

# KIC 009655433

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009655433-01	OBS	No	0.853579	132.307438	9.8	4.469	9.5	6.2	1.87	8468	0.63	37754.36
009655433-02	OBS	No	289.682349	302.595301	98.3	40.645	12.2	5.4	1.87	8468	2.01	15.95

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009655433-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_CROWDED
009655433-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_SKYE—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

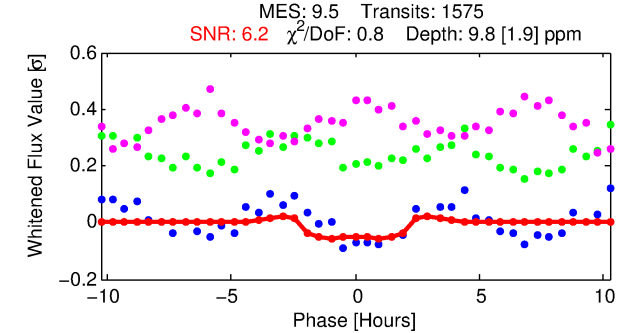
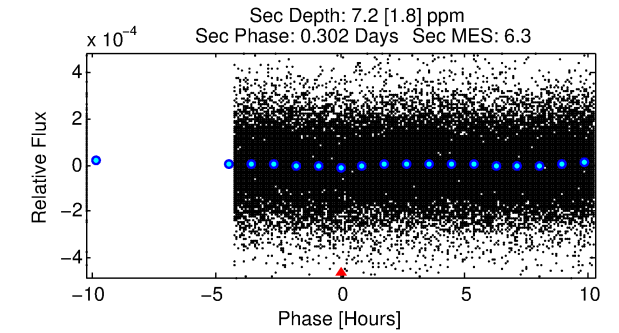
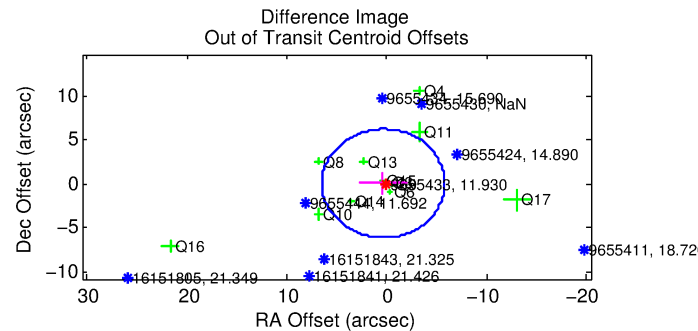
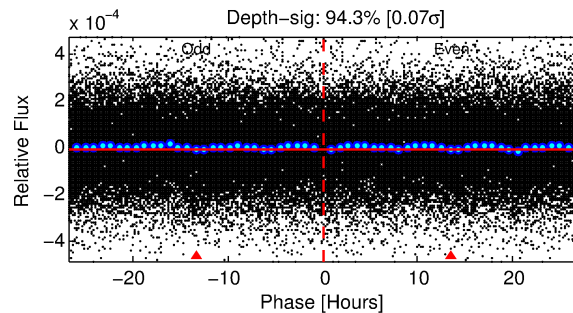
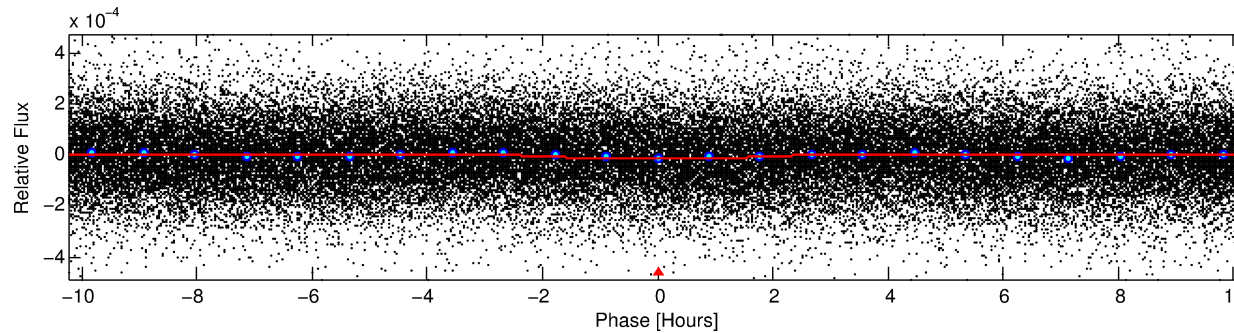
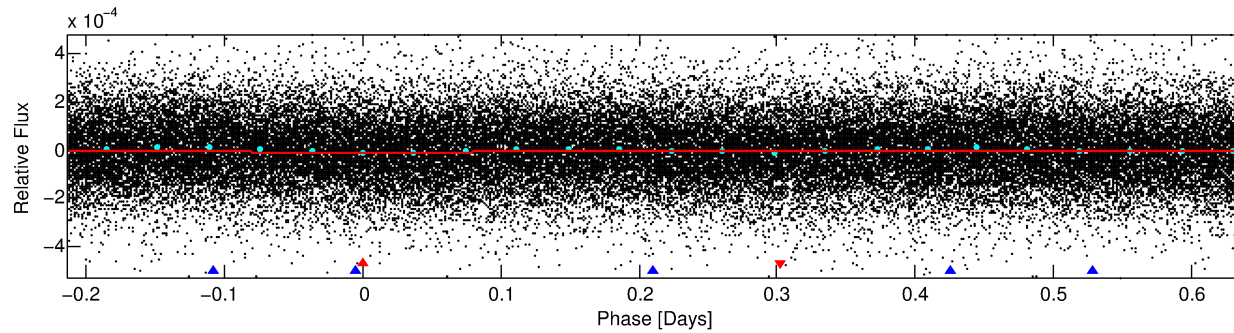
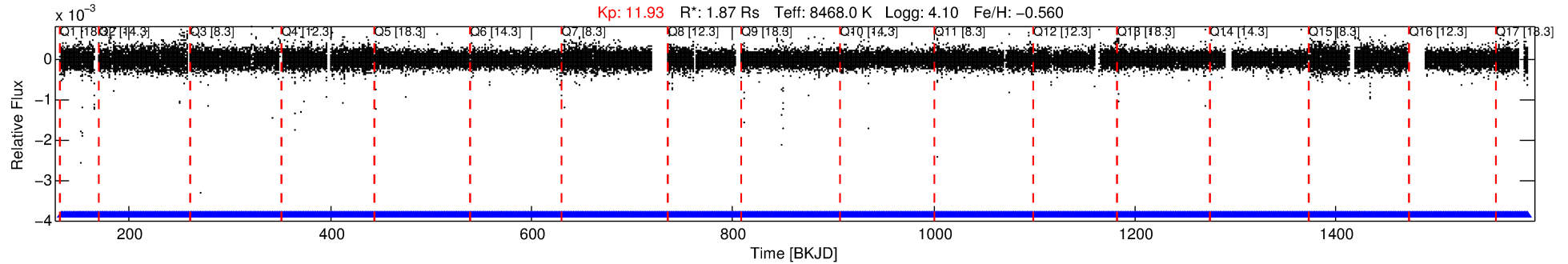
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009655433-01

No Significant Match Found

# DV One-Page Summary

KIC: 9655433 Candidate: 1 of 2 Period: 0.854 d



## DV Fit Results:

Period = 0.85358 [0.00002] d  
Epoch = 132.3074 [0.0054] BKJD  
Rp/R\* = 0.0031 [0.0007]  
a/R\* = 1.34 [0.78]  
b = 0.70 [0.99]  
Seff = 37754.35 [14665.80]  
Teq = 3554 [345] K  
Rp = 0.63 [0.22] Re  
a = 0.0206 [0.0048] AU  
Ag = 4.28 [2.78] [1.18 $\sigma$ ]  
Teffp = 7906 [1114] K [3.73 $\sigma$ ]

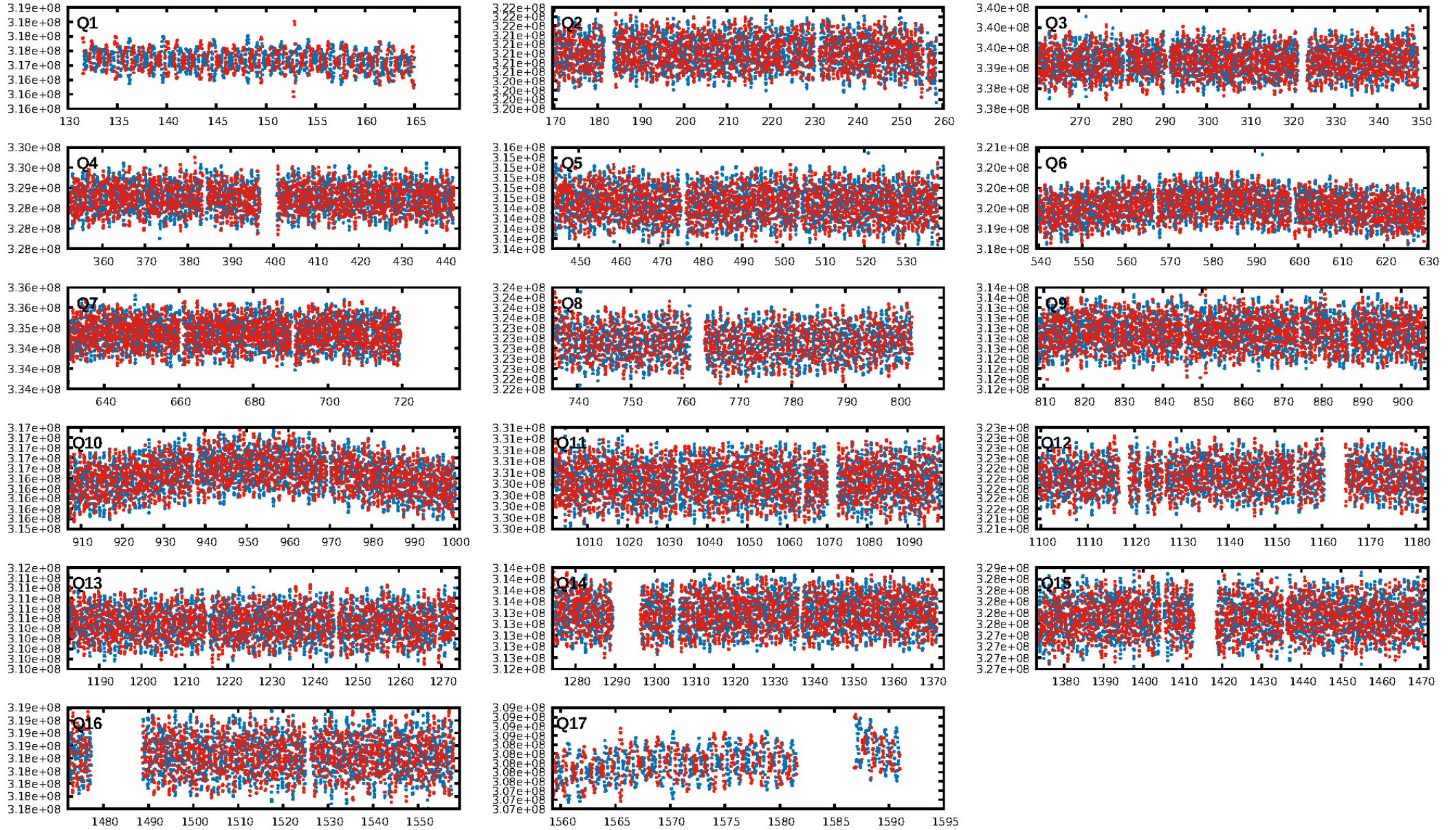
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [169.53 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 4.57e-16  
RollingBand-fgt: 1.00 [1503/1503]  
**GhostDiagnostic-chr: 0.7668**  
Centroid-sig: 79.0%  
Centroid-so: 3.056 arcsec [1.78 $\sigma$ ]  
OotOffset-rm: 0.330 arcsec [0.16 $\sigma$ ]  
OotOffset-st: 3/3/3/3 [12]  
KicOffset-rm: 0.614 arcsec [0.27 $\sigma$ ]  
KicOffset-st: 3/3/3/3 [12]  
DiffImageQuality-fgm: 0.25 [3/12]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 02:04:01 Z

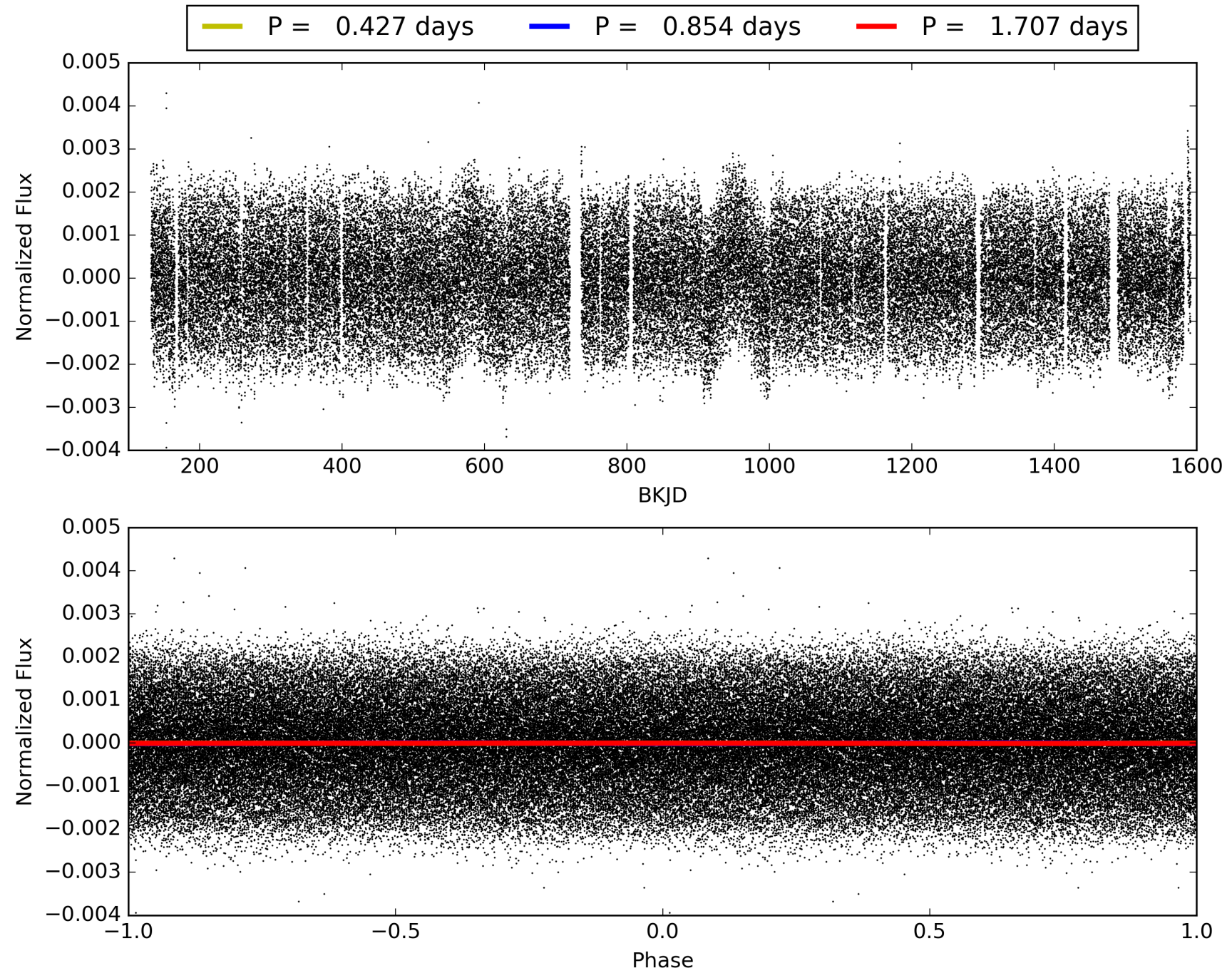
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009655433-01, PDC Light Curves



