

# KIC 010065745

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010065745-01	OBS	No	433.269136	519.782553	2966.8	3.488	13.4	5.6	0.29	3411	1.54	0.02
010065745-02	OBS	No	377.051068	423.087294	3380.7	4.096	11.2	7.6	0.29	3411	1.67	0.02
010065745-03	OBS	No	551.947388	458.018282	3626.5	5.783	9.7	7.2	0.29	3411	1.70	0.01
010065745-04	OBS	No	298.204961	365.418035	2210.0	3.527	10.6	5.6	0.29	3411	1.34	0.03

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010065745-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010065745-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_KIC_POS
010065745-03	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_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010065745-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_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.

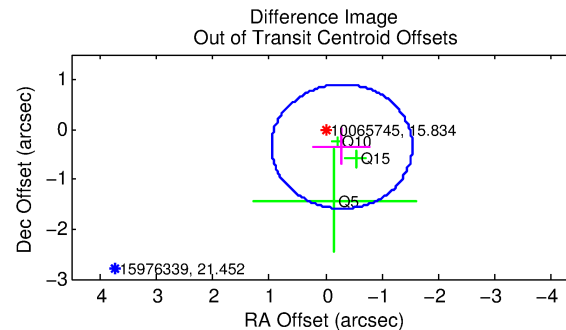
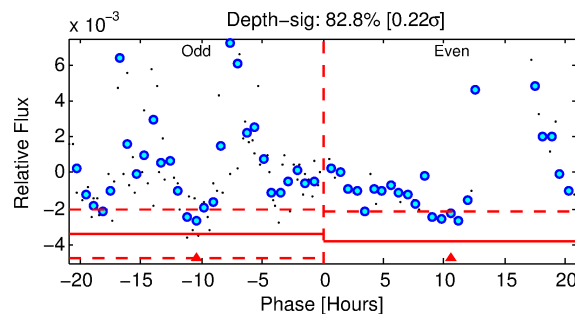
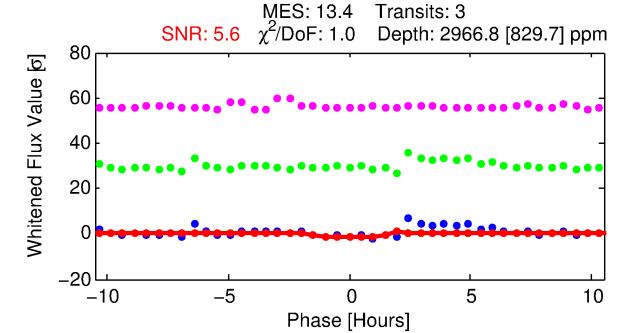
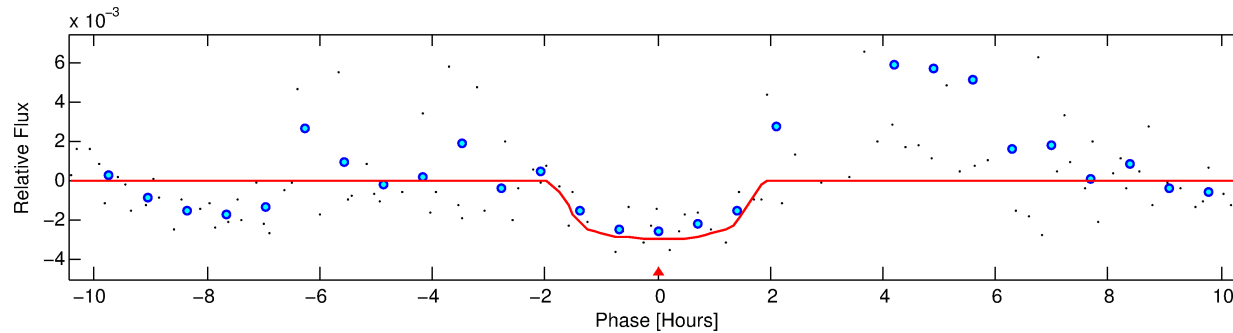
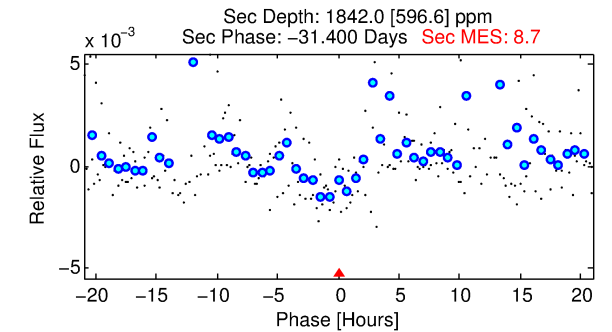
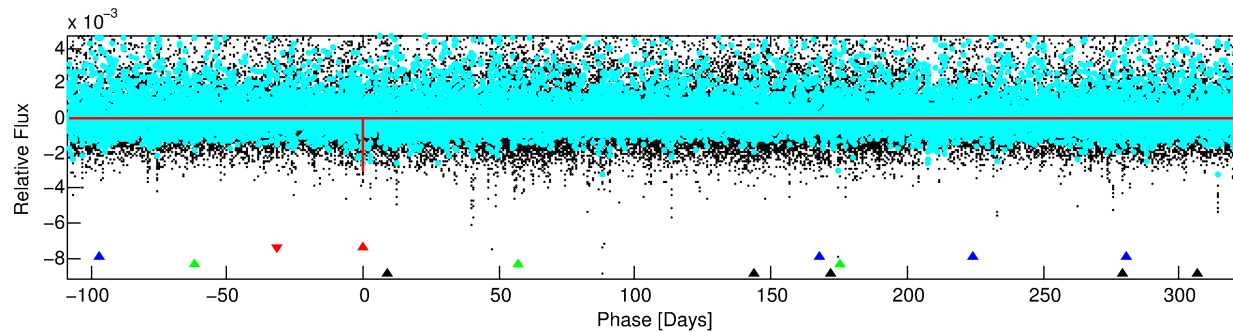
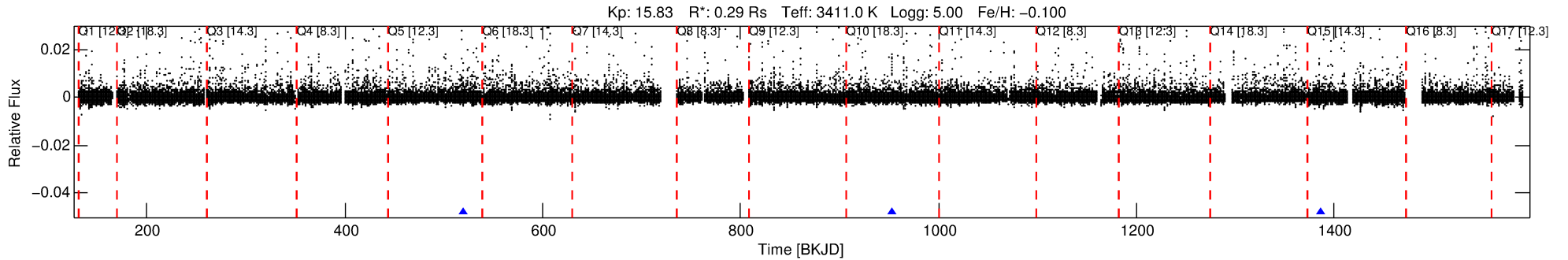
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010065745-01

No Significant Match Found

# DV One-Page Summary

KIC: 10065745 Candidate: 1 of 4 Period: 433.269 d



## DV Fit Results:

Period = 433.26914 [0.00739] d  
Epoch = 519.7826 [0.0098] BKJD  
Rp/R\* = 0.0495 [0.0928]  
a/R\* = 984.27 [8090.26]  
b = 0.16 [50.02]  
Seff = 0.02 [0.00]  
Teq = 93 [3] K  
Rp = 1.55 [2.90] Re  
a = 0.7461 [0.0761] AU  
Ag = 236266.41 [889740.42] [0.27σ]  
Teffp = 3176 [2989] K [1.03σ]

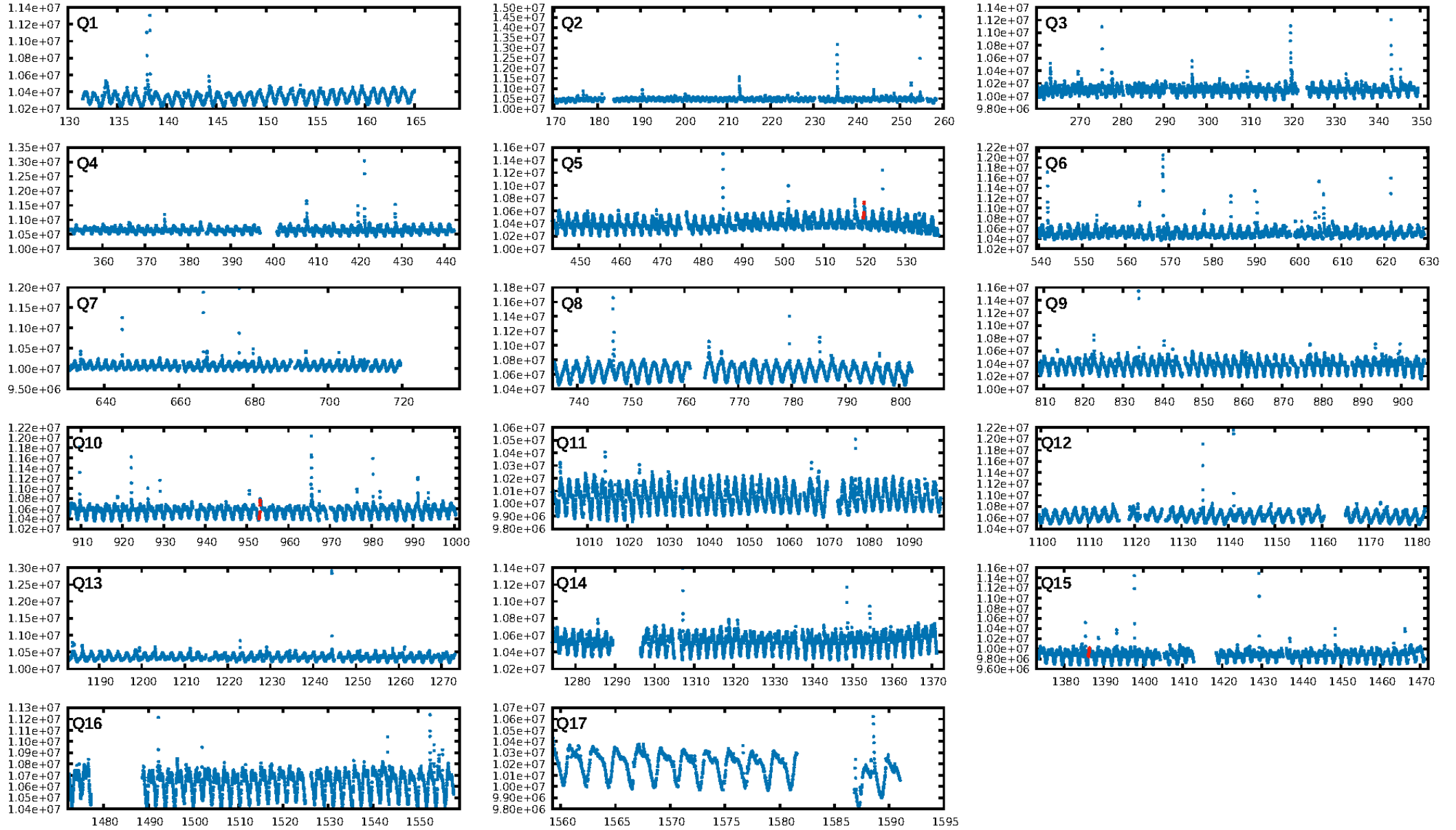
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [250.79σ]  
LongPeriod-sig: 100.0% [421.74σ]  
ModelChiSquare2-sig: 49.3%  
ModelChiSquareGof-sig: 99.8%  
**Bootstrap-pfa: 7.80e-10**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 3.548  
Centroid-sig: 69.9%  
Centroid-so: 0.499 arcsec [0.74σ]  
OotOffset-rm: 0.451 arcsec [1.09σ]  
KicOffset-rm: 0.554 arcsec [1.45σ]  
OotOffset-st: 1/1/0/1 [3]  
KicOffset-st: 1/1/0/1 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

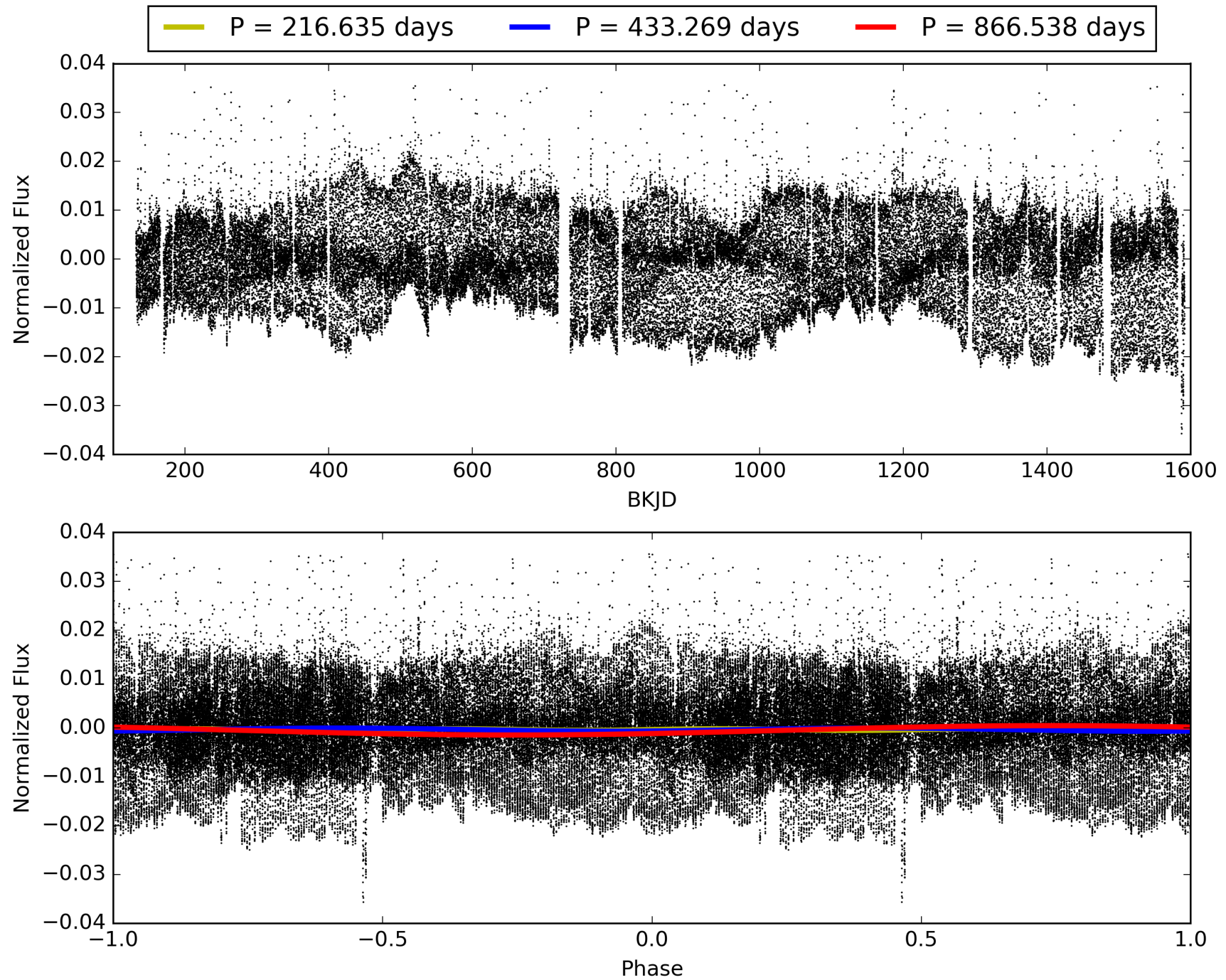
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 03:03:03 Z

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

# TCE 010065745-01, PDC Light Curves



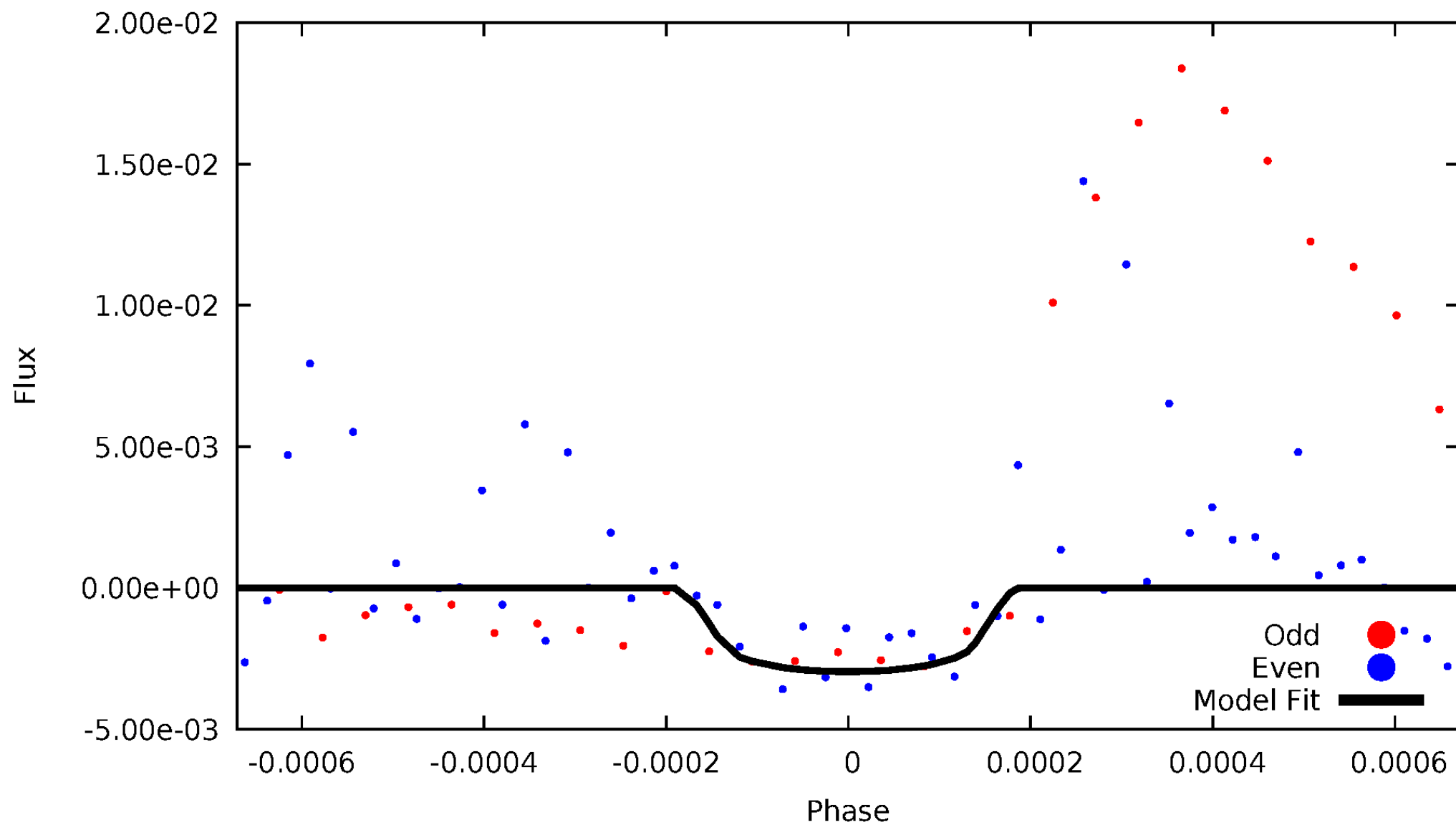
TCE 010065745-01





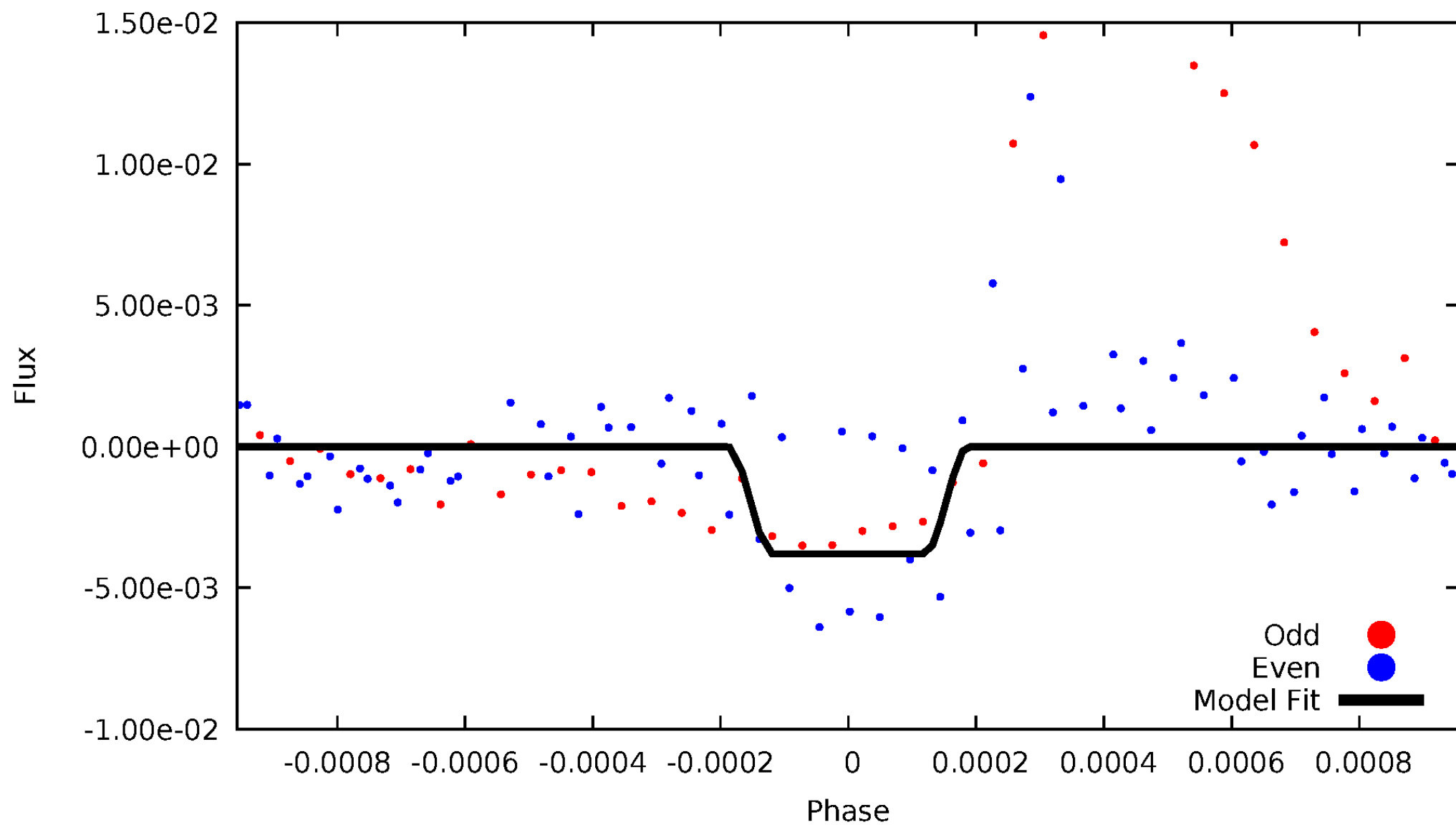
# DV Odd/Even

TCE 010065745-01



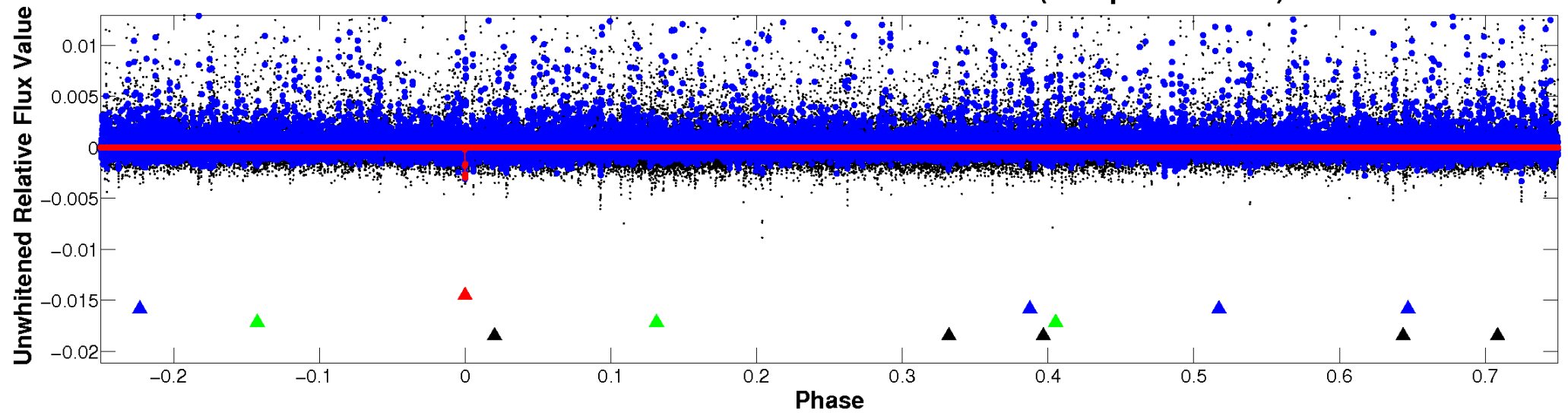
# ALT Odd/Even

TCE 010065745-01

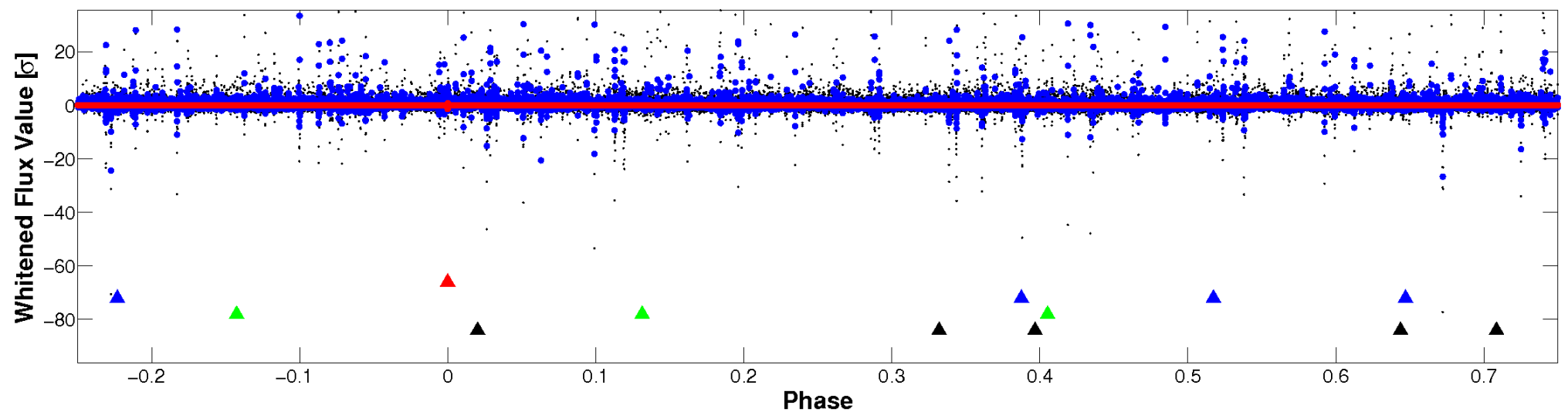


# Non-Whitened Vs. Whitened Light Curve

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

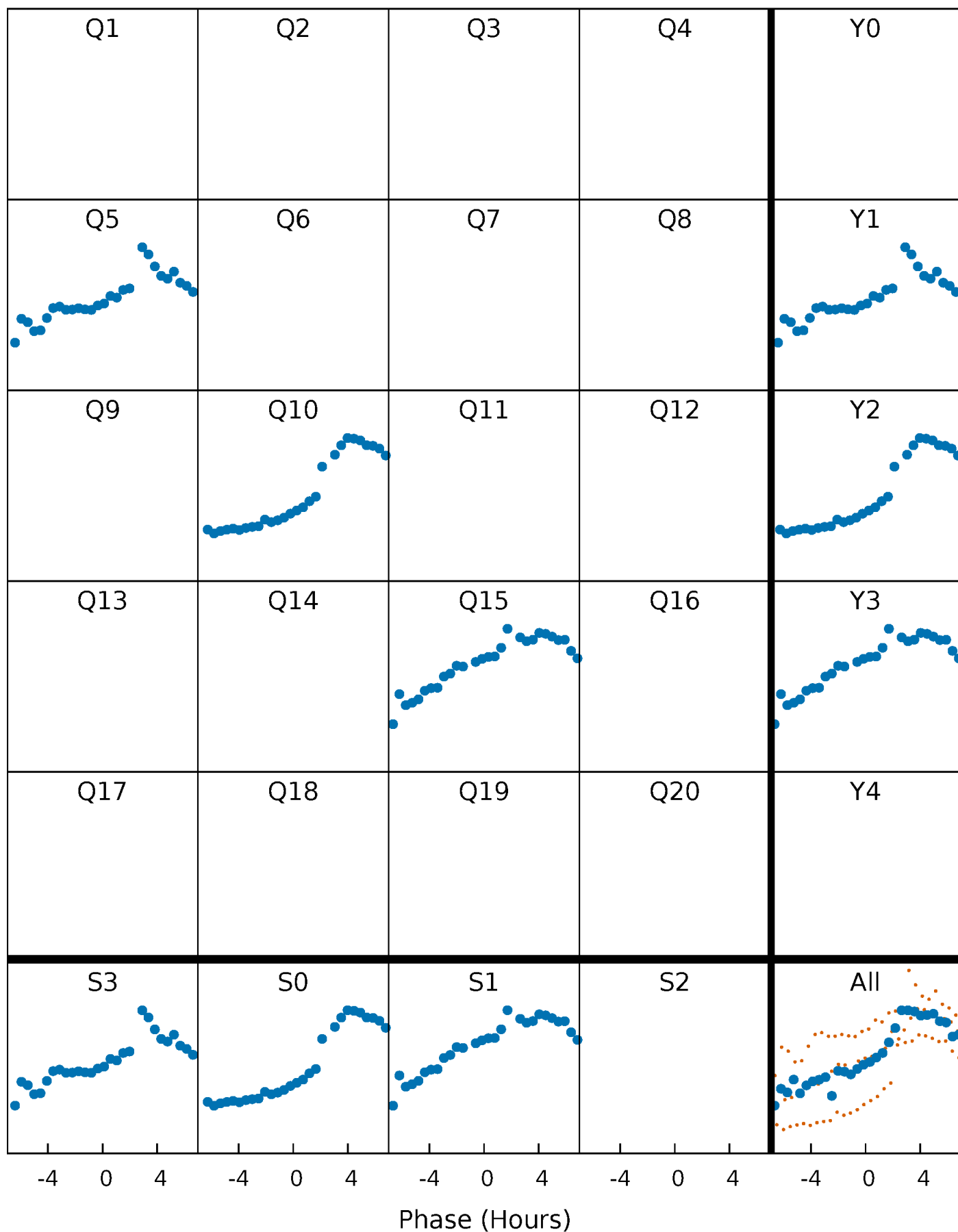


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



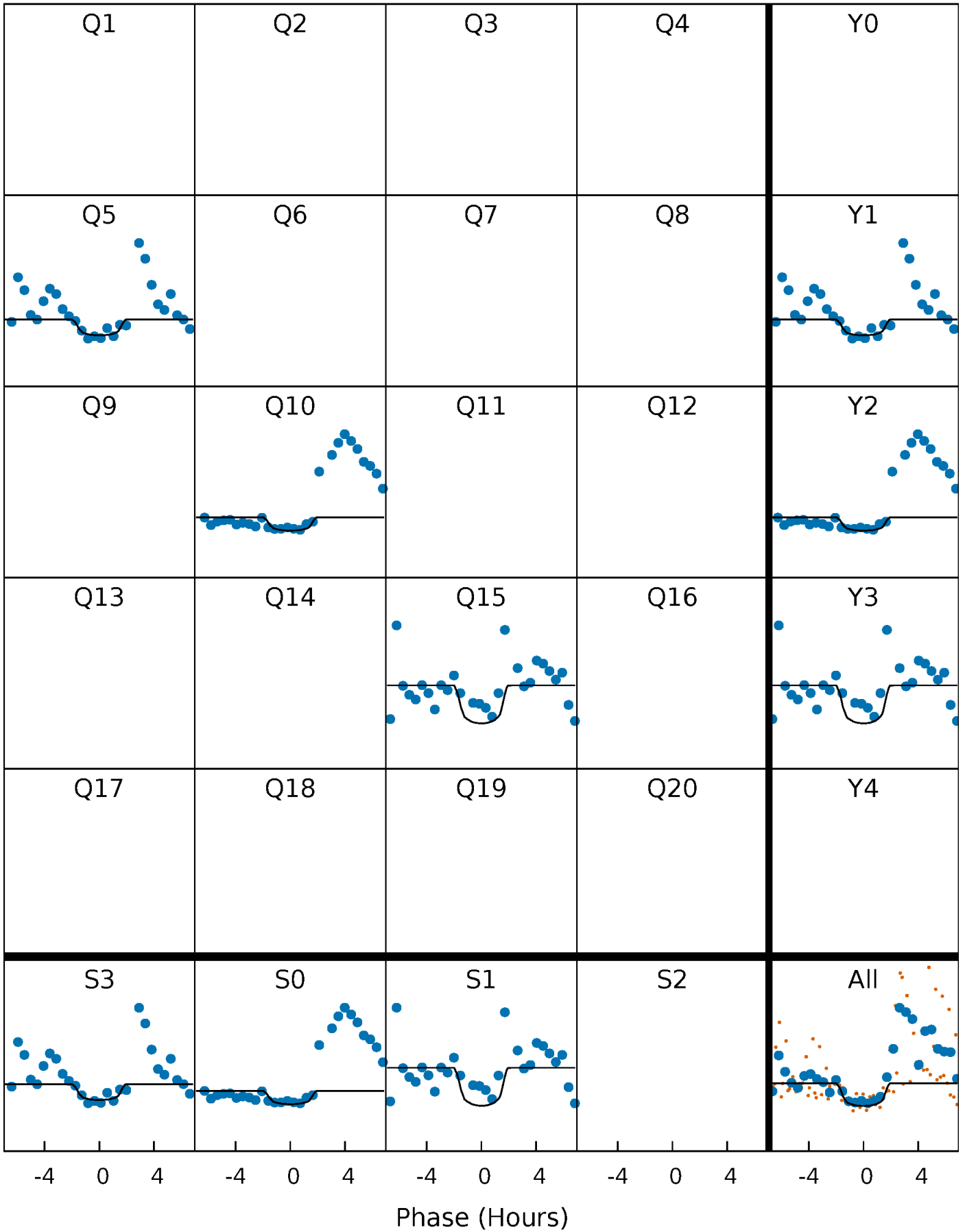
# PDC Quarter-Phased Transit Curves

TCE 010065745-01 P=433.269136 Days  $T_0=519.782553$  (BKJD)



