

# KIC 009291618

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009291618-01	OBS	No	0.524048	131.600031	479.1	1.031	13.0	15.6	3.49	7816	7.82	0.00
009291618-02	OBS	No	0.524047	131.812565	511.1	1.135	13.4	17.4	3.49	7816	9.25	0.00

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009291618-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
009291618-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_SATURATED

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

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

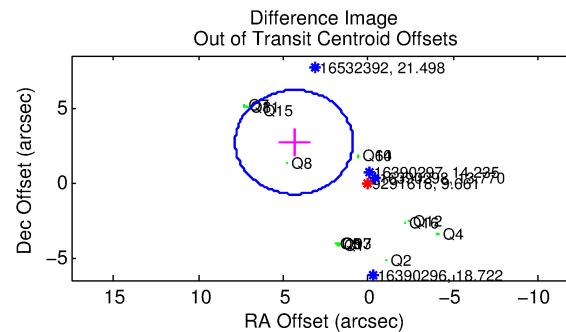
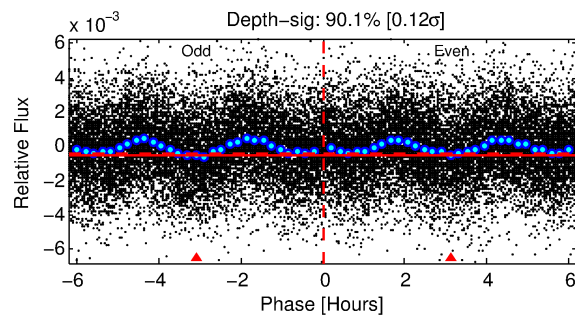
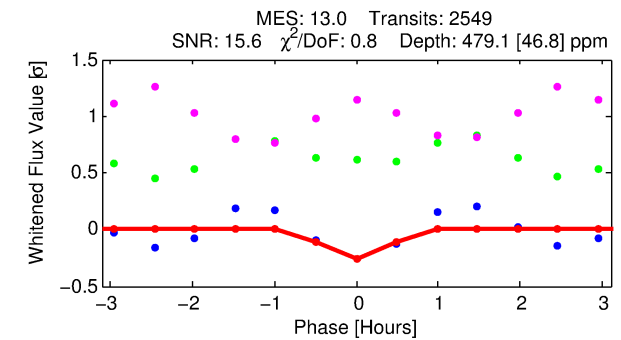
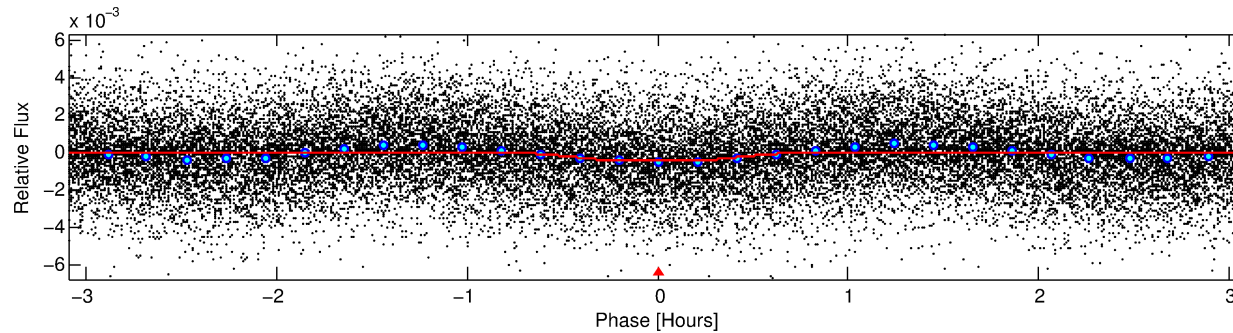
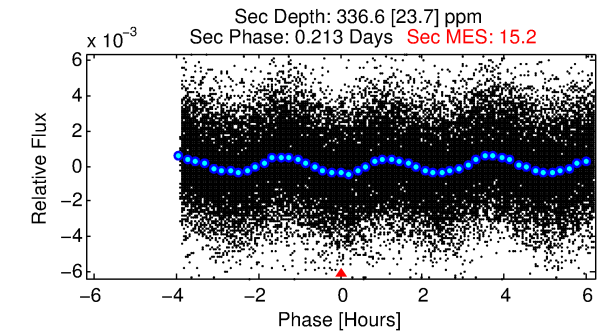
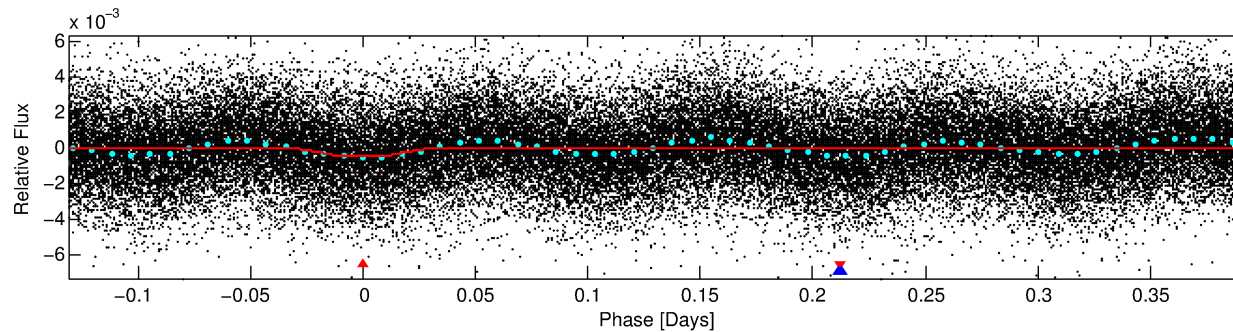
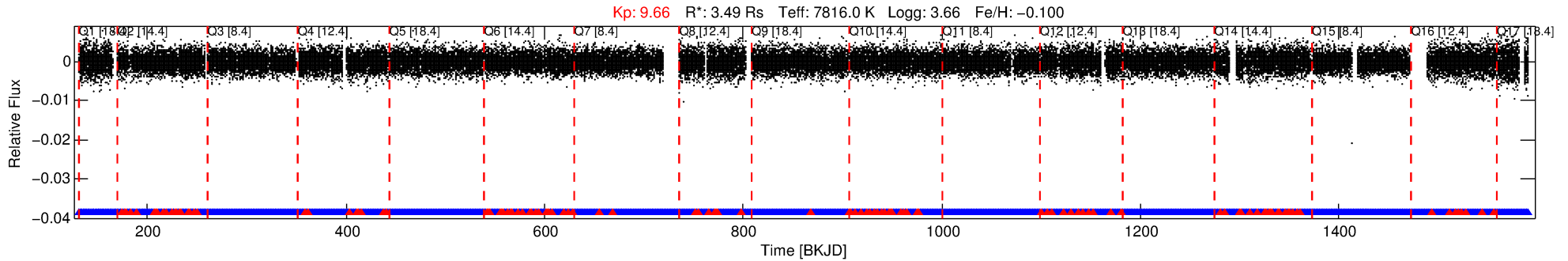
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009291618-01

No Significant Match Found

# DV One-Page Summary

KIC: 9291618 Candidate: 1 of 2 Period: 0.524 d



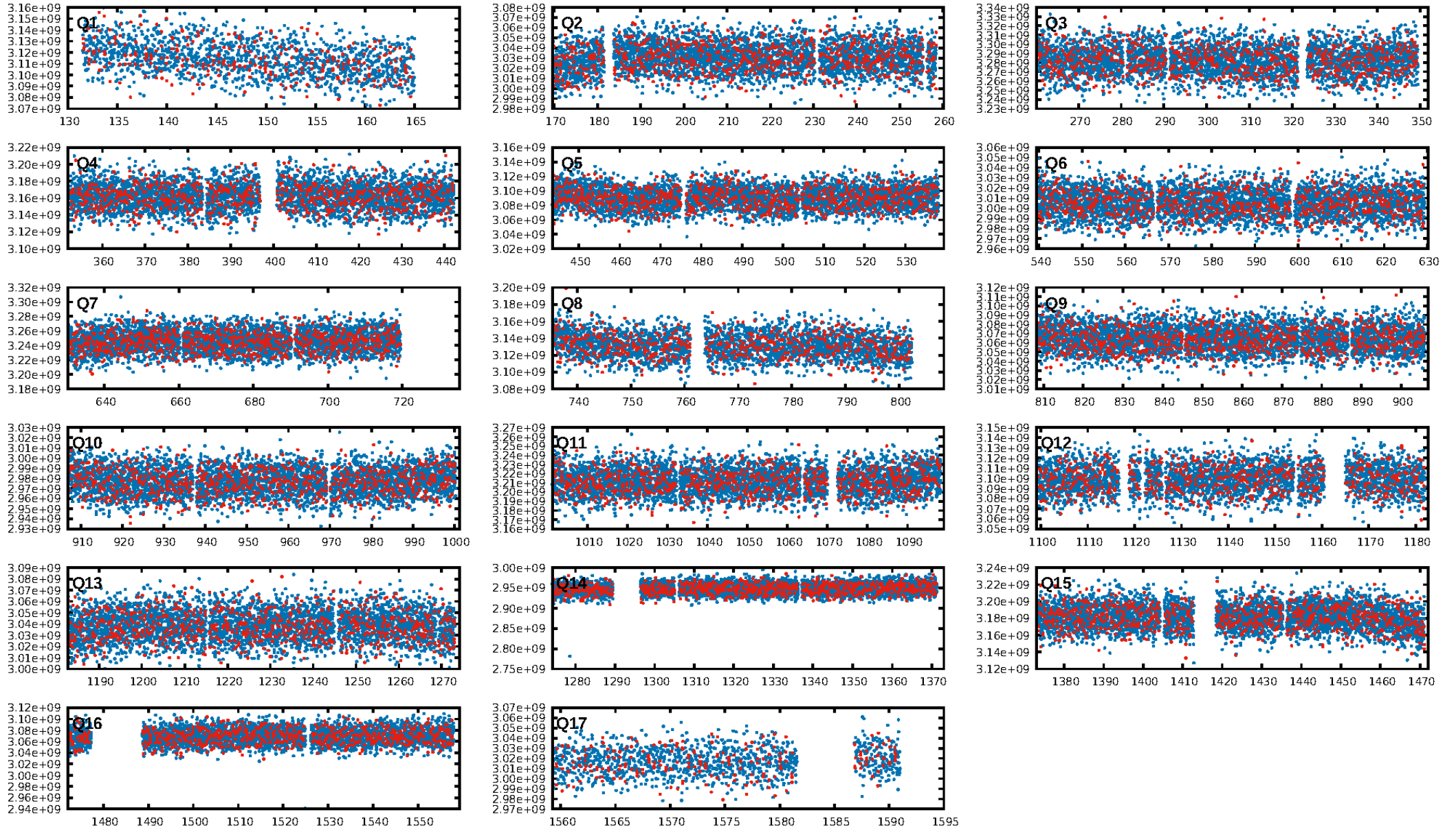
## DV Fit Results:

Period = 0.52405 [0.00001] d  
Epoch = 131.6000 [0.0011] BKJD  
Rp/R\* = 0.0205 [0.0095]  
a/R\* = 3.87 [9.39]  
b = 0.27 [8.81]  
Seff = N/A  
Teq = N/A  
Rp = 7.82 [5.23] Re  
a = N/A  
Ag = N/A  
Teffp = N/A

## DV Diagnostic Results:

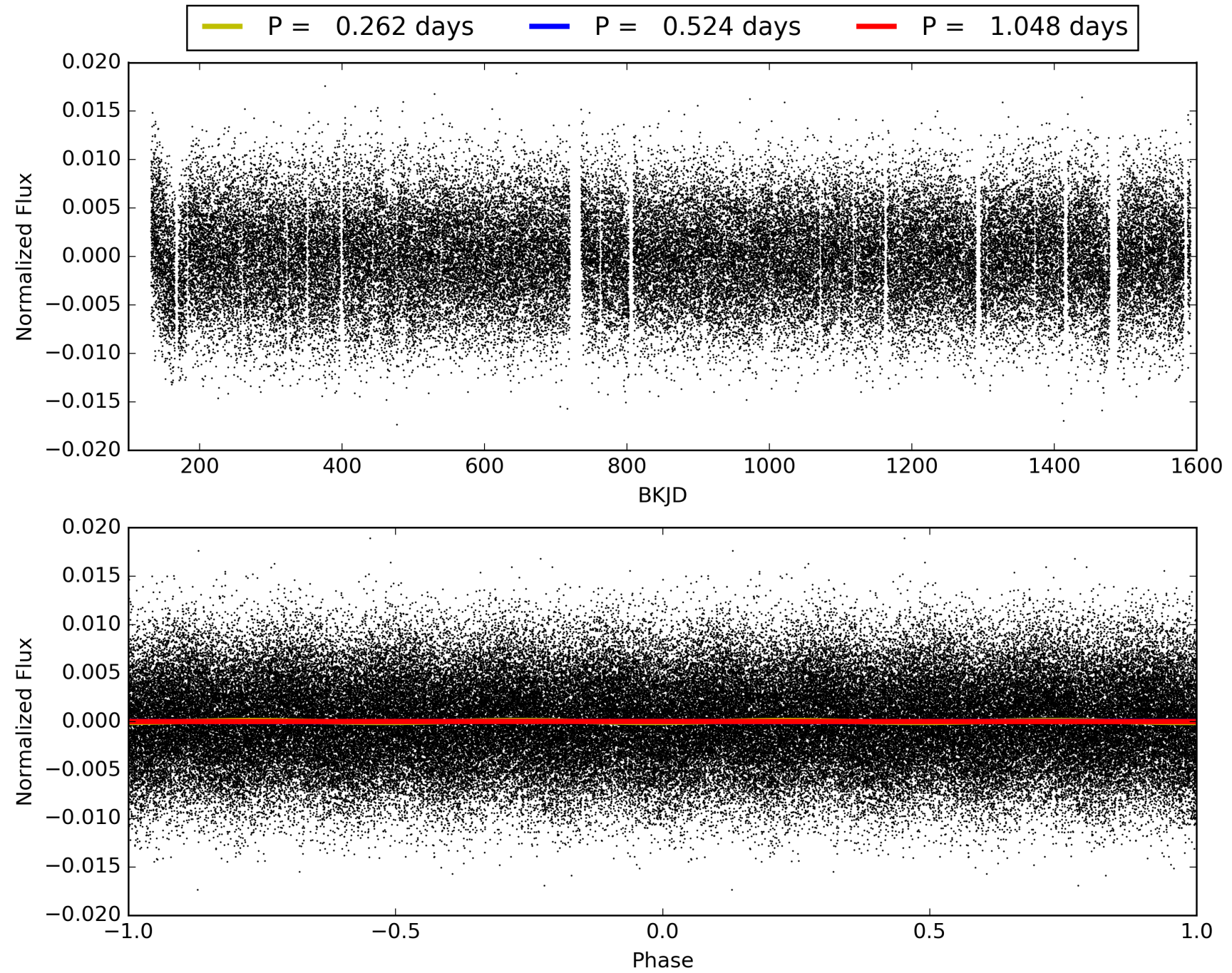
ShortPeriod-sig: 0.0% [0.00 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.47e-55  
RollingBand-fgt: 0.95 [2307/2435]  
GhostDiagnostic-chr: N/A  
Centroid-sig: N/A  
Centroid-so: 0.515 arcsec [5.10 $\sigma$ ]  
OotOffset-rm: 5.127 arcsec [4.43 $\sigma$ ]  
KicOffset-rm: 5.347 arcsec [4.91 $\sigma$ ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.00 [0/17]  
DiffImageOverlap-fno: 0.00 [0/17]

