

# KIC 009491339

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009491339-01	OBS	No	0.577167	131.871584	59.7	1.386	8.4	8.8	84.37	3735	84.10	0.00
009491339-02	OBS	No	0.577164	132.019353	78.2	1.160	7.8	10.1	84.37	3735	96.16	0.00

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009491339-01	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_UNRESOLVED_OFFSET
009491339-02	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_UNRESOLVED_OFFSET

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

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

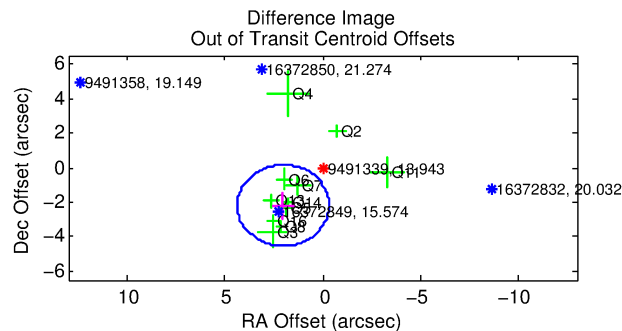
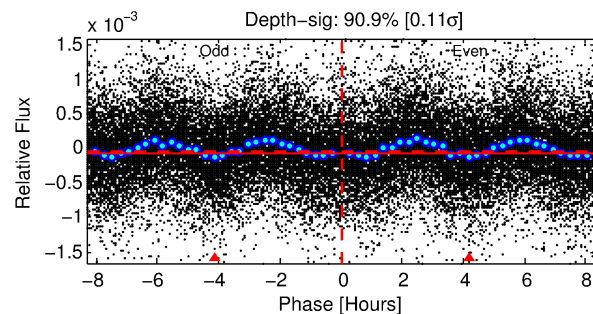
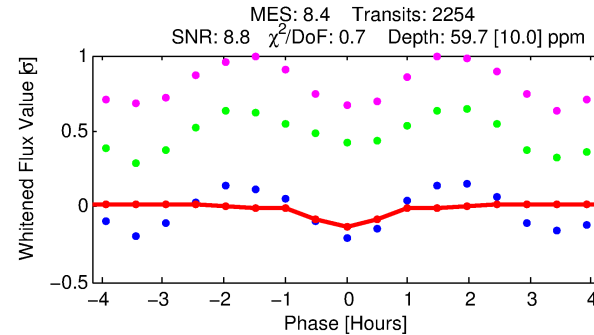
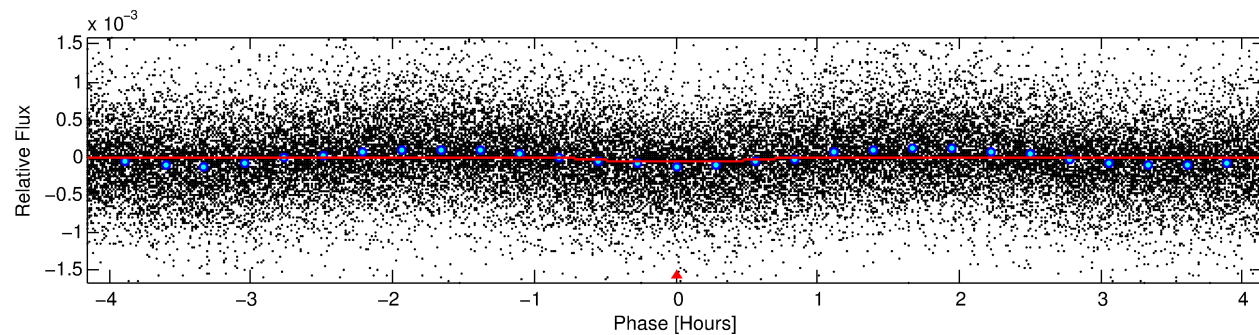
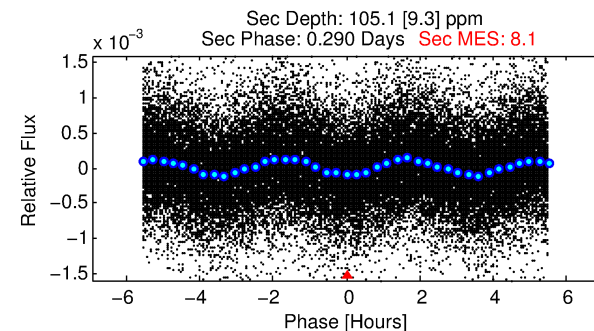
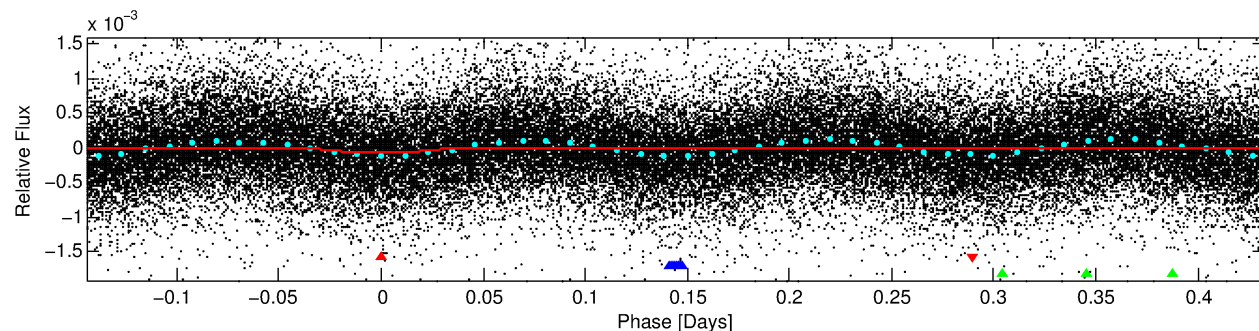
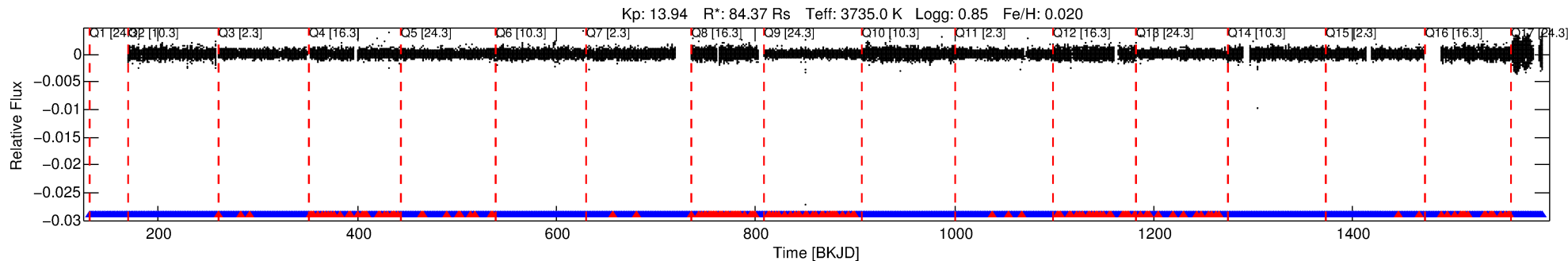
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009491339-01

No Significant Match Found

# DV One-Page Summary

KIC: 9491339 Candidate: 1 of 3 Period: 0.577 d



## DV Fit Results:

Period = 0.57717 [0.00001] d  
Epoch = 131.8716 [0.0024] BKJD  
Rp/R\* = 0.0091 [0.0100]  
a/R\* = 1.71 [3.85]  
b = 0.90 [0.73]  
Seff = N/A  
Teq = N/A  
**Rp = 84.10 [94.26] Re**  
a = N/A  
Ag = N/A  
Teffp = N/A

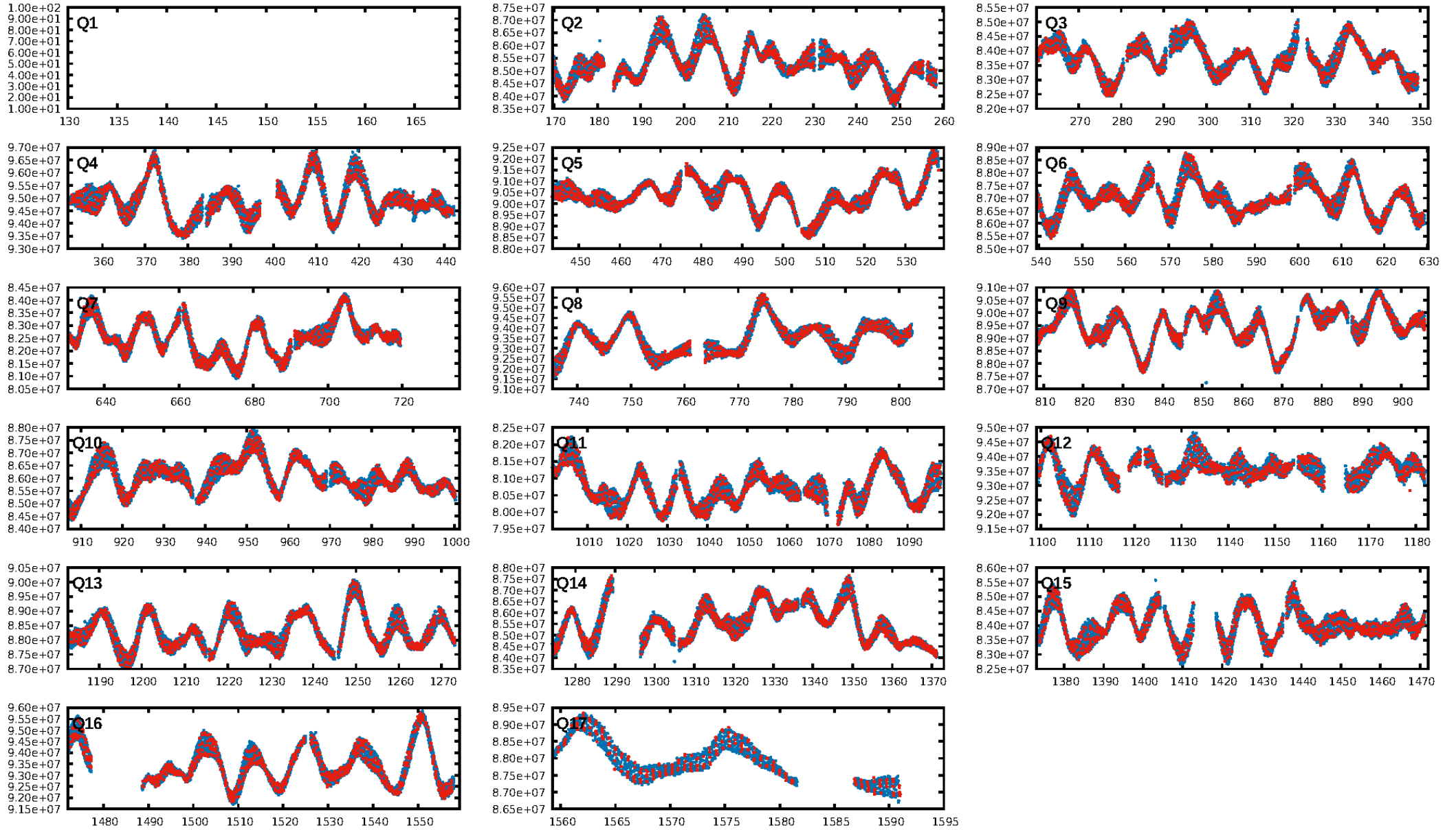
## DV Diagnostic Results:

**ShortPeriod-sig: 0.0% [0.00σ]**  
**LongPeriod-sig: 100.0% [1499.34σ]**  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 3.51e-21  
RollingBand-fgt: 0.92 [2035/2207]  
**GhostDiagnostic-chr: 0.8016**  
Centroid-sig: 23.4%  
Centroid-so: 1.558 arcsec [1.50σ]  
**OotOffset-rm: 2.982 arcsec [3.82σ]**  
**KicOffset-rm: 3.429 arcsec [4.89σ]**  
OotOffset-st: 3/3/3/2 [11]  
KicOffset-st: 3/3/3/2 [11]  
DiffImageQuality-fgm: 0.82 [9/11]  
DiffImageOverlap-fno: 0.00 [0/16]

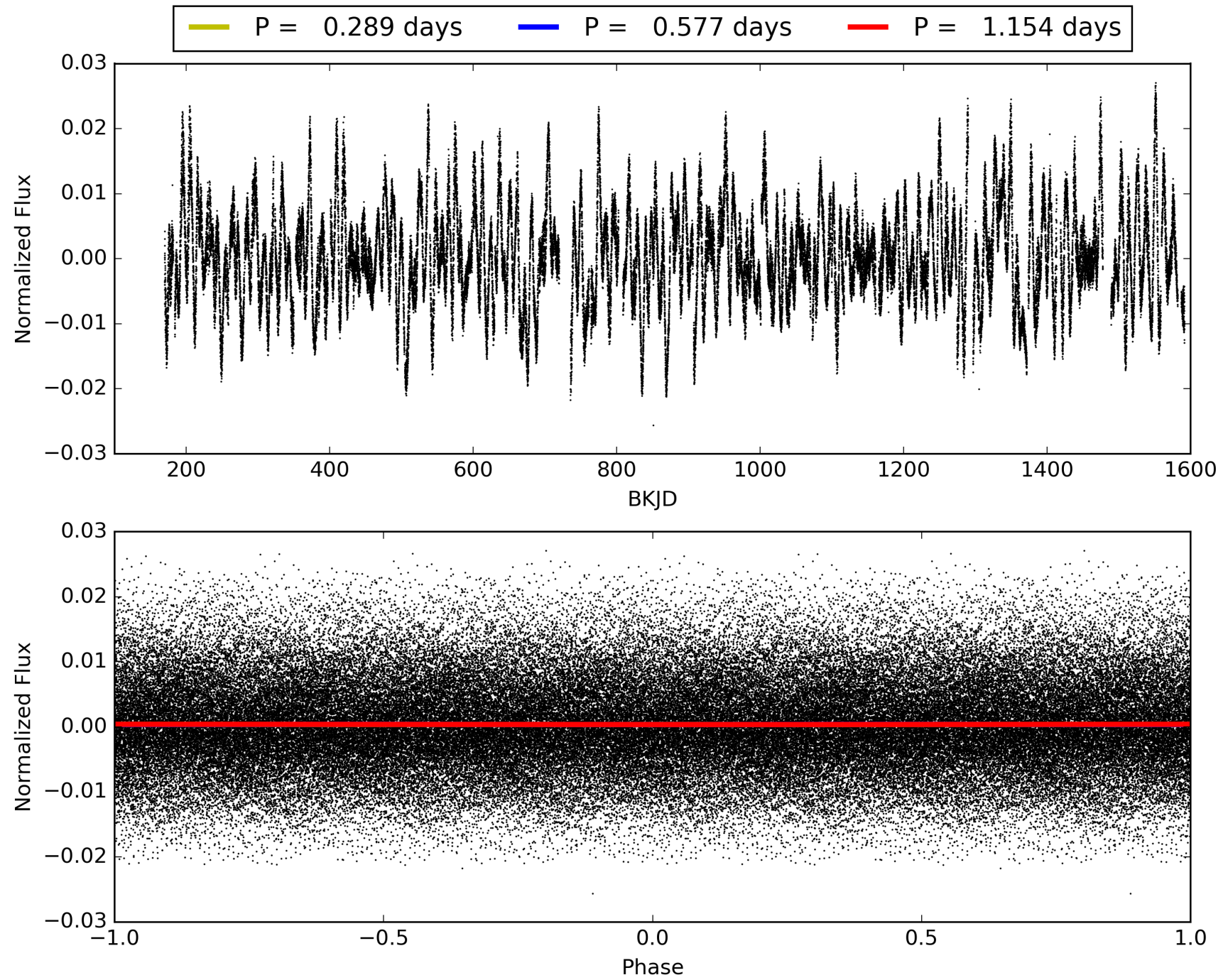
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 02:03:33 Z