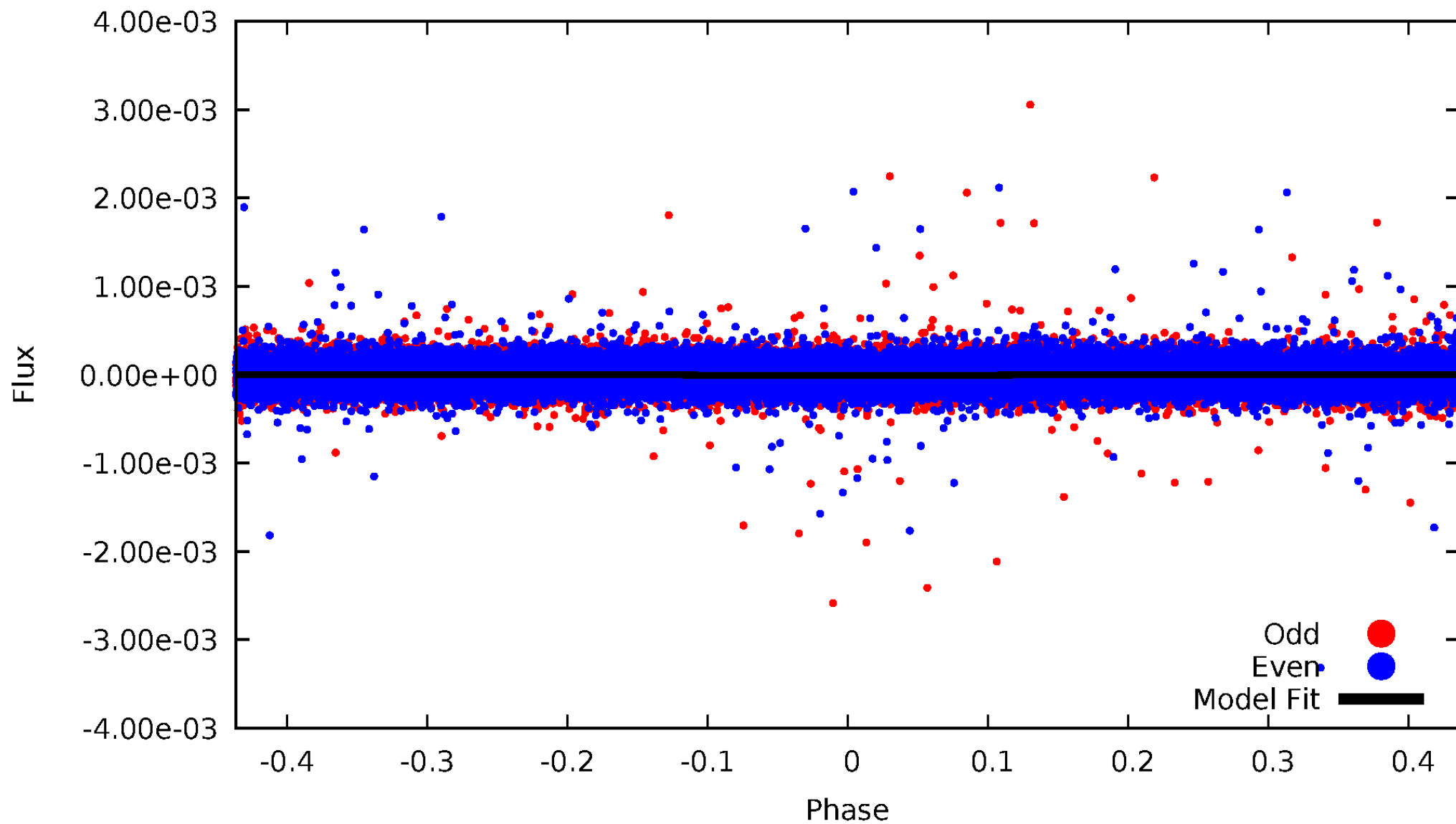


TCE 009655433-01



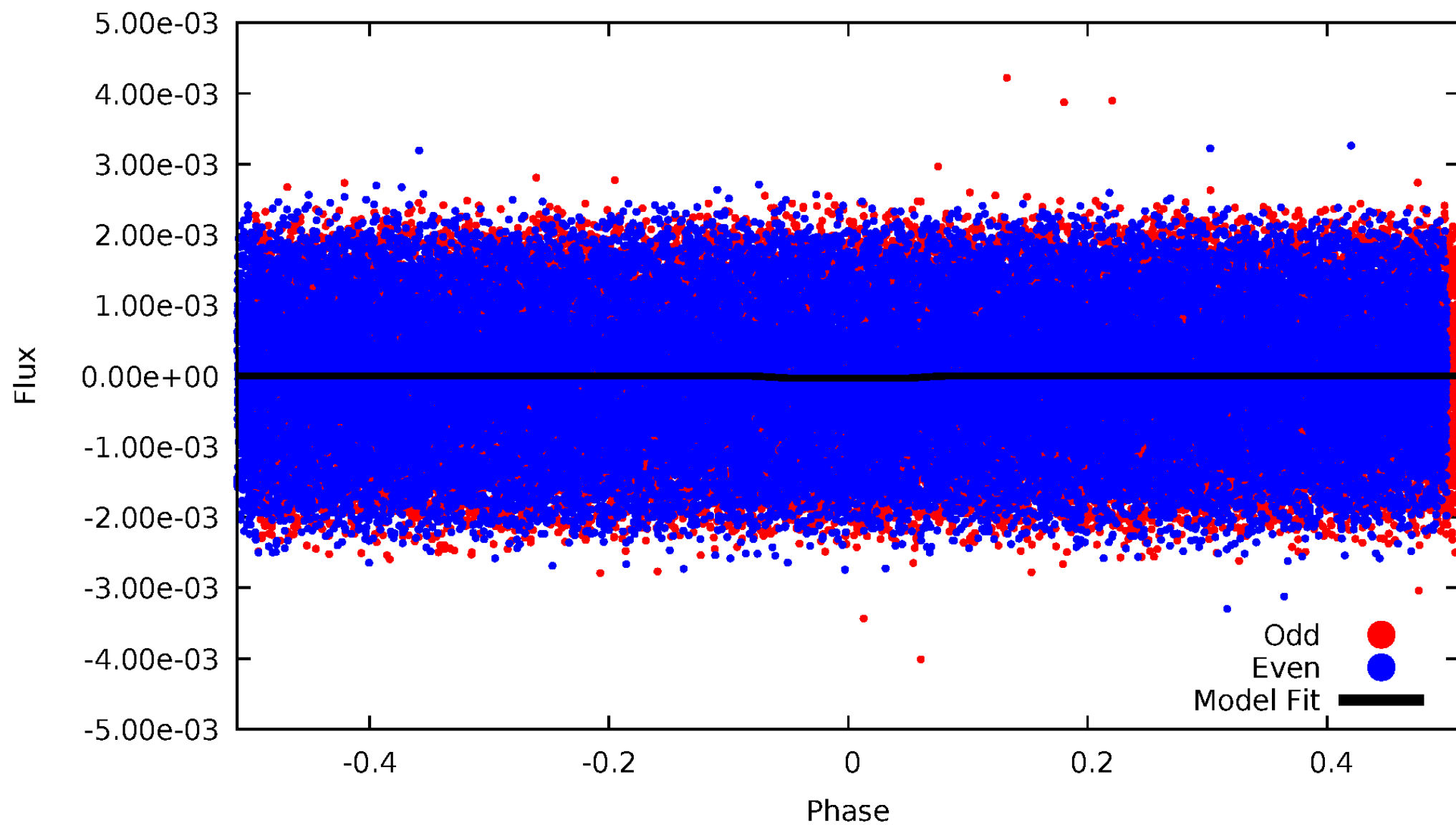
# DV Odd/Even

TCE 009655433-01

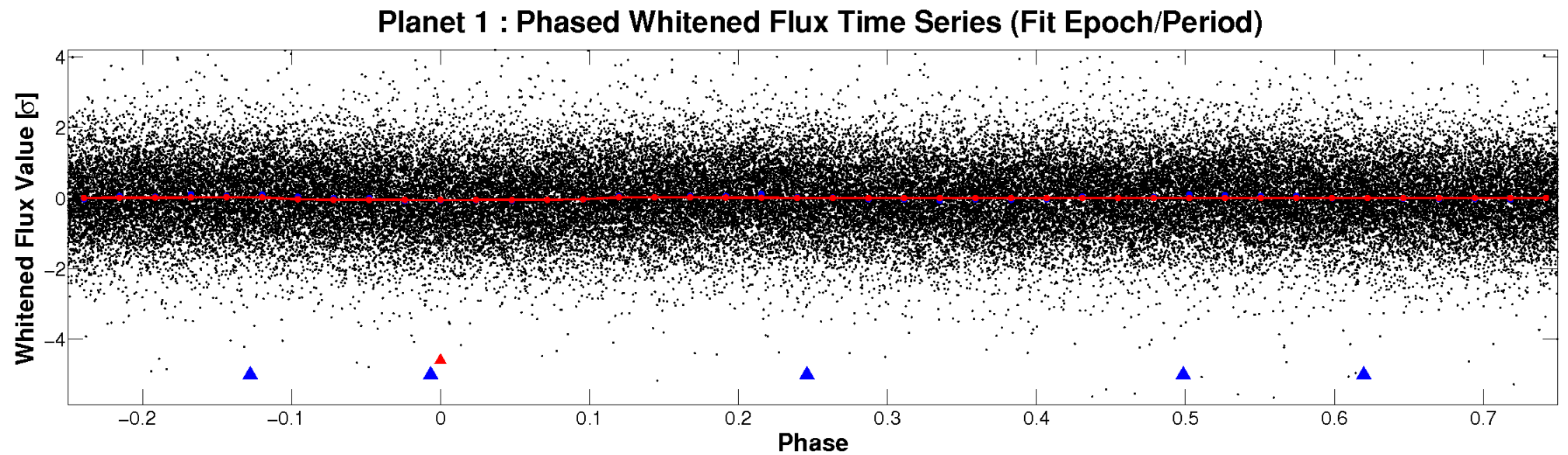
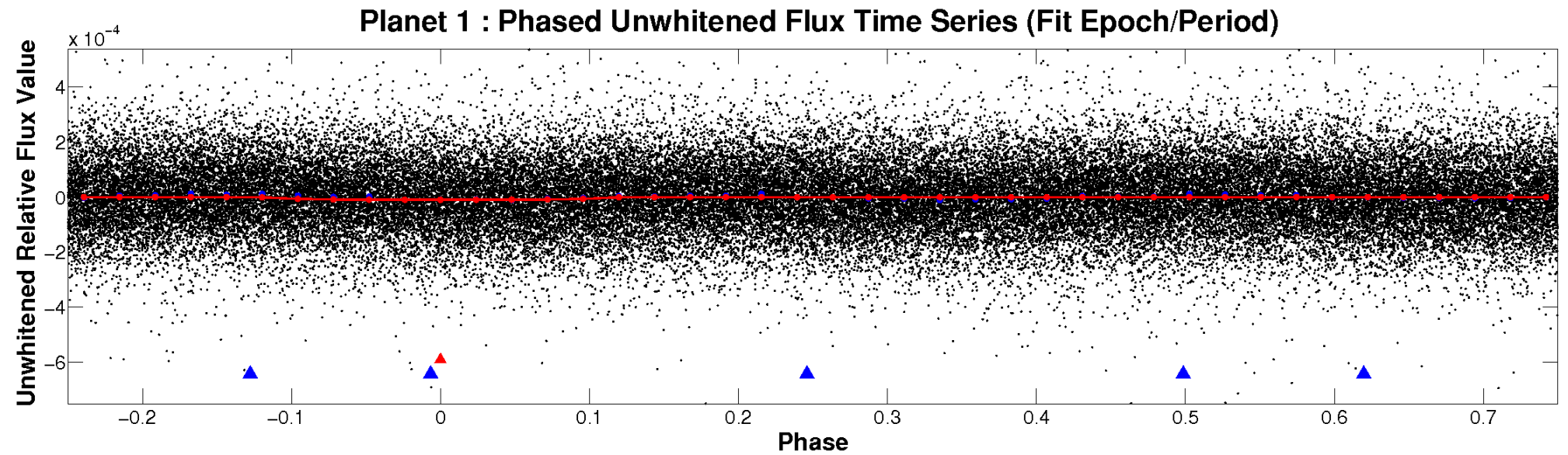


# ALT Odd/Even

TCE 009655433-01



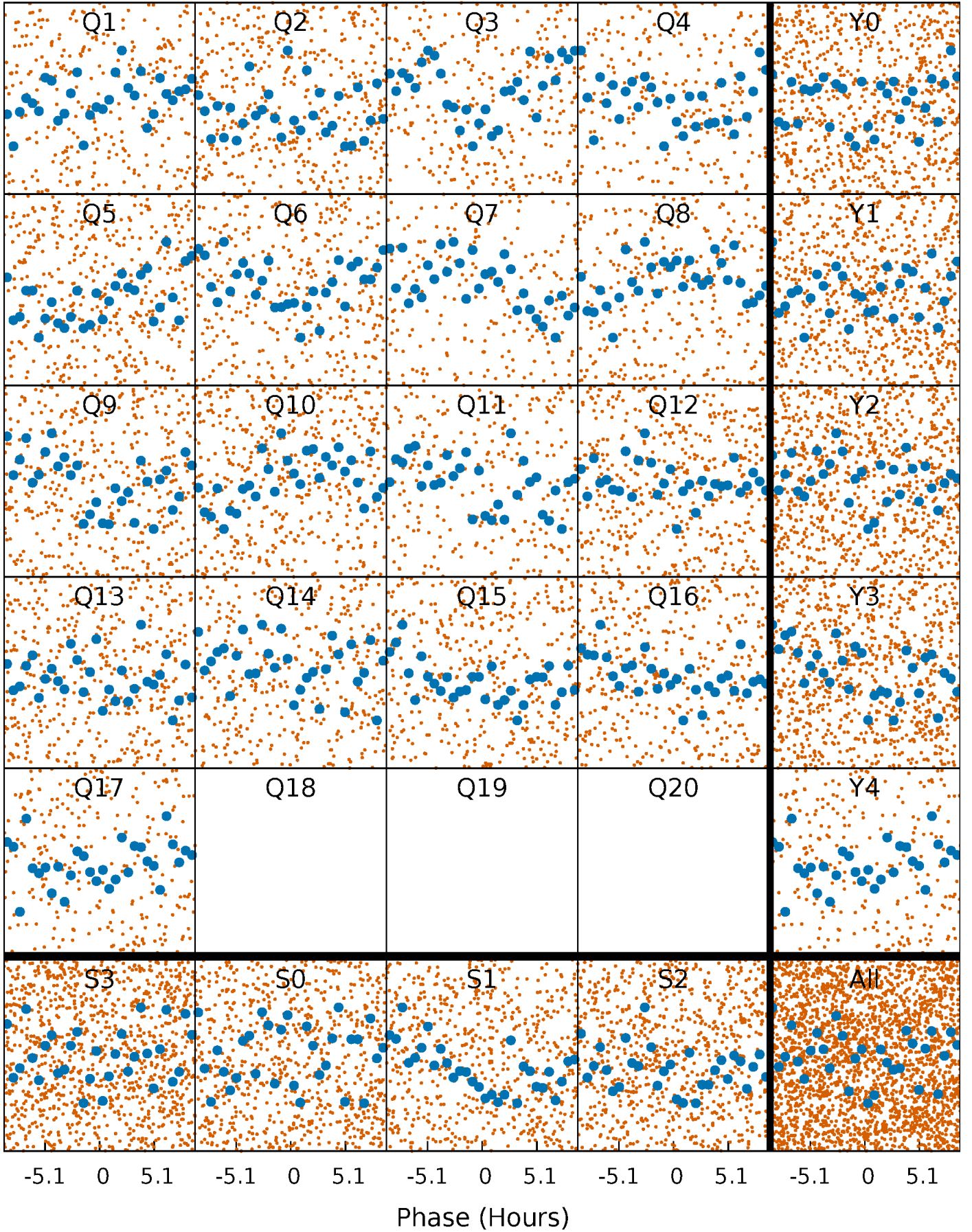
# Non-Whitened Vs. Whitened Light Curve





# PDC Quarter-Phased Transit Curves

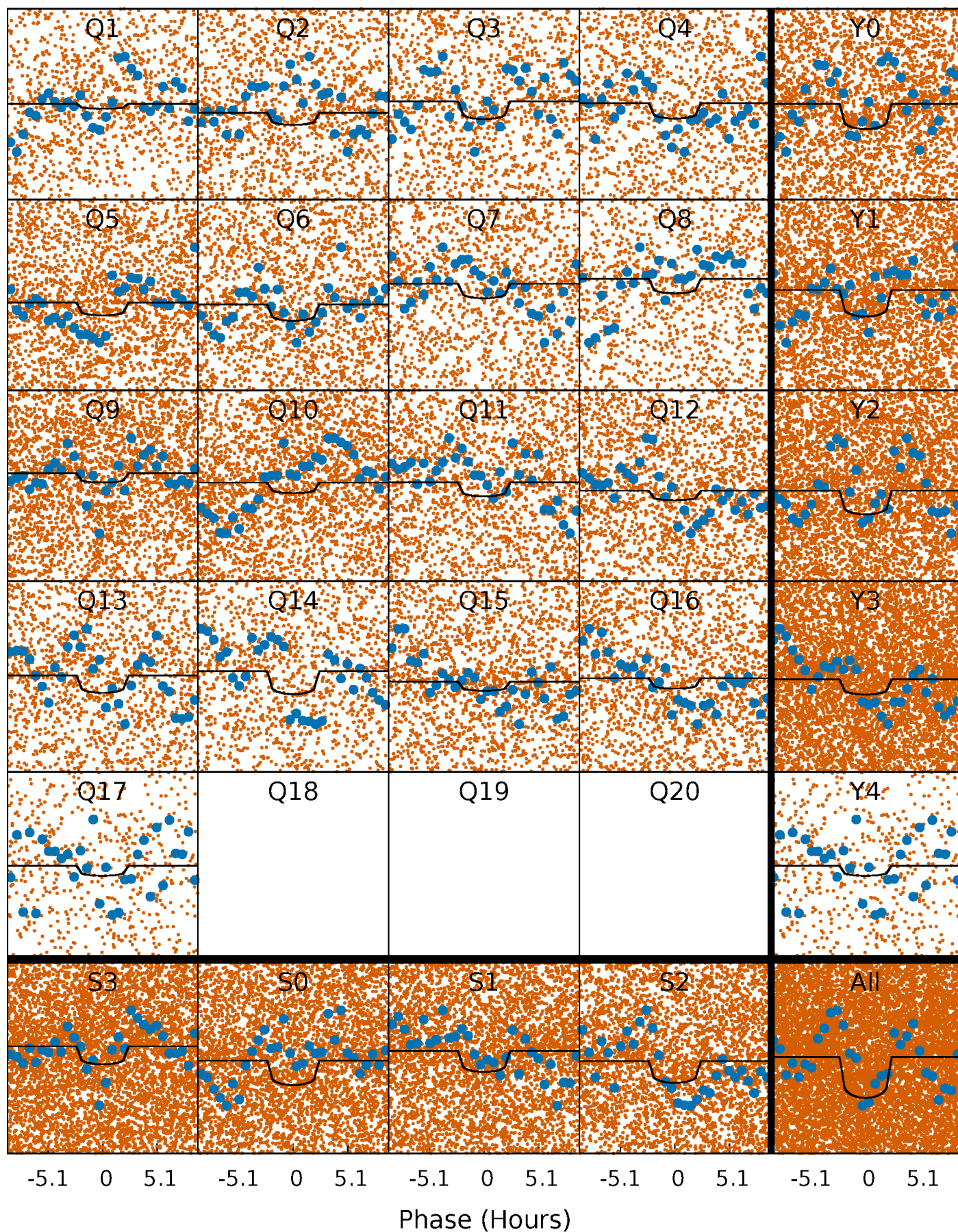
TCE 009655433-01   P= 0.853579 Days    $T_0=132.307438$  (BKJD)





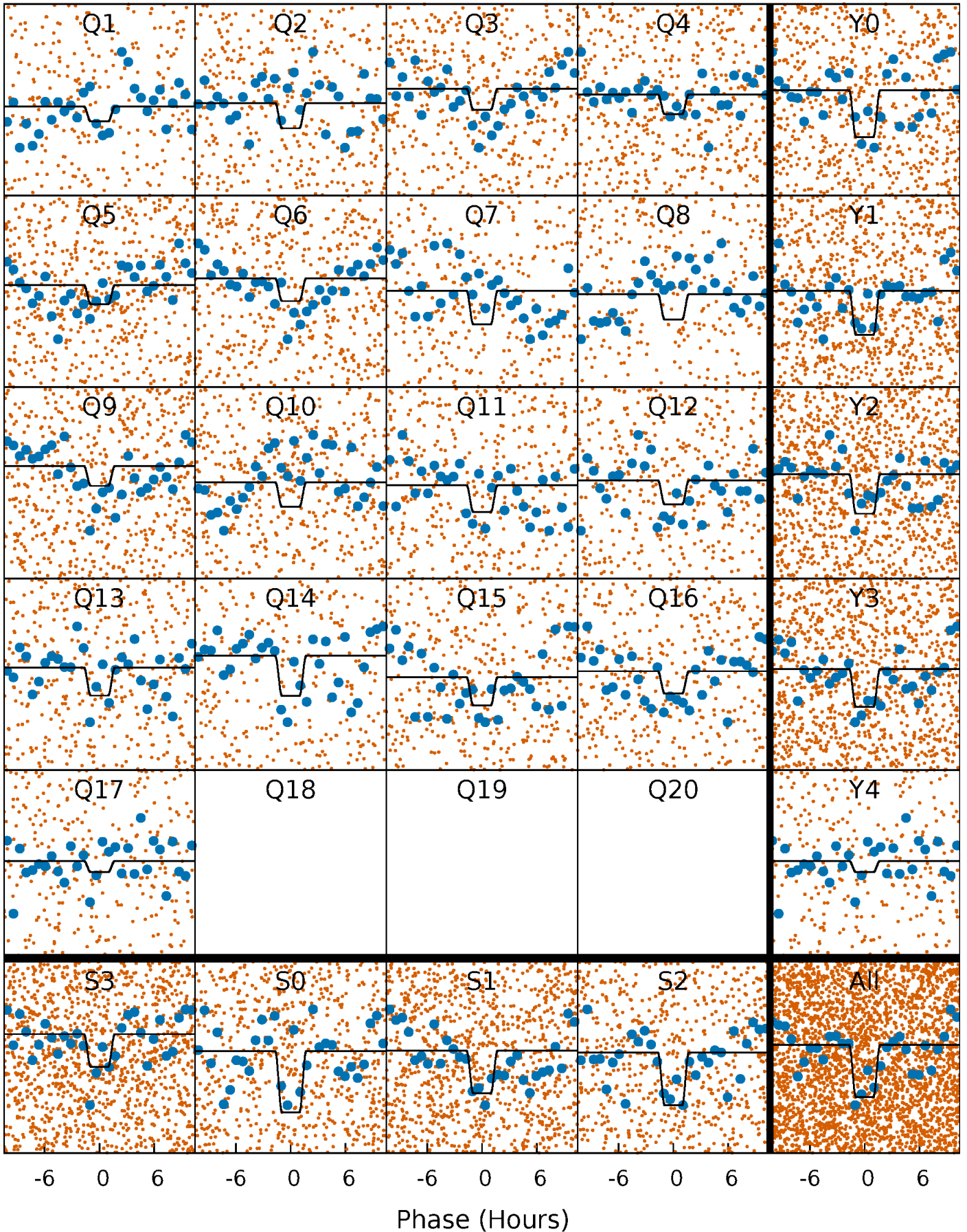
# DV Quarter-Phased Transit Curves

TCE 009655433-01   P= 0.853579 Days    $T_0=132.307438$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

