

# KIC 009655424

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009655424-01	OBS	7218.01	1.036329	131.565116	54.7	4.792	8.1	9.6	0.93	6240	0.82	2917.29
009655424-03	OBS	No	125.646988	161.876219	923.3	11.547	16.7	7.6	0.93	6240	3.27	4.86
009655424-04	OBS	No	627.781049	306.434647	3353.6	28.481	8.6	10.4	0.93	6240	5.45	0.57

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009655424-01	OBS	FP	0.00	1	0	1	0	LPP_DV—CENT_RESOLVED_OFFSET
009655424-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
009655424-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—ALL_TRANS_CHASES—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 009655424-01

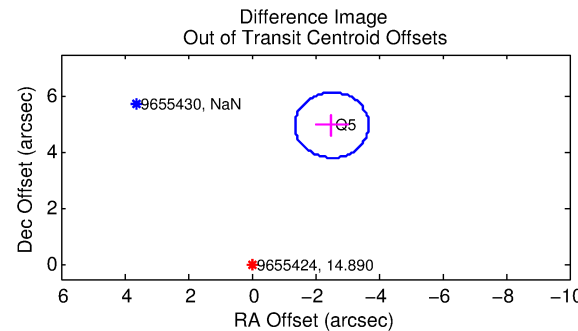
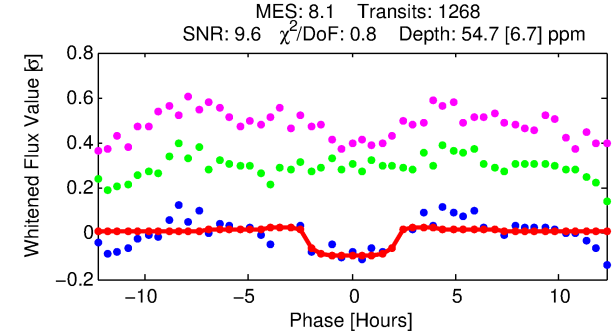
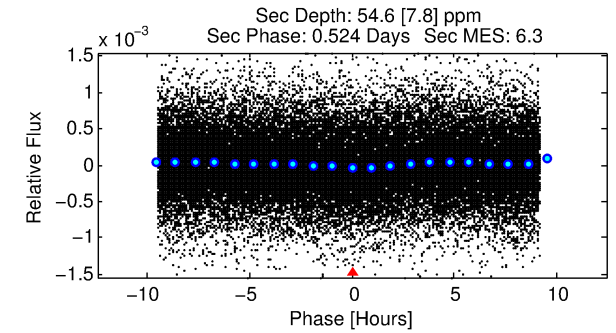
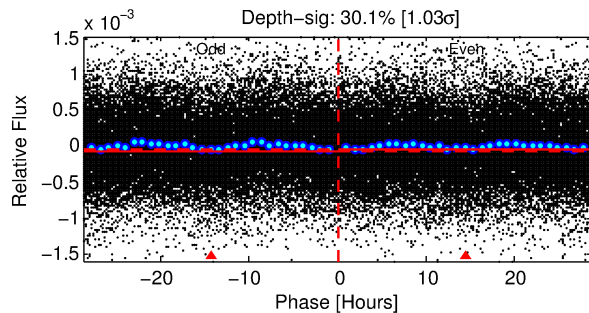
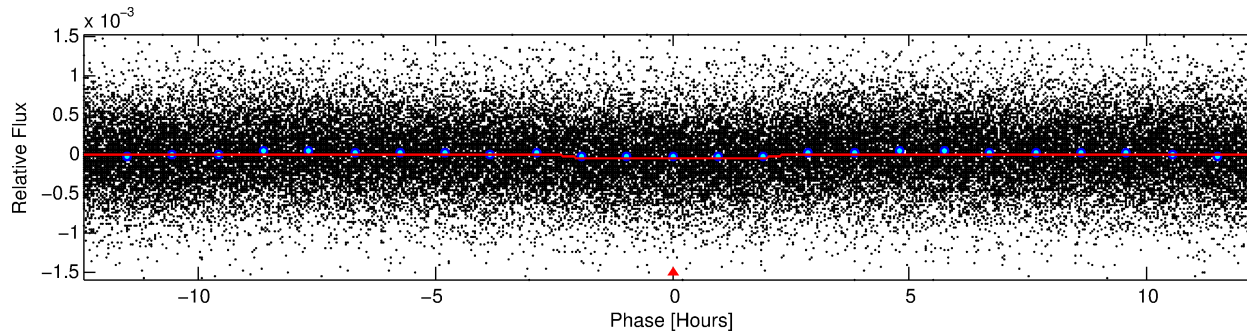
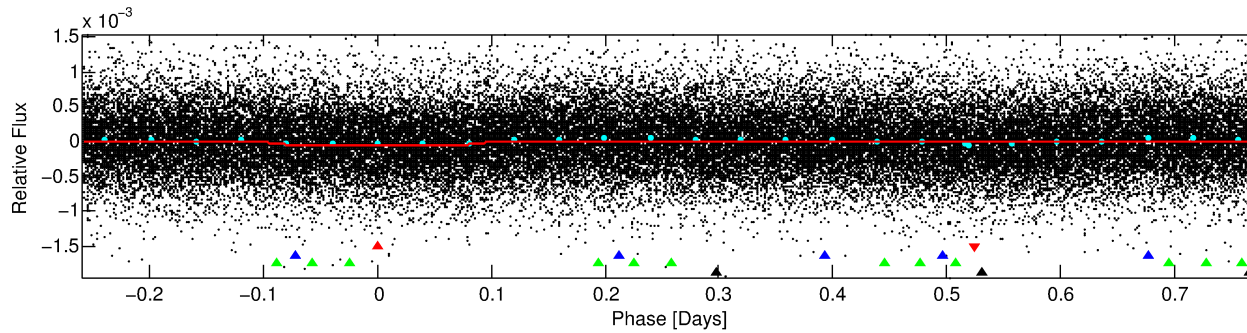
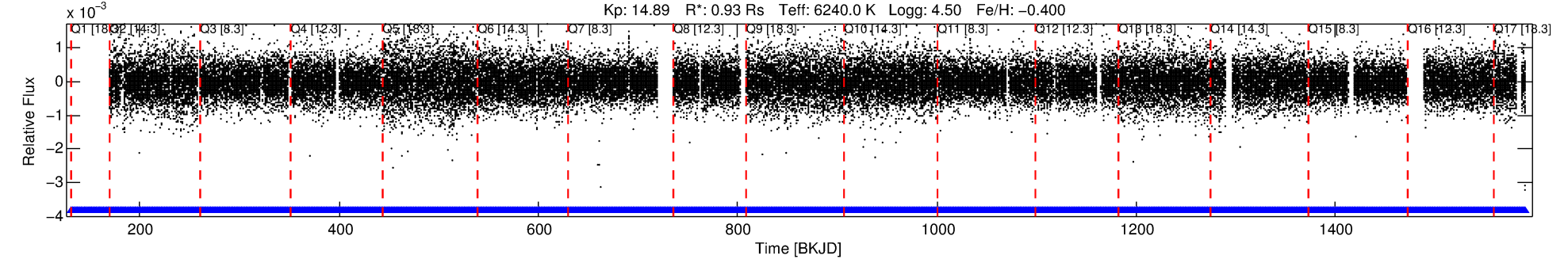
No Significant Match Found

# DV One-Page Summary

KIC: 9655424 Candidate: 1 of 4 Period: 1.036 d

KOI: K07218 Corr: No Ephemeris Match

Kp: 14.89 R\*: 0.93 Rs Teff: 6240.0 K Logg: 4.50 Fe/H: -0.400



## DV Fit Results:

Period = 1.03633 [0.00001] d  
Epoch = 131.5651 [0.0044] BKJD  
Rp/R\* = 0.0081 [0.0026]  
a/R\* = 1.17 [0.57]  
b = 0.92 [0.31]  
Seff = 2917.29 [1189.47]  
Teff = 1874 [191] K  
Rp = 0.82 [0.37] Re  
a = 0.0200 [0.0053] AU  
Ag = 17.93 [13.78] [1.23σ]  
Teffp = 5962 [1018] K [3.95σ]

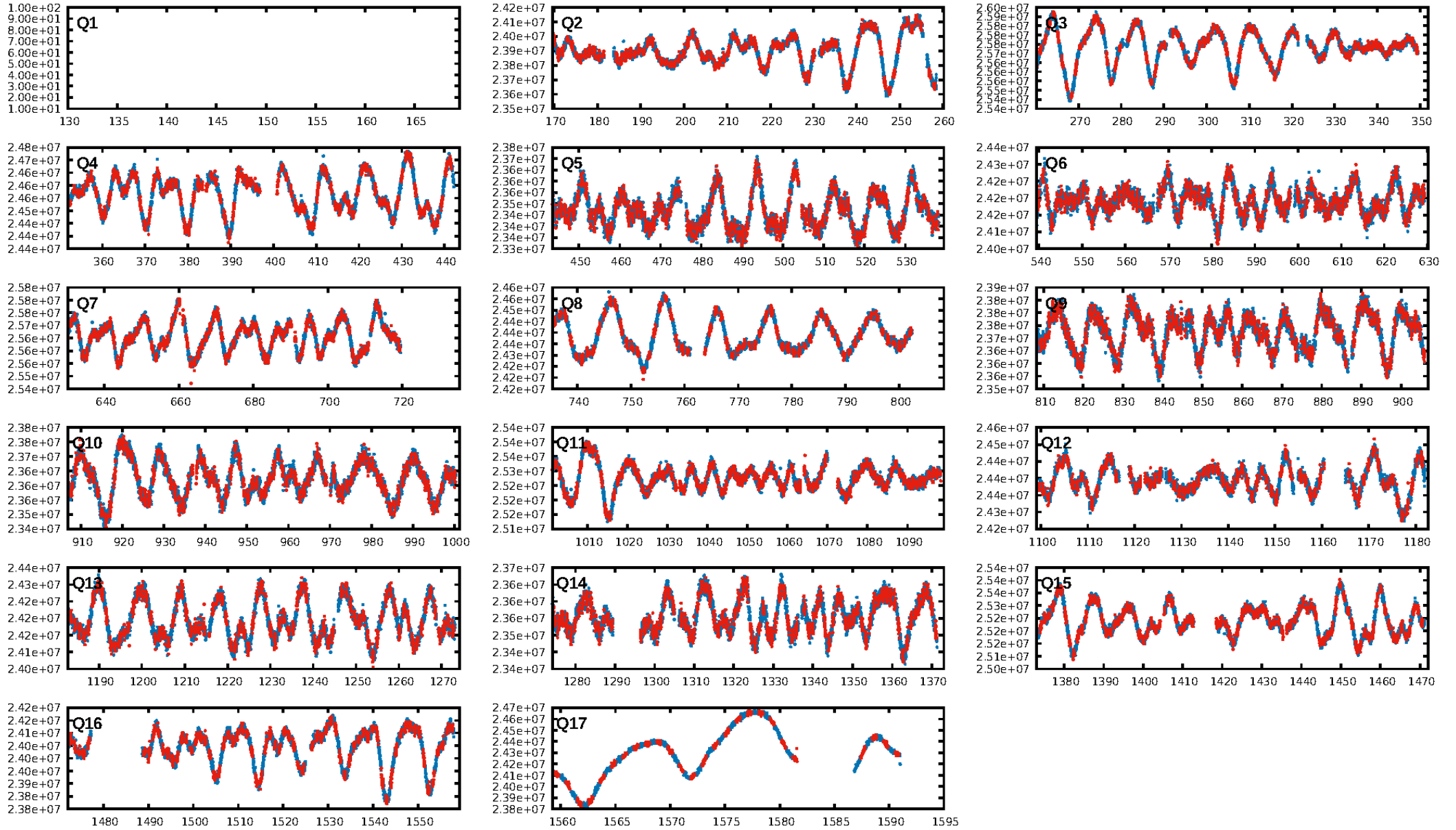
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [239.21σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
**Bootstrap-pfa: 2.23e-12**  
RollingBand-fgt: 1.00 [1242/1242]  
**GhostDiagnostic-chr: -0.3584**  
Centroid-sig: 0.0%  
Centroid-so: 2.303 arcsec [6.16σ]  
OotOffset-rm: 5.578 arcsec [14.39σ]  
KicOffset-rm: 6.947 arcsec [20.10σ]  
OotOffset-st: 0/0/0/1 [1]  
KicOffset-st: 4/4/0/1 [9]  
DiffImageQuality-fgm: 1.00 [9/9]  
DiffImageOverlap-fno: 1.00 [16/16]

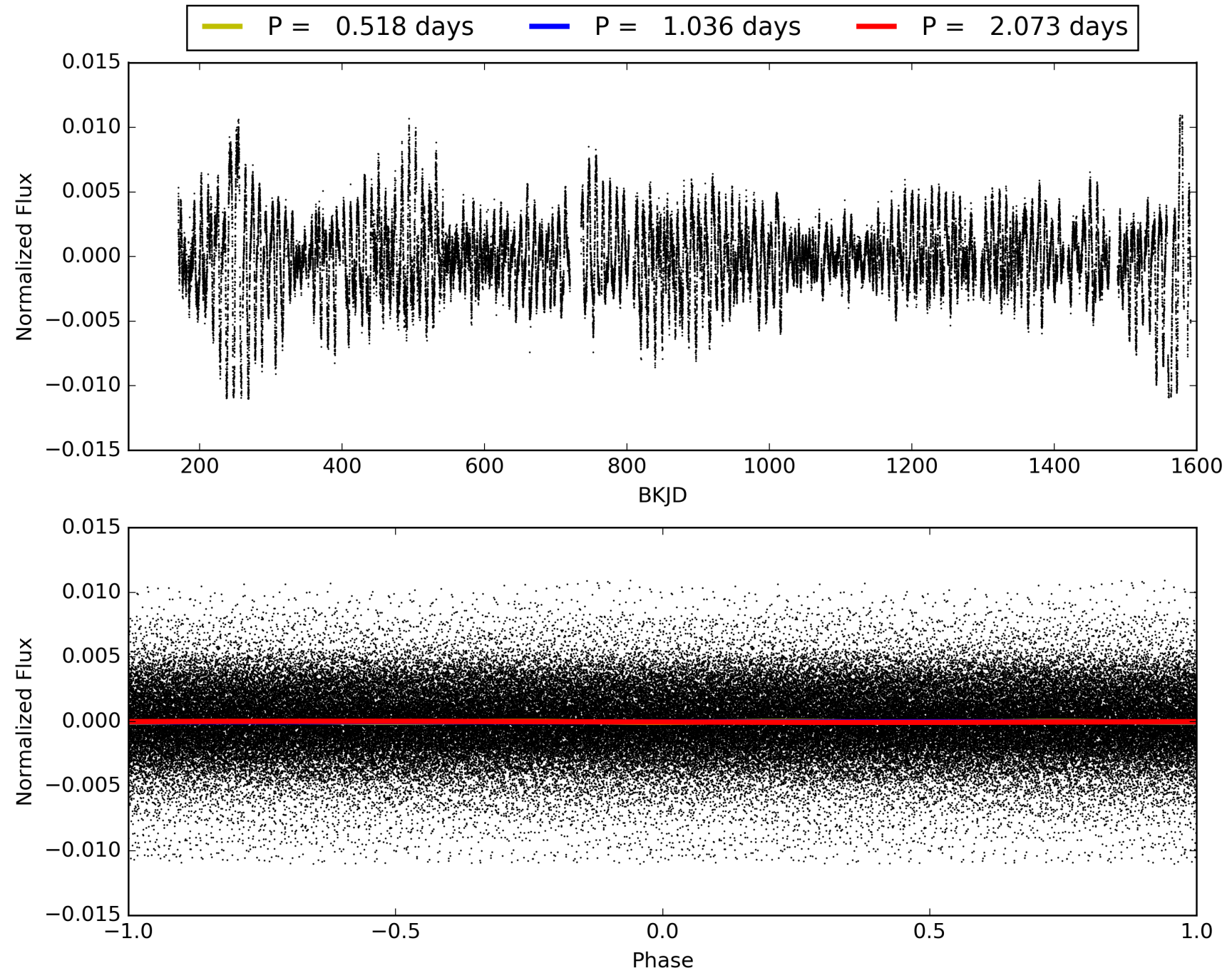
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 11:37:25 Z