# DV Quarter-Phased Transit Curves

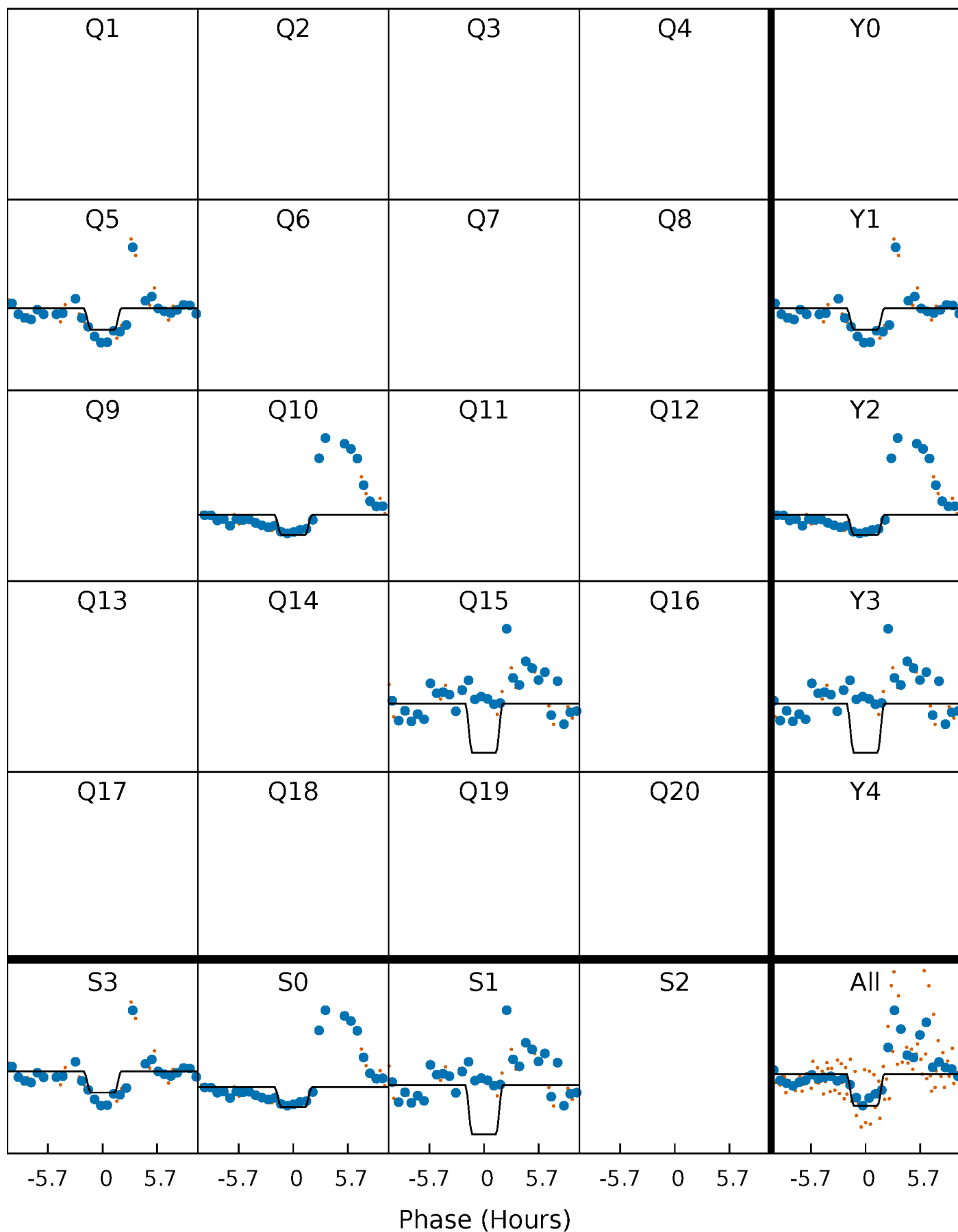
TCE 010065745-01 P=433.269136 Days  $T_0=519.782553$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

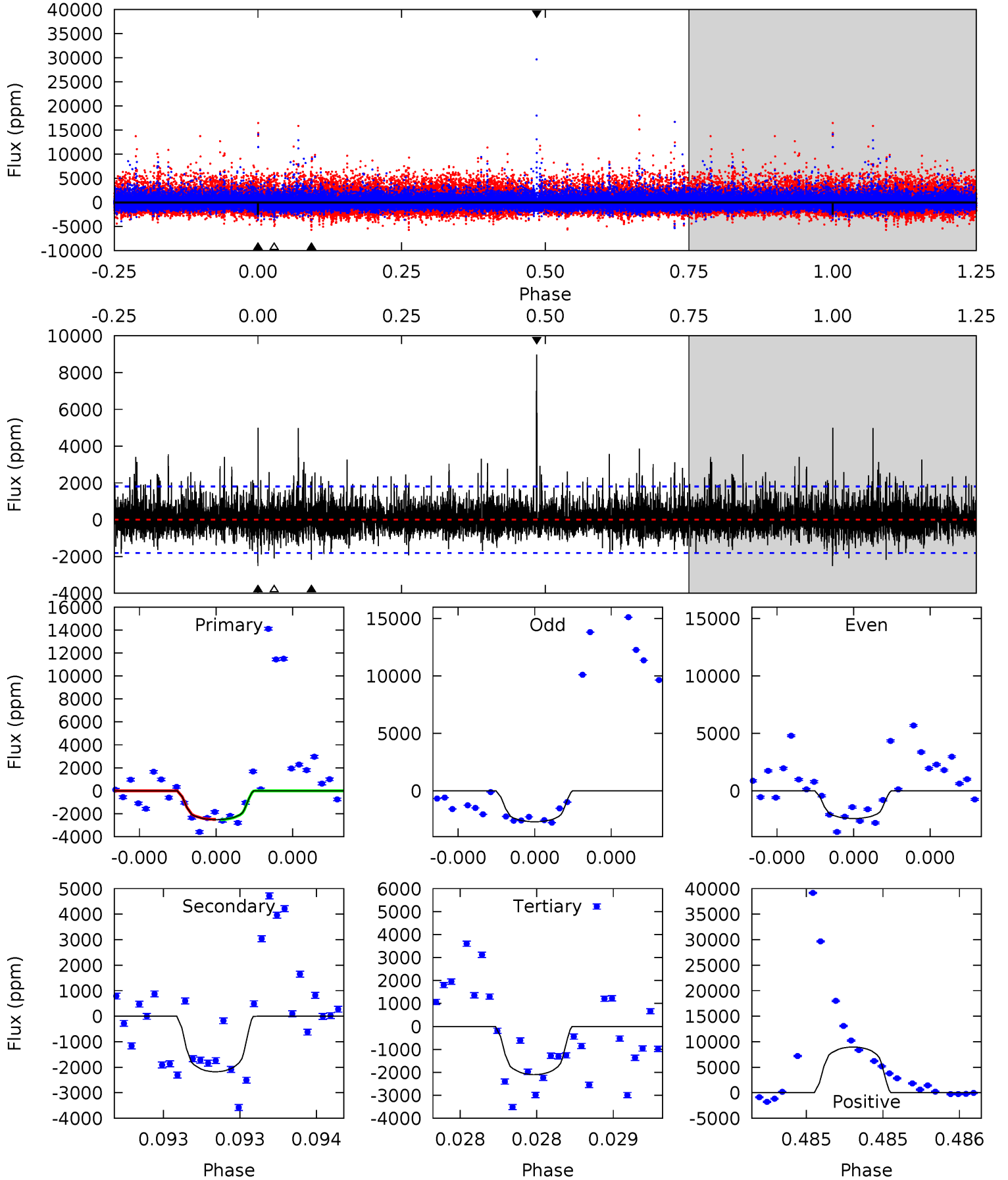
TCE 010065745-01 P=433.266395 Days  $T_0=519.770791$  (BKJD)



# DV Model-Shift Uniqueness Test

010065745-01, P = 433.269136 Days, E = 86.513417 Days

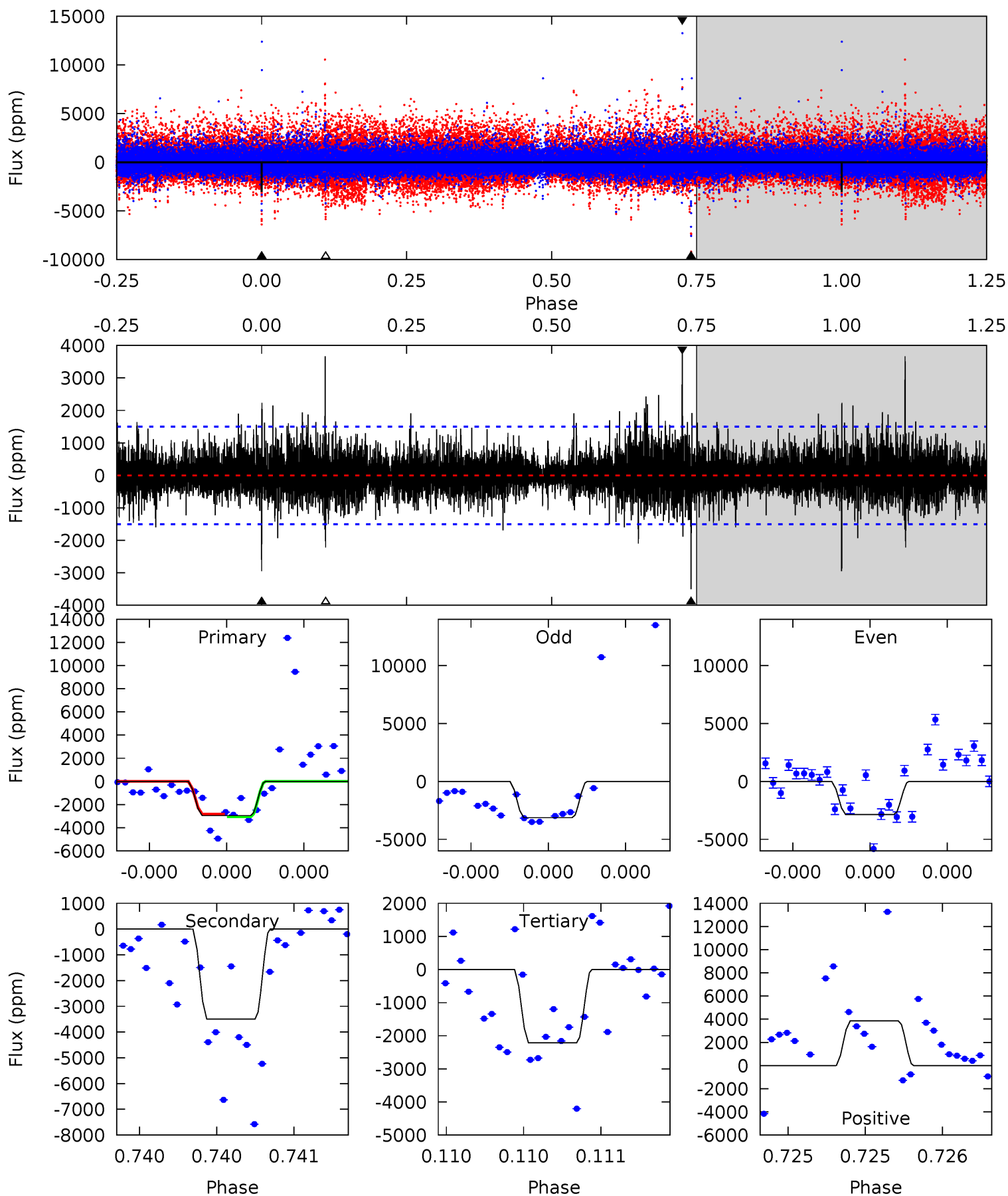
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.84	6.79	6.54	27.9	5.62	3.56	2.04	1.30	-20.1	0.25	-21.1	0.26	0.92	0.78	0.05



# Alt Model-Shift Uniqueness Test

010065745-01, P = 433.266395 Days, E = 86.504396 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
11.1	13.1	8.28	14.4	5.62	3.56	1.85	2.77	-3.35	4.82	-1.30	0.46	0.89	0.52	0.45



### Stellar Parameters For KIC 010065745

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3411^{+40}_{-45}$	$4.995^{+0.031}_{-0.054}$	$-0.100^{+0.100}_{-0.100}$	$0.286^{+0.040}_{-0.029}$	$0.294^{+0.039}_{-0.047}$	$17.760^{+3.848}_{-4.083}$
	+1%/-1%	+1%/-1%	+100%/-100%	+14%/-10%	+13%/-16%	+22%/-23%
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 010065745-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-2179 \pm 321$	$2.60^{+2.43}_{-1.73}$	$131^{+3}_{-3}$	$2887^{+1151}_{-458}$	$100768^{+744664}_{-75501}$
Alt.	$-3501 \pm 267$	$2.98^{+2.32}_{-2.01}$	$131^{+3}_{-3}$	$2969^{+1349}_{-422}$	$121642^{+1041300}_{-84370}$

$T_{\text{max}}$  = 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

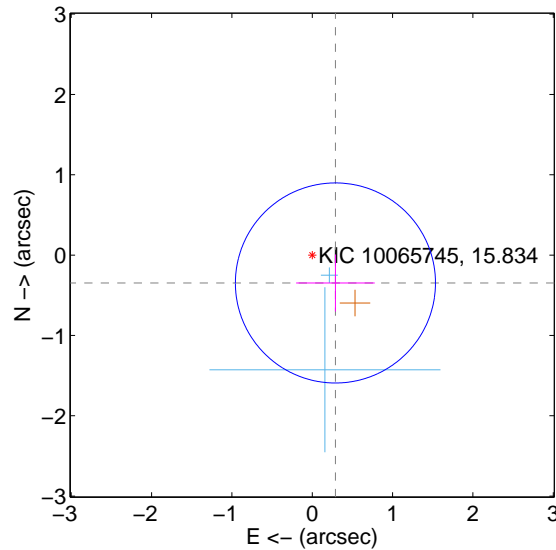
Supplemental centroid analysis for 010065745-01. Kepler magnitude: 15.83. Transit SNR 5.63

There are 2 quarters with good PRF difference image offsets

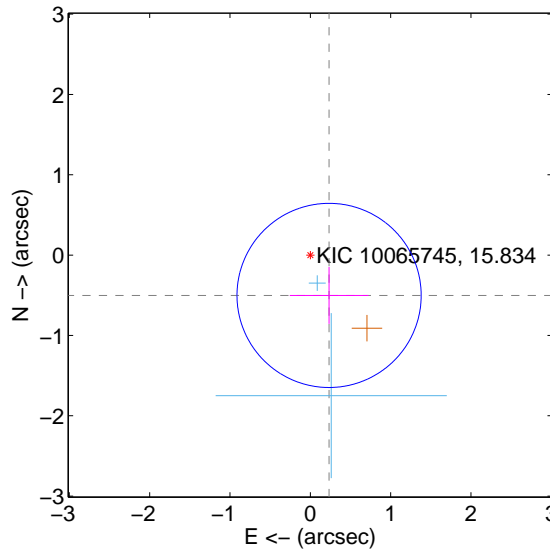
The direct PRF centroid is offset from the target star catalog position by about 0.36 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.451 \pm 0.415$	1.09	$-0.289 \pm 0.489$	$-0.347 \pm 0.355$
PRF-fit source offset from KIC position	$0.554 \pm 0.382$	1.45	$-0.234 \pm 0.489$	$-0.502 \pm 0.355$
photometric centroid source offset	$0.50 \pm 0.67$	0.74	$0.29 \pm 0.69$	$-0.40 \pm 0.66$

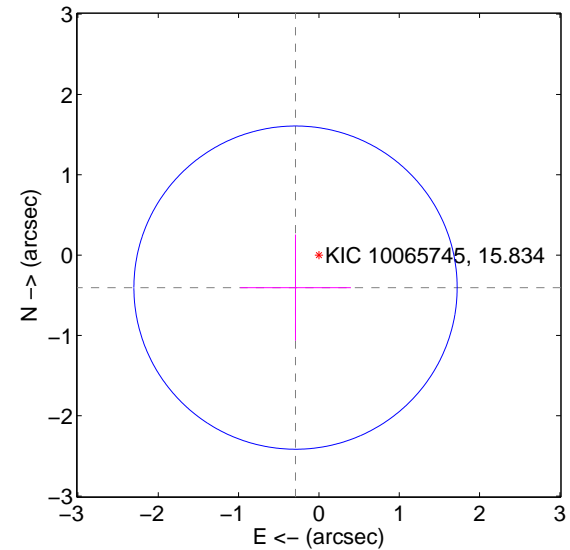
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids



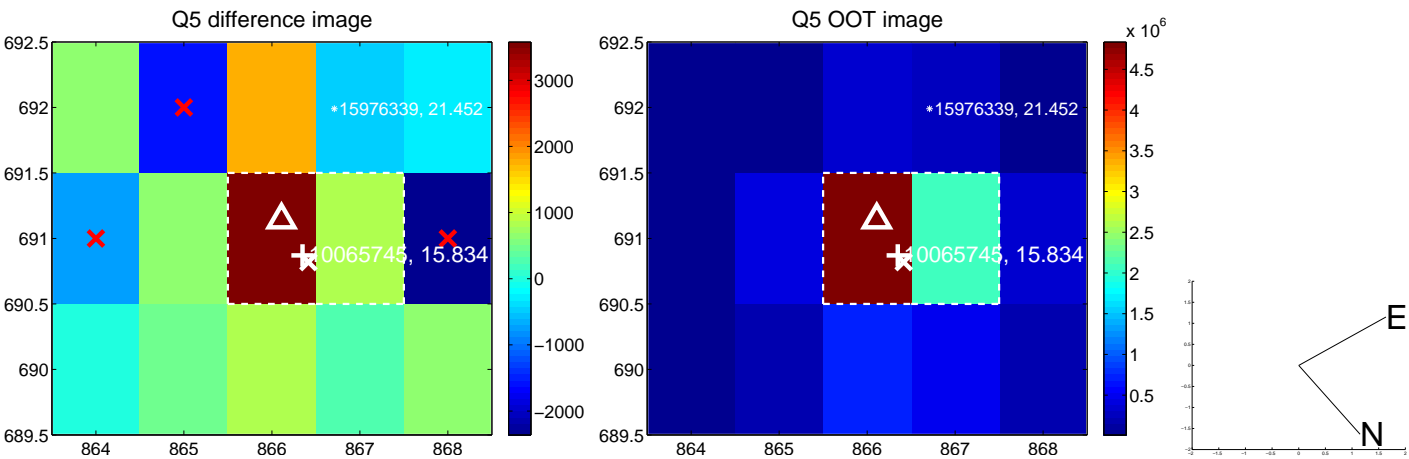
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



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.

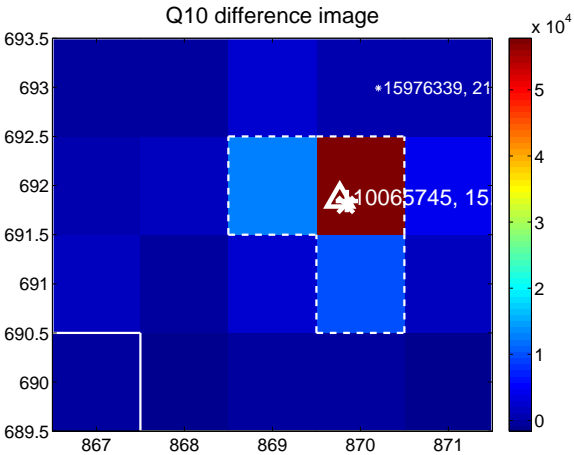
Q9 no difference image



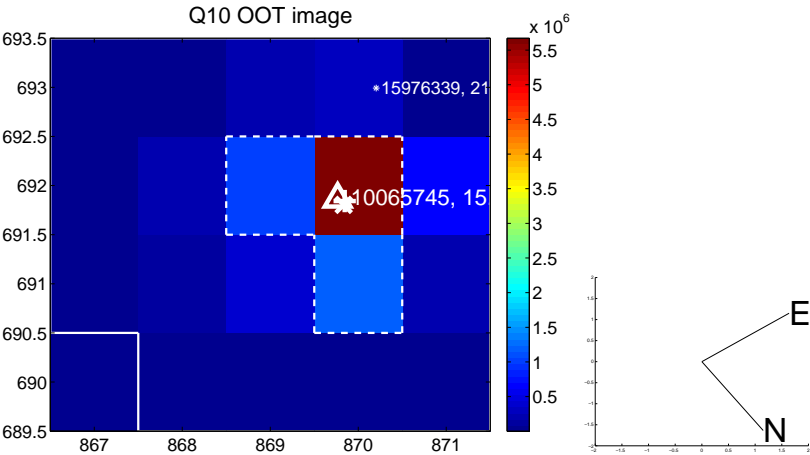
Q9 no OOT image



Q10 difference image



Q10 OOT image



Q11 no difference image



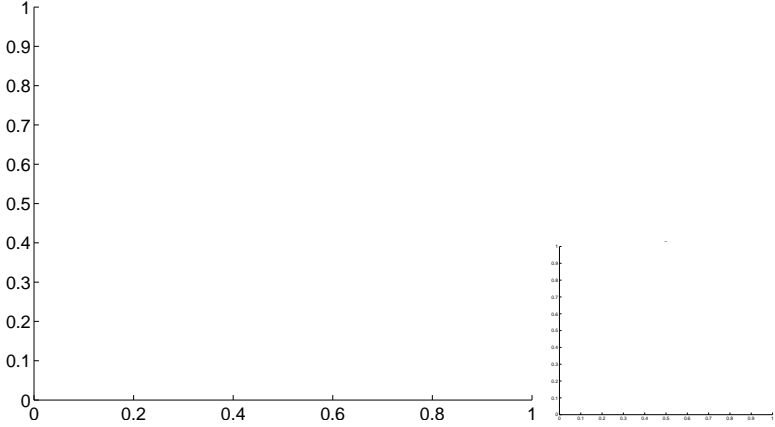
Q11 no OOT image



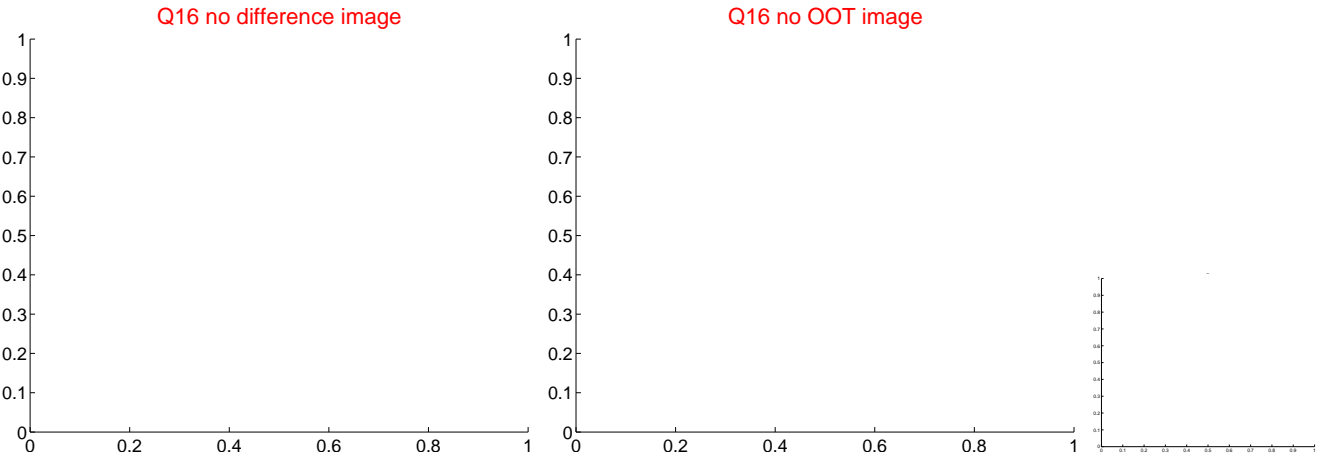
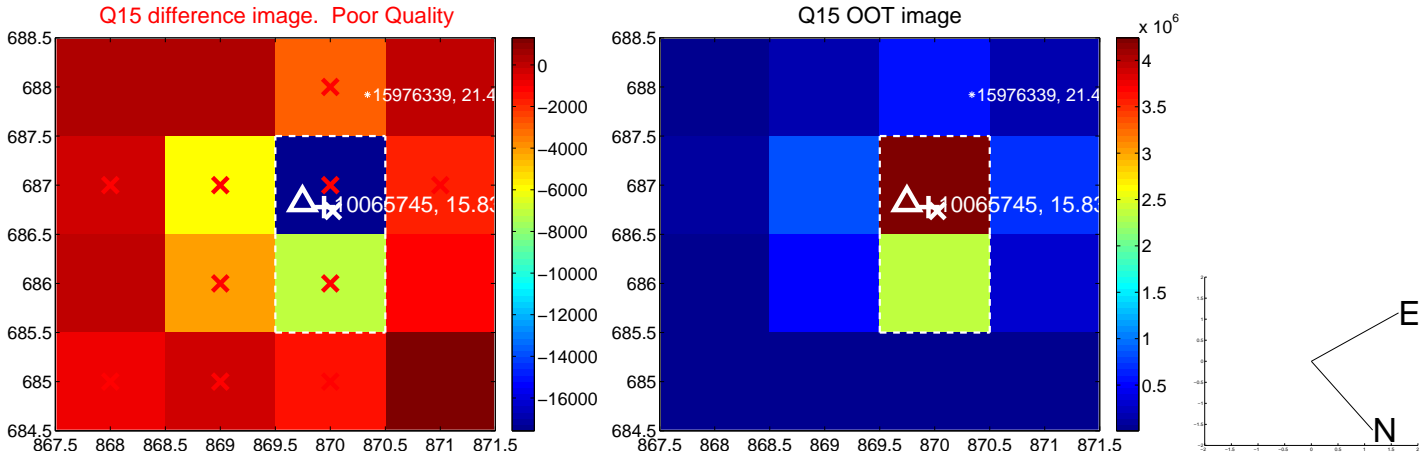
Q12 no difference image



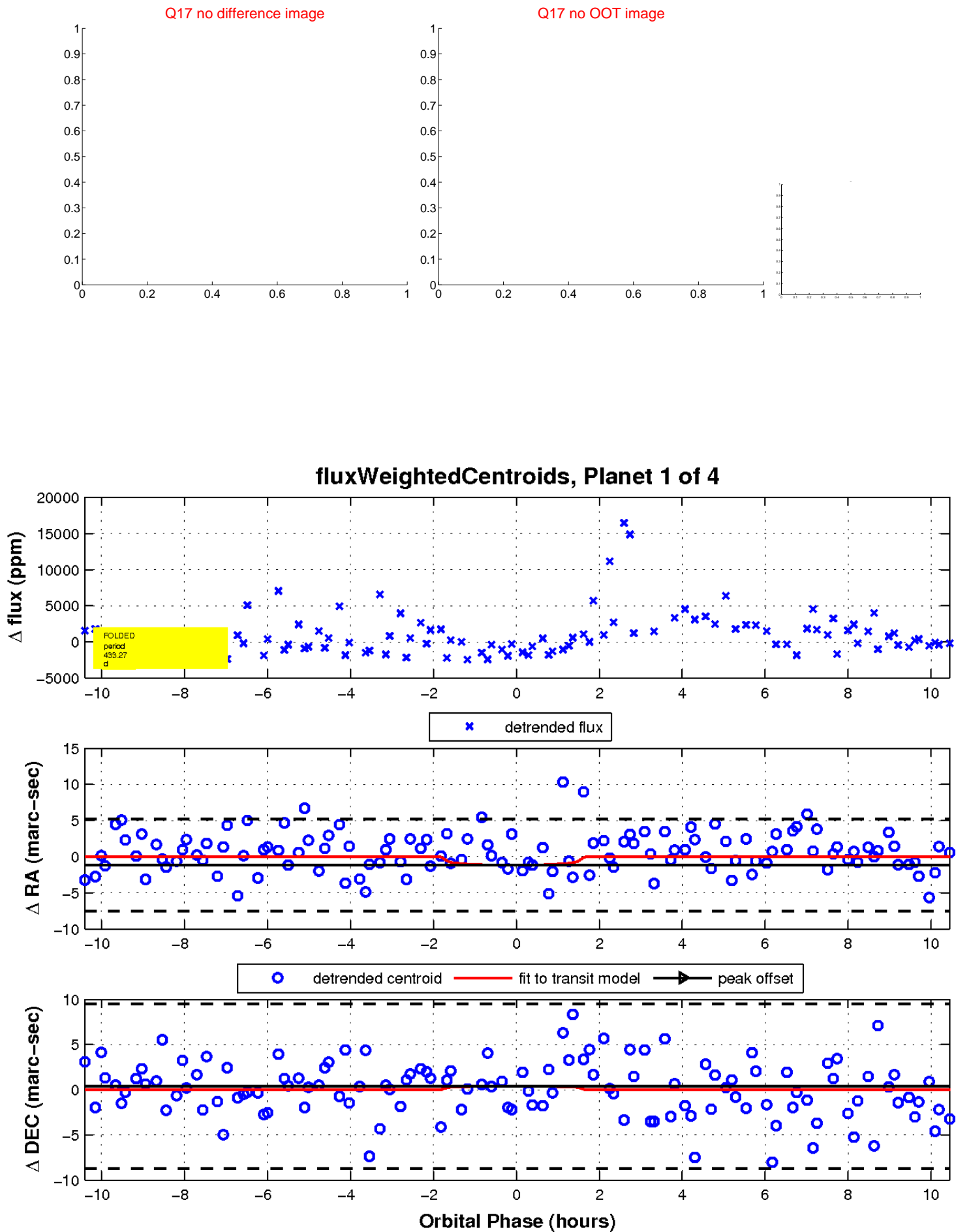
Q12 no OOT image



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



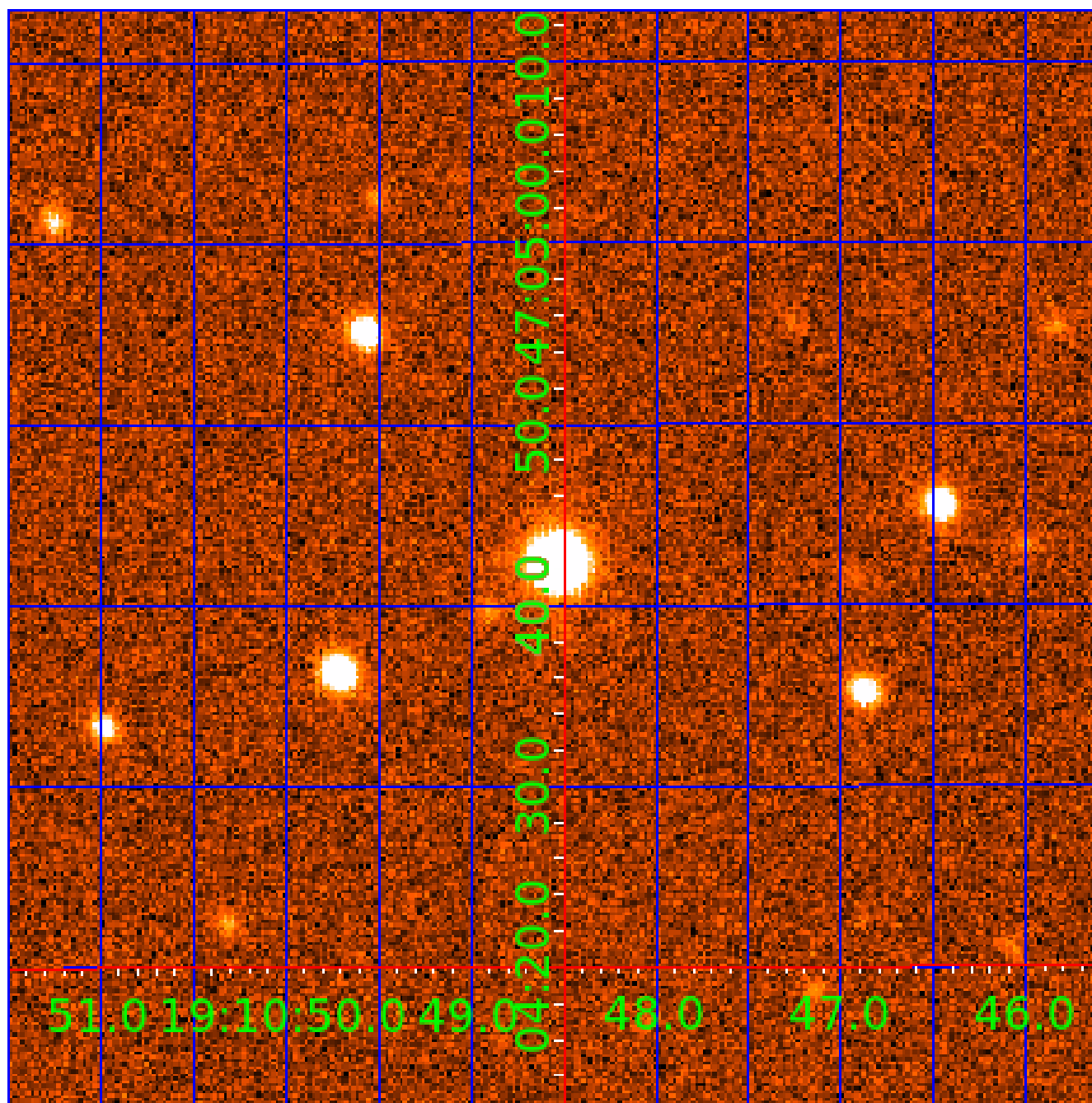
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





# UKIRT Image

Declination



# KIC 010065745

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010065745-01	OBS	No	433.269136	519.782553	2966.8	3.488	13.4	5.6	0.29	3411	1.54	0.02
010065745-02	OBS	No	377.051068	423.087294	3380.7	4.096	11.2	7.6	0.29	3411	1.67	0.02
010065745-03	OBS	No	551.947388	458.018282	3626.5	5.783	9.7	7.2	0.29	3411	1.70	0.01
010065745-04	OBS	No	298.204961	365.418035	2210.0	3.527	10.6	5.6	0.29	3411	1.34	0.03

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010065745-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010065745-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_KIC_POS
010065745-03	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_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010065745-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_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.