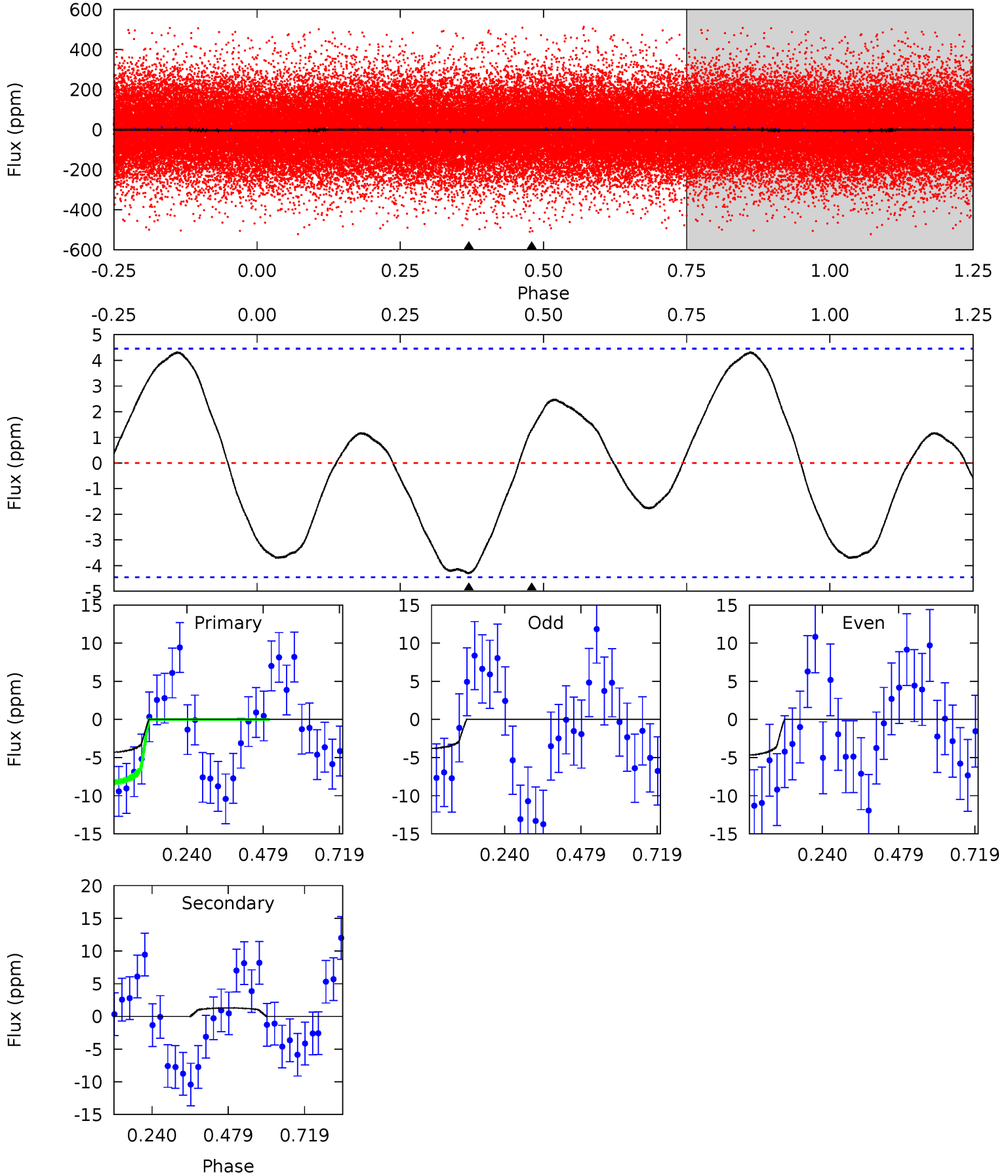
TCE 009655433-01 P= 0.853655 Days  $T_0=132.265142$  (BKJD)



# DV Model-Shift Uniqueness Test

009655433-01, P = 0.853579 Days, E = 131.453859 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
4.22	-1.27	0	0	4.38	1.18	2.71	4.22	4.22	-1.27	-1.27	0.42	1.23	0.50	3.98

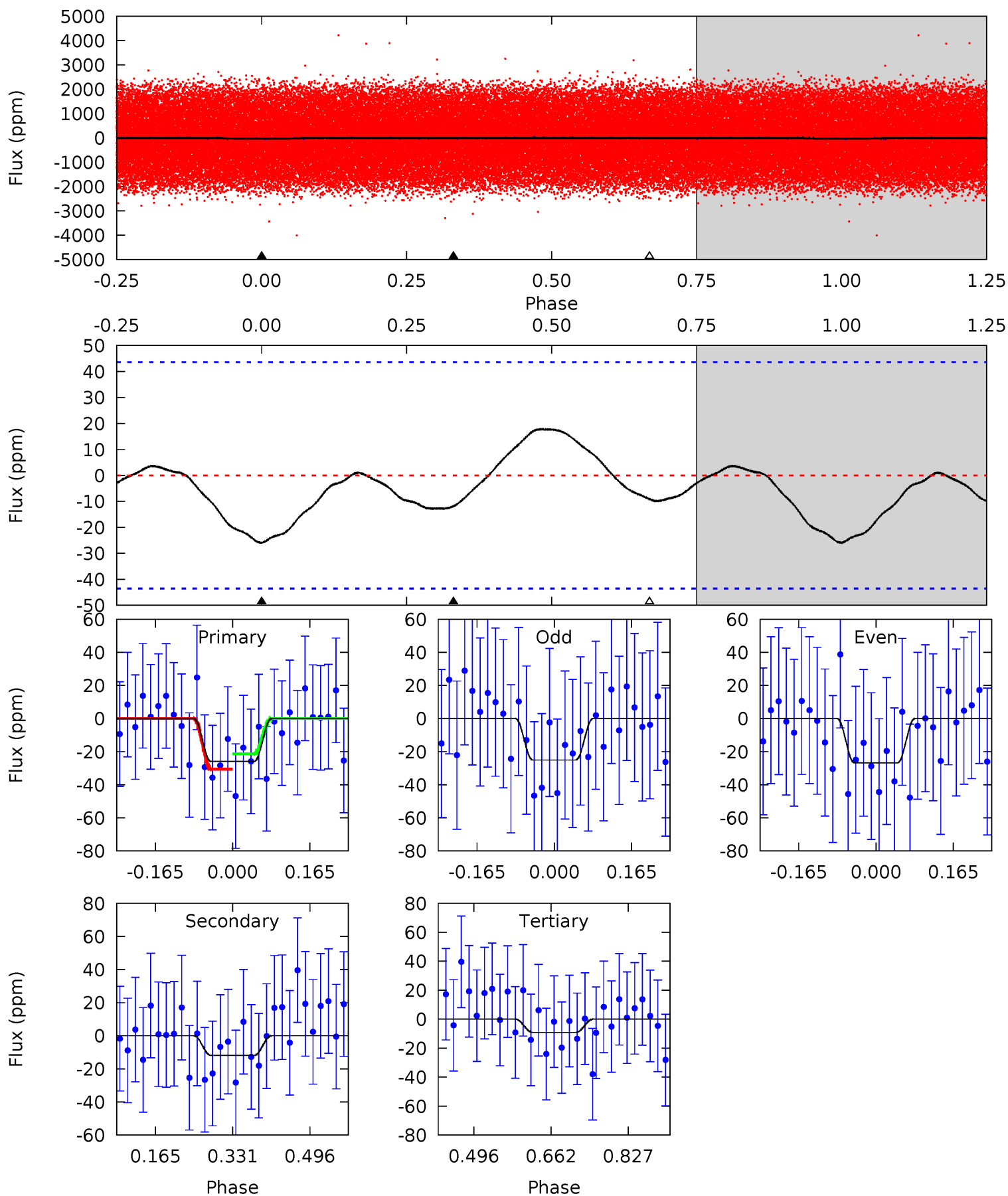




# Alt Model-Shift Uniqueness Test

009655433-01, P = 0.853655 Days, E = 131.411487 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2.66	1.22	0.94	0	4.46	1.39	0.86	1.72	2.66	0.28	1.22	0.09	1.05	0.41	0.48





### Stellar Parameters For KIC 009655433

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$8468^{+265}_{-324}$	$4.101^{+0.204}_{-0.136}$	$-0.560^{+0.200}_{-0.300}$	$1.866^{+0.392}_{-0.480}$	$1.602^{+0.171}_{-0.228}$	$0.348^{+0.391}_{-0.138}$
	+3%/-4%	+5%/-3%	+36%/-54%	+21%/-26%	+11%/-14%	+113%/-40%
Source	PHO54	PHO54	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 009655433-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$1\pm1$	$0.60^{+0.19}_{-0.16}$	$4941^{+331}_{-368}$	$-5354^{+879}_{-980}$	$-0.739^{+0.613}_{-1.159}$
Alt.	$-12\pm10$	$1.13^{+0.21}_{-0.21}$	$4940^{+311}_{-364}$	$6046^{+1522}_{-2769}$	$2.095^{+2.234}_{-1.729}$

$T_{max}$  = 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

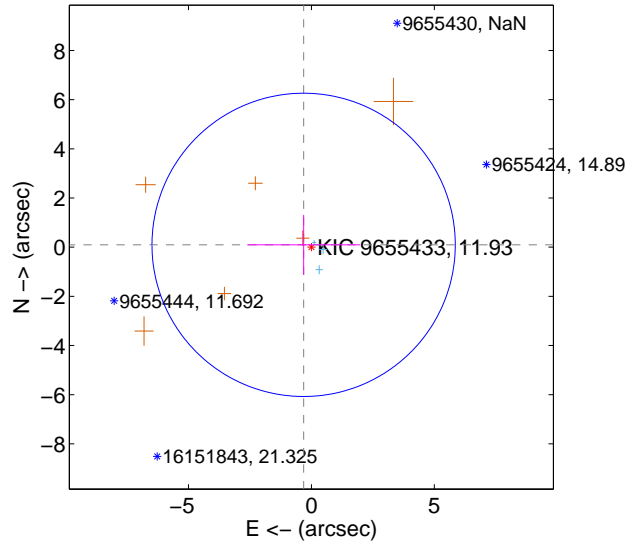
Supplemental centroid analysis for 009655433-01. **Kepler magnitude: 11.93.** Transit SNR 6.21

**There are 3 quarters with good PRF difference image offsets**

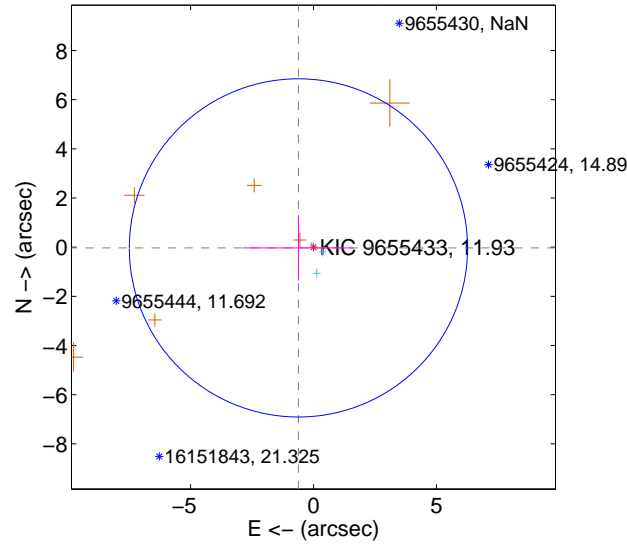
The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.330 \pm 2.056$	0.16	$0.316 \pm 2.294$	$0.094 \pm 1.221$
PRF-fit source offset from KIC position	$0.614 \pm 2.293$	0.27	$0.613 \pm 2.260$	$-0.030 \pm 1.330$
photometric centroid source offset	$3.06 \pm 1.72$	1.78	$2.85 \pm 1.81$	$-1.10 \pm 0.77$

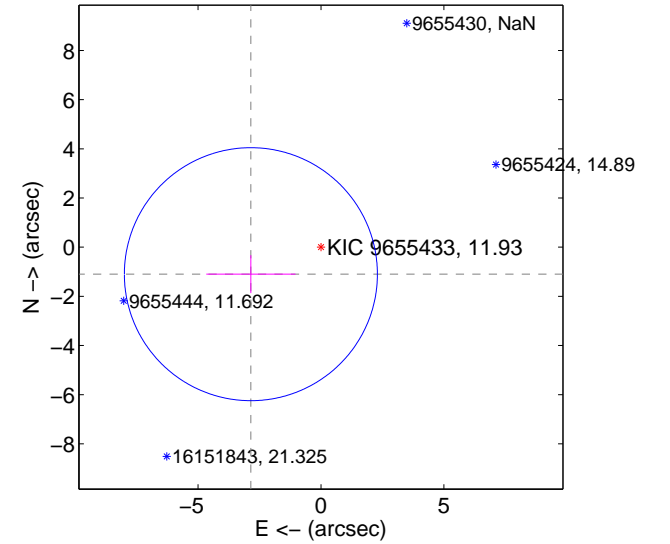
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

