

# KIC 005597401

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005597401-01	OBS	No	384.928980	344.409178	2471.9	3.686	14.8	7.2	0.74	4482	3.68	0.23
005597401-02	OBS	No	564.651881	411.257009	2660.5	3.813	14.4	7.3	0.74	4482	3.65	0.14
005597401-03	OBS	No	545.330748	404.083664	2402.7	5.744	12.7	4.8	0.74	4482	3.68	0.14
005597401-04	OBS	No	329.334416	425.597633	2003.3	3.530	13.2	5.1	0.74	4482	3.18	0.28

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005597401-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
005597401-02	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
005597401-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_SKYE—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_KIC_POS
005597401-04	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.

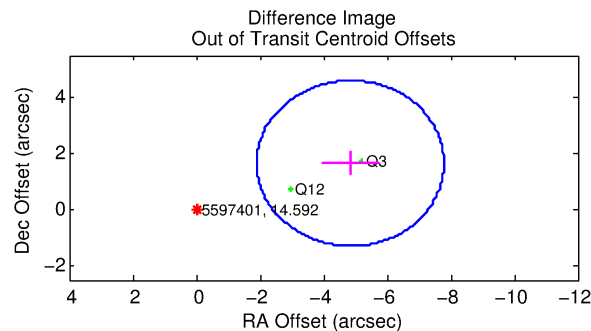
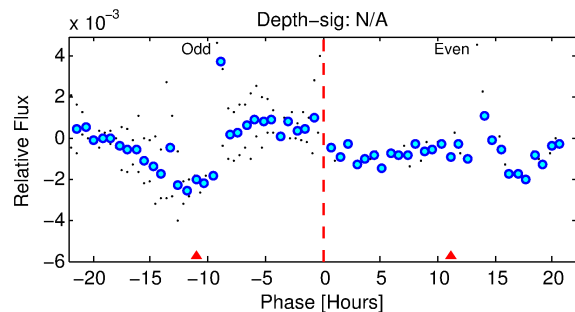
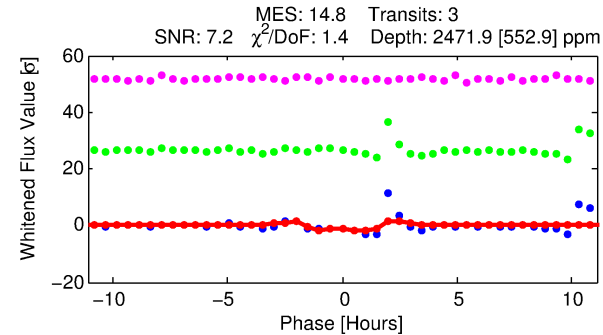
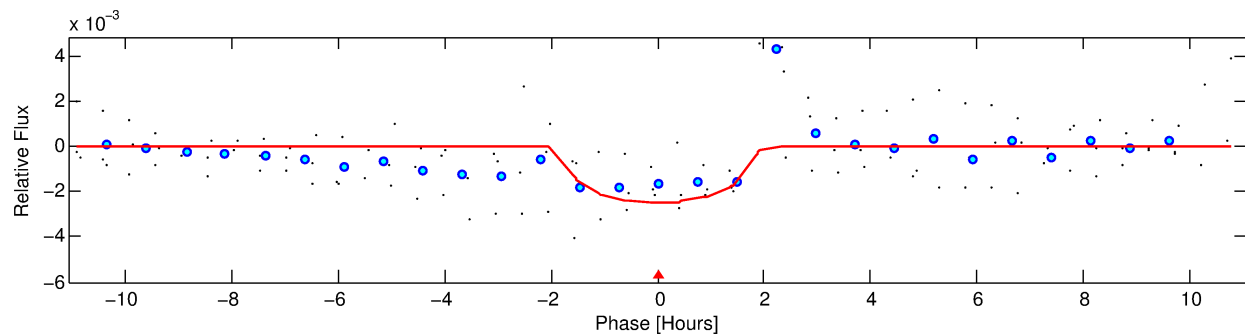
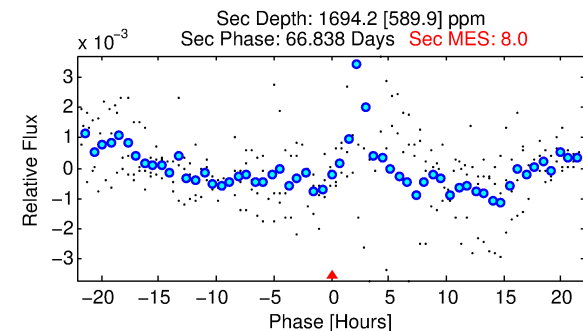
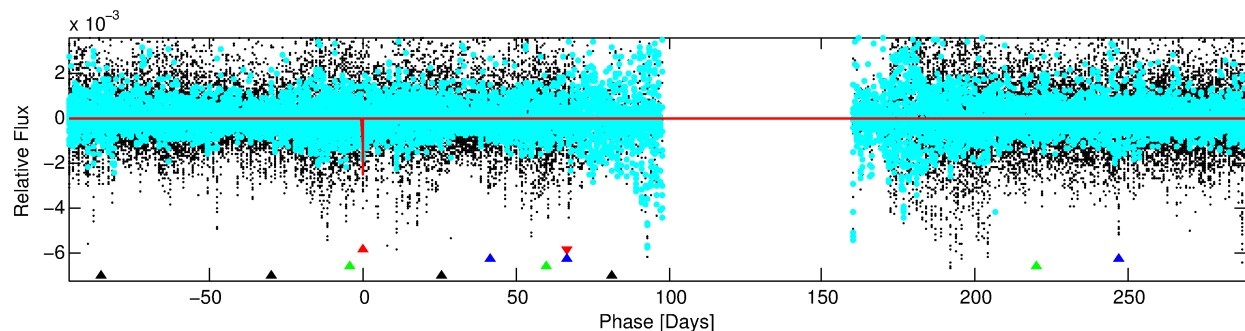
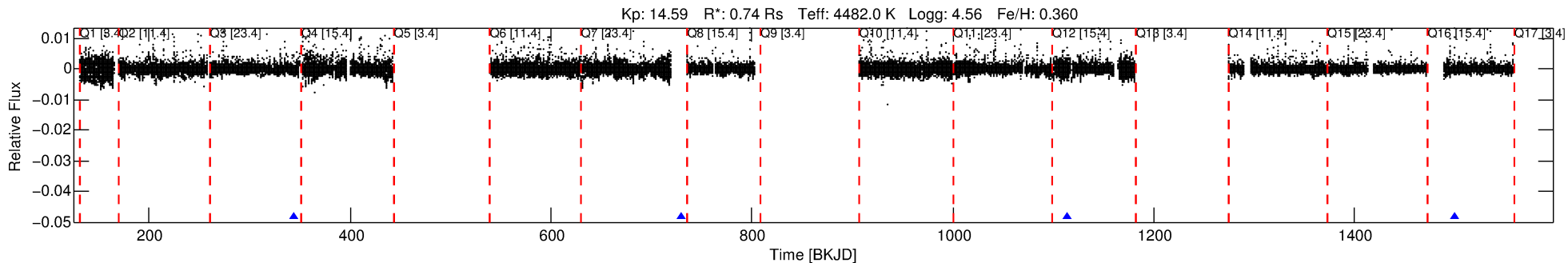
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 005597401-01

No Significant Match Found

# DV One-Page Summary

KIC: 5597401 Candidate: 1 of 4 Period: 384.929 d



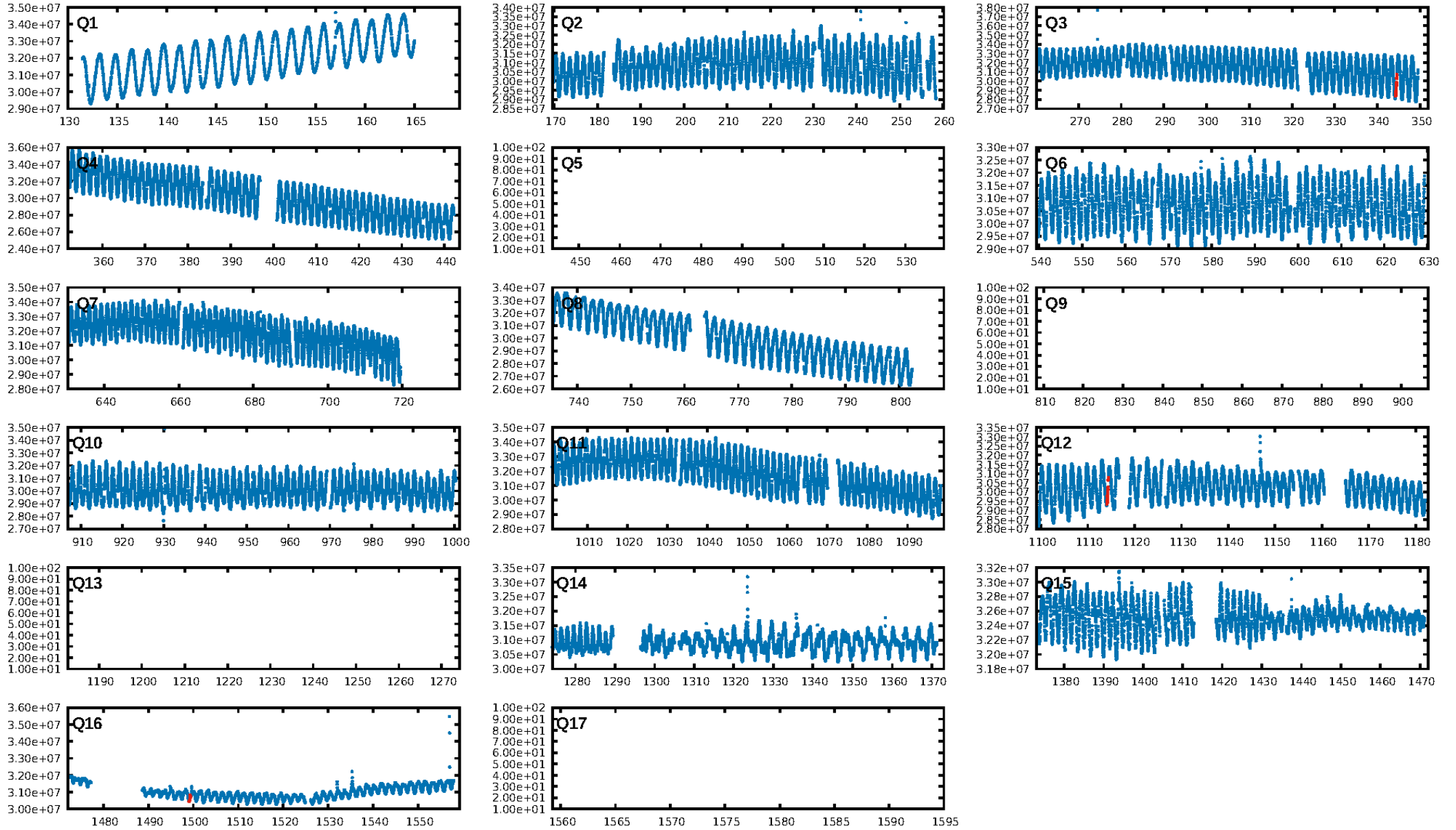
## DV Fit Results:

Period = 384.92898 [0.00398] d  
Epoch = 344.4092 [0.0079] BKJD  
Rp/R\* = 0.0454 [0.0662]  
a/R\* = 740.47 [3021.52]  
b = 0.48 [6.72]  
Seff = 0.23 [0.04]  
Teq = 176 [7] K  
Rp = 3.68 [5.38] Re  
a = 0.9354 [0.0681] AU  
Ag = 60114.84 [176829.89] [0.34σ]  
Teffp = 4269 [3140] K [1.30σ]

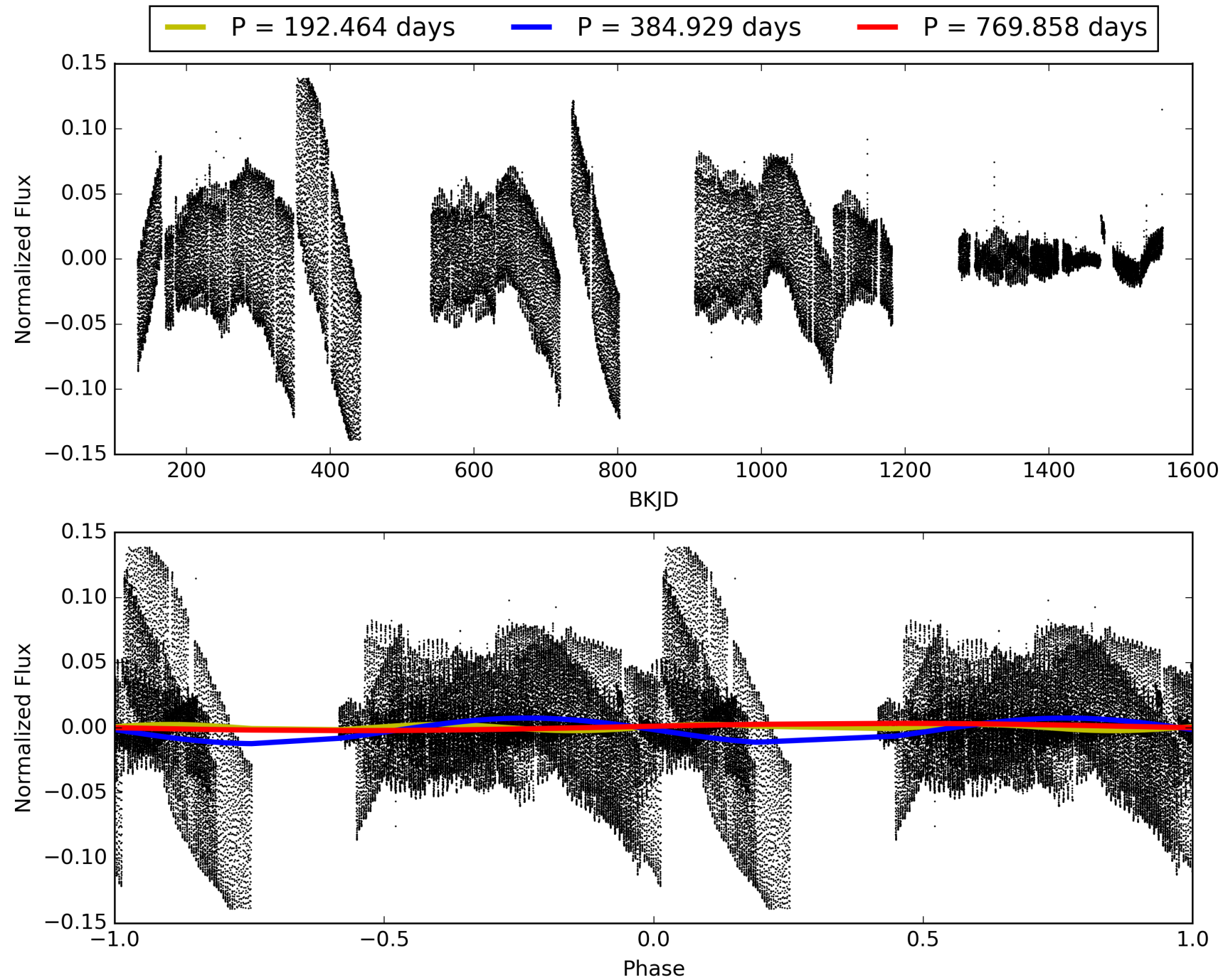
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [261.44σ]  
LongPeriod-sig: 100.0% [564.05σ]  
ModelChiSquare2-sig: 45.1%  
ModelChiSquareGof-sig: 42.9%  
**Bootstrap-pfa: 3.53e-12**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -0.6497  
Centroid-sig: 0.7%  
Centroid-so: 4.512 arcsec [1.53σ]  
**OotOffset-rm: 5.116 arcsec [5.21σ]**  
KicOffset-rm: 0.062 arcsec [0.50σ]  
OotOffset-st: 0/1/1/0 [2]  
KicOffset-st: 0/1/1/0 [2]  
DiffImageQuality-fgm: 1.00 [2/2]  
DiffImageOverlap-fno: 1.00 [2/2]

# TCE 005597401-01, PDC Light Curves

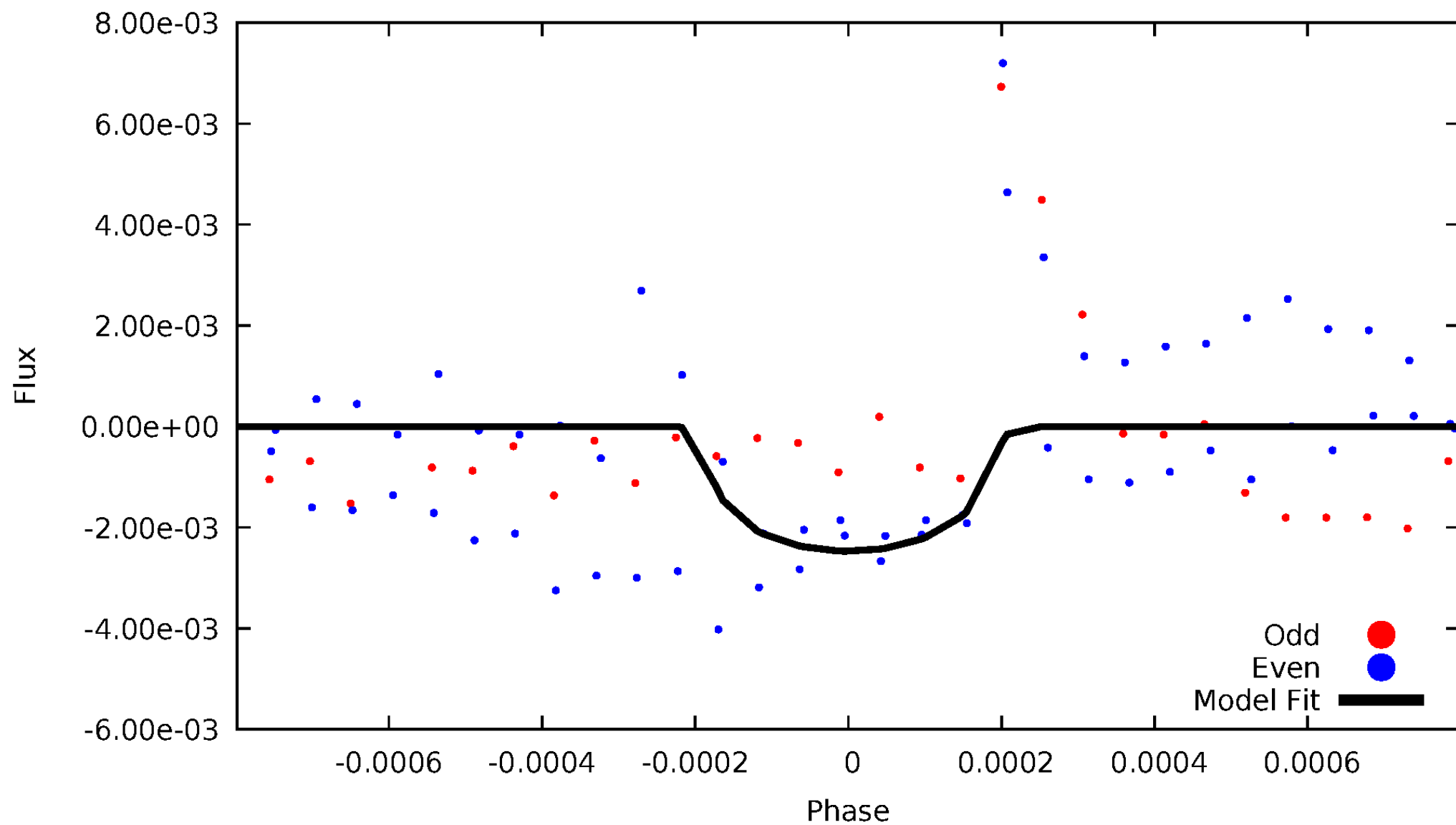


TCE 005597401-01



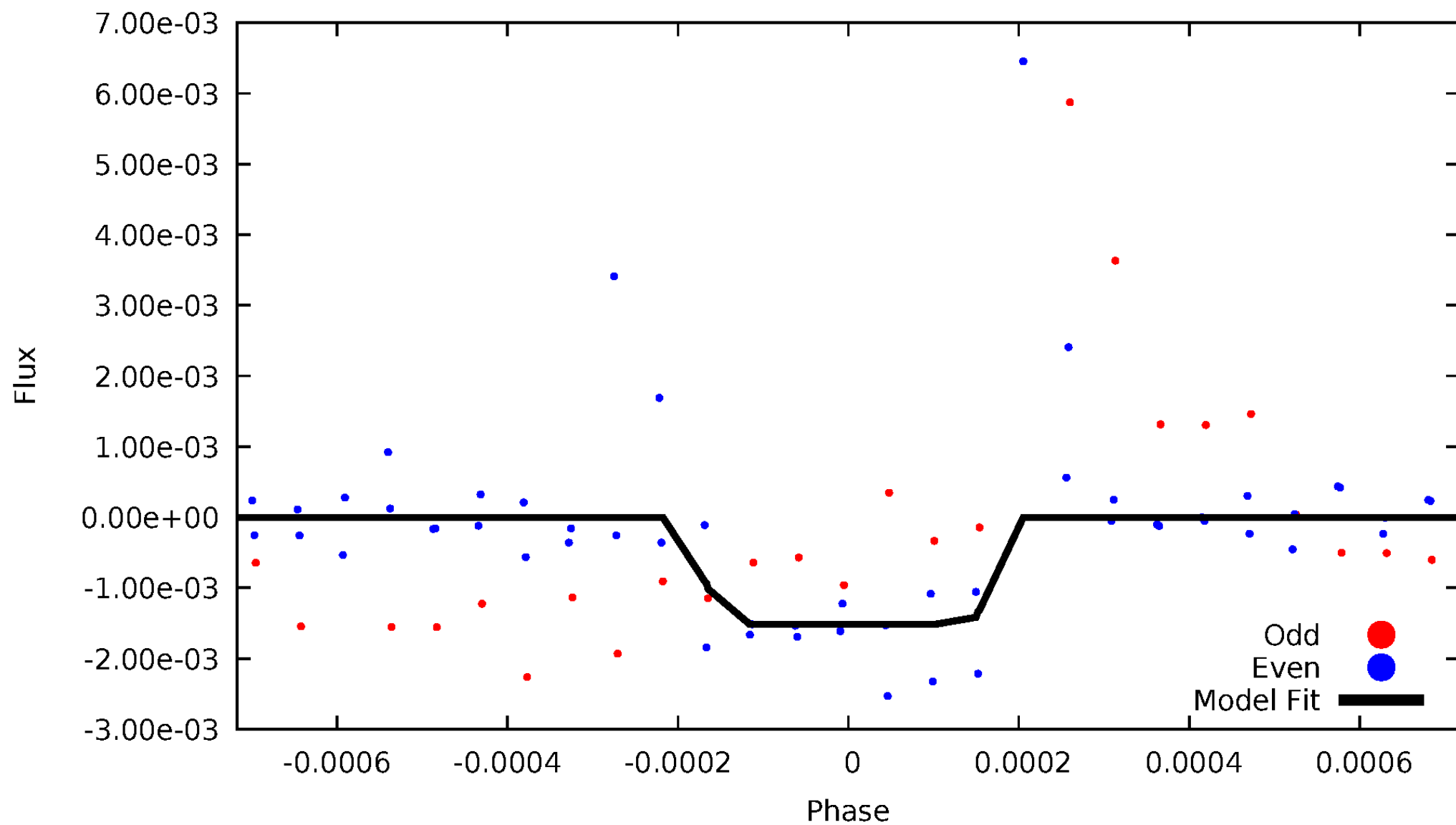
# DV Odd/Even

TCE 005597401-01

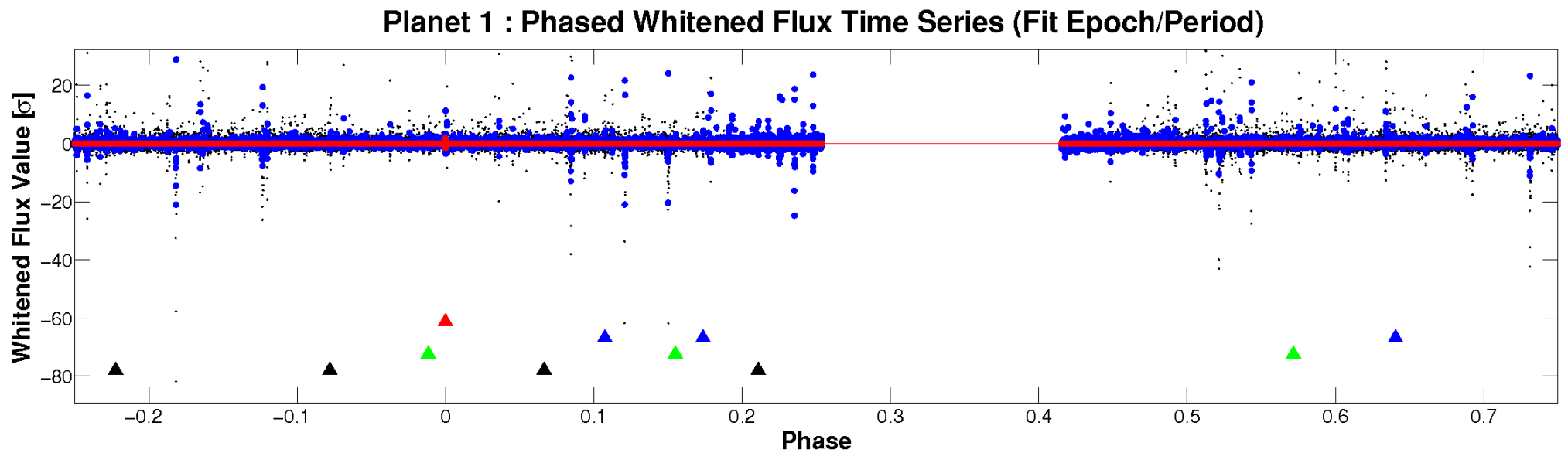
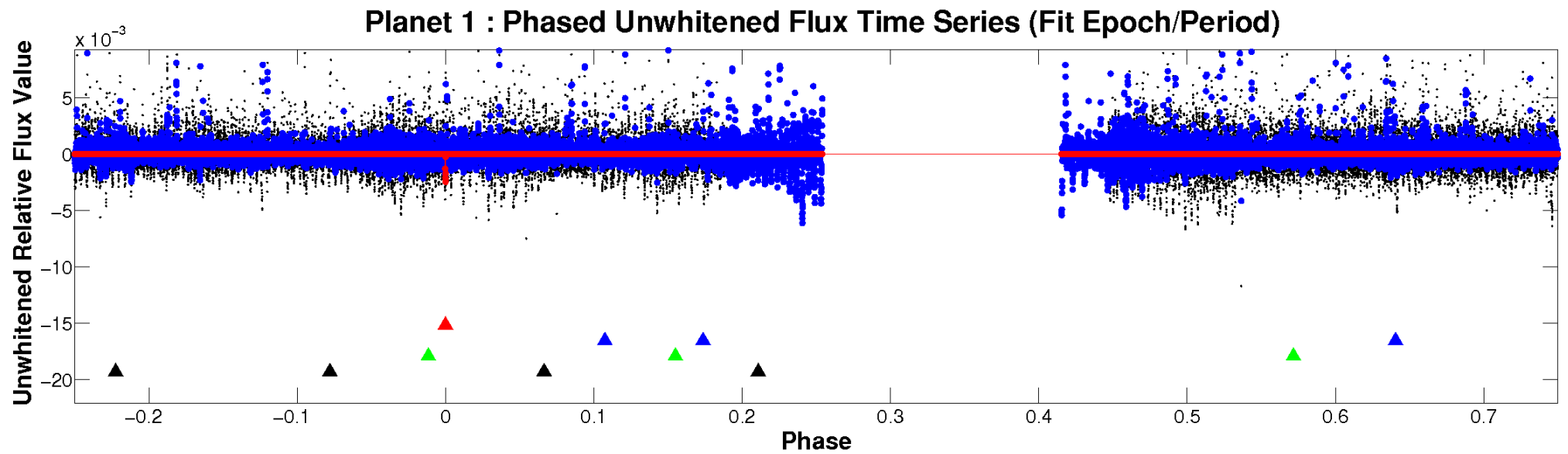


# ALT Odd/Even

TCE 005597401-01

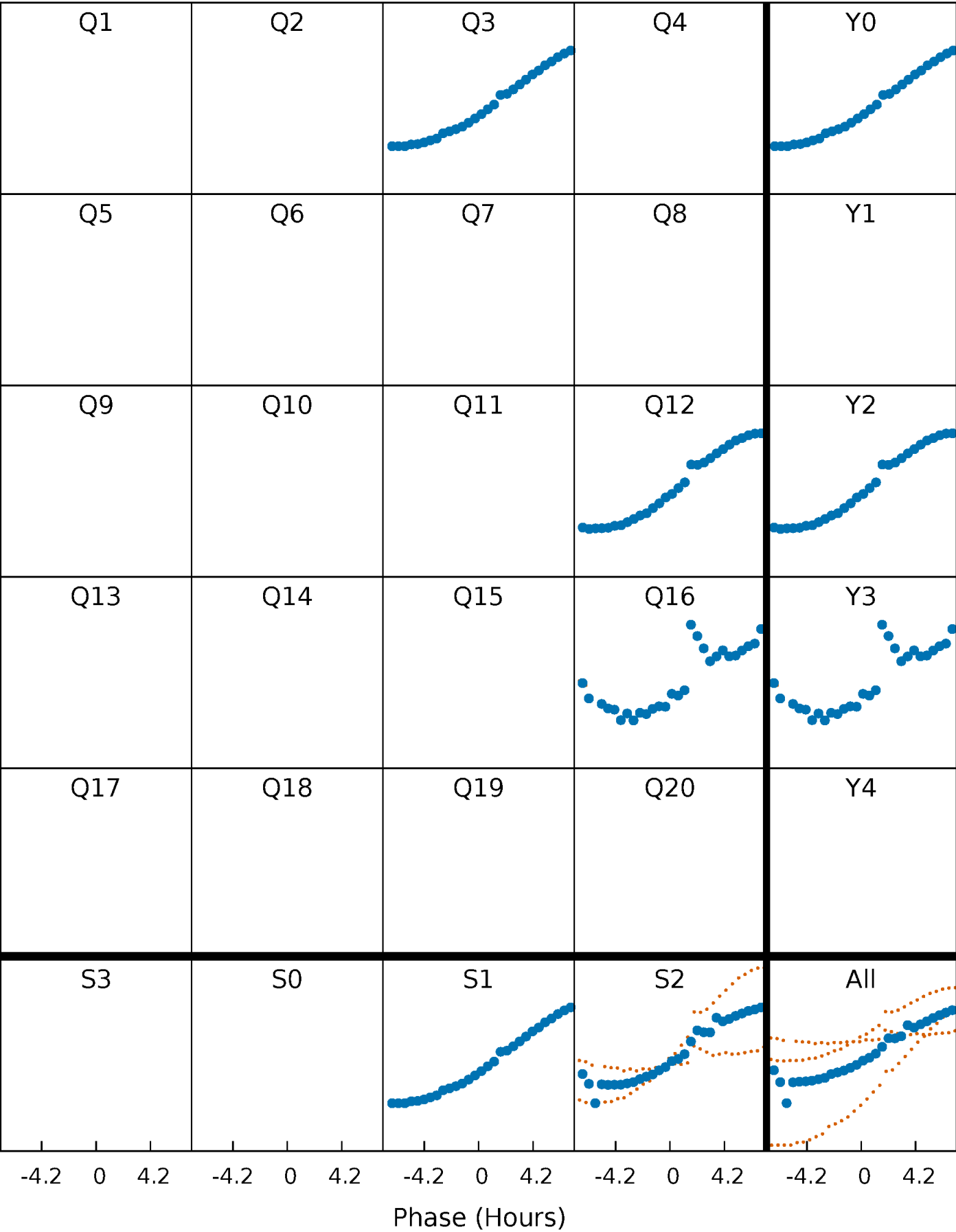


# Non-Whitened Vs. Whitened Light Curve



PDC Quarter-Phased Transit Curves

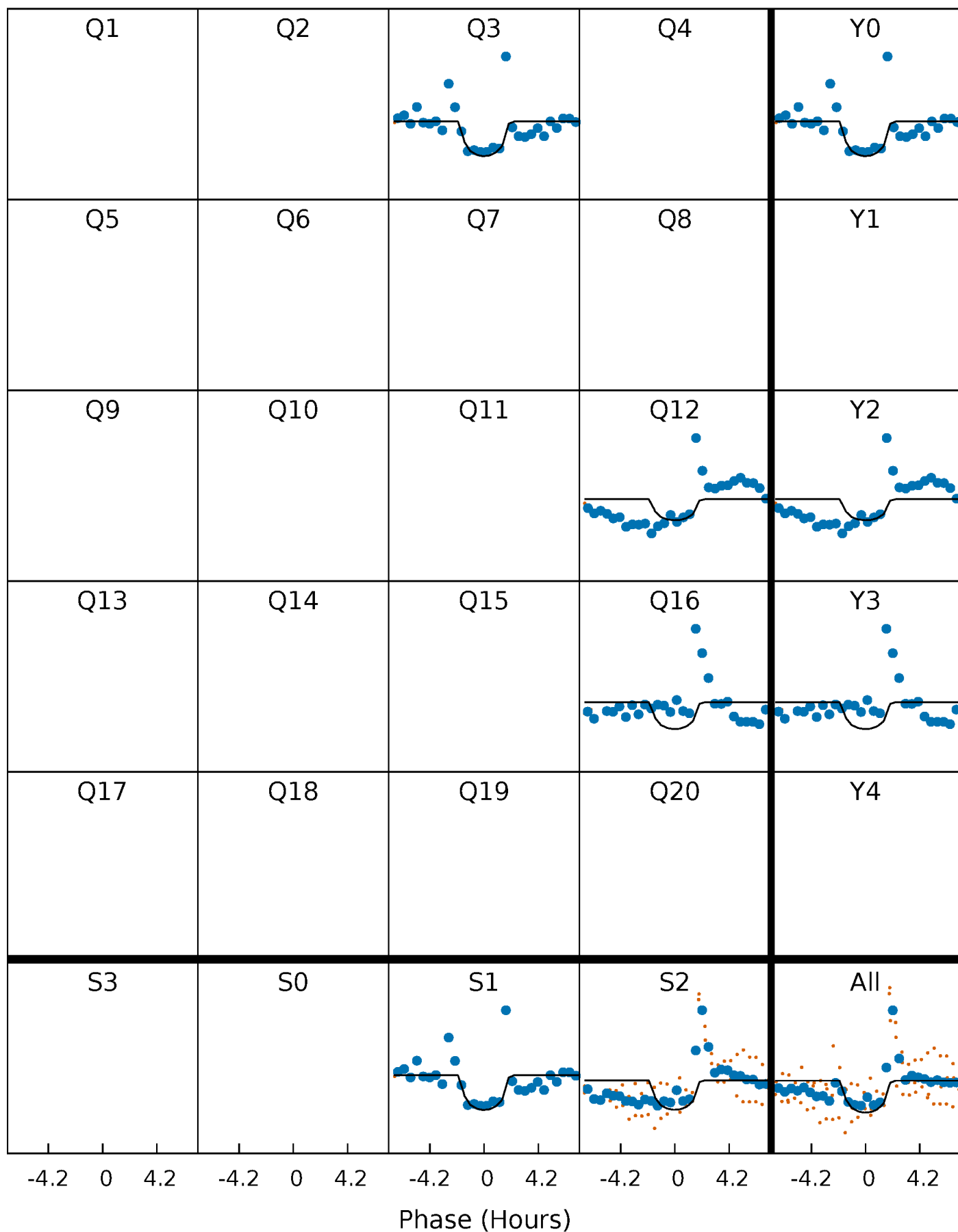
TCE 005597401-01    P=384.928980 Days    T<sub>0</sub>=344.409177 (BKJD)





