

# KIC 009149959

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009149959-01	OBS	No	0.738270	131.998319	15.6	2.872	7.9	8.3	3.85	7102	1.77	101407.80
009149959-02	OBS	No	113.534432	149.814932	128.0	12.962	7.4	7.5	3.85	7102	4.88	123.08

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009149959-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
009149959-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT

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

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

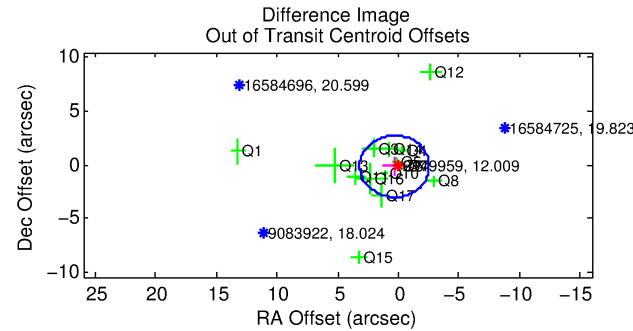
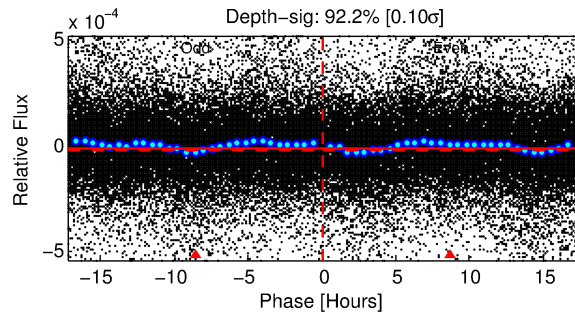
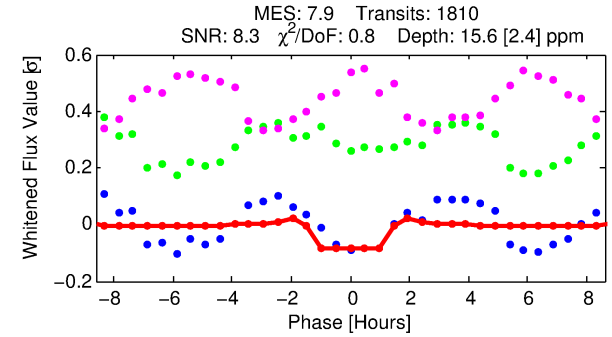
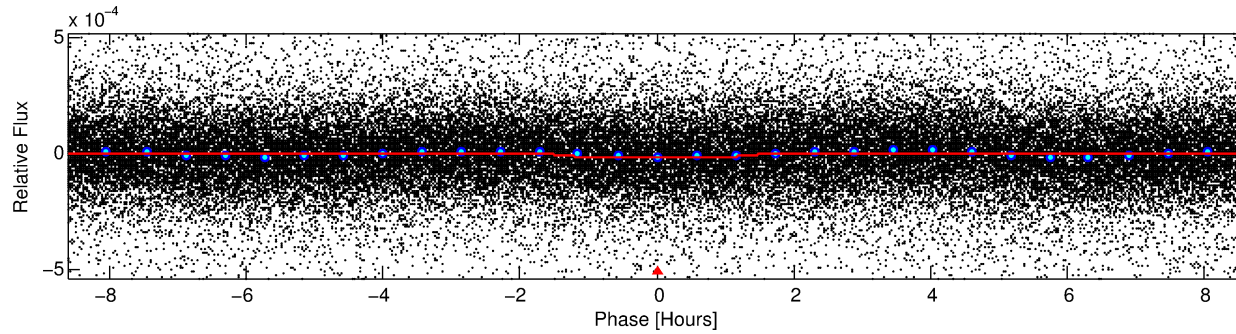
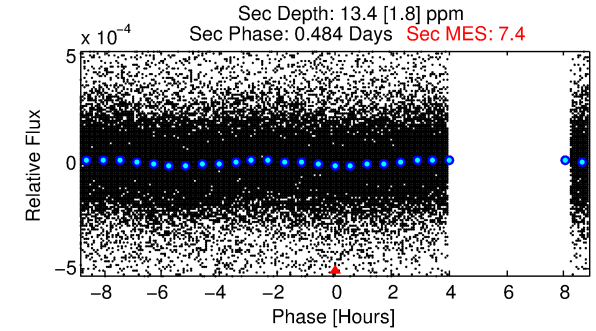
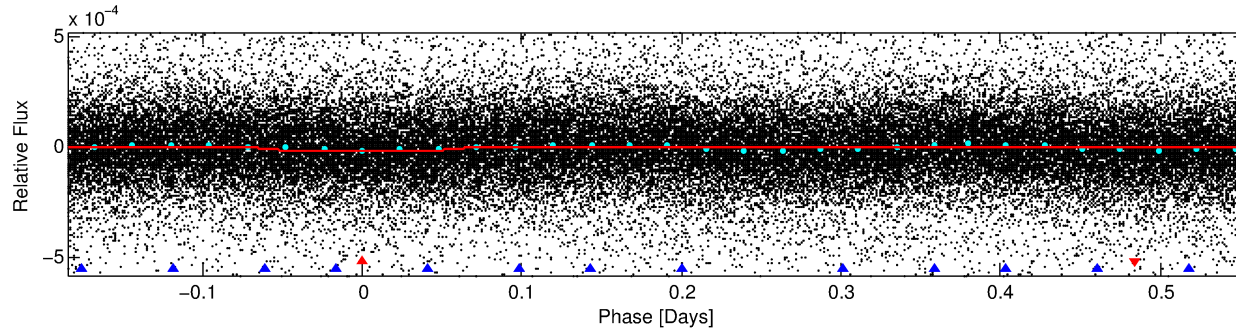
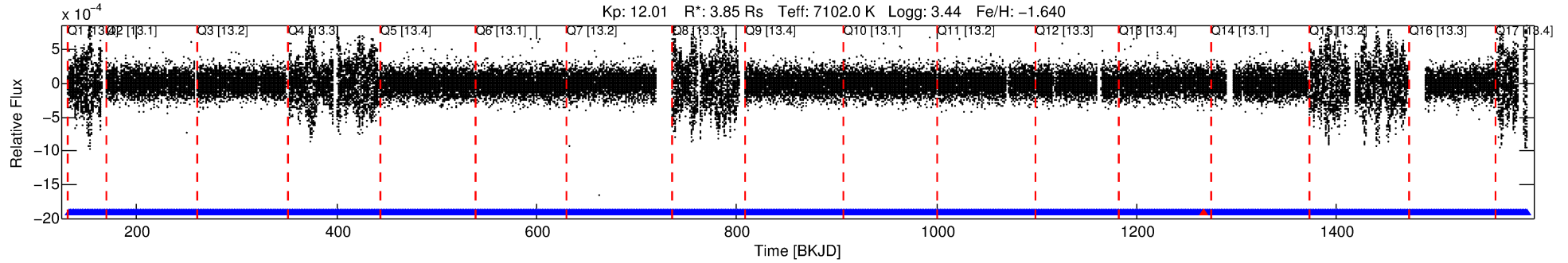
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009149959-01

No Significant Match Found

# DV One-Page Summary

KIC: 9149959 Candidate: 1 of 2 Period: 0.738 d



## DV Fit Results:

Period = 0.73827 [0.00001] d  
Epoch = 131.9983 [0.0029] BKJD  
Rp/R\* = 0.0042 [0.0011]  
a/R\* = 1.28 [0.80]  
b = 0.90 [0.34]  
Seff = 101407.80 [57503.69]  
Teq = 4550 [645] K  
Rp = 1.77 [0.87] Re  
a = 0.0183 [0.0066] AU  
Ag = 0.78 [0.61] [-0.36σ]  
Teffp = 6612 [948] K [1.80σ]

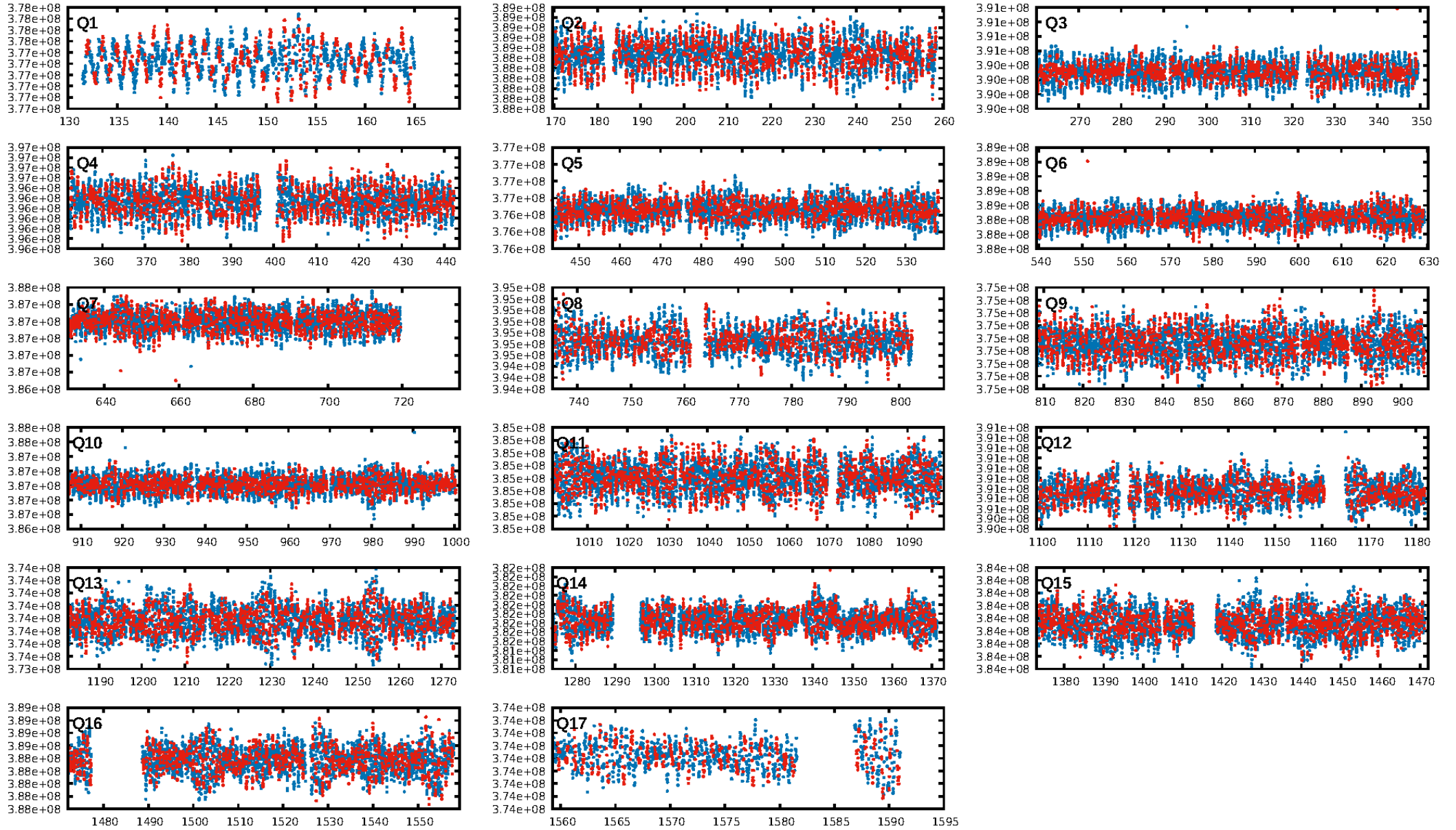
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [203.90σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
**Bootstrap-pfa: 3.12e-12**  
RollingBand-fgt: 1.00 [1728/1729]  
GhostDiagnostic-chr: -21.16  
Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 0.357 arcsec [0.37σ]  
KicOffset-rm: 0.388 arcsec [0.38σ]  
OotOffset-st: 3/4/4/4 [15]  
KicOffset-st: 3/4/4/4 [15]  
DiffImageQuality-fgm: 0.53 [8/15]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 22:28:51 Z

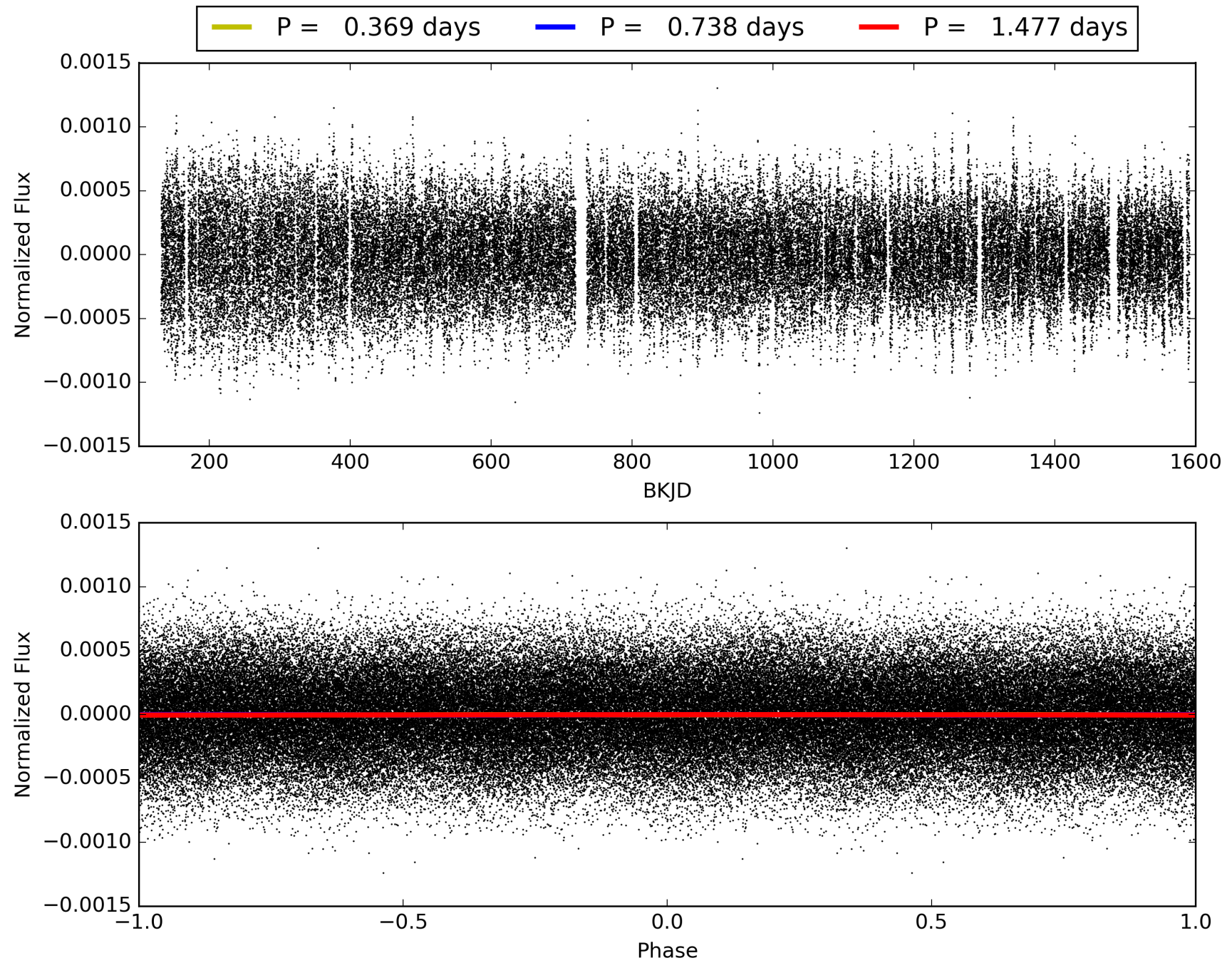
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009149959-01, PDC Light Curves



