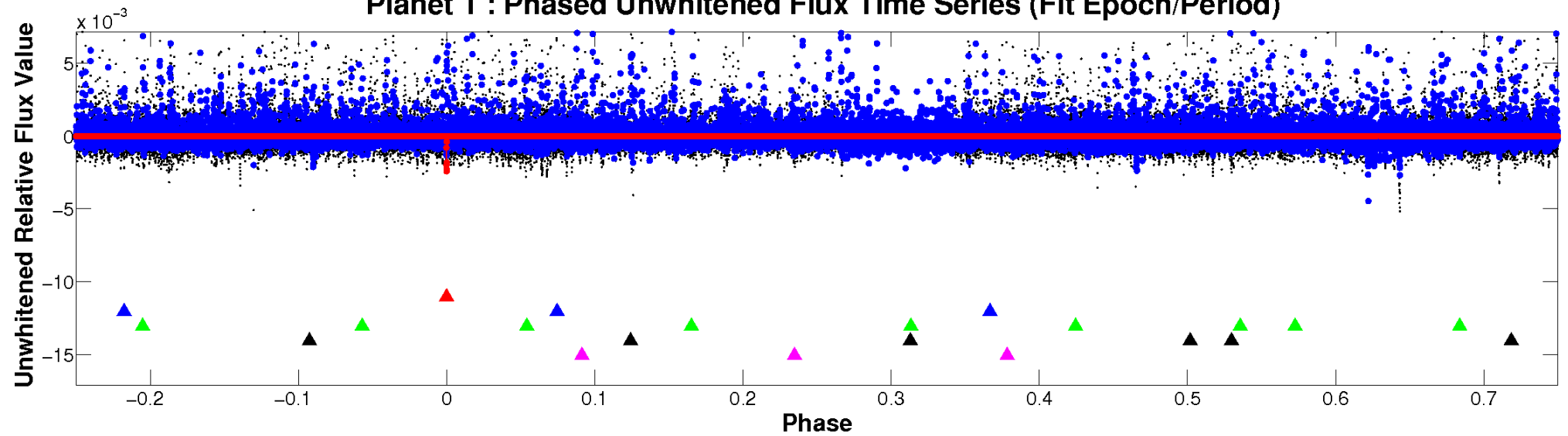
# ALT Odd/Even

TCE 010165244-01

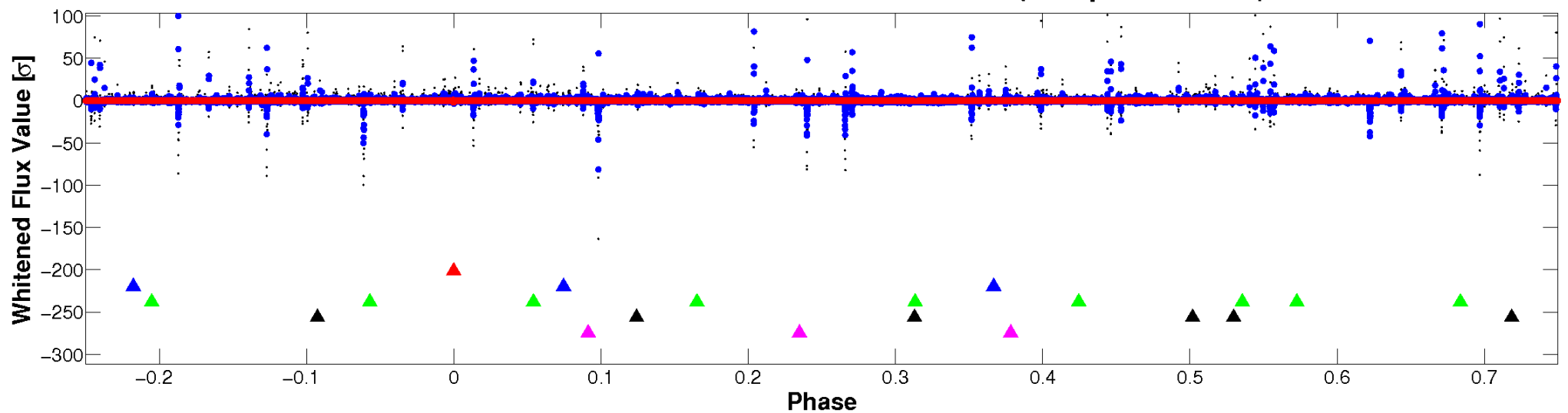


# Non-Whitened Vs. Whitened Light Curve

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

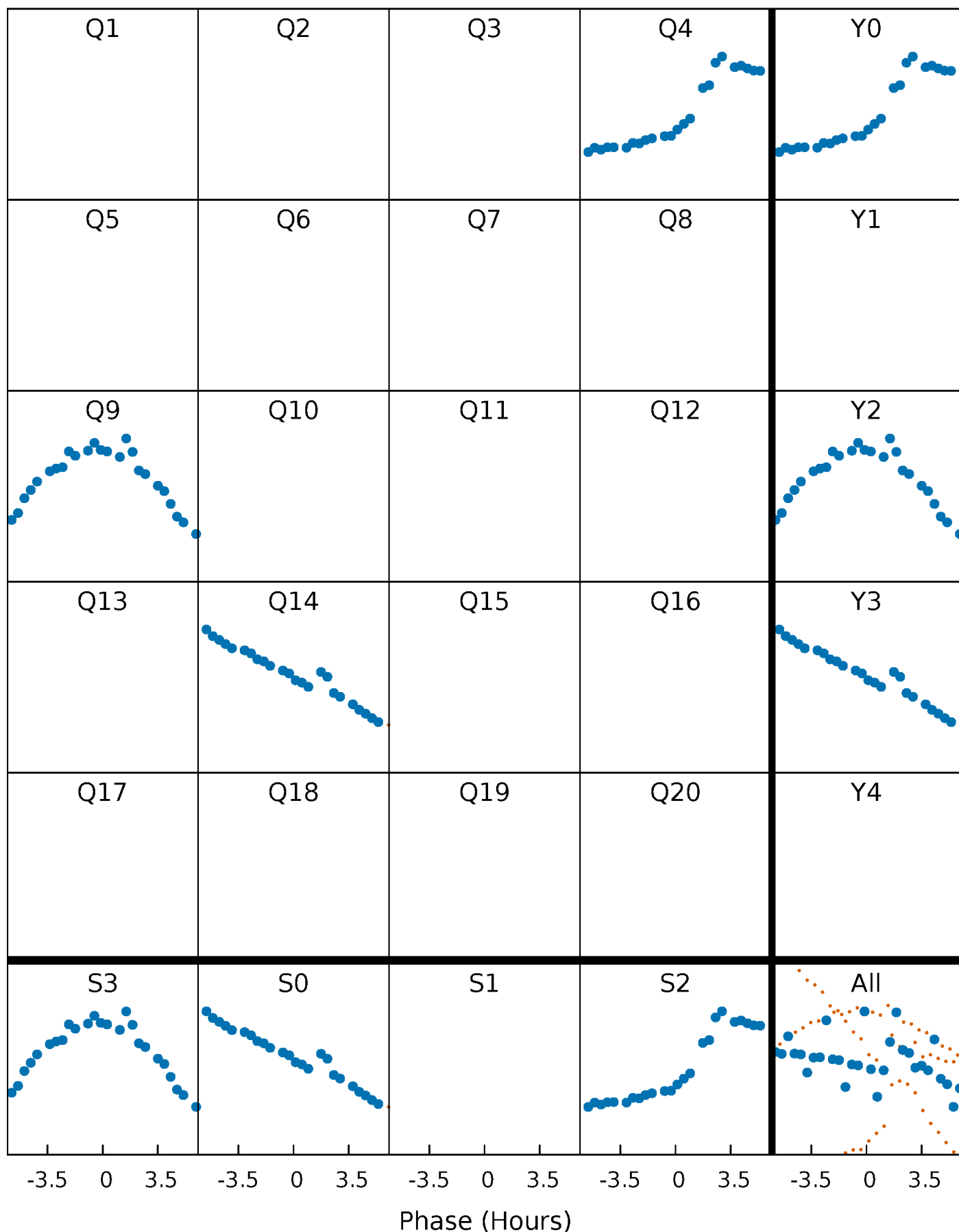


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



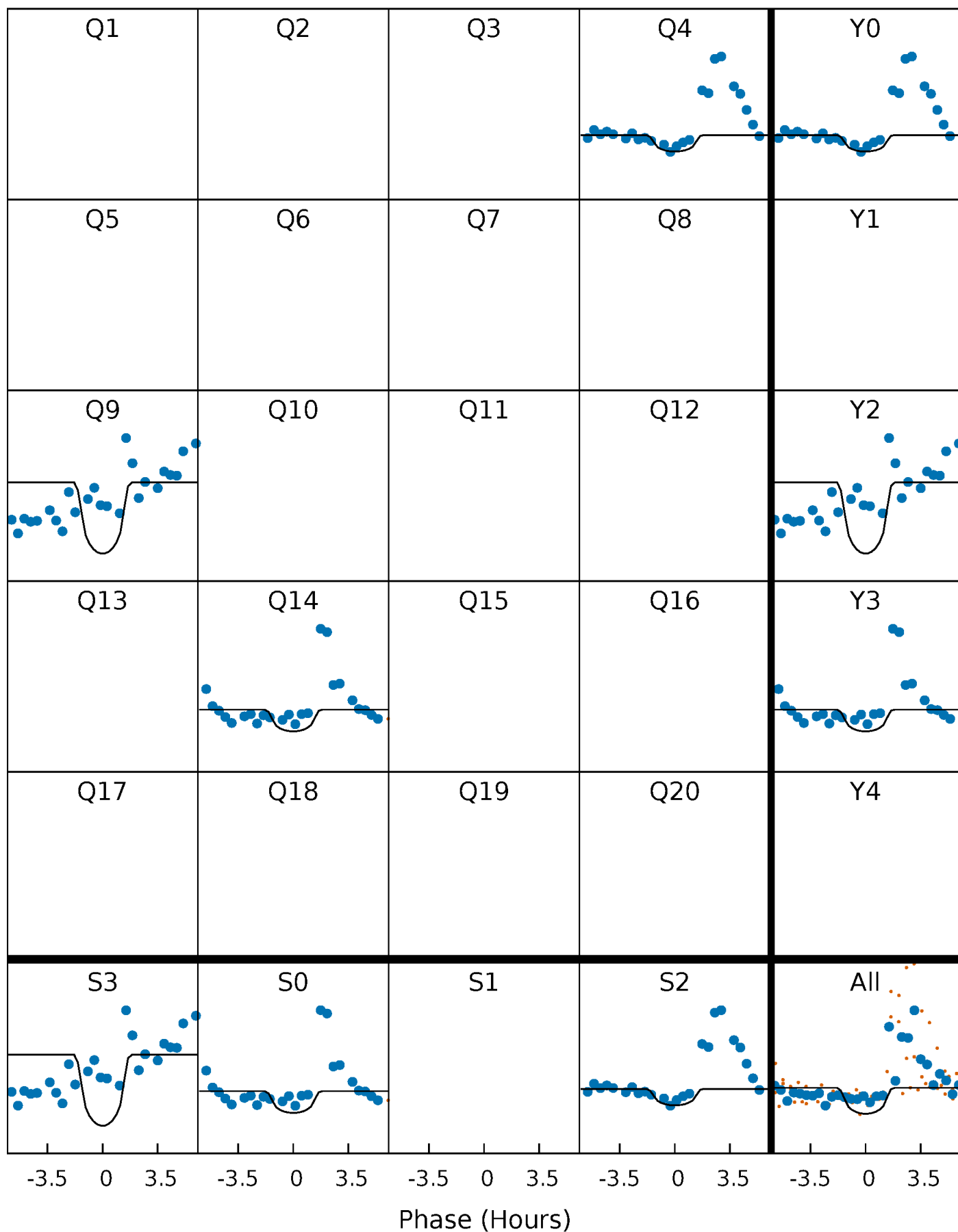
# PDC Quarter-Phased Transit Curves

TCE 010165244-01 P=454.210465 Days  $T_0=424.480337$  (BKJD)



# DV Quarter-Phased Transit Curves

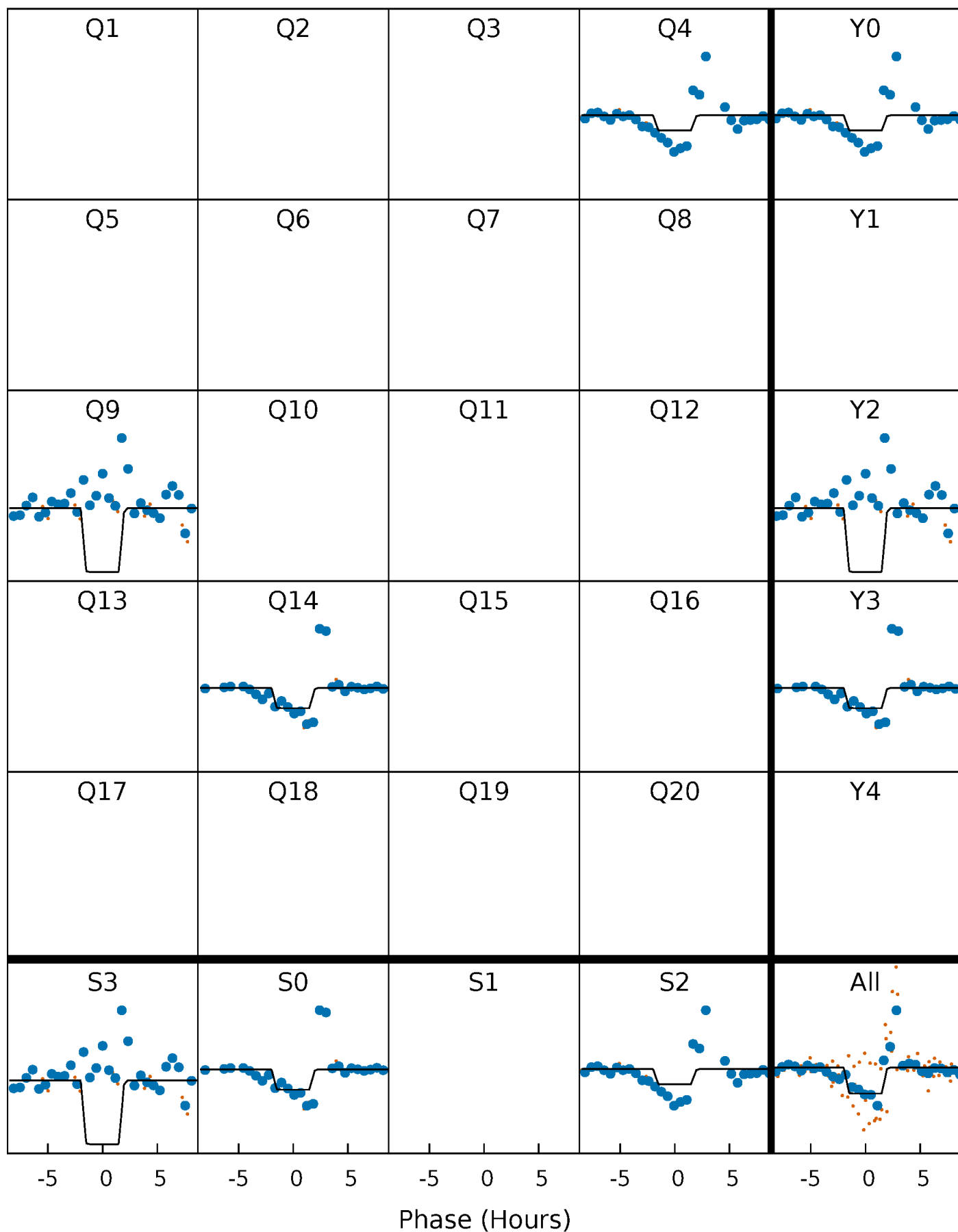
TCE 010165244-01 P=454.210465 Days  $T_0=424.480337$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

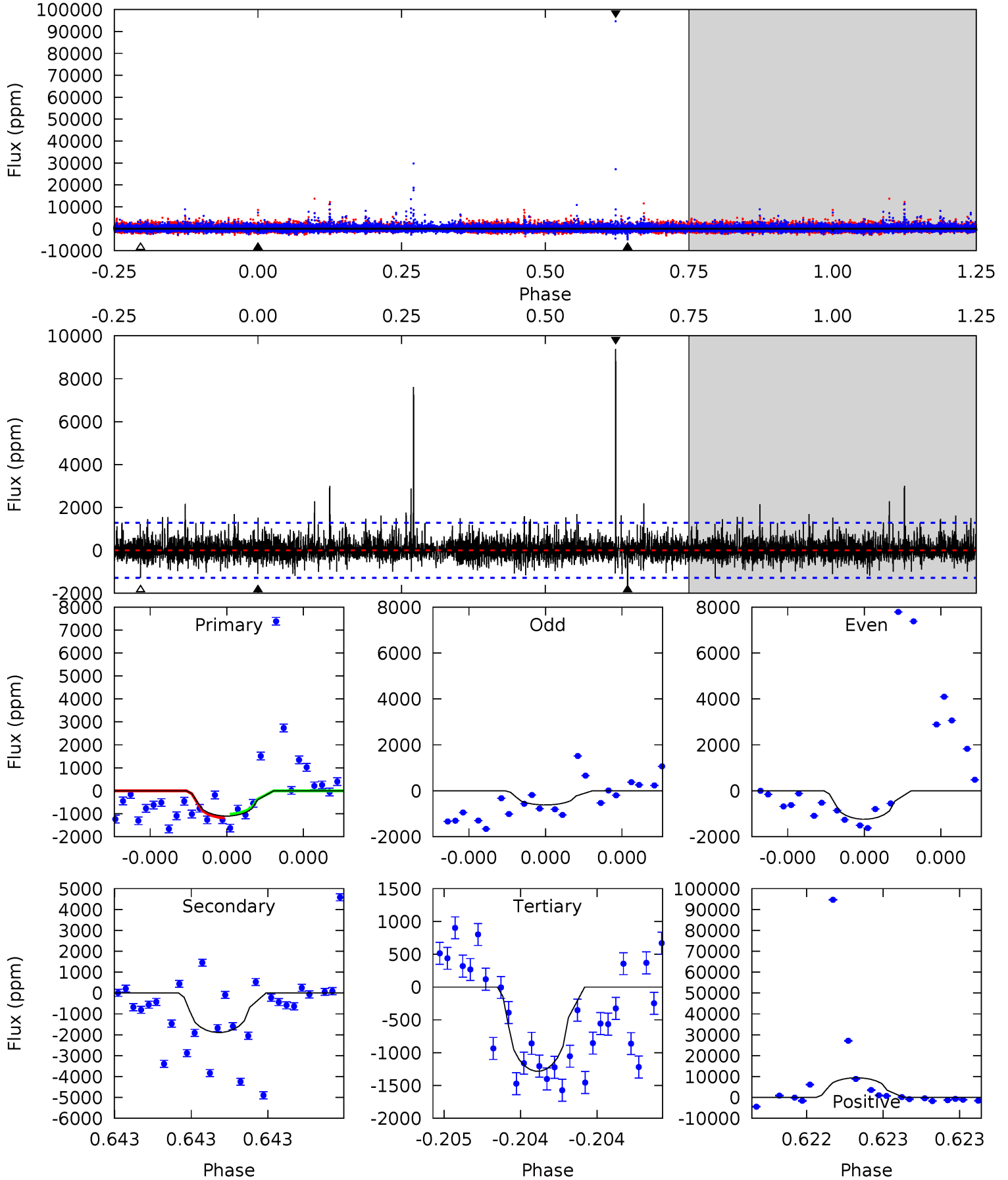
TCE 010165244-01 P=454.197172 Days  $T_0=424.472457$  (BKJD)



# DV Model-Shift Uniqueness Test

010165244-01, P = 454.210465 Days, E = 424.480337 Days

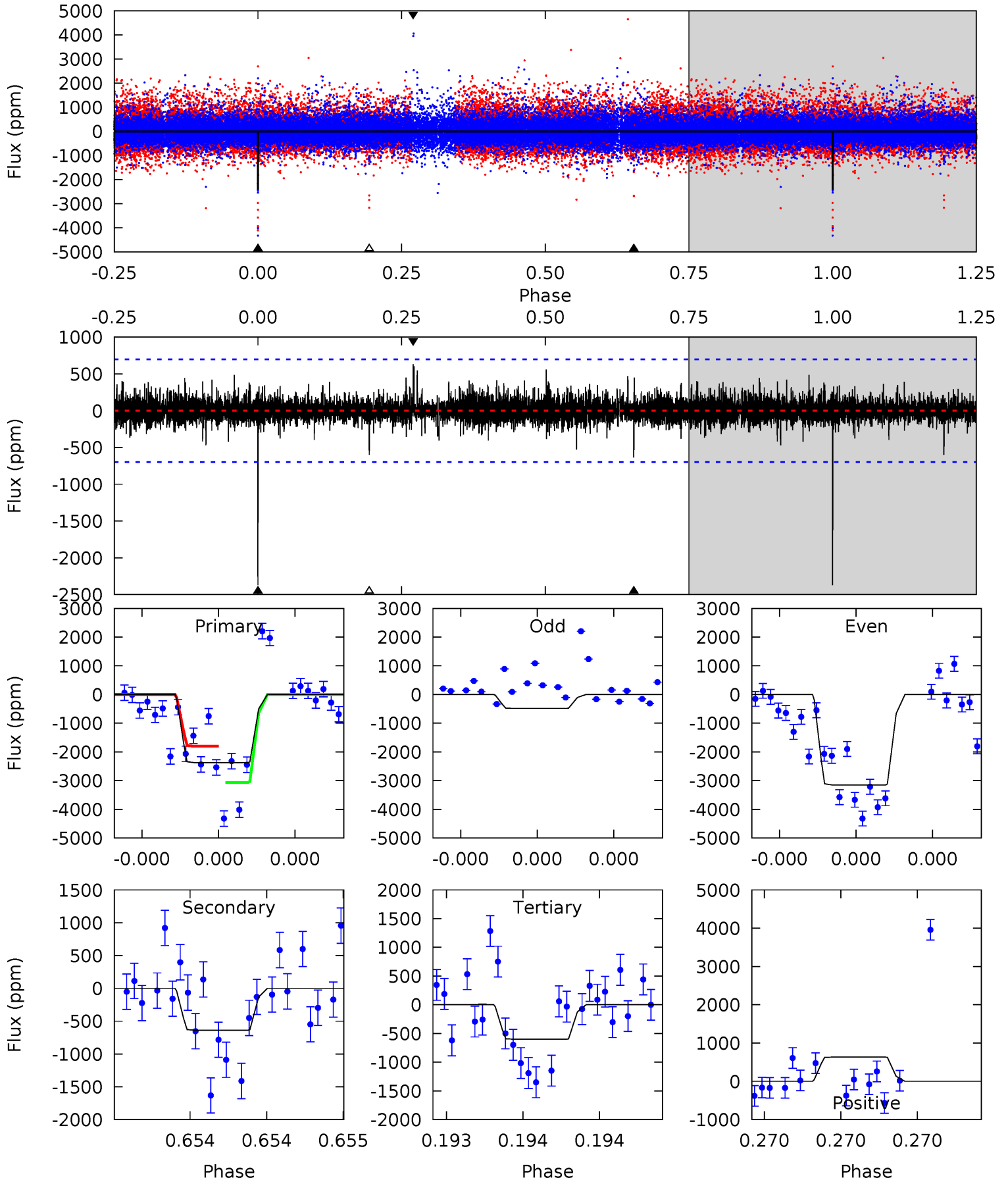
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.85	8.32	5.65	41.3	5.65	3.60	1.75	-0.80	-36.5	2.68	-33.0	0.29	1.15	0.83	0.37



# Alt Model-Shift Uniqueness Test

010165244-01, P = 454.197172 Days, E = 424.472457 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
19.2	5.15	4.85	5.11	5.65	3.59	0.78	14.3	14.1	0.30	0.03	8.27	0.75	0.21	5.14



### Stellar Parameters For KIC 010165244

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4090^{+146}_{-162}$	$4.606^{+0.063}_{-0.014}$	$0.460^{+0.050}_{-0.300}$	$0.674^{+0.025}_{-0.070}$	$0.669^{+0.038}_{-0.057}$	$3.074^{+0.845}_{-0.193}$
	+4%/-4%	+1%/-0%	+11%/-65%	+4%/-10%	+6%/-9%	+28%/-6%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 010165244-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	-1891±227	$6.78^{+5.90}_{-4.51}$	$204^{+9}_{-8}$	$3172^{+1461}_{-511}$	$23222^{+187684}_{-16885}$
Alt.	-636±124	$6.41^{+6.48}_{-4.42}$	$203^{+8}_{-9}$	$2761^{+1203}_{-433}$	$8310^{+83642}_{-6109}$

$T_{max}$  = 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

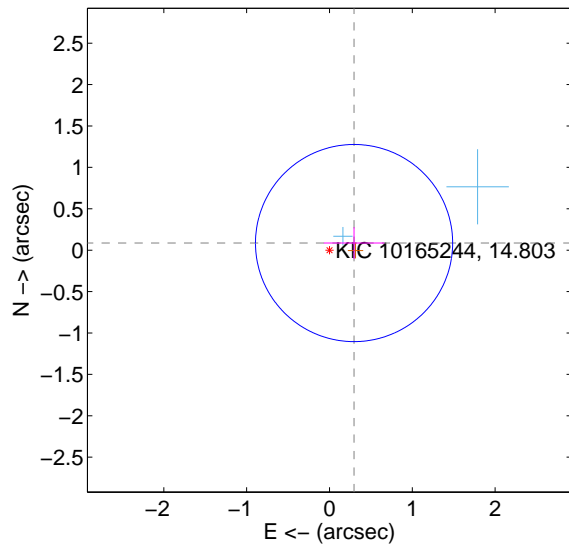
Supplemental centroid analysis for 010165244-01. Kepler magnitude: 14.80. Transit SNR 7.91

There are 2 quarters with good PRF difference image offsets

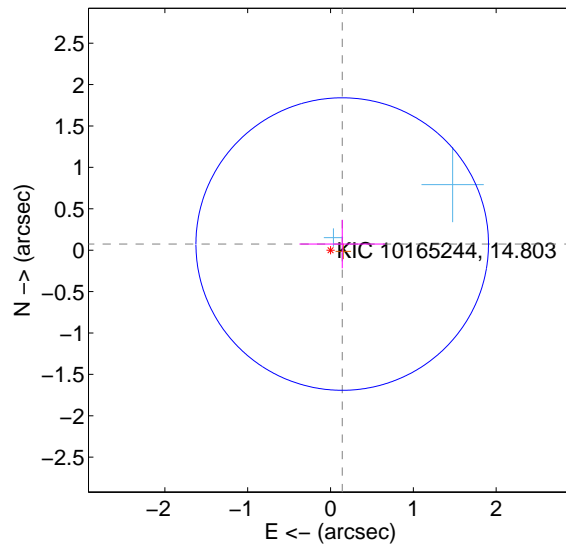
The direct PRF centroid is offset from the target star catalog position by about 0.32 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.309 \pm 0.397$	0.78	$-0.297 \pm 0.366$	$0.086 \pm 0.191$
PRF-fit source offset from KIC position	$0.159 \pm 0.589$	0.27	$-0.141 \pm 0.516$	$0.074 \pm 0.293$
photometric centroid source offset	$0.24 \pm 0.73$	0.32	$0.20 \pm 0.71$	$0.13 \pm 0.79$

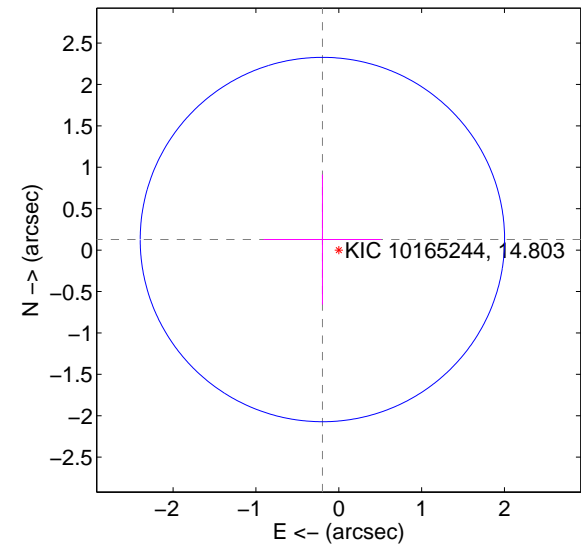
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



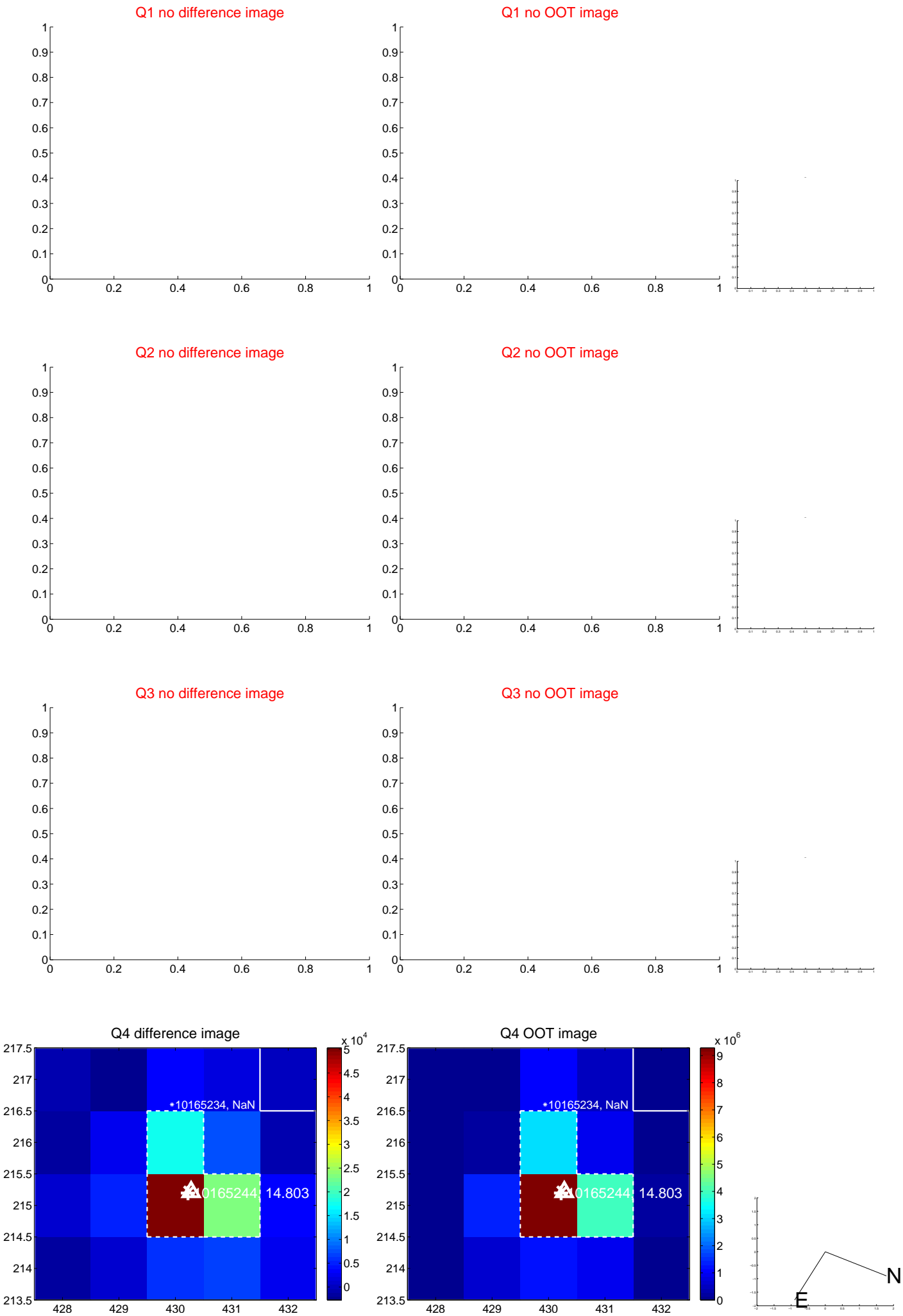
offset from photometric centroids



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.



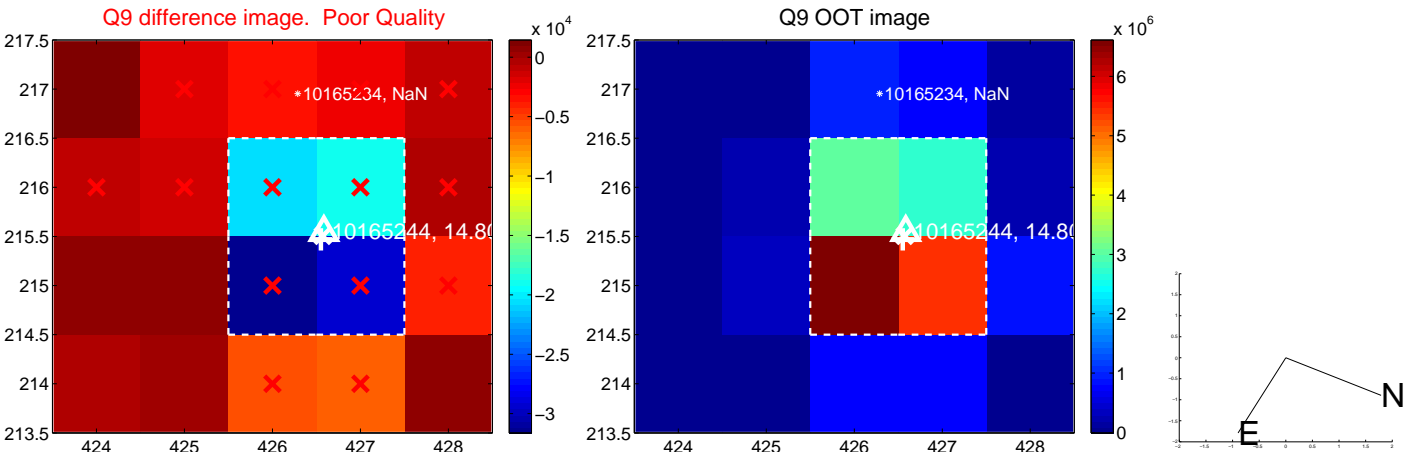
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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.

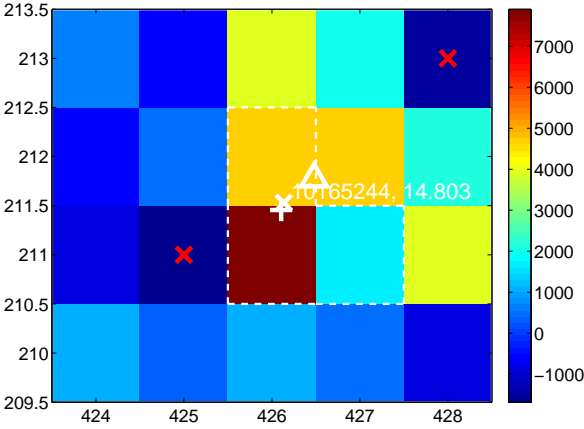
Q13 no difference image



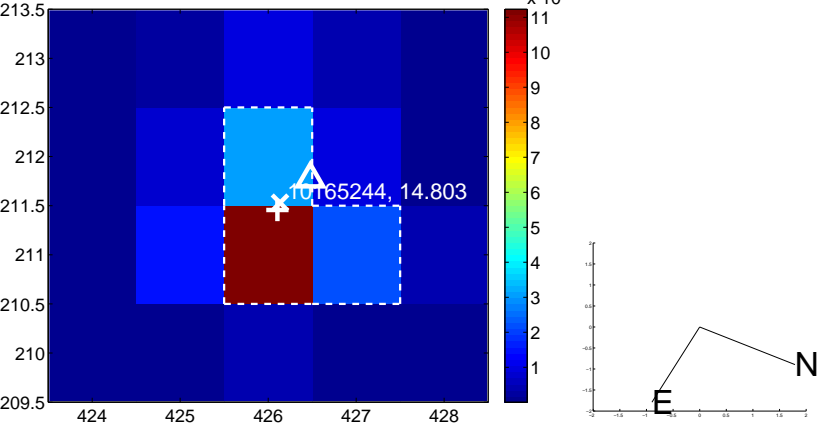
Q13 no OOT image



Q14 difference image



Q14 OOT image



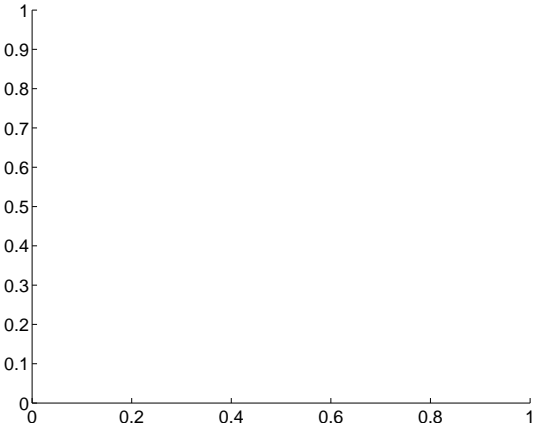
Q15 no difference image



Q15 no OOT image



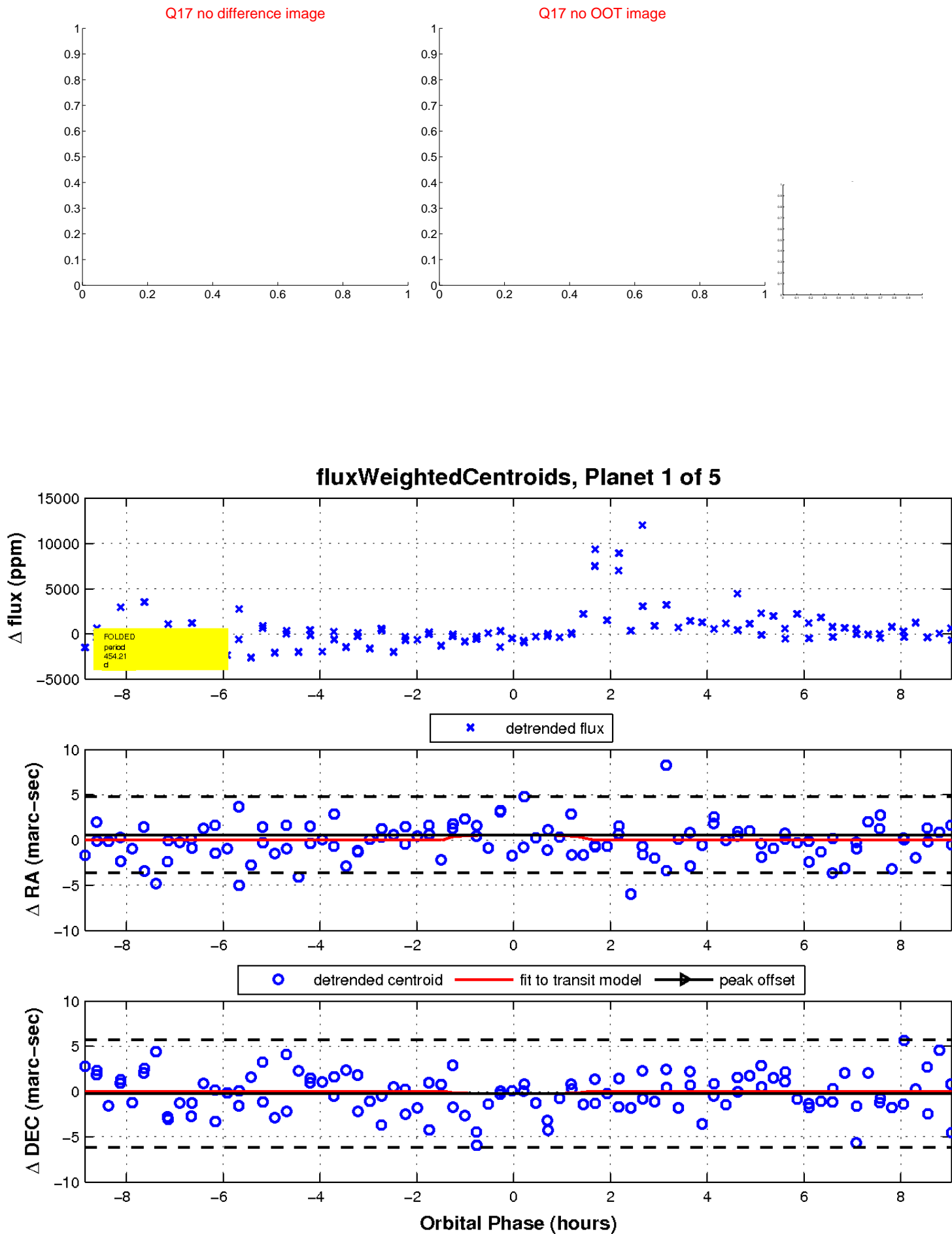
Q16 no difference image



Q16 no OOT image



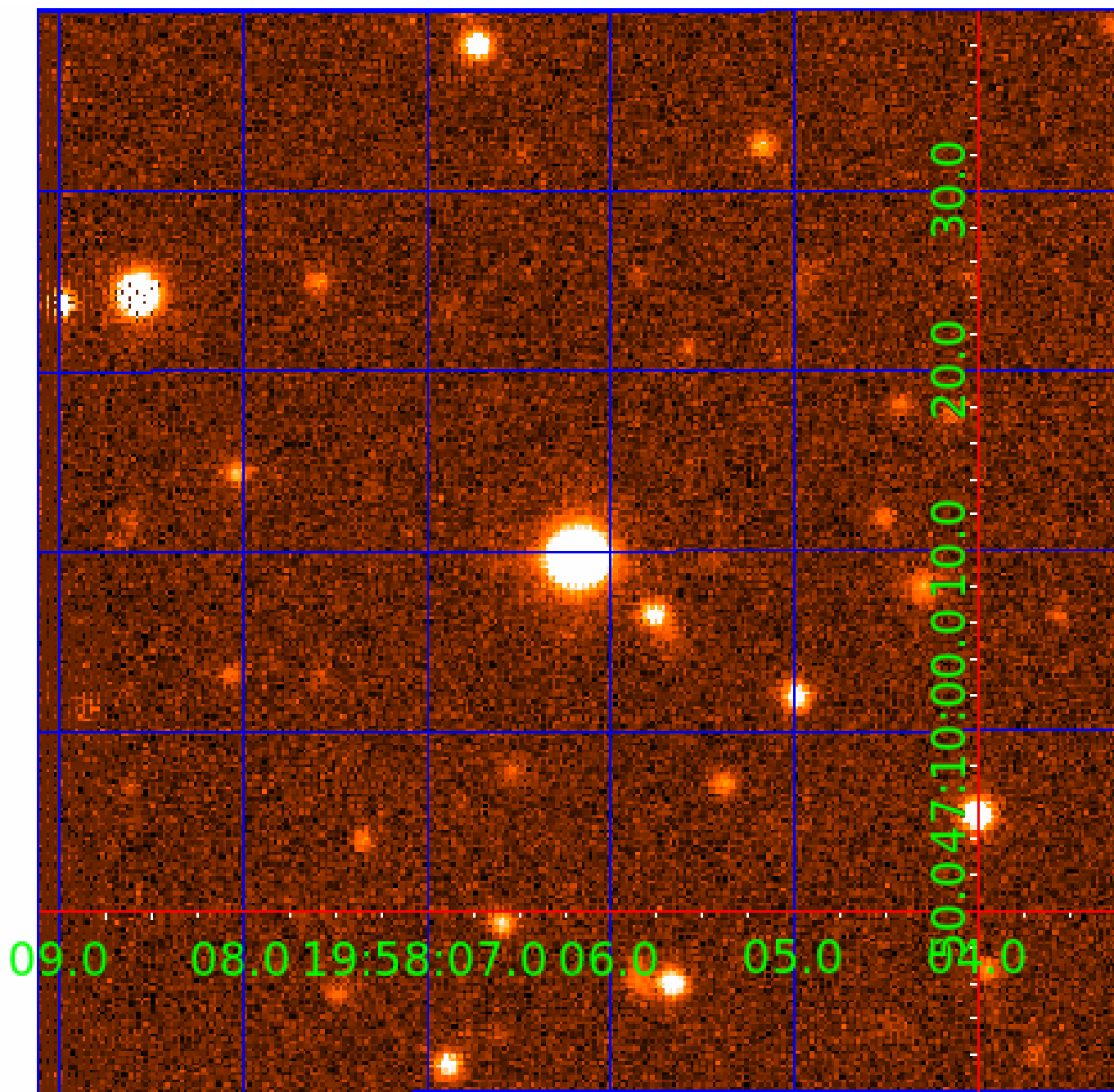
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