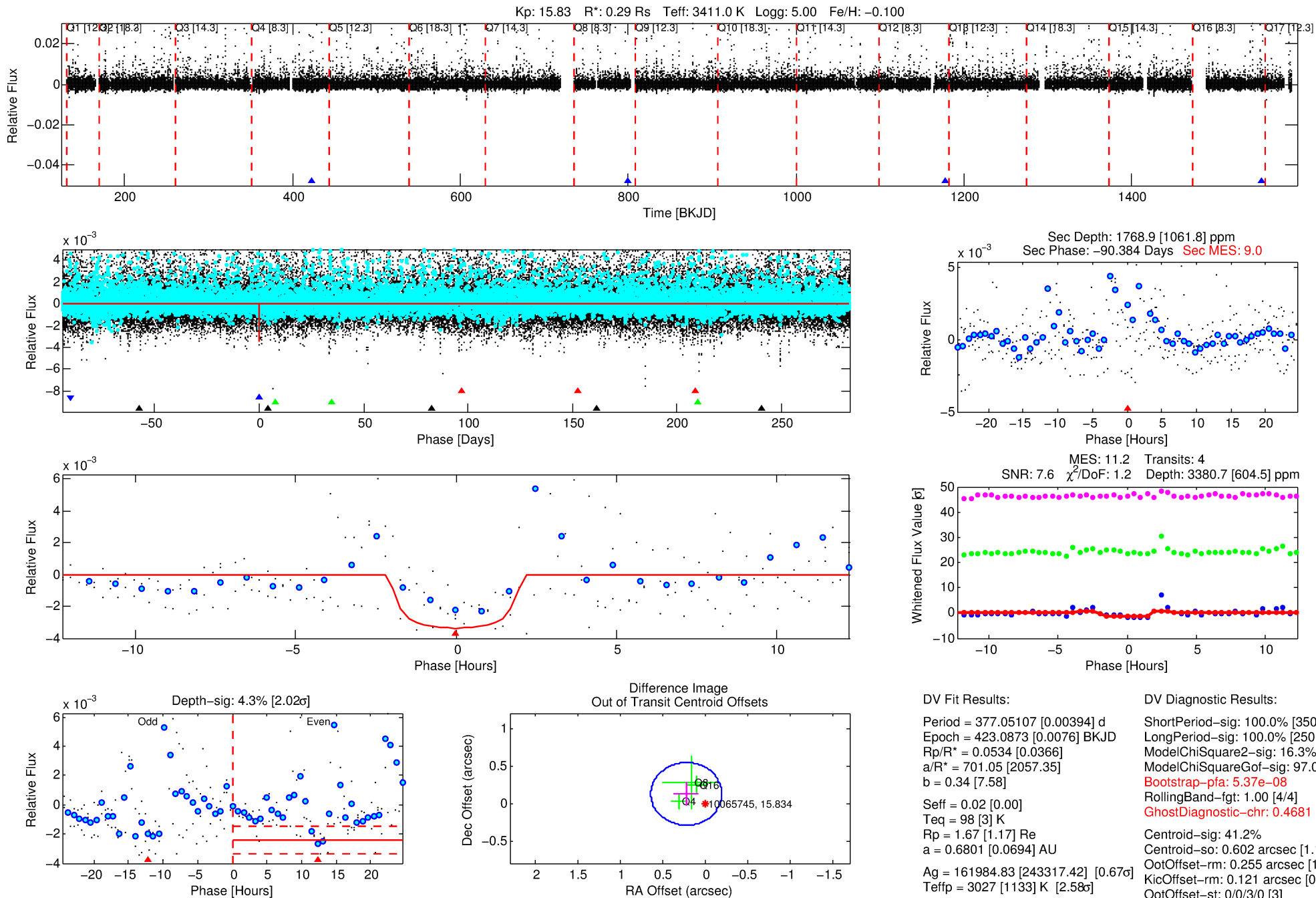
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010065745-02

No Significant Match Found

# DV One-Page Summary

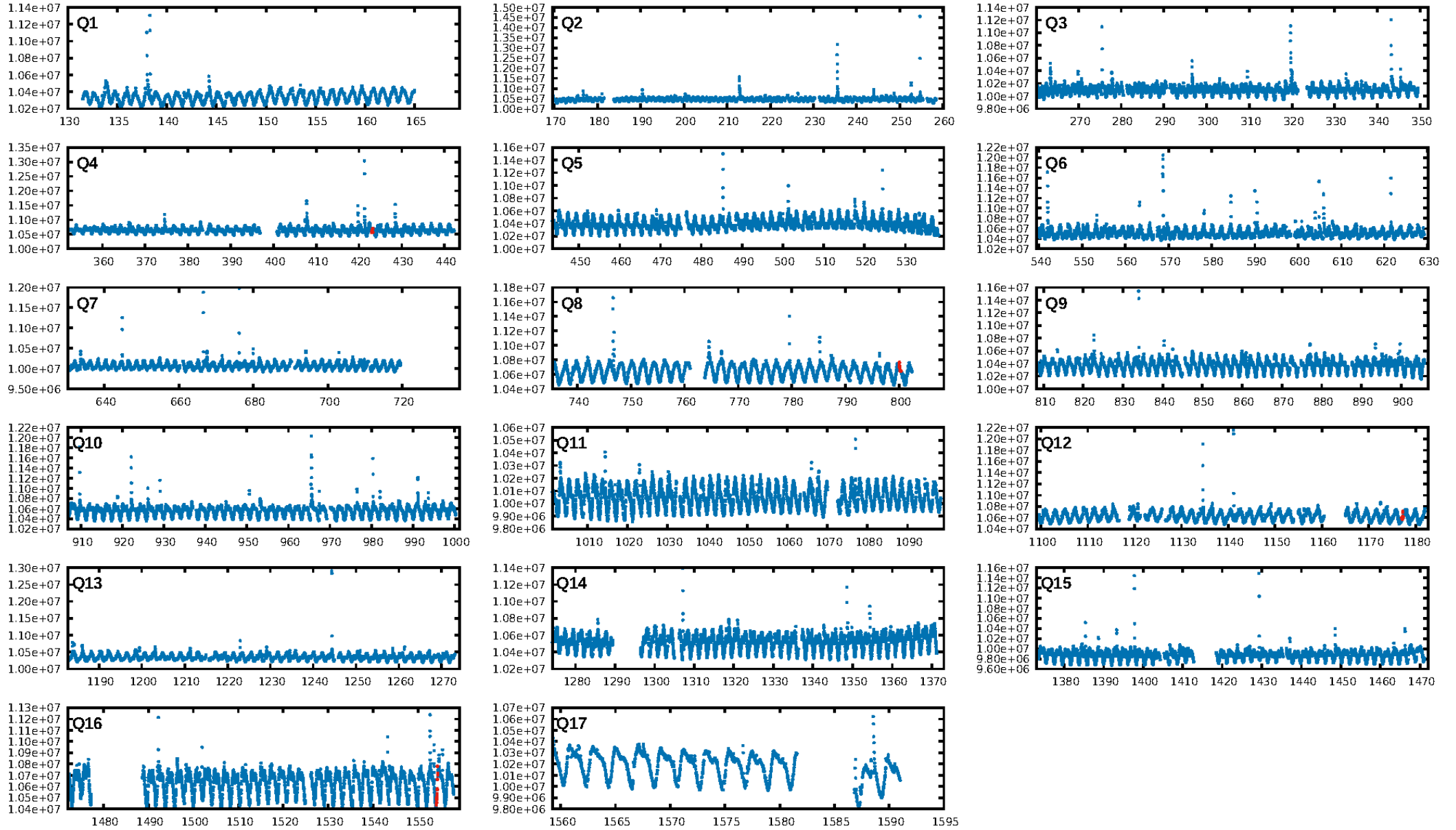
KIC: 10065745 Candidate: 2 of 4 Period: 377.051 d



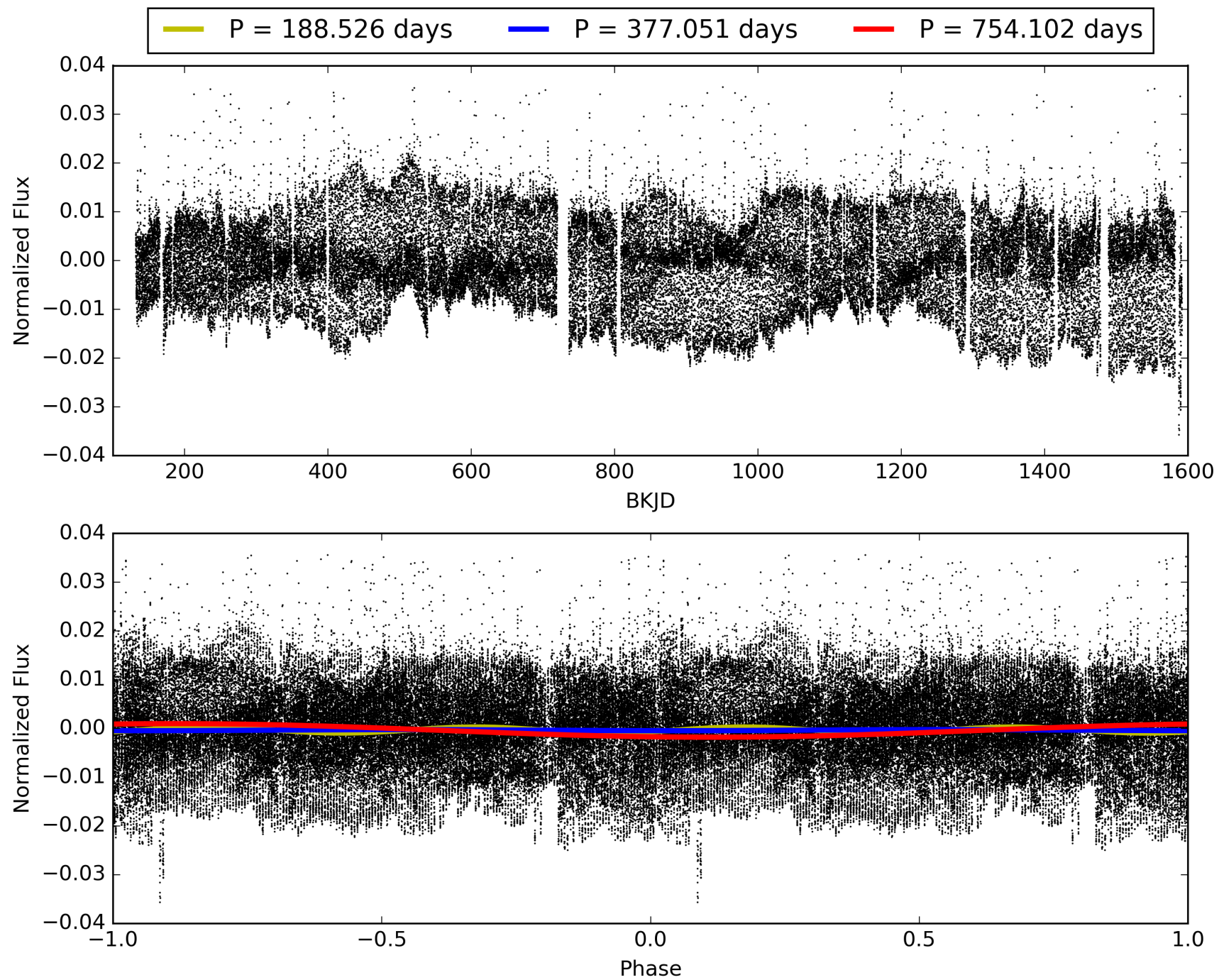
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 03:03:18 Z

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

# TCE 010065745-02, PDC Light Curves



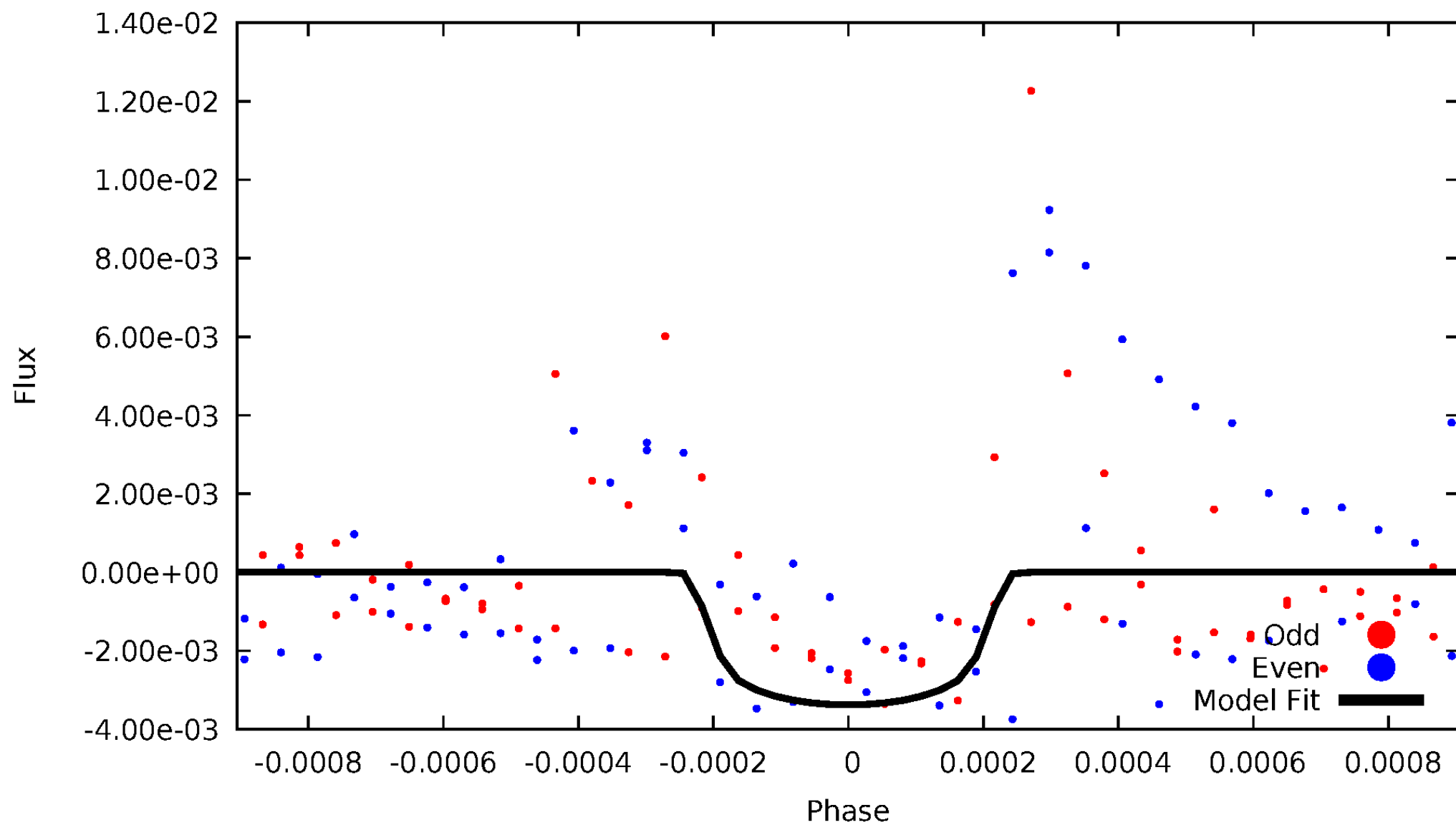
TCE 010065745-02





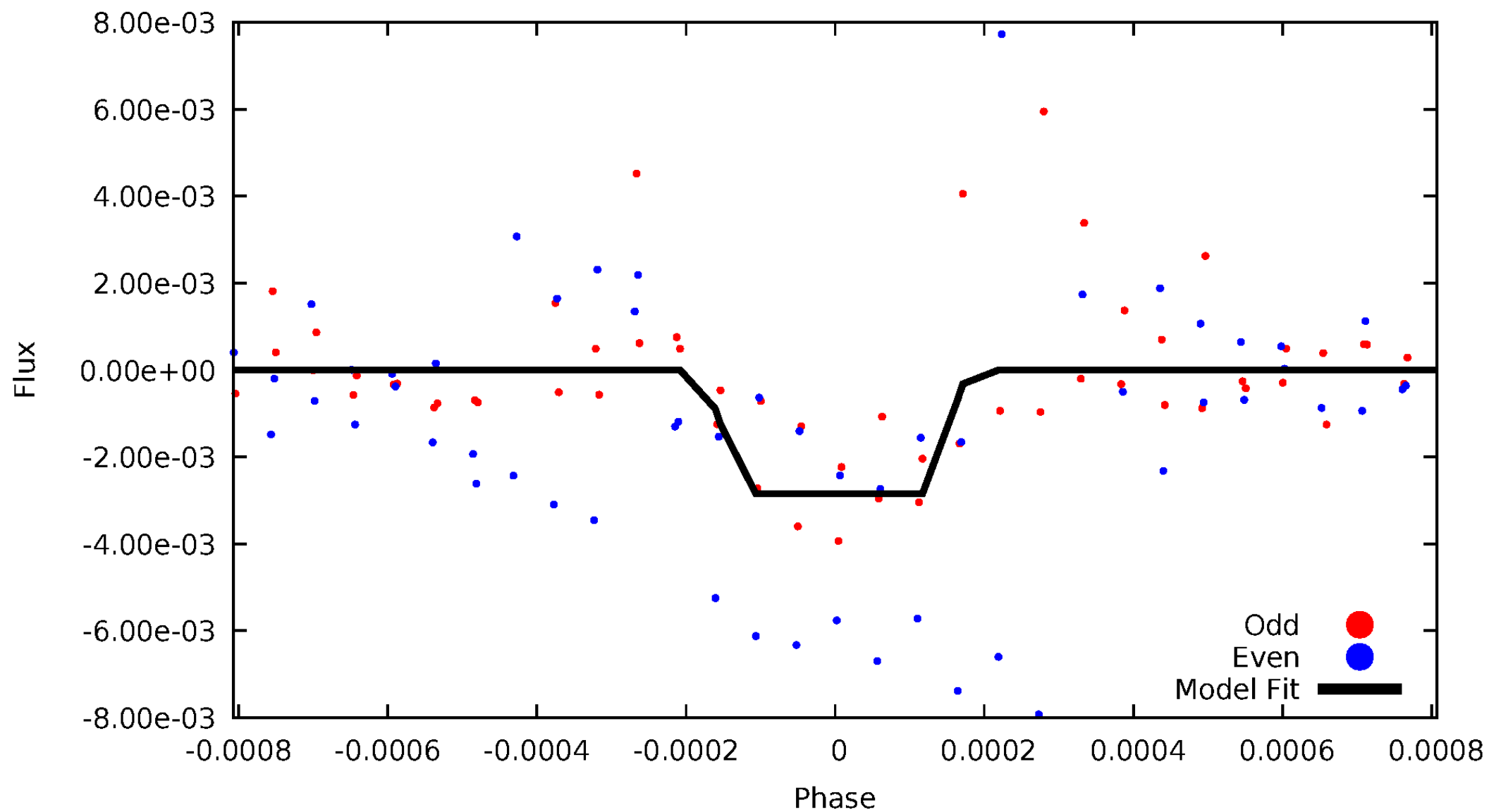
# DV Odd/Even

TCE 010065745-02



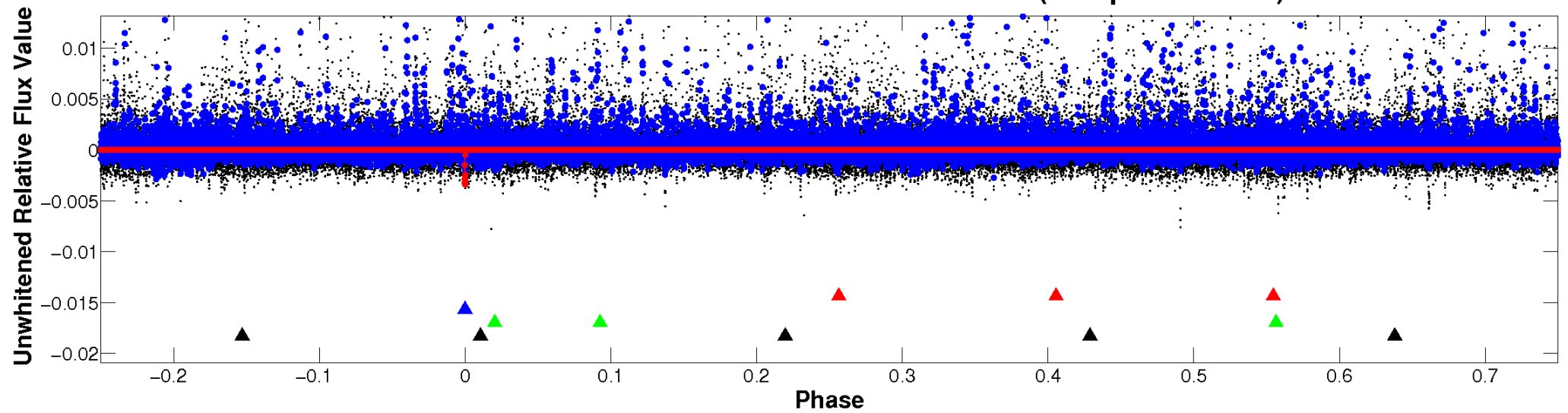
# ALT Odd/Even

TCE 010065745-02

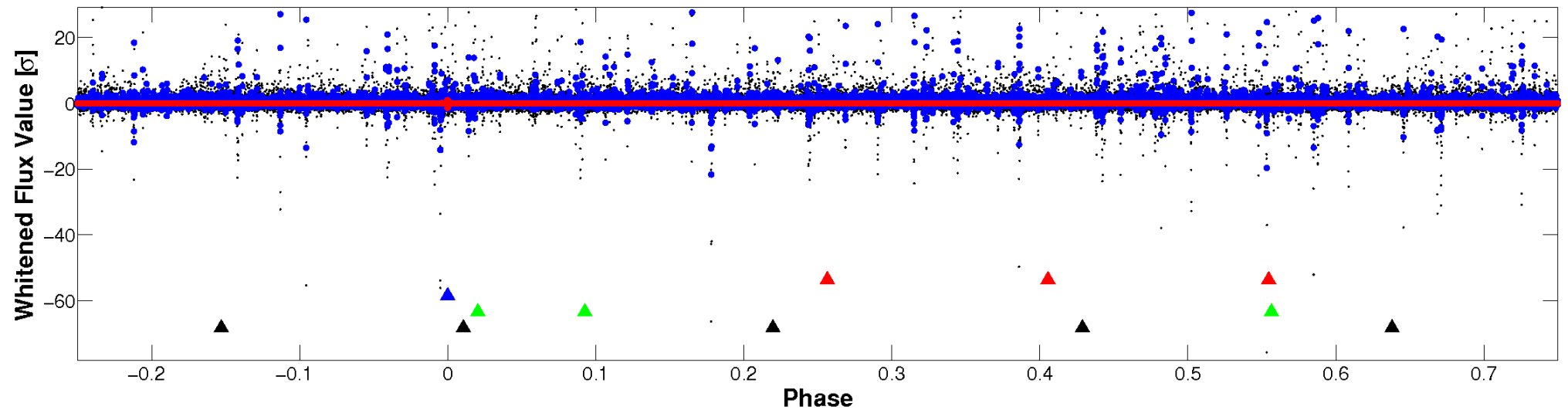


# Non-Whitened Vs. Whitened Light Curve

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

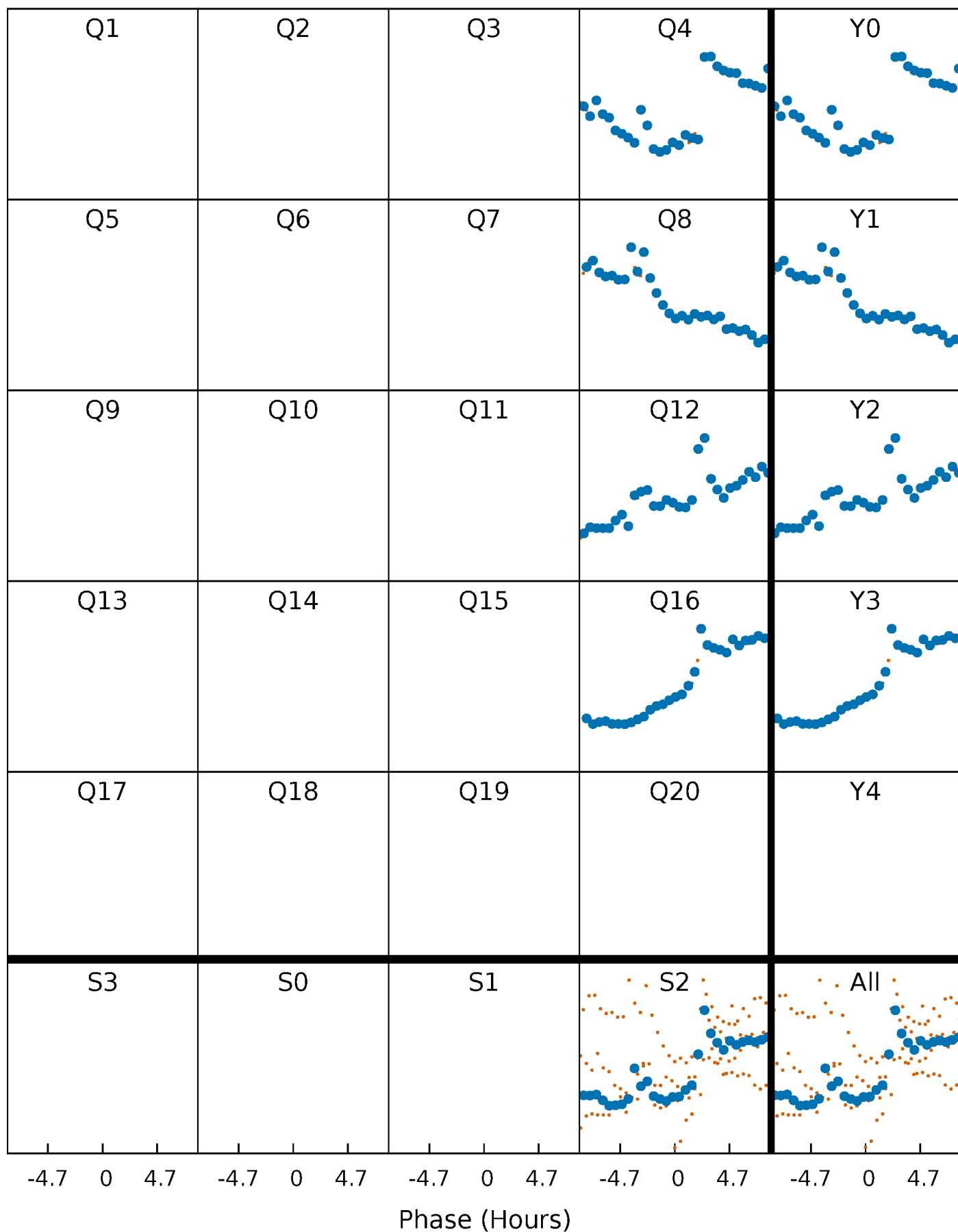


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



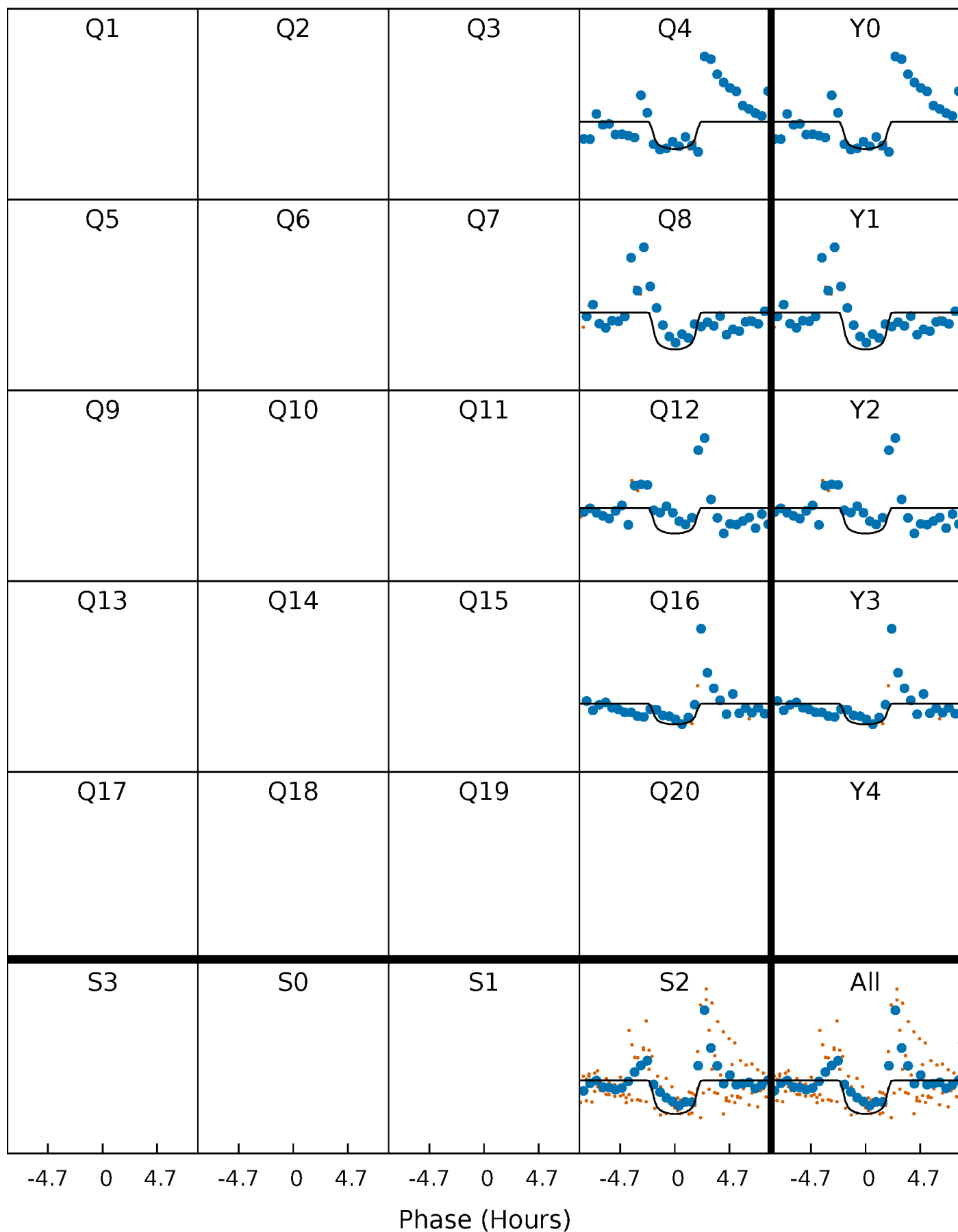
# PDC Quarter-Phased Transit Curves

TCE 010065745-02 P=377.051068 Days  $T_0=423.087294$  (BKJD)