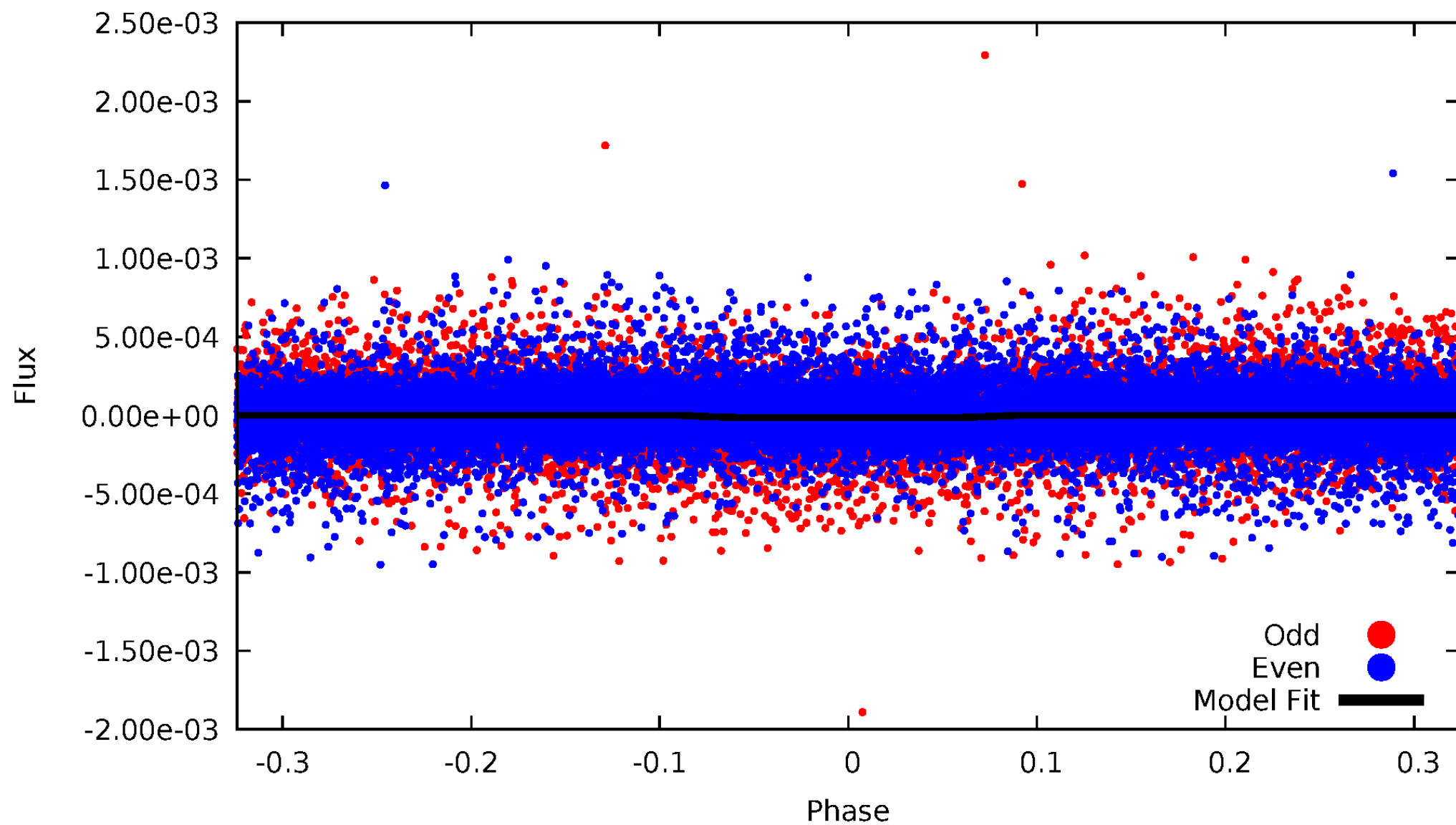


TCE 009149959-01



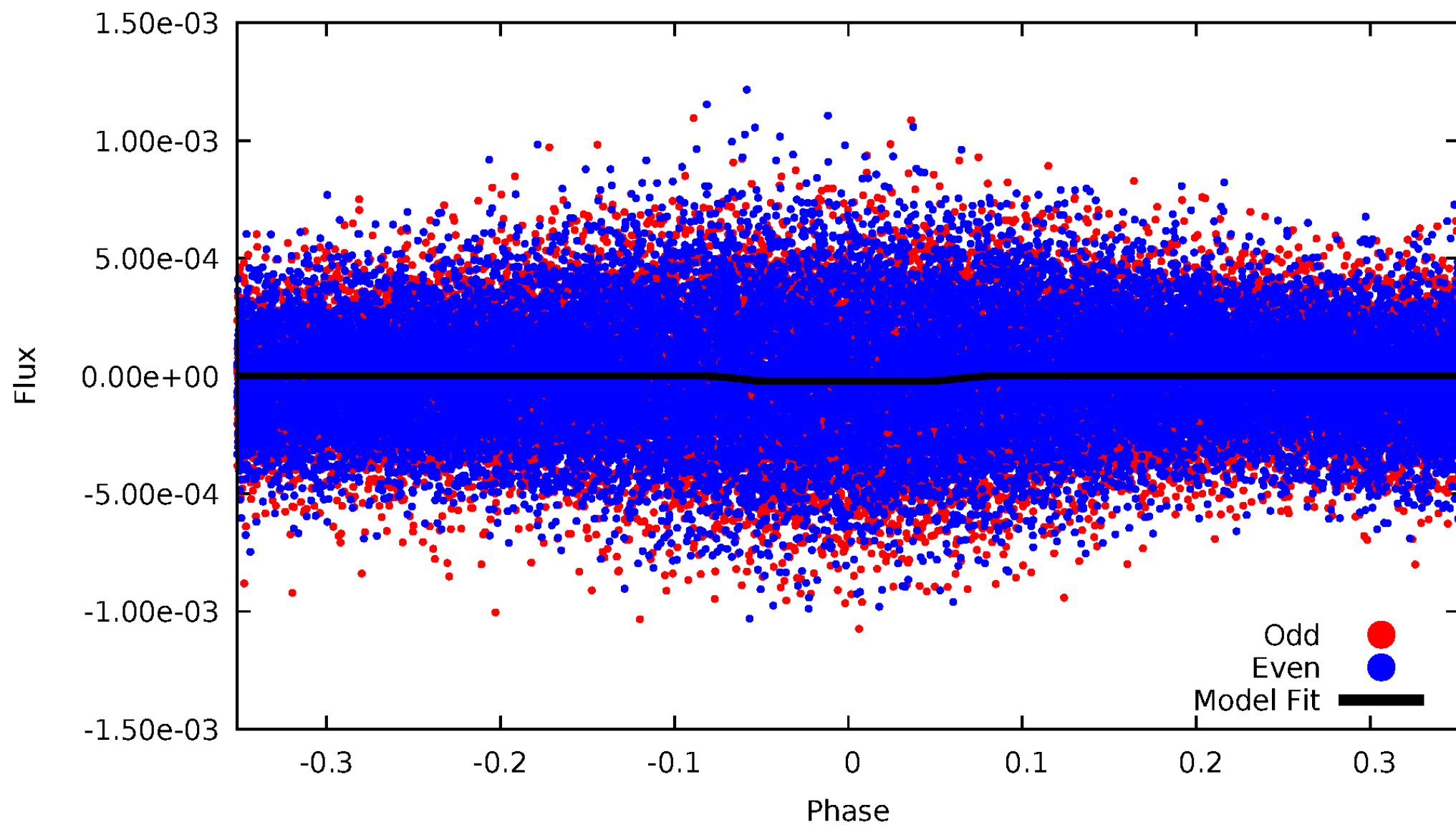
# DV Odd/Even

TCE 009149959-01



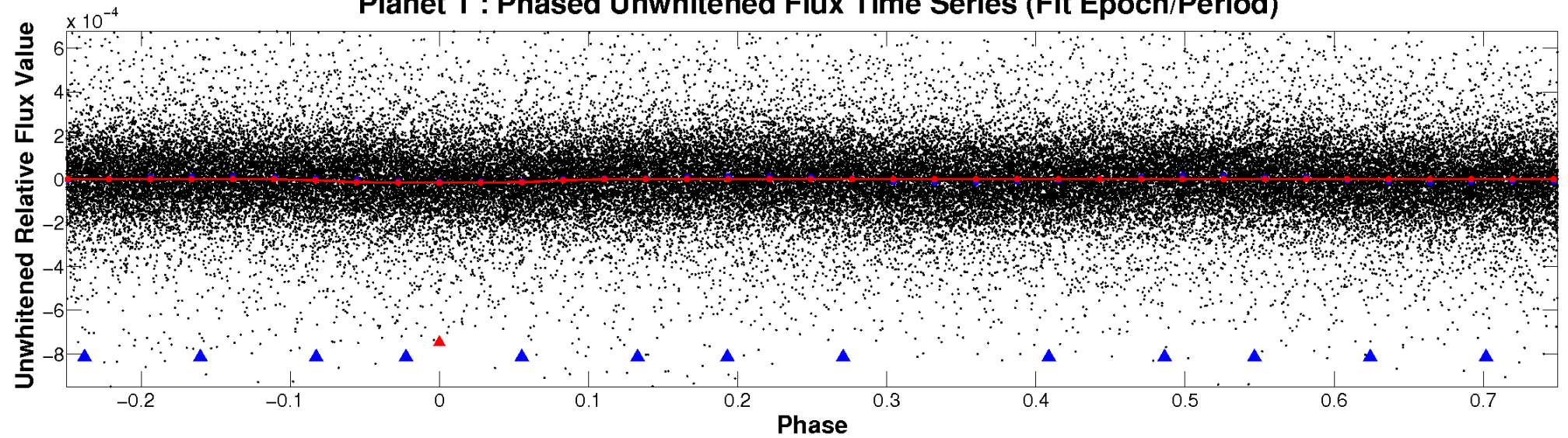
# ALT Odd/Even

TCE 009149959-01

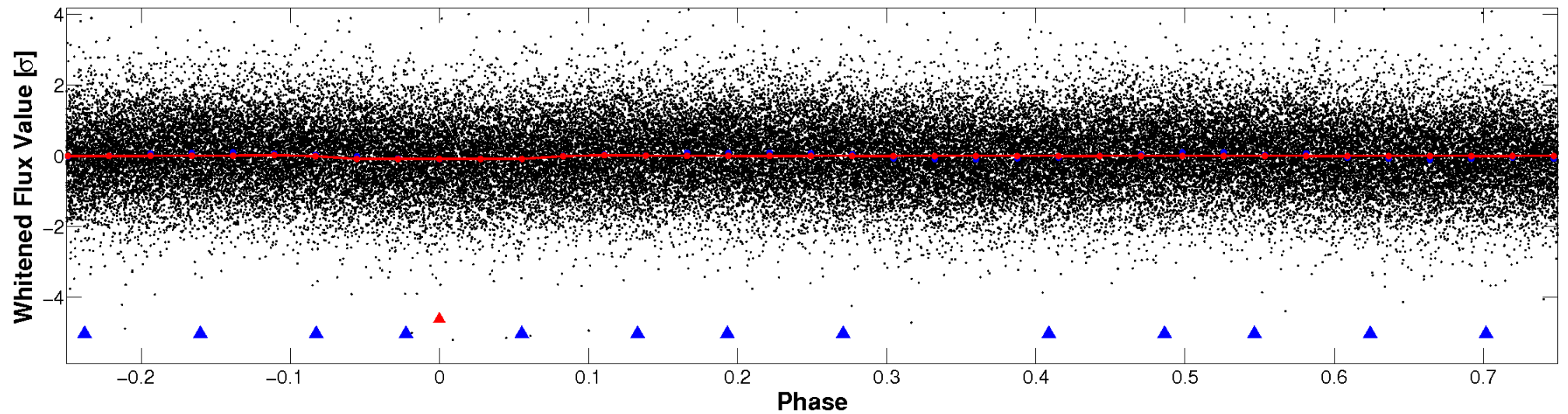


# Non-Whitened Vs. Whitened Light Curve

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



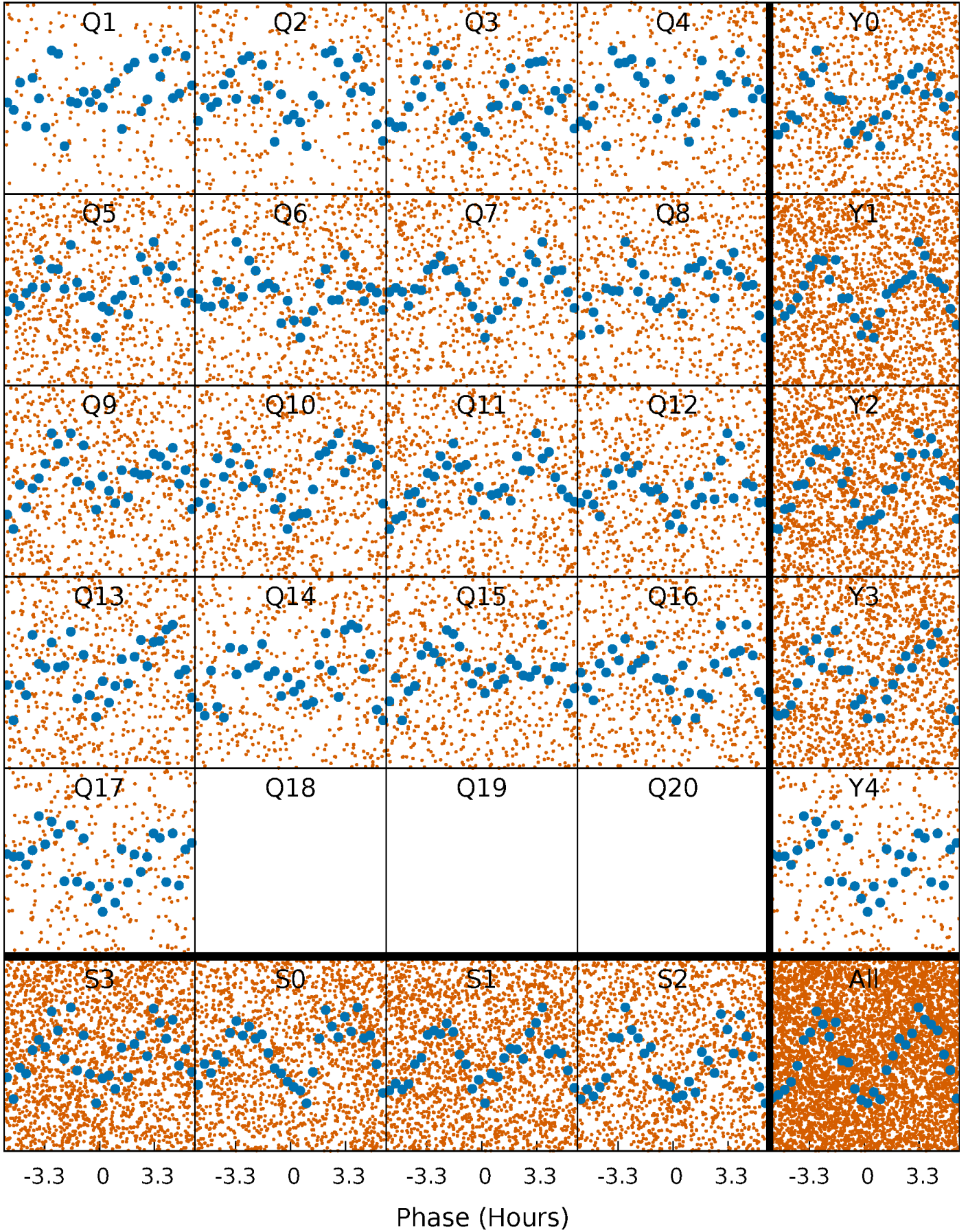
**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

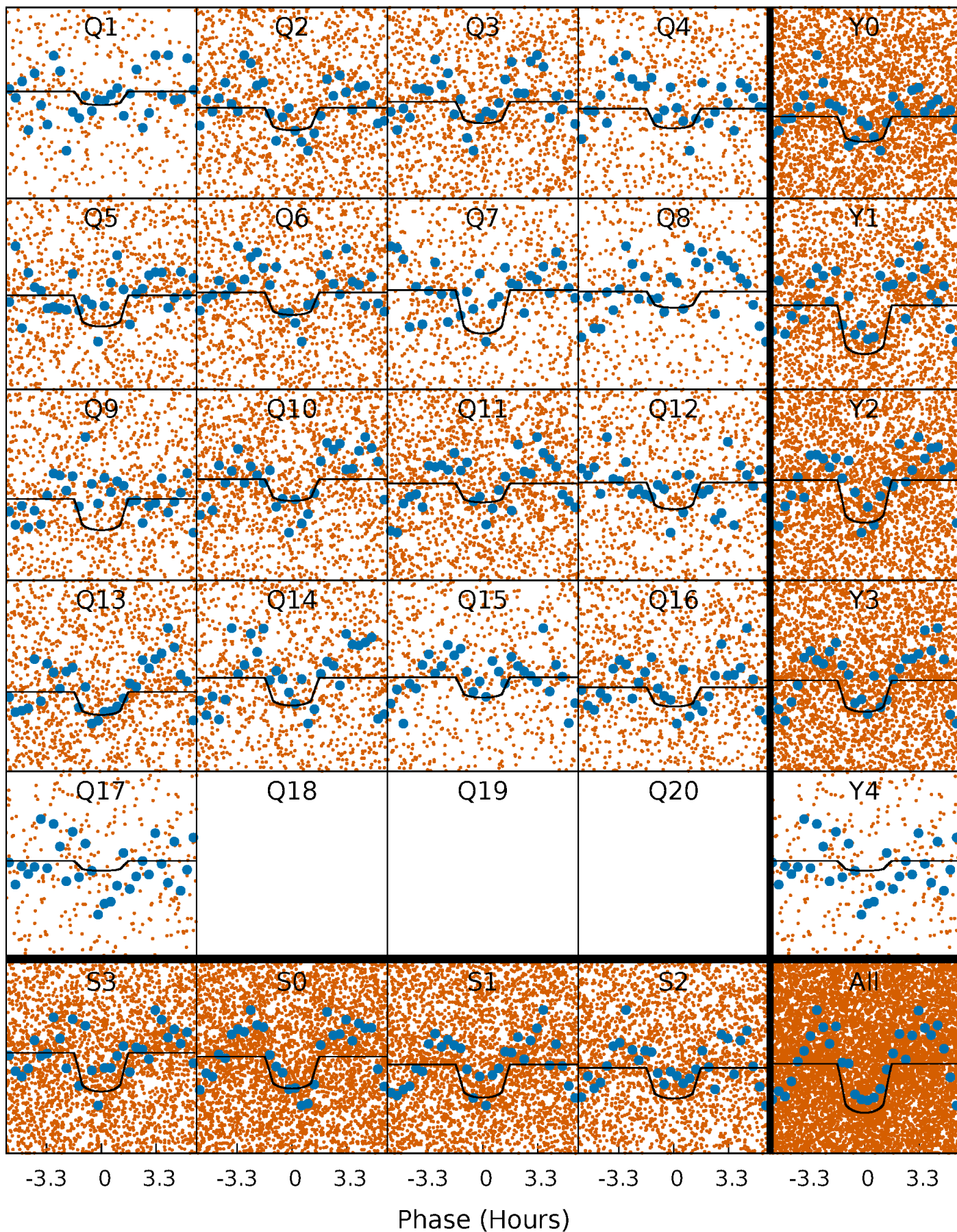
TCE 009149959-01   P= 0.738270 Days    $T_0=131.998319$  (BKJD)





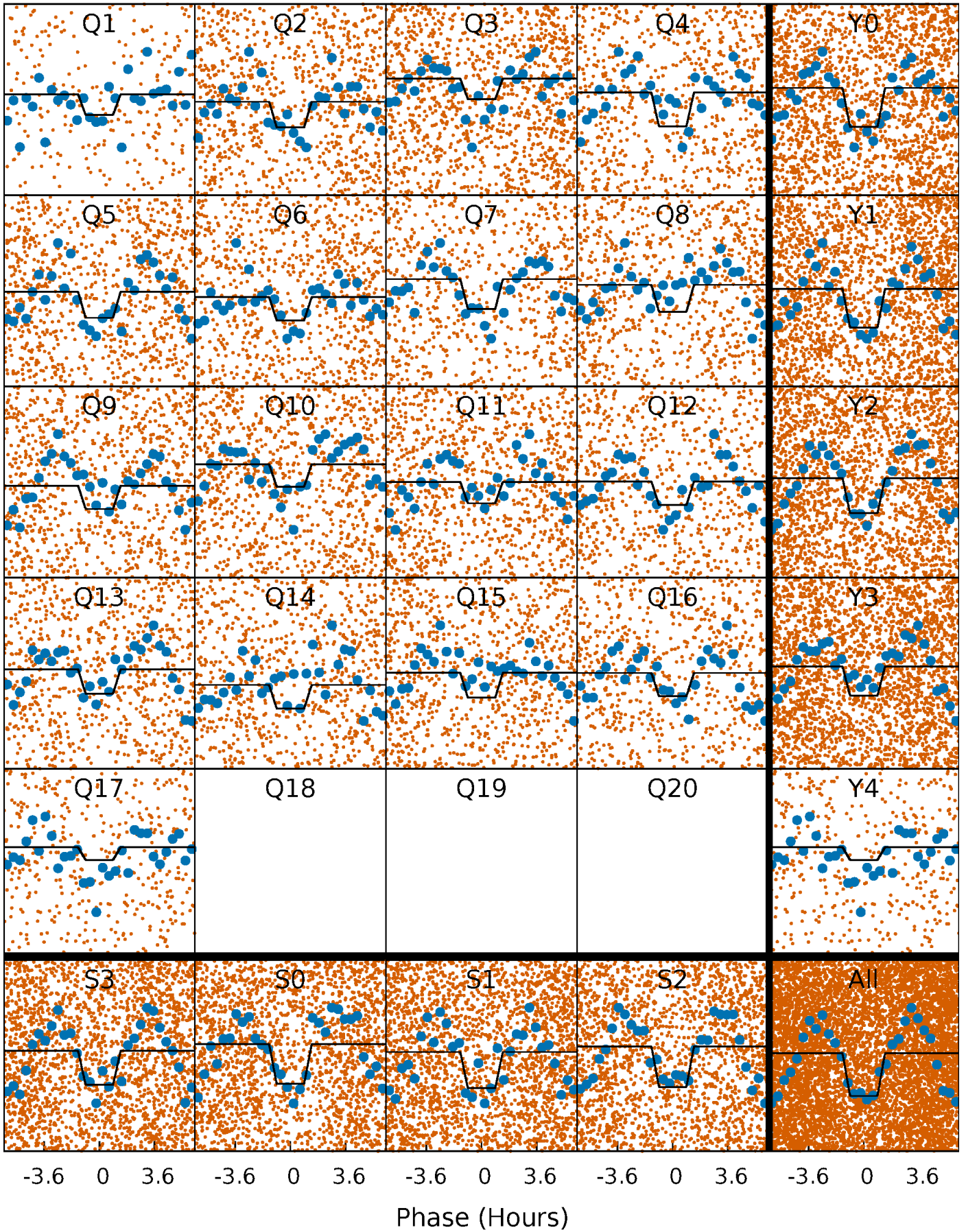
# DV Quarter-Phased Transit Curves

TCE 009149959-01 P= 0.738270 Days  $T_0=131.998319$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 009149959-01   P= 0.738285 Days    $T_0=131.996545$  (BKJD)