# TCE 009291618-01, PDC Light Curves



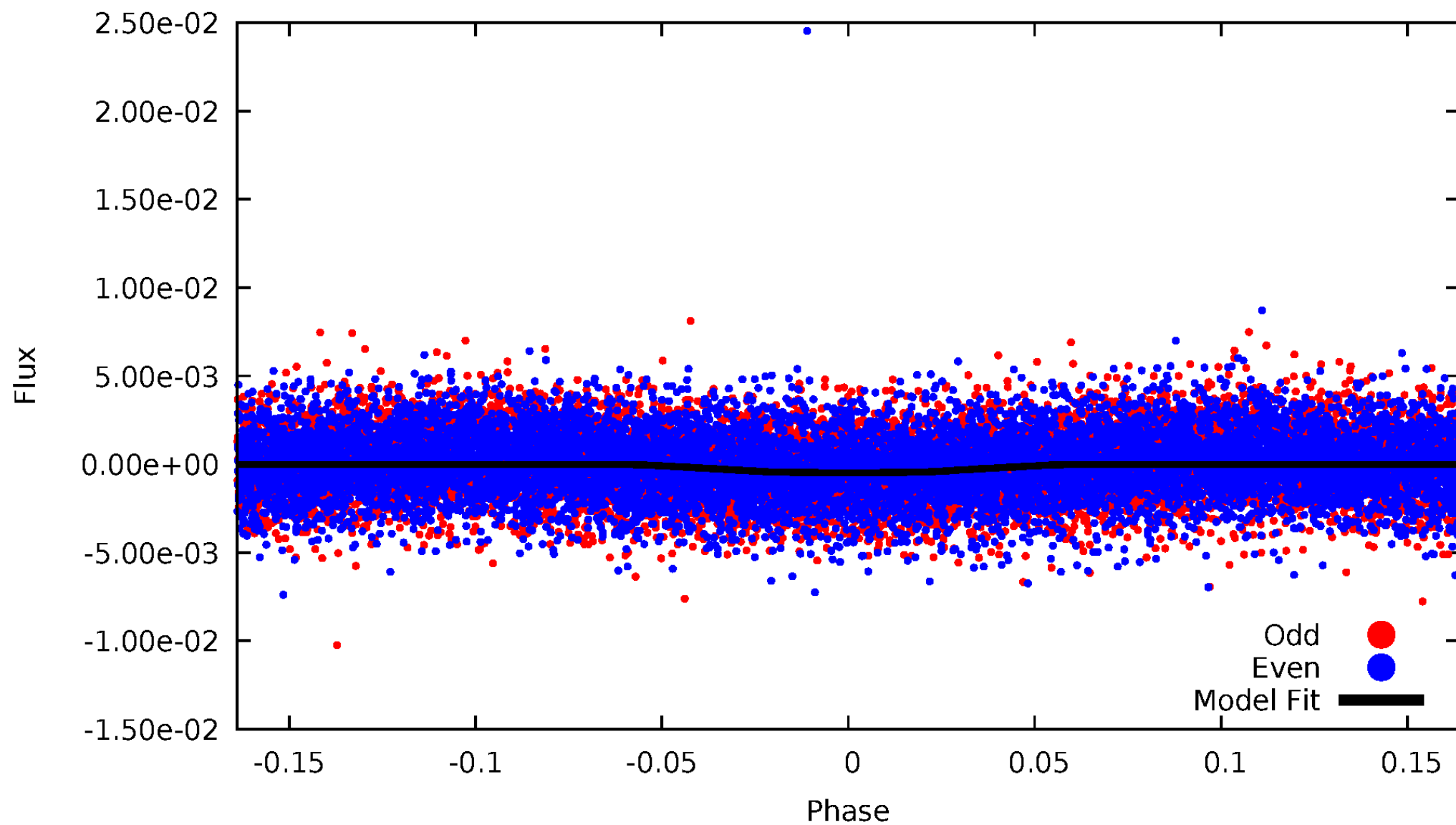


# TCE 009291618-01



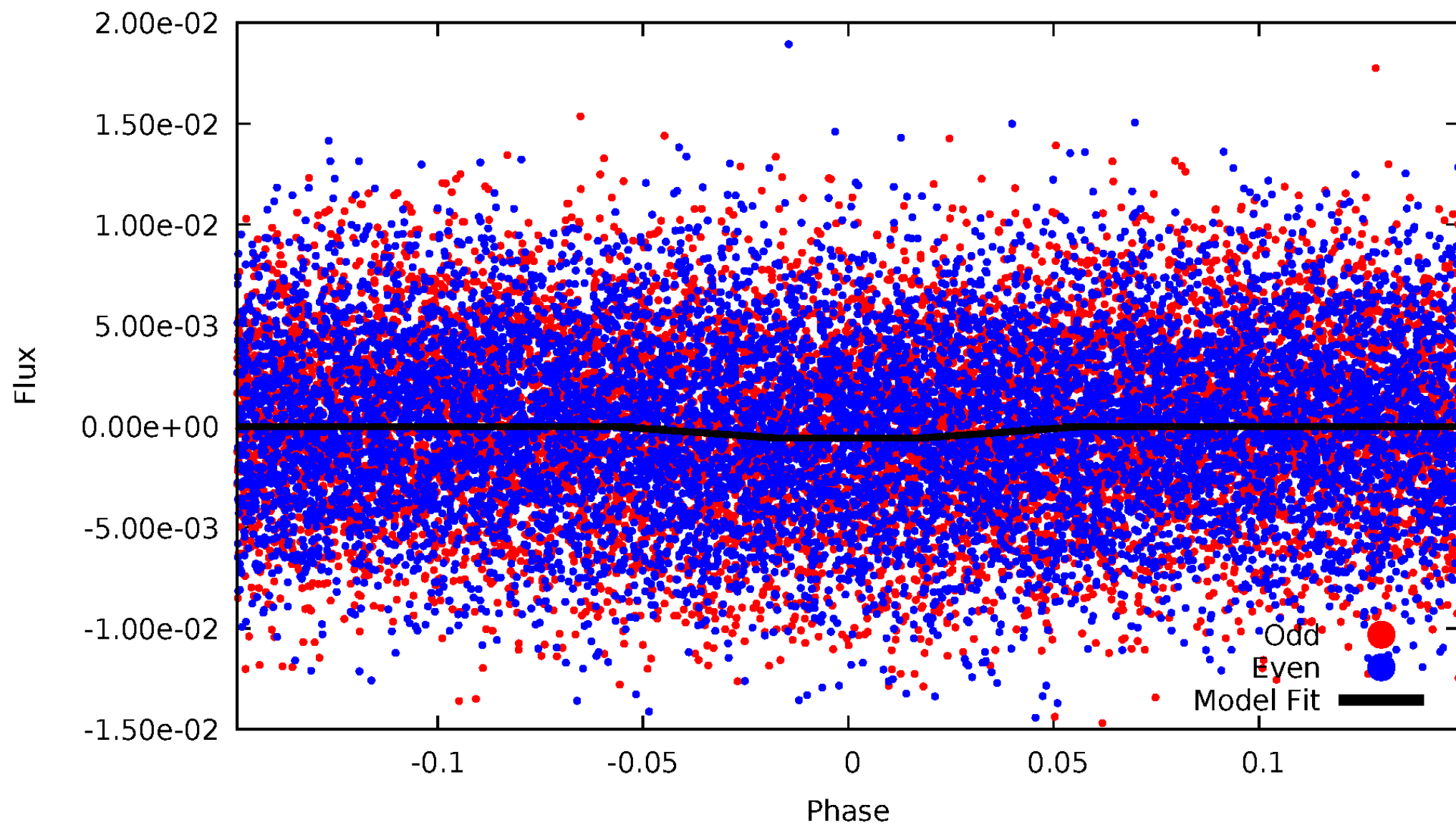
# DV Odd/Even

TCE 009291618-01



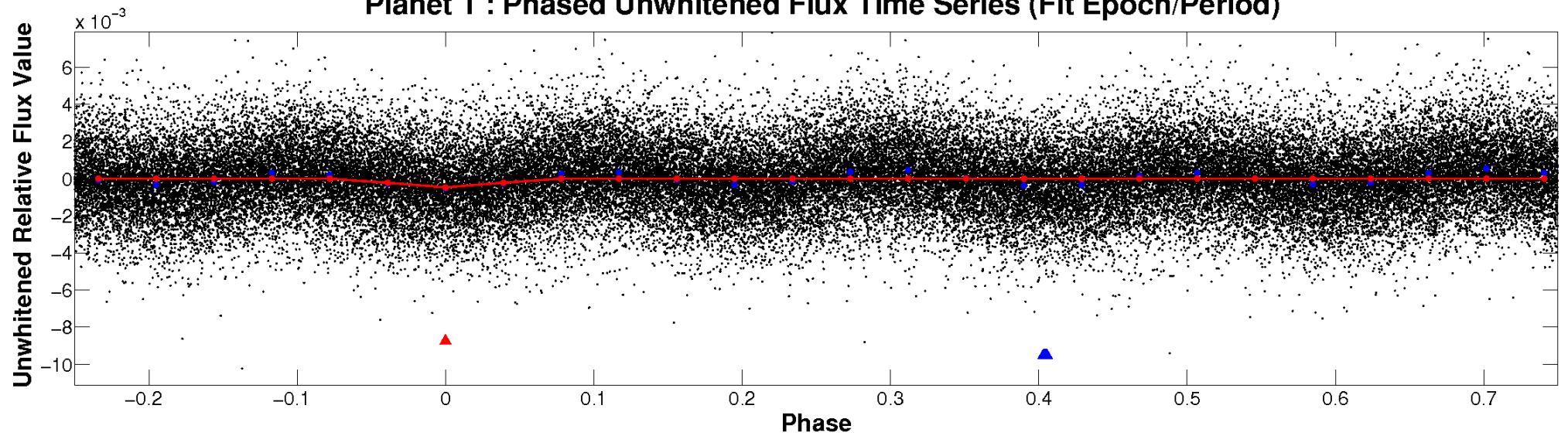
# ALT Odd/Even

TCE 009291618-01

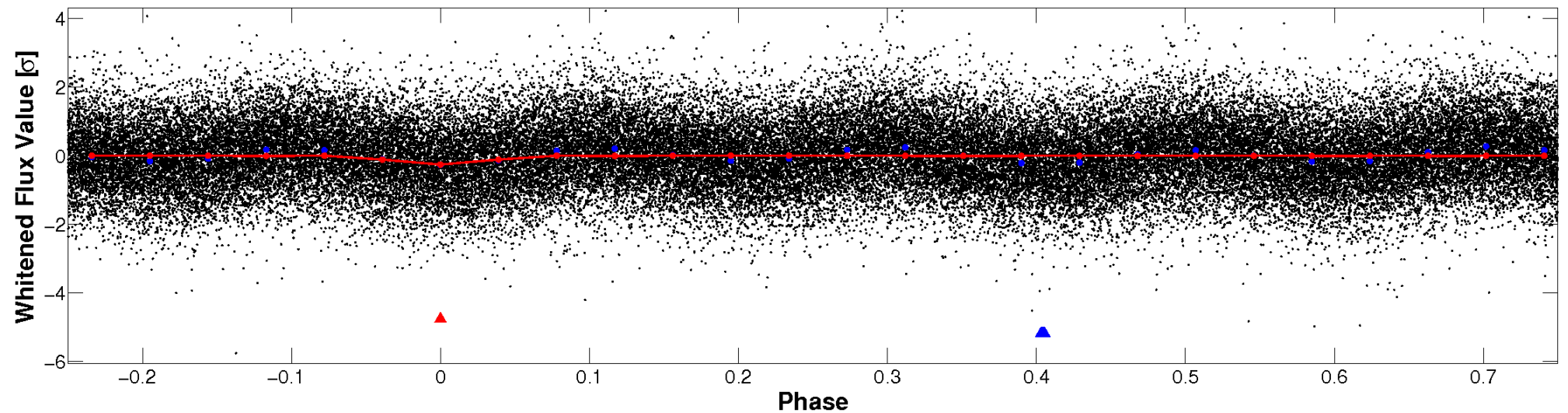


# Non-Whitened Vs. Whitened Light Curve

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



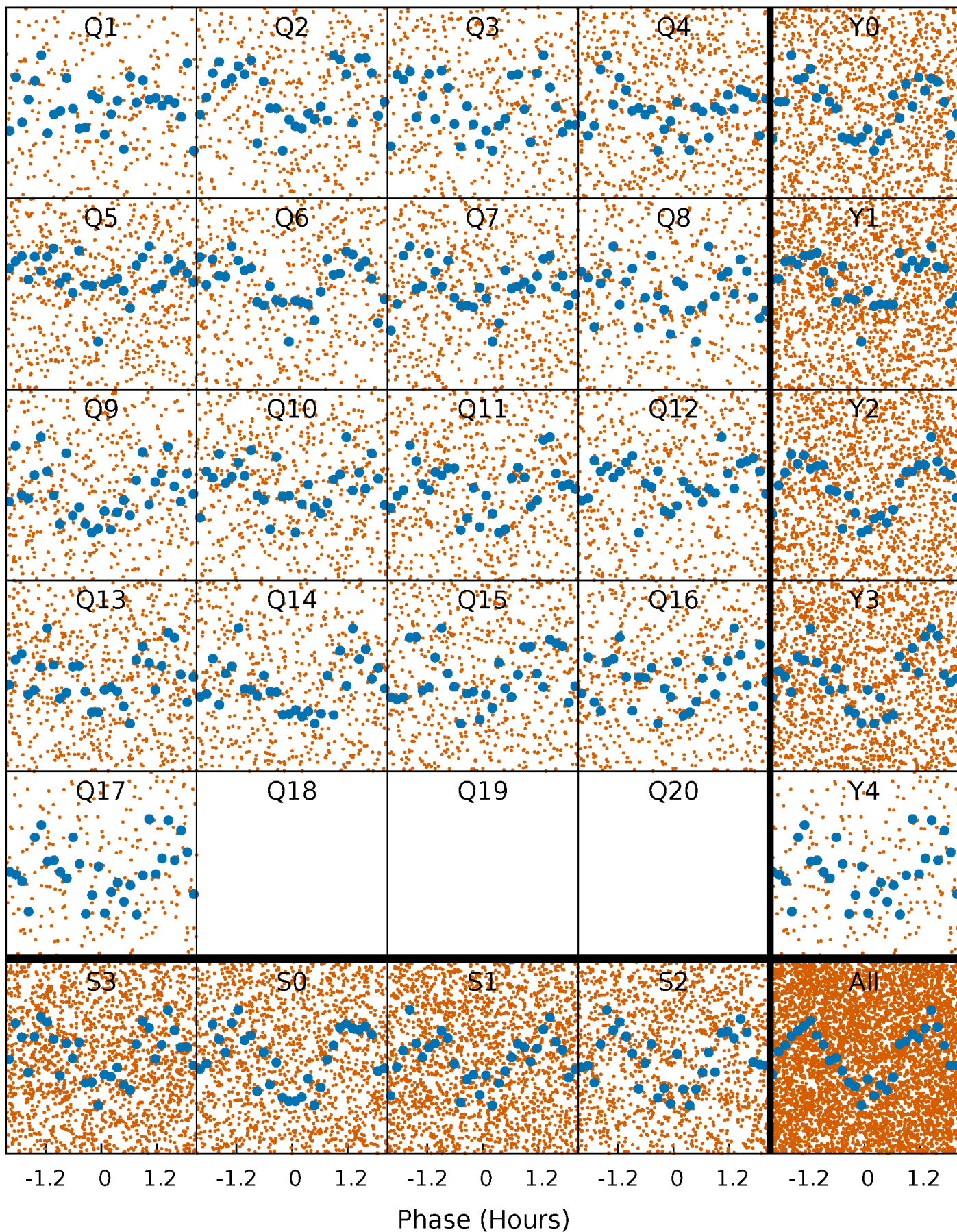
**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

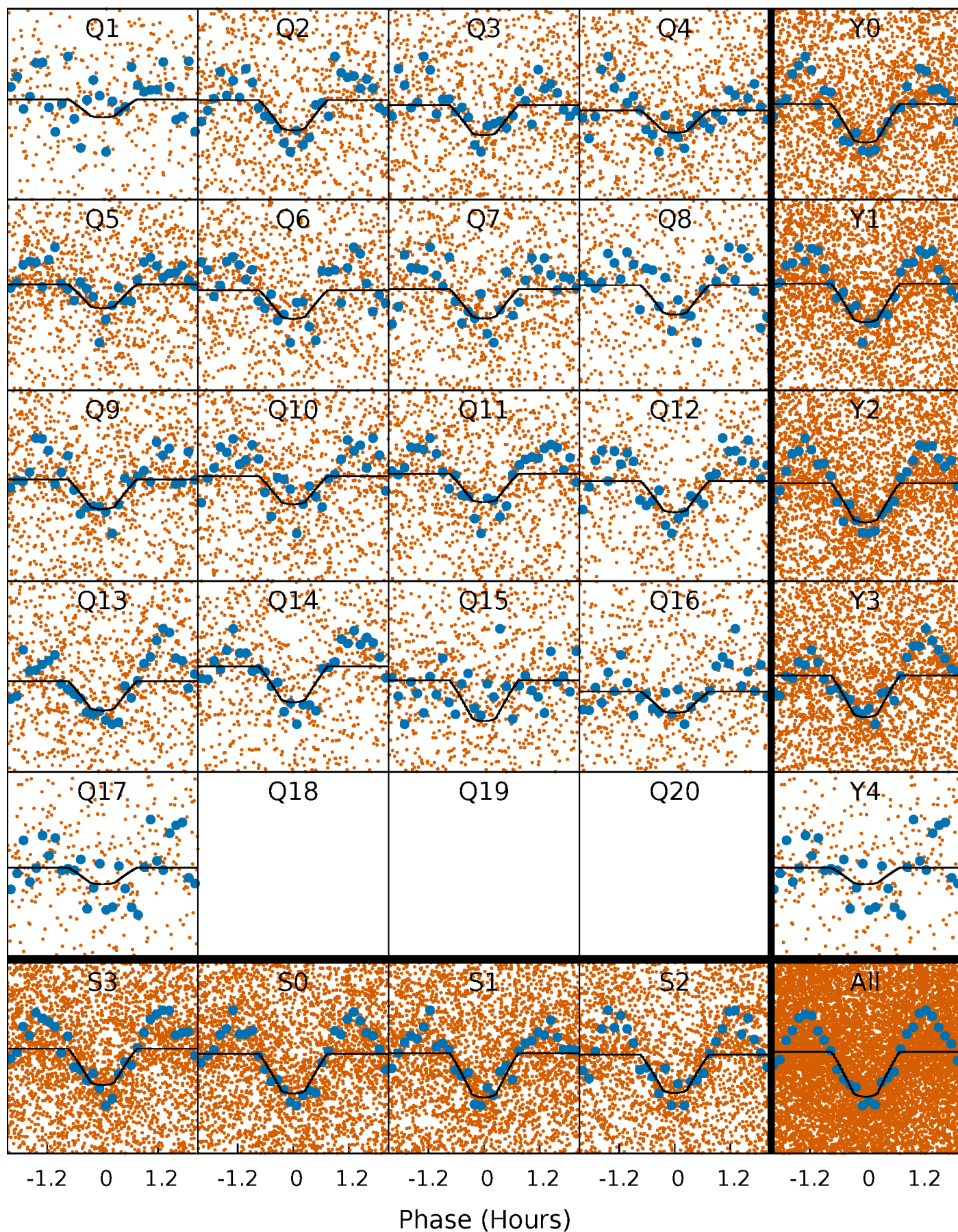
TCE 009291618-01 P= 0.524048 Days  $T_0=131.600031$  (BKJD)





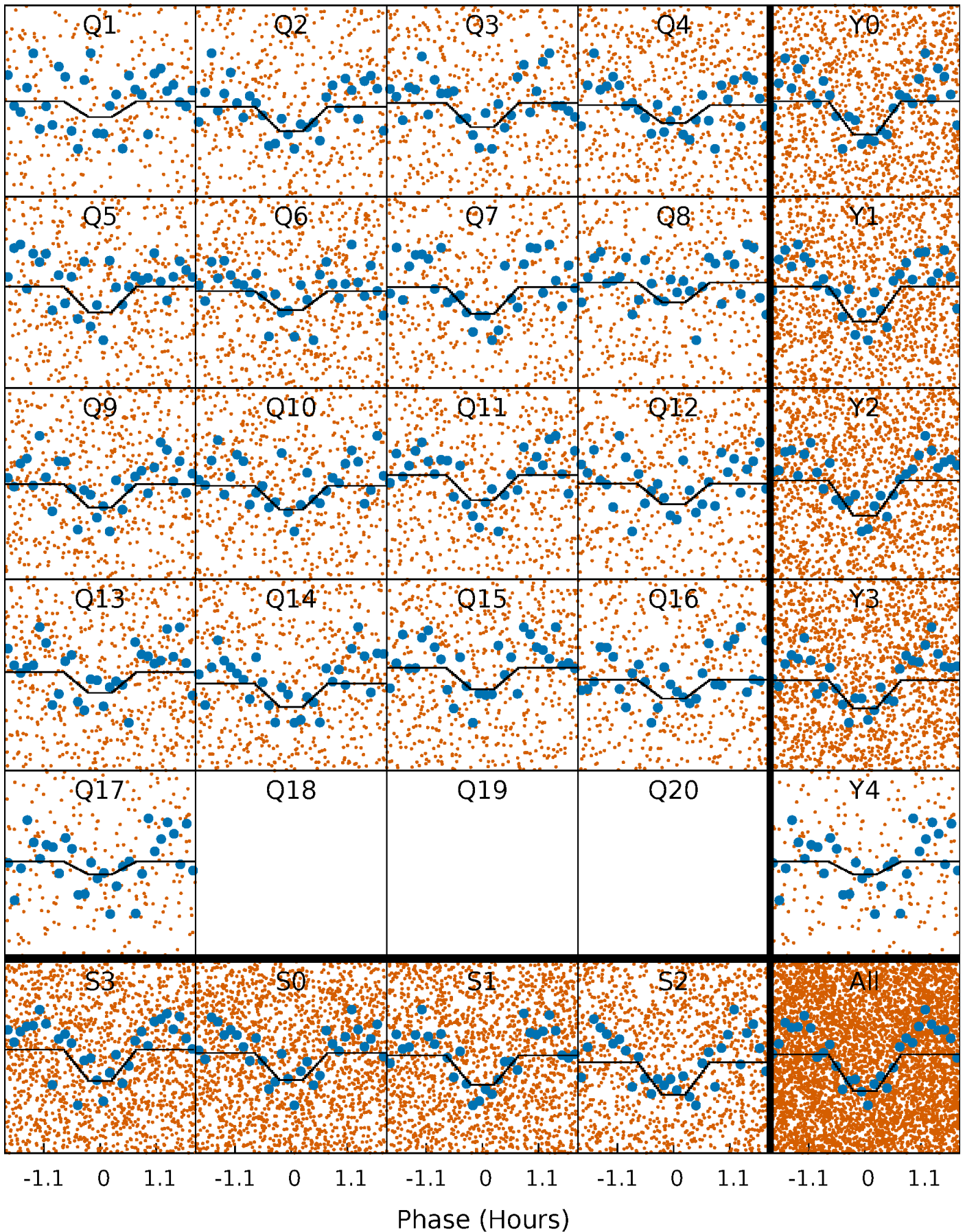
# DV Quarter-Phased Transit Curves

TCE 009291618-01 P= 0.524048 Days  $T_0=131.600031$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