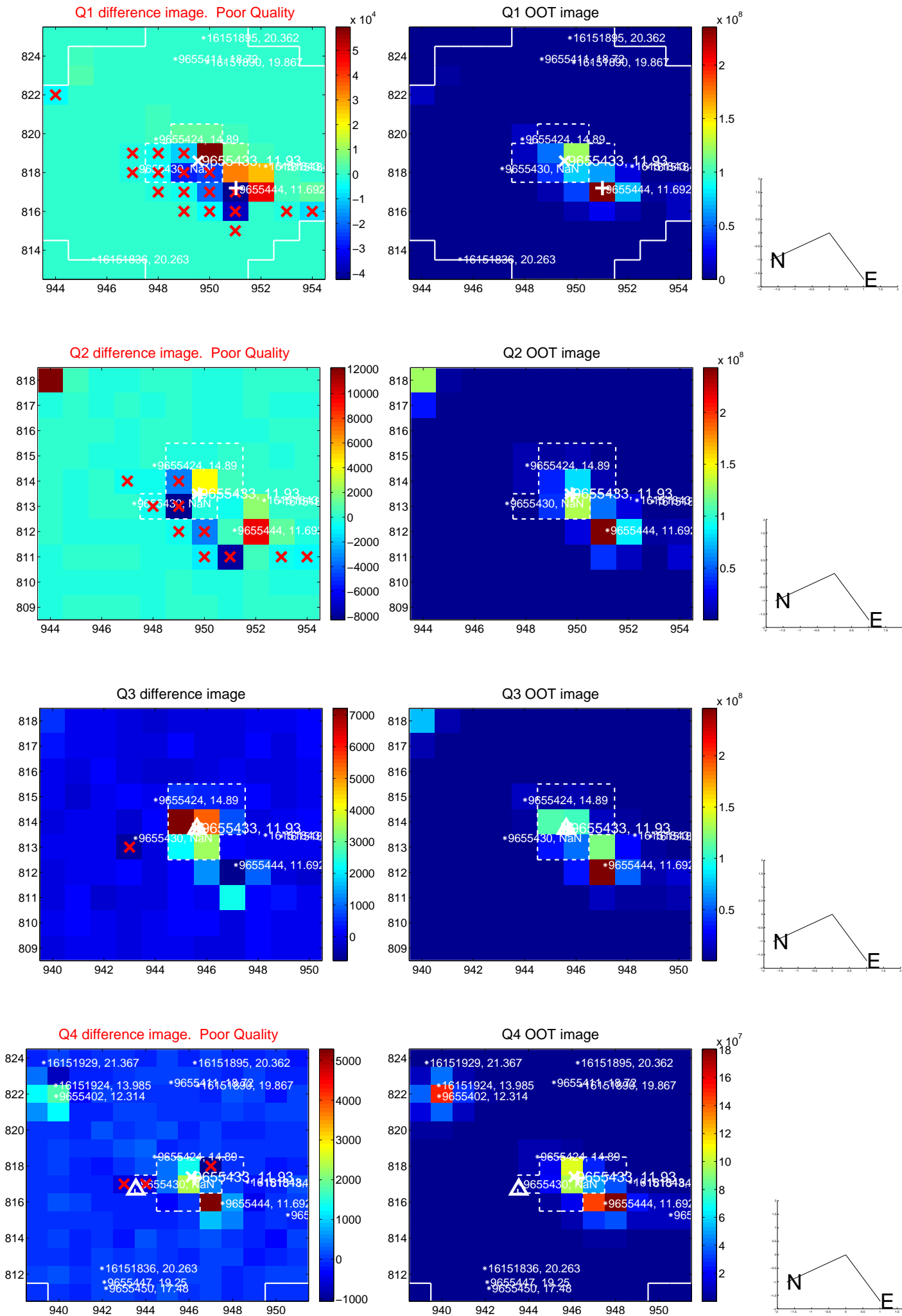


offset from photometric centroids

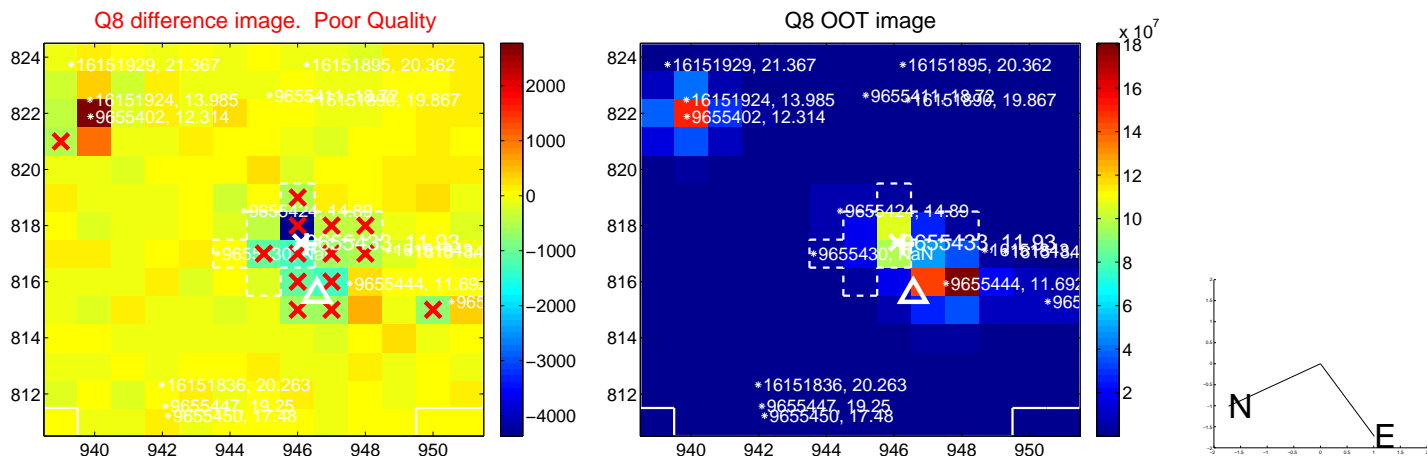
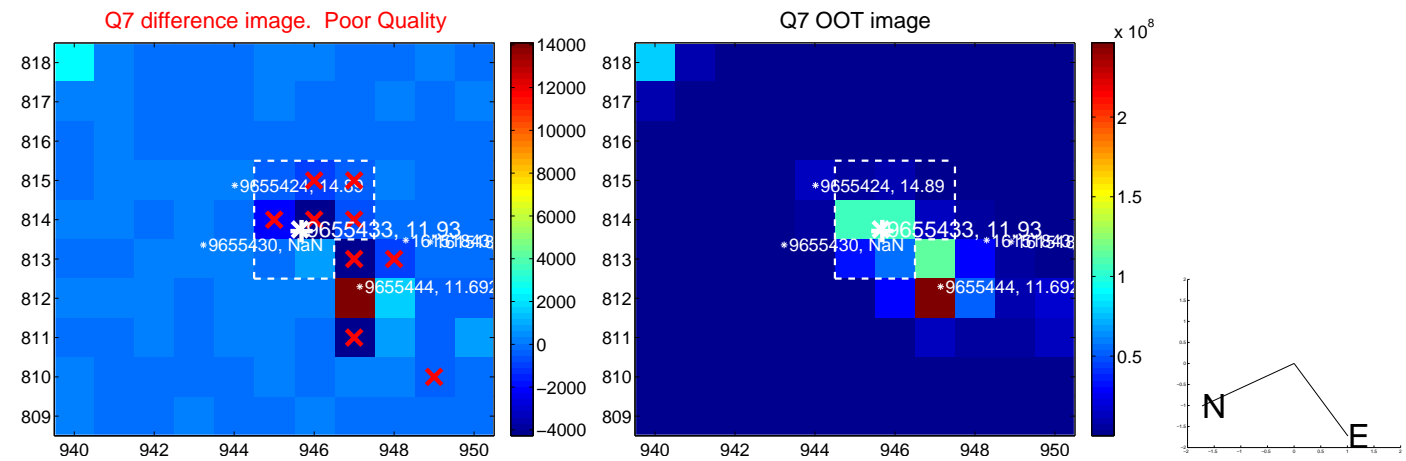
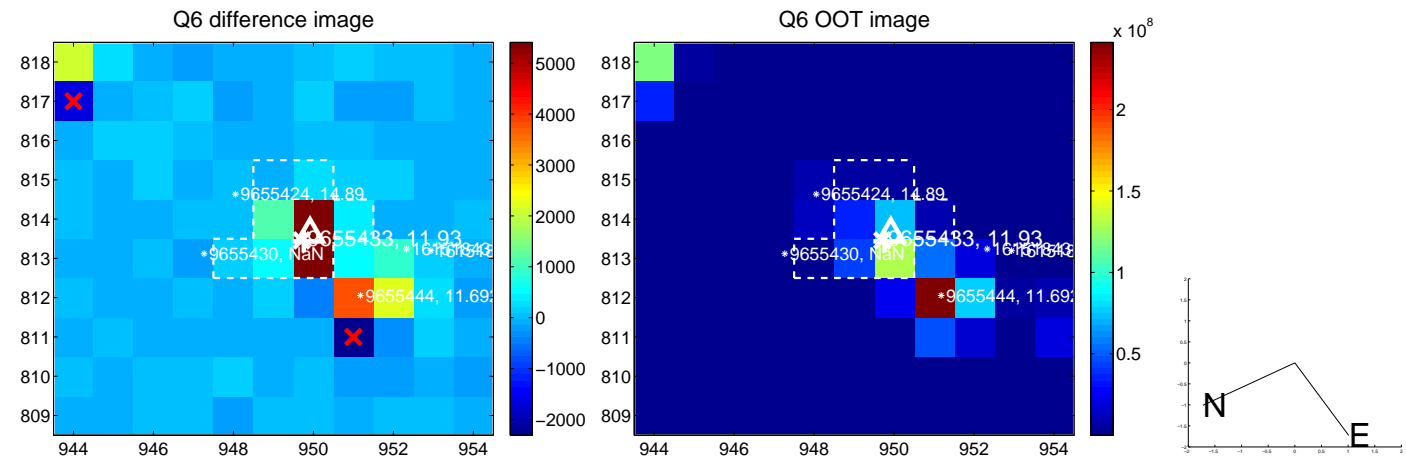
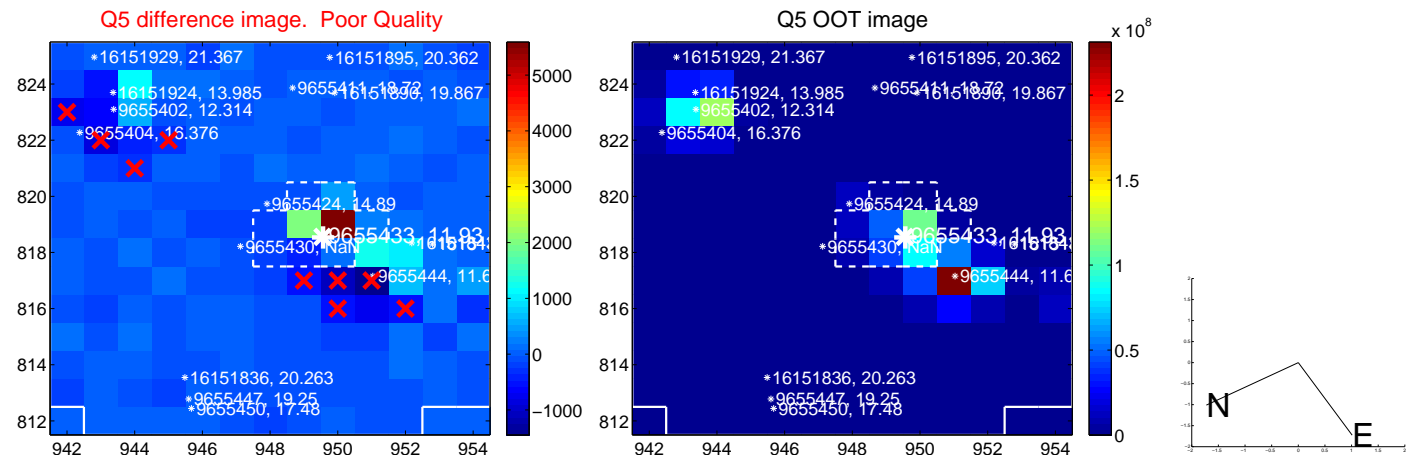


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

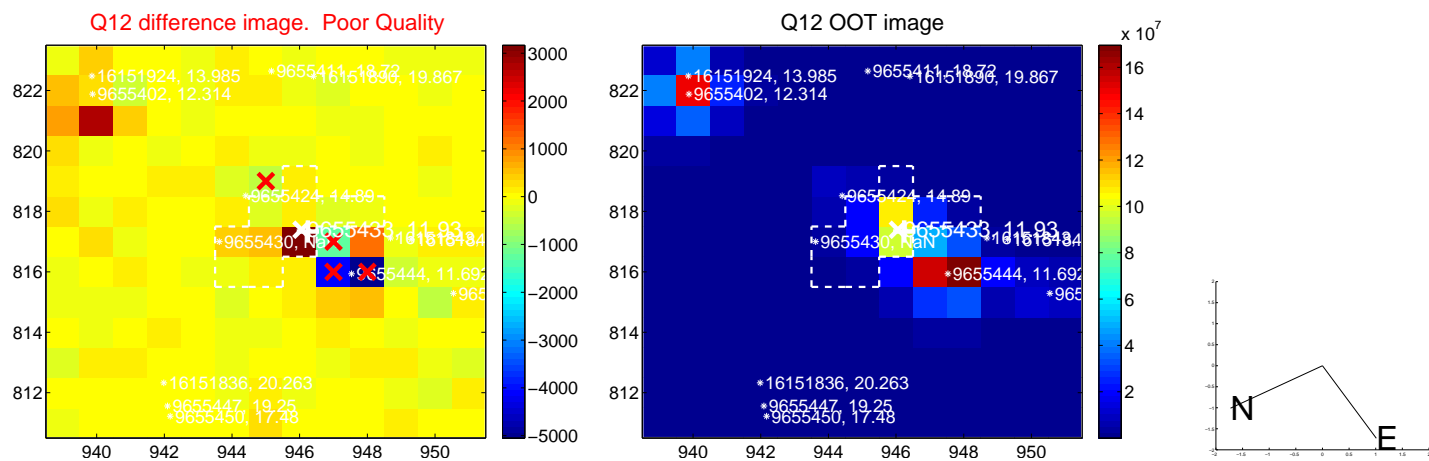
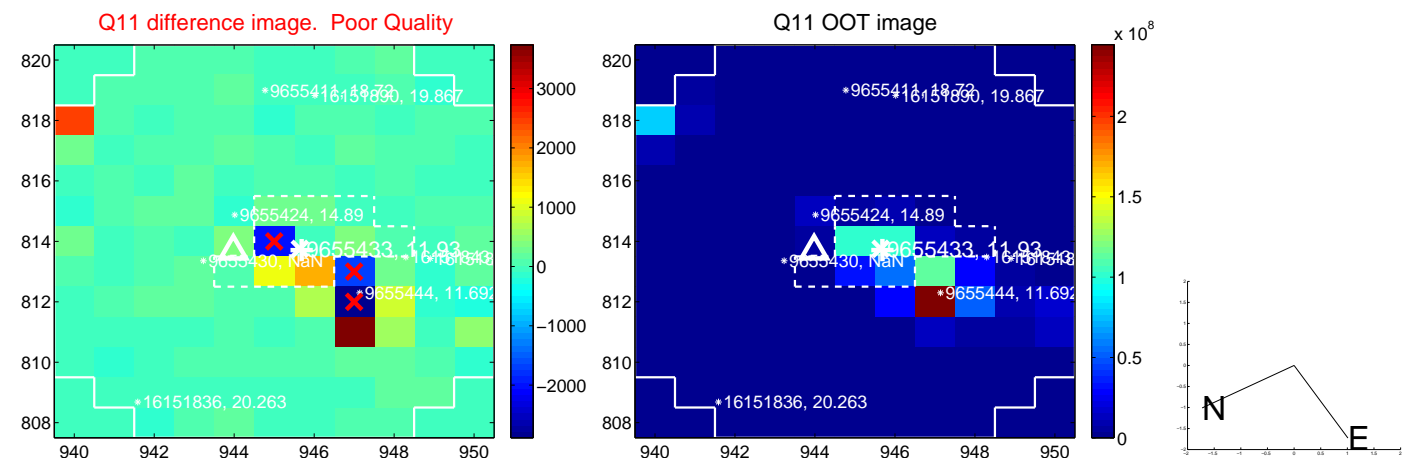
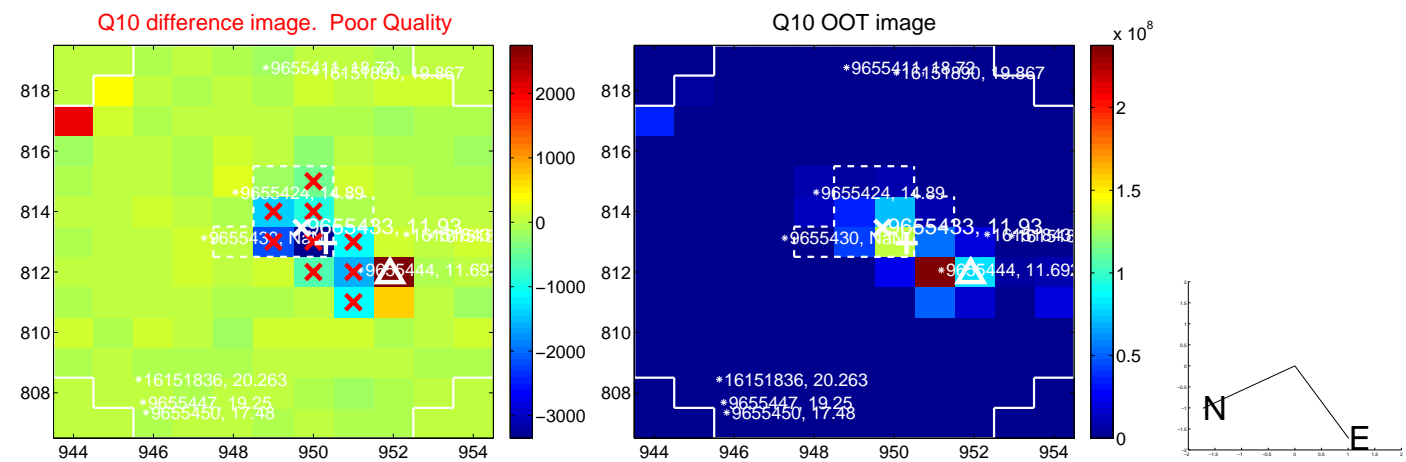
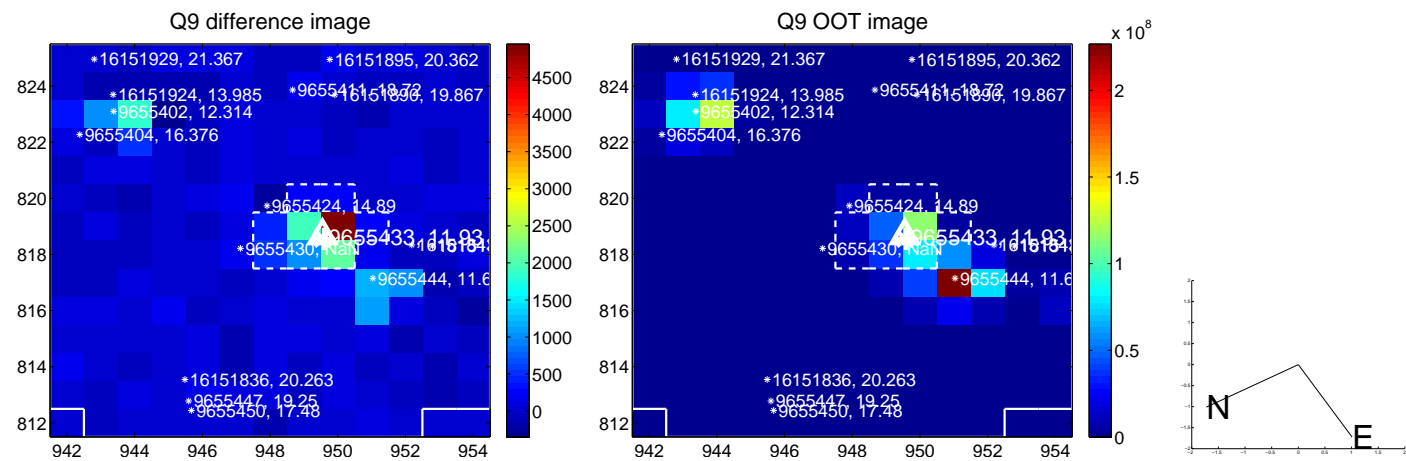


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

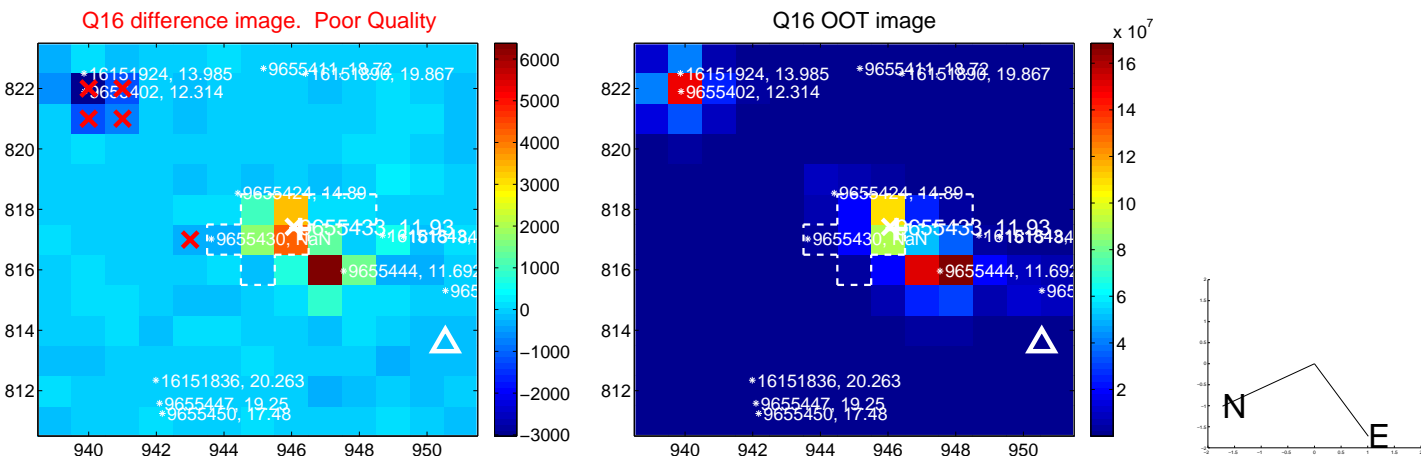
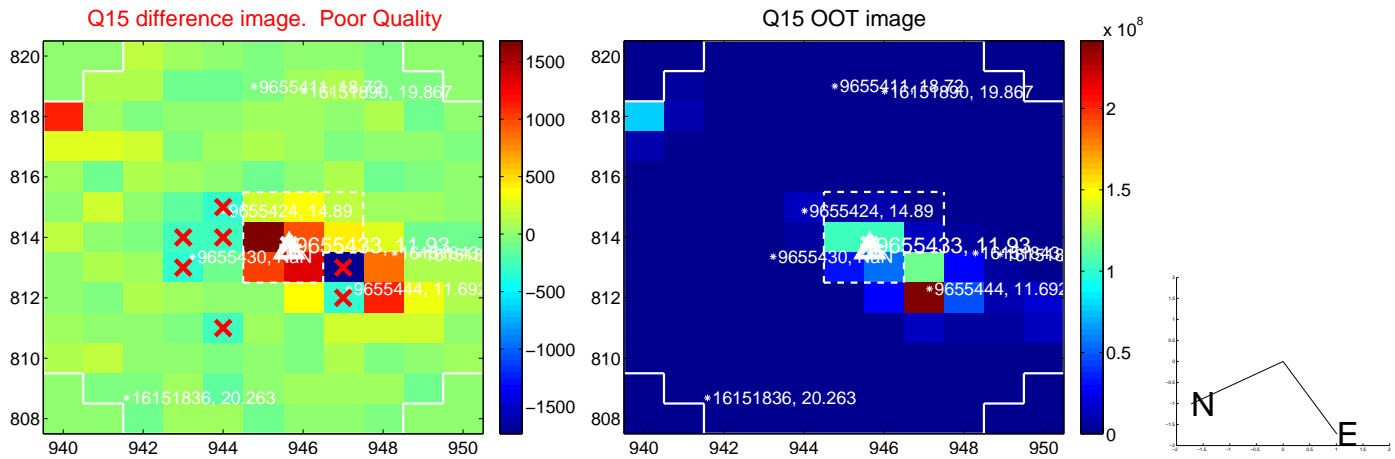
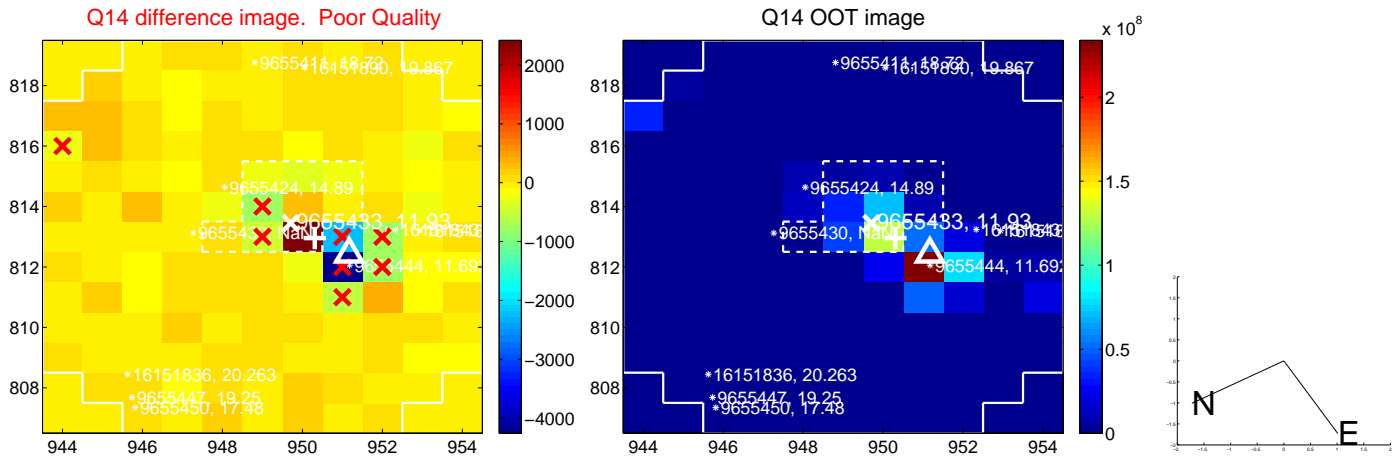
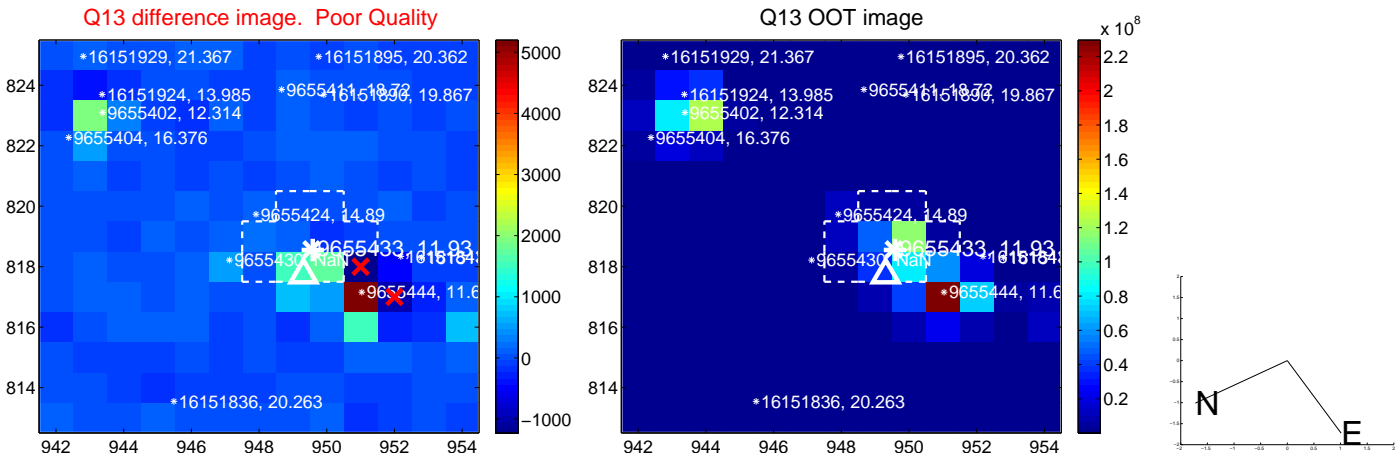