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

# TCE 009655424-01, PDC Light Curves

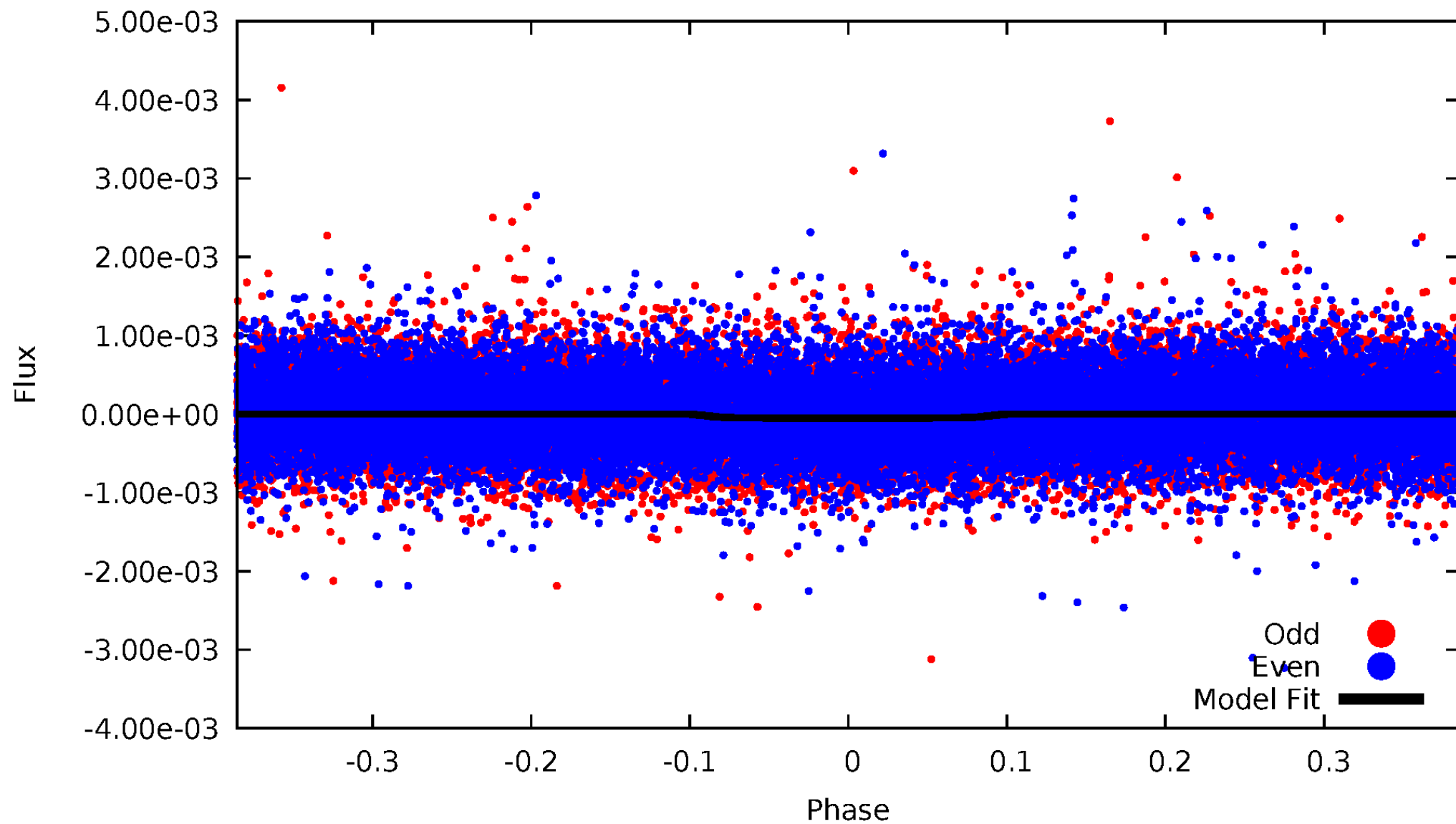


TCE 009655424-01



# DV Odd/Even

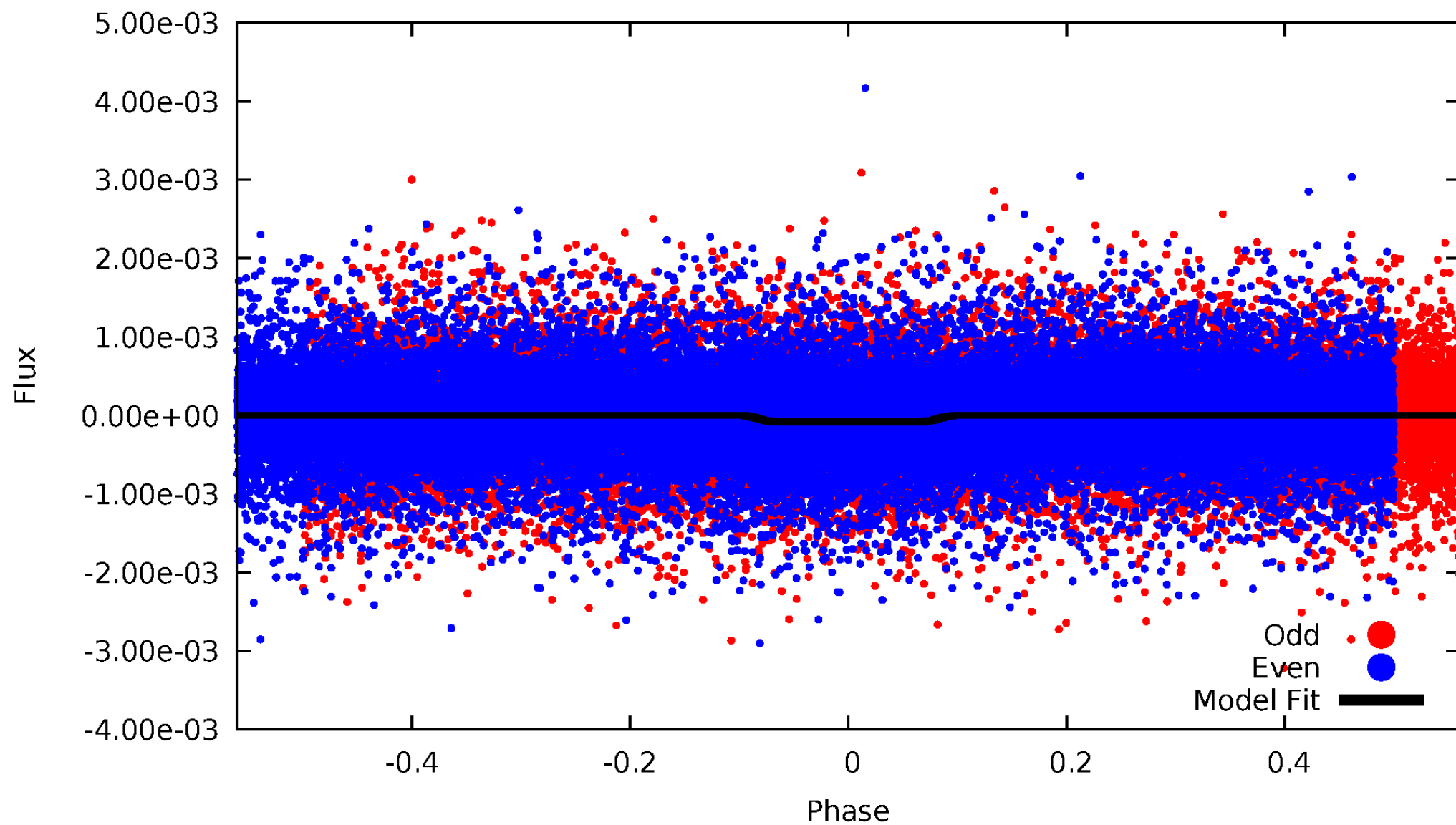
TCE 009655424-01





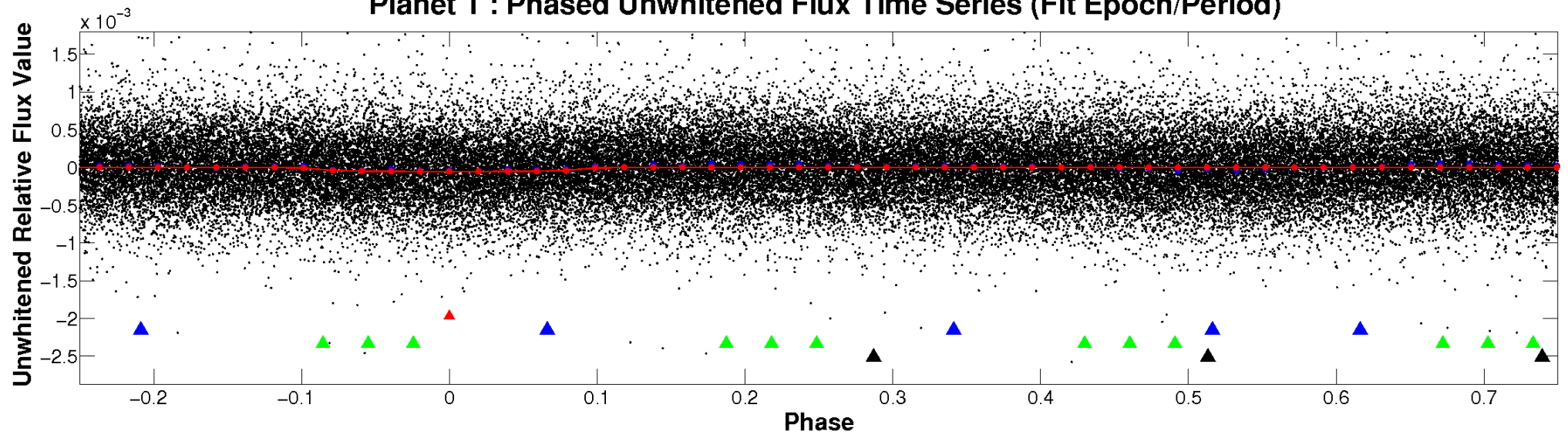
# ALT Odd/Even

TCE 009655424-01

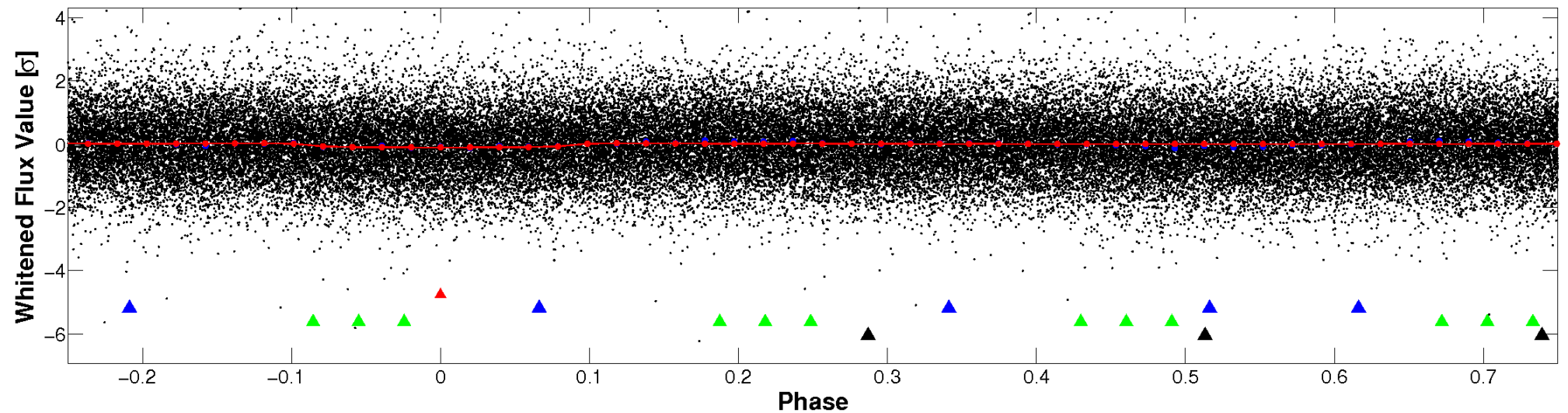


# Non-Whitened Vs. Whitened Light Curve

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

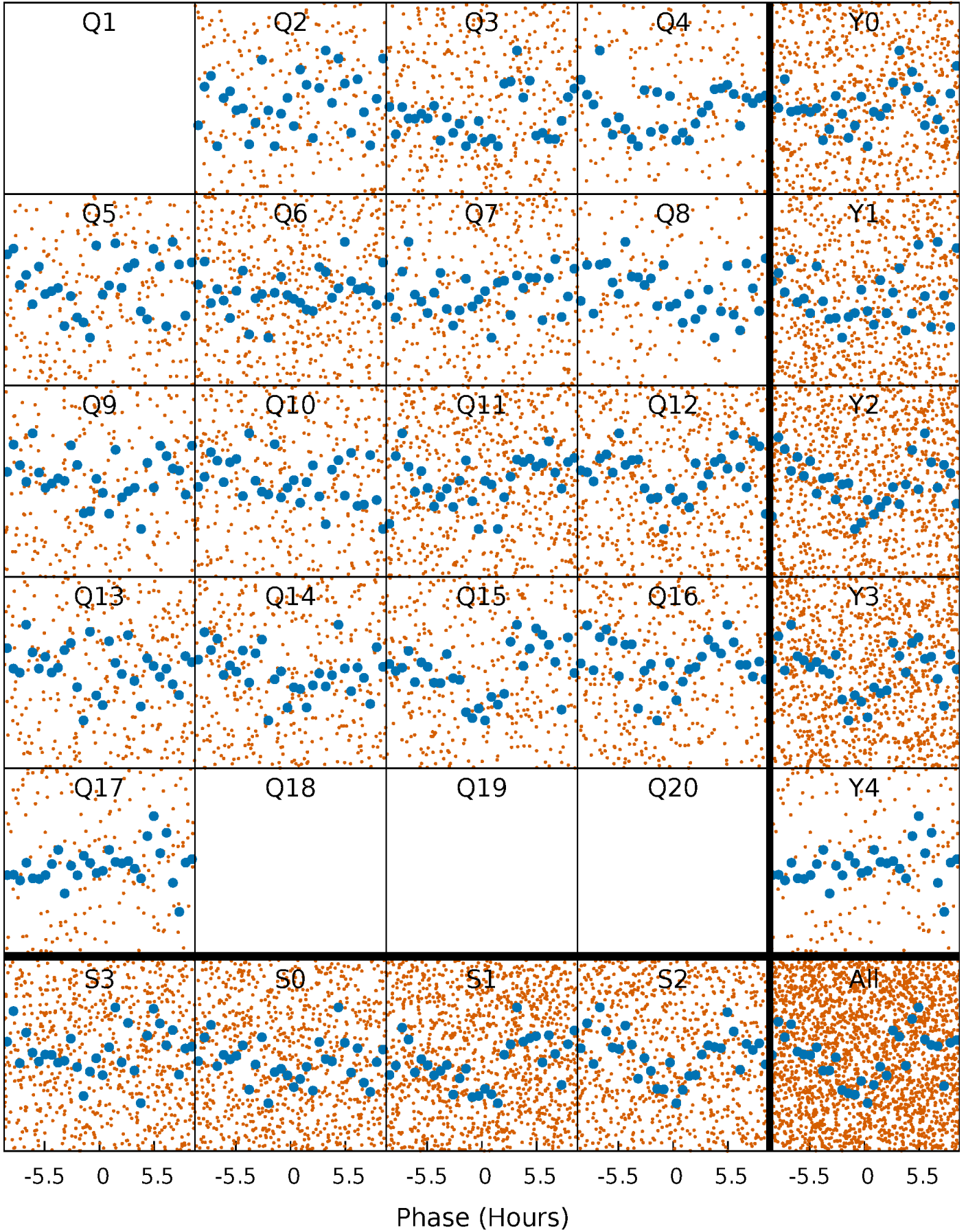


## Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

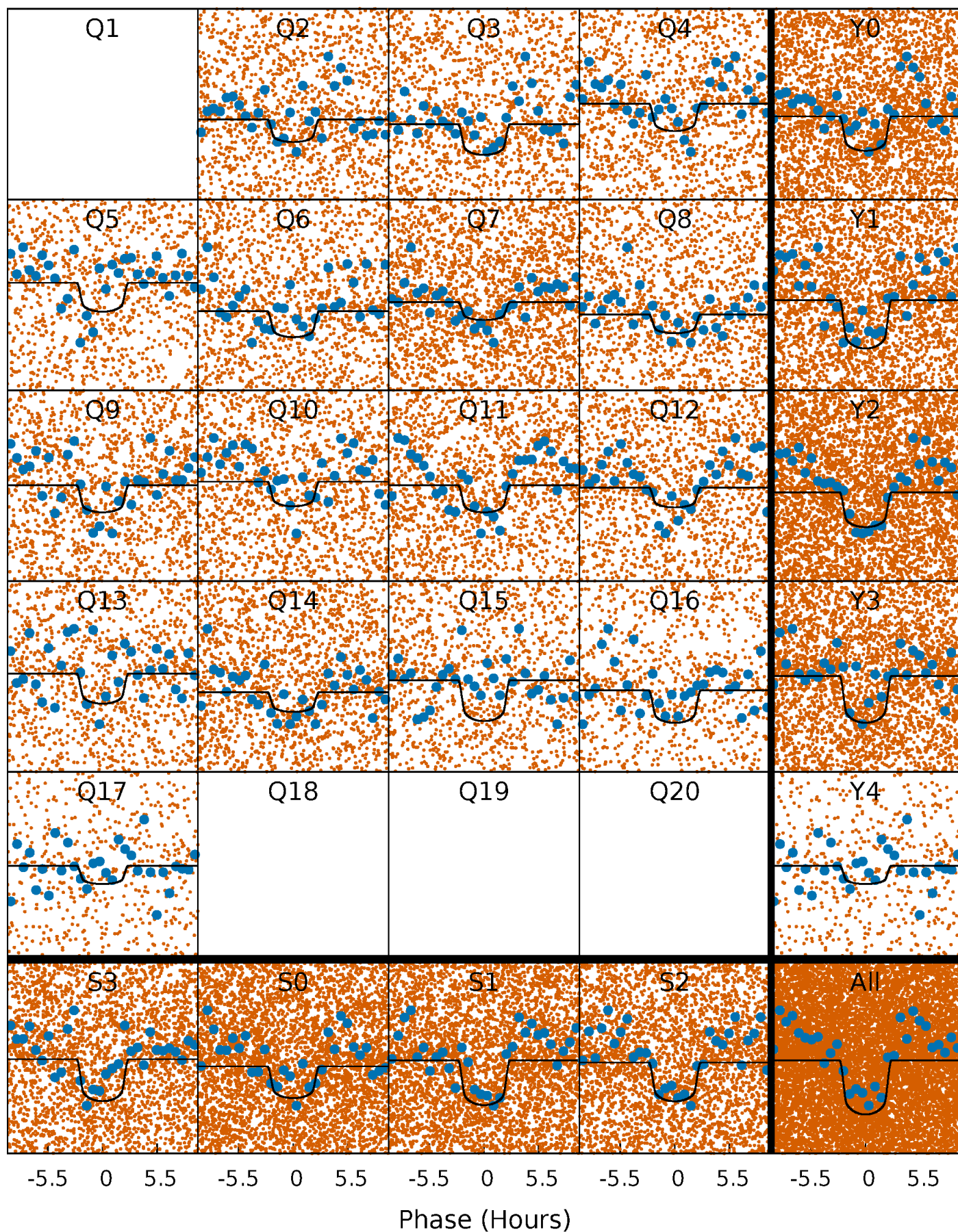
TCE 009655424-01 P= 1.036329 Days  $T_0=131.565115$  (BKJD)





# DV Quarter-Phased Transit Curves

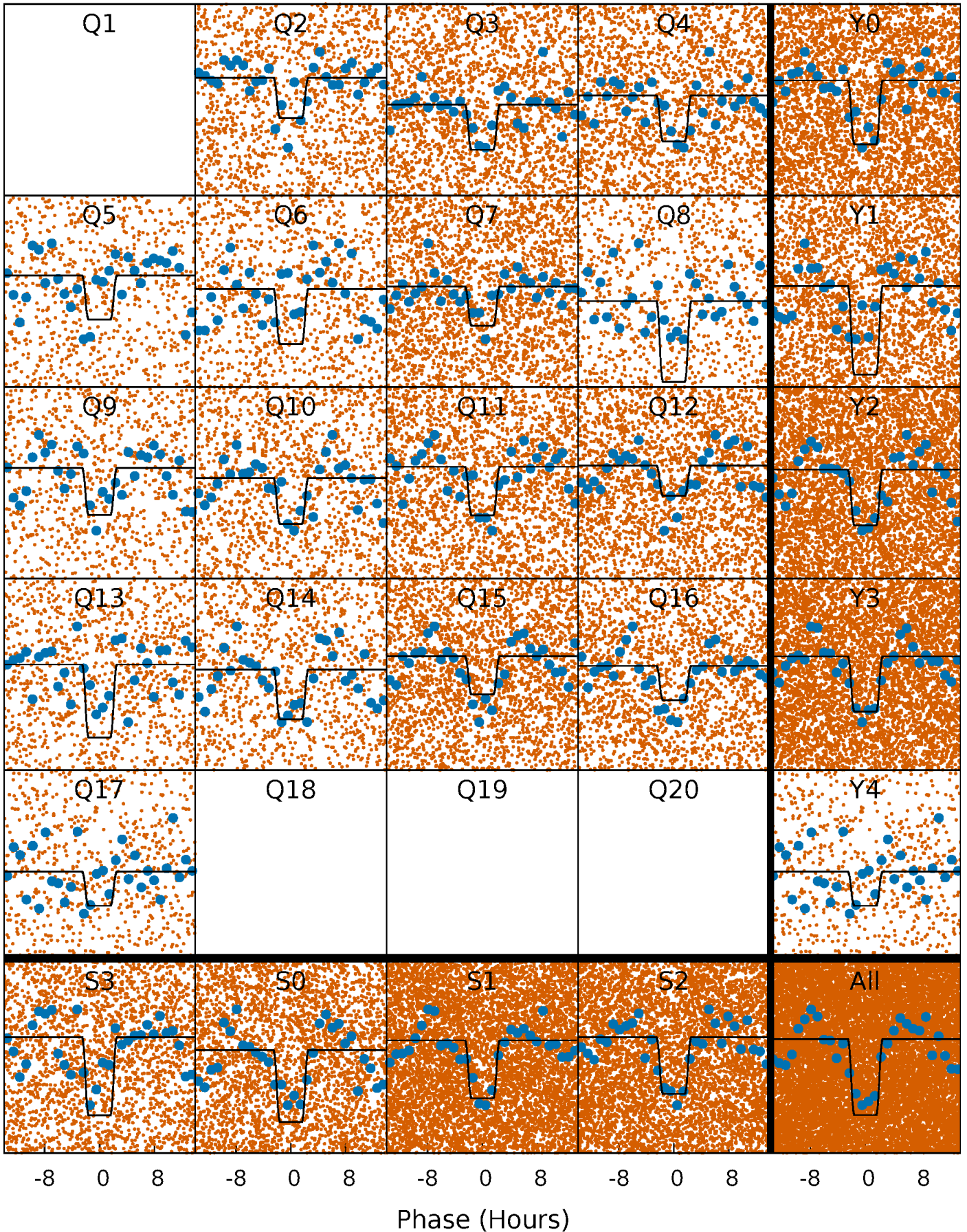
TCE 009655424-01 P= 1.036329 Days  $T_0=131.565115$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

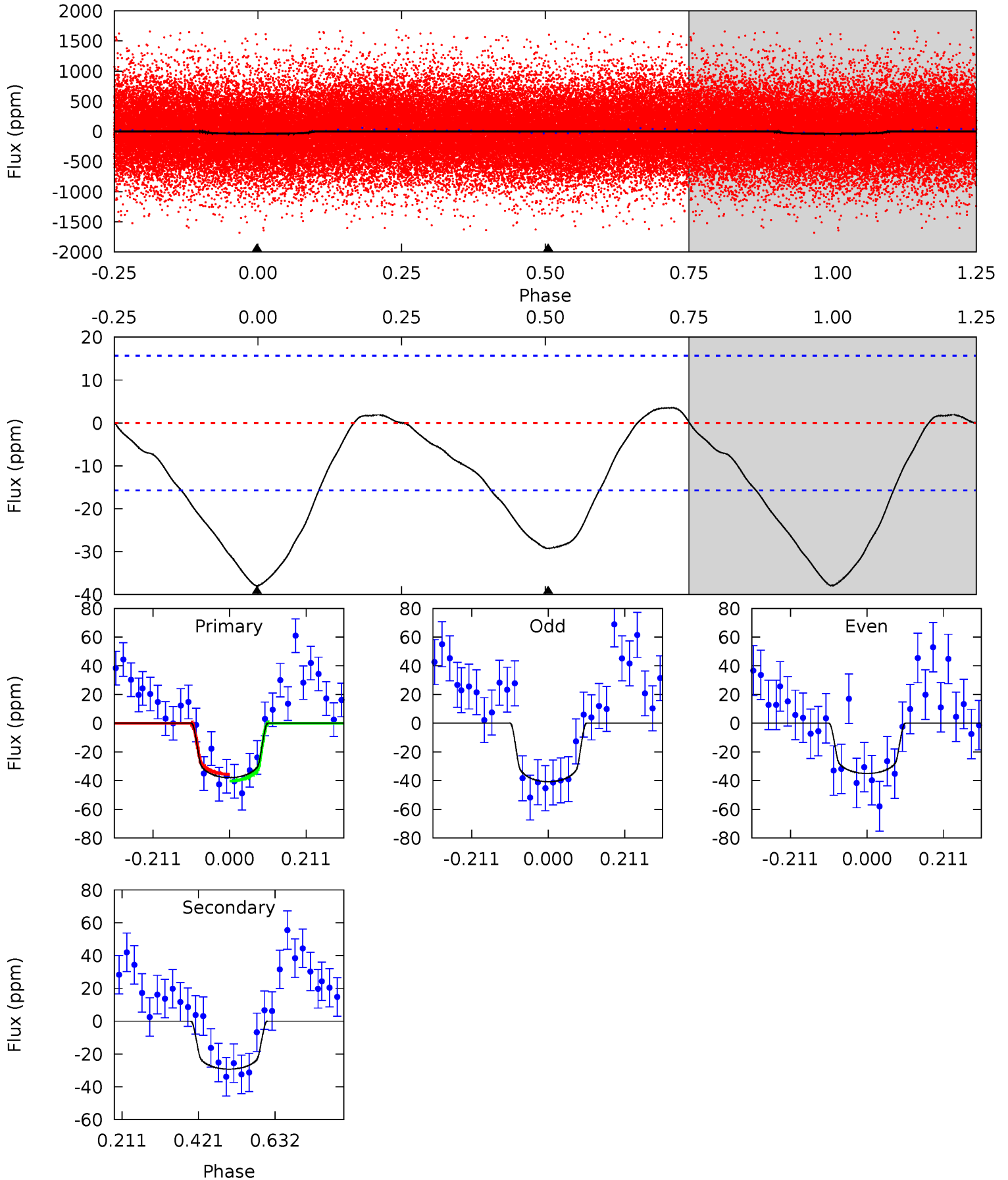
TCE 009655424-01 P= 1.036286 Days  $T_0=131.601201$  (BKJD)



# DV Model-Shift Uniqueness Test

009655424-01, P = 1.036329 Days, E = 131.565115 Days

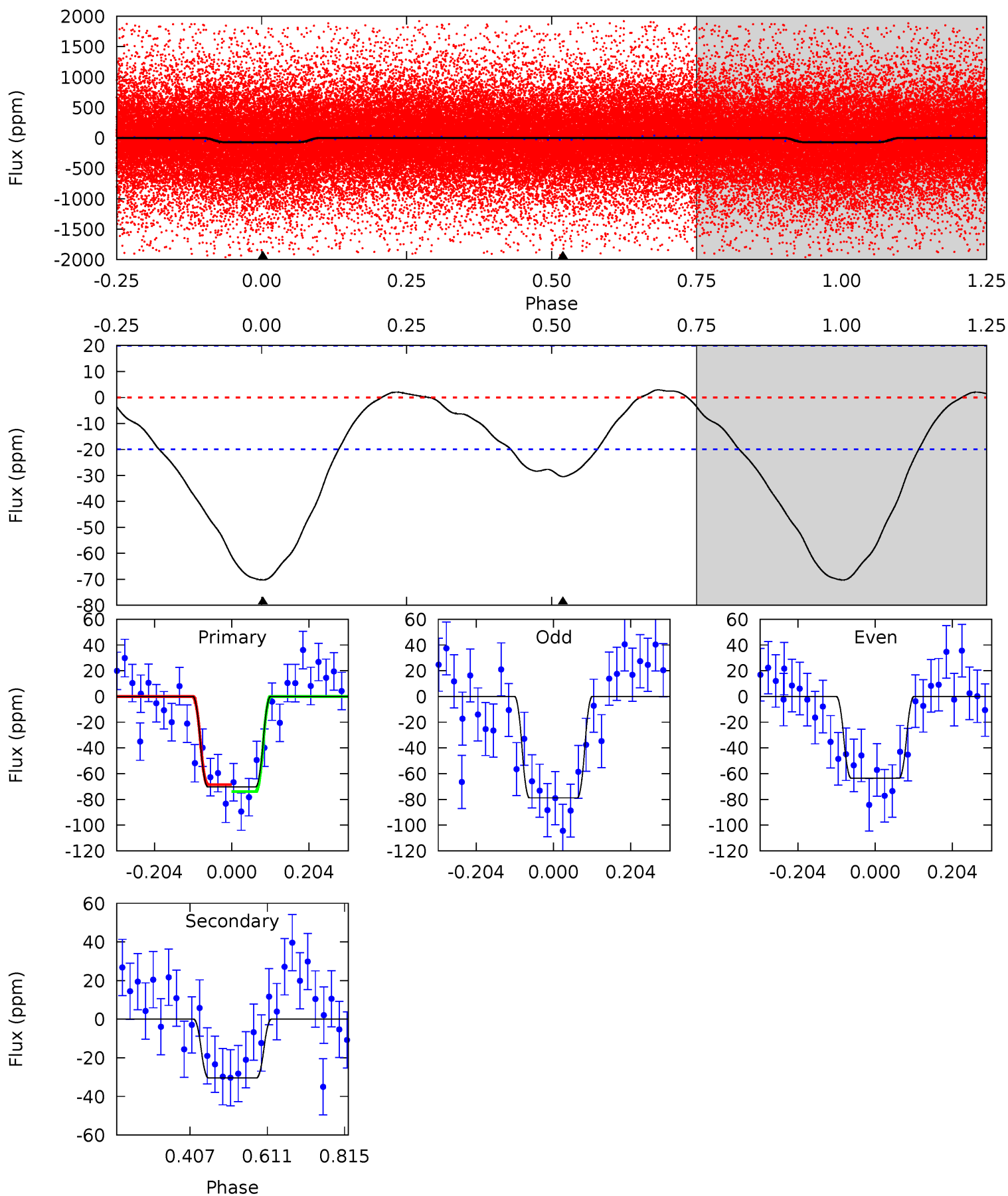
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.6	8.20	0	0	4.41	1.25	0.67	10.6	10.6	8.20	8.20	0.81	0.90	0.09	0.66



# Alt Model-Shift Uniqueness Test

009655424-01, P = 1.036286 Days, E = 131.601201 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
15.5	6.74	0	0	4.41	1.27	0.94	15.5	15.5	6.74	6.74	1.70	0.94	0.04	0.61



### Stellar Parameters For KIC 009655424

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6240^{+169}_{-226}$	$4.502^{+0.052}_{-0.208}$	$-0.400^{+0.300}_{-0.300}$	$0.929^{+0.290}_{-0.097}$	$1.000^{+0.120}_{-0.133}$	$1.758^{+0.484}_{-0.912}$
	+3%/-4%	+1%/-5%	+75%/-75%	+31%/-10%	+12%/-13%	+28%/-52%
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 009655424-01 / KOI 7218.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-29 \pm 4$	$0.85^{+0.30}_{-0.27}$	$2658^{+182}_{-131}$	$5136^{+1009}_{-659}$	$8.787^{+9.344}_{-4.064}$
Alt.	$-30 \pm 5$	$0.98^{+0.30}_{-0.30}$	$2676^{+179}_{-127}$	$4878^{+843}_{-516}$	$6.732^{+7.239}_{-2.754}$

$T_{\text{max}}$  = 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

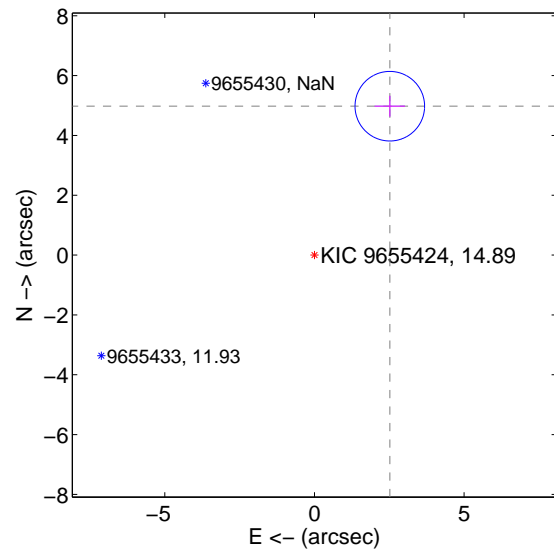
Supplemental centroid analysis for 009655424-01. Kepler magnitude: 14.89. Transit SNR 9.65

There are 9 quarters with good PRF difference image offsets

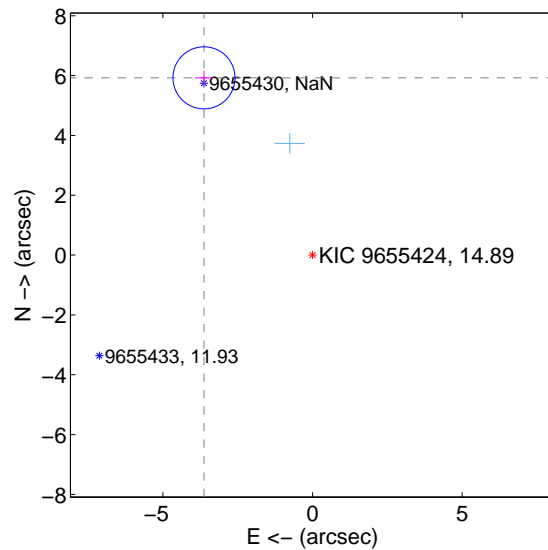
The OOT PRF centroid is offset from the target star catalog position by about 3.50 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$5.578 \pm 0.388$	14.39	$-2.519 \pm 0.509$	$4.976 \pm 0.350$
PRF-fit source offset from KIC position	$6.947 \pm 0.346$	20.10	$3.627 \pm 0.295$	$5.924 \pm 0.236$
photometric centroid source offset	$2.30 \pm 0.37$	6.16	$2.13 \pm 0.39$	$-0.87 \pm 0.23$

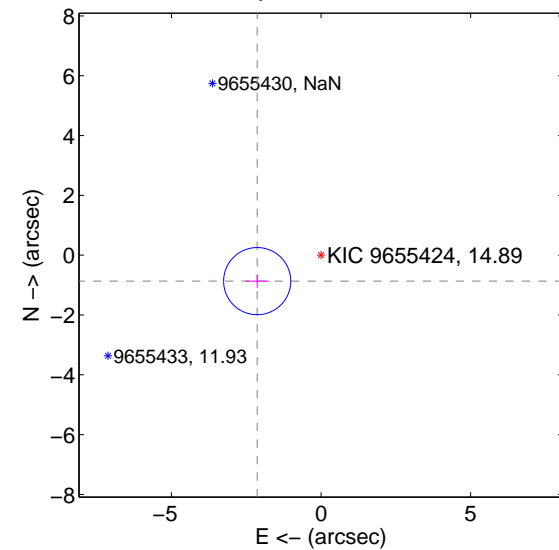
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