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

# TCE 009491339-01, PDC Light Curves

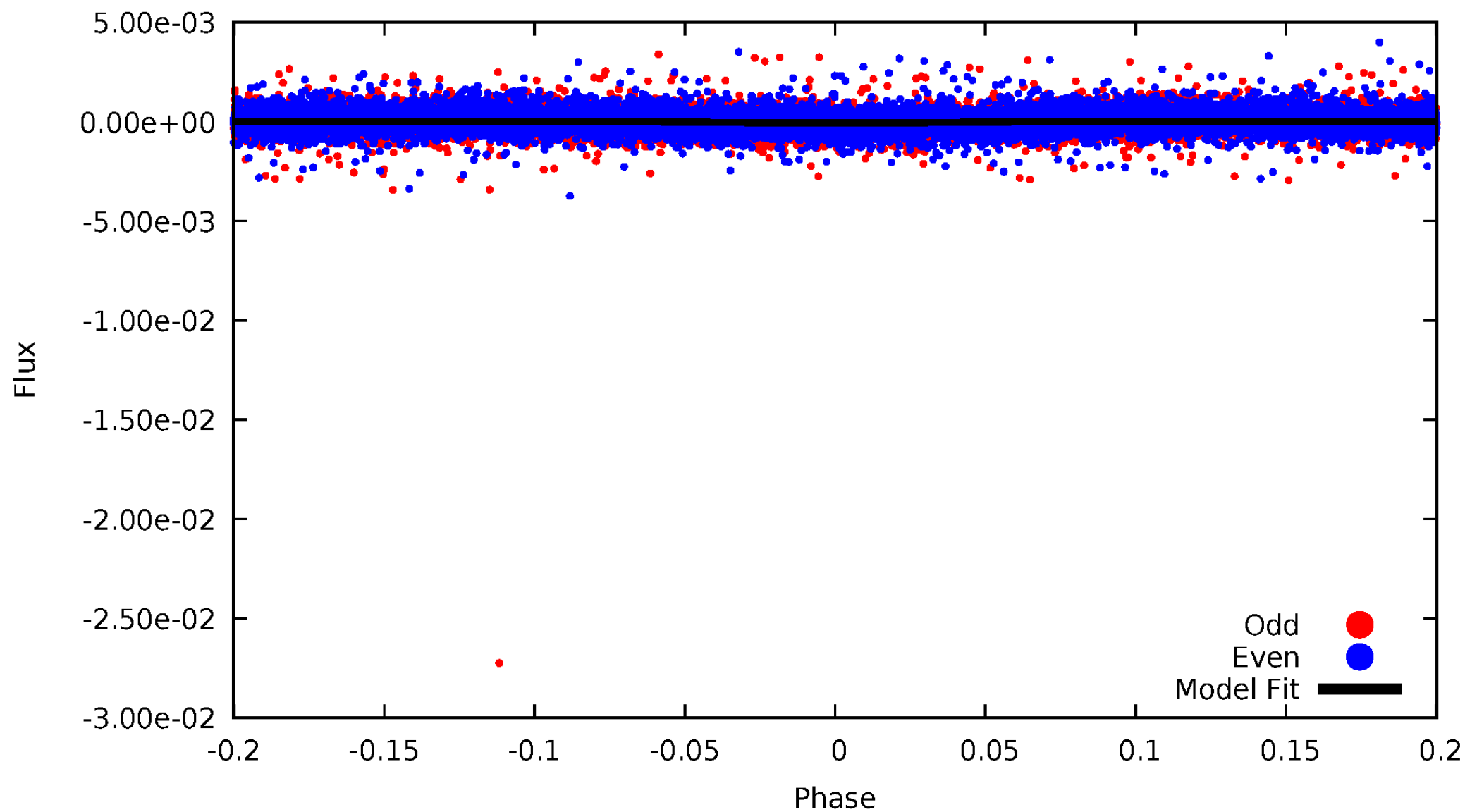


TCE 009491339-01



DV Odd/Even

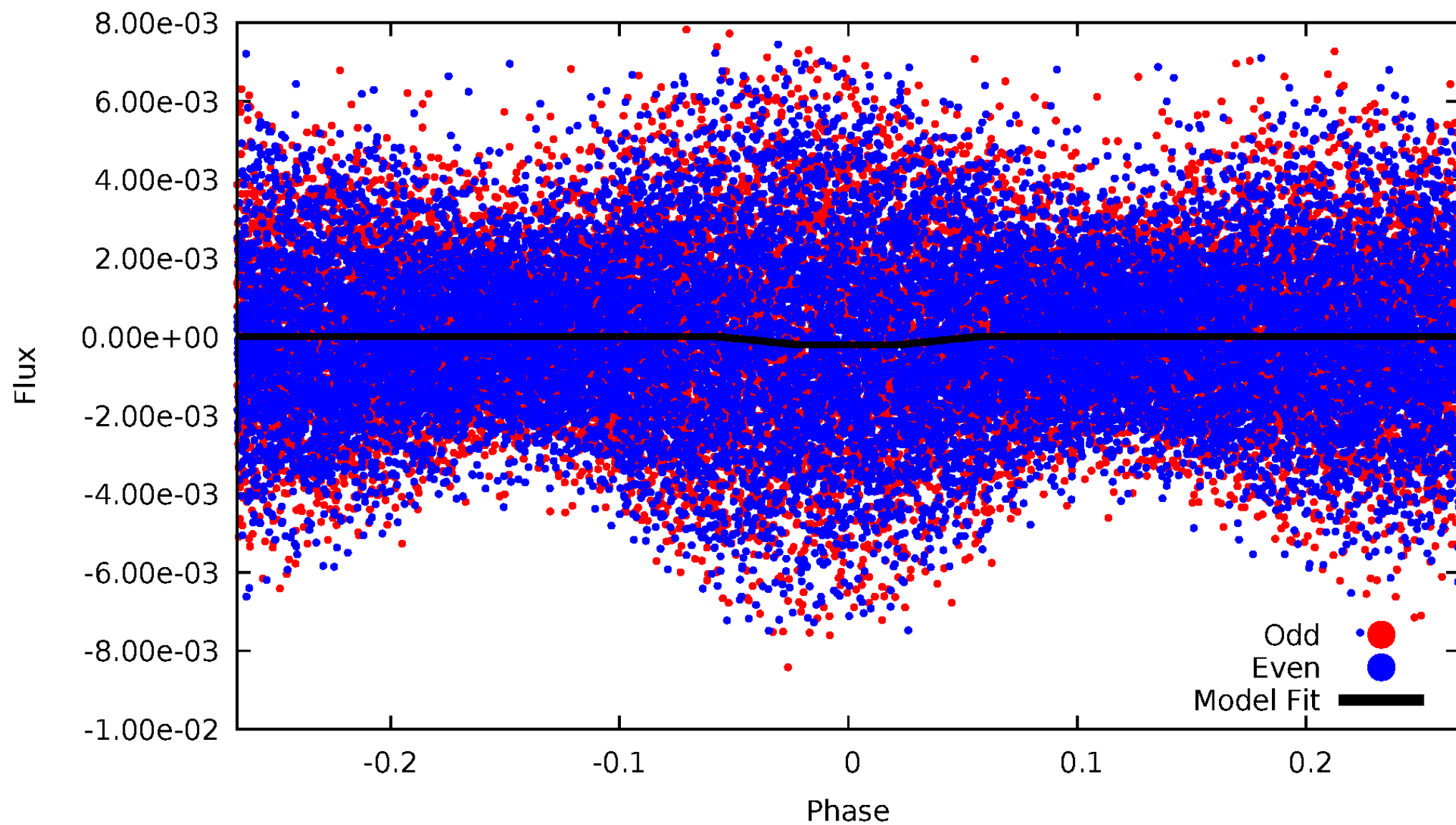
TCE 009491339-01



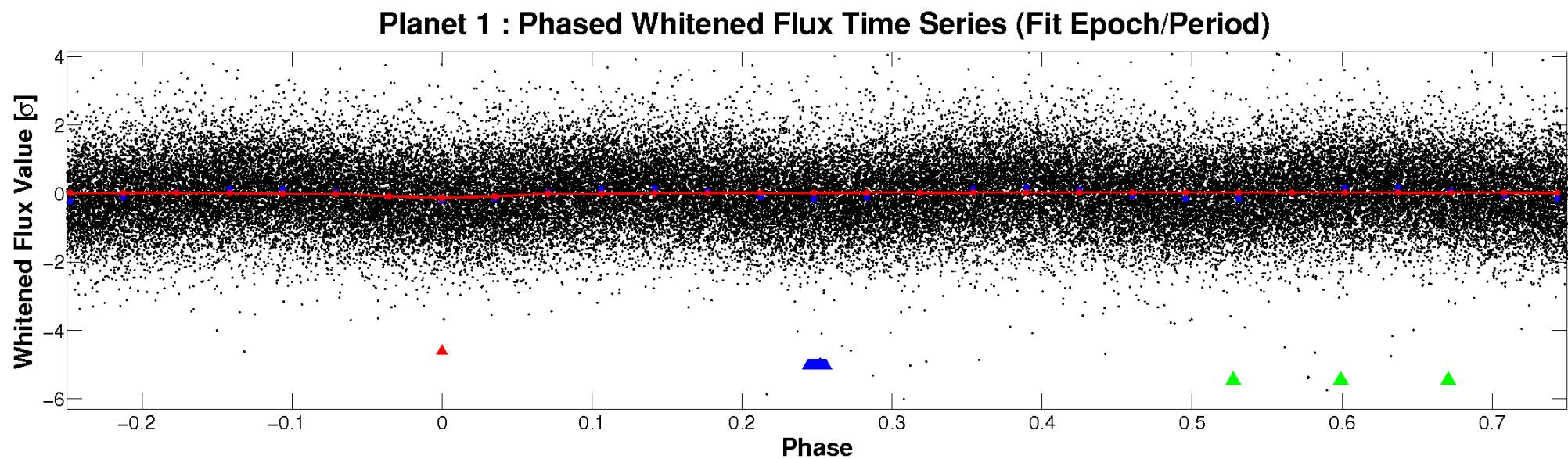
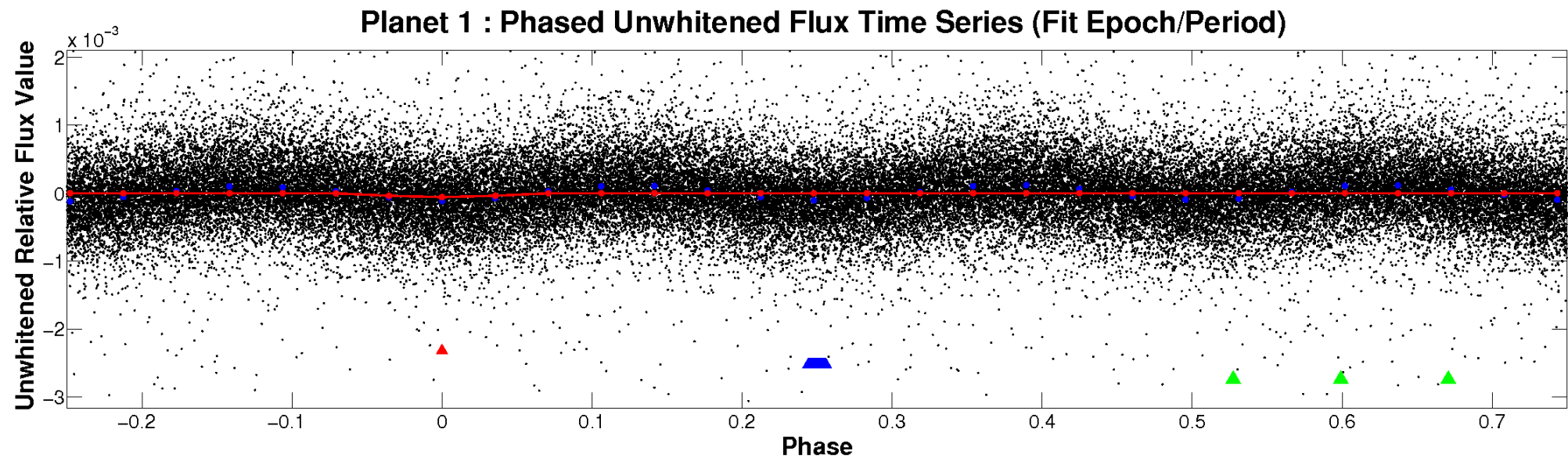


# ALT Odd/Even

TCE 009491339-01

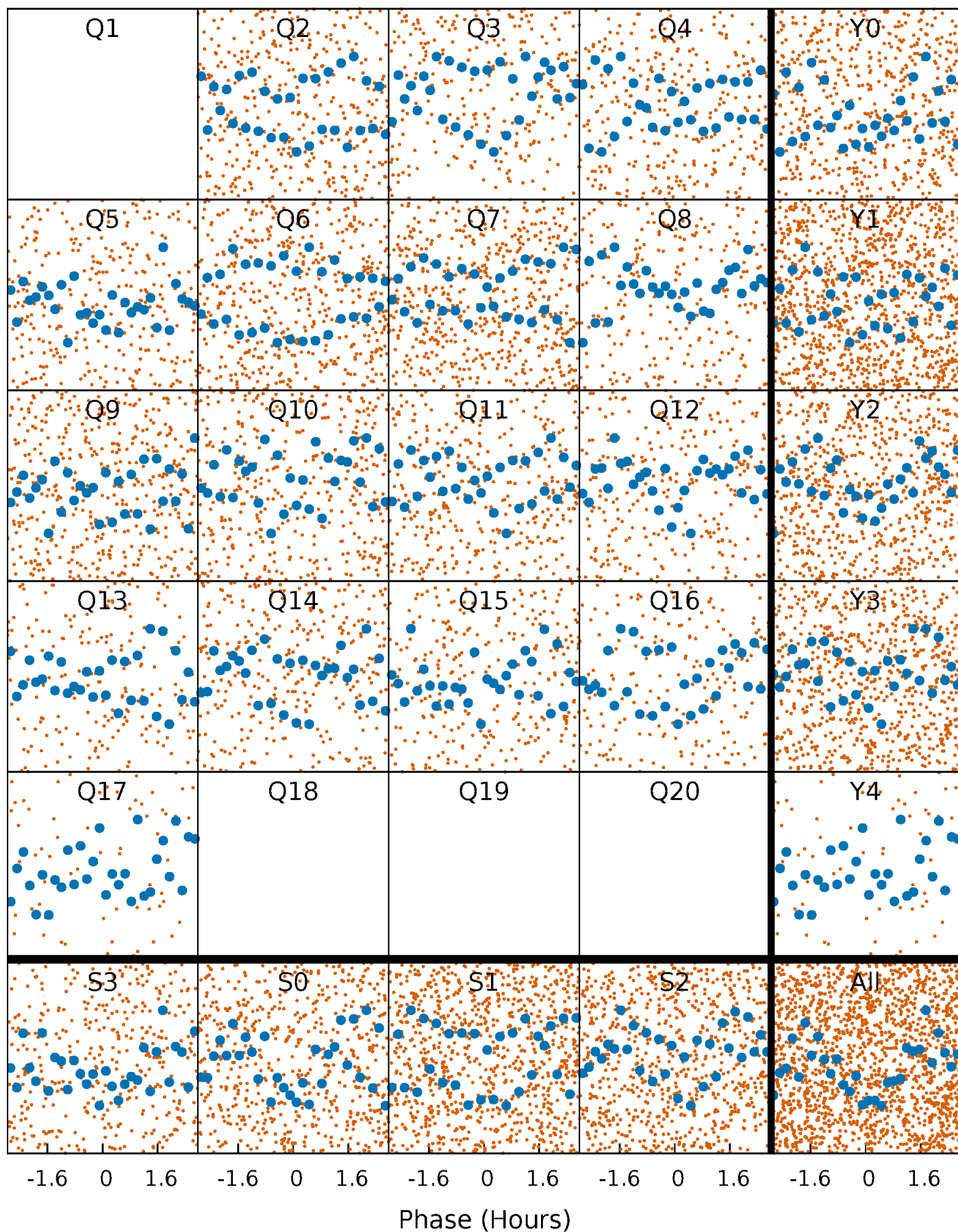


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

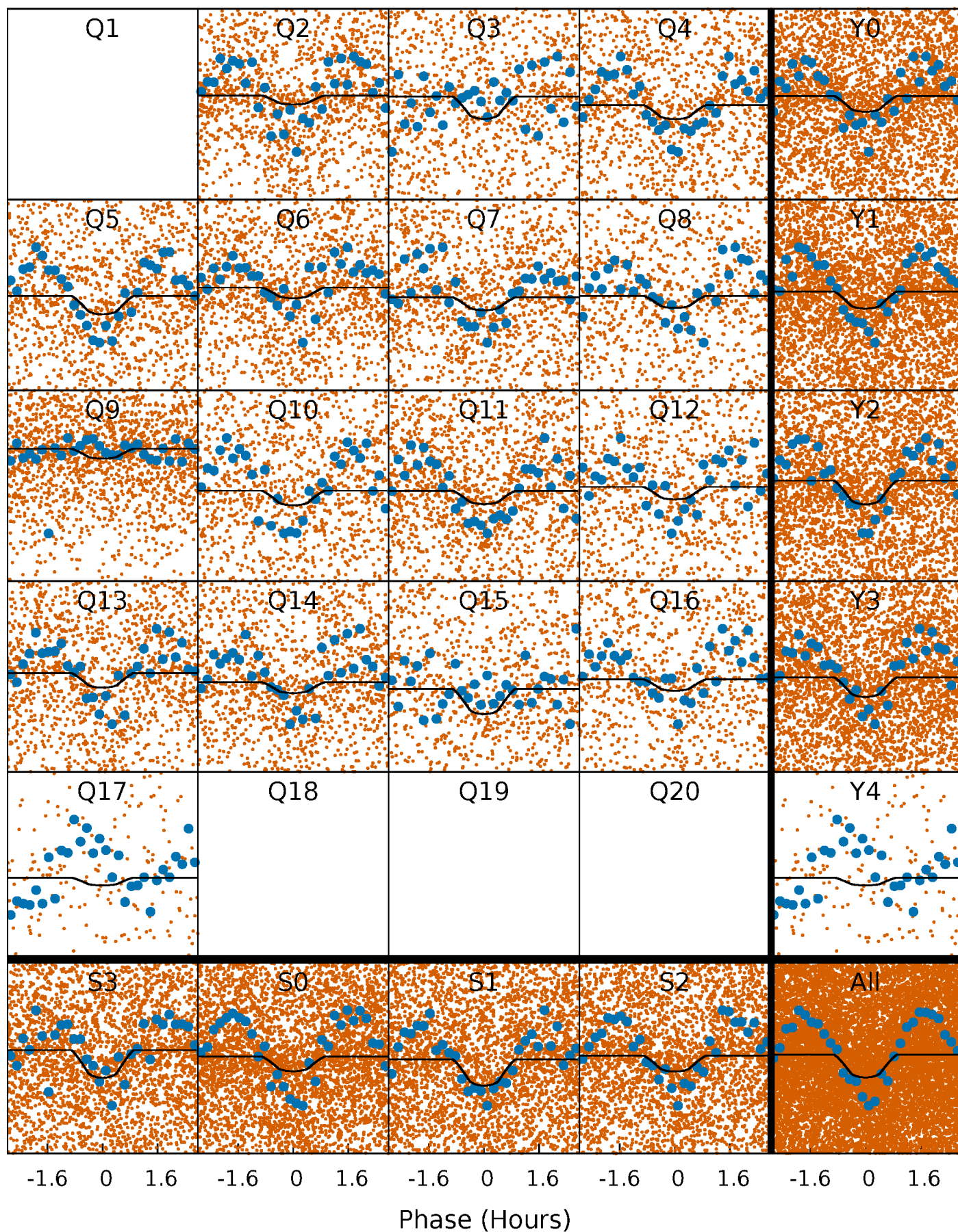
TCE 009491339-01   P= 0.577167 Days    $T_0=131.871584$  (BKJD)





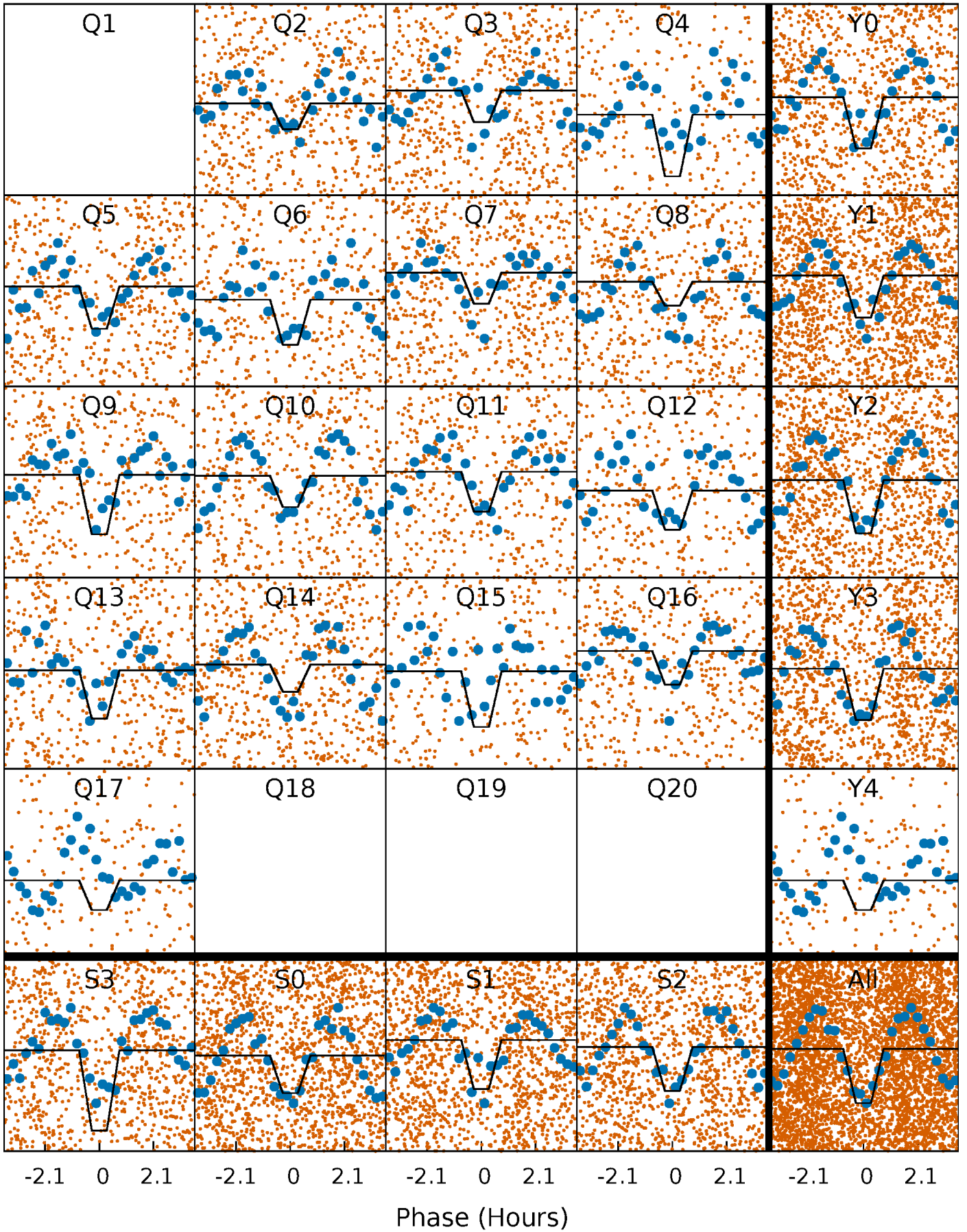
# DV Quarter-Phased Transit Curves

TCE 009491339-01 P= 0.577167 Days  $T_0=131.871584$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

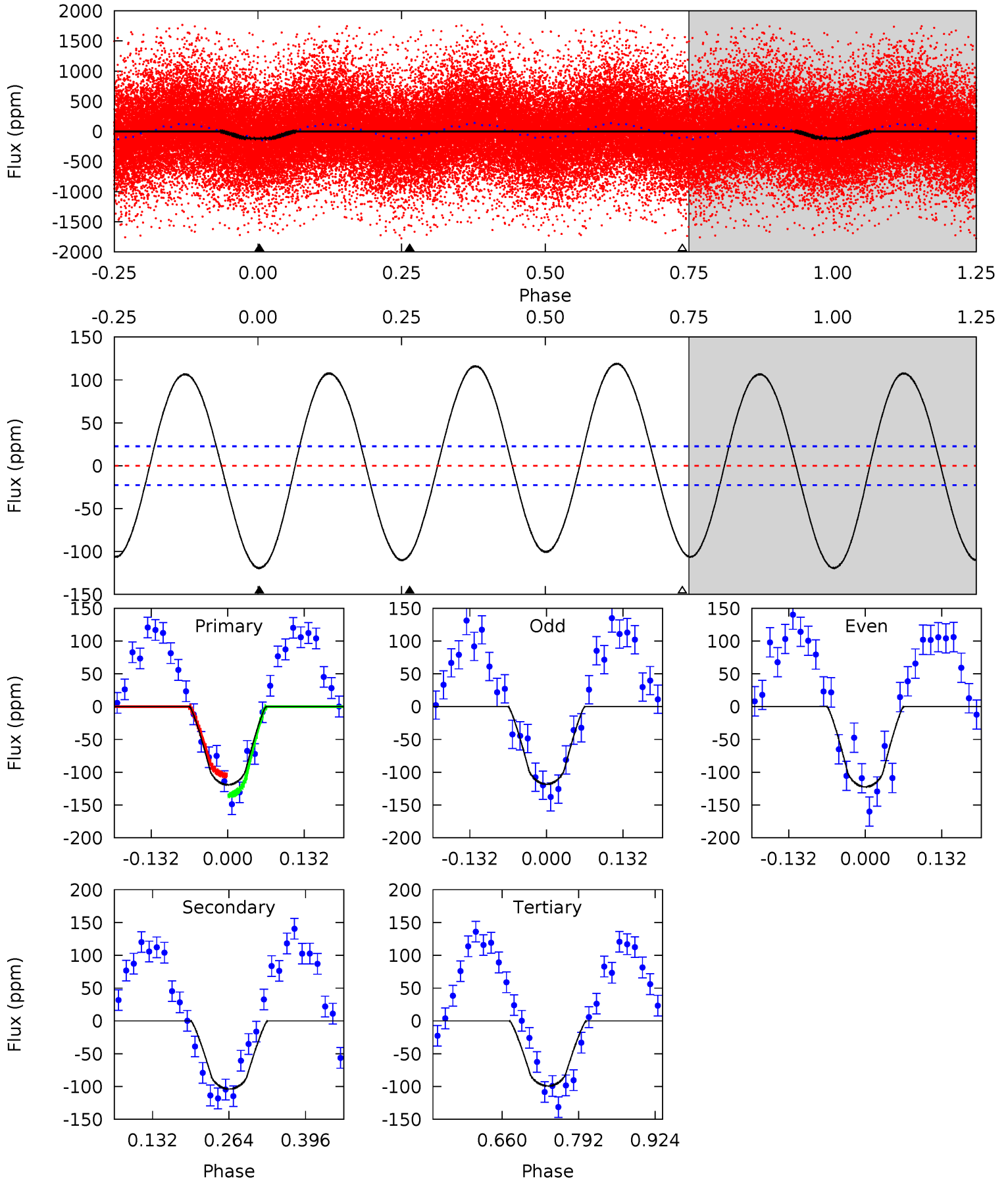
TCE 009491339-01 P= 0.577172 Days  $T_0=131.869635$  (BKJD)