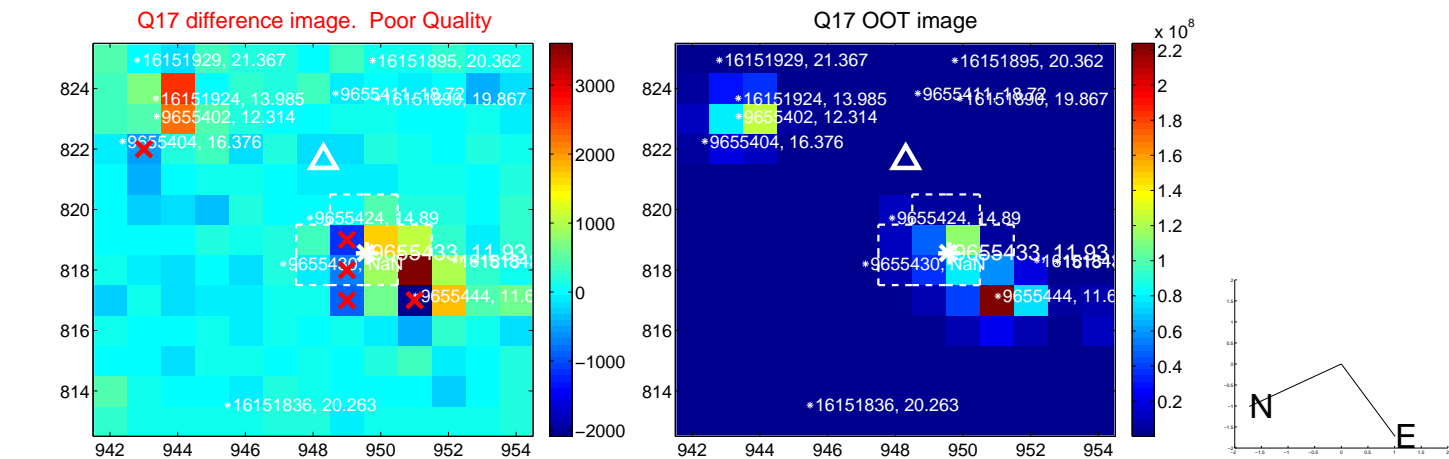
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



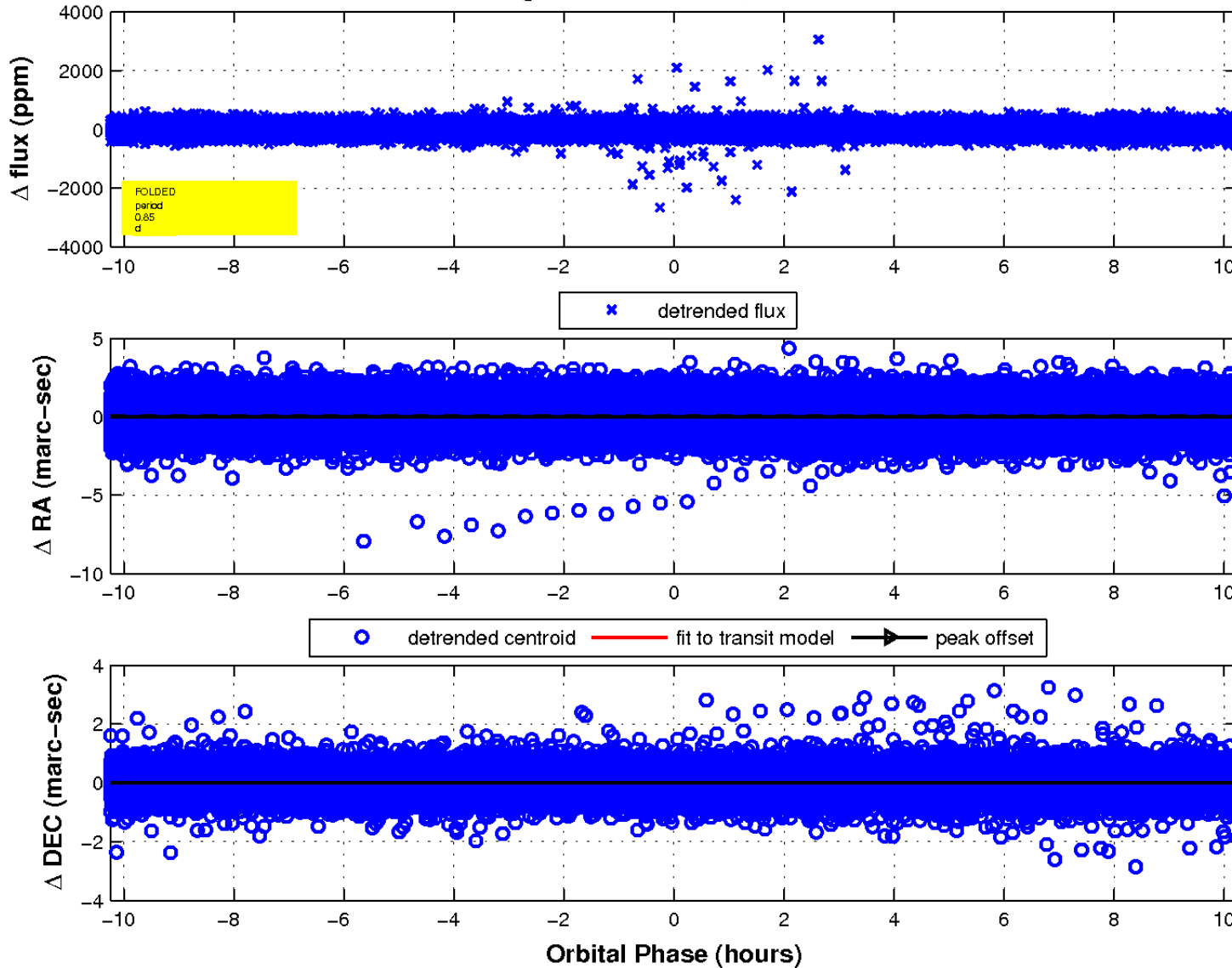
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



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

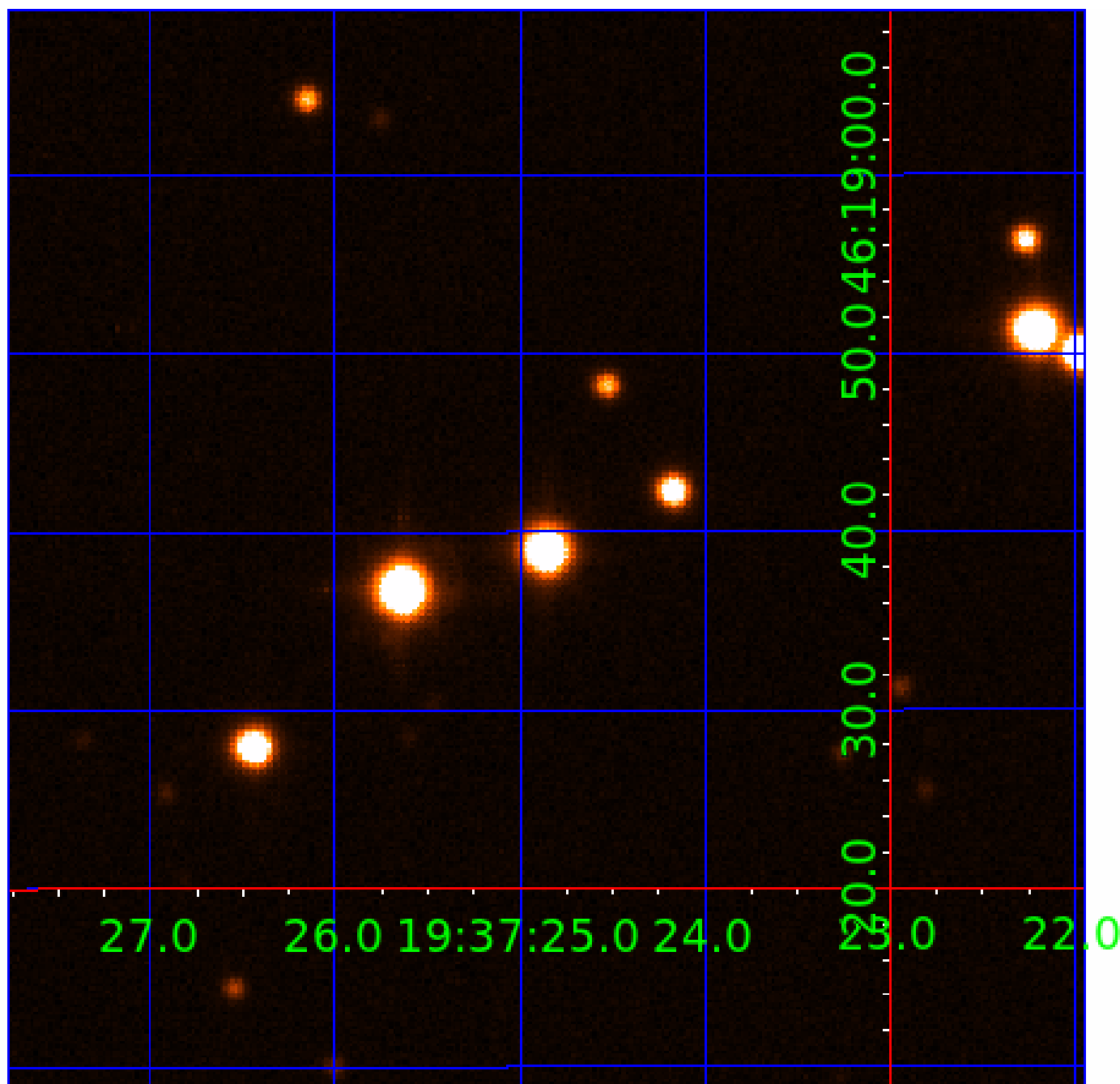


**fluxWeightedCentroids, Planet 1 of 2**



UKIRT Image

Declination





# KIC 009655433

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009655433-01	OBS	No	0.853579	132.307438	9.8	4.469	9.5	6.2	1.87	8468	0.63	37754.36
009655433-02	OBS	No	289.682349	302.595301	98.3	40.645	12.2	5.4	1.87	8468	2.01	15.95

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009655433-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_CROWDED
009655433-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_SKYE—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT— INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

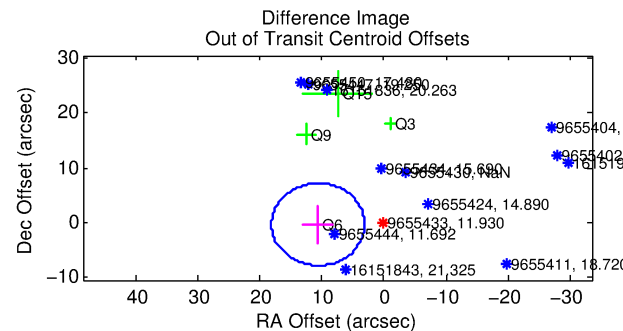
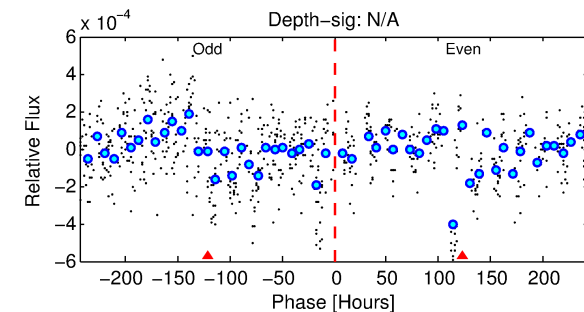
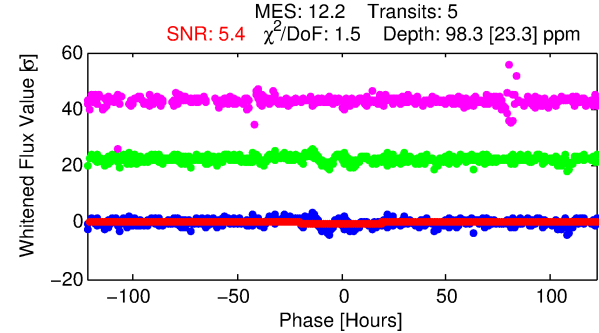
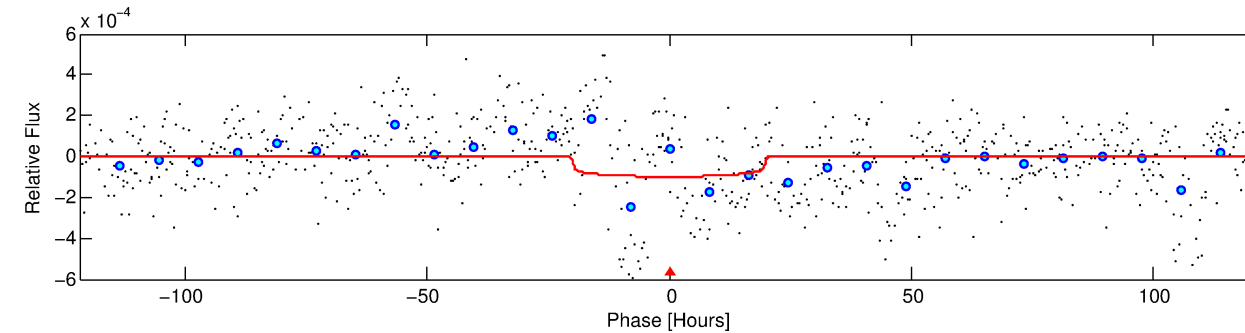
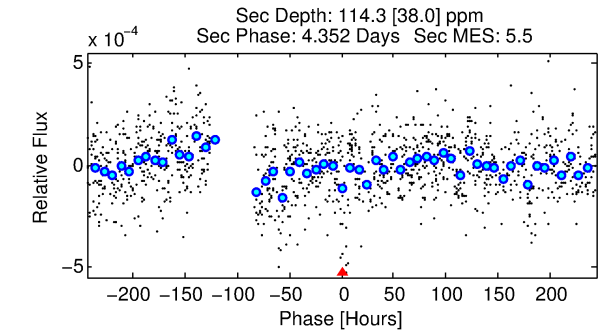
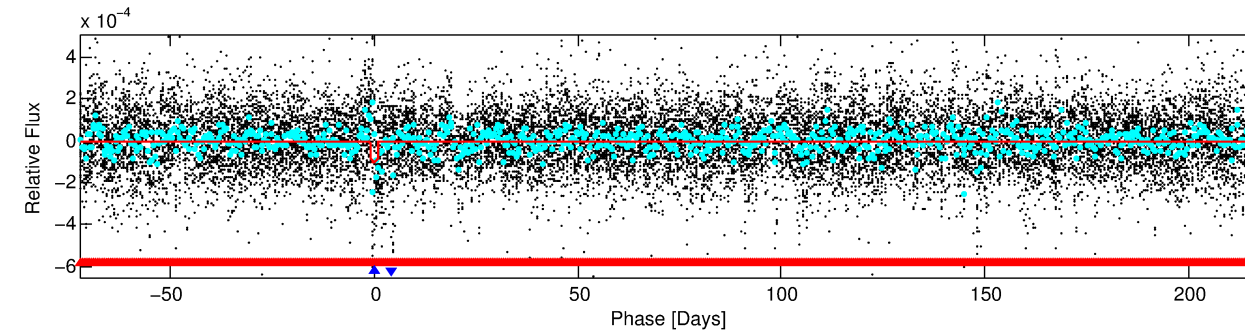
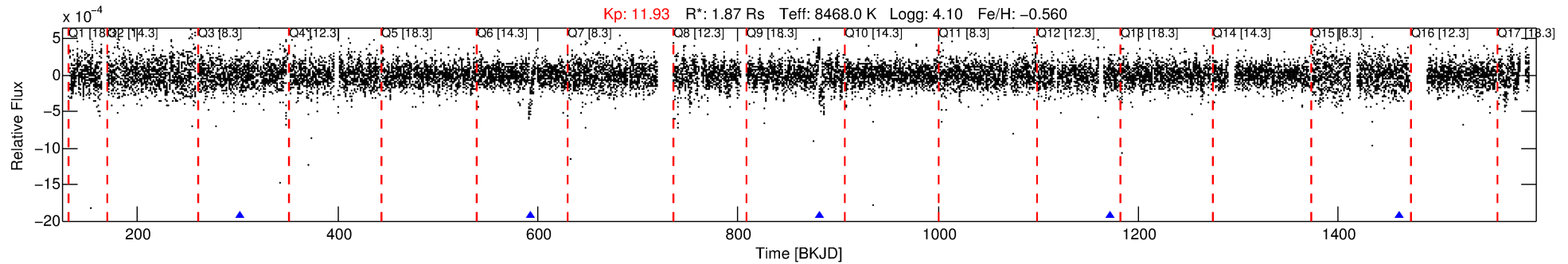
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009655433-02

No Significant Match Found

# DV One-Page Summary

KIC: 9655433 Candidate: 2 of 2 Period: 289.682 d



## DV Fit Results:

Period = 289.68235 [0.01966] d  
Epoch = 302.5953 [0.0395] BKJD  
Rp/R\* = 0.0099 [0.0021]  
a/R\* = 37.09 [38.99]  
b = 0.75 [0.63]  
Seff = 15.95 [6.20]  
Teq = 510 [49] K  
Rp = 2.01 [0.67] Re  
a = 1.0029 [0.2329] AU  
Ag = 15716.17 [10243.48] [1.53σ]  
Teffp = 8821 [1249] K [6.65σ]