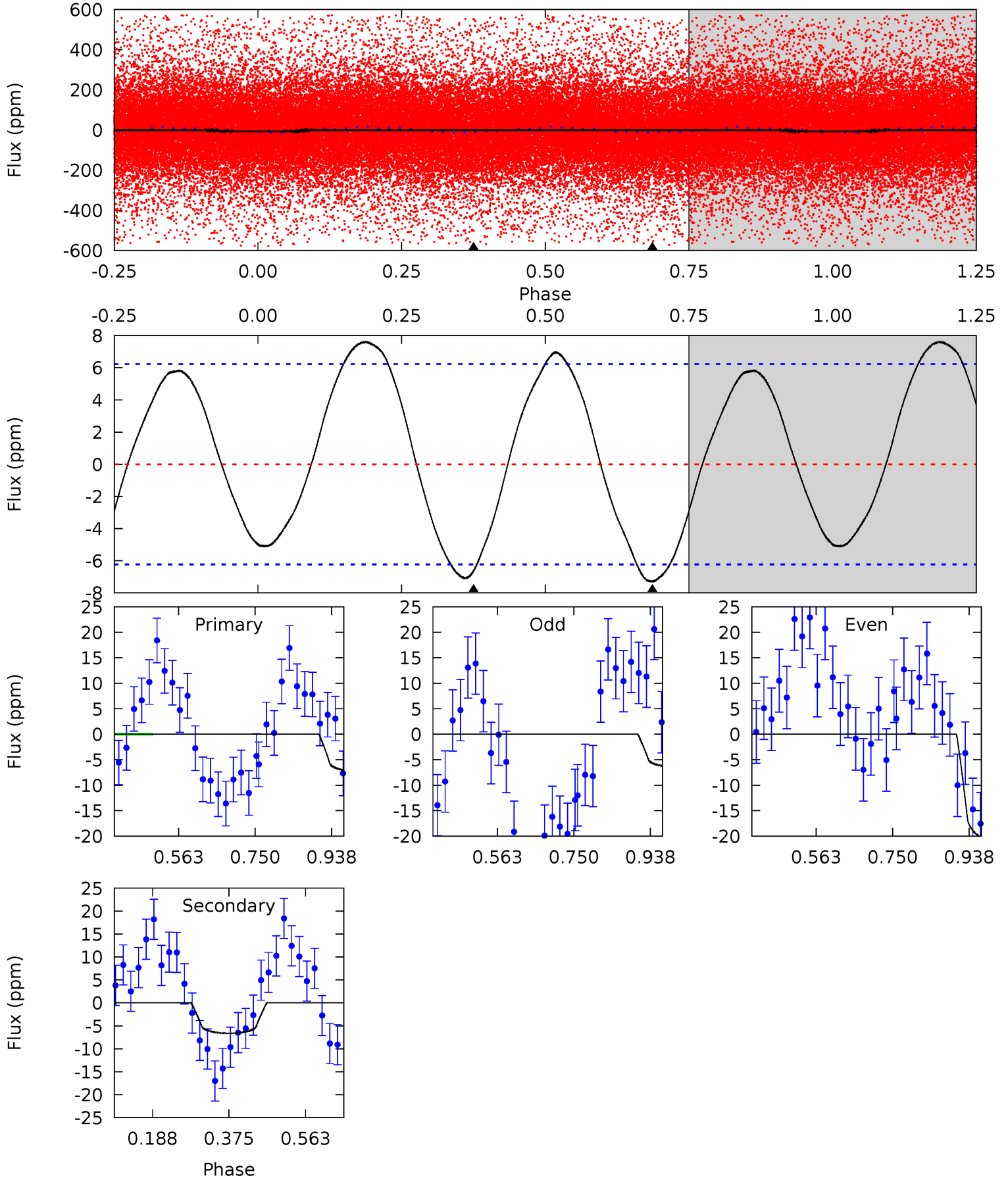




# DV Model-Shift Uniqueness Test

009149959-01, P = 0.738270 Days, E = 131.260049 Days

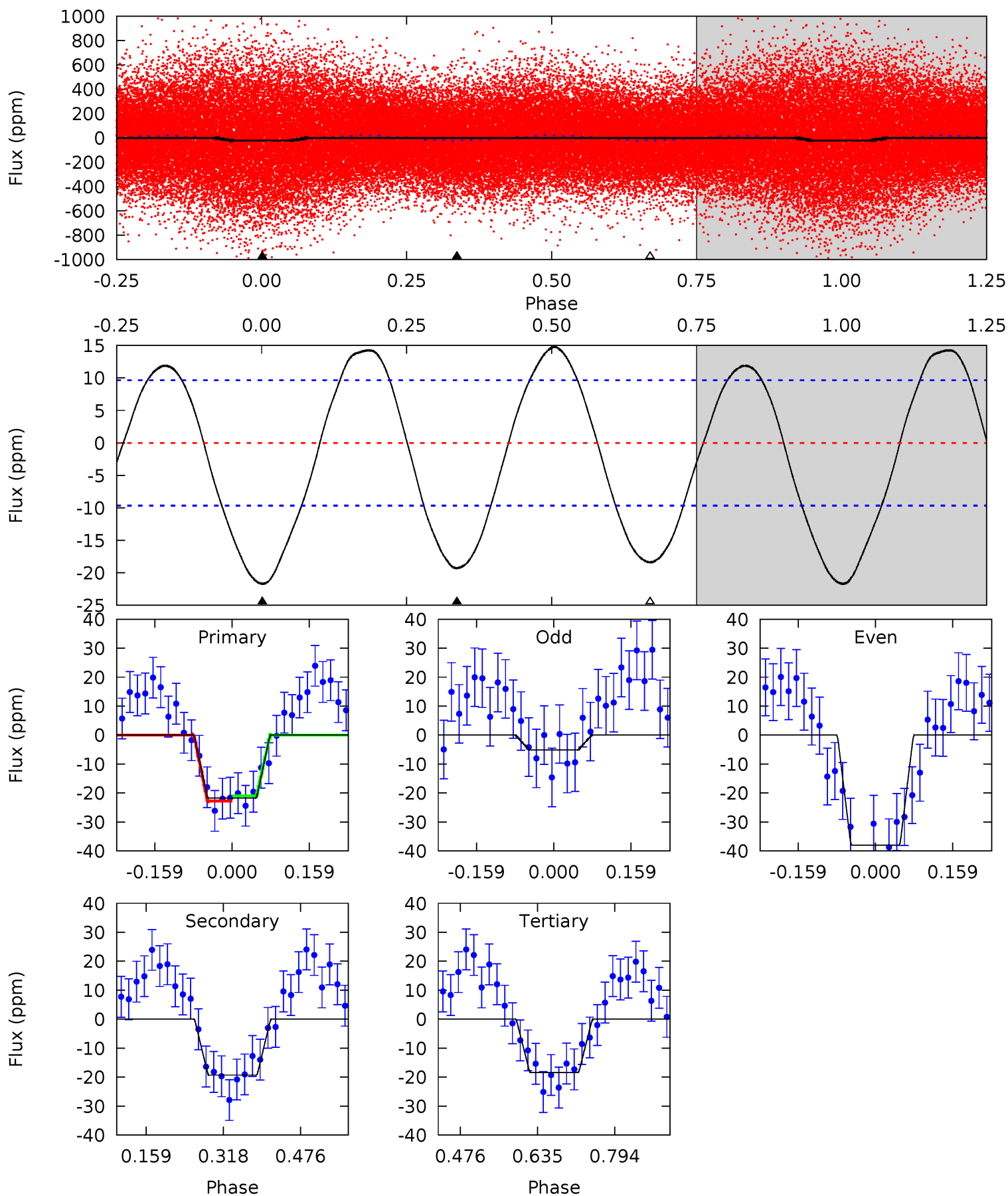
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.18	4.71	0	0	4.43	1.32	3.01	5.18	5.18	4.71	4.71	5.12	0.94	0.51	1.92



# Alt Model-Shift Uniqueness Test

009149959-01, P = 0.738285 Days, E = 131.258260 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
10.0	8.93	8.50	0	4.47	1.41	5.43	1.54	10.0	0.43	8.93	6.98	0.96	0.41	0.31





### Stellar Parameters For KIC 009149959

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7102^{+199}_{-274}$	$3.440^{+0.307}_{-0.102}$	$-1.640^{+0.300}_{-0.200}$	$3.854^{+0.682}_{-1.590}$	$1.493^{+0.127}_{-0.406}$	$0.037^{+0.095}_{-0.012}$
	+3%/-4%	+9%/-3%	+18%/-12%	+18%/-41%	+9%/-27%	+258%/-33%
Source	PHO1	FLK73	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 009149959-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-7 \pm 1$	$1.66^{+0.59}_{-0.56}$	$6254^{+424}_{-597}$	$4288^{+1472}_{-8252}$	$0.434^{+0.481}_{-0.207}$
Alt.	$-19 \pm 2$	$1.78^{+0.56}_{-0.53}$	$6184^{+439}_{-542}$	$6367^{+1381}_{-1129}$	$1.108^{+1.007}_{-0.486}$

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

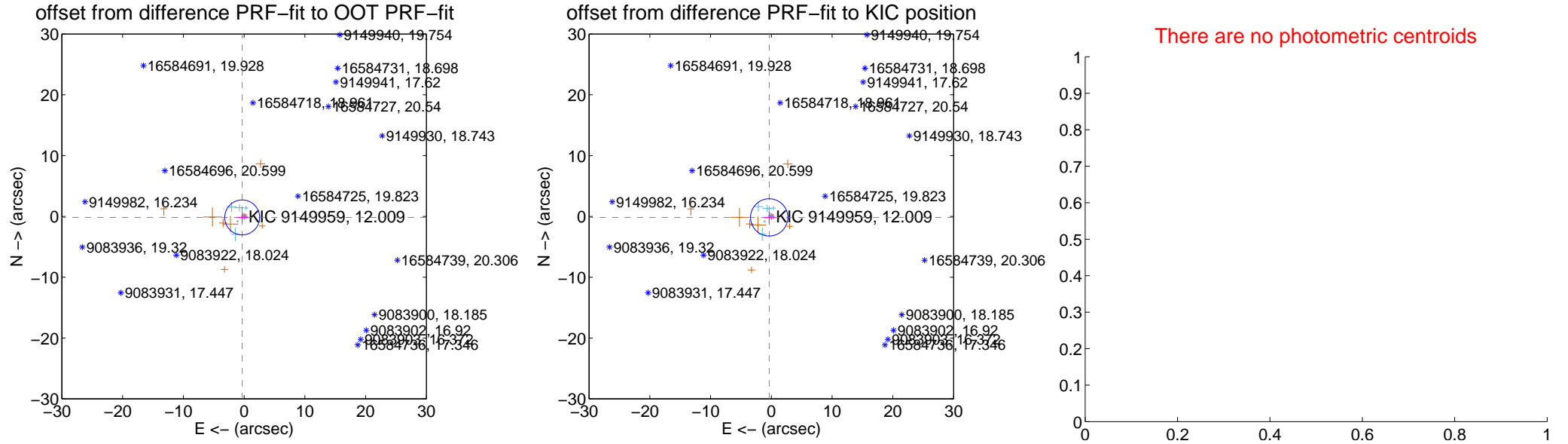
## DV Centroid Data

Supplemental centroid analysis for 009149959-01. Kepler magnitude: 12.01. Transit SNR 8.26

There are 8 quarters with good PRF difference image offsets

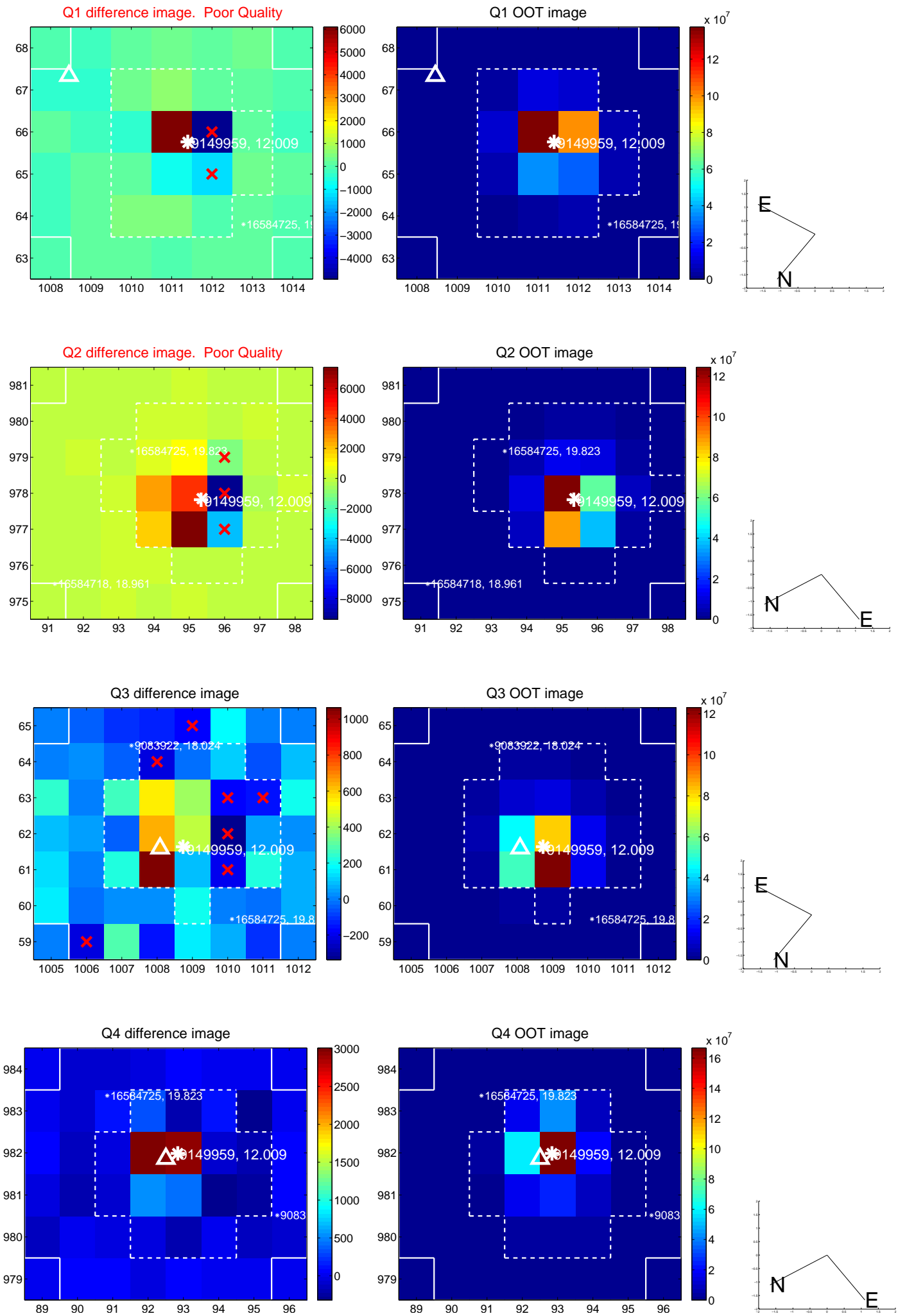
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.357 \pm 0.958$	0.37	$0.318 \pm 0.920$	$-0.162 \pm 0.861$
PRF-fit source offset from KIC position	$0.388 \pm 1.022$	0.38	$0.354 \pm 0.964$	$-0.158 \pm 0.955$
photometric centroid source offset	—	—	—	—