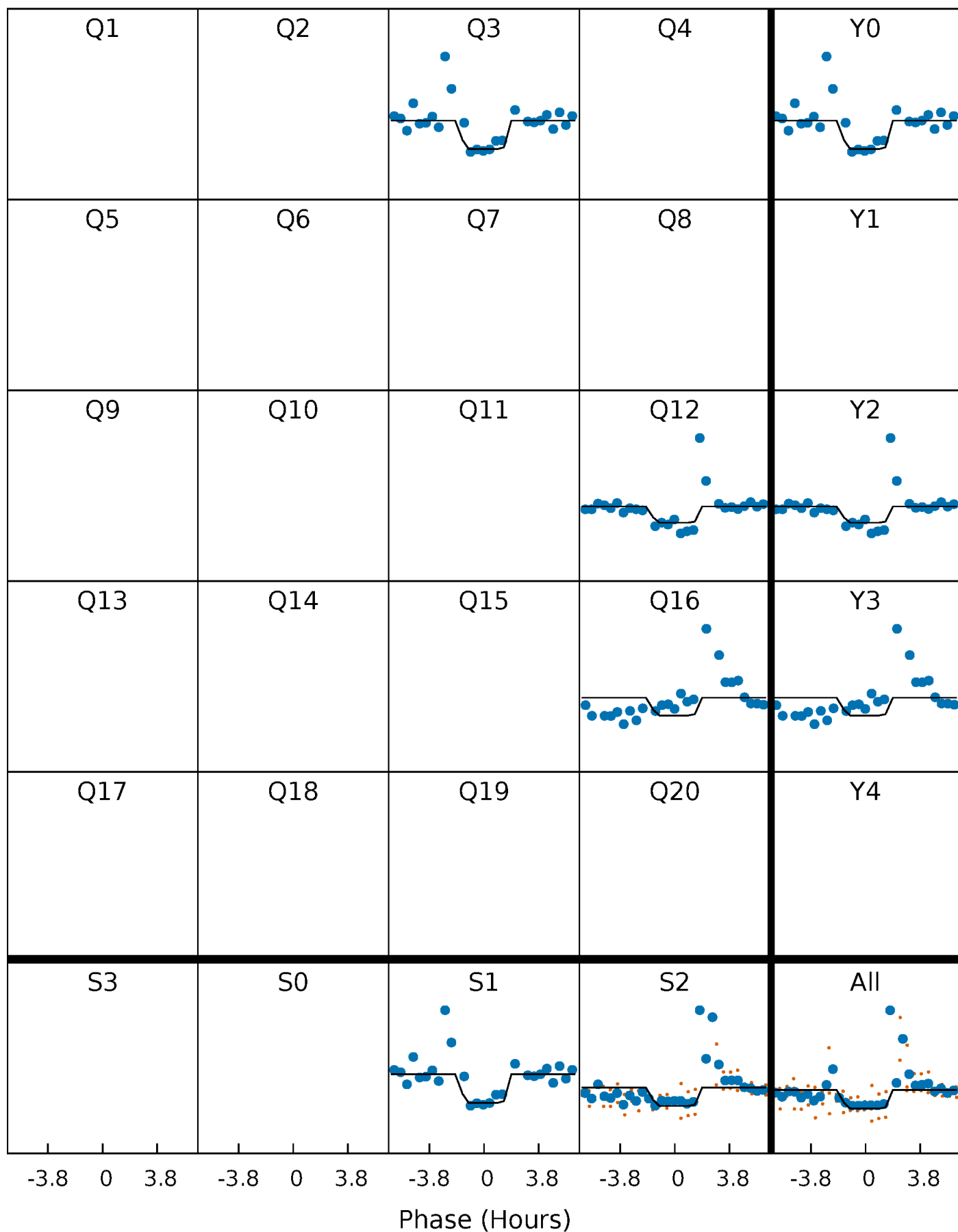
# DV Quarter-Phased Transit Curves

TCE 005597401-01 P=384.928980 Days  $T_0=344.409177$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

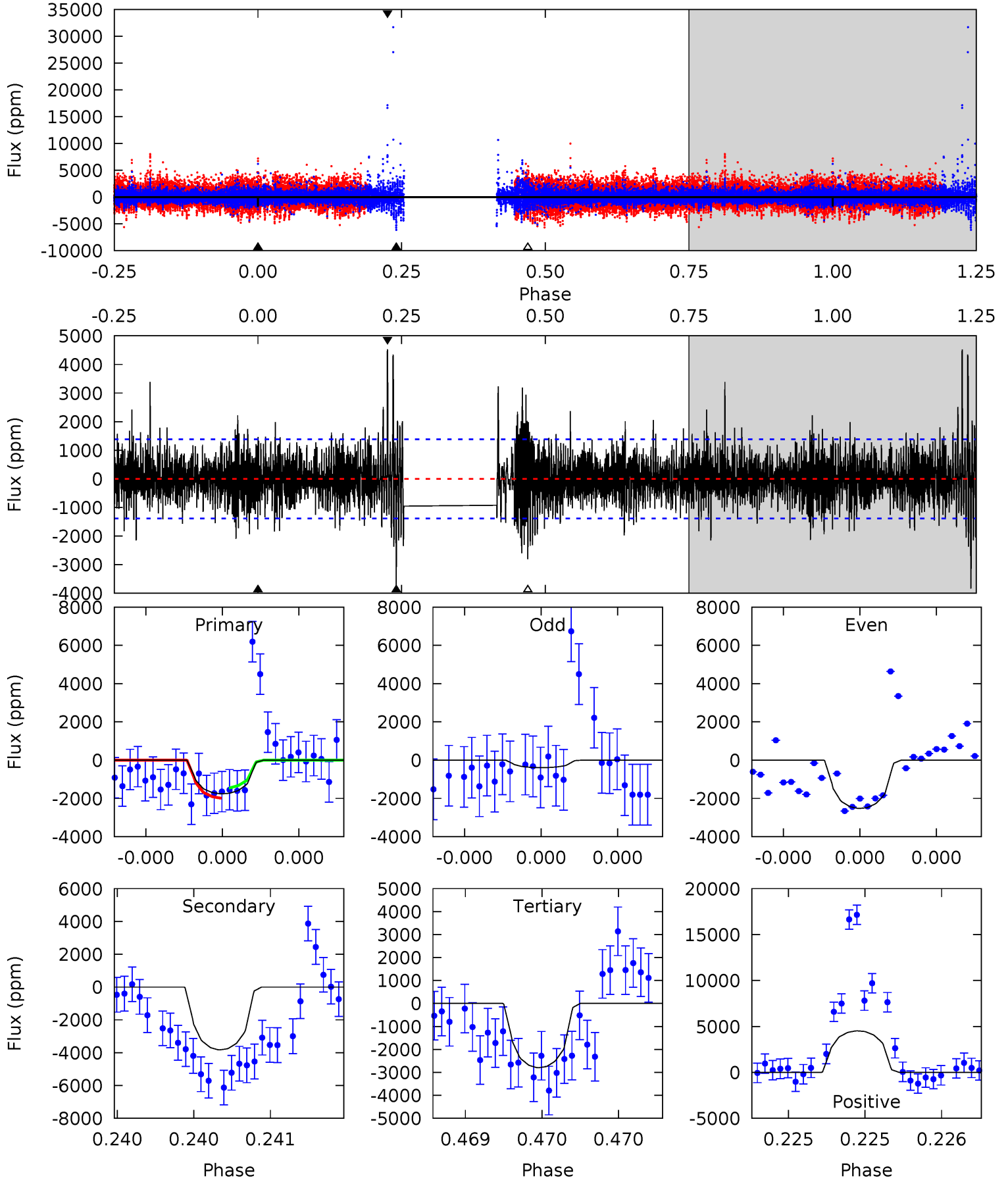
TCE 005597401-01 P=384.927403 Days  $T_0=344.410983$  (BKJD)



# DV Model-Shift Uniqueness Test

005597401-01, P = 384.928980 Days, E = 344.409177 Days

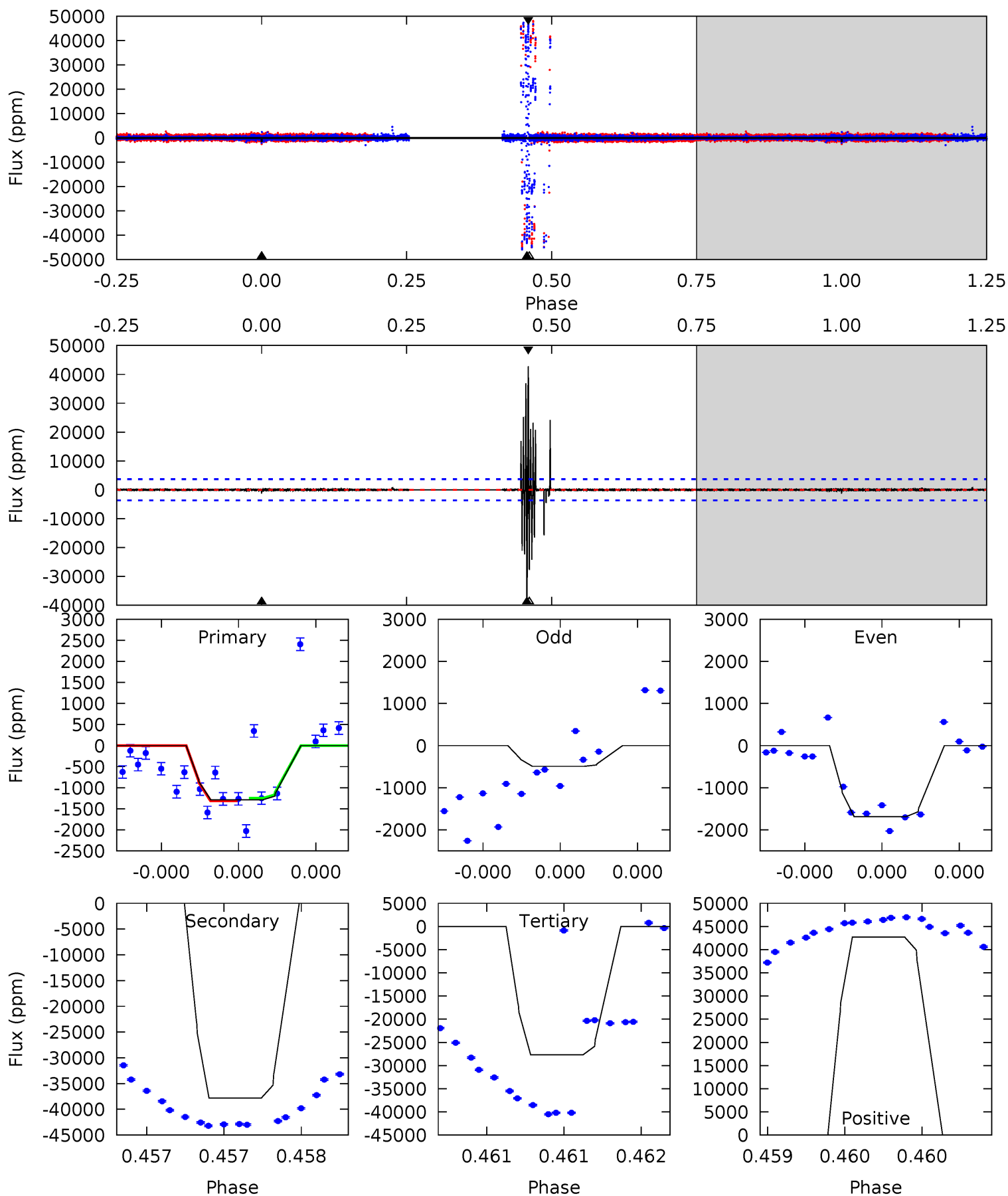
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.10	15.4	11.3	18.2	5.58	3.50	2.48	-4.19	-11.1	4.15	-2.78	3.63	0.83	0.54	1.06



# Alt Model-Shift Uniqueness Test

005597401-01, P = 384.927403 Days, E = 344.410983 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1.97	58.0	42.5	65.5	5.65	3.60	2.92	-40.5	-63.6	15.5	-7.52	0.48	0.95	0.53	0.04



### Stellar Parameters For KIC 005597401

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4482^{+132}_{-132}$	$4.562^{+0.060}_{-0.016}$	$0.360^{+0.100}_{-0.300}$	$0.744^{+0.025}_{-0.063}$	$0.736^{+0.041}_{-0.046}$	$2.514^{+0.637}_{-0.183}$
	+3%/-3%	+1%/-0%	+28%/-83%	+3%/-8%	+6%/-6%	+25%/-7%
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 005597401-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-3830 \pm 248$	$5.19^{+4.62}_{-3.09}$	$244^{+8}_{-8}$	$4385^{+2344}_{-872}$	$67708^{+359416}_{-48391}$
Alt.	$-37831 \pm 652$	$5.09^{+4.33}_{-3.25}$	$245^{+8}_{-8}$	$7672^{+9530}_{-2039}$	$738460^{+4830668}_{-523757}$

$T_{max}$  = 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

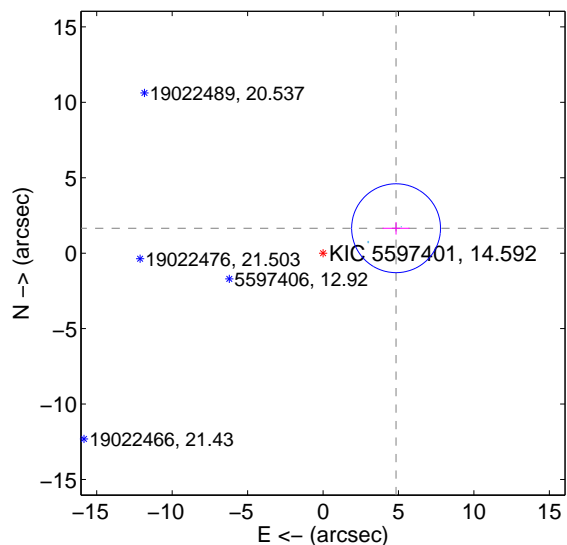
Supplemental centroid analysis for 005597401-01. Kepler magnitude: 14.59. Transit SNR 7.23

There are 2 quarters with good PRF difference image offsets

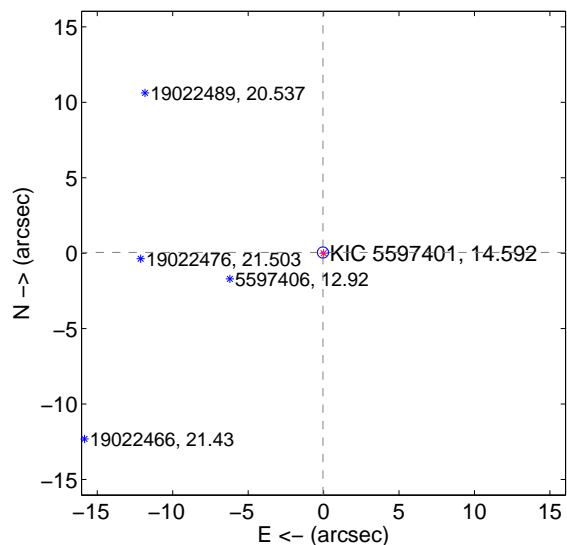
The OOT PRF centroid is offset from the target star catalog position by about 2.82 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$5.116 \pm 0.982$	5.21	$-4.841 \pm 0.897$	$1.654 \pm 0.418$
PRF-fit source offset from KIC position	$0.062 \pm 0.123$	0.50	$0.041 \pm 0.147$	$0.046 \pm 0.101$
photometric centroid source offset	$4.51 \pm 2.95$	1.53	$-4.51 \pm 2.95$	$-0.10 \pm 0.81$

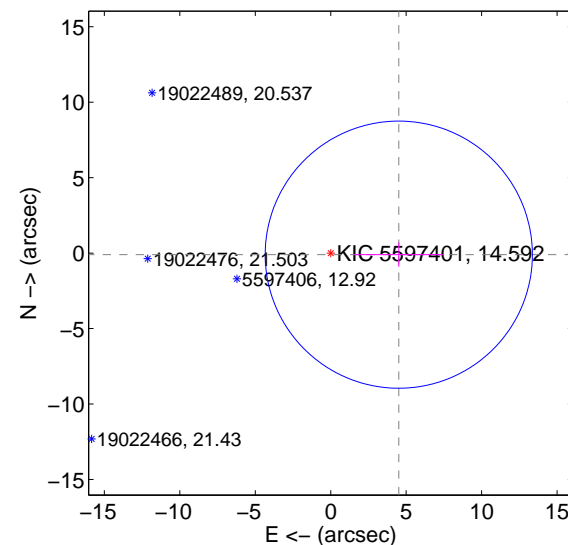
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

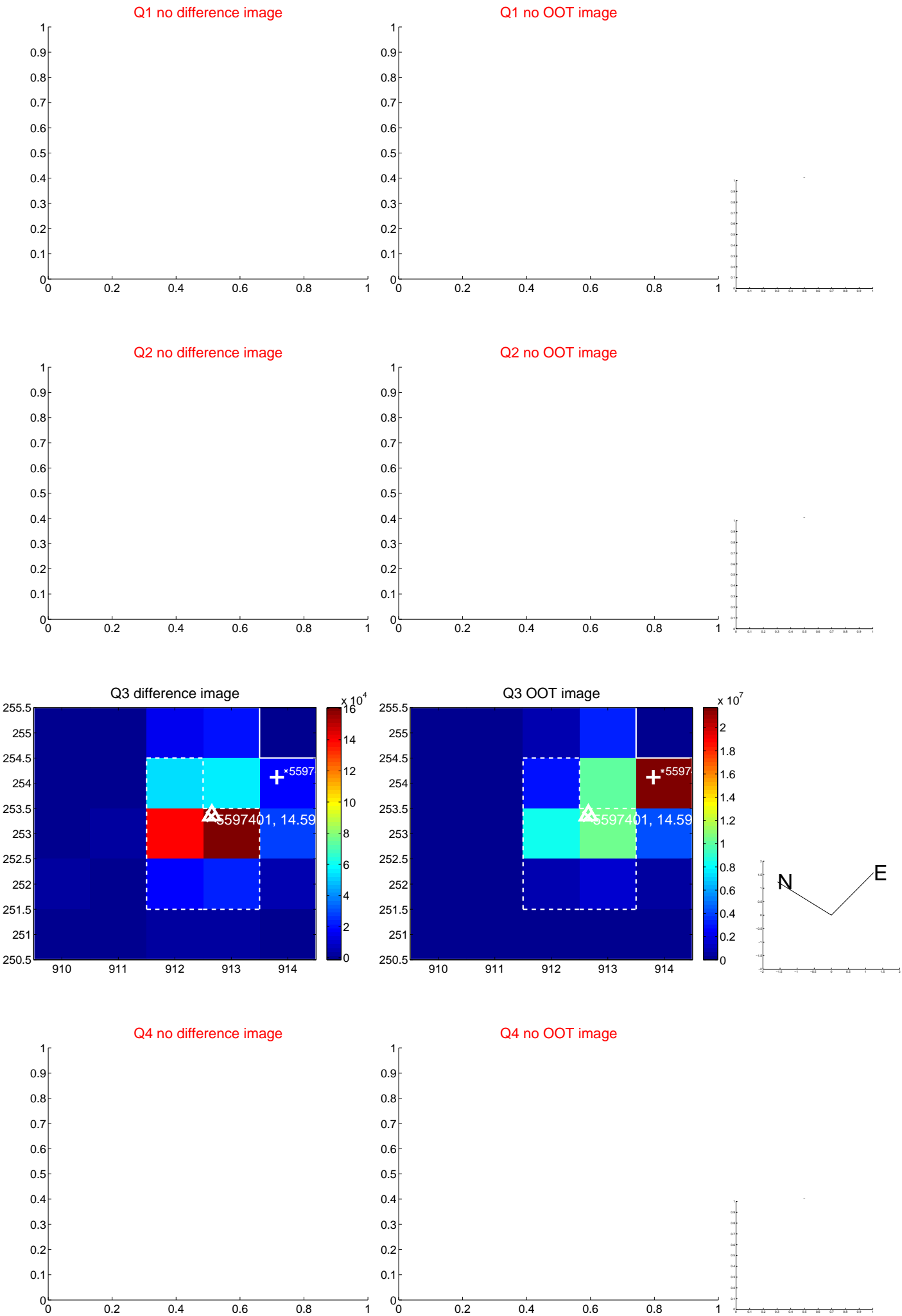


offset from photometric centroids



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.

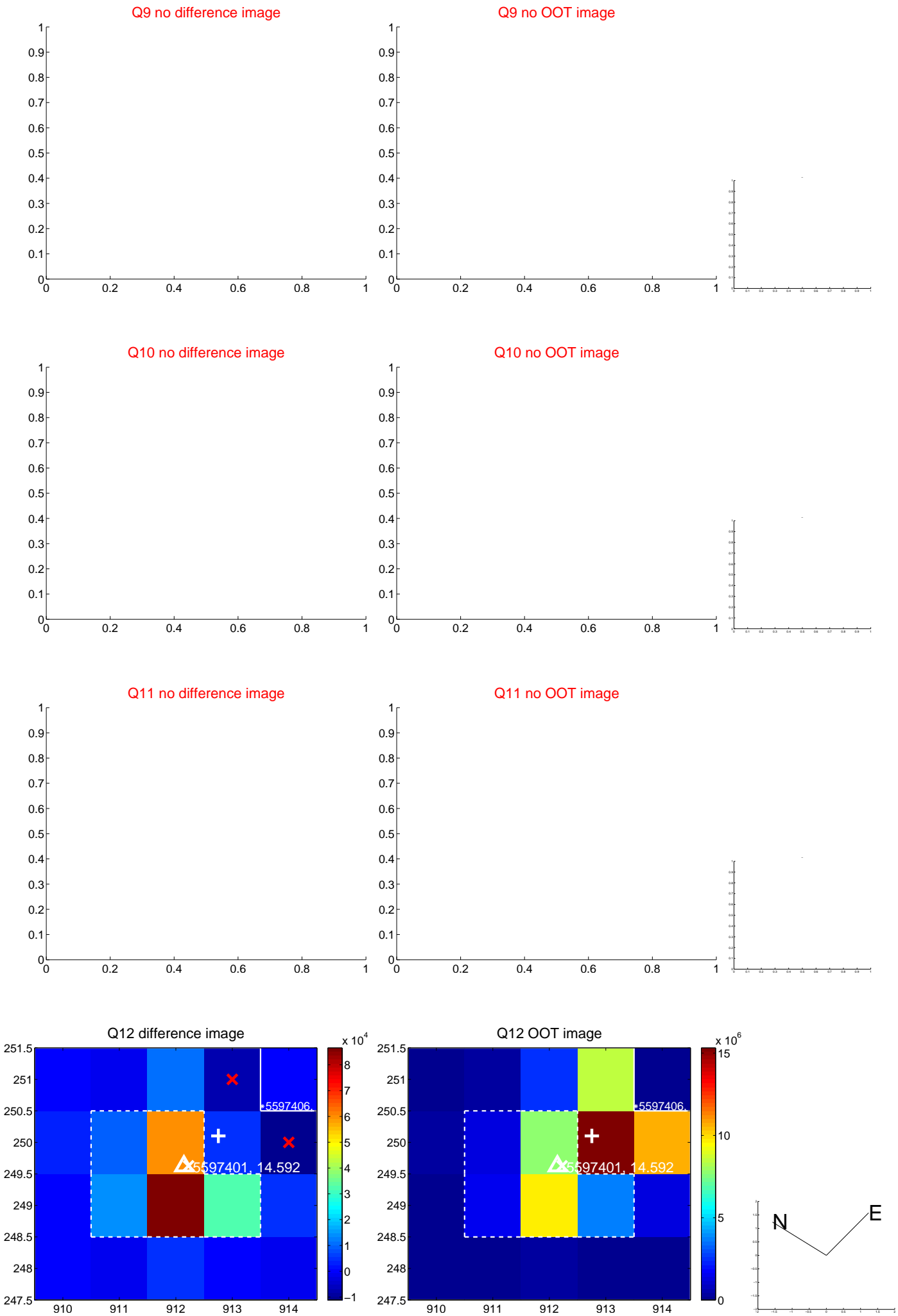


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





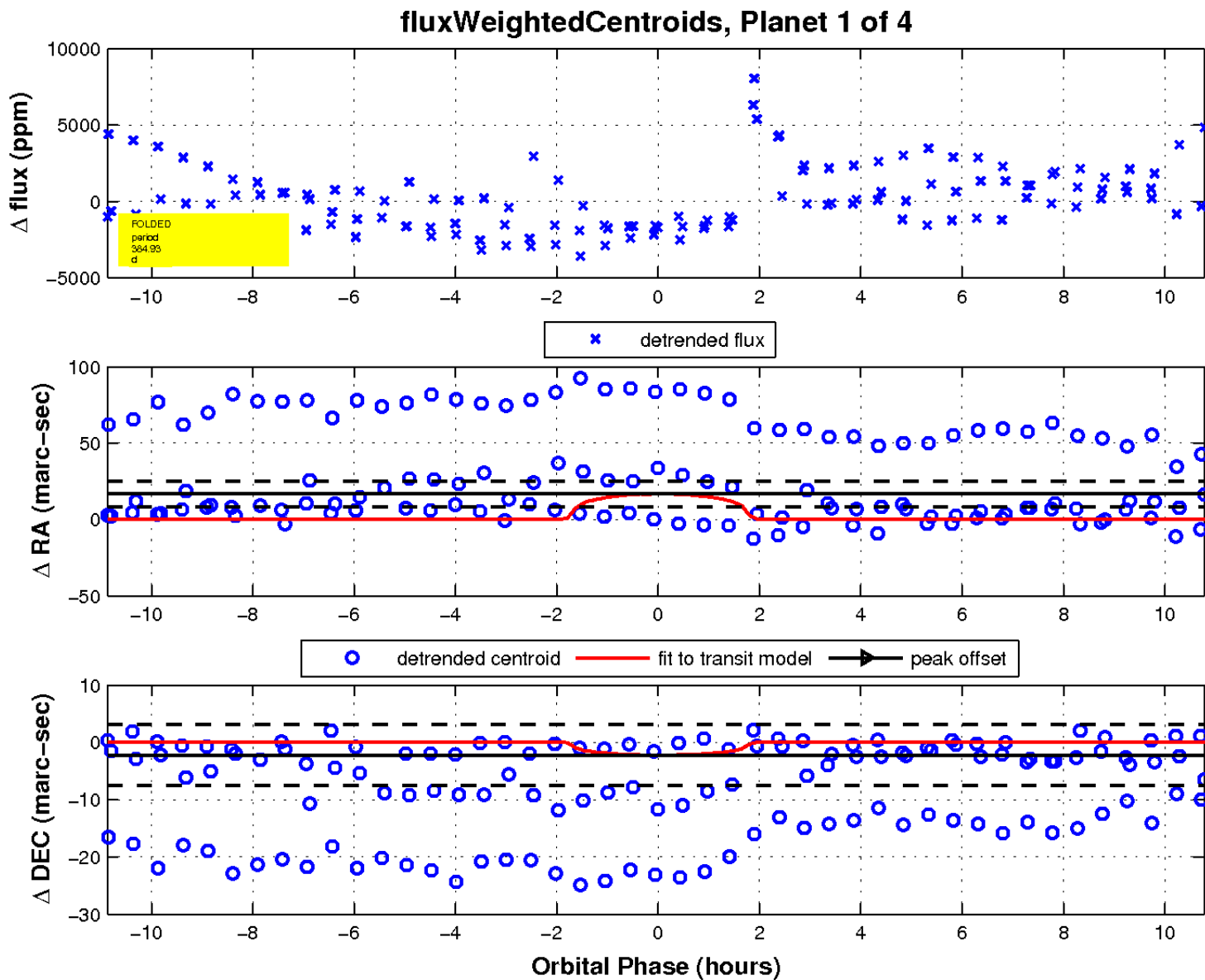
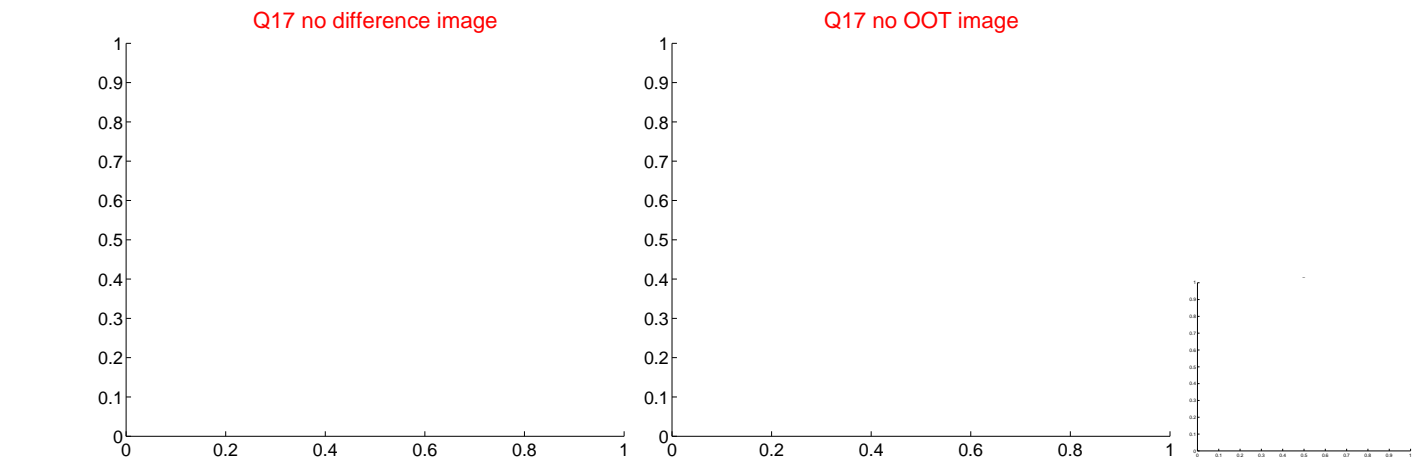
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

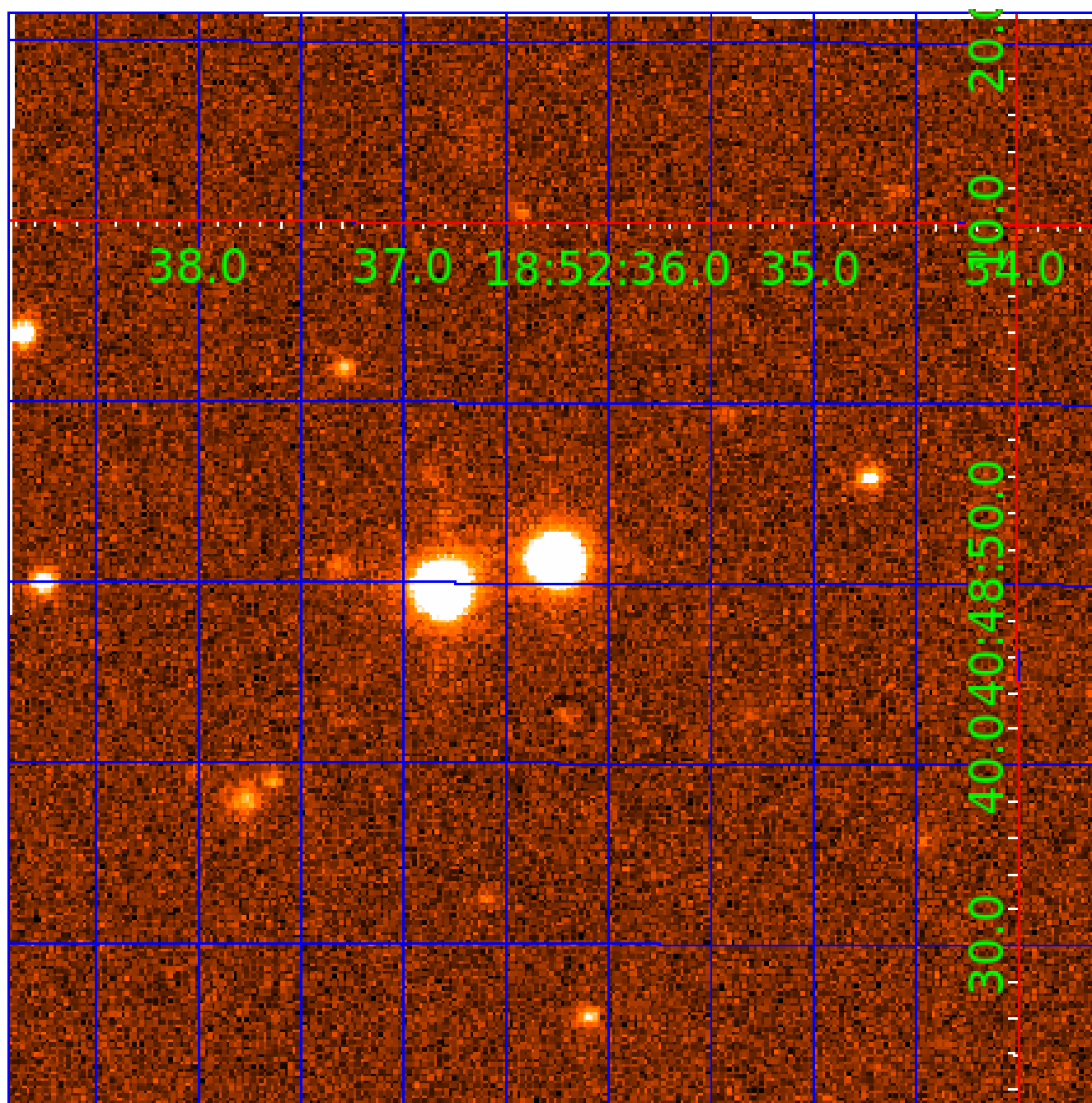


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 005597401

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005597401-01	OBS	No	384.928980	344.409178	2471.9	3.686	14.8	7.2	0.74	4482	3.68	0.23
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005597401-03	OBS	No	545.330748	404.083664	2402.7	5.744	12.7	4.8	0.74	4482	3.68	0.14
005597401-04	OBS	No	329.334416	425.597633	2003.3	3.530	13.2	5.1	0.74	4482	3.18	0.28

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005597401-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
005597401-02	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
005597401-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_SKYE—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_KIC_POS
005597401-04	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.