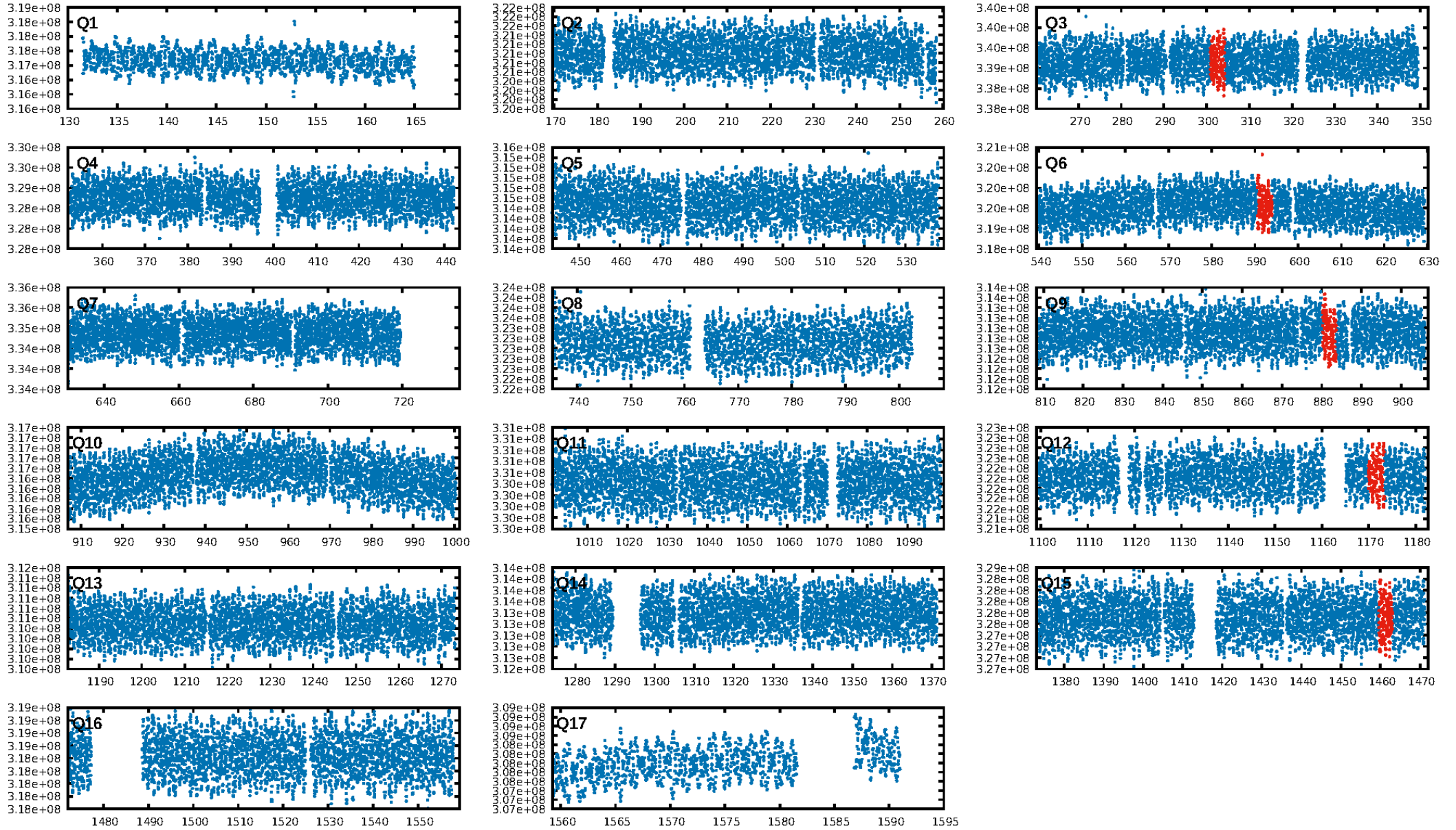
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [169.53σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 5.74e-13  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: -1.249  
Centroid-sig: 2.9%  
Centroid-so: 2.904 arcsec [1.55σ]  
OotOffset-rm: 10.627 arcsec [4.25σ]  
KicOffset-rm: 10.837 arcsec [4.16σ]  
OotOffset-st: 1/2/0/1 [4]  
KicOffset-st: 1/2/0/1 [4]  
DiffImageQuality-fgm: 0.00 [0/4]  
DiffImageOverlap-fno: 0.00 [0/4]

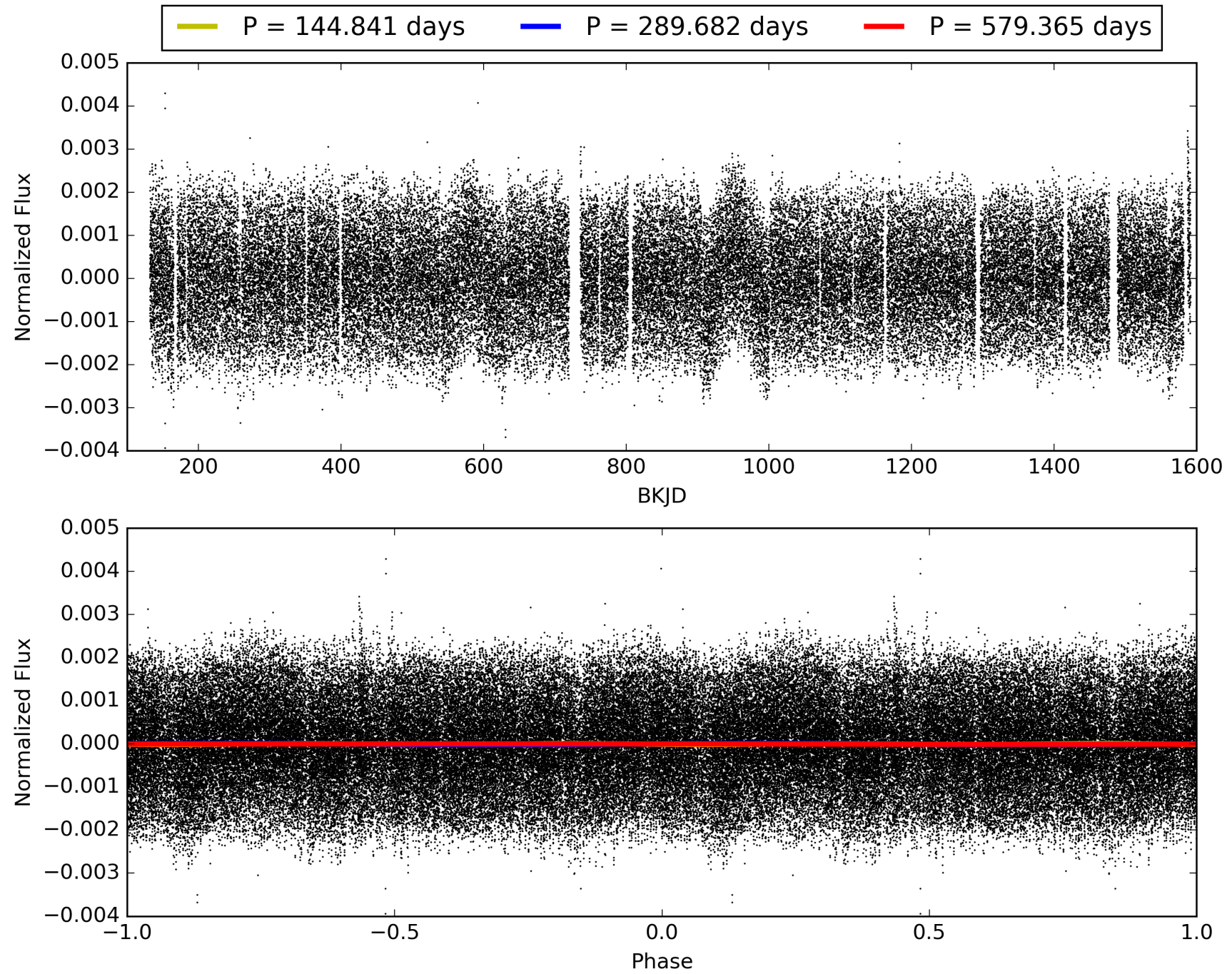
Software Revision: svn-ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 02:04:12 Z