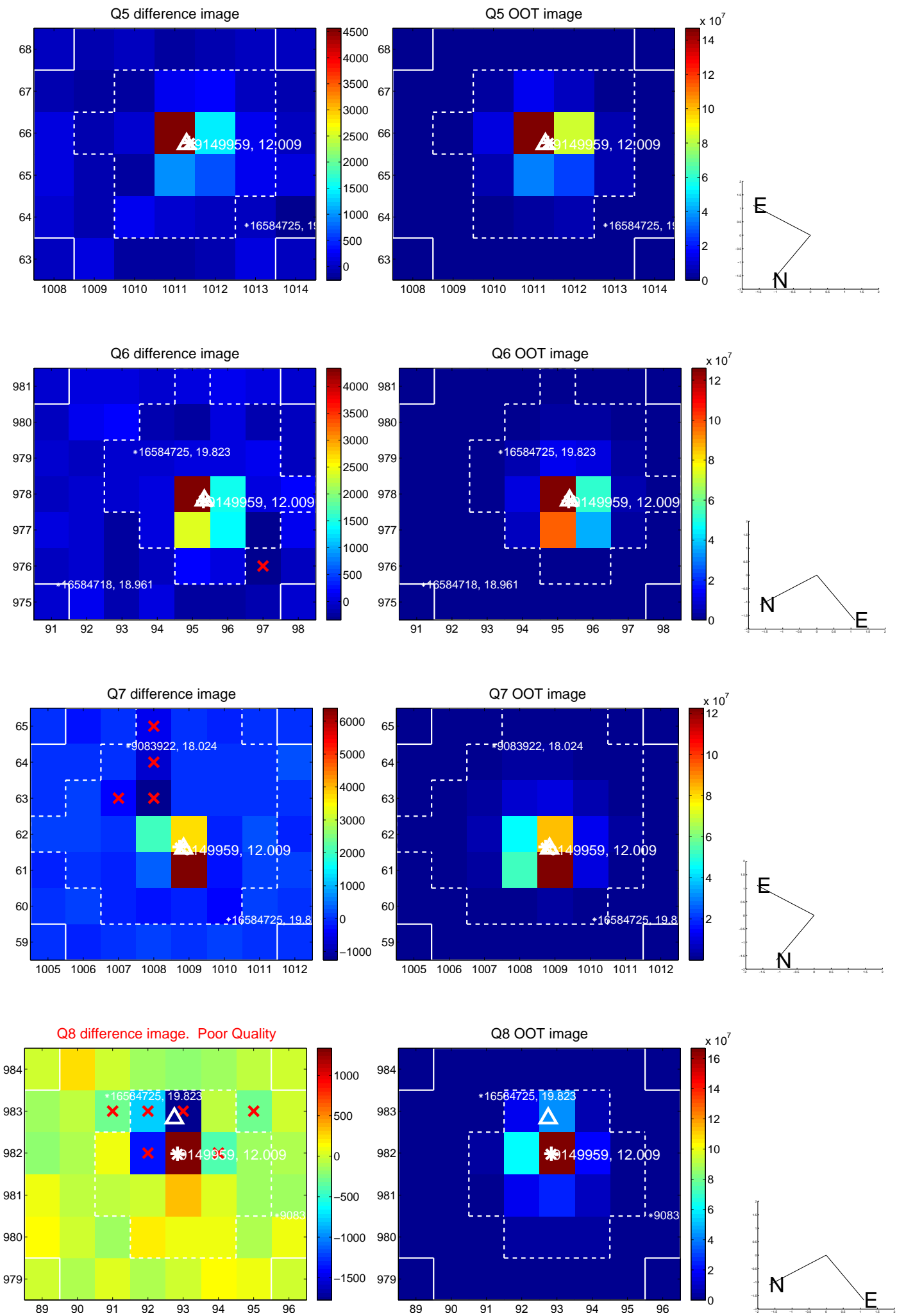


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

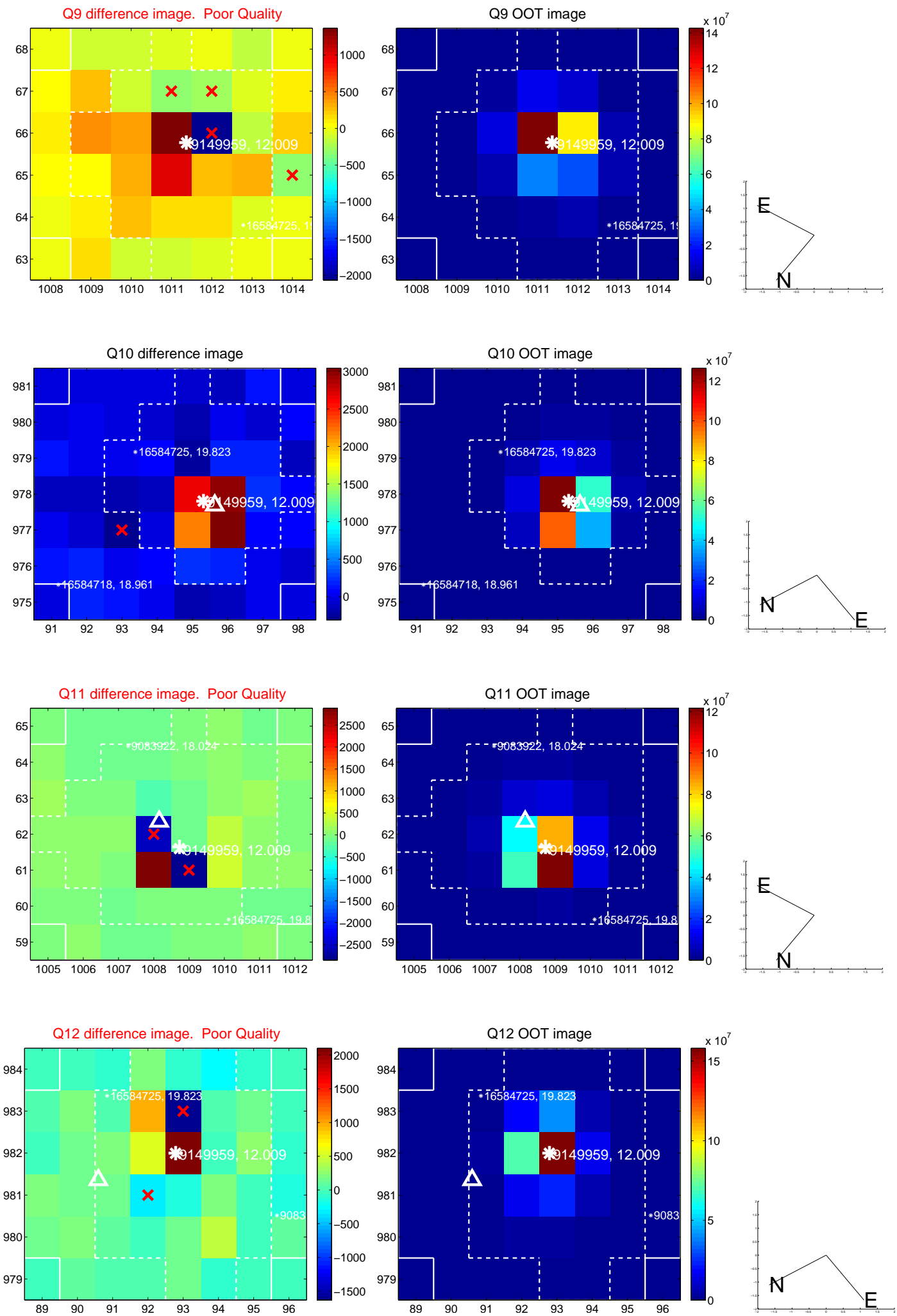


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

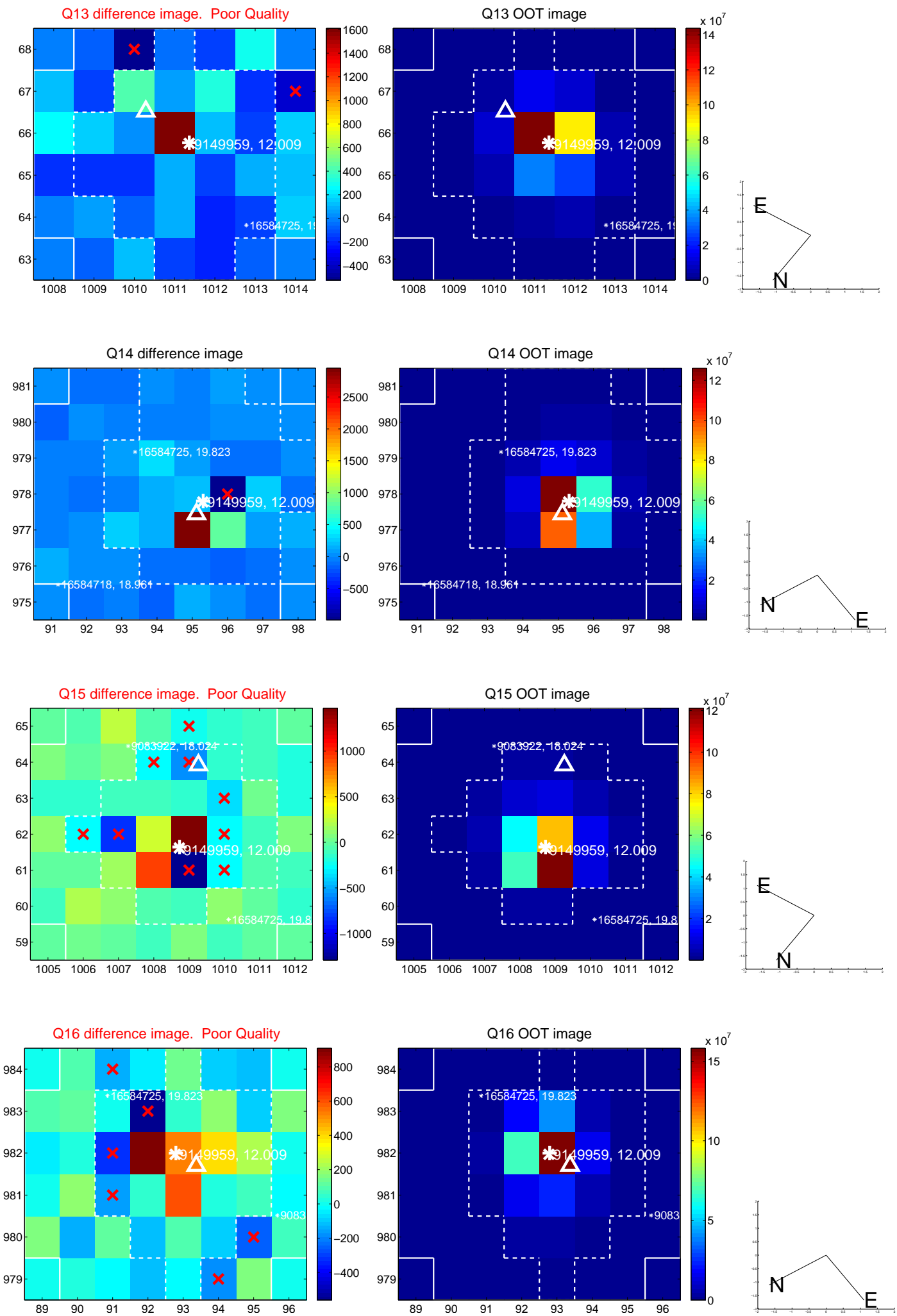




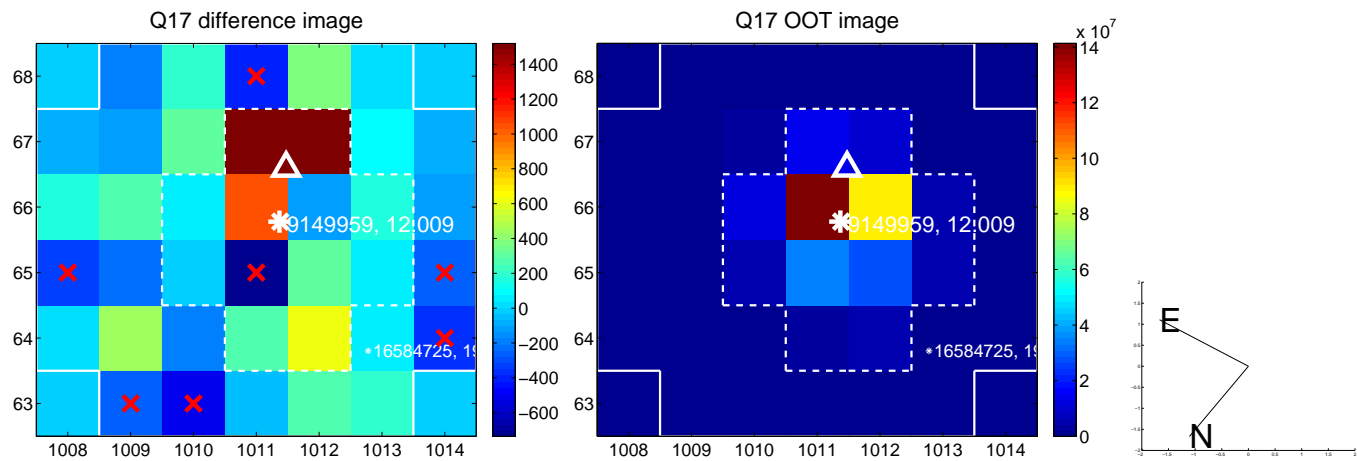
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



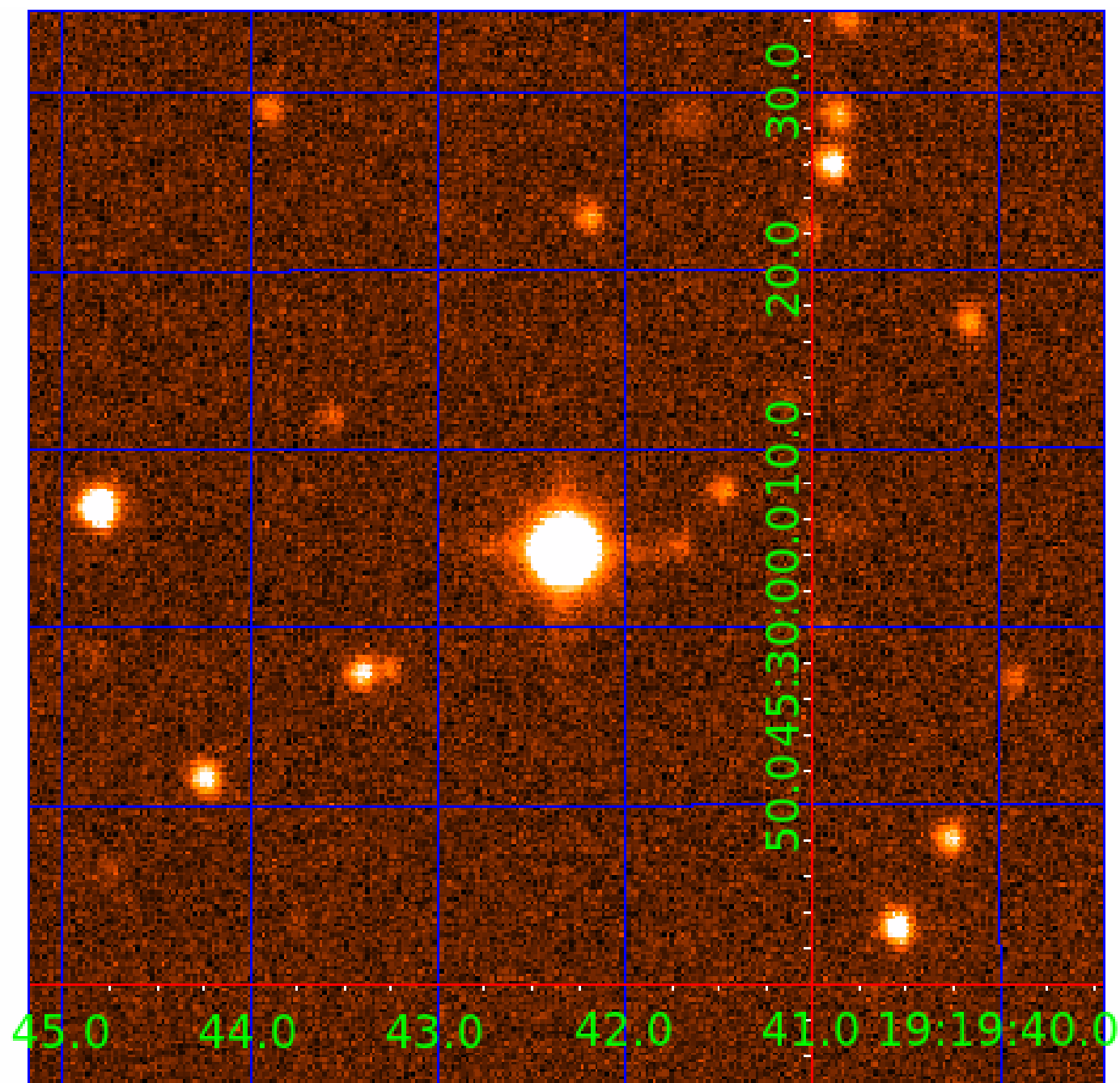
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



folded centroid time series figure for this object.

UKIRT Image

Declination





# KIC 009149959

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009149959-01	OBS	No	0.738270	131.998319	15.6	2.872	7.9	8.3	3.85	7102	1.77	101407.80
009149959-02	OBS	No	113.534432	149.814932	128.0	12.962	7.4	7.5	3.85	7102	4.88	123.08

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009149959-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
009149959-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT

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

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

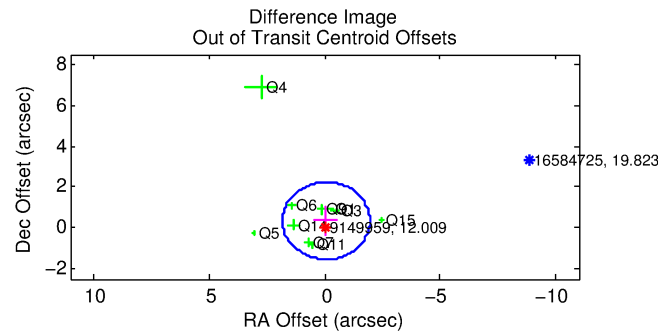
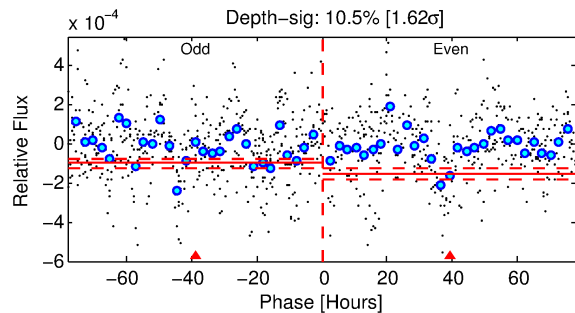
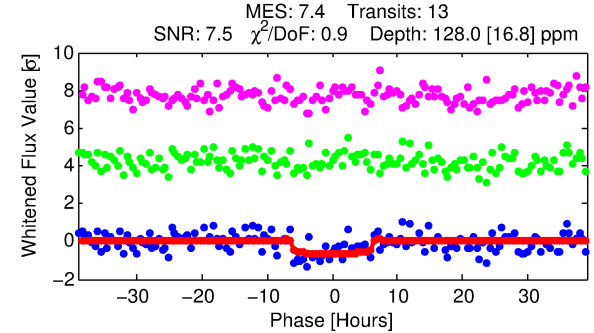
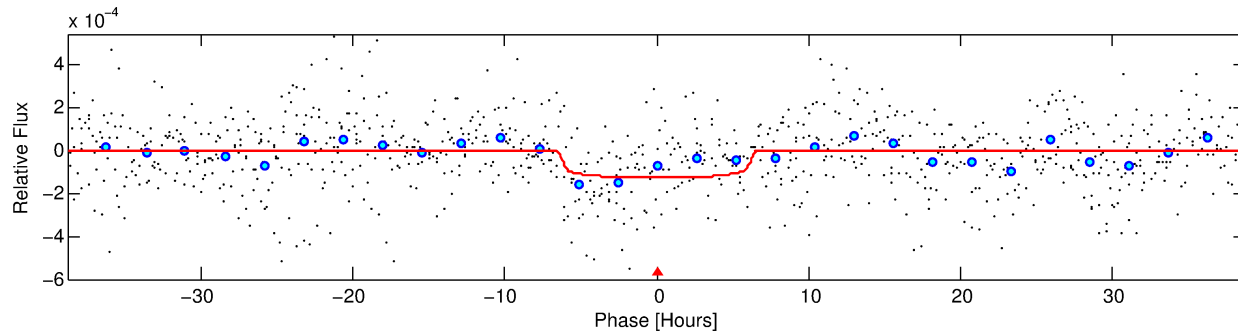
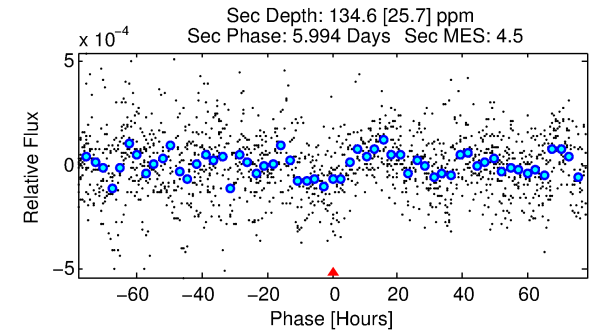
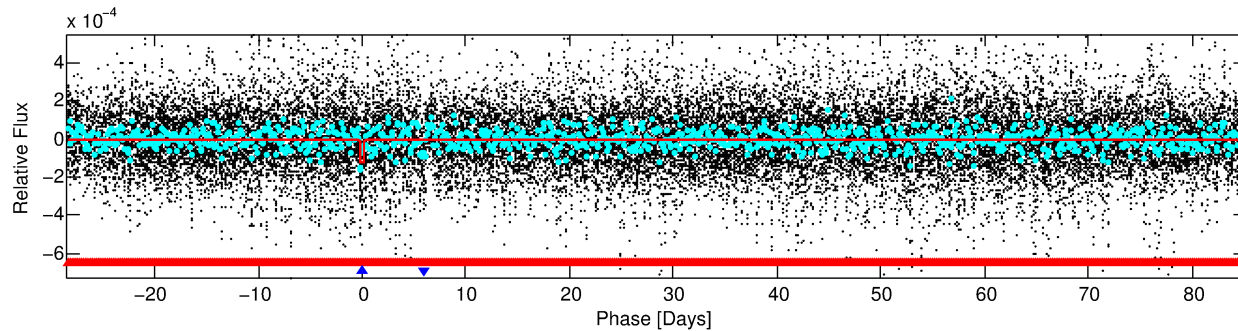
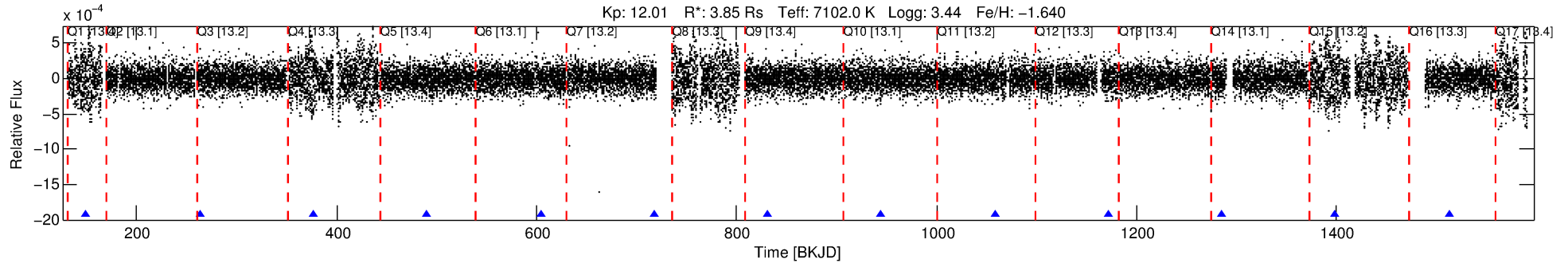
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009149959-02