# DV Model-Shift Uniqueness Test

009491339-01, P = 0.577167 Days, E = 131.871584 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
23.8	20.7	19.8	0	4.51	1.51	15.1	4.00	23.8	0.93	20.7	0.42	1.02	0.50	3.03

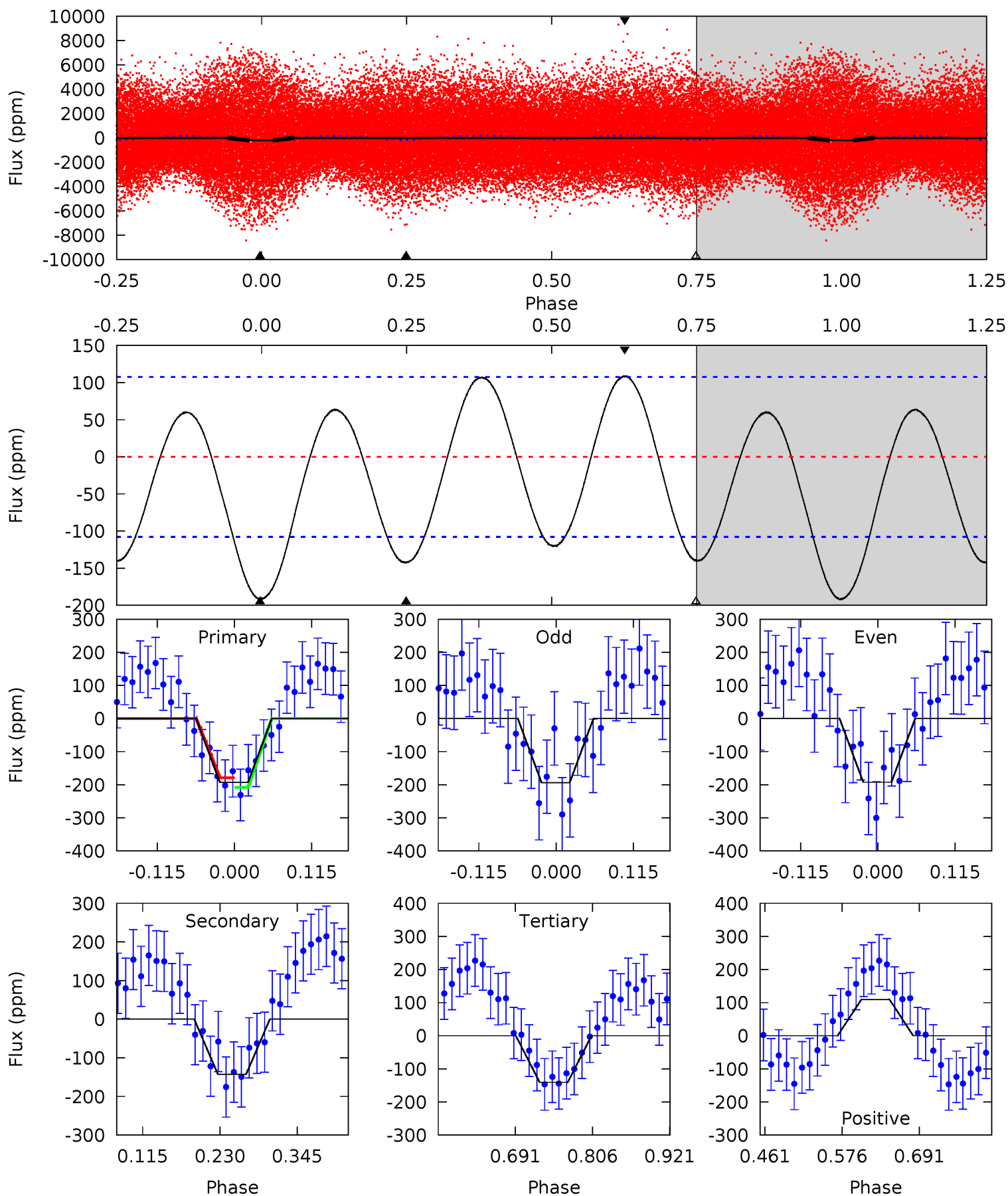




# Alt Model-Shift Uniqueness Test

009491339-01, P = 0.577172 Days, E = 131.869635 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
8.12	6.01	5.92	4.60	4.54	1.58	3.45	2.21	3.52	0.10	1.41	0.03	0.55	0.36	0.61



### Stellar Parameters For KIC 009491339

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$3735^{+74}_{-102}$	$0.852^{+0.030}_{-0.027}$	$0.020^{+0.200}_{-0.250}$	$84.373^{+20.701}_{-18.114}$	$1.847^{+1.320}_{-0.609}$	$0.000^{+0.000}_{-0.000}$
	+2%/-3%	+4%/-3%	+1000%/-1250%	+25%/-21%	+71%/-33%	+32%/-6%
Source	PHO54	AST54	PHO54	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 009491339-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	-104 $\pm$ 5	$103.30^{+88.86}_{-65.55}$	$16376^{+651}_{-649}$	$-15405^{+1672}_{-1491}$	$0.001^{+0.009}_{-0.001}$
Alt.	-143 $\pm$ 24	$138.72^{+95.16}_{-79.67}$	$16389^{+648}_{-624}$	$-15389^{+1509}_{-1604}$	$0.001^{+0.005}_{-0.001}$

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



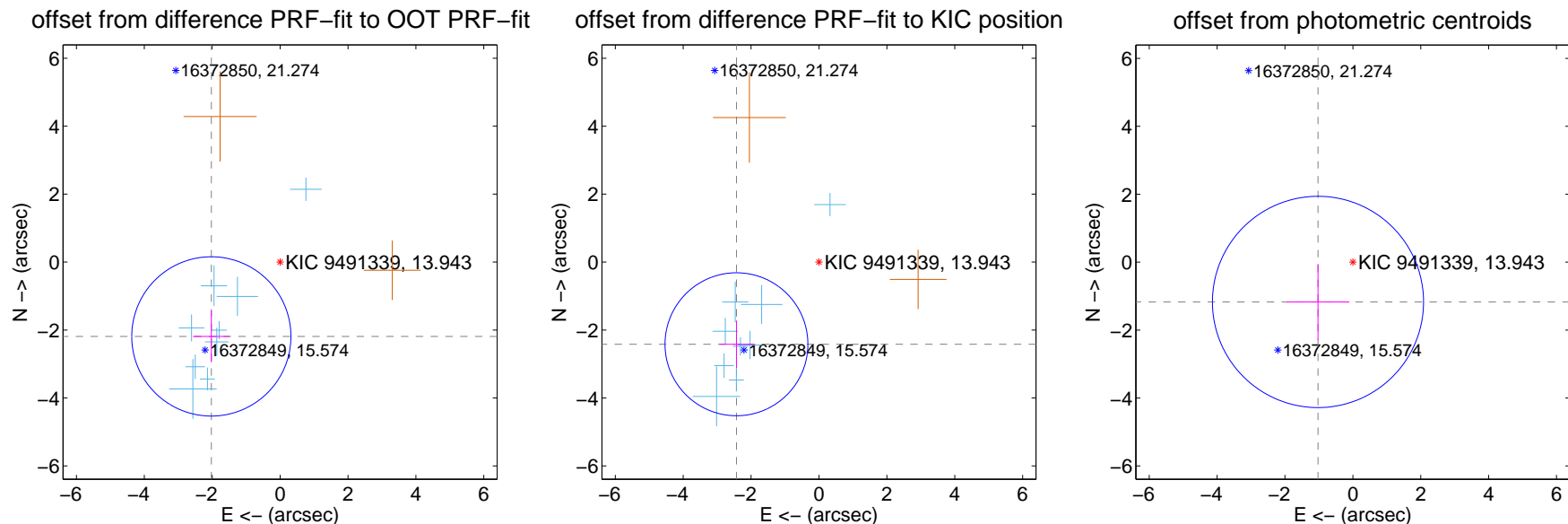
## DV Centroid Data

Supplemental centroid analysis for 009491339-01. Kepler magnitude: 13.94. Transit SNR 8.85

There are 9 quarters with good PRF difference image offsets

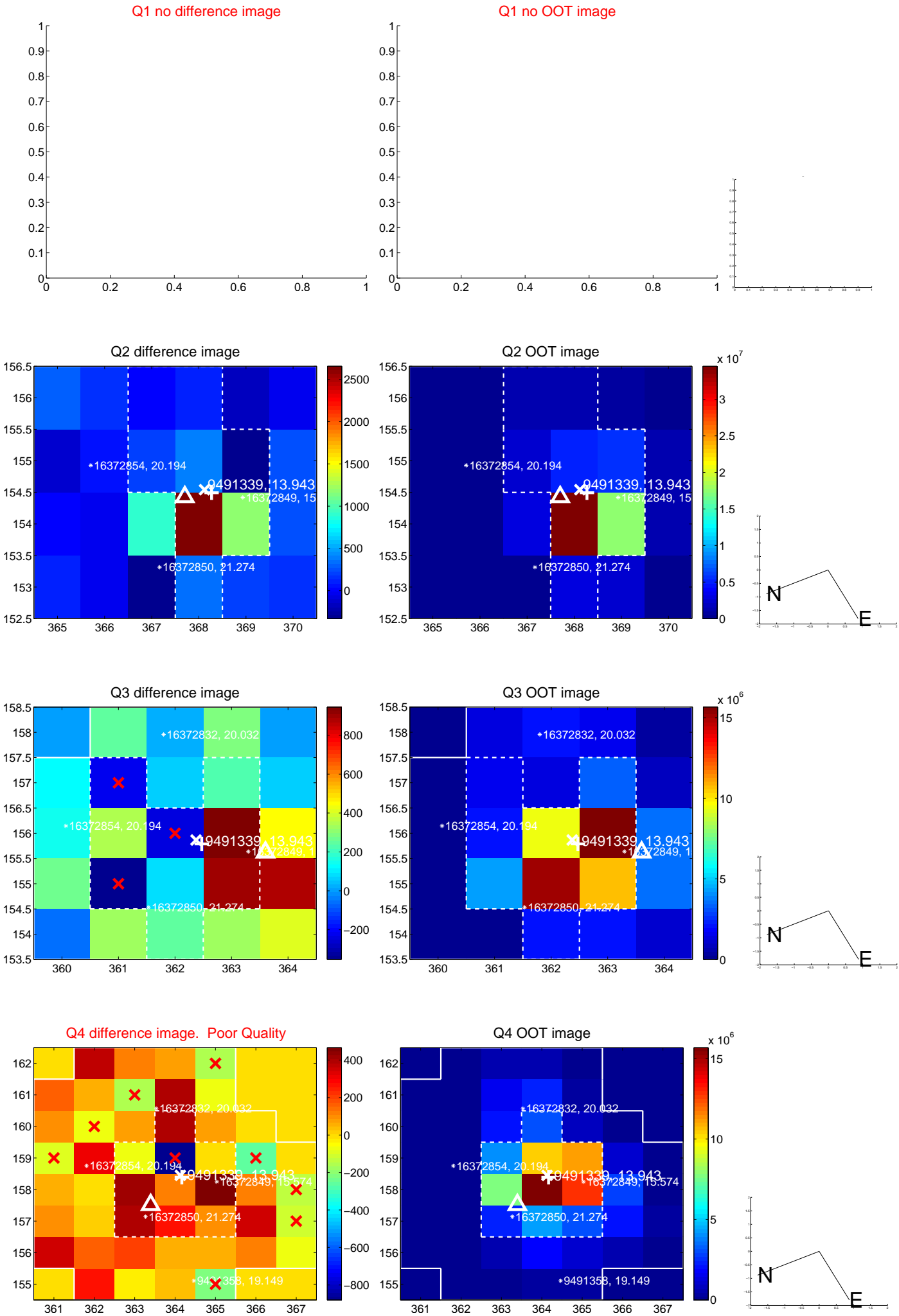
The direct PRF centroid is offset from the target star catalog position by about 0.30 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.982 \pm 0.782$	3.82	$2.026 \pm 0.539$	$-2.188 \pm 0.763$
PRF-fit source offset from KIC position	$3.429 \pm 0.701$	4.89	$2.431 \pm 0.499$	$-2.419 \pm 0.697$
photometric centroid source offset	$1.56 \pm 1.04$	1.50	$1.03 \pm 0.92$	$-1.17 \pm 1.12$



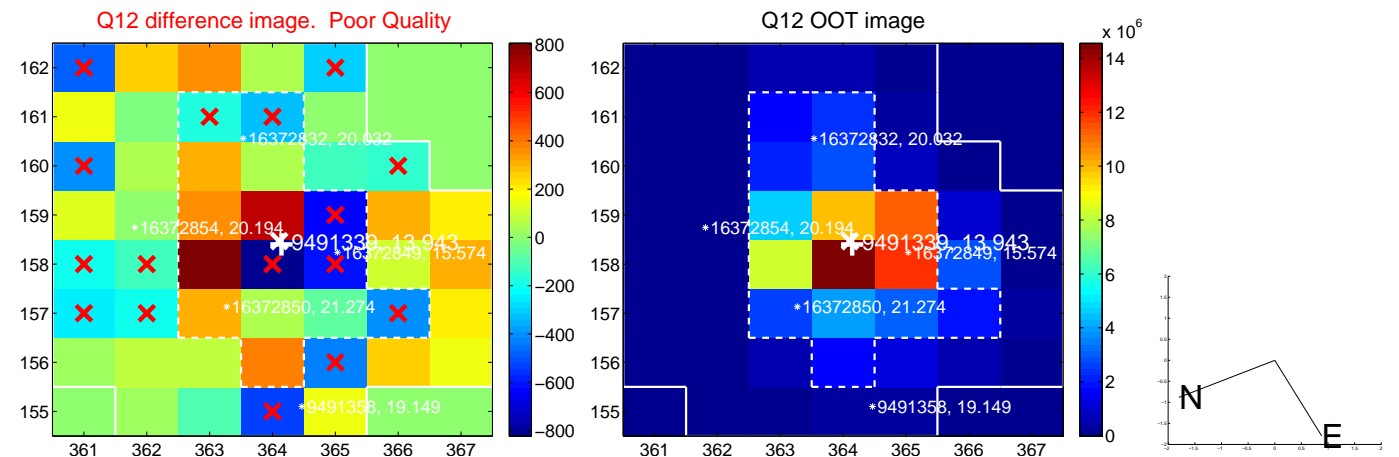
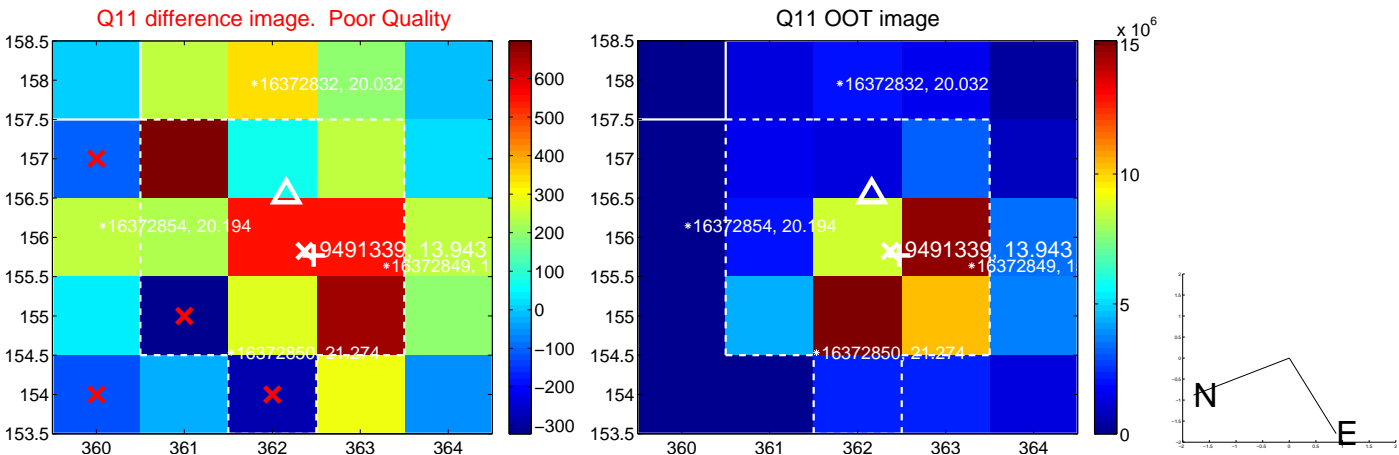
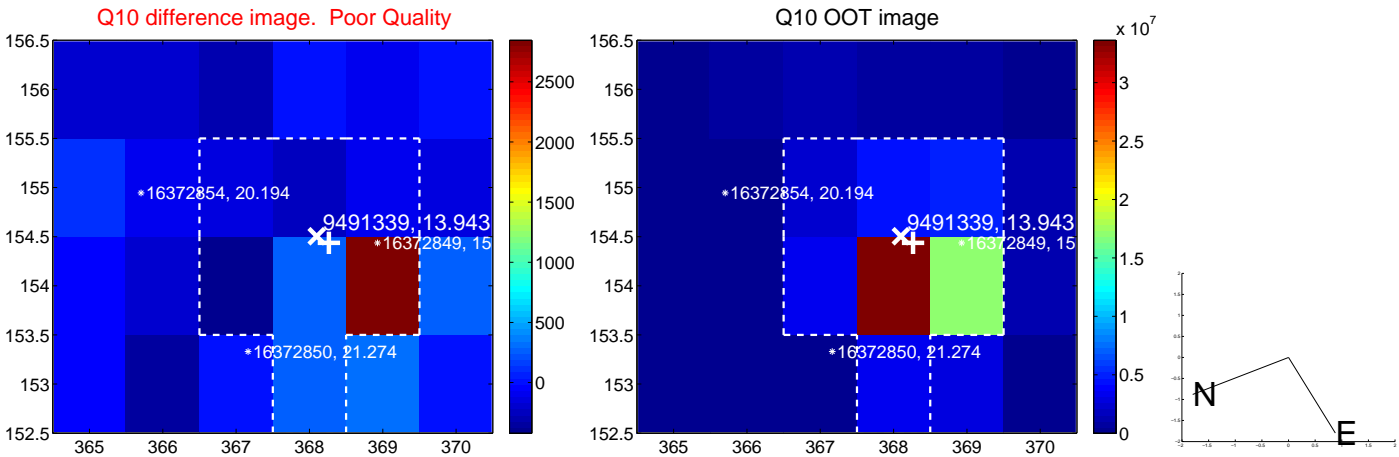
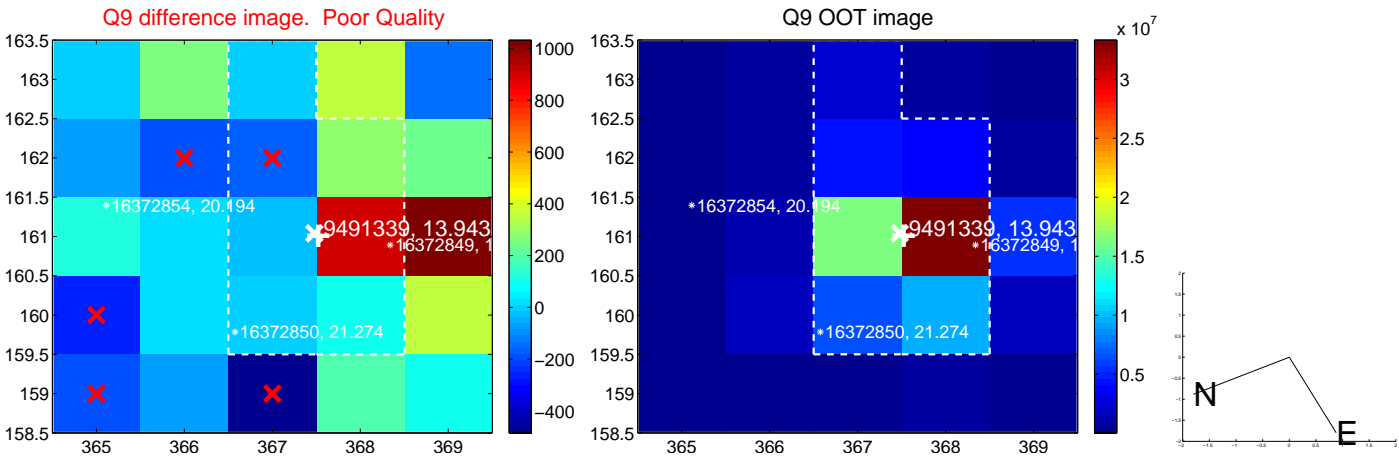
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