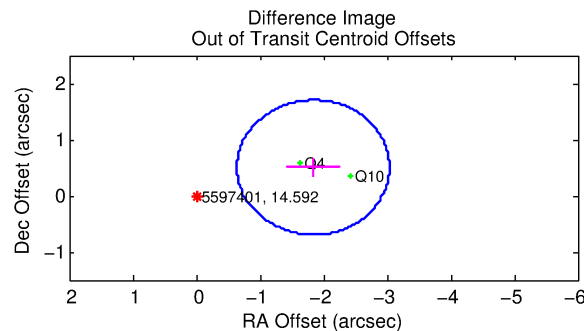
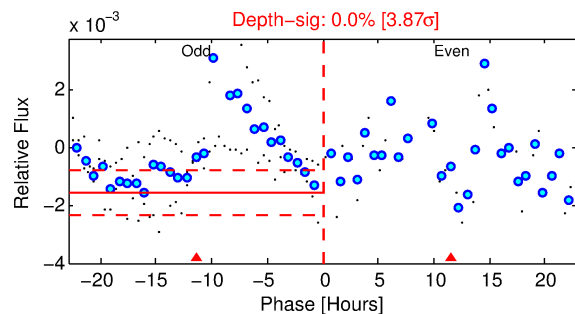
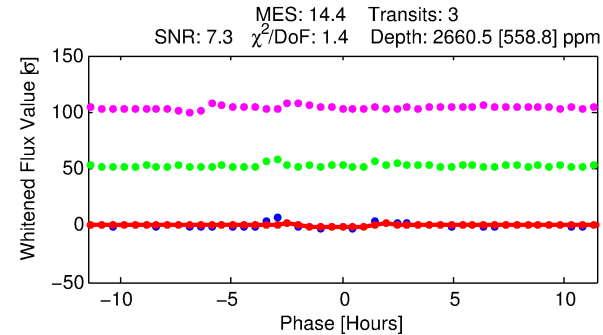
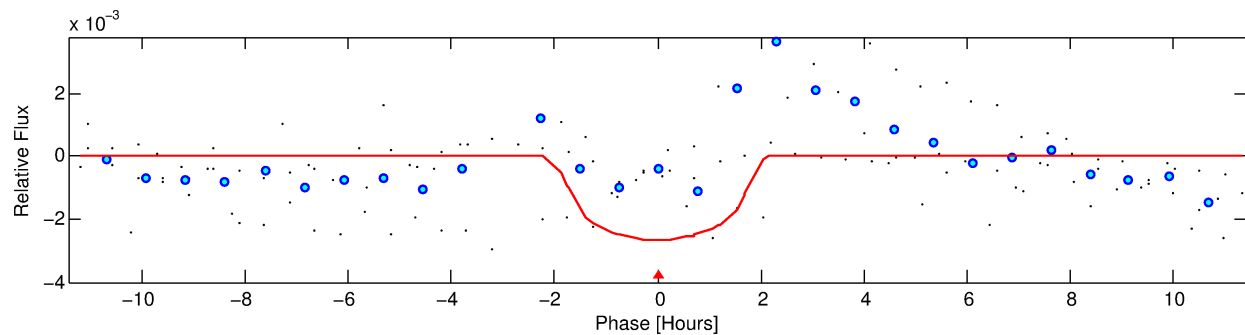
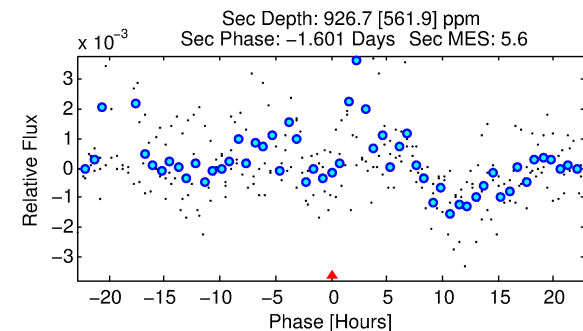
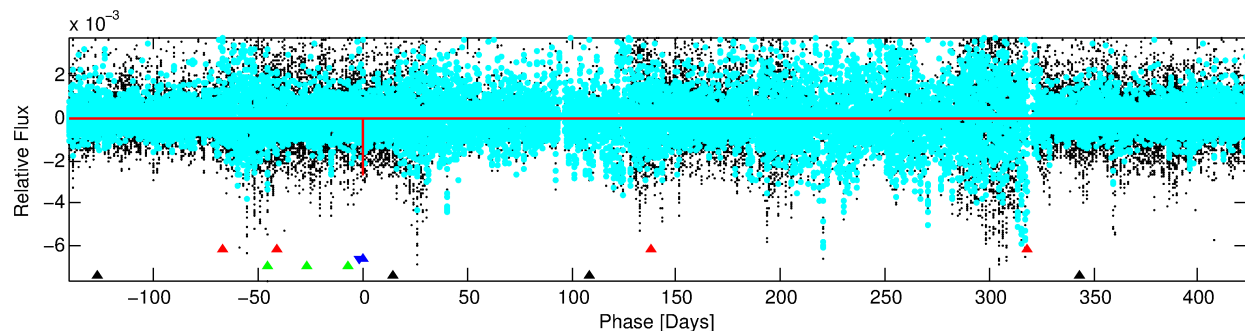
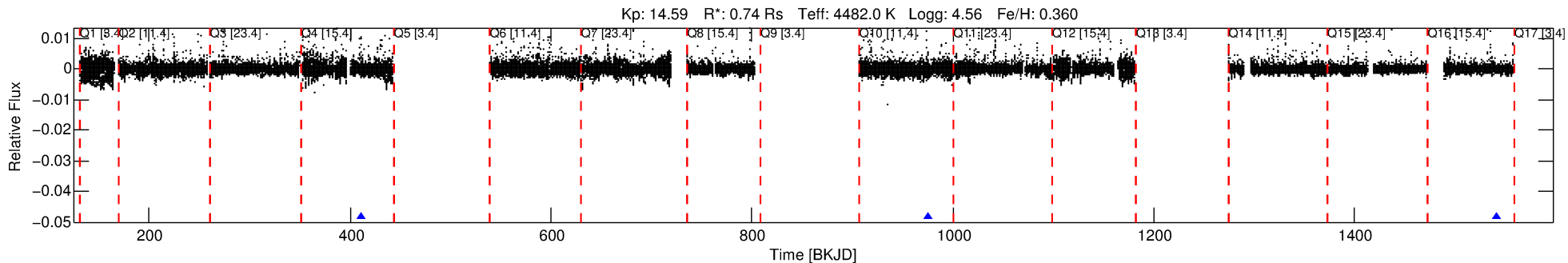
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005597401-02

No Significant Match Found

# DV One-Page Summary

KIC: 5597401 Candidate: 2 of 4 Period: 564.652 d



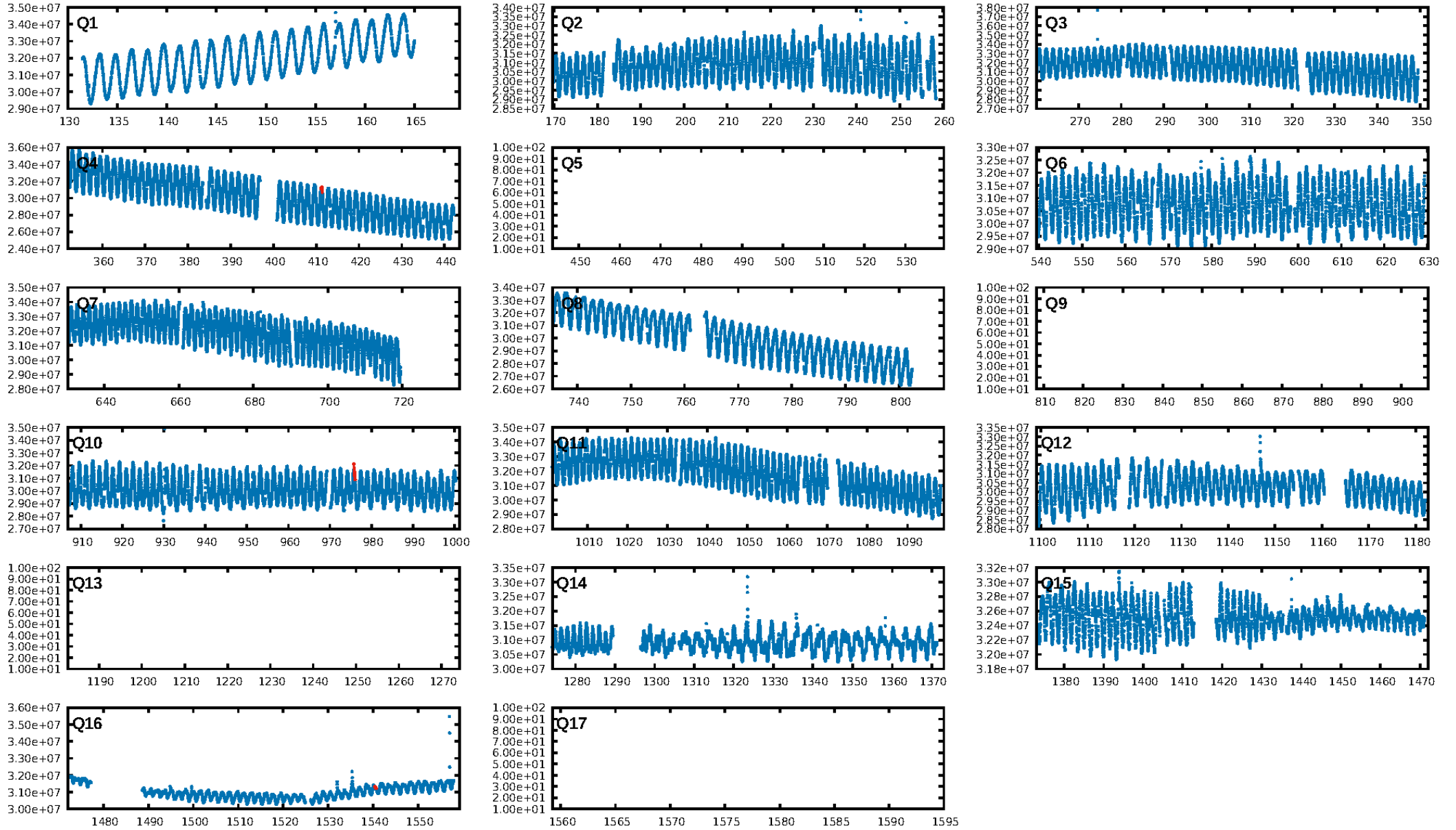
## DV Fit Results:

Period = 564.65188 [0.00471] d  
Epoch = 411.2570 [0.0072] BKJD  
Rp/R\* = 0.0450 [0.1000]  
a/R\* = 1178.63 [7177.22]  
b = 0.08 [77.51]  
Seff = 0.14 [0.02]  
Teq = 155 [6] K  
Rp = 3.65 [8.12] Re  
a = 1.2076 [0.0880] AU  
Ag = 55786.81 [250417.87] [0.22σ]  
Teffp = 3688 [4139] K [0.85σ]

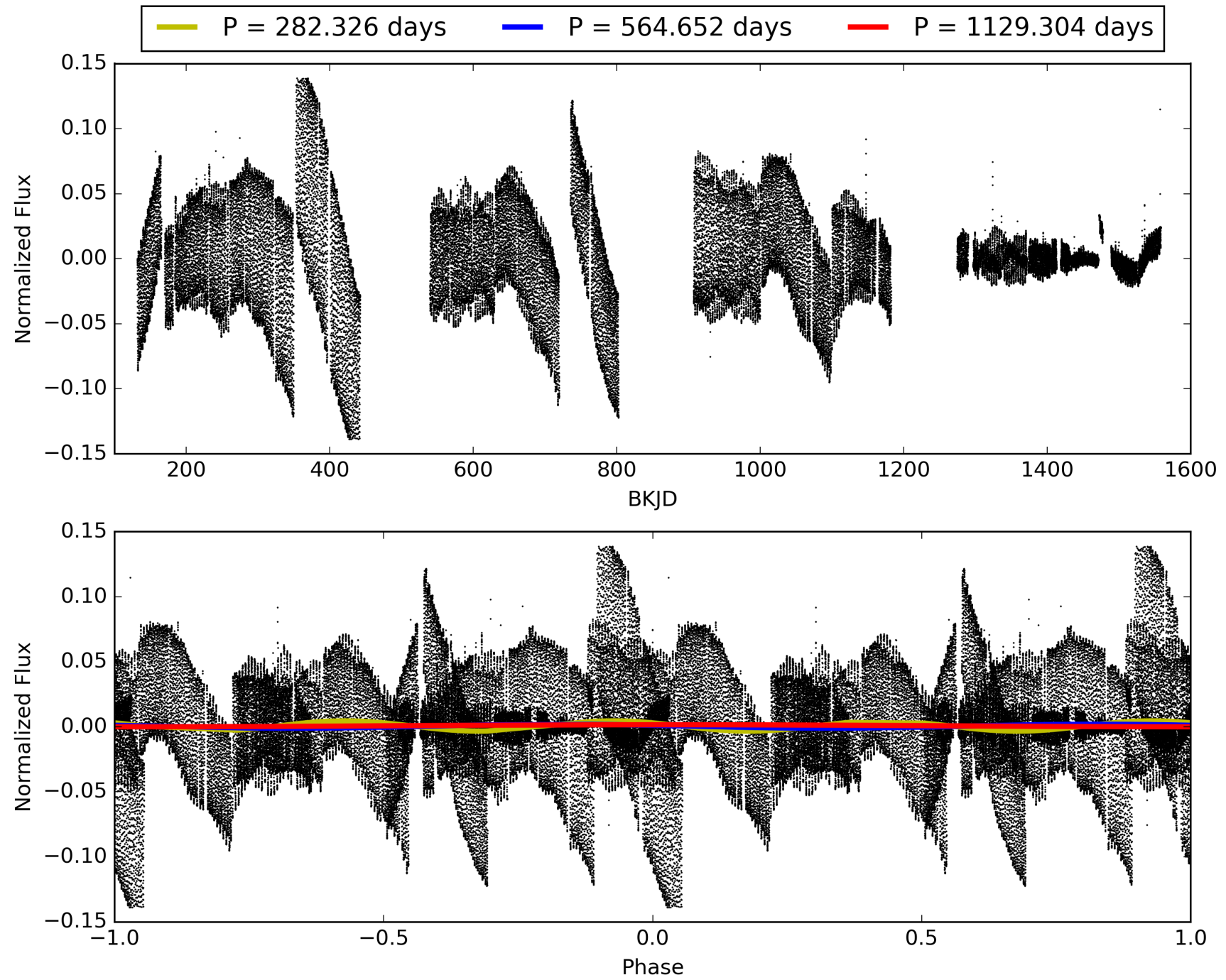
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [67.26σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 11.2%  
Bootstrap-pfa: 5.33e-11  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 0.4369  
Centroid-sig: 6.0%  
Centroid-so: 1.880 arcsec [2.32σ]  
OotOffset-rm: 1.905 arcsec [4.77σ]  
KicOffset-rm: 0.209 arcsec [1.01σ]  
OotOffset-st: 1/0/1/0 [2]  
KicOffset-st: 1/0/1/0 [2]  
DiffImageQuality-fgm: 0.00 [0/2]  
DiffImageOverlap-fno: 1.00 [3/3]

# TCE 005597401-02, PDC Light Curves



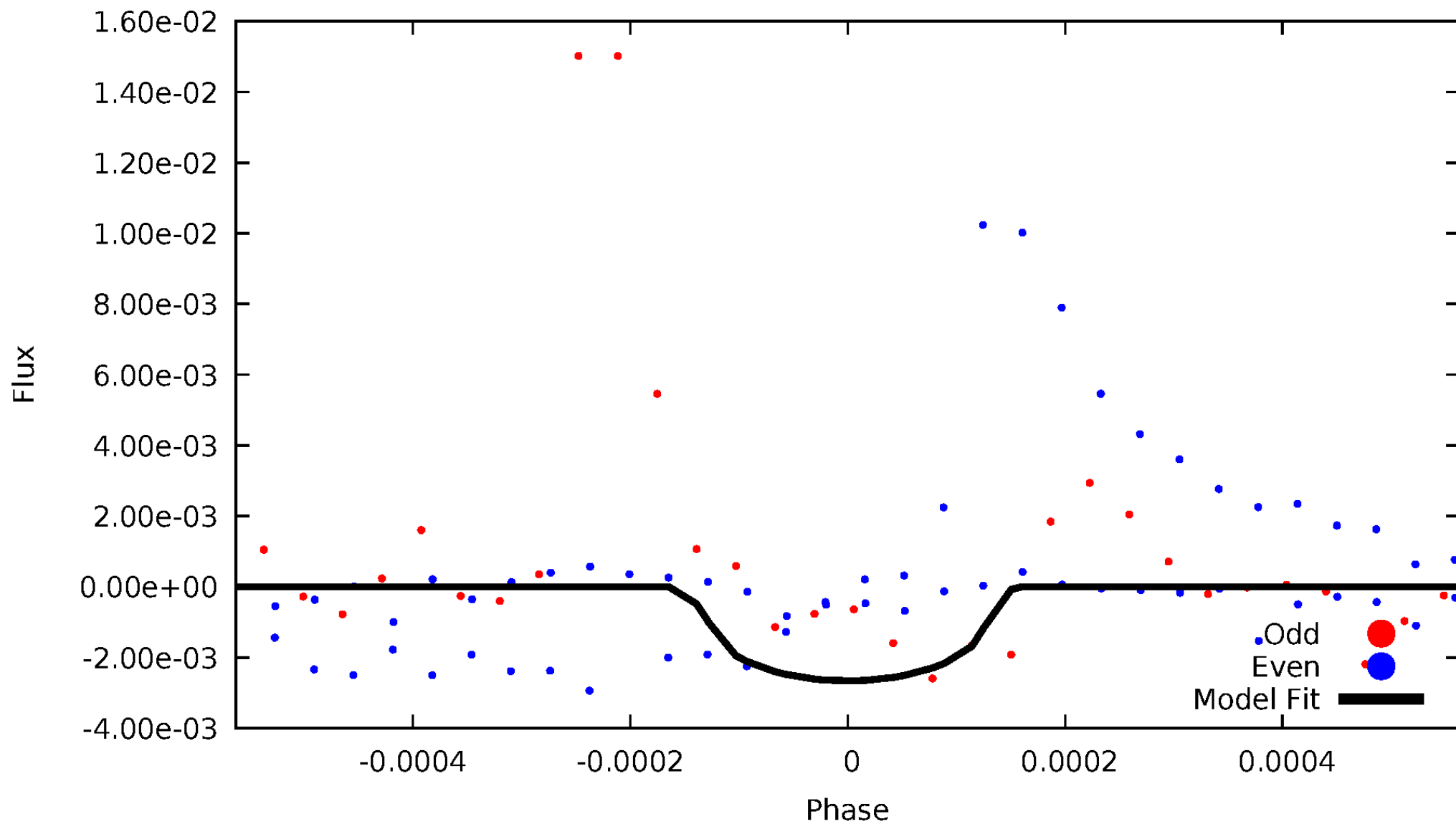
TCE 005597401-02





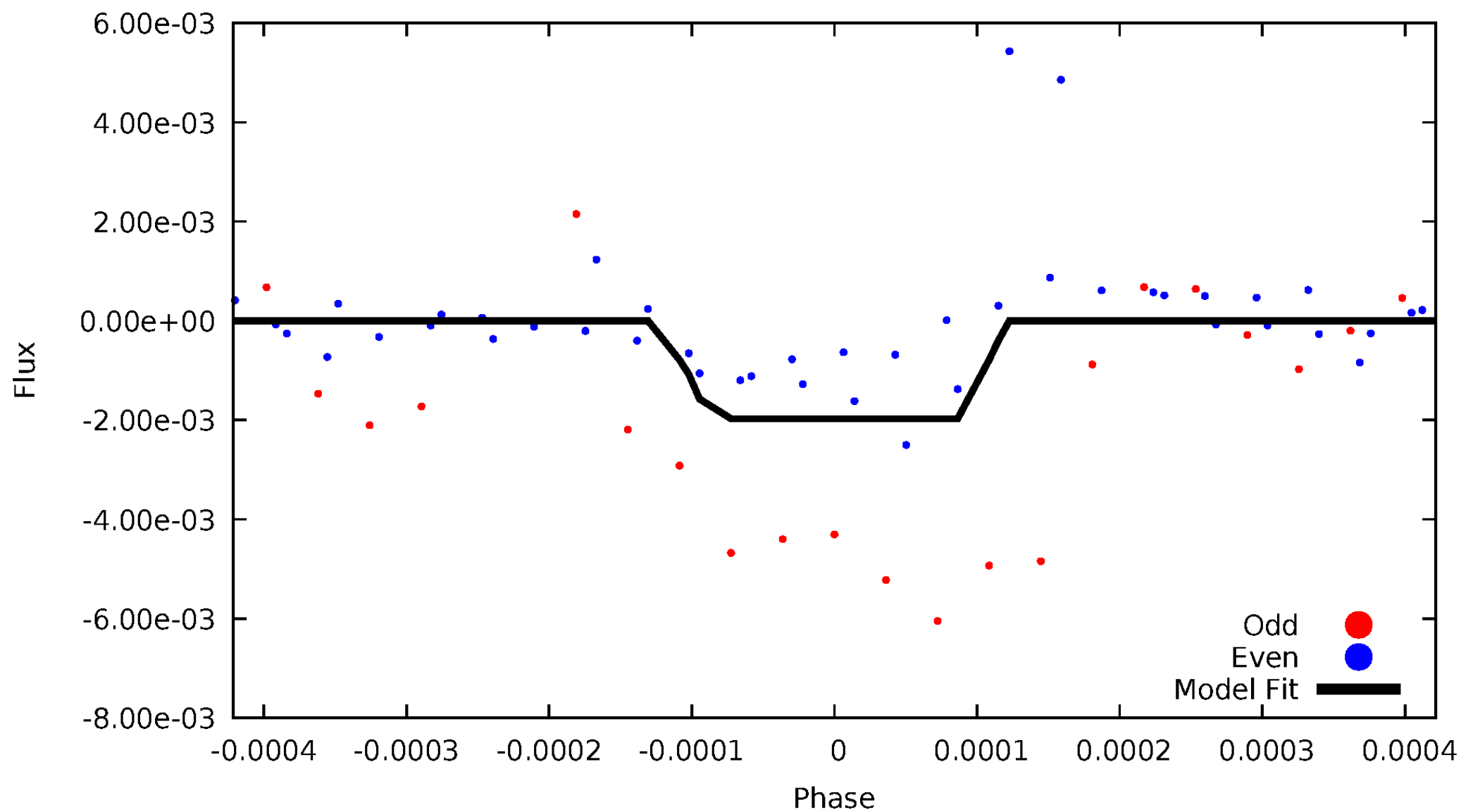
# DV Odd/Even

TCE 005597401-02



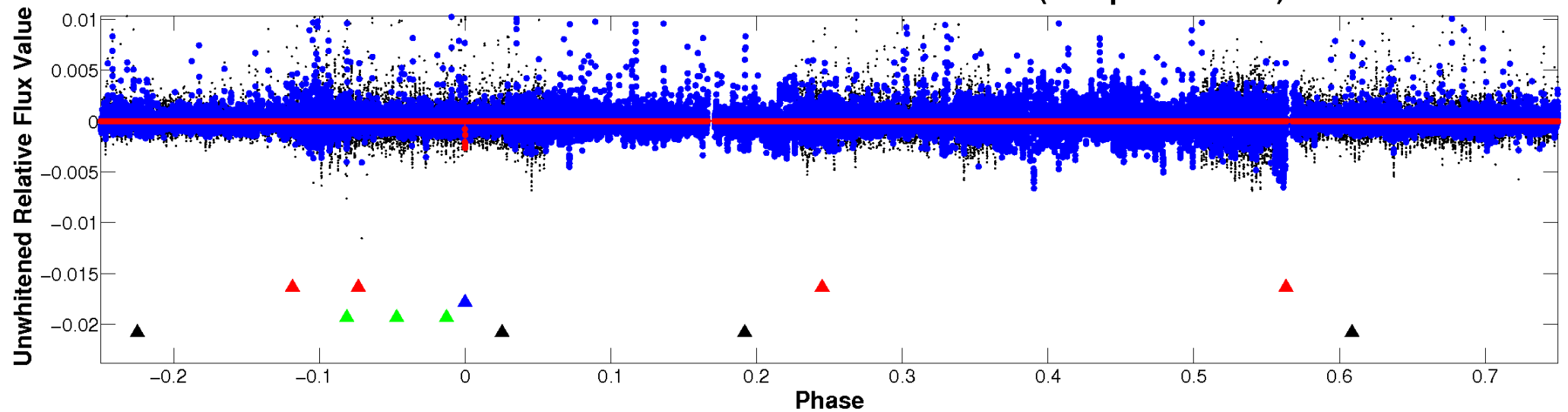
# ALT Odd/Even

TCE 005597401-02

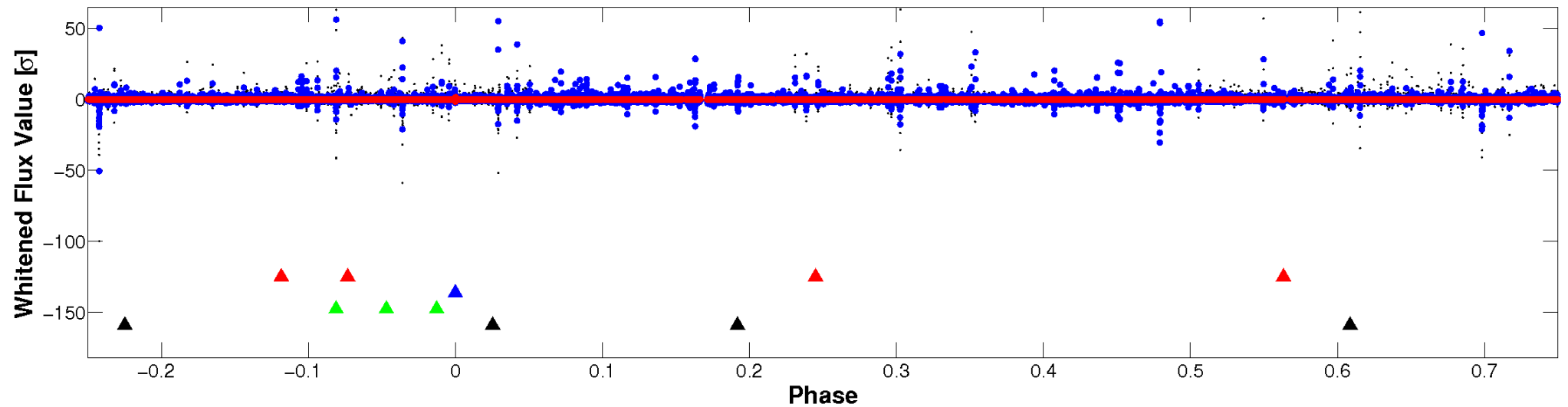


# Non-Whitened Vs. Whitened Light Curve

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

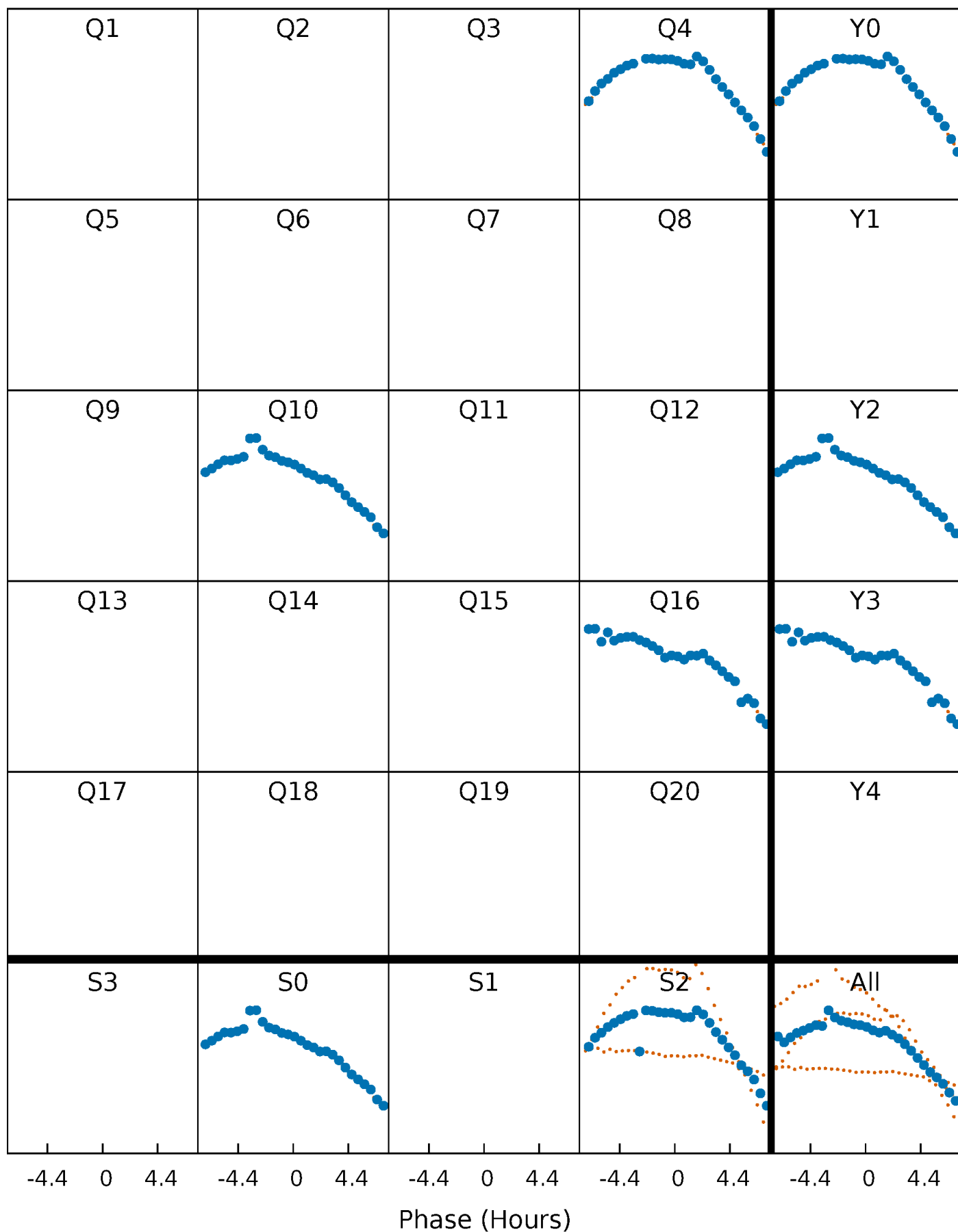


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



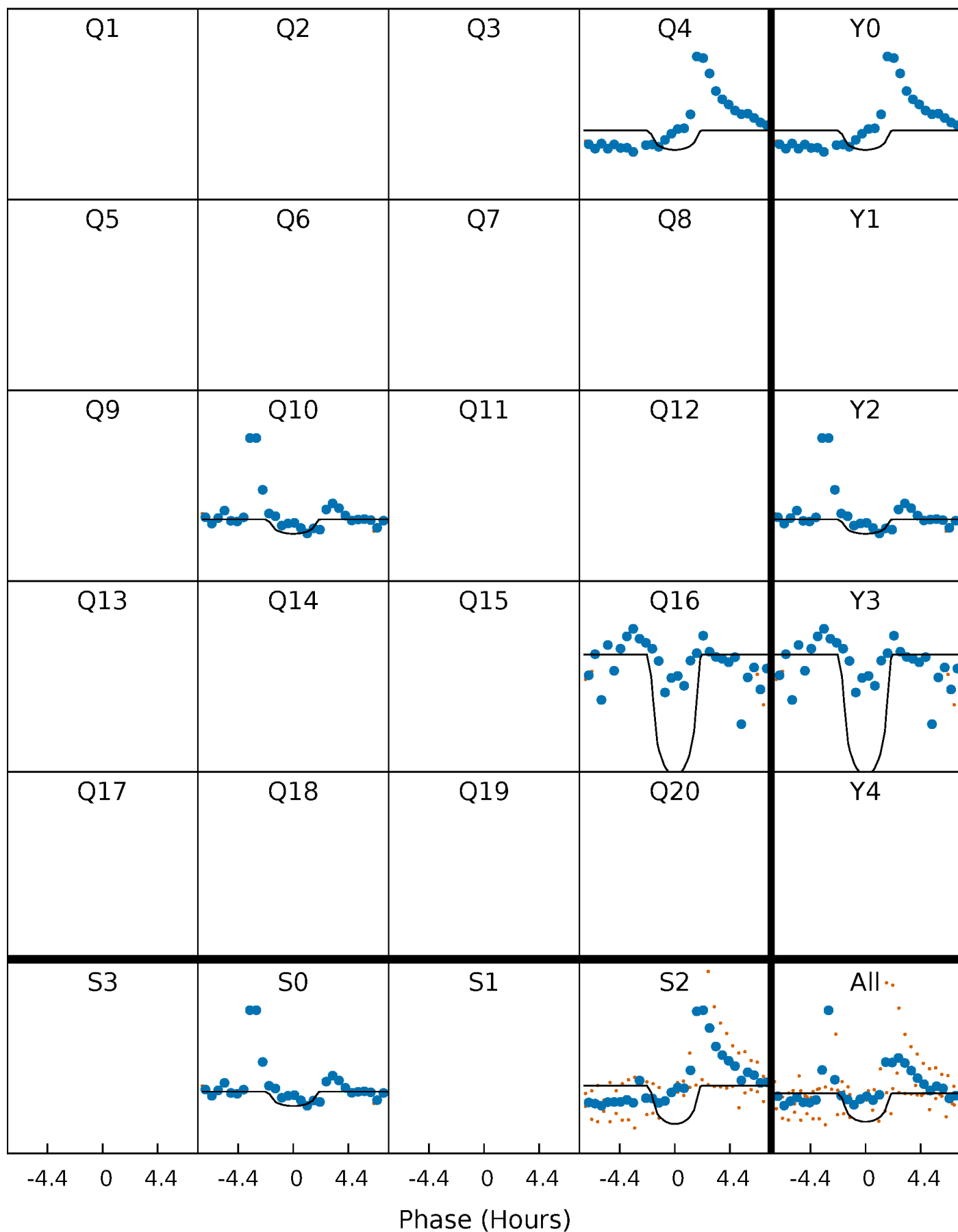
# PDC Quarter-Phased Transit Curves

TCE 005597401-02 P=564.651881 Days  $T_0=411.257009$  (BKJD)



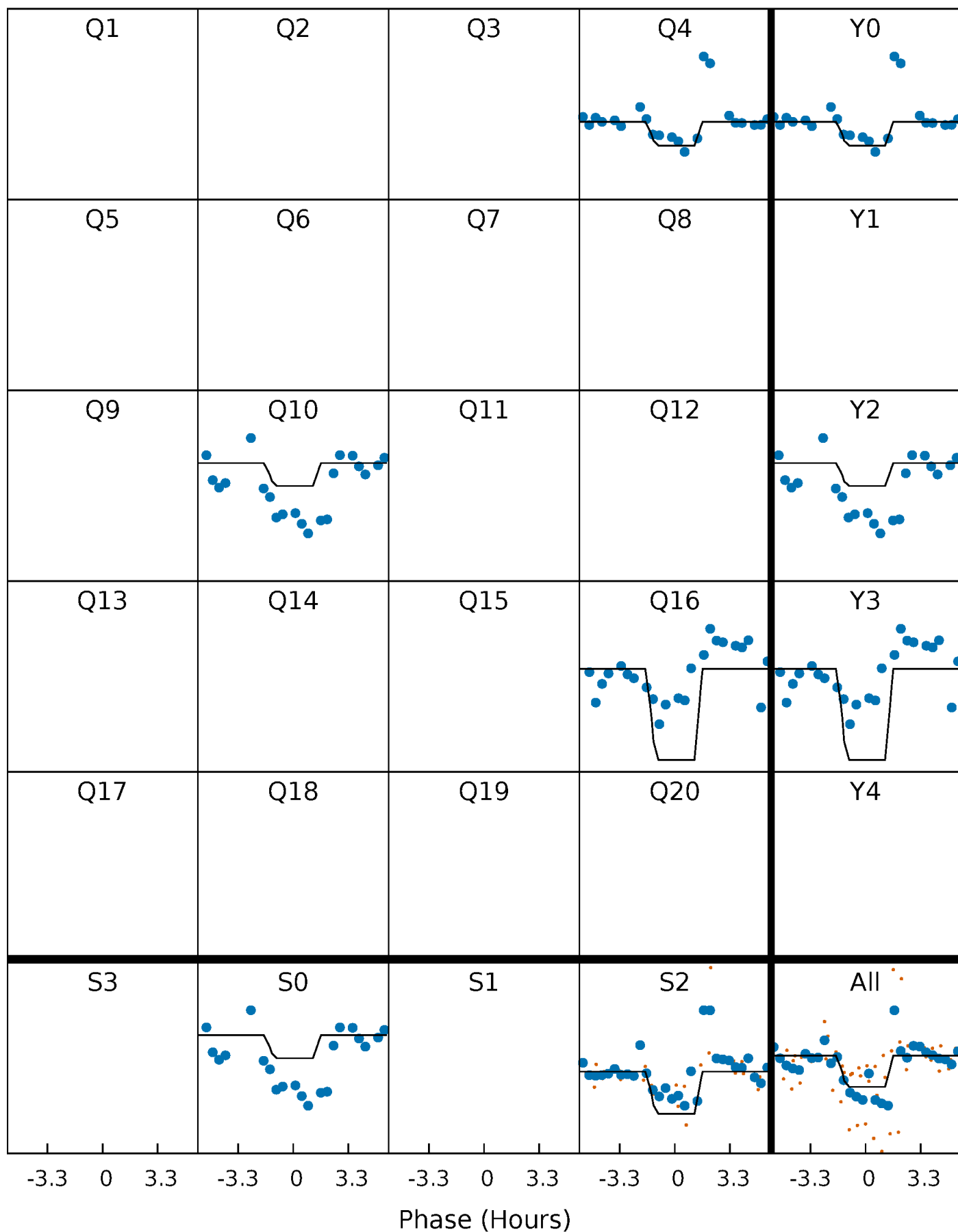
# DV Quarter-Phased Transit Curves

TCE 005597401-02 P=564.651881 Days  $T_0=411.257009$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