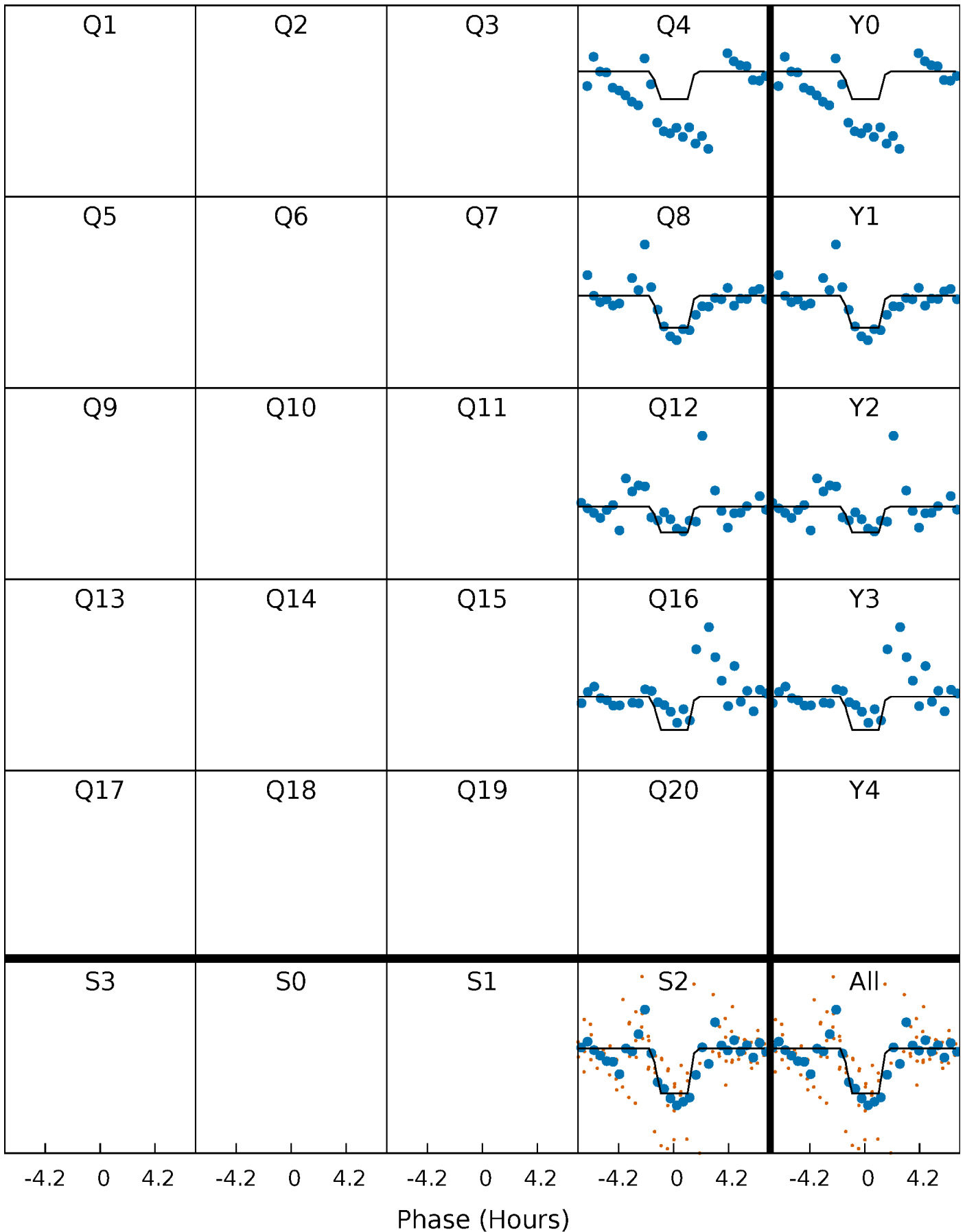
# DV Quarter-Phased Transit Curves

TCE 010065745-02     $P=377.051068$  Days     $T_0=423.087294$  (BKJD)



### Alt. Detrend Quarter-Phased Transit Curves

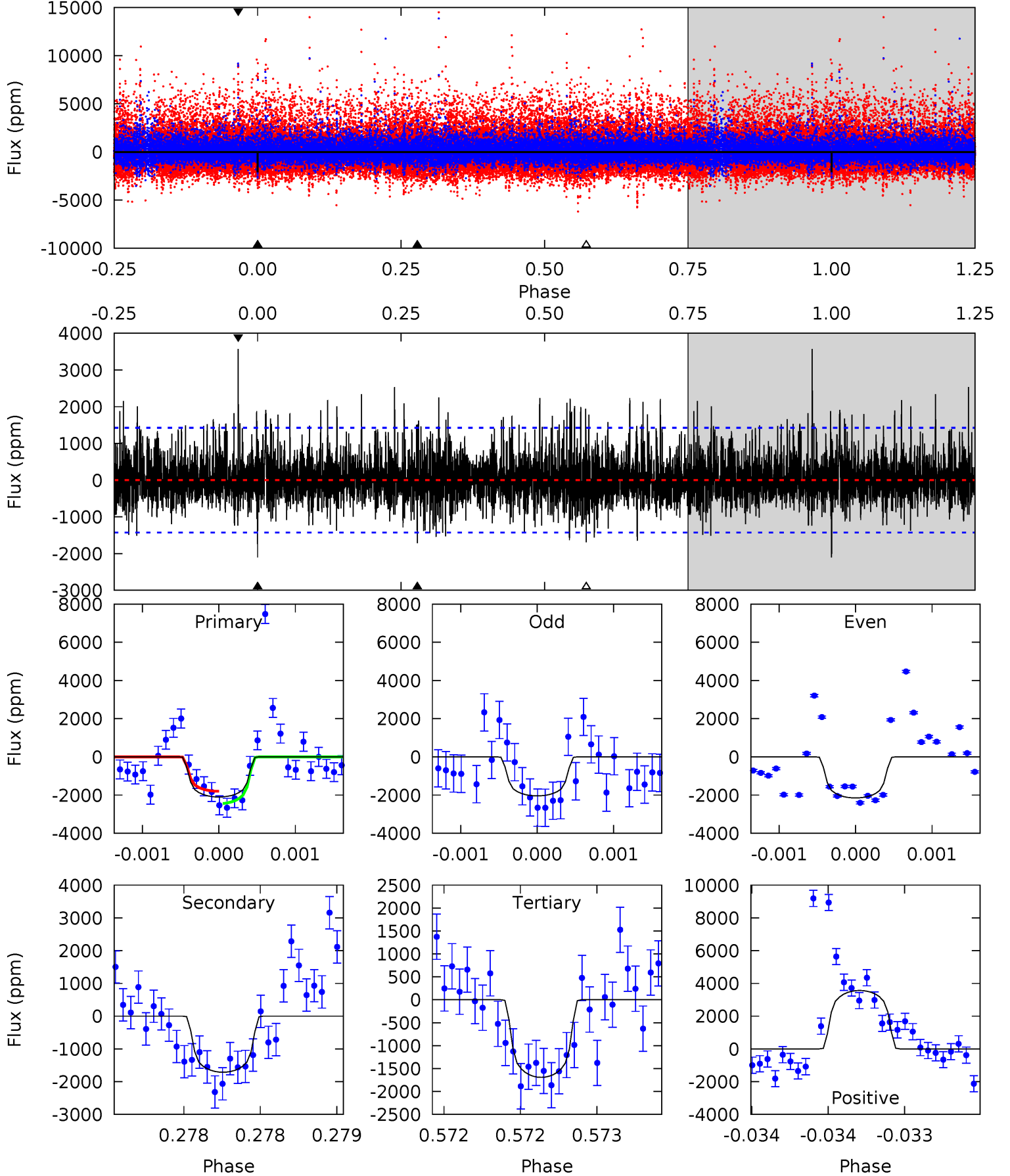
TCE 010065745-02 P=377.060483 Days  $T_0=423.076093$  (BKJD)



# DV Model-Shift Uniqueness Test

010065745-02,  $P = 377.051068$  Days,  $E = 46.036226$  Days

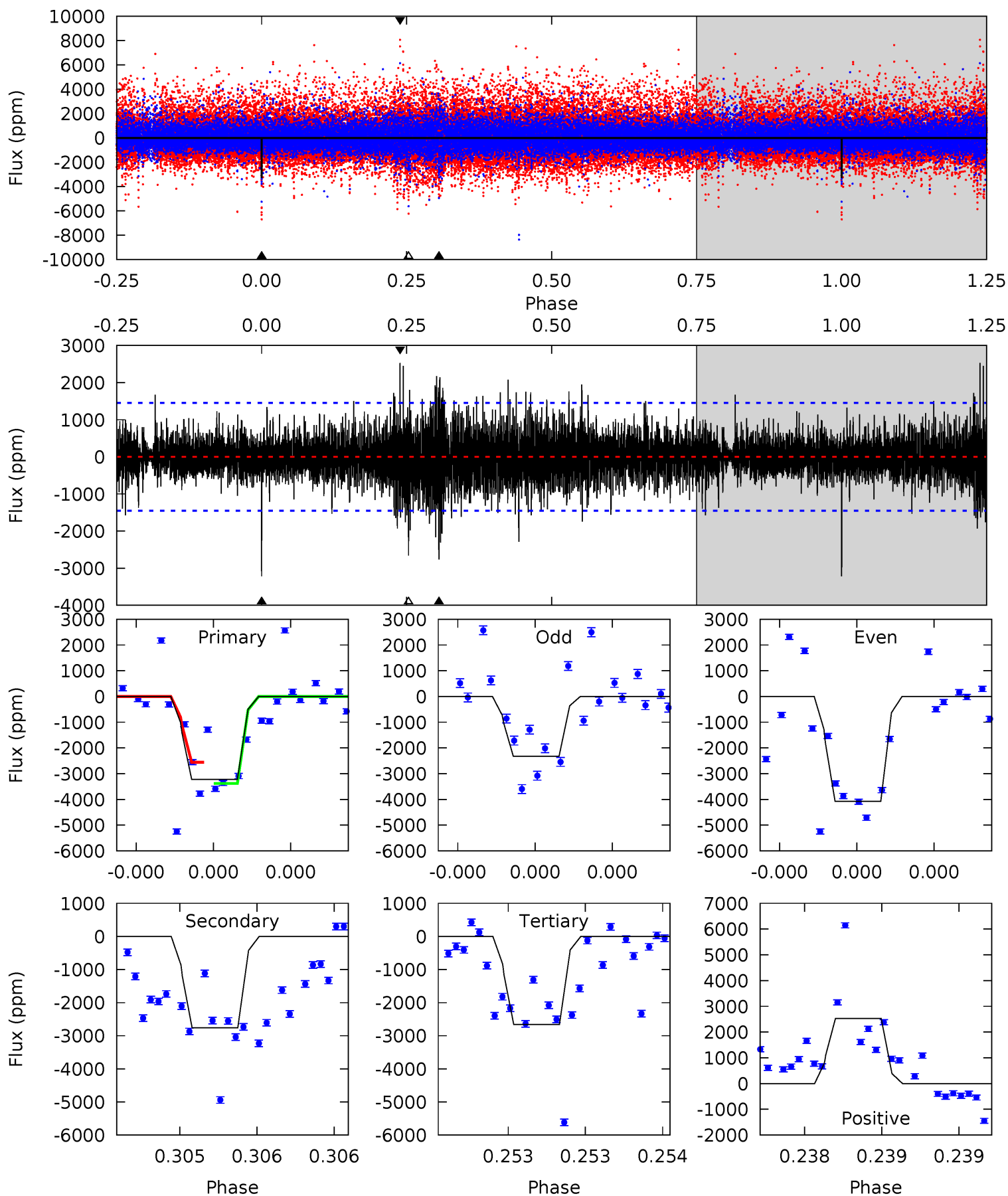
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.20	6.69	6.61	13.9	5.57	3.47	2.09	1.60	-5.73	0.08	-7.25	0.15	1.03	0.63	1.27



# Alt Model-Shift Uniqueness Test

010065745-02, P = 377.060483 Days, E = 46.015610 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
12.5	10.7	10.3	9.78	5.62	3.56	2.02	2.17	2.68	0.38	0.89	3.24	1.27	0.44	1.55





### Stellar Parameters For KIC 010065745

	$T_{\text{eff}} (K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3411^{+40}_{-45}$	$4.995^{+0.031}_{-0.054}$	$-0.100^{+0.100}_{-0.100}$	$0.286^{+0.040}_{-0.029}$	$0.294^{+0.039}_{-0.047}$	$17.760^{+3.848}_{-4.083}$
	+1%/-1%	+1%/-1%	+100%/-100%	+14%/-10%	+13%/-16%	+22%/-23%
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 010065745-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1713 \pm 256$	$1.81^{+1.05}_{-1.00}$	$137^{+4}_{-3}$	$3096^{+835}_{-372}$	$130342^{+526893}_{-78798}$
Alt.	$-2758 \pm 259$	$1.77^{+1.12}_{-1.02}$	$137^{+4}_{-3}$	$3341^{+1141}_{-445}$	$225388^{+1016194}_{-142672}$

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

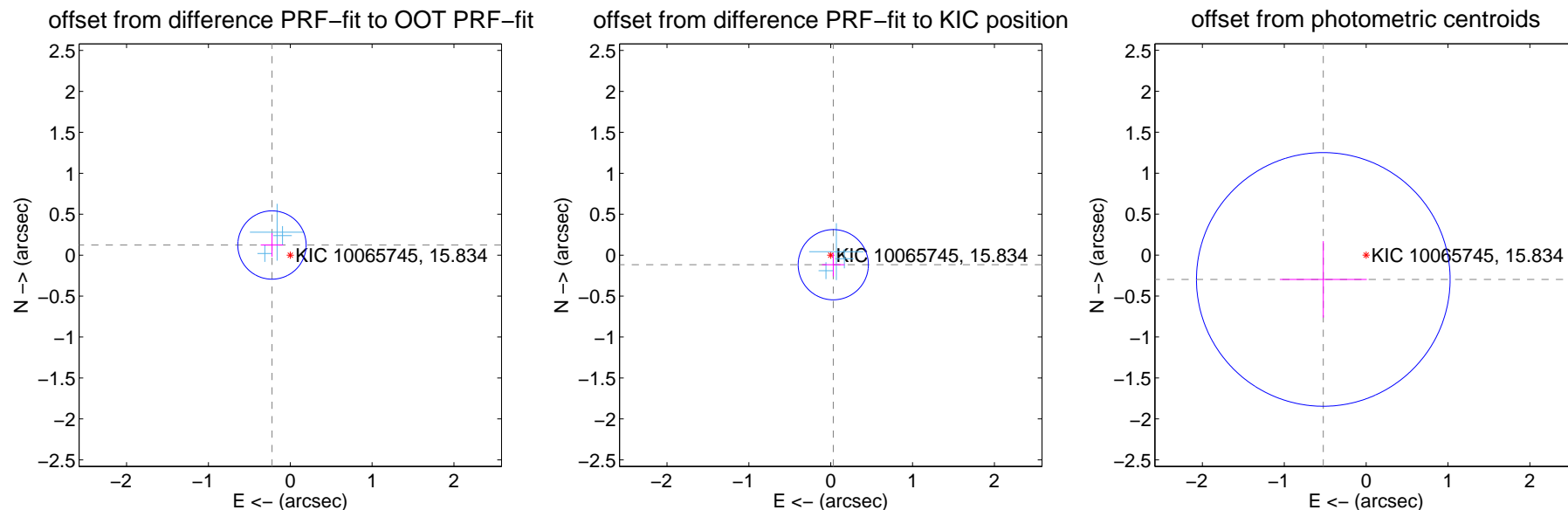
## DV Centroid Data

Supplemental centroid analysis for 010065745-02. Kepler magnitude: 15.83. Transit SNR 7.65

There are 3 quarters with good PRF difference image offsets

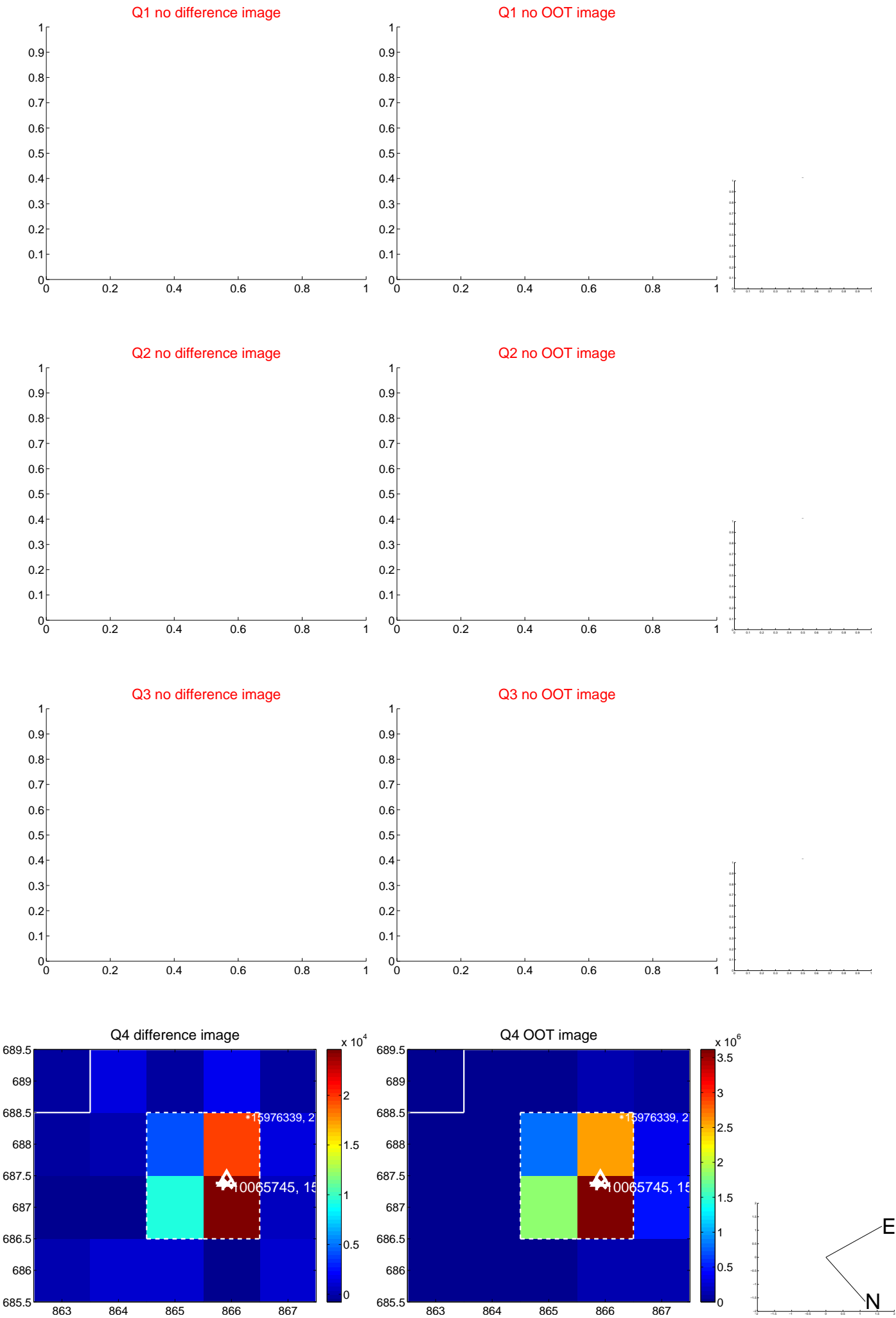
The direct PRF centroid is offset from the target star catalog position by about 0.38 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.255 \pm 0.139$	1.84	$0.223 \pm 0.138$	$0.124 \pm 0.143$
PRF-fit source offset from KIC position	$0.121 \pm 0.143$	0.84	$-0.031 \pm 0.138$	$-0.117 \pm 0.143$
photometric centroid source offset	$0.60 \pm 0.52$	1.17	$0.52 \pm 0.53$	$-0.30 \pm 0.47$

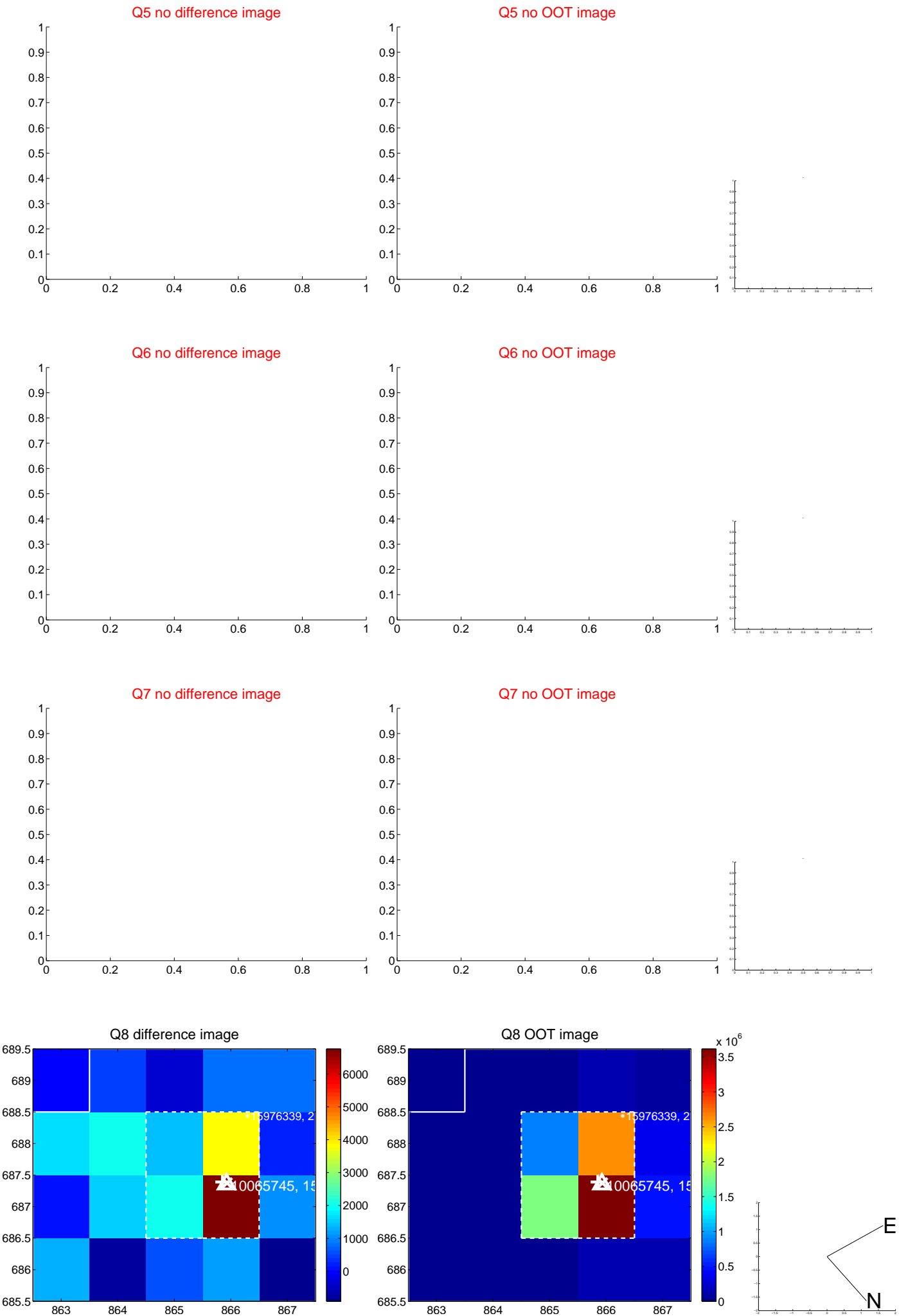


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



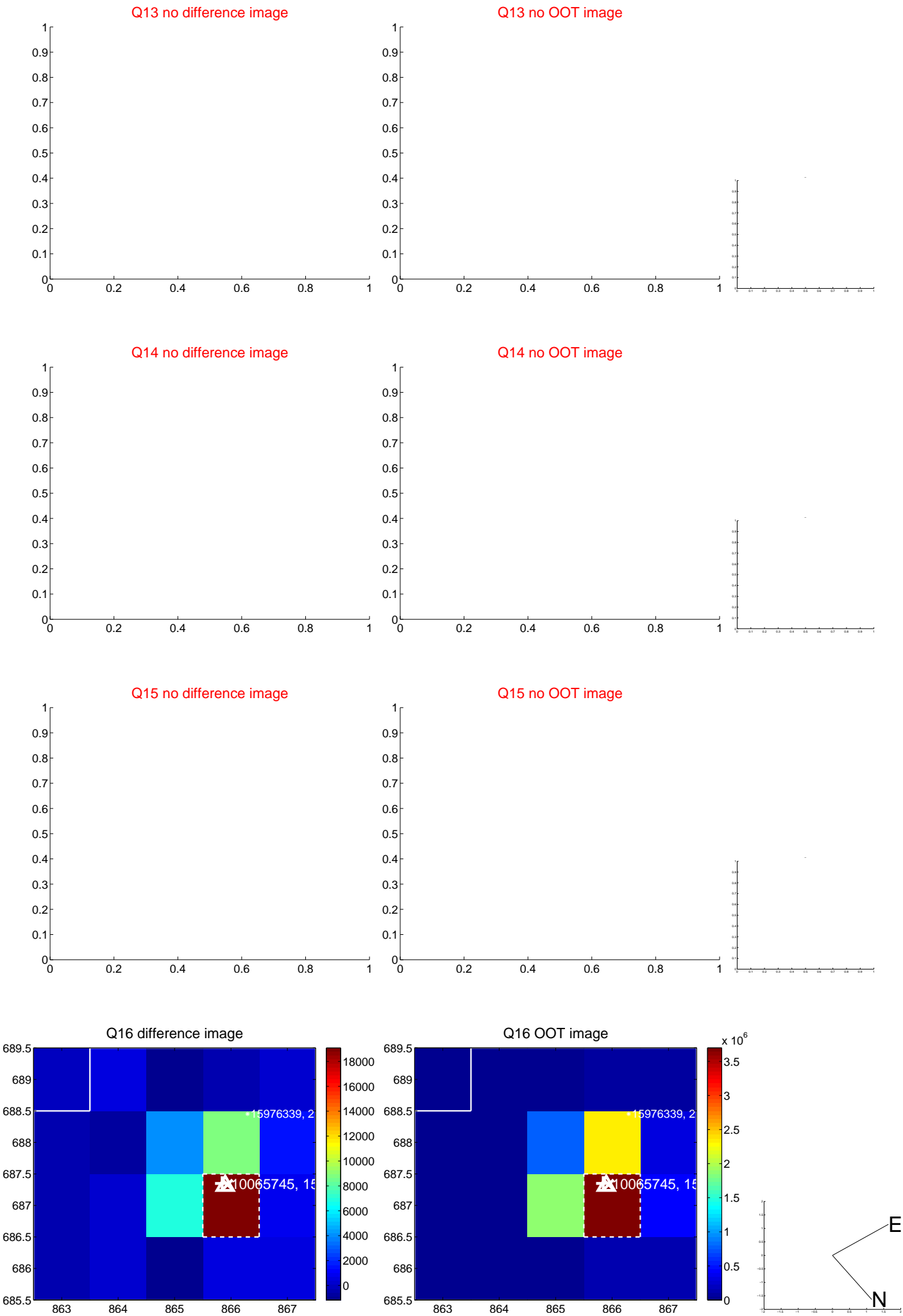
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



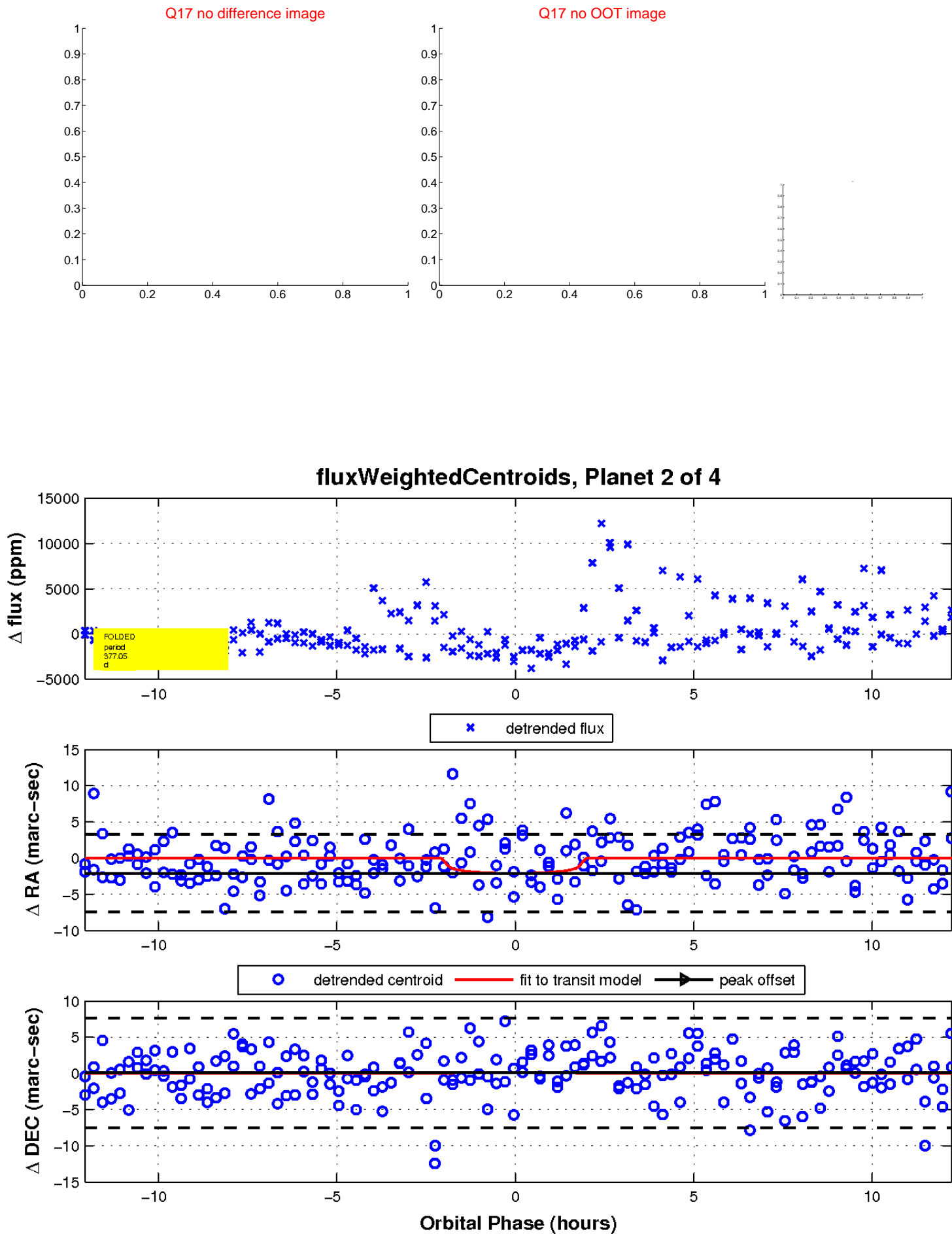
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

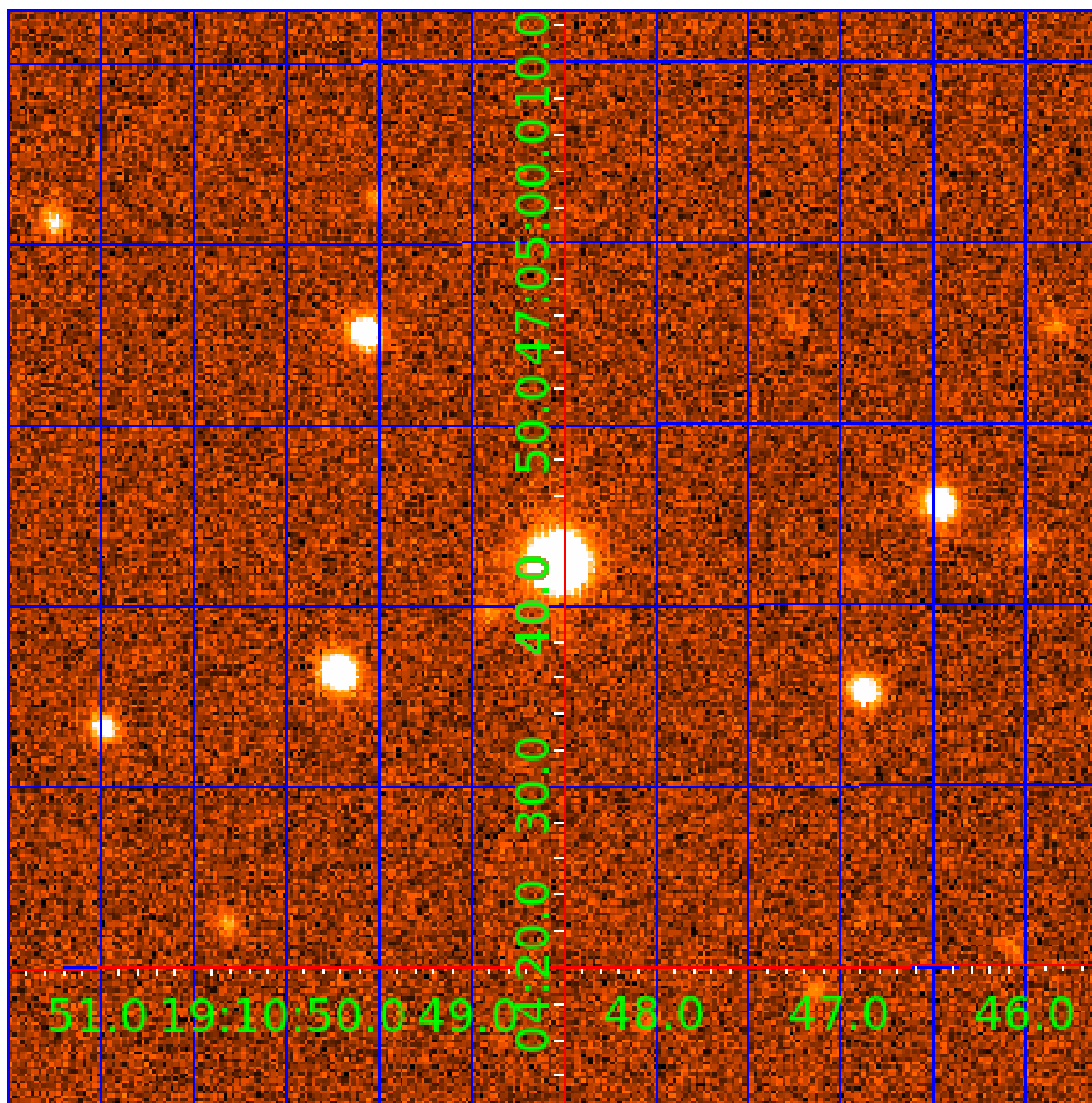


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 010065745

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010065745-01	OBS	No	433.269136	519.782553	2966.8	3.488	13.4	5.6	0.29	3411	1.54	0.02
010065745-02	OBS	No	377.051068	423.087294	3380.7	4.096	11.2	7.6	0.29	3411	1.67	0.02
010065745-03	OBS	No	551.947388	458.018282	3626.5	5.783	9.7	7.2	0.29	3411	1.70	0.01
010065745-04	OBS	No	298.204961	365.418035	2210.0	3.527	10.6	5.6	0.29	3411	1.34	0.03

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010065745-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010065745-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_KIC_POS
010065745-03	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_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010065745-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_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.