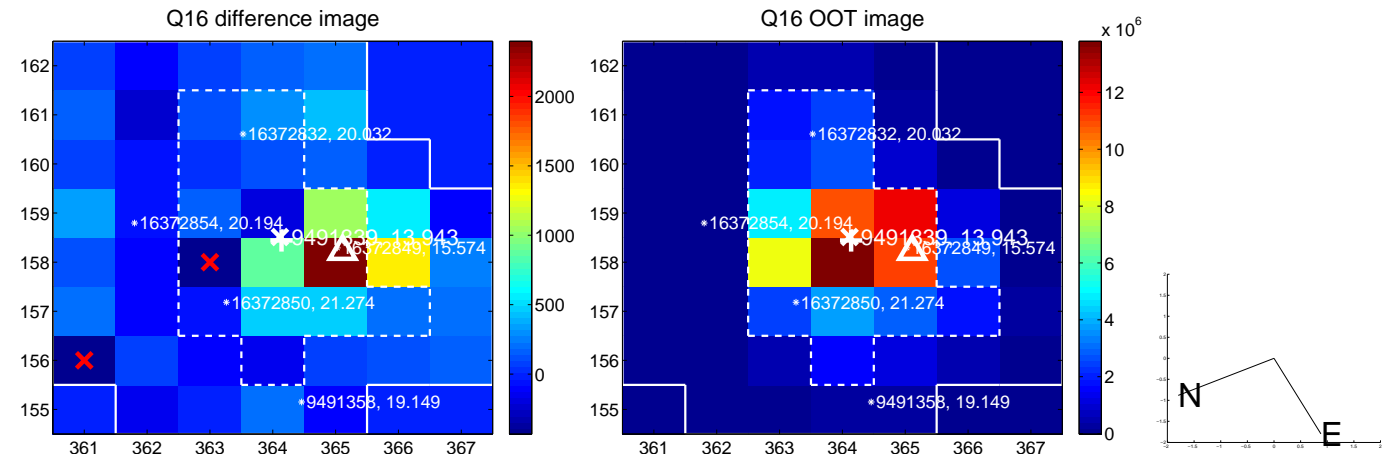
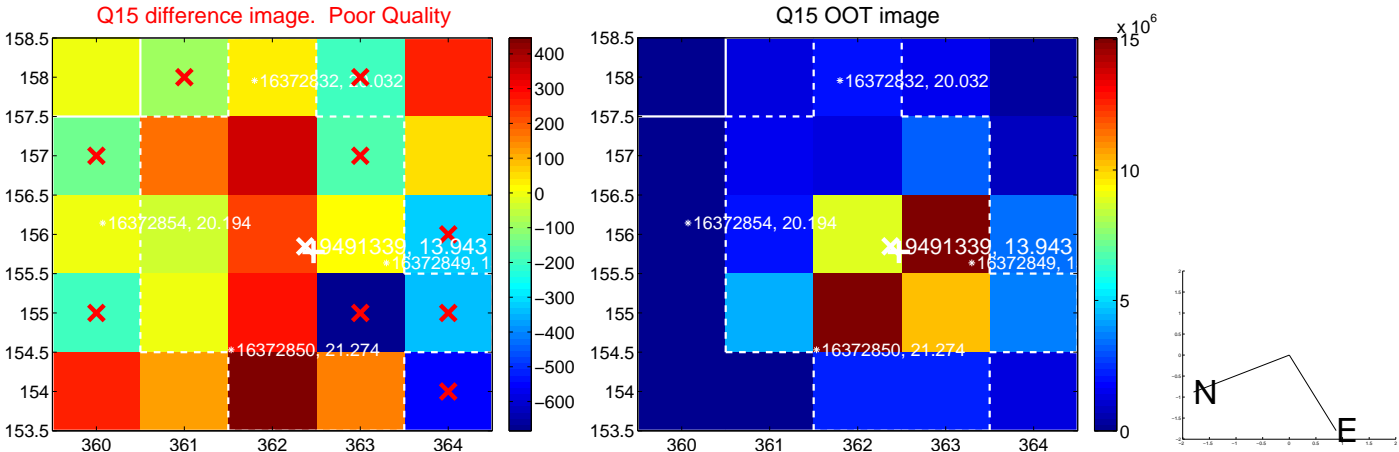
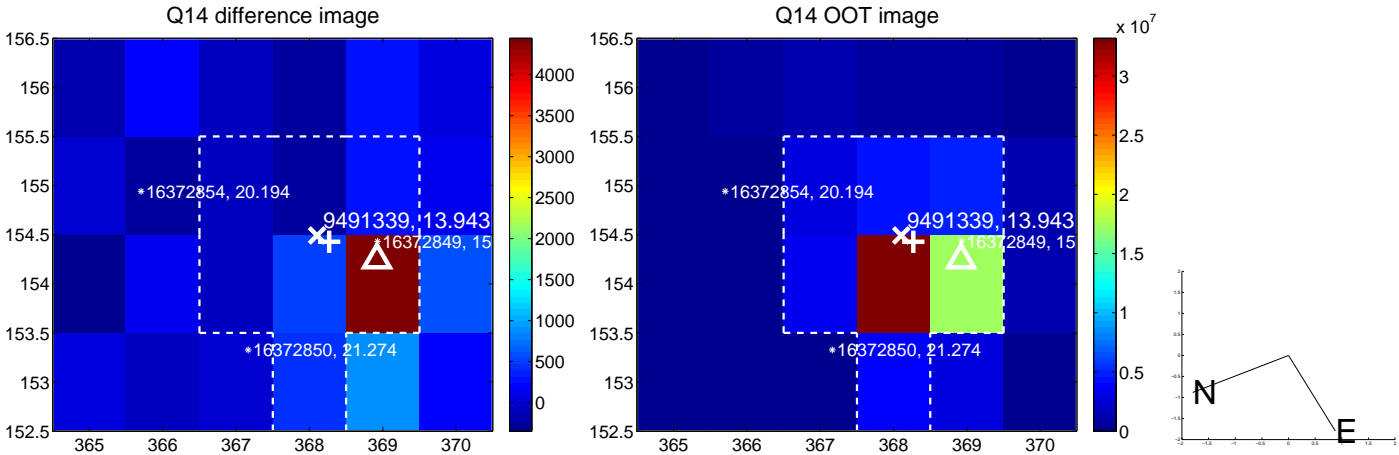
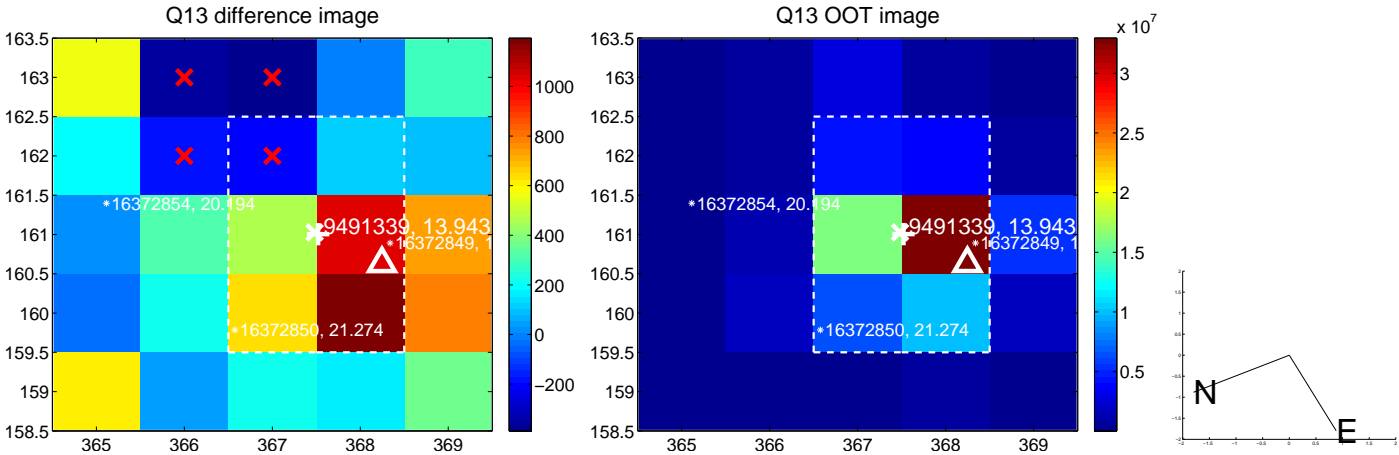




white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

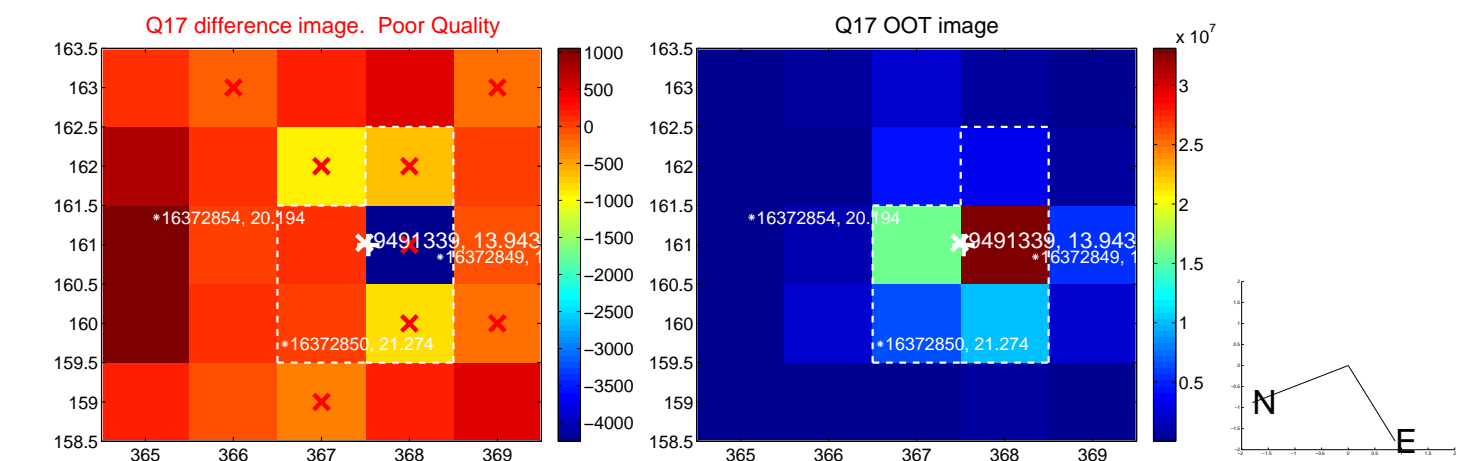


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

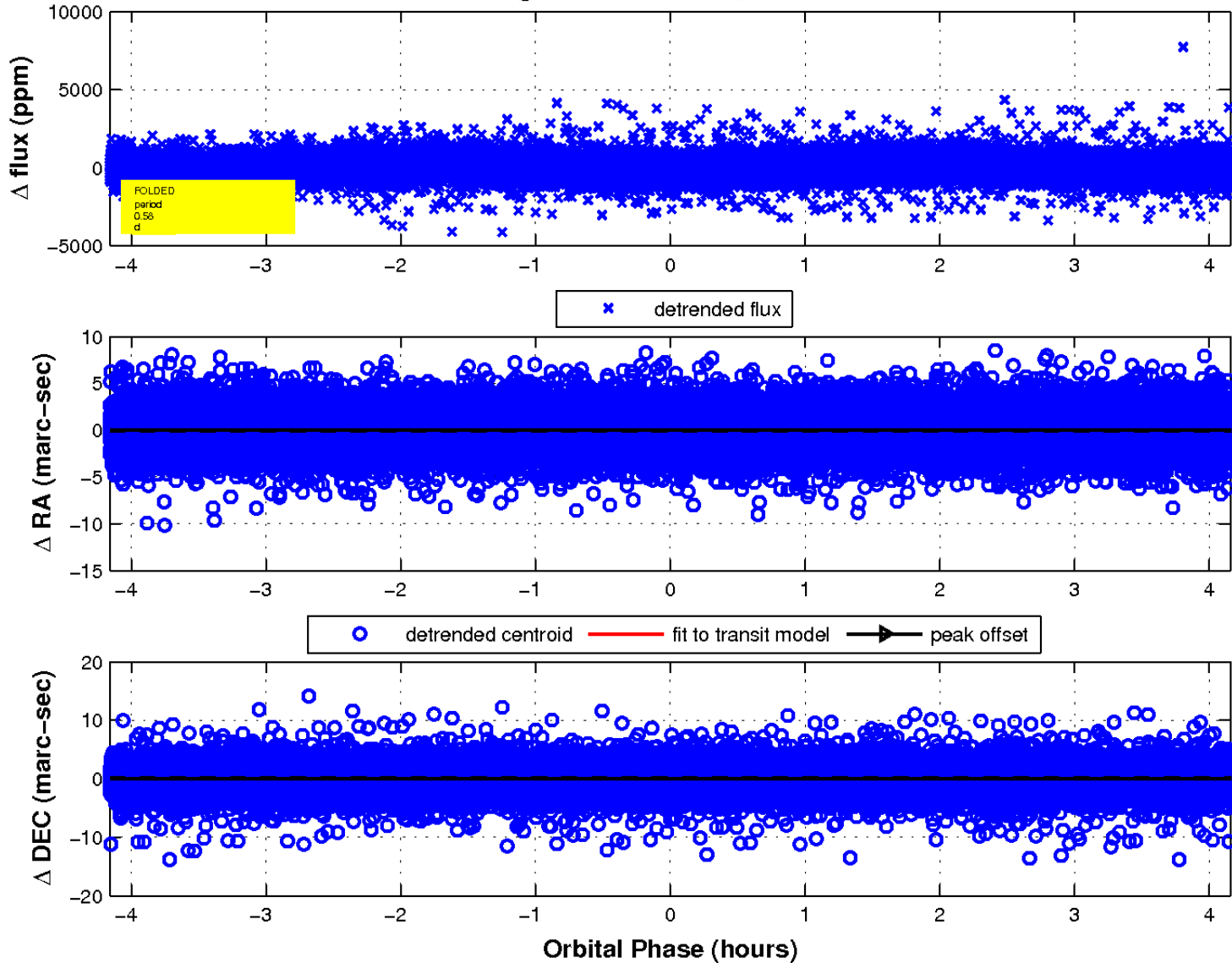




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

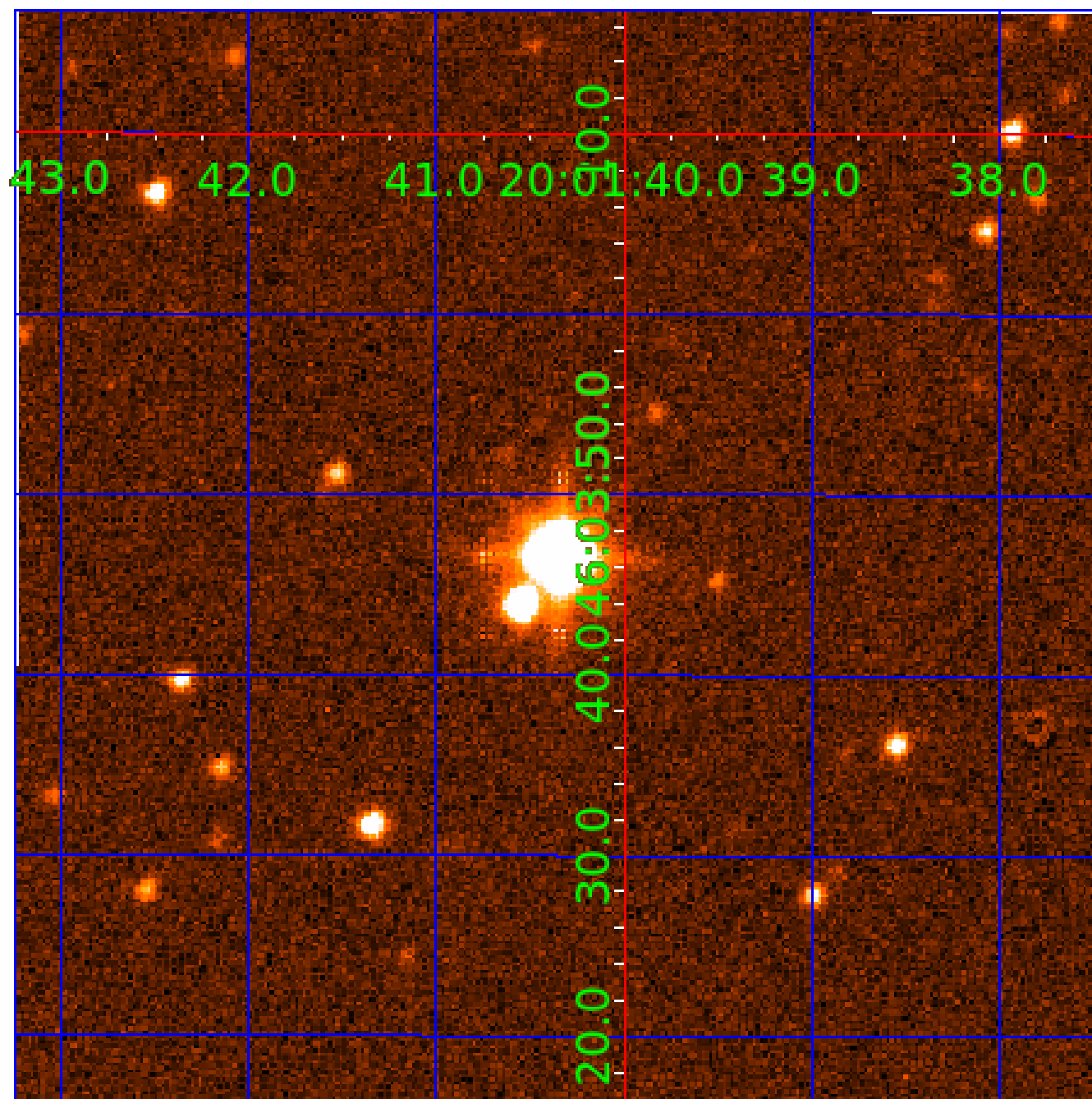


fluxWeightedCentroids, Planet 1 of 3



UKIRT Image

Declination



# KIC 009491339

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009491339-01	OBS	No	0.577167	131.871584	59.7	1.386	8.4	8.8	84.37	3735	84.10	0.00
009491339-02	OBS	No	0.577164	132.019353	78.2	1.160	7.8	10.1	84.37	3735	96.16	0.00

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009491339-01	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_UNRESOLVED_OFFSET
009491339-02	OBS	FP	0.00	1	0	1	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_UNRESOLVED_OFFSET