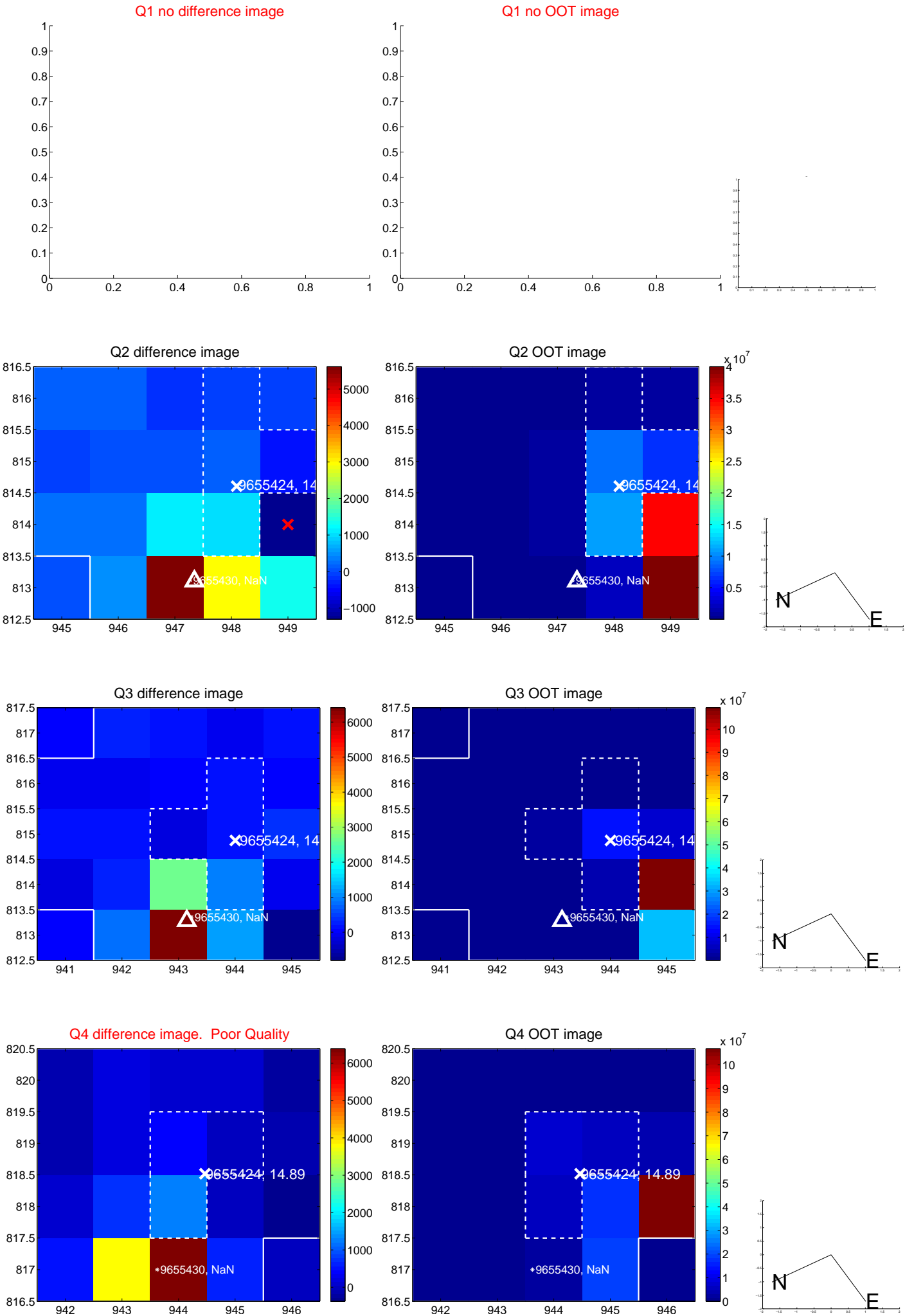


offset from photometric centroids

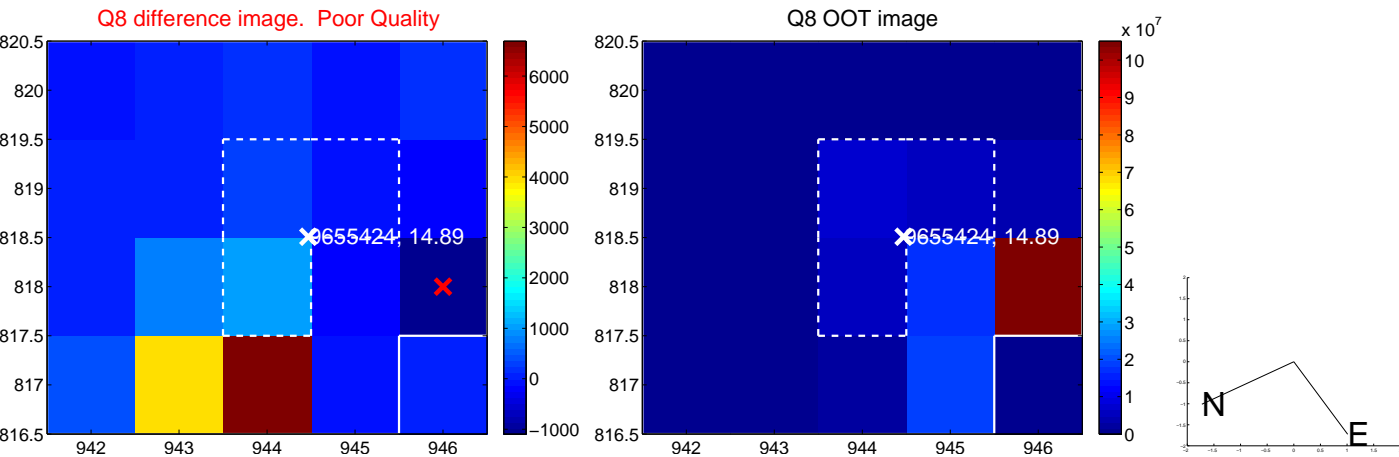
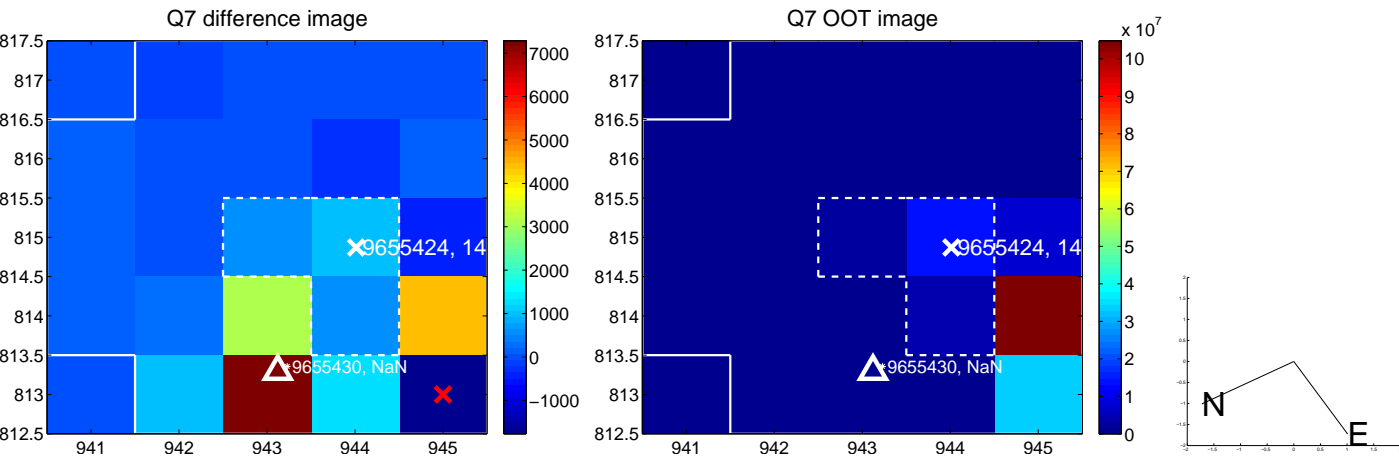
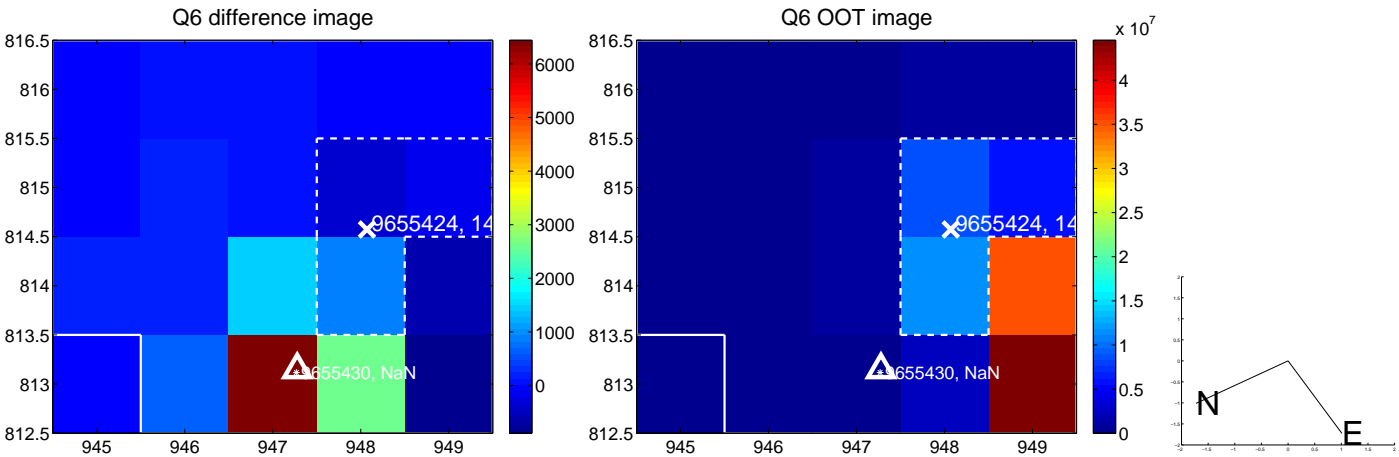
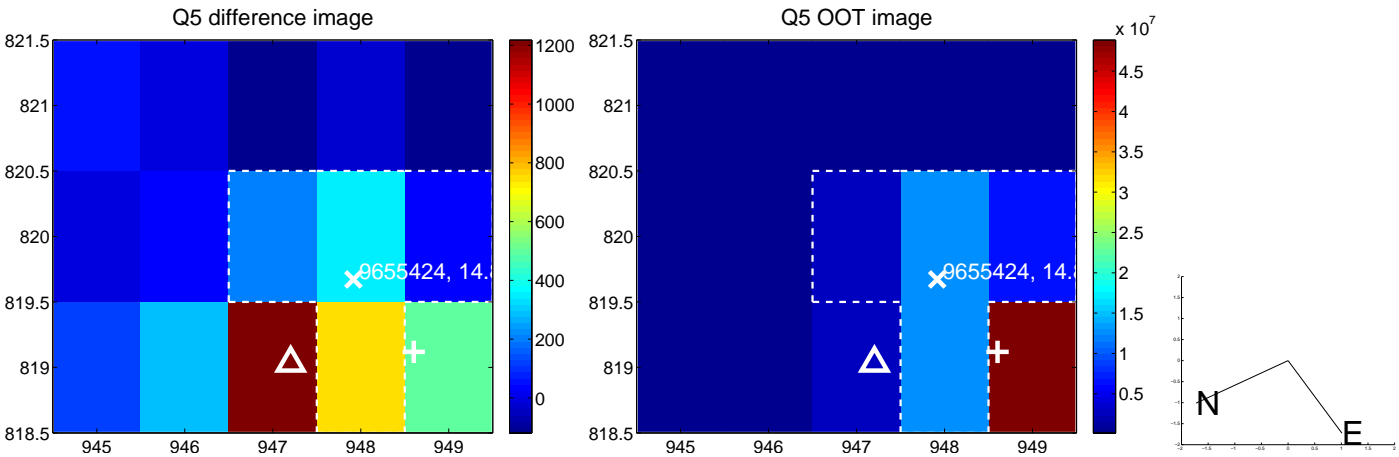


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

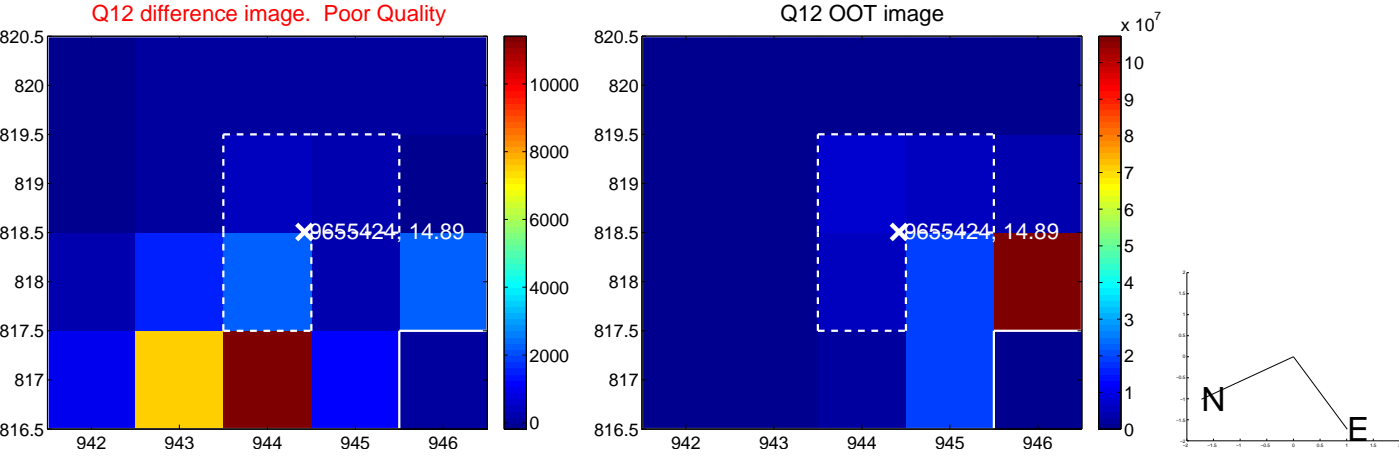
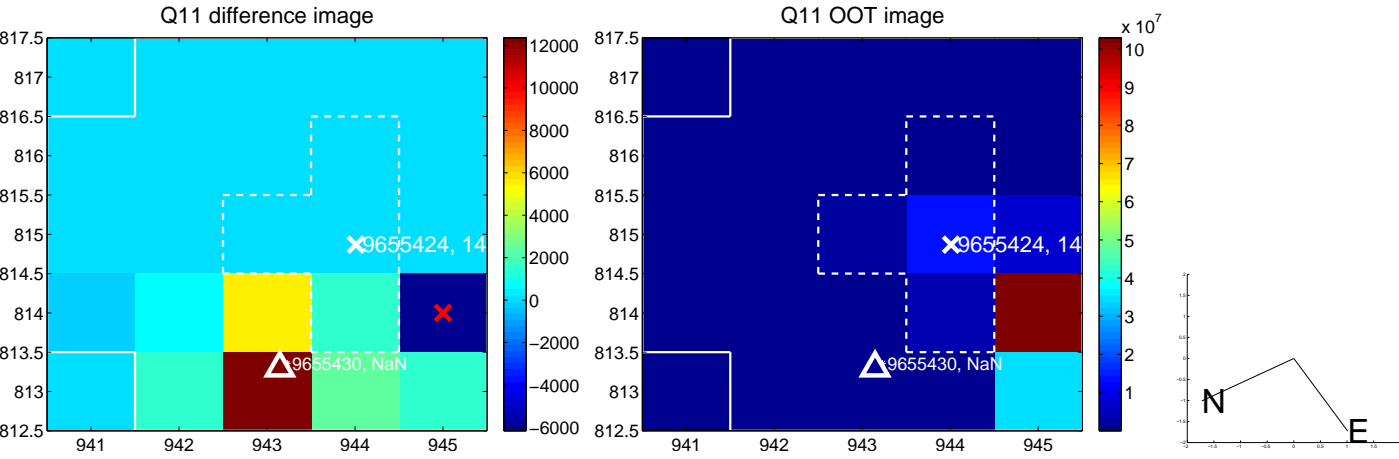
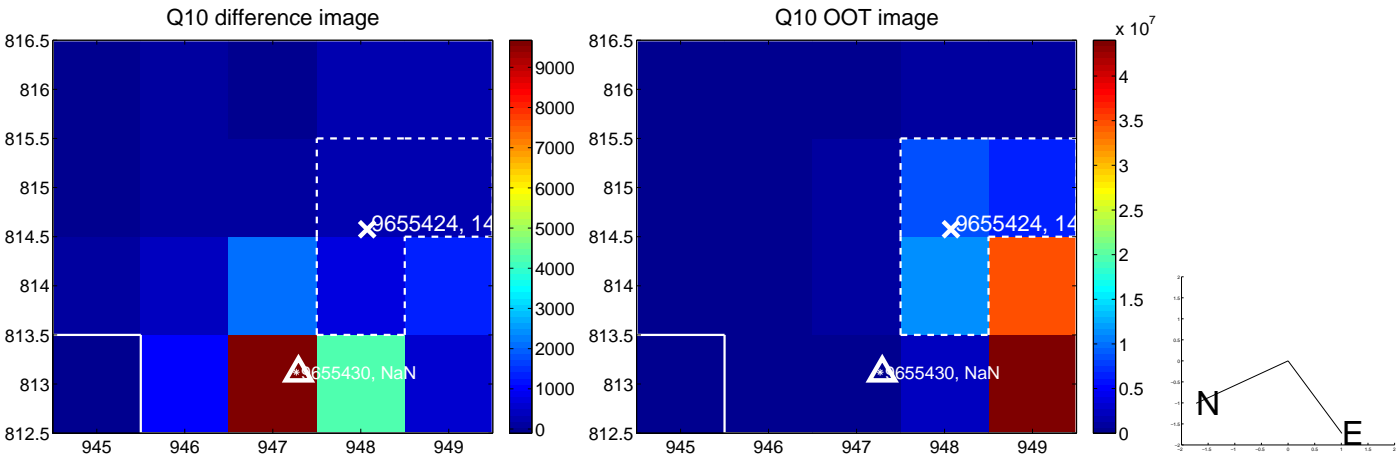
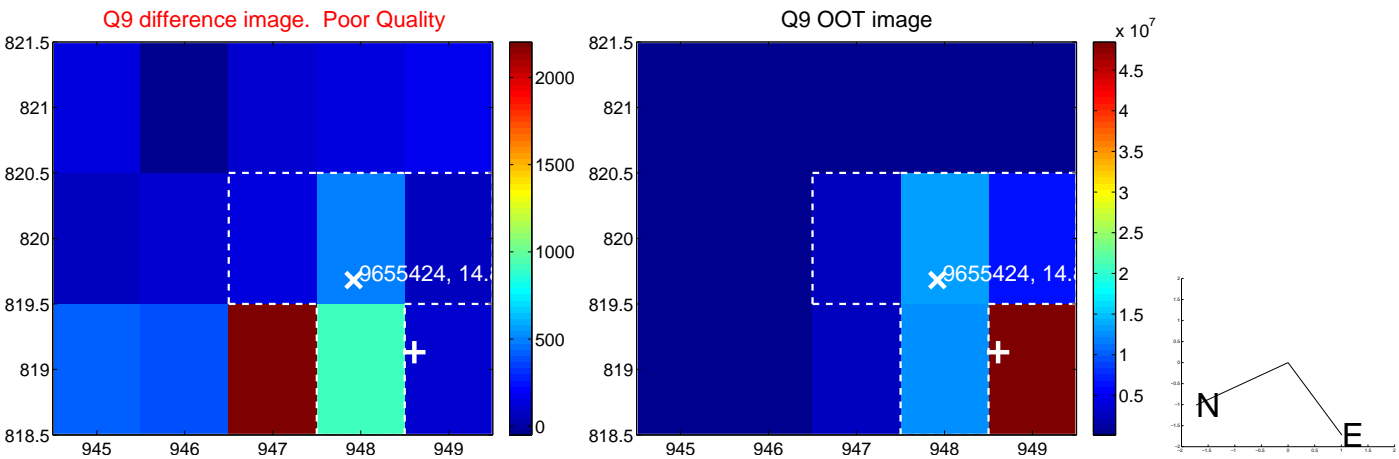
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



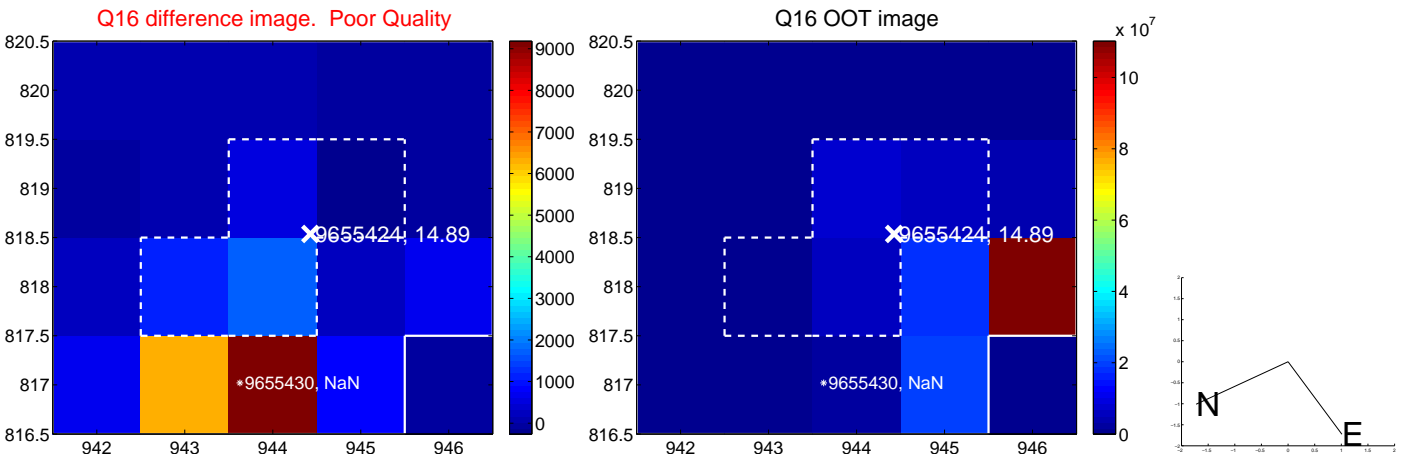
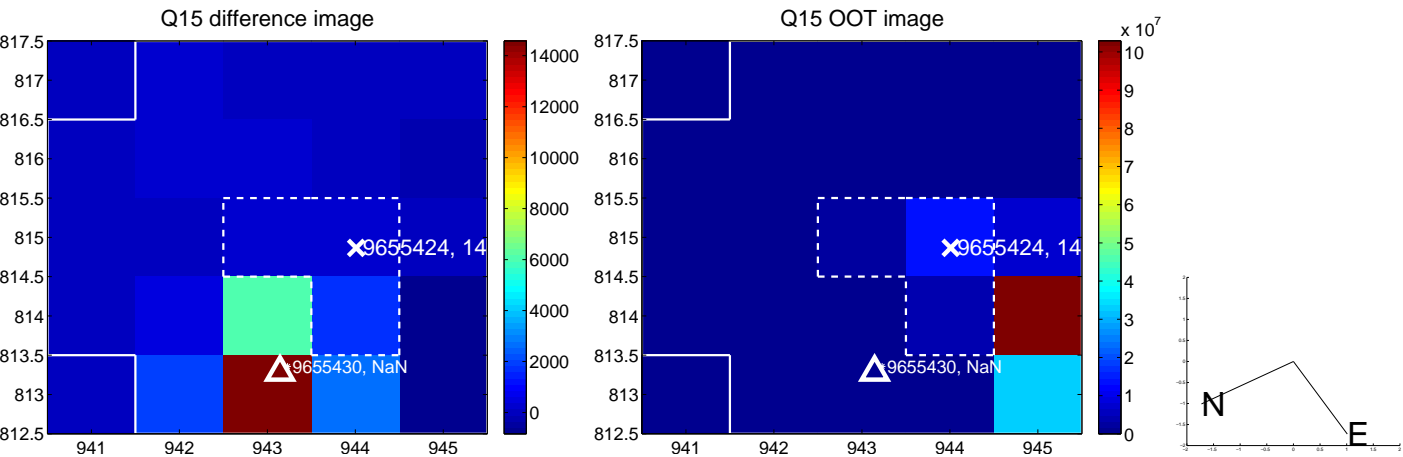
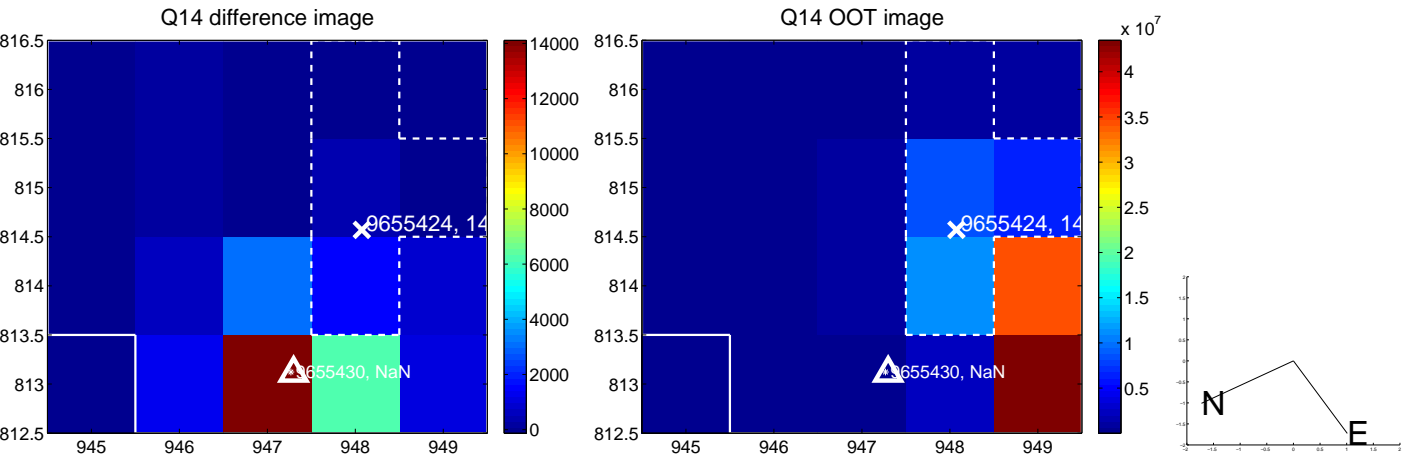
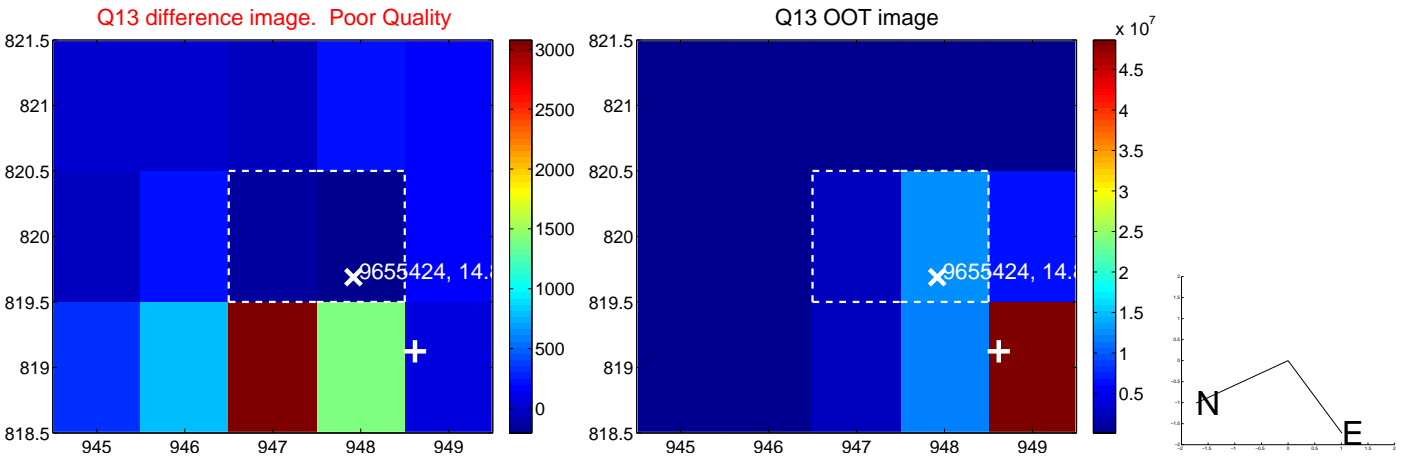
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

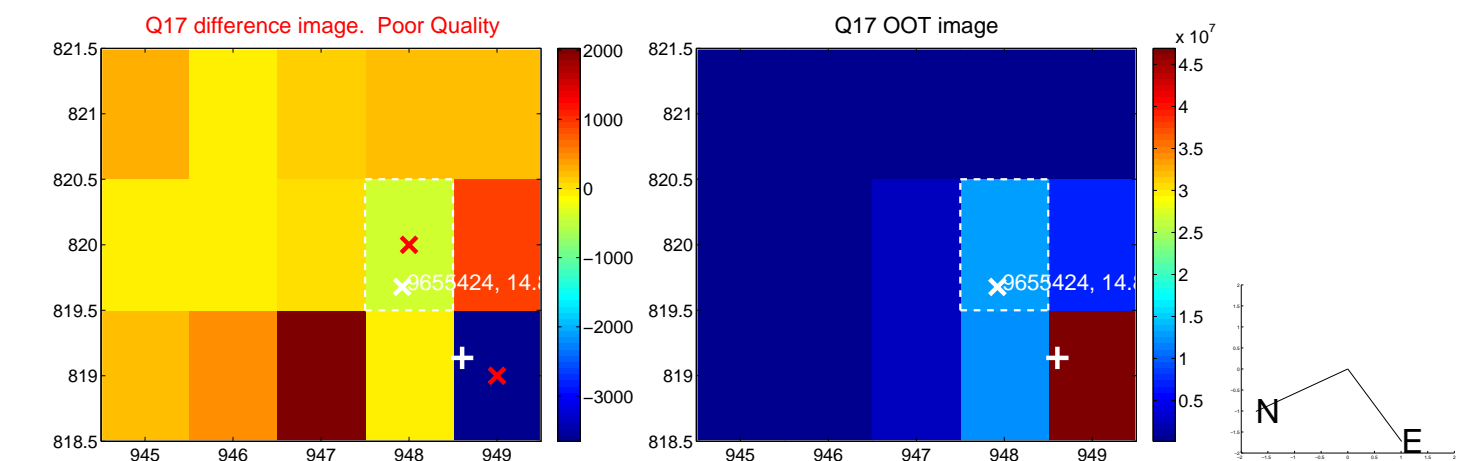


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

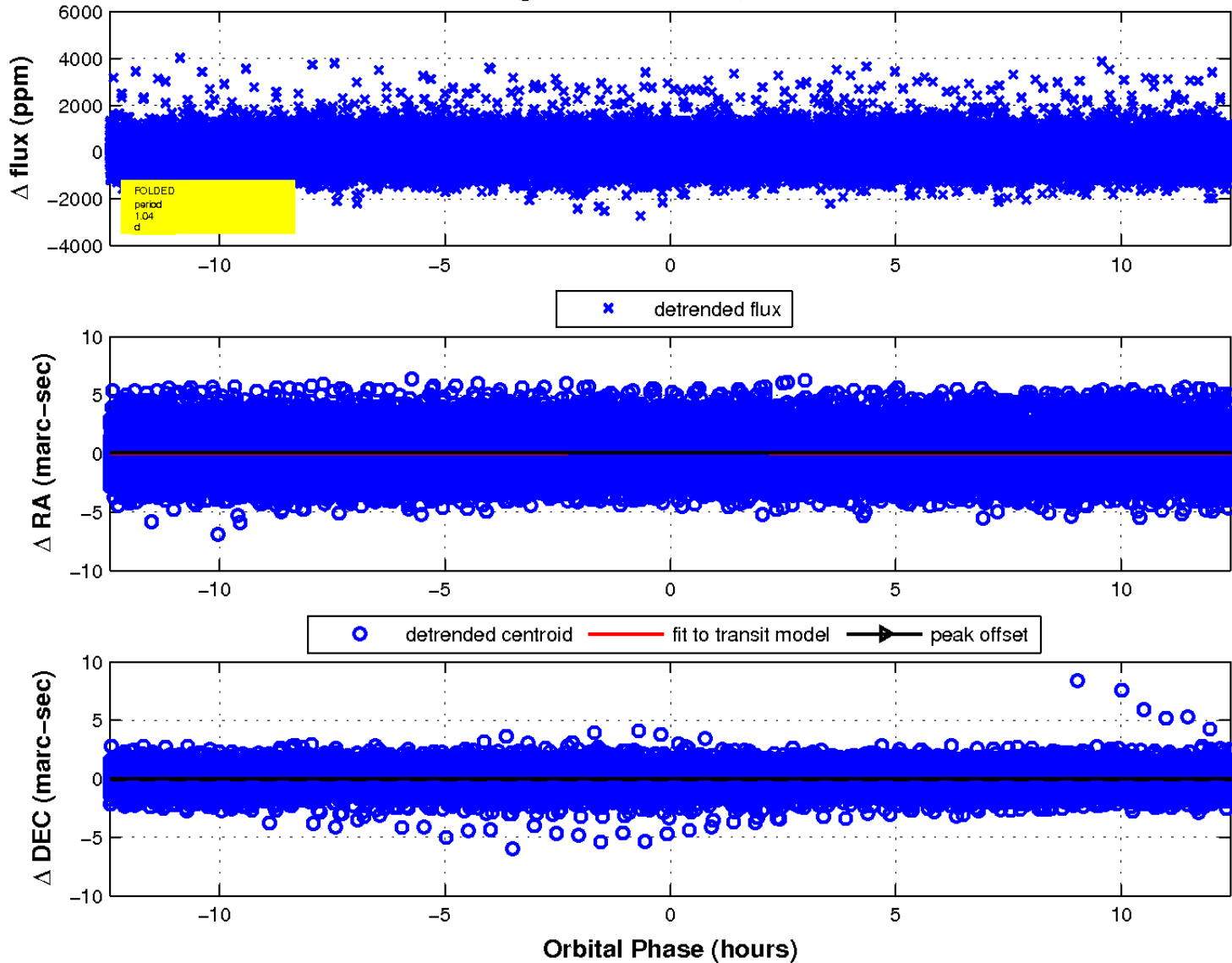




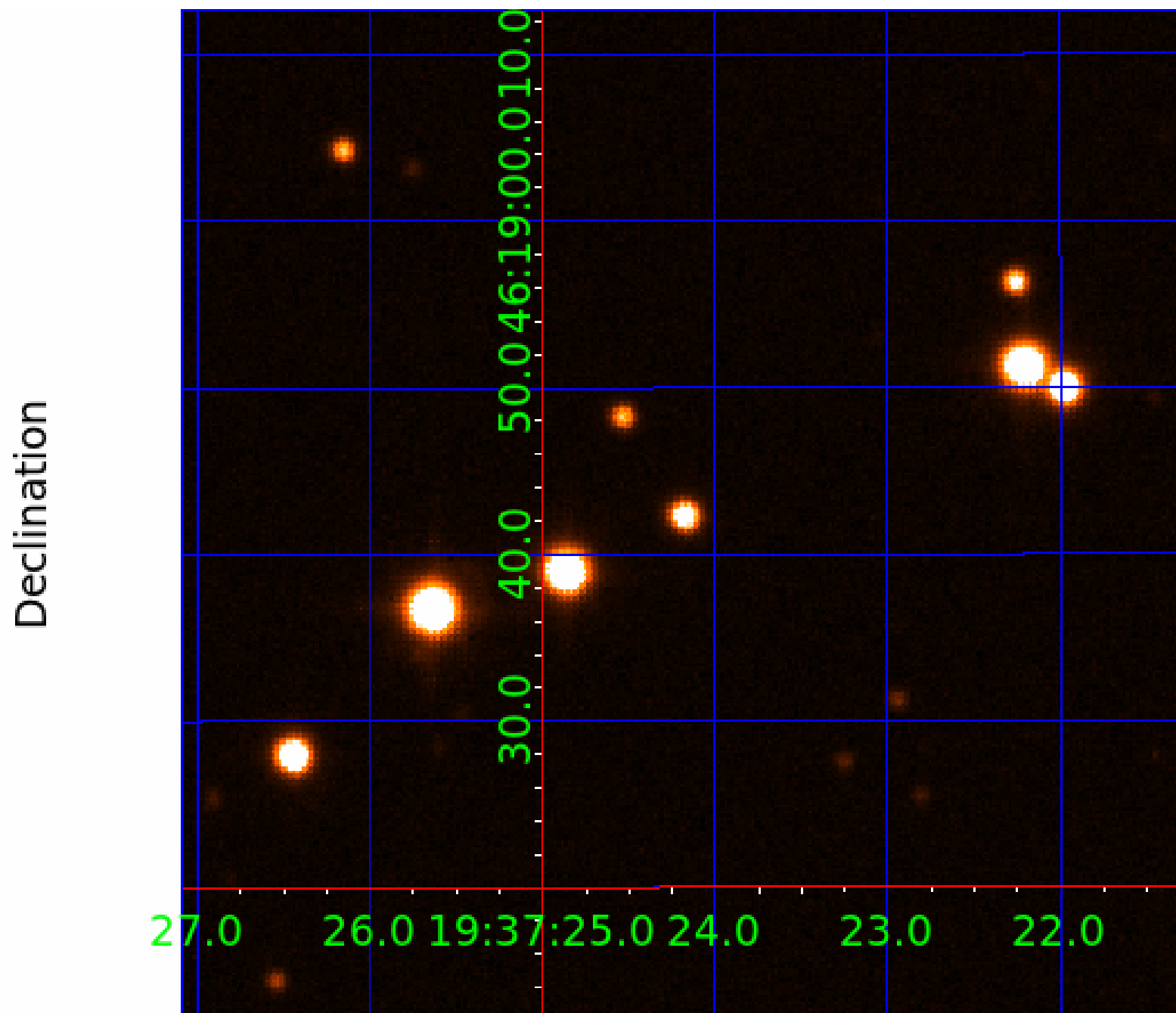
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 1 of 4