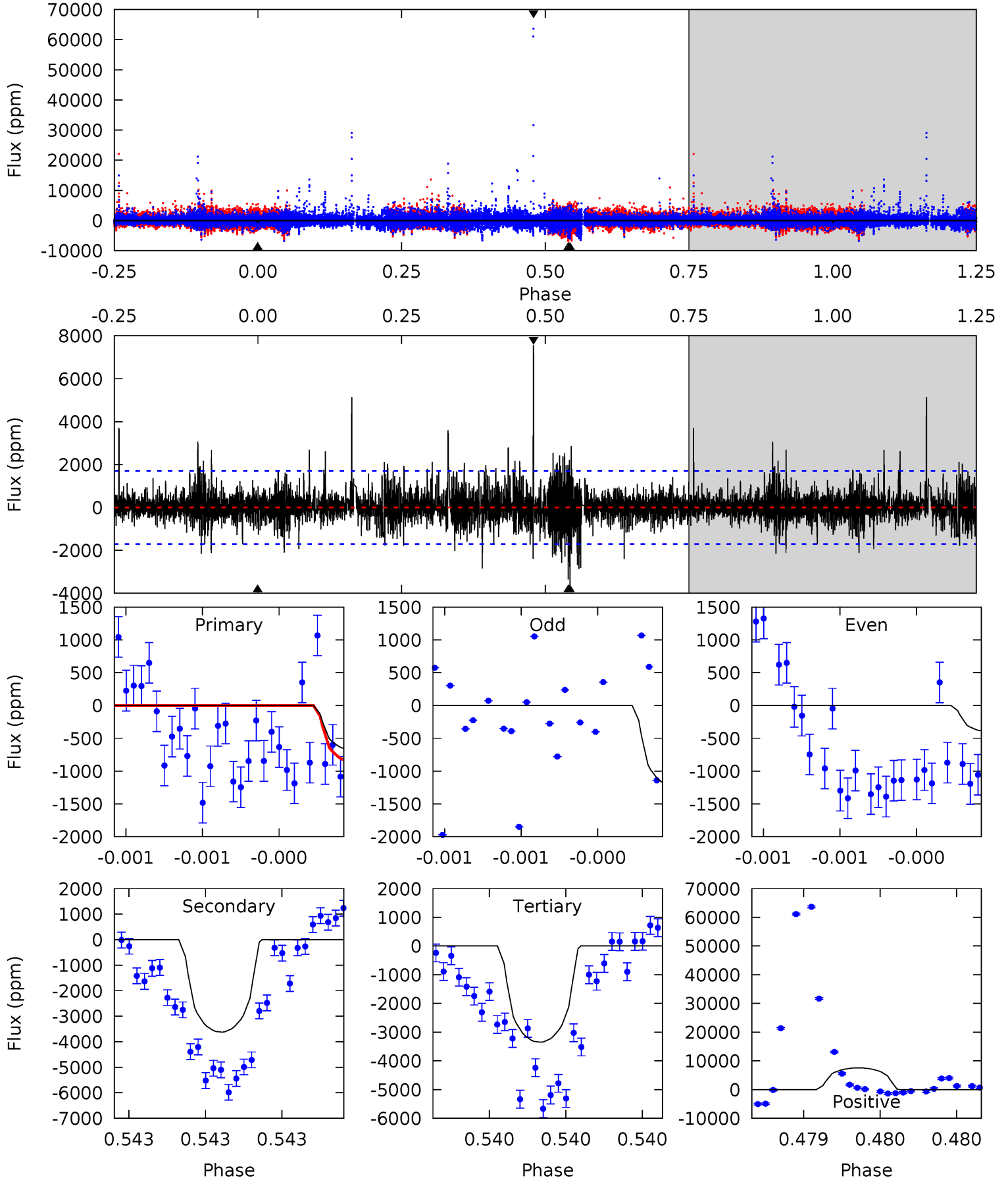
TCE 005597401-02 P=564.654186 Days  $T_0=411.257941$  (BKJD)



# DV Model-Shift Uniqueness Test

005597401-02, P = 564.651881 Days, E = 411.257009 Days

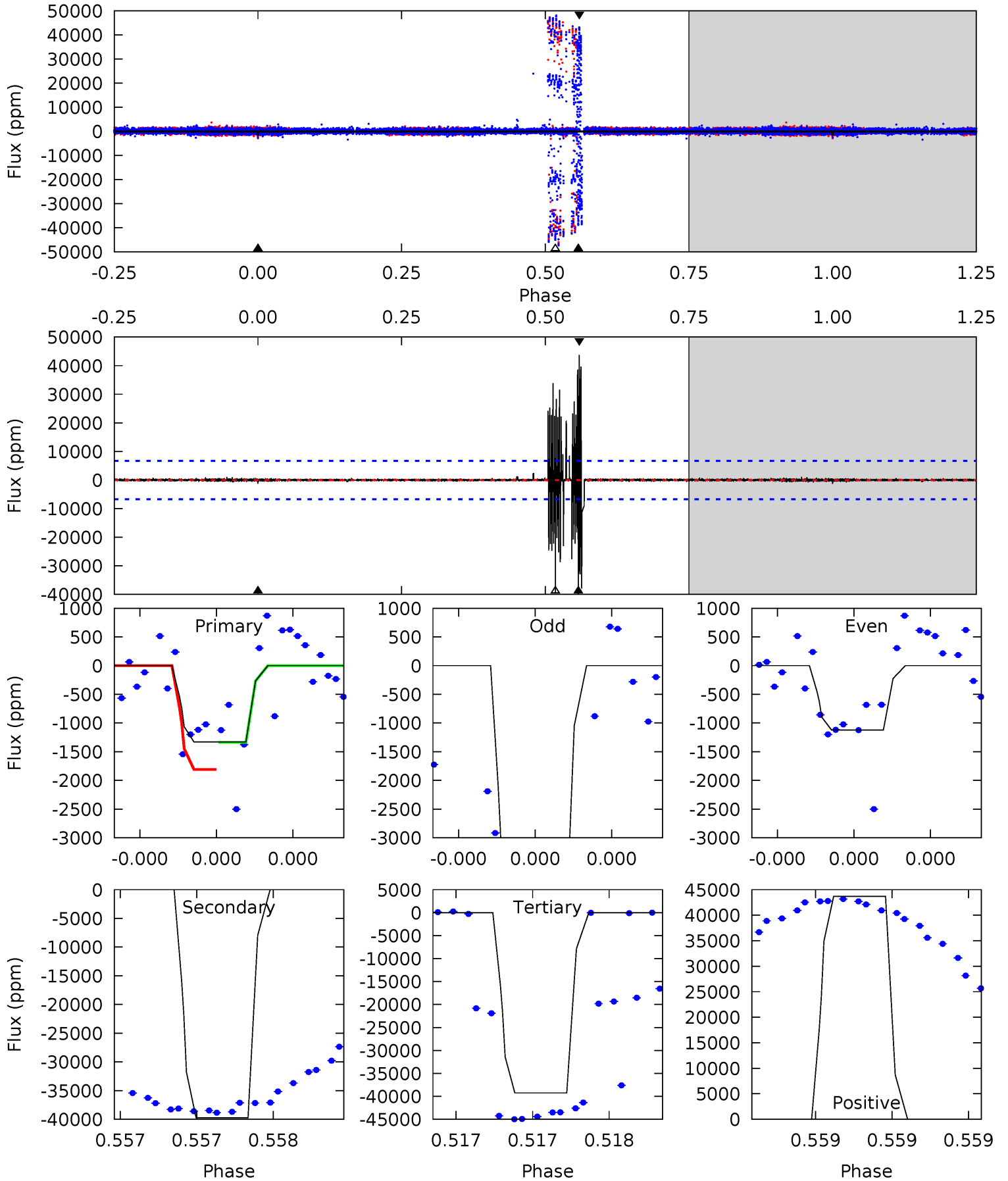
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2.28	12.0	11.1	25.1	5.66	3.62	2.01	-8.82	-22.8	0.91	-13.1	1.06	0.82	0.68	0.55



# Alt Model-Shift Uniqueness Test

005597401-02, P = 564.654186 Days, E = 411.257941 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1.13	33.9	33.5	37.2	5.71	3.69	2.56	-32.3	-36.1	0.40	-3.35	2.27	1.60	0.52	0.23





### Stellar Parameters For KIC 005597401

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4482^{+132}_{-132}$	$4.562^{+0.060}_{-0.016}$	$0.360^{+0.100}_{-0.300}$	$0.744^{+0.025}_{-0.063}$	$0.736^{+0.041}_{-0.046}$	$2.514^{+0.637}_{-0.183}$
	+3%/-3%	+1%/-0%	+28%/-83%	+3%/-8%	+6%/-6%	+25%/-7%
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 005597401-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-3624 \pm 302$	$6.88^{+5.88}_{-4.51}$	$215^{+7}_{-8}$	$3945^{+2231}_{-715}$	$63011^{+471702}_{-45059}$
Alt.	$-39737 \pm 1174$	$7.02^{+6.56}_{-5.00}$	$215^{+7}_{-7}$	$6513^{+9678}_{-1698}$	$659264^{+7437941}_{-479348}$

$T_{\text{max}}$  = 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

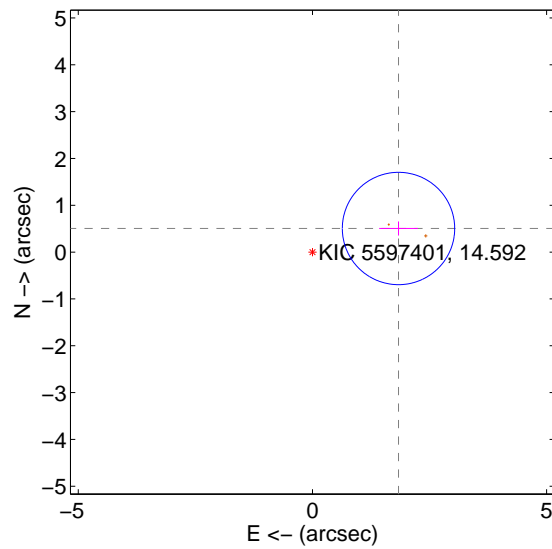
Supplemental centroid analysis for 005597401-02. Kepler magnitude: 14.59. Transit SNR 7.26

There are 0 quarters with good PRF difference image offsets

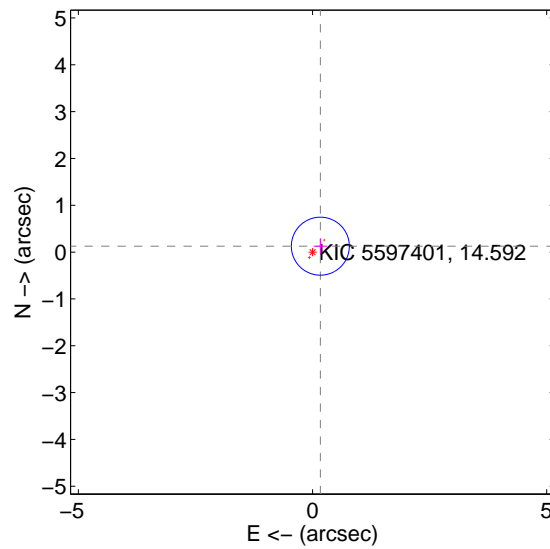
The OOT PRF centroid is offset from the target star catalog position by about 2.53 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.905 \pm 0.400$	$4.77$	$-1.838 \pm 0.413$	$0.504 \pm 0.151$
PRF-fit source offset from KIC position	$0.209 \pm 0.206$	$1.01$	$-0.167 \pm 0.146$	$0.126 \pm 0.165$
photometric centroid source offset	$1.88 \pm 0.81$	$2.32$	$-0.05 \pm 2.32$	$-1.88 \pm 0.81$

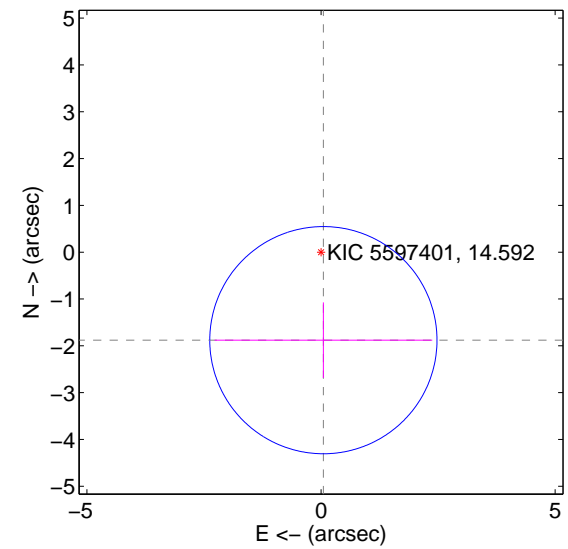
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

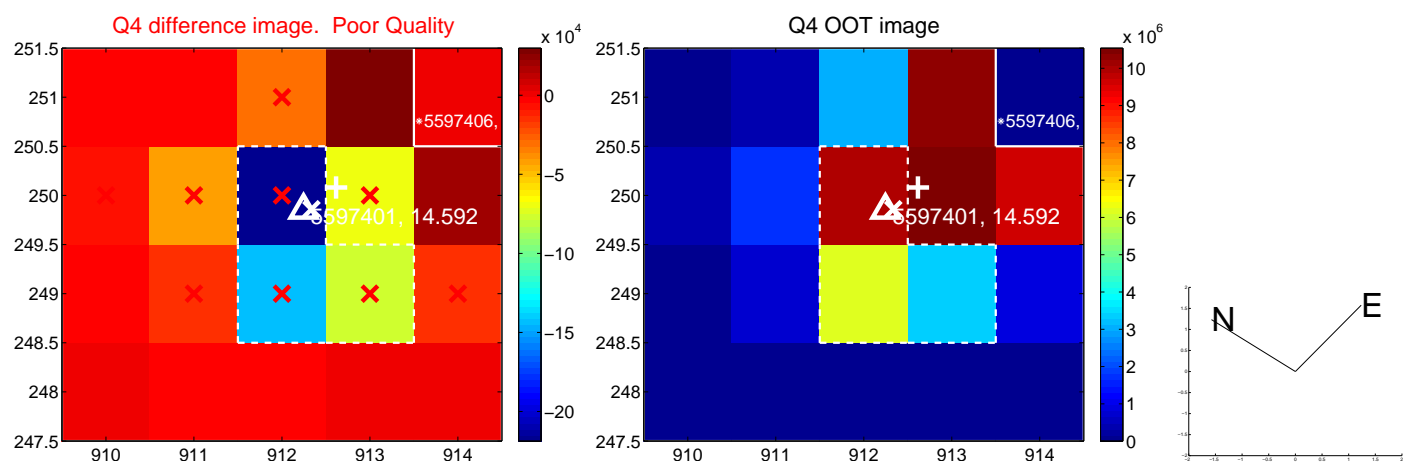
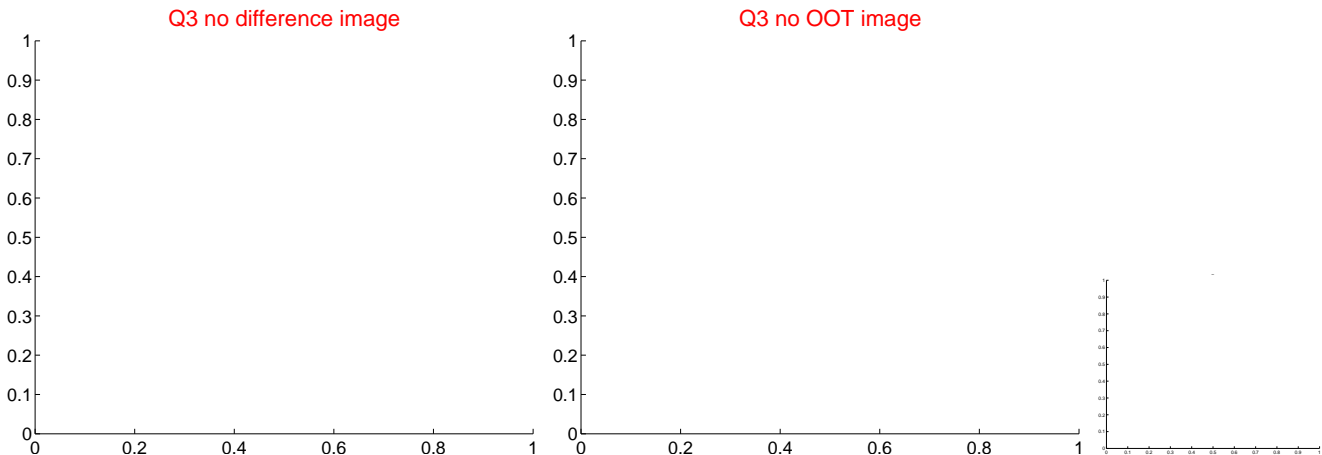
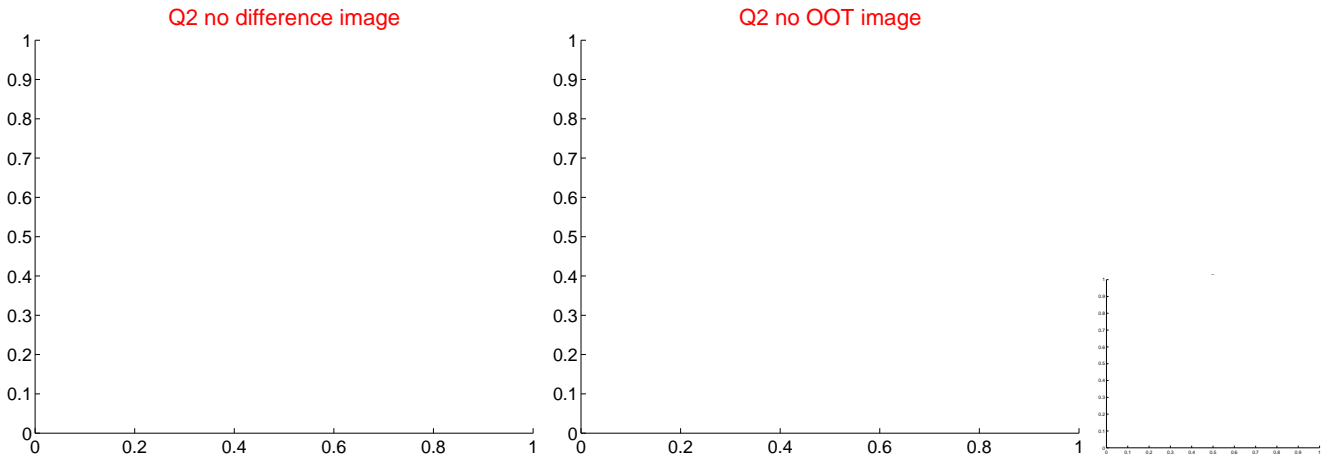
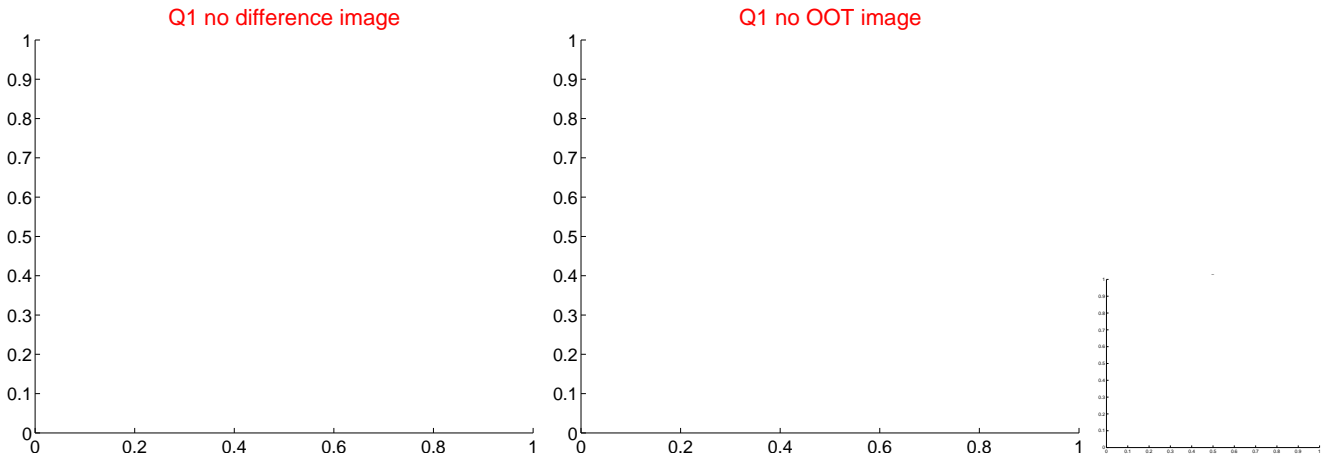


offset from photometric centroids



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.

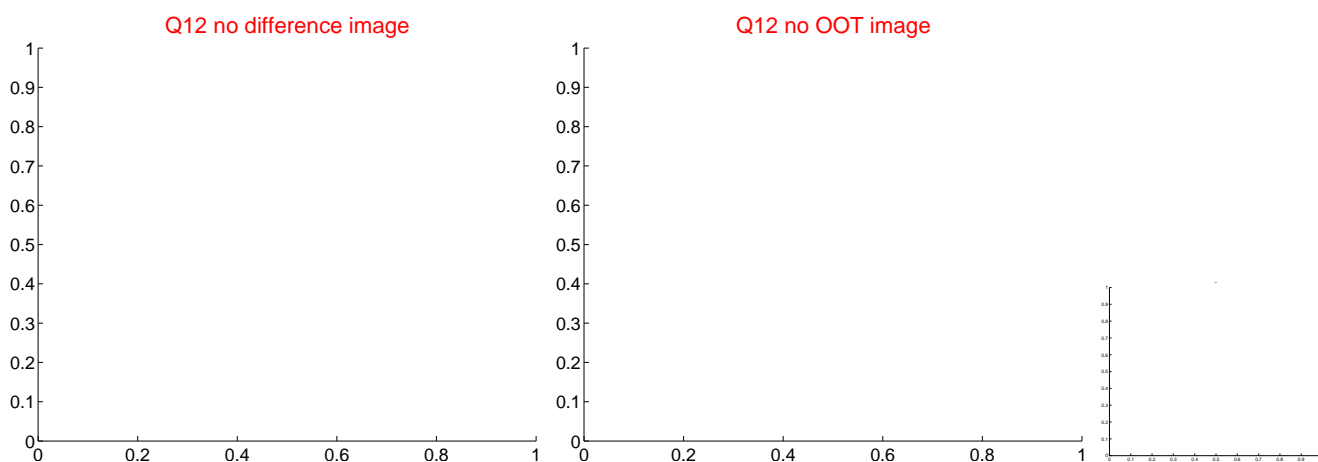
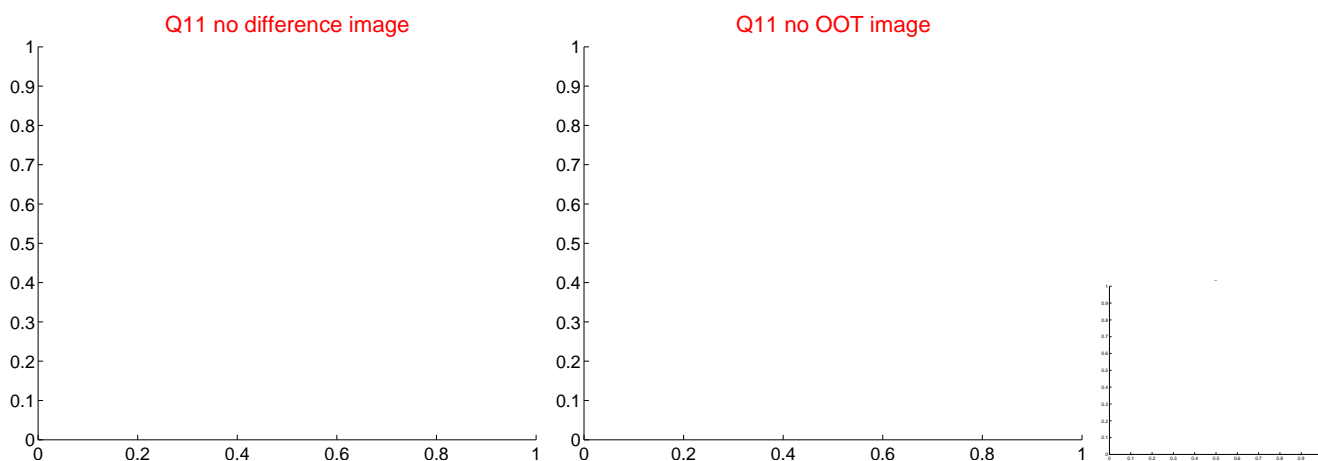
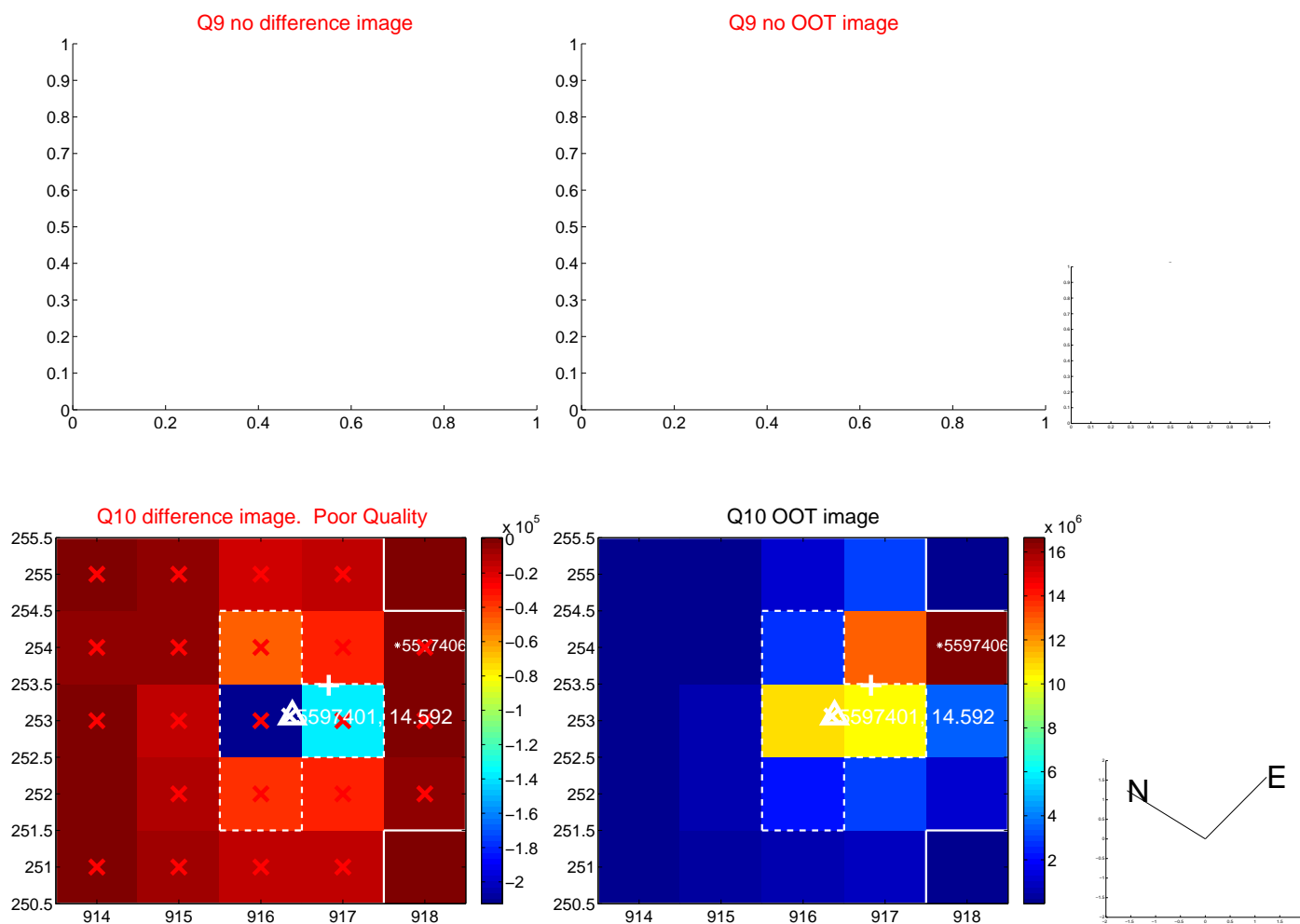
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



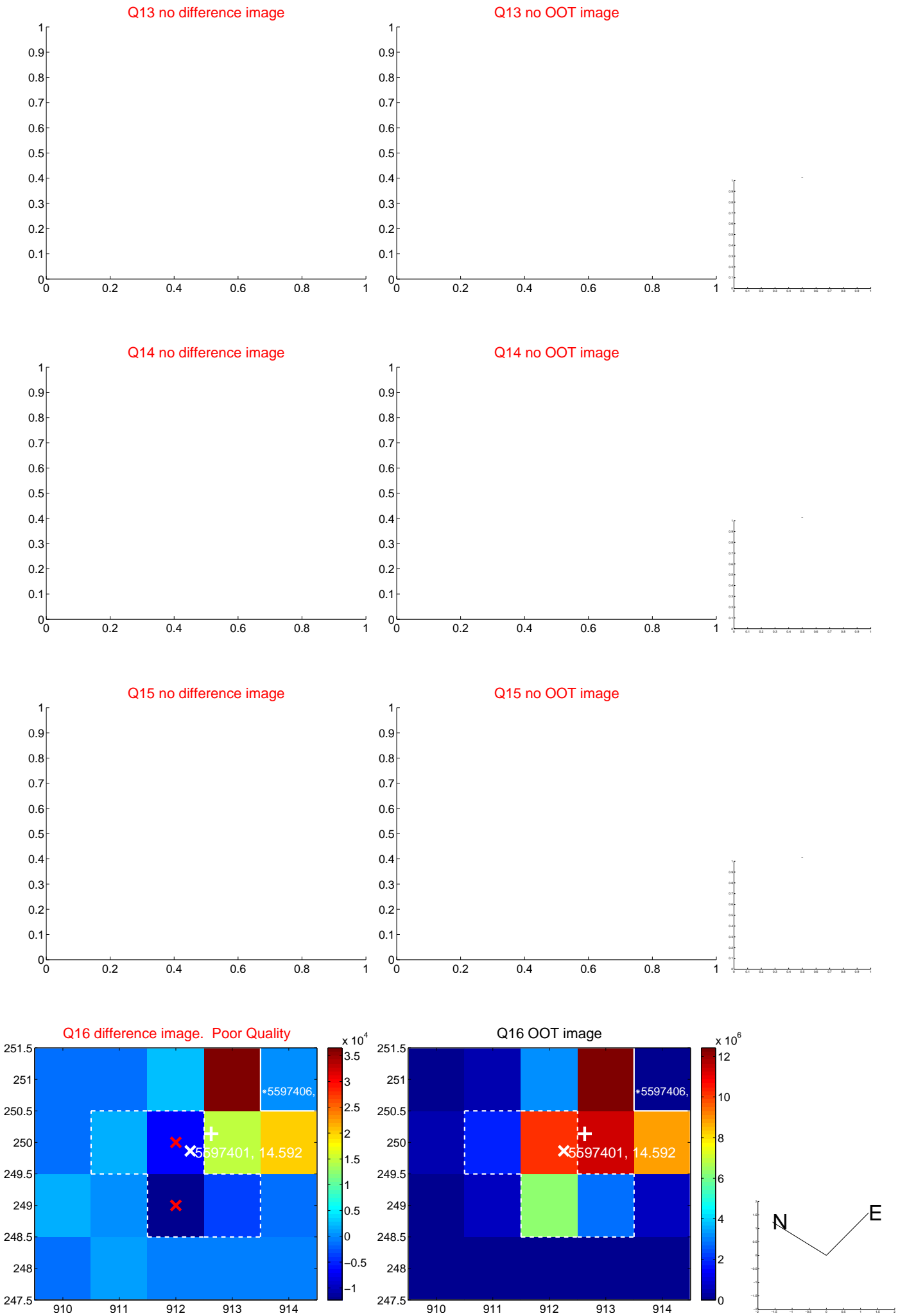
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



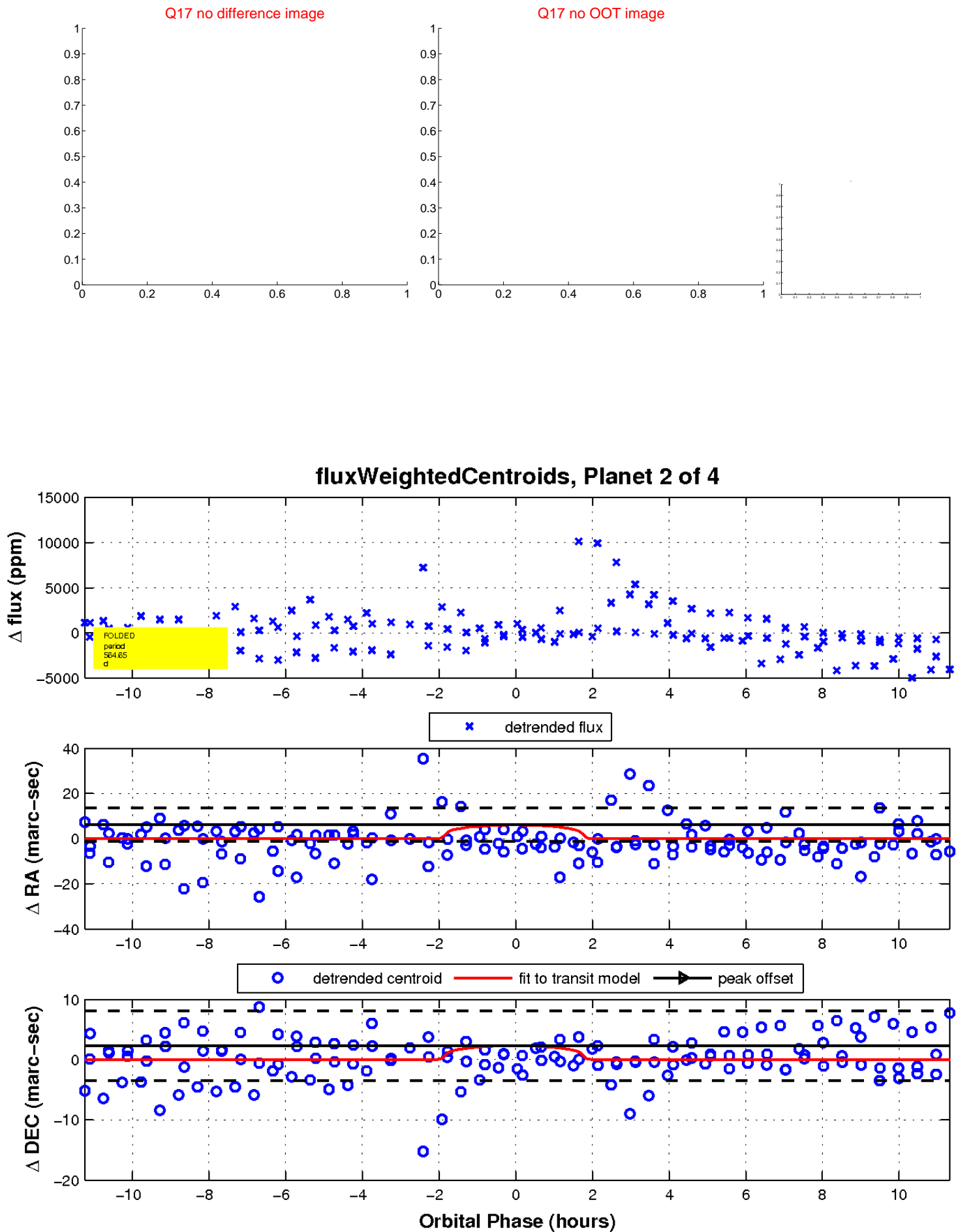
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



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

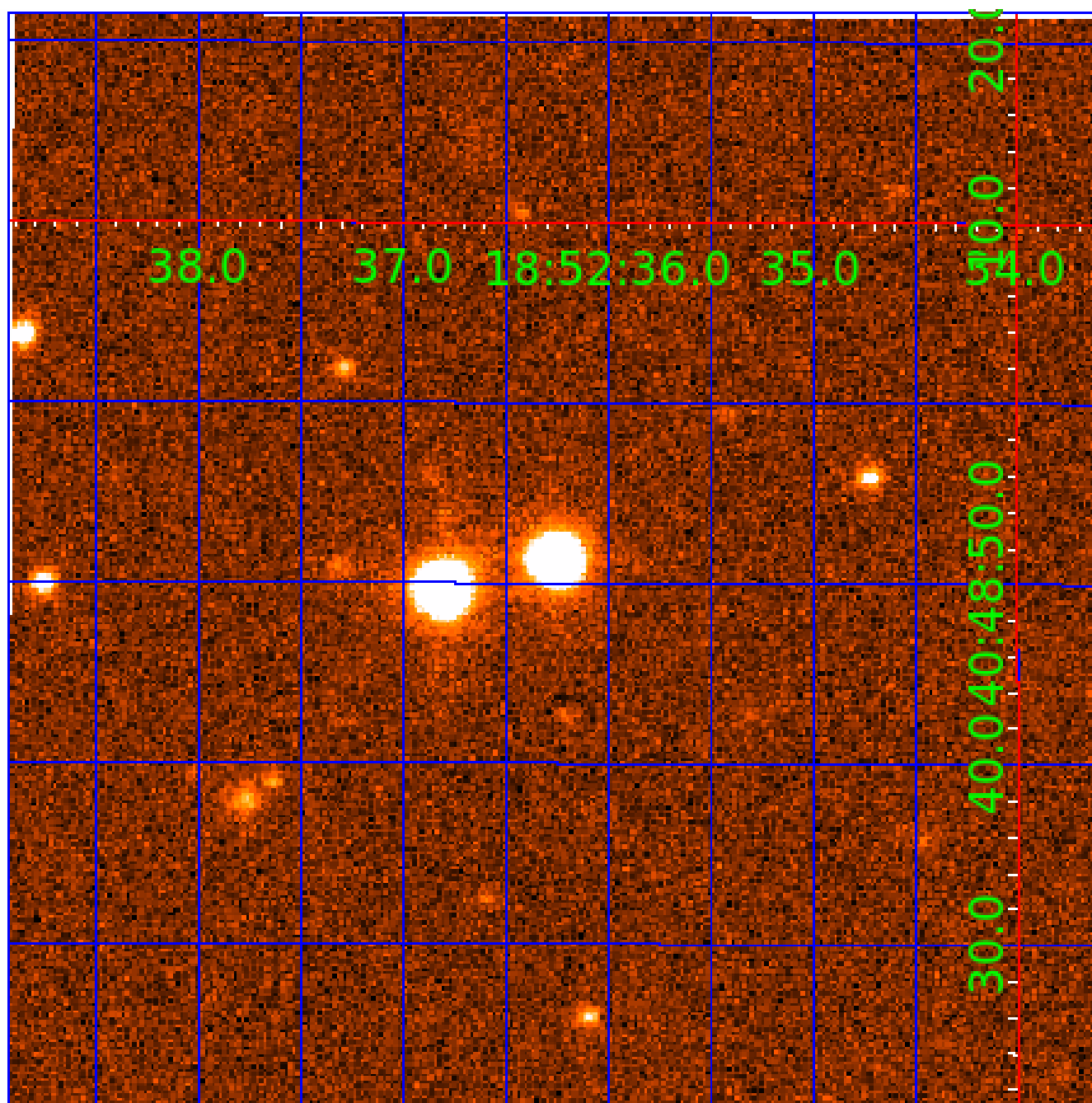


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 005597401

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005597401-01	OBS	No	384.928980	344.409178	2471.9	3.686	14.8	7.2	0.74	4482	3.68	0.23
005597401-02	OBS	No	564.651881	411.257009	2660.5	3.813	14.4	7.3	0.74	4482	3.65	0.14
005597401-03	OBS	No	545.330748	404.083664	2402.7	5.744	12.7	4.8	0.74	4482	3.68	0.14
005597401-04	OBS	No	329.334416	425.597633	2003.3	3.530	13.2	5.1	0.74	4482	3.18	0.28

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005597401-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
005597401-02	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
005597401-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_SKYE—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_KIC_POS
005597401-04	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.