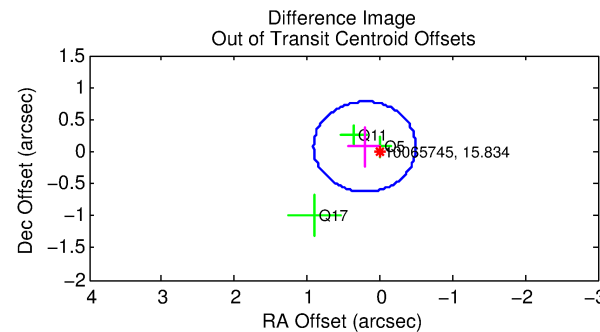
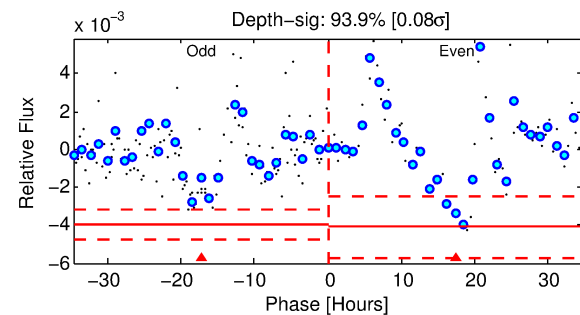
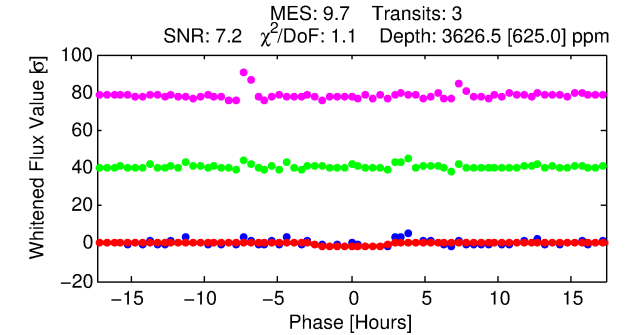
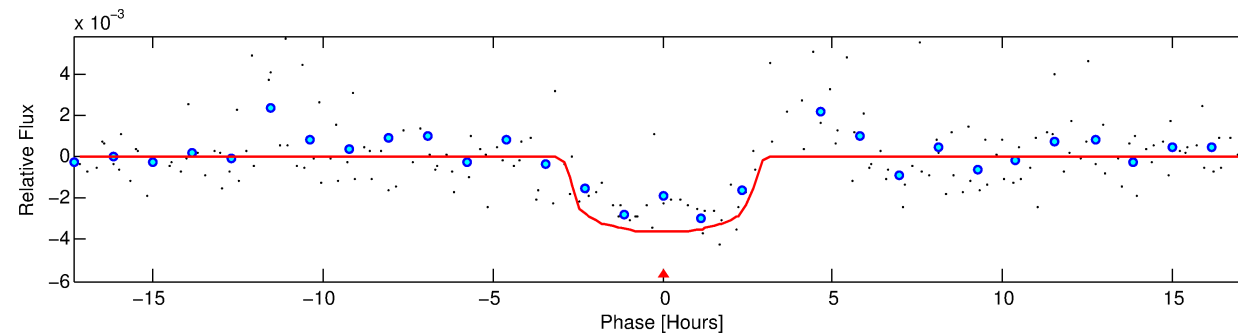
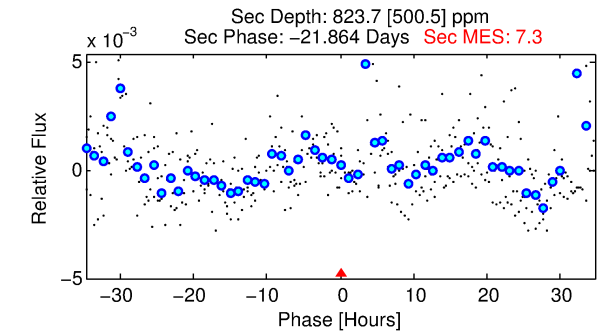
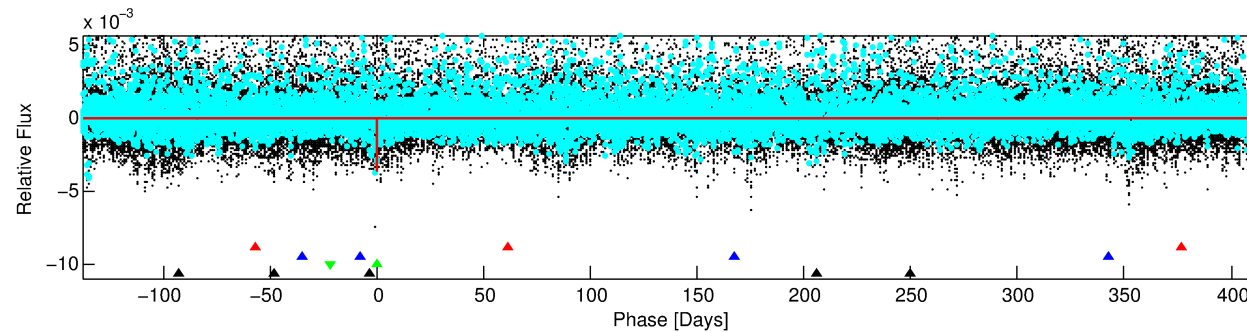
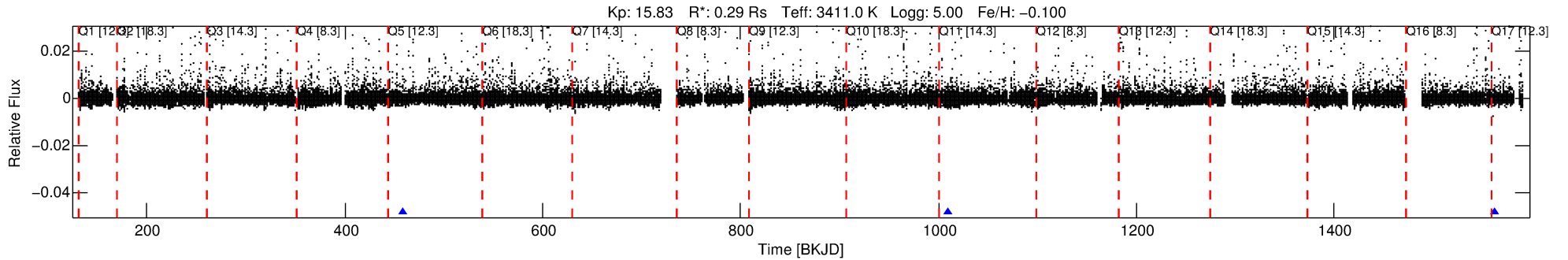
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010065745-03

No Significant Match Found

# DV One-Page Summary

KIC: 10065745 Candidate: 3 of 4 Period: 551.947 d



## DV Fit Results:

Period = 551.94739 [0.00601] d  
Epoch = 458.0183 [0.0083] BKJD  
Rp/R\* = 0.0546 [0.0244]  
a/R\* = 767.40 [1432.17]  
b = 0.07 [28.25]  
Seff = 0.01 [0.00]  
Teq = 86 [3] K  
Rp = 1.70 [0.80] Re  
a = 0.8767 [0.0895] AU  
Ag = 120054.26 [130763.07] [0.92σ]  
**Teffp = 2473 [670] K [3.5σ]**

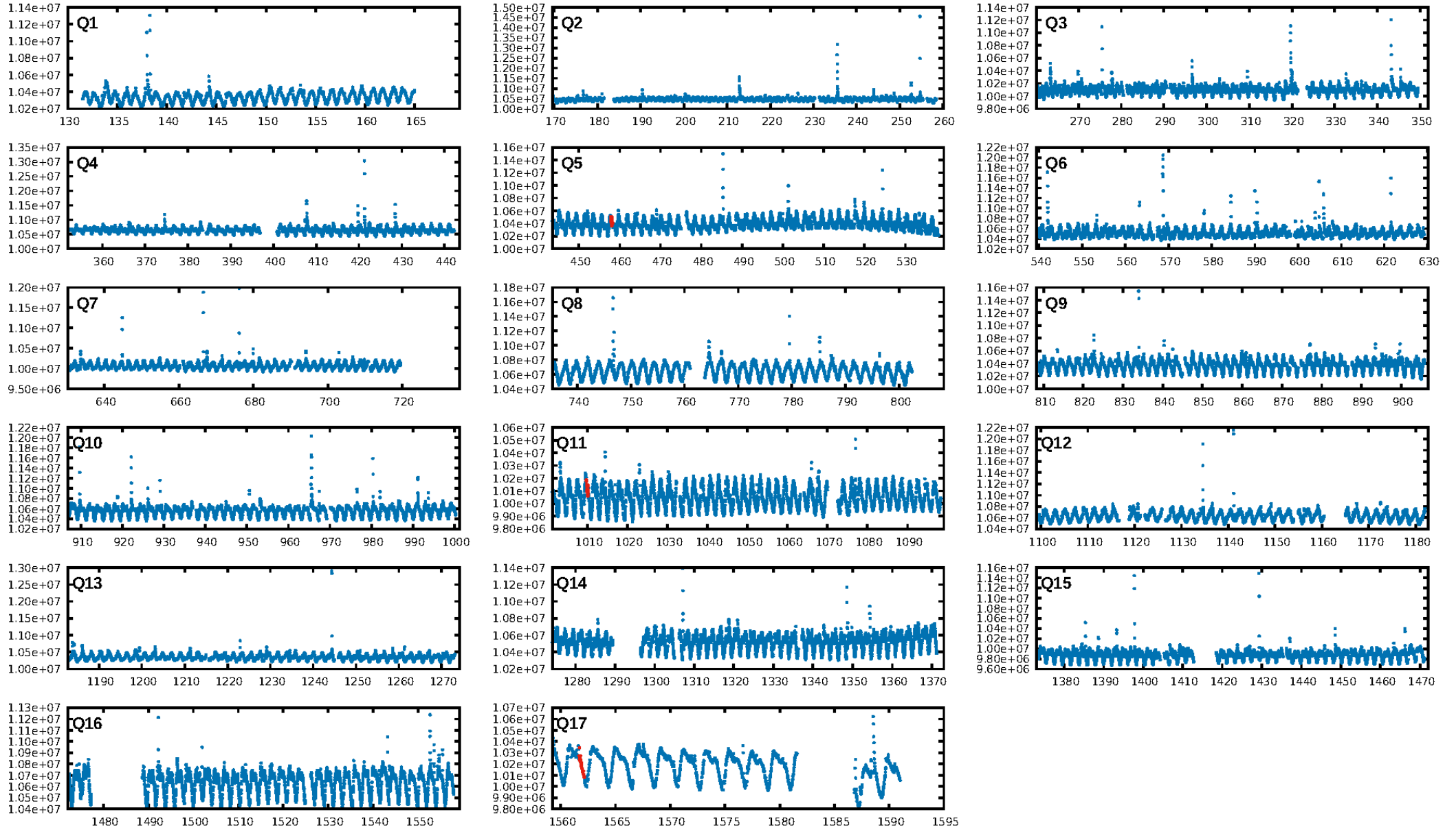
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [421.74σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 61.7%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 3.77e-07**  
RollingBand-fgt: 1.00 [2/2]  
GhostDiagnostic-chr: 1.668  
Centroid-sig: 23.7%  
Centroid-so: 0.810 arcsec [1.78σ]  
OotOffset-rm: 0.223 arcsec [0.95σ]  
OotOffset-st: 0/1/0/2 [3]  
KicOffset-rm: 0.230 arcsec [0.52σ]  
KicOffset-st: 0/1/0/2 [3]  
DiffImageQuality-figm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

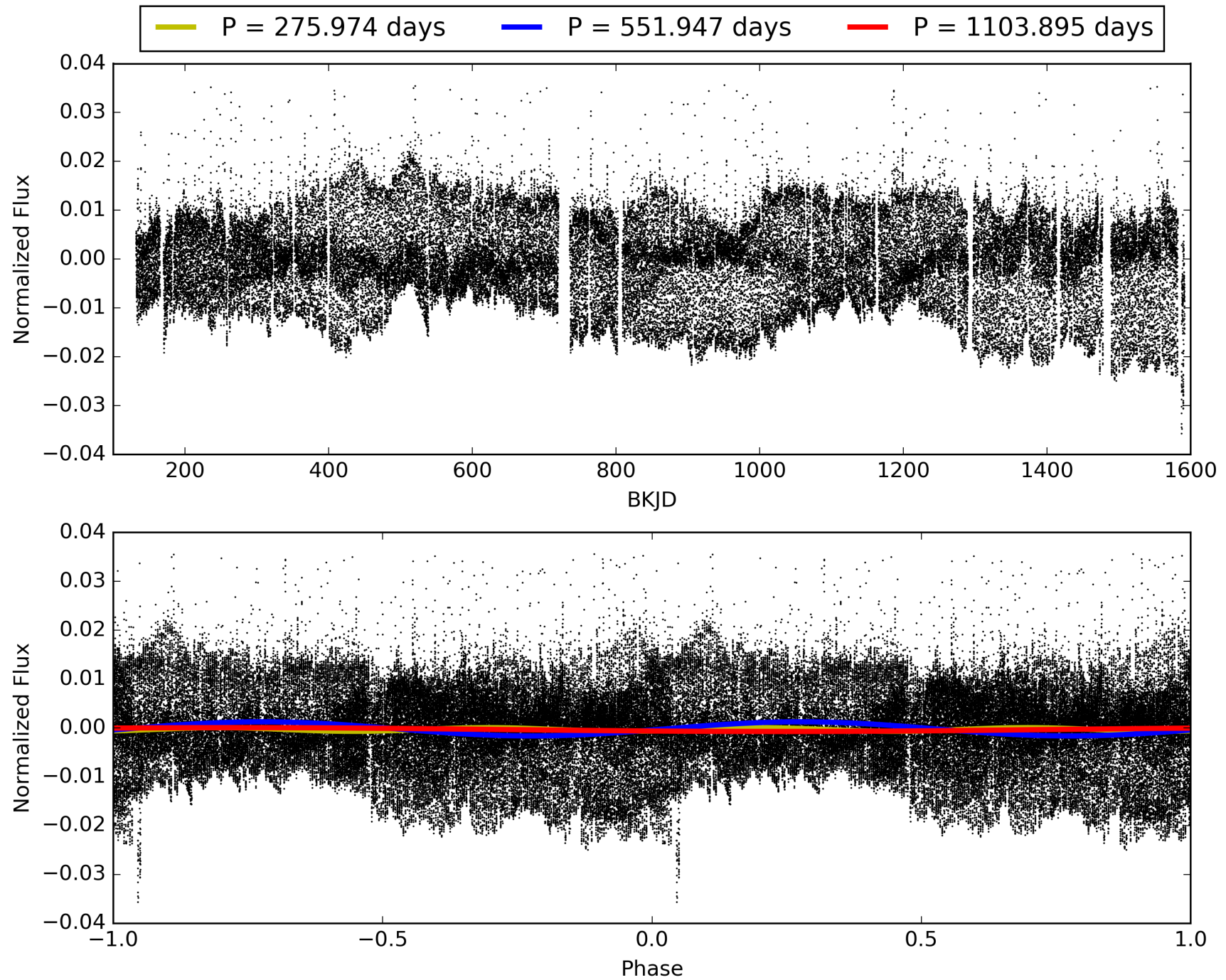
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 03:03:33 Z

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

# TCE 010065745-03, PDC Light Curves

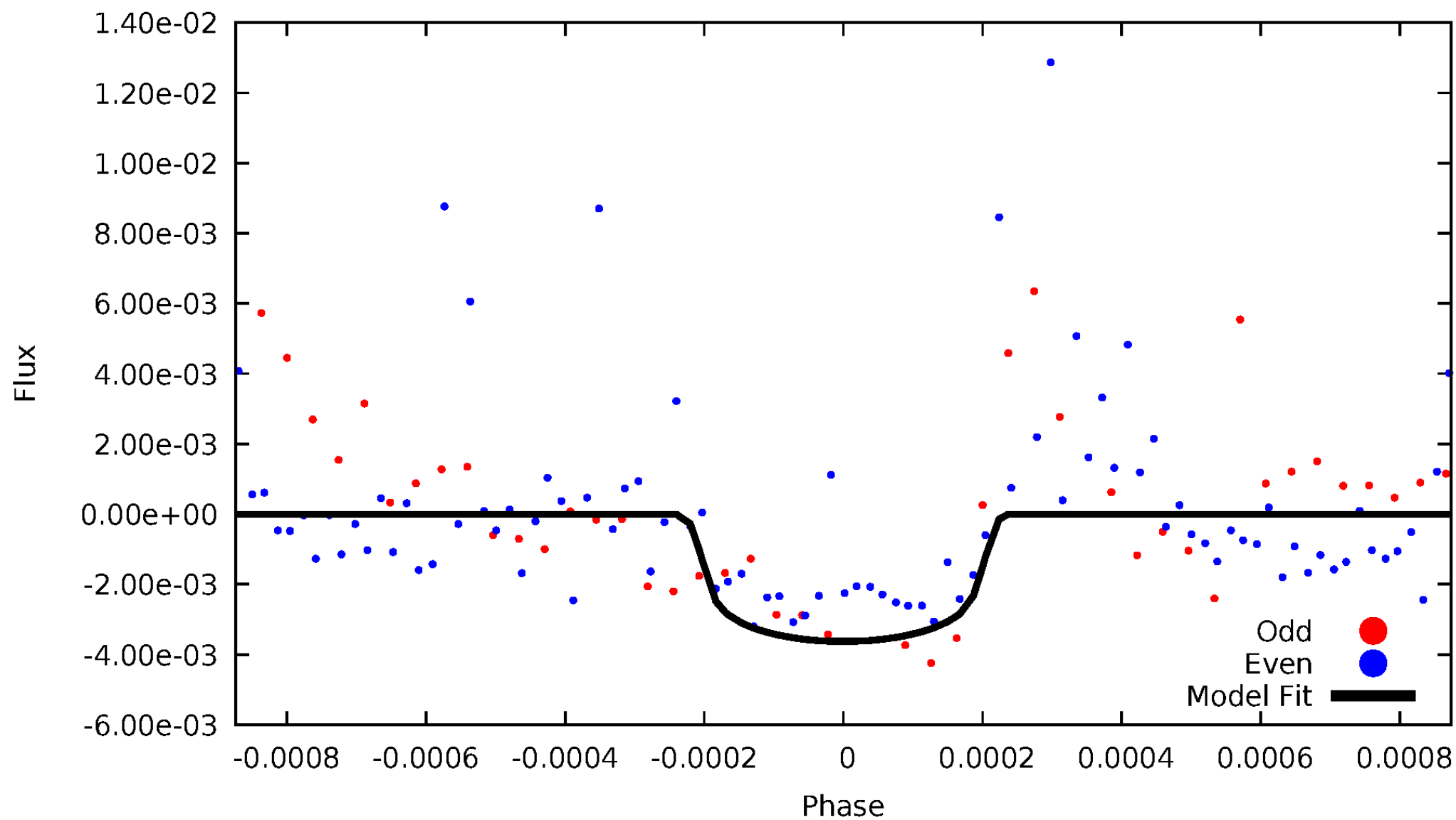


TCE 010065745-03



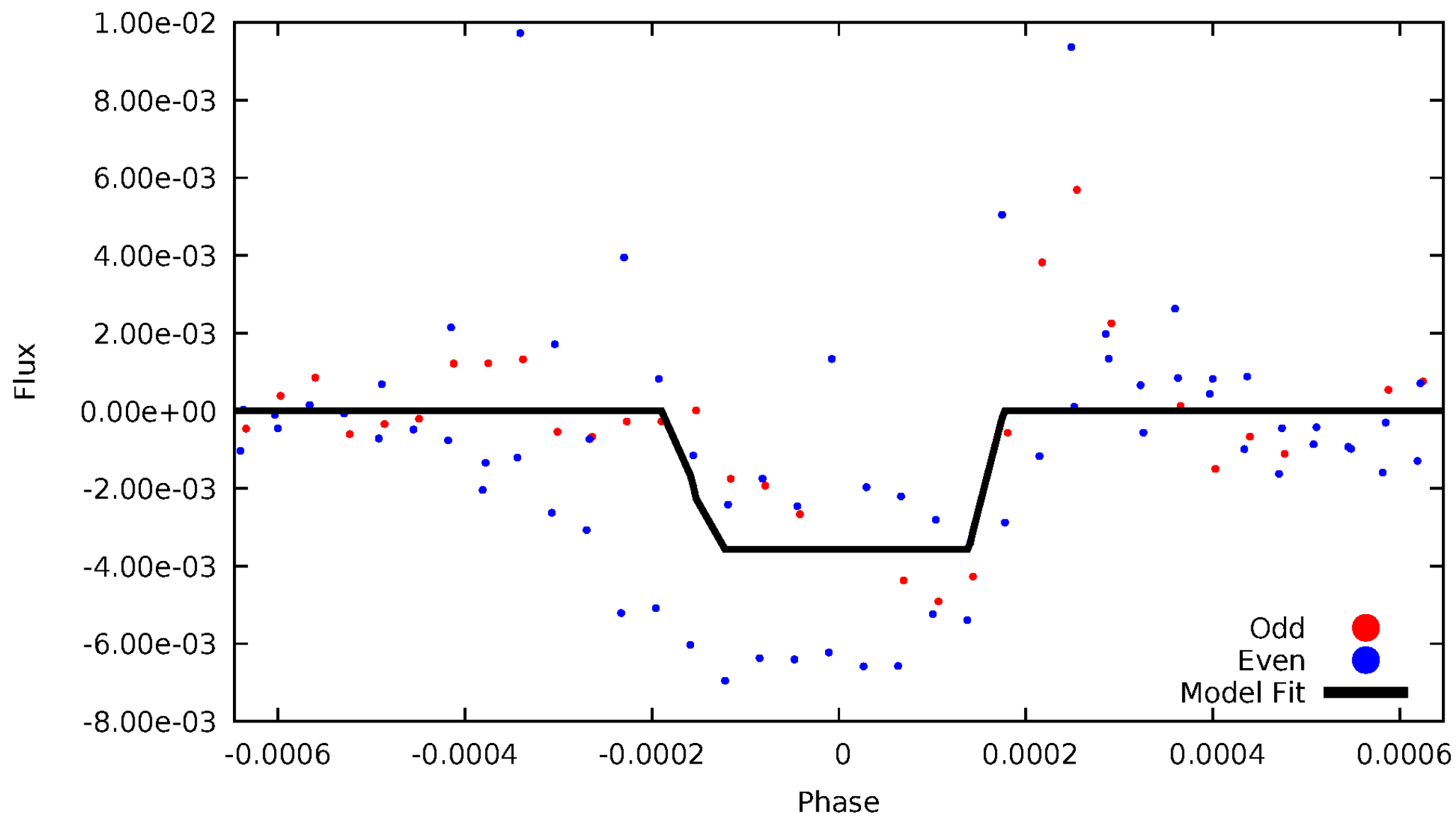
# DV Odd/Even

TCE 010065745-03



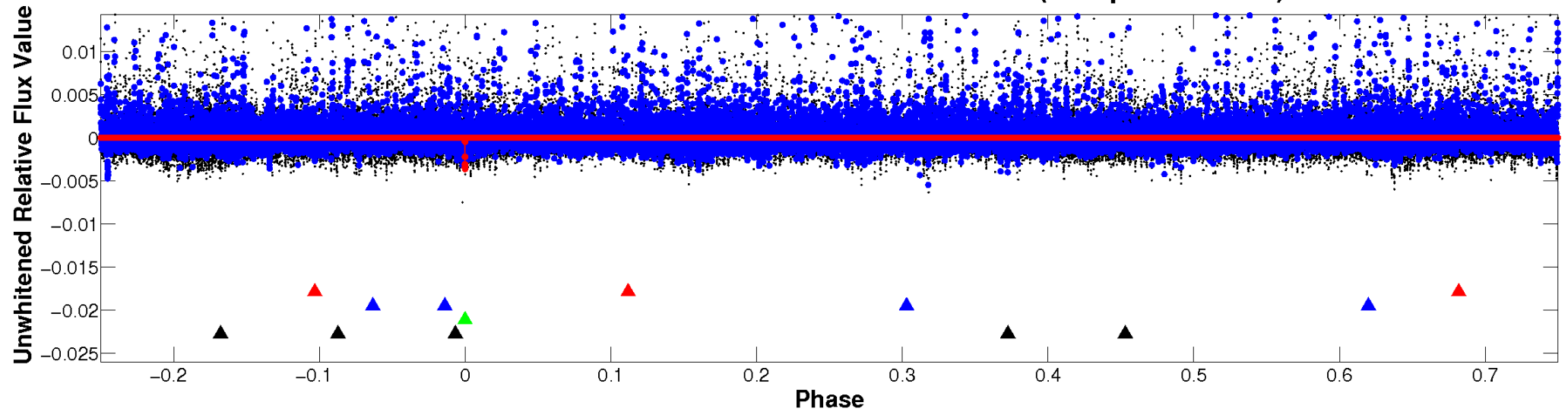
# ALT Odd/Even

TCE 010065745-03

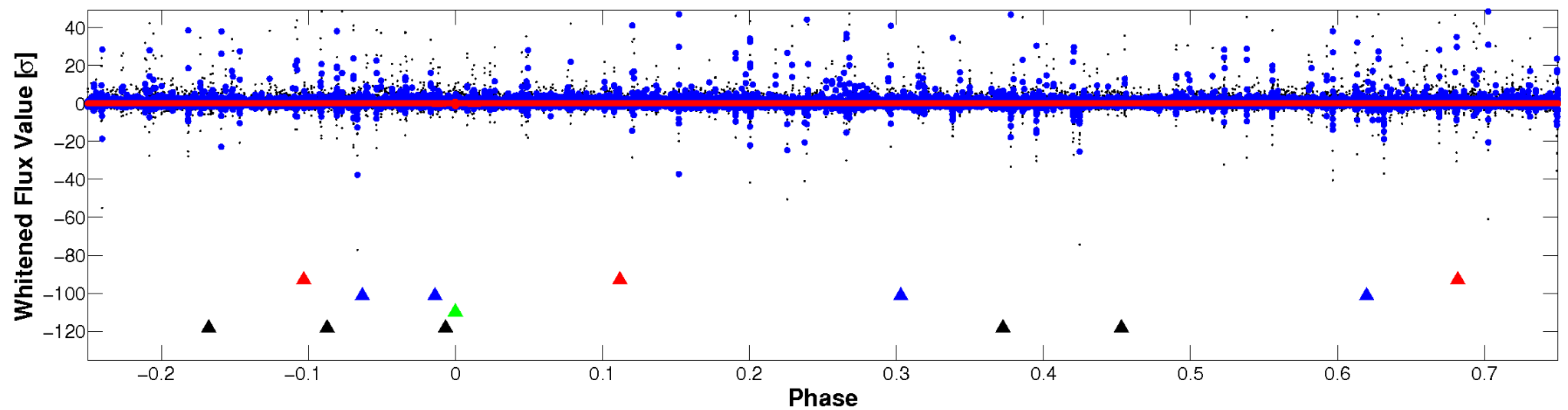


# Non-Whitened Vs. Whitened Light Curve

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

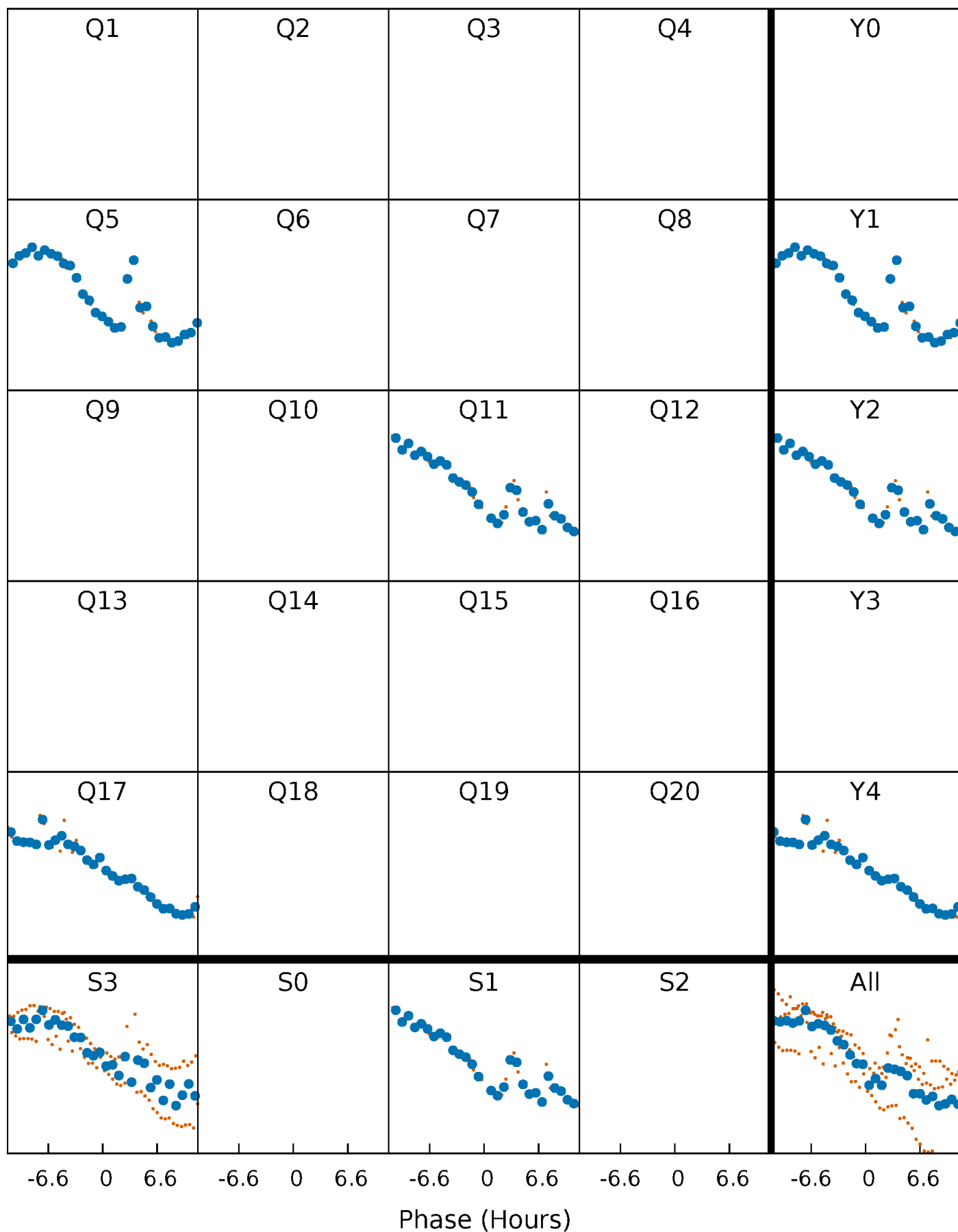


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

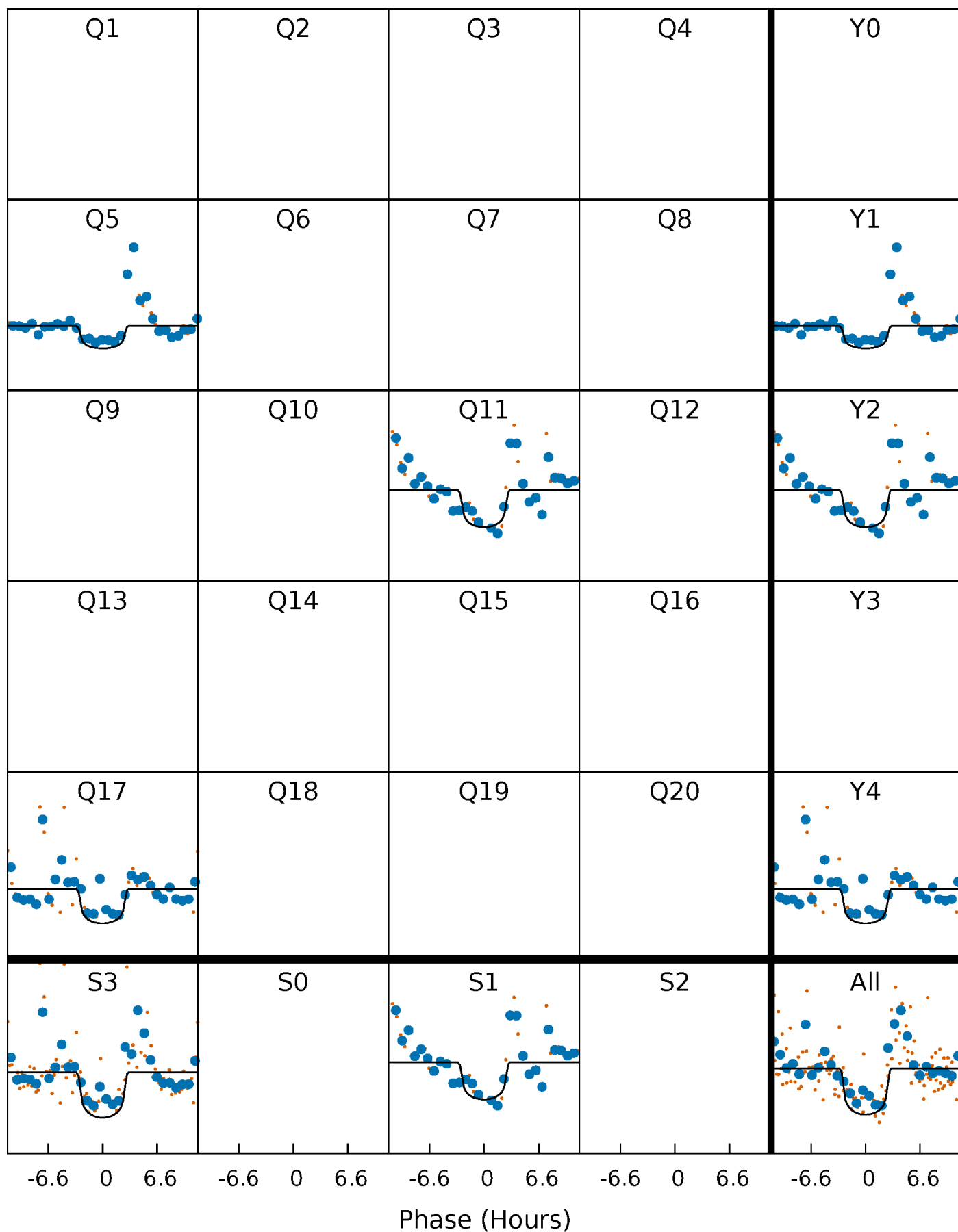
TCE 010065745-03     $P=551.947388$  Days     $T_0=458.018282$  (BKJD)