UKIRT Image



# KIC 009655424

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
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009655424-04	OBS	No	627.781049	306.434647	3353.6	28.481	8.6	10.4	0.93	6240	5.45	0.57

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009655424-01	OBS	FP	0.00	1	0	1	0	LPP_DV—CENT_RESOLVED_OFFSET
009655424-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
009655424-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—ALL_TRANS_CHASES—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 009655424-03

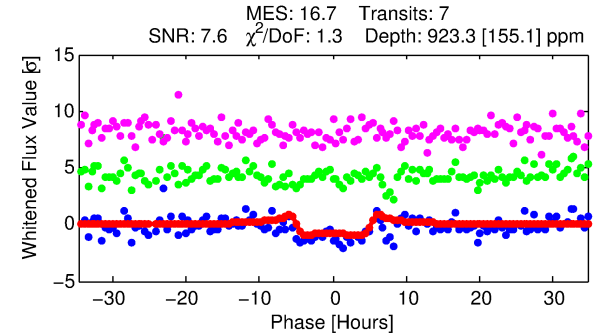
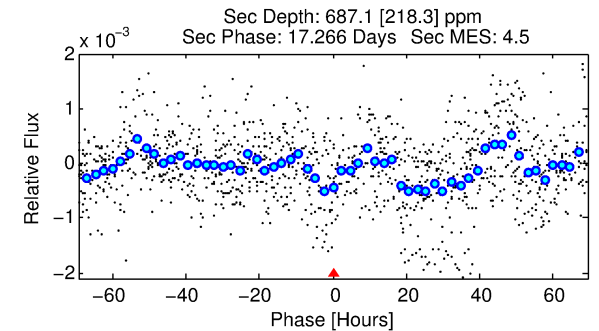
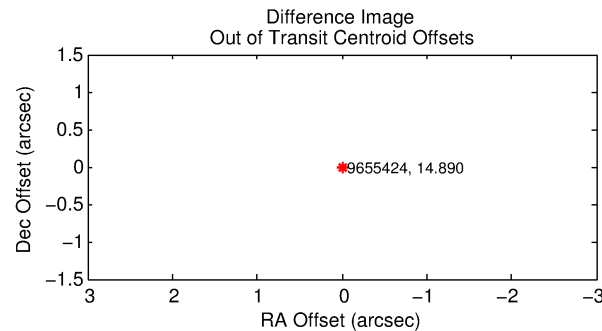
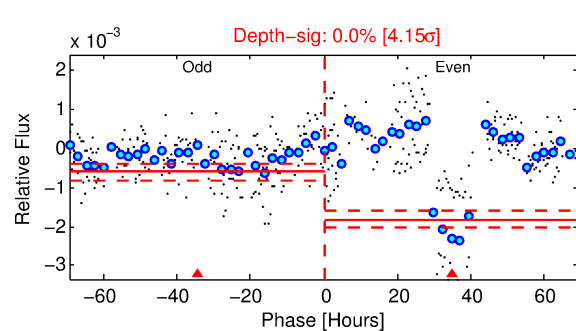
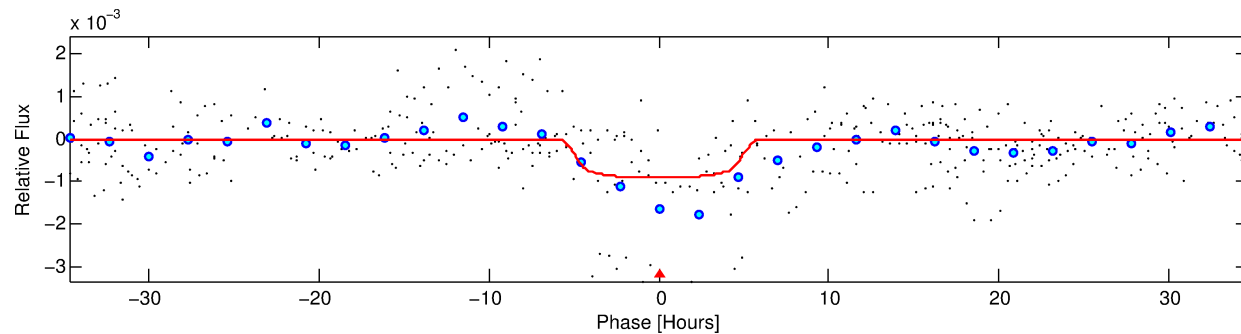
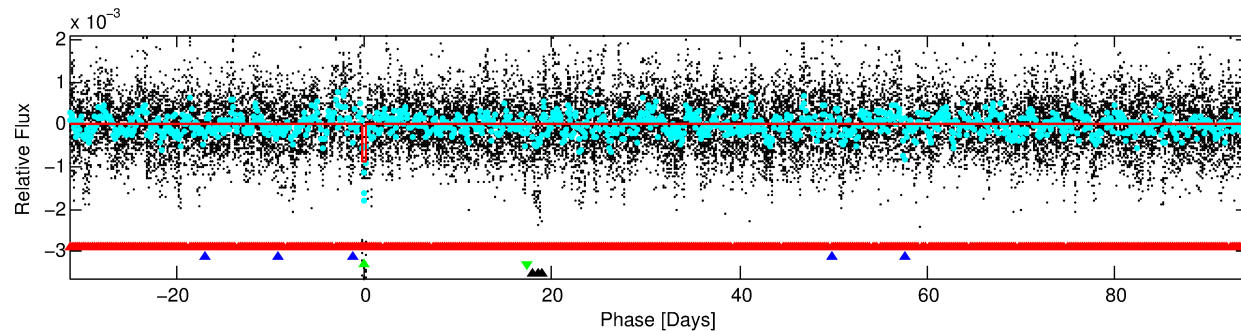
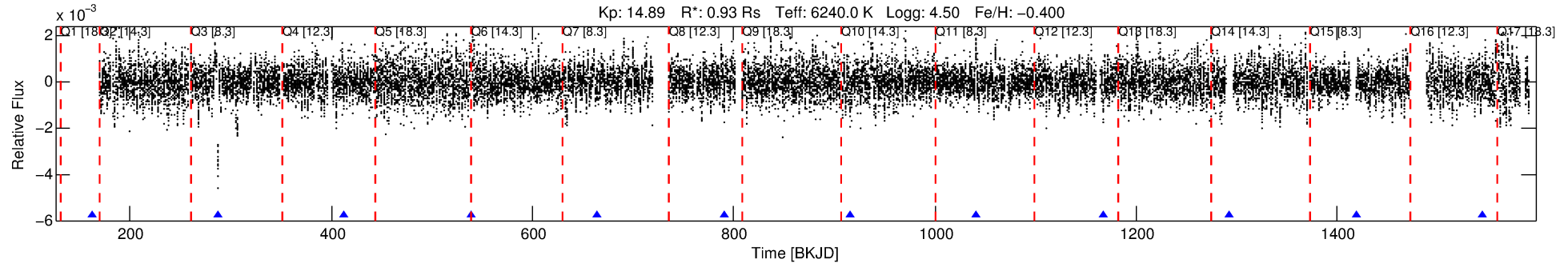
No Significant Match Found

# DV One-Page Summary

KIC: 9655424 Candidate: 3 of 4 Period: 125.647 d

KOI: K07218 Corr: No Ephemeris Match

Kp: 14.89 R\*: 0.93 Rs Teff: 6240.0 K Logg: 4.50 Fe/H: -0.400



## DV Fit Results:

Period = 125.64699 [0.00419] d  
Epoch = 161.8762 [0.0214] BKJD  
Rp/R\* = 0.0323 [0.0037]  
a/R\* = 43.82 [15.63]  
b = 0.89 [0.09]  
Seff = 4.86 [1.98]  
Teq = 379 [39] K  
Rp = 3.27 [1.09] Re  
a = 0.4911 [0.1288] AU  
Ag = 8506.26 [4659.19] [1.83σ]  
Teffp = 5622 [589] K [8.8σ]

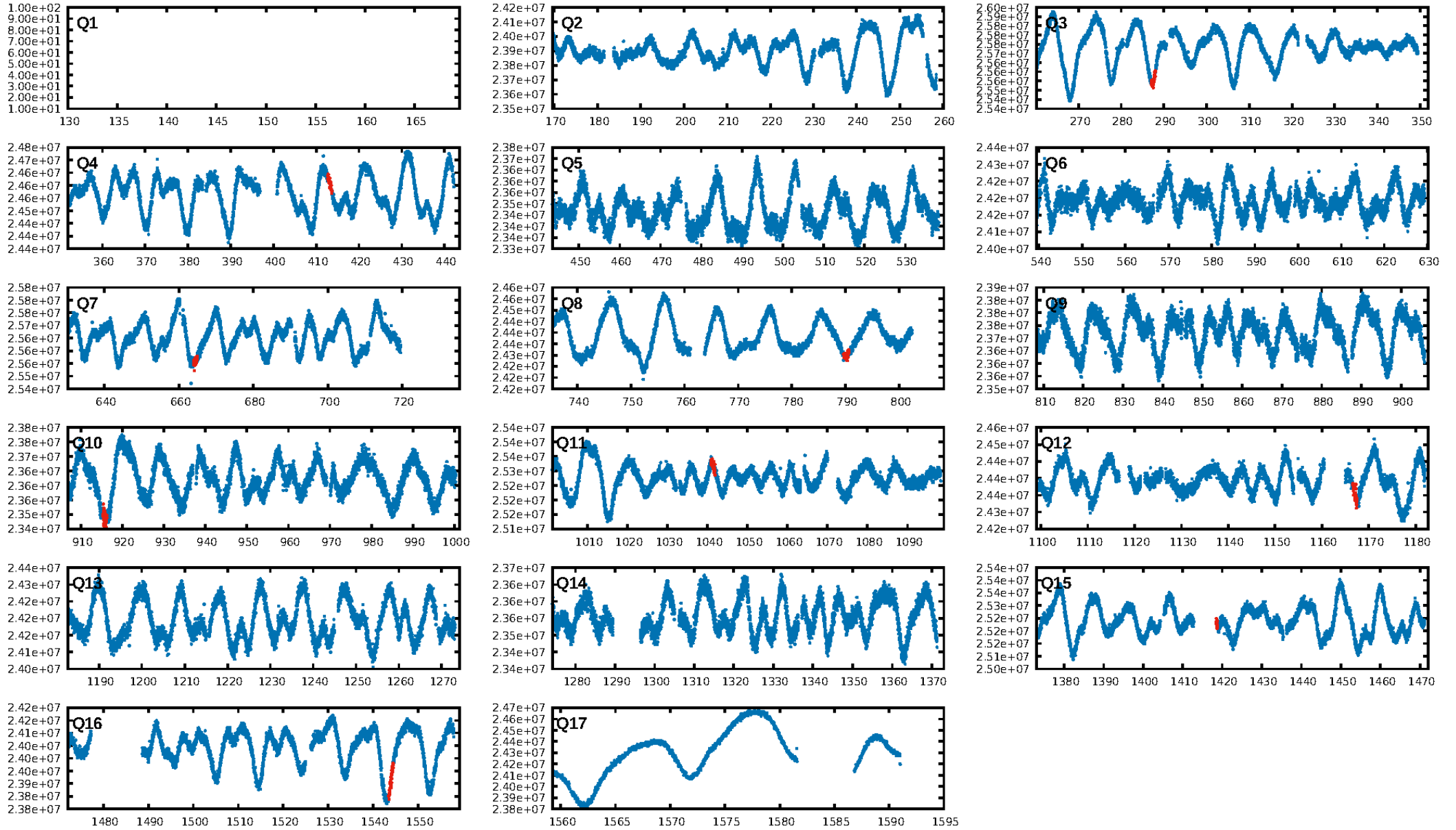
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [239.21σ]  
LongPeriod-sig: 100.0% [283.71σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 2.11e-28  
RollingBand-fgt: 1.00 [7/7]  
GhostDiagnostic-chr: -0.1809  
Centroid-sig: 0.1%  
Centroid-so: 3.737 arcsec [13.17σ]  
OotOffset-rm: N/A  
KicOffset-rm: 0.706 arcsec [1.33σ]  
OotOffset-st: 0/0/0 [0]  
KicOffset-st: 1/1/3/0 [5]  
DiffImageQuality-fgm: 0.40 [2/5]  
DiffImageOverlap-fno: 0.00 [0/7]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 11:37:42 Z

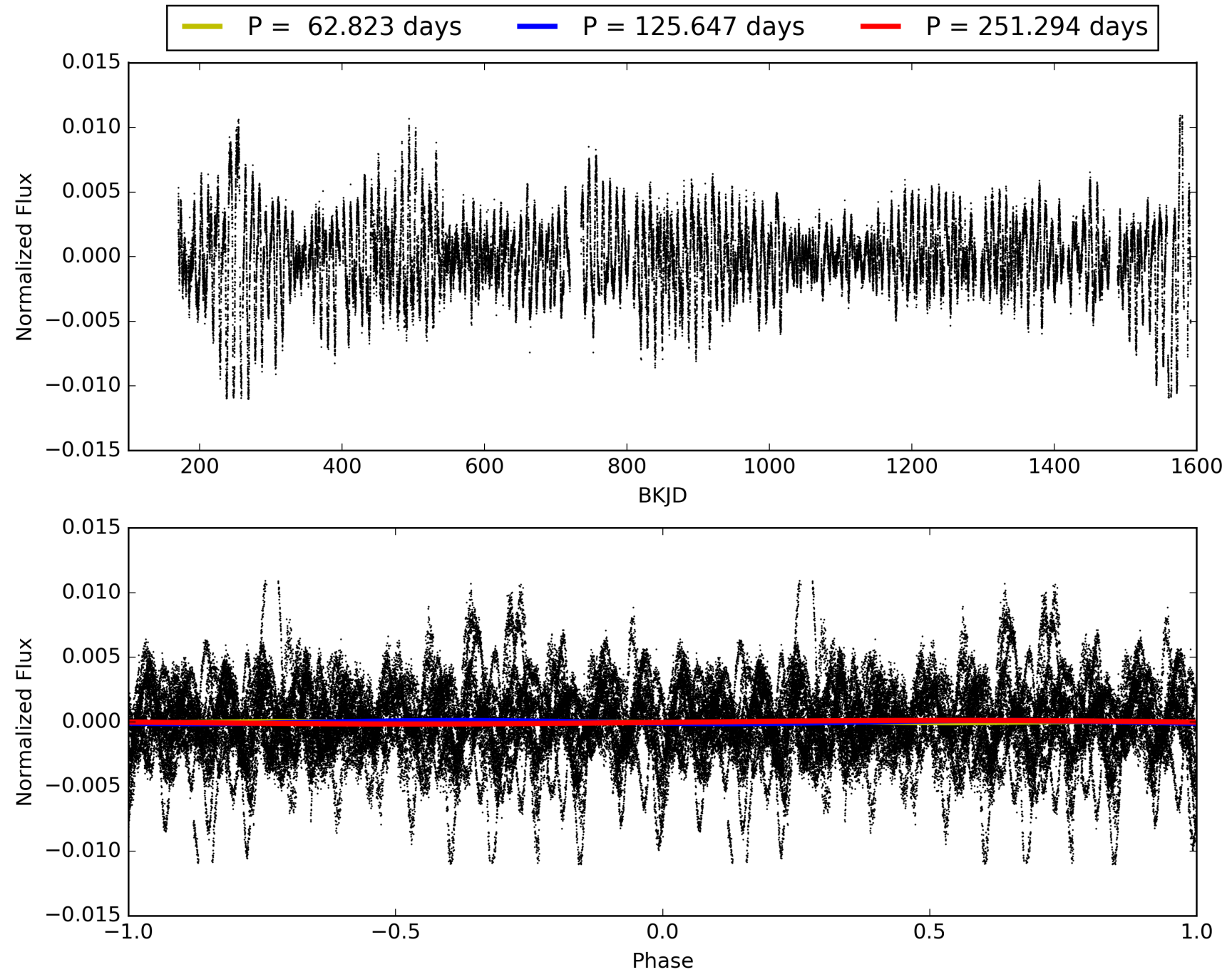
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009655424-03, PDC Light Curves