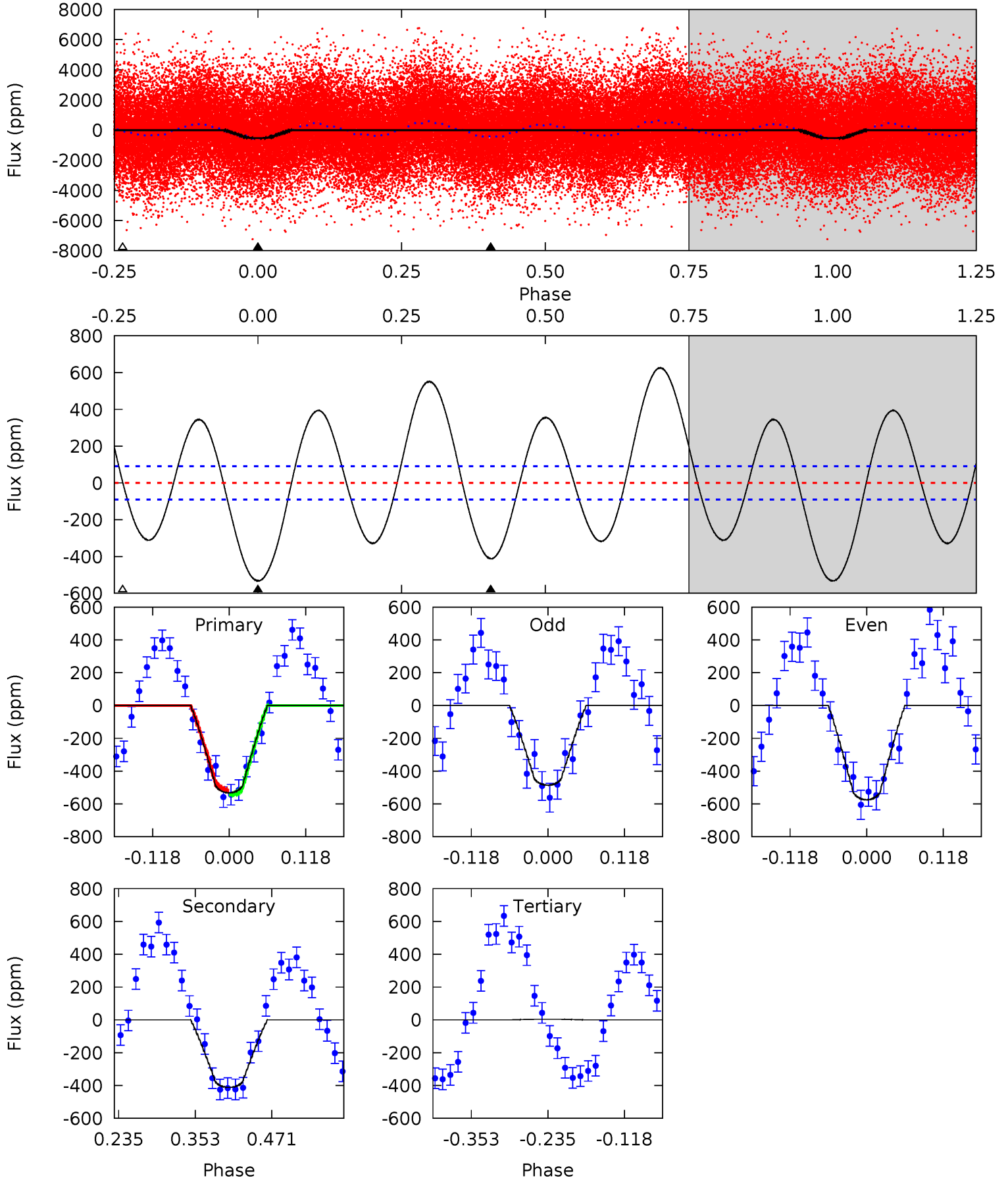
TCE 009291618-01 P= 0.524049 Days  $T_0=131.600968$  (BKJD)



# DV Model-Shift Uniqueness Test

009291618-01, P = 0.524048 Days, E = 131.075983 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
26.6	20.5	-0.20	0	4.53	1.56	14.5	26.8	26.6	20.7	20.5	2.23	0.97	0.54	0.75

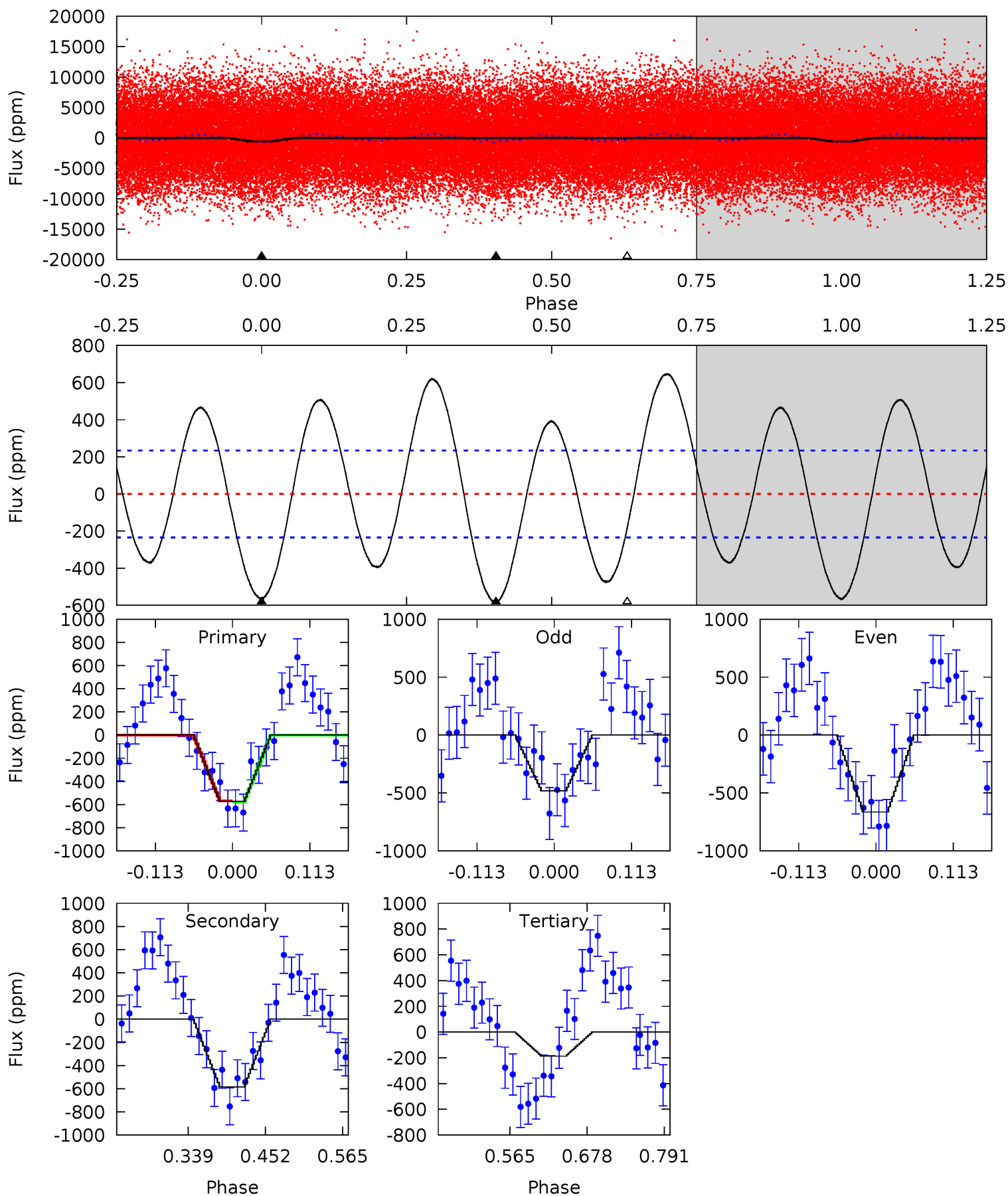




# Alt Model-Shift Uniqueness Test

009291618-01, P = 0.524049 Days, E = 131.076919 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.1	11.3	3.62	0	4.54	1.58	6.61	7.47	11.1	7.68	11.3	1.77	1.02	0.53	0.10





### Stellar Parameters For KIC 009291618

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7816^{+217}_{-326}$	$3.663^{+0.476}_{-0.084}$	$-0.100^{+0.200}_{-0.350}$	$3.490^{+0.720}_{-1.681}$	$2.047^{+0.329}_{-0.535}$	$0.068^{+0.307}_{-0.024}$
	+3%/-4%	+13%/-2%	+200%/-350%	+21%/-48%	+16%/-26%	+452%/-35%
Source	KIC0	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 009291618-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-412 \pm 20$	$6.88^{+3.76}_{-3.35}$	$6778^{+513}_{-954}$	$7009^{+3702}_{-1798}$	$1.246^{+3.430}_{-0.710}$
Alt.	$-584 \pm 52$	$8.06^{+3.76}_{-3.76}$	$6761^{+542}_{-853}$	$7168^{+3592}_{-1608}$	$1.290^{+2.981}_{-0.693}$

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

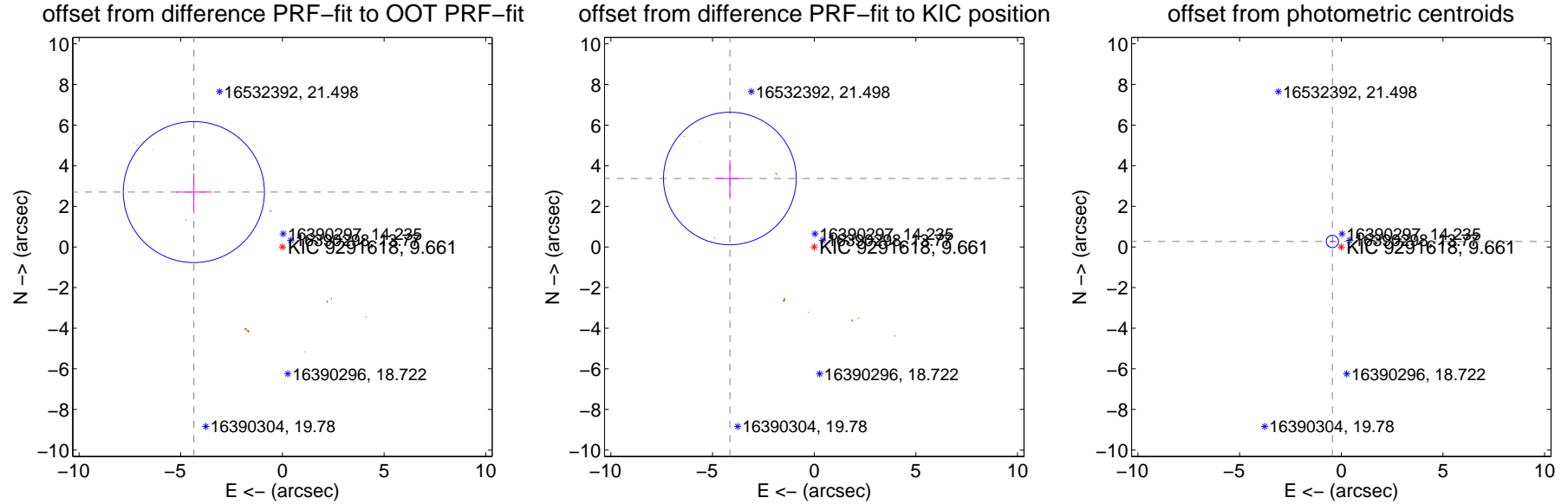
## DV Centroid Data

Supplemental centroid analysis for 009291618-01. **Kepler magnitude: 9.66.** Transit SNR 15.56

**There are 0 quarters with good PRF difference image offsets**

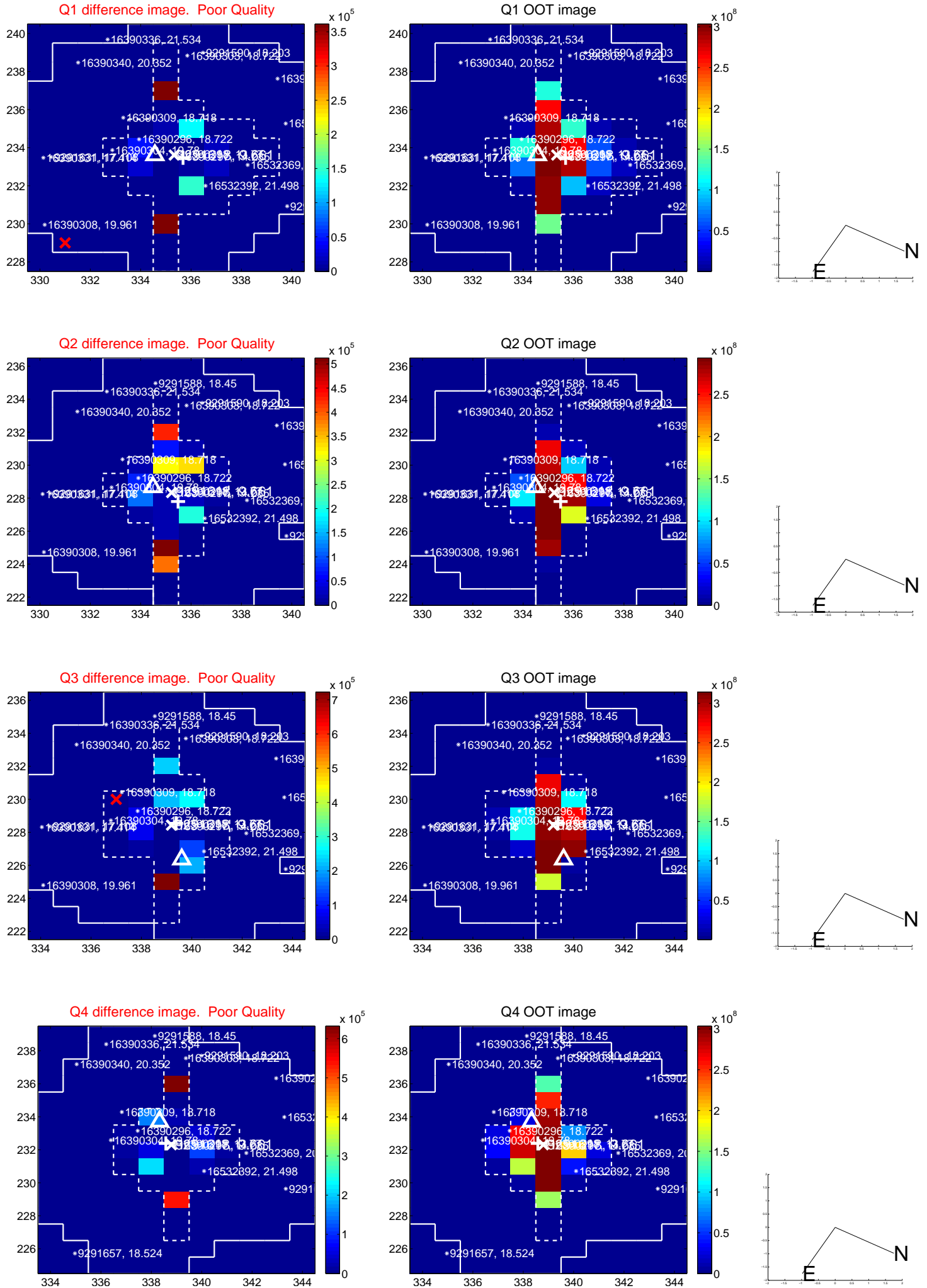
The direct PRF centroid is offset from the target star catalog position by about 1.54 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>5.127 \pm 1.157</math></b>	<b>4.43</b>	$4.358 \pm 0.881$	$2.702 \pm 0.915$
PRF-fit source offset from KIC position	<b><math>5.347 \pm 1.088</math></b>	<b>4.91</b>	$4.150 \pm 0.738$	$3.371 \pm 0.897$
photometric centroid source offset	<b><math>0.51 \pm 0.10</math></b>	<b>5.10</b>	$0.44 \pm 0.11$	$0.27 \pm 0.07$