# KIC 010165244

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
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010165244-02	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—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010165244-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
010165244-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE_ZUMA—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS
010165244-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

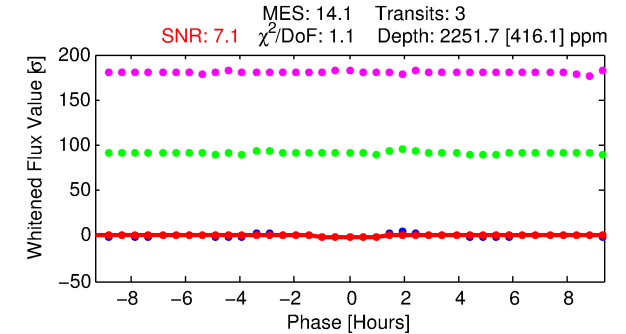
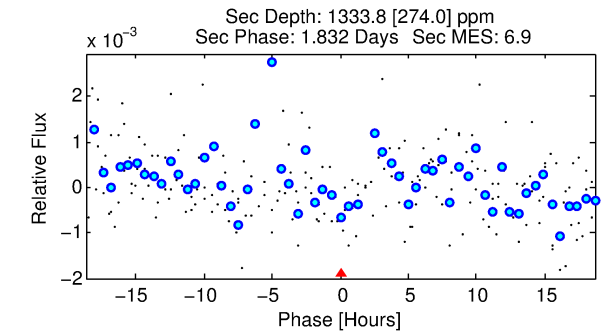
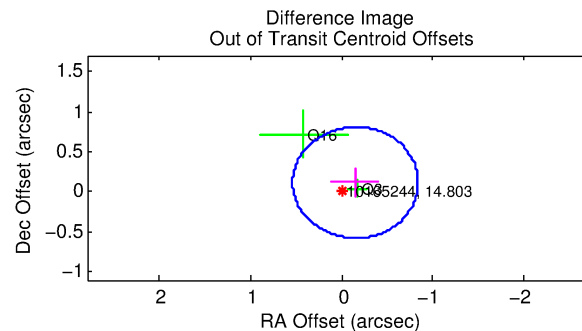
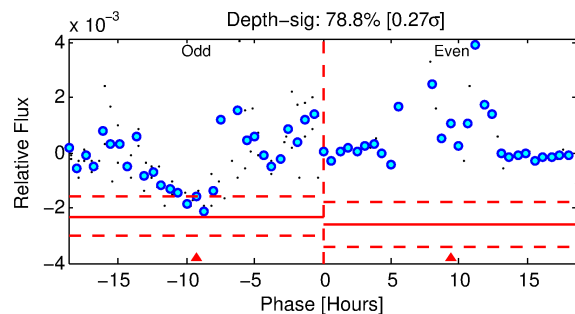
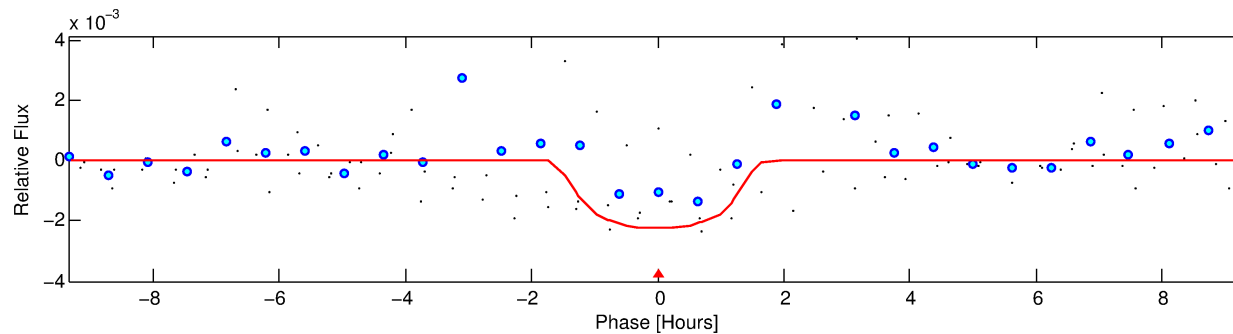
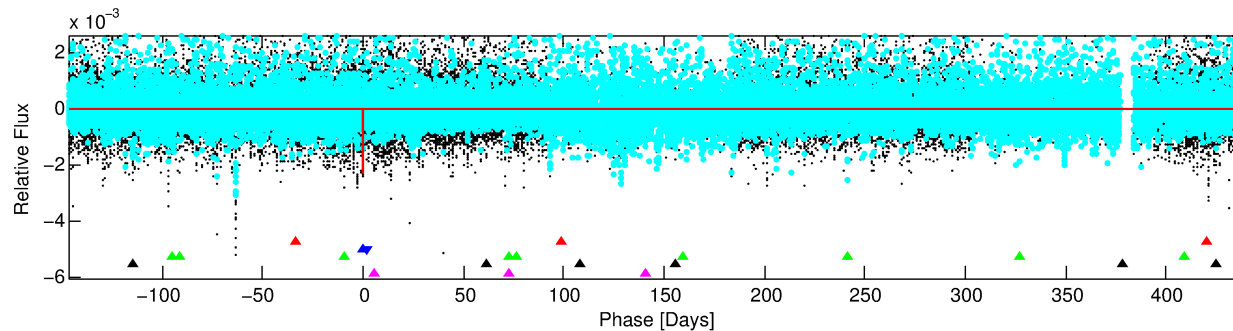
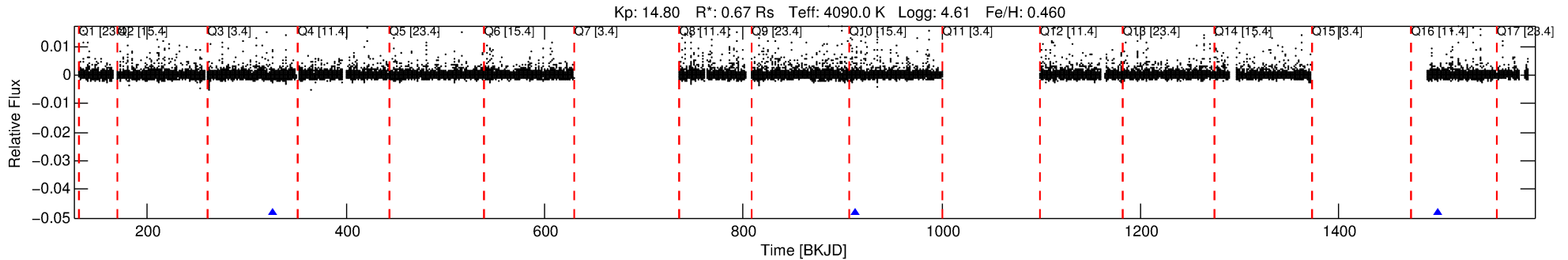
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010165244-02

No Significant Match Found

# DV One-Page Summary

KIC: 10165244 Candidate: 2 of 5 Period: 586.924 d



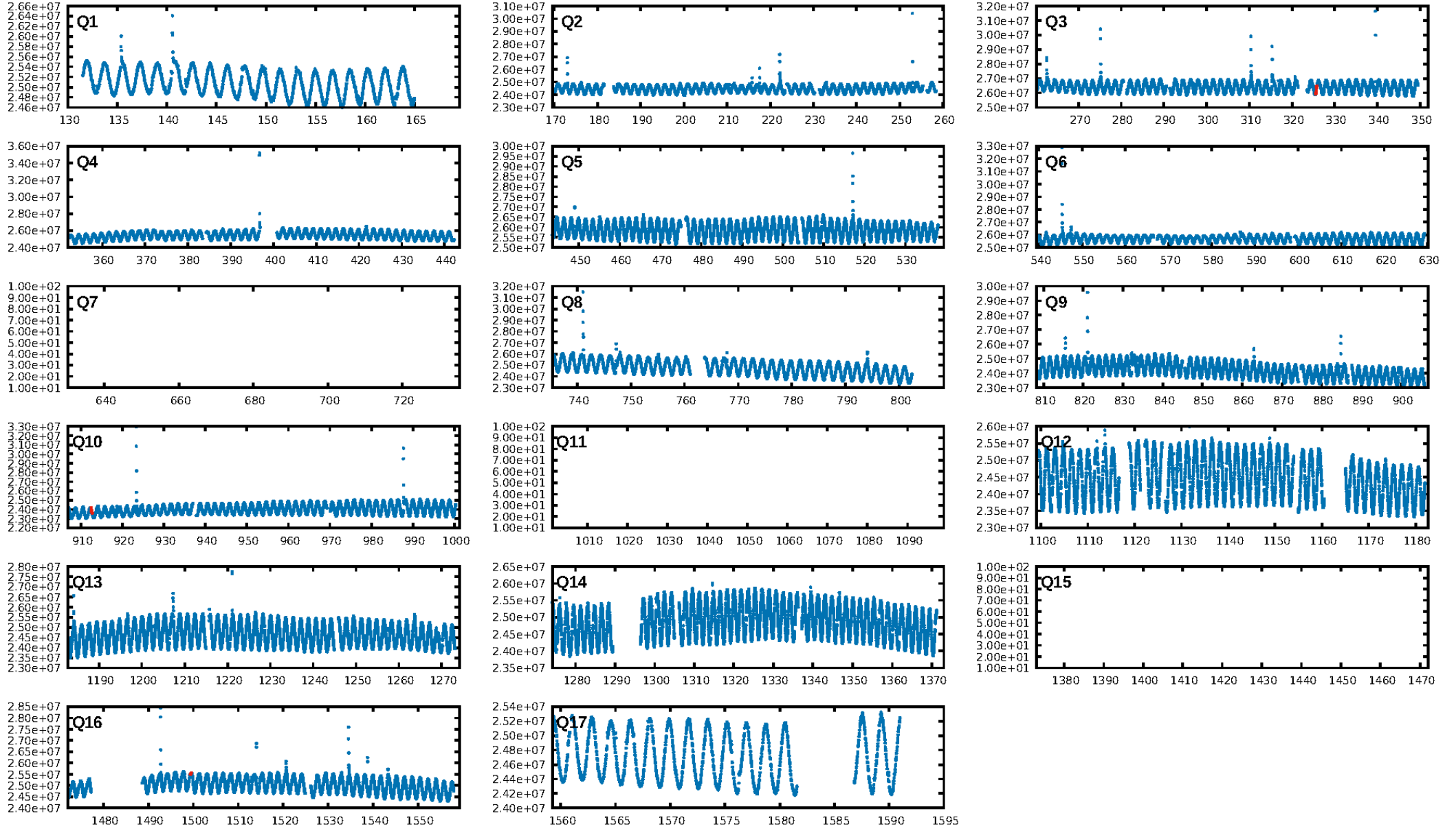
## DV Fit Results:

Period = 586.92420 [0.00563] d  
Epoch = 325.6421 [0.0077] BKJD  
Rp/R\* = 0.0489 [0.0379]  
a/R\* = 996.60 [2276.42]  
b = 0.79 [1.13]  
Seff = 0.08 [0.02]  
Teq = 135 [7] K  
Rp = 3.59 [2.81] Re  
a = 1.2000 [0.1013] AU  
Ag = 81782.89 [128277.81] [0.64σ]  
Teffp = 3536 [1389] K [2.45σ]

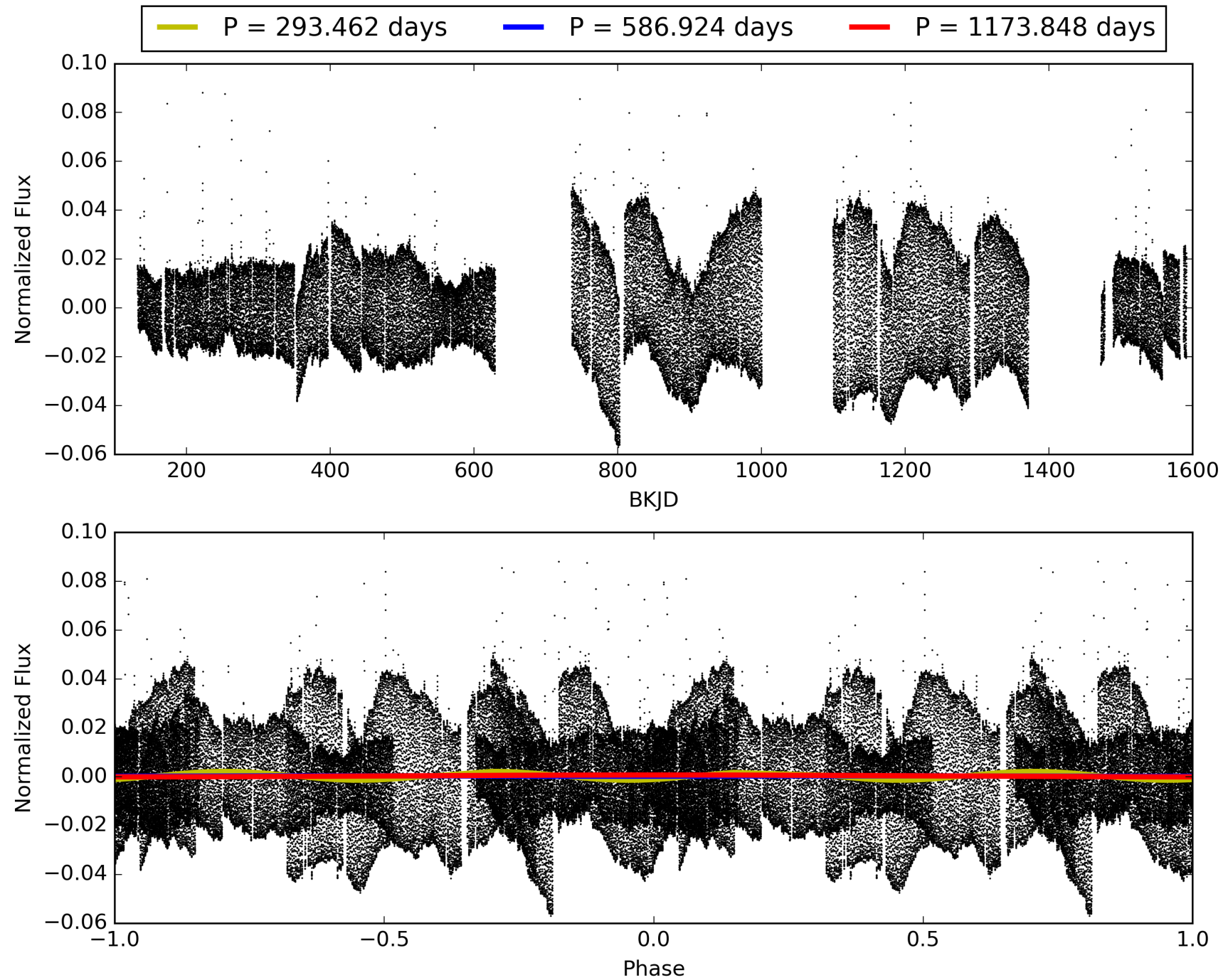
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [188.64σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 1.3%  
ModelChiSquareGof-sig: 48.4%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 2.434  
Centroid-sig: 46.7%  
Centroid-so: 0.675 arcsec [0.85σ]  
OotOffset-rm: 0.191 arcsec [0.83σ]  
OotOffset-st: 0/1/1/0 [2]  
KicOffset-rm: 0.122 arcsec [0.53σ]  
KicOffset-st: 0/1/1/0 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 1.00 [3/3]

# TCE 010165244-02, PDC Light Curves



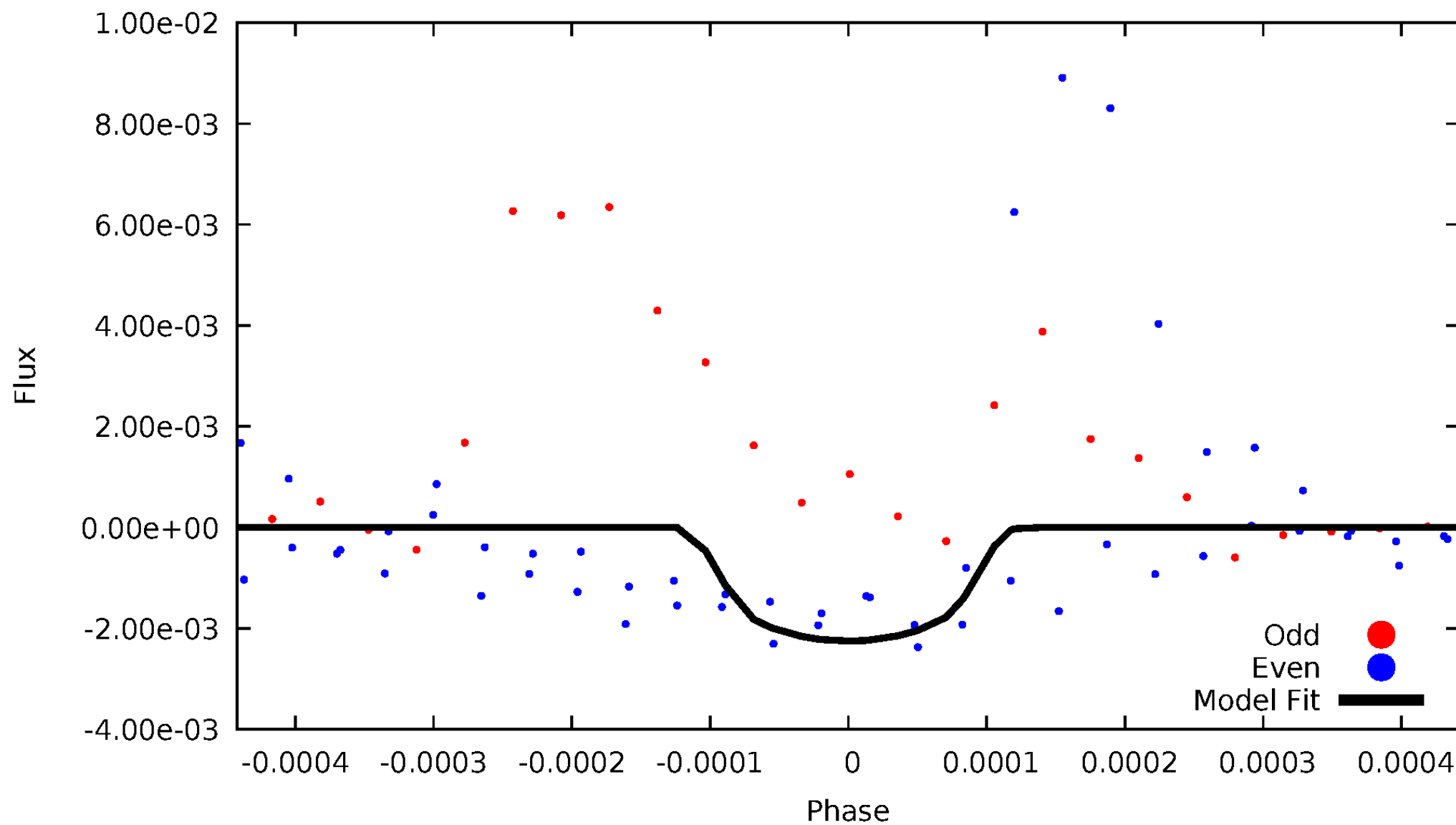
TCE 010165244-02





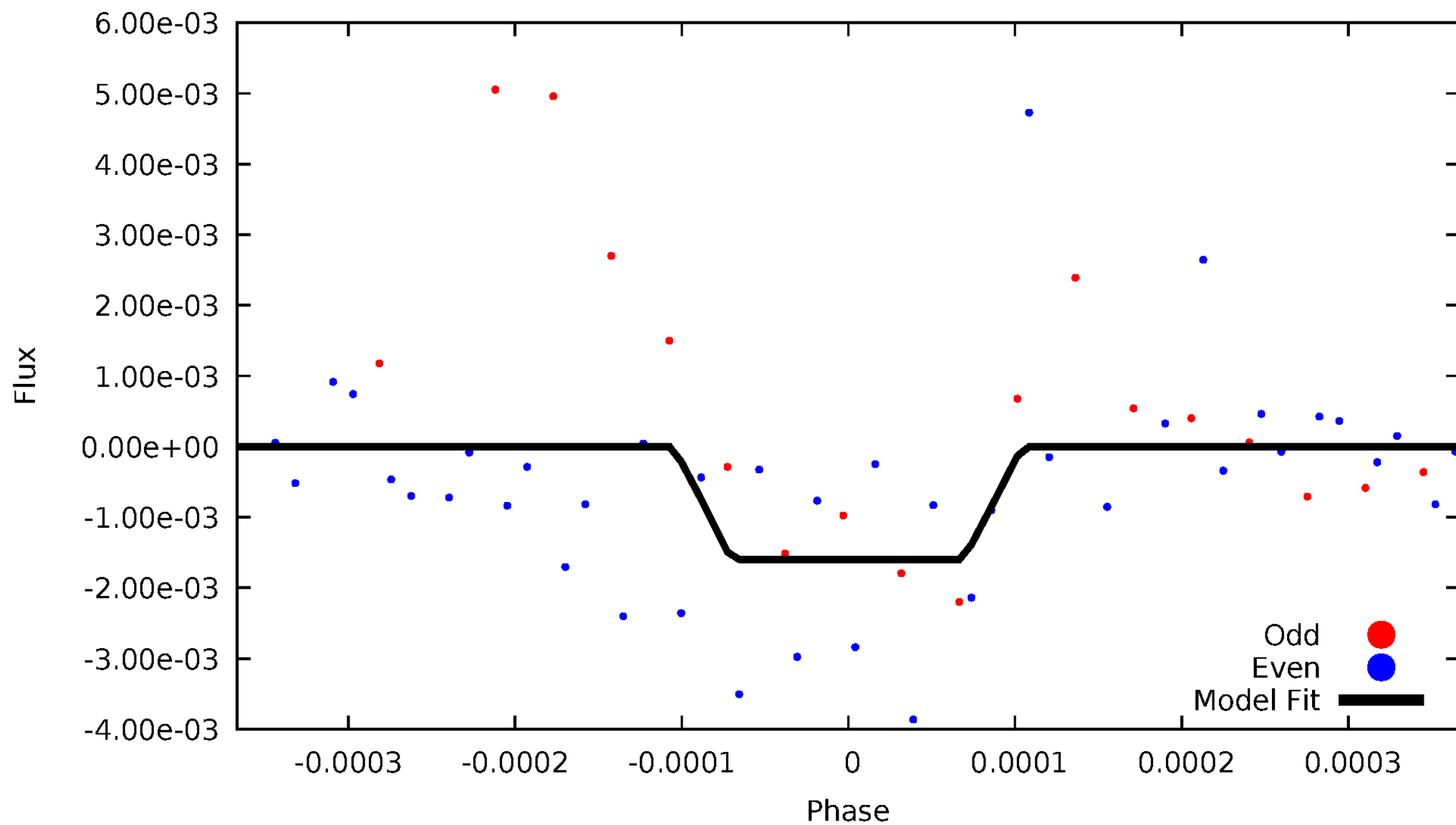
# DV Odd/Even

TCE 010165244-02



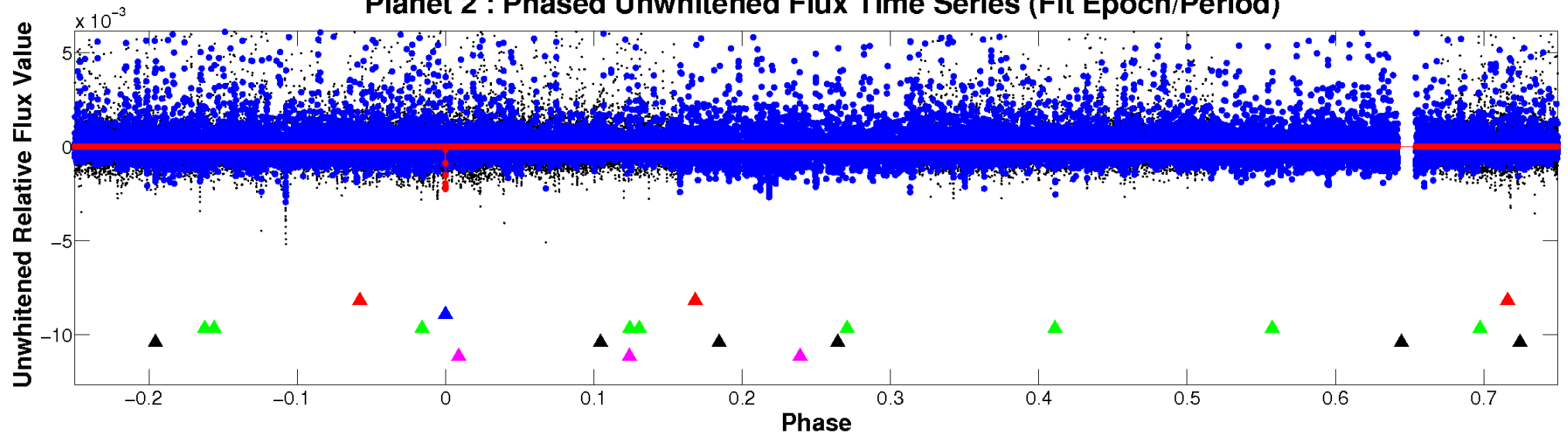
# ALT Odd/Even

TCE 010165244-02

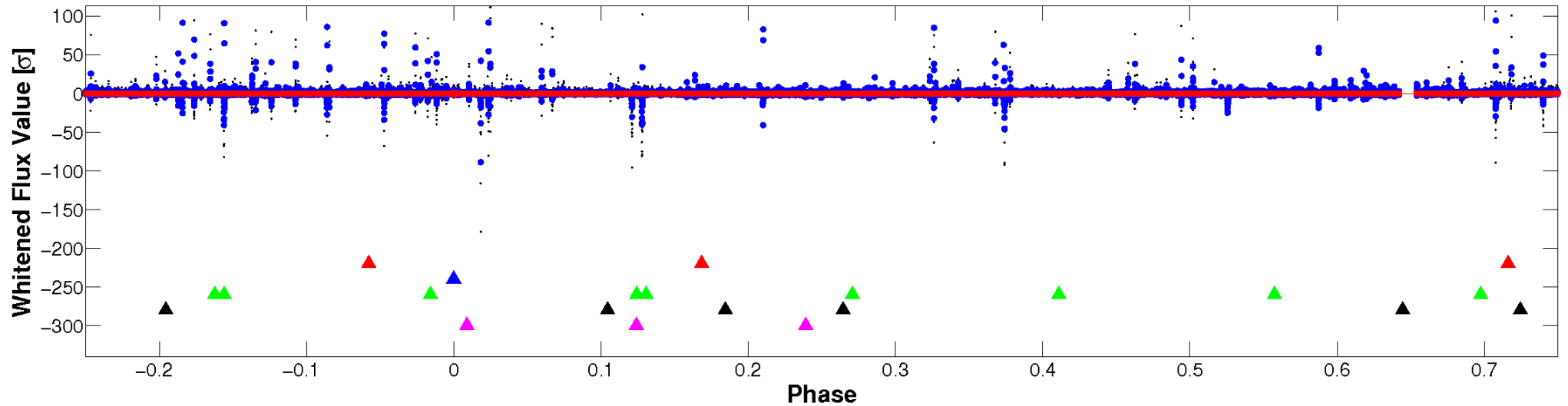


# Non-Whitened Vs. Whitened Light Curve

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

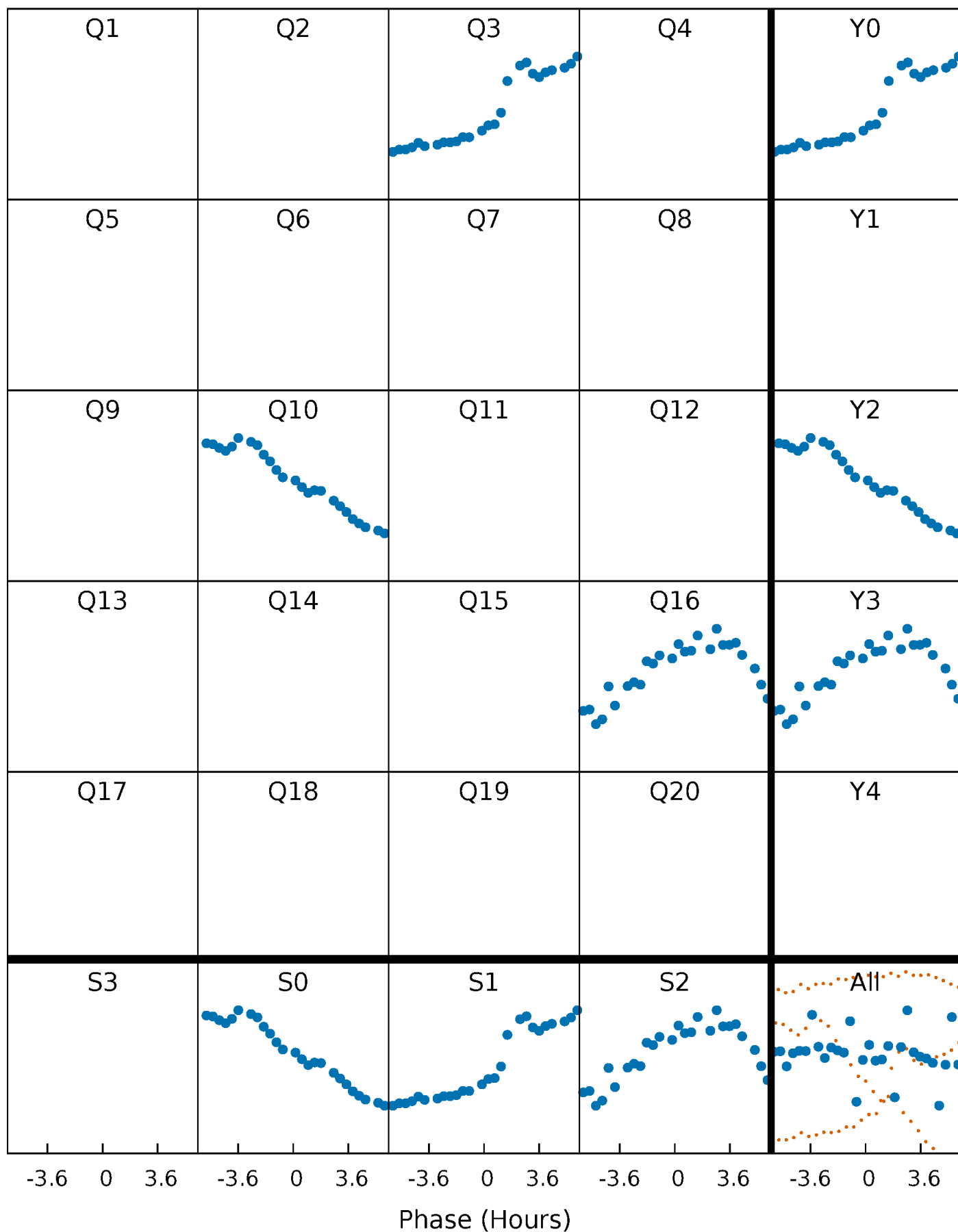


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



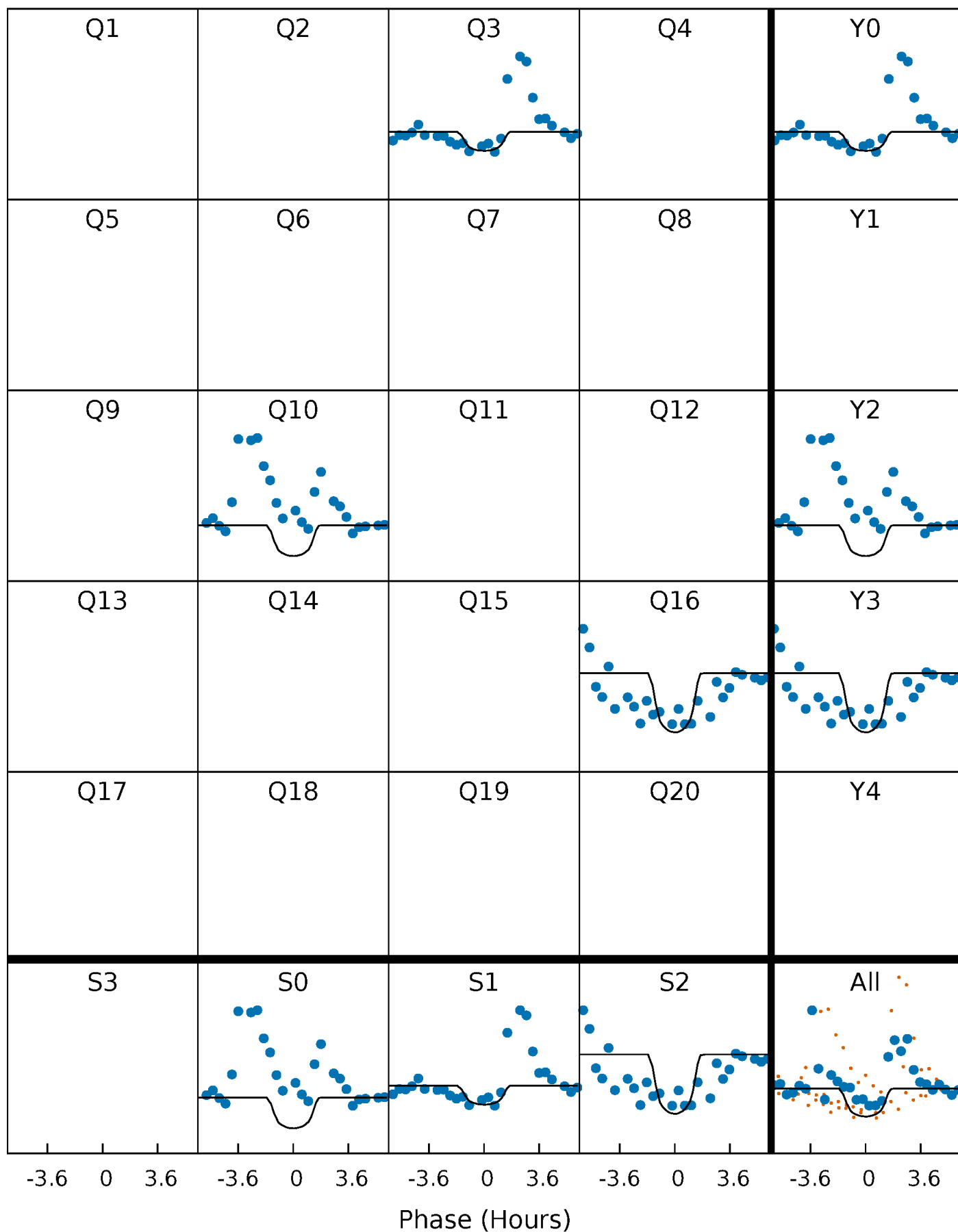
# PDC Quarter-Phased Transit Curves

TCE 010165244-02     $P=586.924204$  Days     $T_0=325.642112$  (BKJD)



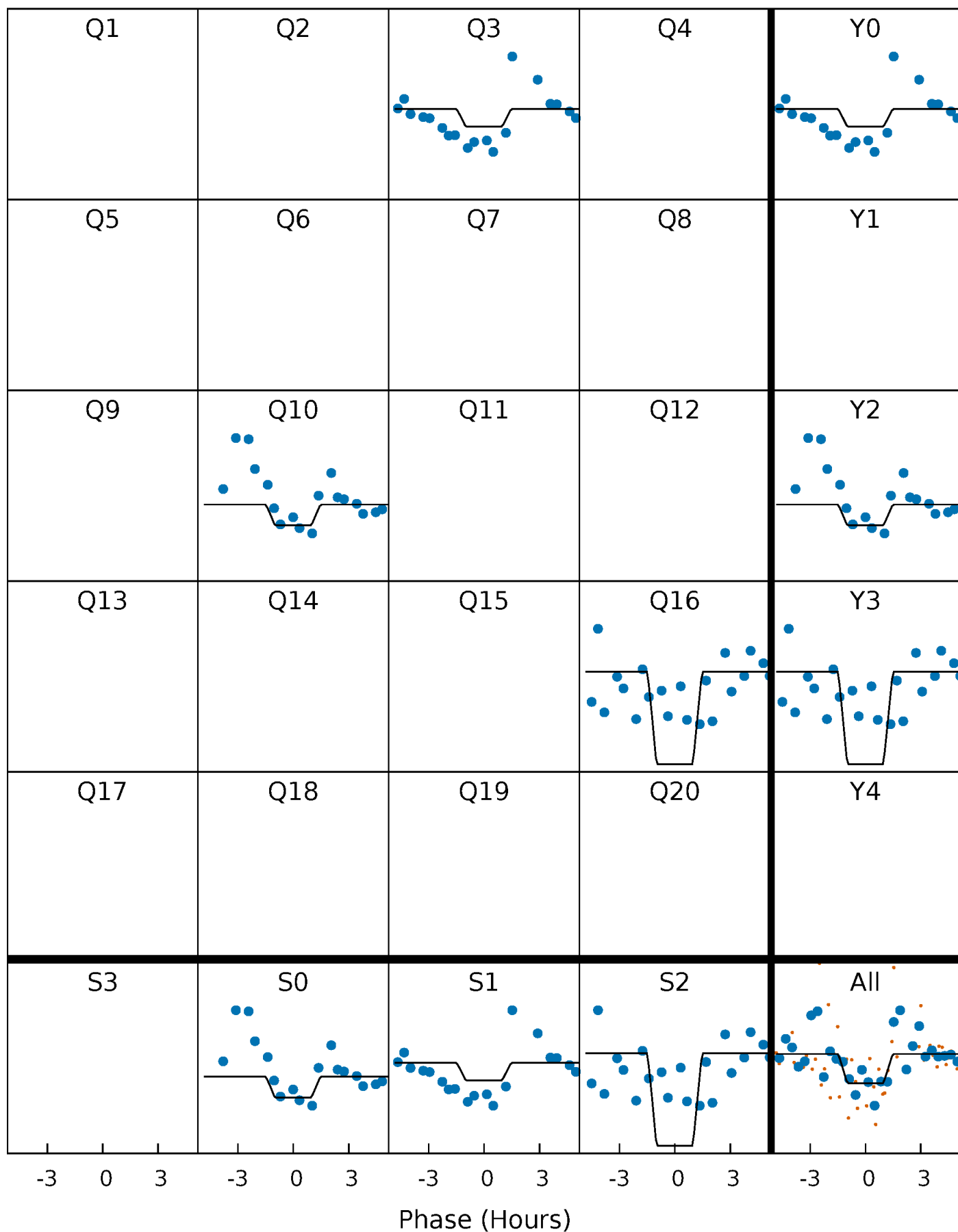
# DV Quarter-Phased Transit Curves

TCE 010165244-02 P=586.924204 Days  $T_0=325.642112$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