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

# TCE 009655433-02, PDC Light Curves



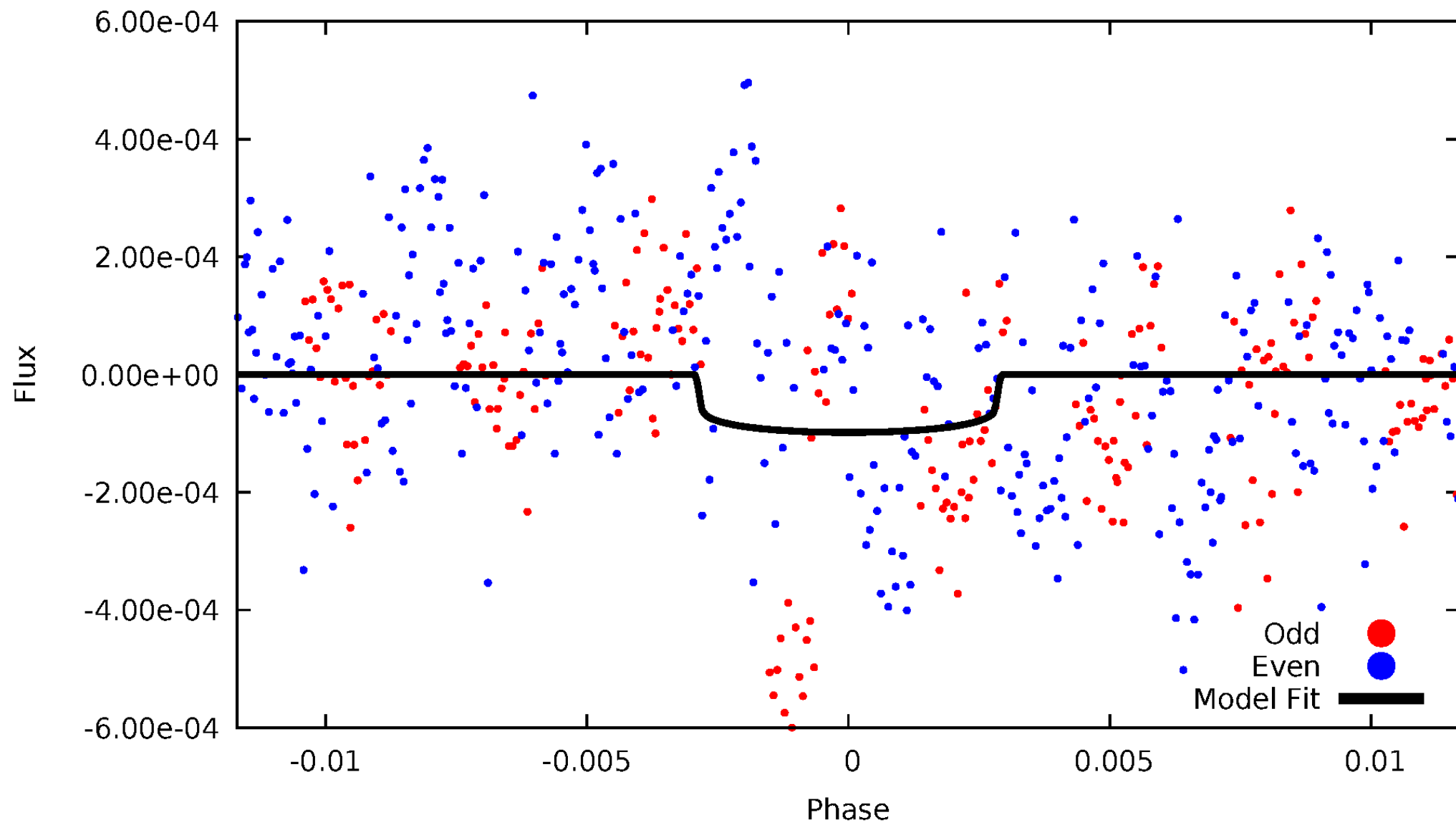
TCE 009655433-02





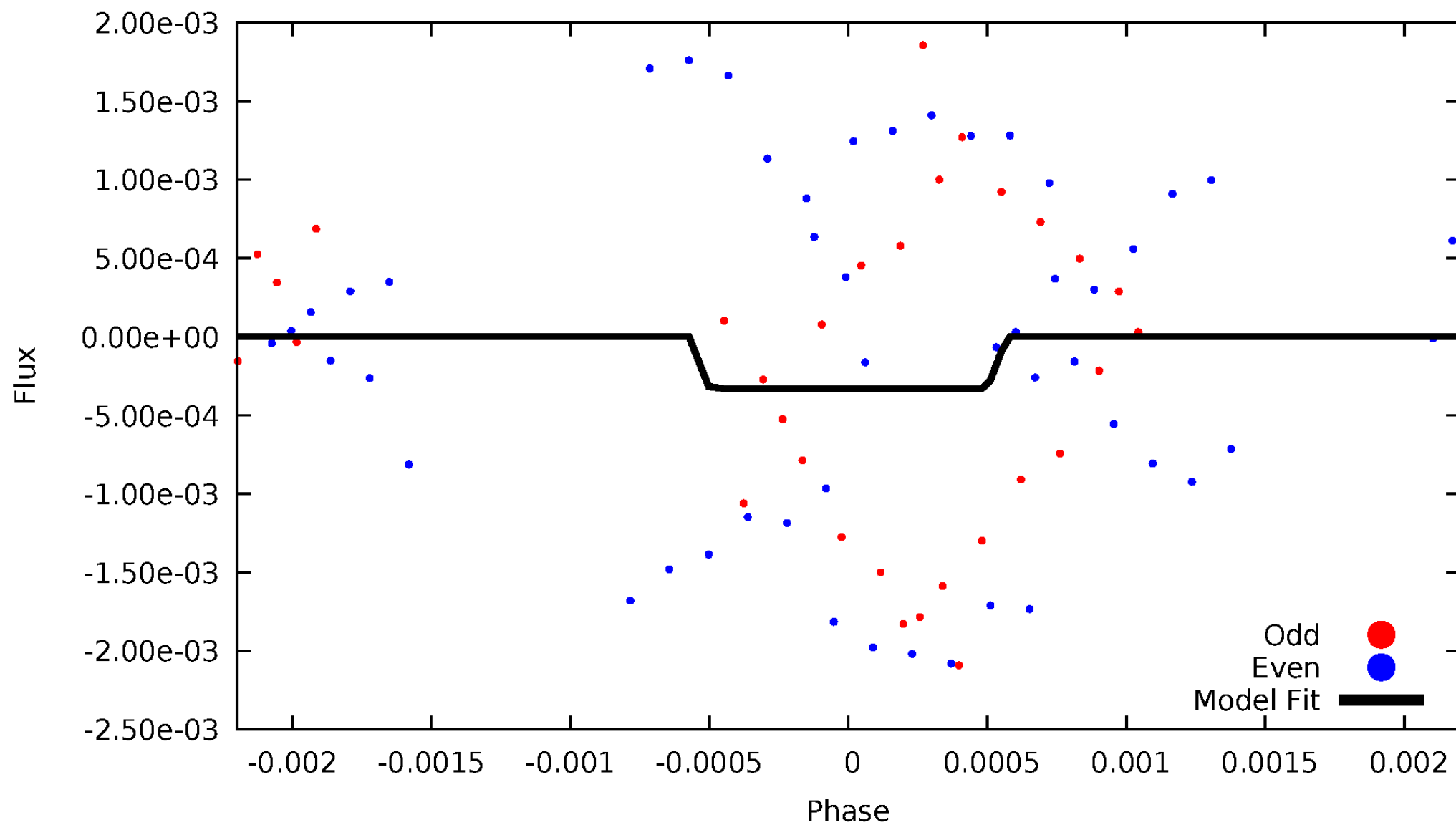
# DV Odd/Even

TCE 009655433-02



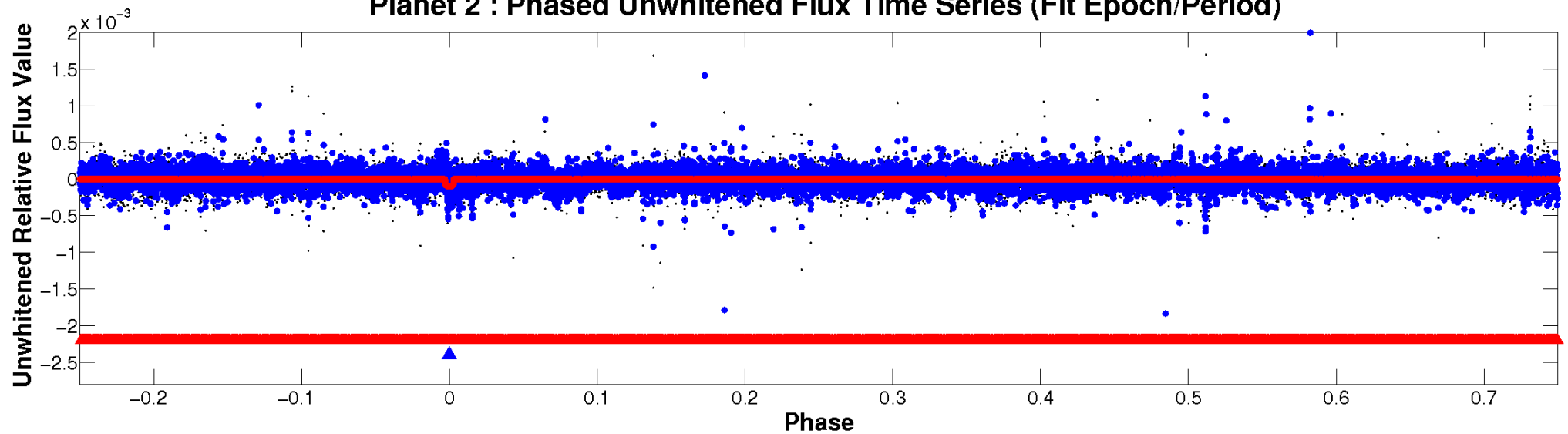
# ALT Odd/Even

TCE 009655433-02

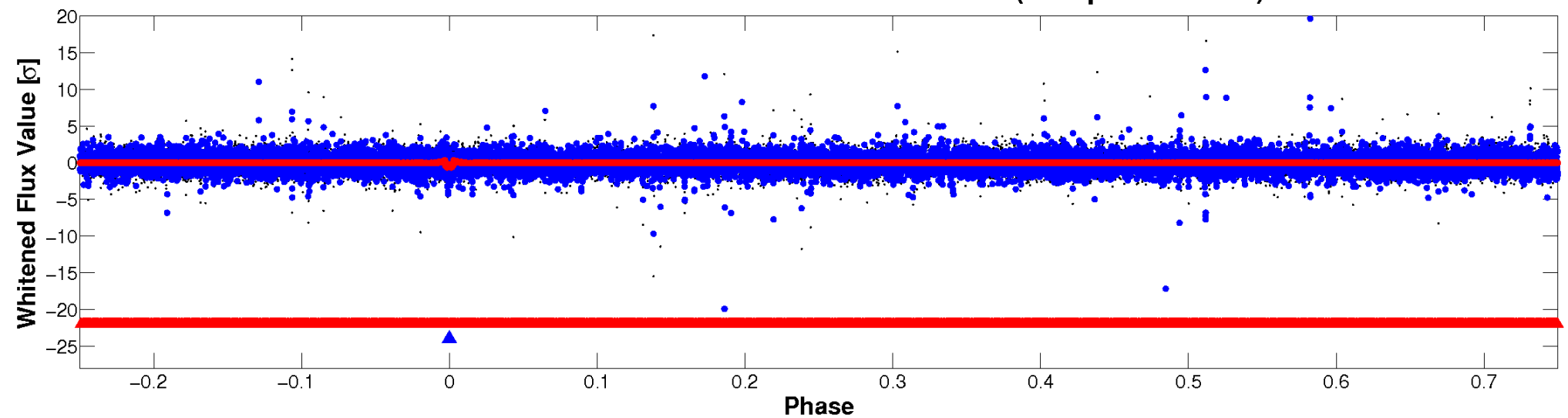


# Non-Whitened Vs. Whitened Light Curve

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

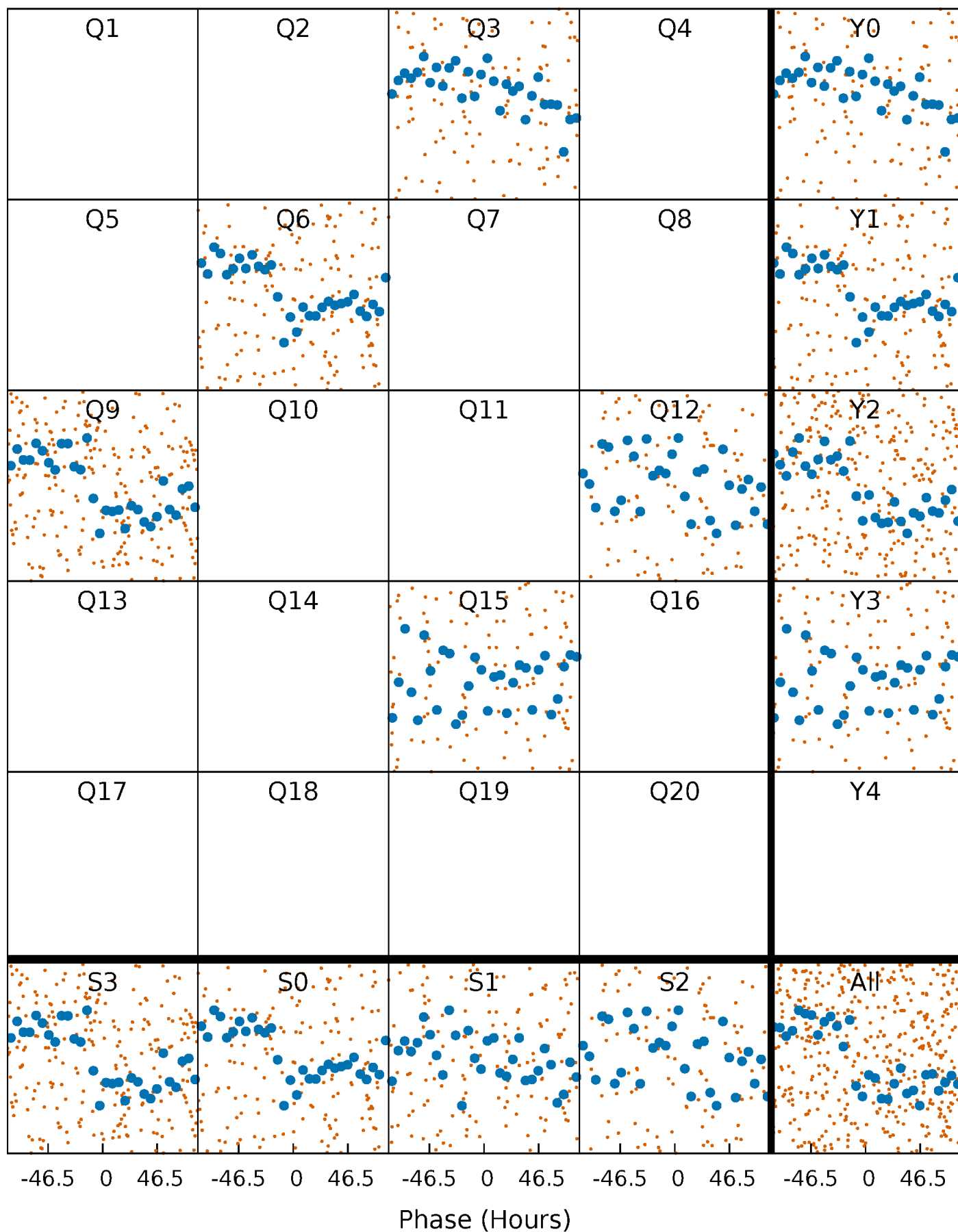


**Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



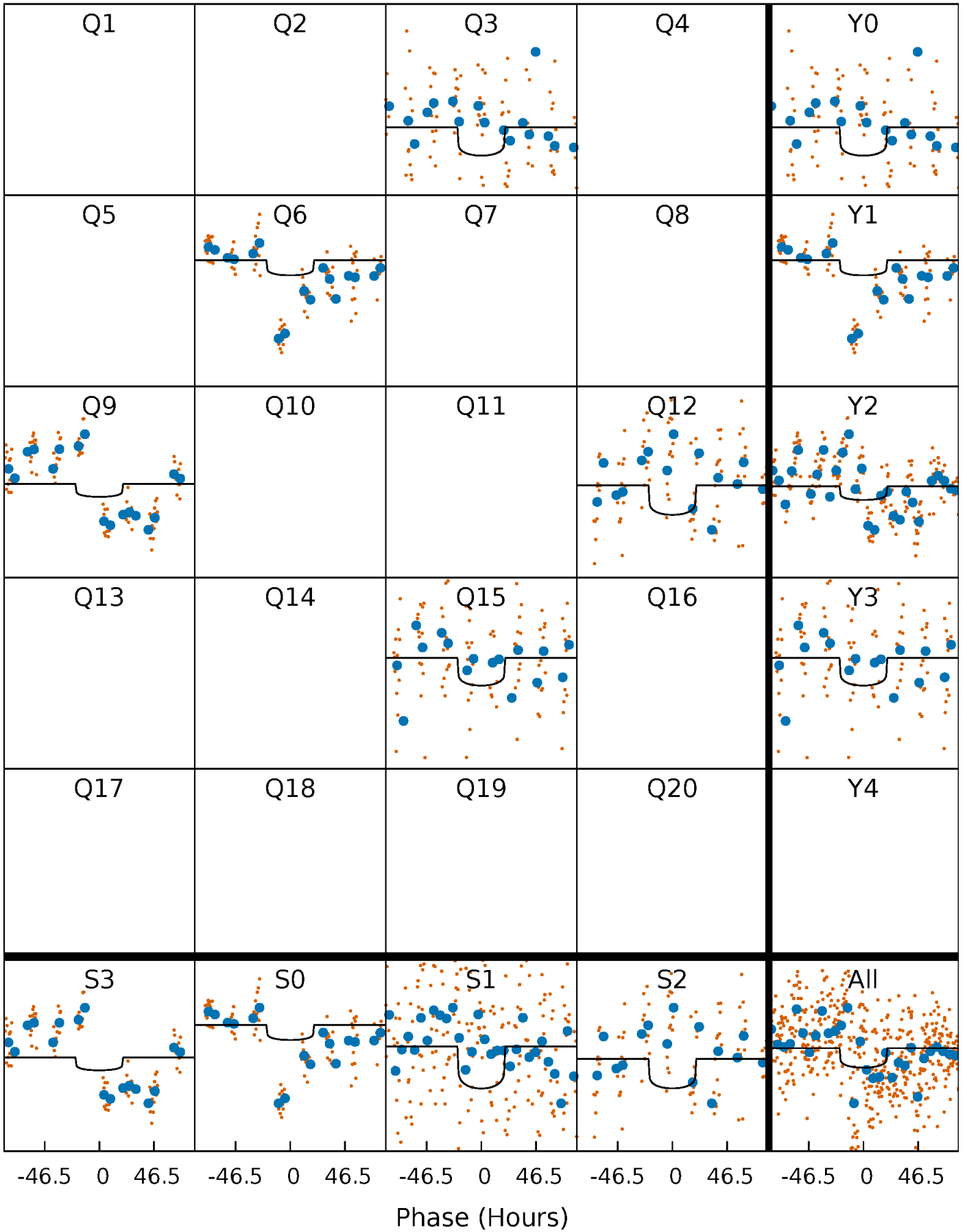
# PDC Quarter-Phased Transit Curves

TCE 009655433-02 P=289.682349 Days  $T_0=302.595301$  (BKJD)



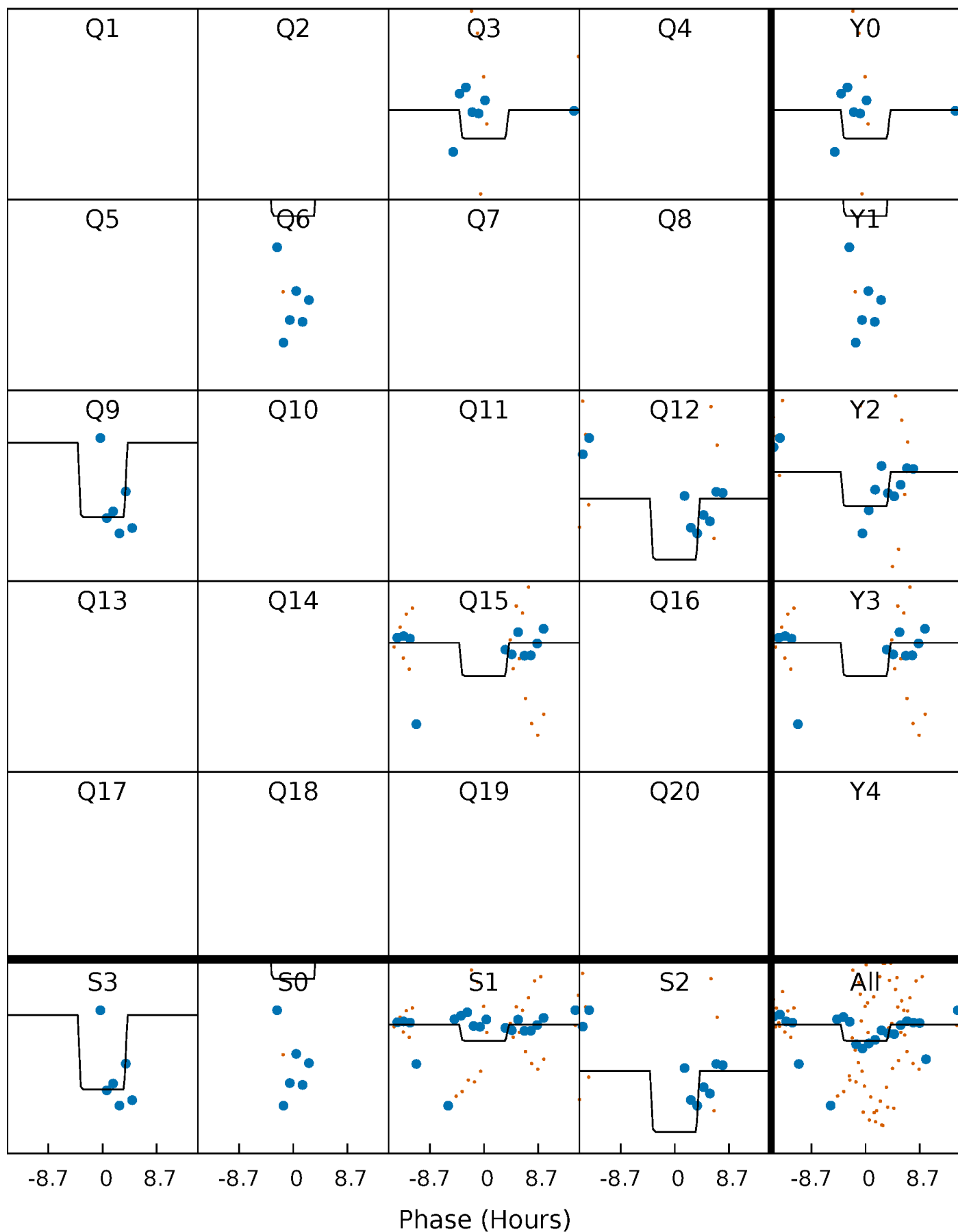
# DV Quarter-Phased Transit Curves

TCE 009655433-02     $P=289.682349$  Days     $T_0=302.595301$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 009655433-02 P=290.122496 Days  $T_0=301.849505$  (BKJD)

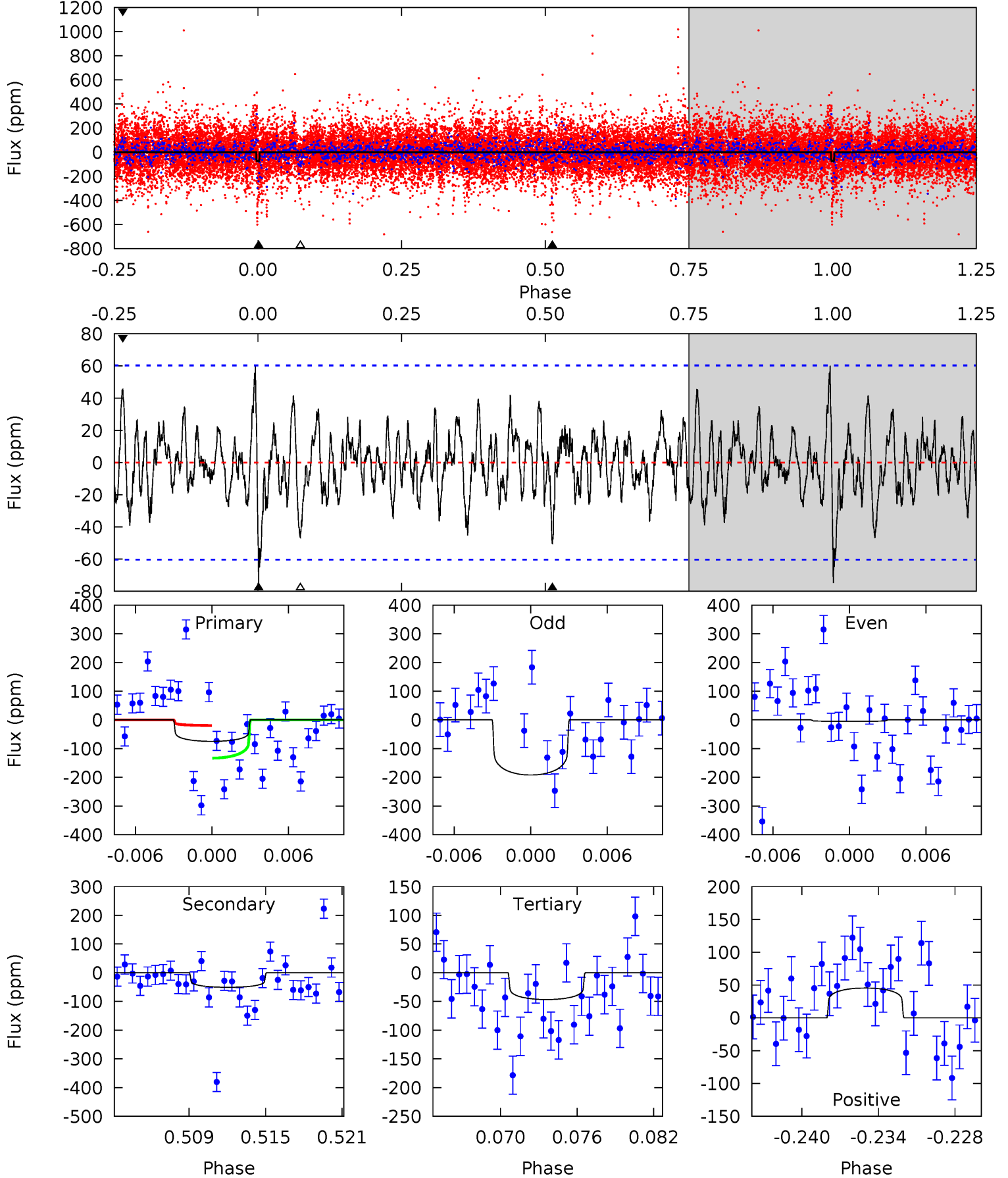




# DV Model-Shift Uniqueness Test

009655433-02, P = 289.682349 Days, E = 12.912952 Days

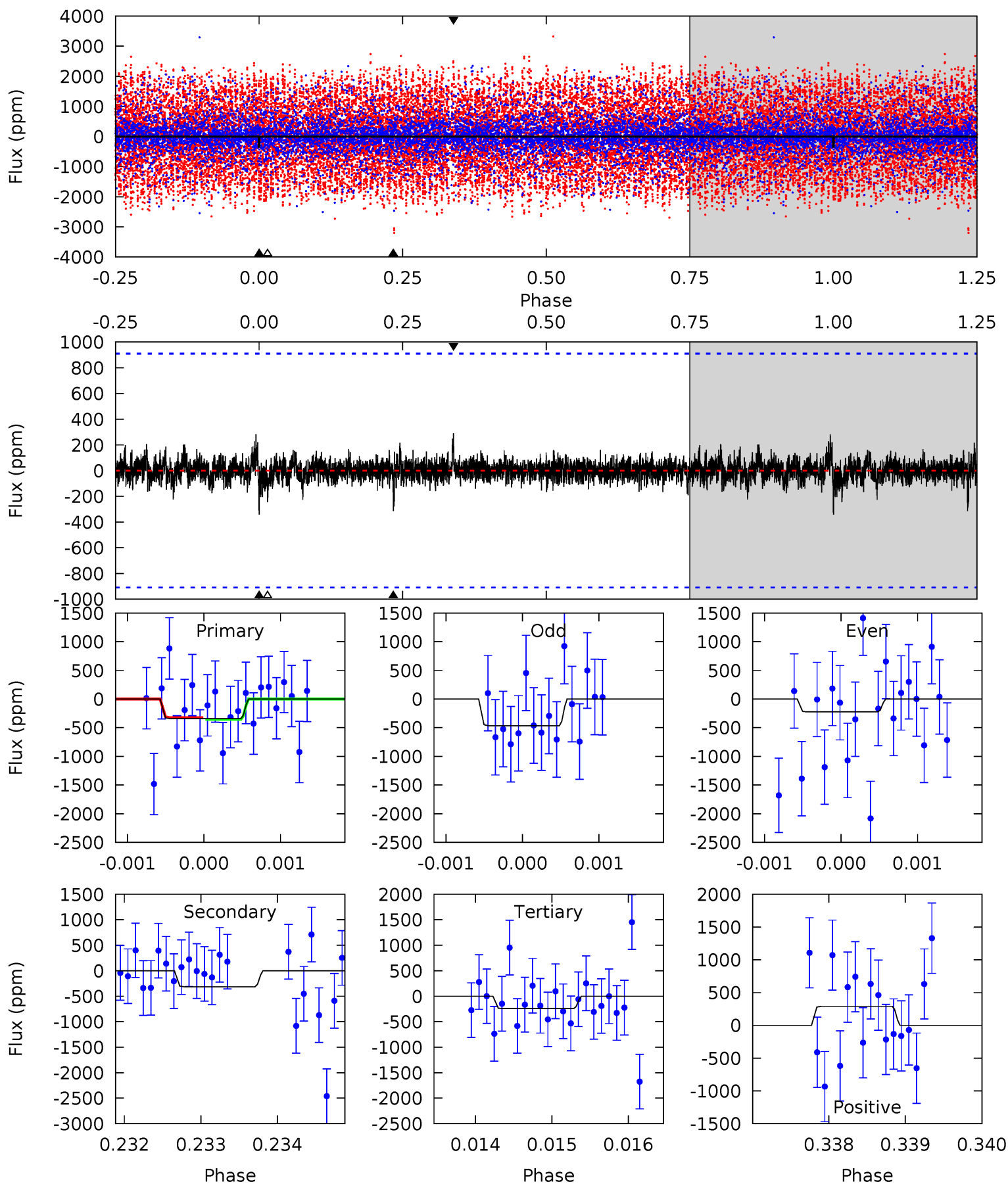
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.36	4.31	3.97	3.87	5.13	2.76	1.39	2.40	2.50	0.34	0.44	7.95	23.4	0.45	4.84



# Alt Model-Shift Uniqueness Test

009655433-02, P = 290.122496 Days, E = 11.727009 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2.05	1.88	1.46	1.74	5.45	3.29	0.32	0.58	0.31	0.42	0.14	0.73	1.01	0.46	0.09



### Stellar Parameters For KIC 009655433

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$8468^{+265}_{-324}$	$4.101^{+0.204}_{-0.136}$	$-0.560^{+0.200}_{-0.300}$	$1.866^{+0.392}_{-0.480}$	$1.602^{+0.171}_{-0.228}$	$0.348^{+0.391}_{-0.138}$
	+3%/-4%	+5%/-3%	+36%/-54%	+21%/-26%	+11%/-14%	+113%/-40%
Source	PHO54	PHO54	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 009655433-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-51 \pm 12$	$1.92^{+0.58}_{-0.47}$	$705^{+46}_{-54}$	$6948^{+1206}_{-815}$	$7418^{+5861}_{-3171}$
Alt.	$-314 \pm 167$	$3.60^{+0.65}_{-0.65}$	$710^{+45}_{-57}$	$8224^{+1615}_{-1702}$	$12625^{+9594}_{-7183}$