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

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

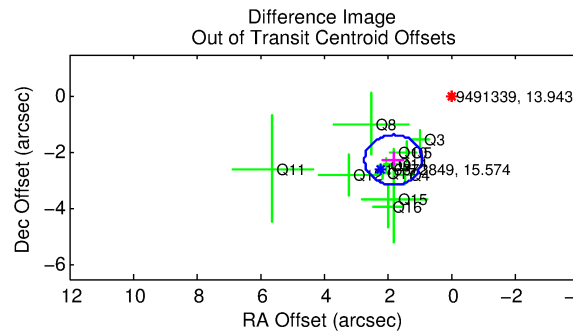
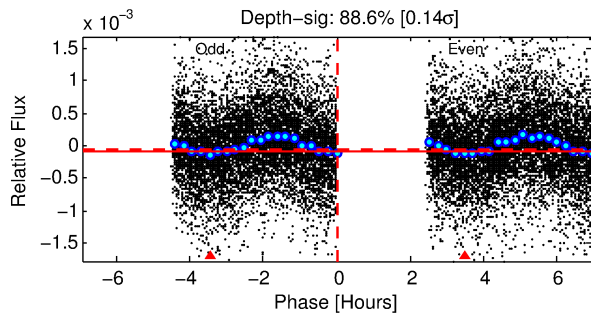
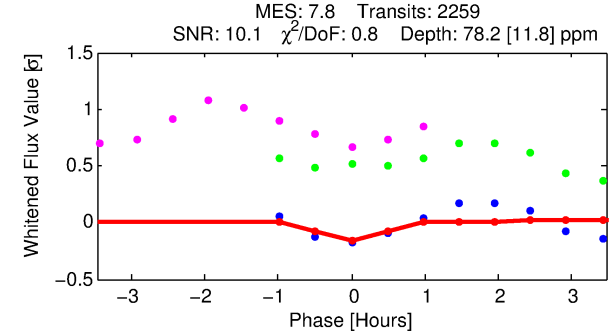
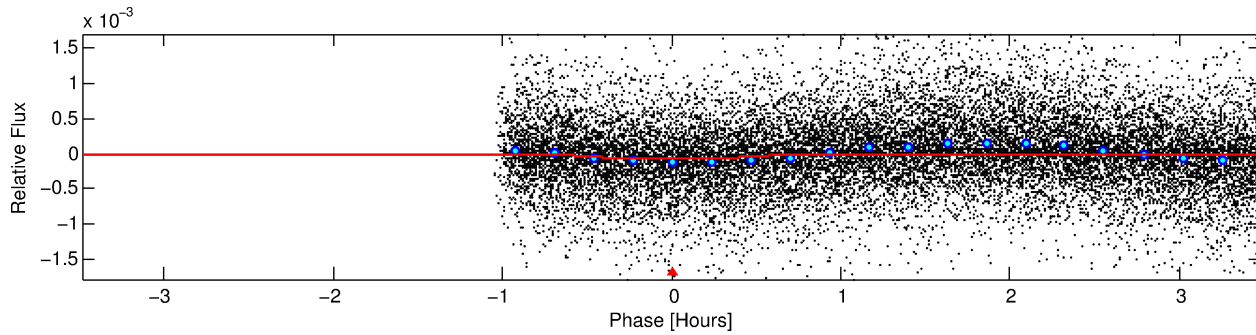
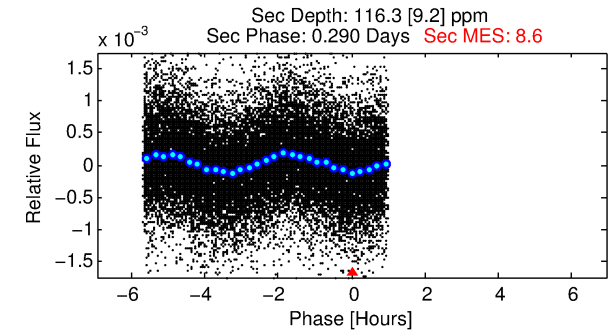
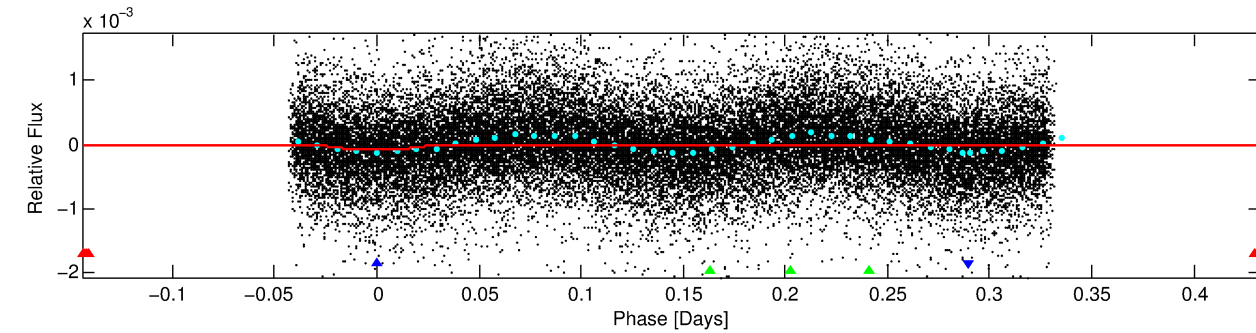
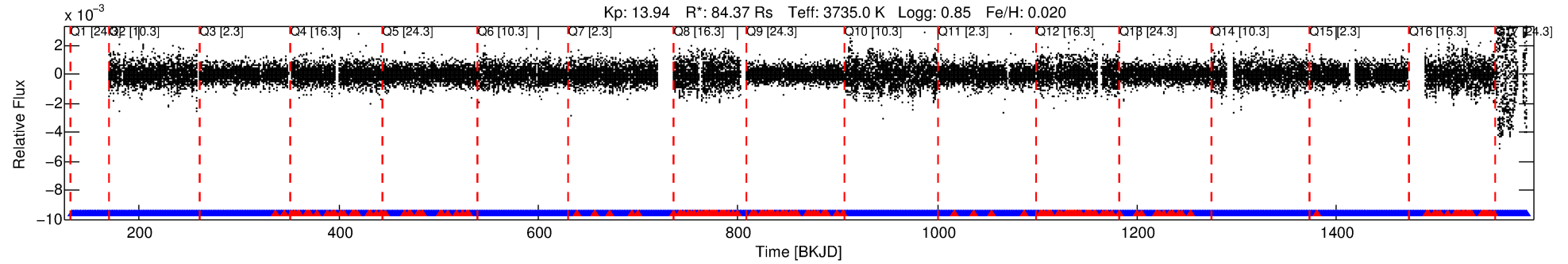
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009491339-02

No Significant Match Found

# DV One-Page Summary

KIC: 9491339 Candidate: 2 of 3 Period: 0.577 d



## DV Fit Results:

Period = 0.57716 [0.00001] d  
Epoch = 132.0194 [0.0018] BKJD  
Rp/R\* = 0.0104 [0.0125]  
a/R\* = 1.98 [5.50]  
b = 0.90 [0.83]  
Seff = N/A  
Teq = N/A  
Rp = 96.16 [117.70] Re  
a = N/A  
Ag = N/A  
Teffp = N/A

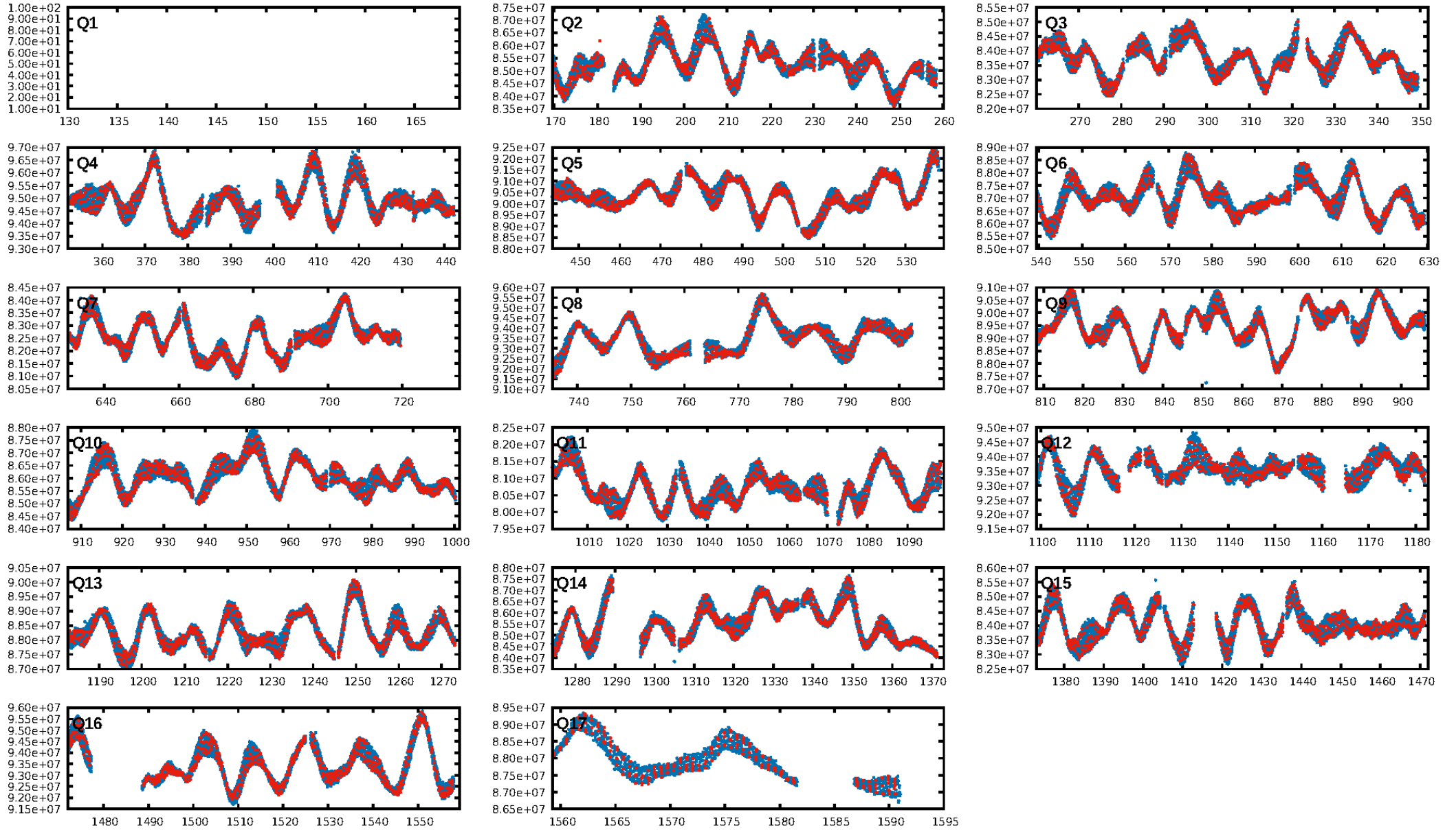
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.21e-18  
RollingBand-fgt: 0.92 [2031/2213]  
GhostDiagnostic-chr: 0.6252  
Centroid-sig: 6.8%  
Centroid-so: 2.158 arcsec [2.67σ]  
OotOffset-rm: 2.904 arcsec [9.71σ]  
KicOffset-rm: 3.379 arcsec [11.14σ]  
OotOffset-st: 2/3/4/3 [12]  
KicOffset-st: 2/3/4/3 [12]  
DiffImageQuality-fgm: 0.58 [7/12]  
DiffImageOverlap-fno: 0.00 [0/16]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 02:03:43 Z

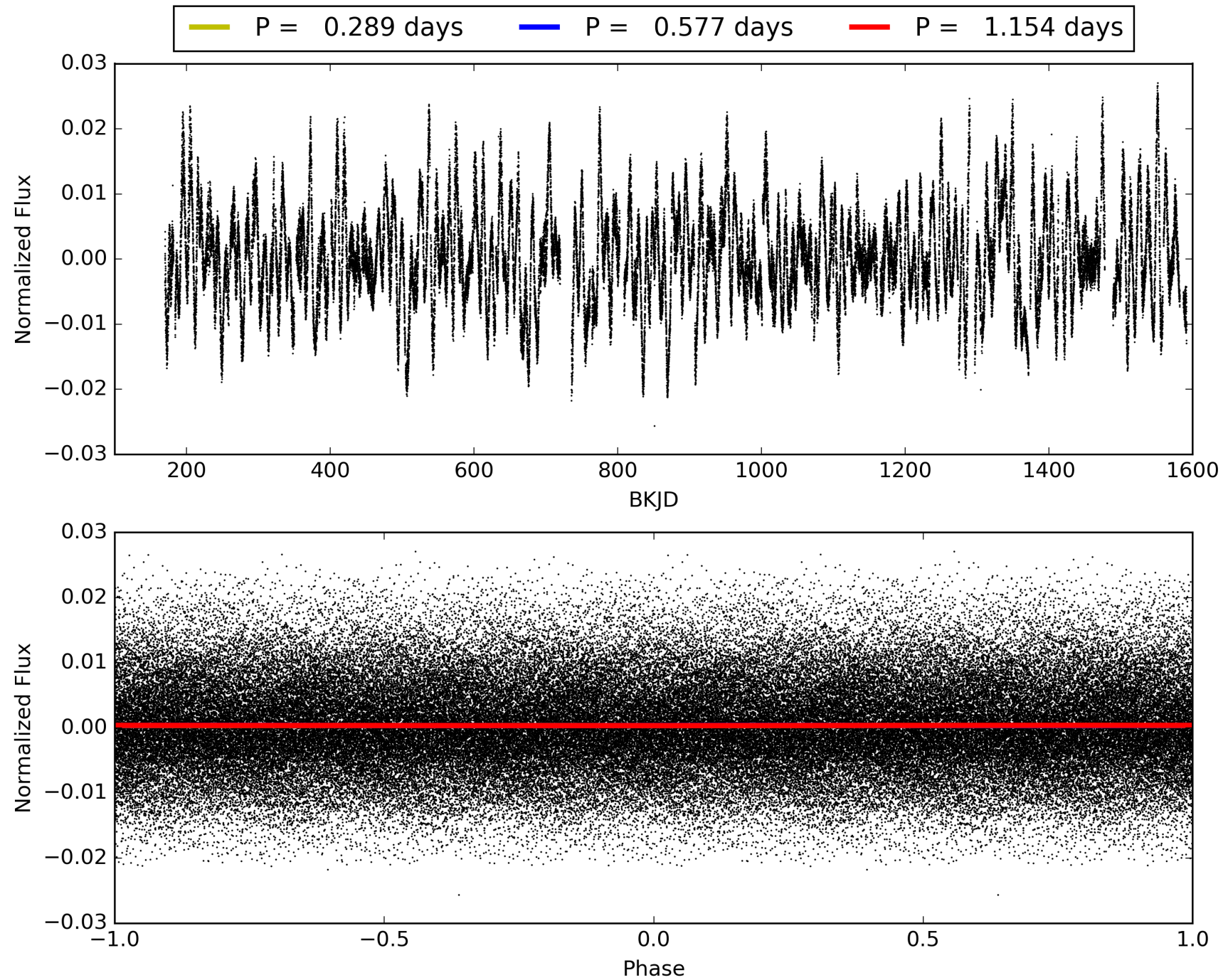
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009491339-02, PDC Light Curves