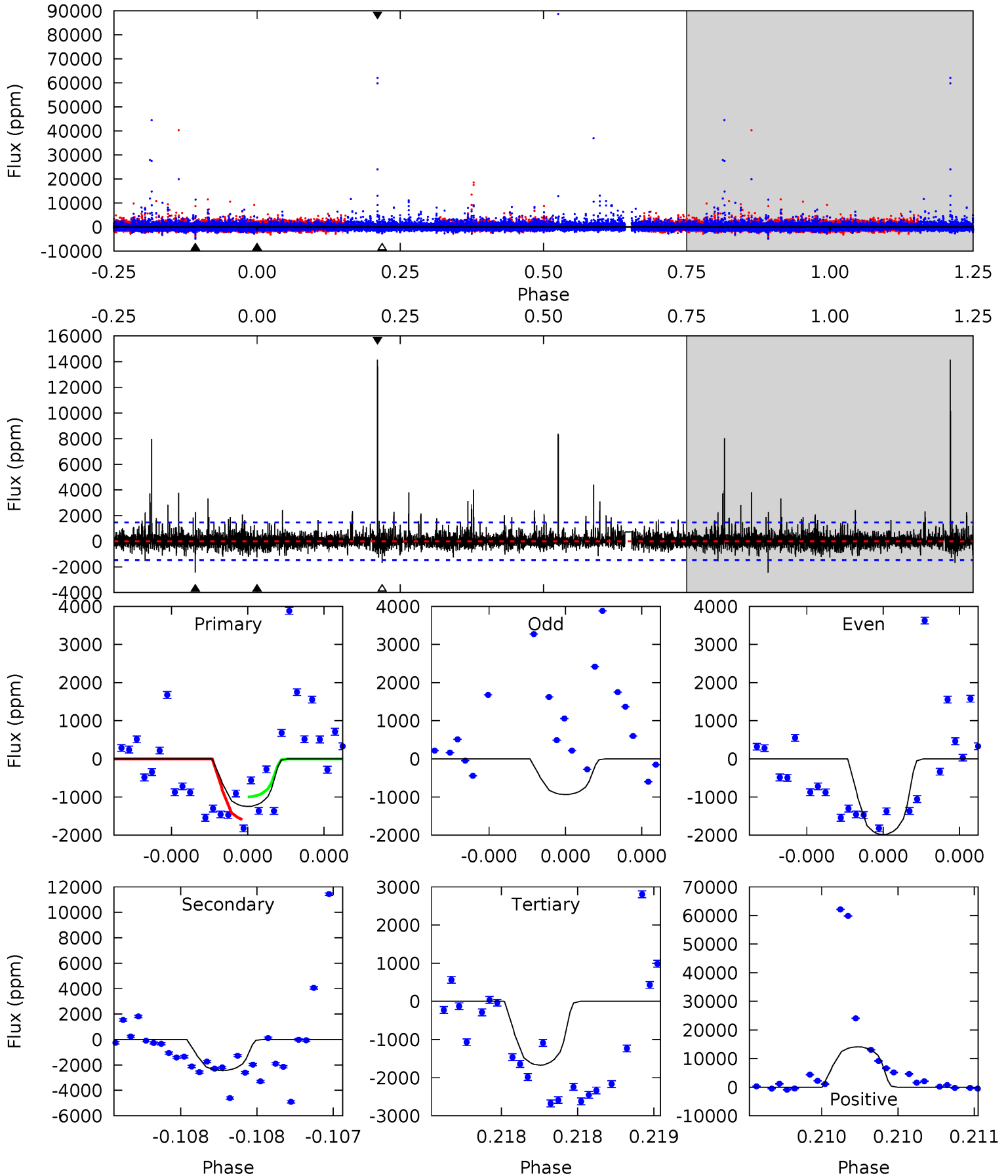
TCE 010165244-02 P=586.919955 Days  $T_0=325.648773$  (BKJD)



# DV Model-Shift Uniqueness Test

010165244-02, P = 586.924204 Days, E = 325.642112 Days

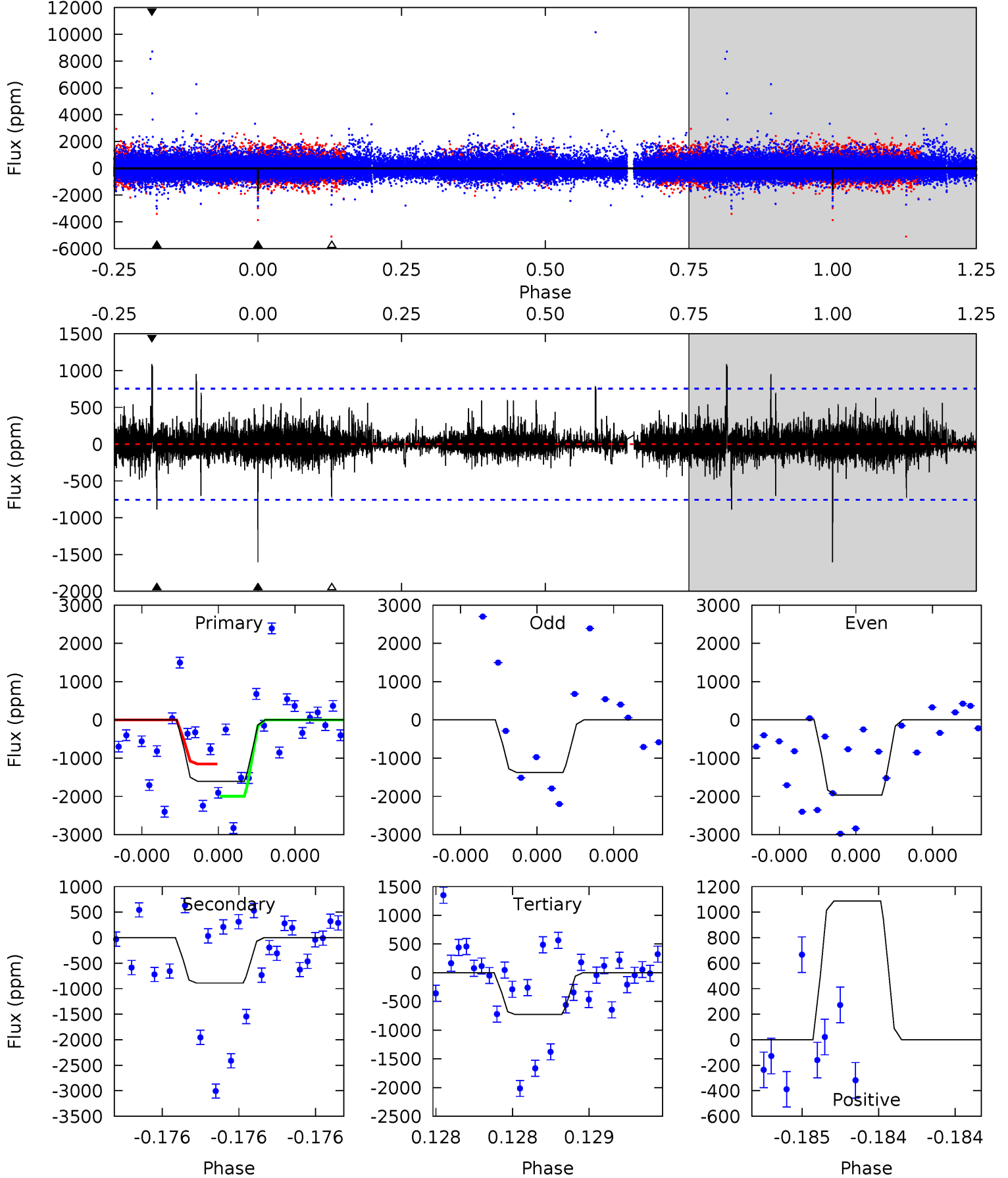
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.85	9.48	6.51	55.0	5.68	3.65	1.90	-1.65	-50.1	2.98	-45.5	0.67	0.51	0.85	1.12



# Alt Model-Shift Uniqueness Test

010165244-02, P = 586.919955 Days, E = 325.648773 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
12.2	6.75	5.52	8.24	5.73	3.72	0.83	6.65	3.92	1.23	-1.50	2.00	1.27	0.40	3.11





### Stellar Parameters For KIC 010165244

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4090^{+146}_{-162}$	$4.606^{+0.063}_{-0.014}$	$0.460^{+0.050}_{-0.300}$	$0.674^{+0.025}_{-0.070}$	$0.669^{+0.038}_{-0.057}$	$3.074^{+0.845}_{-0.193}$
	+4%/-4%	+1%/-0%	+11%/-65%	+4%/-10%	+6%/-9%	+28%/-6%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 010165244-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-2441 \pm 257$	$4.09^{+2.53}_{-2.47}$	$187^{+7}_{-8}$	$3911^{+1799}_{-601}$	$113619^{+629258}_{-69681}$
Alt.	$-890 \pm 132$	$3.54^{+2.54}_{-2.17}$	$187^{+8}_{-8}$	$3448^{+1455}_{-525}$	$57243^{+313242}_{-38769}$

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

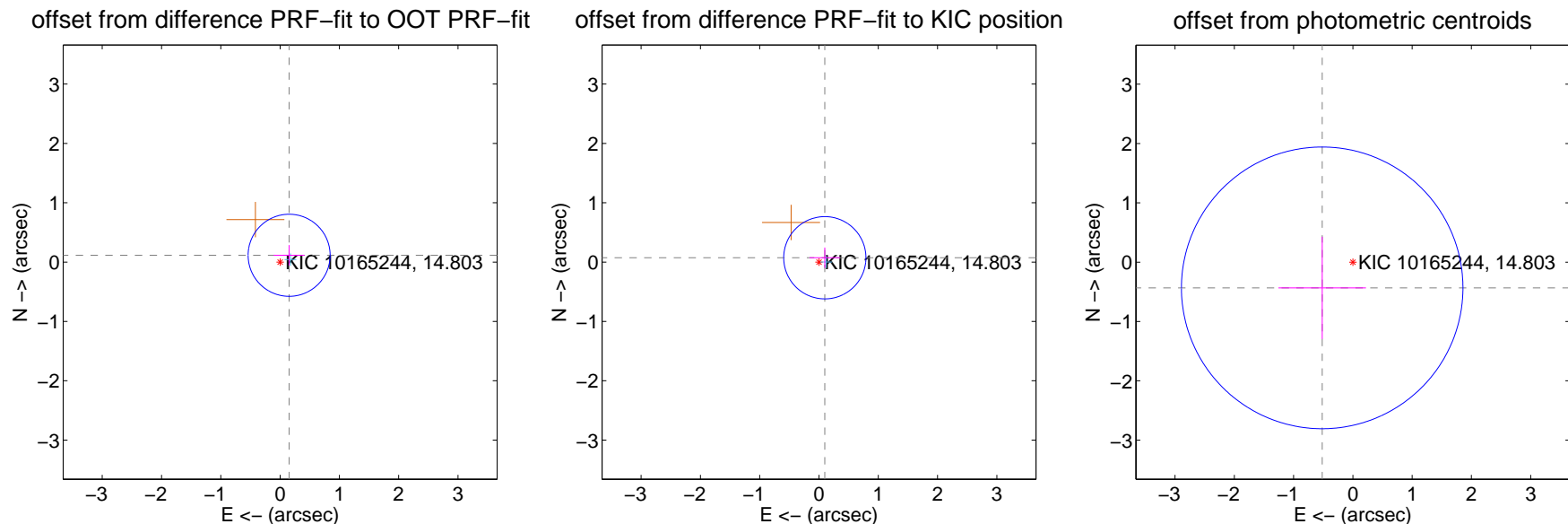
## DV Centroid Data

Supplemental centroid analysis for 010165244-02. Kepler magnitude: 14.80. Transit SNR 7.05

There are 1 quarters with good PRF difference image offsets

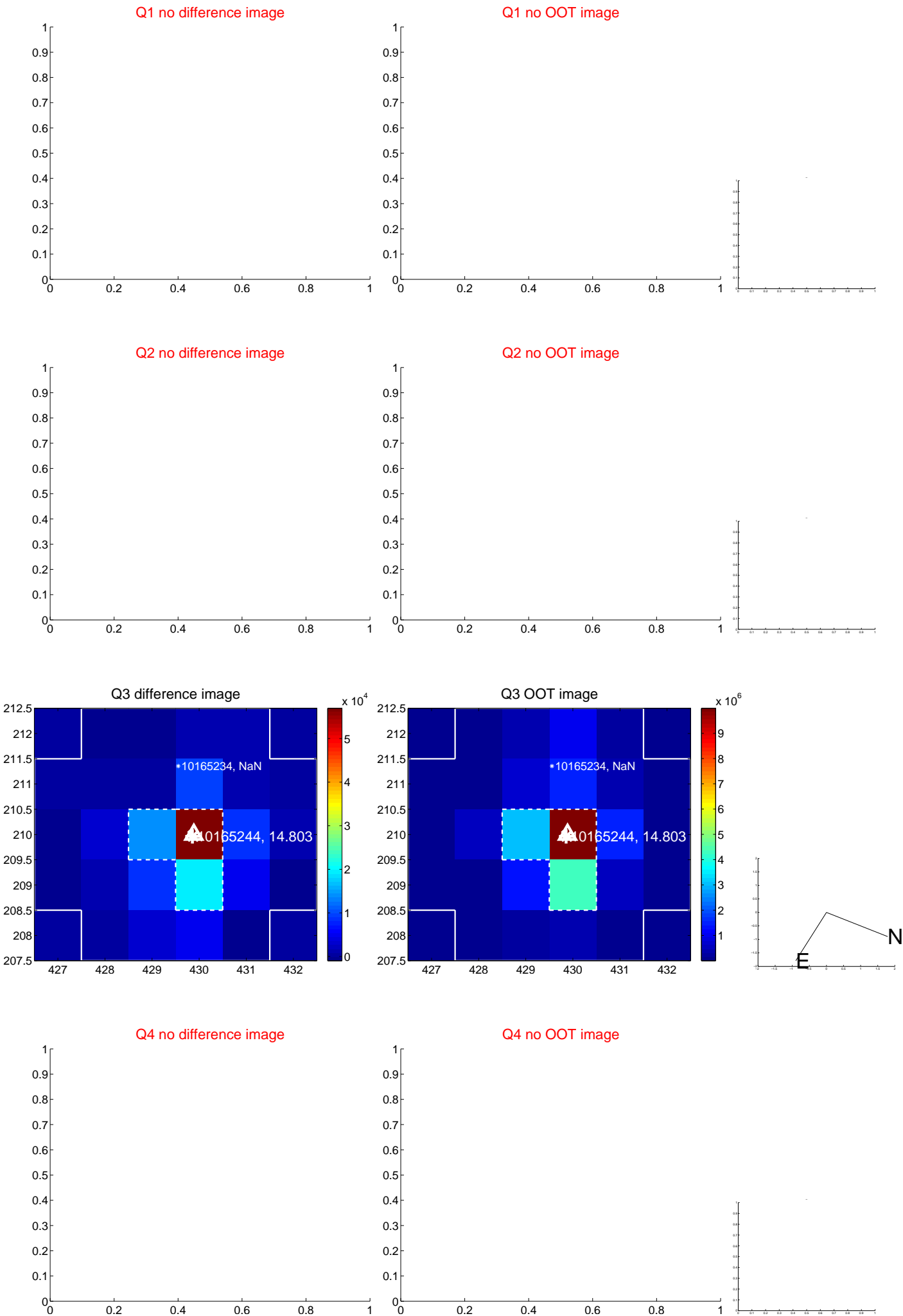
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.191 \pm 0.231$	0.83	$-0.152 \pm 0.258$	$0.115 \pm 0.171$
PRF-fit source offset from KIC position	$0.122 \pm 0.231$	0.53	$-0.098 \pm 0.258$	$0.073 \pm 0.171$
photometric centroid source offset	$0.68 \pm 0.79$	0.85	$0.52 \pm 0.74$	$-0.43 \pm 0.86$



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.

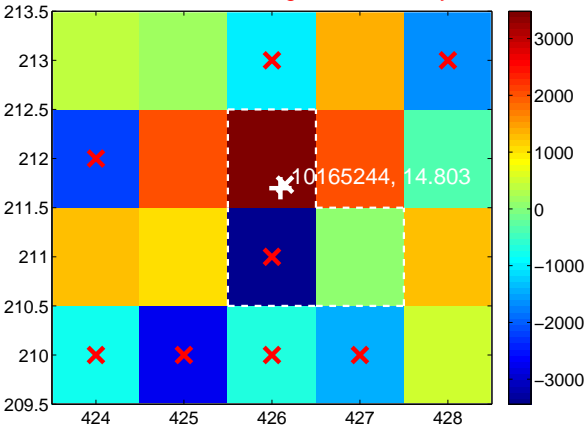
Q9 no difference image



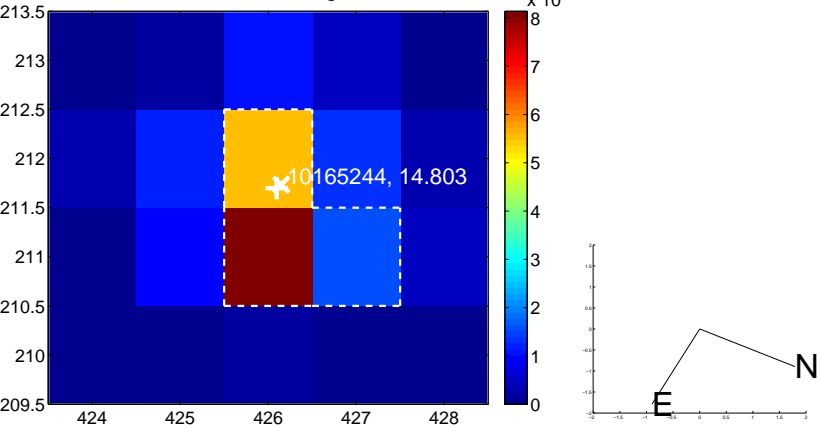
Q9 no OOT image



Q10 difference image. Poor Quality



Q10 OOT image



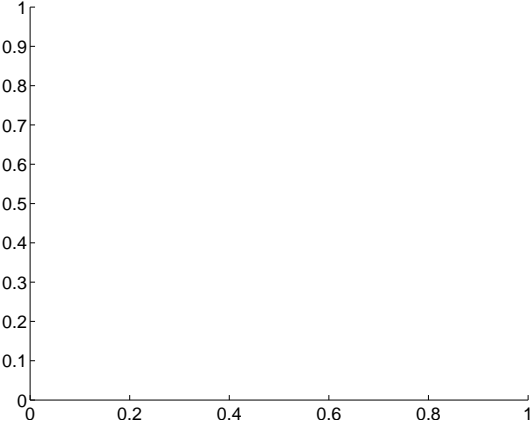
Q11 no difference image



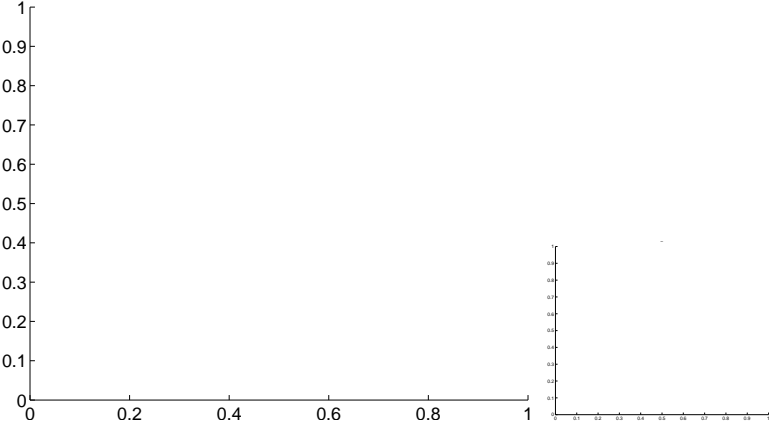
Q11 no OOT image



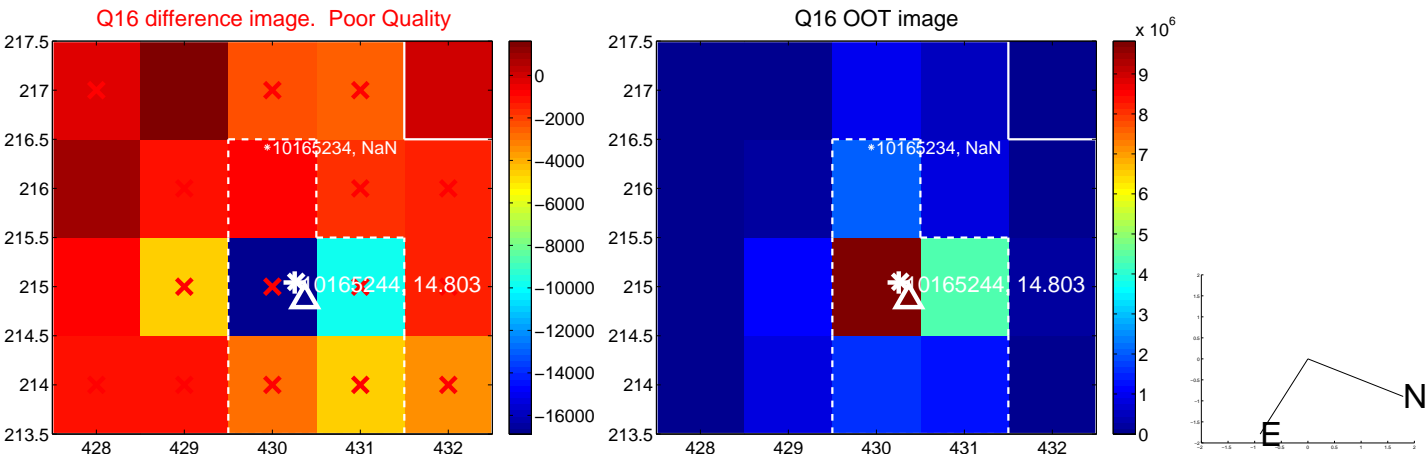
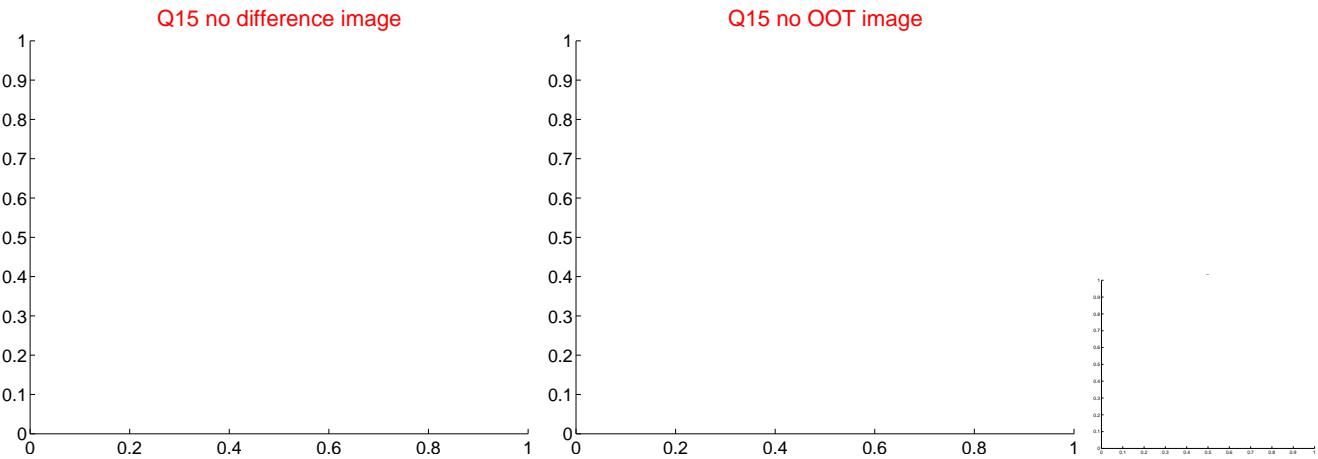
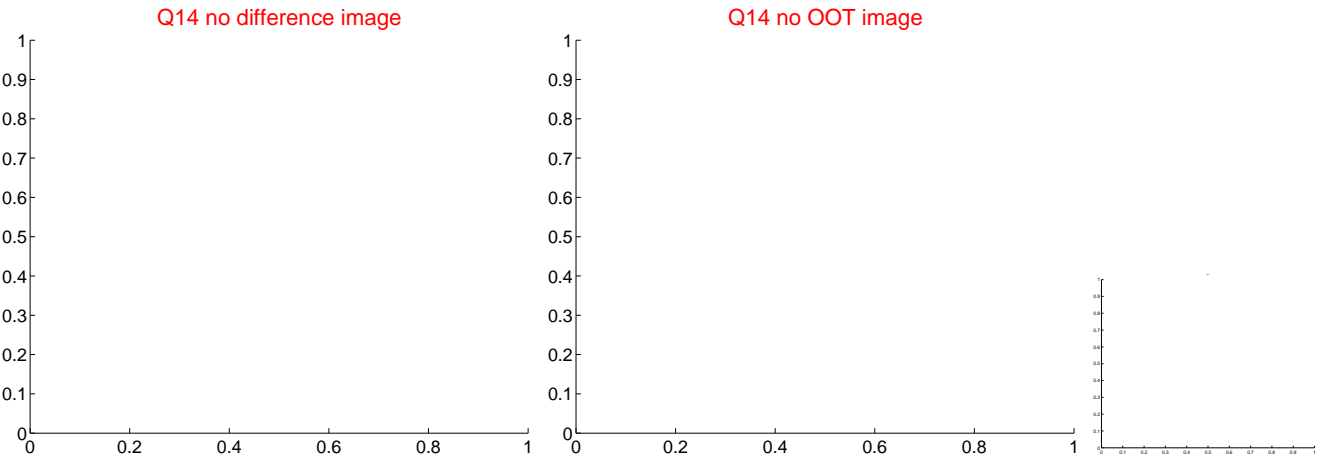
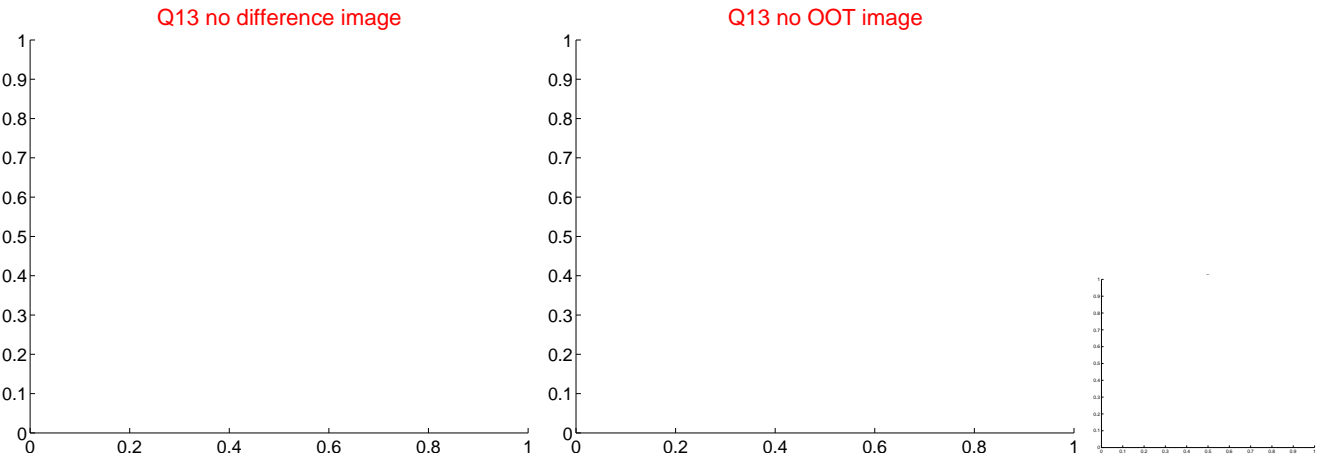
Q12 no difference image



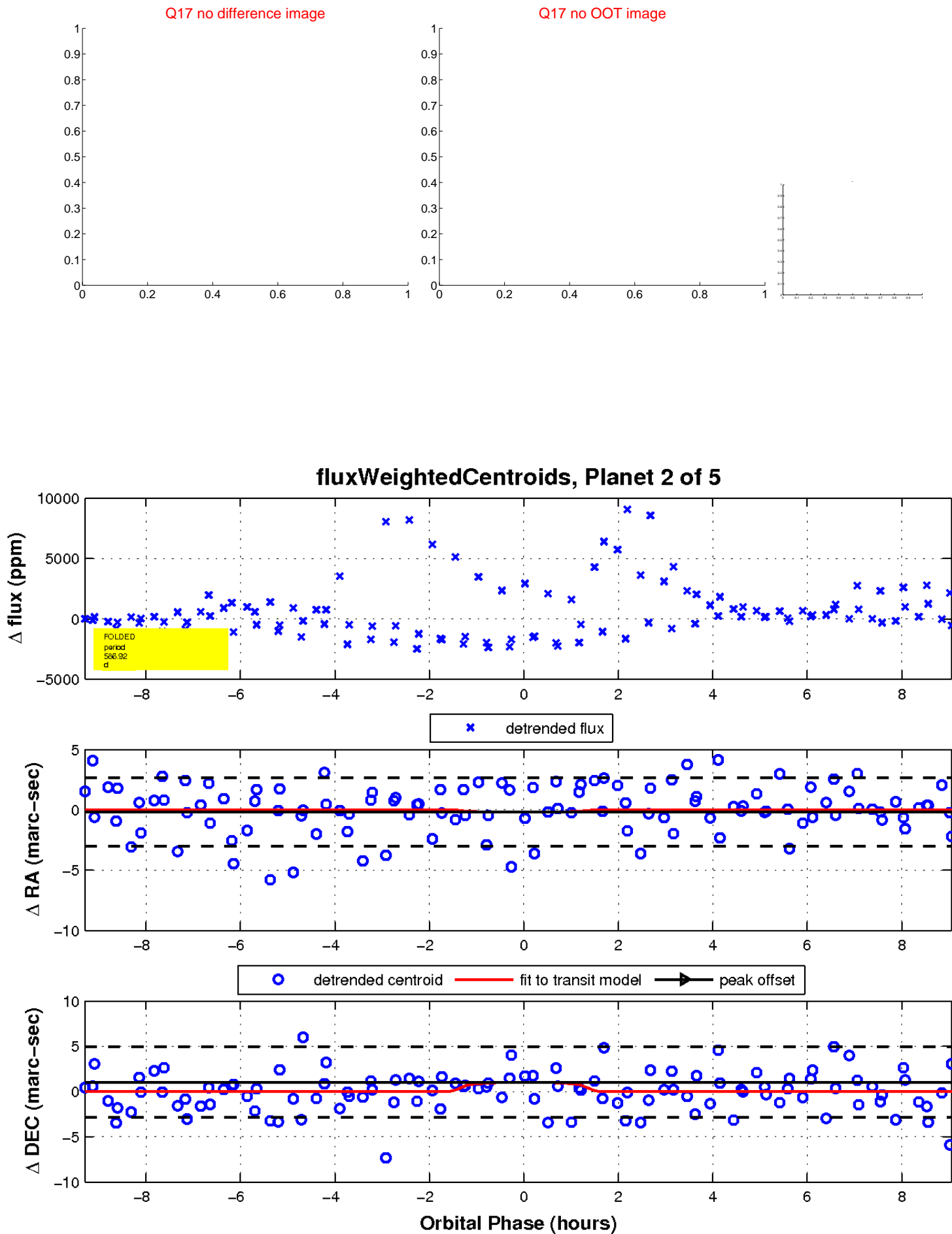
Q12 no OOT image



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

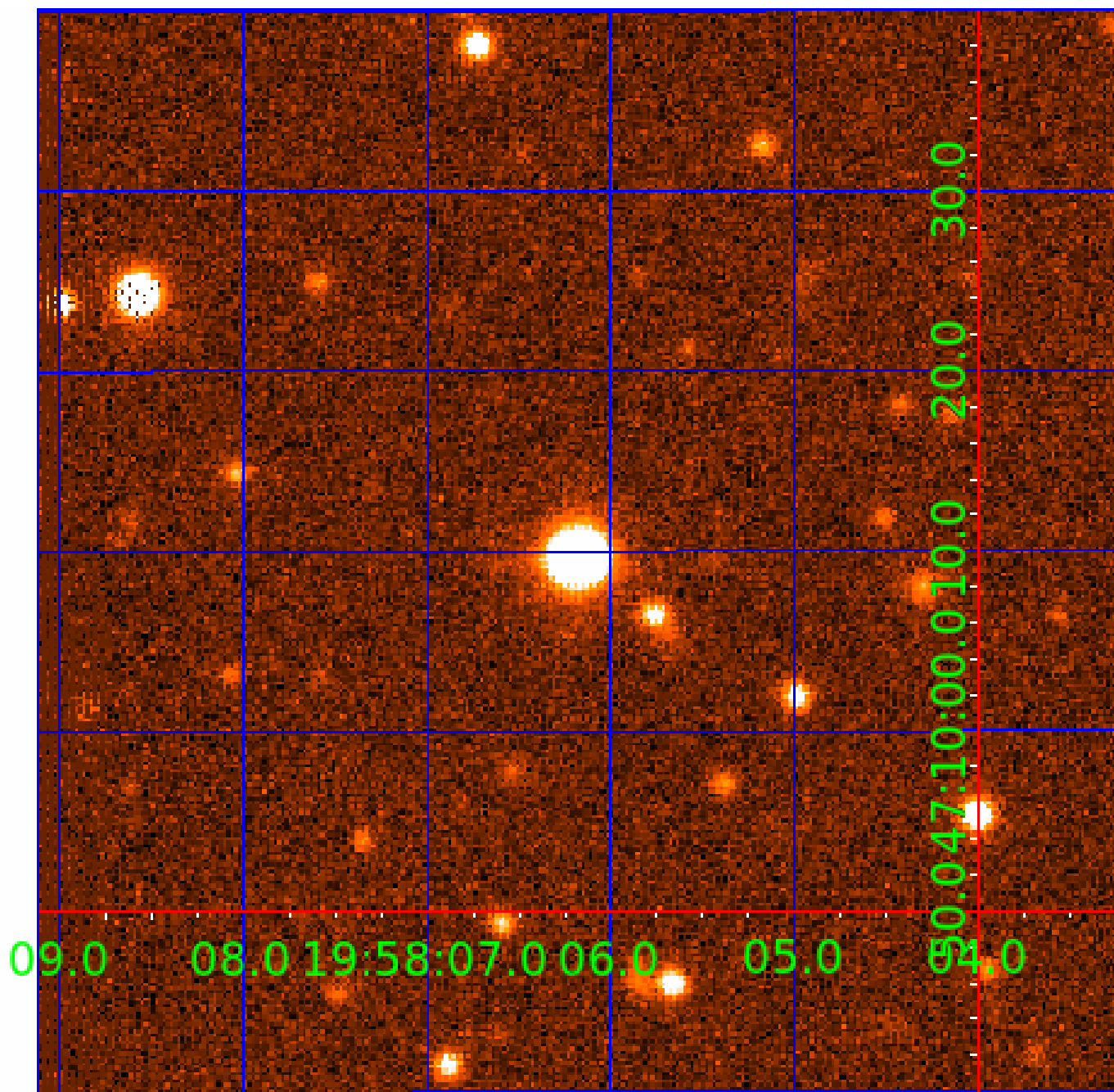


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 010165244

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010165244-01	OBS	No	454.210465	424.480337	2422.7	3.029	13.9	7.9	0.67	4090	3.28	0.11
010165244-02	OBS	No	586.924204	325.642112	2251.7	3.113	14.1	7.1	0.67	4090	3.60	0.08
010165244-03	OBS	No	168.226244	230.373498	2194.9	6.555	12.2	6.4	0.67	4090	3.98	0.42
010165244-04	OBS	No	269.994191	210.878507	2702.4	5.035	15.3	9.1	0.67	4090	3.89	0.22
010165244-05	OBS	No	519.388410	465.965620	2051.4	8.009	11.9	5.6	0.67	4090	6.22	0.09

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010165244-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010165244-02	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—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010165244-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
010165244-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE_ZUMA—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS
010165244-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

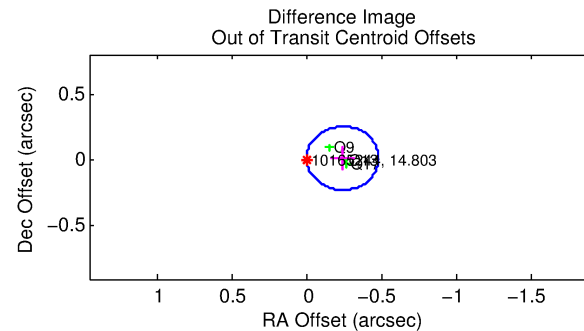
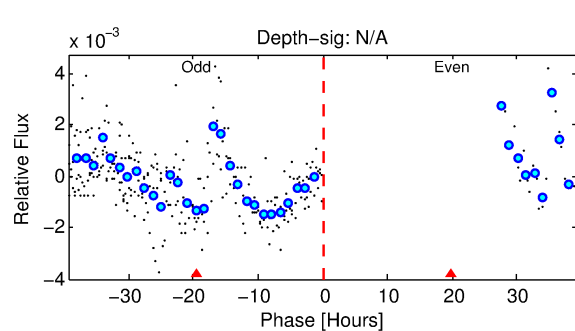
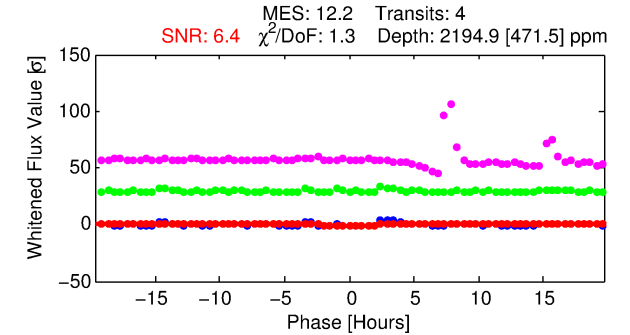
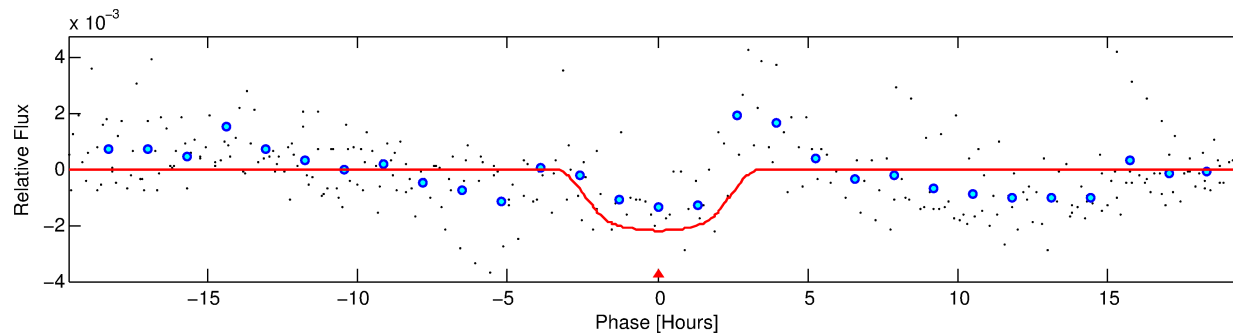
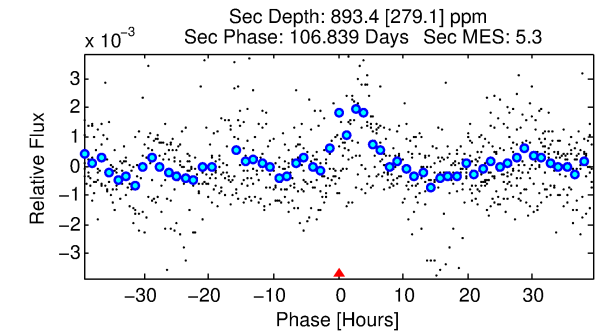
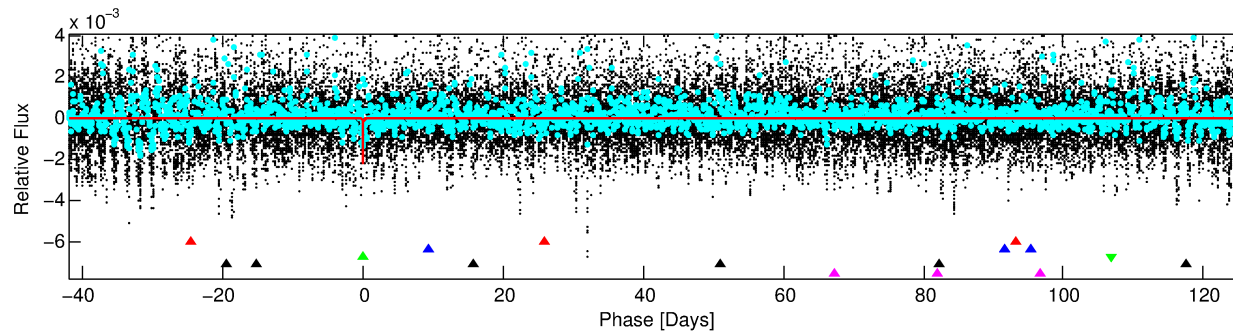
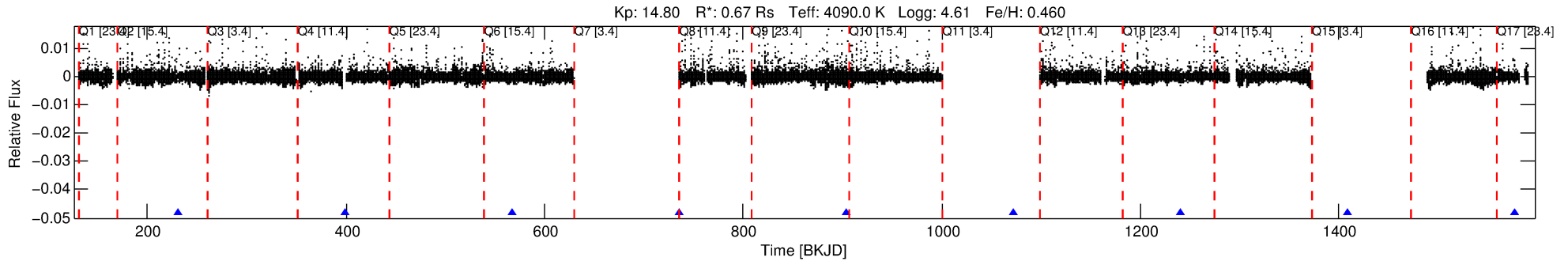
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010165244-03