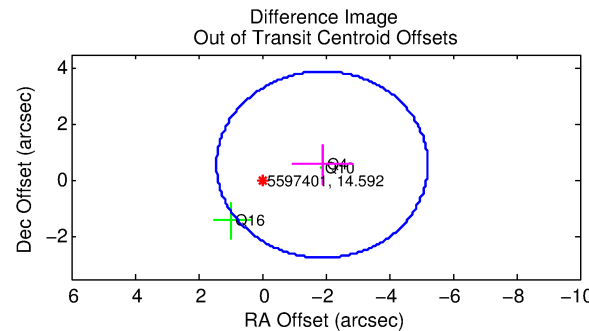
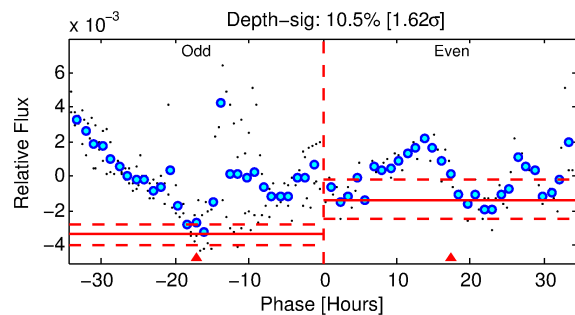
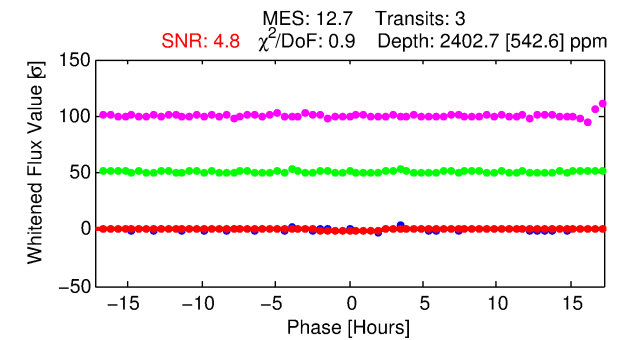
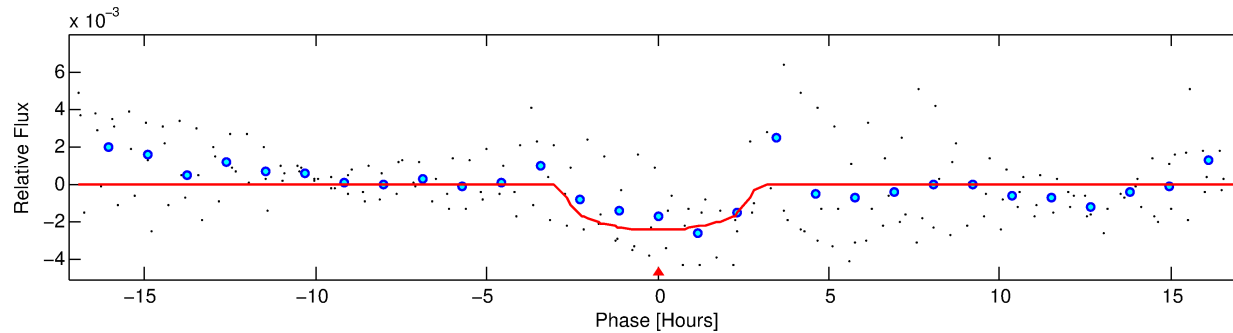
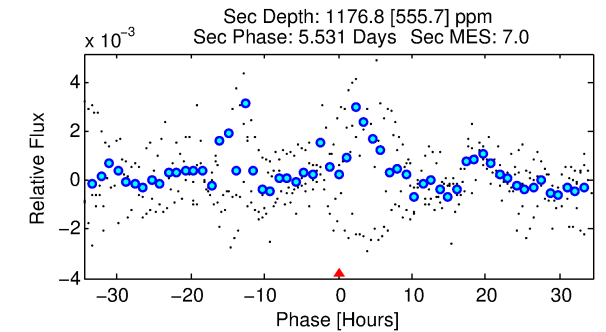
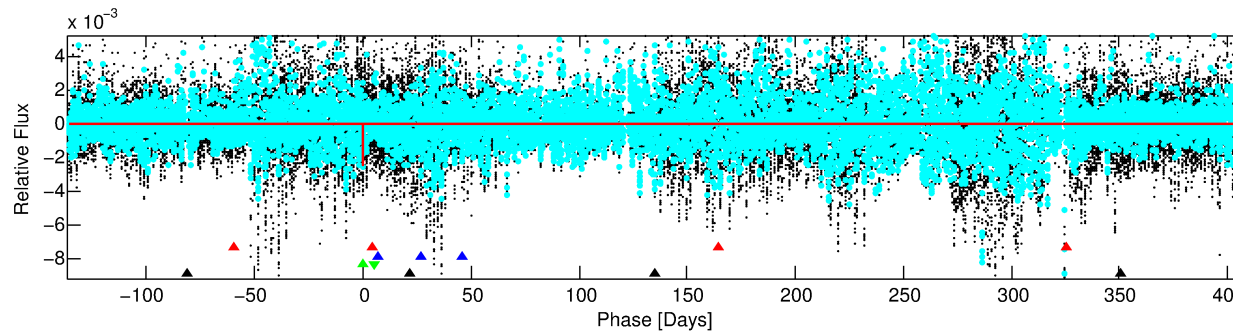
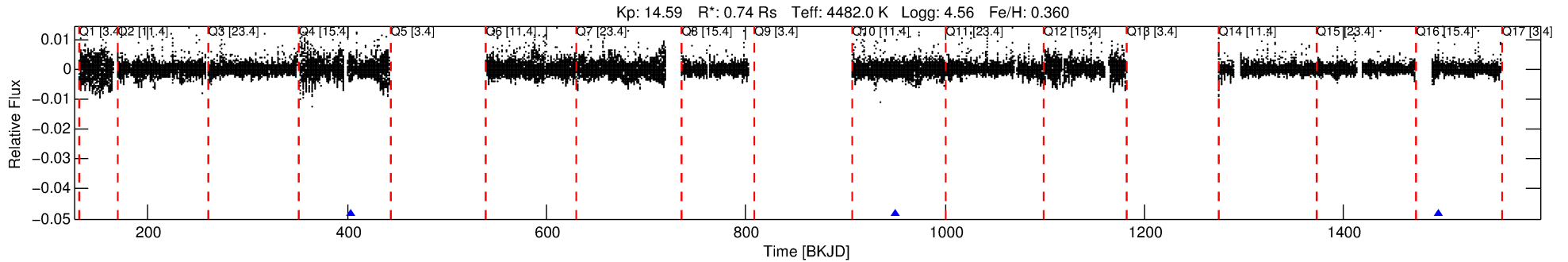
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005597401-03

No Significant Match Found

# DV One-Page Summary

KIC: 5597401 Candidate: 3 of 4 Period: 545.331 d



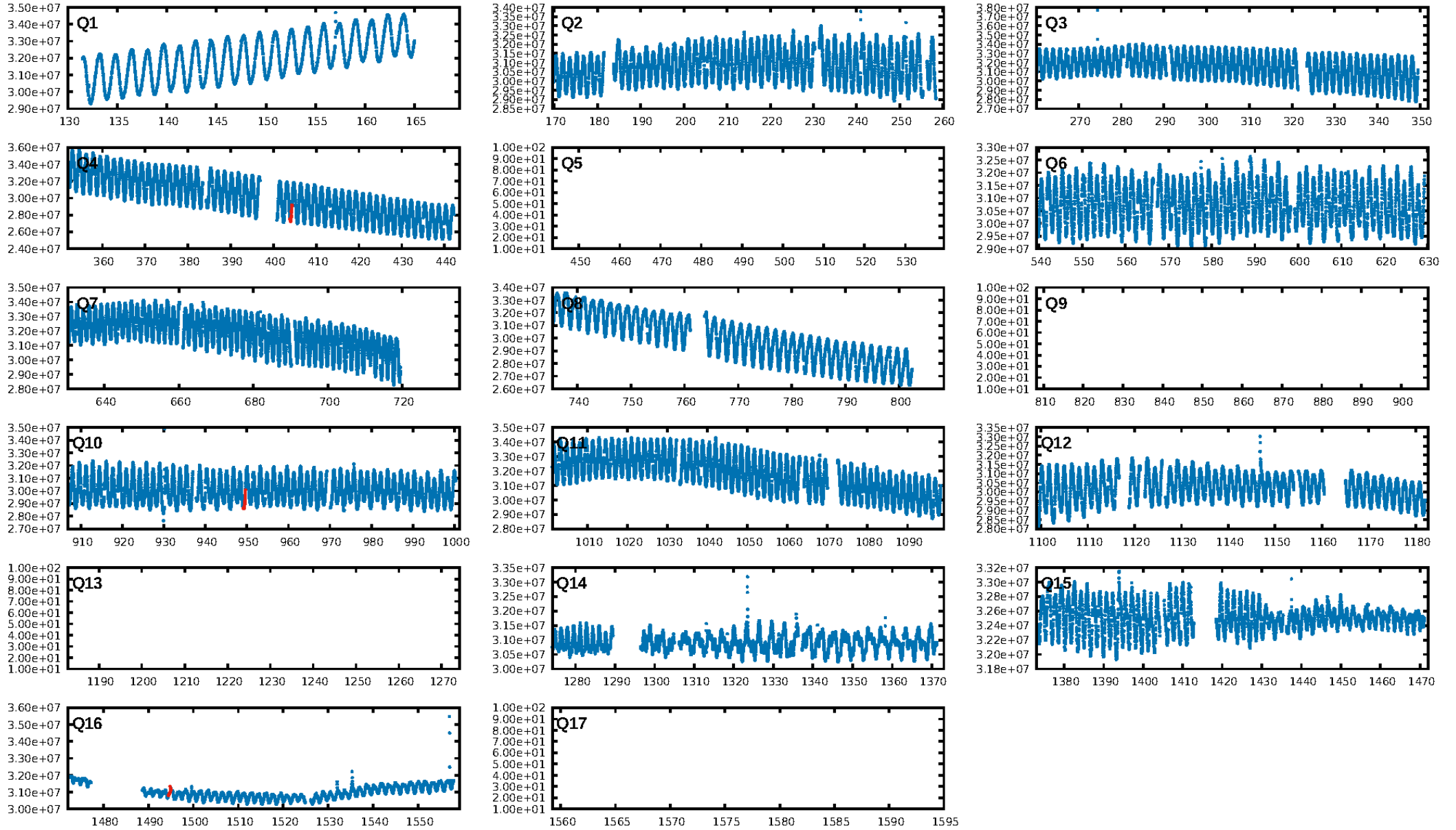
## DV Fit Results:

Period = 545.33075 [0.00583] d  
Epoch = 404.0837 [0.0065] BKJD  
Rp/R\* = 0.0453 [0.0451]  
a/R\* = 650.40 [1869.24]  
b = 0.54 [3.91]  
Seff = 0.14 [0.02]  
Teq = 157 [6] K  
Rp = 3.68 [3.67] Re  
a = 1.1799 [0.0860] AU  
Ag = 66599.42 [136308.24] [0.49σ]  
Teffp = 3900 [1996] K [1.88σ]

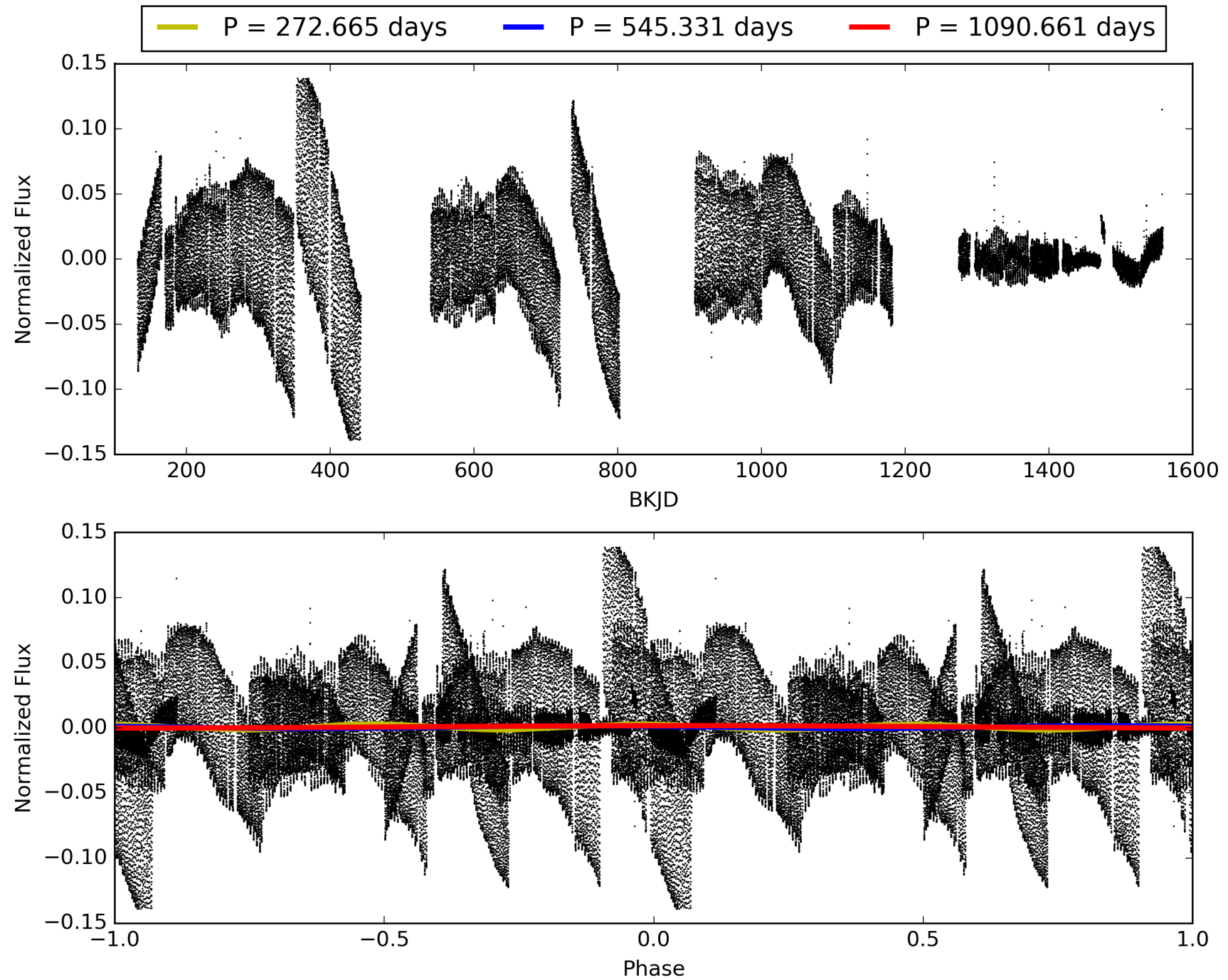
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [564.05σ]  
LongPeriod-sig: 100.0% [67.26σ]  
ModelChiSquare2-sig: 11.7%  
ModelChiSquareGof-sig: 97.4%  
Bootstrap-pfa: 4.42e-09  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -0.3105  
Centroid-sig: 24.3%  
Centroid-so: 4.326 arcsec [1.38σ]  
OotOffset-rm: 1.980 arcsec [1.79σ]  
KicOffset-rm: 0.193 arcsec [0.19σ]  
OotOffset-st: 1/0/2/0 [3]  
KicOffset-st: 1/0/2/0 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 1.00 [3/3]

# TCE 005597401-03, PDC Light Curves

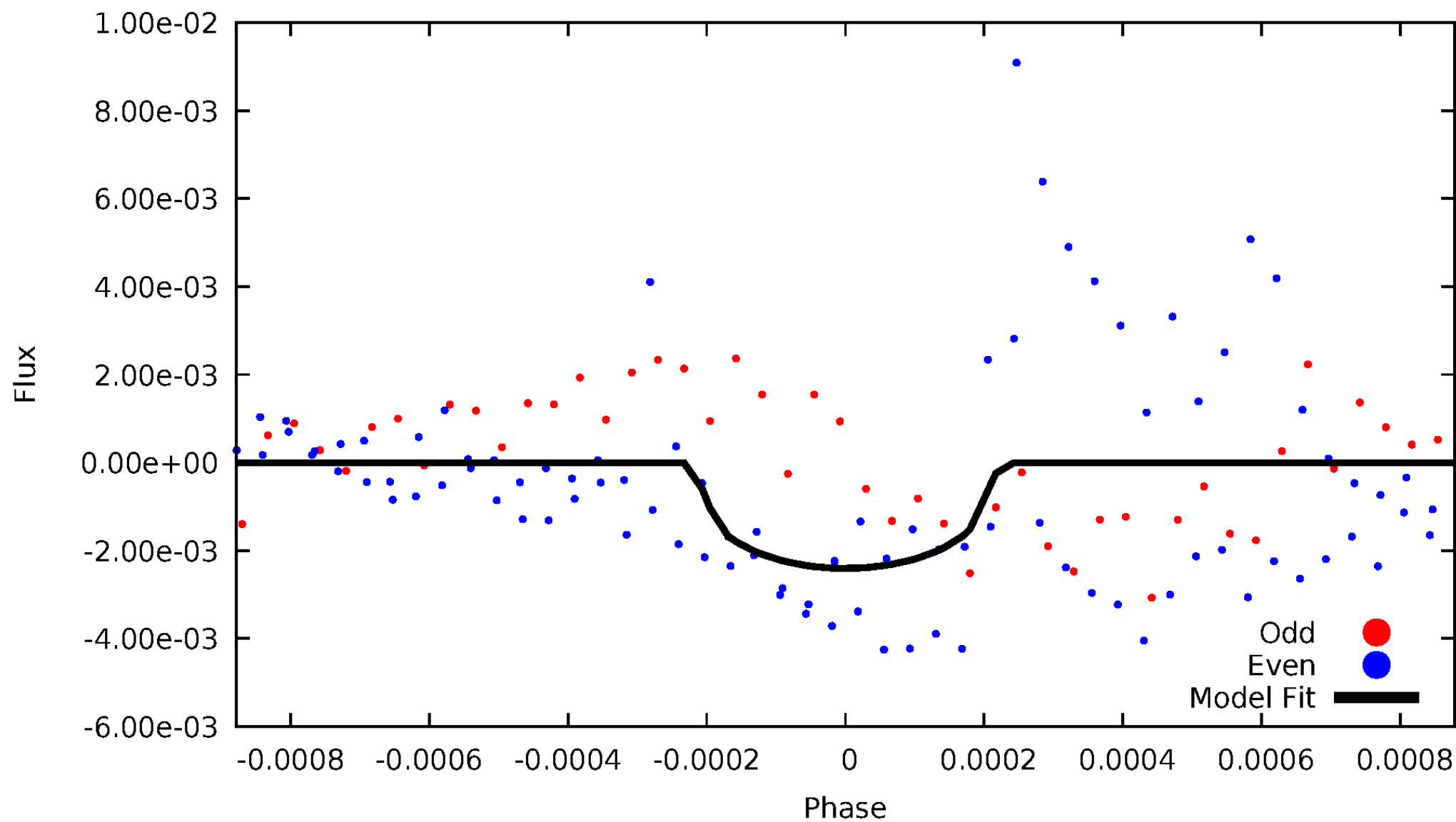


TCE 005597401-03



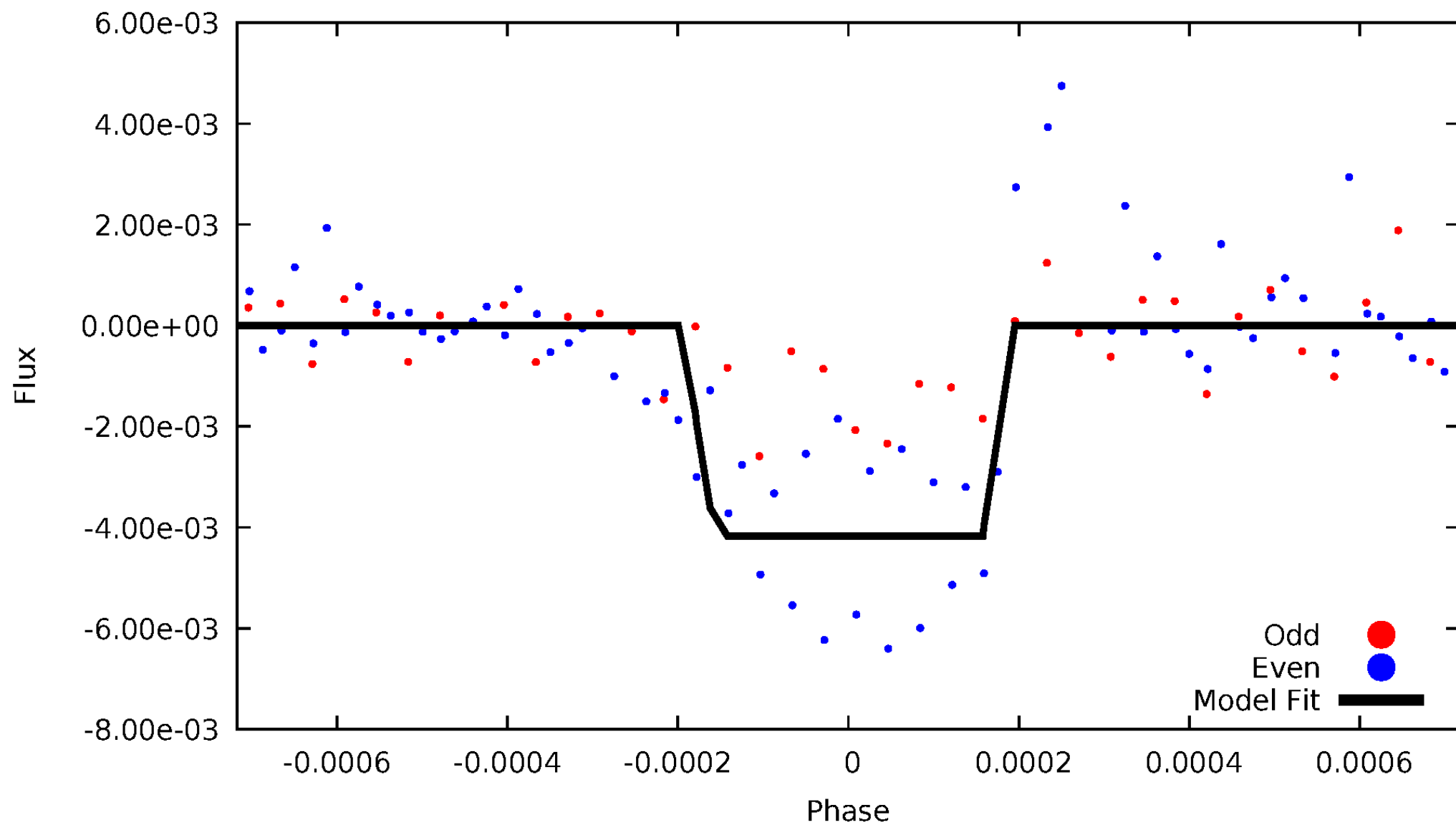
# DV Odd/Even

TCE 005597401-03



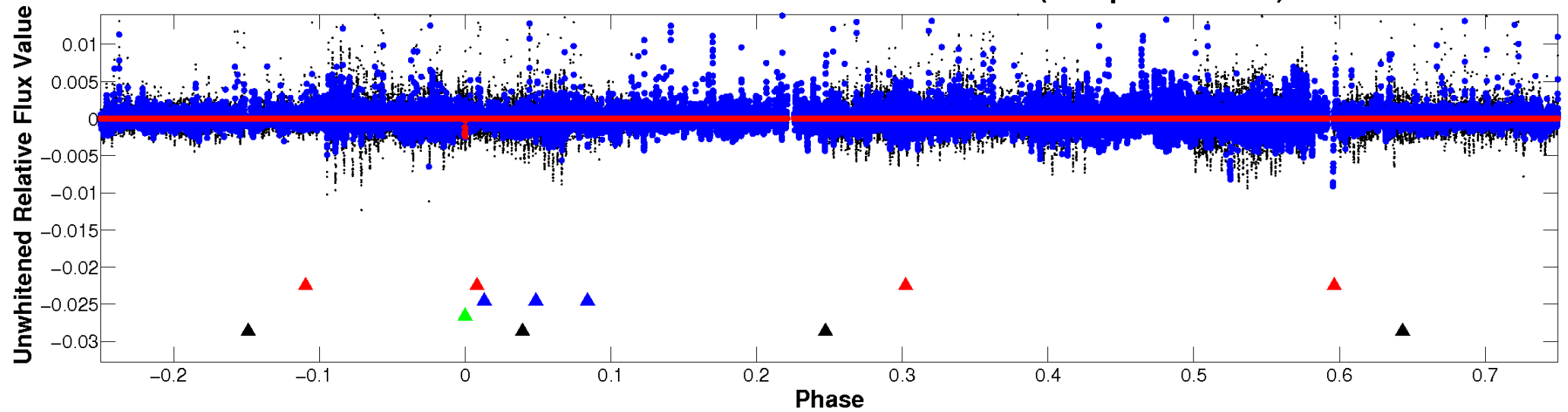
# ALT Odd/Even

TCE 005597401-03

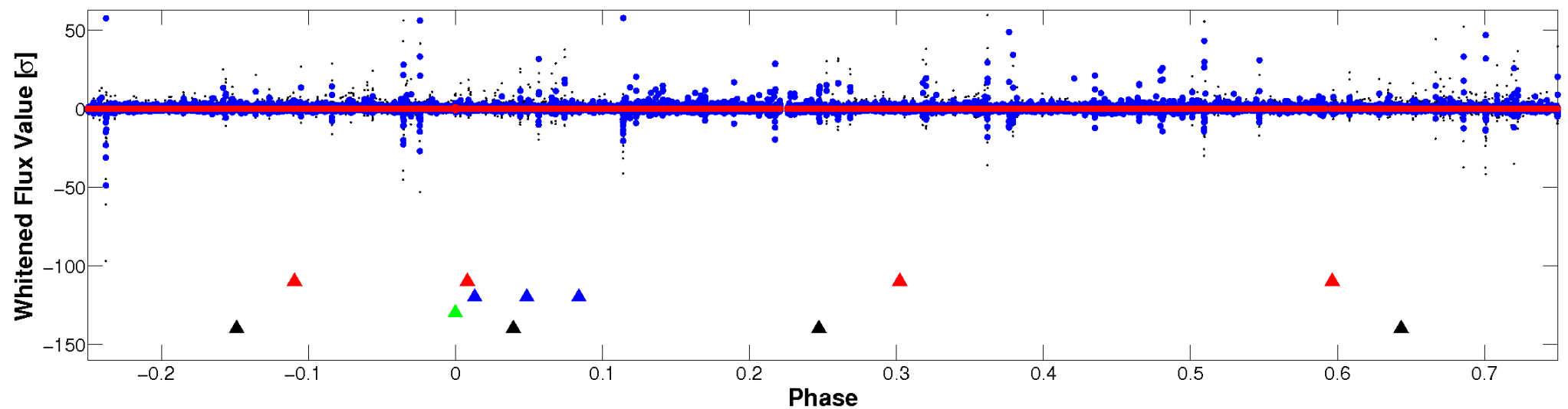


# Non-Whitened Vs. Whitened Light Curve

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

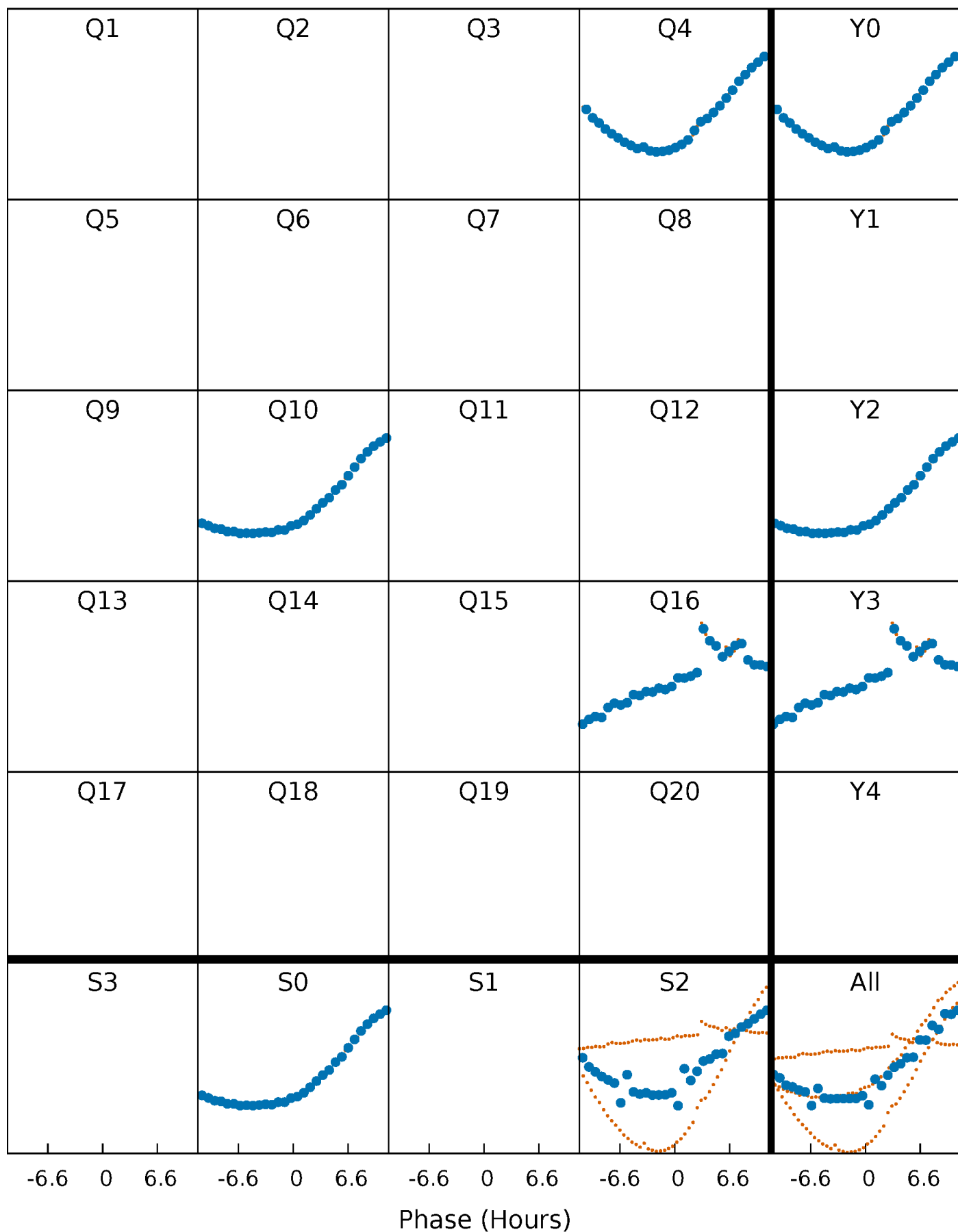


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

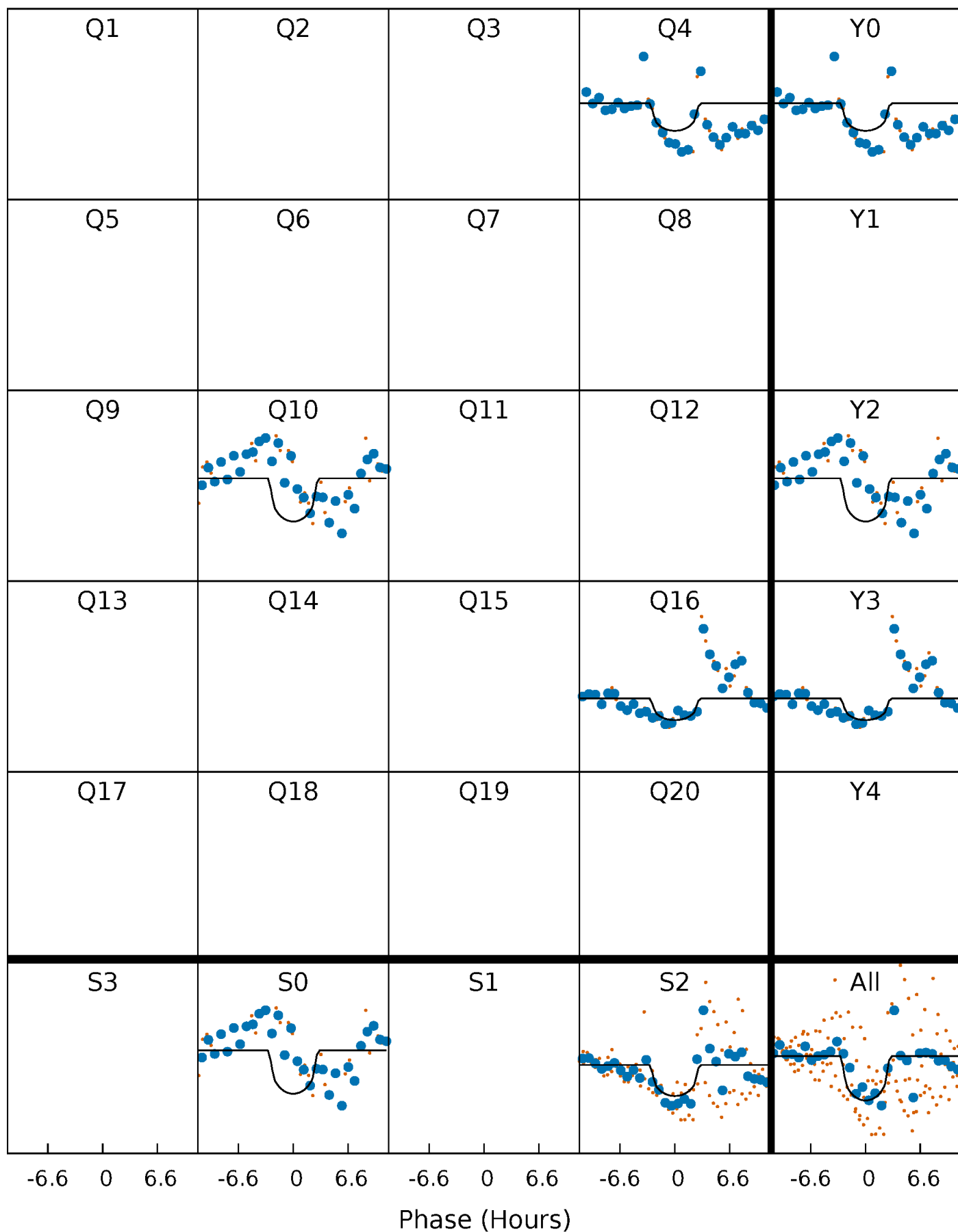
TCE 005597401-03 P=545.330748 Days  $T_0=404.083664$  (BKJD)