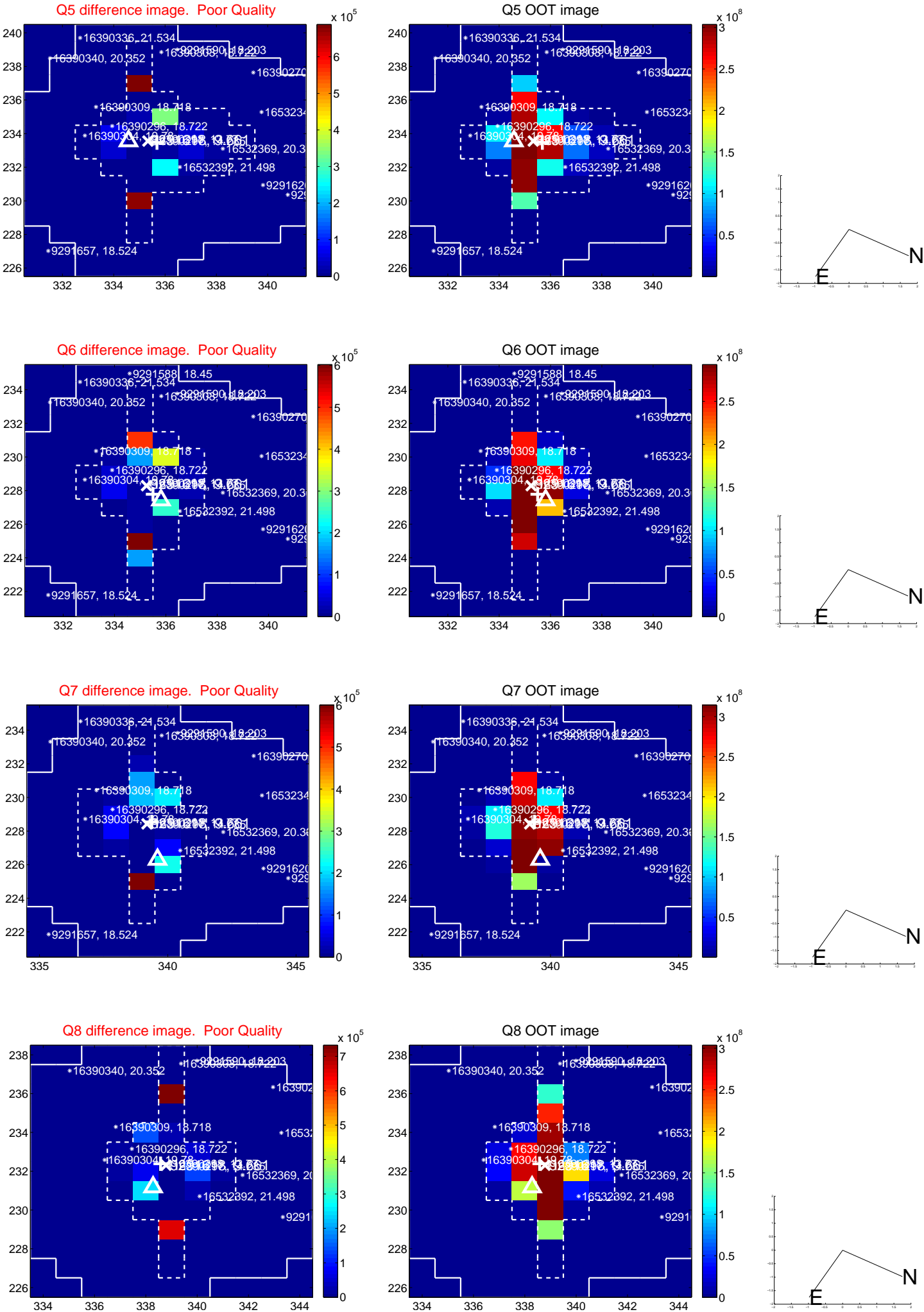


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

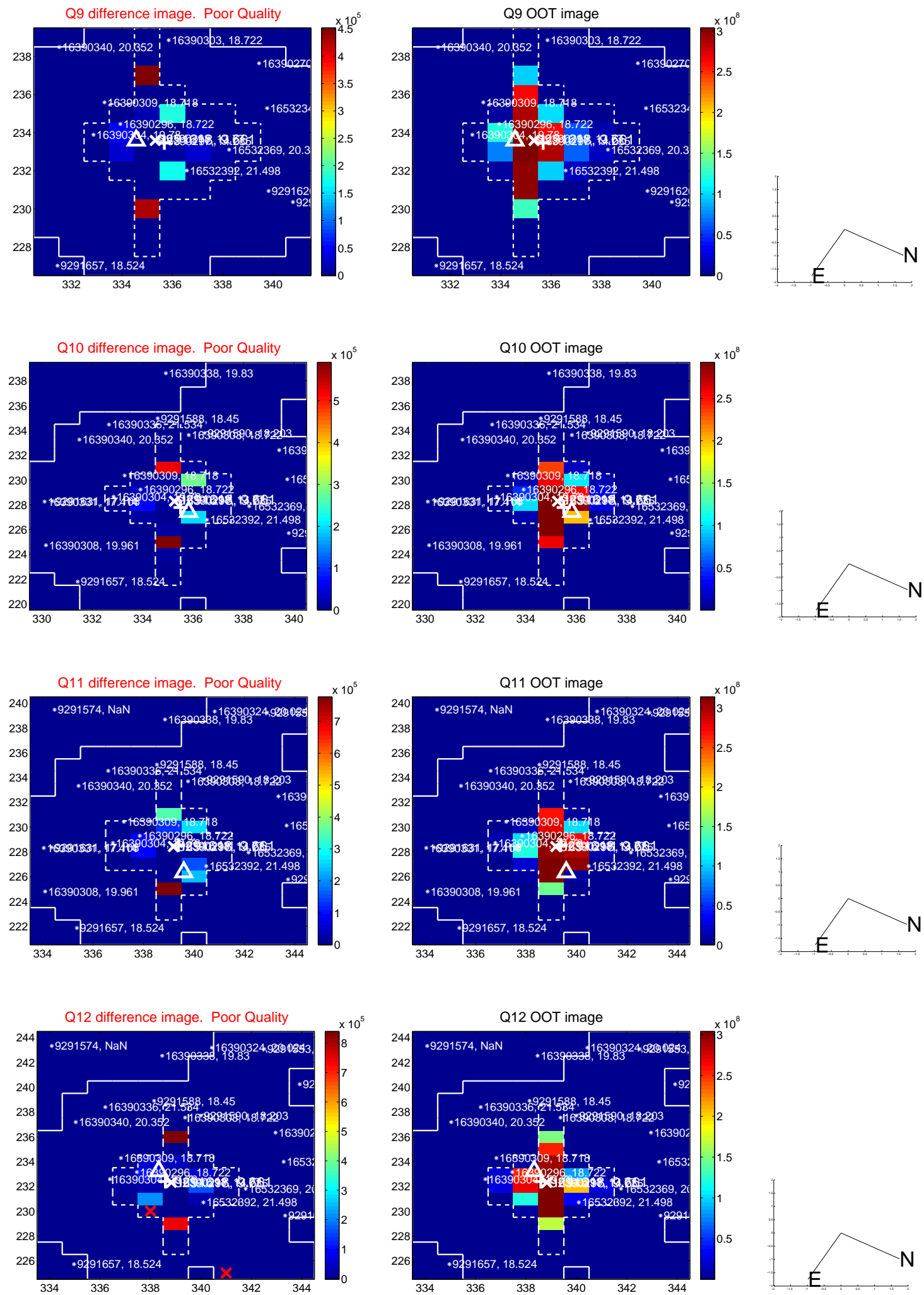


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

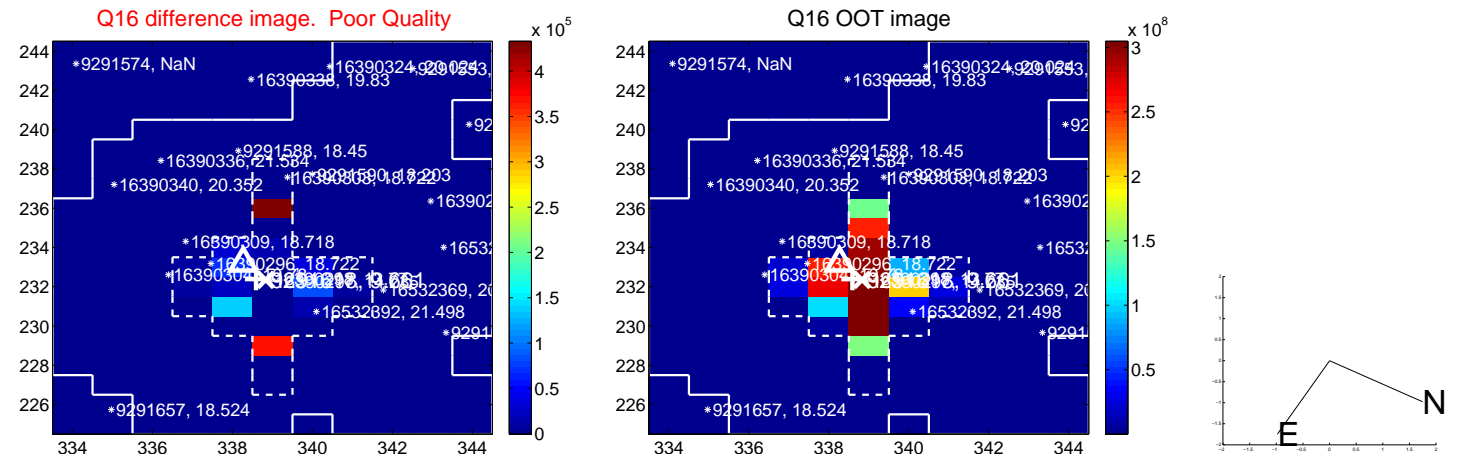
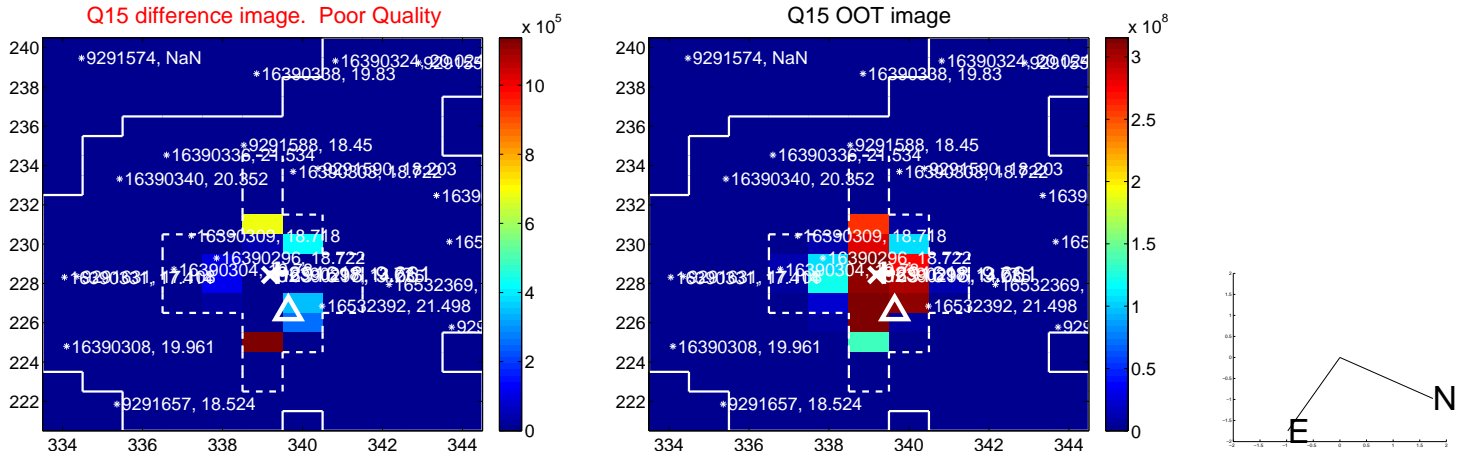
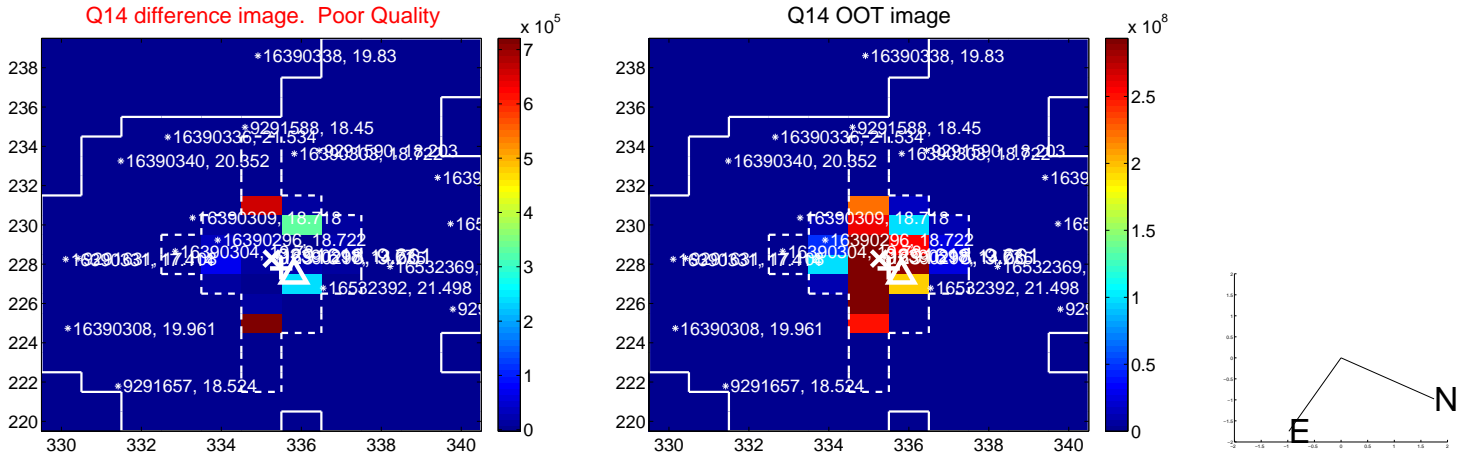
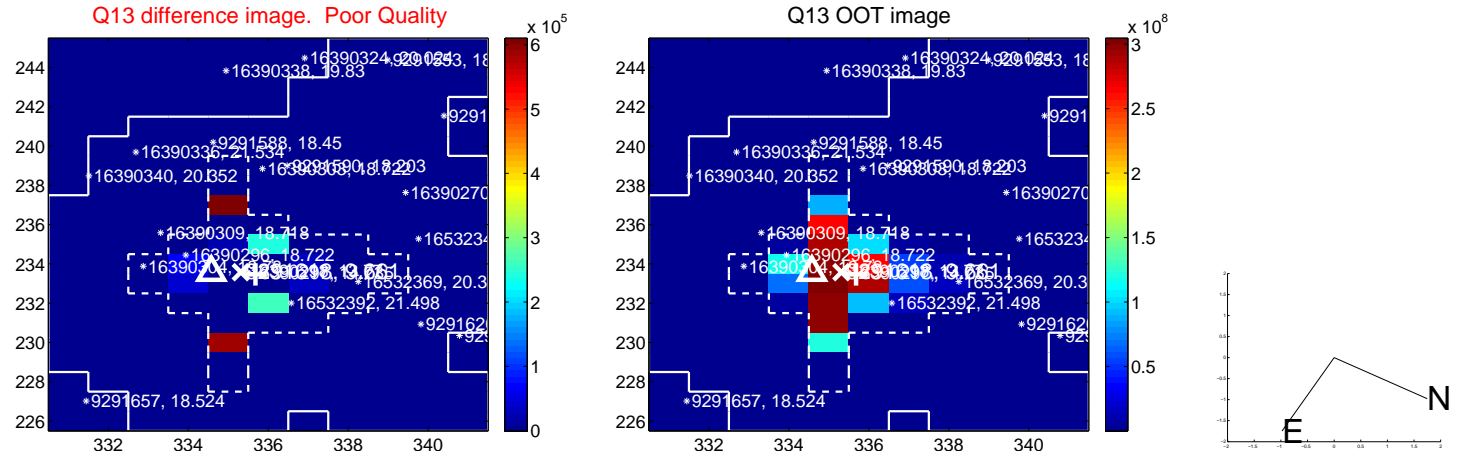




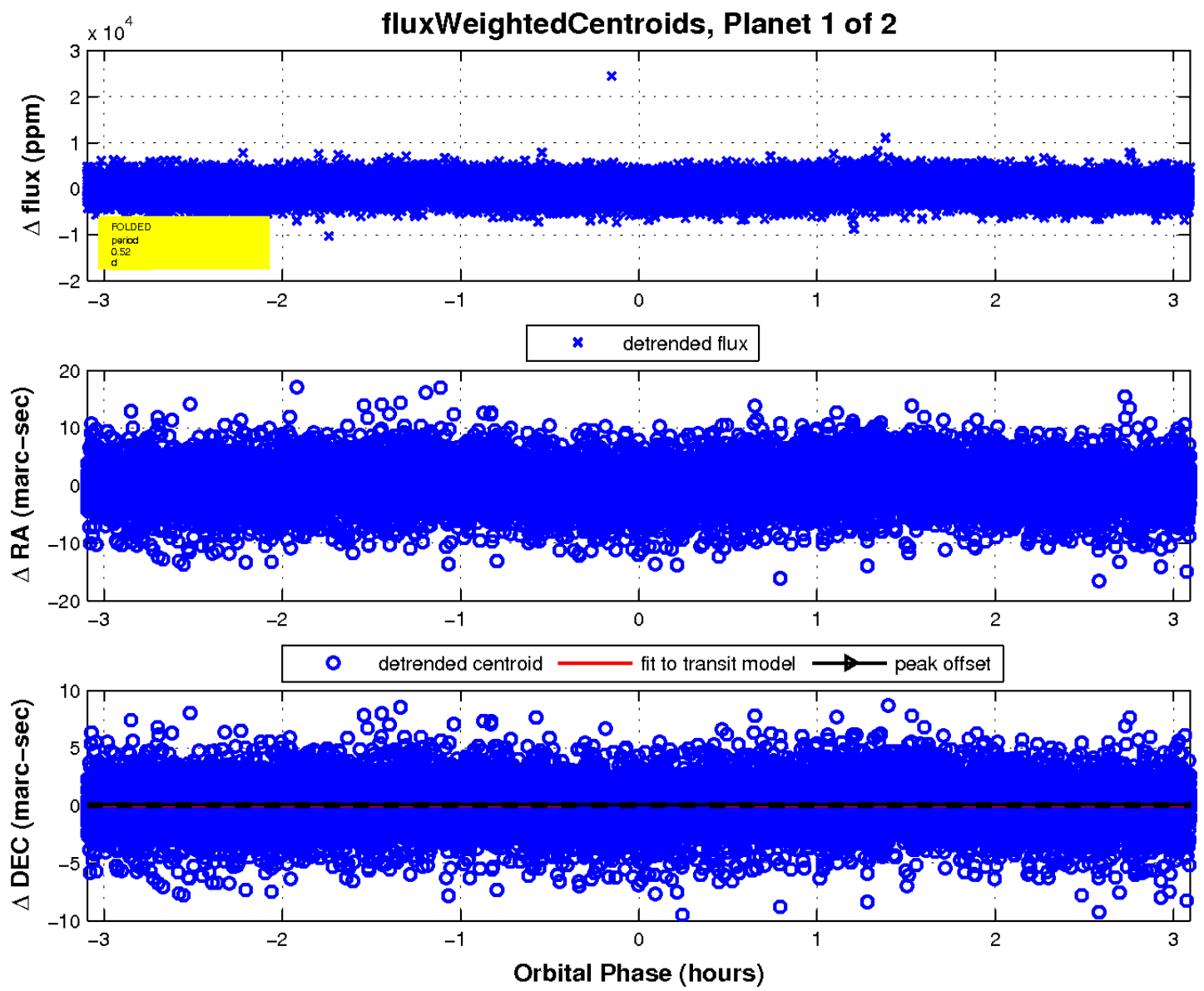
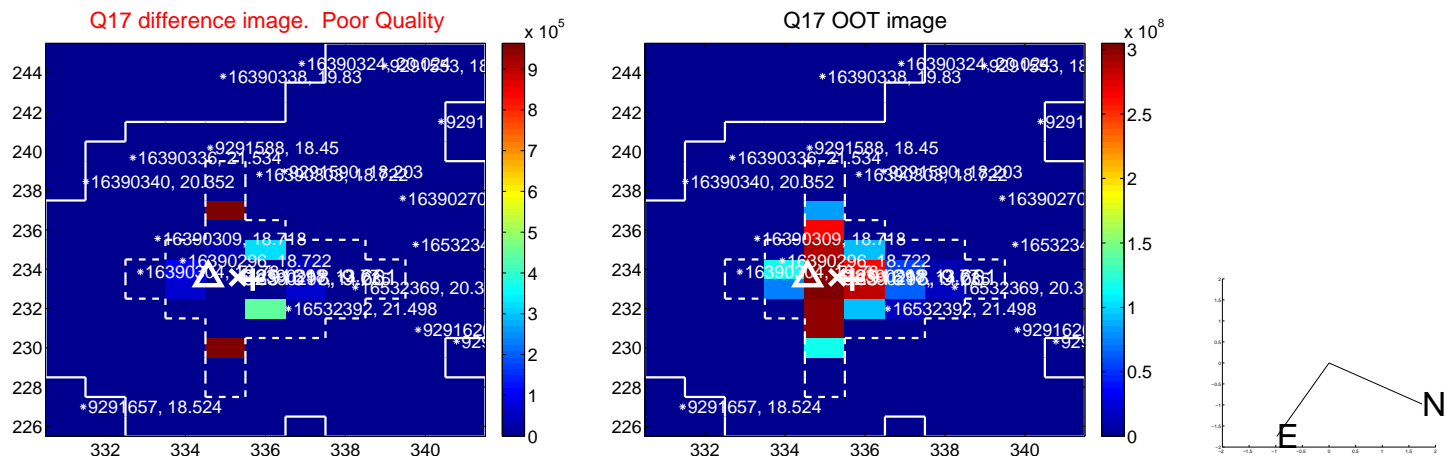
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



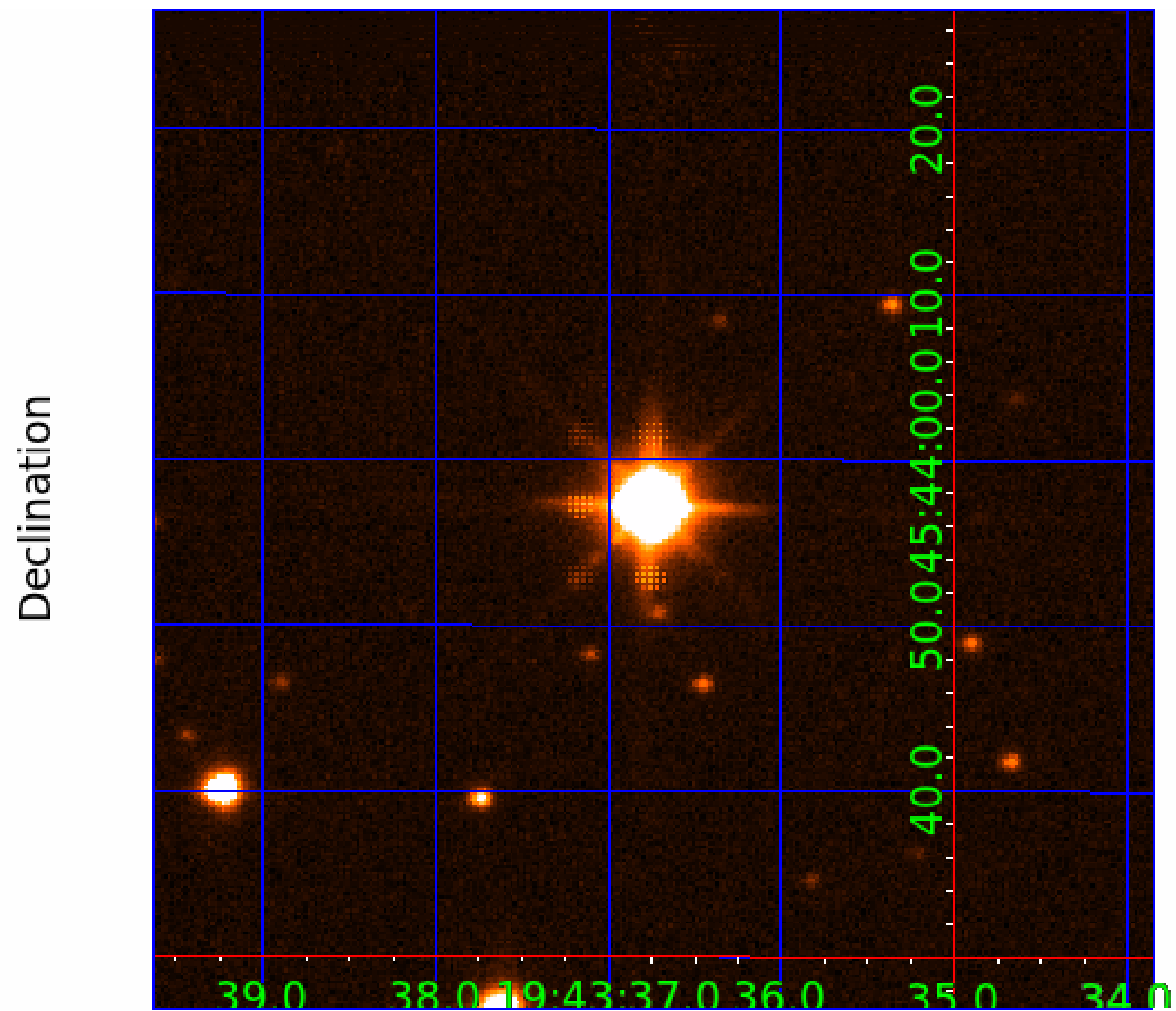
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image





# KIC 009291618

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009291618-01	OBS	No	0.524048	131.600031	479.1	1.031	13.0	15.6	3.49	7816	7.82	0.00
009291618-02	OBS	No	0.524047	131.812565	511.1	1.135	13.4	17.4	3.49	7816	9.25	0.00

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009291618-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
009291618-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_SATURATED