No Significant Match Found

# DV One-Page Summary

KIC: 9149959 Candidate: 2 of 2 Period: 113.534 d



## DV Fit Results:

Period = 113.53443 [0.00243] d  
Epoch = 149.8149 [0.0175] BKJD  
Rp/R\* = 0.0116 [0.0021]  
a/R\* = 38.20 [39.51]  
b = 0.84 [0.38]  
Seff = 123.08 [69.79]  
Teq = 849 [120] K  
Rp = 4.88 [2.20] Re  
a = 0.5245 [0.1899] AU  
Ag = 856.27 [586.05] [1.46σ]  
Teffp = 7103 [783] K [7.89σ]

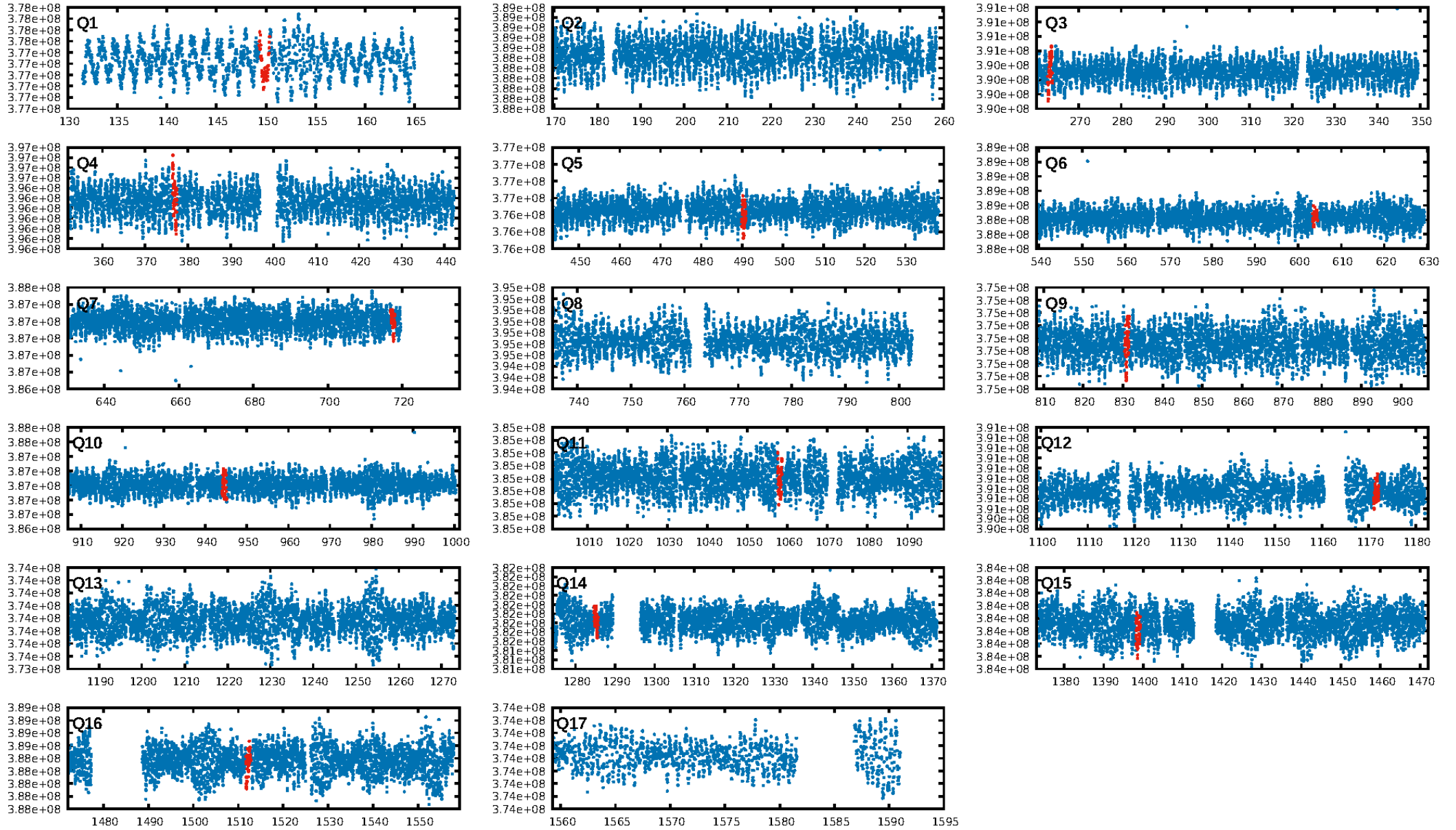
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [203.90σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 74.2%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 1.16e-09**  
RollingBand-fgt: 1.00 [12/12]  
GhostDiagnostic-chr: -1.366  
Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 0.353 arcsec [0.56σ]  
KicOffset-rm: 0.320 arcsec [0.43σ]  
OotOffset-st: 2/4/1/3 [10]  
KicOffset-st: 2/4/1/3 [10]  
DiffImageQuality-fgm: 0.40 [4/10]  
DiffImageOverlap-fno: 0.00 [0/12]

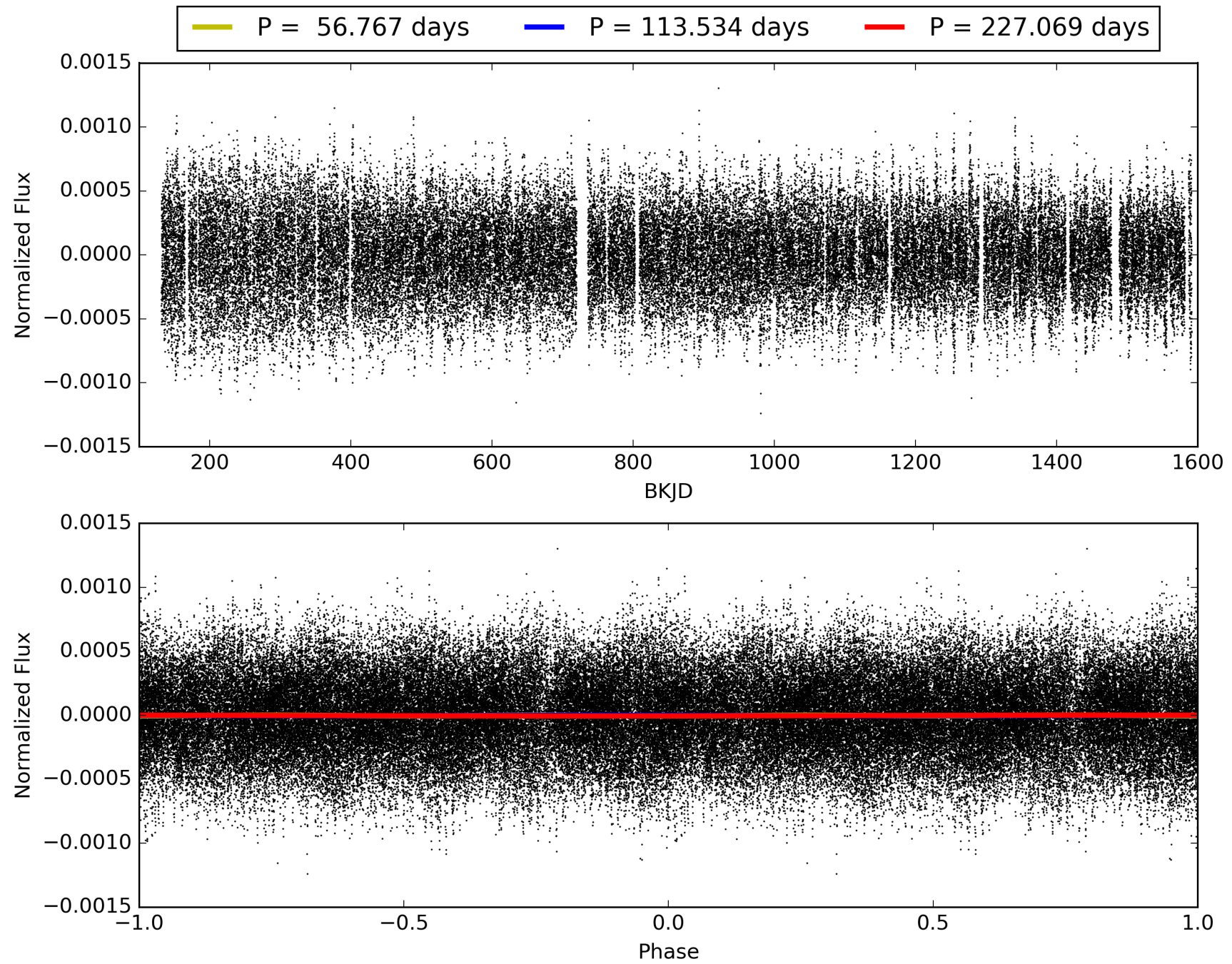
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 22:29:02 Z