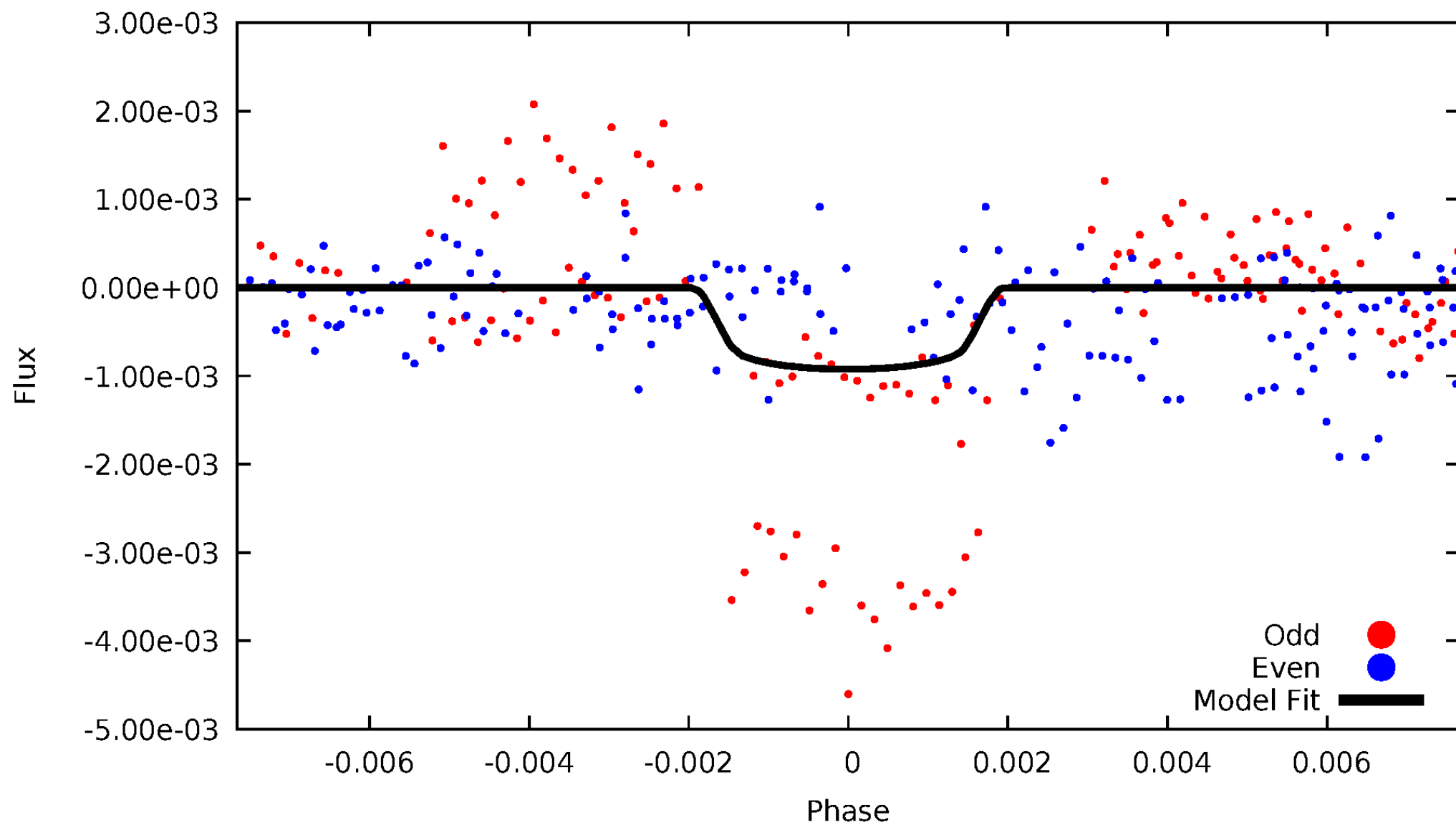


TCE 009655424-03



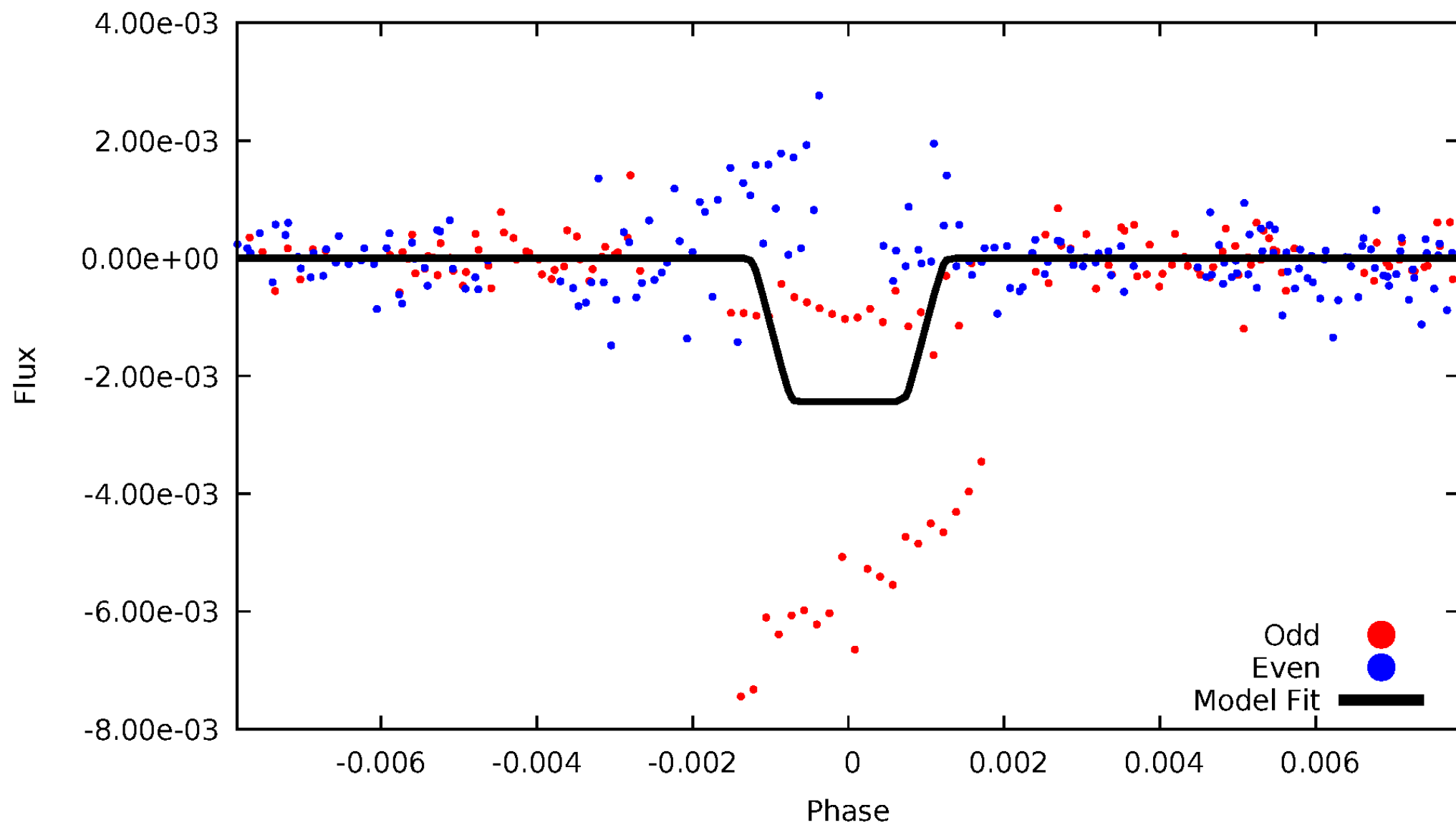
# DV Odd/Even

TCE 009655424-03



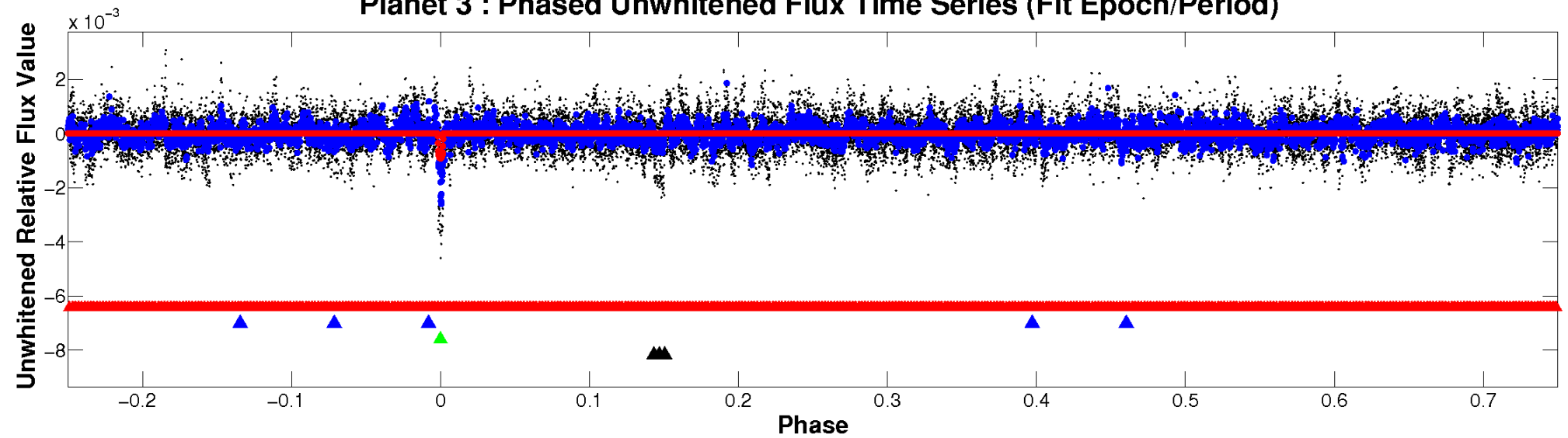
# ALT Odd/Even

TCE 009655424-03

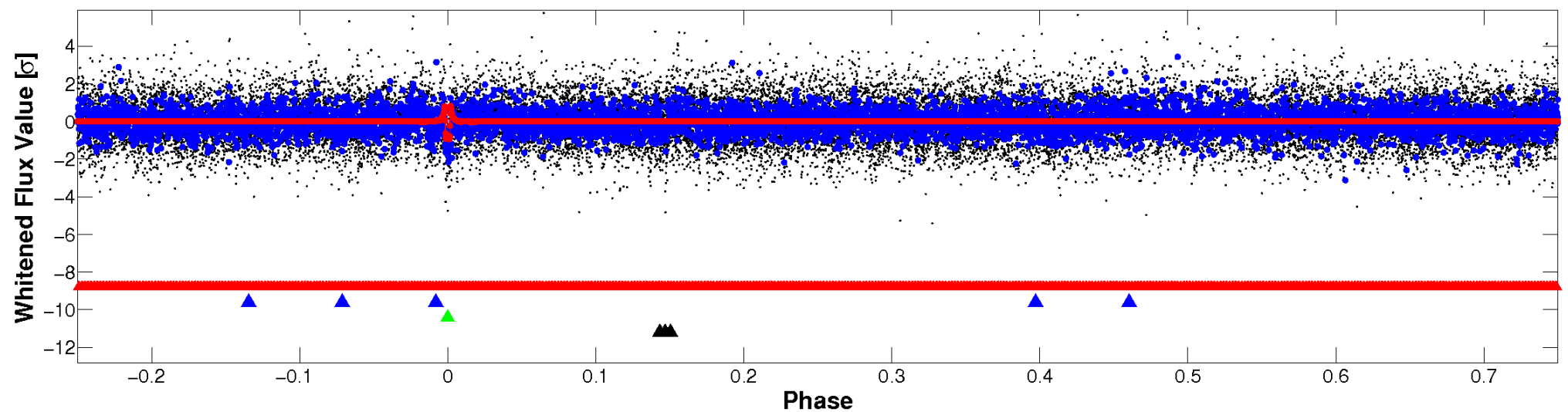


# Non-Whitened Vs. Whitened Light Curve

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

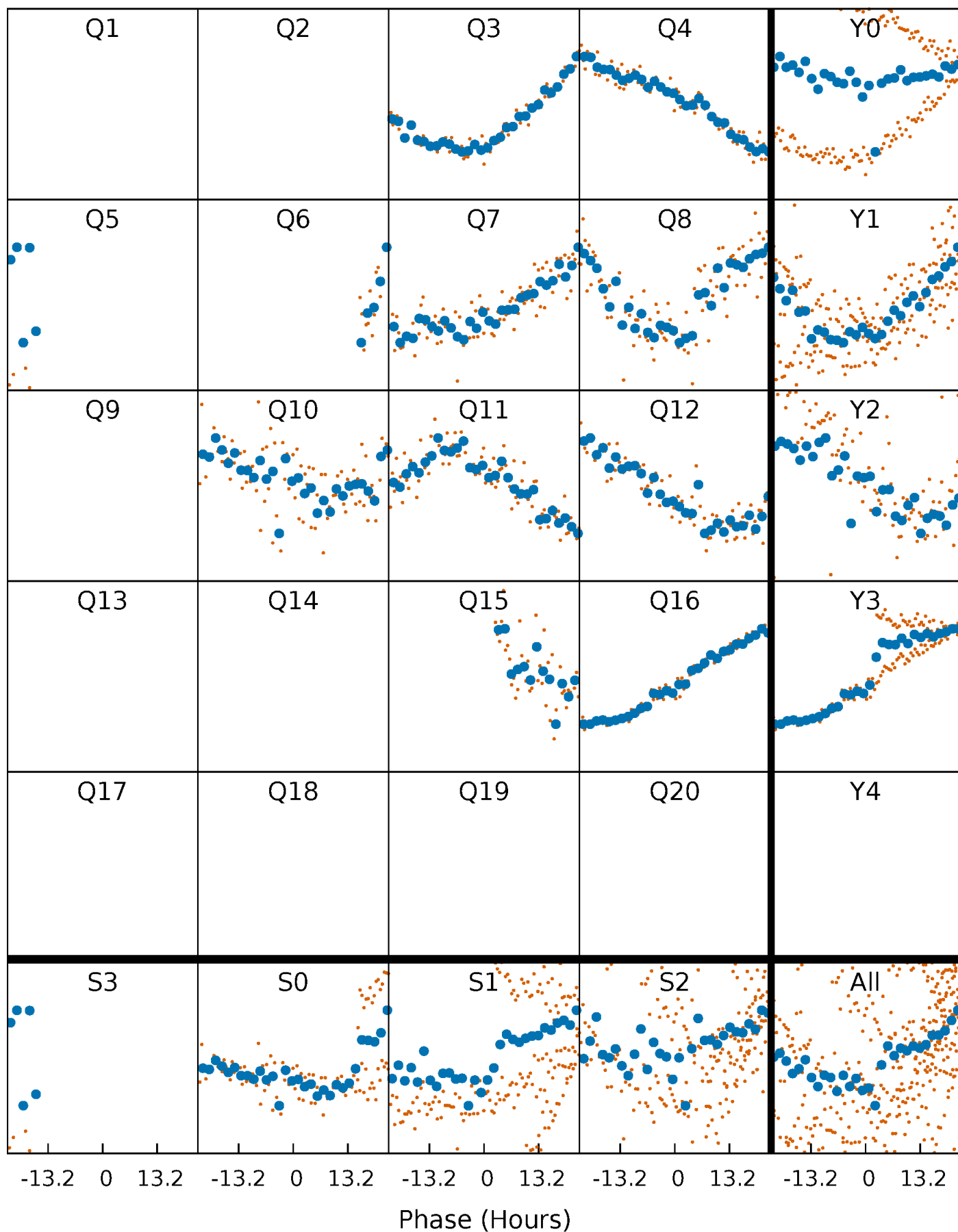


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

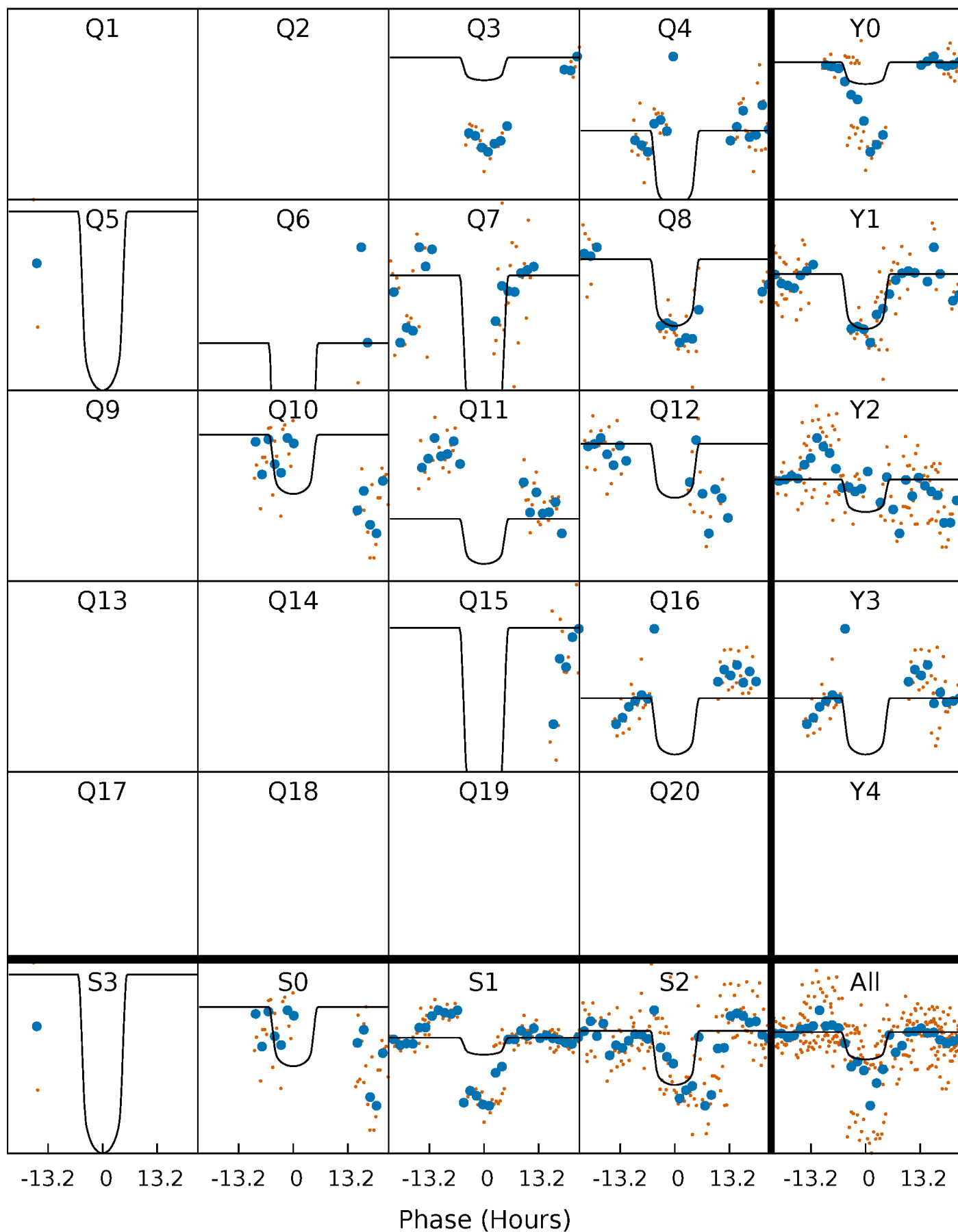
TCE 009655424-03 P=125.646988 Days  $T_0=161.876219$  (BKJD)





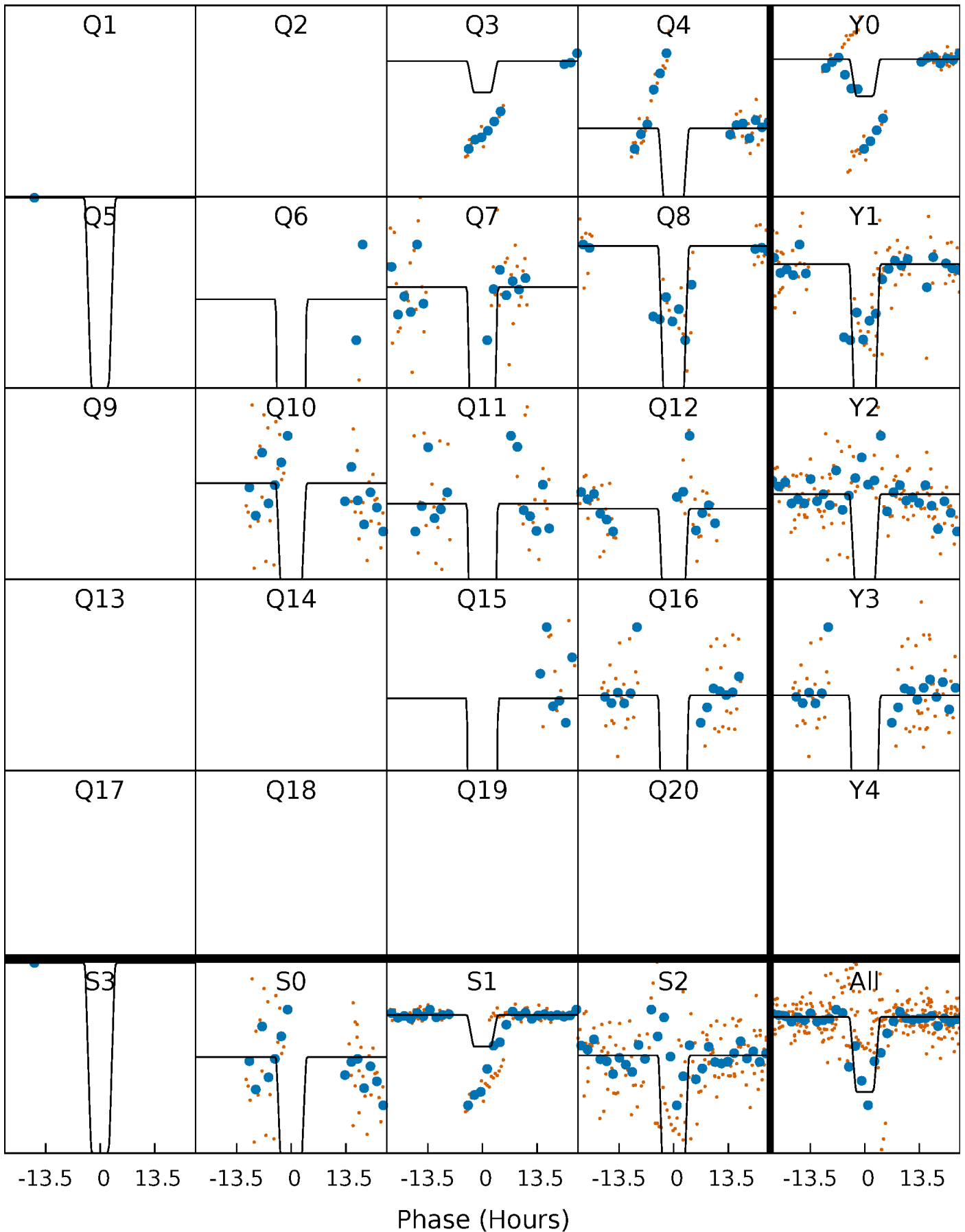
# DV Quarter-Phased Transit Curves

TCE 009655424-03 P=125.646988 Days  $T_0=161.876219$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

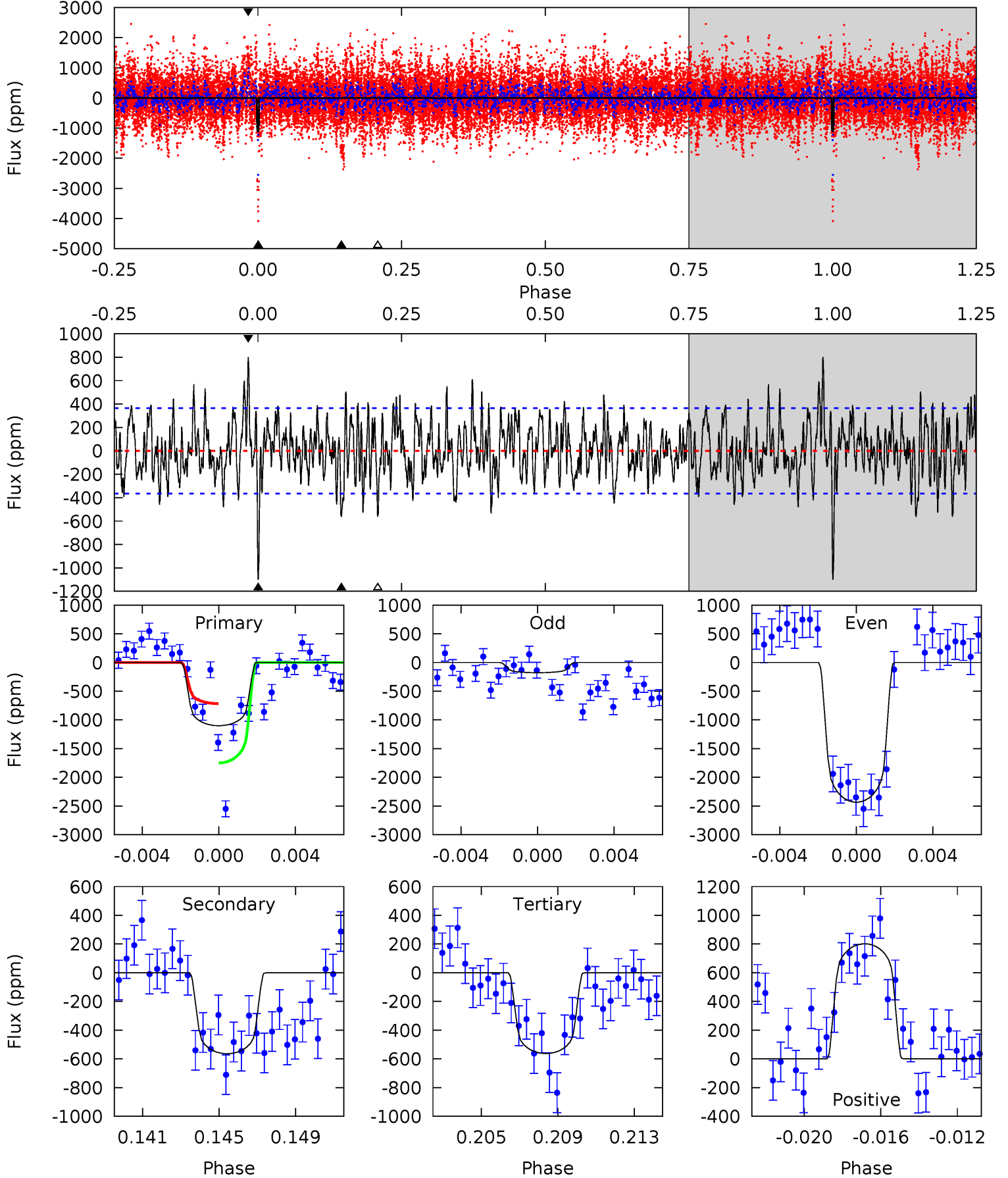
TCE 009655424-03 P=125.659583 Days  $T_0=161.853298$  (BKJD)



# DV Model-Shift Uniqueness Test

009655424-03, P = 125.646988 Days, E = 161.876219 Days

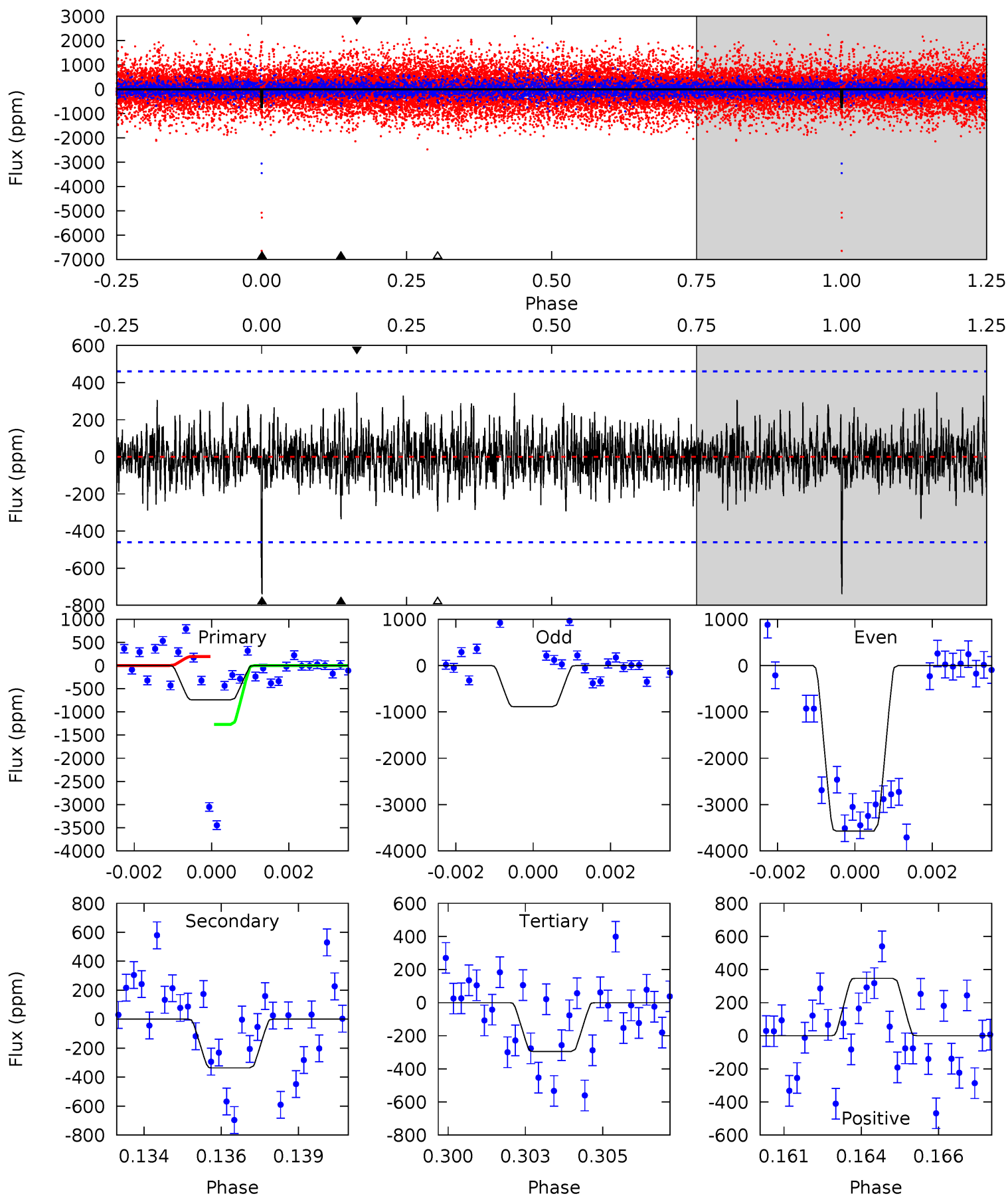
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
15.7	8.02	8.00	11.4	5.20	2.88	2.81	7.67	4.26	0.02	-3.39	17.3	1.79	0.42	7.39



# Alt Model-Shift Uniqueness Test

009655424-03, P = 125.659583 Days, E = 161.853298 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
8.50	3.86	3.39	3.98	5.29	3.03	1.07	5.11	4.52	0.48	-0.12	17.8	-4.13	0.32	6.08



### Stellar Parameters For KIC 009655424

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6240^{+169}_{-226}$	$4.502^{+0.052}_{-0.208}$	$-0.400^{+0.300}_{-0.300}$	$0.929^{+0.290}_{-0.097}$	$1.000^{+0.120}_{-0.133}$	$1.758^{+0.484}_{-0.912}$
	+3%/-4%	+1%/-5%	+75%/-75%	+31%/-10%	+12%/-13%	+28%/-52%
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 009655424-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-563 \pm 70$	$3.40^{+0.60}_{-0.47}$	$540^{+36}_{-26}$	$5361^{+399}_{-317}$	$6265^{+2296}_{-1857}$
Alt.	$-336 \pm 87$	$5.17^{+1.04}_{-0.60}$	$541^{+39}_{-26}$	$4082^{+259}_{-254}$	$1564^{+670}_{-545}$

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

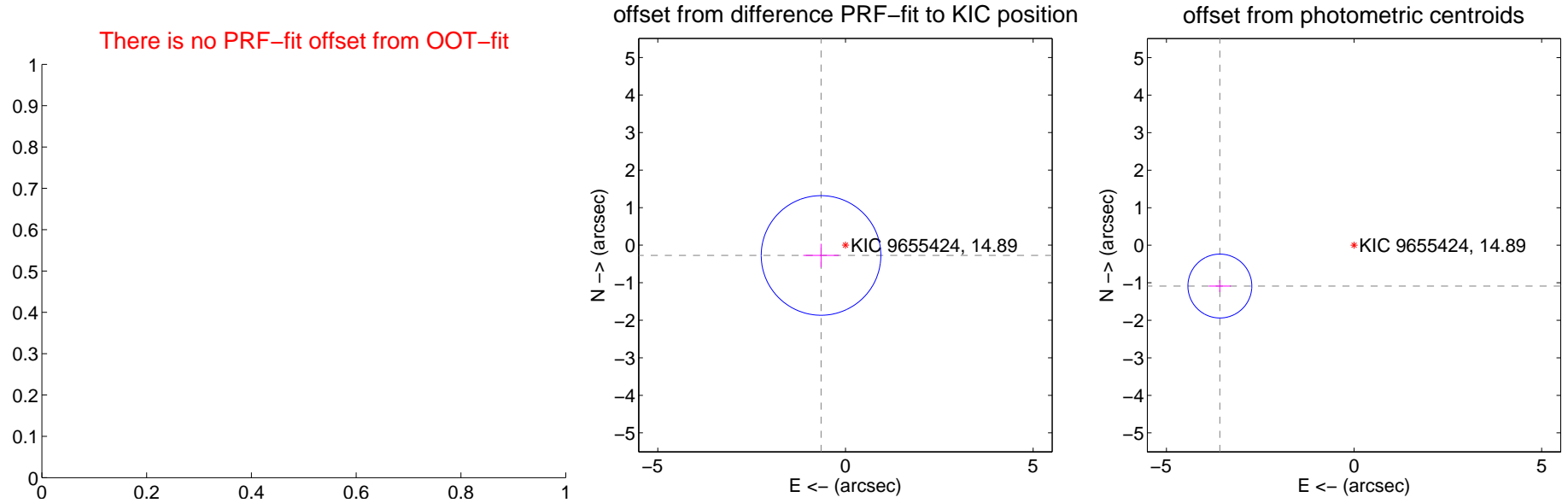
## DV Centroid Data

Supplemental centroid analysis for 009655424-03. Kepler magnitude: 14.89. Transit SNR 7.57

There are 2 quarters with good PRF difference image offsets

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

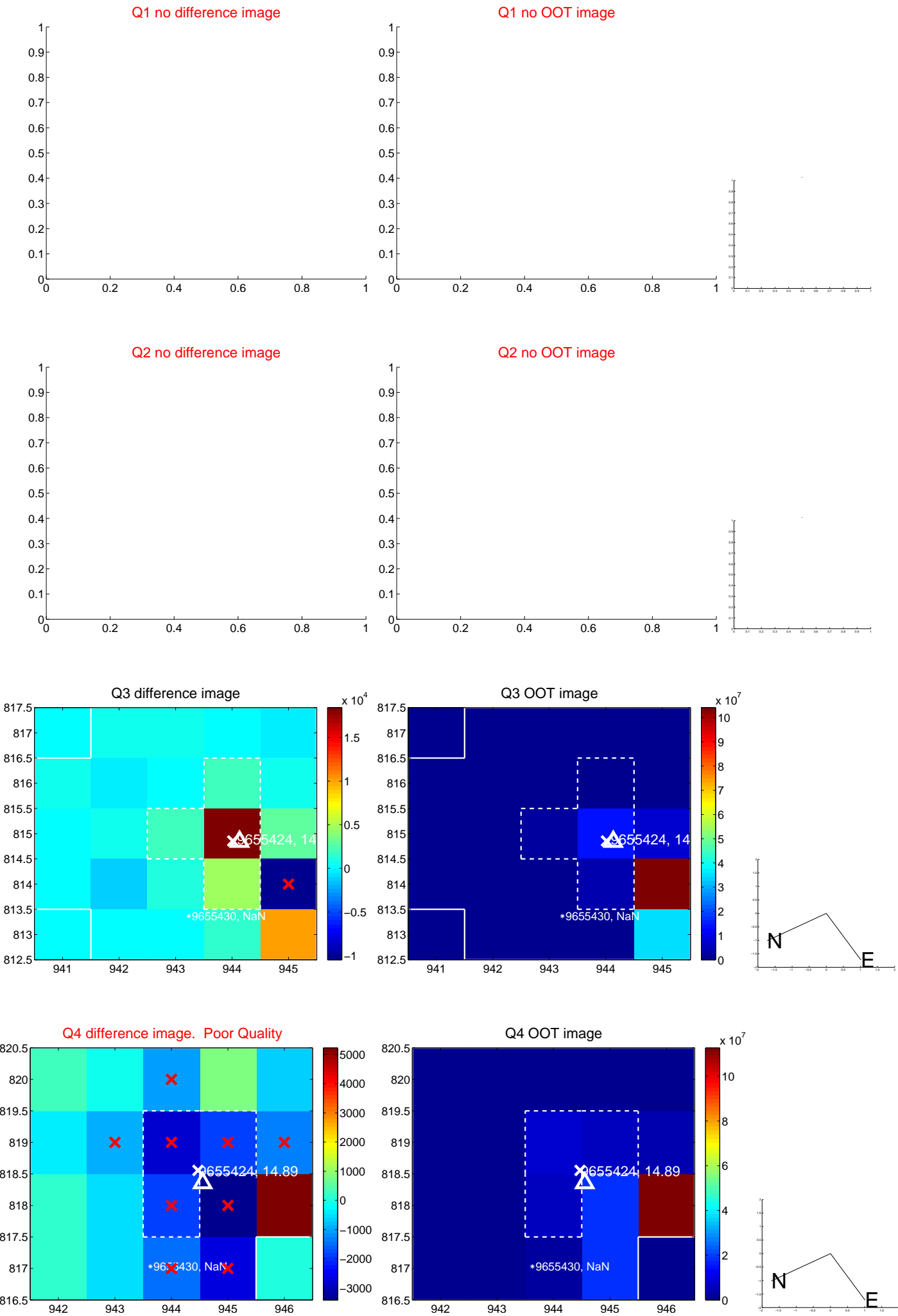
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	—	—	—	—
PRF-fit source offset from KIC position	$0.706 \pm 0.531$	1.33	$0.651 \pm 0.473$	$-0.274 \pm 0.311$
photometric centroid source offset	$3.74 \pm 0.28$	13.17	$3.58 \pm 0.29$	$-1.09 \pm 0.16$



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.