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

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

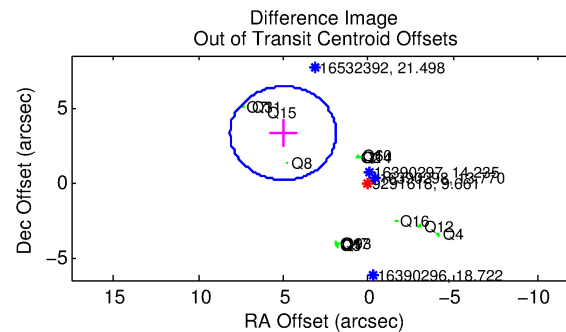
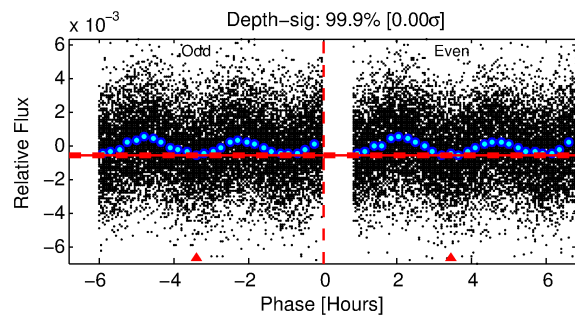
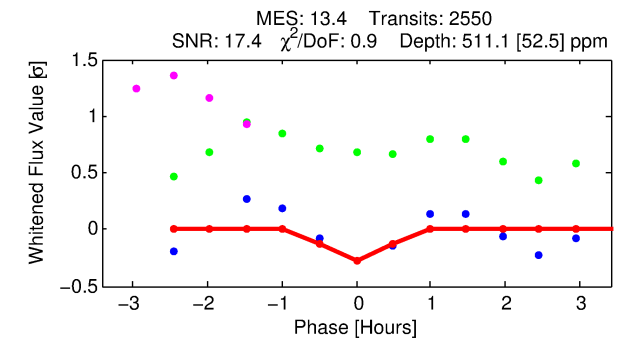
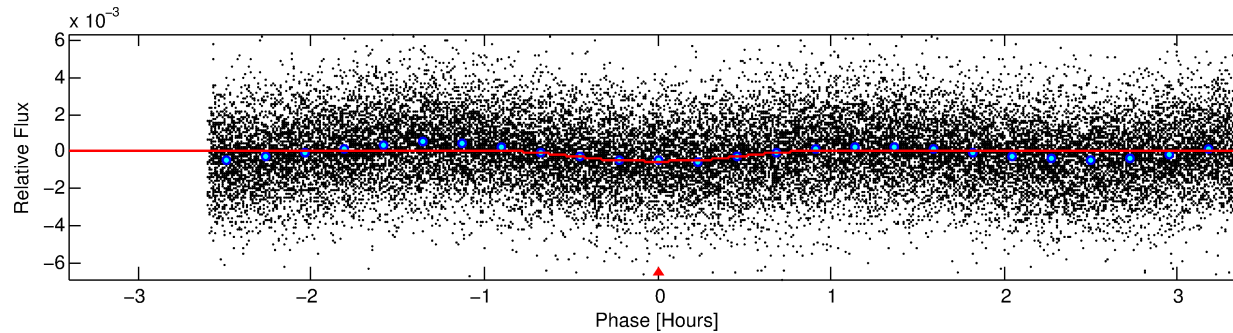
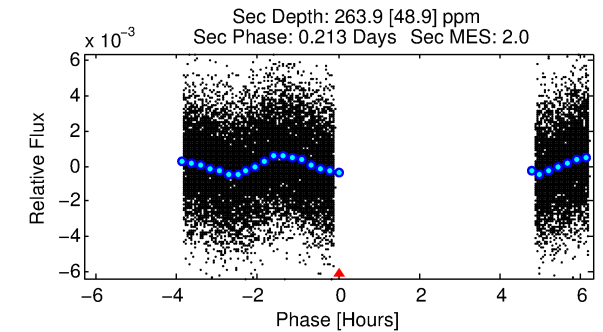
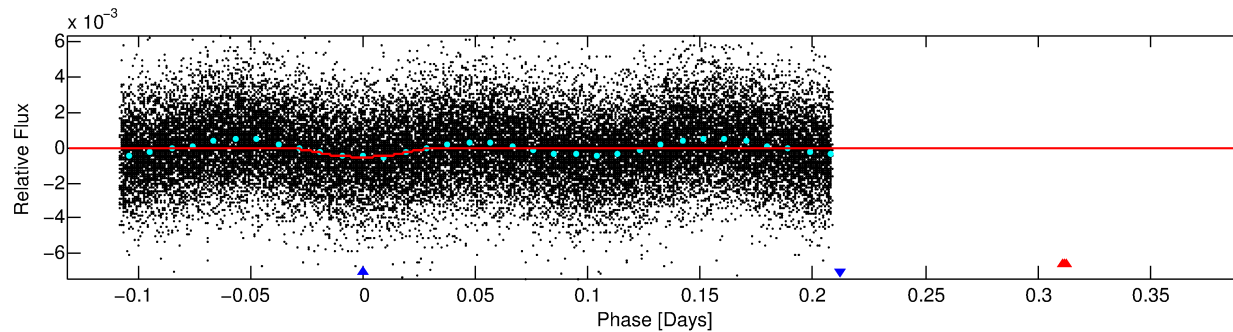
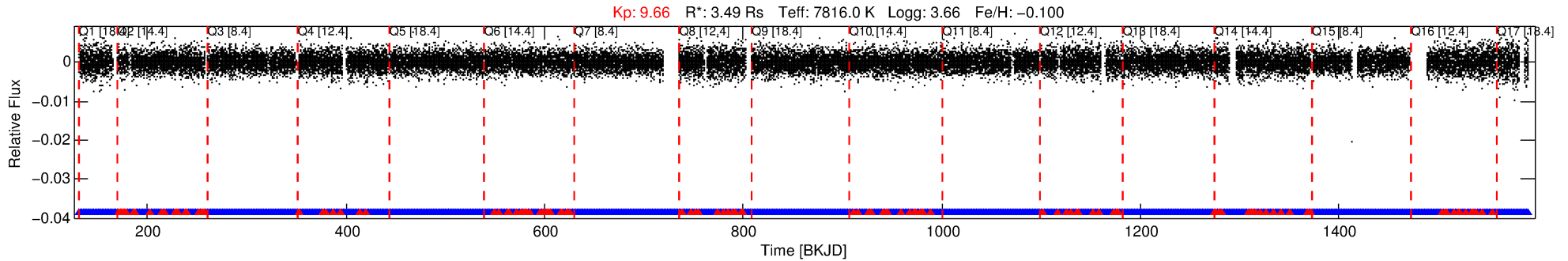
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009291618-02

No Significant Match Found

# DV One-Page Summary

KIC: 9291618 Candidate: 2 of 2 Period: 0.524 d



## DV Fit Results:

Period = 0.52405 [0.00001] d  
Epoch = 131.8126 [0.0011] BKJD  
Rp/R\* = 0.0243 [0.0069]  
a/R\* = 1.96 [2.40]  
b = 0.90 [0.35]  
Seff = N/A  
Teq = N/A  
Rp = 9.25 [5.18] Re  
a = N/A  
Ag = N/A  
Teffp = N/A

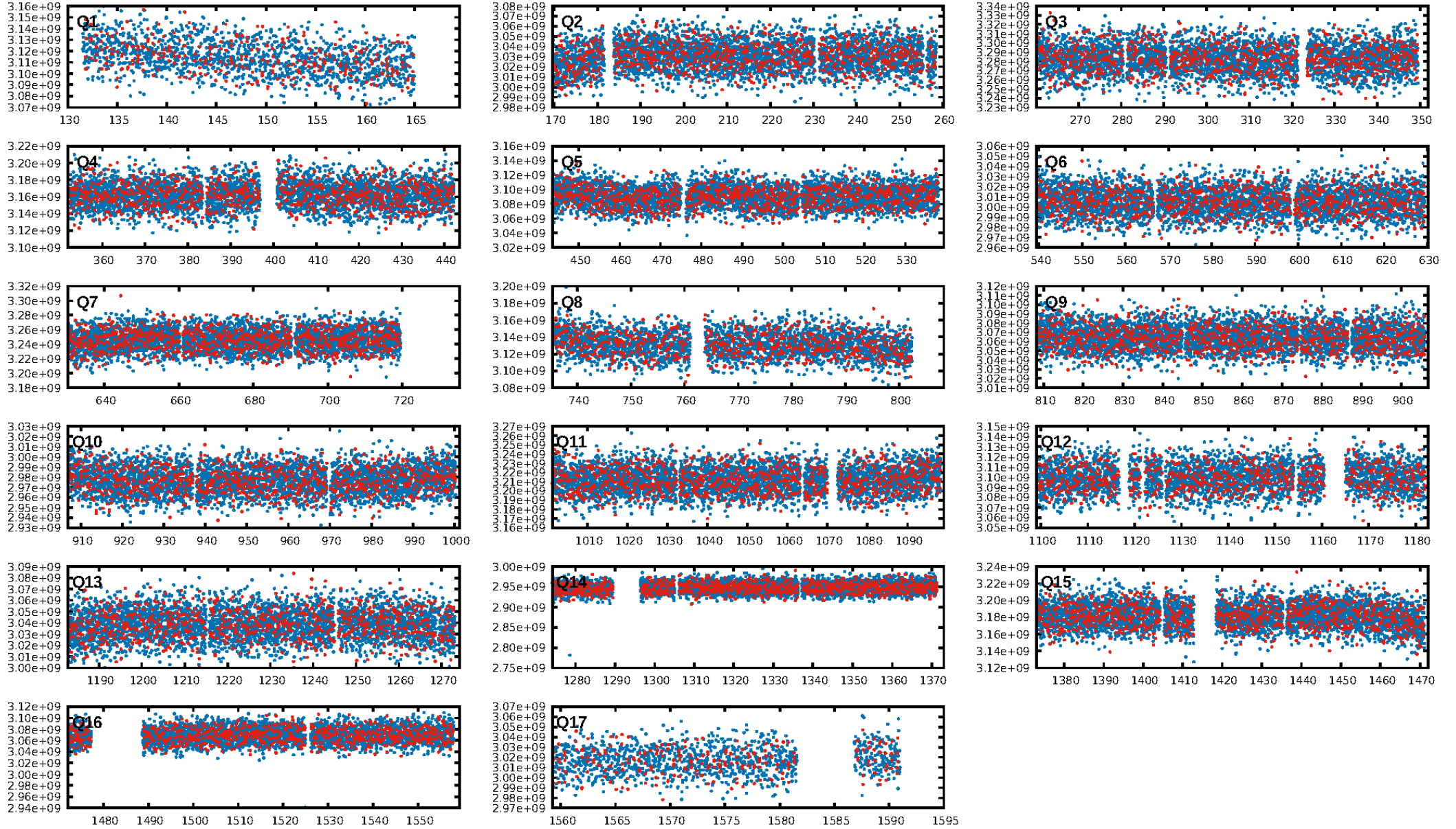
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.04e-58  
RollingBand-fgt: 0.95 [2320/2436]  
GhostDiagnostic-chr: N/A  
Centroid-sig: N/A  
Centroid-so: 0.545 arcsec [5.71σ]  
OotOffset-rm: 5.994 arcsec [5.75σ]  
KicOffset-rm: 6.015 arcsec [5.60σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.00 [0/17]  
DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 18:26:13 Z

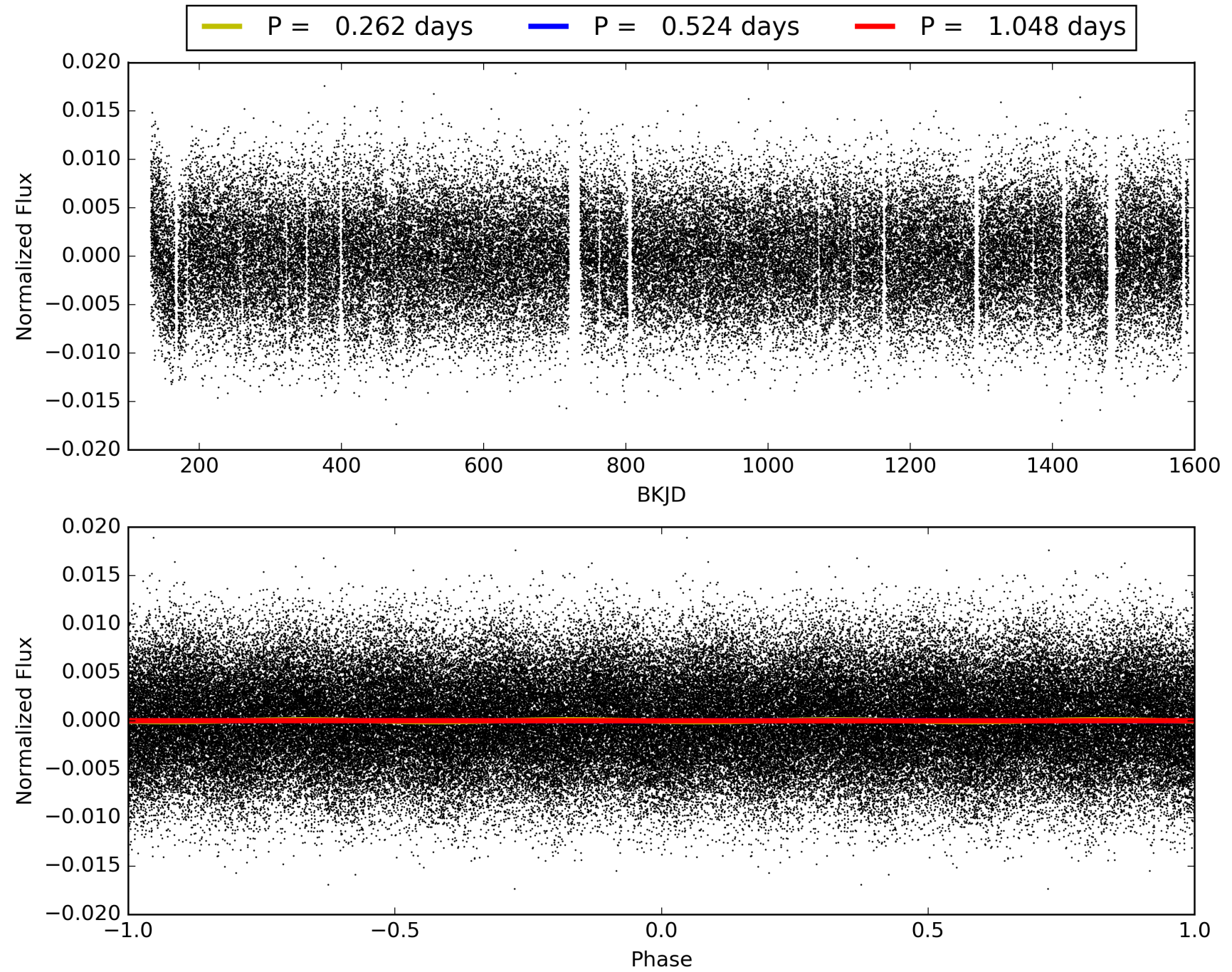
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009291618-02, PDC Light Curves