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

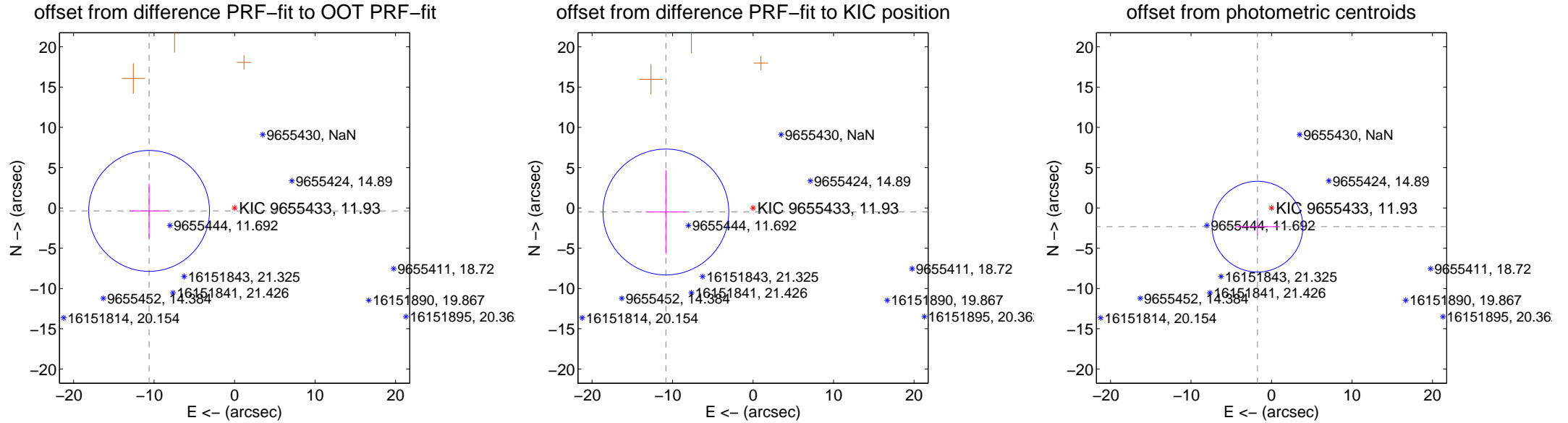
## DV Centroid Data

Supplemental centroid analysis for 009655433-02. **Kepler magnitude: 11.93.** Transit SNR 5.37

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

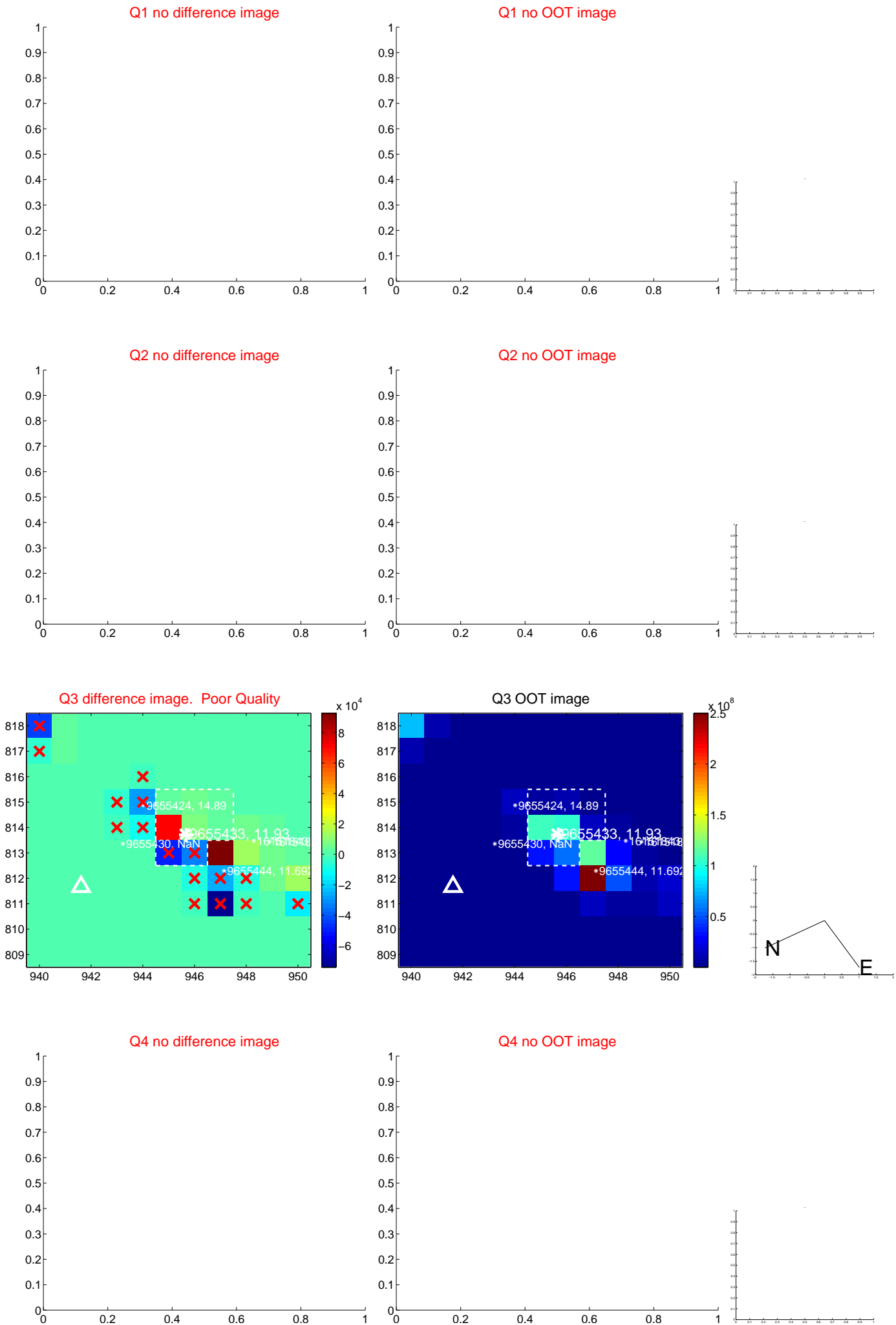
The direct PRF centroid is offset from the target star catalog position by about 0.21 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b>10.627 <math>\pm</math> 2.501</b>	<b>4.25</b>	10.620 $\pm$ 2.434	-0.365 $\pm$ 3.386
PRF-fit source offset from KIC position	<b>10.837 <math>\pm</math> 2.604</b>	<b>4.16</b>	10.826 $\pm$ 2.501	-0.502 $\pm$ 5.194
photometric centroid source offset	2.90 $\pm$ 1.88	1.55	1.74 $\pm$ 2.78	-2.32 $\pm$ 1.08

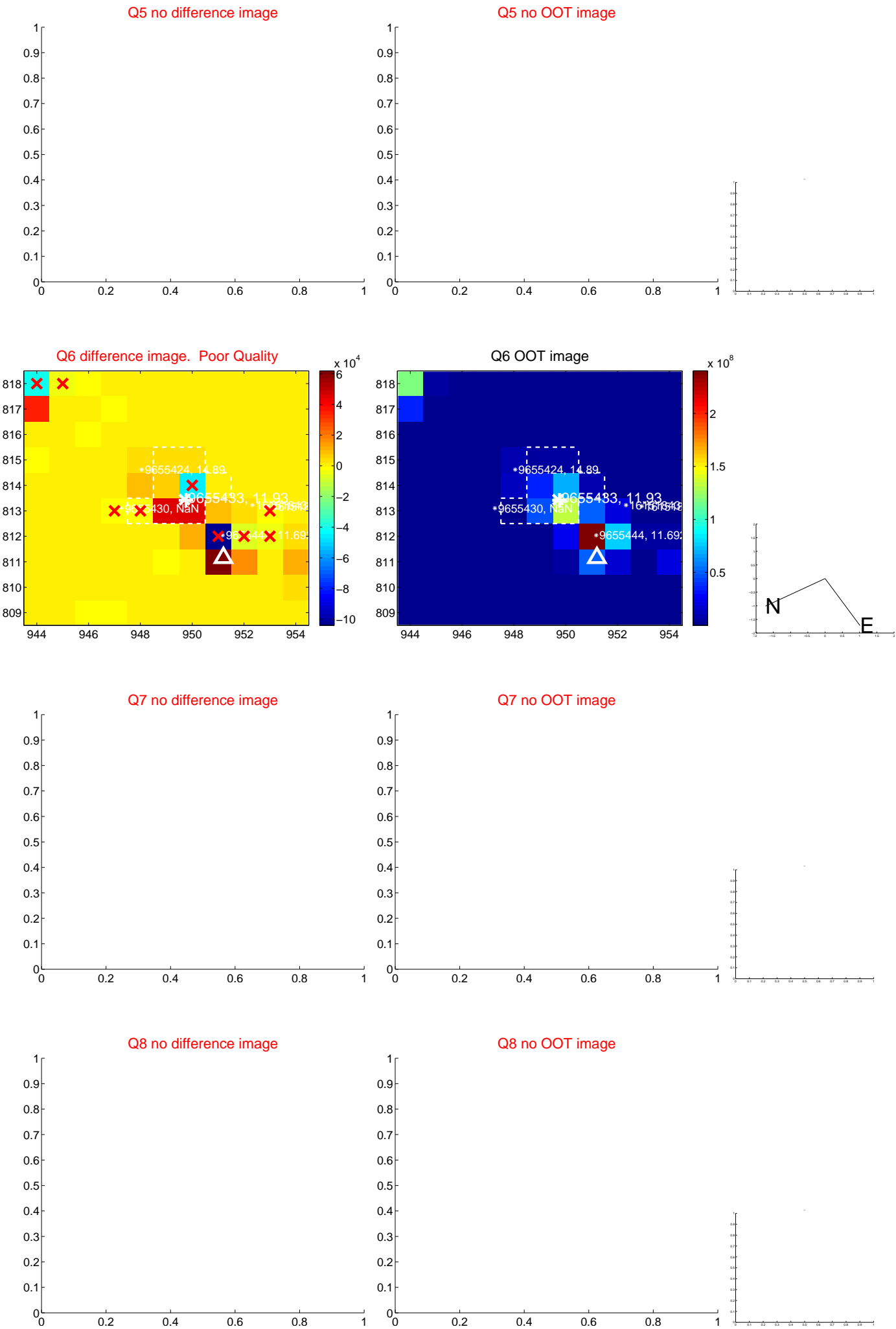


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

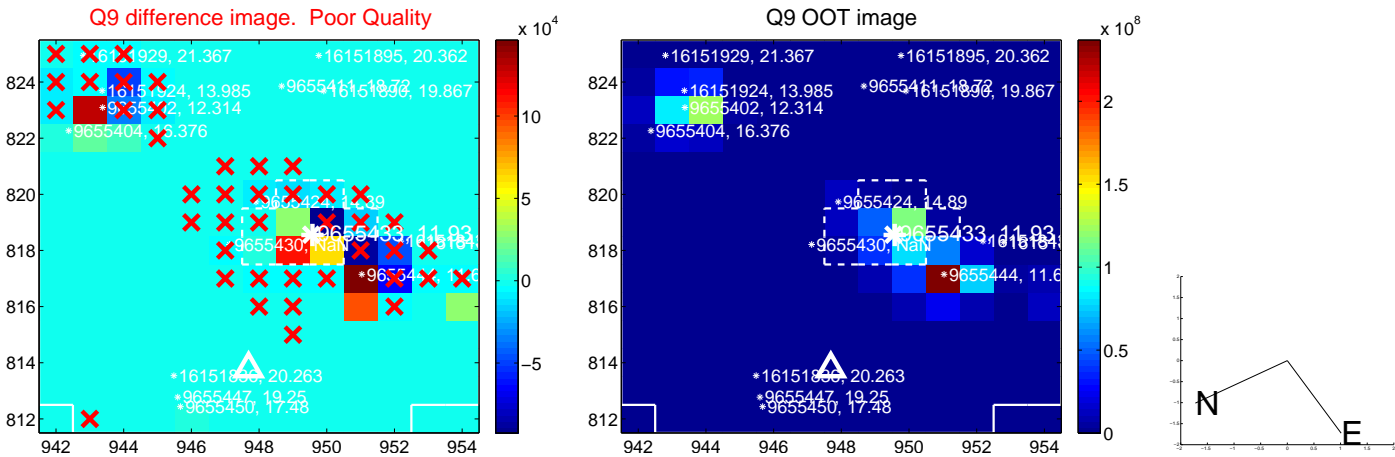


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

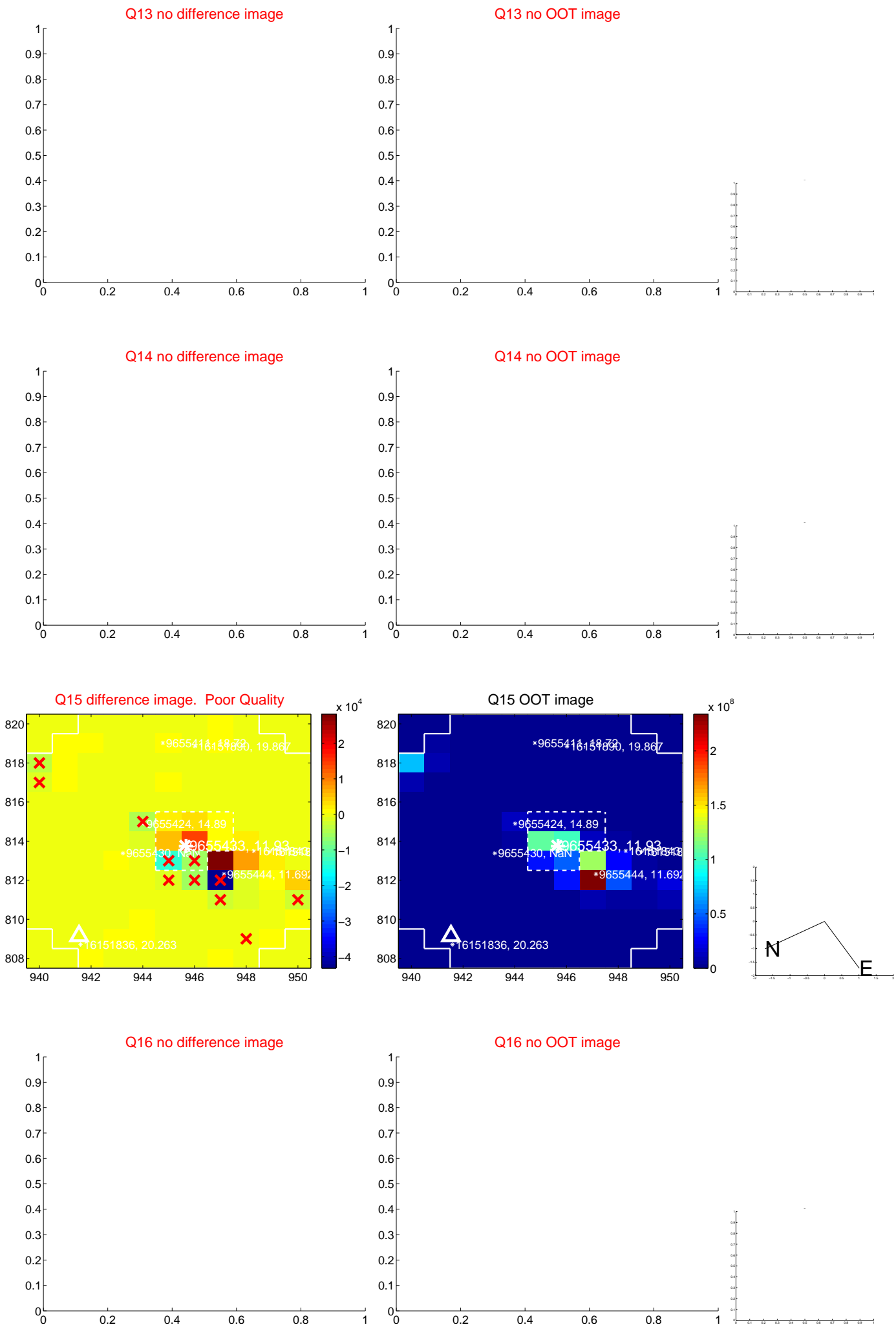




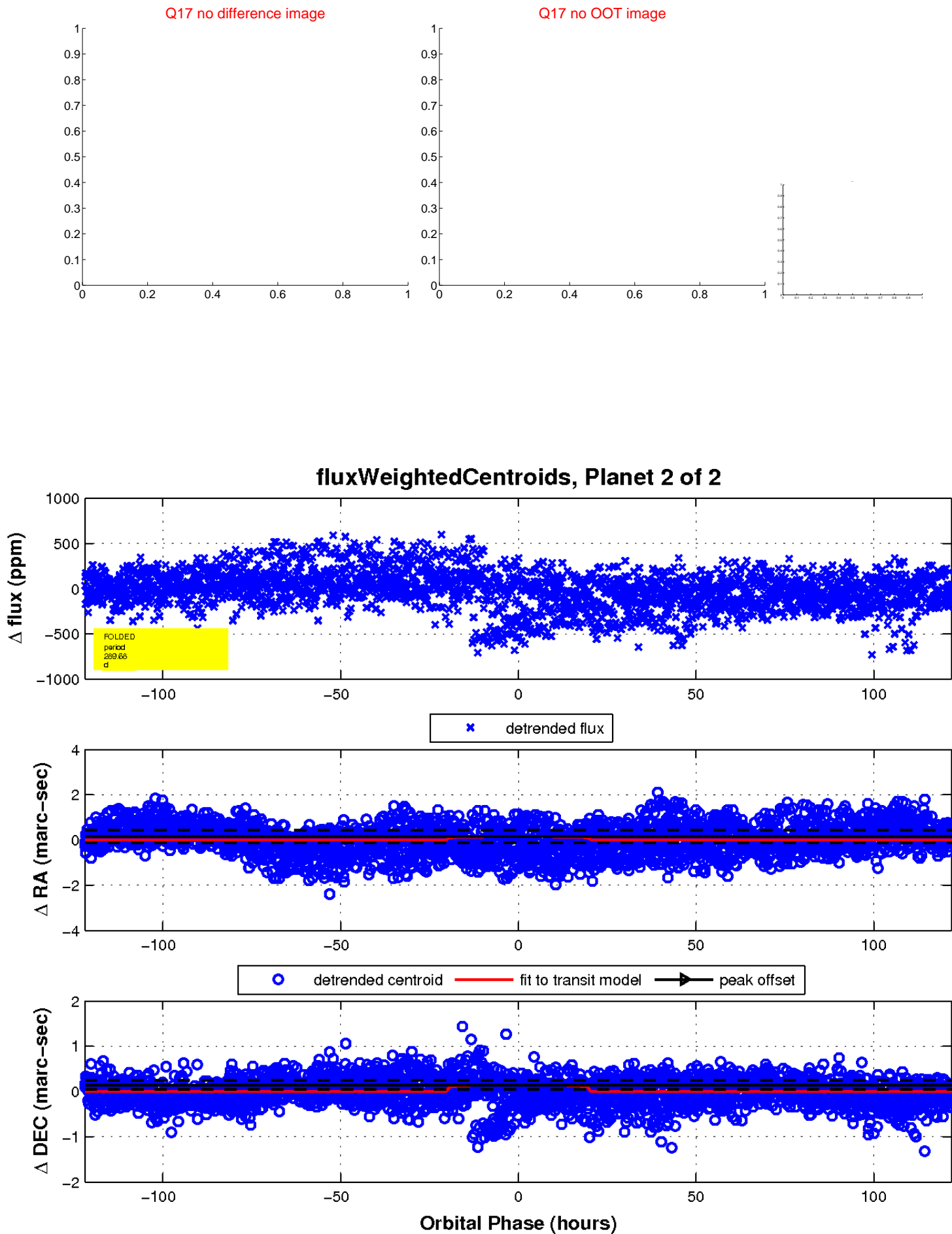
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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UKIRT Image

Declination