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

# TCE 009149959-02, PDC Light Curves

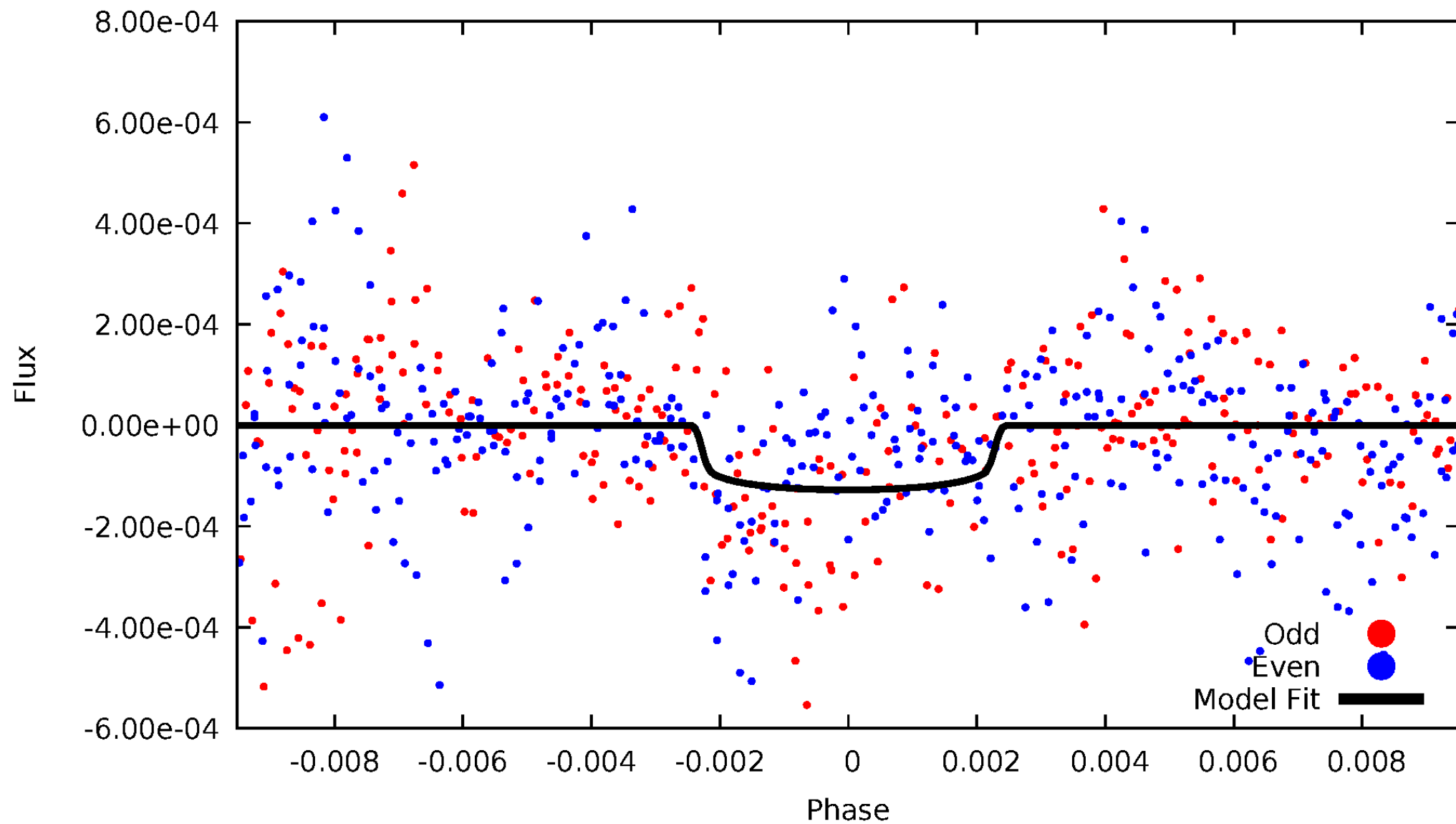


TCE 009149959-02



# DV Odd/Even

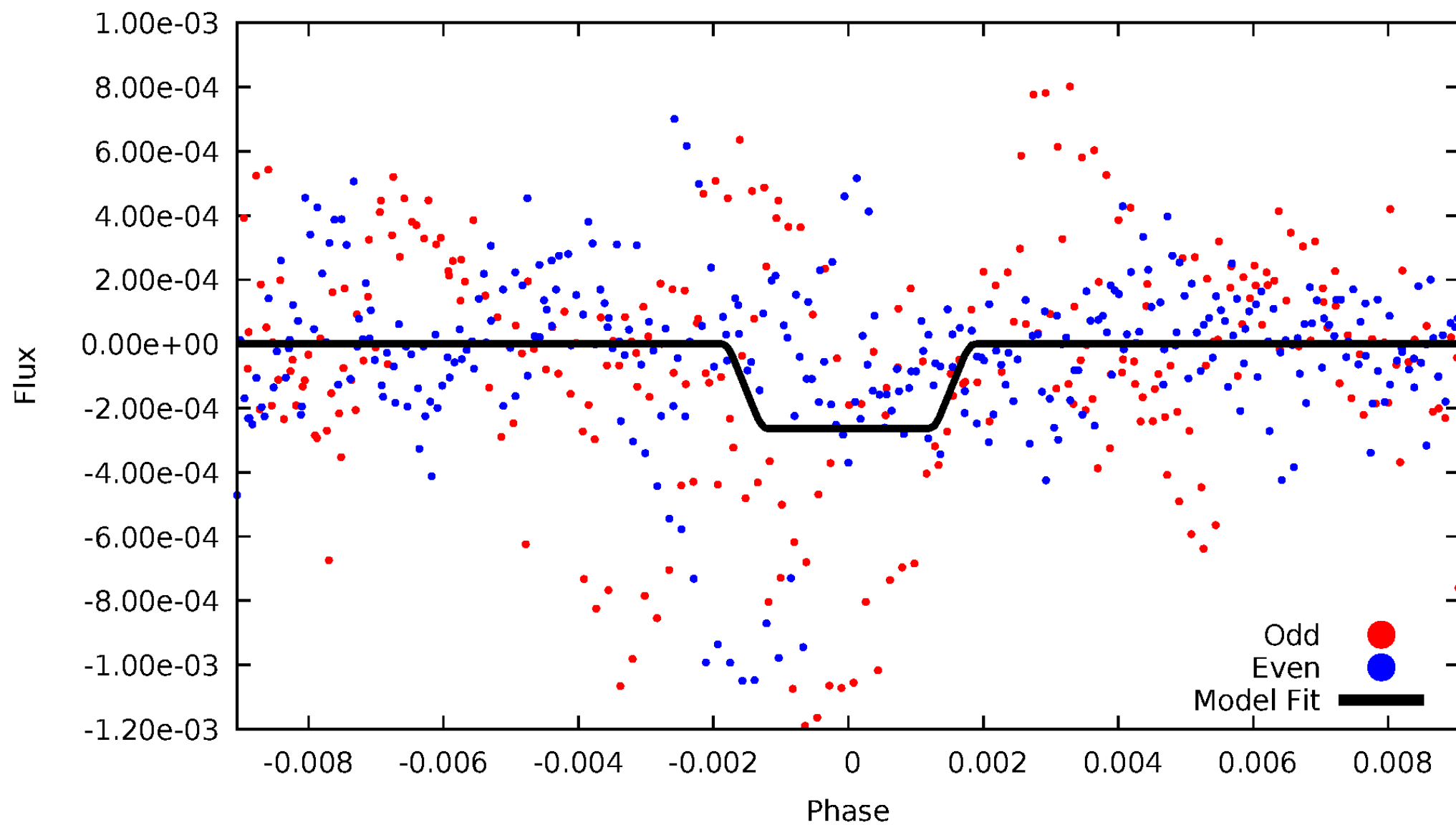
TCE 009149959-02





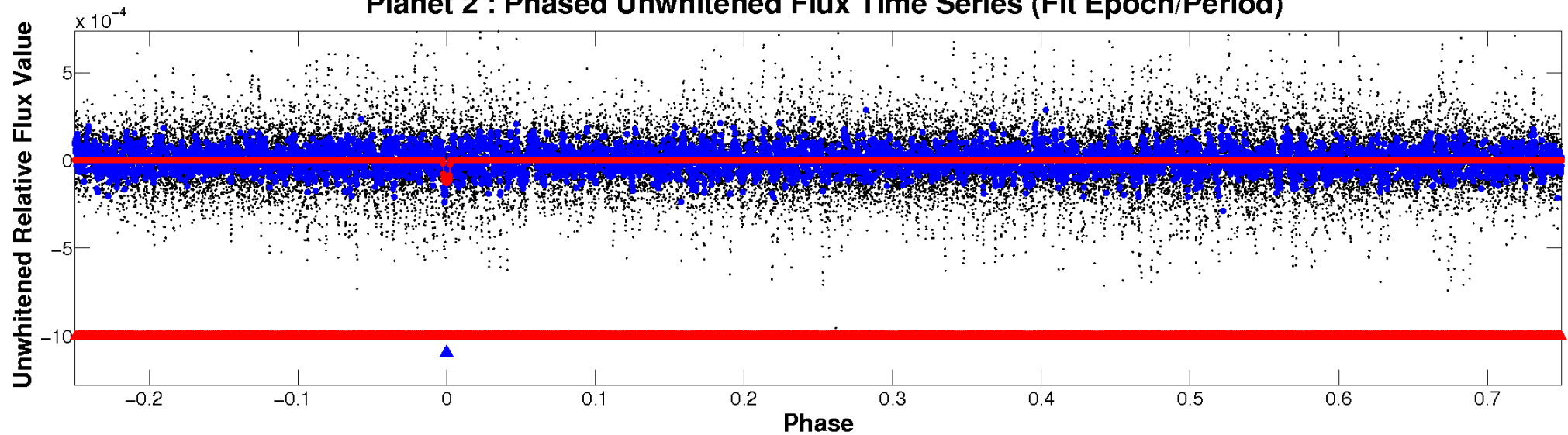
# ALT Odd/Even

TCE 009149959-02

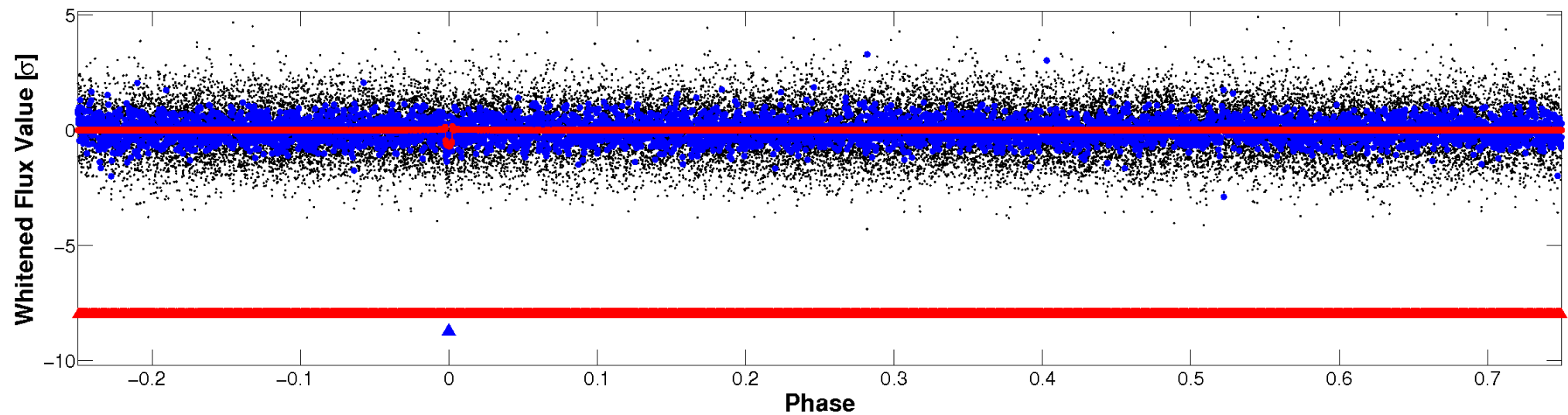


# Non-Whitened Vs. Whitened Light Curve

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

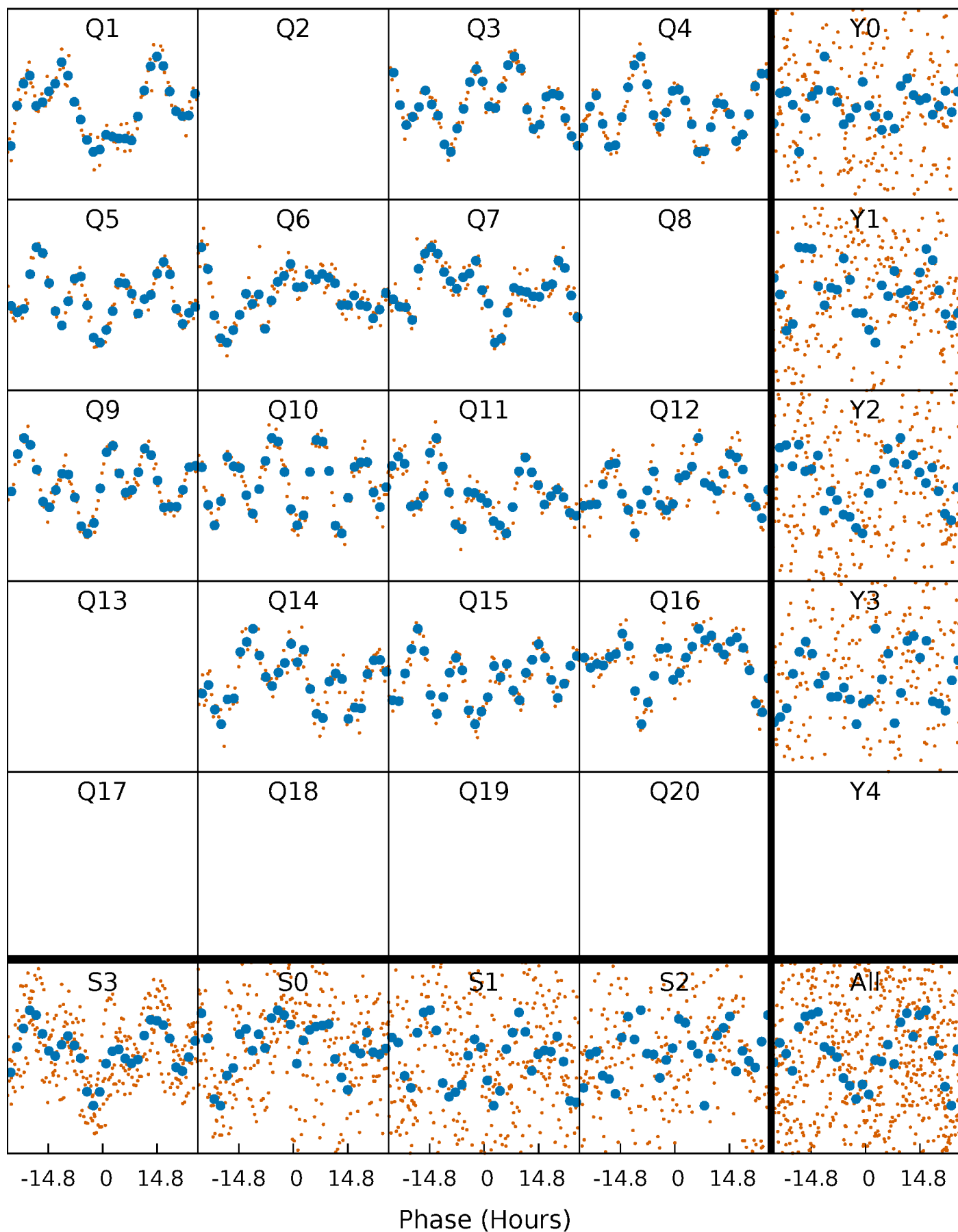


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



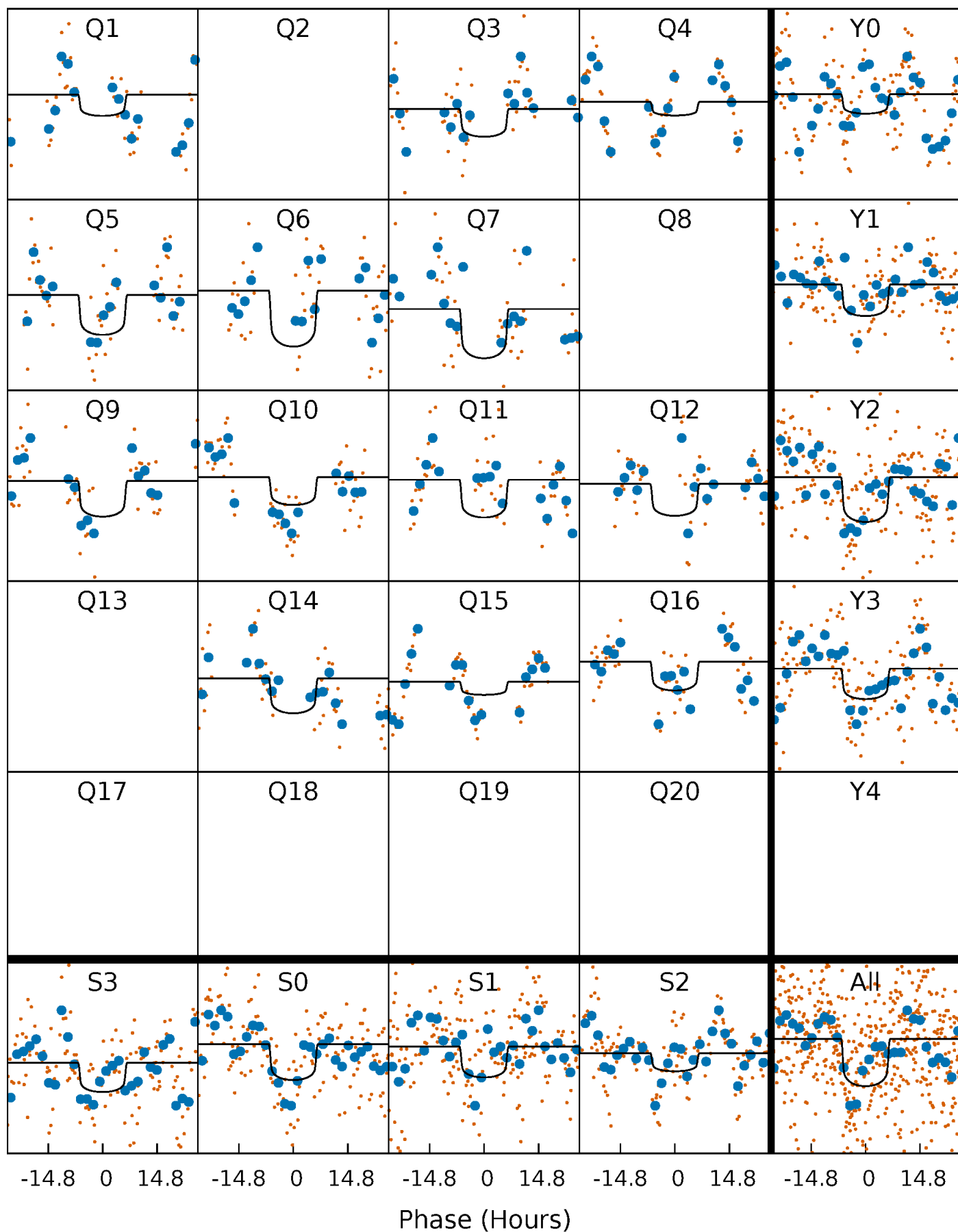
# PDC Quarter-Phased Transit Curves

TCE 009149959-02   P=113.534432 Days    $T_0=149.814932$  (BKJD)



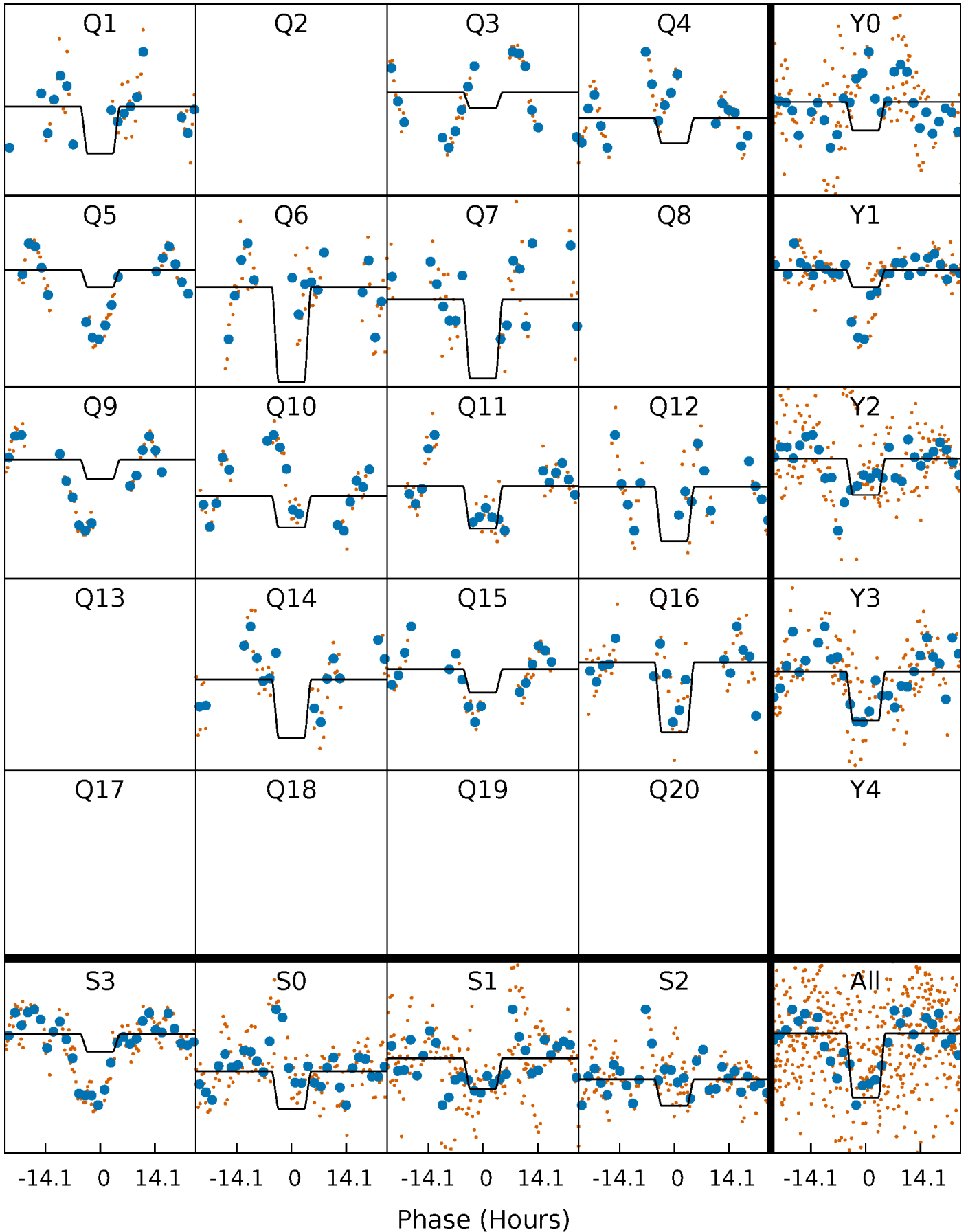
# DV Quarter-Phased Transit Curves

TCE 009149959-02 P=113.534432 Days  $T_0=149.814932$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 009149959-02 P=113.536588 Days  $T_0=149.788979$  (BKJD)