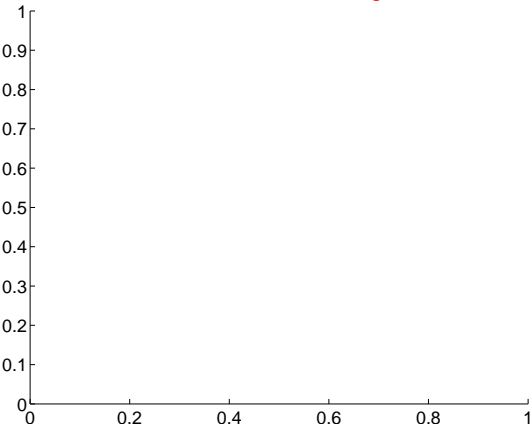


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

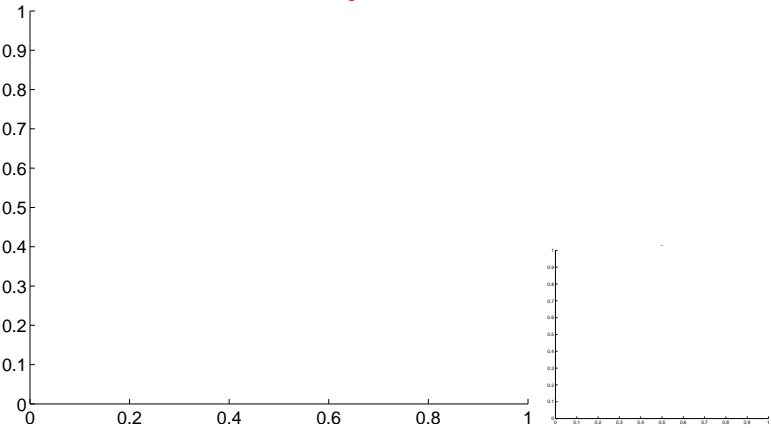


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

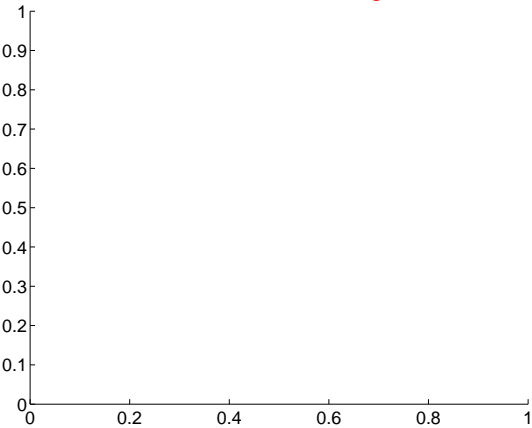
Q5 no difference image



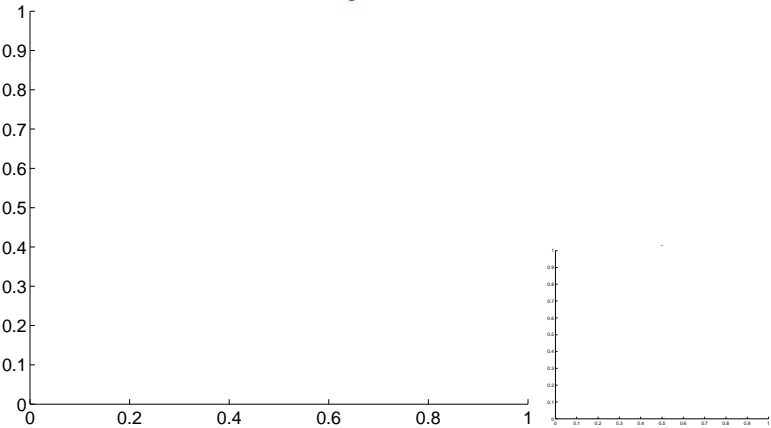
Q5 no OOT image



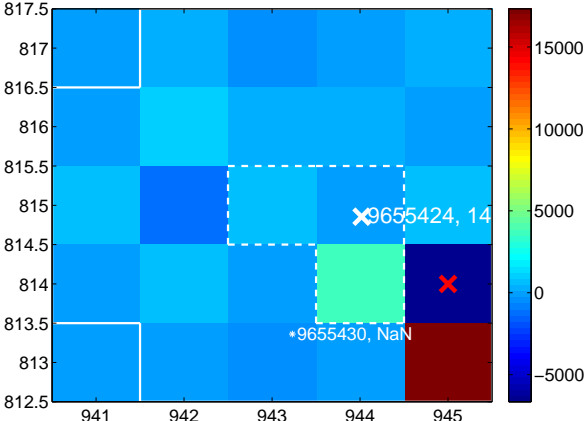
Q6 no difference image



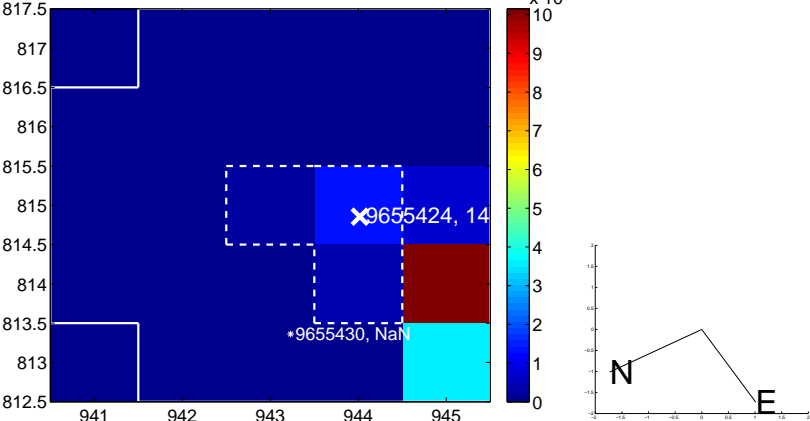
Q6 no OOT image



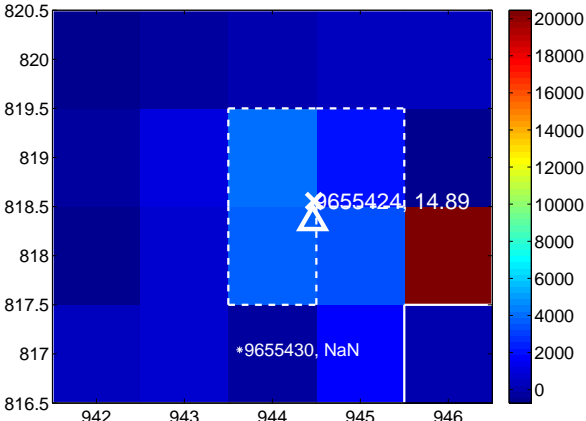
Q7 difference image. Poor Quality



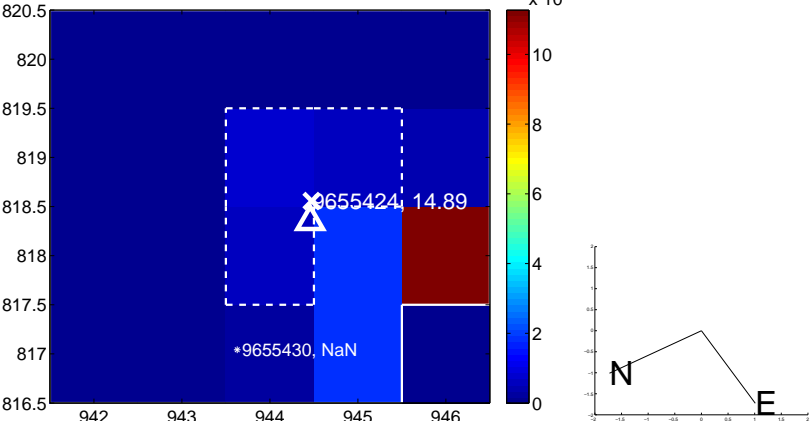
Q7 OOT image



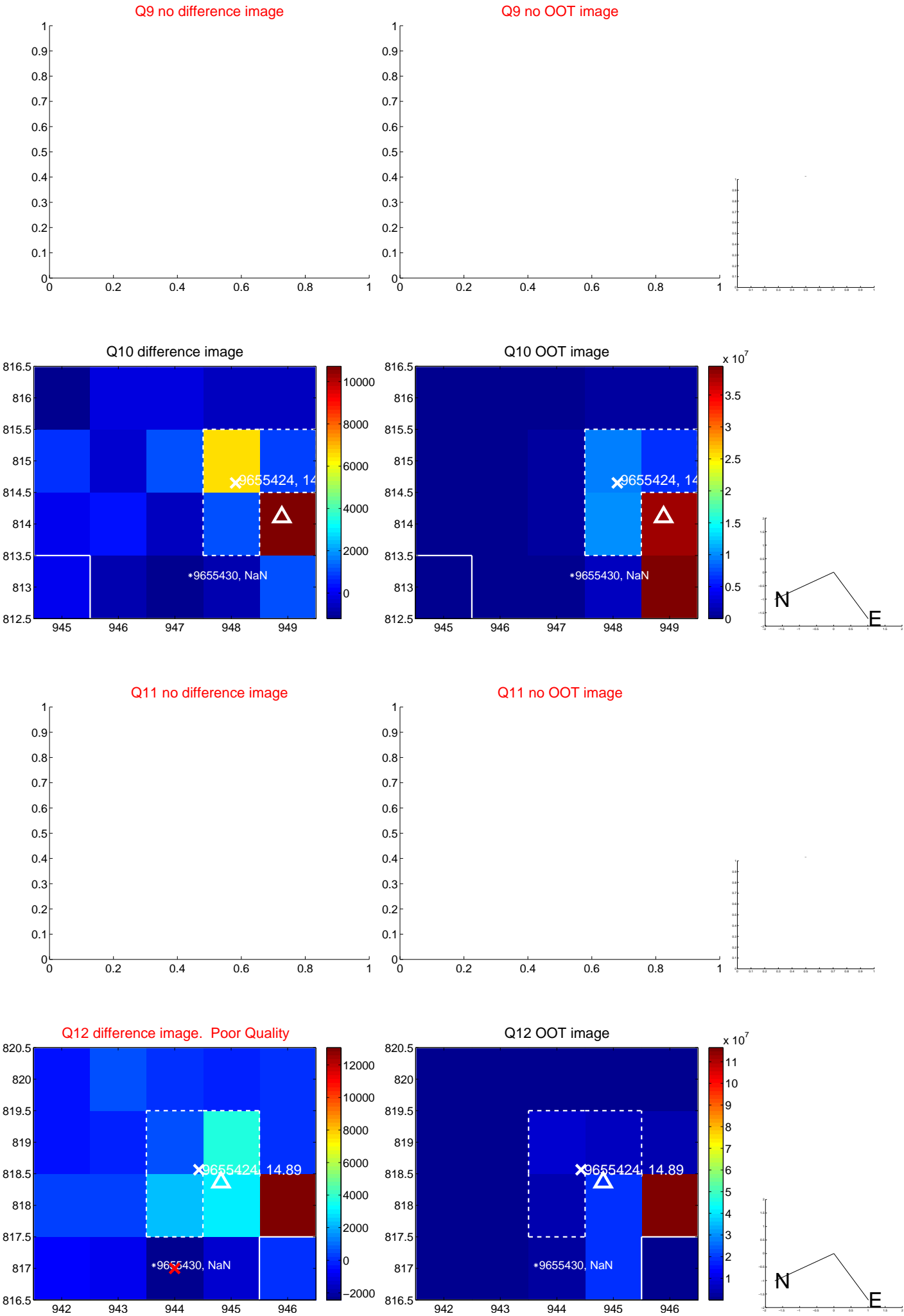
Q8 difference image. Poor Quality



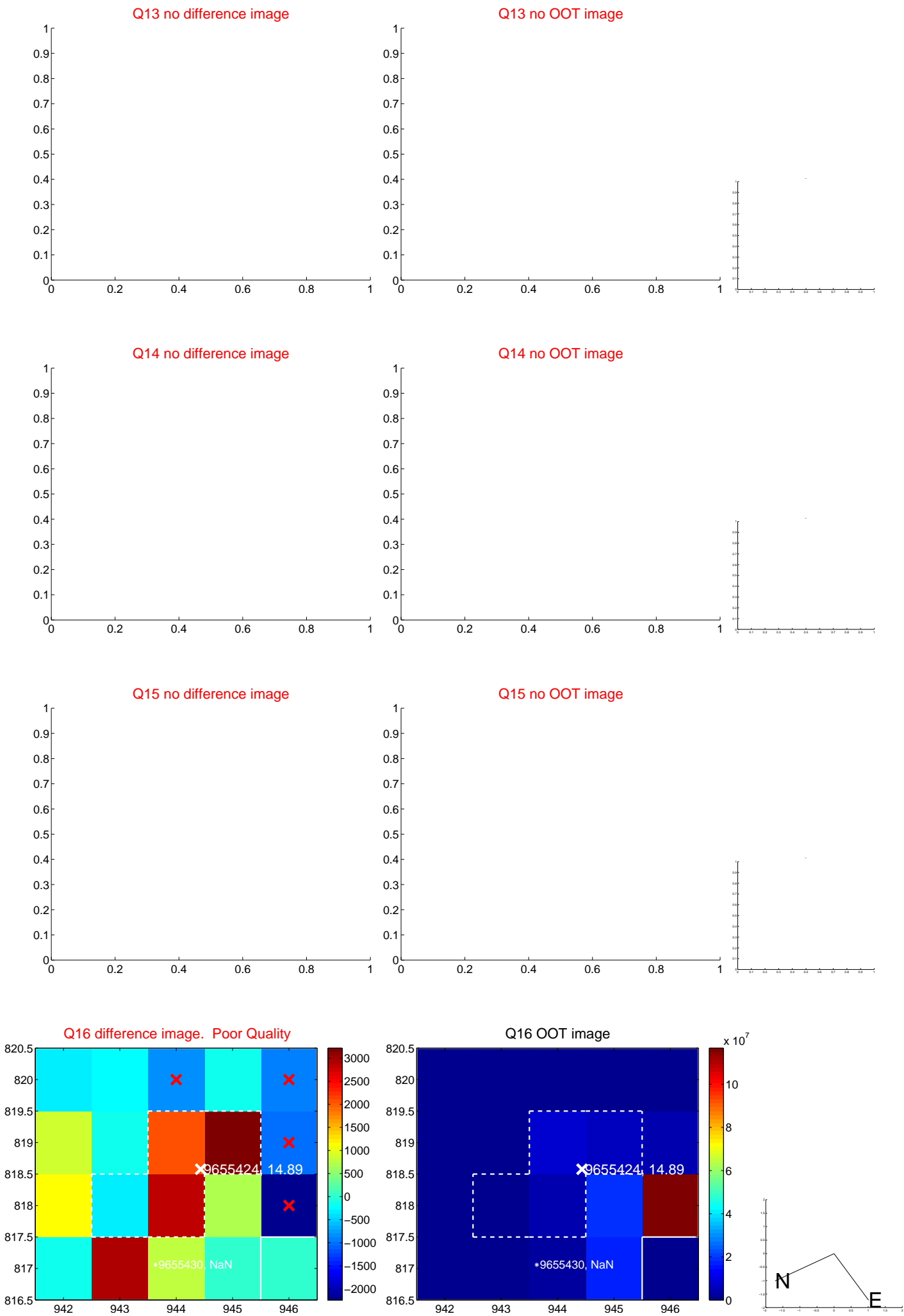
Q8 OOT image



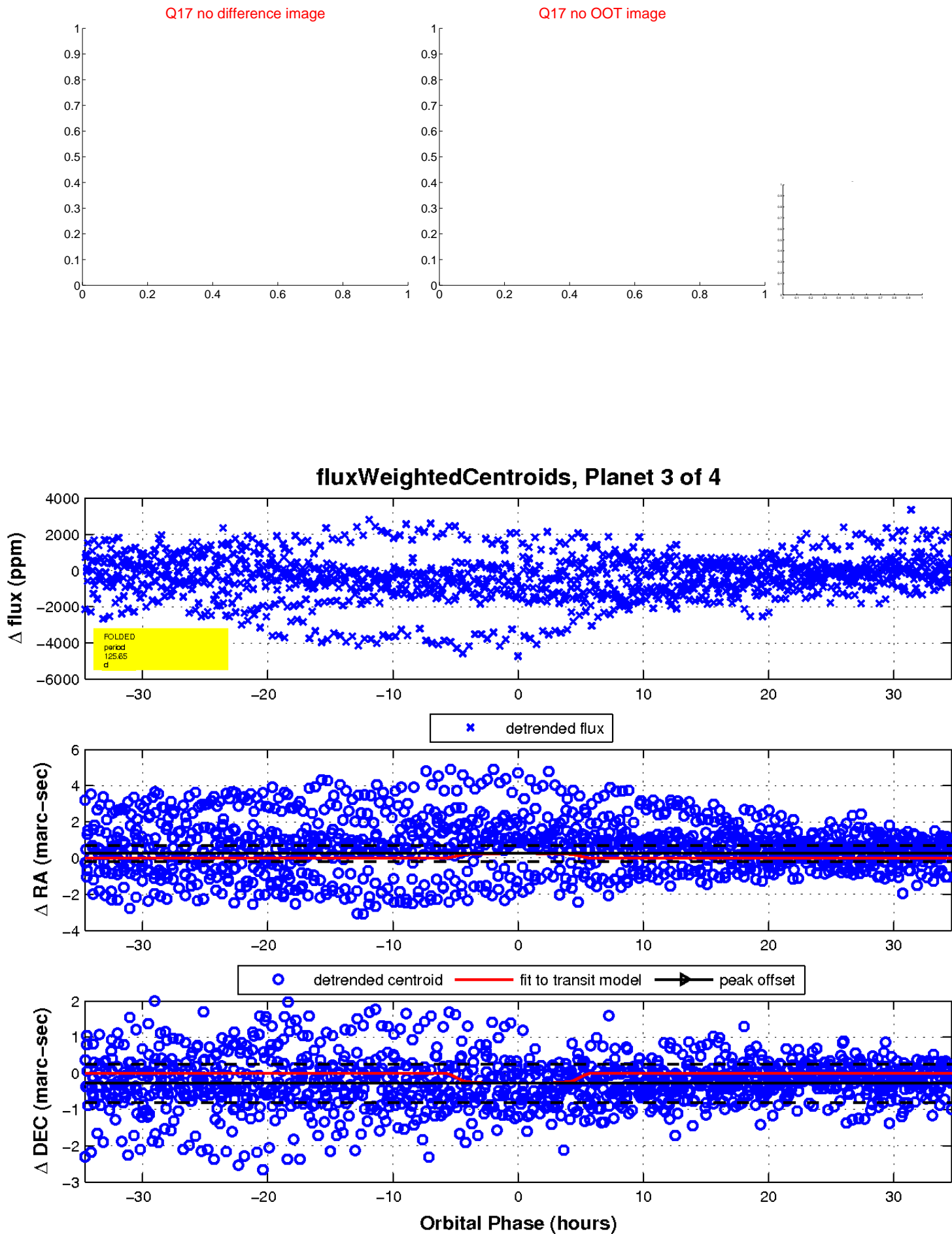
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



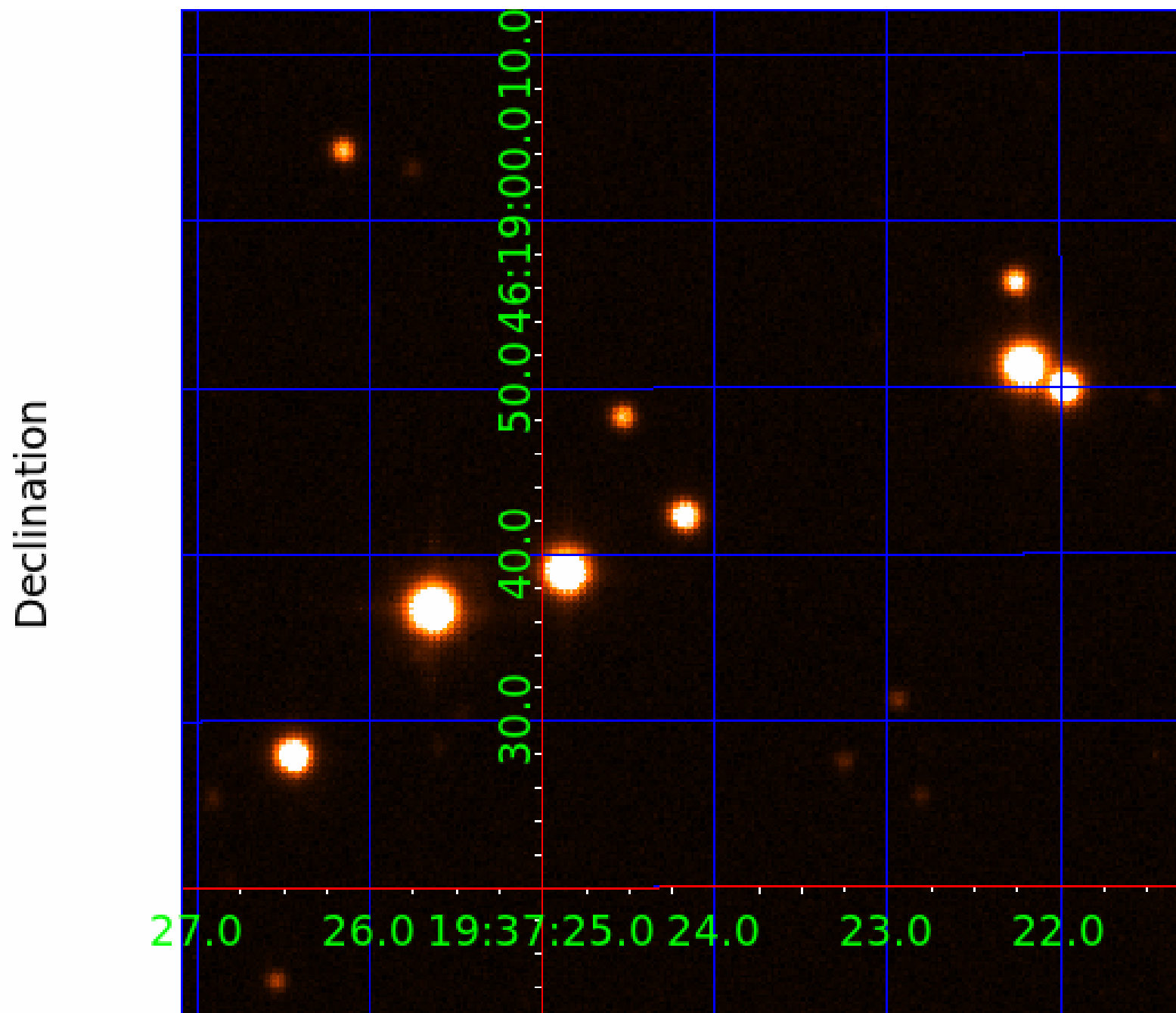
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image





# KIC 009655424

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009655424-01	OBS	7218.01	1.036329	131.565116	54.7	4.792	8.1	9.6	0.93	6240	0.82	2917.29
009655424-03	OBS	No	125.646988	161.876219	923.3	11.547	16.7	7.6	0.93	6240	3.27	4.86
009655424-04	OBS	No	627.781049	306.434647	3353.6	28.481	8.6	10.4	0.93	6240	5.45	0.57

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009655424-01	OBS	FP	0.00	1	0	1	0	LPP_DV—CENT_RESOLVED_OFFSET
009655424-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
009655424-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—ALL_TRANS_CHASES—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 009655424-04

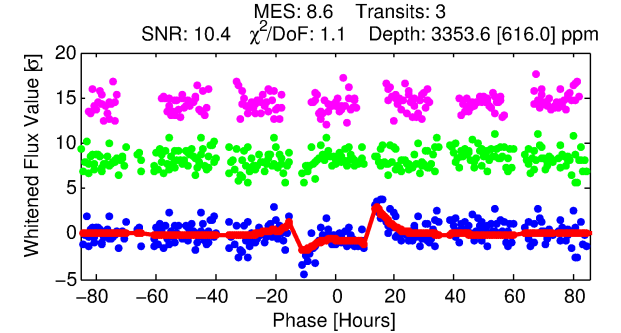
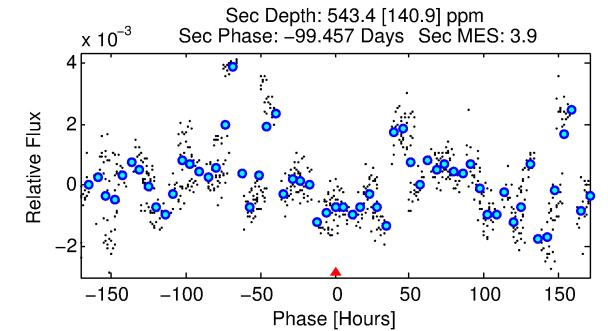
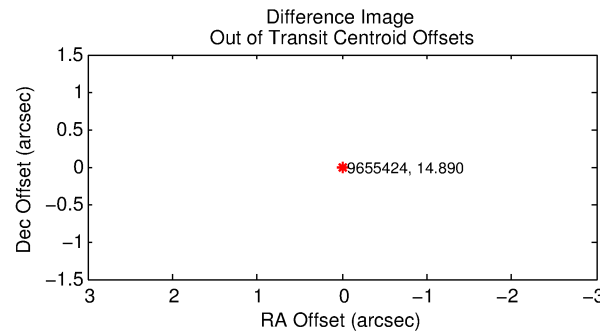
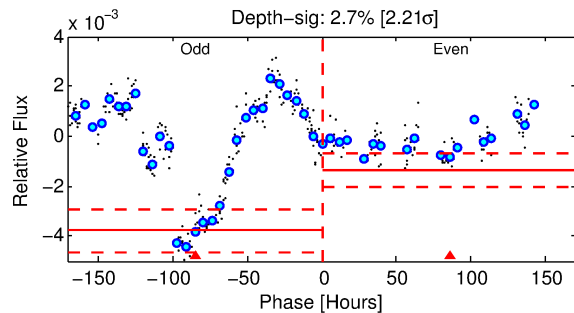
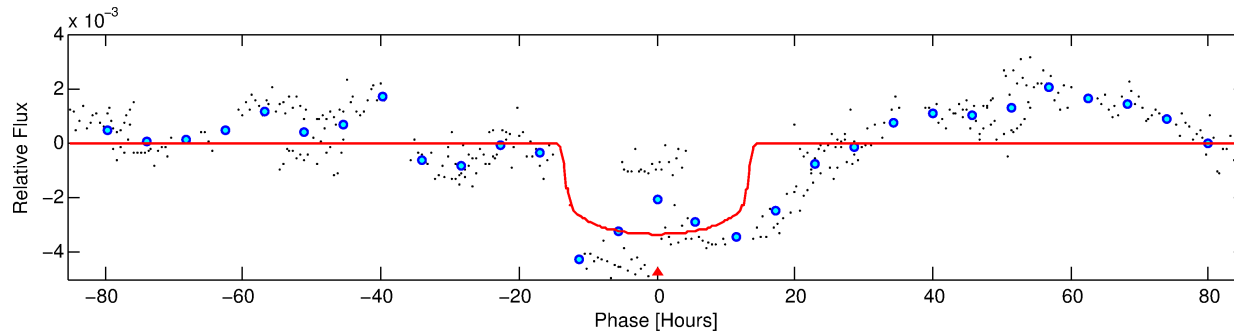
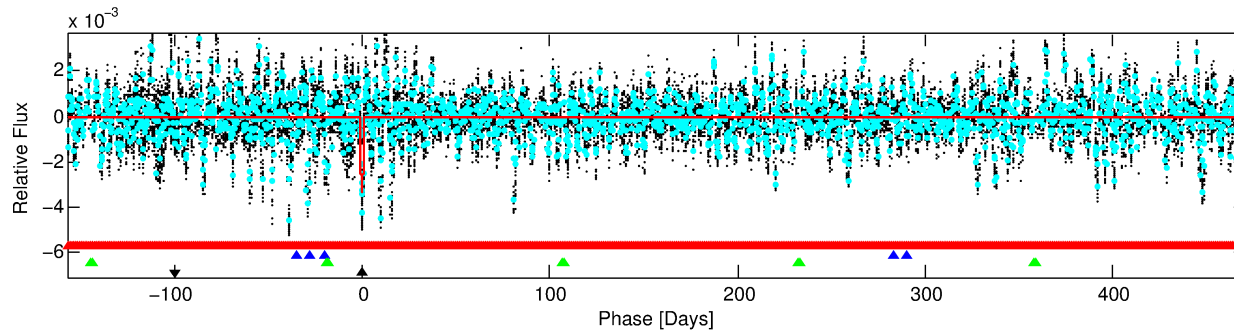
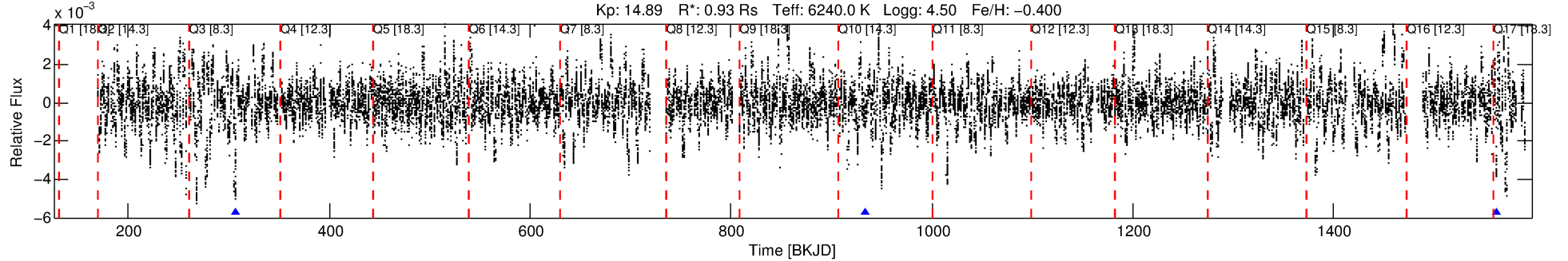
No Significant Match Found