No Significant Match Found

# DV One-Page Summary

KIC: 10165244 Candidate: 3 of 5 Period: 168.226 d



## DV Fit Results:

Period = 168.22624 [0.00373] d  
Epoch = 230.3735 [0.0239] BKJD  
Rp/R\* = 0.0542 [0.0075]  
a/R\* = 104.83 [23.35]  
b = 0.91 [0.05]  
Seff = 0.42 [0.08]  
Teq = 205 [10] K  
Rp = 3.98 [0.69] Re  
a = 0.5217 [0.0441] AU  
Ag = 8423.88 [3648.25] [2.31σ]  
Teffp = 3038 [338] K [8.37σ]

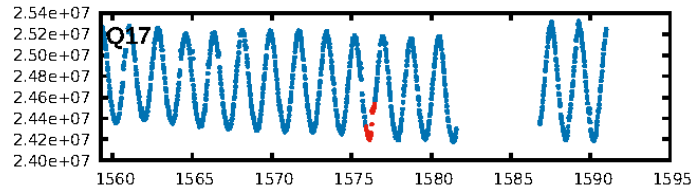
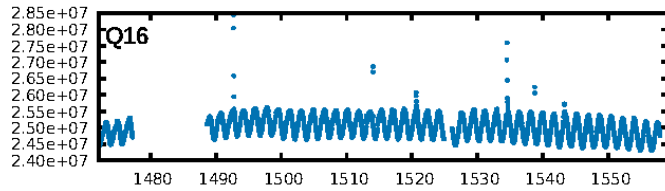
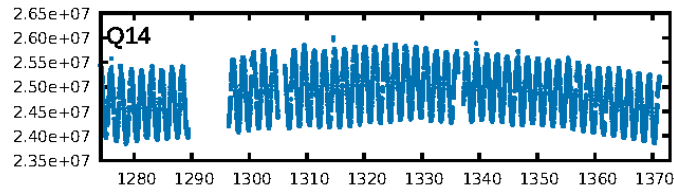
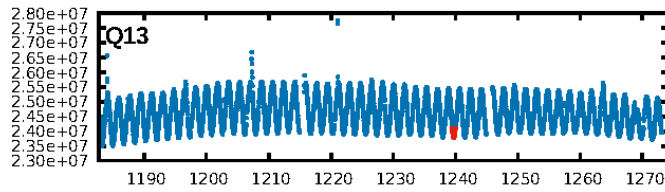
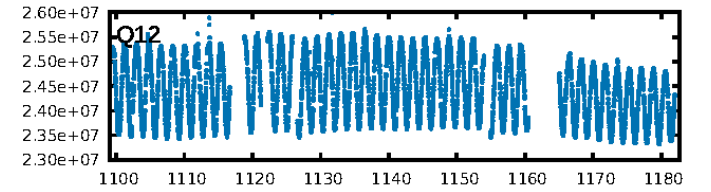
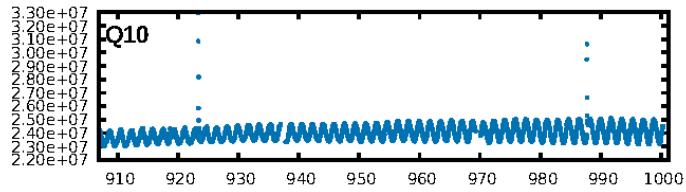
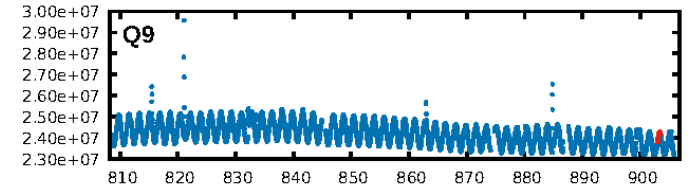
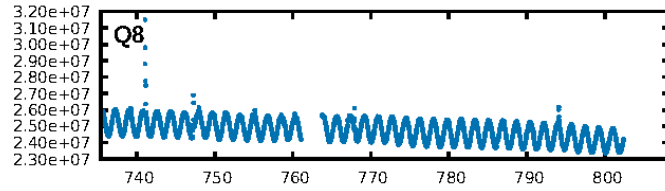
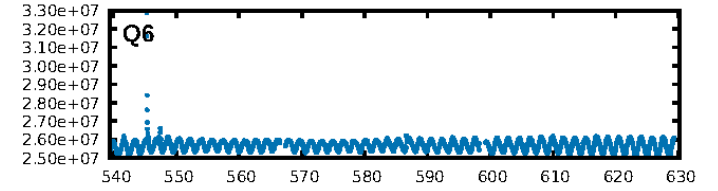
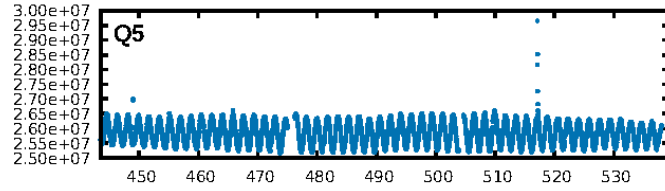
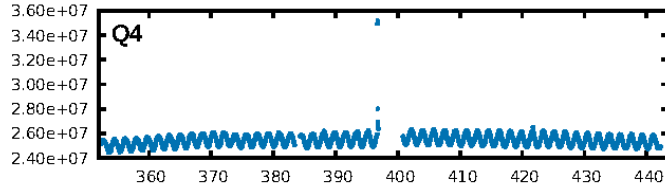
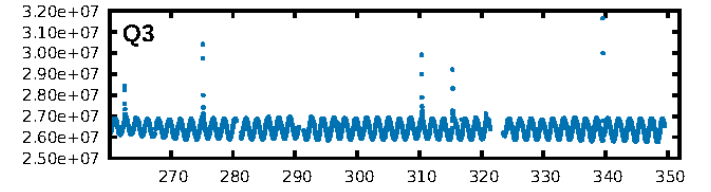
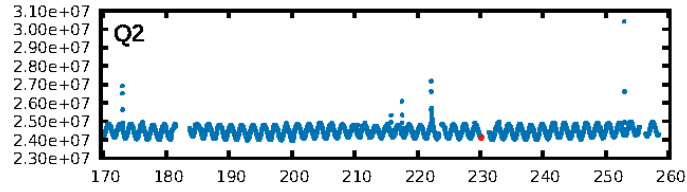
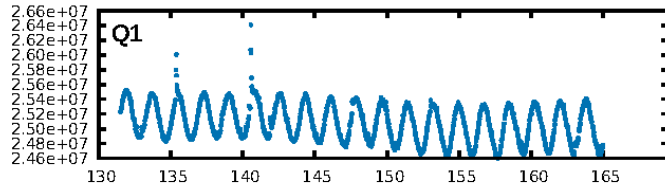
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [295.51σ]  
ModelChiSquare2-sig: 54.9%  
ModelChiSquareGof-sig: 95.9%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 0.3156  
Centroid-sig: 49.7%  
Centroid-so: 0.670 arcsec [1.21σ]  
OotOffset-rm: 0.244 arcsec [3.04σ]  
KicOffset-rm: 0.073 arcsec [0.94σ]  
OotOffset-st: 0/0/0/3 [3]  
KicOffset-st: 0/0/0/3 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

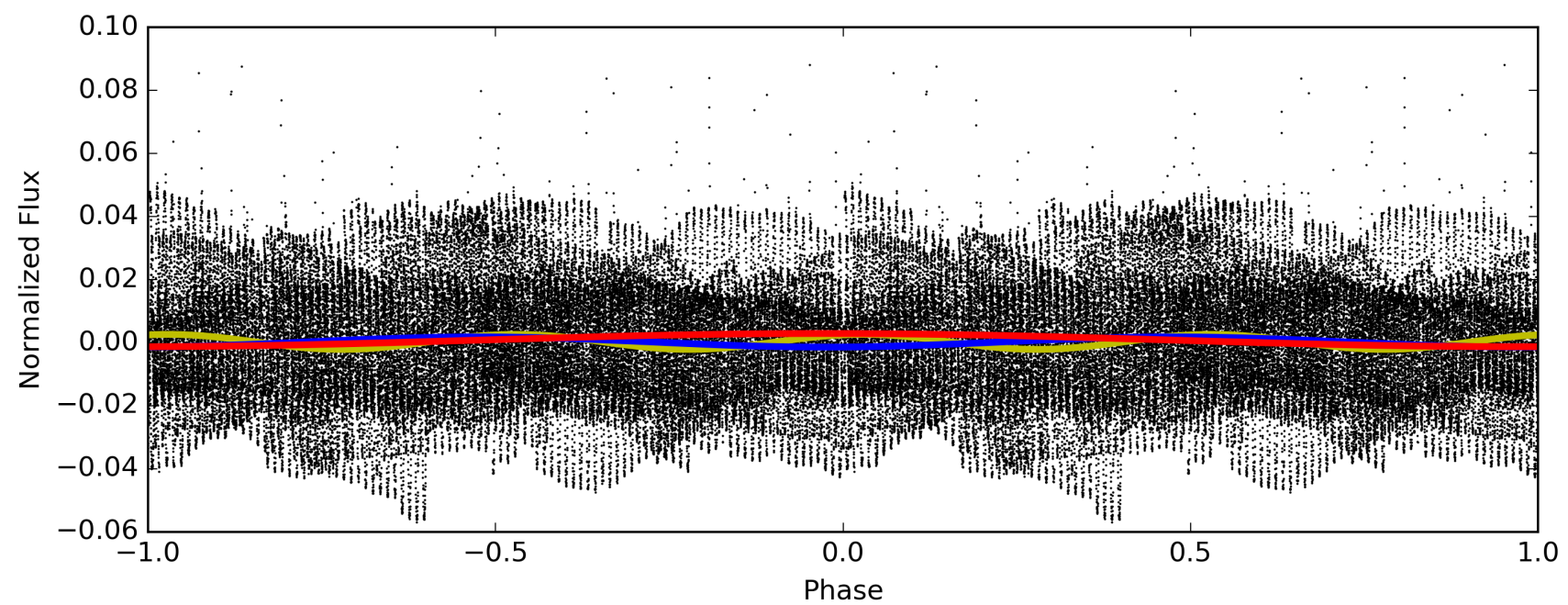
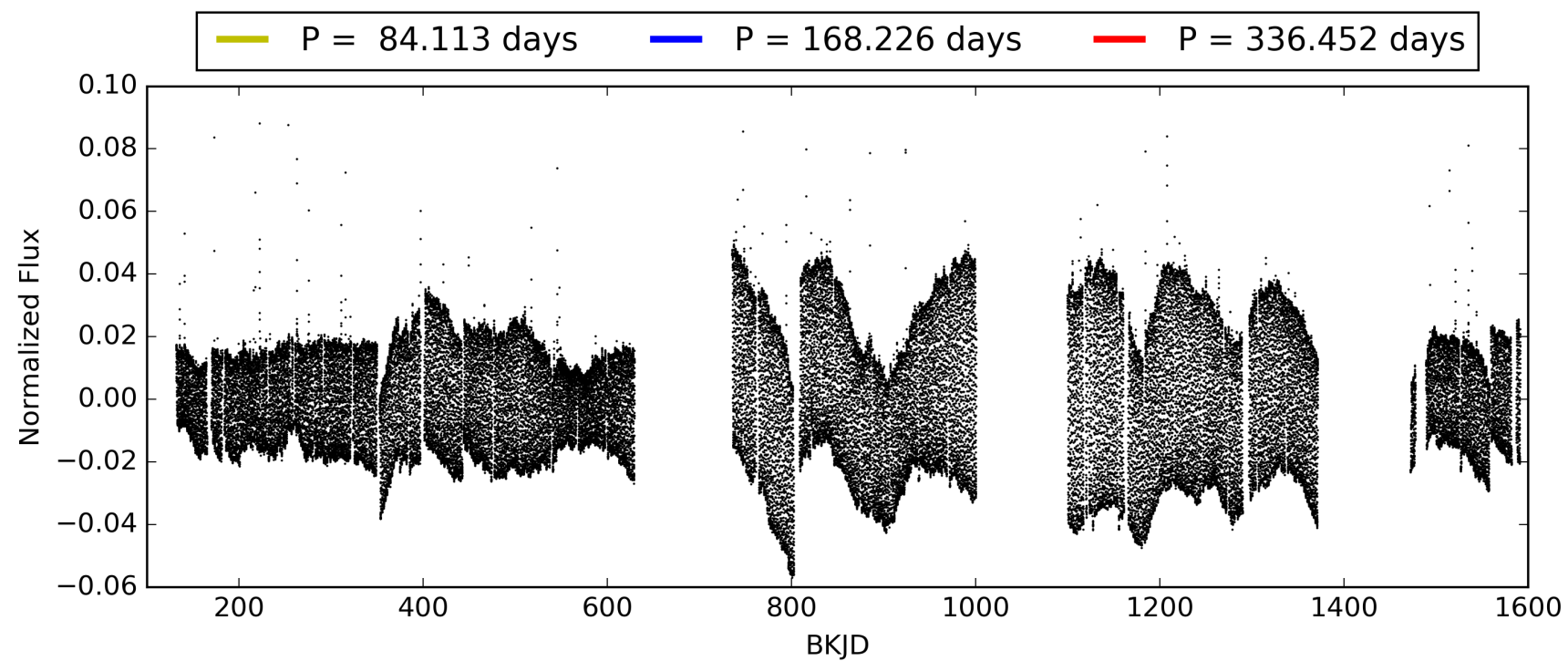
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 17:25:31 Z

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

# TCE 010165244-03, PDC Light Curves

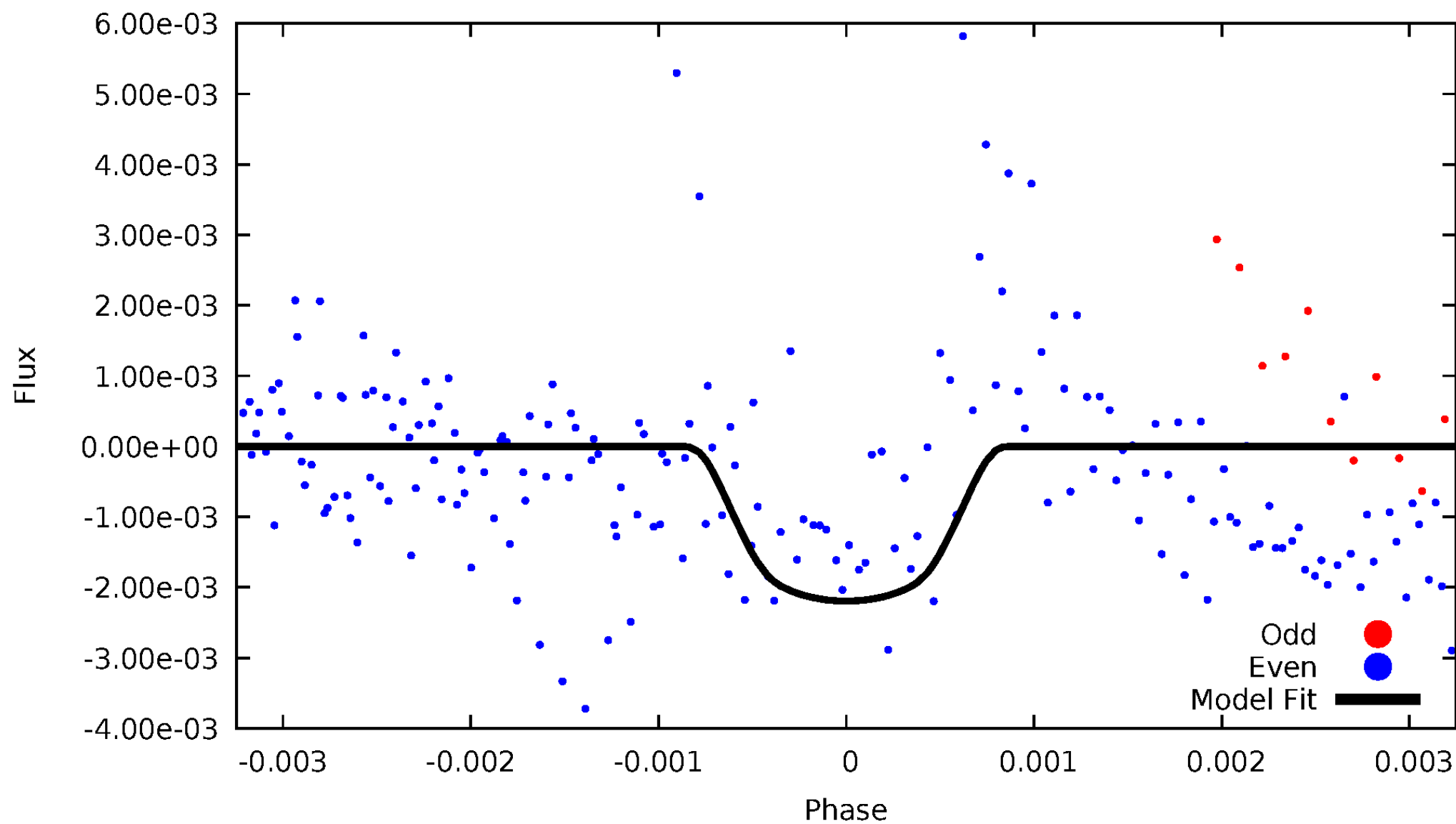


TCE 010165244-03



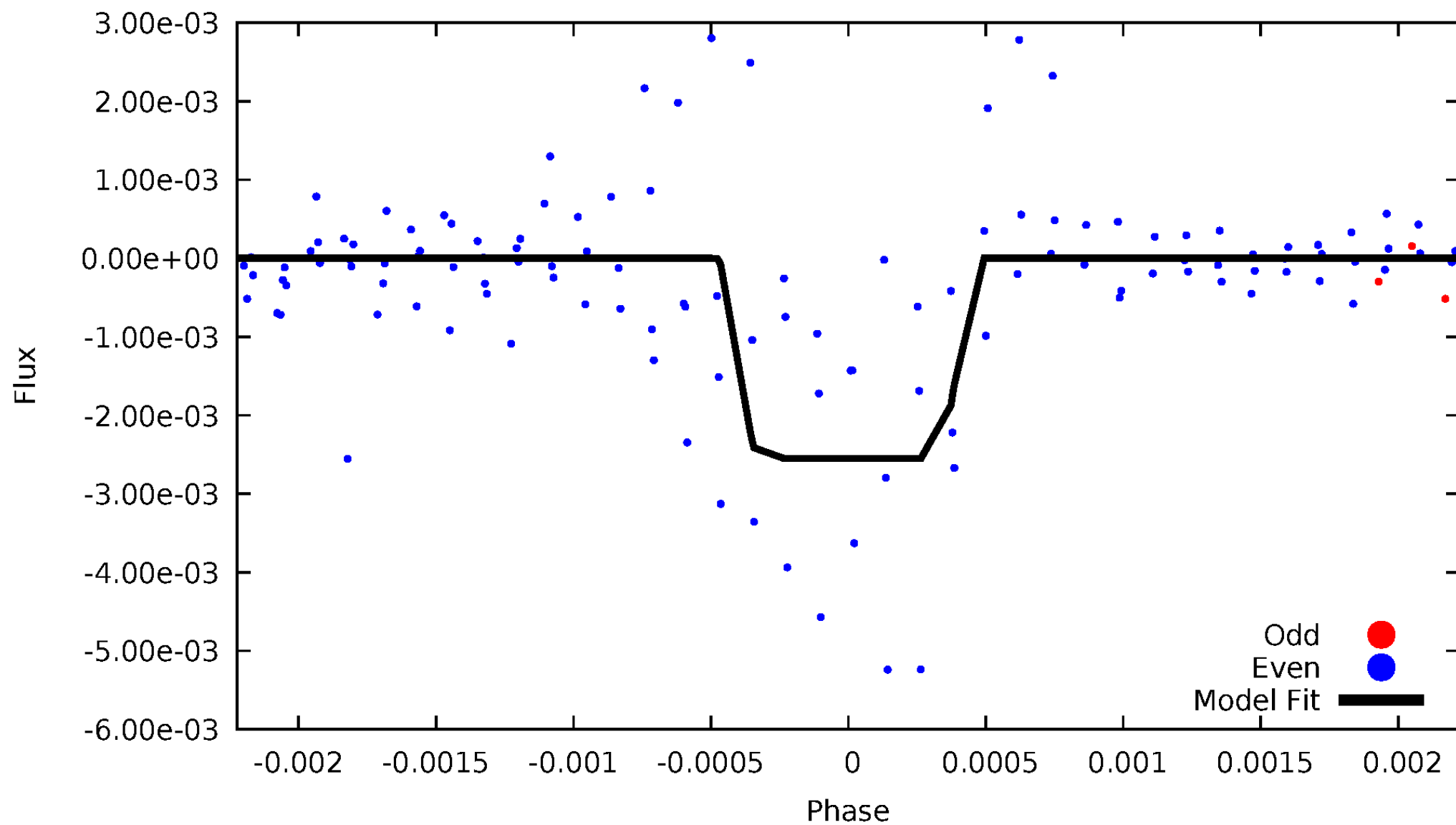
# DV Odd/Even

TCE 010165244-03



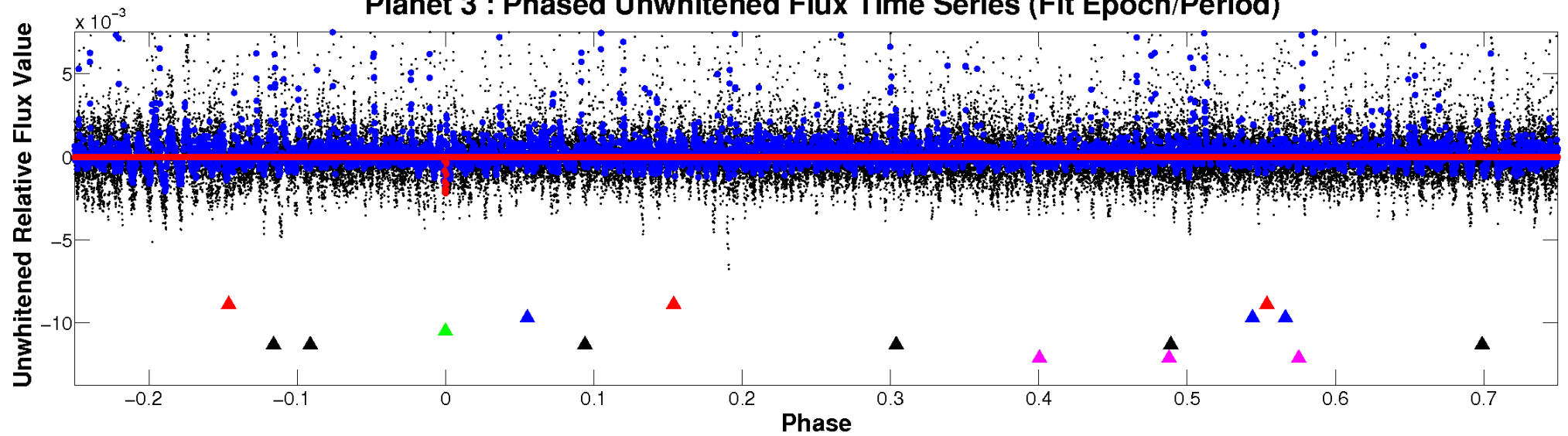
# ALT Odd/Even

TCE 010165244-03

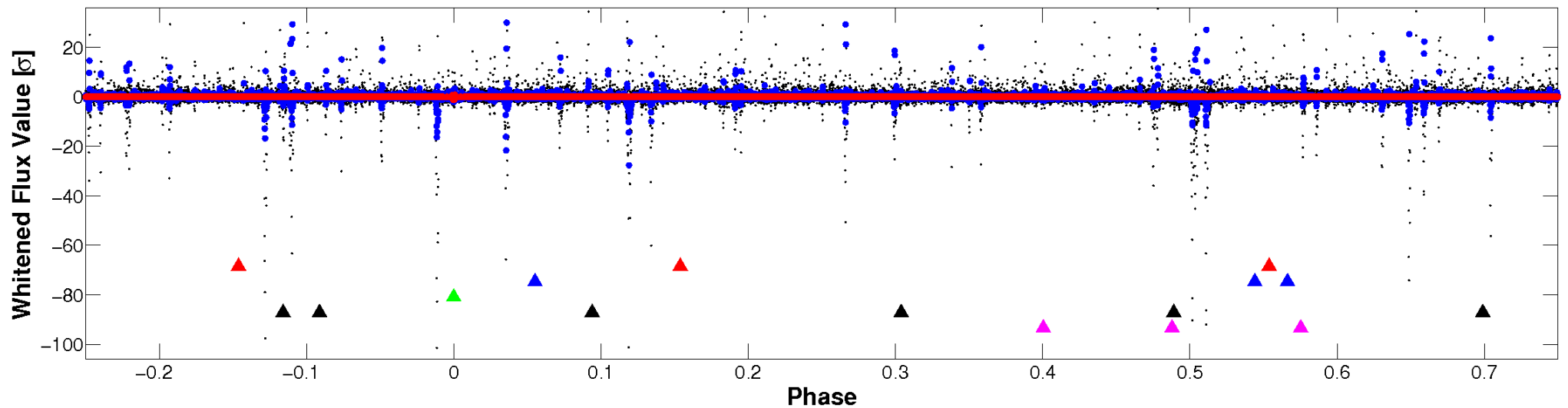


# Non-Whitened Vs. Whitened Light Curve

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

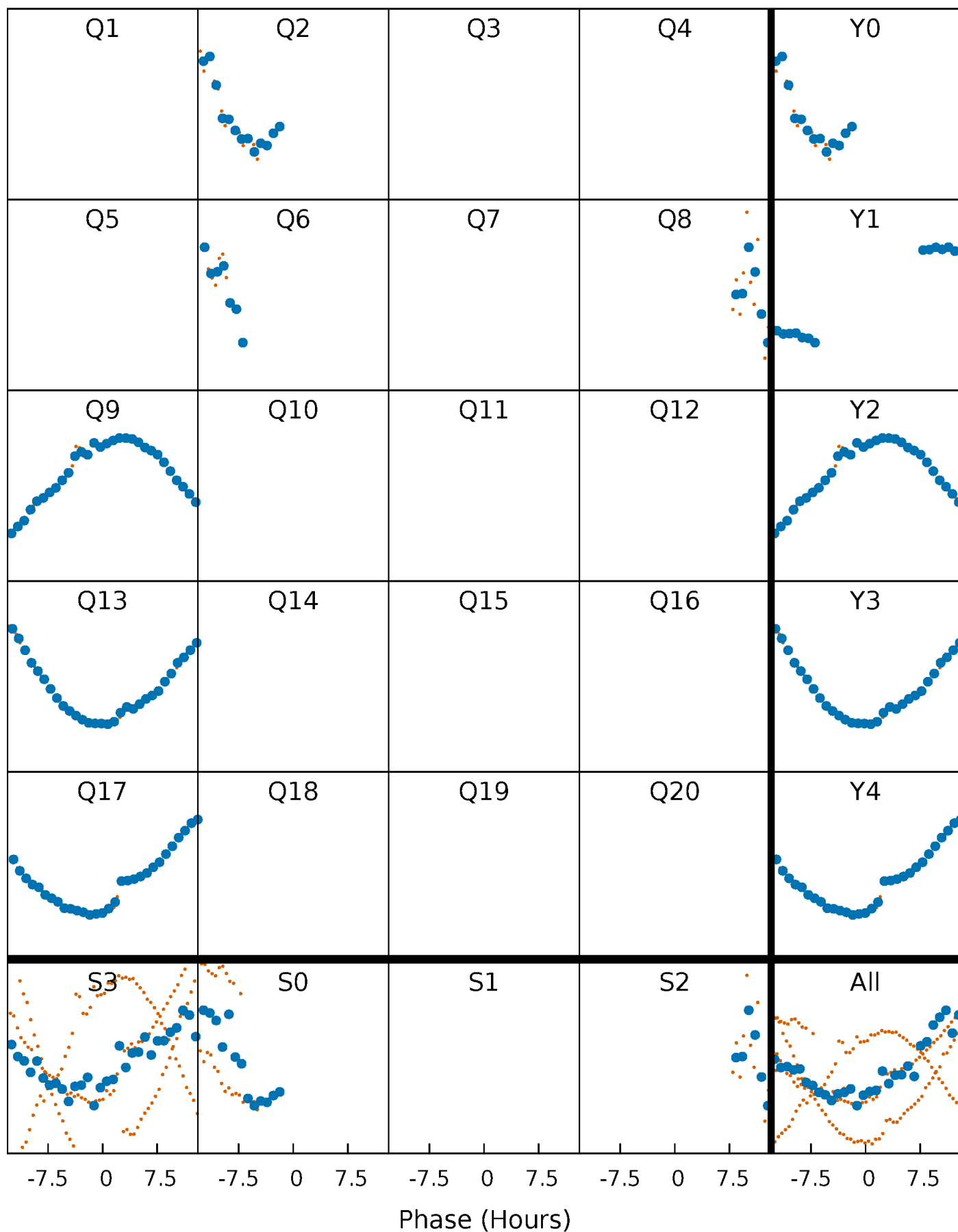


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

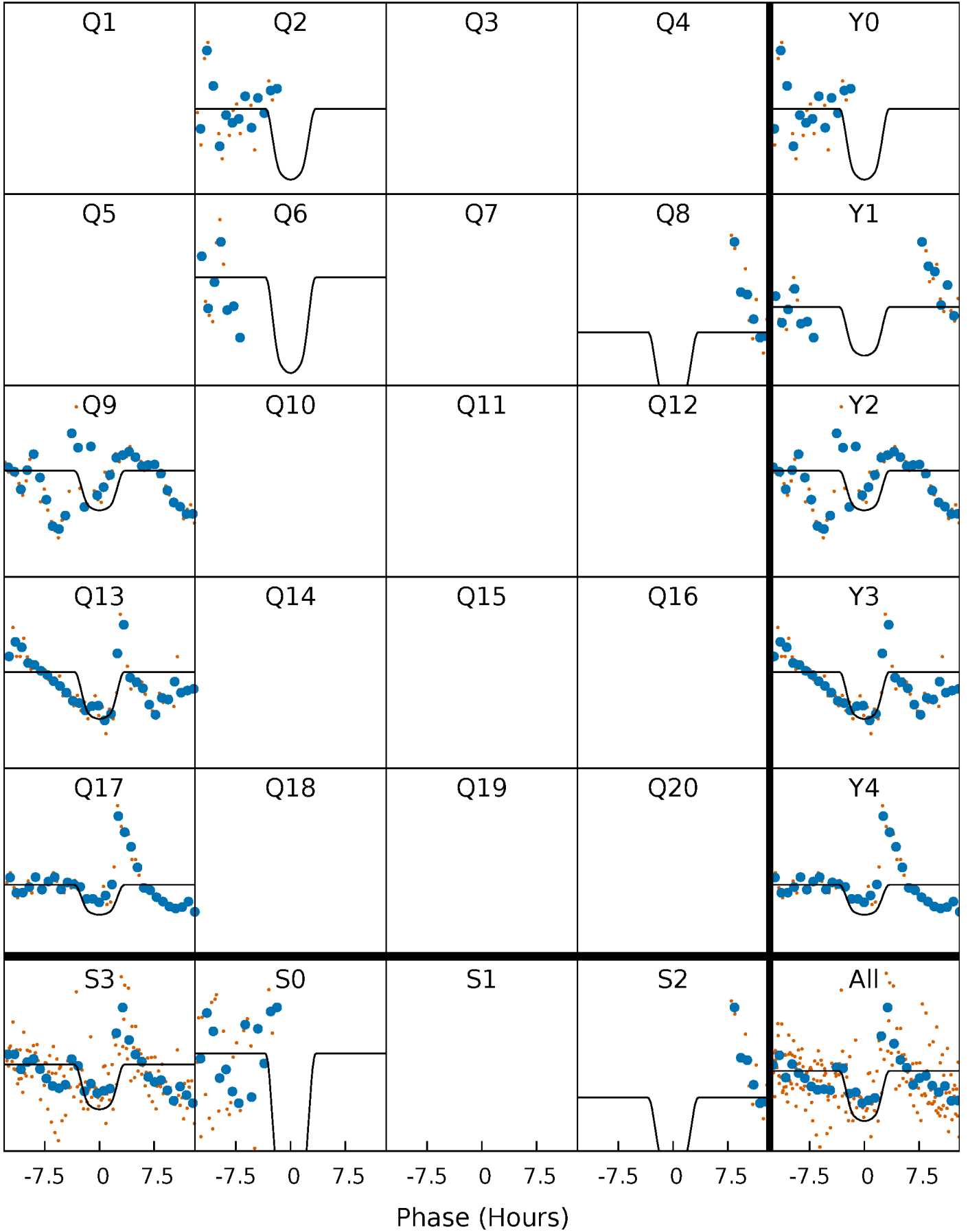
TCE 010165244-03     $P=168.226244$  Days     $T_0=230.373498$  (BKJD)





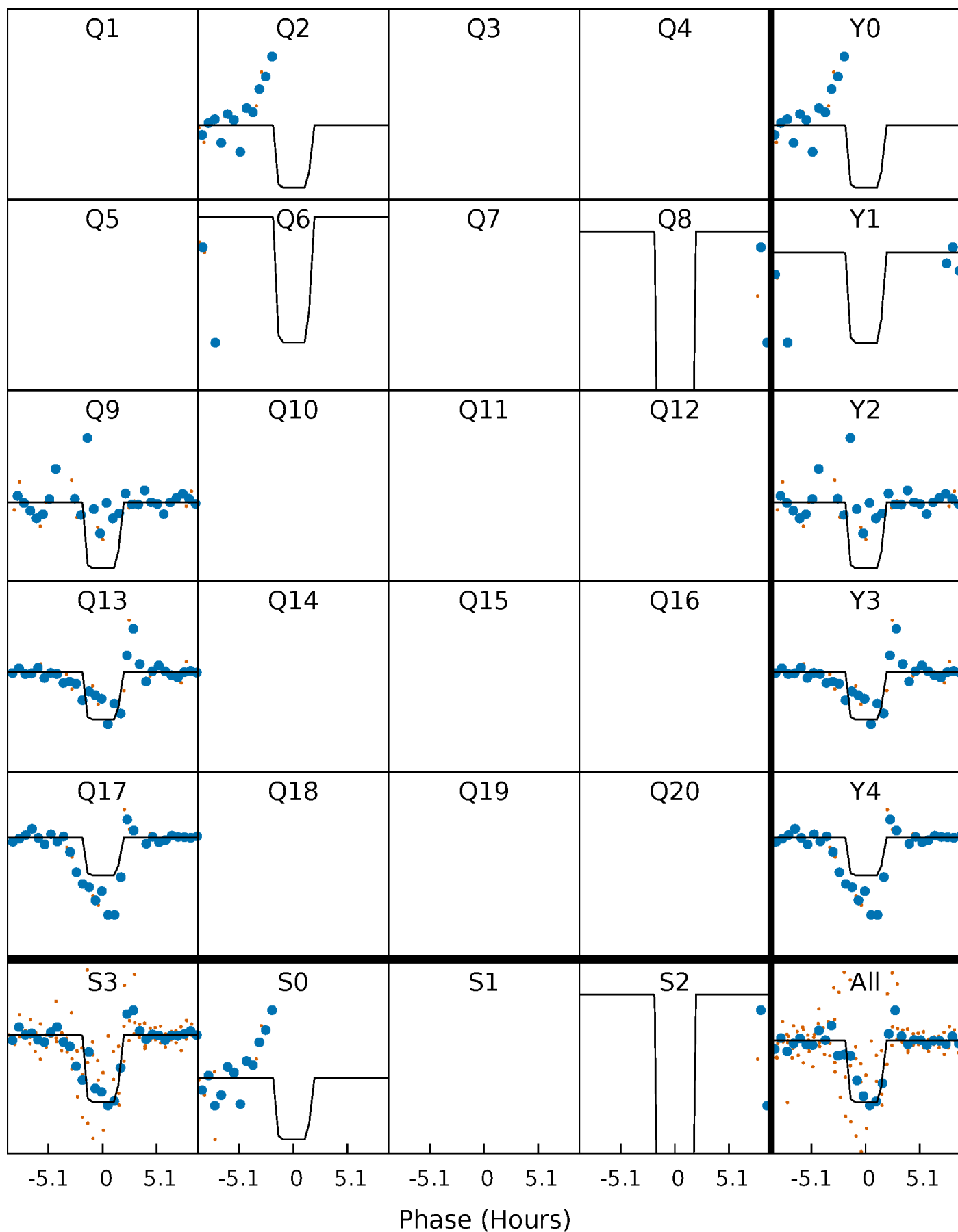
# DV Quarter-Phased Transit Curves

TCE 010165244-03 P=168.226244 Days  $T_0=230.373498$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

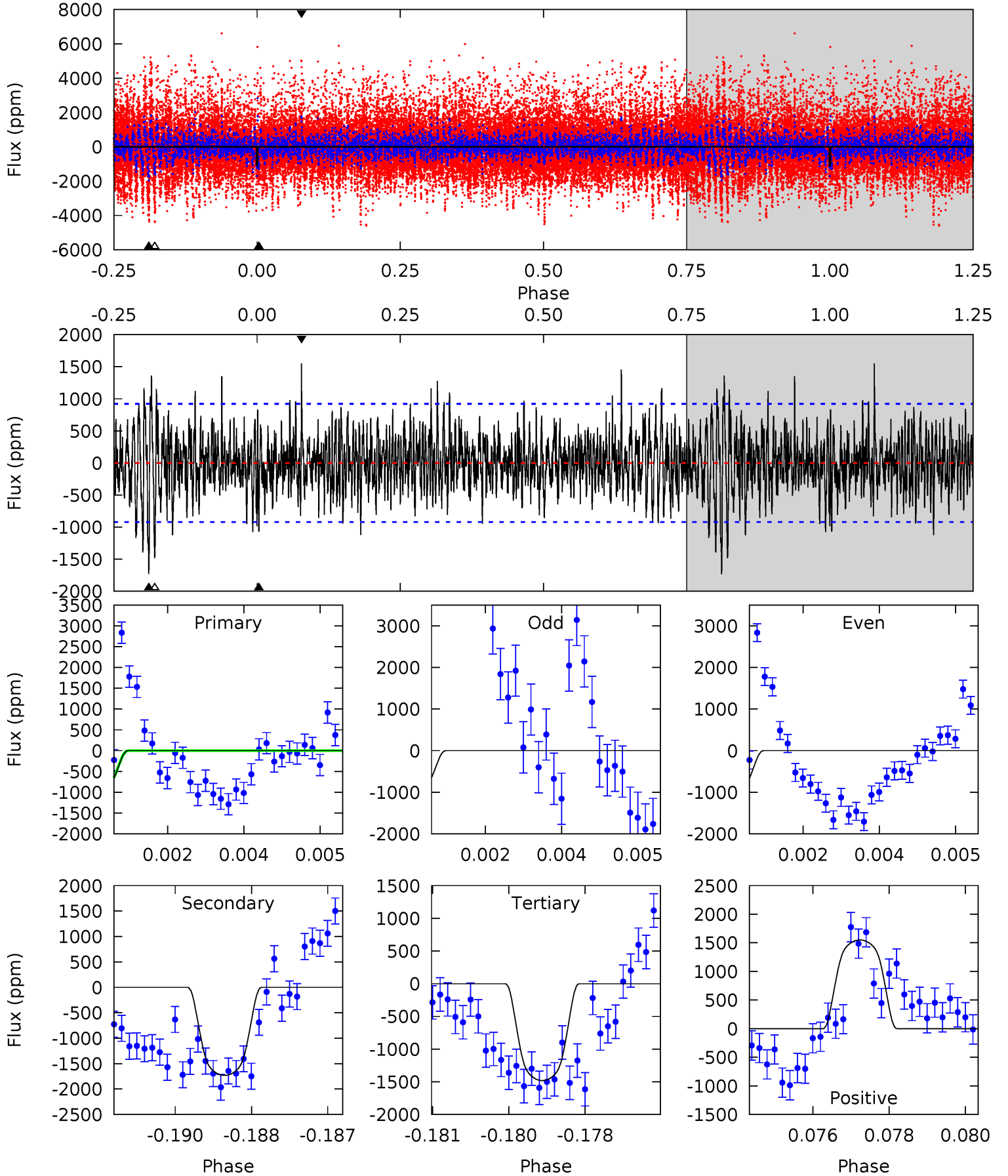
TCE 010165244-03 P=168.228599 Days  $T_0=230.374017$  (BKJD)