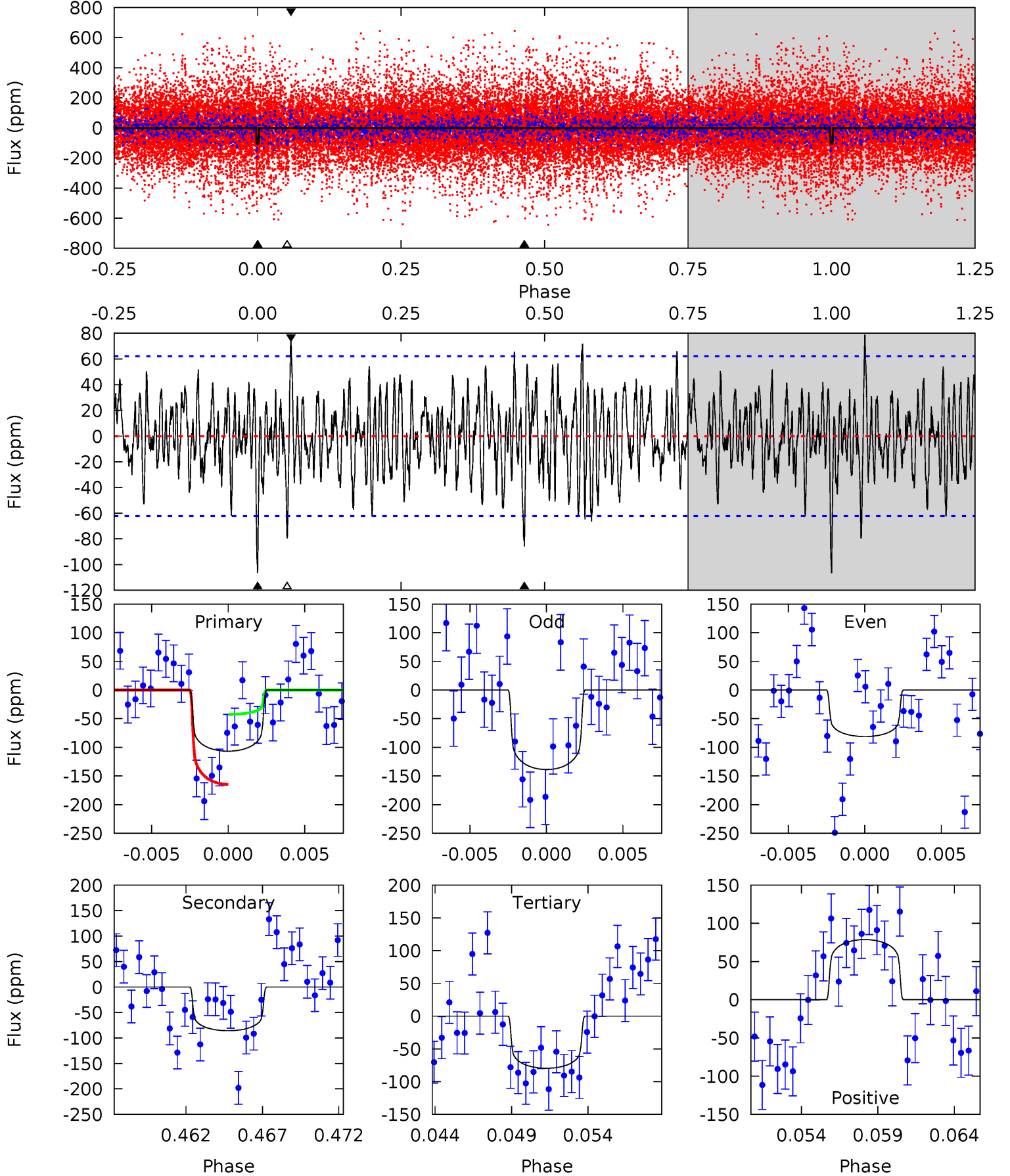




# DV Model-Shift Uniqueness Test

009149959-02, P = 113.534432 Days, E = 36.280500 Days

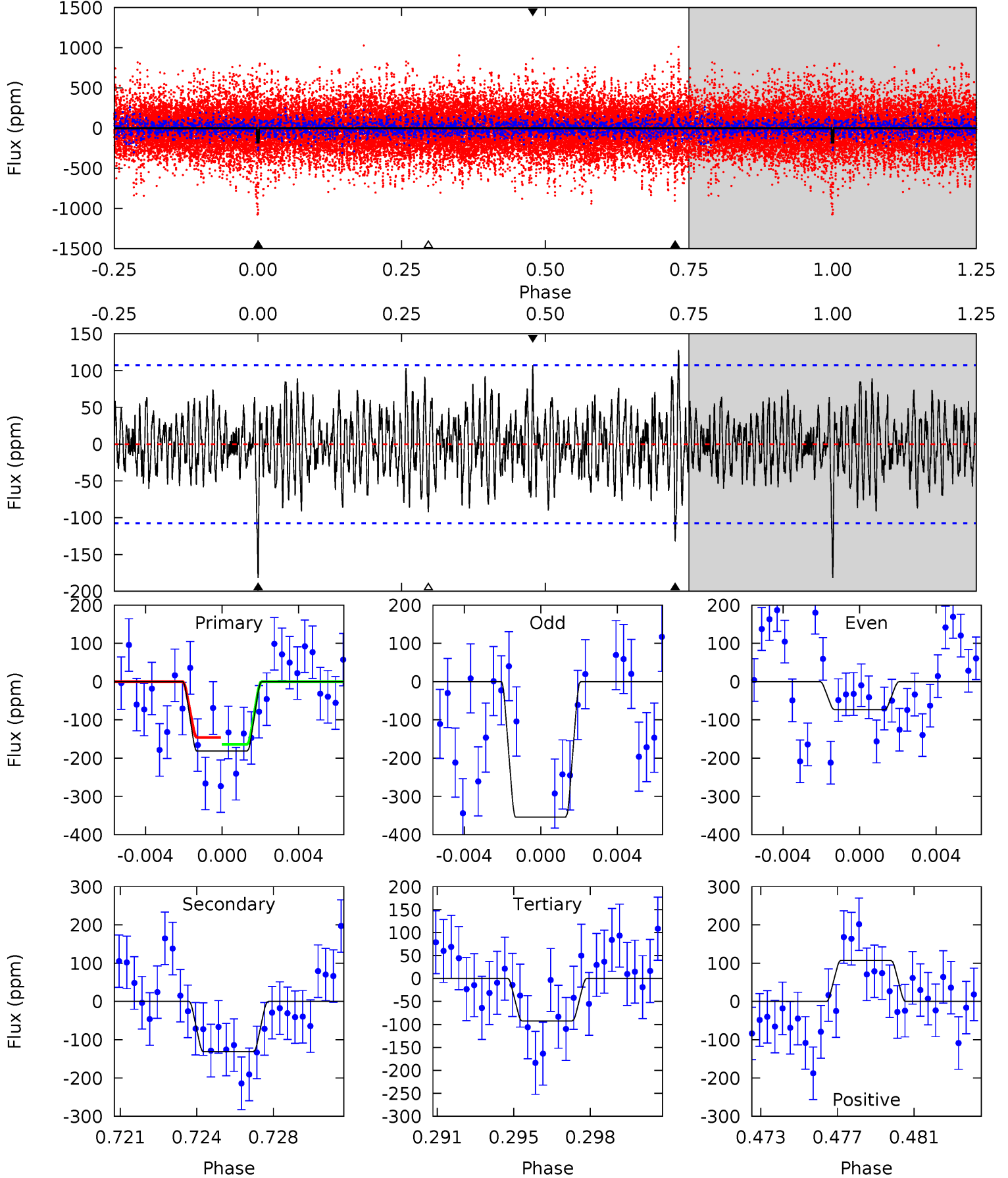
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.85	7.11	6.60	6.53	5.16	2.81	2.04	2.25	2.32	0.51	0.58	2.36	1.12	0.42	5.08



# Alt Model-Shift Uniqueness Test

009149959-02, P = 113.536588 Days, E = 36.252391 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
8.81	6.36	4.48	5.20	5.22	2.91	1.73	4.33	3.61	1.89	1.17	6.79	2.29	0.41	0.44



### Stellar Parameters For KIC 009149959

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7102^{+199}_{-274}$	$3.440^{+0.307}_{-0.102}$	$-1.640^{+0.300}_{-0.200}$	$3.854^{+0.682}_{-1.590}$	$1.493^{+0.127}_{-0.406}$	$0.037^{+0.095}_{-0.012}$
	+3%/-4%	+9%/-3%	+18%/-12%	+18%/-41%	+9%/-27%	+258%/-33%
Source	PHO1	FLK73	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 009149959-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-86 \pm 12$	$4.61^{+1.16}_{-1.11}$	$1165^{+74}_{-107}$	$6270^{+728}_{-572}$	$601^{+388}_{-228}$
Alt.	$-131 \pm 21$	$6.52^{+1.30}_{-1.52}$	$1163^{+72}_{-106}$	$5876^{+527}_{-429}$	$455^{+322}_{-141}$

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

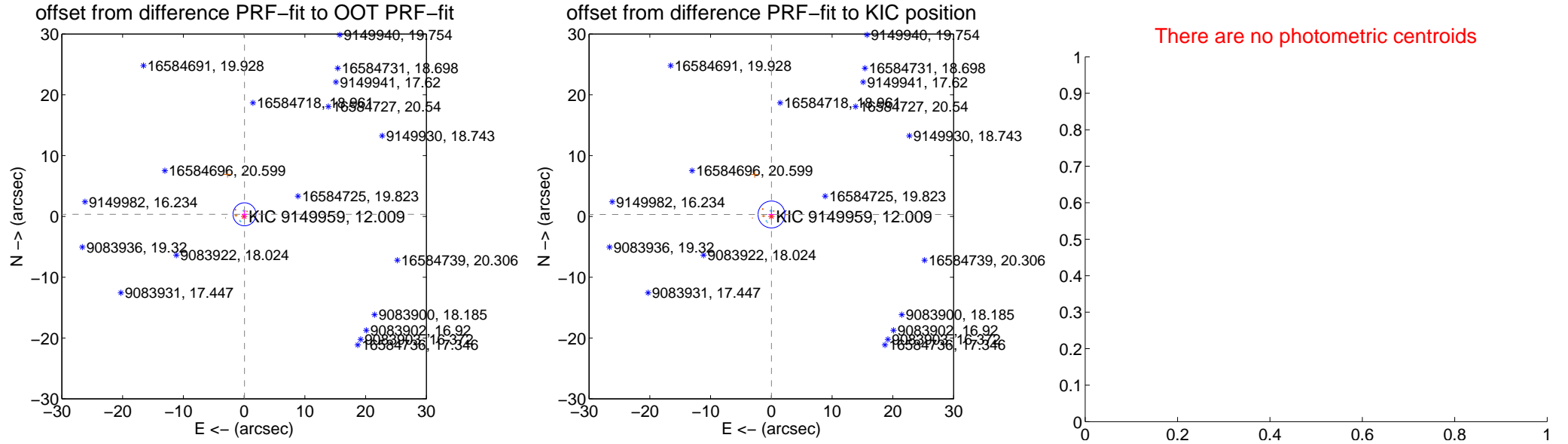
## DV Centroid Data

Supplemental centroid analysis for 009149959-02. Kepler magnitude: 12.01. Transit SNR 7.54

There are 4 quarters with good PRF difference image offsets

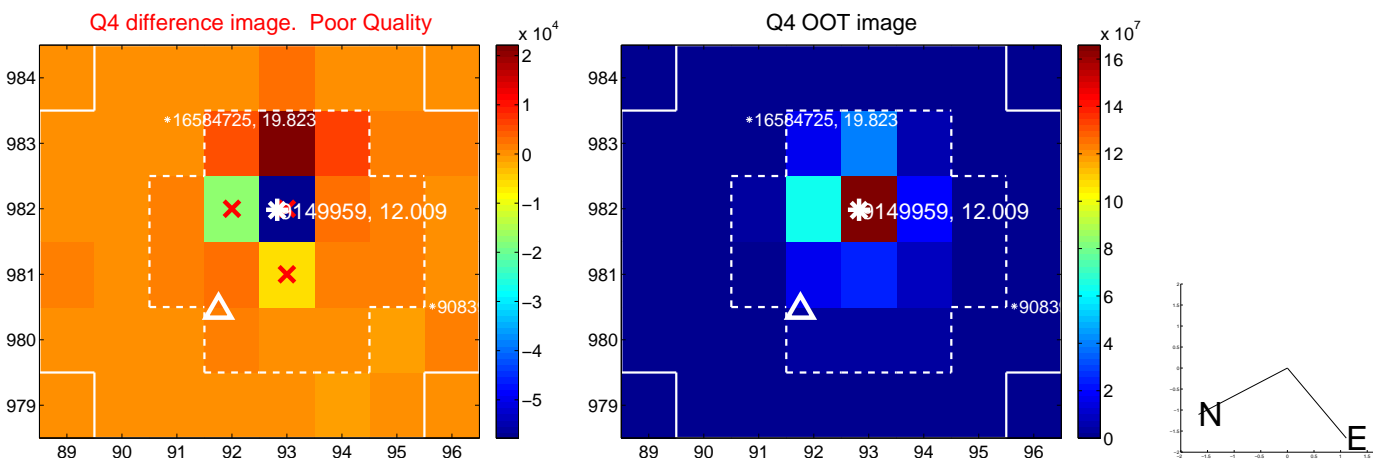
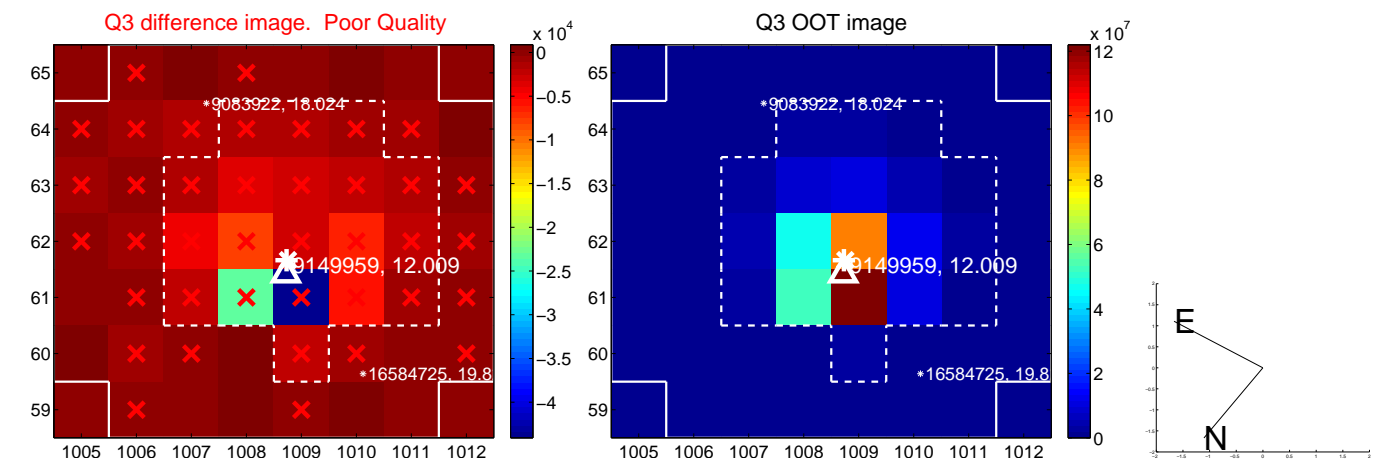
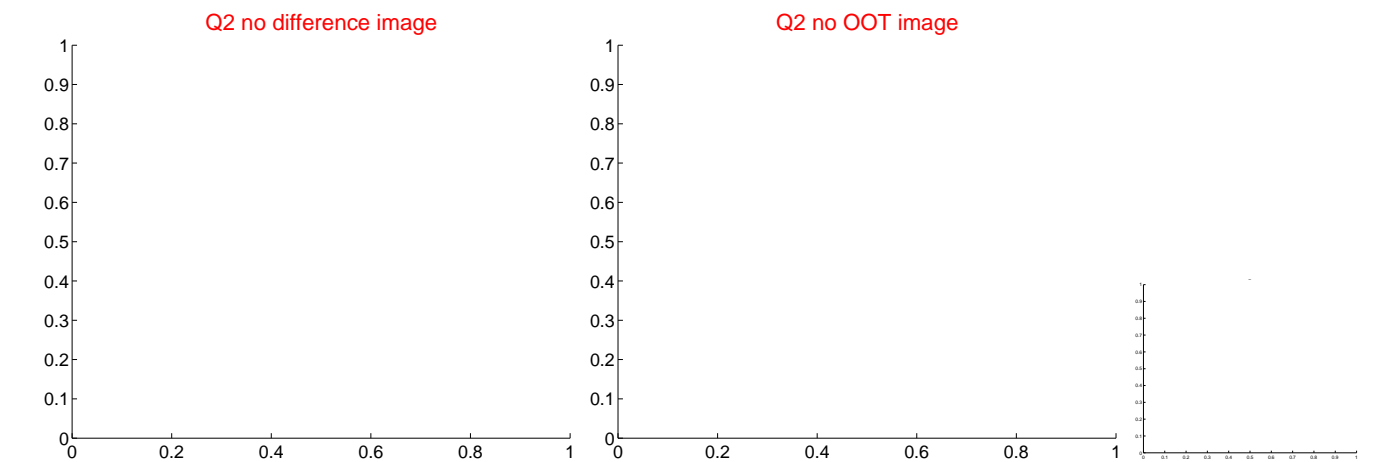
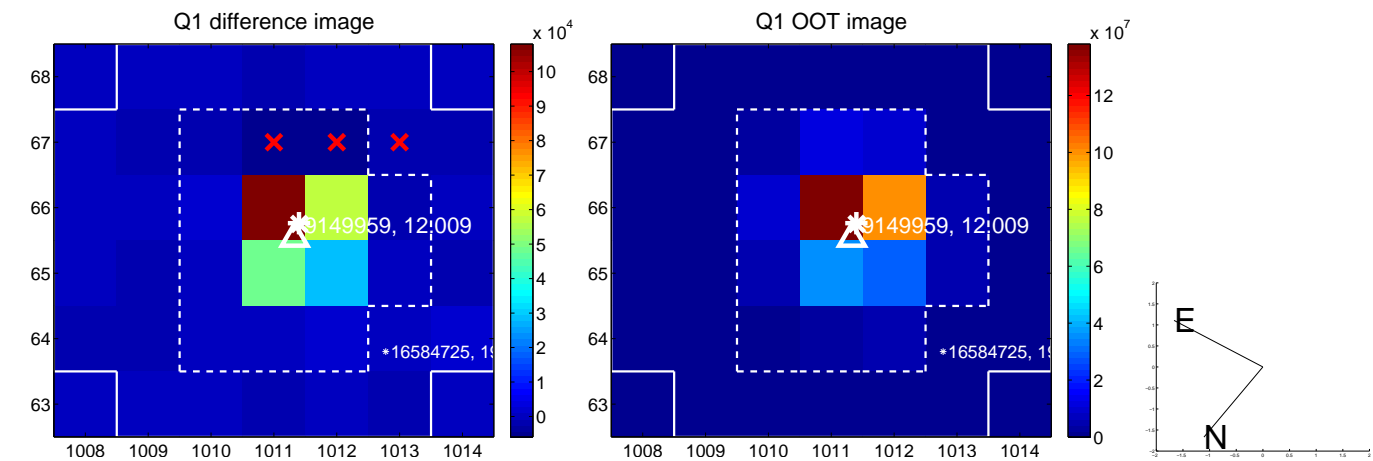
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.353 \pm 0.630$	0.56	$-0.061 \pm 0.473$	$0.348 \pm 0.652$
PRF-fit source offset from KIC position	$0.320 \pm 0.737$	0.43	$-0.022 \pm 0.496$	$0.319 \pm 0.751$
photometric centroid source offset	—	—	—	—