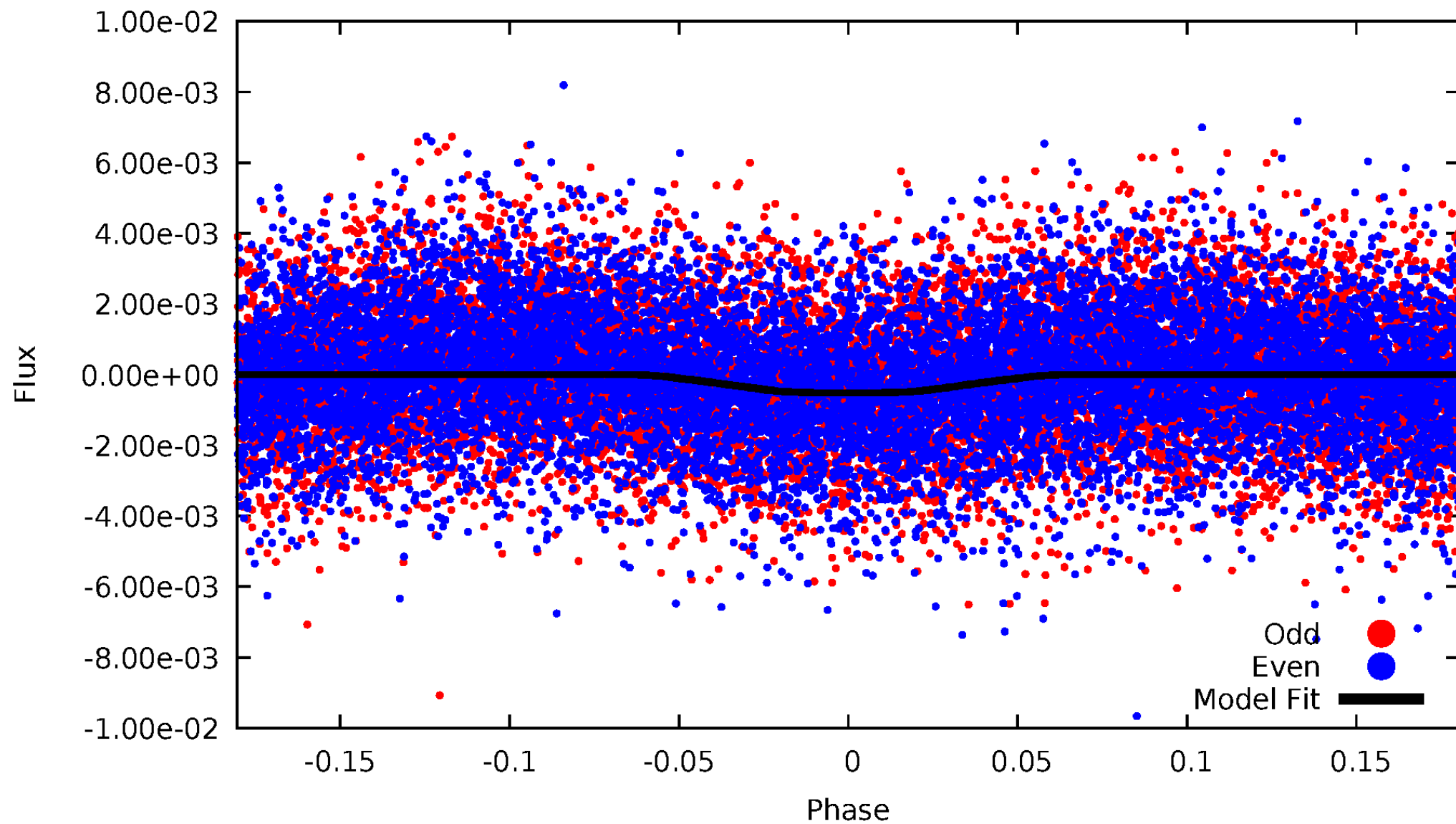
# TCE 009291618-02





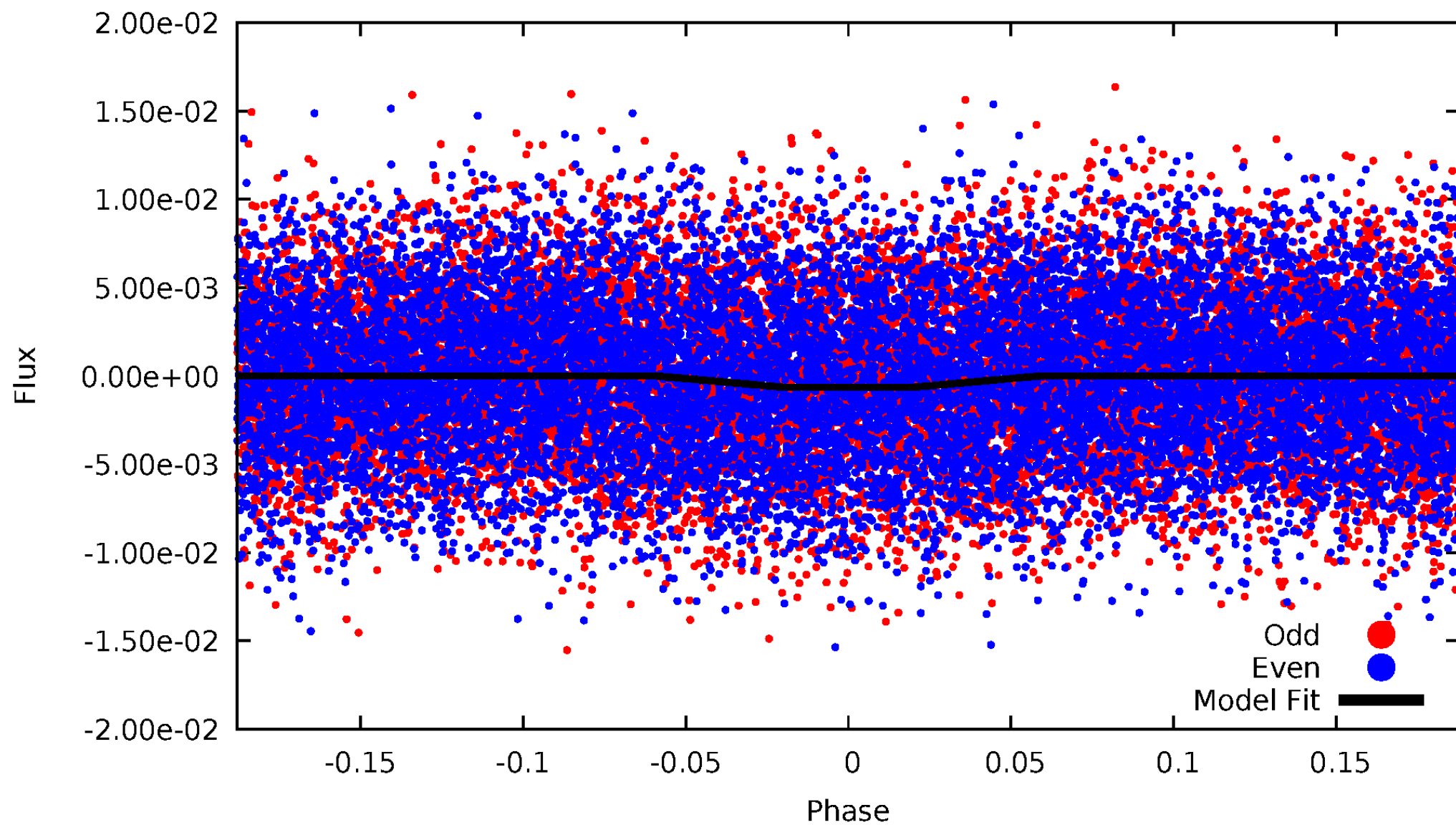
DV Odd/Even

TCE 009291618-02



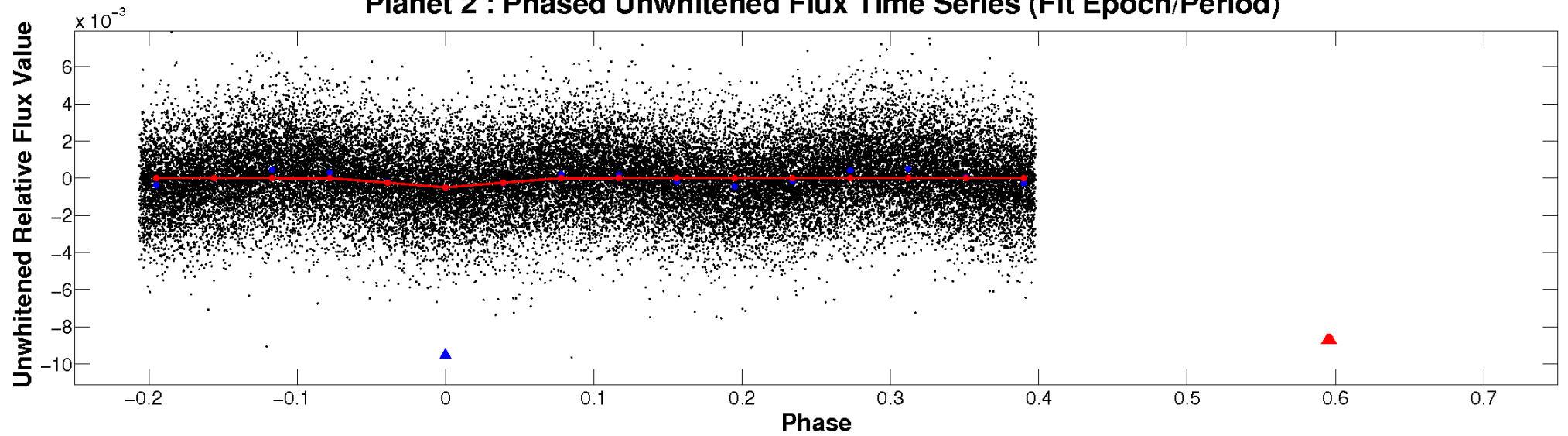
# ALT Odd/Even

TCE 009291618-02

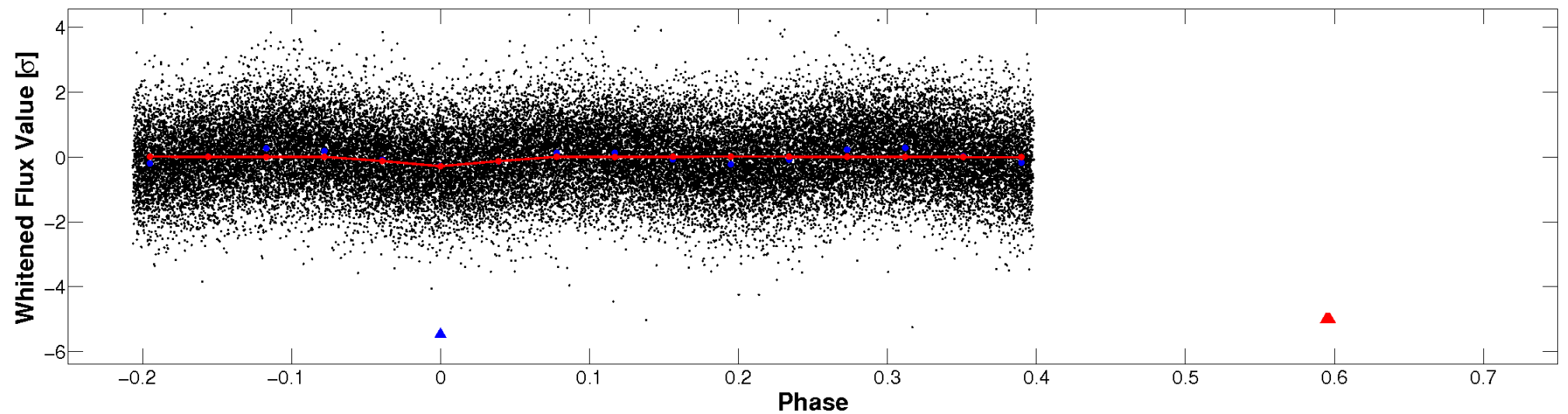


# Non-Whitened Vs. Whitened Light Curve

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

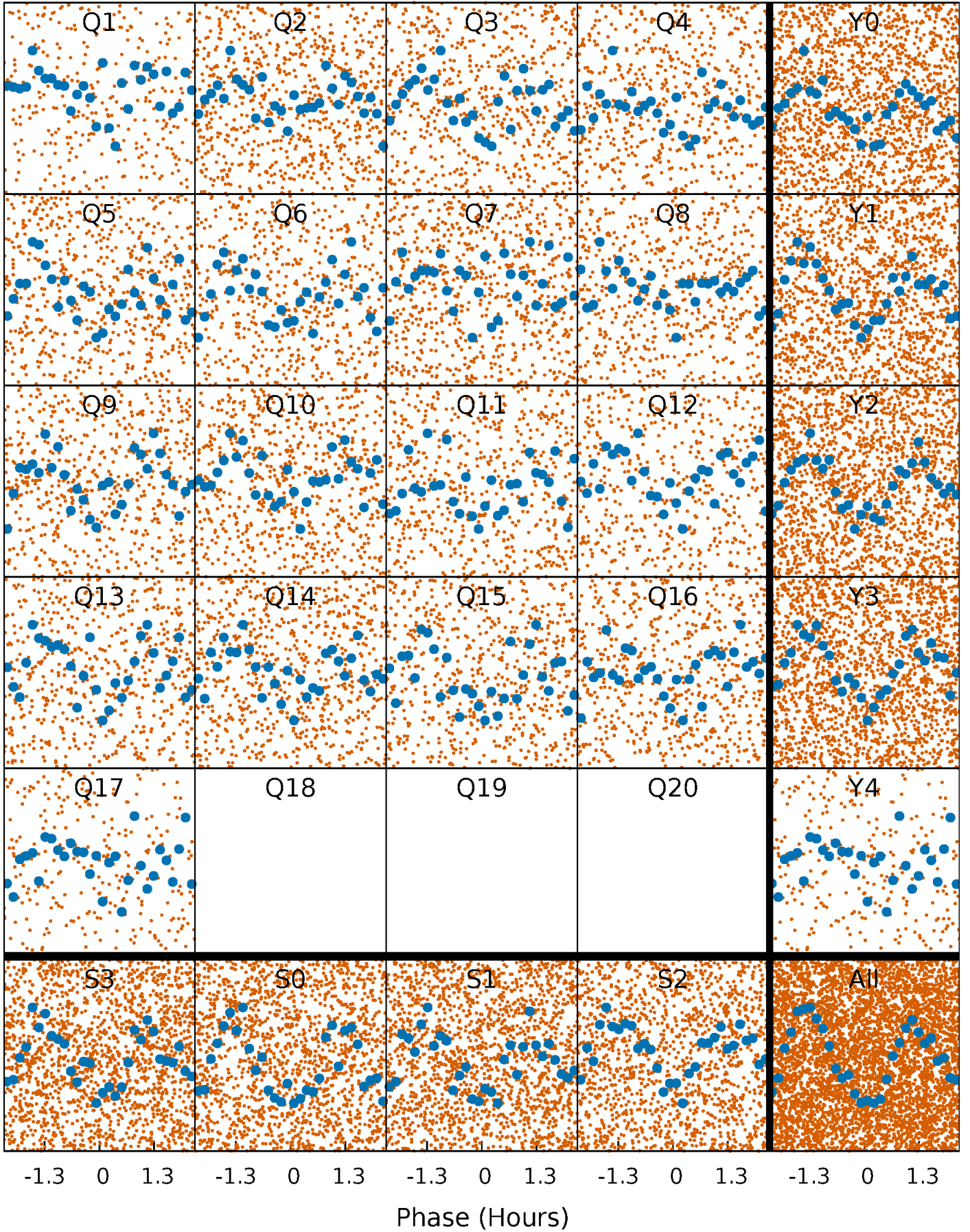


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

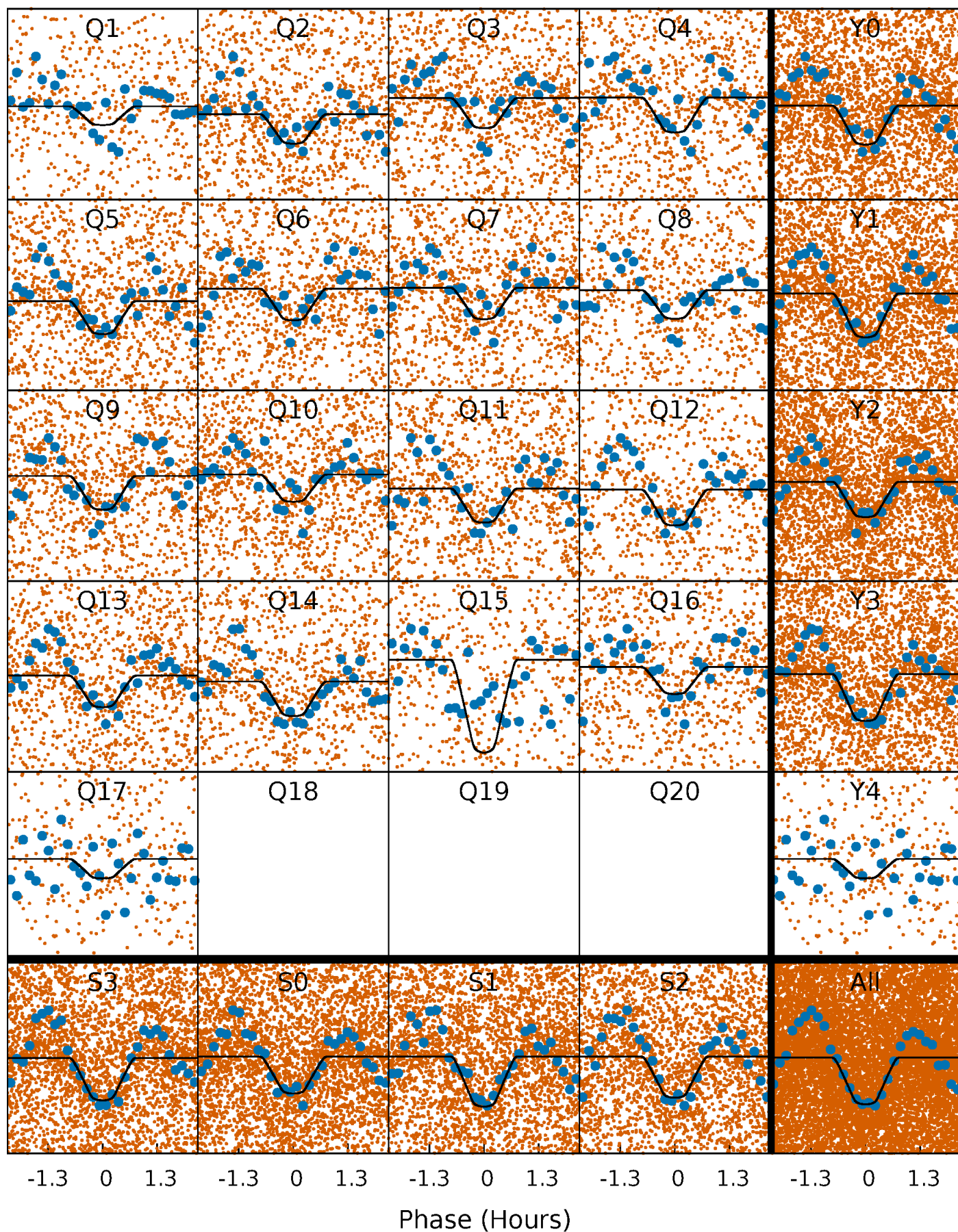
TCE 009291618-02 P= 0.524047 Days  $T_0=131.812565$  (BKJD)





# DV Quarter-Phased Transit Curves

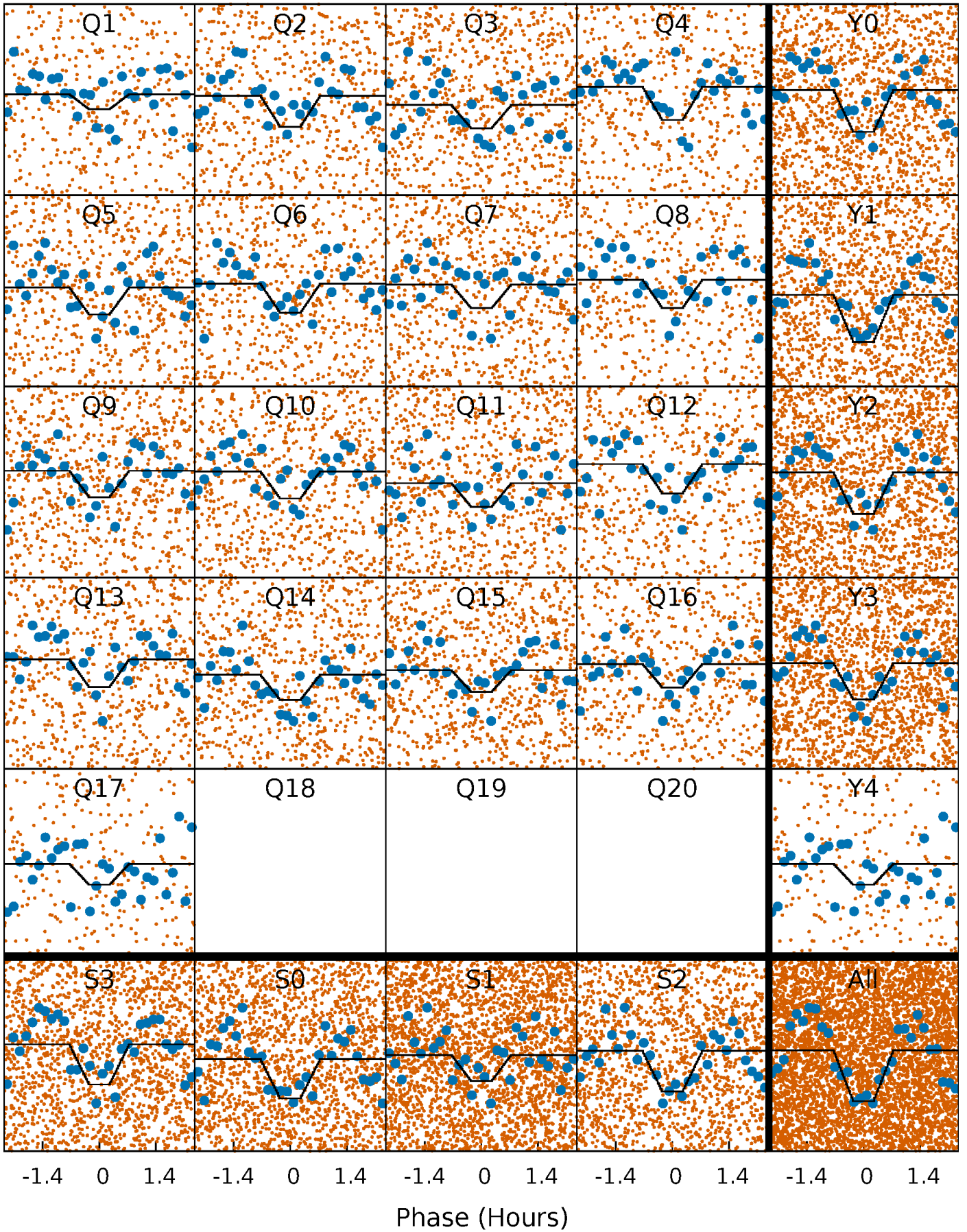
TCE 009291618-02 P= 0.524047 Days  $T_0=131.812565$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

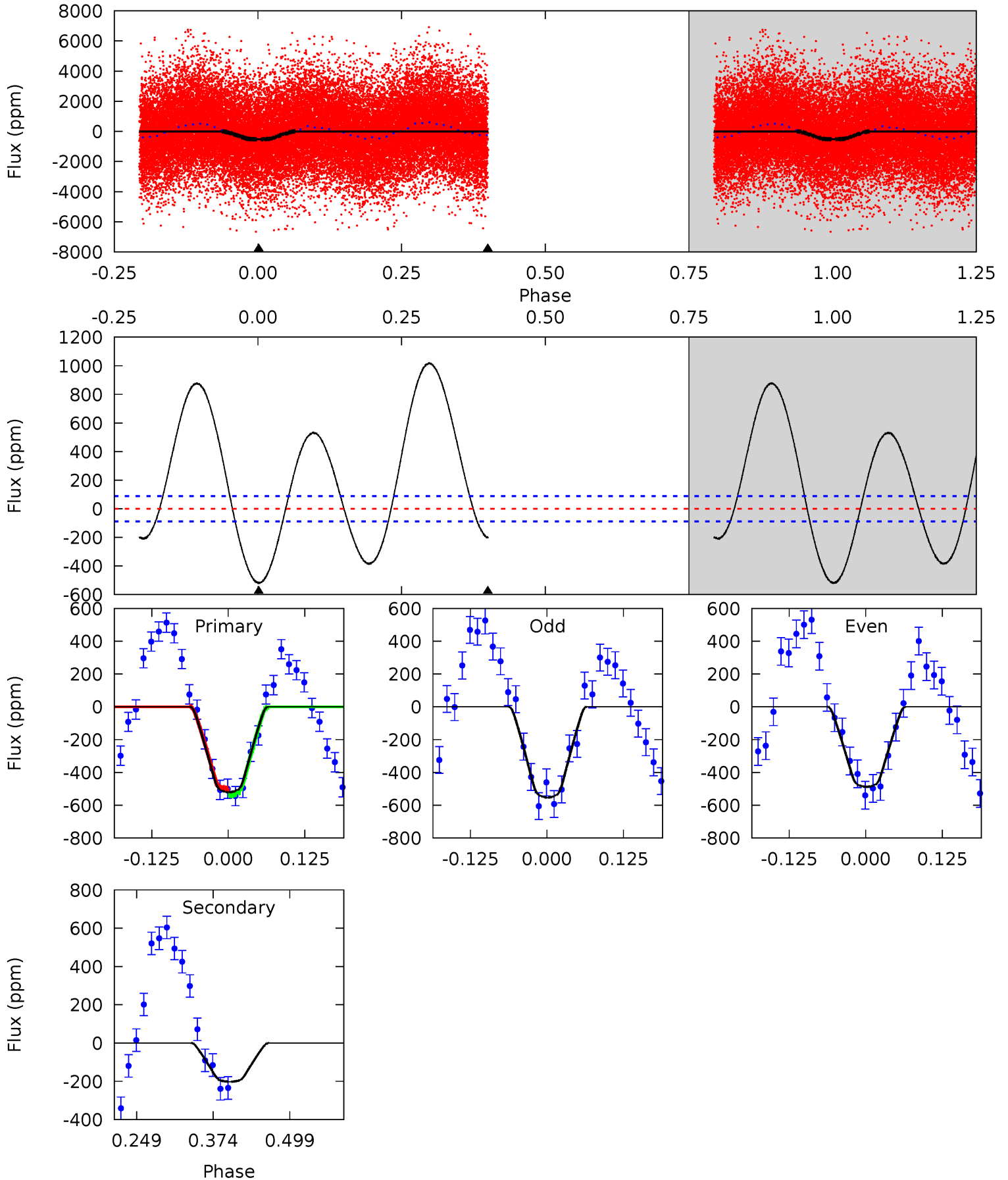
TCE 009291618-02 P= 0.524049 Days  $T_0=131.812074$  (BKJD)