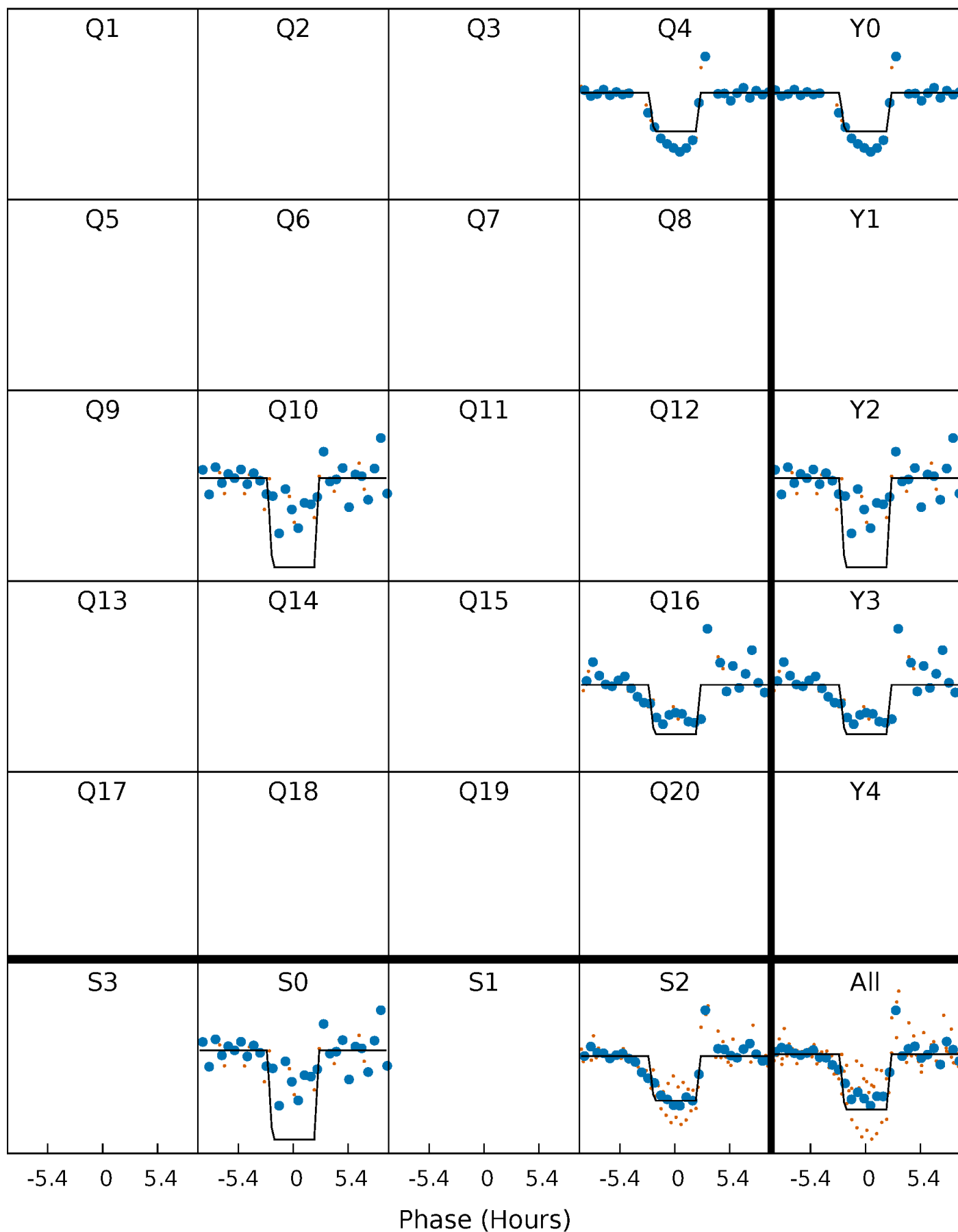
# DV Quarter-Phased Transit Curves

TCE 005597401-03     $P=545.330748$  Days     $T_0=404.083664$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

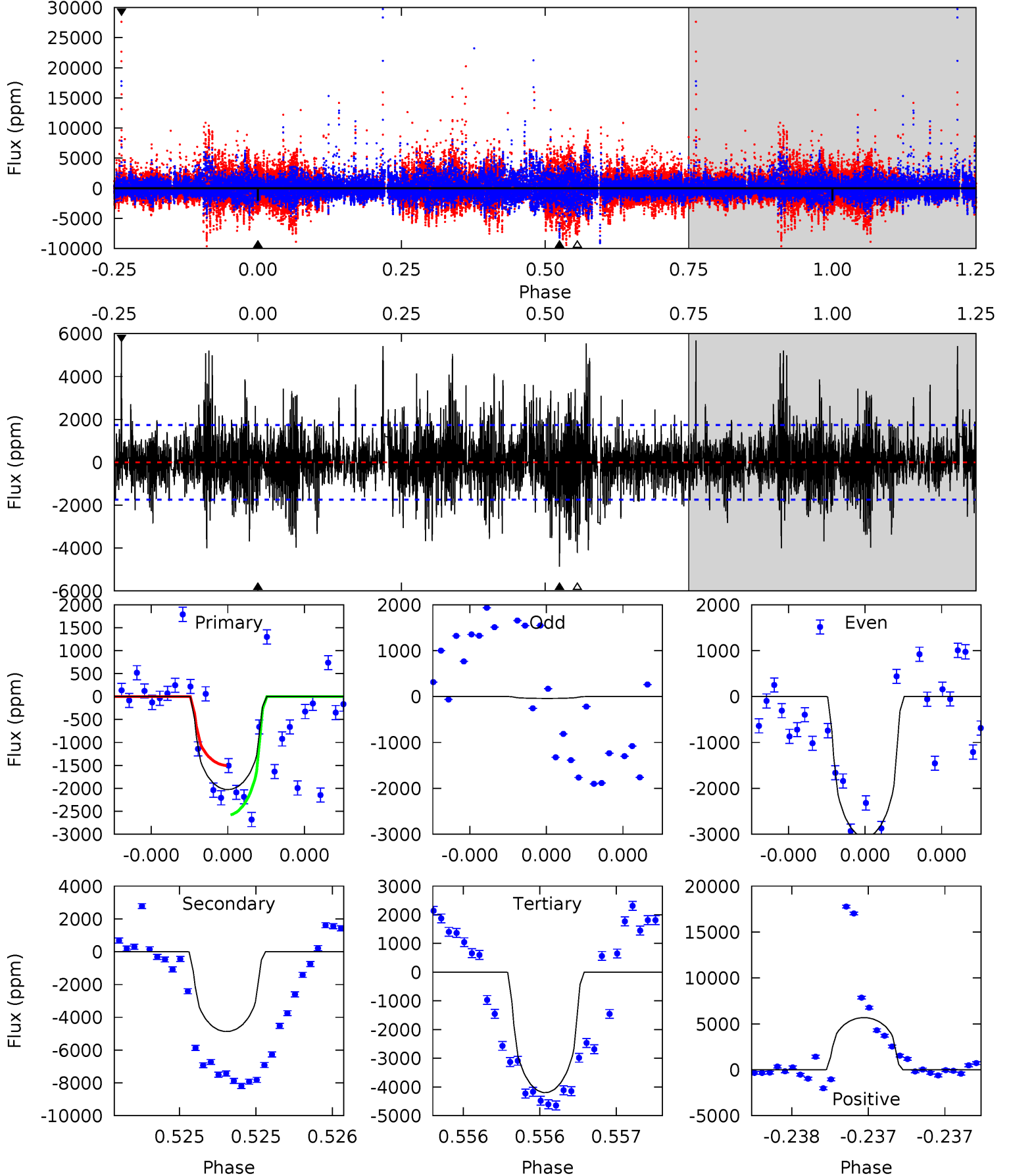
TCE 005597401-03 P=545.337660 Days  $T_0=404.088448$  (BKJD)



# DV Model-Shift Uniqueness Test

005597401-03, P = 545.330748 Days, E = 404.083664 Days

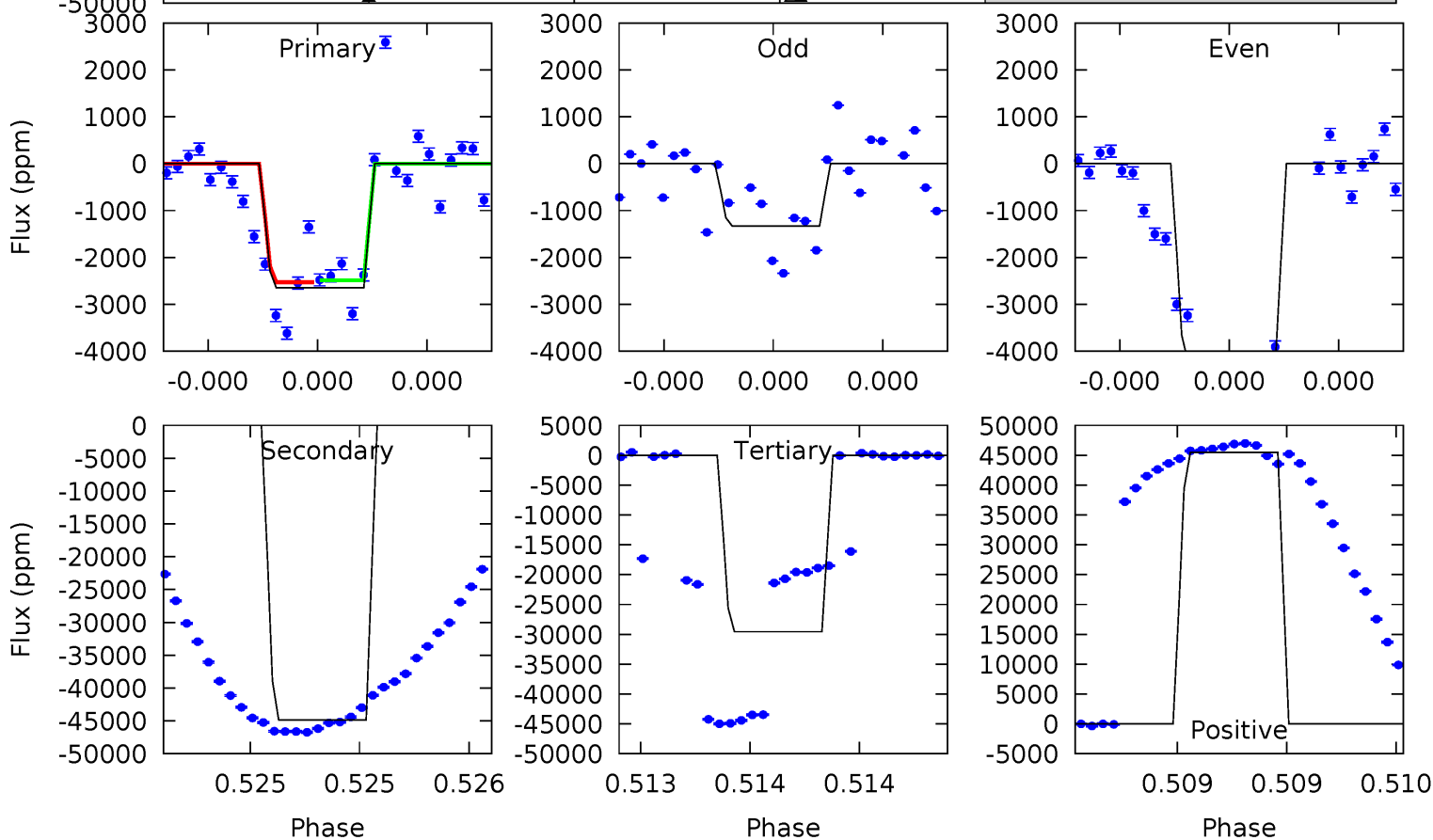
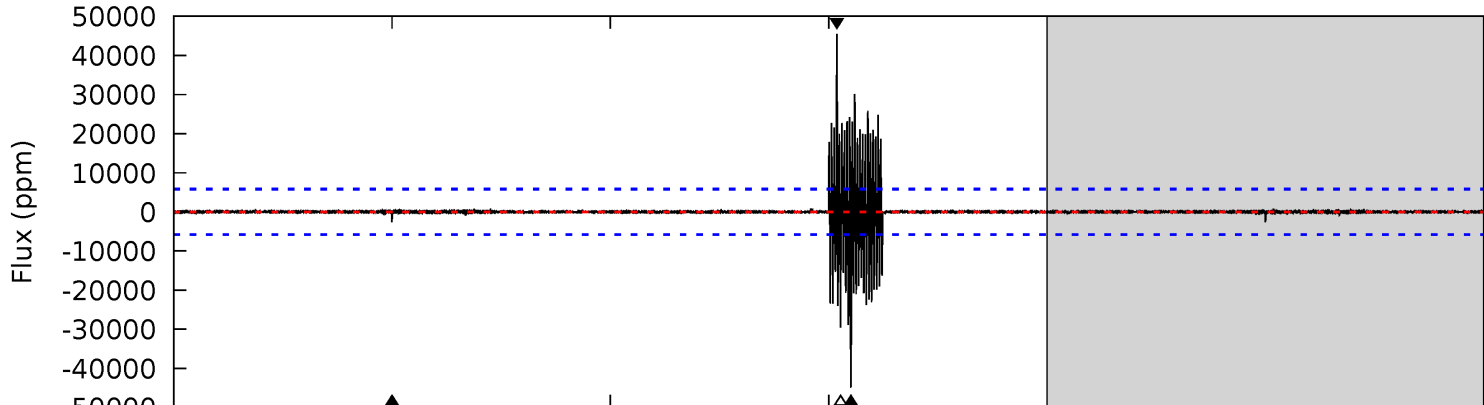
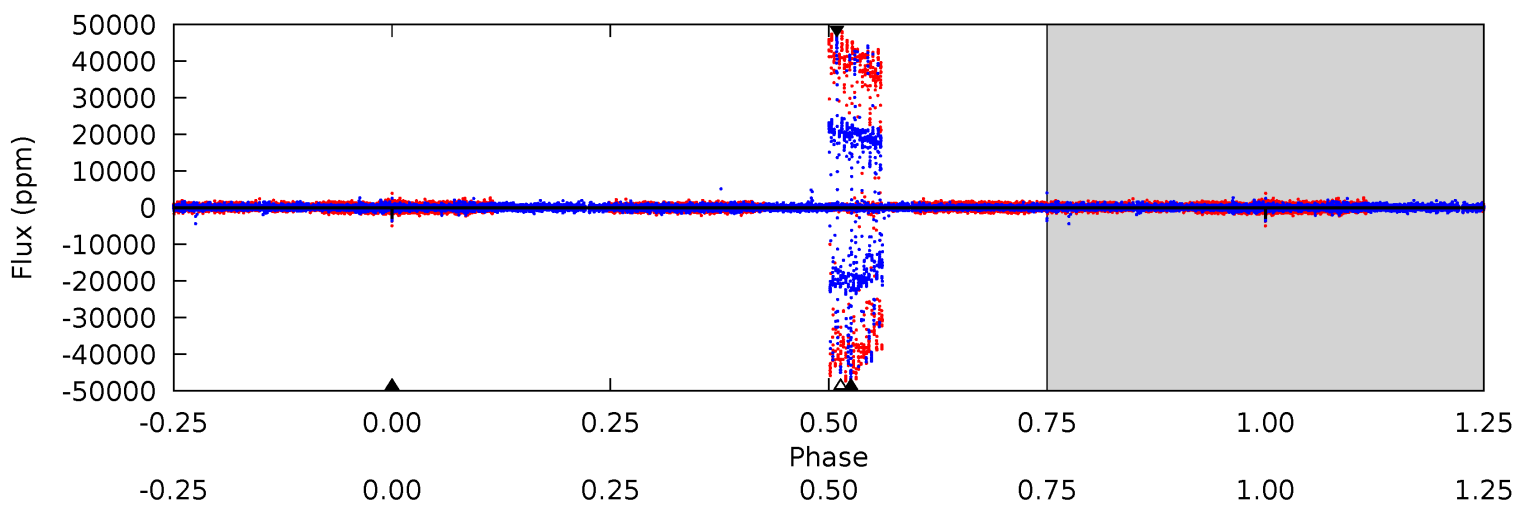
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.50	15.6	13.5	18.2	5.58	3.49	3.59	-6.96	-11.7	2.16	-2.58	3.93	0.83	0.54	1.72



# Alt Model-Shift Uniqueness Test

005597401-03, P = 545.337660 Days, E = 404.088448 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
2.56	43.3	28.5	43.9	5.62	3.56	2.83	-26.0	-41.3	14.8	-0.58	1.76	1.17	0.50	0.02



### Stellar Parameters For KIC 005597401

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4482^{+132}_{-132}$	$4.562^{+0.060}_{-0.016}$	$0.360^{+0.100}_{-0.300}$	$0.744^{+0.025}_{-0.063}$	$0.736^{+0.041}_{-0.046}$	$2.514^{+0.637}_{-0.183}$
	+3%/-3%	+1%/-0%	+28%/-83%	+3%/-8%	+6%/-6%	+25%/-7%
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 005597401-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-4870 \pm 312$	$4.39^{+3.37}_{-2.54}$	$217^{+7}_{-8}$	$4942^{+2693}_{-1004}$	$202012^{+947891}_{-139678}$
Alt.	$-44862 \pm 1036$	$5.42^{+3.61}_{-3.06}$	$218^{+7}_{-8}$	$7838^{+7019}_{-1927}$	$1245631^{+5168332}_{-803434}$

$T_{\text{max}}$  = 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

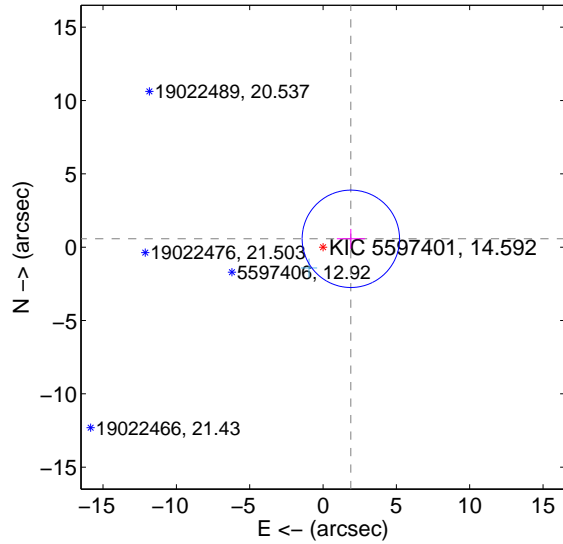
Supplemental centroid analysis for 005597401-03. Kepler magnitude: 14.59. Transit SNR 4.83

There are 3 quarters with good PRF difference image offsets

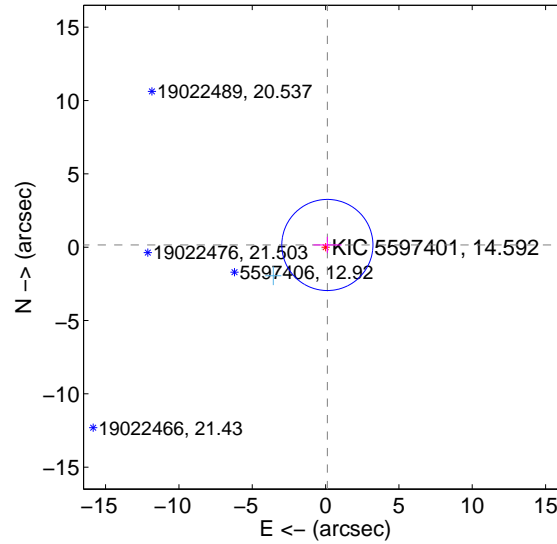
The OOT PRF centroid is offset from the target star catalog position by about 2.67 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.980 \pm 1.107$	1.79	$-1.896 \pm 0.955$	$0.570 \pm 0.673$
PRF-fit source offset from KIC position	$0.193 \pm 1.036$	0.19	$-0.122 \pm 0.964$	$0.150 \pm 0.555$
photometric centroid source offset	$4.33 \pm 3.14$	1.38	$4.31 \pm 3.15$	$-0.40 \pm 0.87$

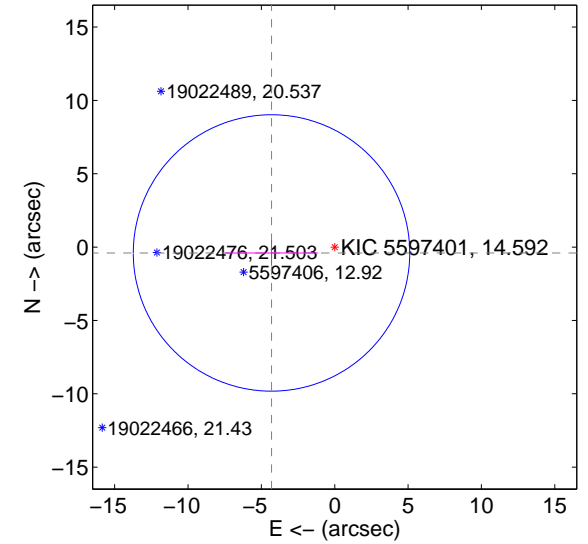
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

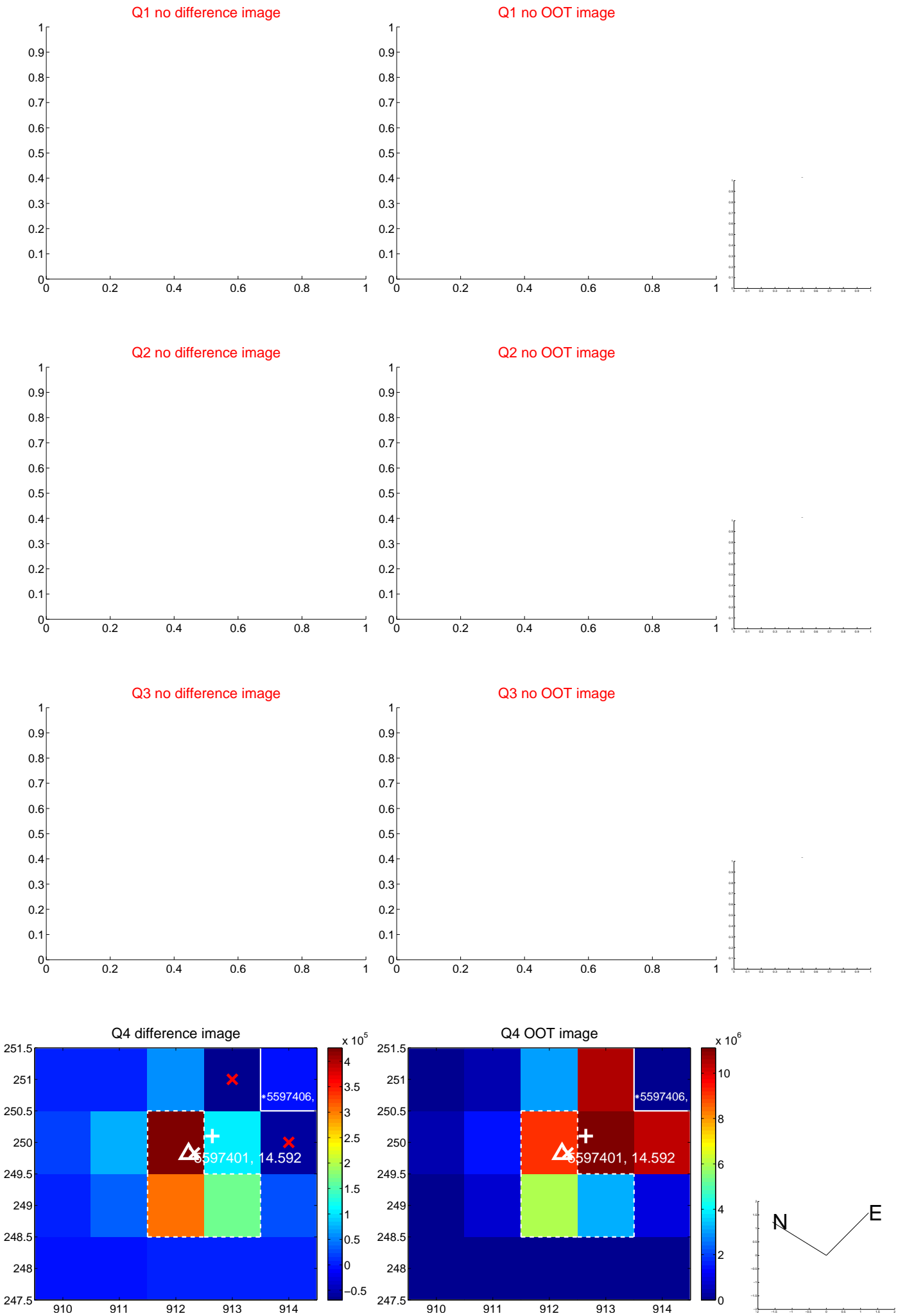


offset from photometric centroids



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.

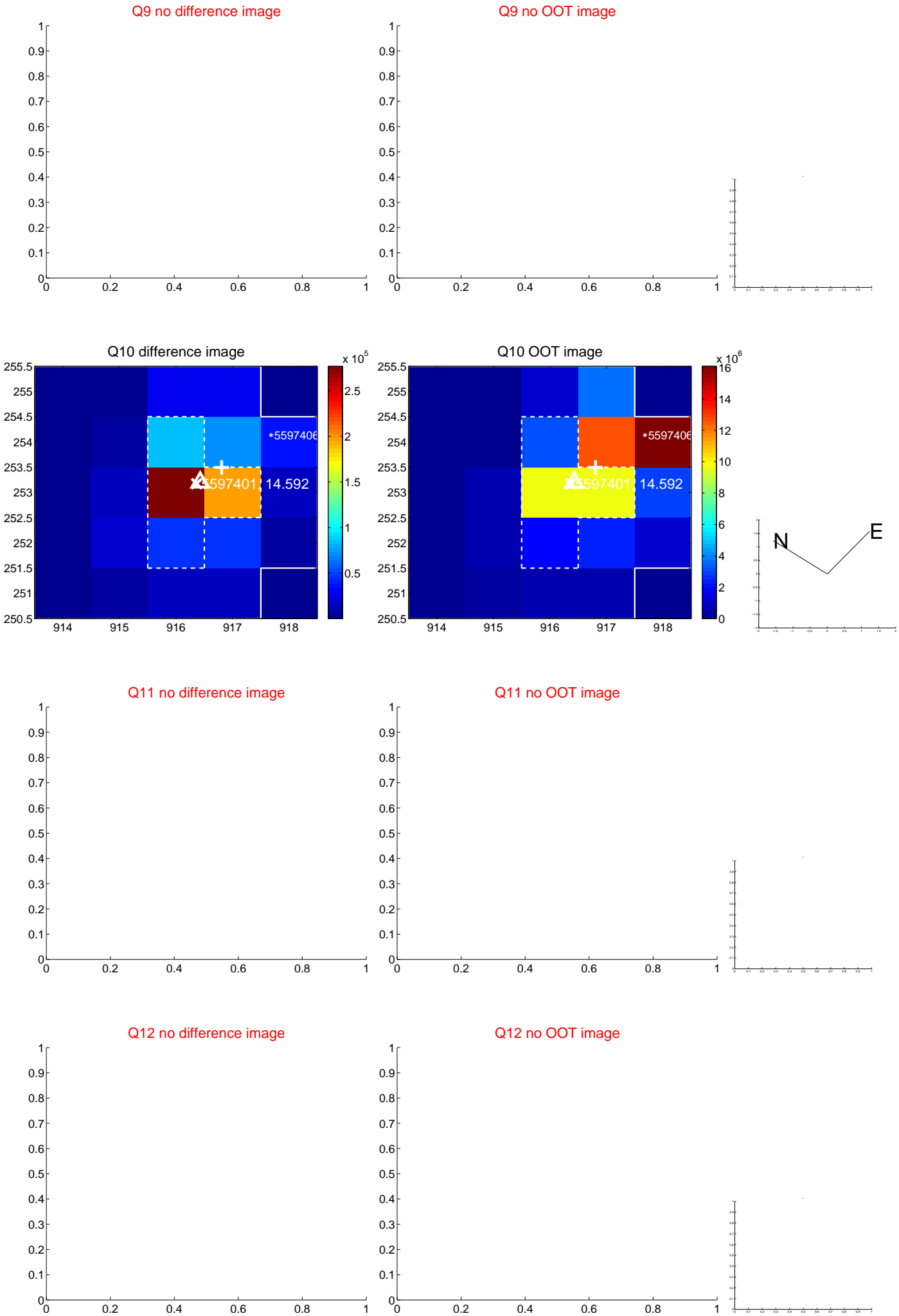


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

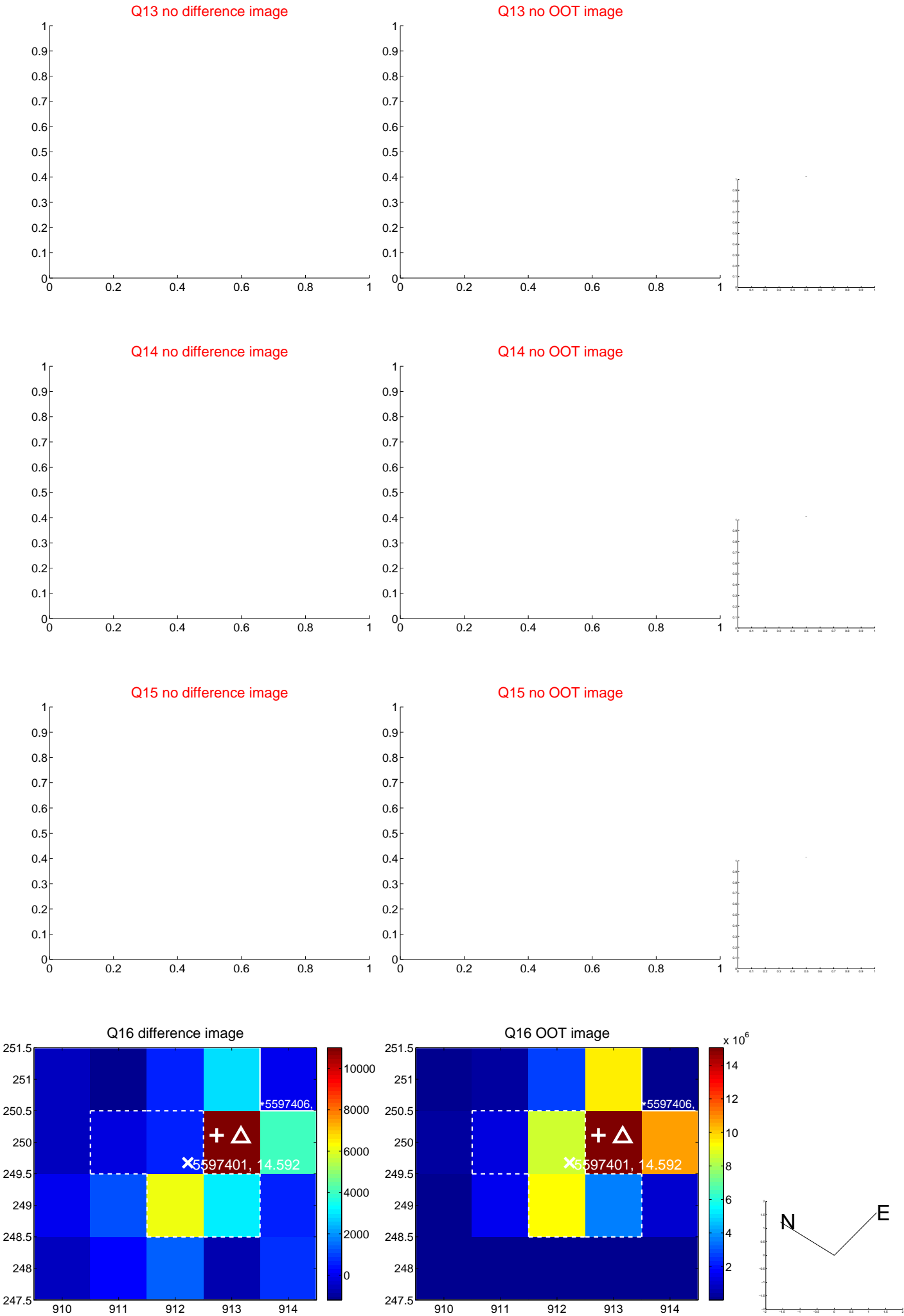




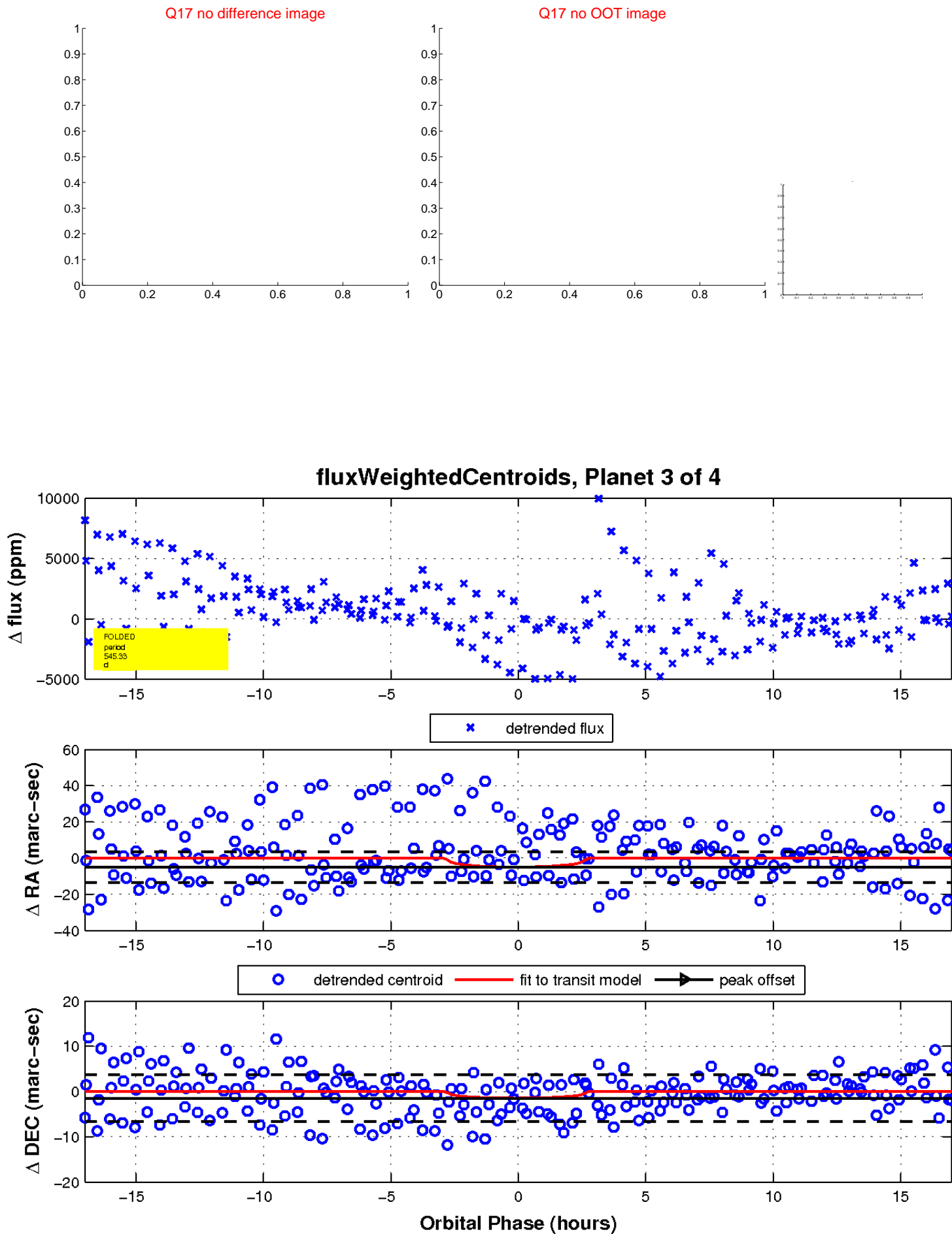
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

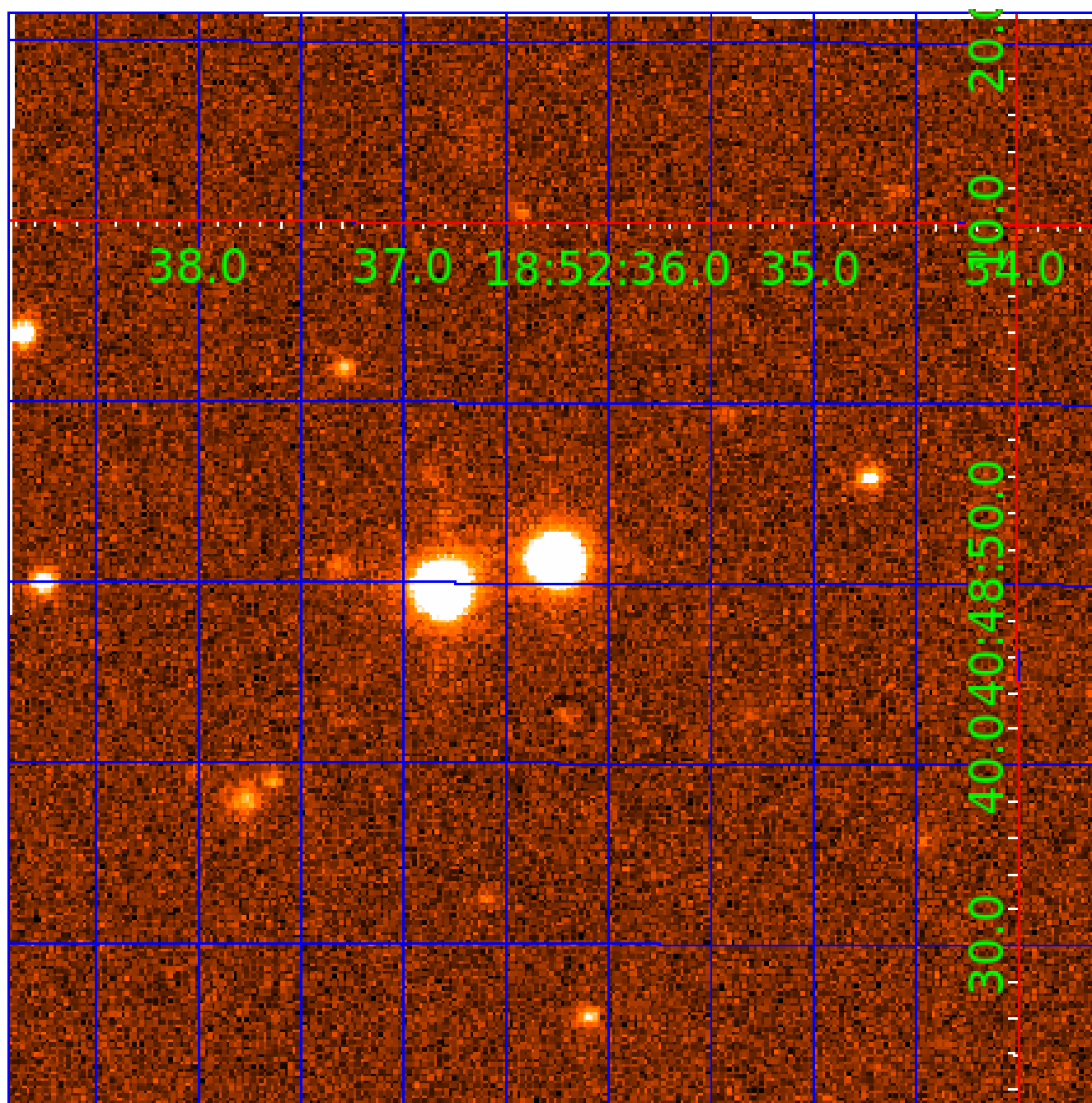


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 005597401

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005597401-01	OBS	No	384.928980	344.409178	2471.9	3.686	14.8	7.2	0.74	4482	3.68	0.23
005597401-02	OBS	No	564.651881	411.257009	2660.5	3.813	14.4	7.3	0.74	4482	3.65	0.14
005597401-03	OBS	No	545.330748	404.083664	2402.7	5.744	12.7	4.8	0.74	4482	3.68	0.14
005597401-04	OBS	No	329.334416	425.597633	2003.3	3.530	13.2	5.1	0.74	4482	3.18	0.28

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005597401-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
005597401-02	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
005597401-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_SKYE—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_KIC_POS
005597401-04	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.