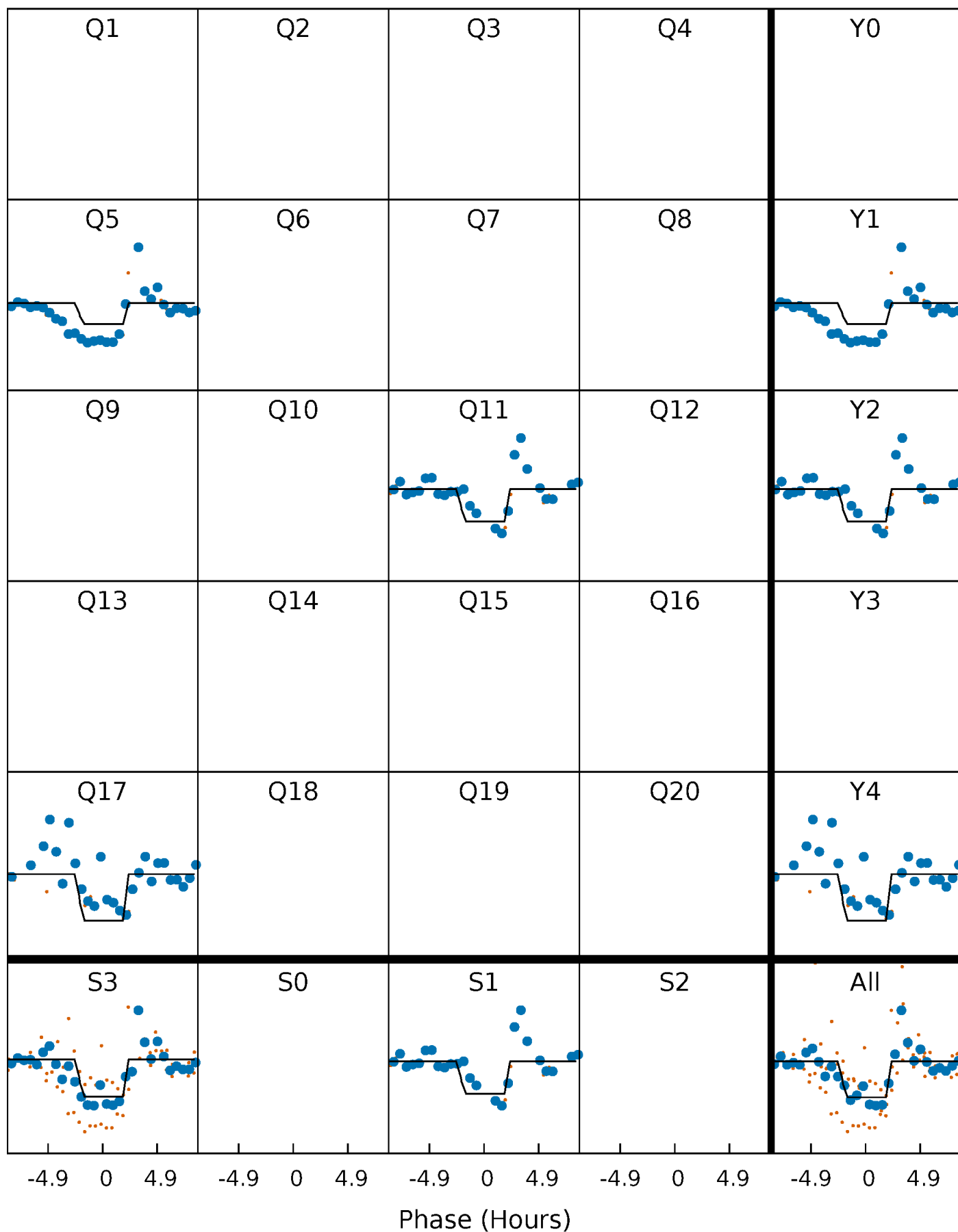
# DV Quarter-Phased Transit Curves

TCE 010065745-03     $P=551.947388$  Days     $T_0=458.018282$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

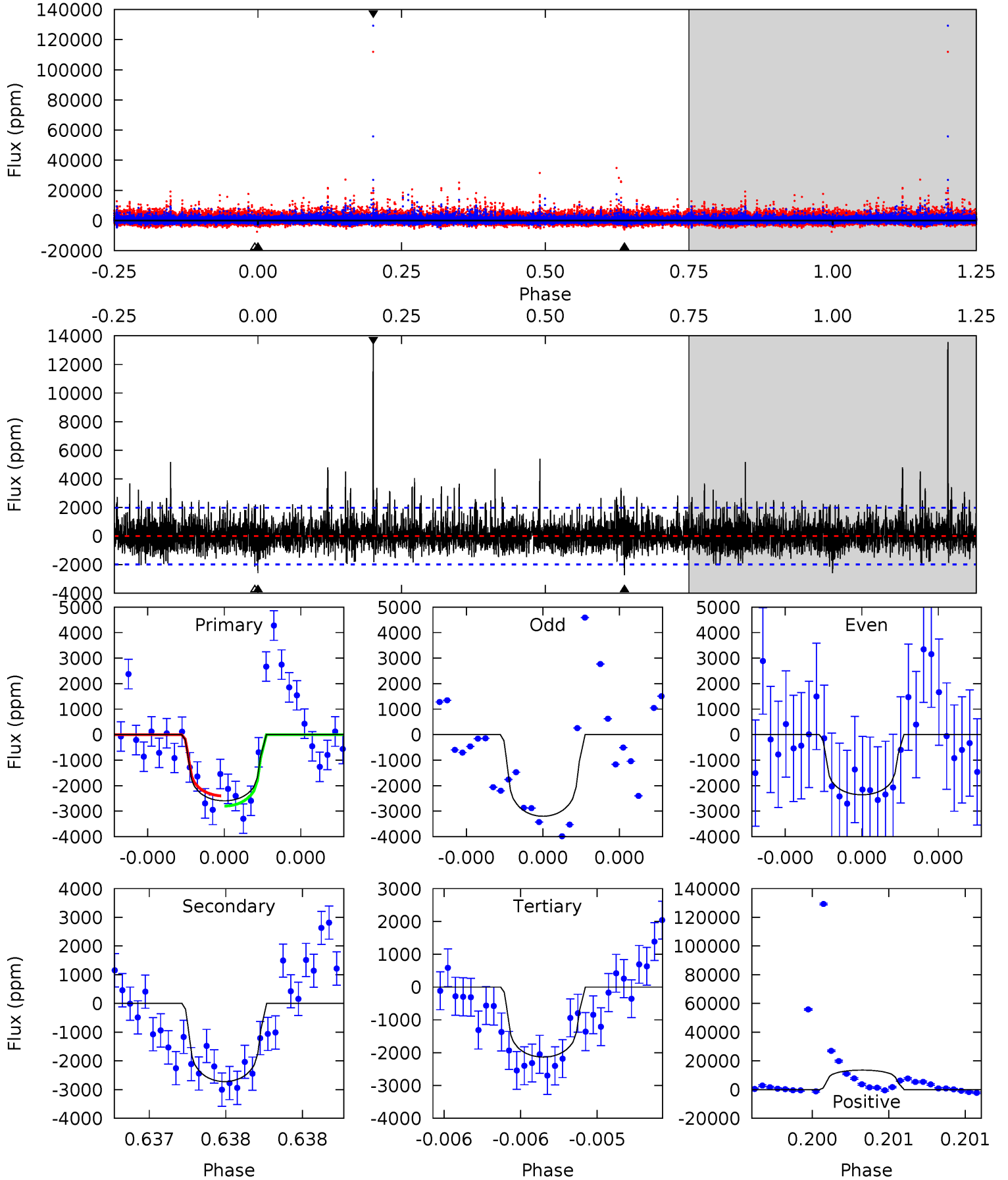
TCE 010065745-03 P=551.930889 Days  $T_0=458.045565$  (BKJD)



# DV Model-Shift Uniqueness Test

010065745-03, P = 551.947388 Days, E = 458.018282 Days

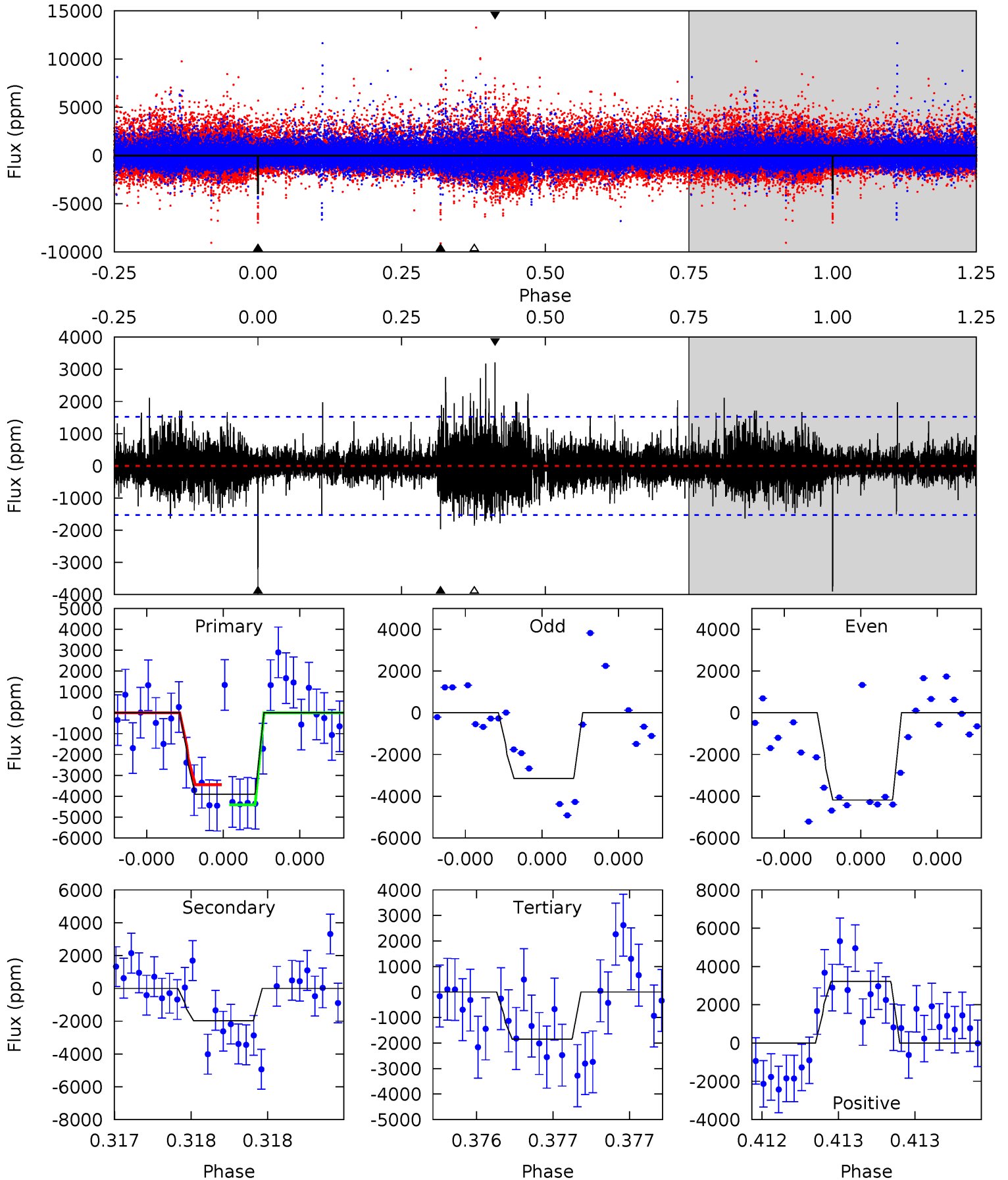
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.32	7.68	6.03	38.3	5.60	3.52	2.29	1.30	-30.9	1.66	-30.6	0.65	1.09	0.83	0.56



# Alt Model-Shift Uniqueness Test

010065745-03, P = 551.930889 Days, E = 458.045565 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
14.4	7.28	6.85	11.9	5.64	3.59	1.71	7.57	2.53	0.43	-4.61	1.61	1.22	0.45	1.77



### Stellar Parameters For KIC 010065745

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3411^{+40}_{-45}$	$4.995^{+0.031}_{-0.054}$	$-0.100^{+0.100}_{-0.100}$	$0.286^{+0.040}_{-0.029}$	$0.294^{+0.039}_{-0.047}$	$17.760^{+3.848}_{-4.083}$
	+1%/-1%	+1%/-1%	+100%/-100%	+14%/-10%	+13%/-16%	+22%/-23%
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 010065745-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-2722 \pm 354$	$1.71^{+0.75}_{-0.76}$	$121^{+3}_{-3}$	$3355^{+732}_{-337}$	$392956^{+869246}_{-207833}$
Alt.	$-1969 \pm 270$	$1.89^{+0.77}_{-0.76}$	$121^{+3}_{-3}$	$3094^{+545}_{-275}$	$227227^{+424890}_{-110020}$

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

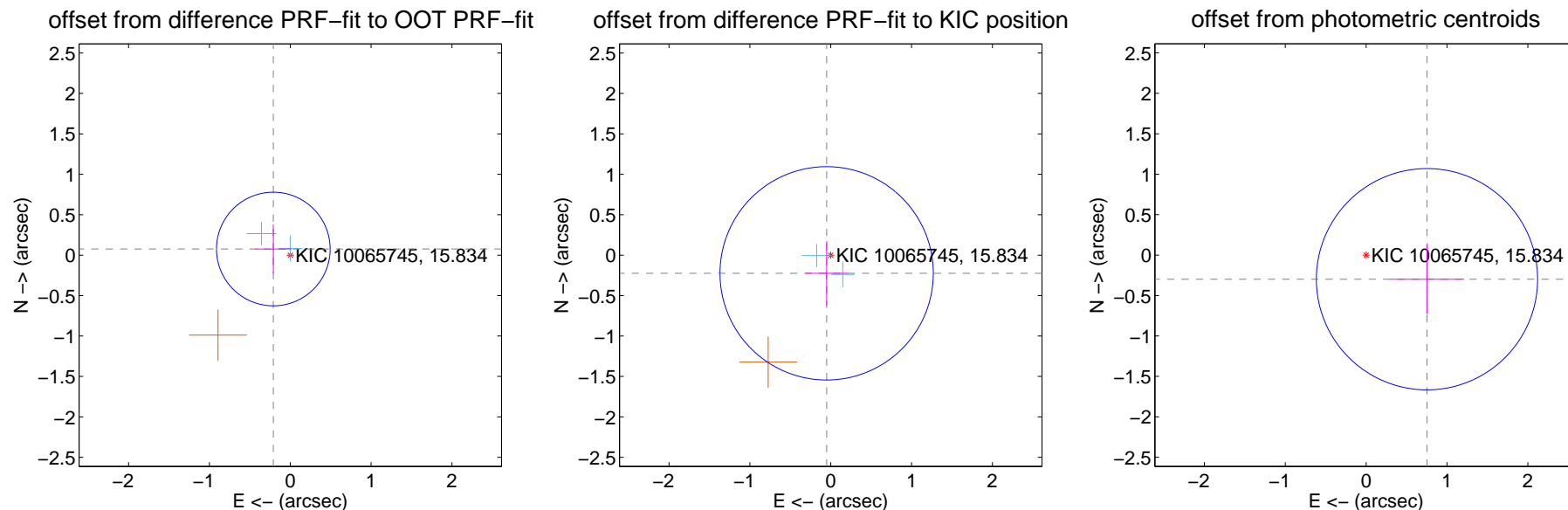
## DV Centroid Data

Supplemental centroid analysis for 010065745-03. Kepler magnitude: 15.83. Transit SNR 7.24

There are 2 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.35 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.223 \pm 0.234$	0.95	$0.210 \pm 0.224$	$0.076 \pm 0.304$
PRF-fit source offset from KIC position	$0.230 \pm 0.440$	0.52	$0.050 \pm 0.264$	$-0.225 \pm 0.398$
photometric centroid source offset	$0.81 \pm 0.46$	1.78	$-0.75 \pm 0.46$	$-0.30 \pm 0.43$

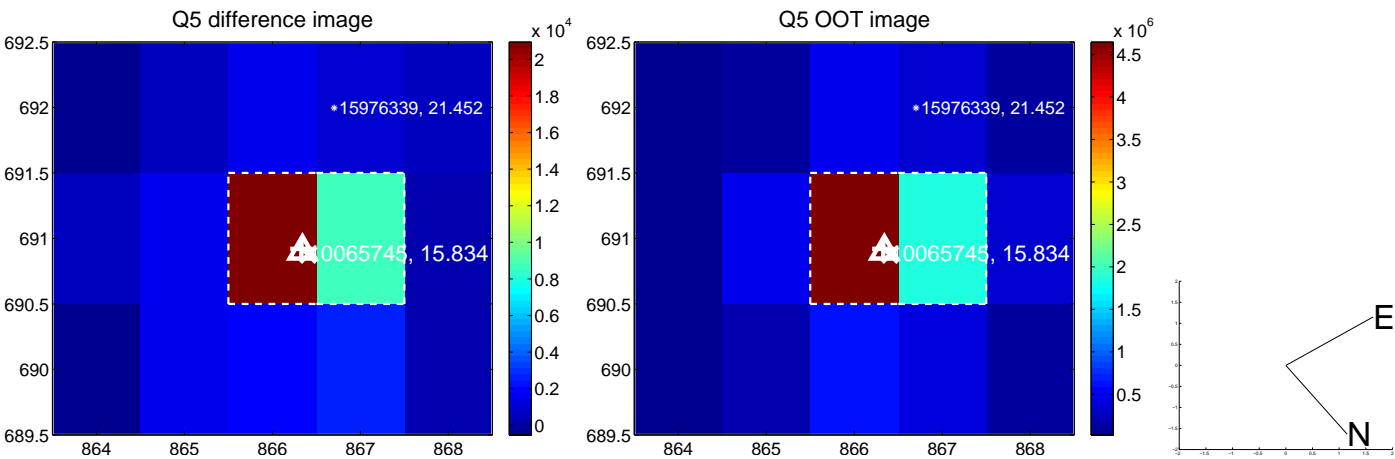


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

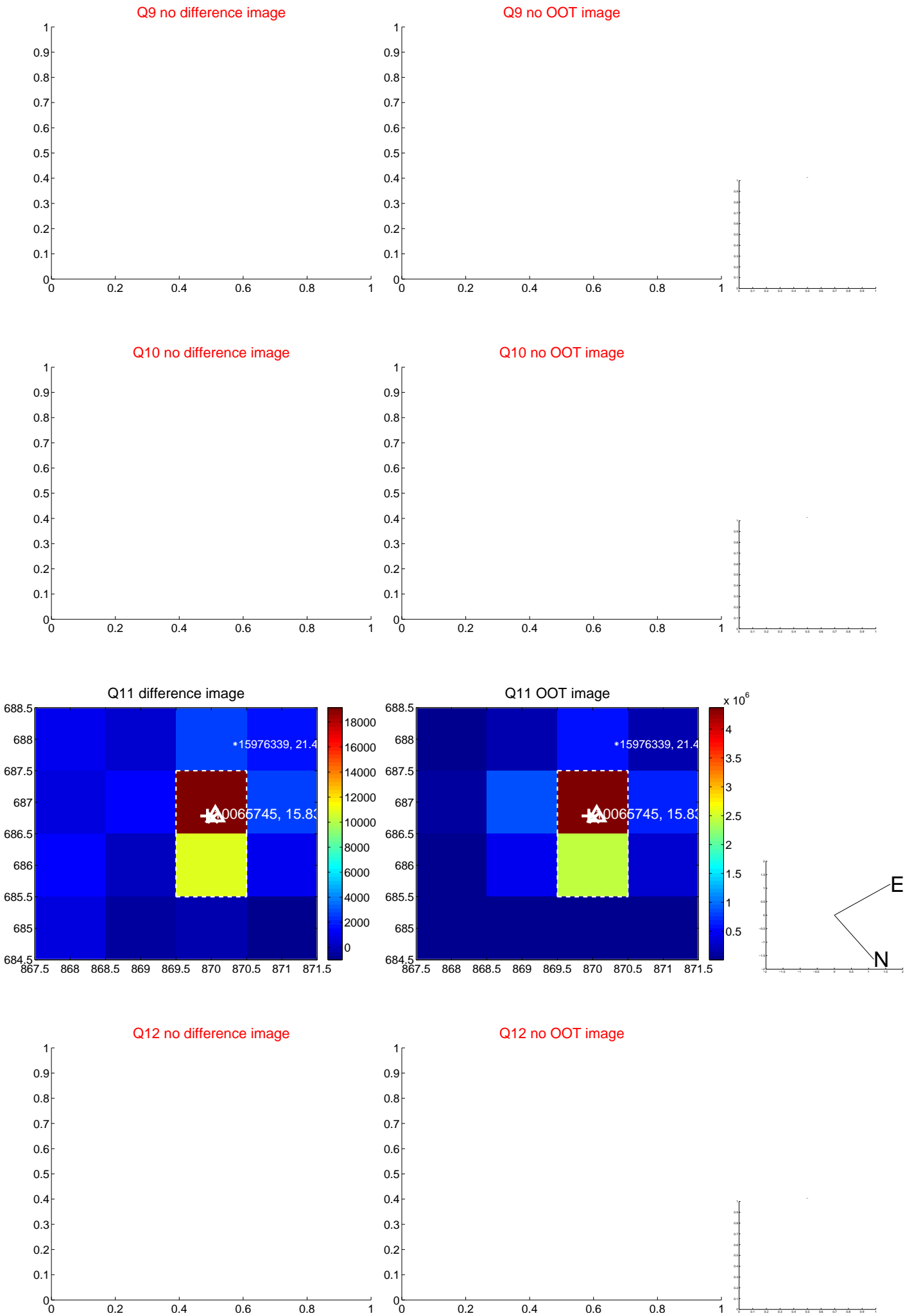


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





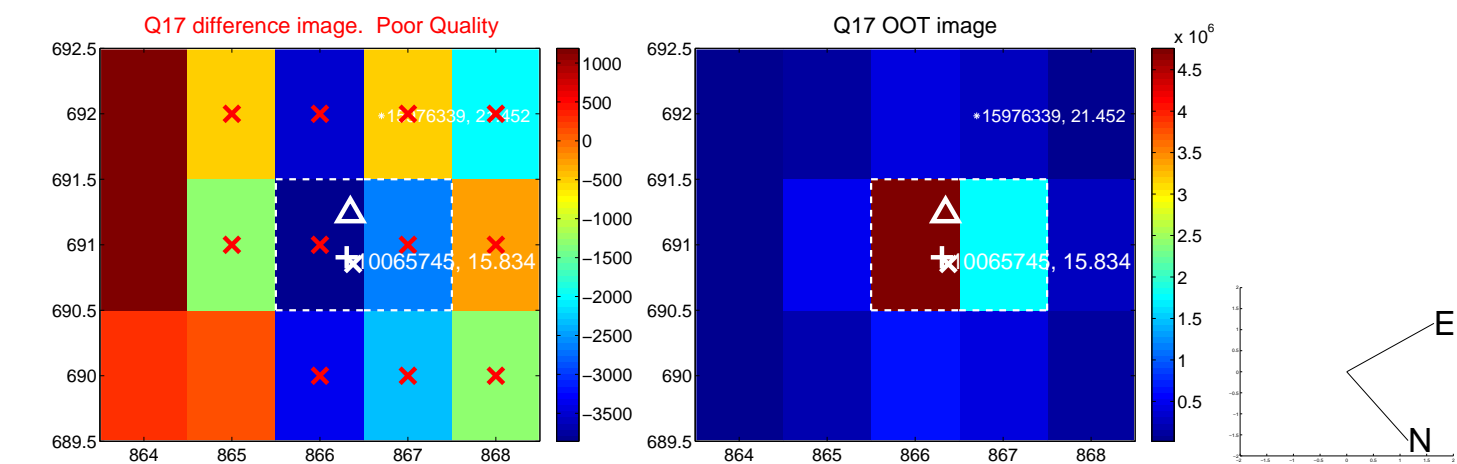
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



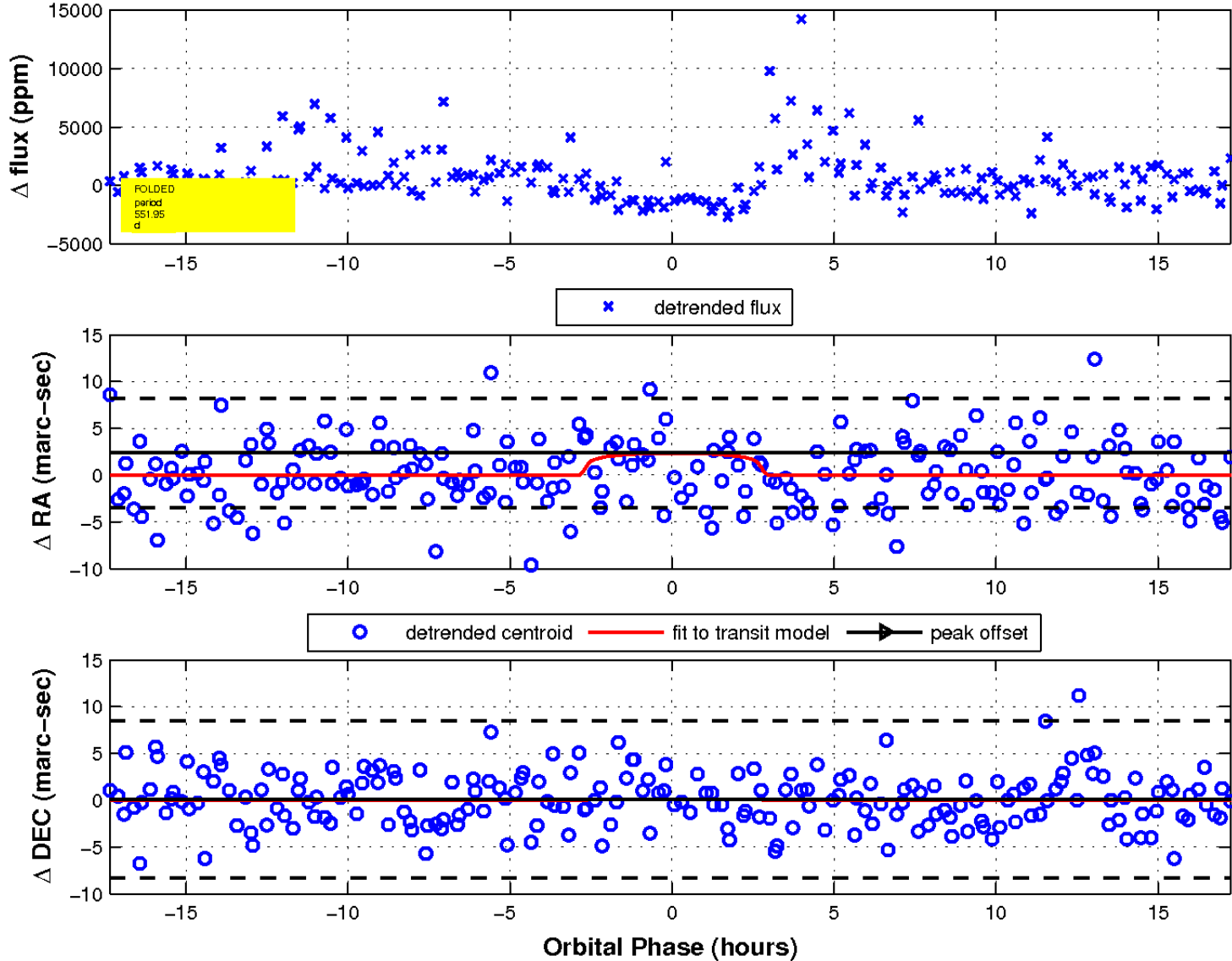
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

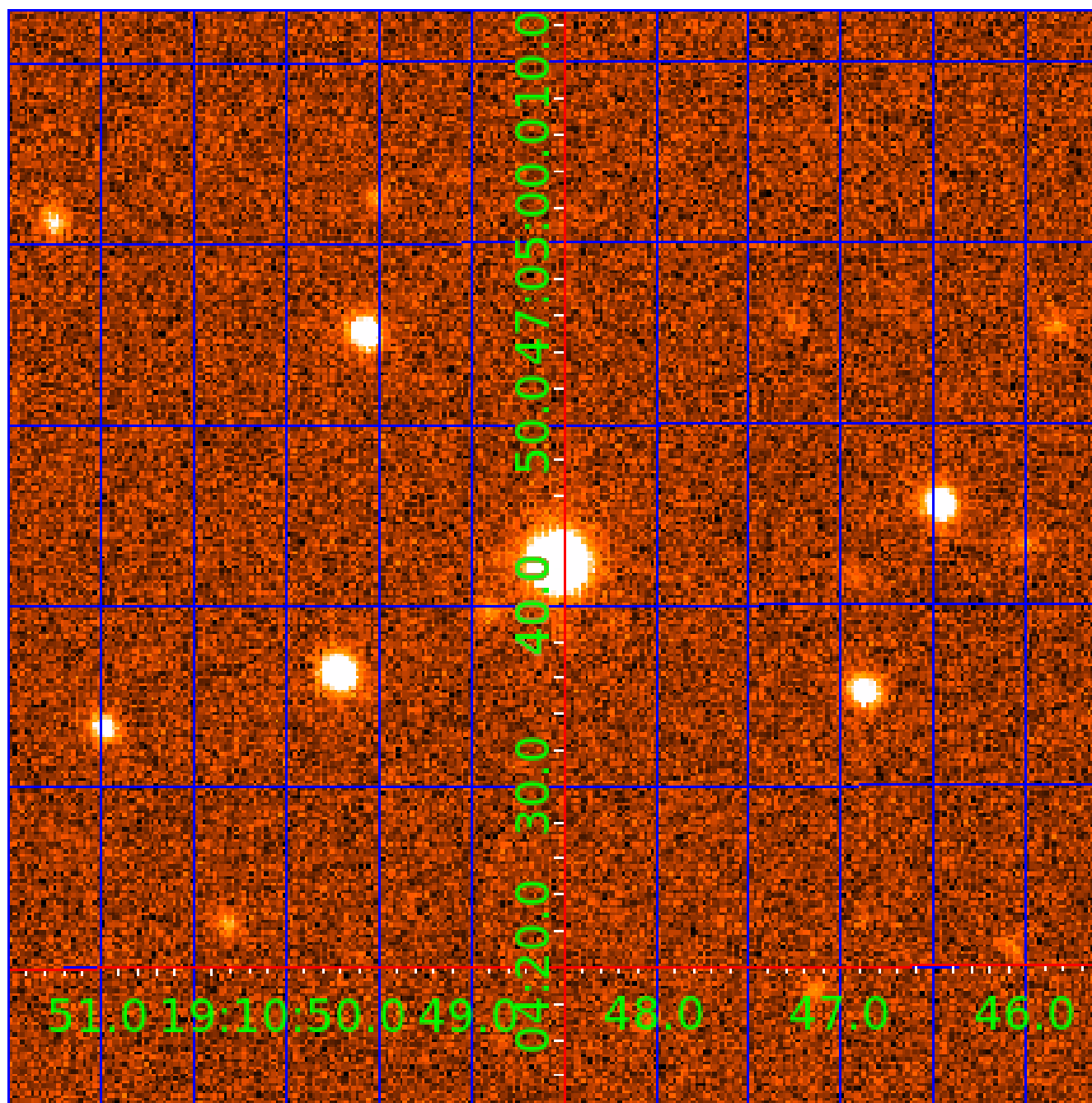


fluxWeightedCentroids, Planet 3 of 4



# UKIRT Image

Declination



# KIC 010065745

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010065745-01	OBS	No	433.269136	519.782553	2966.8	3.488	13.4	5.6	0.29	3411	1.54	0.02
010065745-02	OBS	No	377.051068	423.087294	3380.7	4.096	11.2	7.6	0.29	3411	1.67	0.02
010065745-03	OBS	No	551.947388	458.018282	3626.5	5.783	9.7	7.2	0.29	3411	1.70	0.01
010065745-04	OBS	No	298.204961	365.418035	2210.0	3.527	10.6	5.6	0.29	3411	1.34	0.03

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010065745-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010065745-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_KIC_POS
010065745-03	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_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010065745-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_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.