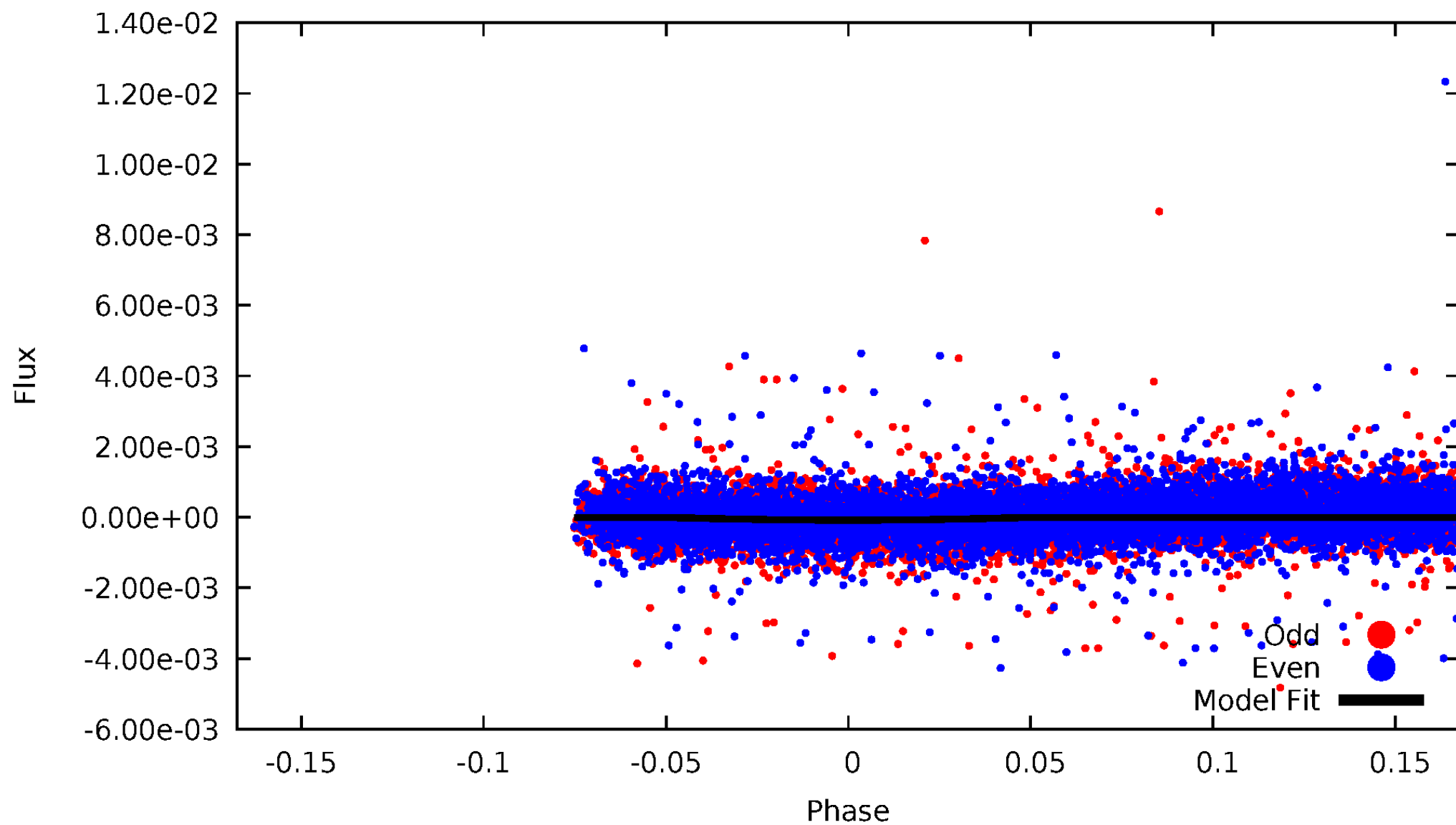


# TCE 009491339-02



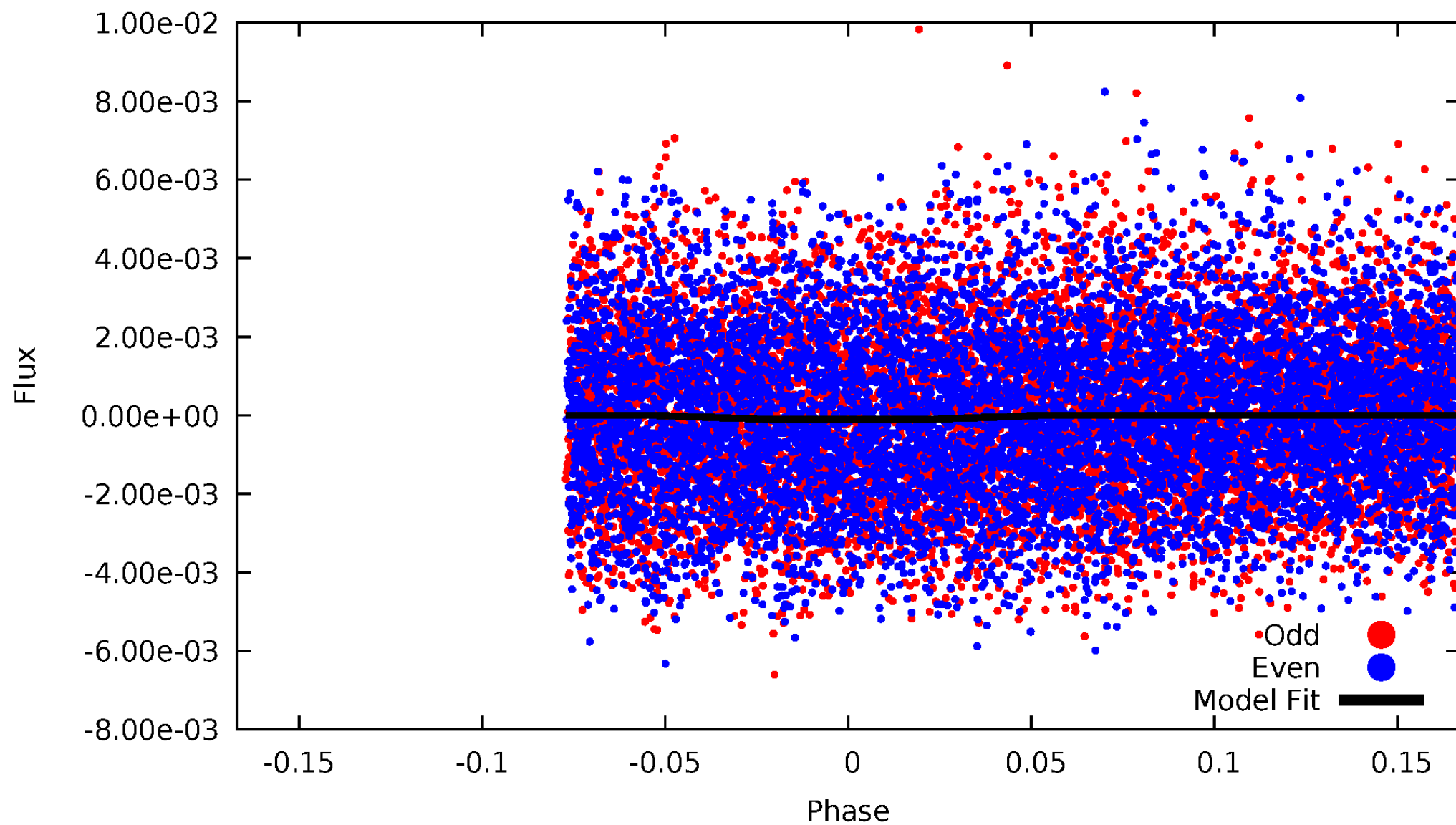
# DV Odd/Even

TCE 009491339-02



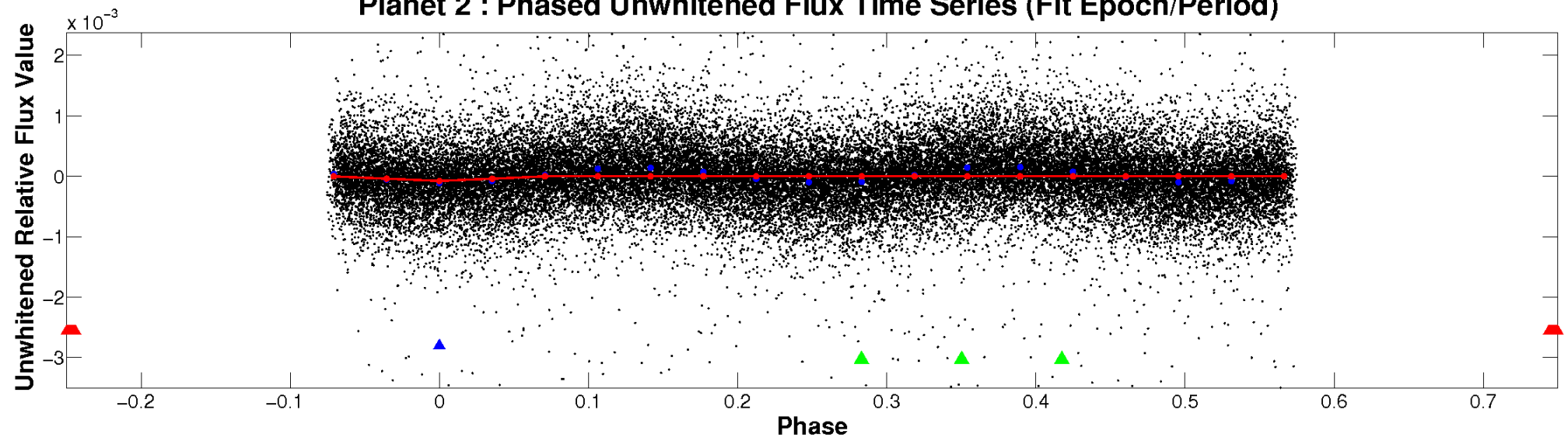
# ALT Odd/Even

TCE 009491339-02

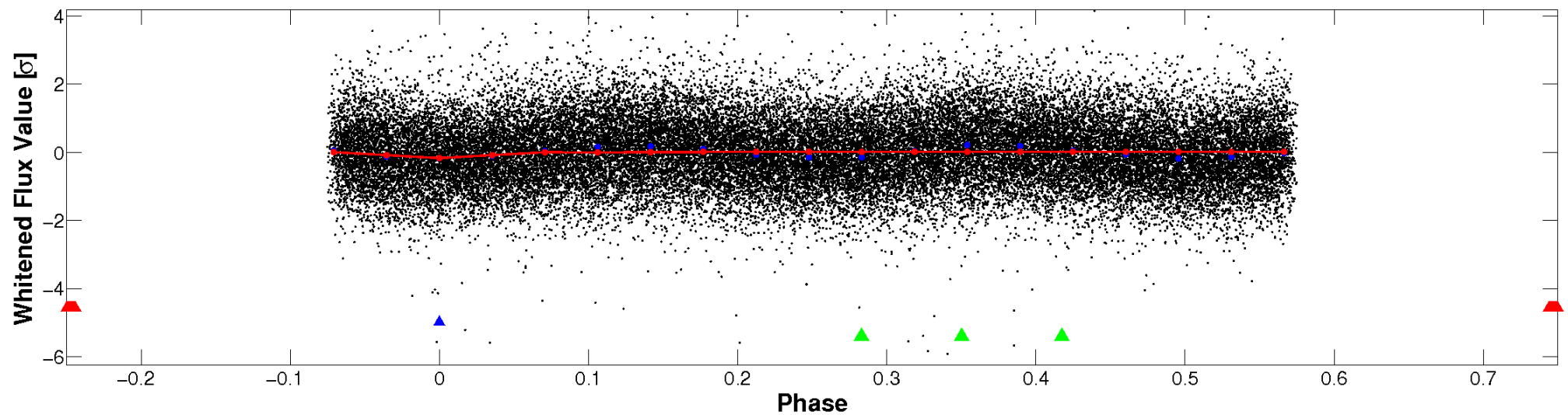


# Non-Whitened Vs. Whitened Light Curve

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

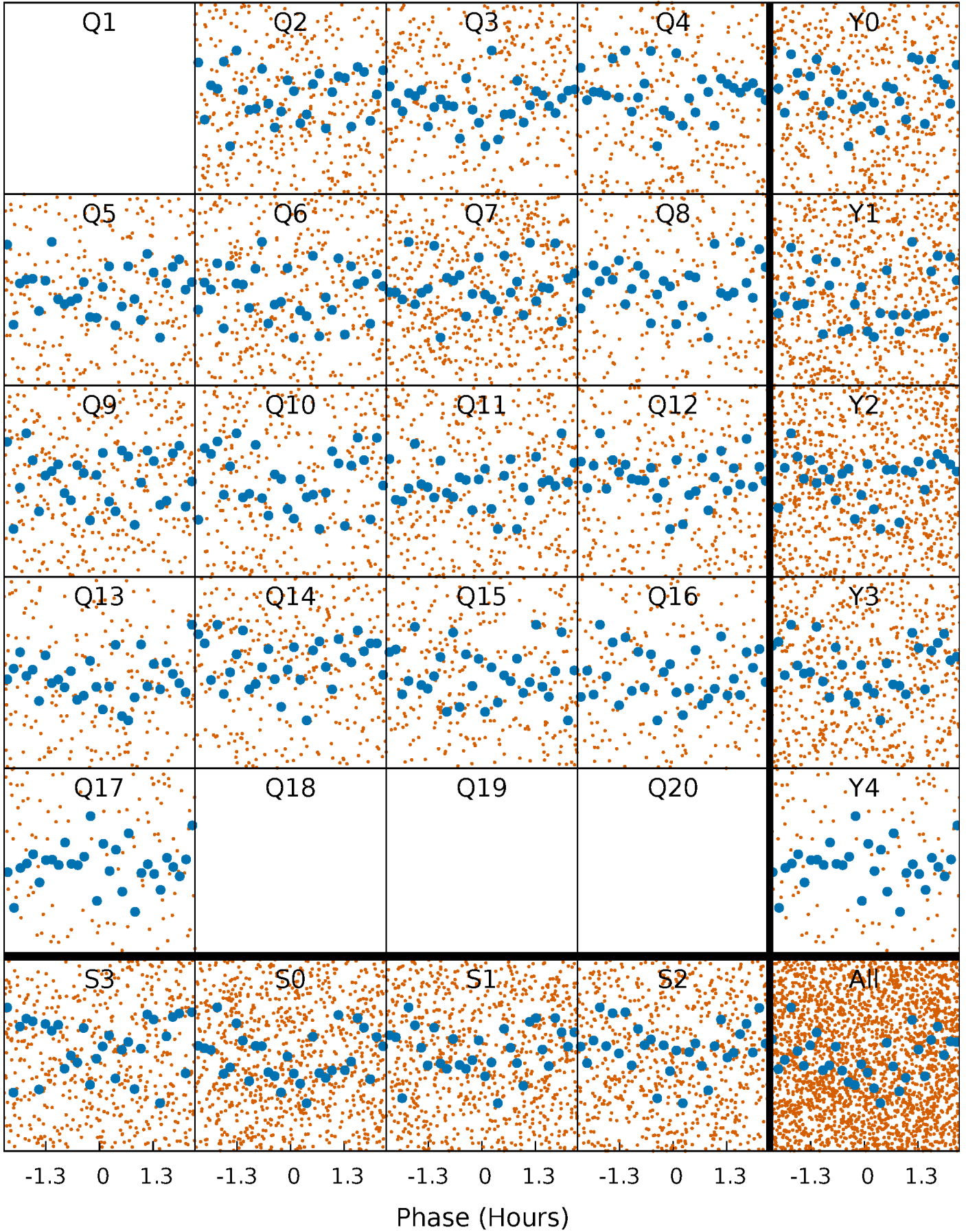


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

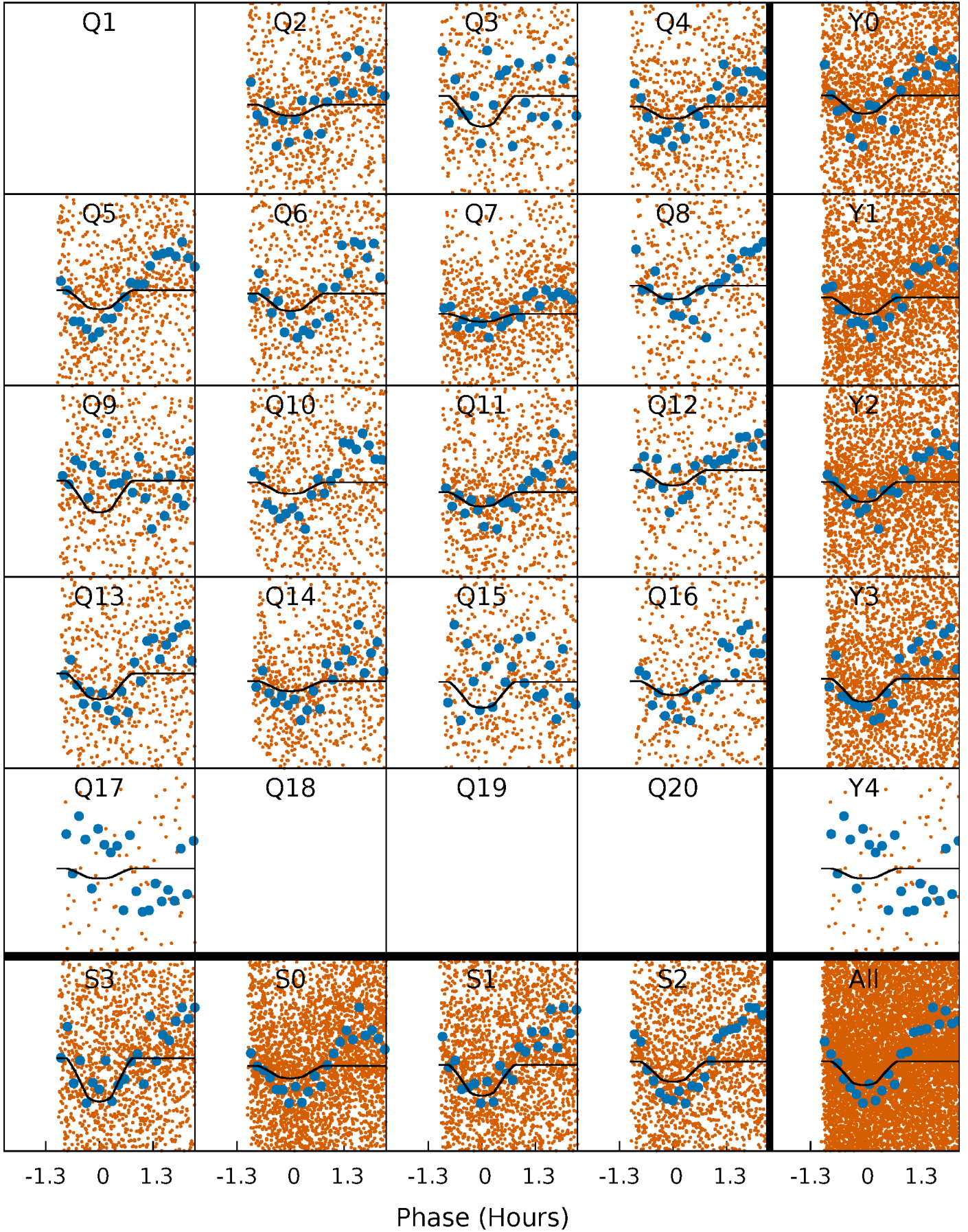
TCE 009491339-02 P= 0.577164 Days  $T_0=132.019353$  (BKJD)





# DV Quarter-Phased Transit Curves

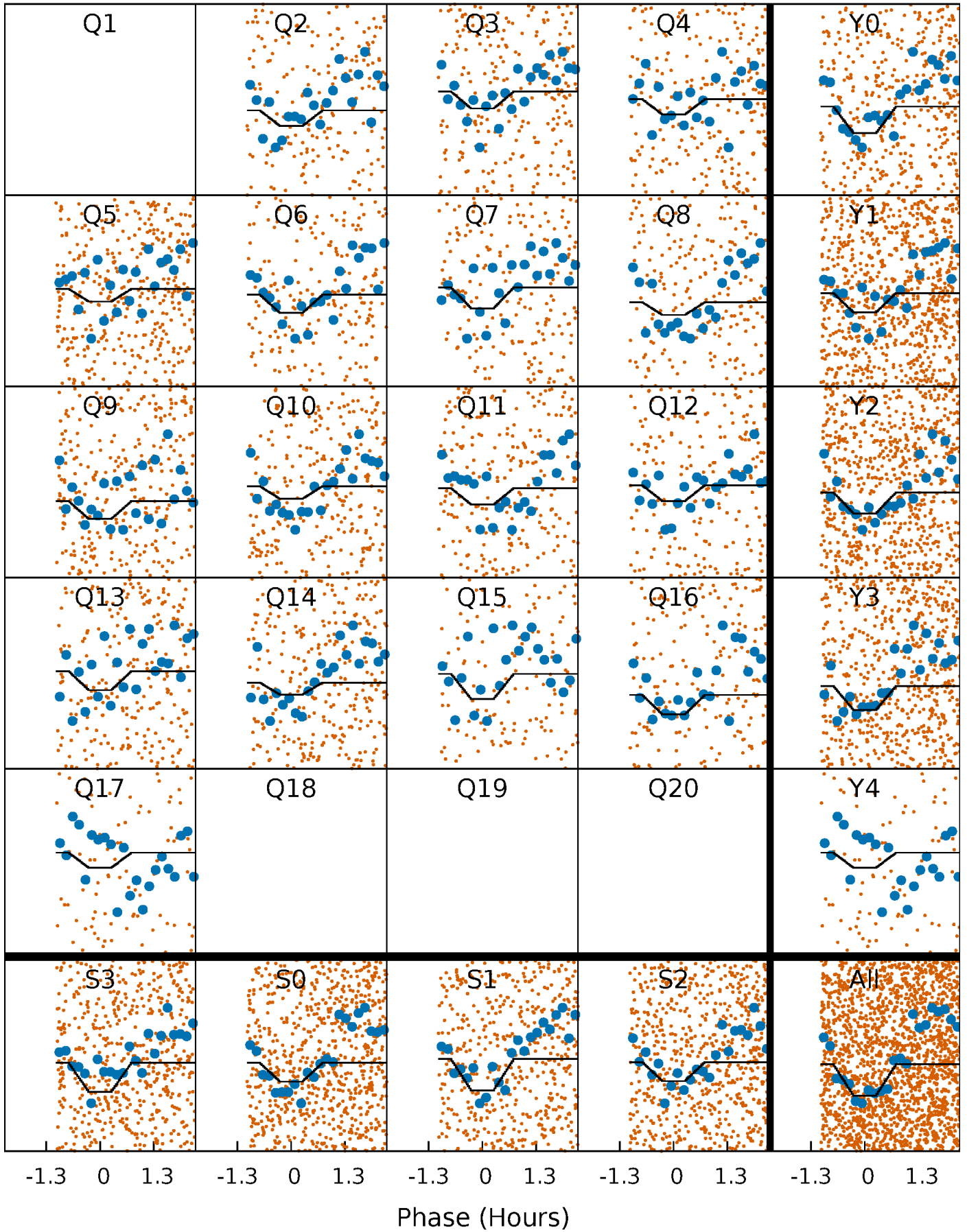
TCE 009491339-02   P= 0.577164 Days    $T_0=132.019353$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

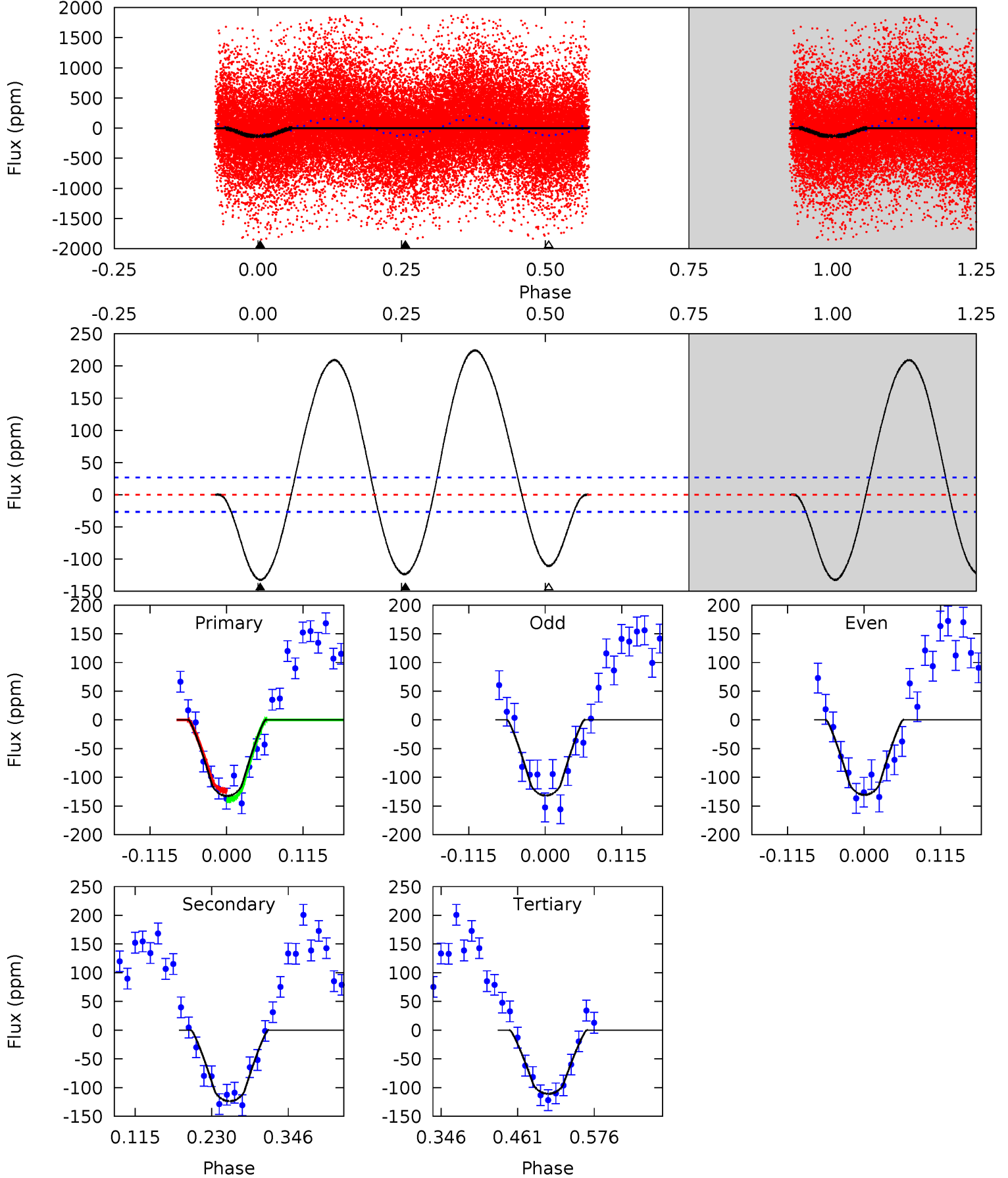
TCE 009491339-02   P= 0.577167 Days    $T_0=132.020141$  (BKJD)