# DV Model-Shift Uniqueness Test

009291618-02, P = 0.524047 Days, E = 131.288518 Days

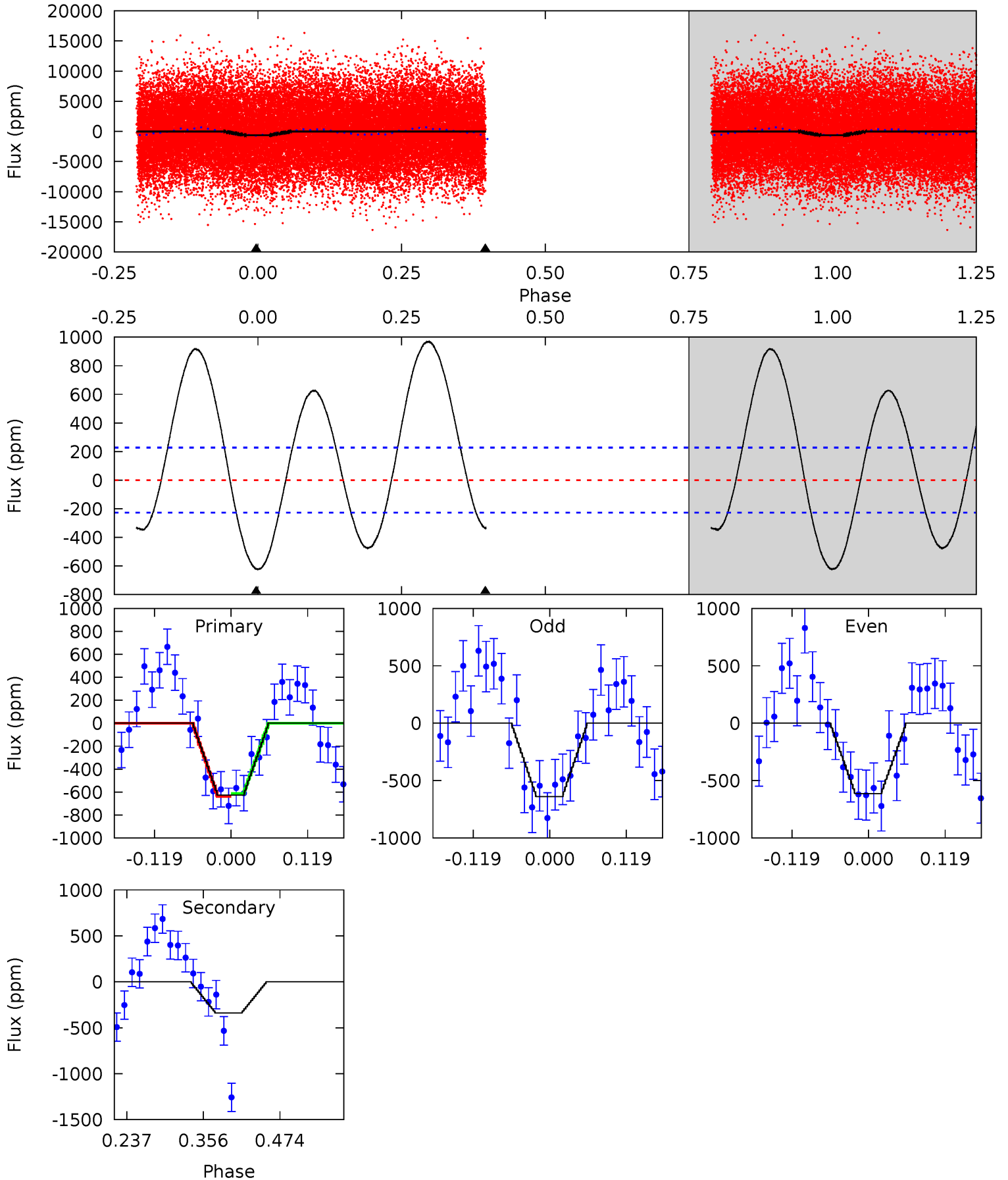
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
26.8	10.4	0	0	4.52	1.54	18.1	26.8	26.8	10.4	10.4	1.67	0.95	0.66	0.92



# Alt Model-Shift Uniqueness Test

009291618-02, P = 0.524049 Days, E = 131.288025 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.5	6.74	0	0	4.53	1.56	8.01	12.5	12.5	6.74	6.74	0.27	1.03	0.61	0.24



### Stellar Parameters For KIC 009291618

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7816^{+217}_{-326}$	$3.663^{+0.476}_{-0.084}$	$-0.100^{+0.200}_{-0.350}$	$3.490^{+0.720}_{-1.681}$	$2.047^{+0.329}_{-0.535}$	$0.068^{+0.307}_{-0.024}$
	+3%/-4%	+13%/-2%	+200%/-350%	+21%/-48%	+16%/-26%	+452%/-35%
Source	KIC0	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 009291618-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-202 \pm 19$	$8.24^{+3.12}_{-3.02}$	$6772^{+500}_{-928}$	$4417^{+1805}_{-8702}$	$0.430^{+0.569}_{-0.210}$
Alt.	$-338 \pm 50$	$8.70^{+3.11}_{-2.81}$	$6777^{+525}_{-810}$	$5488^{+1621}_{-1538}$	$0.647^{+0.700}_{-0.290}$

$T_{max}$  = 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

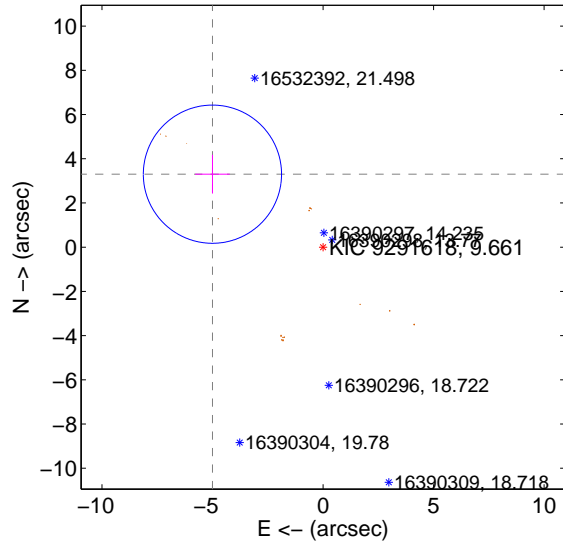
Supplemental centroid analysis for 009291618-02. **Kepler magnitude: 9.66.** Transit SNR 17.40

**There are 0 quarters with good PRF difference image offsets**

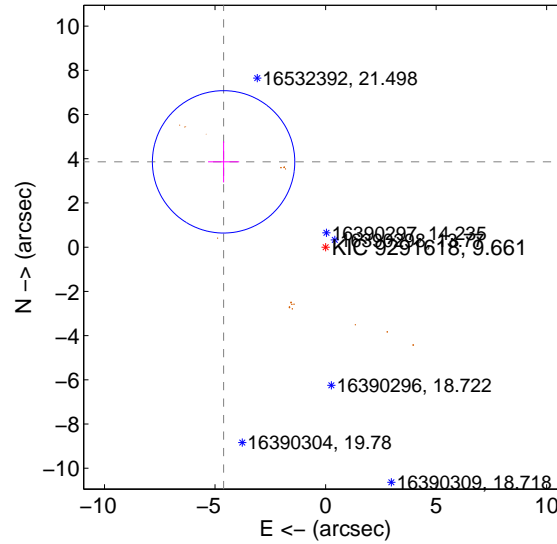
The direct PRF centroid is offset from the target star catalog position by about 1.54 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>5.994 \pm 1.042</math></b>	<b>5.75</b>	$5.003 \pm 0.784$	$3.302 \pm 0.877$
PRF-fit source offset from KIC position	<b><math>6.015 \pm 1.073</math></b>	<b>5.60</b>	$4.614 \pm 0.705$	$3.860 \pm 0.930$
photometric centroid source offset	<b><math>0.54 \pm 0.10</math></b>	<b>5.71</b>	$0.48 \pm 0.10$	$0.26 \pm 0.06$

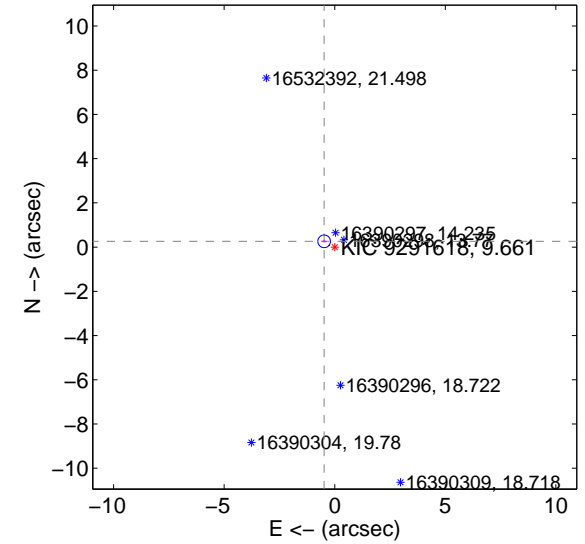
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



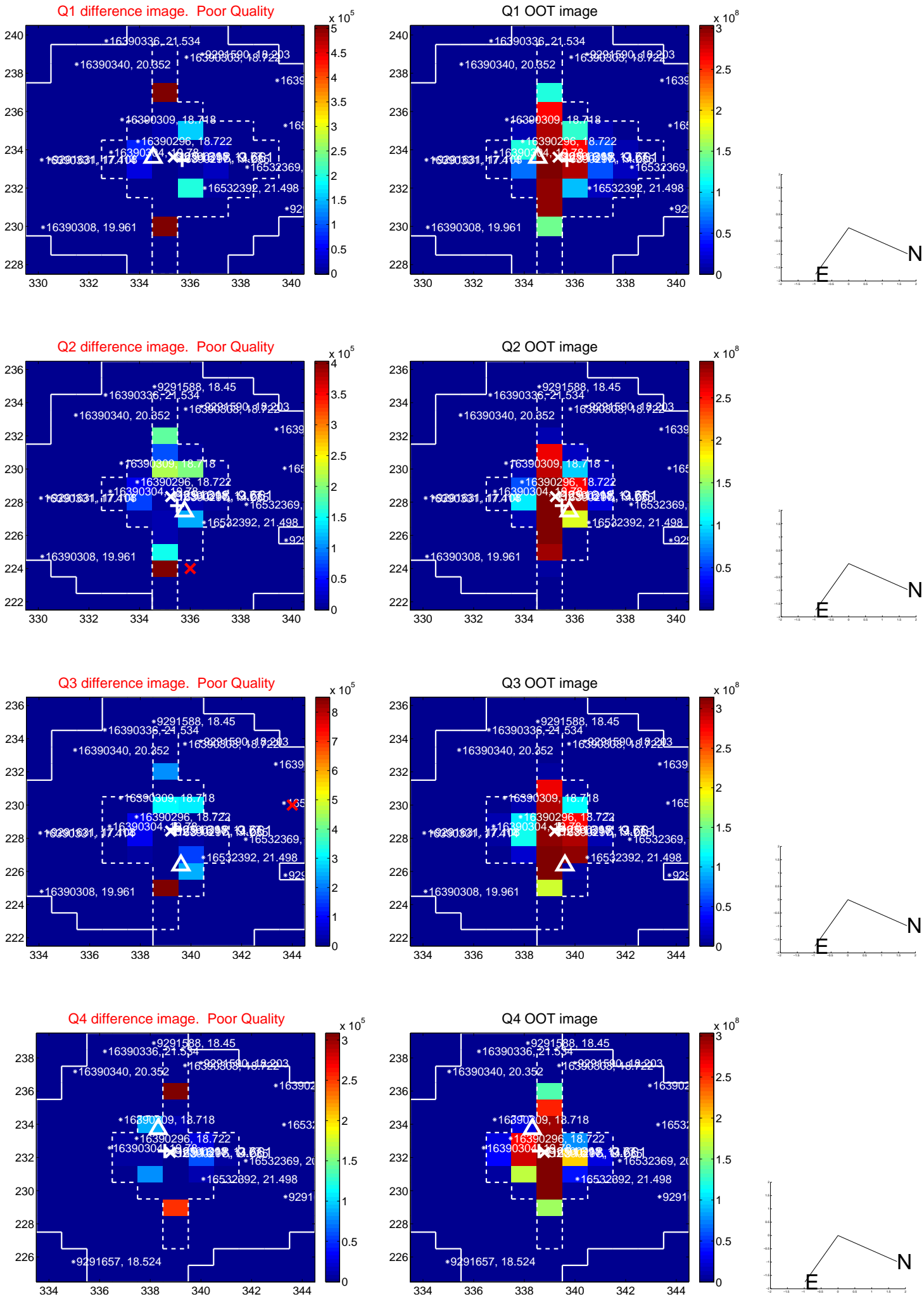
offset from photometric centroids



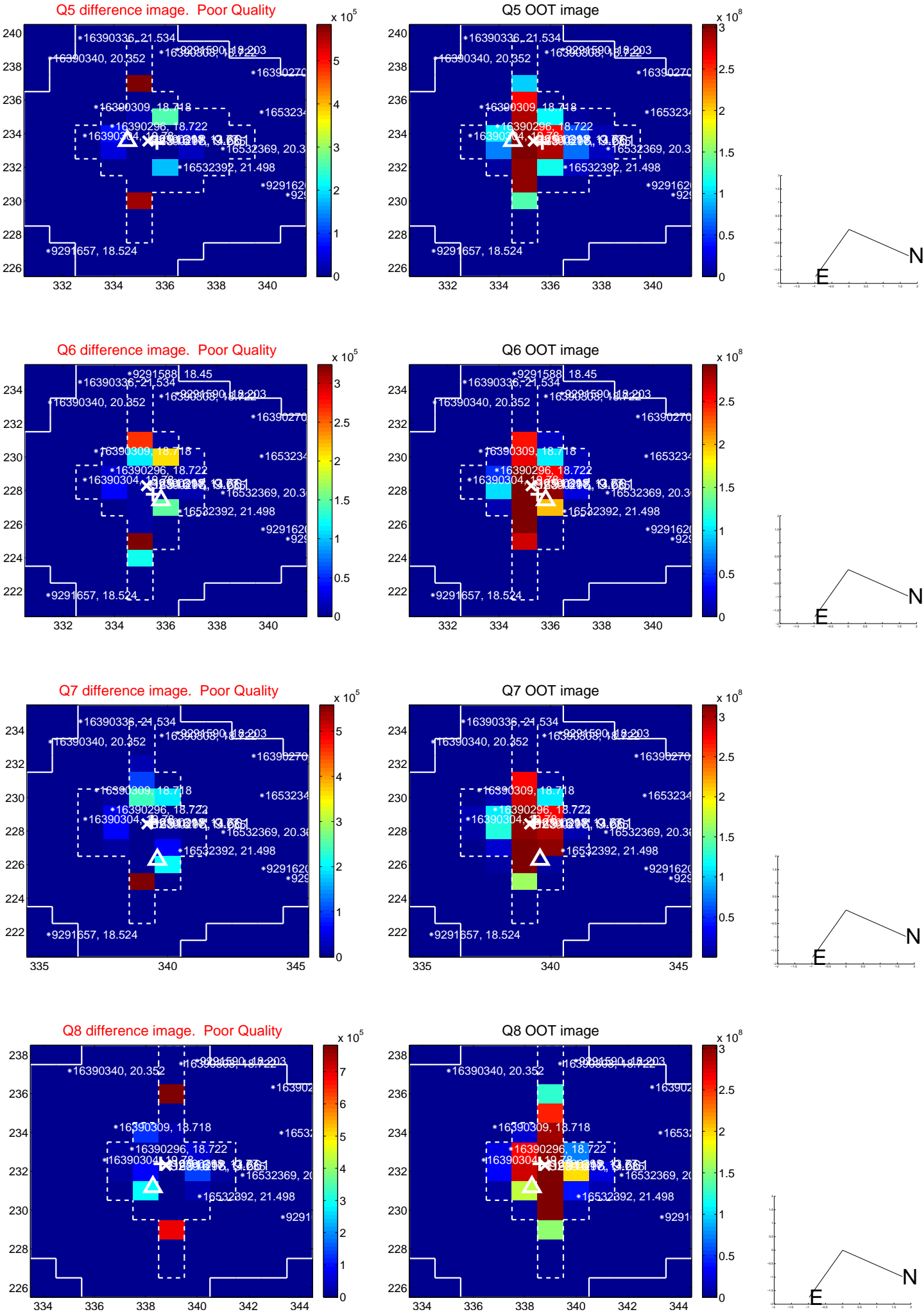
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