# DV Model-Shift Uniqueness Test

010165244-03, P = 168.226244 Days, E = 62.147254 Days

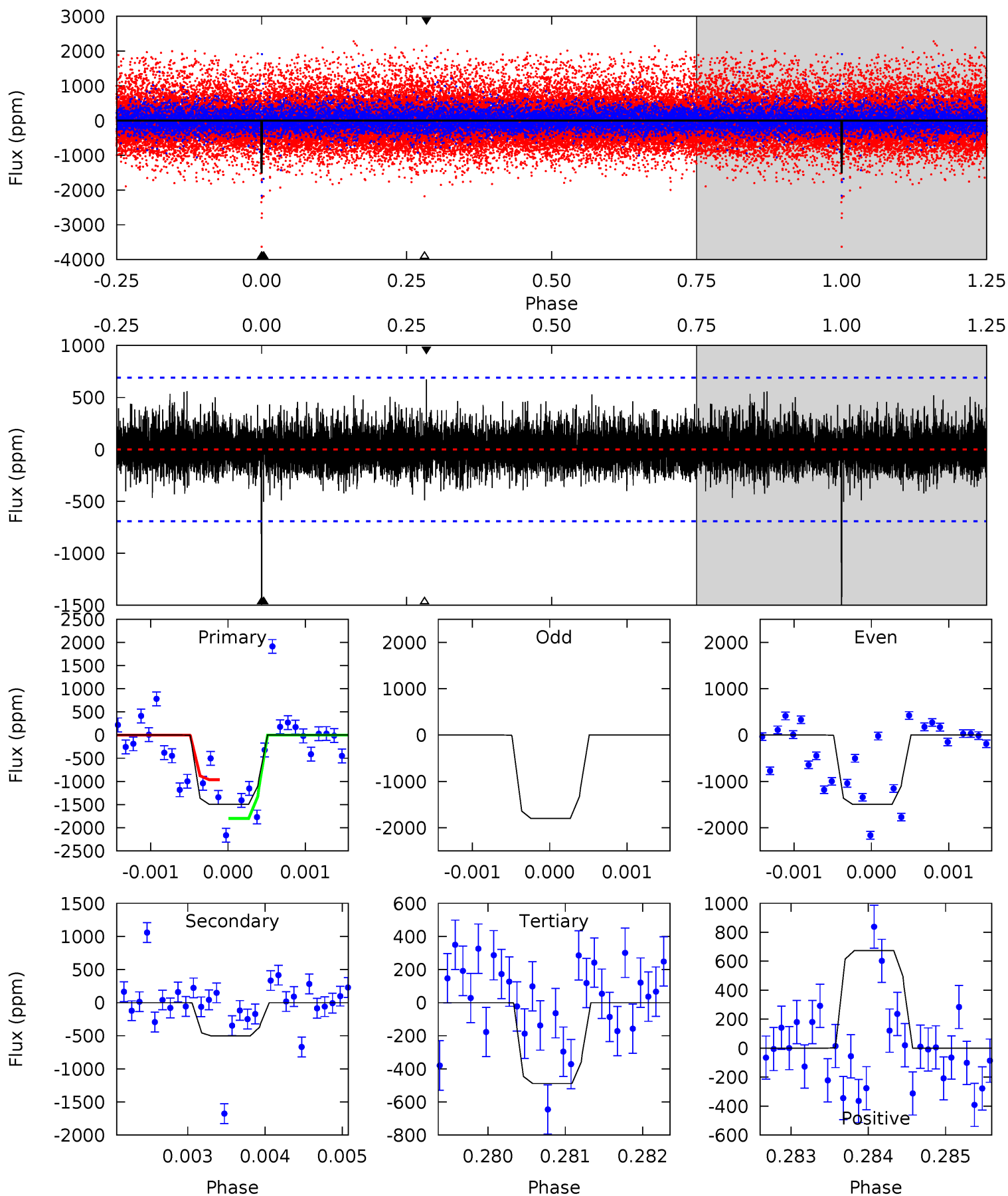
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.20	10.0	8.60	8.99	5.35	3.13	2.20	-2.40	-2.80	1.45	1.05	0.13	0.91	0.47	0.78



# Alt Model-Shift Uniqueness Test

010165244-03, P = 168.228599 Days, E = 62.145418 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
11.8	3.97	3.86	5.32	5.46	3.30	1.04	7.95	6.49	0.10	-1.36	1.50	1.22	0.31	0



### Stellar Parameters For KIC 010165244

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4090^{+146}_{-162}$	$4.606^{+0.063}_{-0.014}$	$0.460^{+0.050}_{-0.300}$	$0.674^{+0.025}_{-0.070}$	$0.669^{+0.038}_{-0.057}$	$3.074^{+0.845}_{-0.193}$
	+4%/-4%	+1%/-0%	+11%/-65%	+4%/-10%	+6%/-9%	+28%/-6%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 010165244-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-1731 \pm 172$	$3.91^{+0.55}_{-0.58}$	$283^{+13}_{-12}$	$3732^{+240}_{-204}$	$17167^{+6272}_{-4217}$
Alt.	$-502 \pm 127$	$3.62^{+0.57}_{-0.52}$	$283^{+12}_{-13}$	$3144^{+221}_{-204}$	$5712^{+2741}_{-1851}$

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

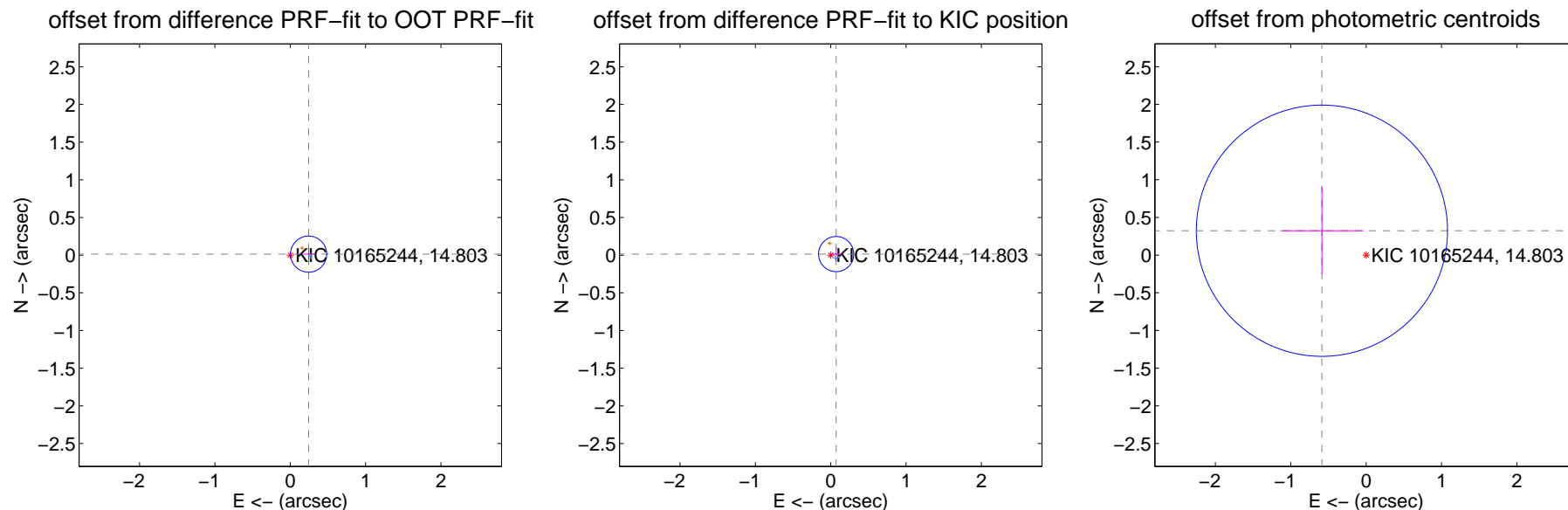
## DV Centroid Data

Supplemental centroid analysis for 010165244-03. Kepler magnitude: 14.80. Transit SNR 6.39

There are 2 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.22 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.244 \pm 0.080$	3.04	$-0.243 \pm 0.080$	$0.013 \pm 0.080$
PRF-fit source offset from KIC position	$0.073 \pm 0.078$	0.94	$-0.072 \pm 0.077$	$0.014 \pm 0.095$
photometric centroid source offset	$0.67 \pm 0.56$	1.21	$0.59 \pm 0.55$	$0.32 \pm 0.58$



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

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

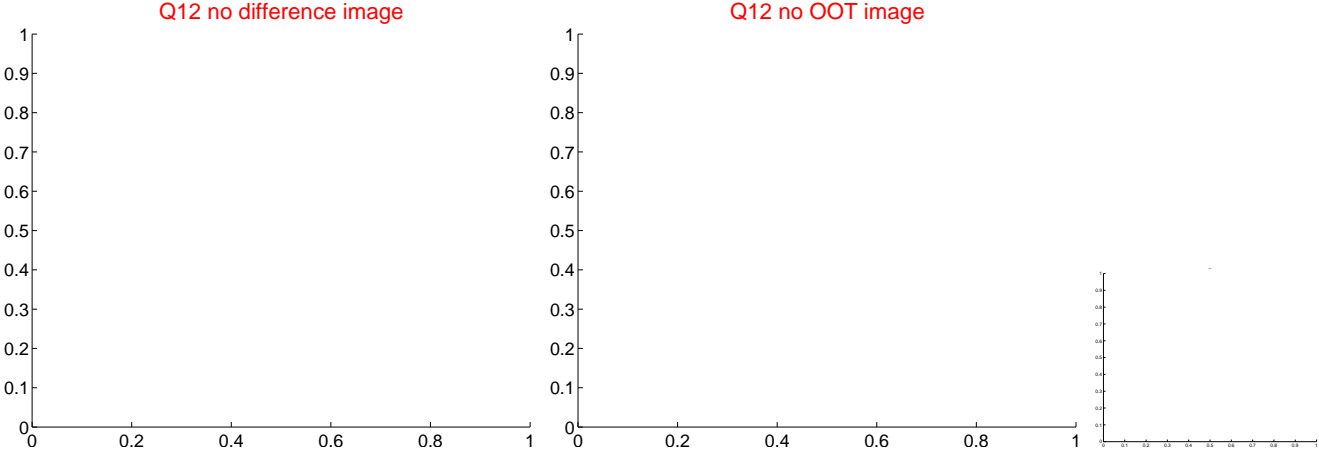
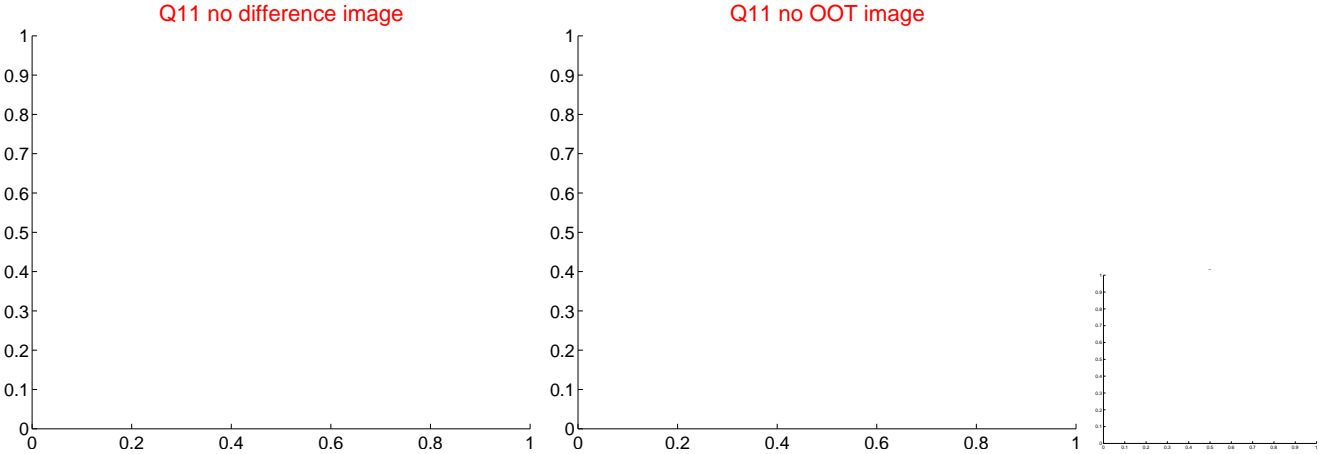
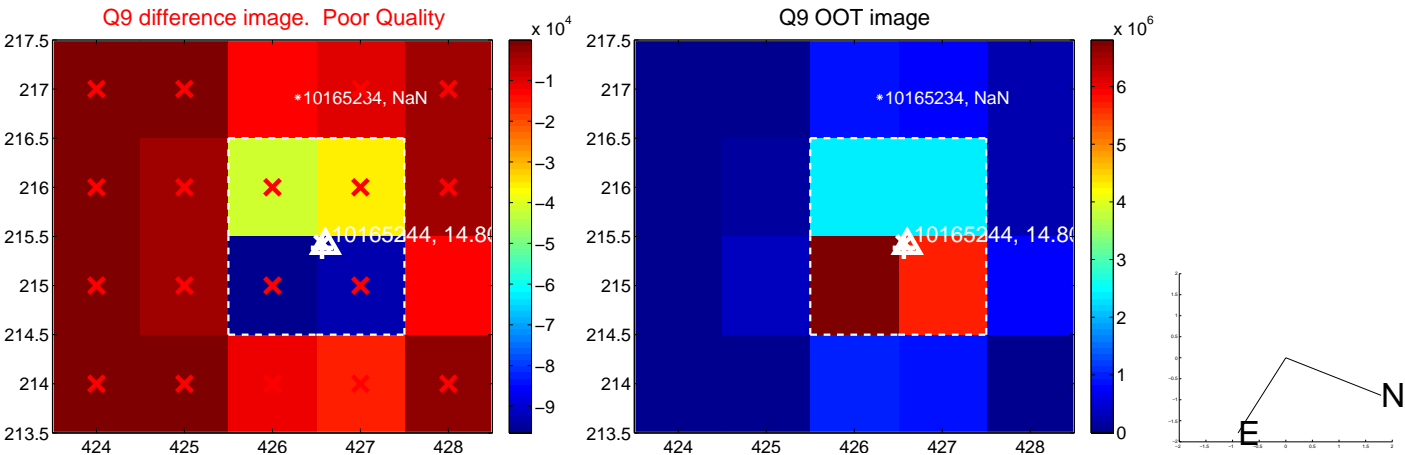


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

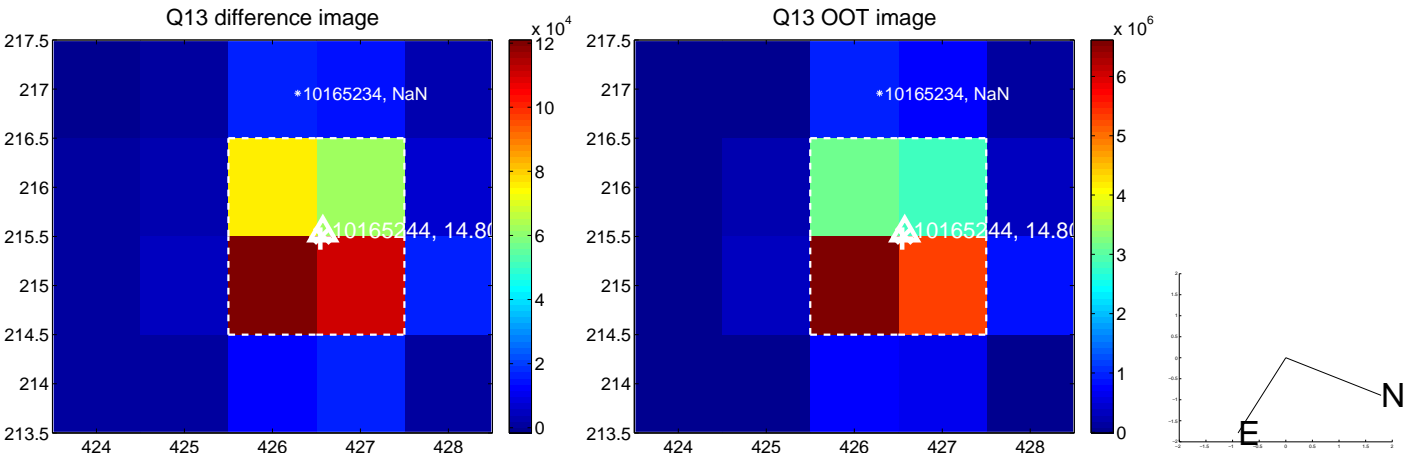




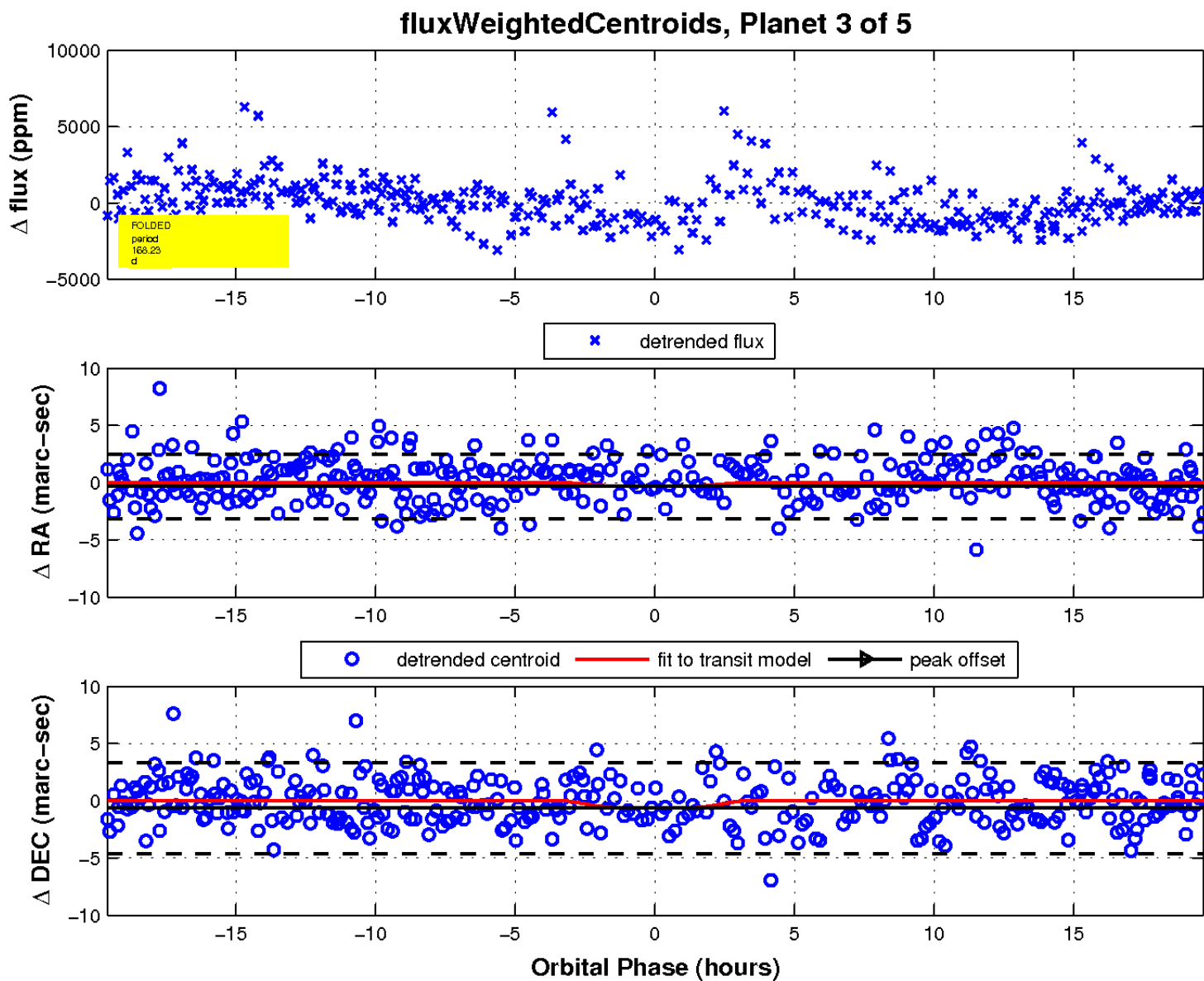
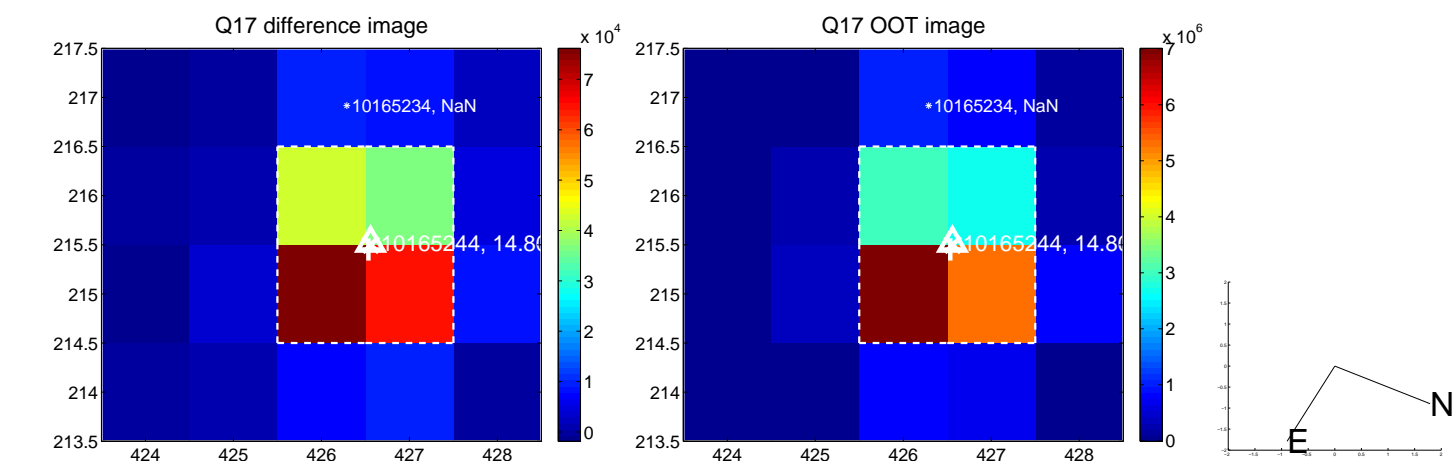
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

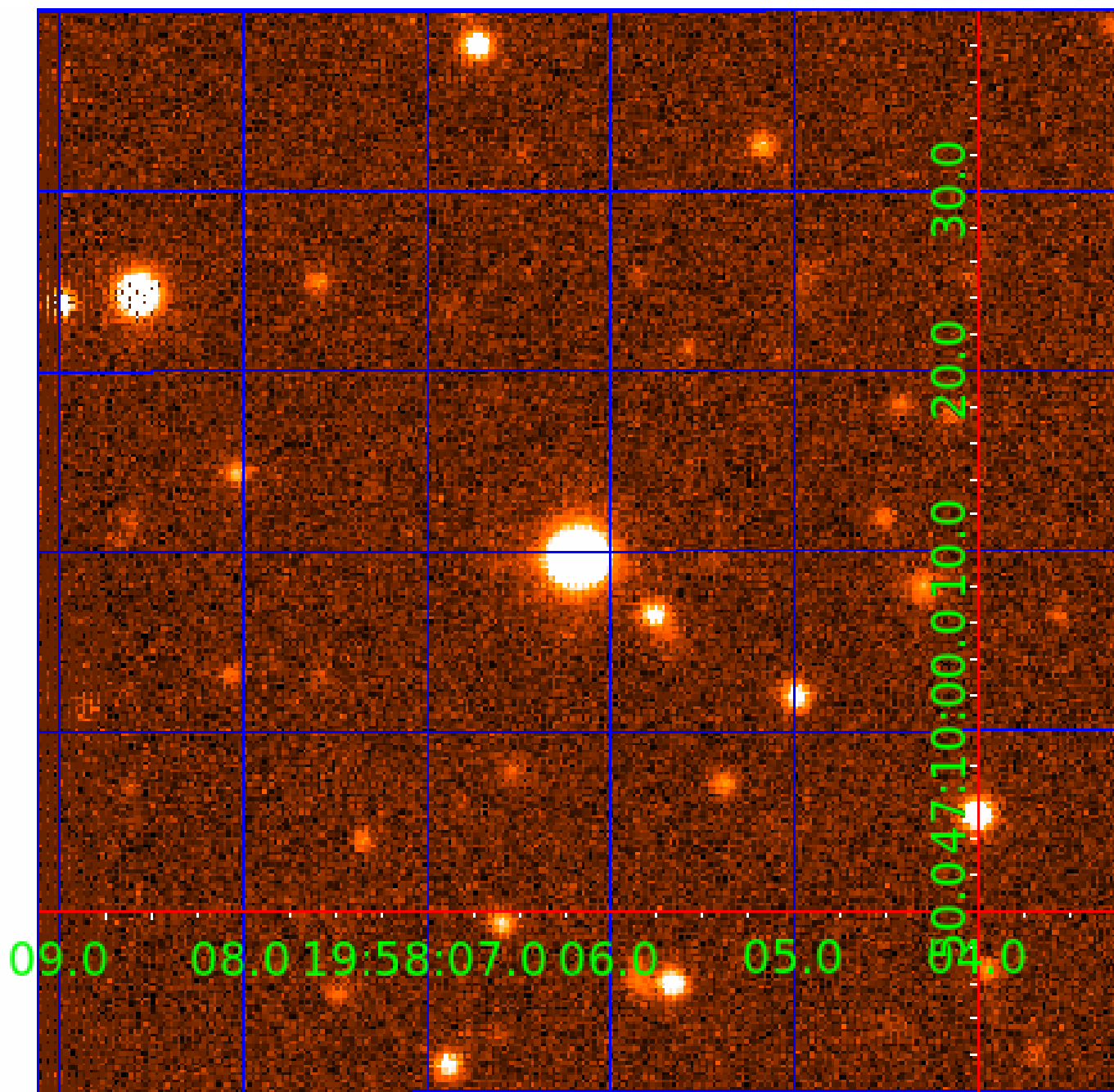


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 010165244

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010165244-01	OBS	No	454.210465	424.480337	2422.7	3.029	13.9	7.9	0.67	4090	3.28	0.11
010165244-02	OBS	No	586.924204	325.642112	2251.7	3.113	14.1	7.1	0.67	4090	3.60	0.08
010165244-03	OBS	No	168.226244	230.373498	2194.9	6.555	12.2	6.4	0.67	4090	3.98	0.42
010165244-04	OBS	No	269.994191	210.878507	2702.4	5.035	15.3	9.1	0.67	4090	3.89	0.22
010165244-05	OBS	No	519.388410	465.965620	2051.4	8.009	11.9	5.6	0.67	4090	6.22	0.09

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010165244-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010165244-02	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—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010165244-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
010165244-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE_ZUMA—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS
010165244-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

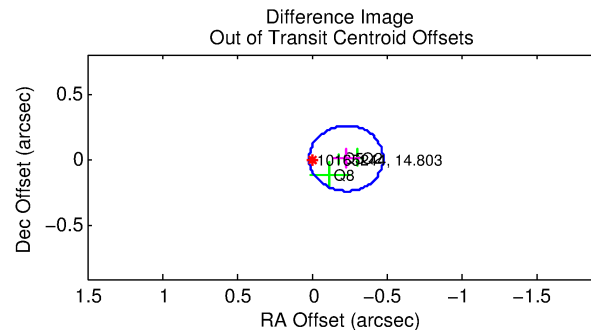
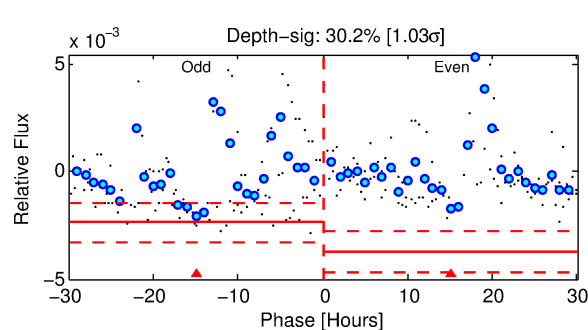
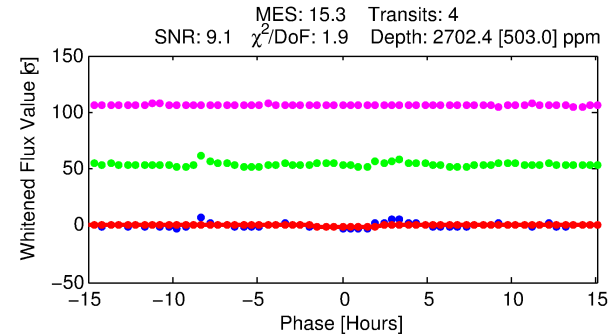
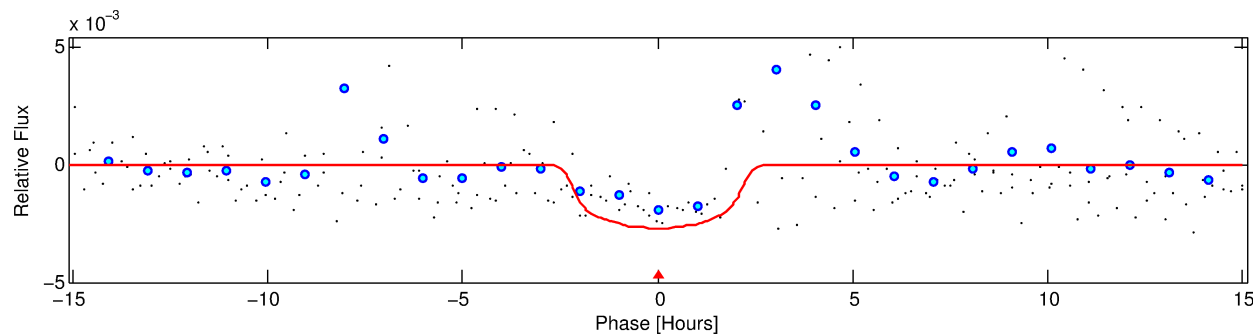
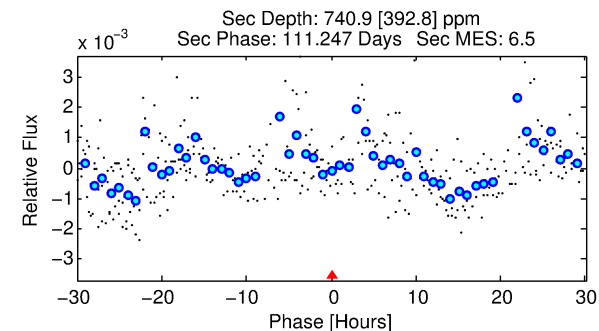
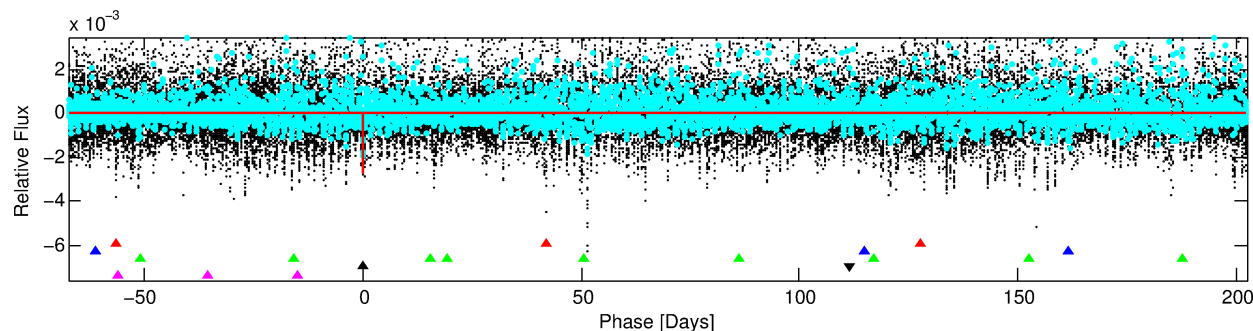
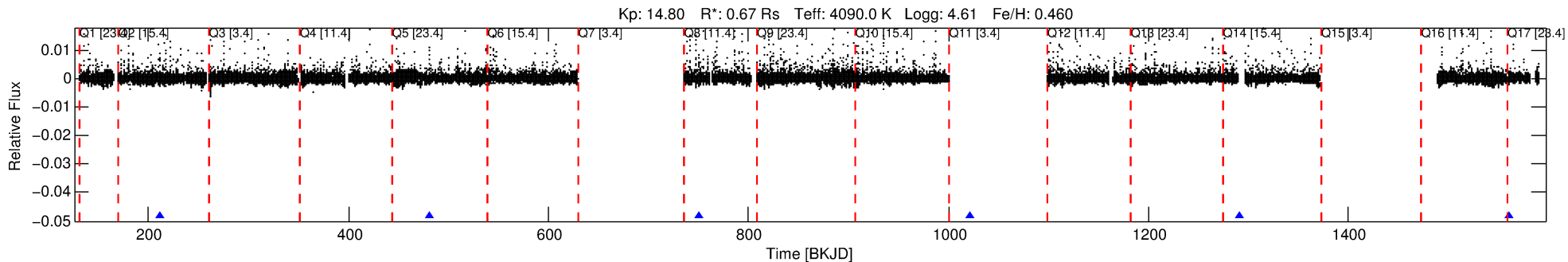
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010165244-04

No Significant Match Found

# DV One-Page Summary

KIC: 10165244 Candidate: 4 of 5 Period: 269.994 d



## DV Fit Results:

Period = 269.99419 [0.00399] d  
Epoch = 210.8785 [0.0089] BKJD  
Rp/R\* = 0.0529 [0.0254]  
a/R\* = 293.54 [397.56]  
b = 0.77 [0.73]  
Seff = 0.22 [0.04]  
Teq = 175 [9] K  
Rp = 3.89 [1.91] Re  
a = 0.7151 [0.0604] AU  
Ag = 13763.10 [15178.29] [0.91σ]  
Teffp = 2933 [812] K [3.40σ]

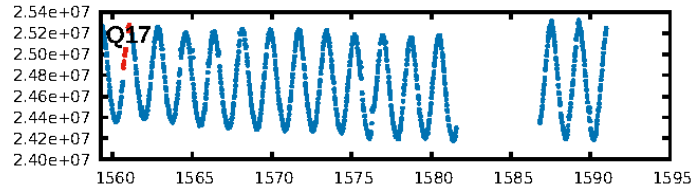
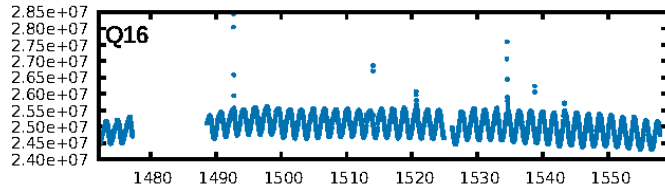
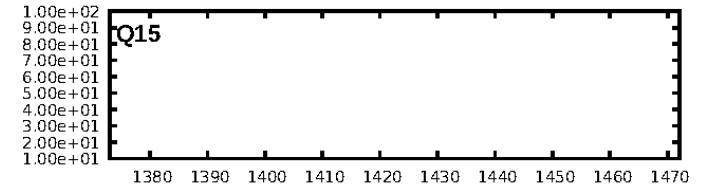
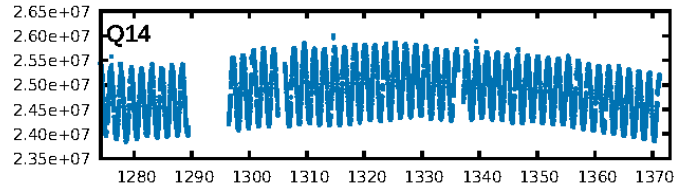
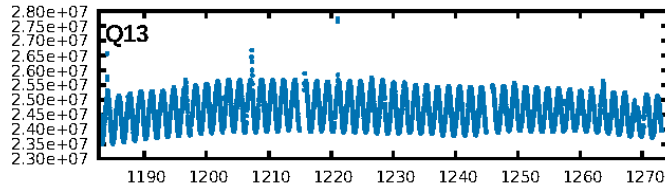
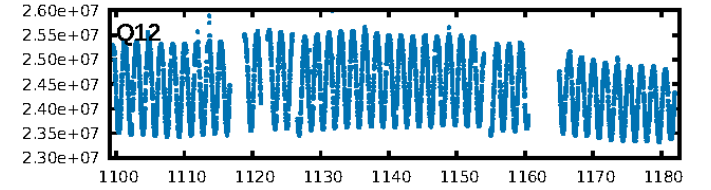
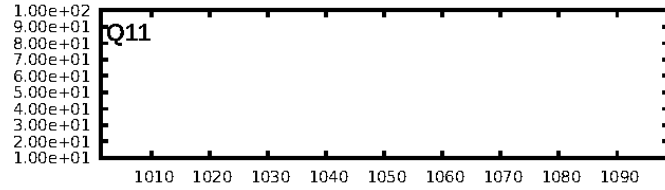
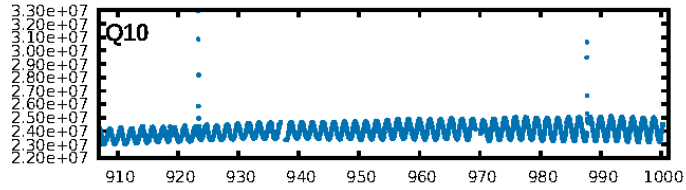
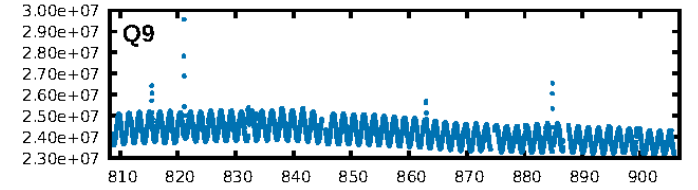
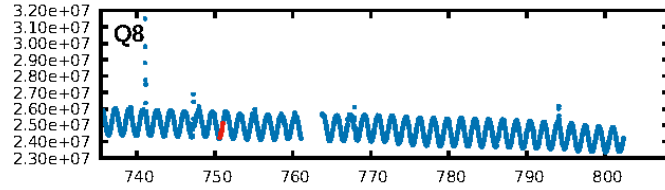
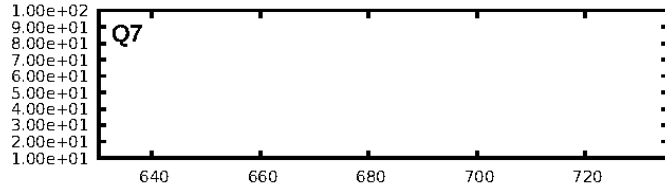
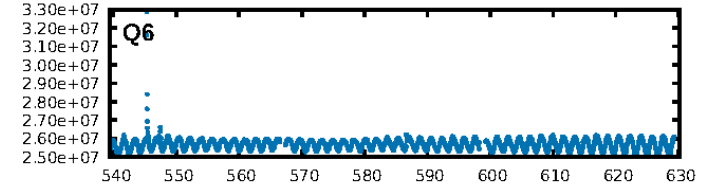
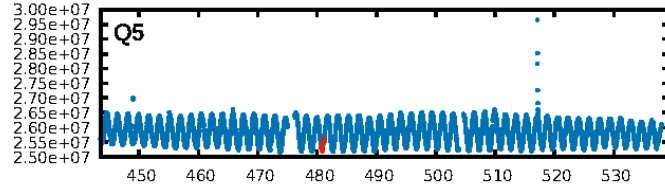
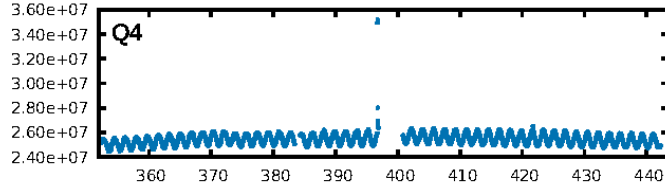
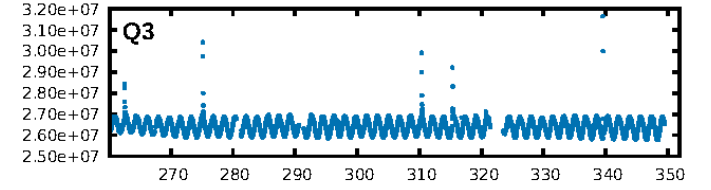
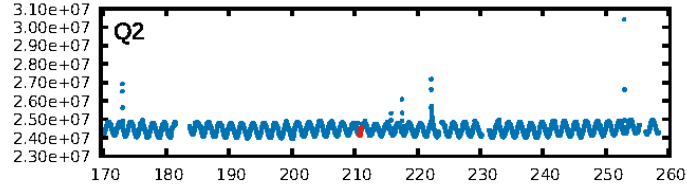
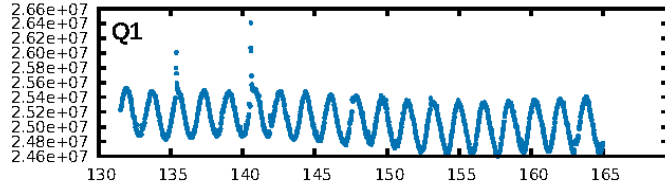
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [295.51σ]  
LongPeriod-sig: 100.0% [752.45σ]  
ModelChiSquare2-sig: 5.9%  
ModelChiSquareGof-sig: 62.1%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 17.46  
Centroid-sig: 91.4%  
Centroid-so: 0.572 arcsec [1.15σ]  
OotOffset-rm: 0.231 arcsec [2.80σ]  
KicOffset-rm: 0.037 arcsec [0.45σ]  
OotOffset-st: 1/0/1/1 [3]  
KicOffset-st: 1/0/1/1 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 1.00 [3/3]