# DV One-Page Summary

KIC: 9655424 Candidate: 4 of 4 Period: 627.781 d

KOI: K07218 Corr: No Ephemeris Match

Kp: 14.89 R\*: 0.93 Rs Teff: 6240.0 K Logg: 4.50 Fe/H: -0.400



## DV Fit Results:

Period = 627.78105 [0.04925] d  
Epoch = 306.4346 [0.0547] BKJD  
Rp/R\* = 0.0538 [0.0158]  
a/R\* = 169.36 [191.82]  
b = 0.31 [3.27]  
Seff = 0.57 [0.23]  
Teq = 221 [23] K  
Rp = 5.45 [2.34] Re  
a = 1.4352 [0.3764] AU  
Ag = 20729.63 [15479.18] [1.34σ]  
Teffp = 4109 [676] K [5.75σ]

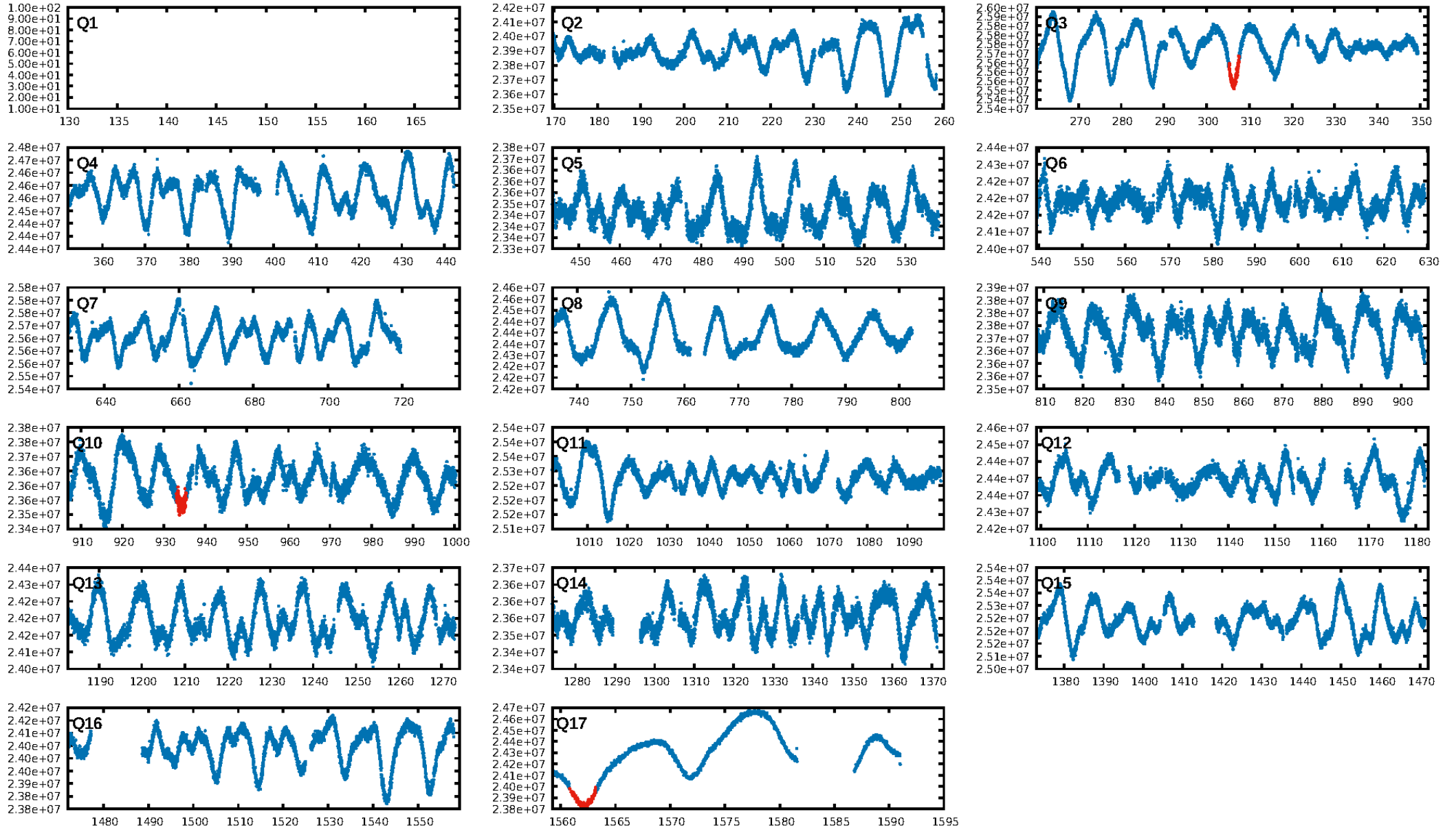
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [251.14σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 45.5%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 2.32e-10  
RollingBand-fgt: 1.00 [2/2]  
GhostDiagnostic-chr: -1.572  
Centroid-sig: 62.8%  
Centroid-so: 4.051 arcsec [24.32σ]  
OotOffset-rm: N/A  
KicOffset-rm: 0.487 arcsec [1.21σ]  
OotOffset-st: 0/0/0 [0]  
KicOffset-st: 1/1/0/0 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 0.00 [0/2]

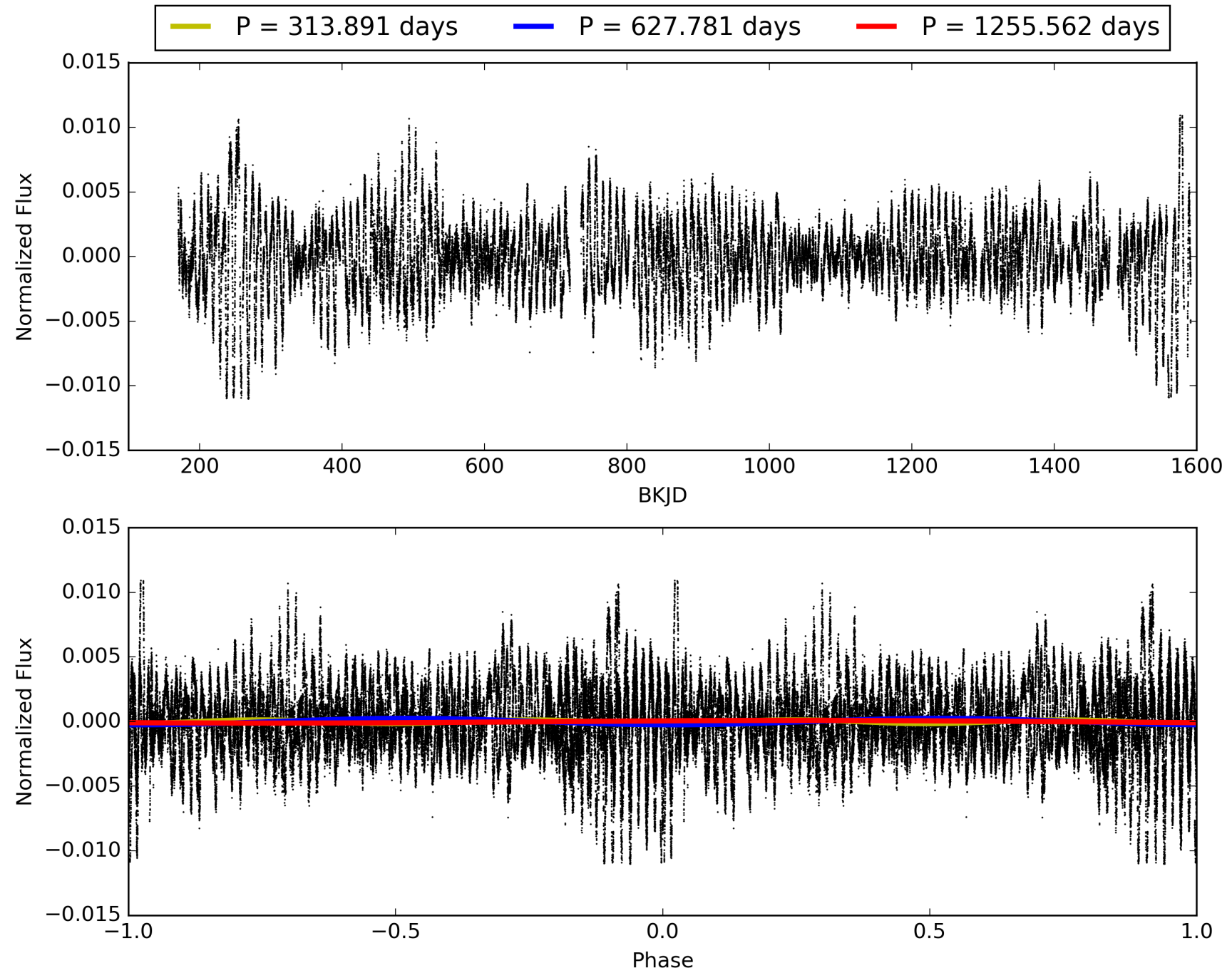
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 11:37:48 Z

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

# TCE 009655424-04, PDC Light Curves

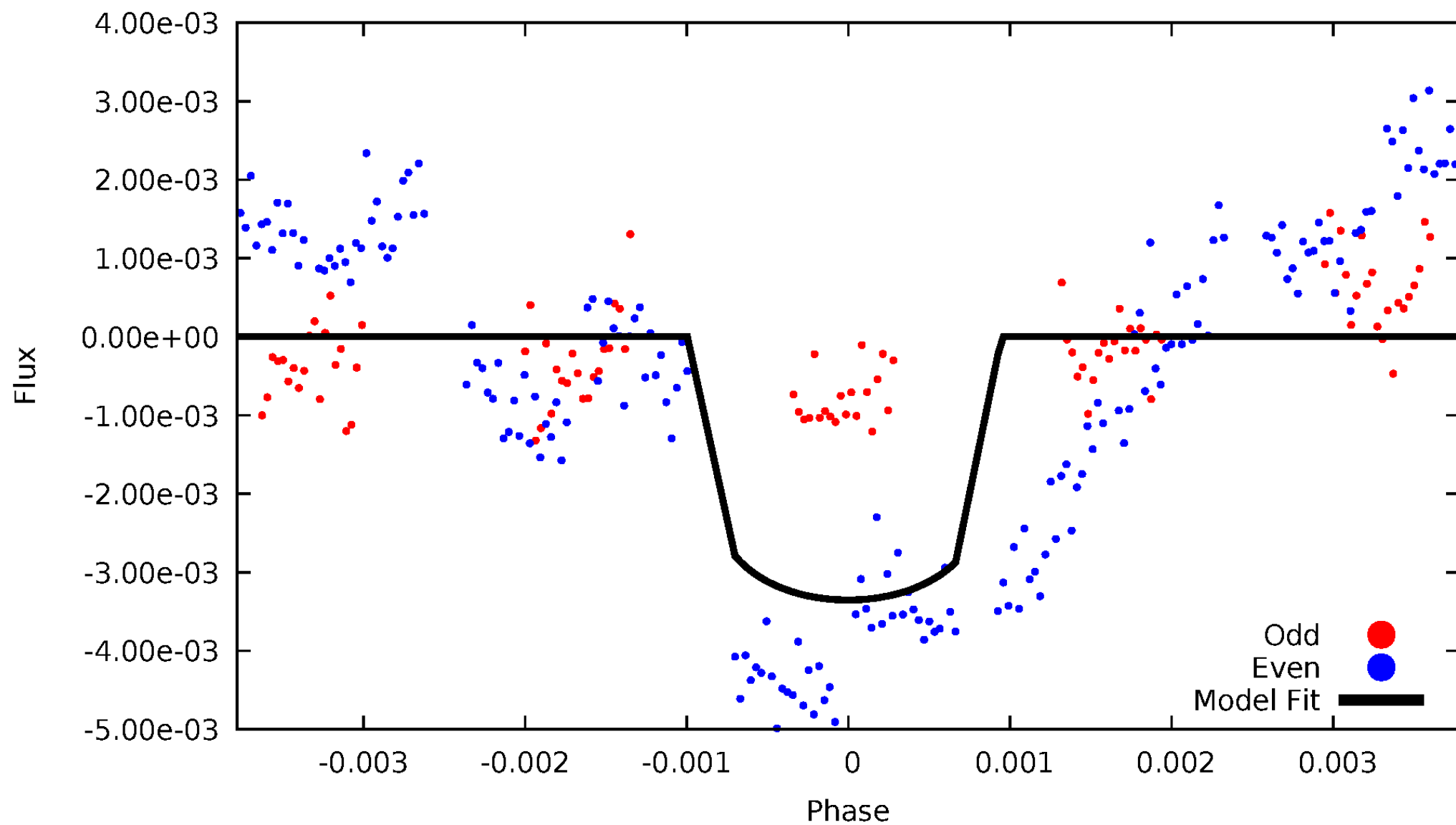


TCE 009655424-04



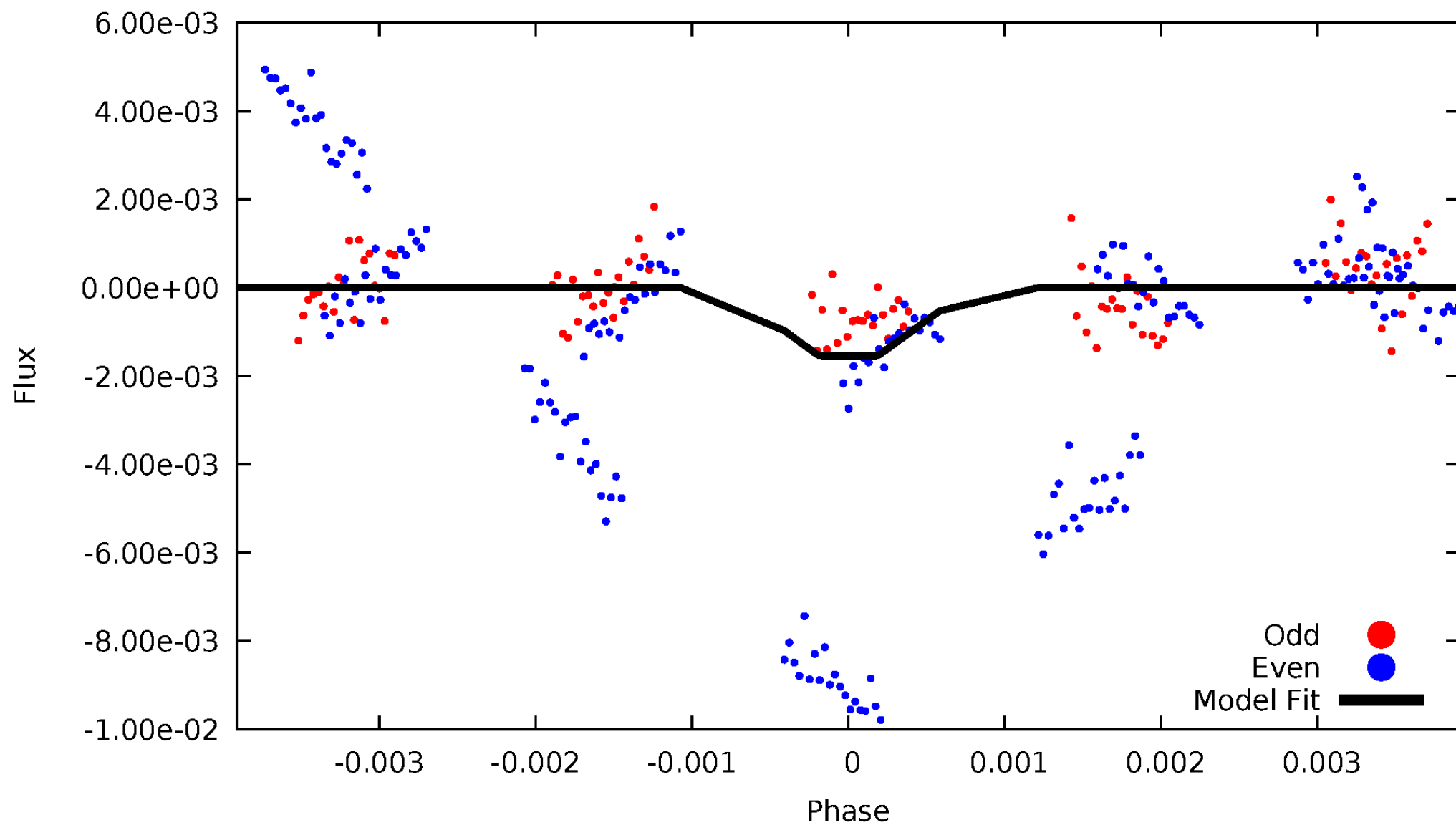
# DV Odd/Even

TCE 009655424-04



# ALT Odd/Even

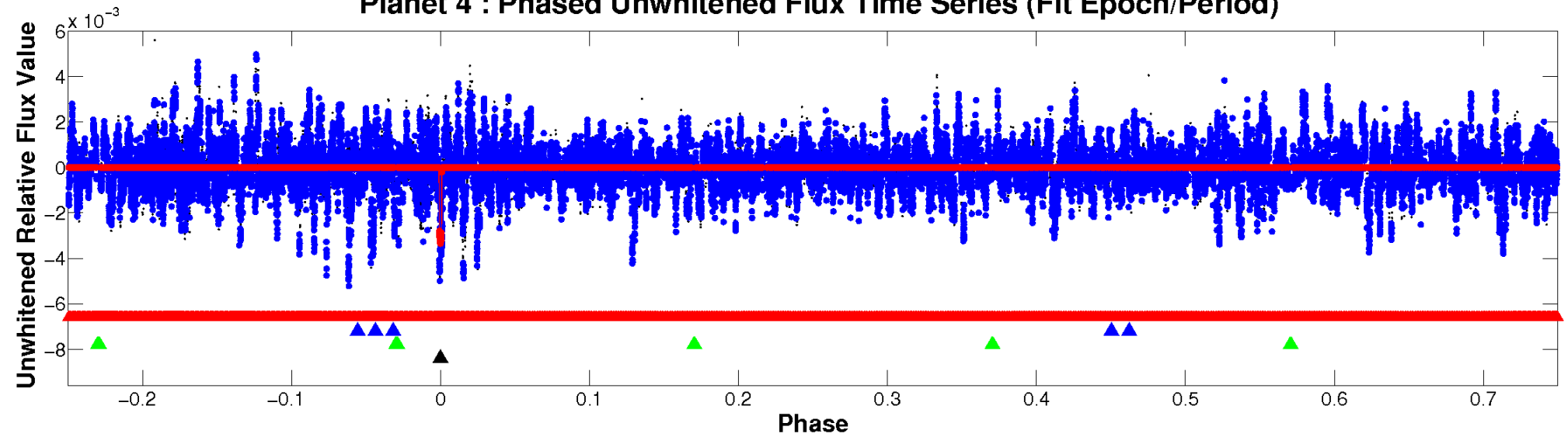
TCE 009655424-04



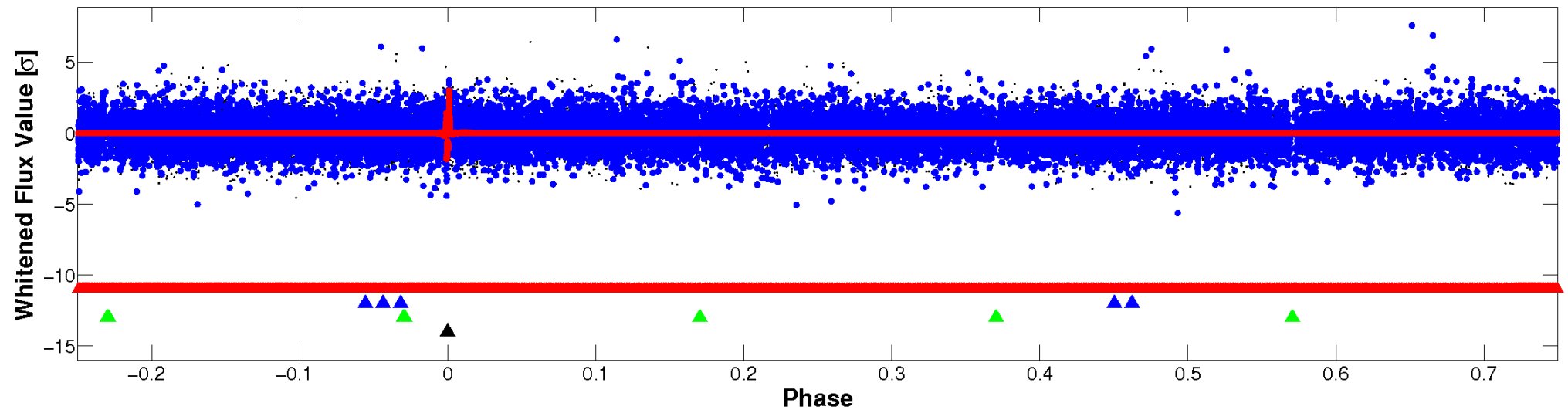


# Non-Whitened Vs. Whitened Light Curve

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

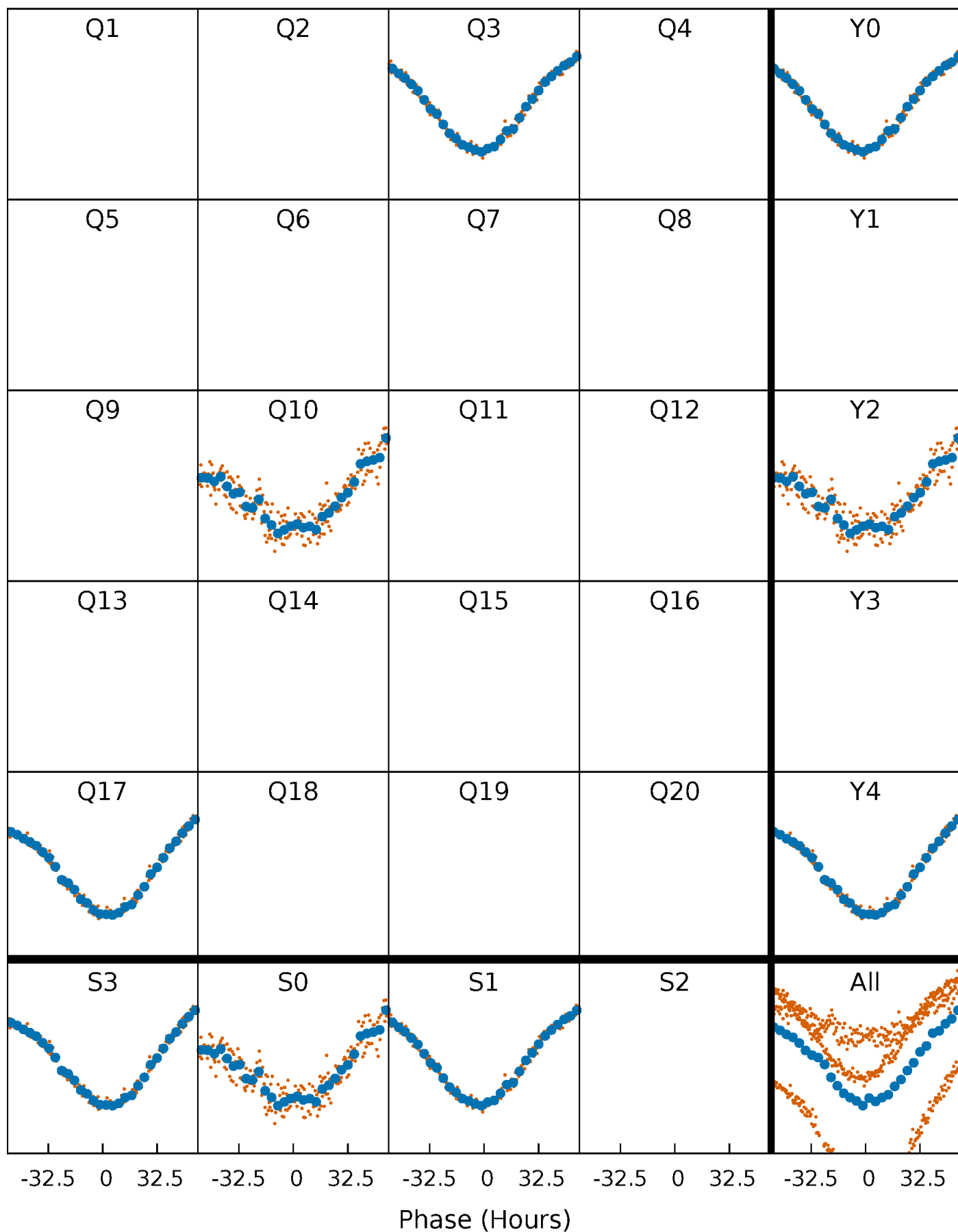


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



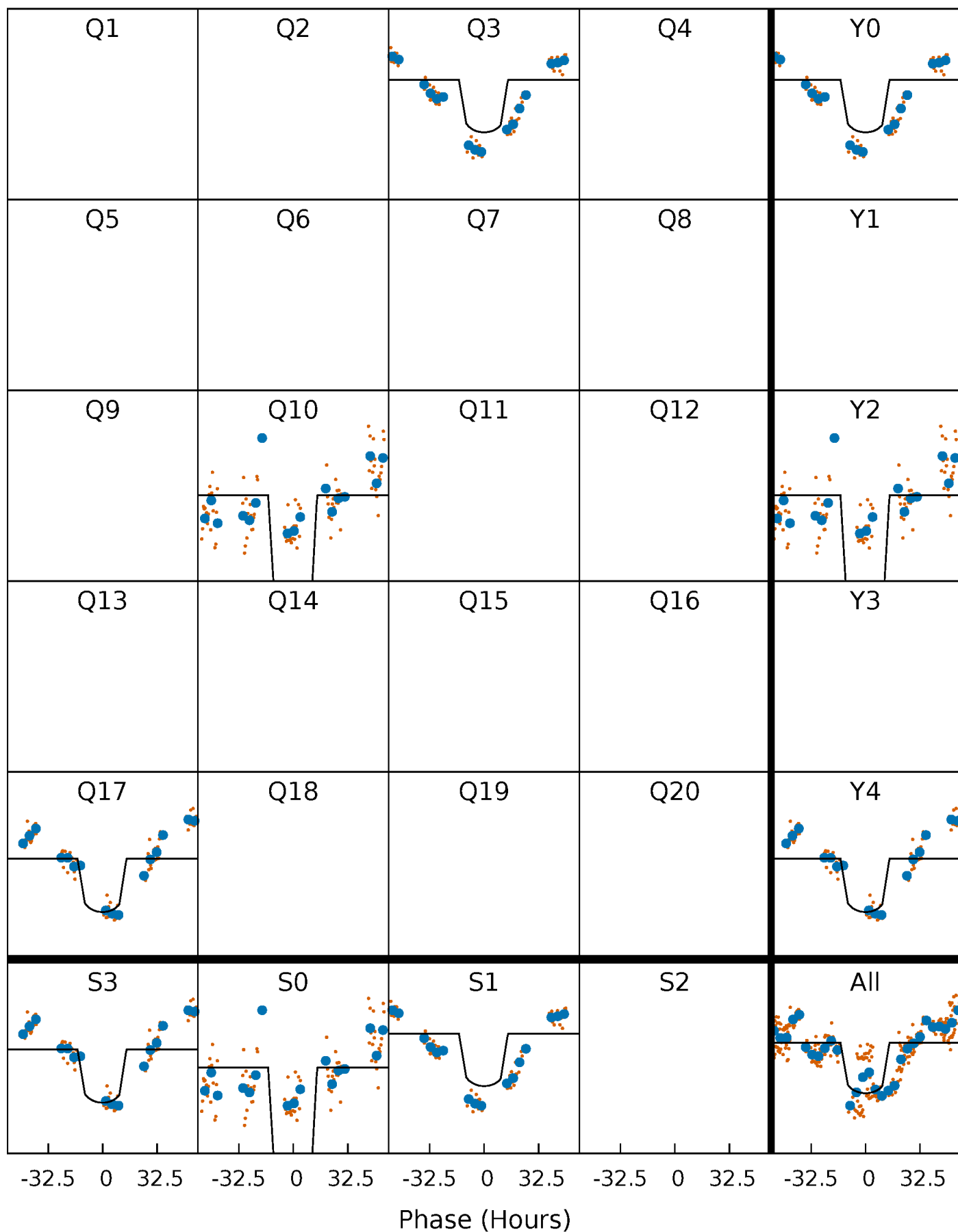
# PDC Quarter-Phased Transit Curves

TCE 009655424-04     $P=627.781049$  Days     $T_0=306.434647$  (BKJD)