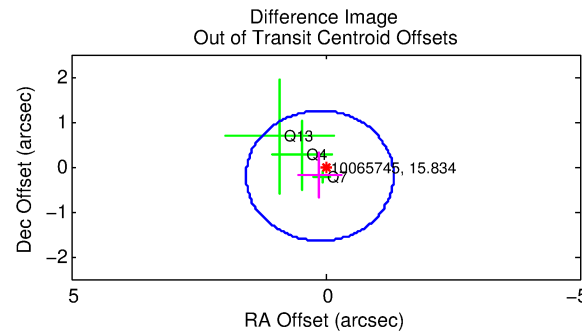
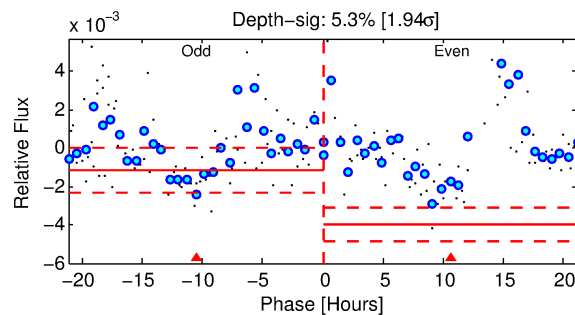
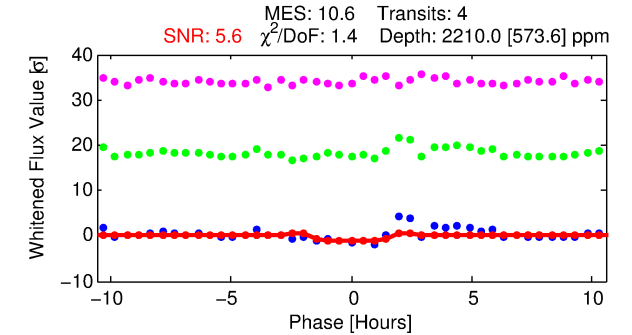
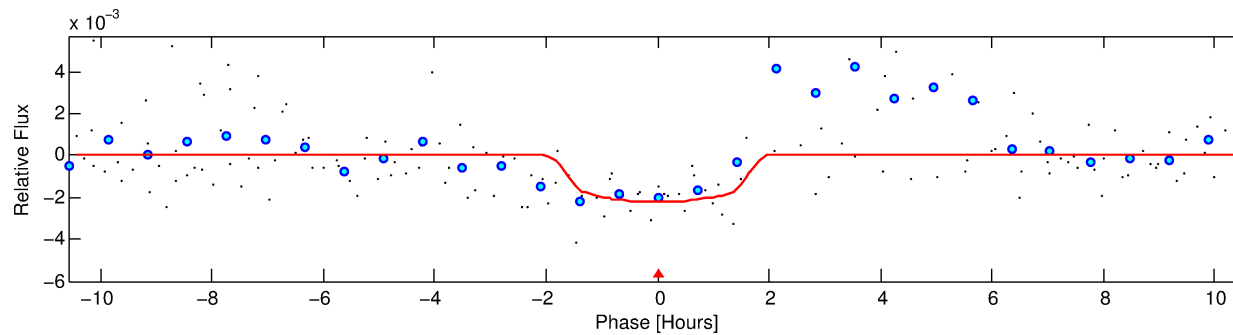
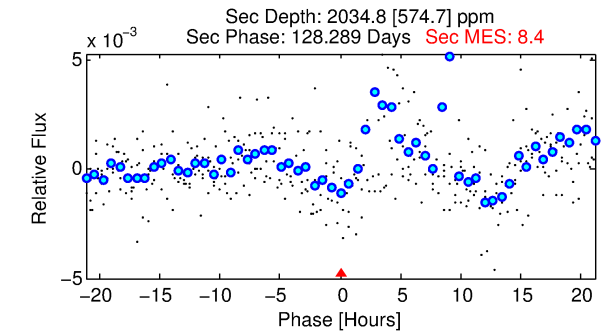
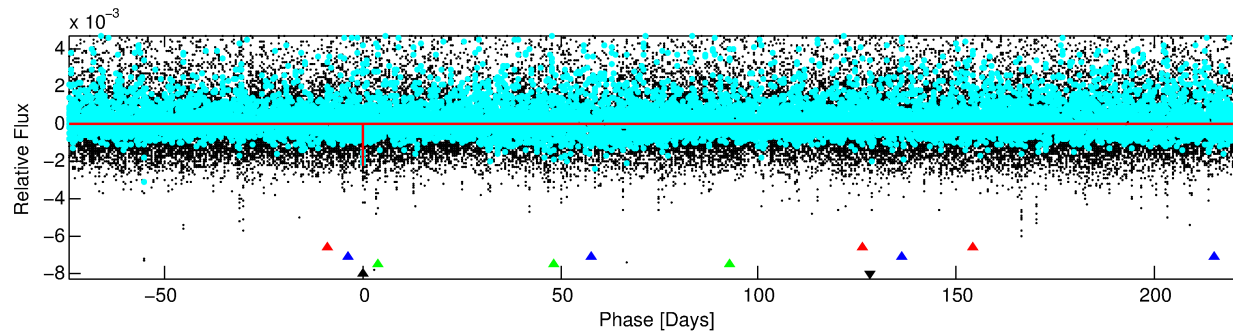
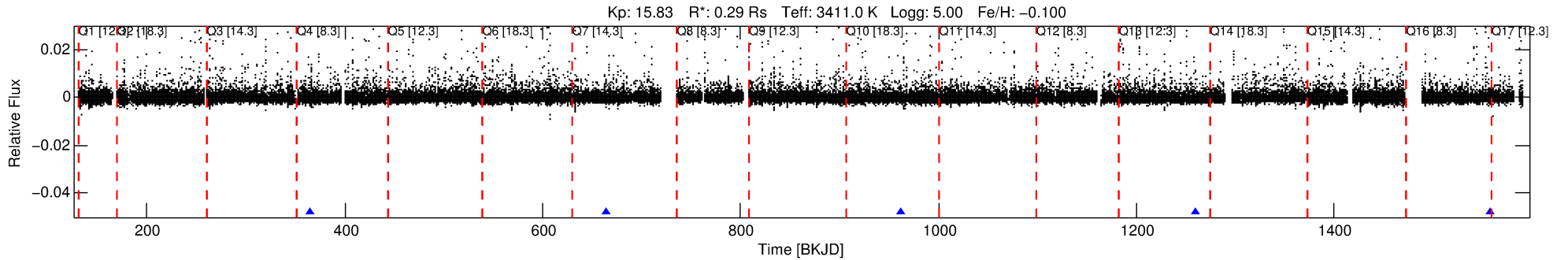
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010065745-04

No Significant Match Found

# DV One-Page Summary

KIC: 10065745 Candidate: 4 of 4 Period: 298.205 d



## DV Fit Results:

Period = 298.20496 [0.00619] d  
Epoch = 365.4180 [0.0120] BKJD  
Rp/R\* = 0.0428 [0.1023]  
a/R\* = 660.95 [7007.91]  
b = 0.20 [50.58]  
Seff = 0.03 [0.00]  
Teq = 106 [4] K  
Rp = 1.34 [3.20] Re  
a = 0.5816 [0.0593] AU  
Ag = 212236.66 [1016249.28] [0.21σ]  
Teffp = 3502 [4191] K [0.81σ]

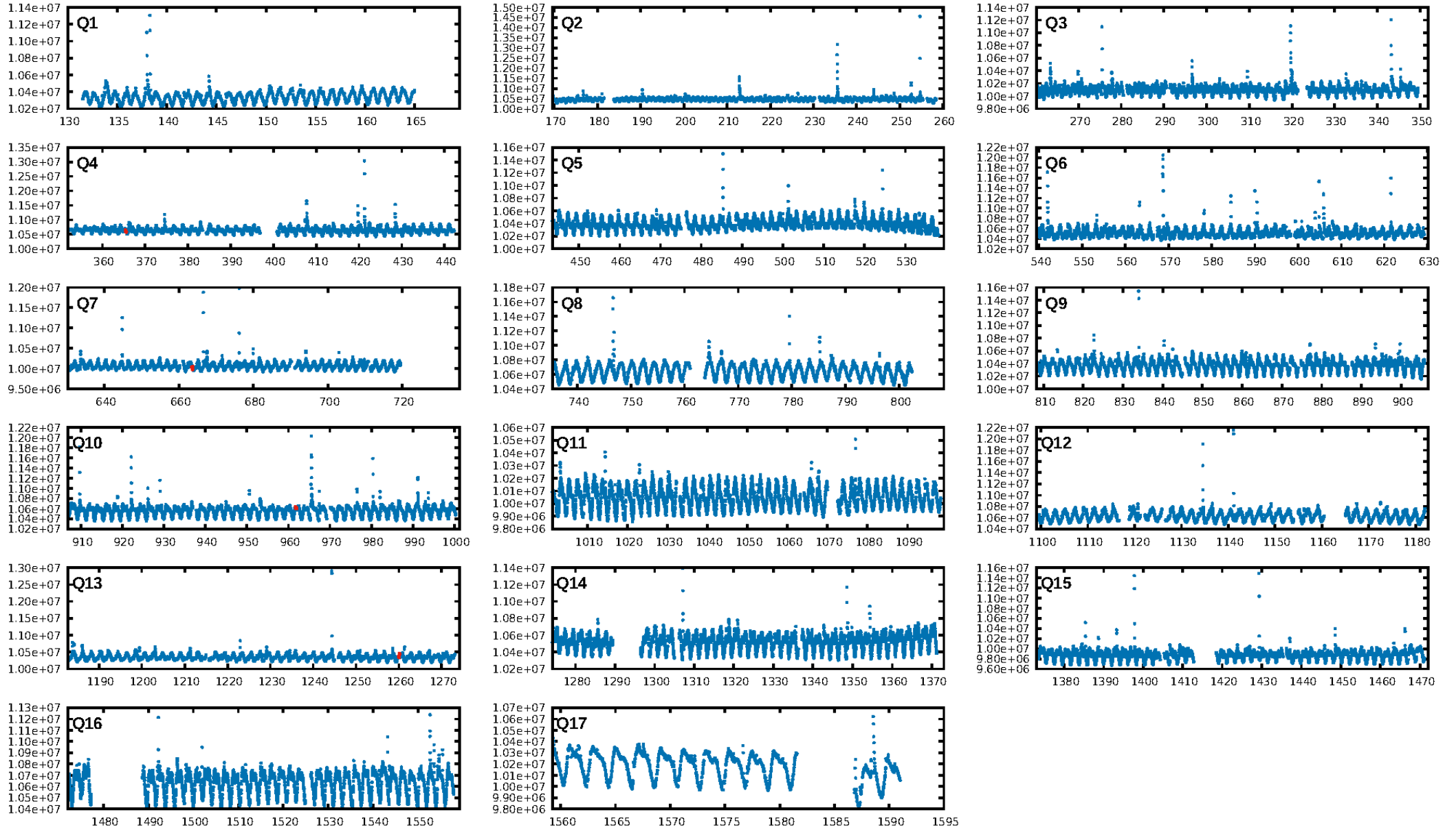
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [350.10σ]  
ModelChiSquare2-sig: 0.8%  
ModelChiSquareGof-sig: 75.6%  
Bootstrap-pfa: 3.45e-08  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 0.6912  
Centroid-sig: 6.5%  
Centroid-so: 1.389 arcsec [1.77σ]  
OotOffset-rm: 0.233 arcsec [0.48σ]  
KicOffset-rm: 0.440 arcsec [0.88σ]  
OotOffset-st: 0/1/1/1 [3]  
KicOffset-st: 0/1/1/1 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [4/4]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 03:03:47 Z

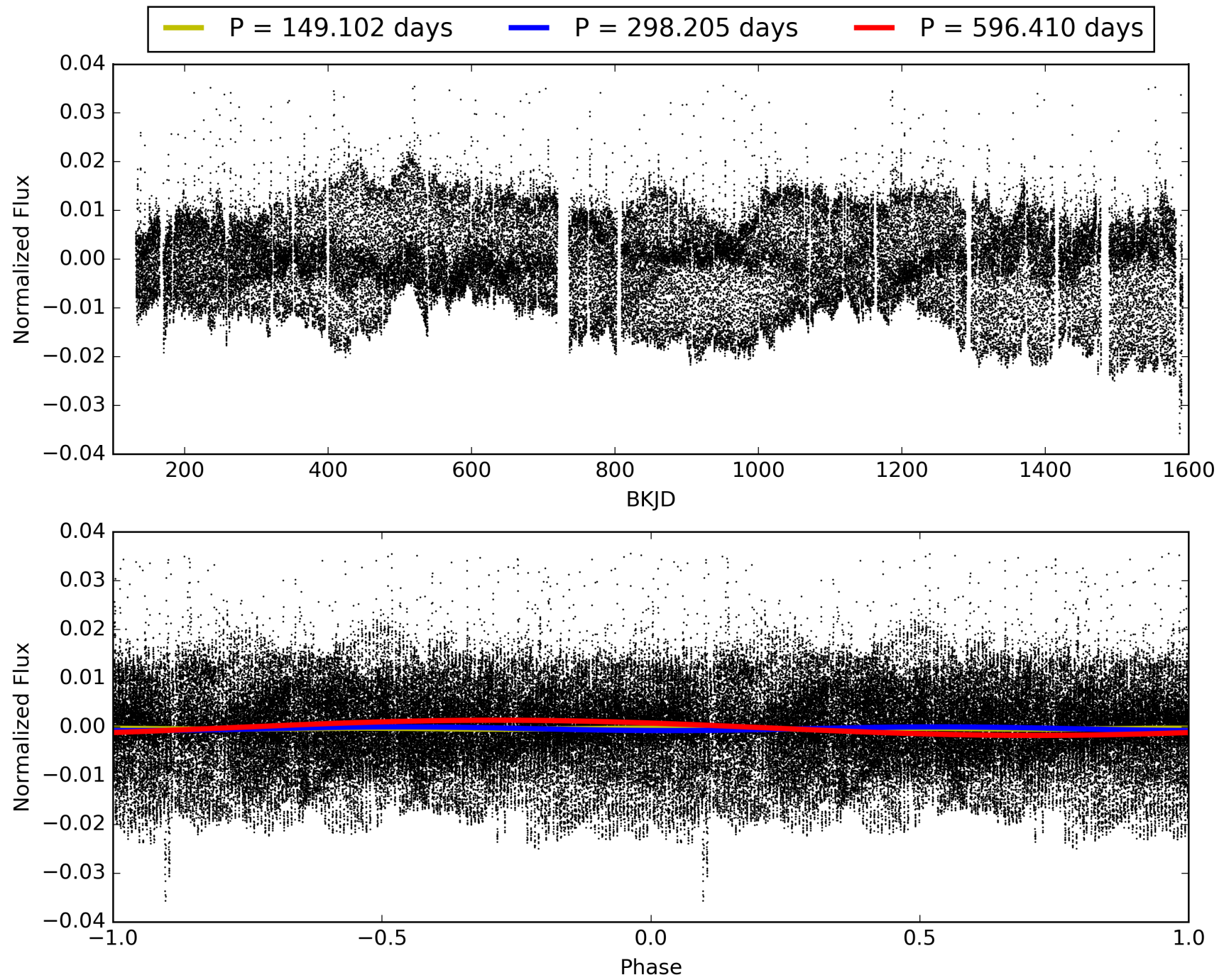
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010065745-04, PDC Light Curves





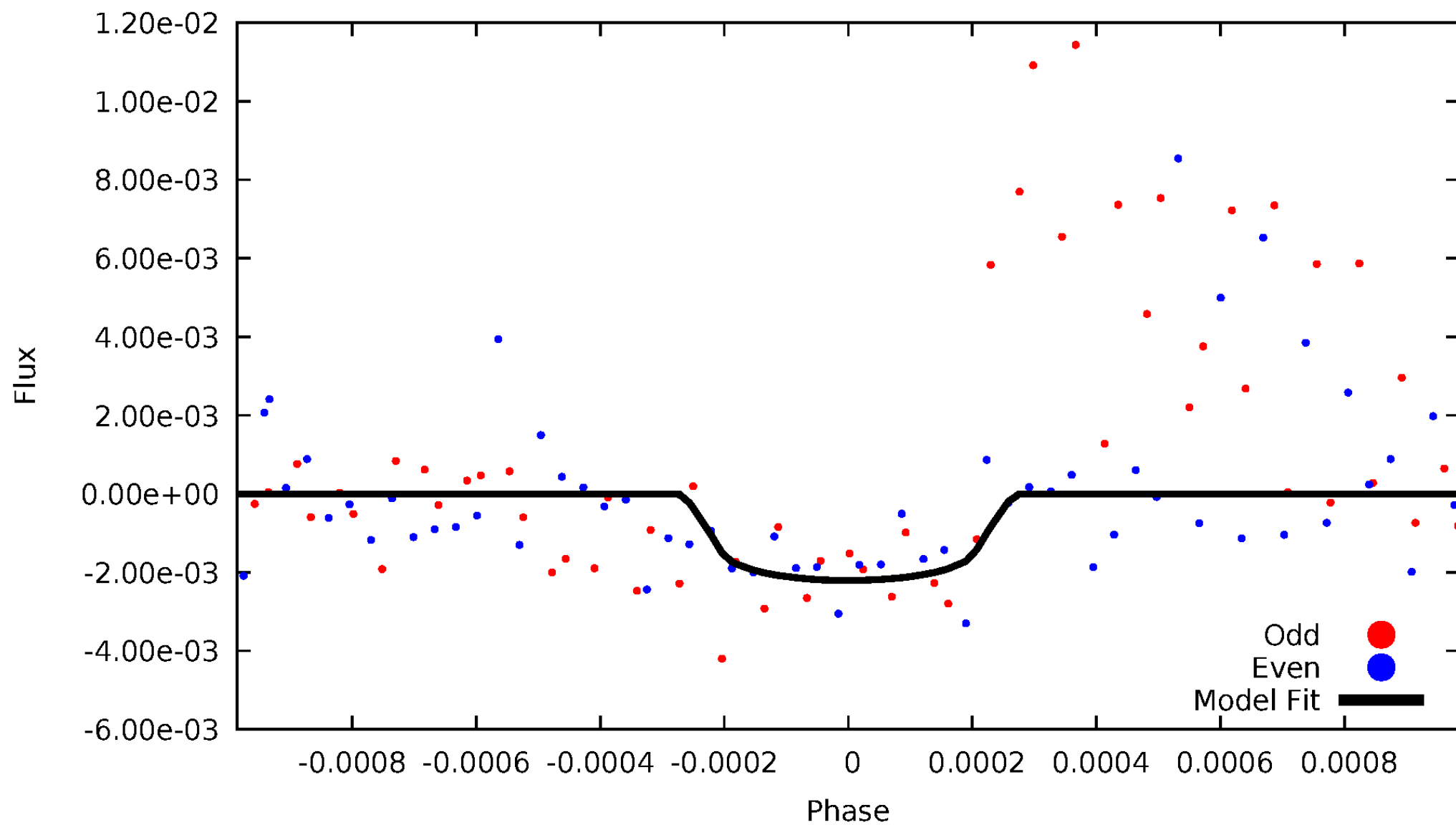
TCE 010065745-04





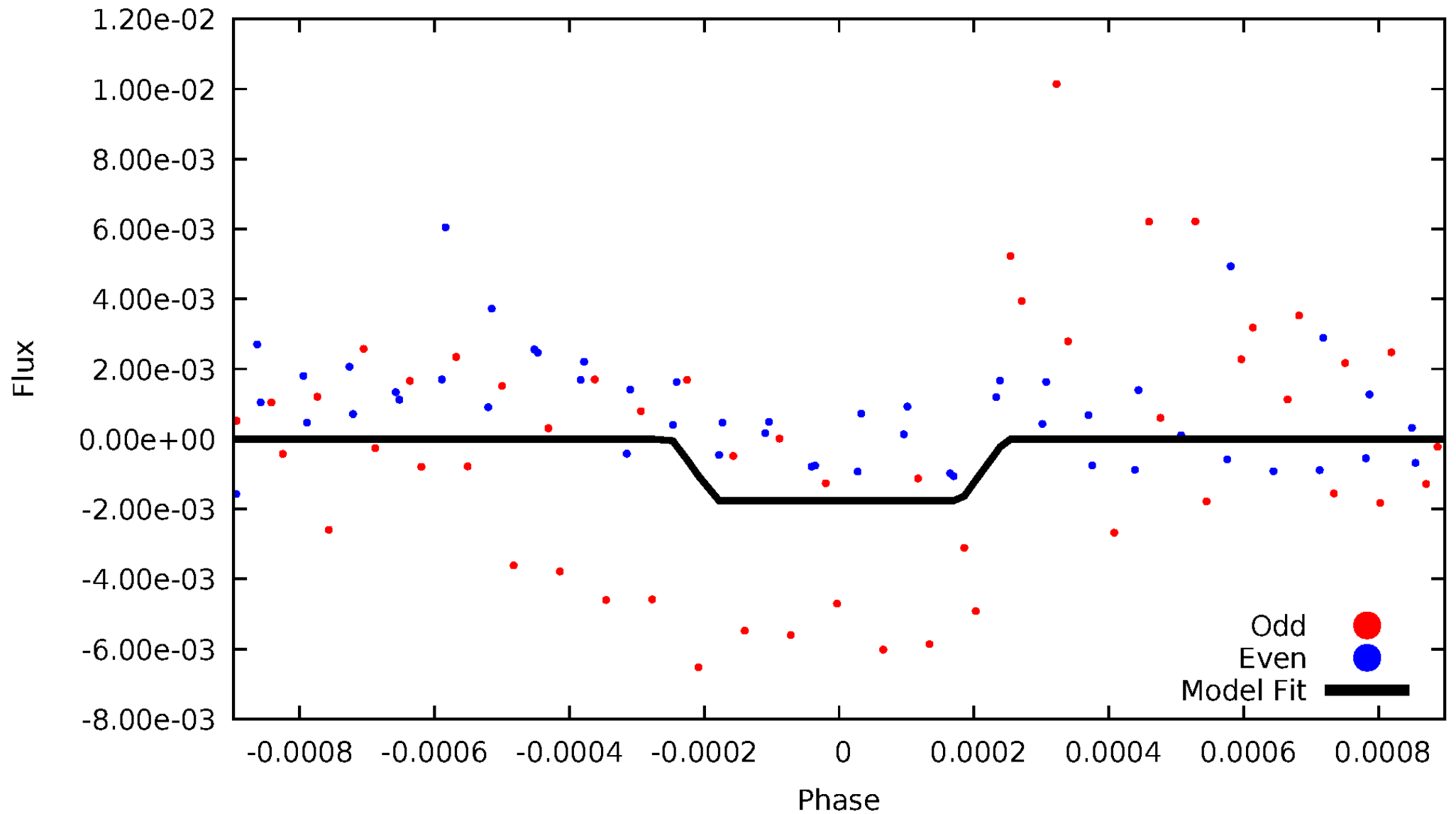
# DV Odd/Even

TCE 010065745-04



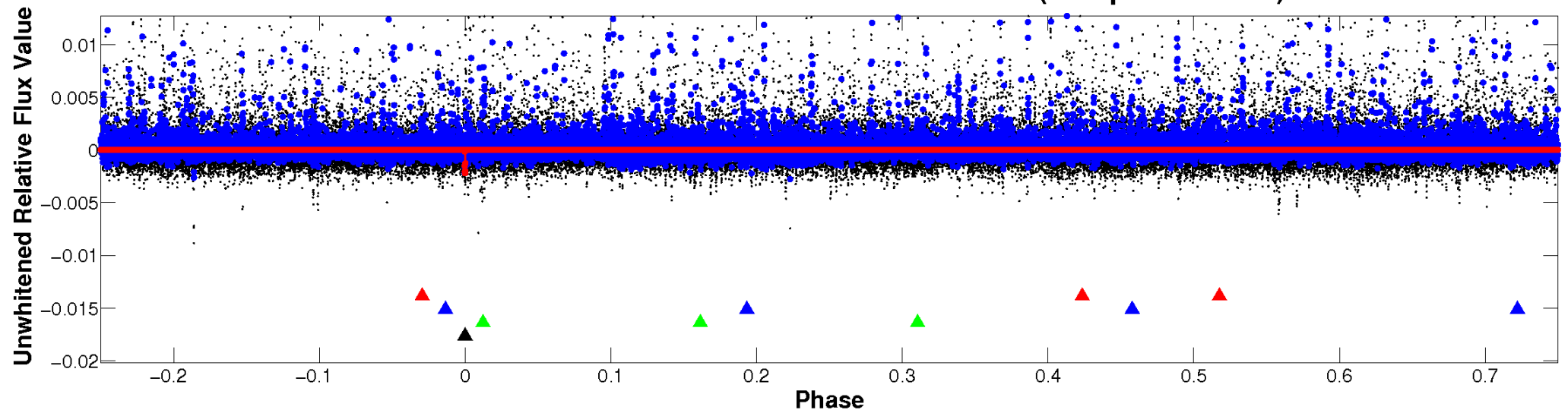
# ALT Odd/Even

TCE 010065745-04

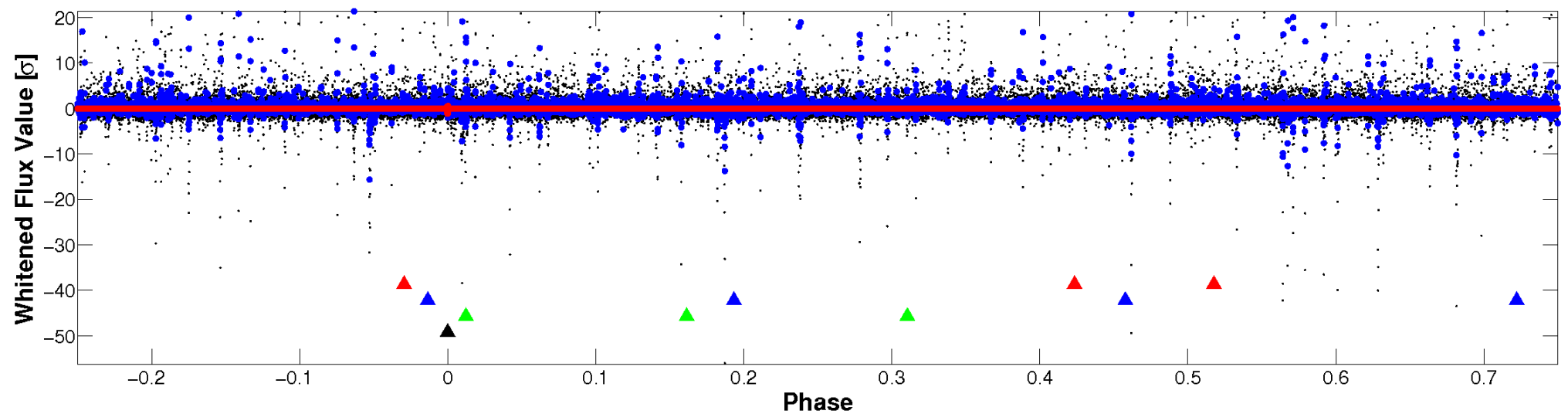


# Non-Whitened Vs. Whitened Light Curve

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

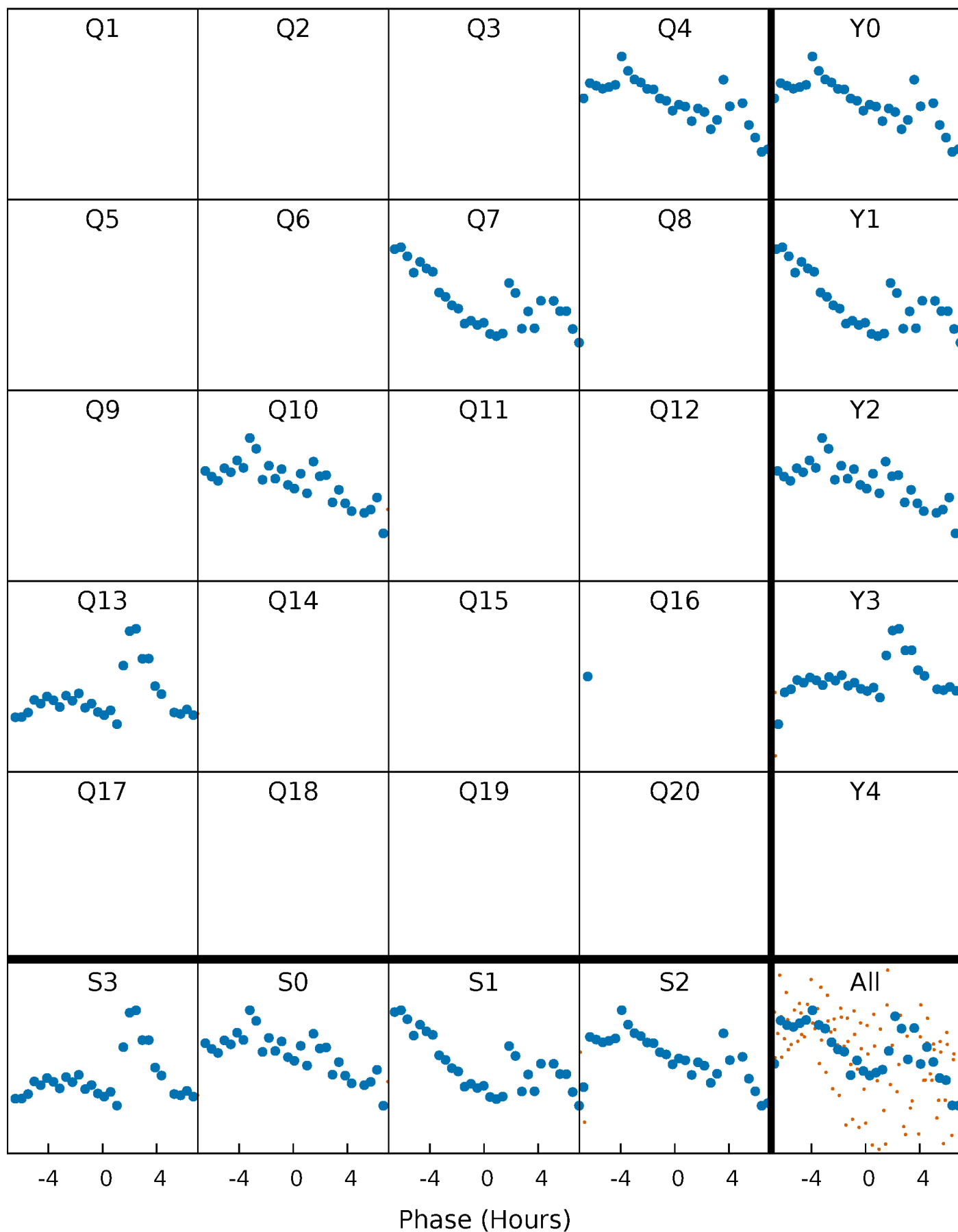


Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



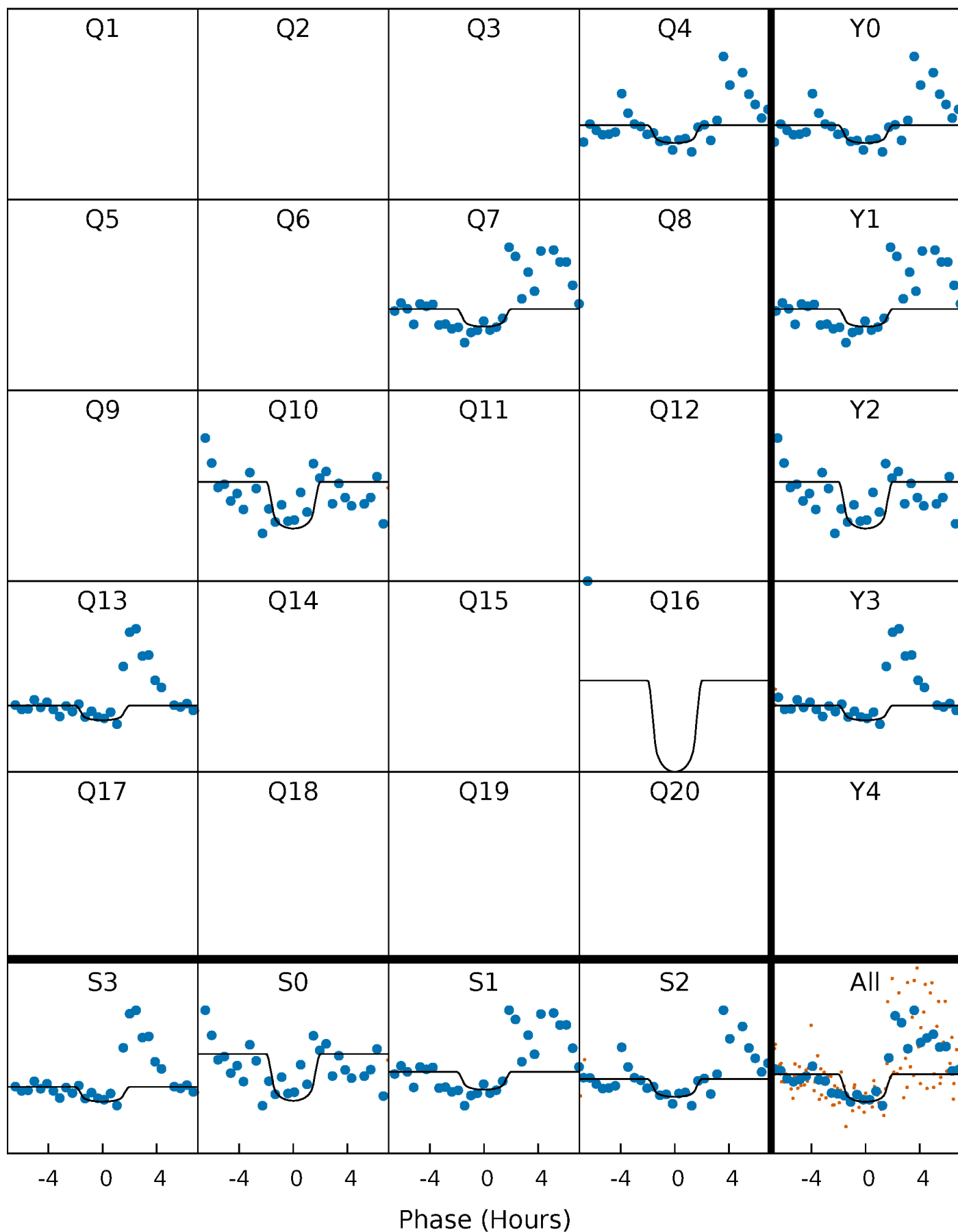
# PDC Quarter-Phased Transit Curves

TCE 010065745-04     $P=298.204961$  Days     $T_0=365.418035$  (BKJD)