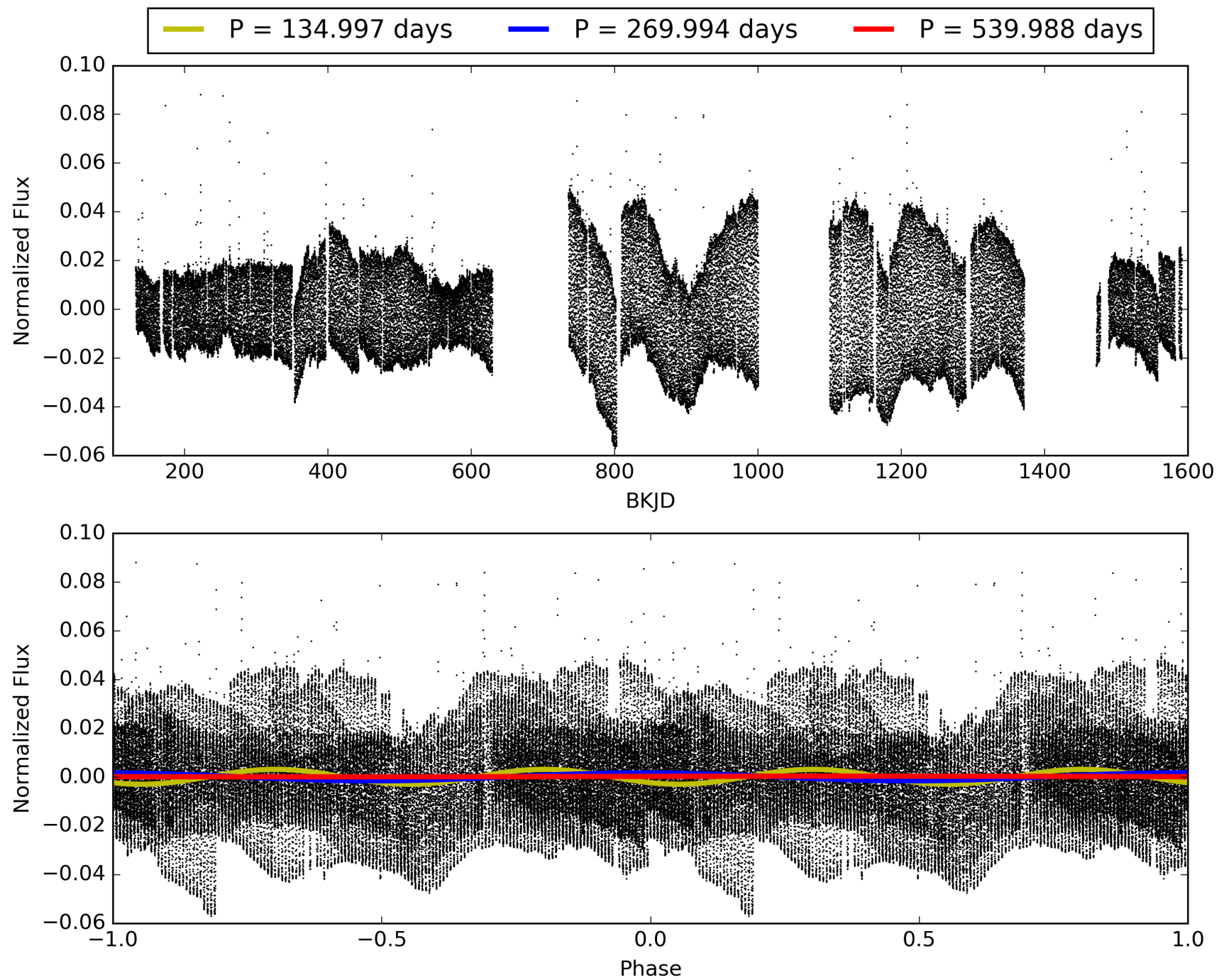
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 17:25:40 Z

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

# TCE 010165244-04, PDC Light Curves



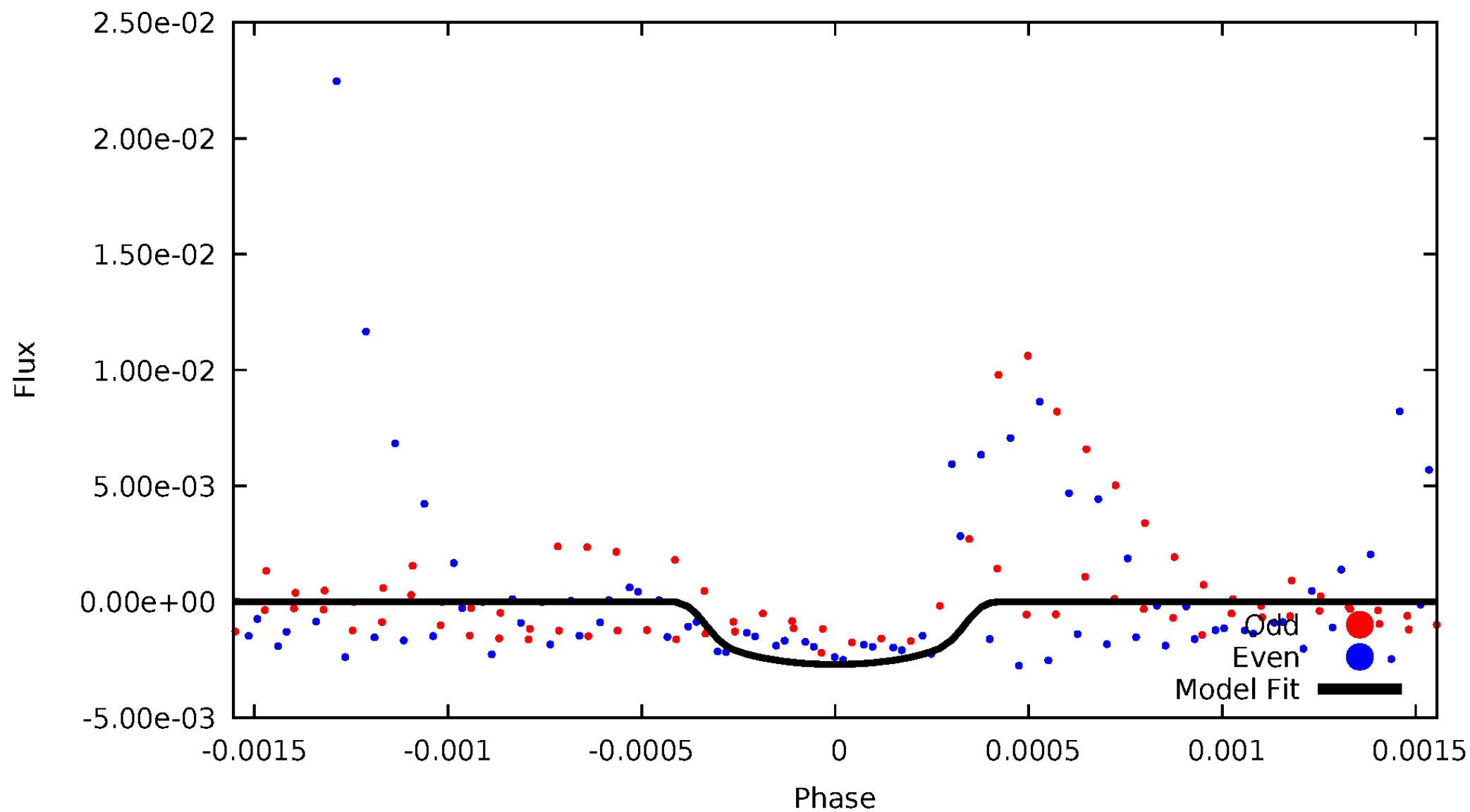
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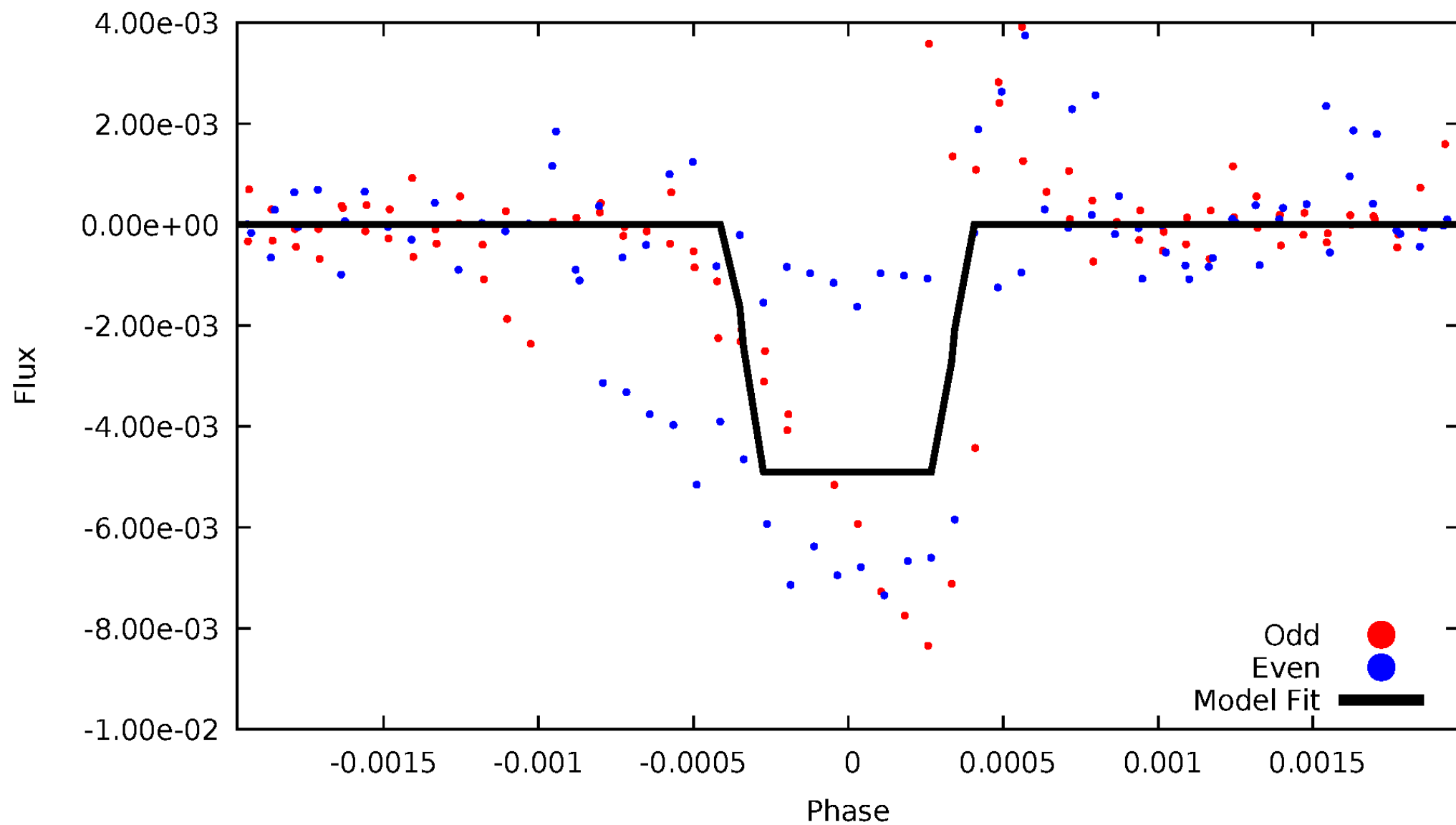
# DV Odd/Even

TCE 010165244-04



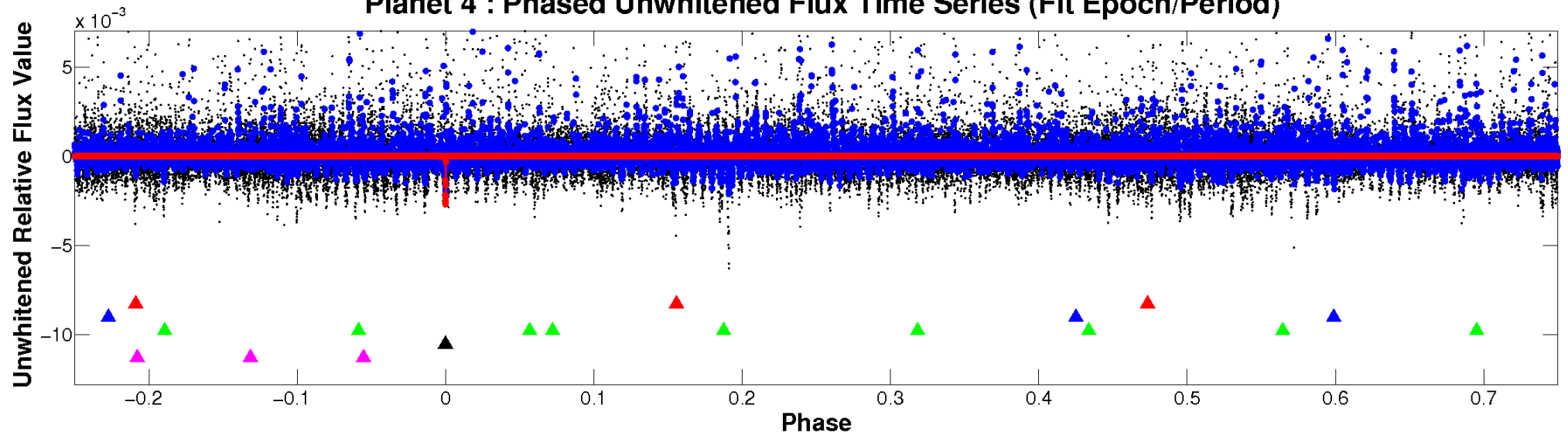
# ALT Odd/Even

TCE 010165244-04

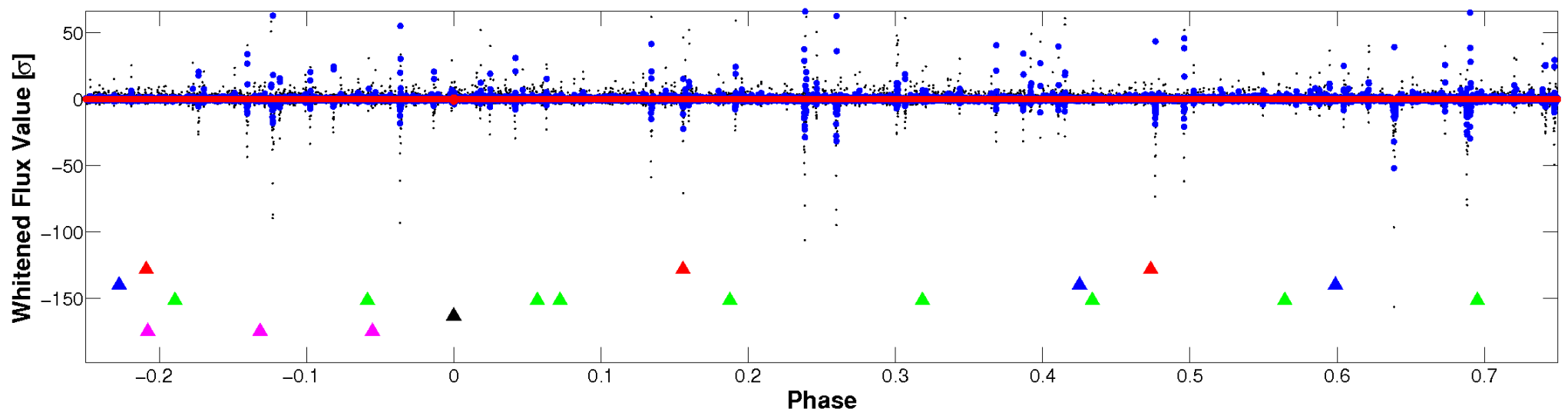


# Non-Whitened Vs. Whitened Light Curve

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

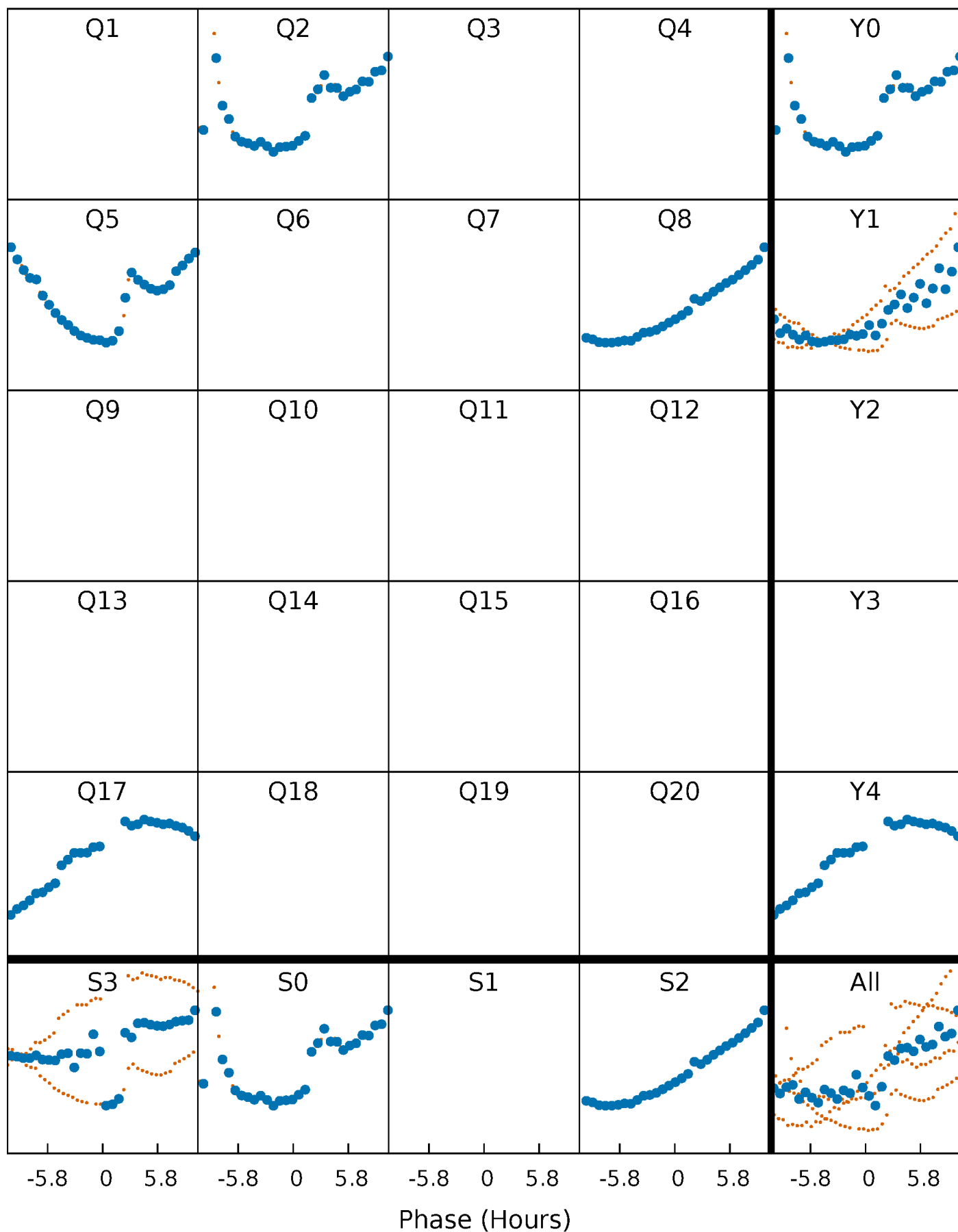


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



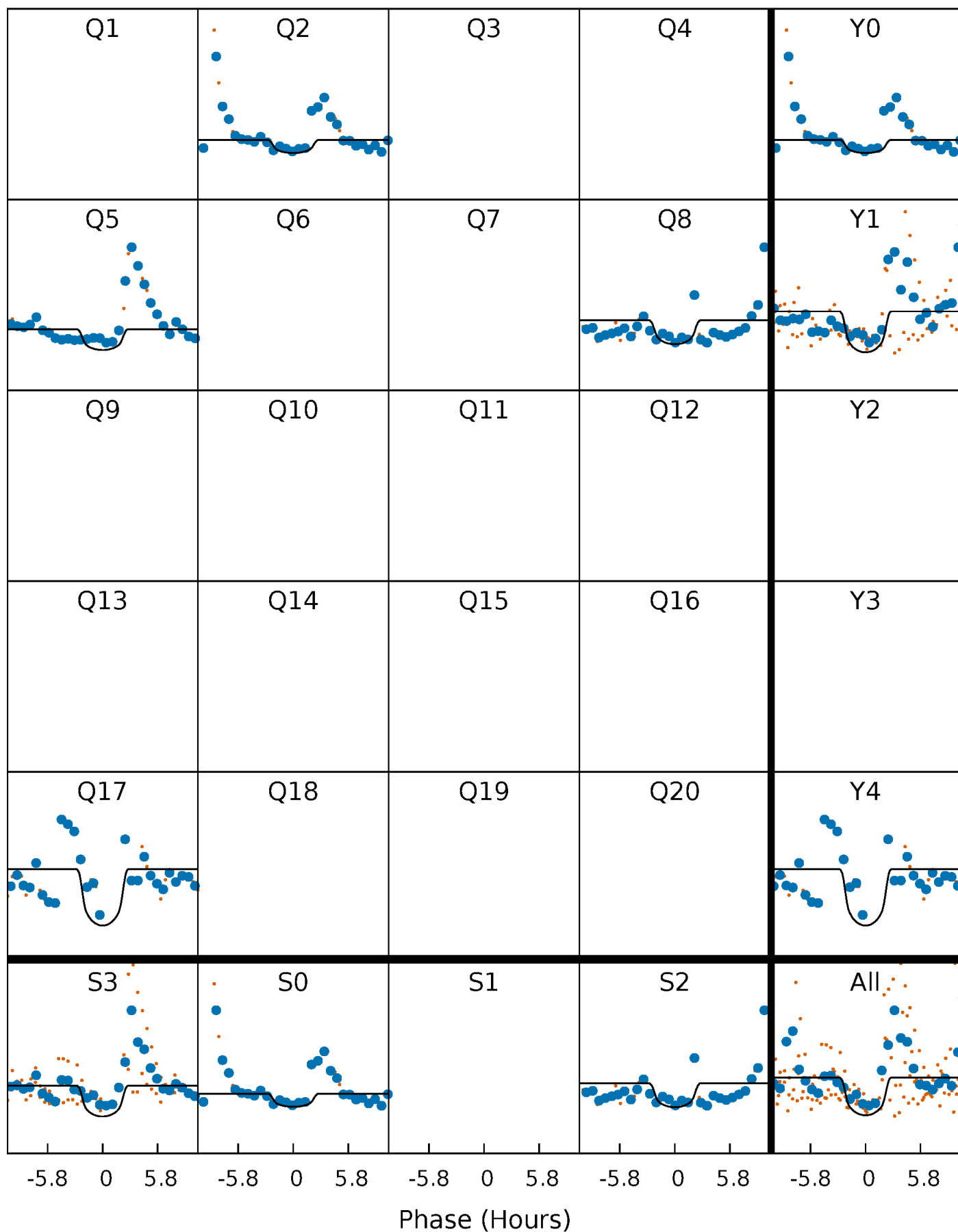
# PDC Quarter-Phased Transit Curves

TCE 010165244-04     $P=269.994191$  Days     $T_0=210.878507$  (BKJD)



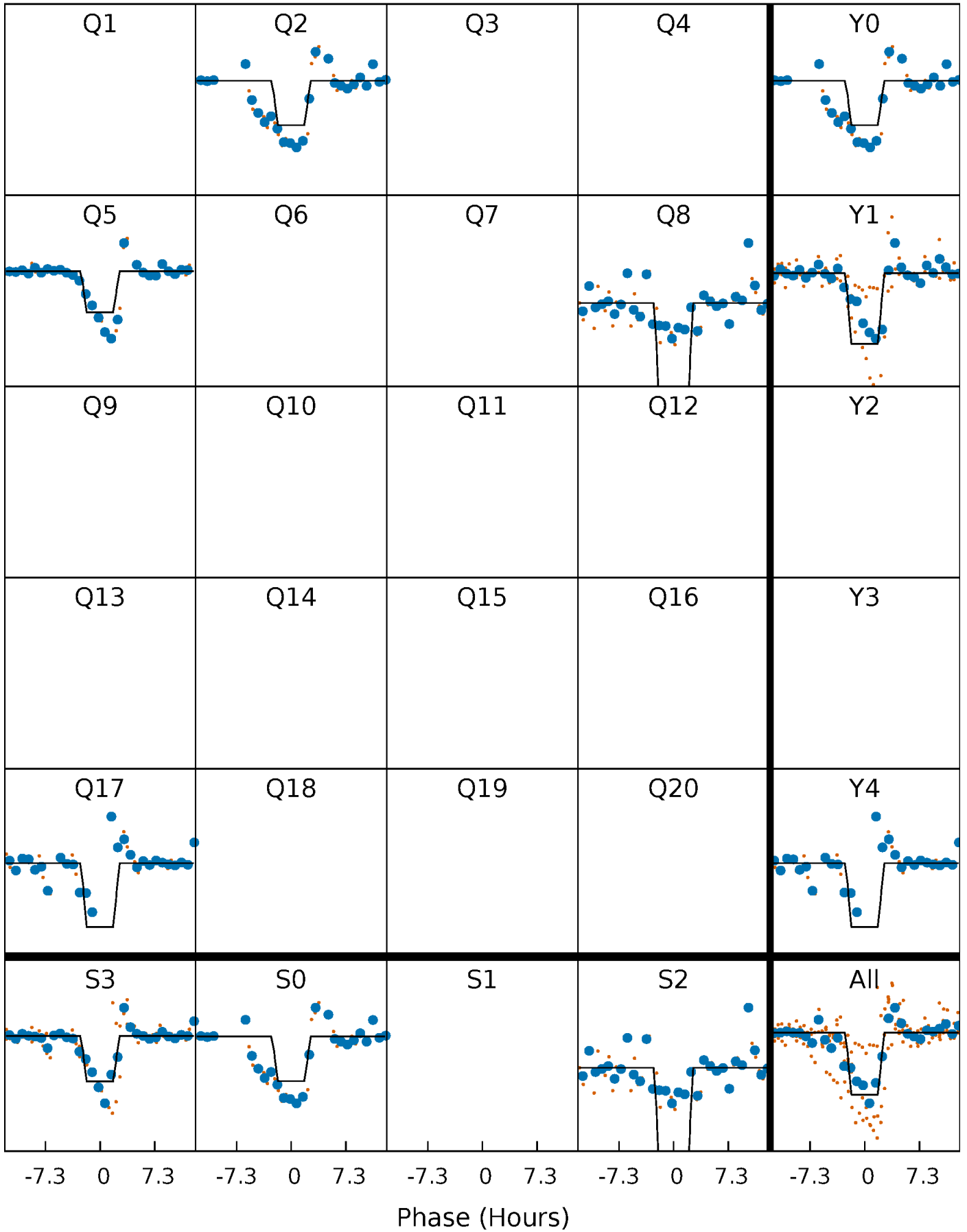
# DV Quarter-Phased Transit Curves

TCE 010165244-04     $P=269.994191$  Days     $T_0=210.878507$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

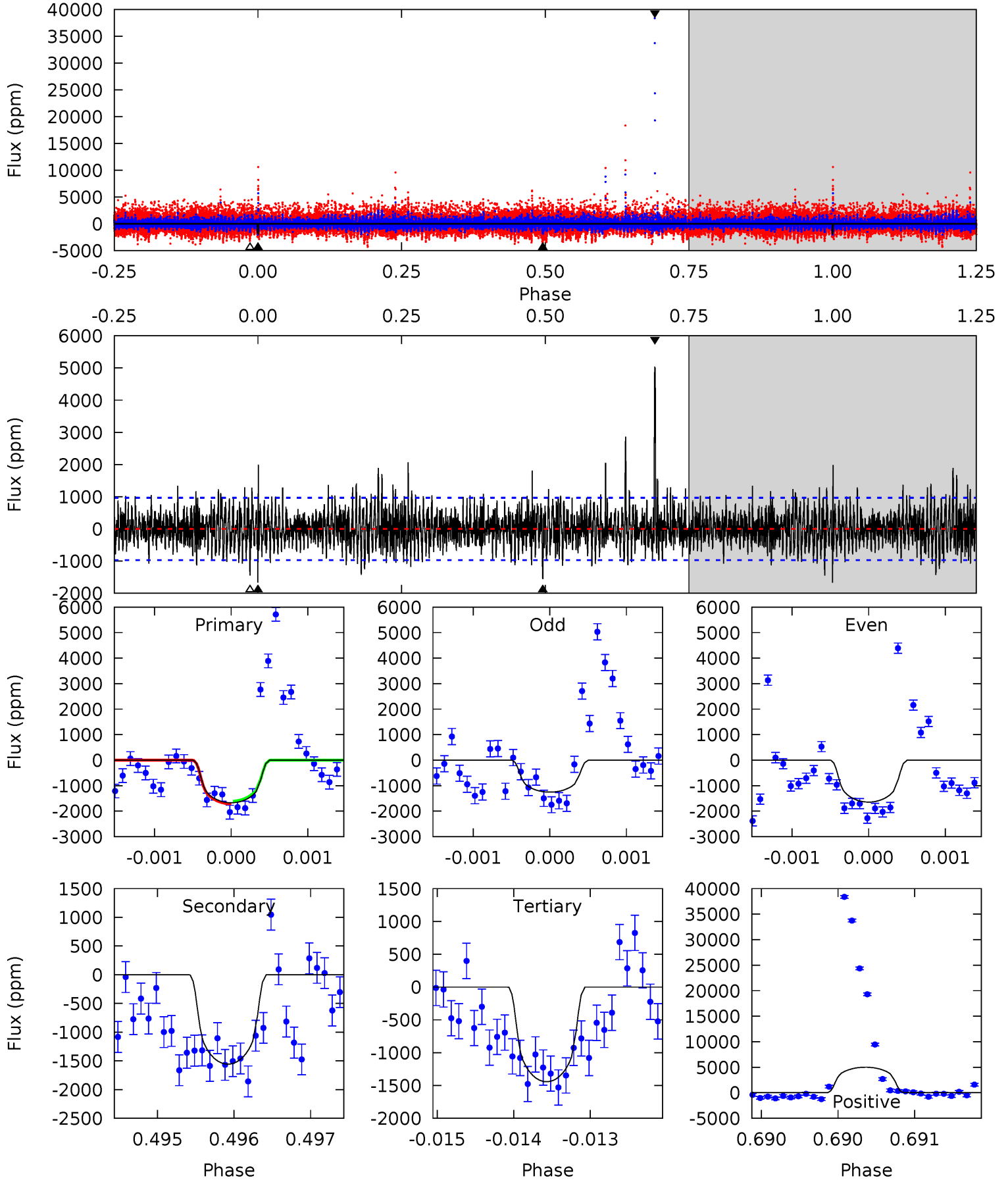
TCE 010165244-04     $P=270.009062$  Days     $T_0=210.846764$  (BKJD)



# DV Model-Shift Uniqueness Test

010165244-04, P = 269.994191 Days, E = 210.878507 Days

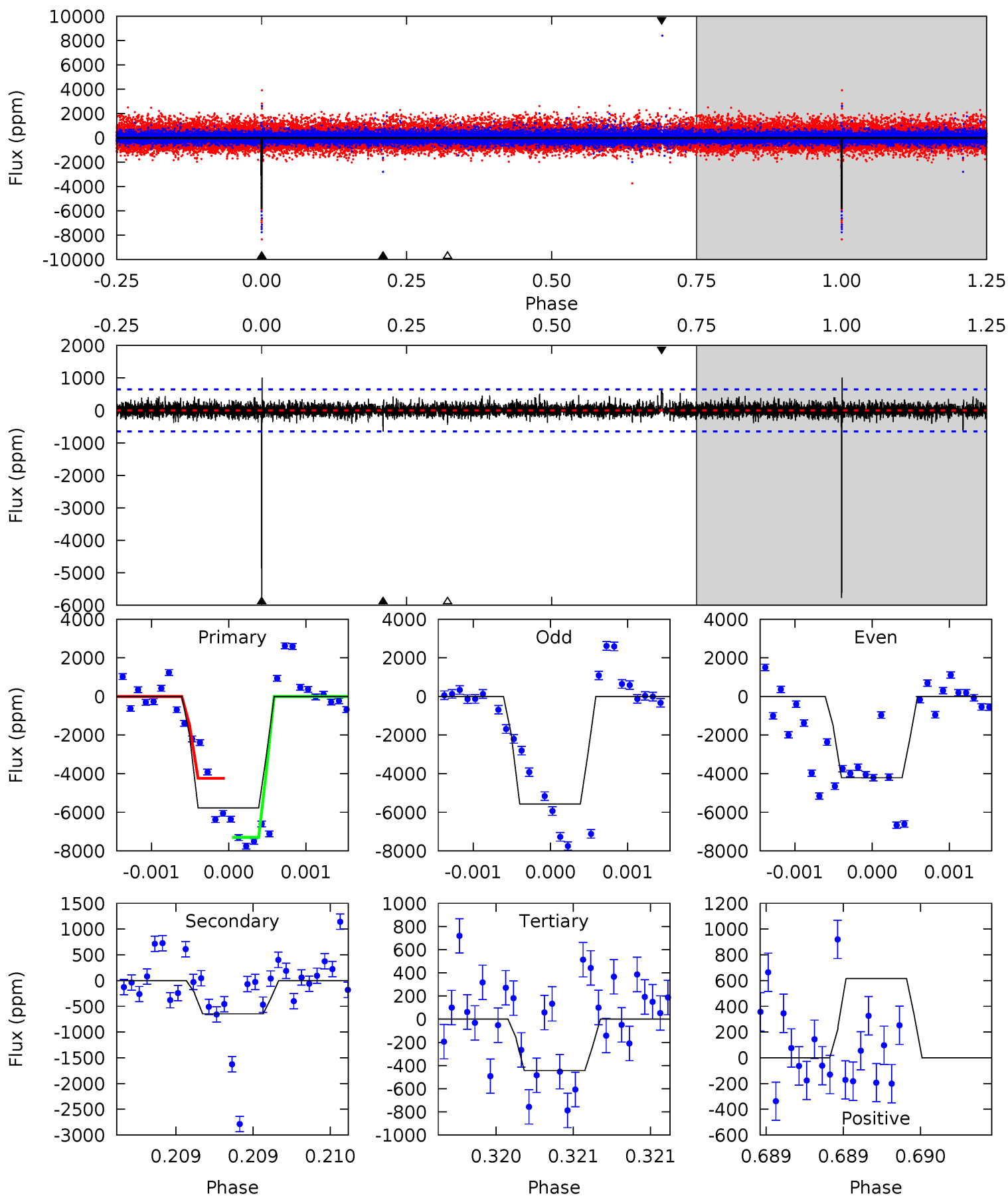
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.45	8.81	8.16	28.4	5.48	3.34	2.59	1.28	-18.9	0.65	-19.6	0.65	1.09	0.75	0.30



# Alt Model-Shift Uniqueness Test

010165244-04, P = 270.009062 Days, E = 210.846764 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
49.3	5.52	3.79	5.25	5.52	3.39	0.91	45.5	44.1	1.73	0.26	6.87	1.03	0.15	13.2





### Stellar Parameters For KIC 010165244

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4090^{+146}_{-162}$	$4.606^{+0.063}_{-0.014}$	$0.460^{+0.050}_{-0.300}$	$0.674^{+0.025}_{-0.070}$	$0.669^{+0.038}_{-0.057}$	$3.074^{+0.845}_{-0.193}$
	+4%/-4%	+1%/-0%	+11%/-65%	+4%/-10%	+6%/-9%	+28%/-6%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 010165244-04 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-1557 \pm 177$	$3.87^{+1.86}_{-1.69}$	$242^{+9}_{-10}$	$3683^{+891}_{-469}$	$29291^{+67288}_{-16192}$
Alt.	$-646 \pm 117$	$5.11^{+1.83}_{-1.91}$	$243^{+9}_{-10}$	$2958^{+474}_{-250}$	$6989^{+11510}_{-3352}$

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

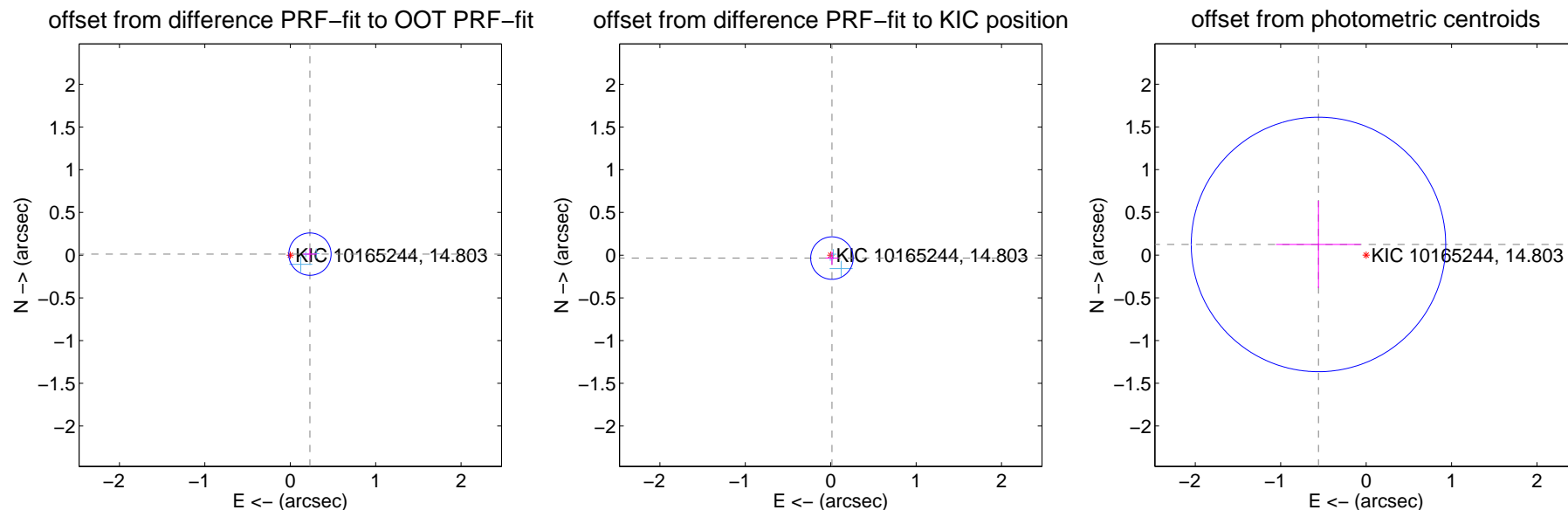
## DV Centroid Data

Supplemental centroid analysis for 010165244-04. Kepler magnitude: 14.80. Transit SNR 9.09

There are 3 quarters with good PRF difference image offsets

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

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.231 \pm 0.083$	2.80	$-0.231 \pm 0.083$	$0.012 \pm 0.068$
PRF-fit source offset from KIC position	$0.037 \pm 0.083$	0.45	$-0.014 \pm 0.074$	$-0.034 \pm 0.078$
photometric centroid source offset	$0.57 \pm 0.50$	1.15	$0.56 \pm 0.50$	$0.12 \pm 0.51$



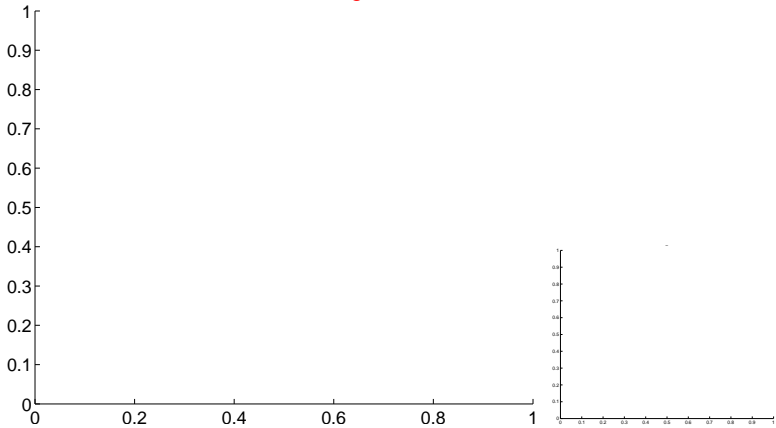
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