# DV Model-Shift Uniqueness Test

009491339-02, P = 0.577164 Days, E = 132.019353 Days

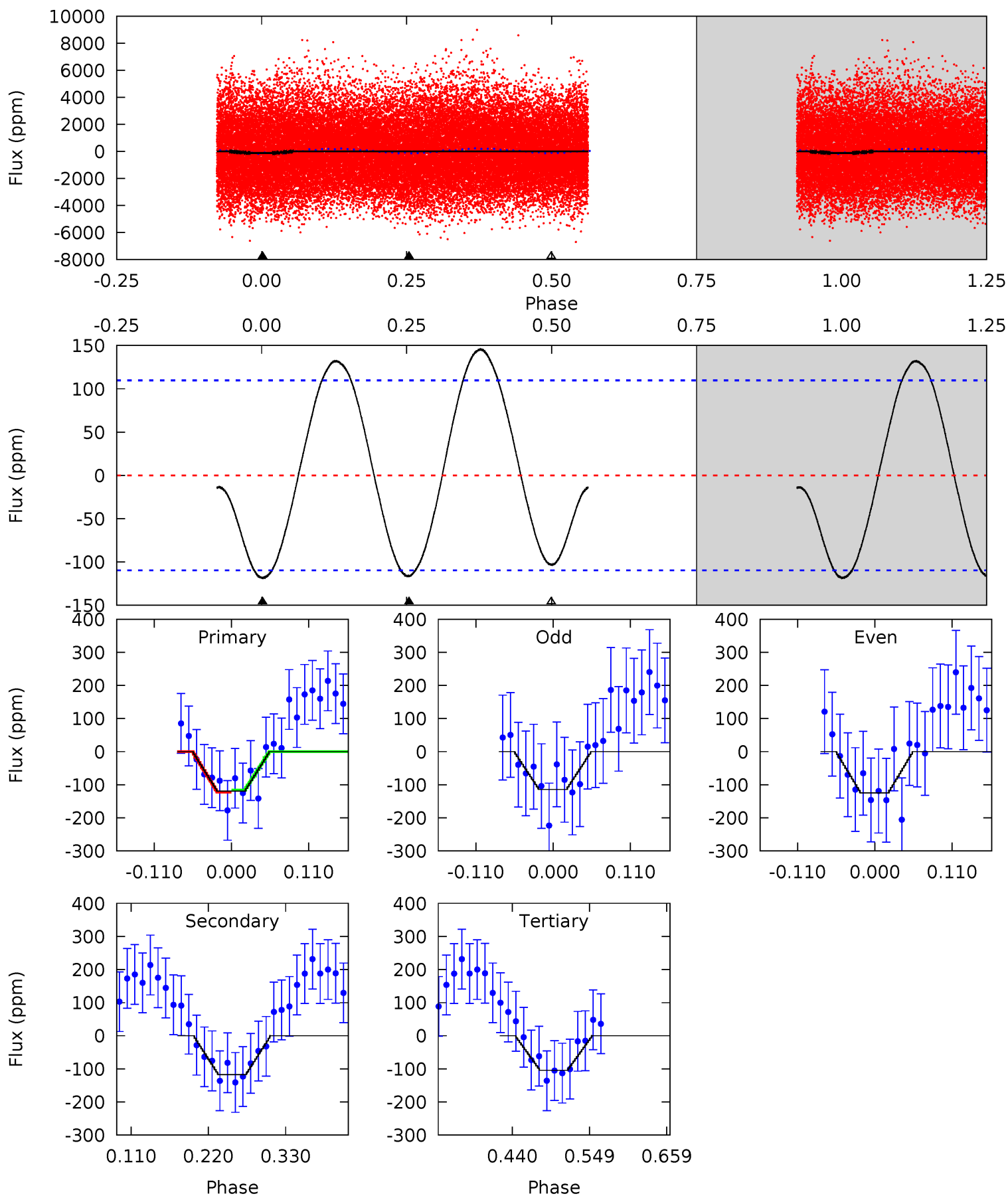
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
22.5	21.0	18.8	0	4.54	1.58	20.6	3.68	22.5	2.17	21.0	0.10	1.10	0.63	0



# Alt Model-Shift Uniqueness Test

009491339-02, P = 0.577167 Days, E = 132.020141 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
4.96	4.87	4.32	0	4.54	1.60	3.83	0.63	4.96	0.54	4.87	0.22	0.52	0.55	0.13



### Stellar Parameters For KIC 009491339

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3735^{+74}_{-102}$	$0.852^{+0.030}_{-0.027}$	$0.020^{+0.200}_{-0.250}$	$84.373^{+20.701}_{-18.114}$	$1.847^{+1.320}_{-0.609}$	$0.000^{+0.000}_{-0.000}$
	+2%/-3%	+4%/-3%	+1000%/-1250%	+25%/-21%	+71%/-33%	+32%/-6%
Source	PHO54	AST54	PHO54	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 009491339-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	-124±6	$127.17^{+115.99}_{-79.32}$	$16366^{+633}_{-608}$	$-15369^{+1507}_{-1450}$	$0.001^{+0.007}_{-0.001}$
Alt.	-117±24	$128.67^{+113.94}_{-81.59}$	$16399^{+658}_{-573}$	$-15398^{+1428}_{-1557}$	$0.001^{+0.007}_{-0.001}$

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

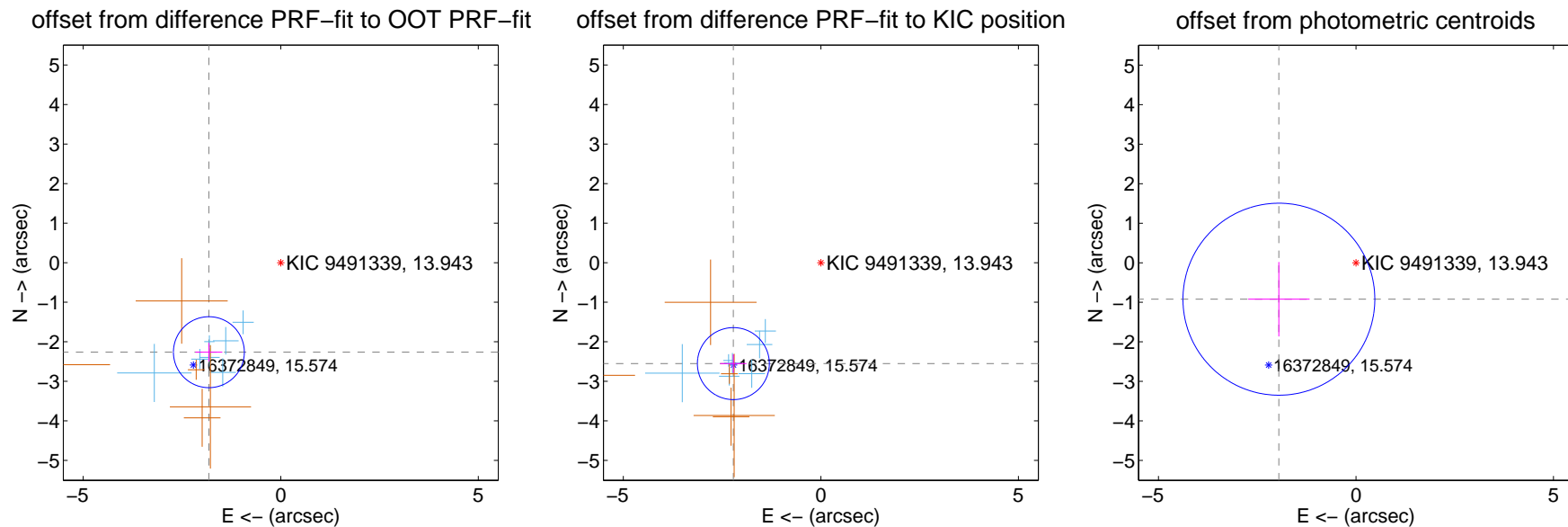
## DV Centroid Data

Supplemental centroid analysis for 009491339-02. Kepler magnitude: 13.94. Transit SNR 10.09

There are 7 quarters with good PRF difference image offsets

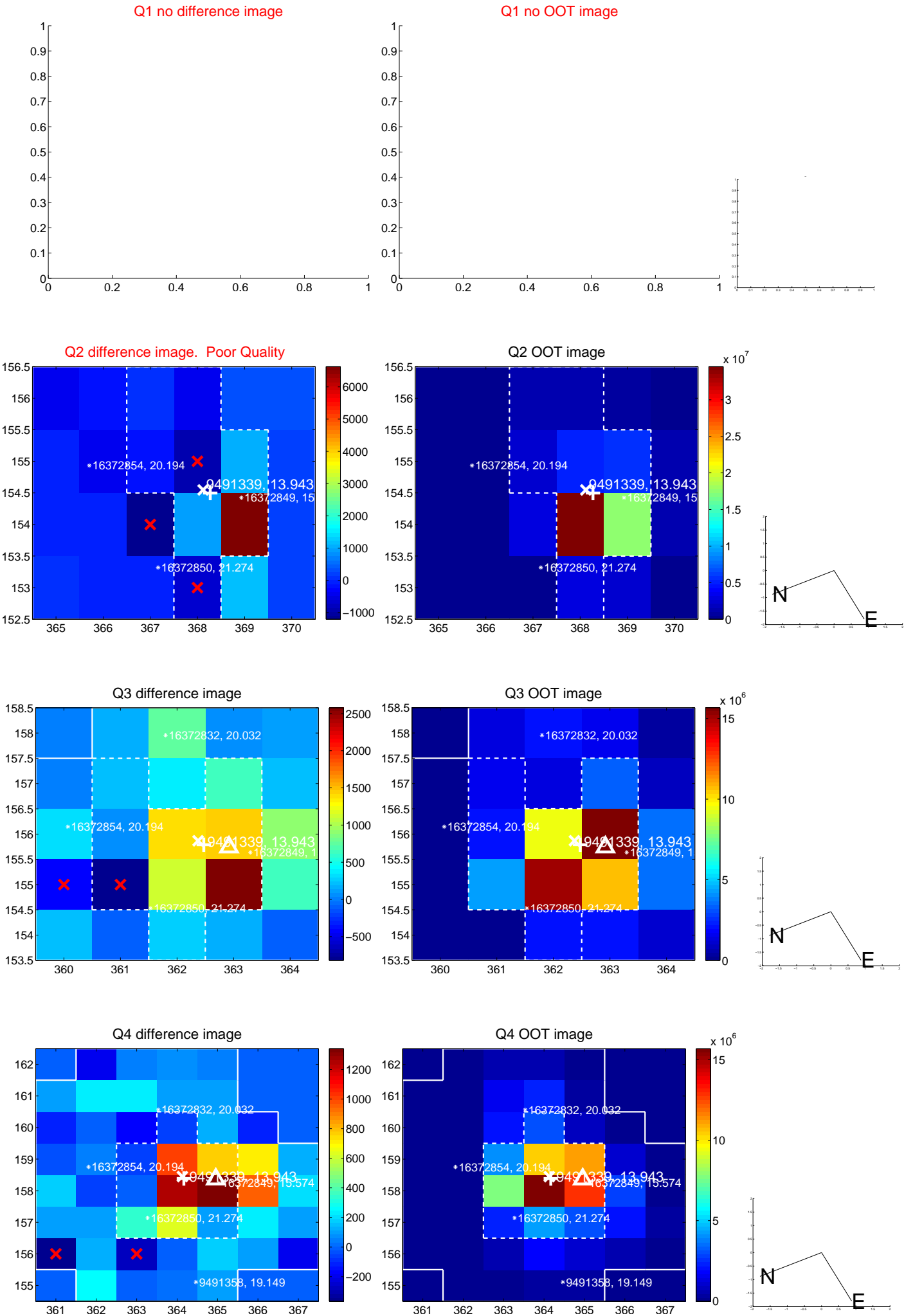
The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.904 \pm 0.299$	9.71	$1.819 \pm 0.342$	$-2.263 \pm 0.234$
PRF-fit source offset from KIC position	$3.379 \pm 0.303$	11.14	$2.215 \pm 0.333$	$-2.552 \pm 0.234$
photometric centroid source offset	$2.16 \pm 0.81$	2.67	$1.95 \pm 0.78$	$-0.92 \pm 0.94$



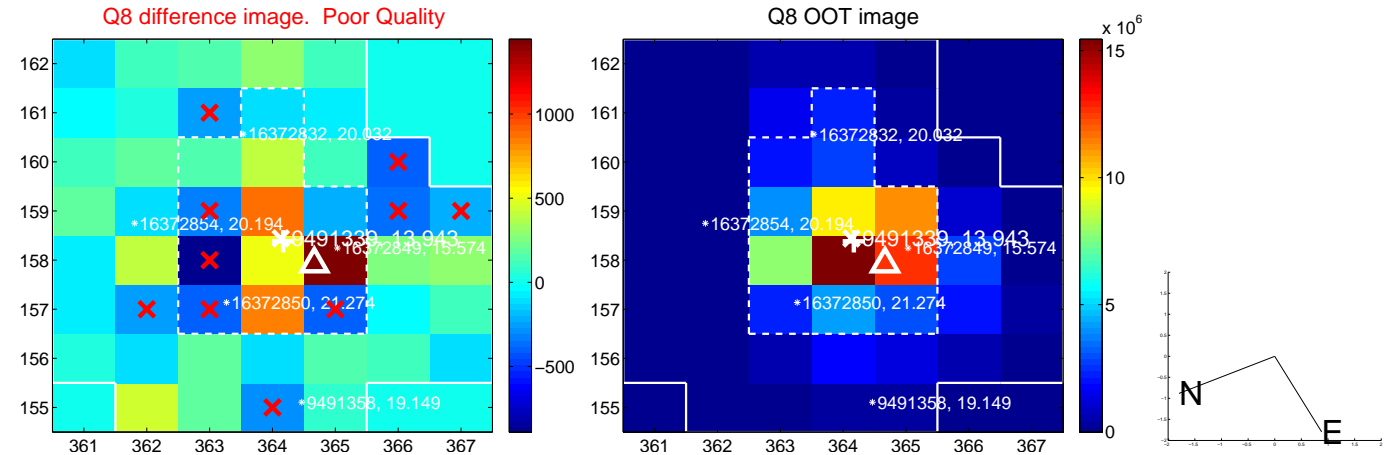
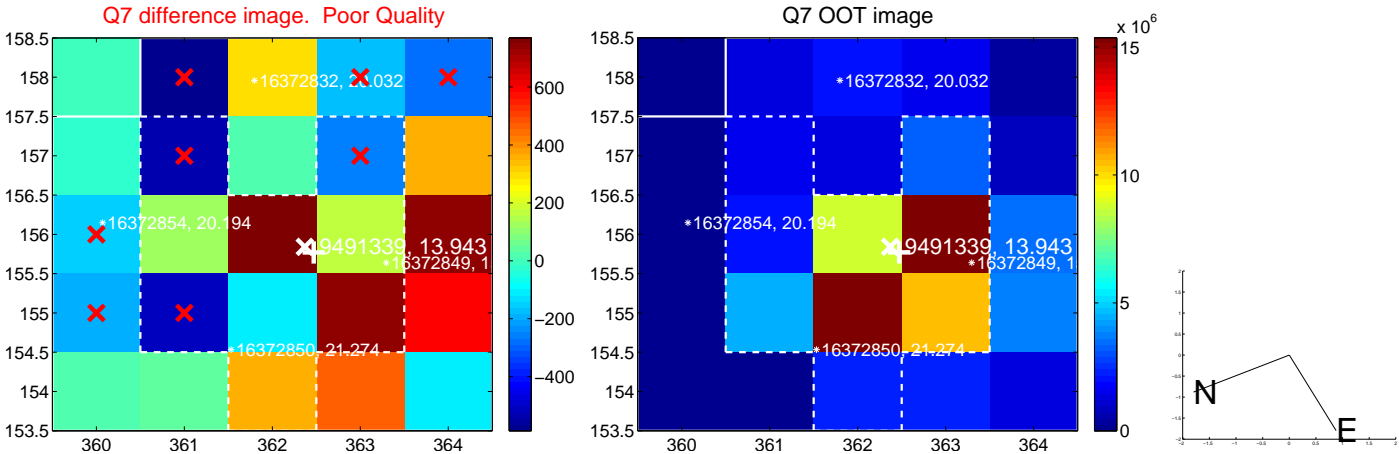
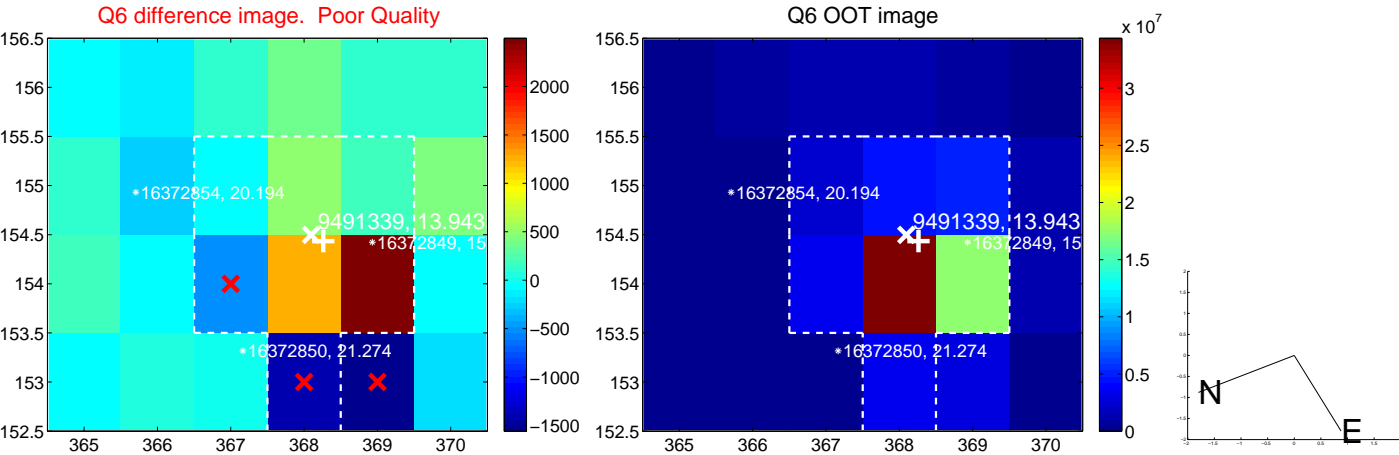
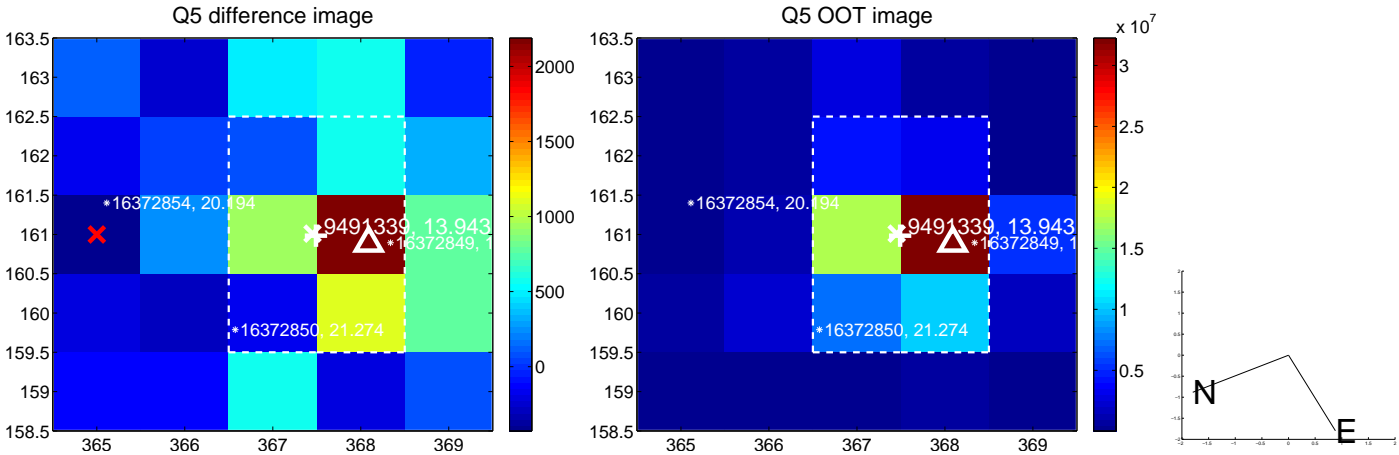
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