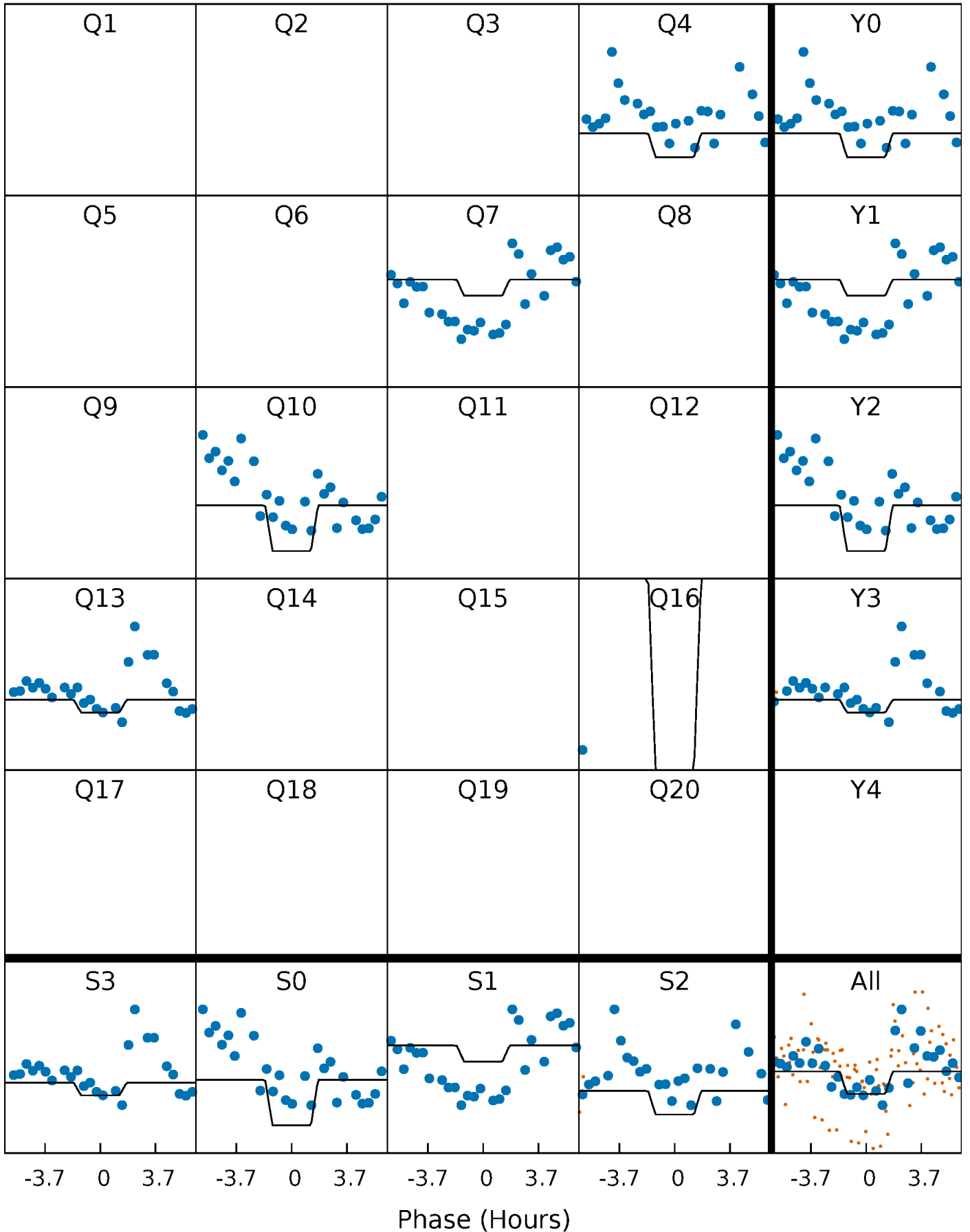
# DV Quarter-Phased Transit Curves

TCE 010065745-04     $P=298.204961$  Days     $T_0=365.418035$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

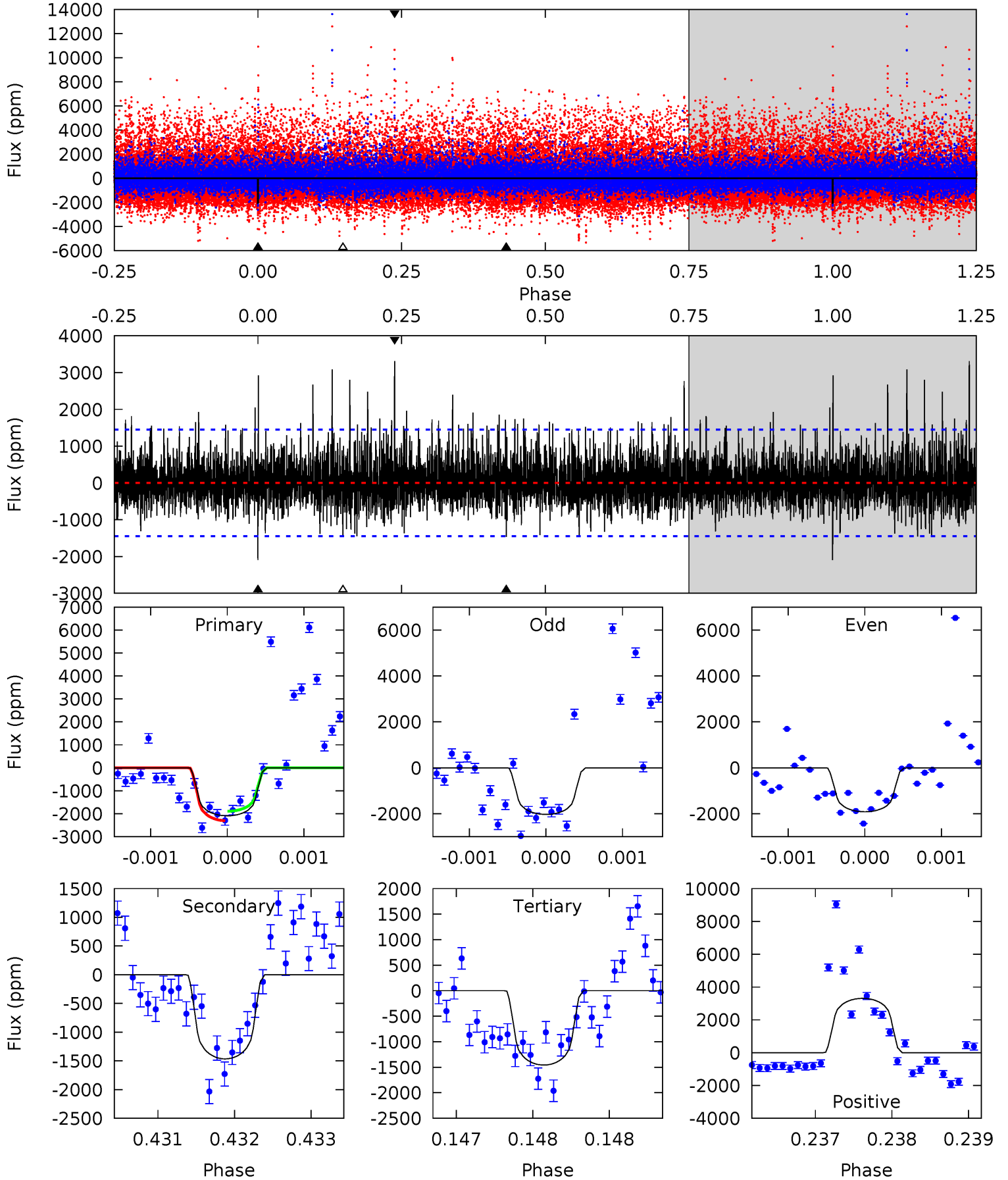
TCE 010065745-04     $P=298.200563$  Days     $T_0=365.423859$  (BKJD)



# DV Model-Shift Uniqueness Test

010065745-04, P = 298.204961 Days, E = 67.213074 Days

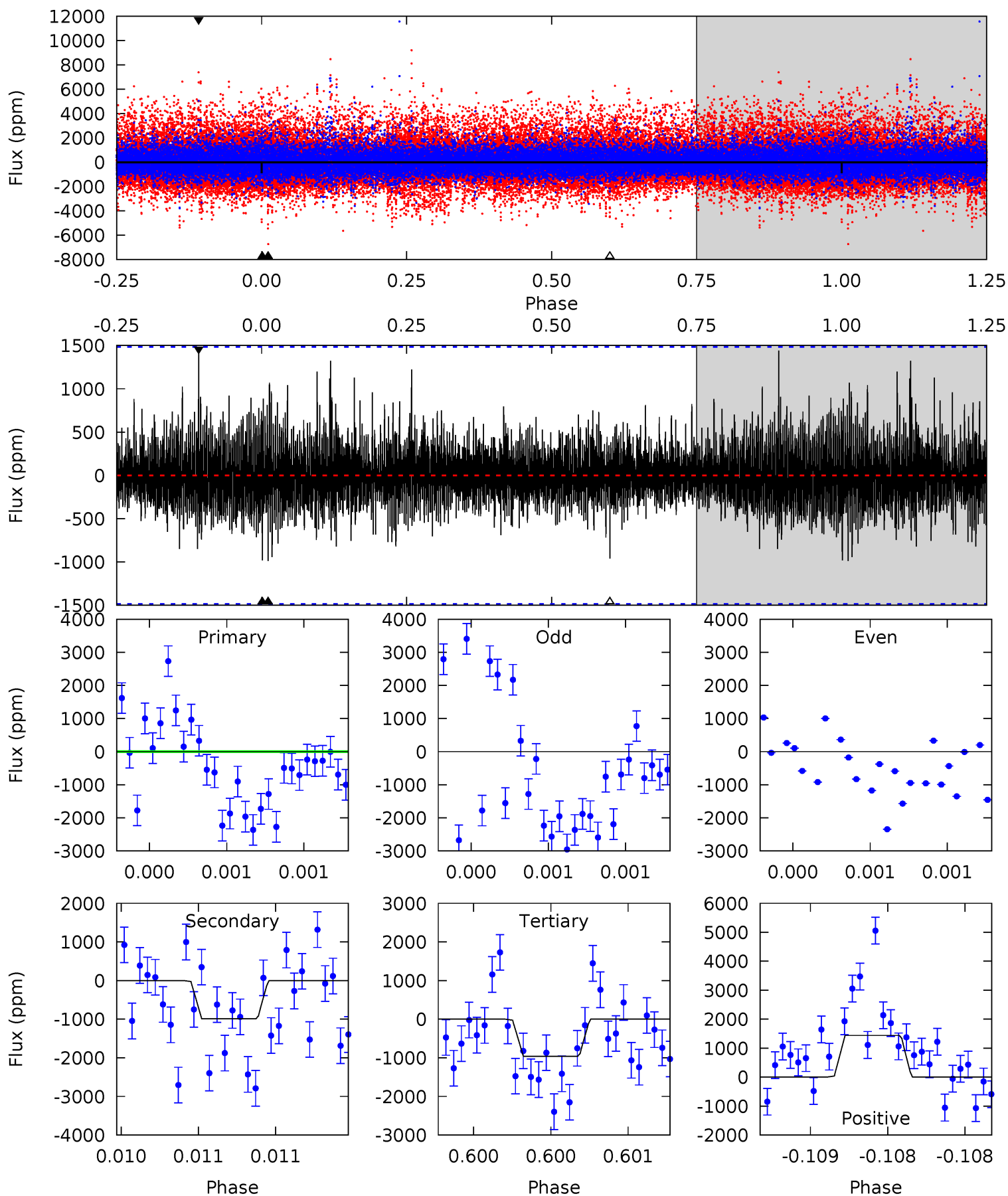
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.02	5.61	5.58	12.7	5.55	3.45	1.94	2.43	-4.67	0.03	-7.07	0.18	1.03	0.61	0.80



# Alt Model-Shift Uniqueness Test

010065745-04, P = 298.200563 Days, E = 67.223296 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
3.14	3.71	3.60	5.41	5.57	3.48	0.99	-0.46	-2.27	0.11	-1.70	6.80	2.32	0.59	0.15





### Stellar Parameters For KIC 010065745

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3411^{+40}_{-45}$	$4.995^{+0.031}_{-0.054}$	$-0.100^{+0.100}_{-0.100}$	$0.286^{+0.040}_{-0.029}$	$0.294^{+0.039}_{-0.047}$	$17.760^{+3.848}_{-4.083}$
	+1%/-1%	+1%/-1%	+100%/-100%	+14%/-10%	+13%/-16%	+22%/-23%
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 010065745-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1466 \pm 261$	$2.85^{+2.63}_{-1.95}$	$148^{+4}_{-3}$	$2671^{+1088}_{-388}$	$33376^{+305612}_{-24634}$
Alt.	$-988 \pm 266$	$2.61^{+2.86}_{-1.78}$	$148^{+4}_{-4}$	$2583^{+978}_{-413}$	$24969^{+239639}_{-19309}$

$T_{max}$  = 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

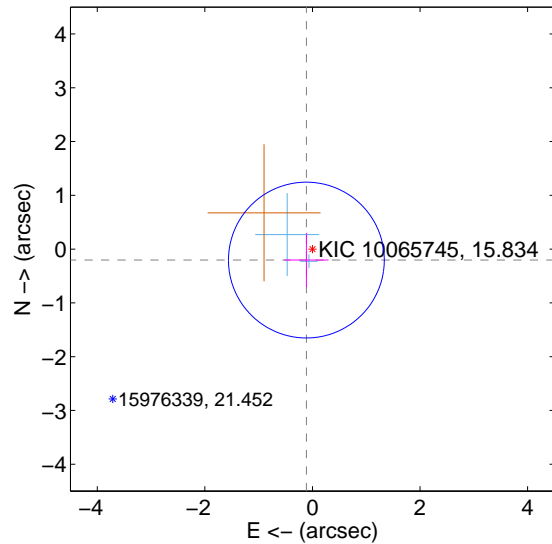
Supplemental centroid analysis for 010065745-04. Kepler magnitude: 15.83. Transit SNR 5.60

There are 2 quarters with good PRF difference image offsets

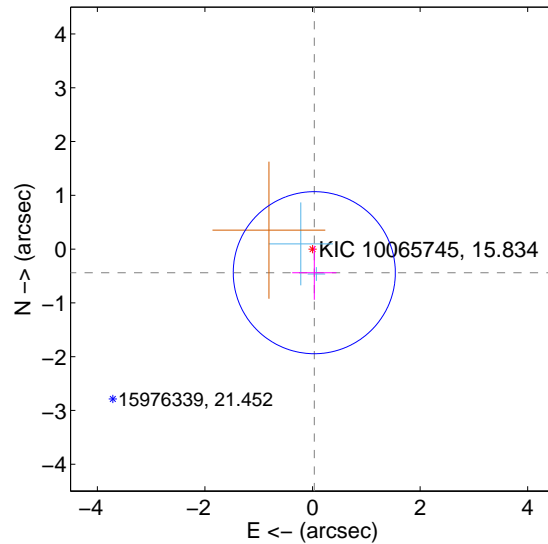
The direct PRF centroid is offset from the target star catalog position by about 0.33 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.233 \pm 0.483$	0.48	$0.113 \pm 0.411$	$-0.204 \pm 0.503$
PRF-fit source offset from KIC position	$0.440 \pm 0.502$	0.88	$-0.033 \pm 0.411$	$-0.439 \pm 0.503$
photometric centroid source offset	$1.39 \pm 0.79$	1.77	$-0.12 \pm 0.80$	$-1.38 \pm 0.79$

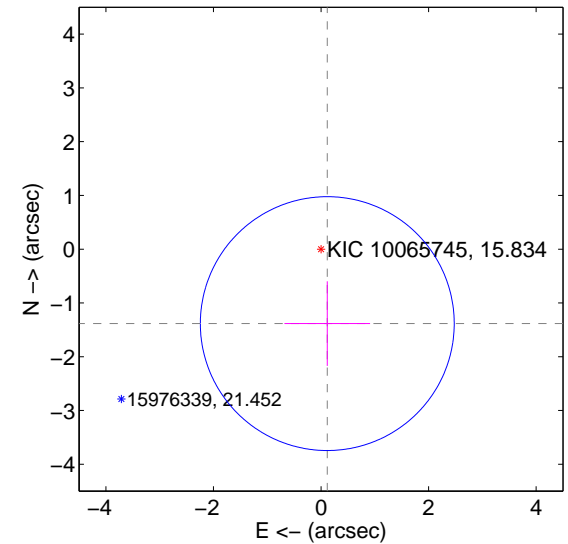
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

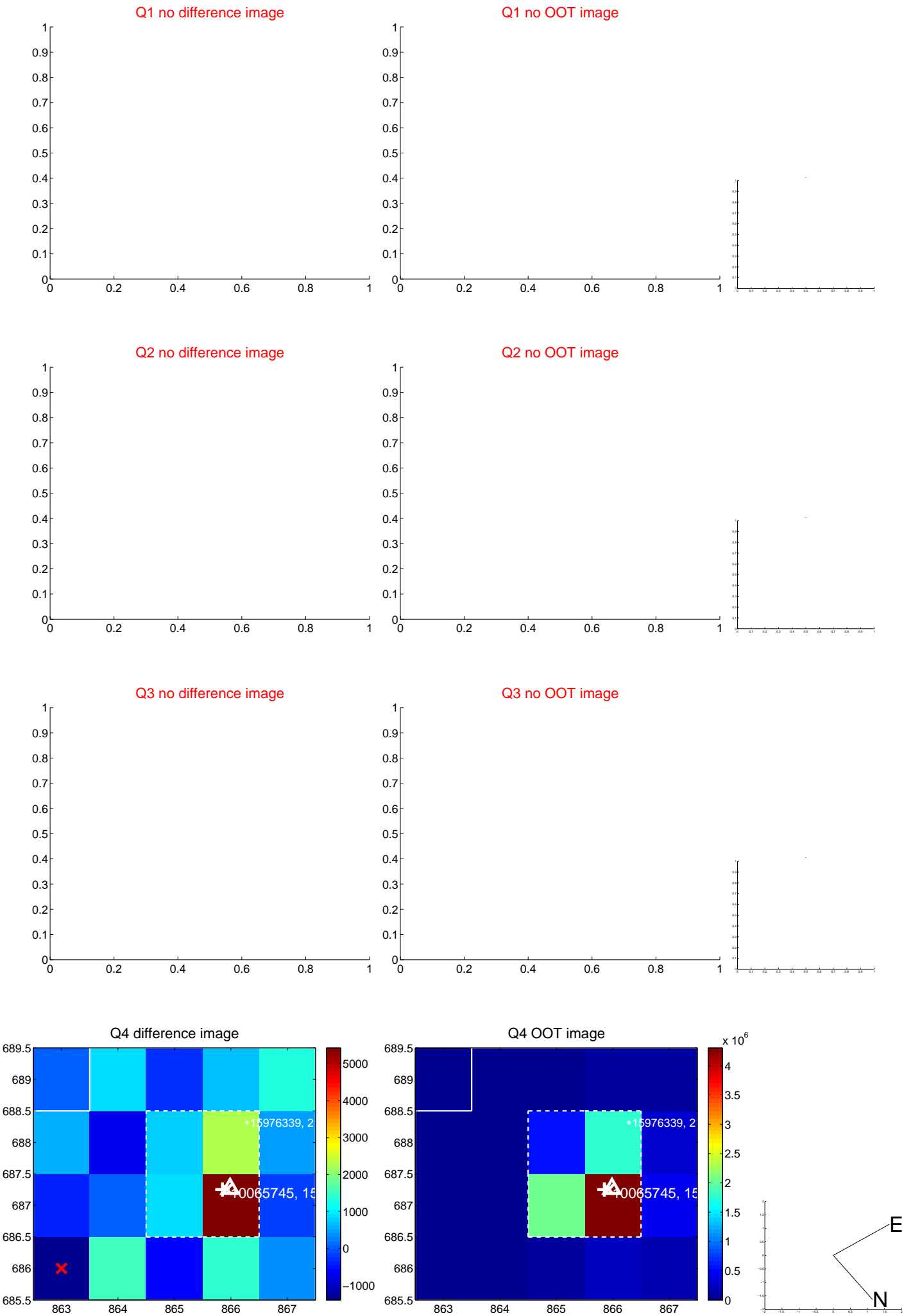


offset from photometric centroids

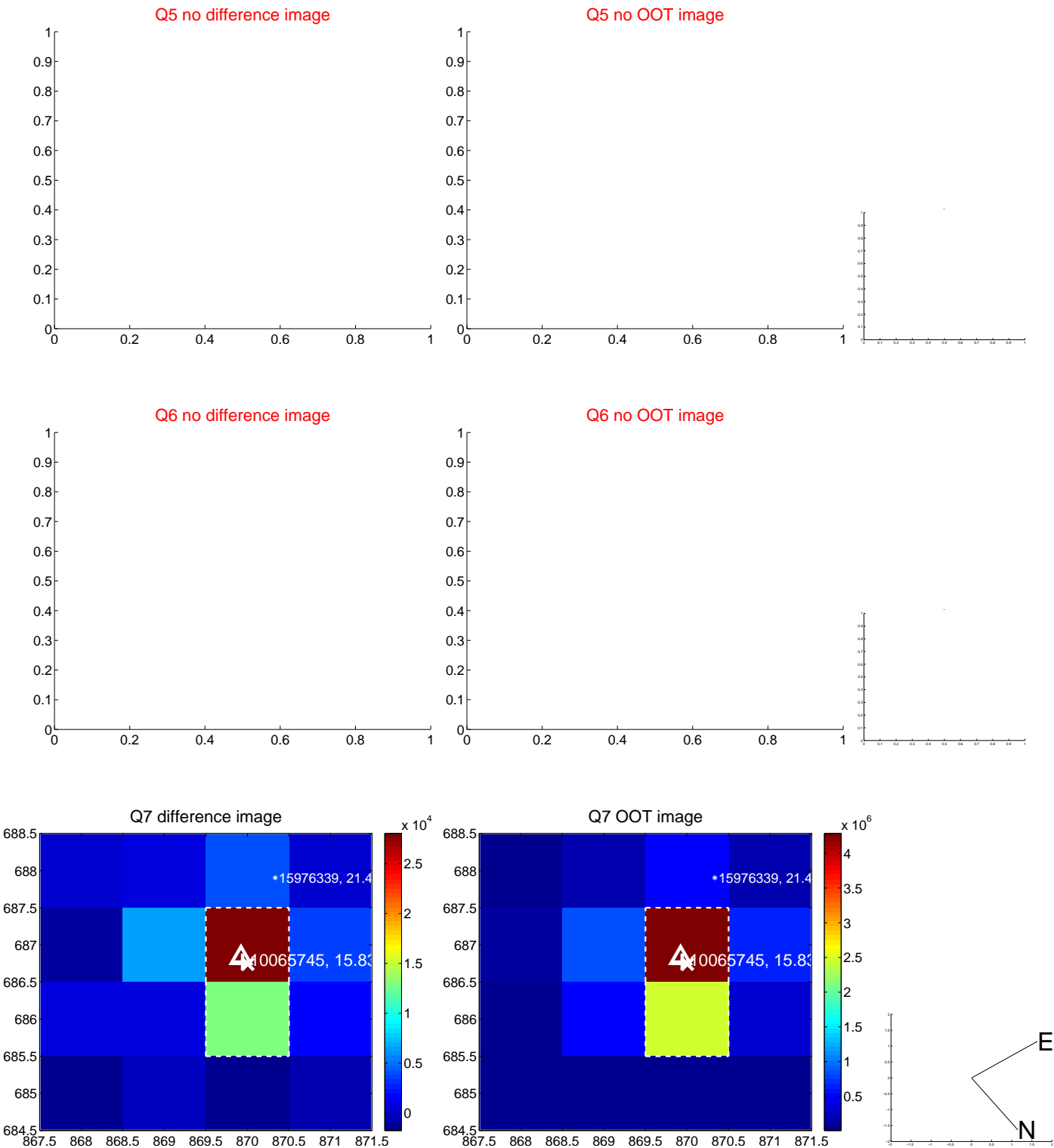


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

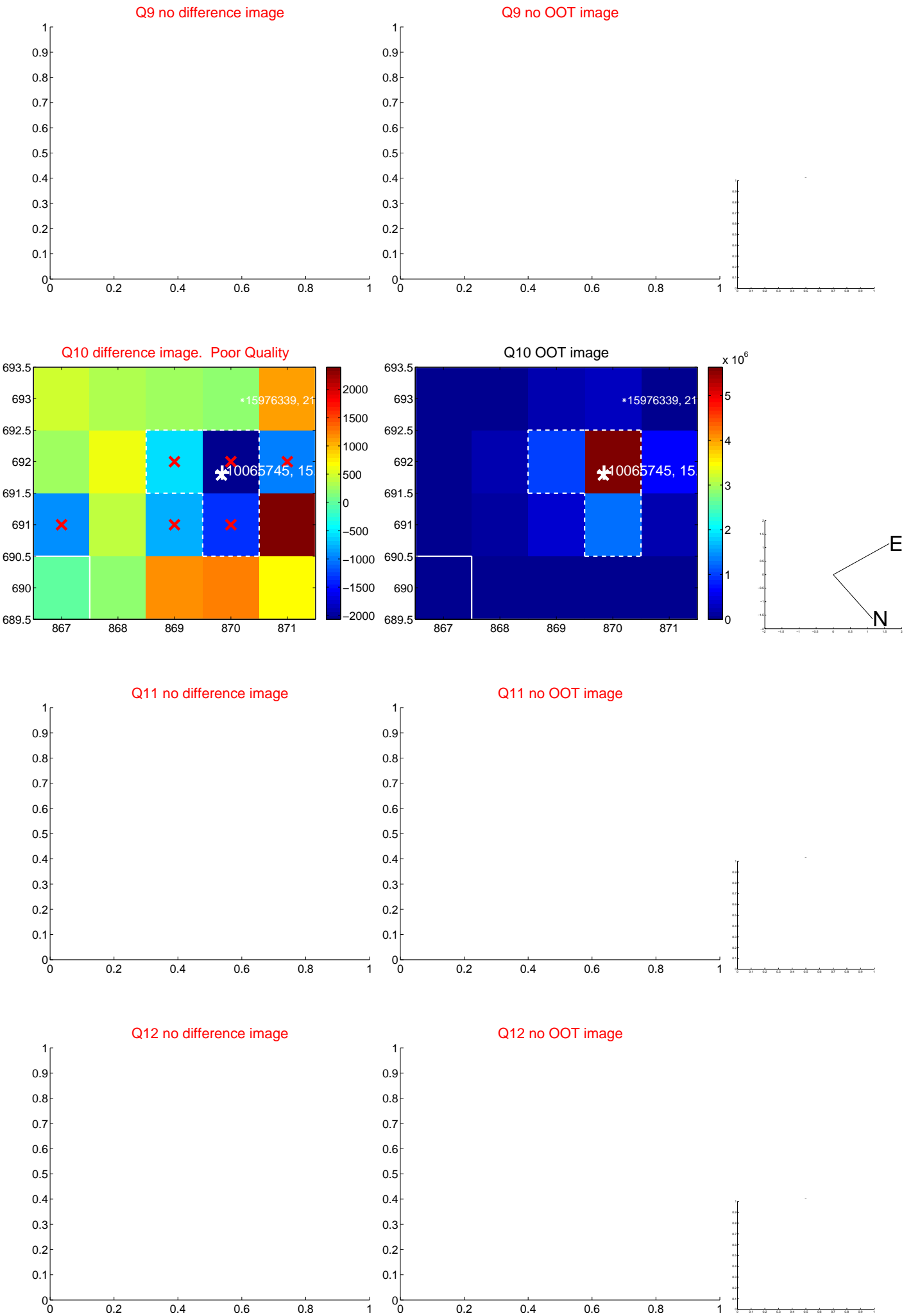
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



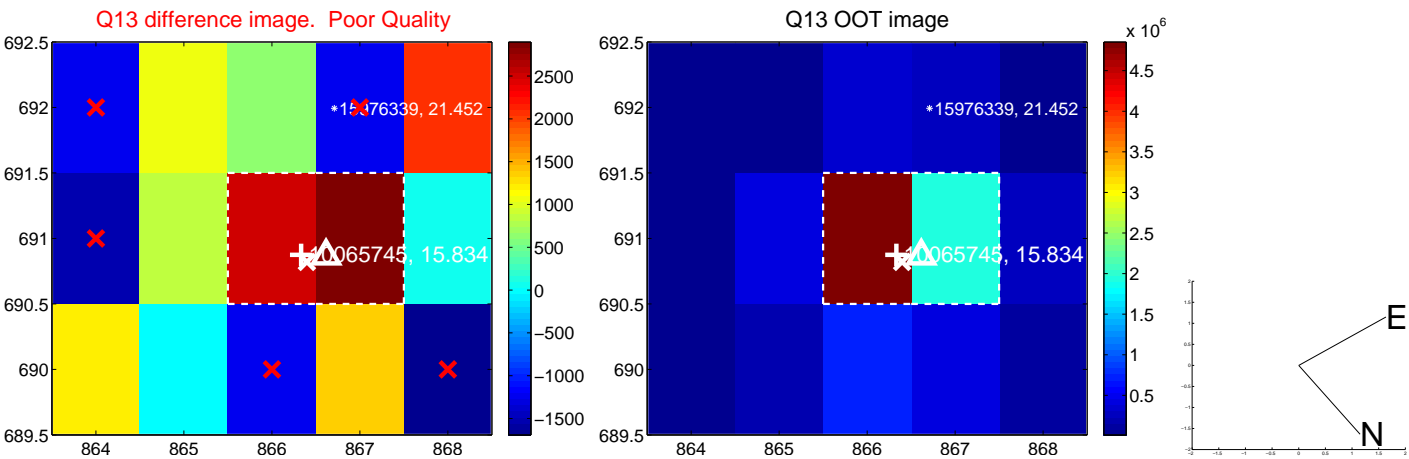
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



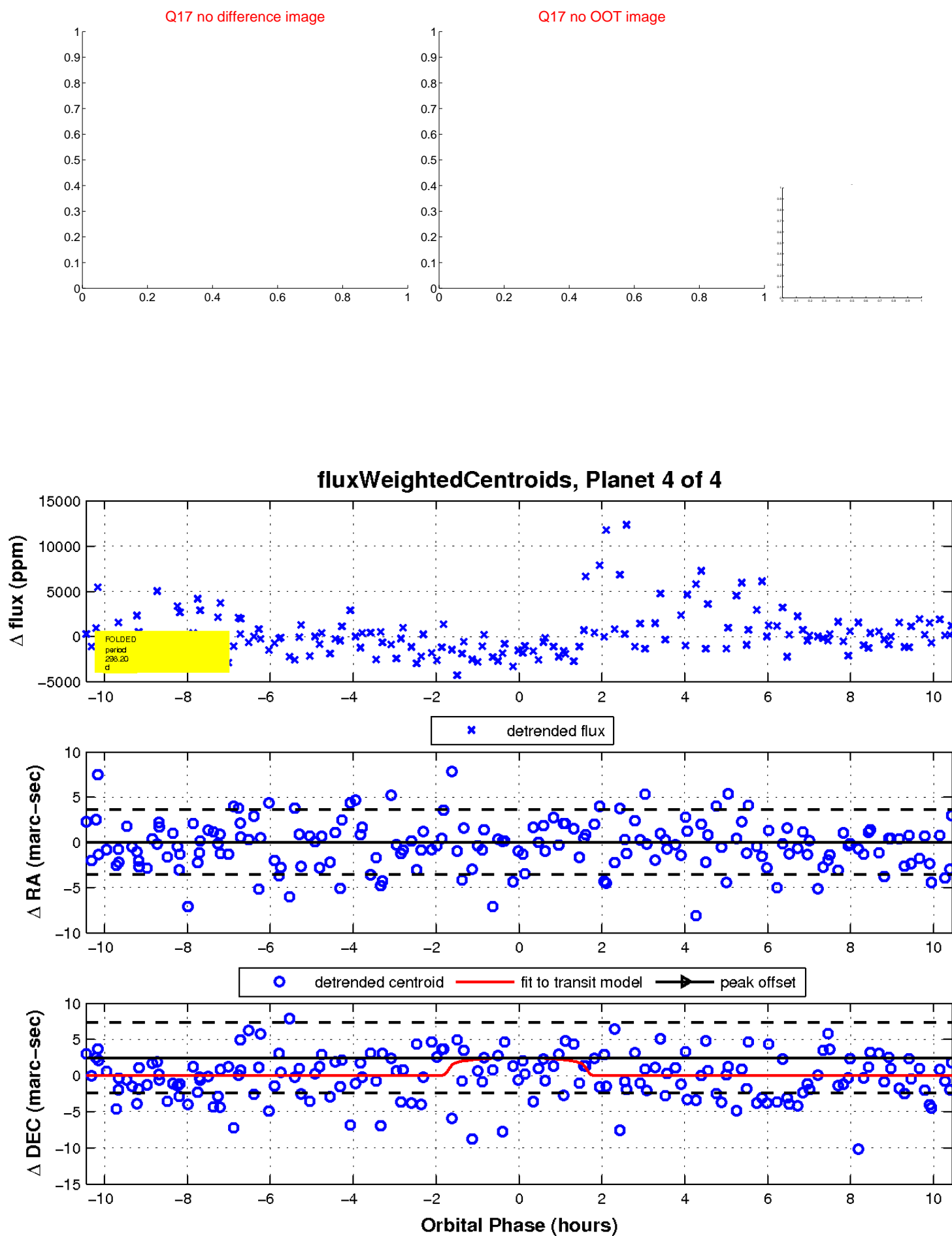
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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.



# UKIRT Image

Declination