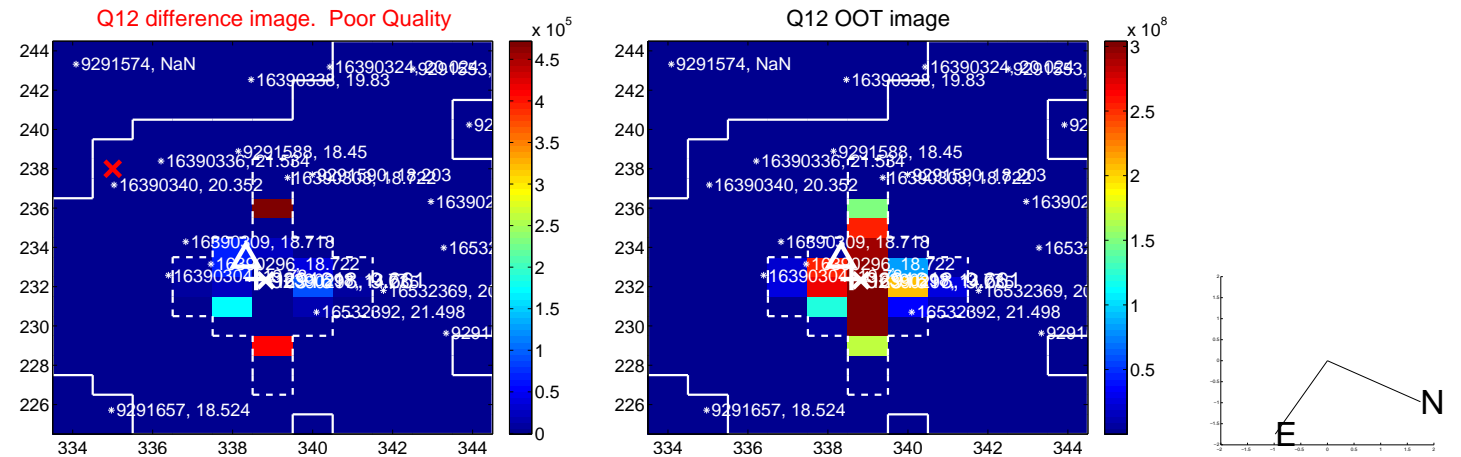
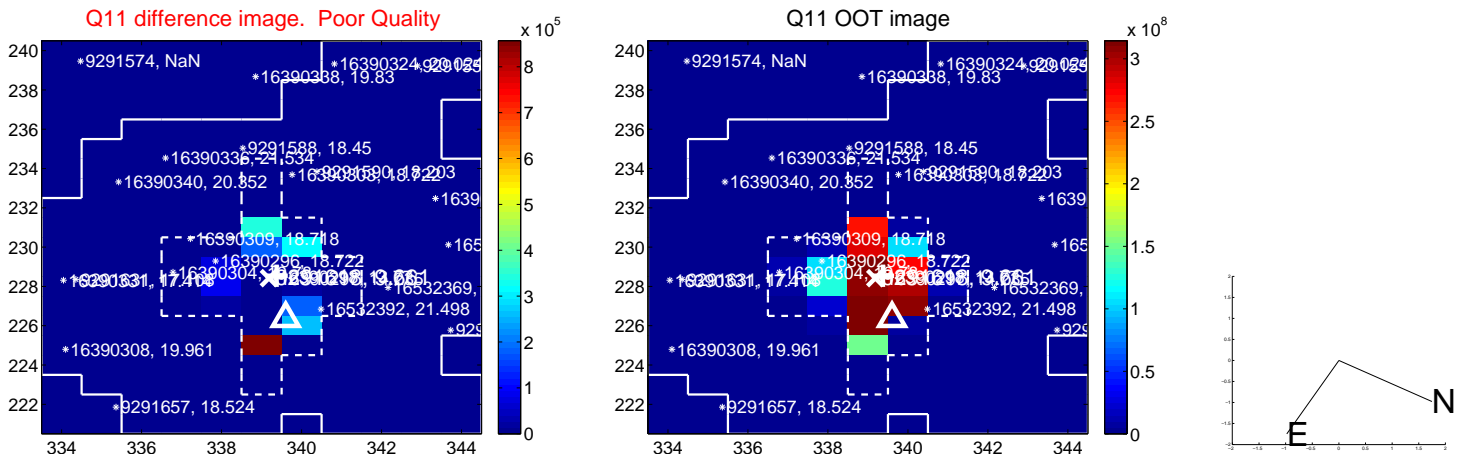
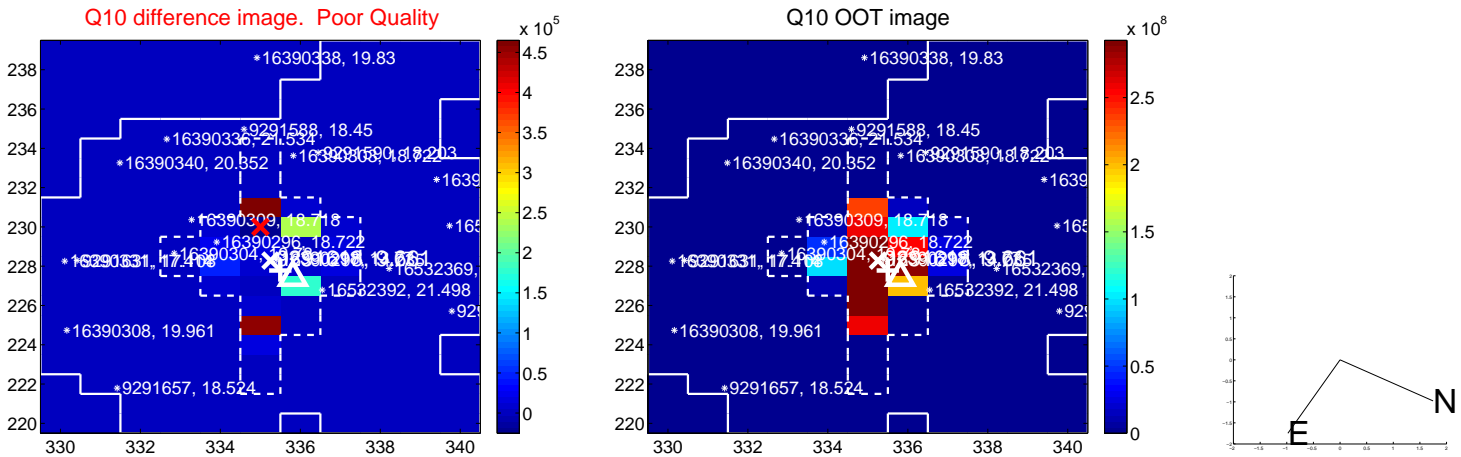
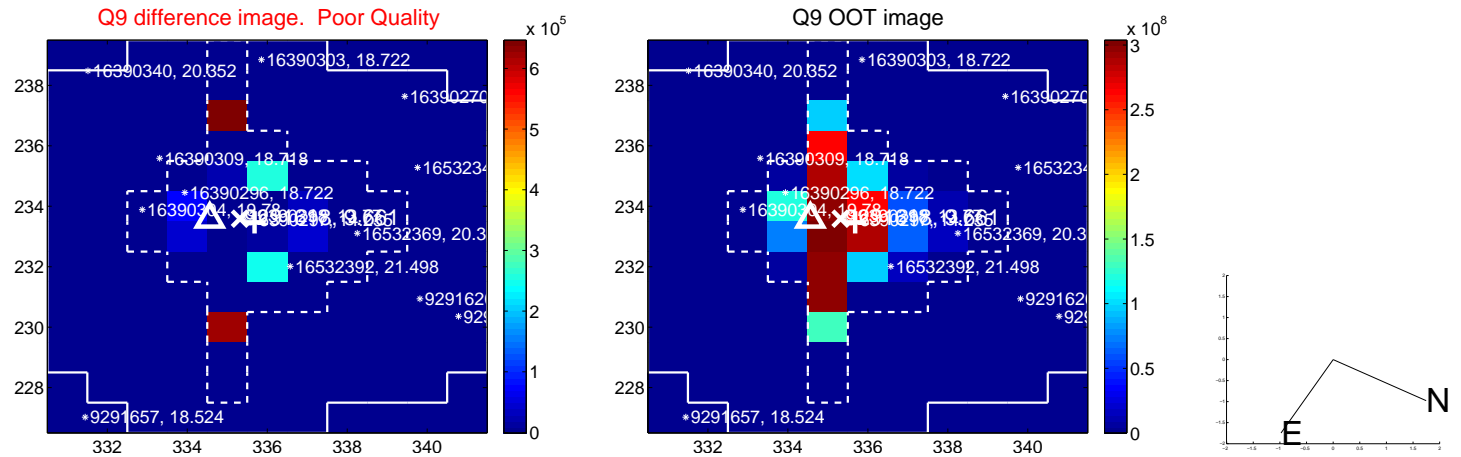
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



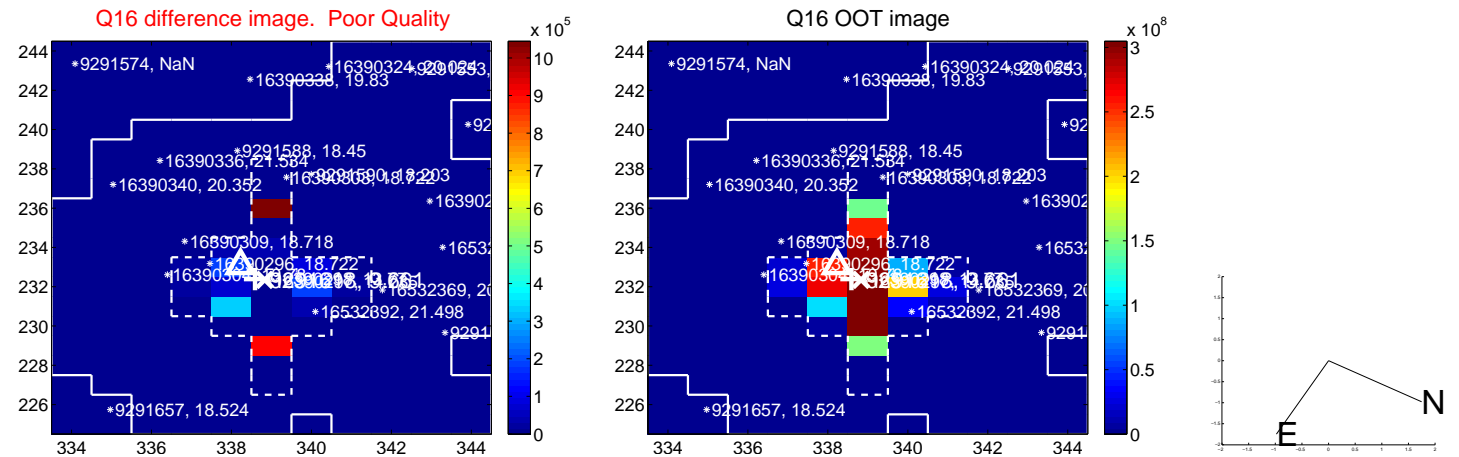
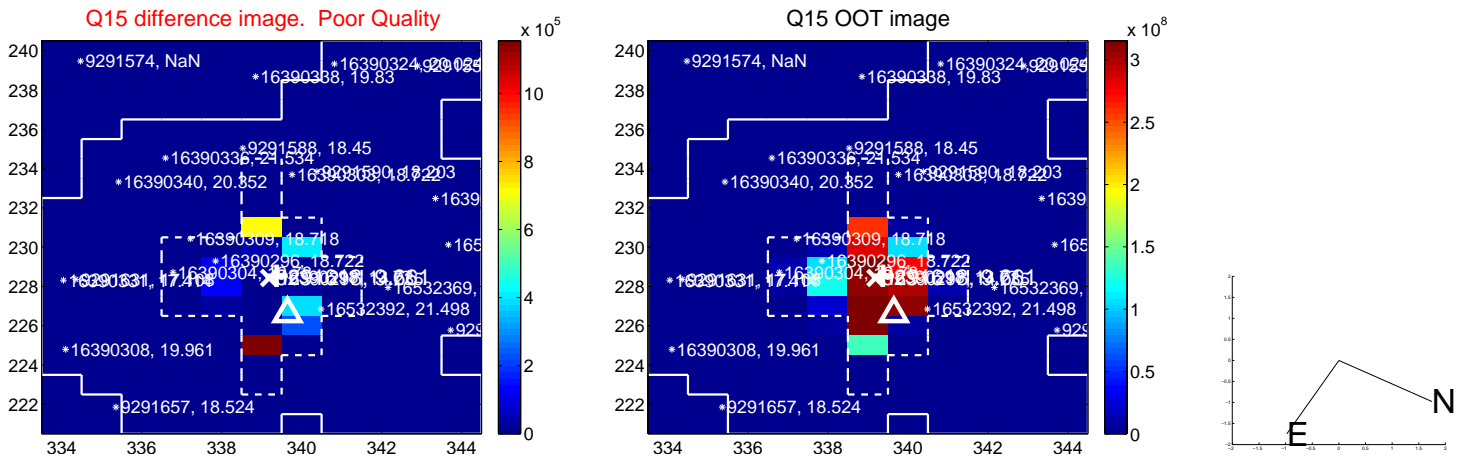
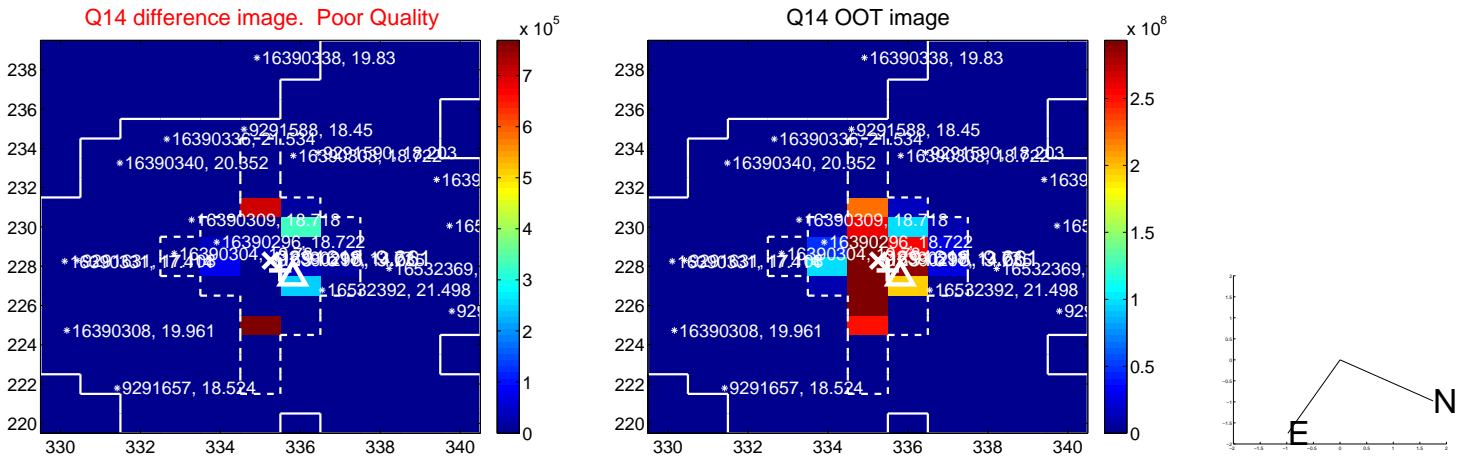
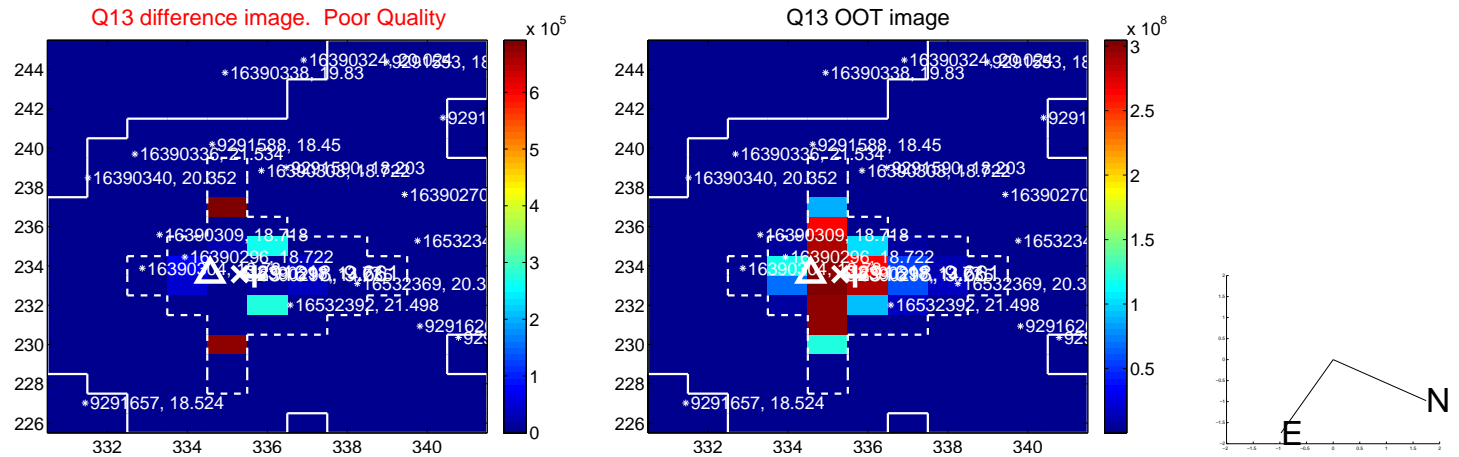
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



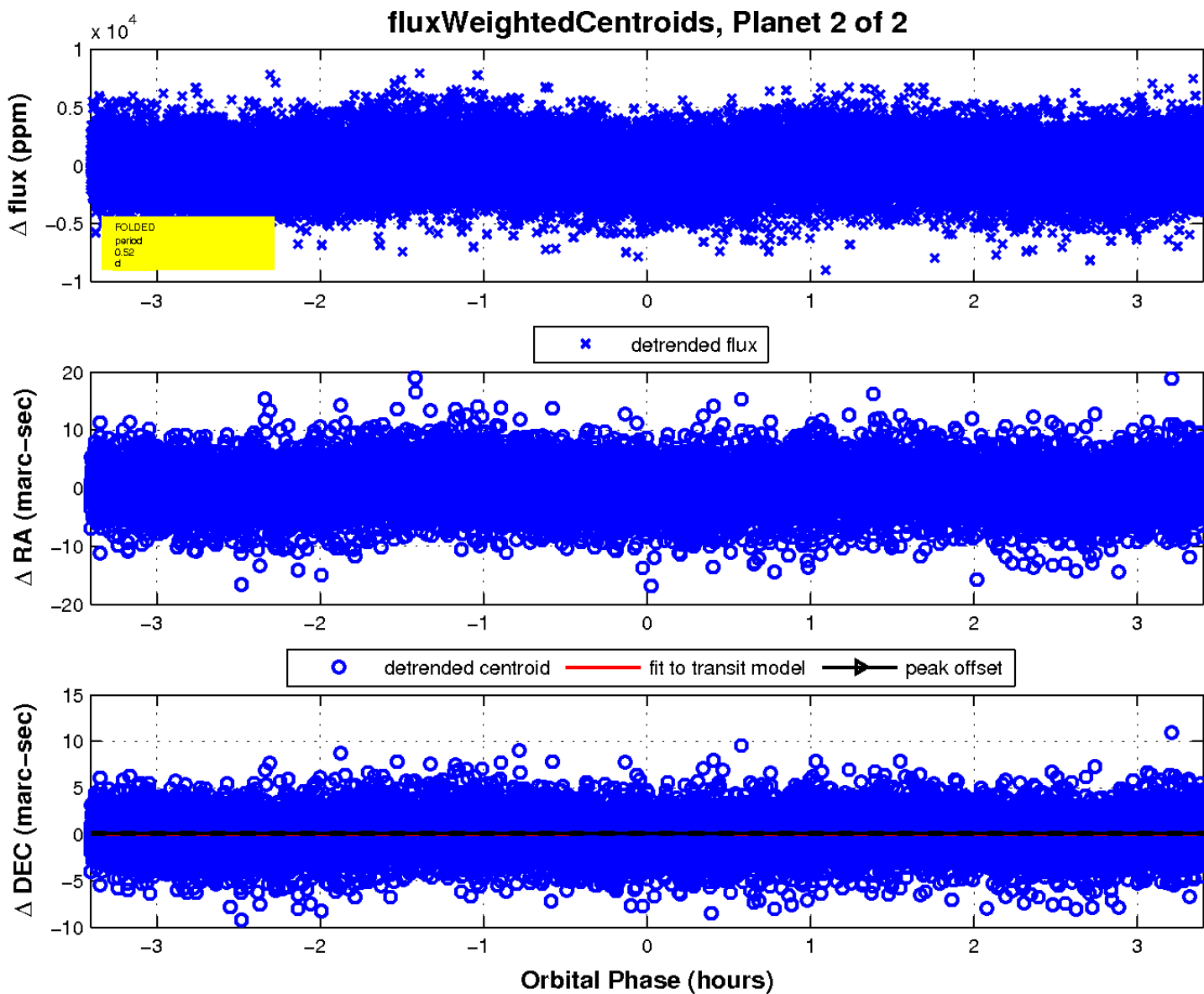
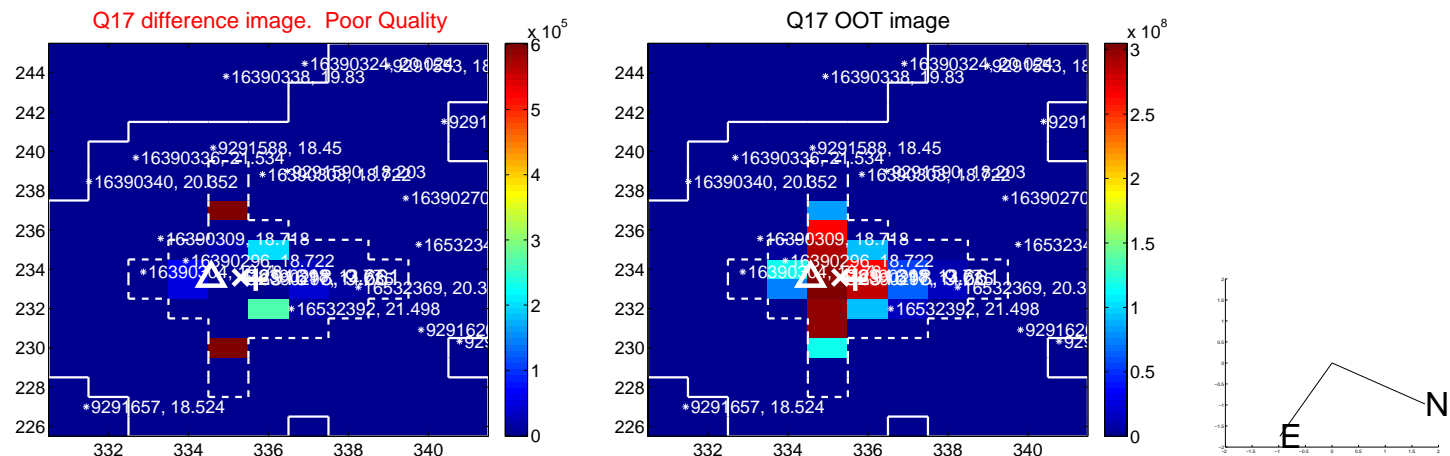
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