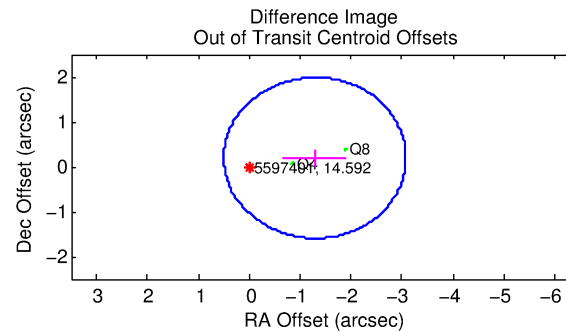
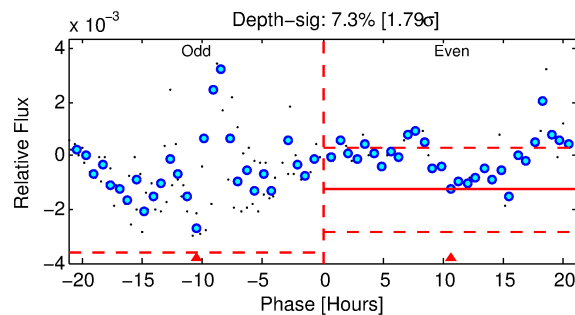
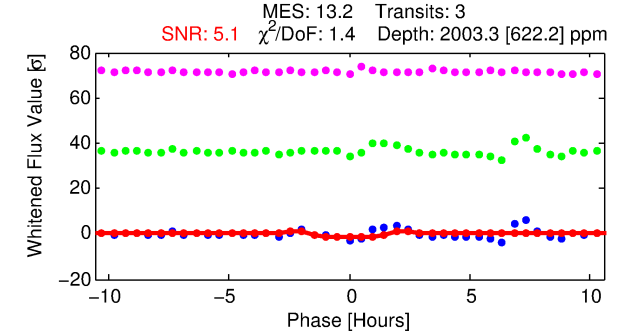
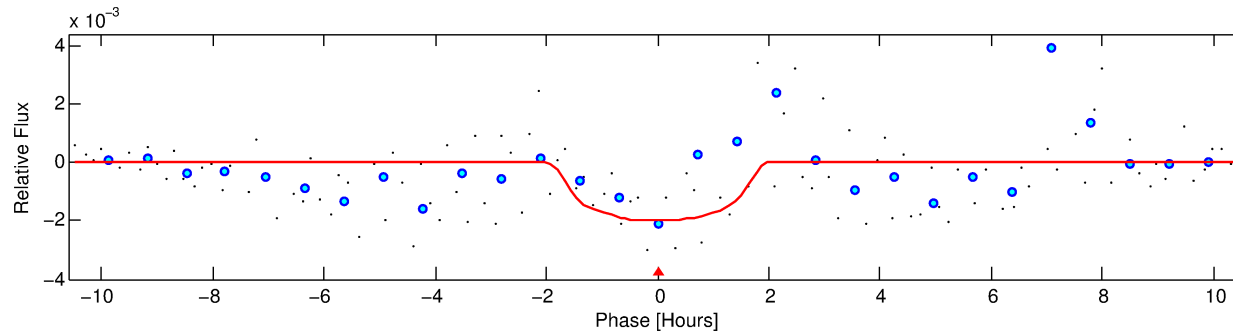
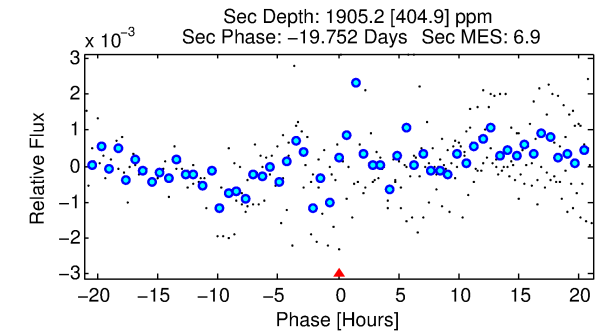
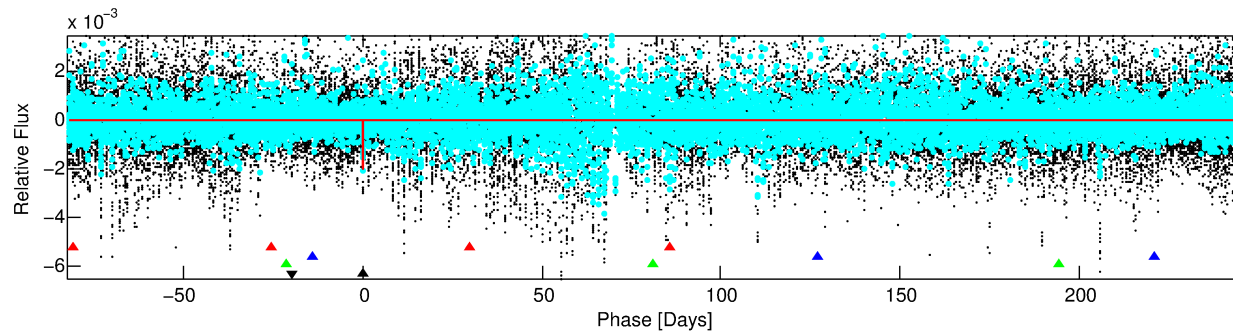
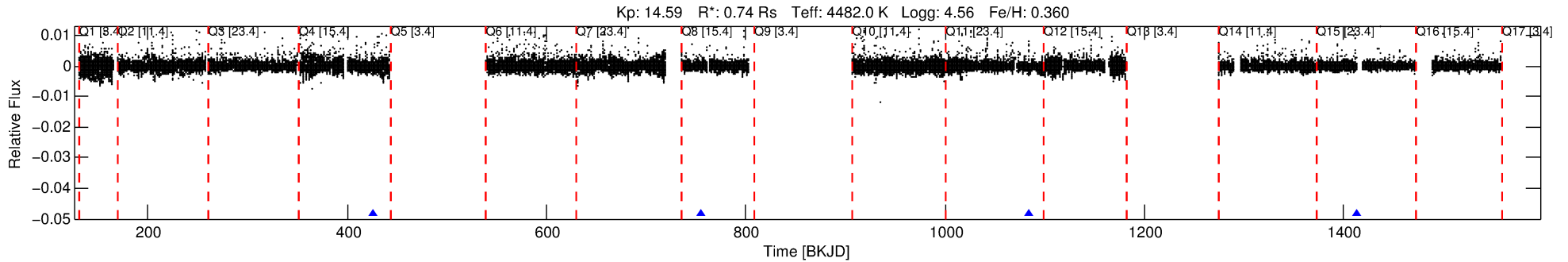
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 005597401-04

No Significant Match Found

# DV One-Page Summary

KIC: 5597401 Candidate: 4 of 4 Period: 329.334 d



## DV Fit Results:

Period = 329.33442 [0.00586] d  
Epoch = 425.5976 [0.0088] BKJD  
Rp/R\* = 0.0392 [0.0797]  
a/R\* = 728.46 [4098.94]  
b = 0.19 [29.66]  
Seff = 0.28 [0.05]  
Teq = 186 [7] K  
Rp = 3.18 [6.48] Re  
a = 0.8430 [0.0614] AU  
Ag = 73471.92 [299167.96] [0.25σ]  
Teffp = 4728 [4814] K [0.94σ]

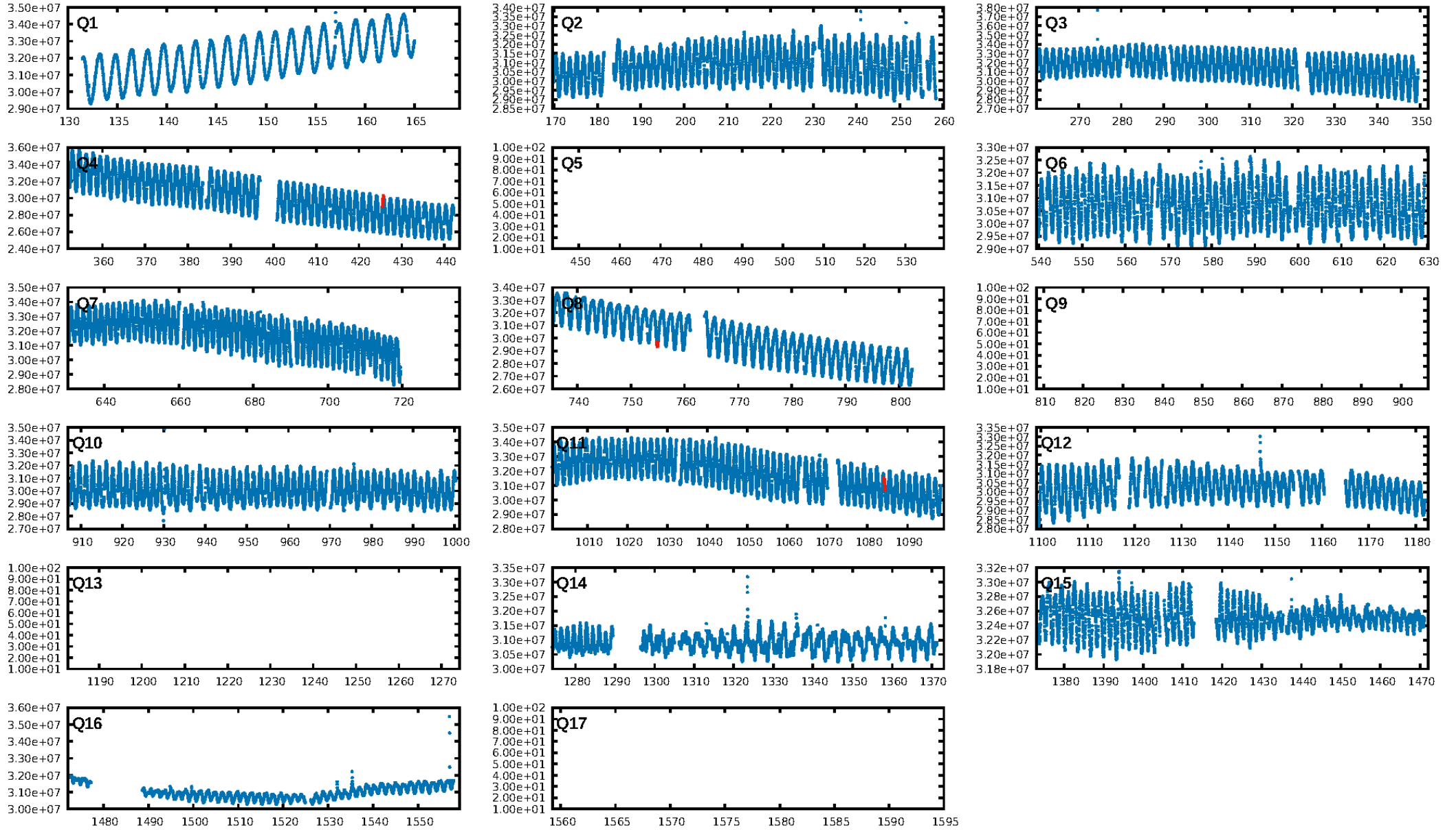
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [261.44σ]  
ModelChiSquare2-sig: 2.8%  
ModelChiSquareGof-sig: 87.0%  
**Bootstrap-pfa: 2.16e-10**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 9.876  
Centroid-sig: 45.3%  
Centroid-so: 0.771 arcsec [0.21σ]  
OotOffset-rm: 1.305 arcsec [2.19σ]  
KicOffset-rm: 0.348 arcsec [1.69σ]  
OotOffset-st: 0/0/2/0 [2]  
KicOffset-st: 0/0/2/0 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 1.00 [3/3]

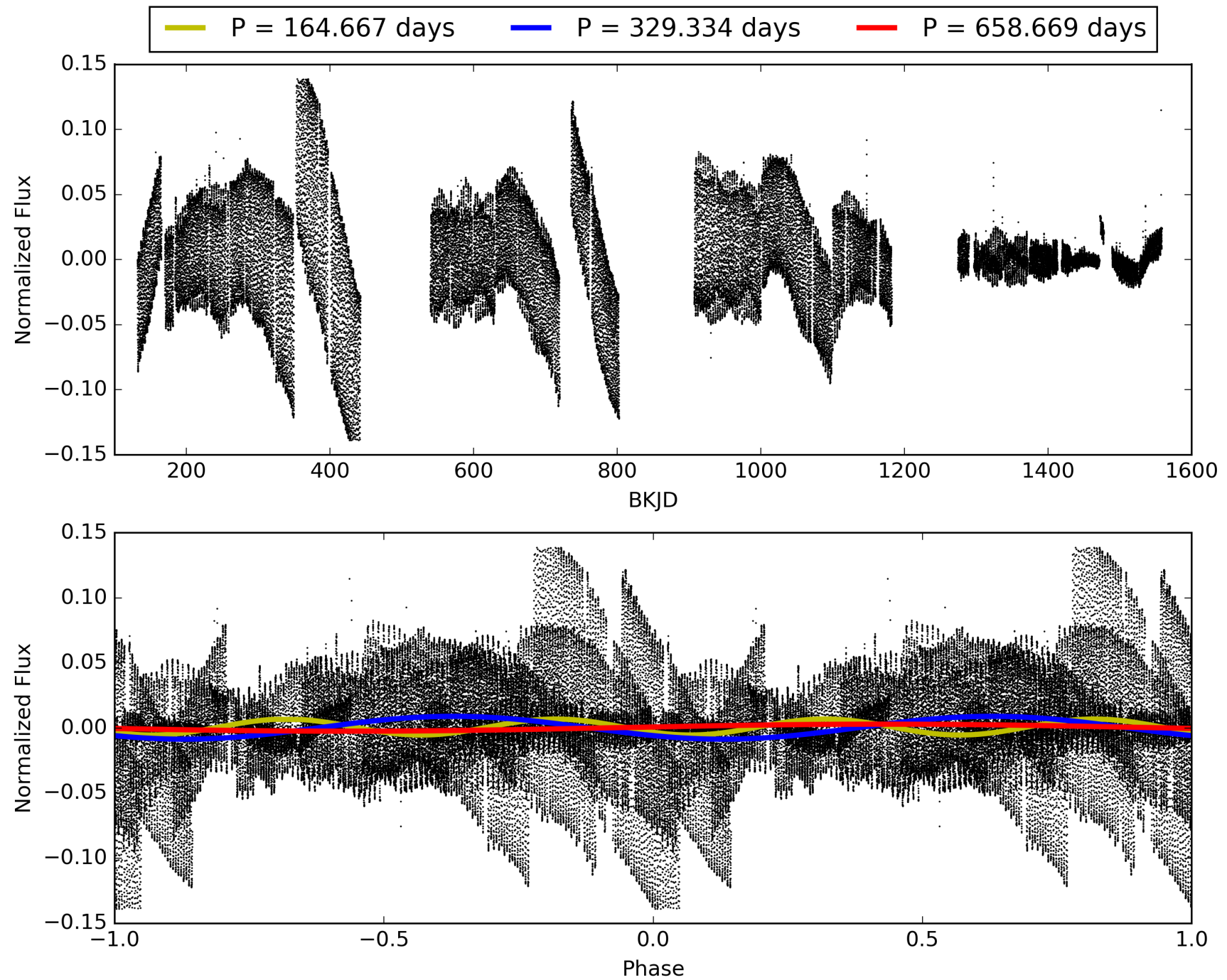
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 02:03:29 Z

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

# TCE 005597401-04, PDC Light Curves



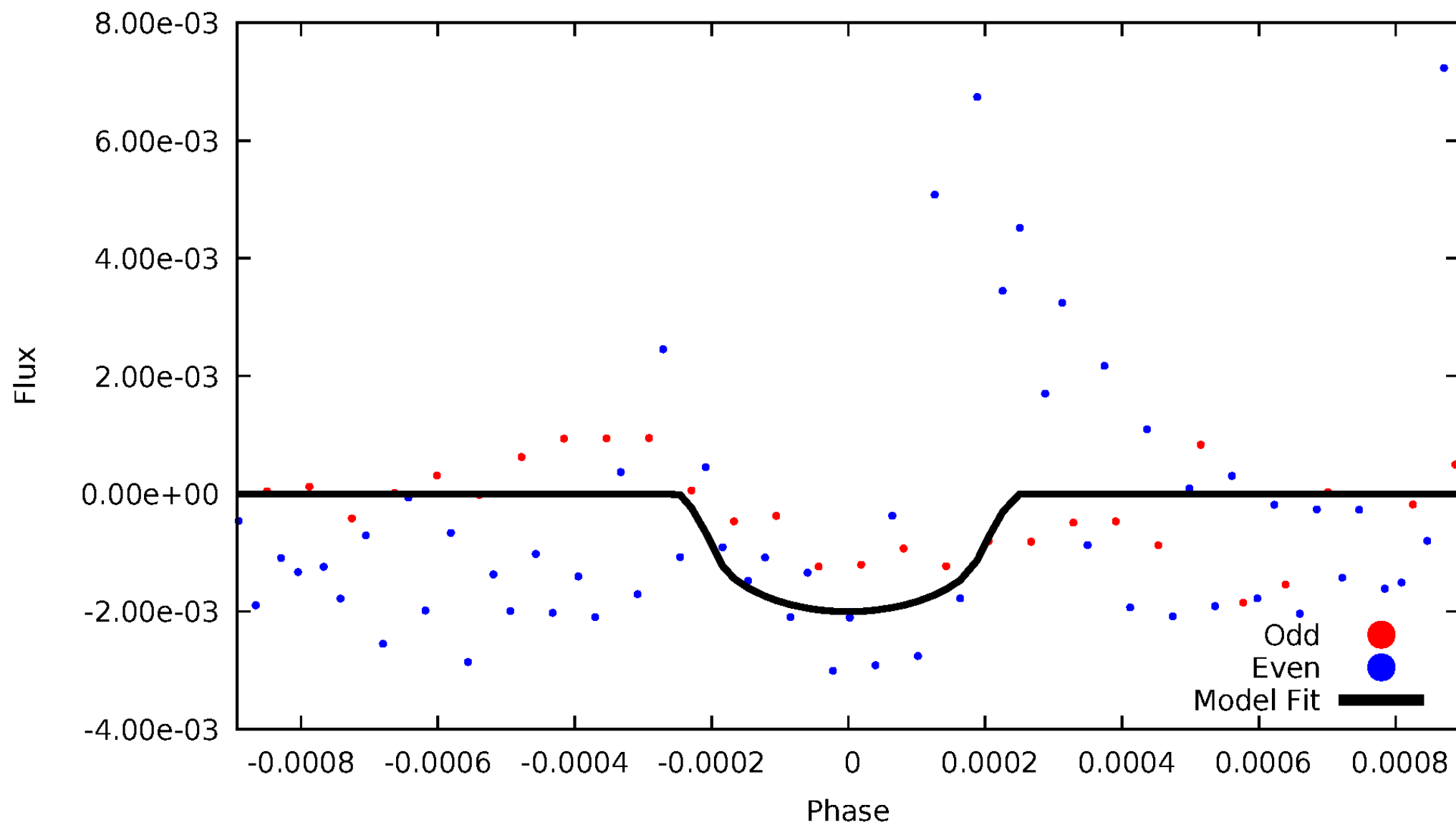
TCE 005597401-04





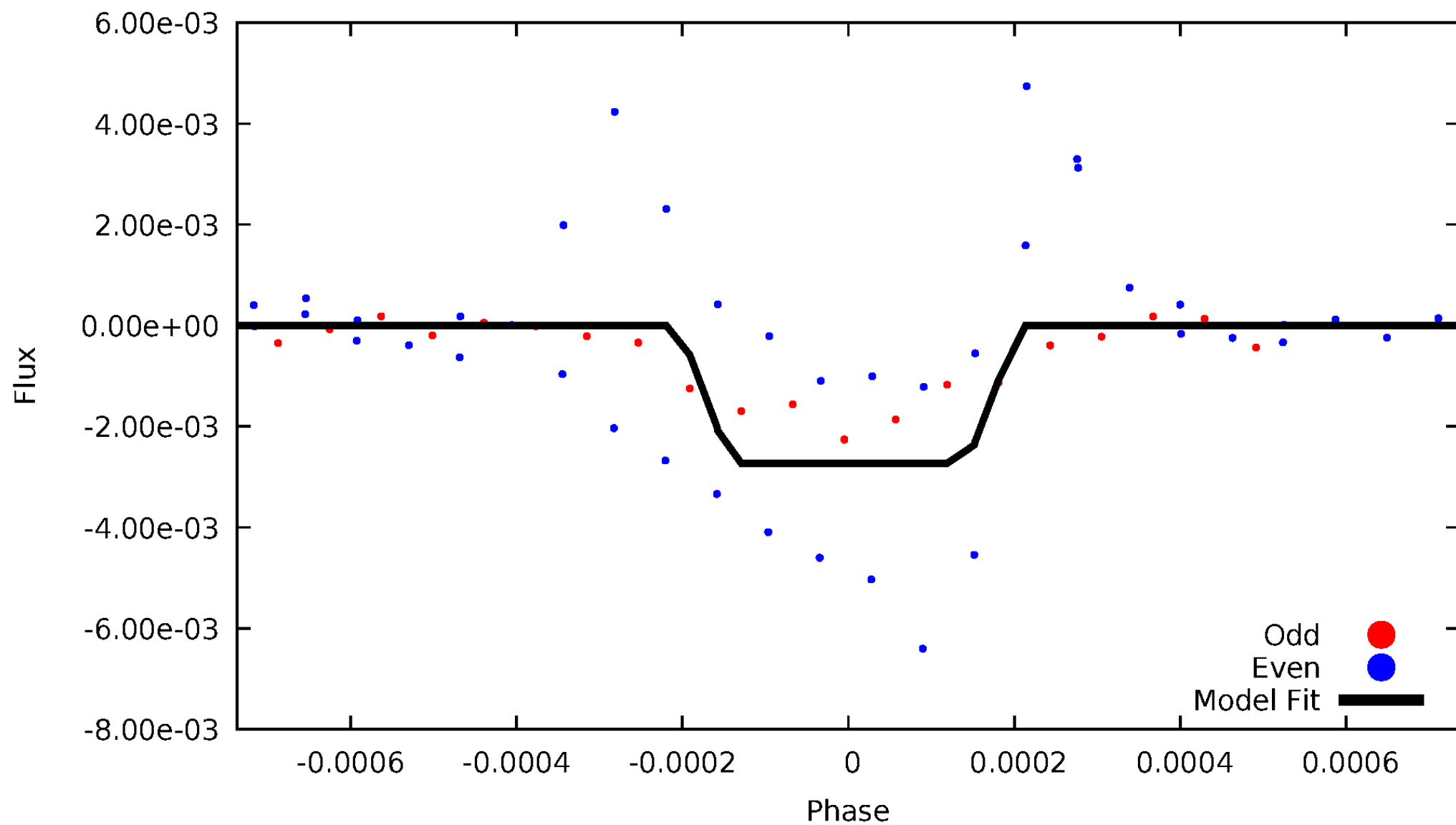
# DV Odd/Even

TCE 005597401-04



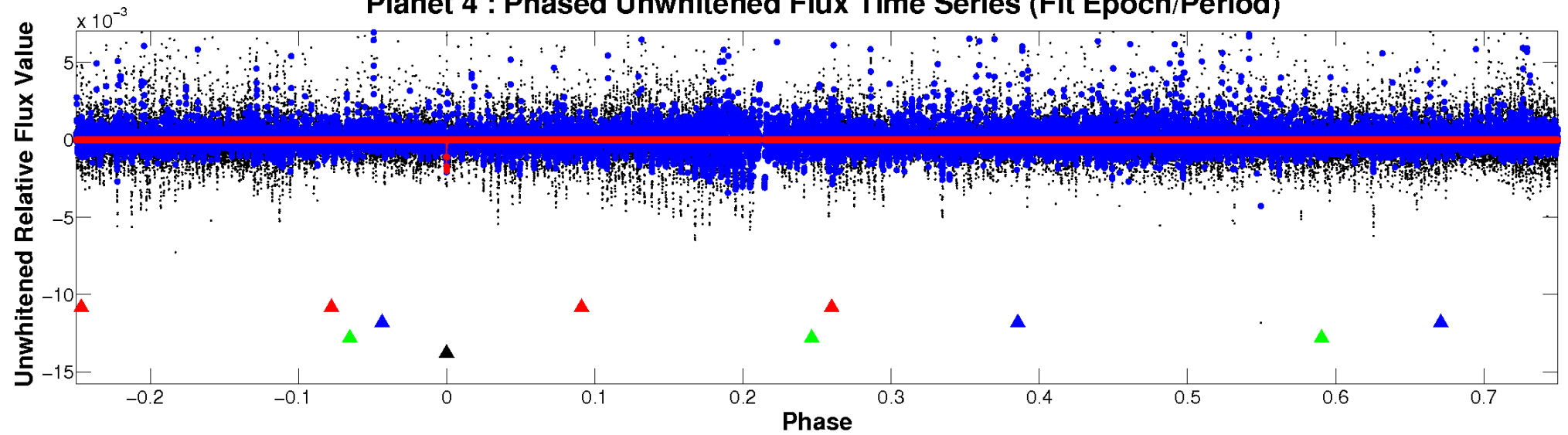
# ALT Odd/Even

TCE 005597401-04

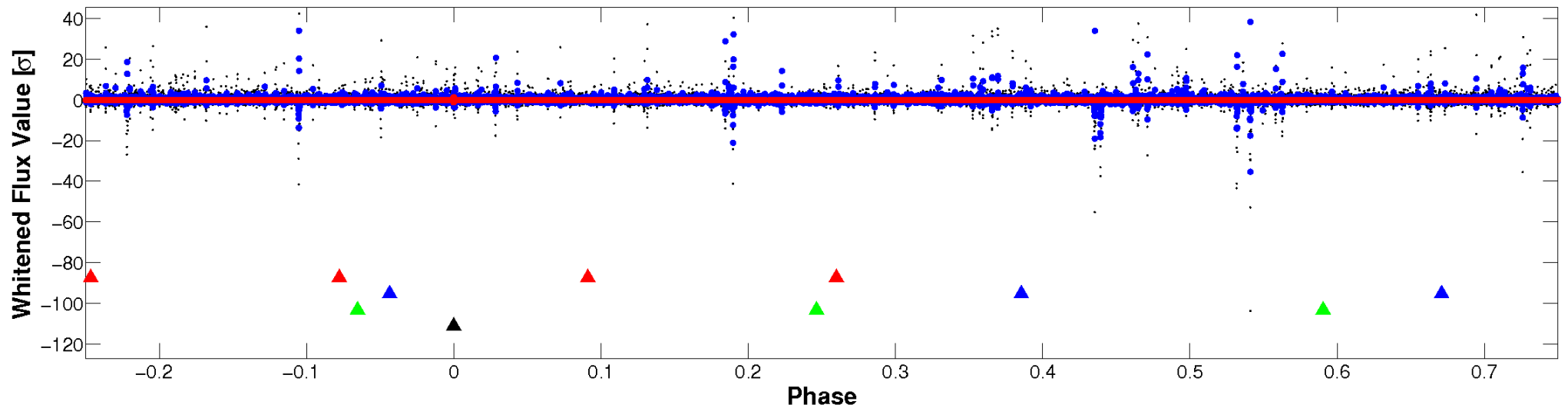


# Non-Whitened Vs. Whitened Light Curve

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

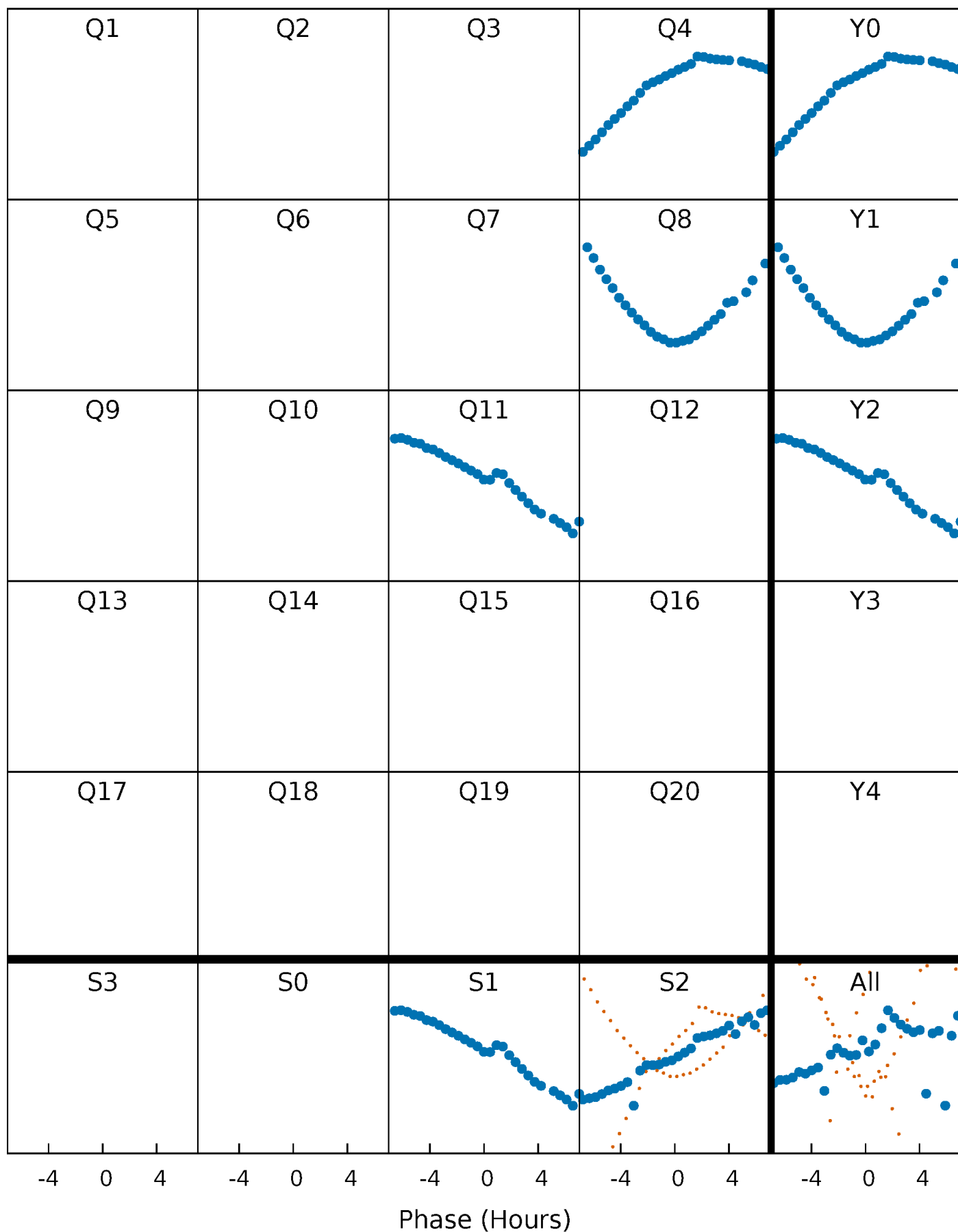


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



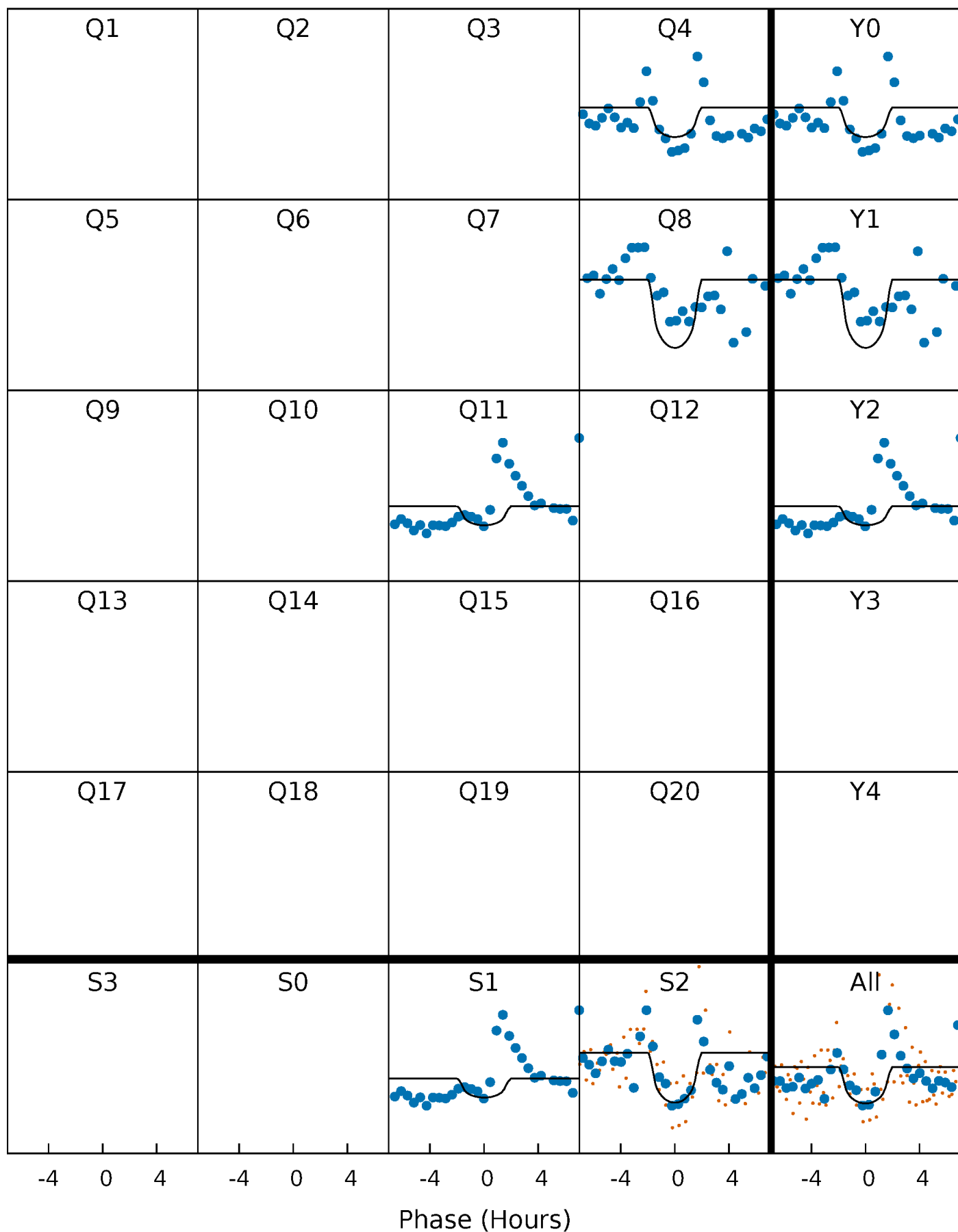
# PDC Quarter-Phased Transit Curves

TCE 005597401-04     $P=329.334416$  Days     $T_0=425.597633$  (BKJD)