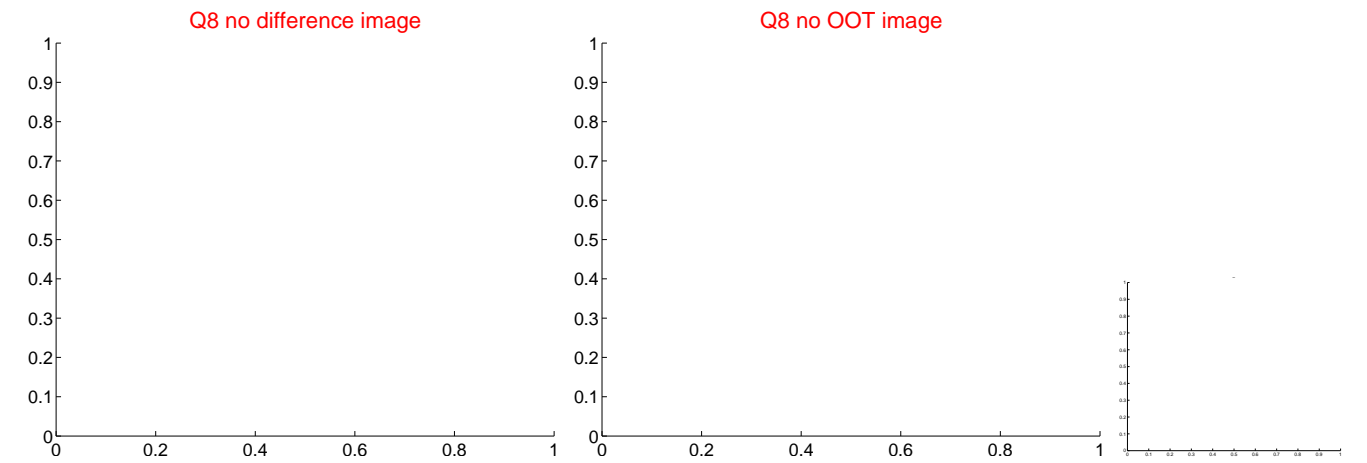
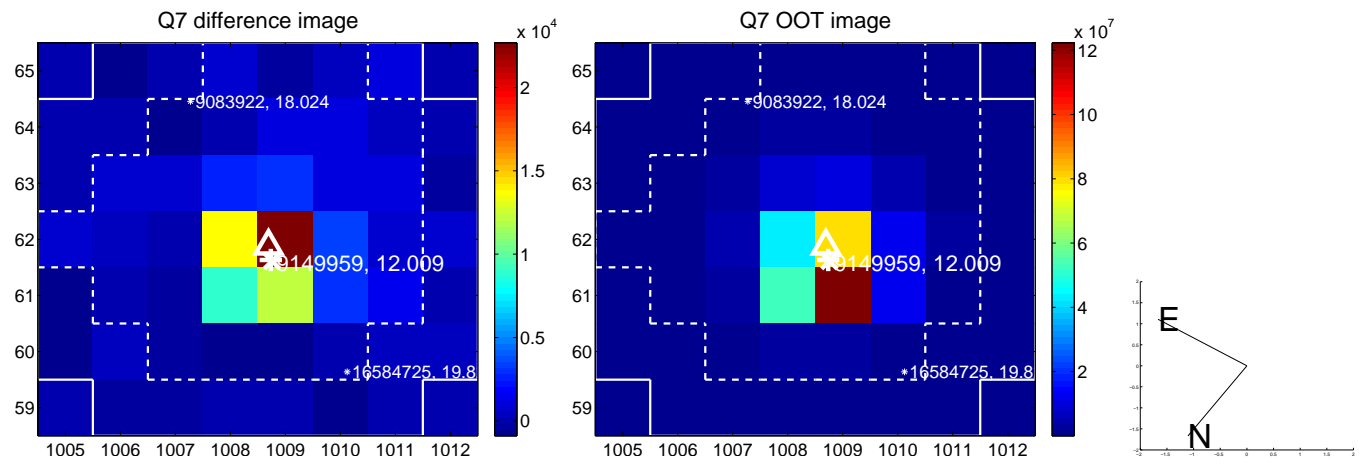
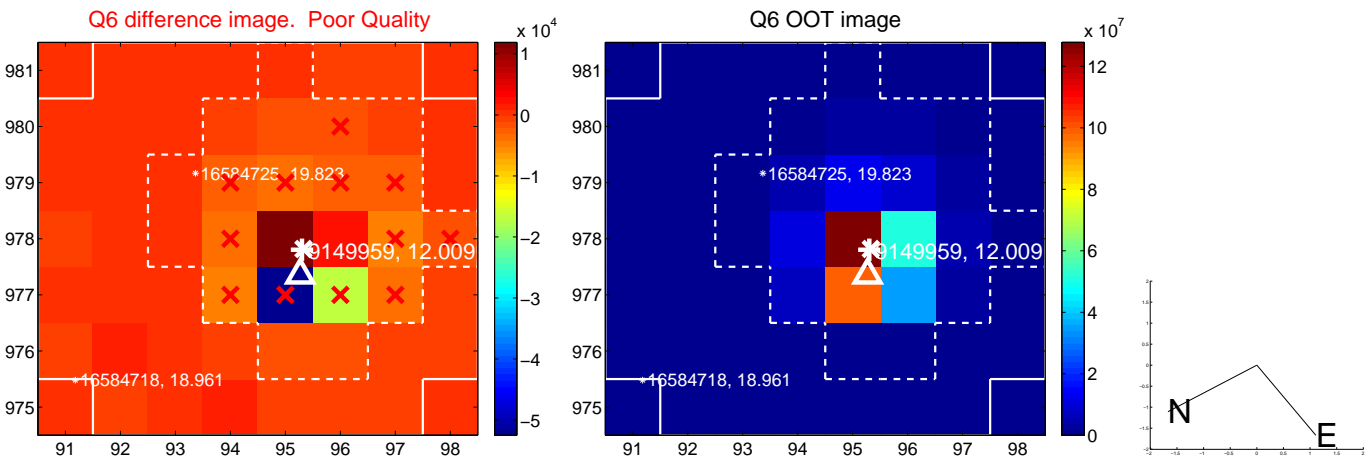
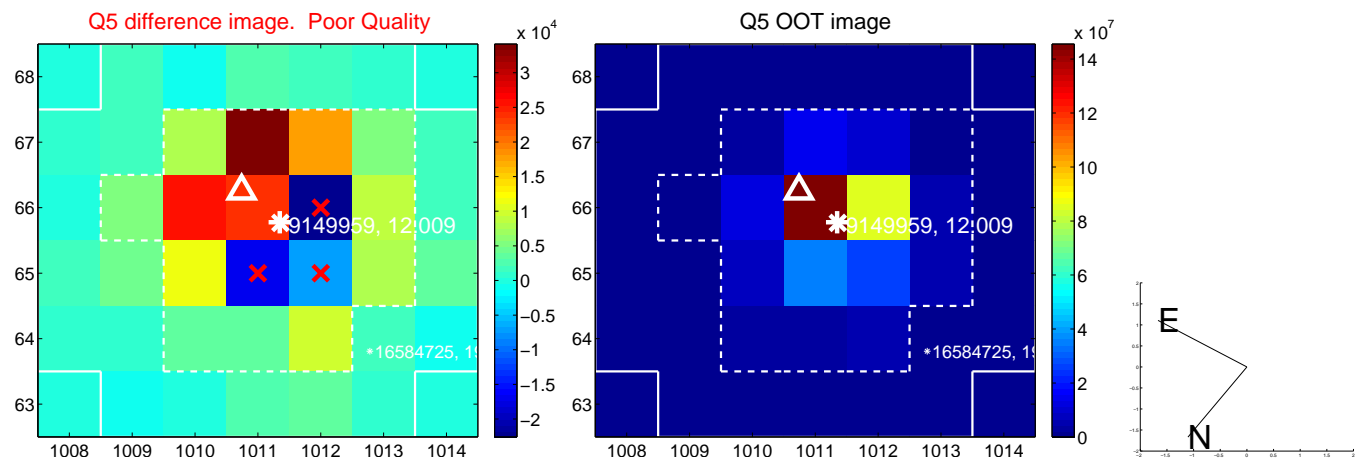
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

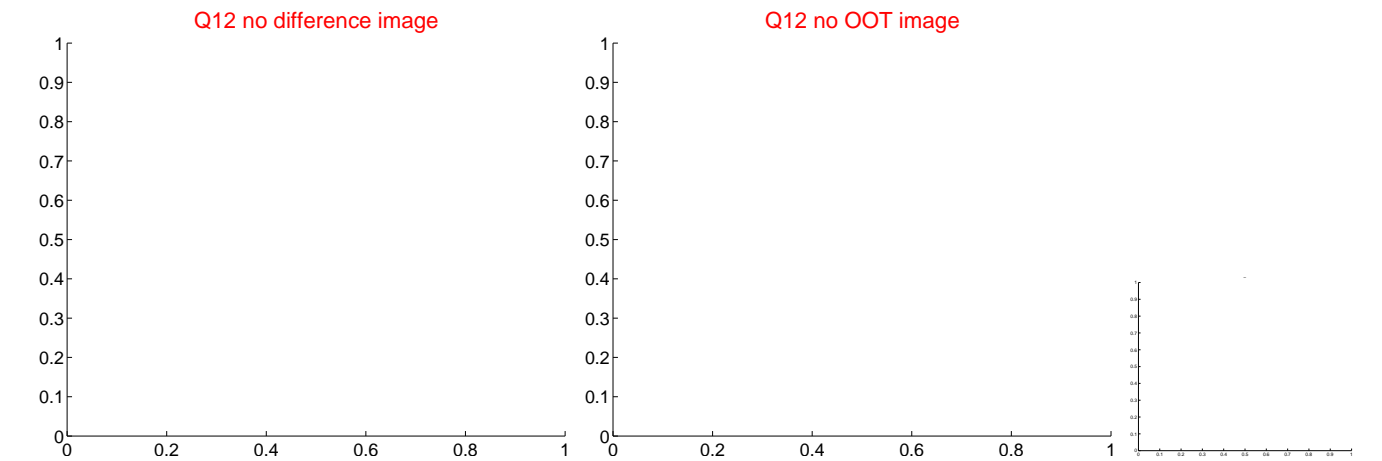
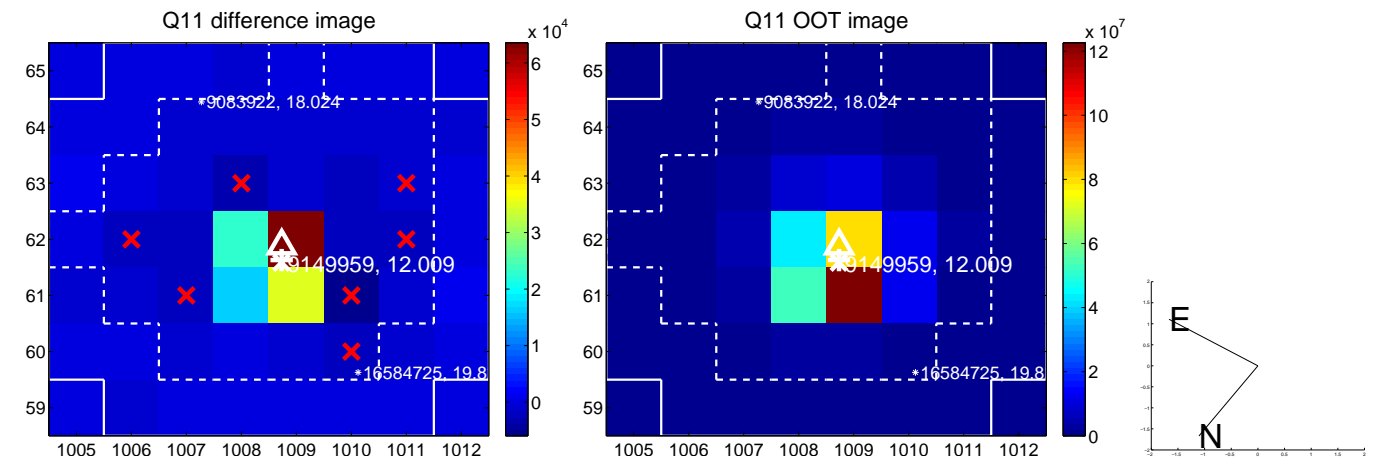
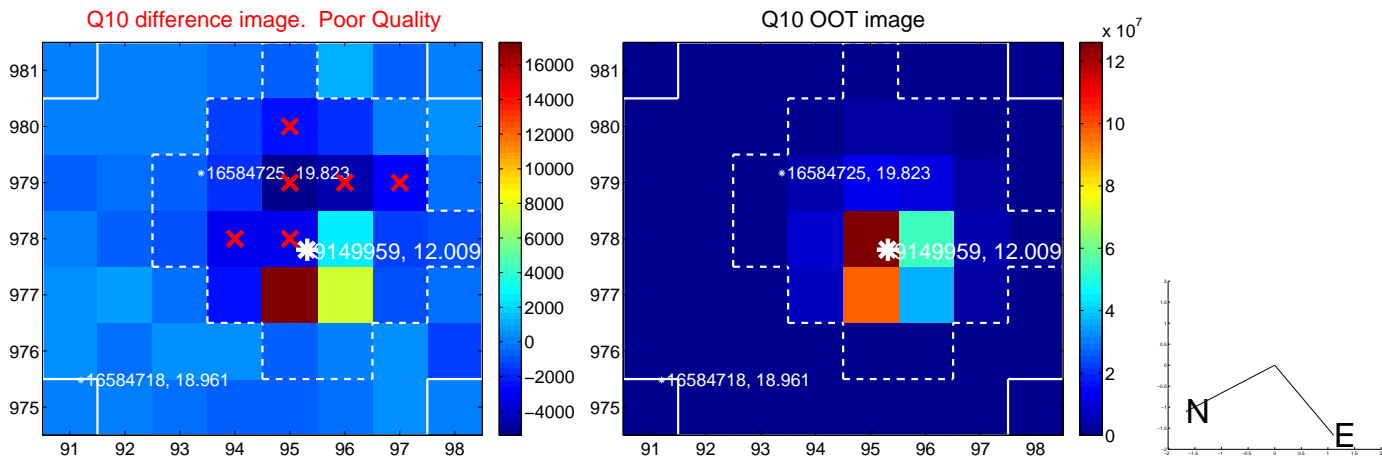
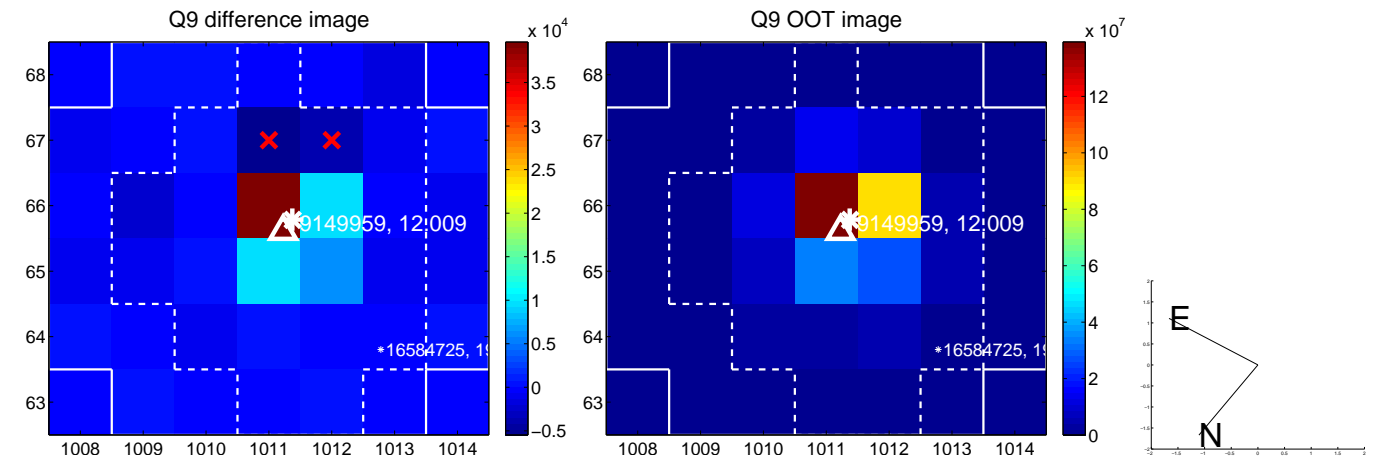




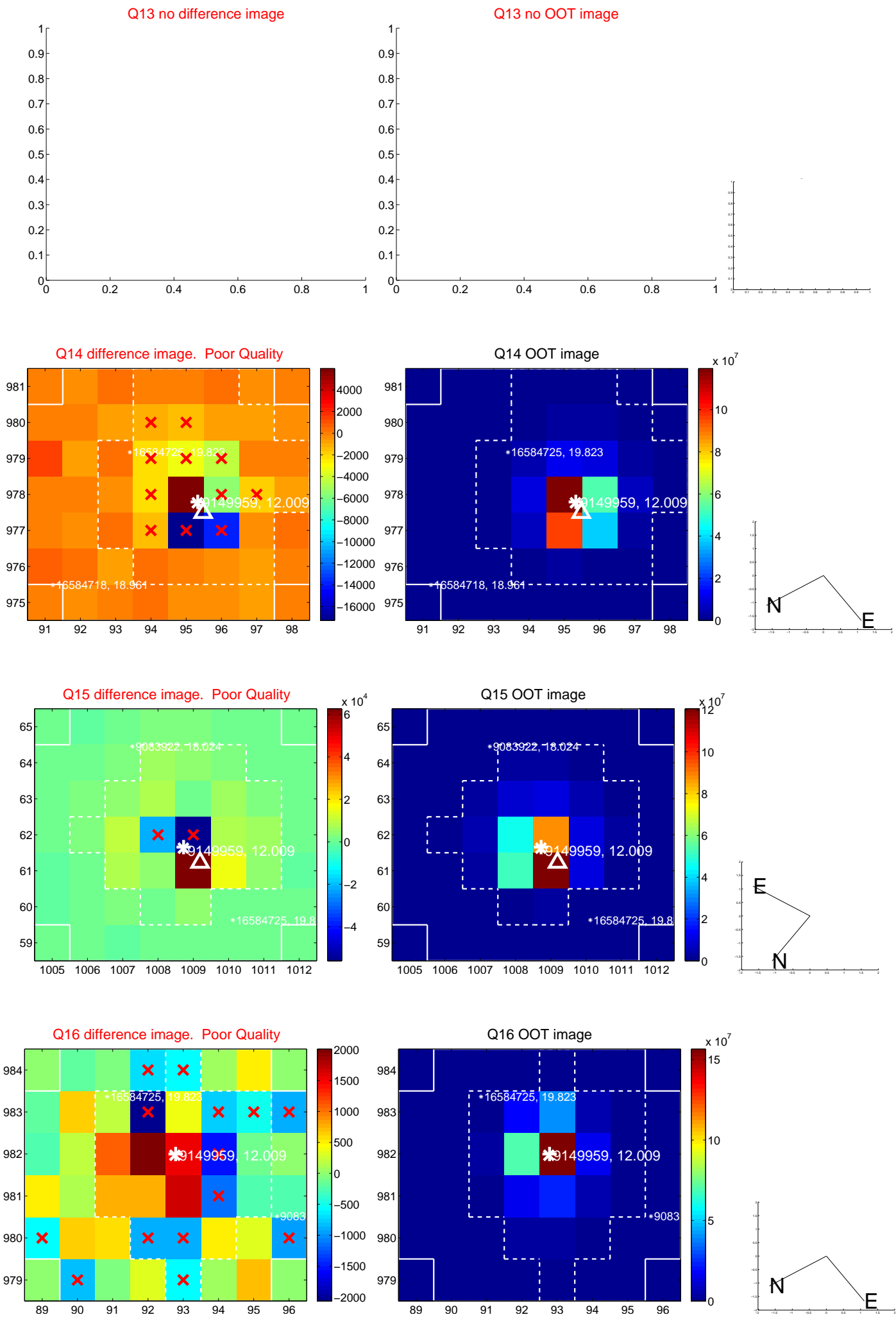
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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.



folded centroid time series figure for this object.

UKIRT Image

Declination