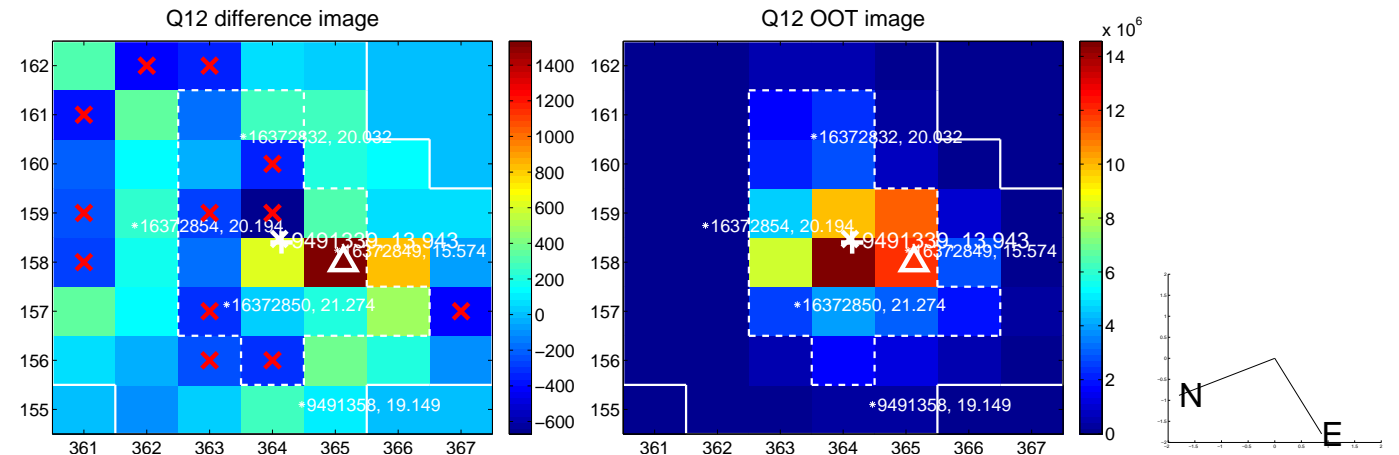
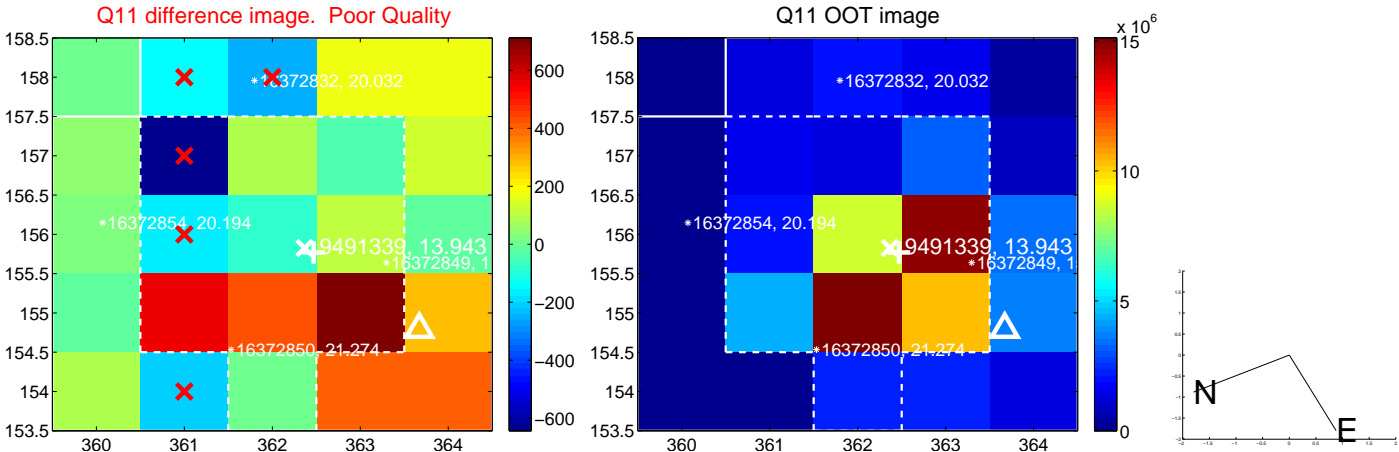
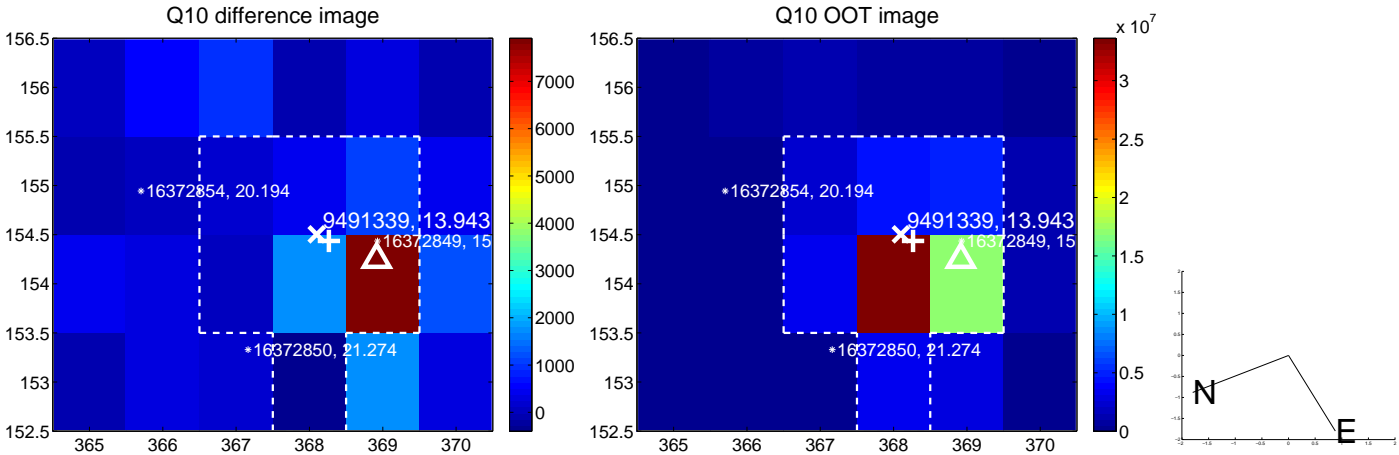
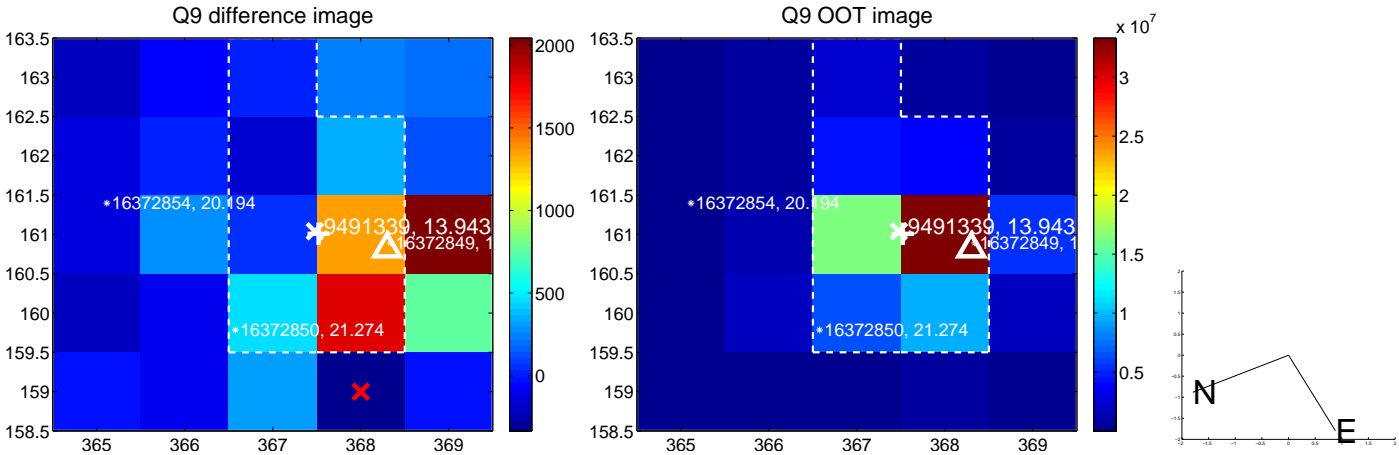




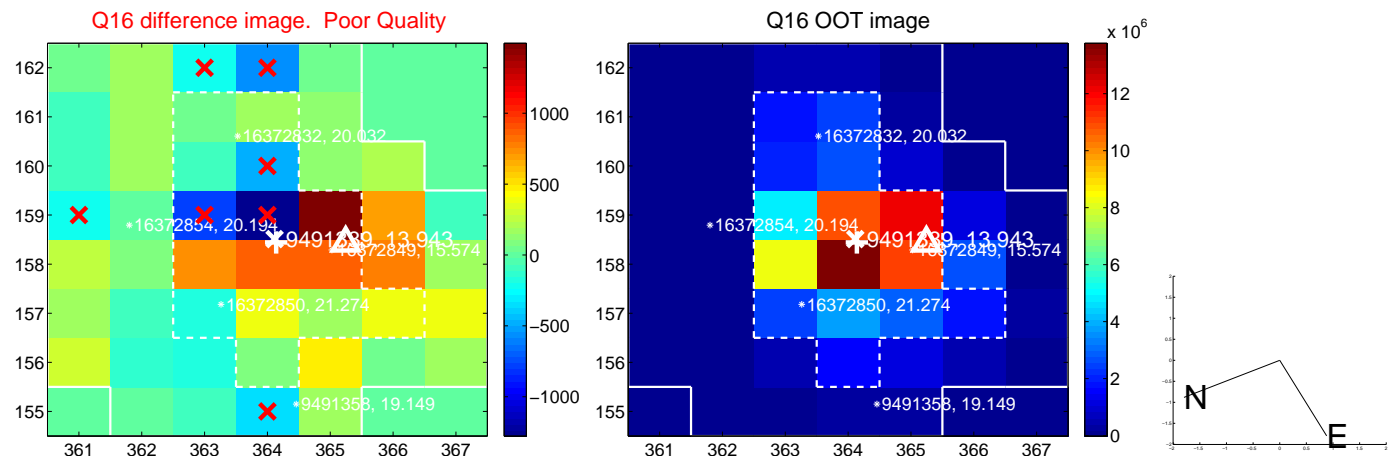
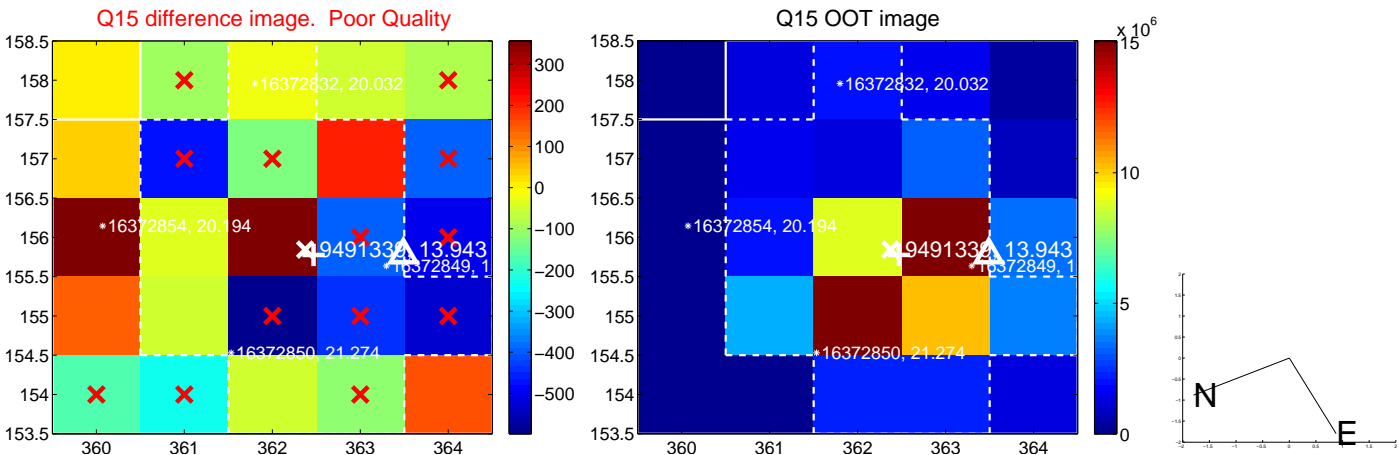
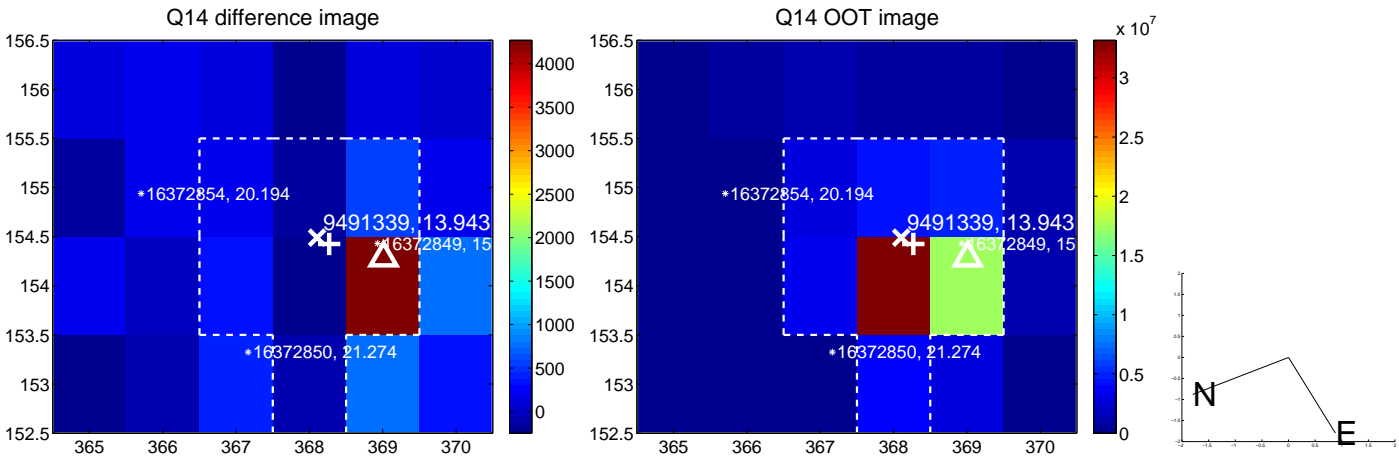
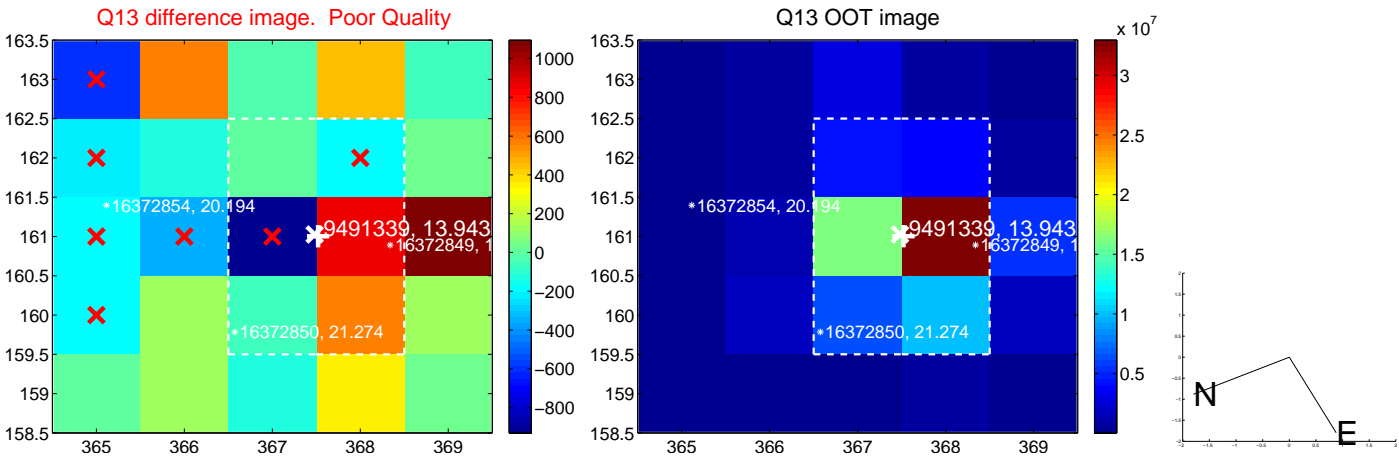
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



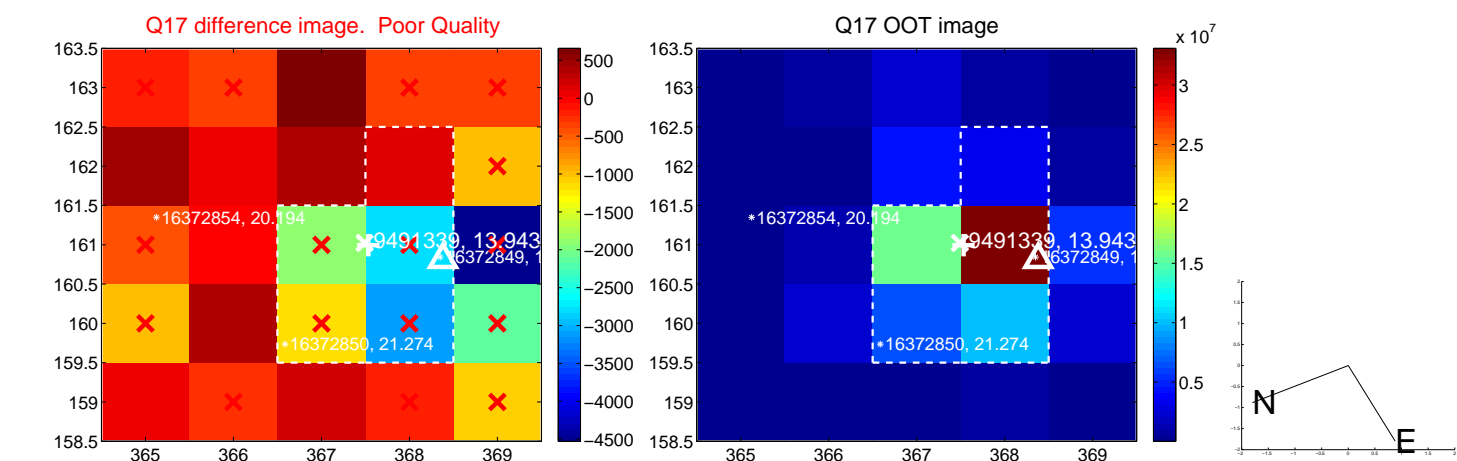
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



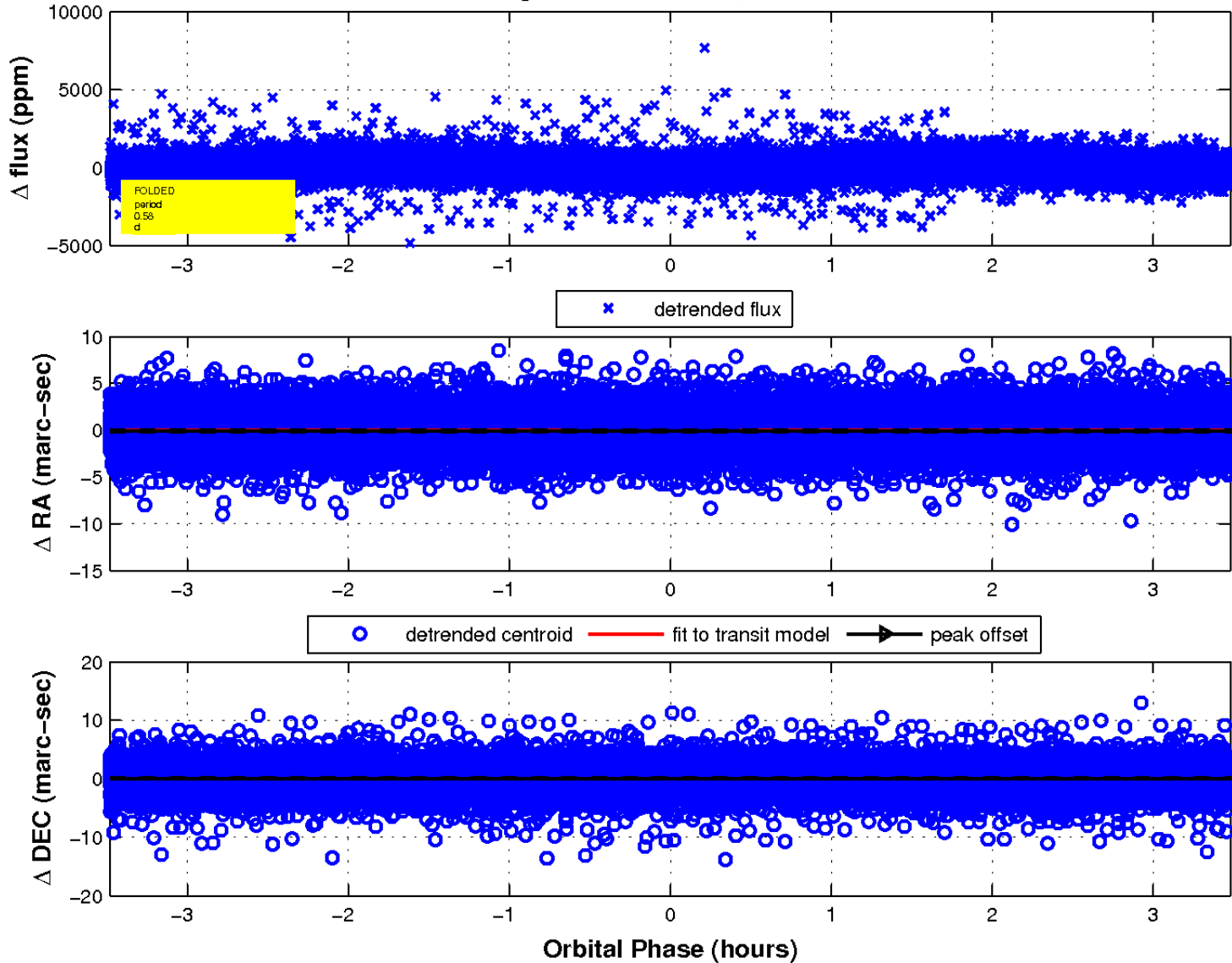
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 3



UKIRT Image

Declination