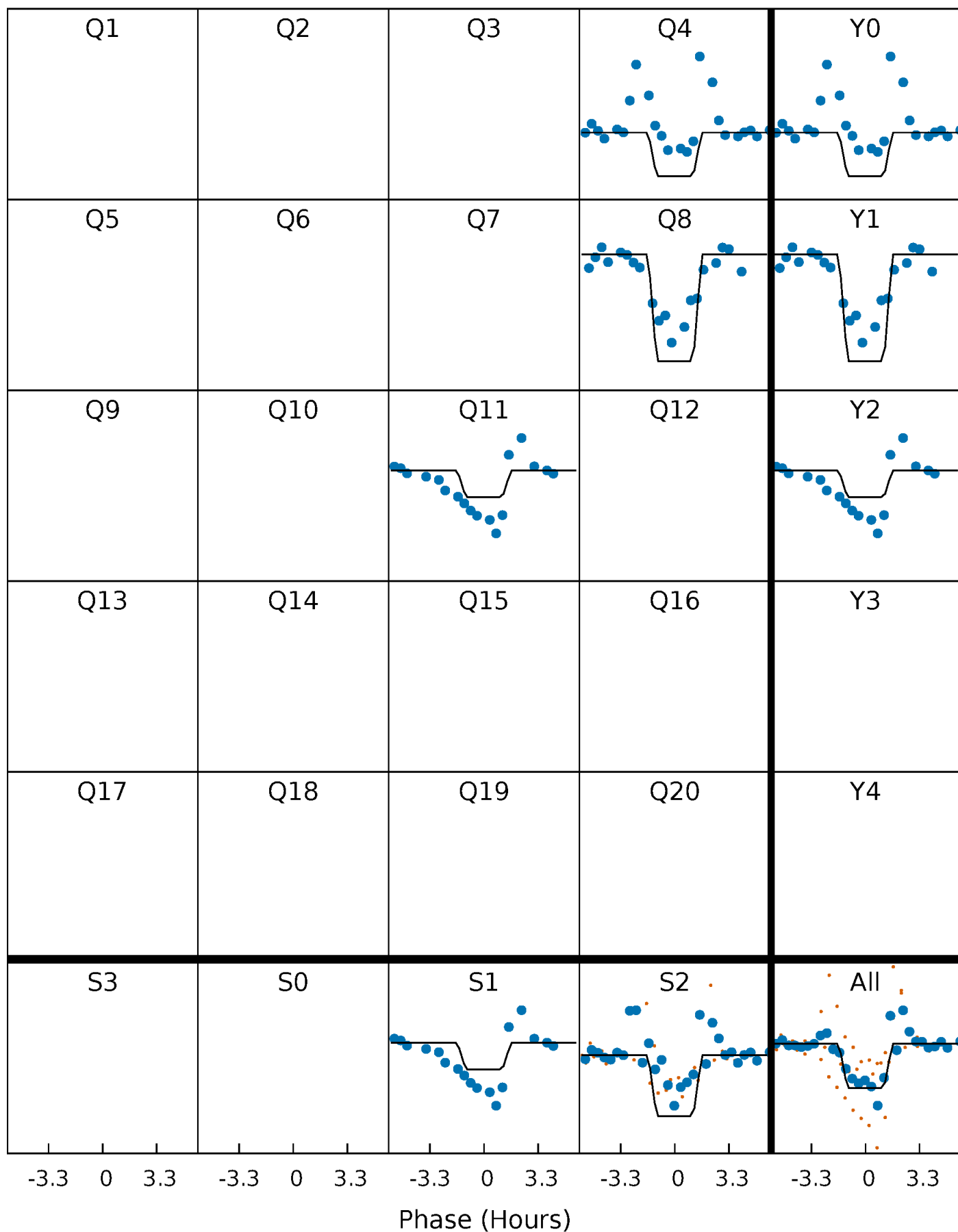
# DV Quarter-Phased Transit Curves

TCE 005597401-04     $P=329.334416$  Days     $T_0=425.597633$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

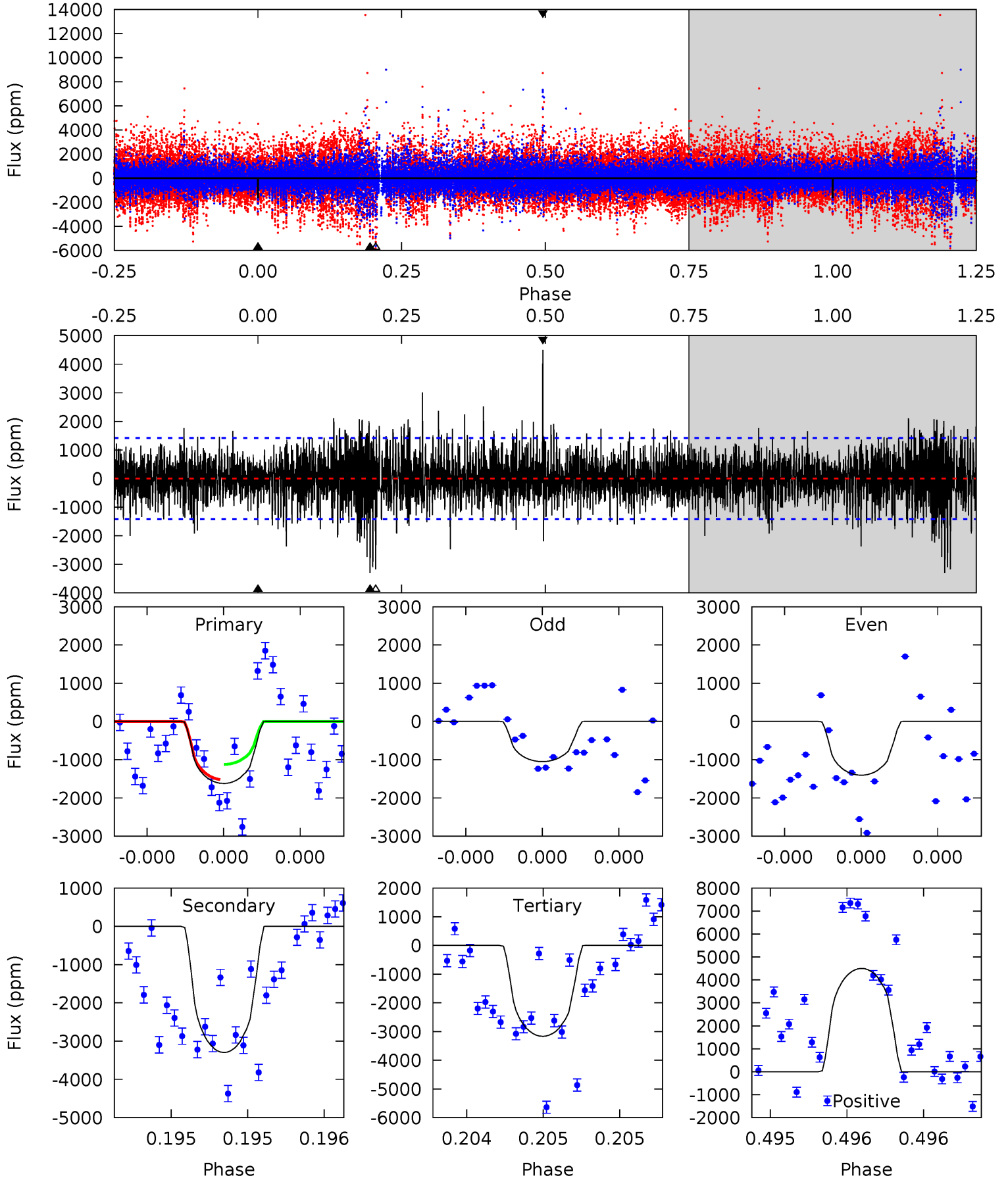
TCE 005597401-04     $P=329.318238$  Days     $T_0=425.601197$  (BKJD)



# DV Model-Shift Uniqueness Test

005597401-04, P = 329.334416 Days, E = 96.263217 Days

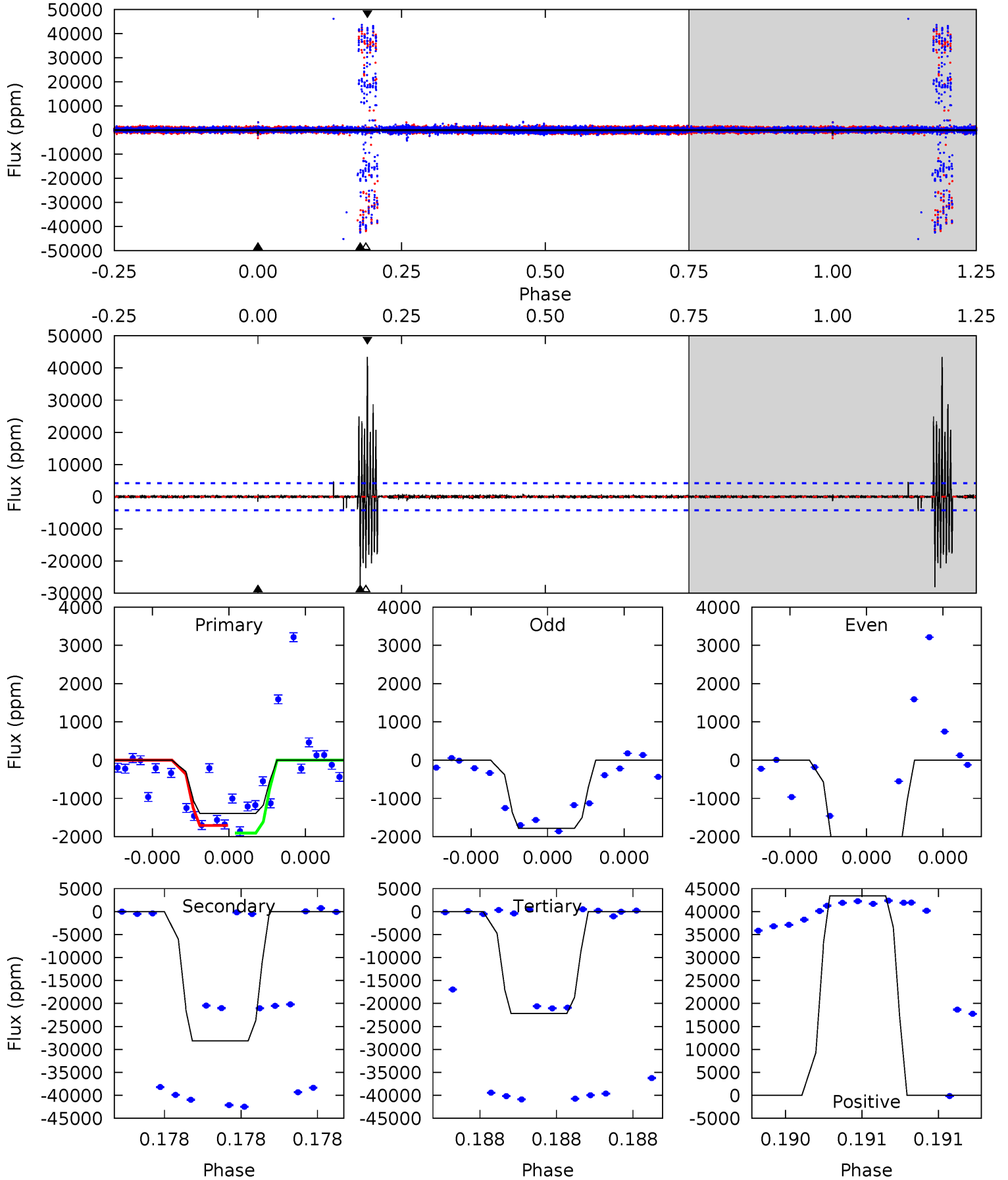
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.38	13.0	12.4	17.7	5.58	3.49	2.41	-6.07	-11.3	0.52	-4.73	0.54	0.92	0.58	0.80



# Alt Model-Shift Uniqueness Test

005597401-04, P = 329.318238 Days, E = 96.282959 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1.87	37.8	29.8	58.3	5.64	3.58	2.39	-27.9	-56.4	8.00	-20.5	0.37	1.40	0.61	0.13





### Stellar Parameters For KIC 005597401

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4482^{+132}_{-132}$	$4.562^{+0.060}_{-0.016}$	$0.360^{+0.100}_{-0.300}$	$0.744^{+0.025}_{-0.063}$	$0.736^{+0.041}_{-0.046}$	$2.514^{+0.637}_{-0.183}$
	+3%/-3%	+1%/-0%	+28%/-83%	+3%/-8%	+6%/-6%	+25%/-7%
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 005597401-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-3298 \pm 254$	$5.85^{+5.13}_{-3.88}$	$258^{+8}_{-8}$	$4116^{+2399}_{-800}$	$39194^{+291243}_{-28412}$
Alt.	$-28111 \pm 744$	$6.60^{+5.25}_{-4.19}$	$257^{+8}_{-9}$	$6166^{+5511}_{-1421}$	$268044^{+1753035}_{-187098}$

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

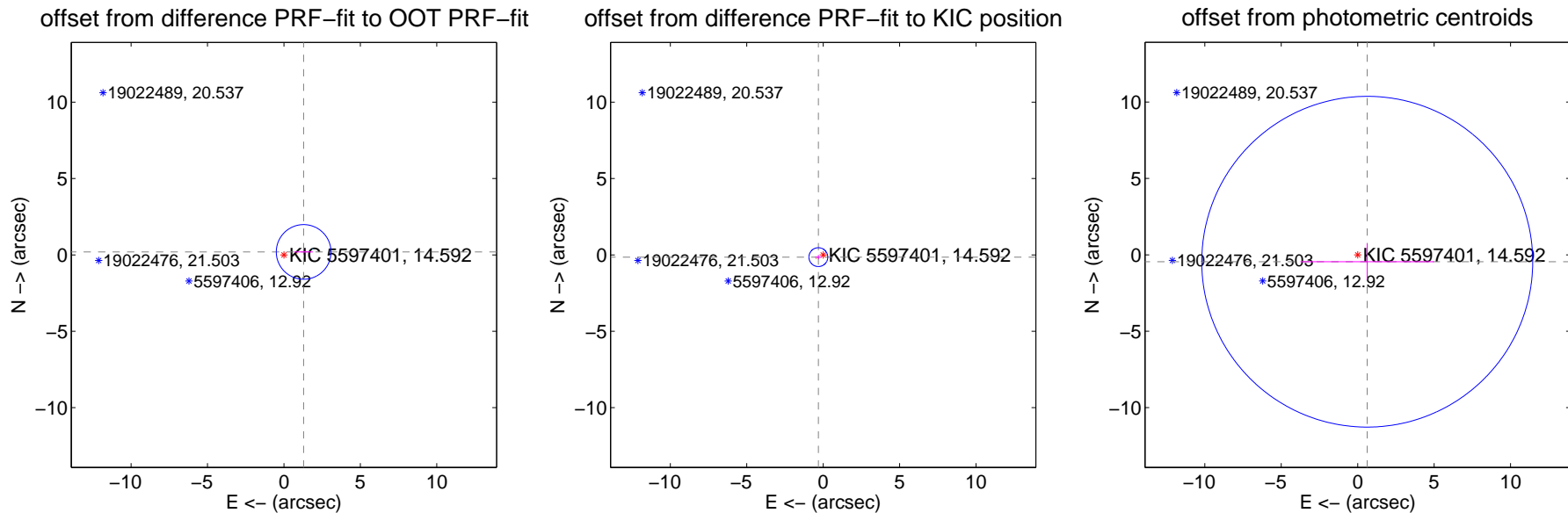
## DV Centroid Data

Supplemental centroid analysis for 005597401-04. Kepler magnitude: 14.59. Transit SNR 5.07

There are 1 quarters with good PRF difference image offsets

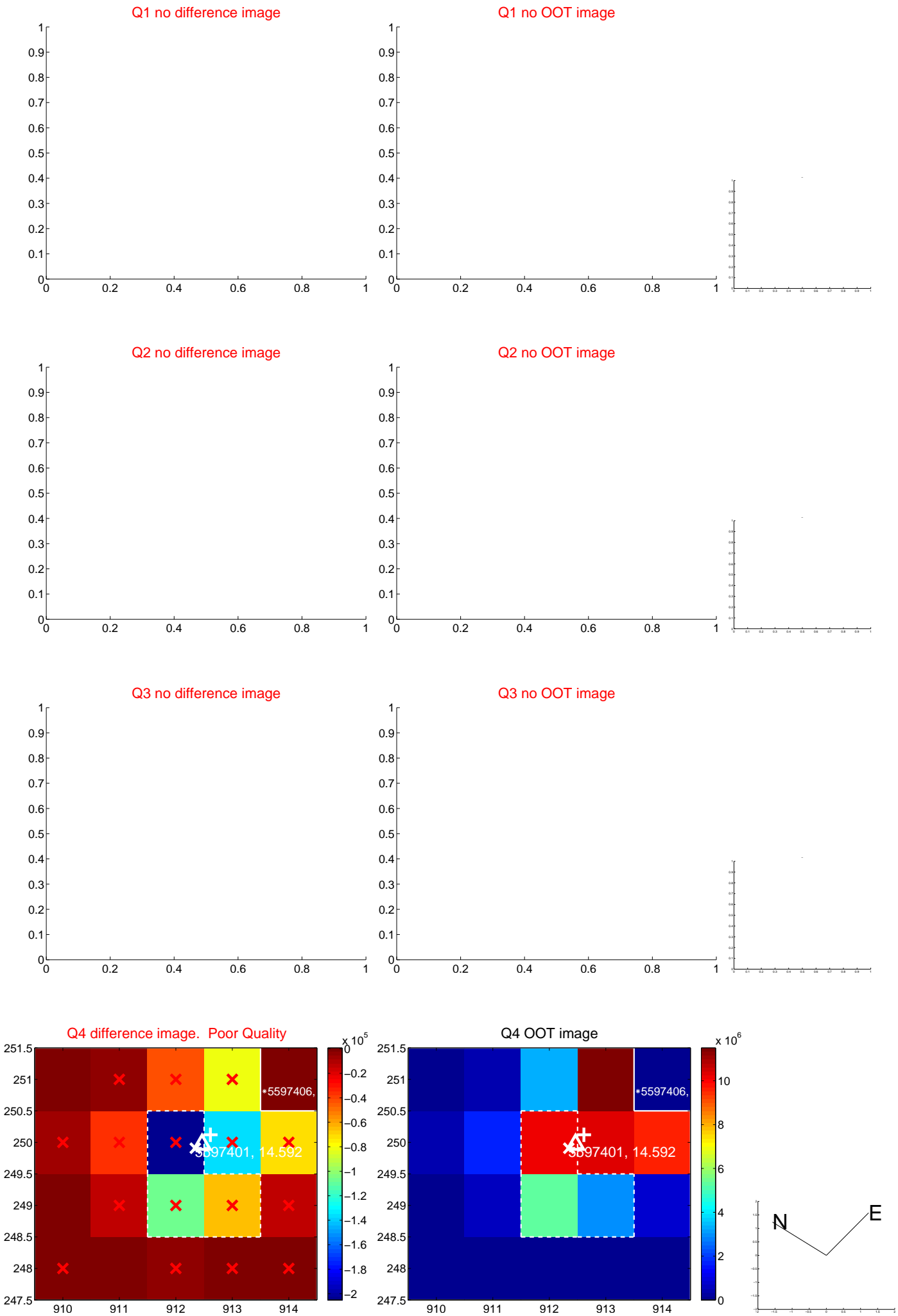
The OOT PRF centroid is offset from the target star catalog position by about 2.04 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.305 \pm 0.597$	2.19	$-1.291 \pm 0.603$	$0.194 \pm 0.180$
PRF-fit source offset from KIC position	$0.348 \pm 0.206$	1.69	$0.316 \pm 0.217$	$-0.146 \pm 0.143$
photometric centroid source offset	$0.77 \pm 3.61$	0.21	$-0.63 \pm 4.37$	$-0.45 \pm 1.19$



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

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



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

Q5 no difference image



Q5 no OOT image



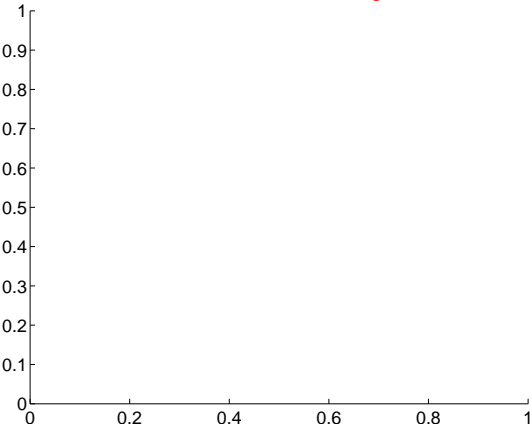
Q6 no difference image



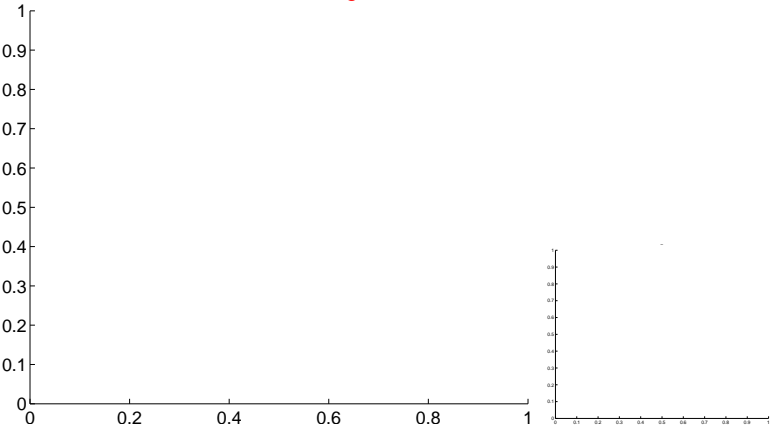
Q6 no OOT image



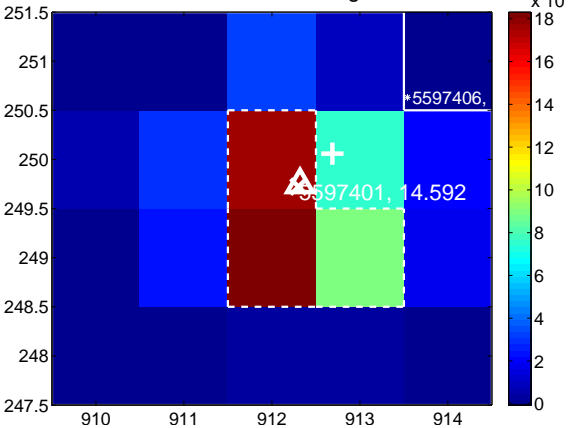
Q7 no difference image



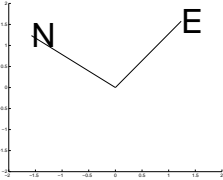
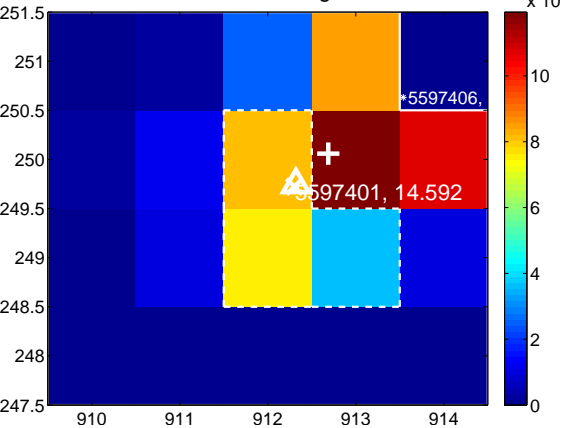
Q7 no OOT image



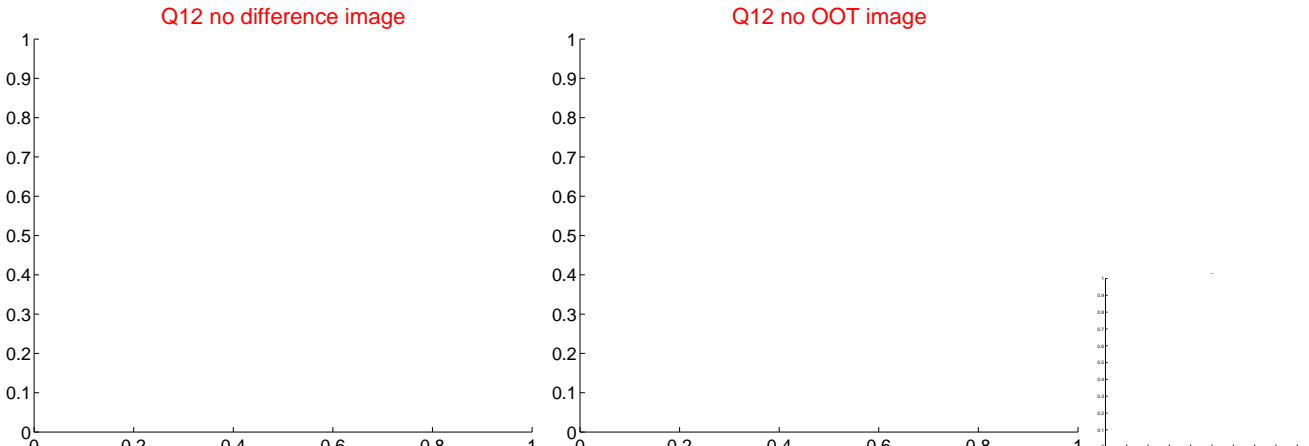
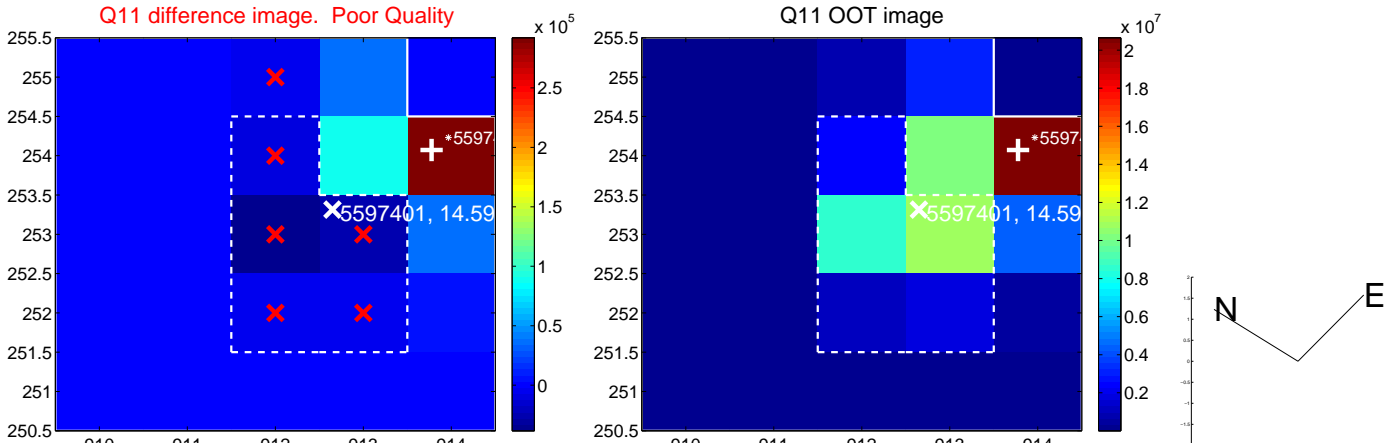
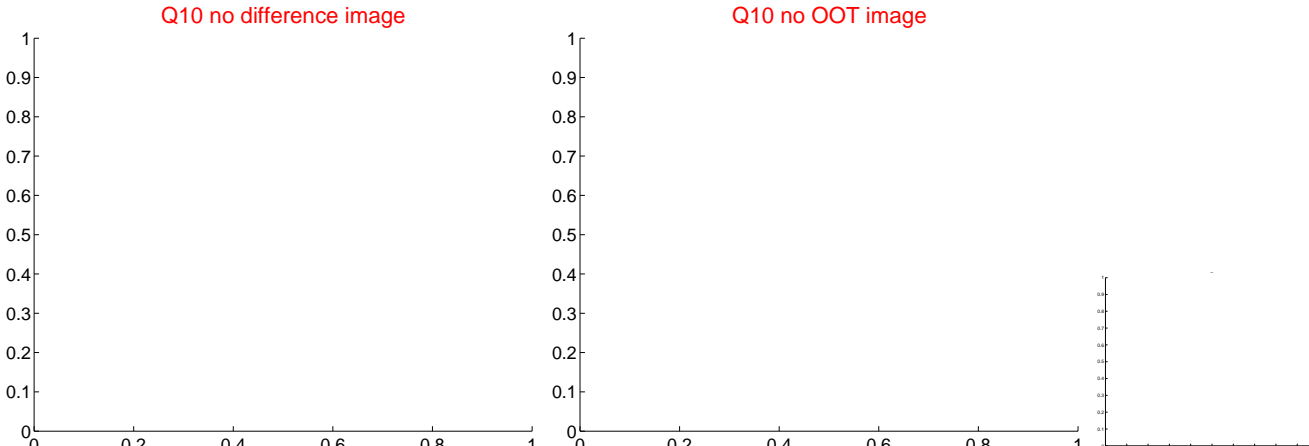
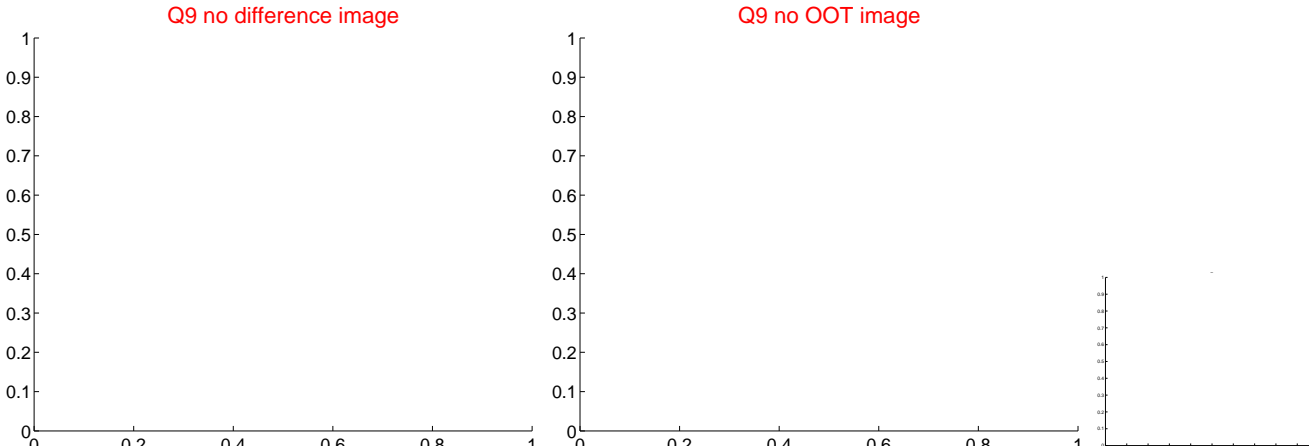
Q8 difference image



Q8 OOT image



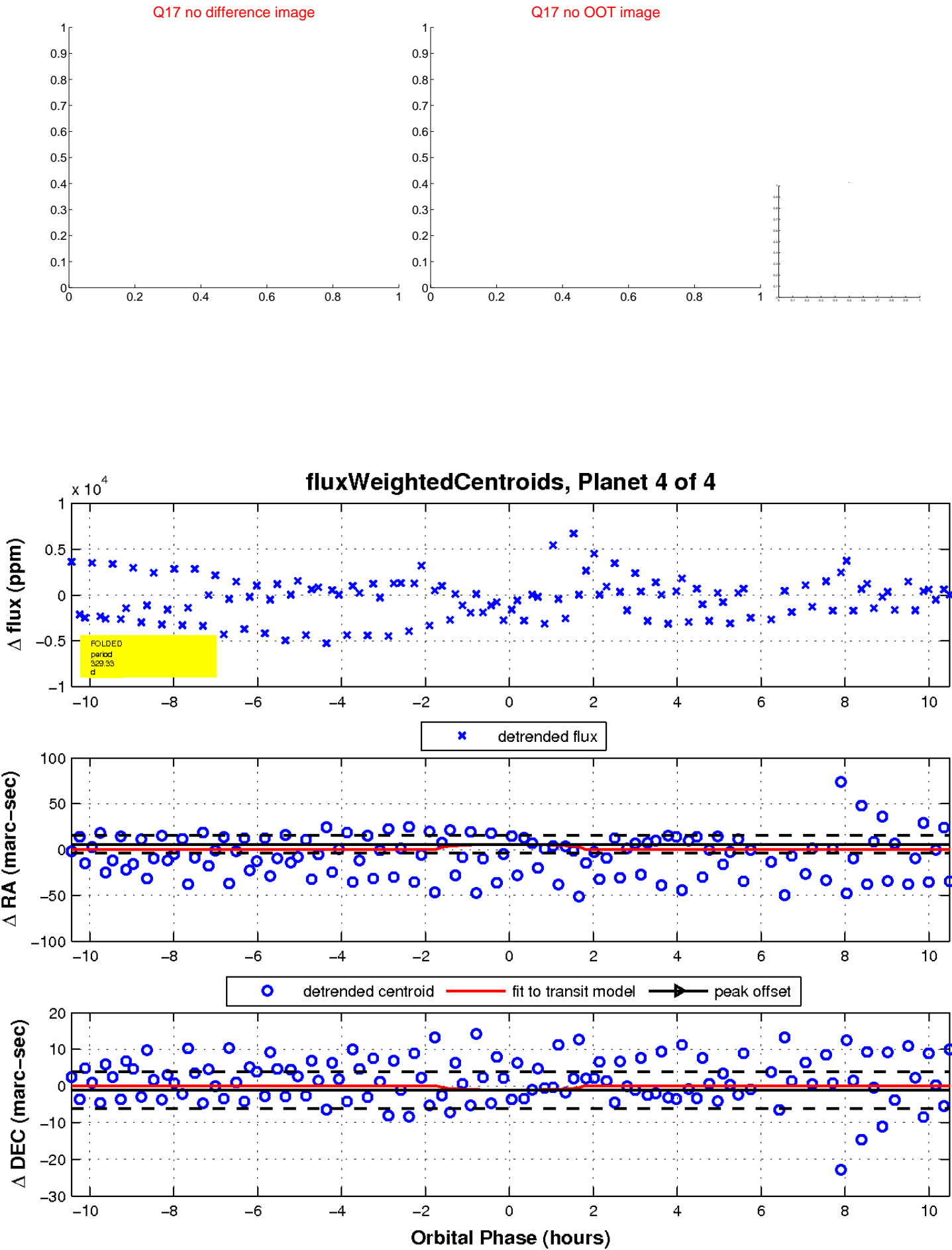
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



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



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



UKIRT Image

Declination