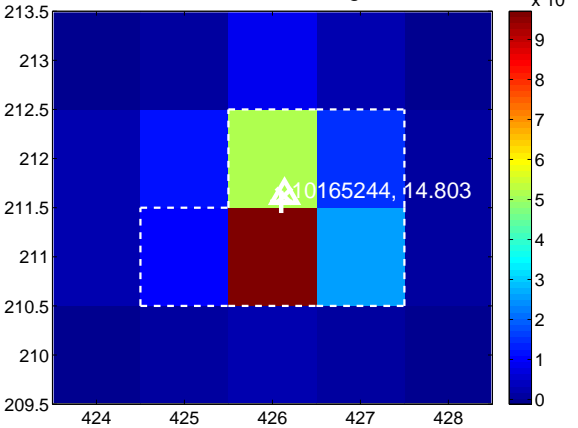
Q1 no difference image



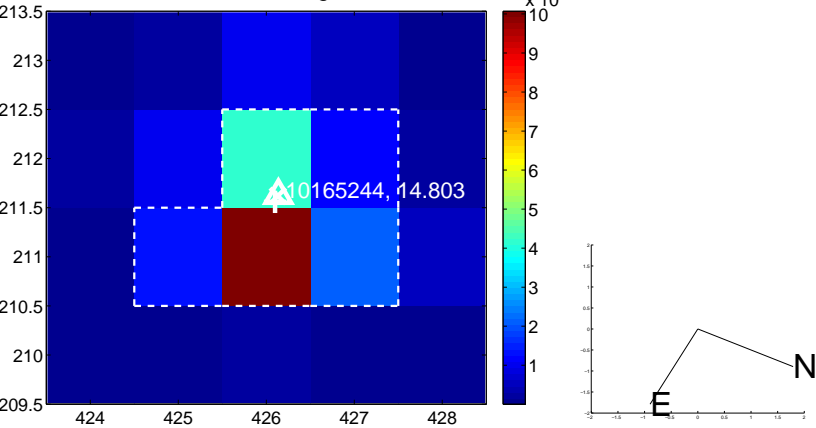
Q1 no OOT image



Q2 difference image



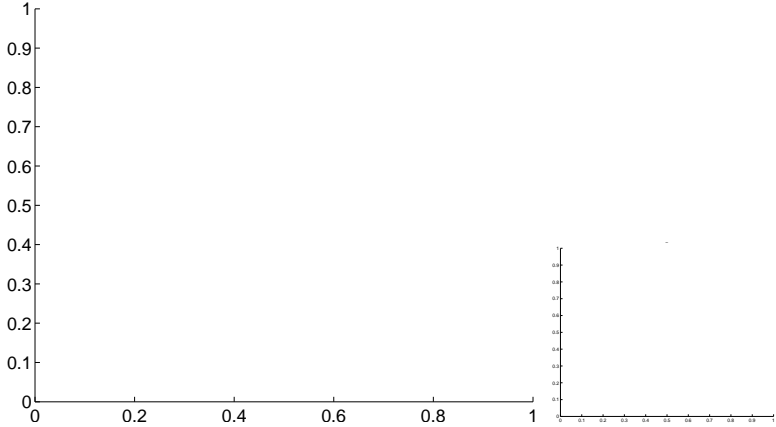
Q2 OOT image



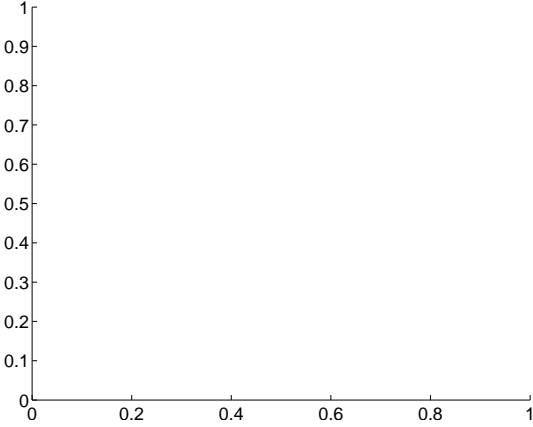
Q3 no difference image



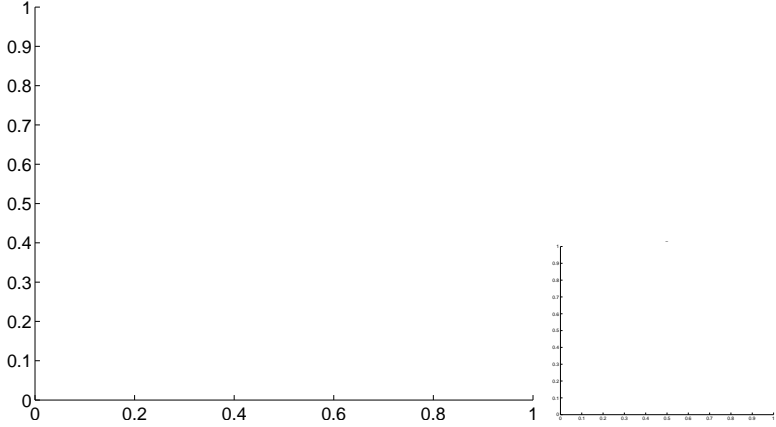
Q3 no OOT image



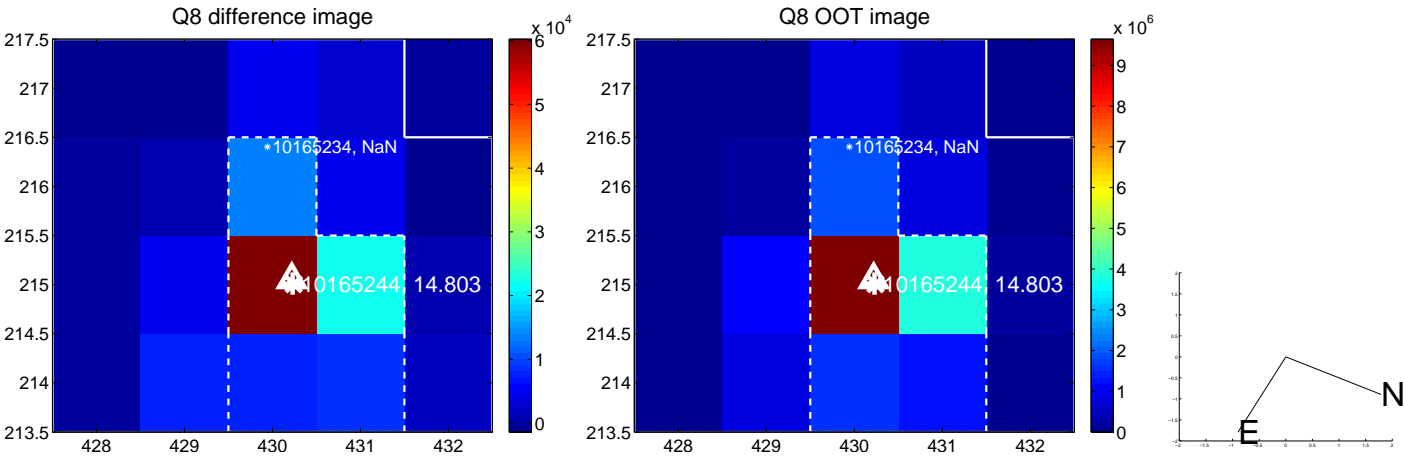
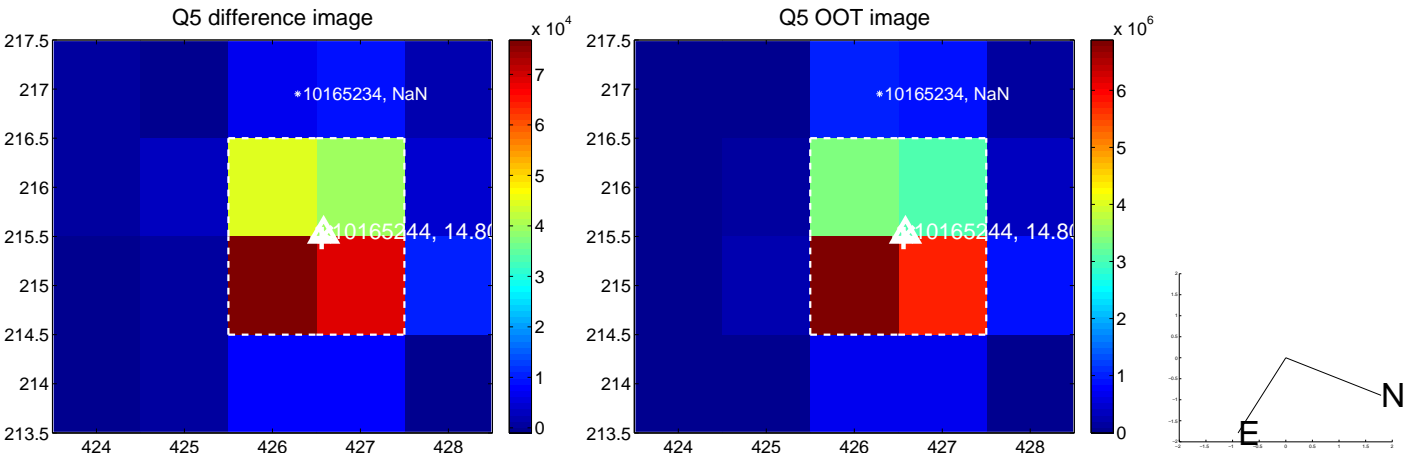
Q4 no difference image



Q4 no OOT image



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



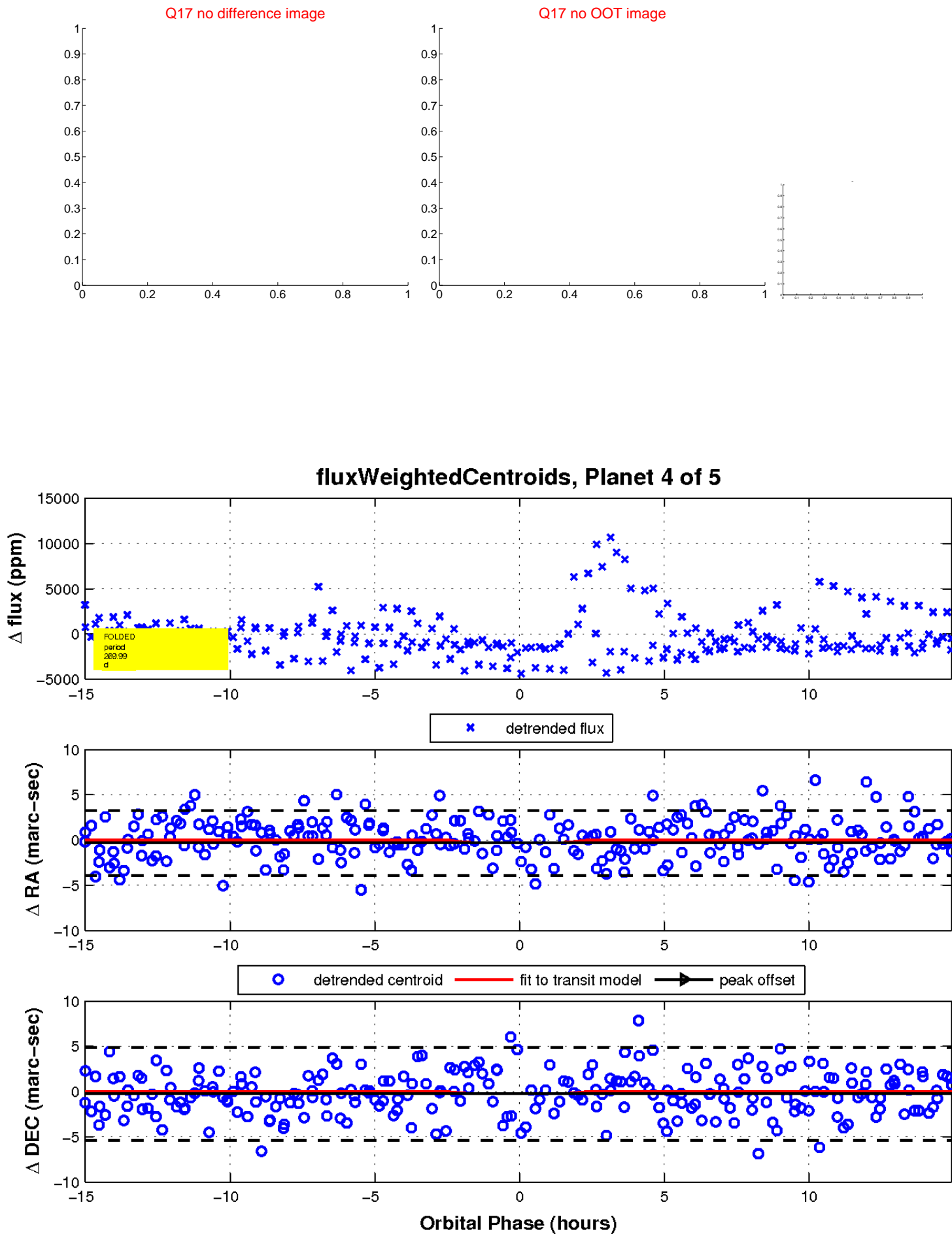
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

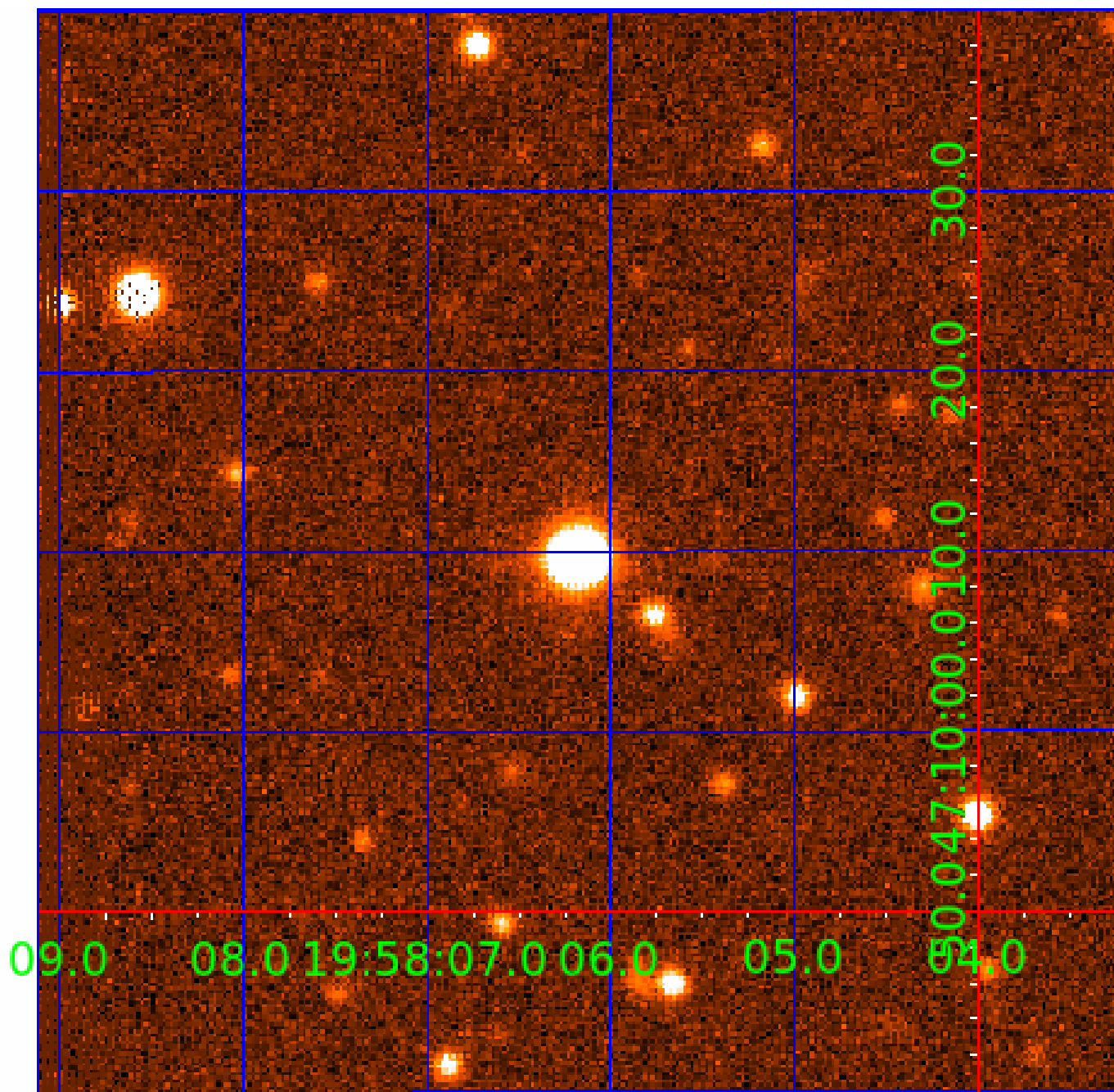


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 010165244

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010165244-01	OBS	No	454.210465	424.480337	2422.7	3.029	13.9	7.9	0.67	4090	3.28	0.11
010165244-02	OBS	No	586.924204	325.642112	2251.7	3.113	14.1	7.1	0.67	4090	3.60	0.08
010165244-03	OBS	No	168.226244	230.373498	2194.9	6.555	12.2	6.4	0.67	4090	3.98	0.42
010165244-04	OBS	No	269.994191	210.878507	2702.4	5.035	15.3	9.1	0.67	4090	3.89	0.22
010165244-05	OBS	No	519.388410	465.965620	2051.4	8.009	11.9	5.6	0.67	4090	6.22	0.09

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010165244-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010165244-02	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—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010165244-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
010165244-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE_ZUMA—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS
010165244-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

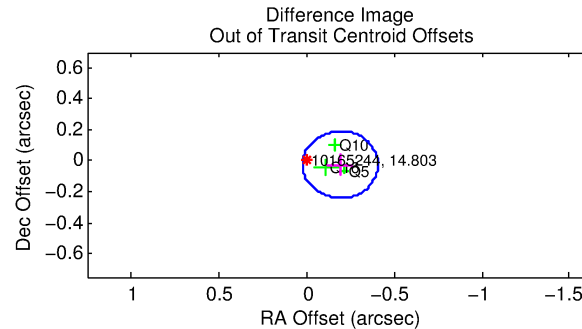
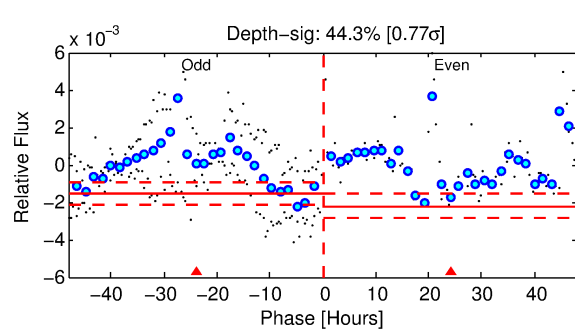
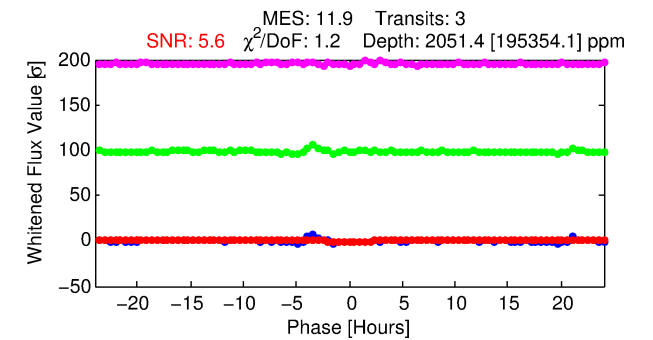
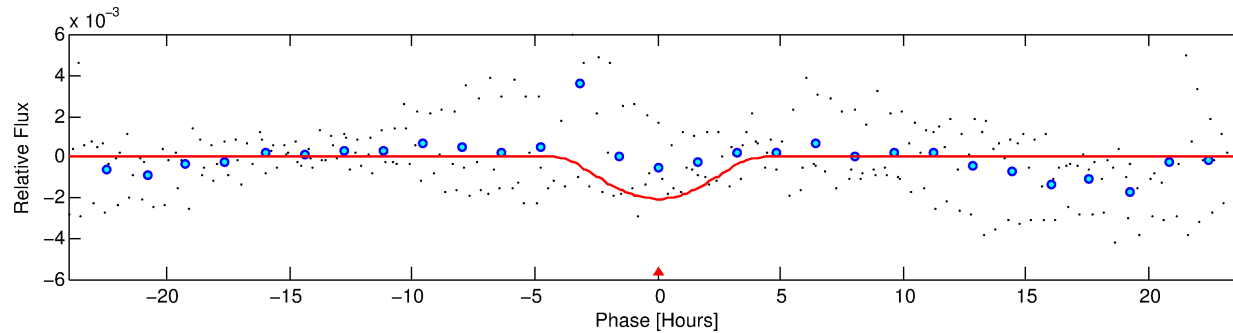
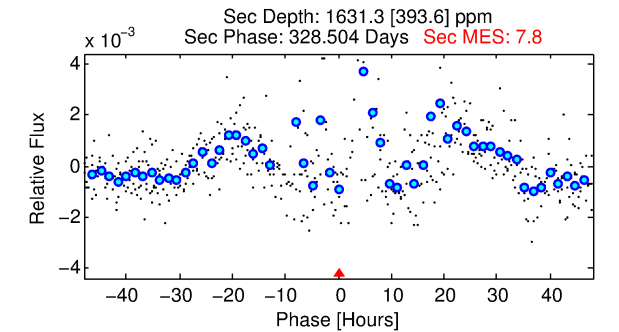
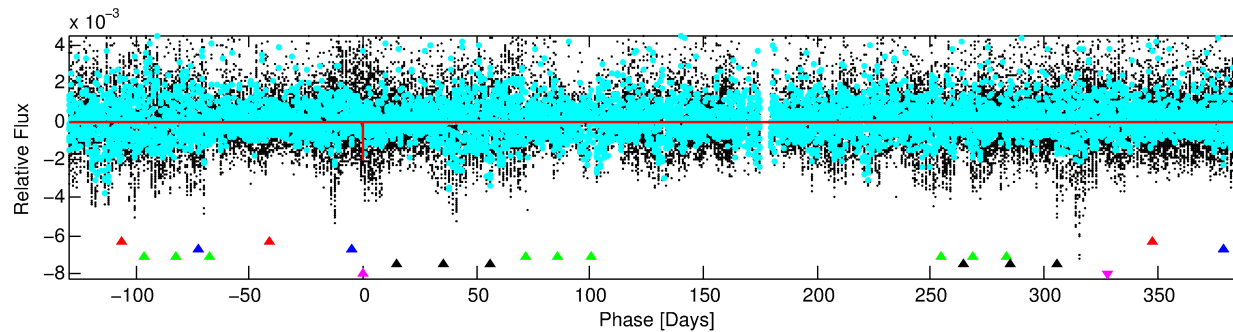
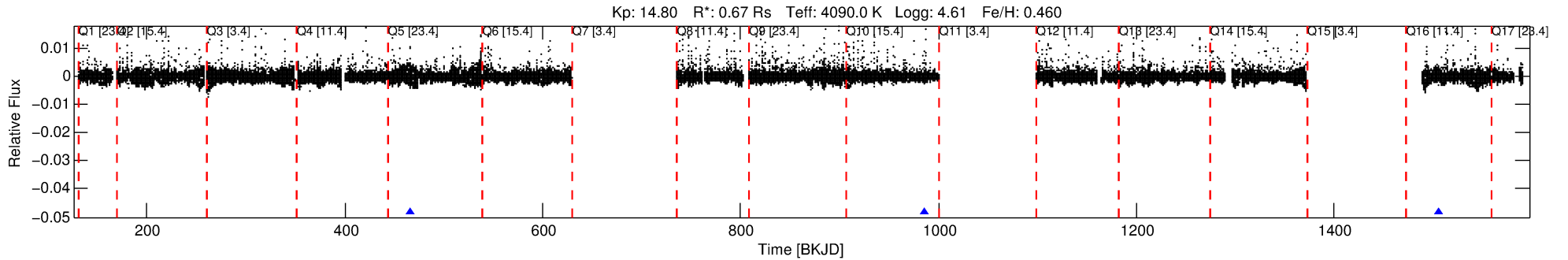
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010165244-05

No Significant Match Found

# DV One-Page Summary

KIC: 10165244 Candidate: 5 of 5 Period: 519.388 d



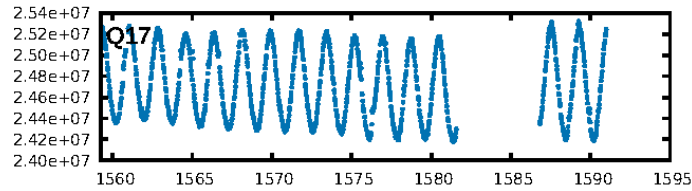
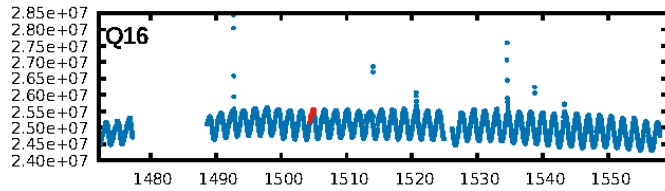
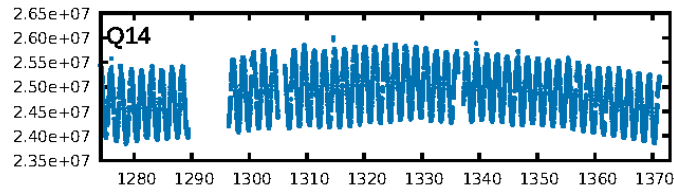
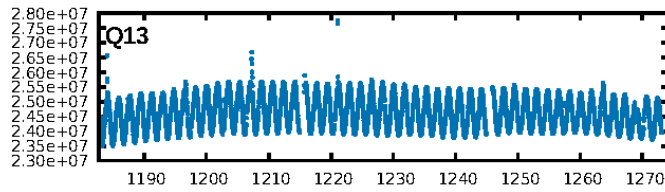
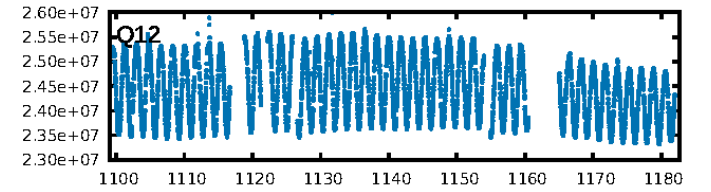
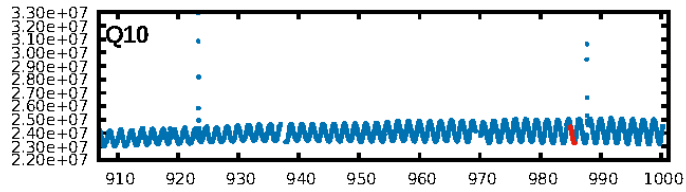
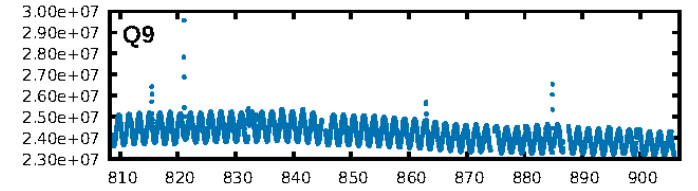
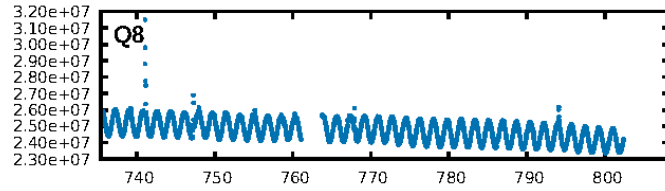
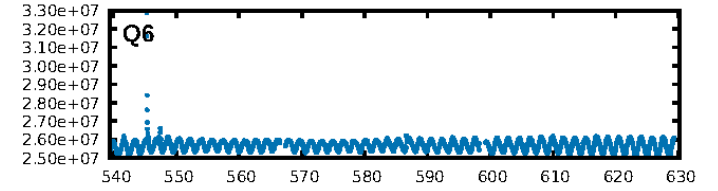
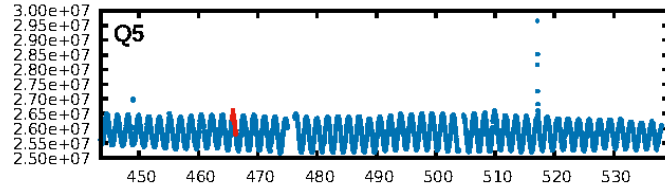
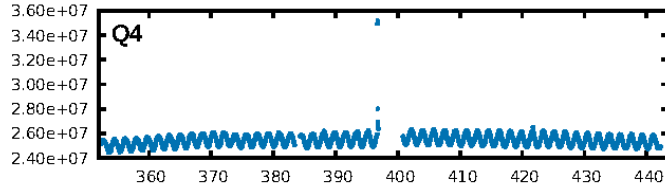
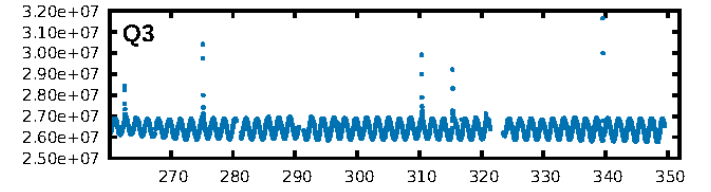
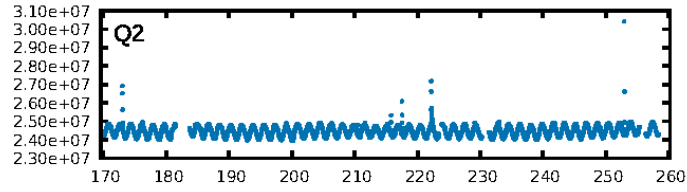
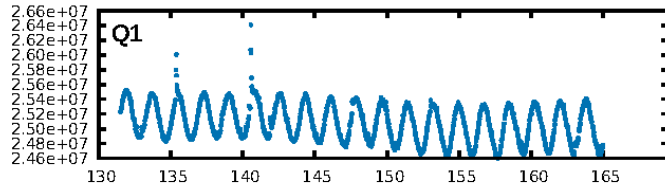
## DV Fit Results:

Period = 519.38841 [0.01799] d  
Epoch = 465.9656 [0.0218] BKJD  
Rp/R\* = 0.0845 [0.3564]  
a/R\* = 207.98 [176.01]  
b = 1.00 [5.68]  
Seff = 0.09 [0.02]  
Teq = 141 [7] K  
Rp = 6.22 [26.22] Re  
a = 1.1061 [0.0934] AU  
Ag = 28404.24 [239607.34] [0.12σ]  
Teffp = 2827 [5963] K [0.45σ]

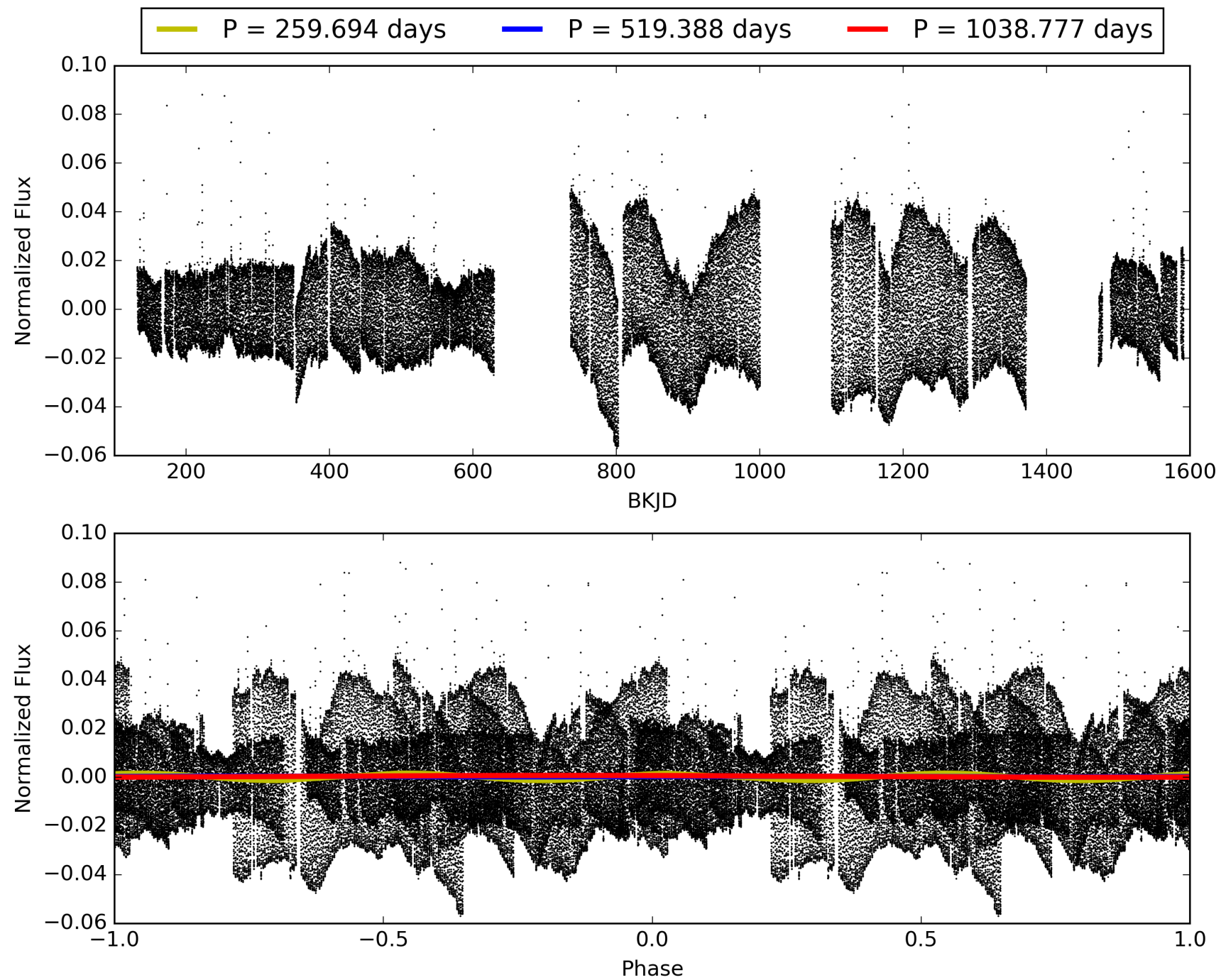
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [182.69σ]  
LongPeriod-sig: 100.0% [188.64σ]  
ModelChiSquare2-sig: 13.5%  
ModelChiSquareGof-sig: 77.1%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -1.533  
Centroid-sig: 35.2%  
Centroid-so: 0.893 arcsec [1.29σ]  
OotOffset-rm: 0.193 arcsec [2.69σ]  
KicOffset-rm: 0.066 arcsec [0.75σ]  
OotOffset-st: 1/0/1/1 [3]  
KicOffset-st: 1/0/1/1 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 1.00 [3/3]