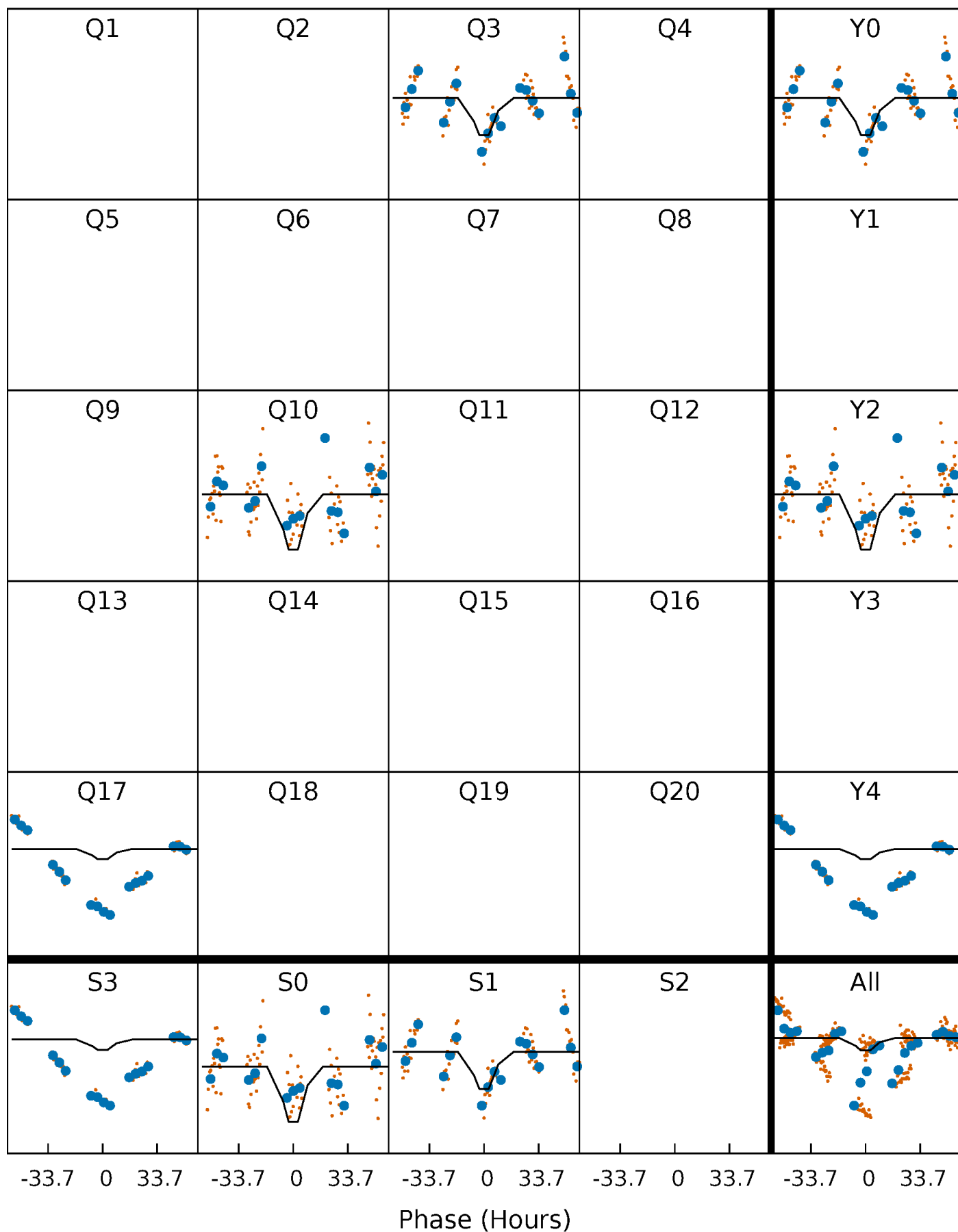
# DV Quarter-Phased Transit Curves

TCE 009655424-04     $P=627.781049$  Days     $T_0=306.434647$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

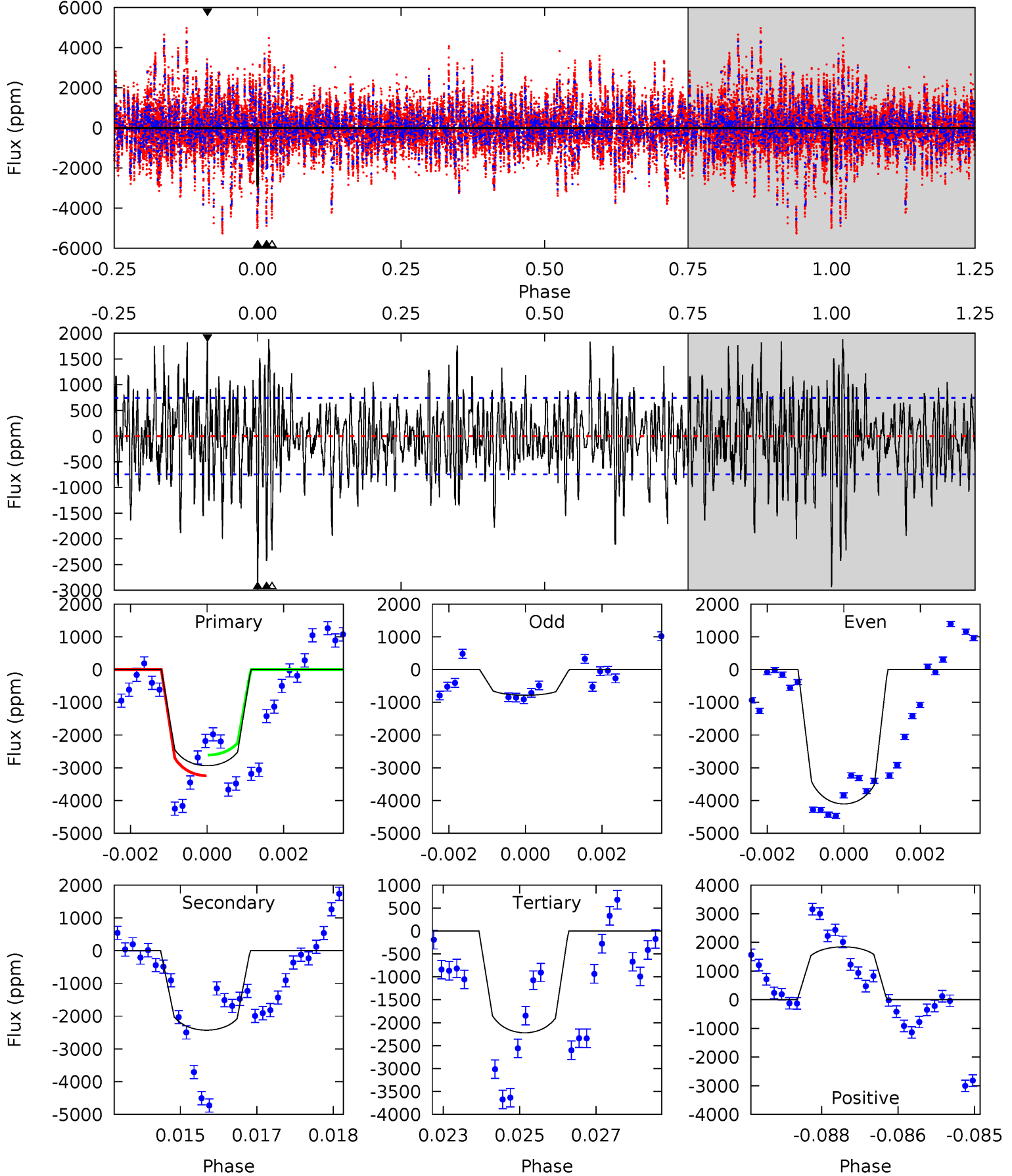
TCE 009655424-04 P=628.134446 Days  $T_0=306.014494$  (BKJD)



# DV Model-Shift Uniqueness Test

009655424-04, P = 627.781049 Days, E = 306.434647 Days

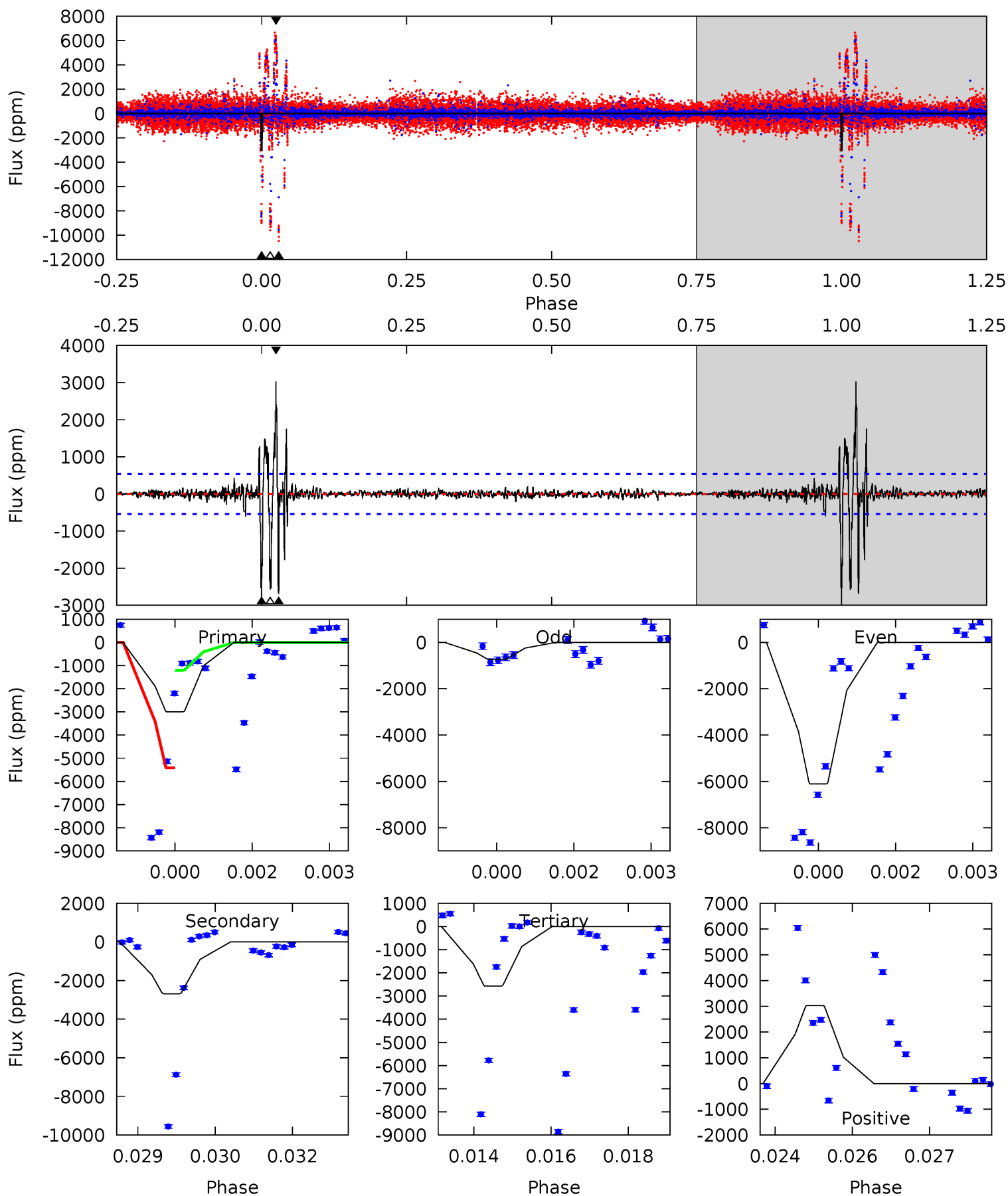
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
21.1	17.5	16.0	13.3	5.36	3.15	4.42	5.15	7.85	1.50	4.19	11.6	0.84	0.39	2.29



# Alt Model-Shift Uniqueness Test

009655424-04, P = 628.134446 Days, E = 306.014494 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
29.6	26.5	25.4	29.9	5.37	3.16	2.83	4.19	-0.30	1.08	-3.41	28.8	2.38	0.50	21.0





### Stellar Parameters For KIC 009655424

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6240^{+169}_{-226}$	$4.502^{+0.052}_{-0.208}$	$-0.400^{+0.300}_{-0.300}$	$0.929^{+0.290}_{-0.097}$	$1.000^{+0.120}_{-0.133}$	$1.758^{+0.484}_{-0.912}$
	+3%/-4%	+1%/-5%	+75%/-75%	+31%/-10%	+12%/-13%	+28%/-52%
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 009655424-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-2429 \pm 139$	$5.69^{+1.81}_{-1.61}$	$315^{+23}_{-15}$	$5947^{+1115}_{-721}$	$83399^{+79713}_{-36122}$
Alt.	$-2683 \pm 101$	$4.15^{+1.86}_{-1.73}$	$316^{+22}_{-15}$	$7224^{+2916}_{-1192}$	$173989^{+322194}_{-92834}$

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

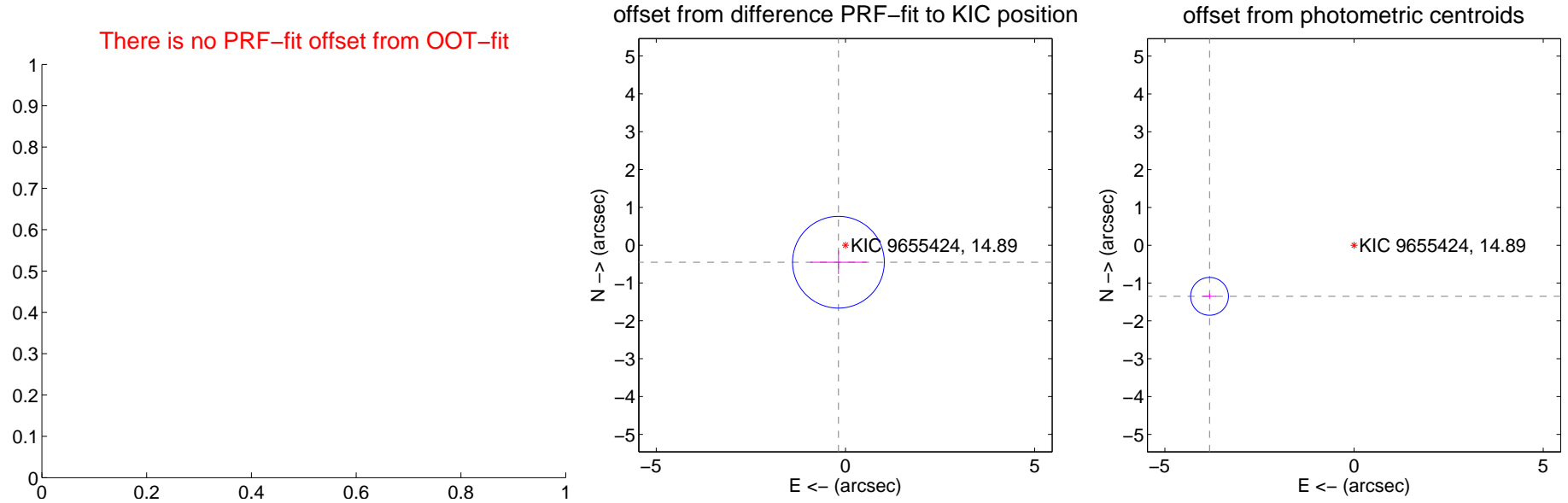
## DV Centroid Data

Supplemental centroid analysis for 009655424-04. Kepler magnitude: 14.89. Transit SNR 10.38

There are 1 quarters with good PRF difference image offsets

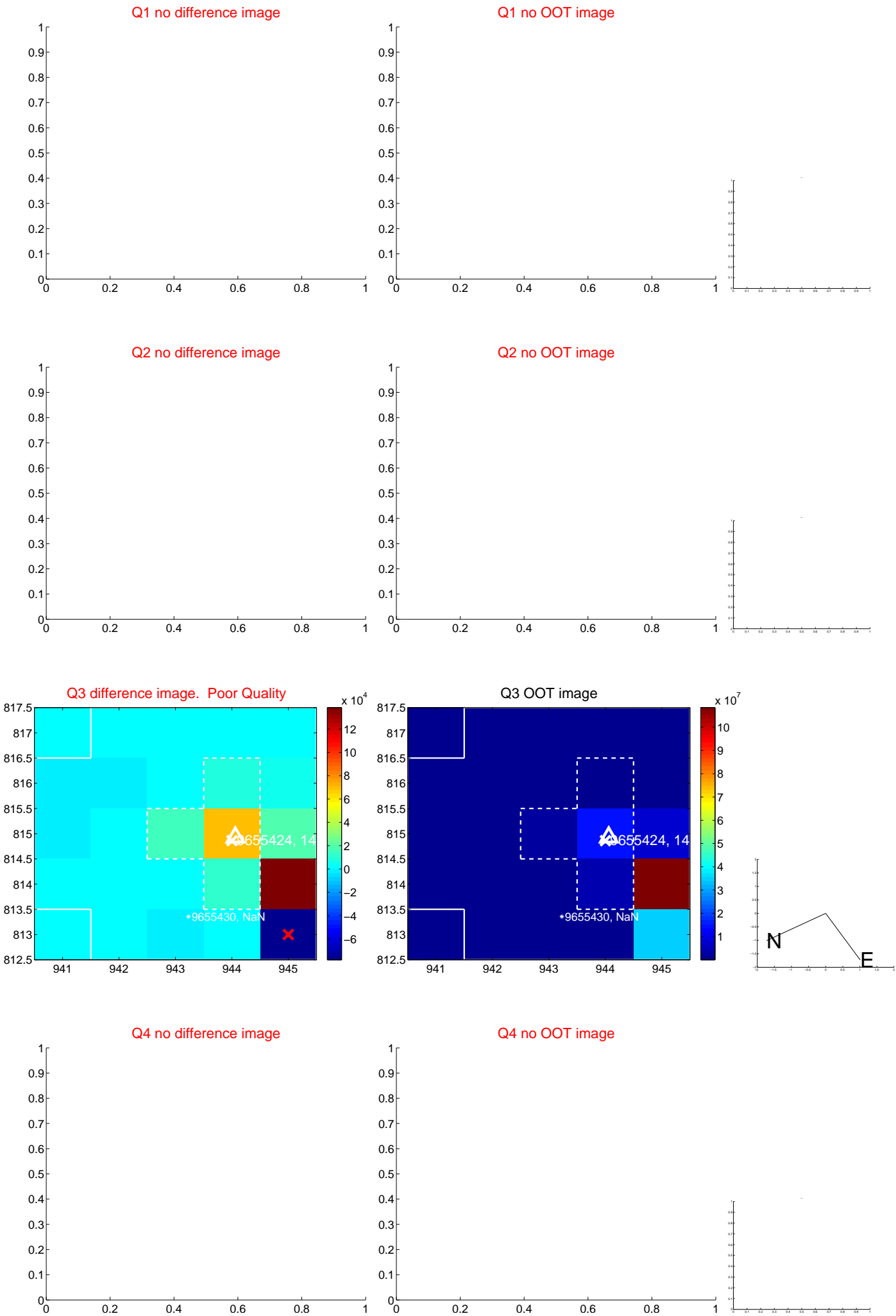
The direct PRF centroid is offset from the target star catalog position by about NaN arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	—	—	—	—
PRF-fit source offset from KIC position	$0.487 \pm 0.404$	1.21	$0.186 \pm 0.744$	$-0.450 \pm 0.311$
photometric centroid source offset	$4.05 \pm 0.17$	24.32	$3.82 \pm 0.17$	$-1.35 \pm 0.07$



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.

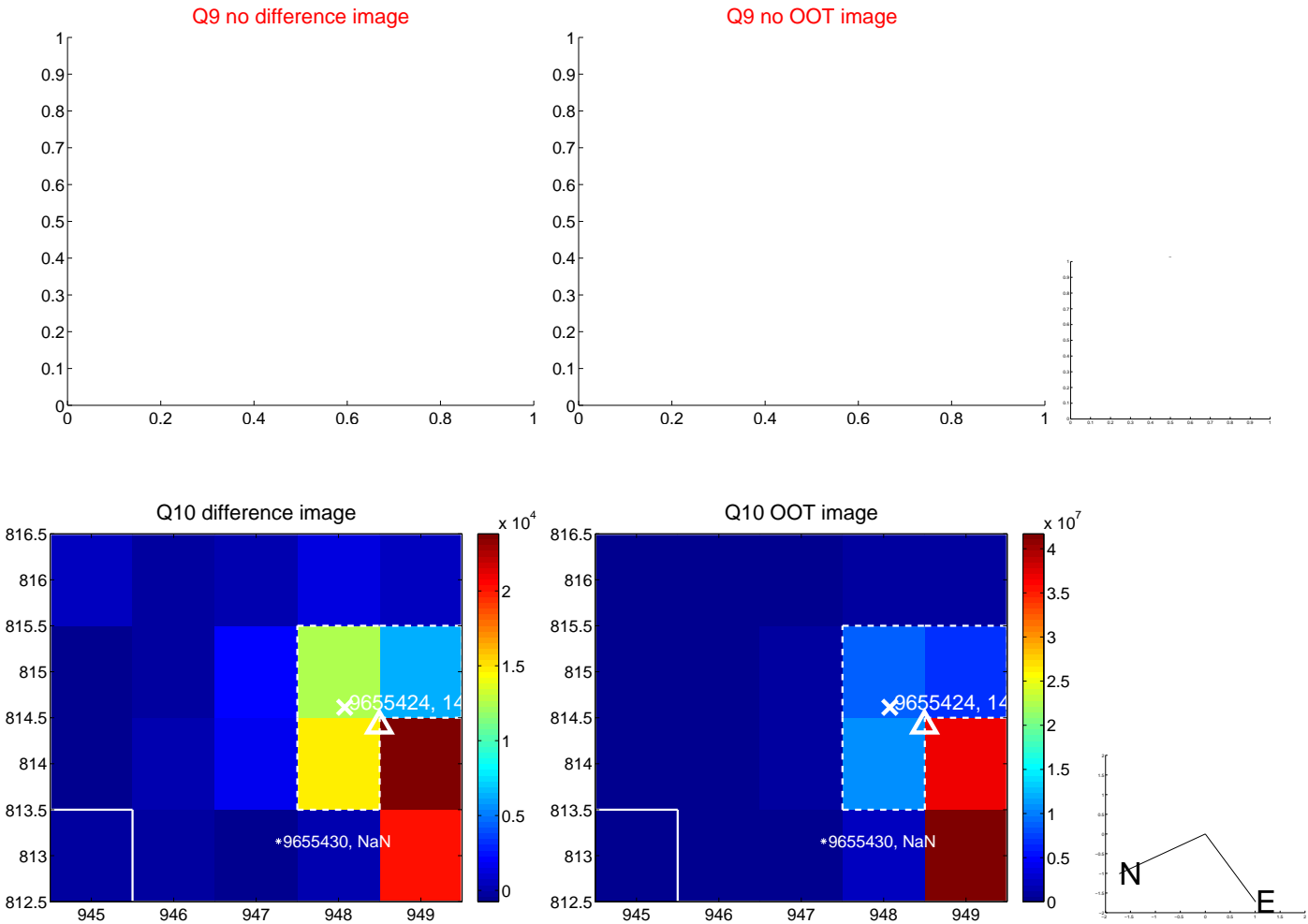
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



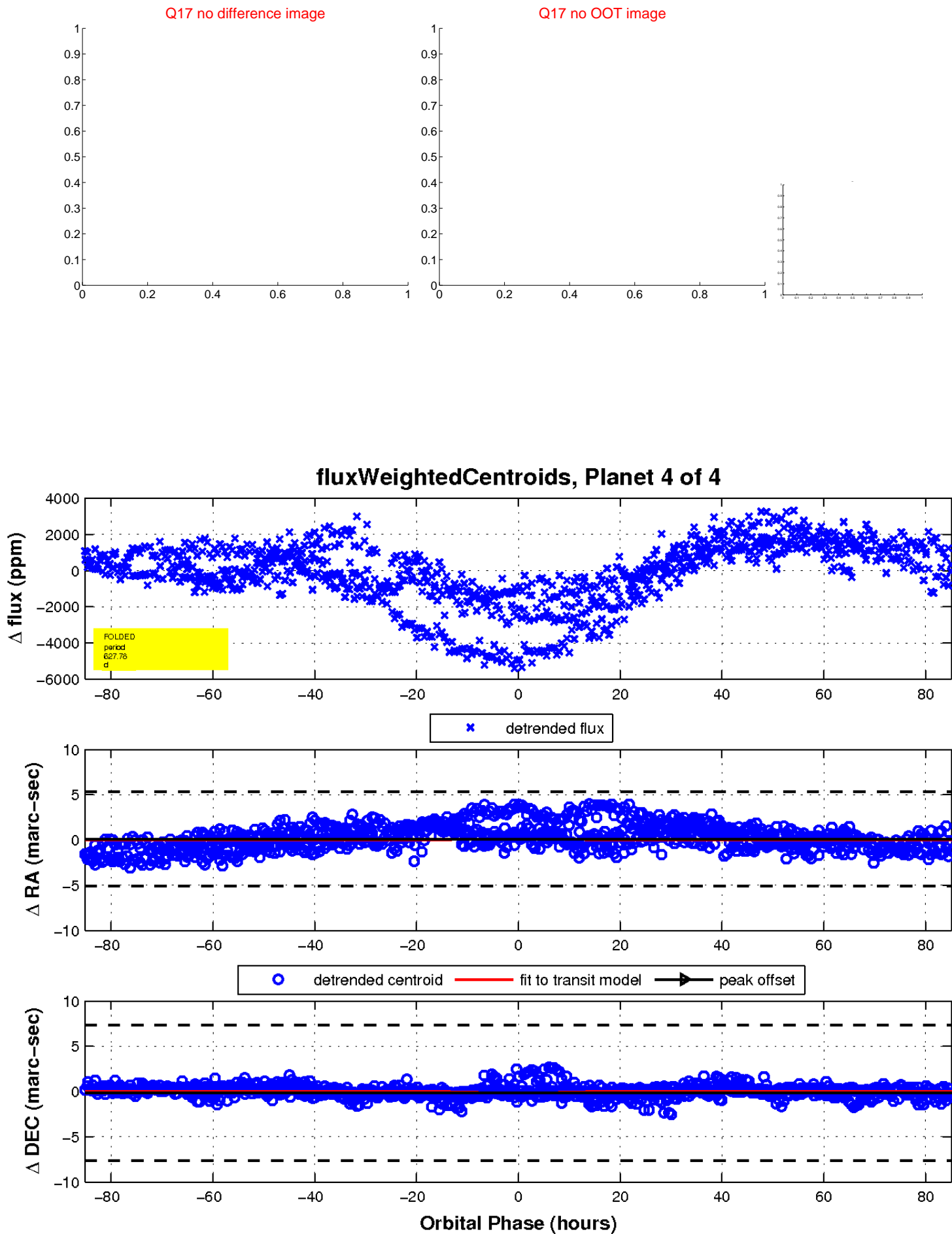
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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.





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