# TCE 010165244-05, PDC Light Curves

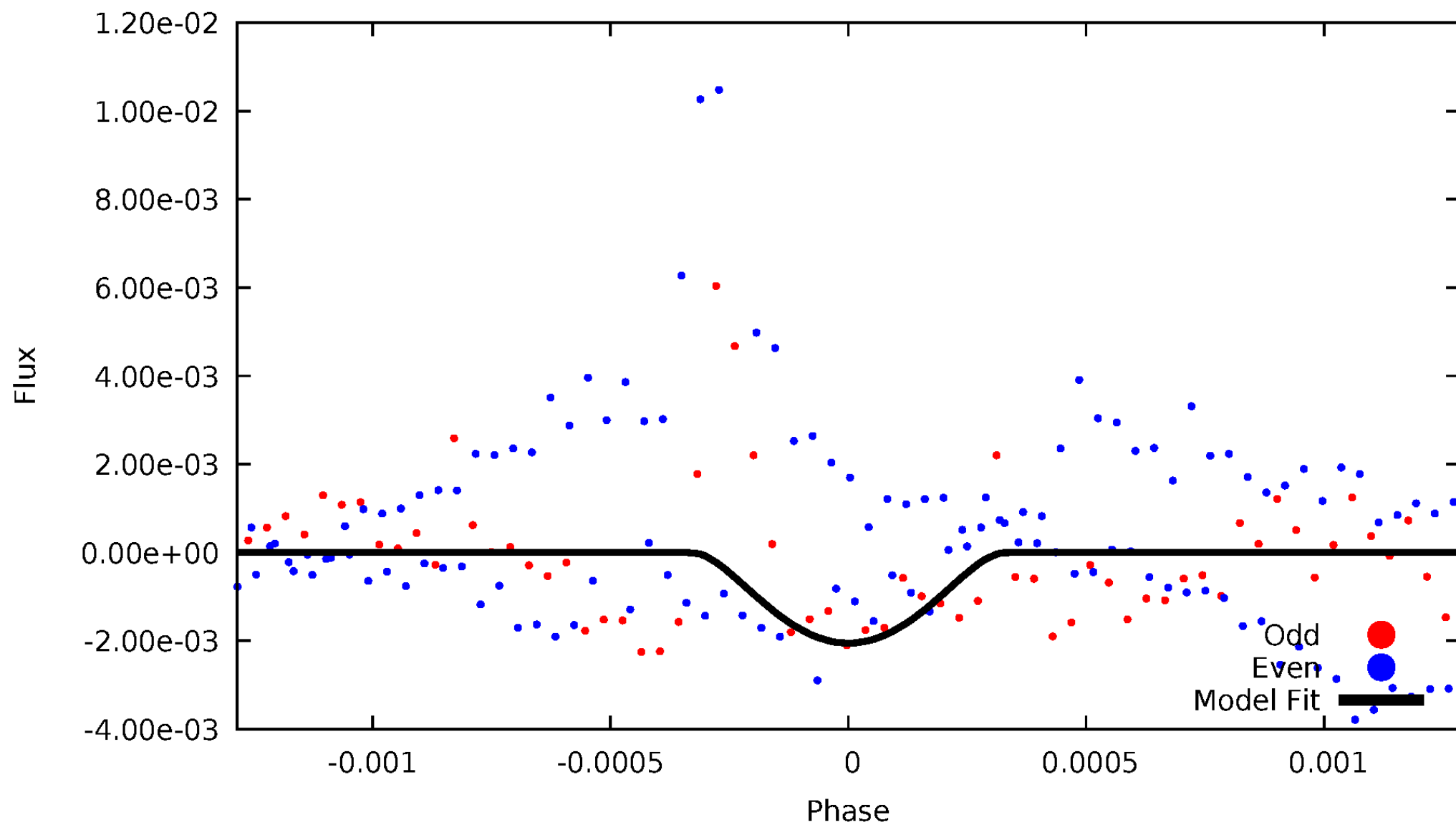


# TCE 010165244-05



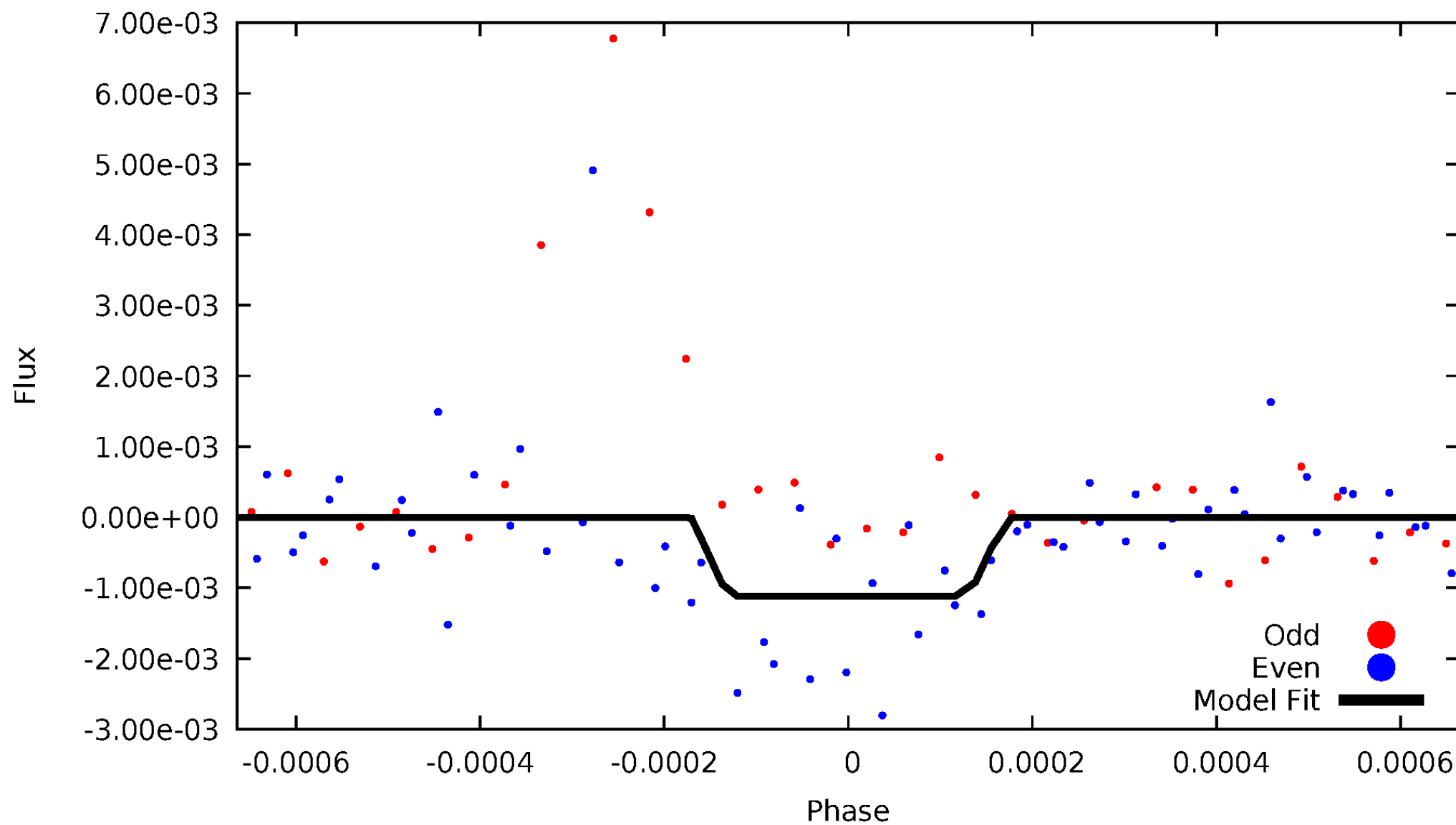
# DV Odd/Even

TCE 010165244-05



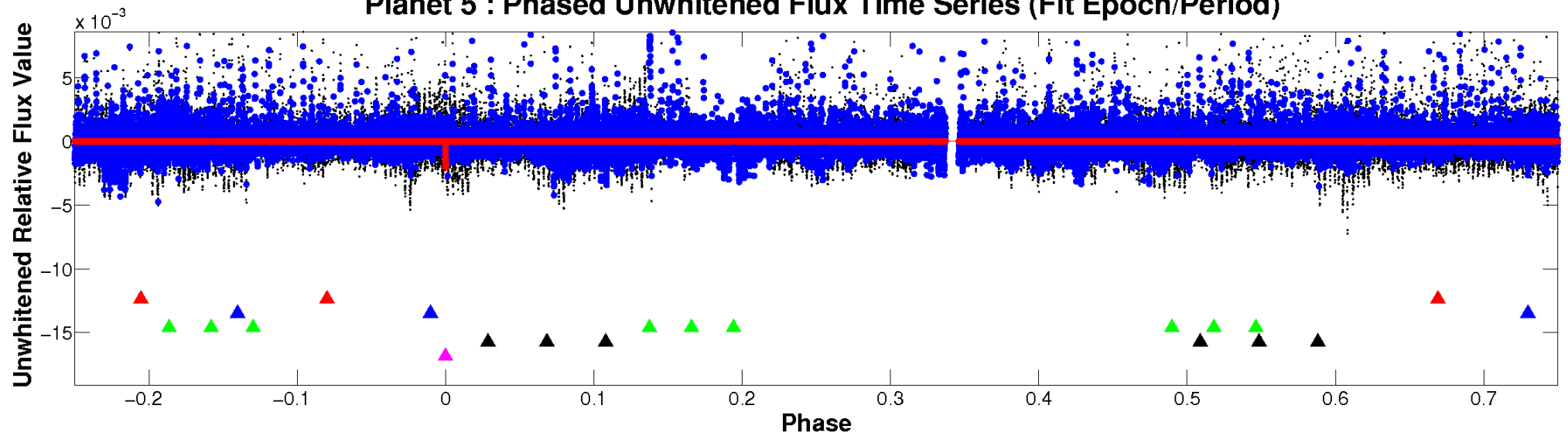
# ALT Odd/Even

TCE 010165244-05

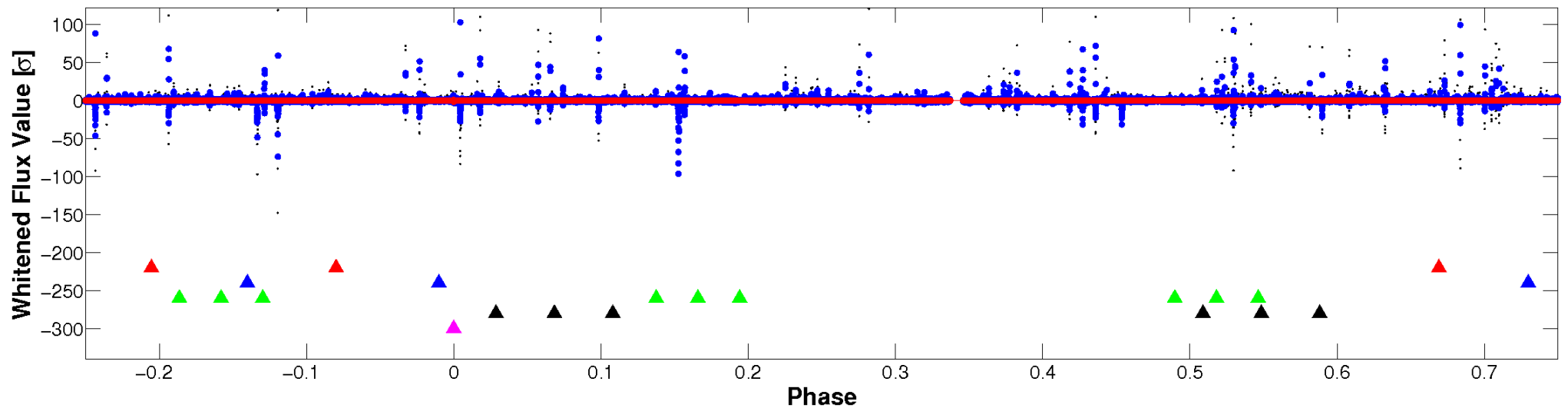


# Non-Whitened Vs. Whitened Light Curve

## Planet 5 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

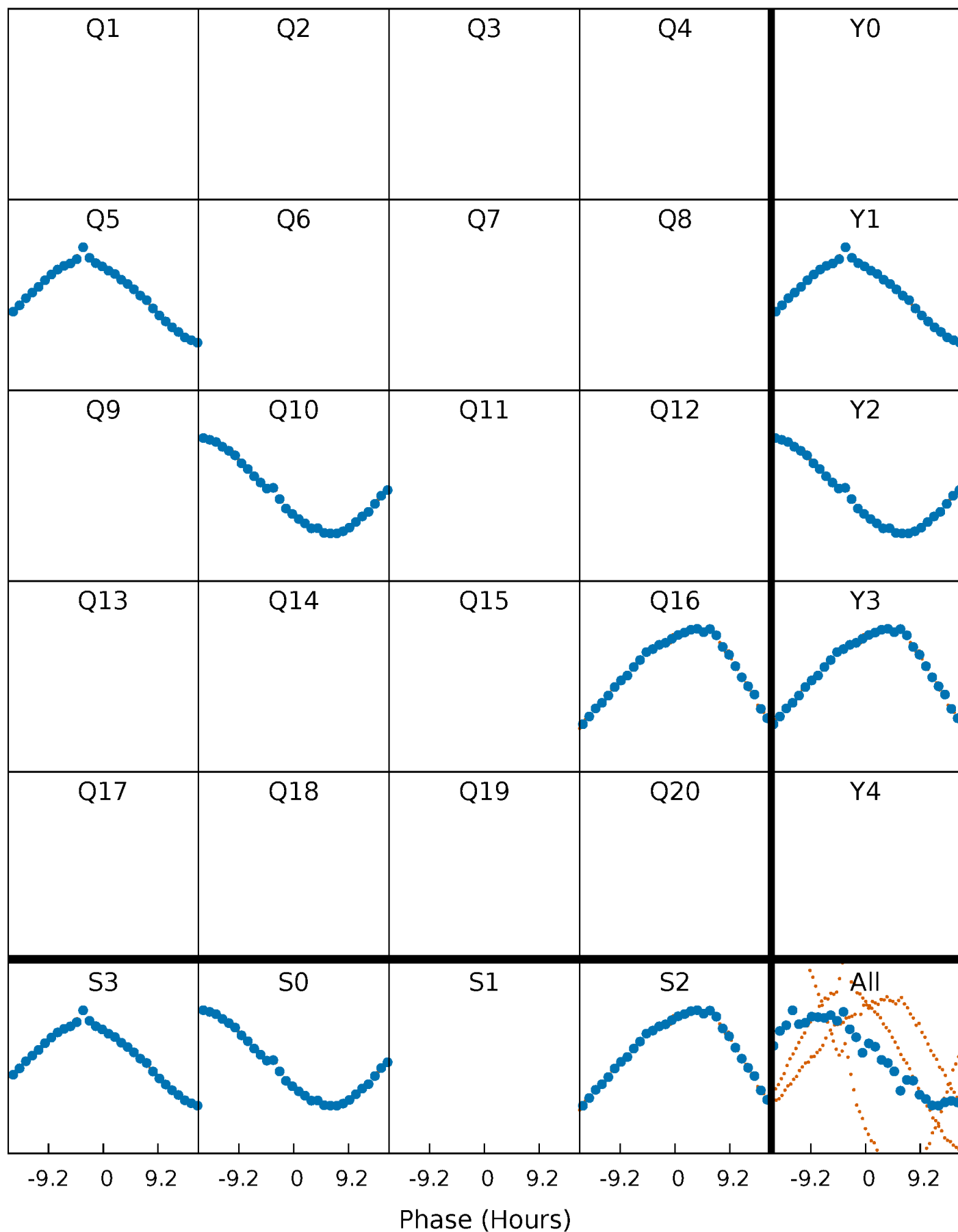


## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

TCE 010165244-05     $P=519.388410$  Days     $T_0=465.965620$  (BKJD)





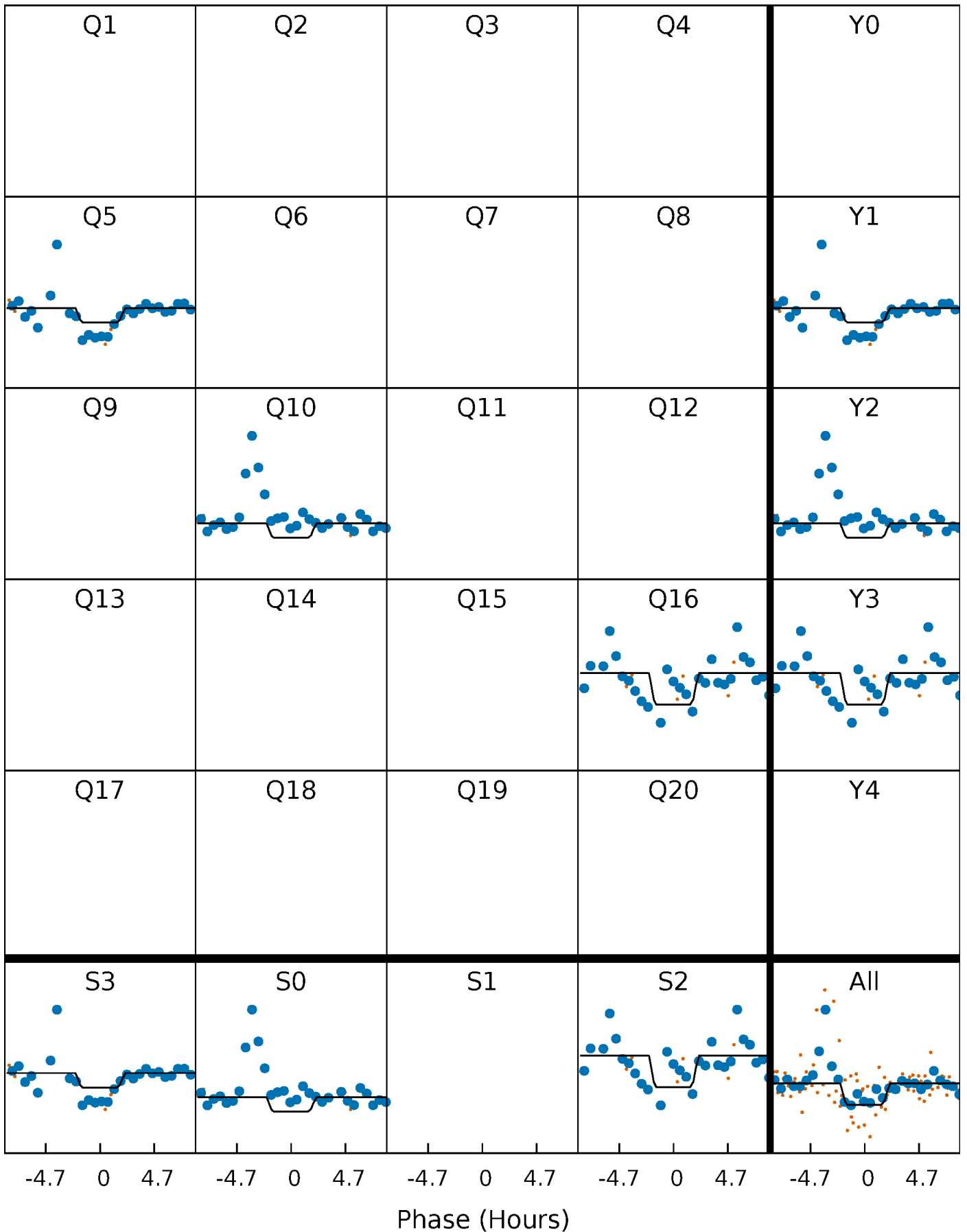
# DV Quarter-Phased Transit Curves

TCE 010165244-05     $P=519.388410$  Days     $T_0=465.965620$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

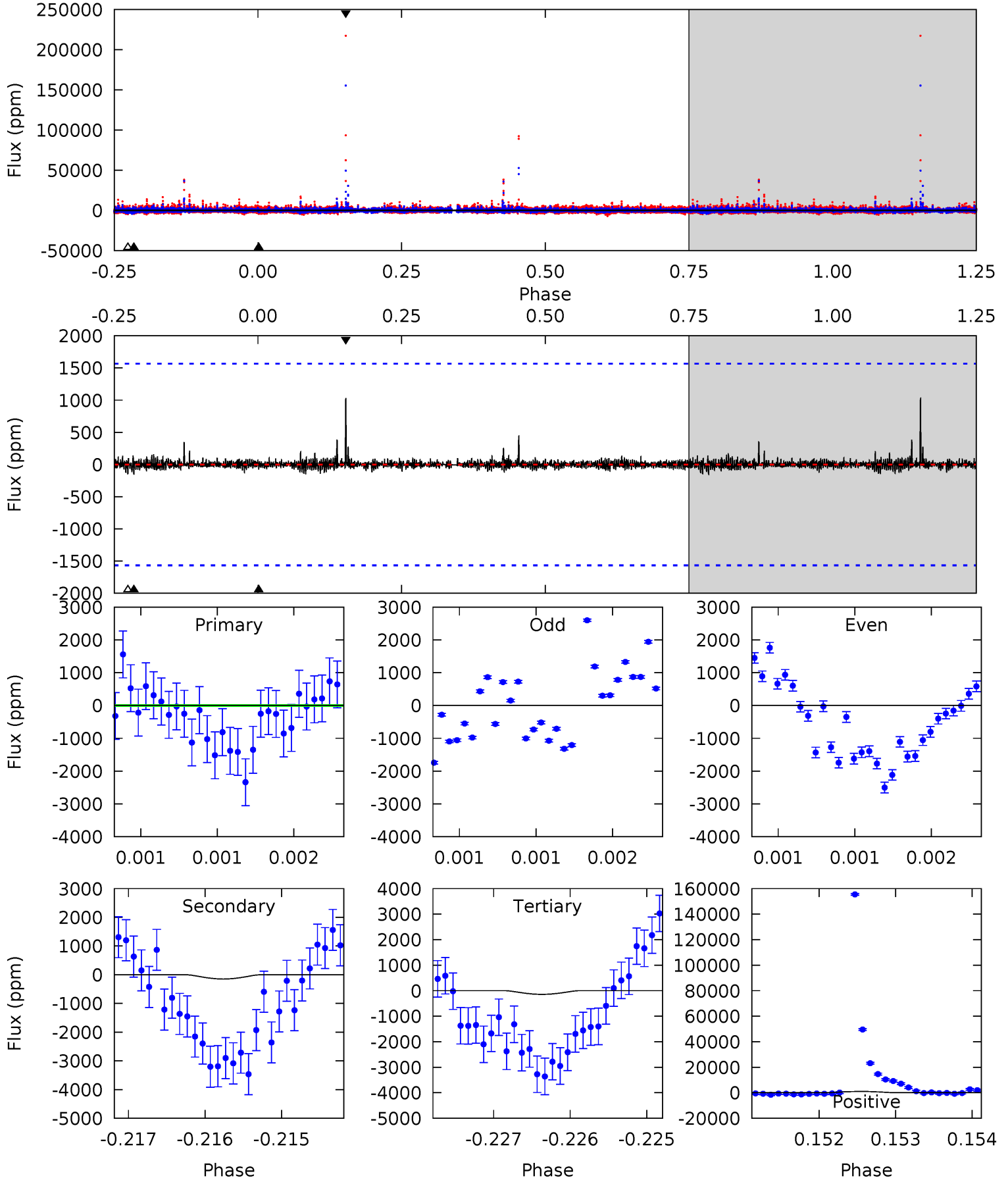
TCE 010165244-05     $P=519.393850$  Days     $T_0=465.968621$  (BKJD)



# DV Model-Shift Uniqueness Test

010165244-05, P = 519.388410 Days, E = 465.965620 Days

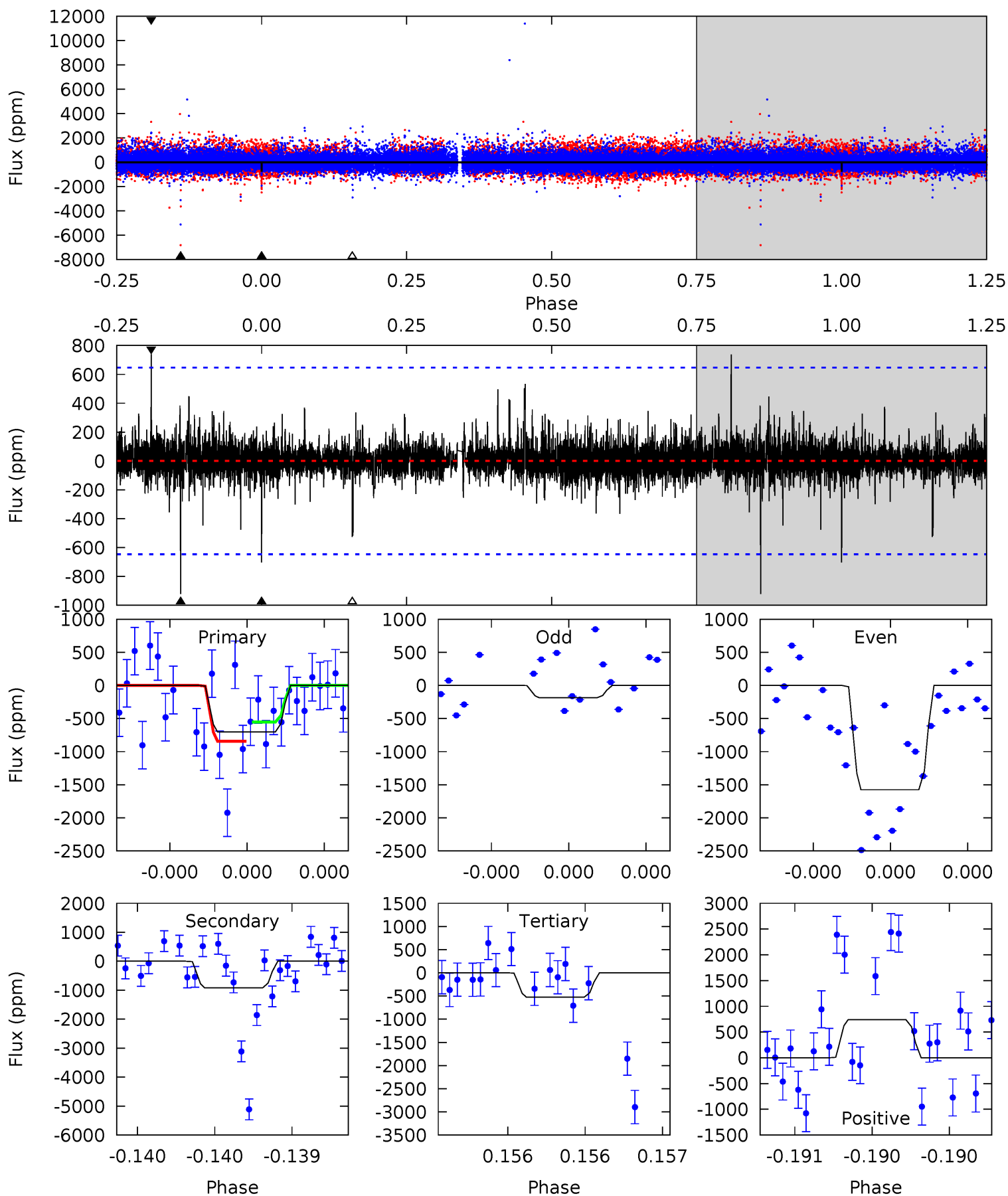
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0.26	0.53	0.51	3.62	5.52	3.40	0.16	-0.25	-3.36	0.02	-3.09	0.55	0.04	0.87	0.20



# Alt Model-Shift Uniqueness Test

010165244-05, P = 519.393850 Days, E = 465.968621 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
6.14	8.06	4.59	6.46	5.65	3.60	0.69	1.55	-0.32	3.47	1.60	4.05	1.21	0.44	1.28



### Stellar Parameters For KIC 010165244

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4090^{+146}_{-162}$	$4.606^{+0.063}_{-0.014}$	$0.460^{+0.050}_{-0.300}$	$0.674^{+0.025}_{-0.070}$	$0.669^{+0.038}_{-0.057}$	$3.074^{+0.845}_{-0.193}$
	+4%/-4%	+1%/-0%	+11%/-65%	+4%/-10%	+6%/-9%	+28%/-6%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 010165244-05 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-149 \pm 284$	$19.99^{+21.01}_{-13.00}$	$195^{+7}_{-9}$	$1730^{+527}_{-3563}$	$128^{+1800}_{-394}$
Alt.	$-921 \pm 114$	$18.41^{+21.21}_{-12.87}$	$195^{+8}_{-8}$	$2232^{+809}_{-326}$	$1865^{+19112}_{-1487}$

$T_{max}$  = 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

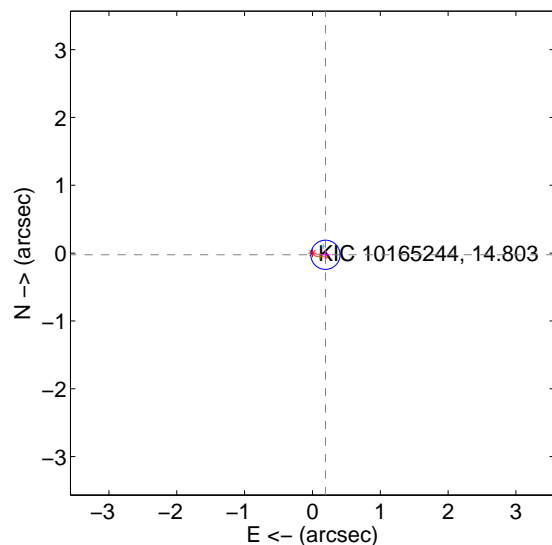
Supplemental centroid analysis for 010165244-05. Kepler magnitude: 14.80. Transit SNR 5.59

There are 1 quarters with good PRF difference image offsets

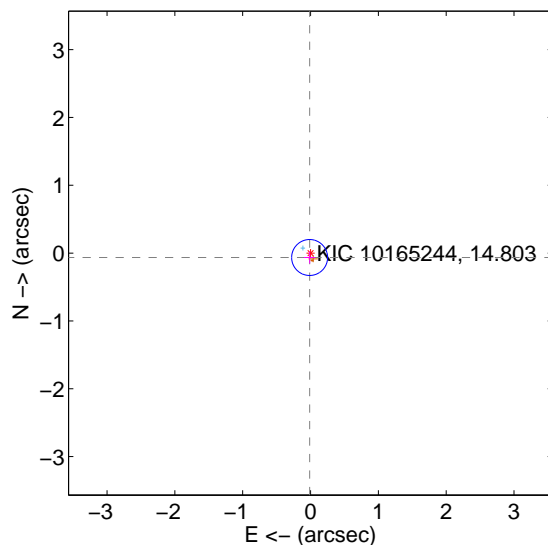
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.193 \pm 0.072$	2.69	$-0.192 \pm 0.072$	$-0.025 \pm 0.070$
PRF-fit source offset from KIC position	$0.066 \pm 0.088$	0.75	$0.013 \pm 0.082$	$-0.065 \pm 0.089$
photometric centroid source offset	$0.89 \pm 0.69$	1.29	$0.68 \pm 0.66$	$-0.58 \pm 0.74$

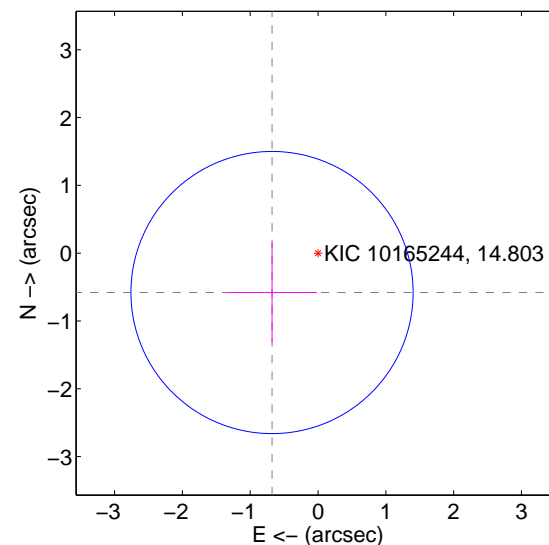
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids

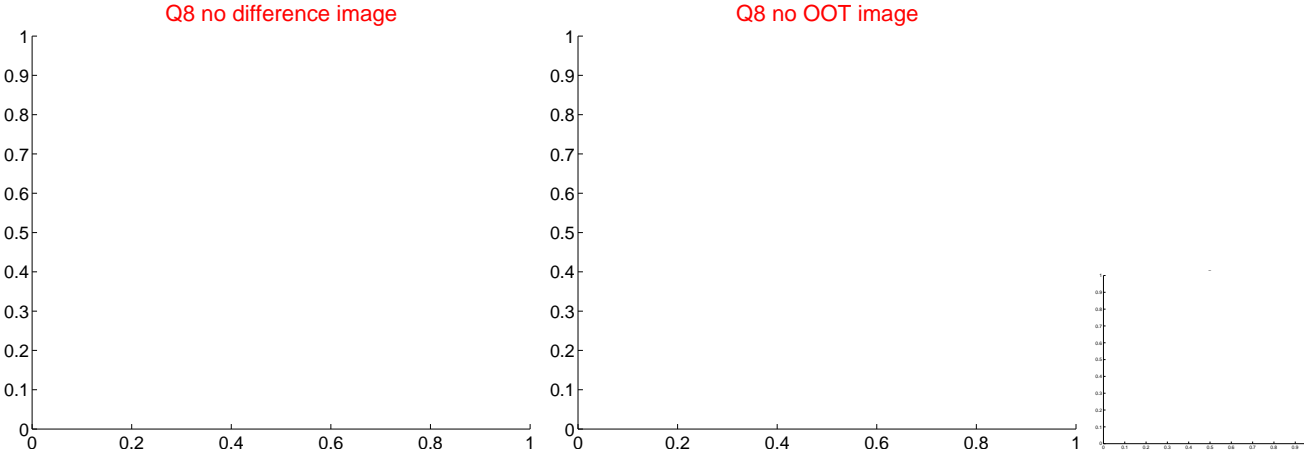
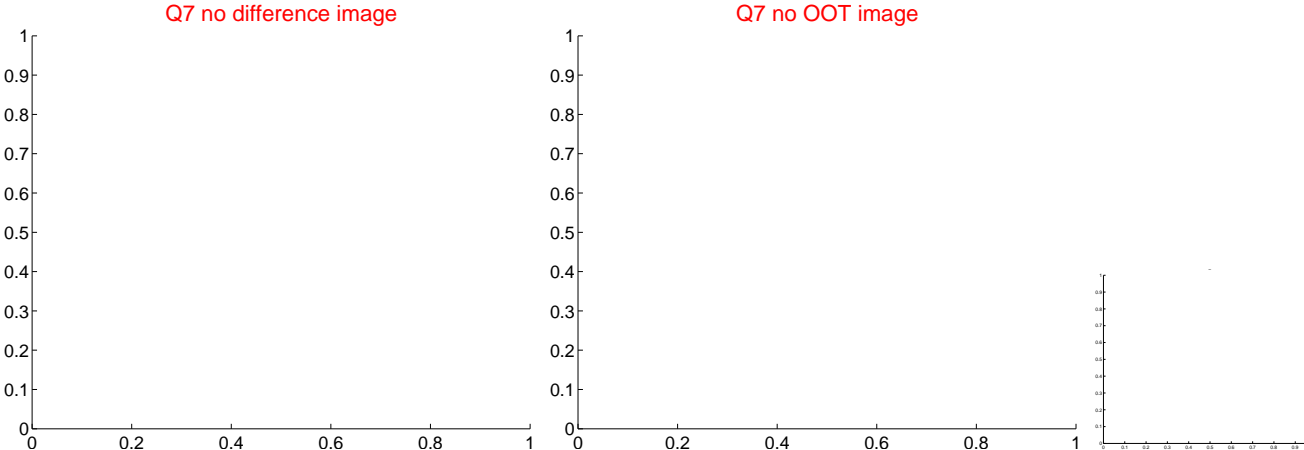
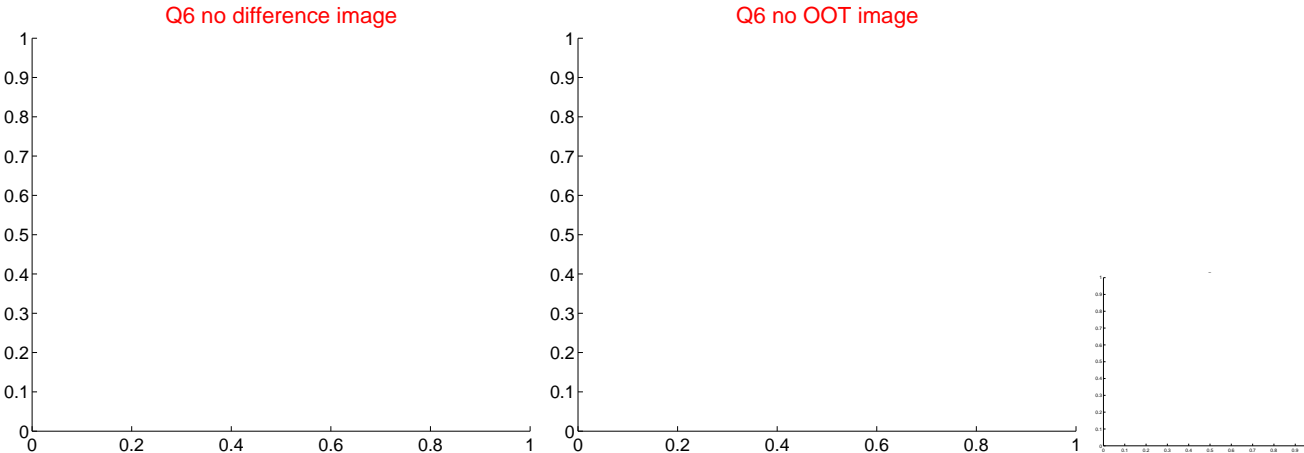
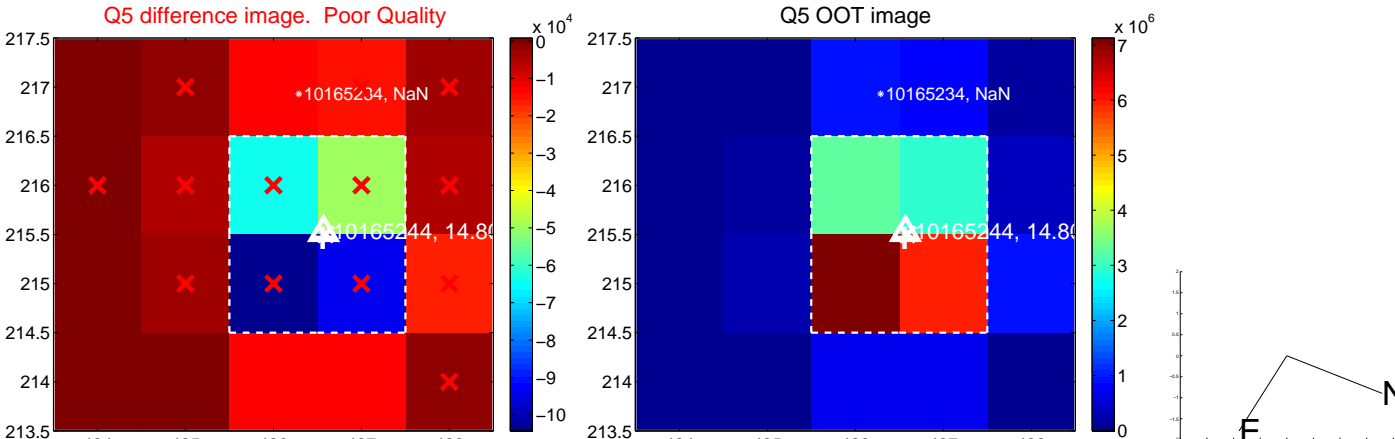


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

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

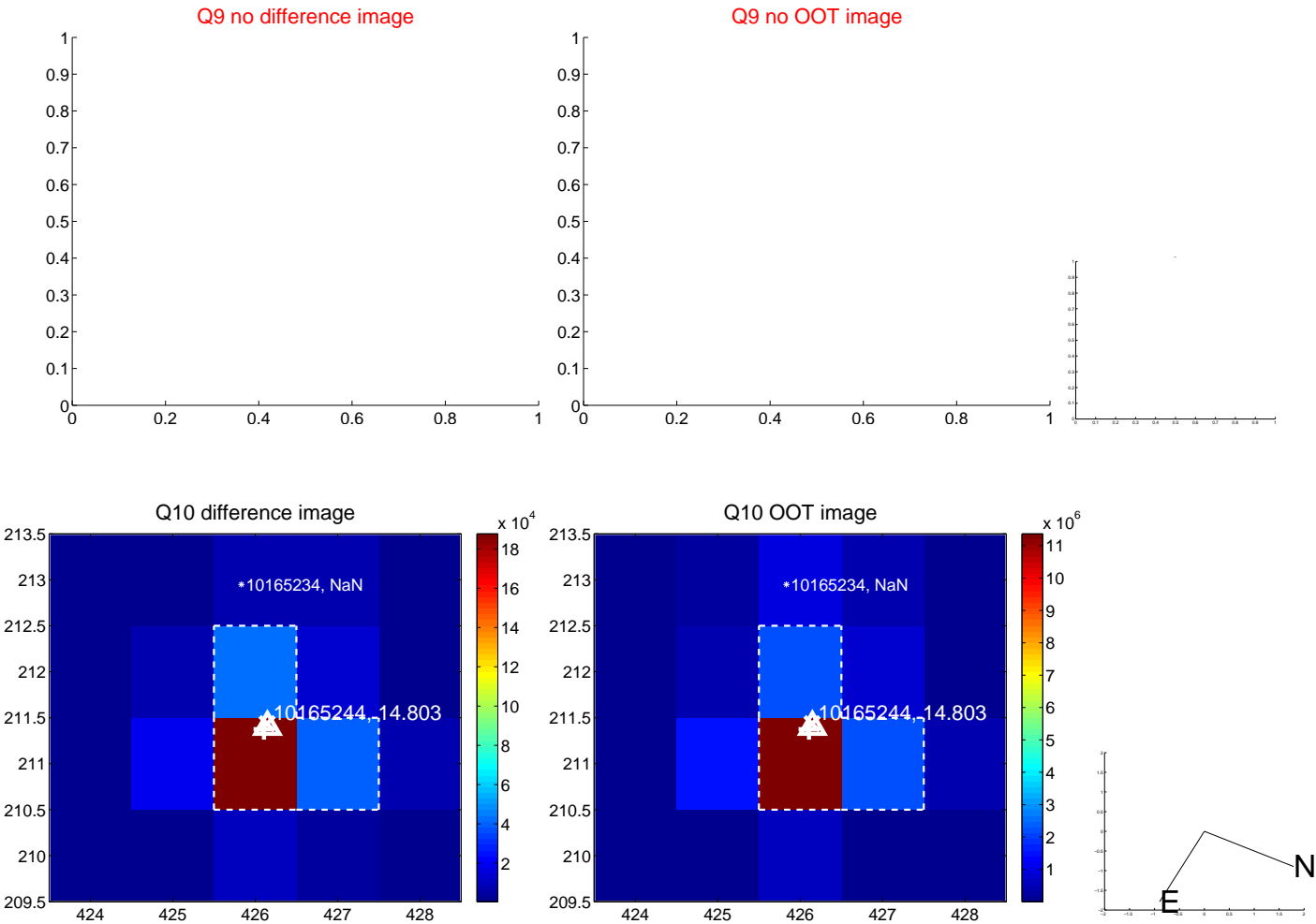


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value

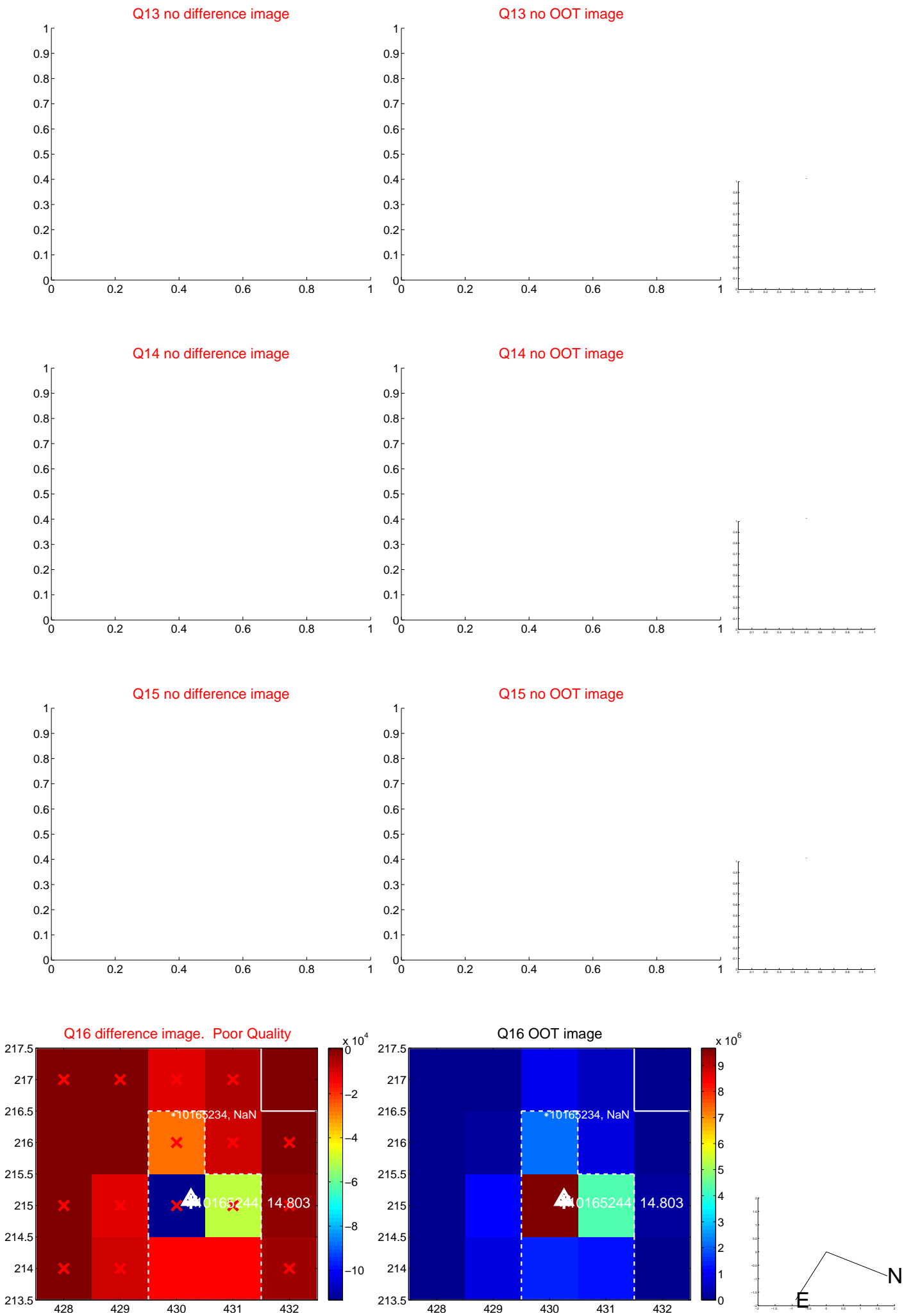




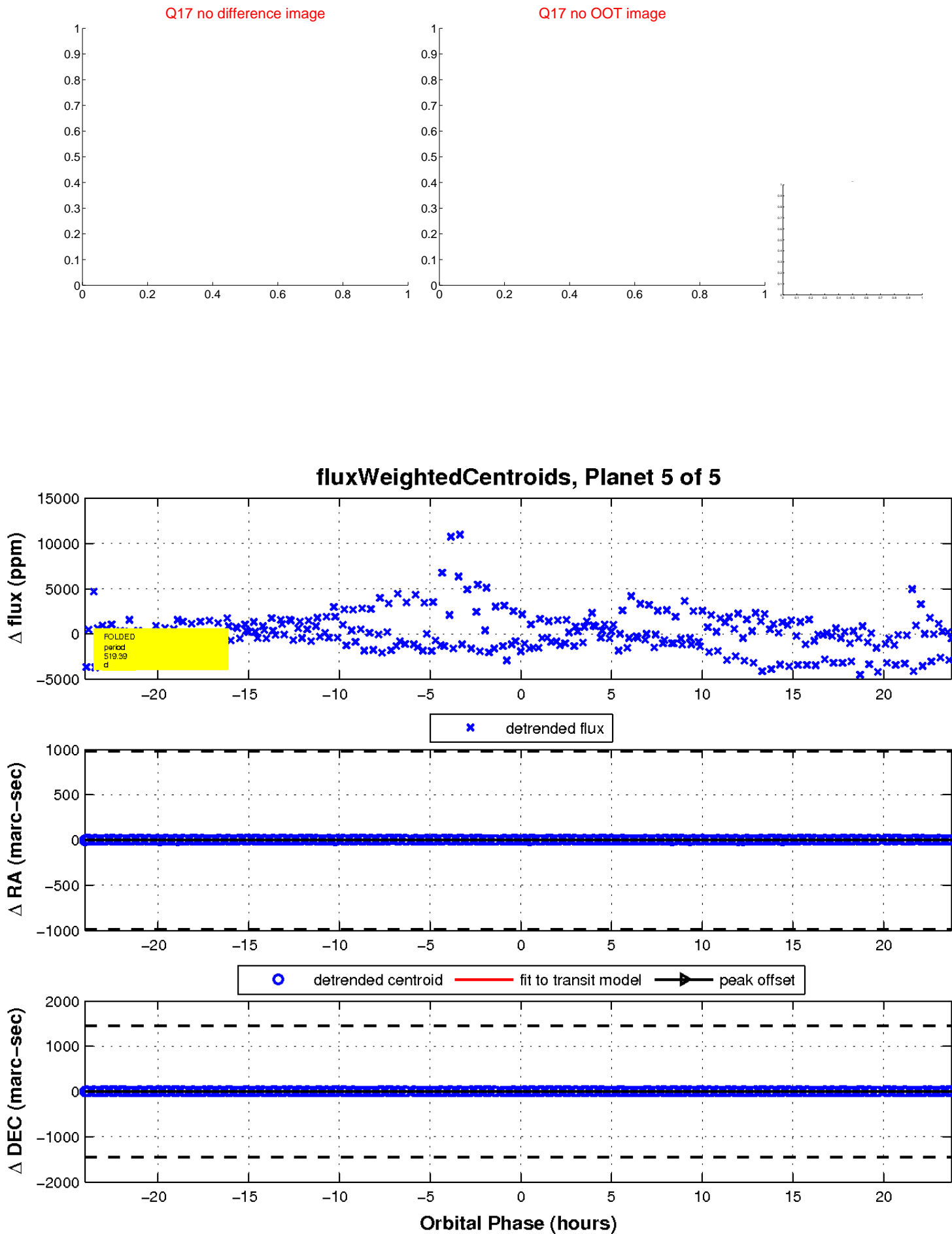
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



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



UKIRT Image

Declination

